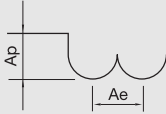
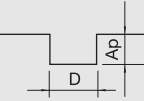
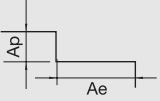


| 파삭재<br>Material     |                         | 프리하트강/고경도강<br>Prehardened Steels / Hardened Steels<br>NAK / SKD61                                                                                                                                                                                                           |               |                   |                    | 고경도강<br>Hardened Steels<br>STAVX / SKD61 |               |                   |                    | 고경도강<br>Hardened Steels<br>SKD11 / YXR7 / SKH51 |               |                   |                    |
|---------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------|--------------------|------------------------------------------|---------------|-------------------|--------------------|-------------------------------------------------|---------------|-------------------|--------------------|
| 경도 Hardness         |                         | 30 ~ 45HRC                                                                                                                                                                                                                                                                  |               |                   |                    | 45 ~ 55HRC                               |               |                   |                    | 55 ~ 68HRC                                      |               |                   |                    |
| 반경<br>Radius        | 유효장<br>Effective Length | RPM                                                                                                                                                                                                                                                                         | FEED          | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                      | FEED          | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                             | FEED          | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.1               | 0.2                     | 50,000                                                                                                                                                                                                                                                                      | 326           | 0.005             | 0.005              | 50,000                                   | 216           | 0.004             | 0.004              | 50,000                                          | 120           | 0.003             | 0.003              |
| "                   | 0.5                     | 50,000                                                                                                                                                                                                                                                                      | 308           | 0.004             | 0.004              | 50,000                                   | 198           | 0.003             | 0.003              | 50,000                                          | 110           | 0.002             | 0.003              |
| R 0.15              | 0.3                     | 50,000                                                                                                                                                                                                                                                                      | 800           | 0.006             | 0.010              | 50,000                                   | 520           | 0.004             | 0.005              | 50,000                                          | 410           | 0.003             | 0.005              |
| "                   | 0.5                     | 50,000                                                                                                                                                                                                                                                                      | 720           | 0.006             | 0.010              | 50,000                                   | 450           | 0.003             | 0.005              | 50,000                                          | 390           | 0.003             | 0.005              |
| "                   | 1                       | 50,000                                                                                                                                                                                                                                                                      | 650           | 0.006             | 0.010              | 50,000                                   | 410           | 0.003             | 0.005              | 50,000                                          | 350           | 0.003             | 0.004              |
| R 0.2               | 0.3                     | 50,000                                                                                                                                                                                                                                                                      | 1,120         | 0.010             | 0.010              | 50,000                                   | 750           | 0.005             | 0.006              | 50,000                                          | 650           | 0.005             | 0.005              |
| "                   | 1                       | 50,000                                                                                                                                                                                                                                                                      | 1,050         | 0.010             | 0.010              | 50,000                                   | 710           | 0.005             | 0.005              | 50,000                                          | 600           | 0.005             | 0.005              |
| "                   | 3                       | 50,000                                                                                                                                                                                                                                                                      | 540           | 0.005             | 0.005              | 50,000                                   | 360           | 0.003             | 0.003              | 50,000                                          | 310           | 0.002             | 0.003              |
| R 0.25              | 0.4                     | 50,000                                                                                                                                                                                                                                                                      | 1,420         | 0.010             | 0.020              | 50,000                                   | 1,210         | 0.050             | 0.010              | 50,000                                          | 1,030         | 0.005             | 0.001              |
| "                   | 1                       | 50,000                                                                                                                                                                                                                                                                      | 1,290         | 0.010             | 0.015              | 50,000                                   | 1,100         | 0.005             | 0.010              | 50,000                                          | 980           | 0.005             | 0.010              |
| "                   | 3                       | 50,000                                                                                                                                                                                                                                                                      | 1,090         | 0.010             | 0.015              | 50,000                                   | 850           | 0.005             | 0.010              | 50,000                                          | 730           | 0.005             | 0.010              |
| R 0.3               | 0.5                     | 50,000                                                                                                                                                                                                                                                                      | 2,300         | 0.020             | 0.020              | 50,000                                   | 1,890         | 0.015             | 0.015              | 50,000                                          | 1,520         | 0.010             | 0.010              |
| "                   | 1                       | 50,000                                                                                                                                                                                                                                                                      | 2,180         | 0.020             | 0.020              | 50,000                                   | 1,760         | 0.010             | 0.010              | 50,000                                          | 1,490         | 0.010             | 0.010              |
| "                   | 3                       | 40,000                                                                                                                                                                                                                                                                      | 1,300         | 0.015             | 0.020              | 40,000                                   | 1,060         | 0.010             | 0.010              | 40,000                                          | 870           | 0.010             | 0.010              |
| "                   | 5                       | 30,000                                                                                                                                                                                                                                                                      | 650           | 0.015             | 0.050              | 30,000                                   | 590           | 0.010             | 0.010              | 30,000                                          | 390           | 0.005             | 0.005              |
| R 0.4               | 0.6                     | 50,000                                                                                                                                                                                                                                                                      | 2,600         | 0.020             | 0.030              | 50,000                                   | 1,980         | 0.020             | 0.020              | 50,000                                          | 1,720         | 0.010             | 0.020              |
| "                   | 2                       | 40,000                                                                                                                                                                                                                                                                      | 2,100         | 0.015             | 0.020              | 40,000                                   | 1,450         | 0.015             | 0.015              | 40,000                                          | 1,210         | 0.010             | 0.010              |
| "                   | 4                       | 30,000                                                                                                                                                                                                                                                                      | 1,540         | 0.015             | 0.015              | 30,000                                   | 940           | 0.010             | 0.015              | 30,000                                          | 840           | 0.010             | 0.010              |
| "                   | 8                       | 24,000                                                                                                                                                                                                                                                                      | 970           | 0.010             | 0.010              | 24,000                                   | 650           | 0.005             | 0.010              | 24,000                                          | 470           | 0.005             | 0.005              |
| R 0.5               | 1.5                     | 40,000                                                                                                                                                                                                                                                                      | 2,560         | 0.030             | 0.040              | 40,000                                   | 1,980         | 0.020             | 0.030              | 40,000                                          | 1,590         | 0.020             | 0.020              |
| "                   | 3                       | 30,000                                                                                                                                                                                                                                                                      | 2,100         | 0.030             | 0.030              | 30,000                                   | 1,650         | 0.020             | 0.030              | 30,000                                          | 1,240         | 0.020             | 0.020              |
| "                   | 5                       | 30,000                                                                                                                                                                                                                                                                      | 1,700         | 0.030             | 0.030              | 30,000                                   | 1,360         | 0.015             | 0.020              | 30,000                                          | 1,080         | 0.010             | 0.015              |
| "                   | 10                      | 25,000                                                                                                                                                                                                                                                                      | 780           | 0.015             | 0.015              | 25,000                                   | 620           | 0.010             | 0.015              | 16,000                                          | 500           | 0.010             | 0.010              |
| R 0.75              | 2                       | 40,000                                                                                                                                                                                                                                                                      | 2,300         | 0.040             | 0.040              | 40,000                                   | 1,920         | 0.030             | 0.030              | 40,000                                          | 1,530         | 0.020             | 0.030              |
| "                   | 4                       | 30,000                                                                                                                                                                                                                                                                      | 2,010         | 0.030             | 0.030              | 30,000                                   | 1,600         | 0.025             | 0.025              | 30,000                                          | 1,280         | 0.020             | 0.020              |
| "                   | 8                       | 30,000                                                                                                                                                                                                                                                                      | 1,700         | 0.030             | 0.030              | 30,000                                   | 1,360         | 0.020             | 0.030              | 30,000                                          | 1,080         | 0.010             | 0.010              |
| R 1                 | 2                       | 40,000                                                                                                                                                                                                                                                                      | 3,310         | 0.050             | 0.050              | 40,000                                   | 2,640         | 0.040             | 0.040              | 40,000                                          | 2,110         | 0.030             | 0.040              |
| "                   | 6                       | 40,000                                                                                                                                                                                                                                                                      | 3,020         | 0.030             | 0.040              | 40,000                                   | 2,410         | 0.030             | 0.030              | 40,000                                          | 1,930         | 0.020             | 0.030              |
| "                   | 10                      | 24,000                                                                                                                                                                                                                                                                      | 1,210         | 0.020             | 0.030              | 24,000                                   | 970           | 0.010             | 0.030              | 24,000                                          | 770           | 0.010             | 0.020              |
| "                   | 14                      | 16,000                                                                                                                                                                                                                                                                      | 920           | 0.010             | 0.020              | 16,000                                   | 780           | 0.010             | 0.010              | 16,000                                          | 630           | 0.010             | 0.010              |
| R 1.5               | 3                       | 40,000                                                                                                                                                                                                                                                                      | 2,500         | 0.030             | 0.040              | 40,000                                   | 2,000         | 0.030             | 0.030              | 40,000                                          | 1,600         | 0.020             | 0.030              |
| "                   | 6                       | 32,000                                                                                                                                                                                                                                                                      | 2,100         | 0.030             | 0.030              | 32,000                                   | 1,680         | 0.020             | 0.030              | 32,000                                          | 1,340         | 0.020             | 0.030              |
| "                   | 10                      | 21,000                                                                                                                                                                                                                                                                      | 1,700         | 0.020             | 0.030              | 21,000                                   | 1,360         | 0.020             | 0.020              | 21,000                                          | 1,080         | 0.010             | 0.020              |
| "                   | 16                      | 16,000                                                                                                                                                                                                                                                                      | 1,100         | 0.020             | 0.030              | 16,000                                   | 880           | 0.010             | 0.020              | 16,000                                          | 700           | 0.010             | 0.010              |
| R 2                 | 4                       | 40,000                                                                                                                                                                                                                                                                      | 2,100         | 0.030             | 0.040              | 40,000                                   | 1,680         | 0.030             | 0.030              | 40,000                                          | 1,340         | 0.020             | 0.030              |
| "                   | 10                      | 21,000                                                                                                                                                                                                                                                                      | 1,620         | 0.020             | 0.030              | 21,000                                   | 1,290         | 0.020             | 0.020              | 21,000                                          | 1,030         | 0.010             | 0.020              |
| "                   | 16                      | 16,000                                                                                                                                                                                                                                                                      | 1,060         | 0.010             | 0.020              | 16,000                                   | 840           | 0.010             | 0.020              | 16,000                                          | 670           | 0.010             | 0.010              |
| R 3                 |                         | 16,000~<br>50,000                                                                                                                                                                                                                                                           | 960~<br>8,000 | 0.050             | 0.060              | 13,000~<br>50,000                        | 780~<br>6,000 | 0.050             | 0.060              | 11,000~<br>50,000                               | 540~<br>4,000 | 0.050             | 0.060              |
| 절입량<br>Depth of Cut |                         |  <p>Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/> Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/> D : Outside Diameter 외경 (mm)<br/> n : Speed 회전속도 (min<sup>-1</sup>)<br/> Vf : Feed 이송속도 (mm/min)</p> |               |                   |                    |                                          |               |                   |                    |                                                 |               |                   |                    |

- HRC68 이상 고경도강 가공시 68HRC 조건의 같은 직경 파이에 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 이 절삭 조건표는 절삭조건의 참고 수치 입니다. 실제 가공시에는 가공 형상 , 가공 목적, 적용 기계 등에 따라 조건을 조정 하십시오.
- 절삭조건이 없는 유효장은 비슷한 유효장에 비례하여 사용 하십시오.
- 길이가 긴 엔드밀의 경우 떨림, 이상음이 발생할 경우에는 상기표의 회전속도와 이송속도를 같은 비율로 내려서 사용해 주십시오.
- In case machining Hardened steel HRC upper 68, reduce 20% of cutting parameter on the table.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If there is no effective length of your endmill on the table, use a similar type of effective length and apply the same proportion.
- In case of long length endmill shaking or abnormal sound, lower the rotation speed and feed speed of the table above by the same ratio.

| 피삭재<br>Material           |                            | 프리하튼강/고경도강<br>Prehardened Steels / Hardened Steels<br>NAK / SKD61                                                                                                                                                                                                                                                                                                            |               |                   |                    | 고경도강<br>Hardened Steels<br>STAVX / SKD61 |               |                   |                    | 고경도강<br>Hardened Steels<br>SKD11 / YXR7 / SKH51 |               |                   |                    |
|---------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------|--------------------|------------------------------------------|---------------|-------------------|--------------------|-------------------------------------------------|---------------|-------------------|--------------------|
| 경도 Hardness               |                            | 30 ~ 45HRC                                                                                                                                                                                                                                                                                                                                                                   |               |                   |                    | 45 ~ 55HRC                               |               |                   |                    | 55 ~ 68HRC                                      |               |                   |                    |
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM                                                                                                                                                                                                                                                                                                                                                                          | FEED          | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                      | FEED          | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                             | FEED          | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.2                      | 0.2                        | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 211           | 0.005             | 0.005              | 50,000                                   | 140           | 0.004             | 0.004              | 50,000                                          | 78            | 0.003             | 0.003              |
| "                         | 0.5                        | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 200           | 0.004             | 0.004              | 50,000                                   | 130           | 0.003             | 0.003              | 50,000                                          | 71            | 0.002             | 0.003              |
| ø0.3                      | 0.3                        | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 520           | 0.006             | 0.010              | 50,000                                   | 290           | 0.004             | 0.005              | 50,000                                          | 260           | 0.003             | 0.005              |
| "                         | 0.5                        | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 460           | 0.006             | 0.010              | 50,000                                   | 270           | 0.003             | 0.005              | 50,000                                          | 250           | 0.003             | 0.005              |
| "                         | 1                          | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 422           | 0.006             | 0.010              | 50,000                                   | 260           | 0.003             | 0.005              | 50,000                                          | 220           | 0.003             | 0.004              |
| ø0.4                      | 0.3                        | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 840           | 0.010             | 0.010              | 50,000                                   | 490           | 0.005             | 0.006              | 50,000                                          | 430           | 0.005             | 0.005              |
| "                         | 1                          | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 690           | 0.010             | 0.010              | 50,000                                   | 470           | 0.005             | 0.005              | 50,000                                          | 420           | 0.005             | 0.005              |
| "                         | 2                          | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 370           | 0.005             | 0.005              | 50,000                                   | 240           | 0.003             | 0.003              | 50,000                                          | 209           | 0.002             | 0.003              |
| ø0.5                      | 0.4                        | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 940           | 0.010             | 0.020              | 50,000                                   | 810           | 0.050             | 0.010              | 50,000                                          | 732           | 0.005             | 0.010              |
| "                         | 1                          | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 850           | 0.010             | 0.015              | 50,000                                   | 560           | 0.005             | 0.010              | 50,000                                          | 523           | 0.005             | 0.010              |
| "                         | 3                          | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 560           | 0.010             | 0.015              | 50,000                                   | 530           | 0.005             | 0.010              | 50,000                                          | 504           | 0.005             | 0.010              |
| ø0.8                      | 0.6                        | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 1,530         | 0.020             | 0.020              | 50,000                                   | 1,254         | 0.015             | 0.015              | 50,000                                          | 1,083         | 0.010             | 0.010              |
| "                         | 2                          | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 1,440         | 0.020             | 0.020              | 50,000                                   | 1,169         | 0.010             | 0.010              | 50,000                                          | 1,064         | 0.010             | 0.010              |
| "                         | 4                          | 40,000                                                                                                                                                                                                                                                                                                                                                                       | 860           | 0.015             | 0.020              | 40,000                                   | 703           | 0.010             | 0.010              | 40,000                                          | 620           | 0.010             | 0.010              |
| "                         | 6                          | 30,000                                                                                                                                                                                                                                                                                                                                                                       | 440           | 0.015             | 0.050              | 30,000                                   | 390           | 0.010             | 0.010              | 30,000                                          | 280           | 0.005             | 0.005              |
| ø1                        | 0.7                        | 50,000                                                                                                                                                                                                                                                                                                                                                                       | 1,730         | 0.020             | 0.030              | 50,000                                   | 1,311         | 0.020             | 0.020              | 50,000                                          | 1,230         | 0.010             | 0.020              |
| "                         | 2                          | 40,000                                                                                                                                                                                                                                                                                                                                                                       | 1,390         | 0.015             | 0.200              | 40,000                                   | 960           | 0.015             | 0.015              | 40,000                                          | 870           | 0.010             | 0.010              |
| "                         | 4                          | 30,000                                                                                                                                                                                                                                                                                                                                                                       | 1,030         | 0.015             | 0.015              | 30,000                                   | 620           | 0.010             | 0.015              | 30,000                                          | 600           | 0.010             | 0.010              |
| "                         | 8                          | 24,000                                                                                                                                                                                                                                                                                                                                                                       | 650           | 0.010             | 0.010              | 24,000                                   | 440           | 0.005             | 0.010              | 24,000                                          | 340           | 0.005             | 0.005              |
| ø1.5                      | 0.8                        | 40,000                                                                                                                                                                                                                                                                                                                                                                       | 1,700         | 0.030             | 0.040              | 40,000                                   | 1,090         | 0.020             | 0.030              | 40,000                                          | 1,130         | 0.020             | 0.020              |
| "                         | 2                          | 30,000                                                                                                                                                                                                                                                                                                                                                                       | 1,400         | 0.030             | 0.030              | 30,000                                   | 1,100         | 0.020             | 0.030              | 30,000                                          | 880           | 0.020             | 0.020              |
| "                         | 4                          | 30,000                                                                                                                                                                                                                                                                                                                                                                       | 1,130         | 0.030             | 0.030              | 30,000                                   | 900           | 0.015             | 0.020              | 30,000                                          | 770           | 0.010             | 0.015              |
| "                         | 8                          | 16,000                                                                                                                                                                                                                                                                                                                                                                       | 520           | 0.015             | 0.015              | 16,000                                   | 410           | 0.010             | 0.015              | 16,000                                          | 350           | 0.010             | 0.010              |
| ø2                        | 2                          | 40,000                                                                                                                                                                                                                                                                                                                                                                       | 1,530         | 0.040             | 0.040              | 40,000                                   | 1,270         | 0.030             | 0.030              | 40,000                                          | 1,090         | 0.020             | 0.030              |
| "                         | 4                          | 30,000                                                                                                                                                                                                                                                                                                                                                                       | 1,330         | 0.030             | 0.030              | 30,000                                   | 1,060         | 0.025             | 0.025              | 30,000                                          | 910           | 0.020             | 0.020              |
| "                         | 8                          | 26,000                                                                                                                                                                                                                                                                                                                                                                       | 1,130         | 0.030             | 0.030              | 26,000                                   | 900           | 0.020             | 0.030              | 26,000                                          | 770           | 0.010             | 0.010              |
| ø2.5                      | 1.2                        | 40,000                                                                                                                                                                                                                                                                                                                                                                       | 2,200         | 0.050             | 0.050              | 40,000                                   | 1,760         | 0.040             | 0.040              | 40,000                                          | 1,500         | 0.030             | 0.040              |
| "                         | 4                          | 40,000                                                                                                                                                                                                                                                                                                                                                                       | 1,540         | 0.030             | 0.040              | 40,000                                   | 1,240         | 0.030             | 0.030              | 40,000                                          | 1,150         | 0.020             | 0.030              |
| "                         | 10                         | 24,000                                                                                                                                                                                                                                                                                                                                                                       | 810           | 0.020             | 0.030              | 24,000                                   | 650           | 0.010             | 0.030              | 24,000                                          | 260           | 0.010             | 0.020              |
| ø3                        | 6                          | 40,000                                                                                                                                                                                                                                                                                                                                                                       | 1,400         | 0.030             | 0.030              | 40,000                                   | 1,120         | 0.020             | 0.030              | 40,000                                          | 960           | 0.020             | 0.030              |
| "                         | 10                         | 21,000                                                                                                                                                                                                                                                                                                                                                                       | 1,130         | 0.020             | 0.030              | 21,000                                   | 900           | 0.020             | 0.020              | 21,000                                          | 770           | 0.010             | 0.020              |
| "                         | 16                         | 16,000                                                                                                                                                                                                                                                                                                                                                                       | 730           | 0.020             | 0.030              | 16,000                                   | 590           | 0.010             | 0.020              | 16,000                                          | 500           | 0.010             | 0.010              |
| ø4                        | 6                          | 40,000                                                                                                                                                                                                                                                                                                                                                                       | 1,430         | 0.030             | 0.040              | 40,000                                   | 1,120         | 0.030             | 0.030              | 40,000                                          | 1,040         | 0.020             | 0.030              |
| "                         | 10                         | 21,000                                                                                                                                                                                                                                                                                                                                                                       | 1,080         | 0.020             | 0.030              | 21,000                                   | 850           | 0.020             | 0.020              | 21,000                                          | 740           | 0.010             | 0.020              |
| "                         | 16                         | 16,000                                                                                                                                                                                                                                                                                                                                                                       | 700           | 0.010             | 0.020              | 21,000                                   | 560           | 0.010             | 0.020              | 16,000                                          | 470           | 0.010             | 0.010              |
| ø6                        |                            | 16,000~<br>50,000                                                                                                                                                                                                                                                                                                                                                            | 740~<br>6,000 | 0.050             | 0.060              | 13,000~<br>50,000                        | 590~<br>4,000 | 0.050             | 0.060              | 11,000~<br>50,000                               | 390~<br>3,000 | 0.050             | 0.060              |
| 절입량<br>Depth of Cut       |                            | <div> <div>Slotting</div> <div>• Ap : Axial Depth</div> <div>• D : Outside Diameter</div>  </div> <div> <div>Side Milling</div> <div>• Ap : Axial Depth</div> <div>• Ae : Radial Depth</div>  </div> |               |                   |                    |                                          |               |                   |                    |                                                 |               |                   |                    |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC68 이상 고경도강 가공시 68HRC 조건에 같은 직경 파이에 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 이 절삭 조건표는 절삭 조건의 참고 수치 입니다. 실제 가공시에는 가공 형상 , 가공 목적, 적용 기계 등에 따라 조건을 조정 하십시오.
- 절삭조건이 없는 유효장은 비슷한 유효장에 비례하여 사용 하십시오.
- 길이가 긴 엔드밀의 경우 떨림, 이상음이 발생할 경우에는 상기표의 회전속도와 이송속도를 같은 비율로 내려서 사용해 주십시오.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- In case machining Hardened steel HRC upper 68, reduce 20% of cutting parameter on the table.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If there is no effective length of your endmill on the table, use a similar type of effective length and apply the same proportion.
- In case of long length endmill shaking or abnormal sound, lower the rotation speed and feed speed of the table above by the same ratio.

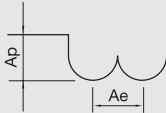
| 파삭재<br>Material           |                            | 프리하트강/고경도강<br>Prehardened Steels / Hardened Steels<br>NAK / SKD61 |               |                   |                    | 고경도강<br>Hardened Steels<br>STAVX / SKD61 |               |                   |                    | 고경도강<br>Hardened Steels<br>SKD11 / YXR7 / SKH51 |               |                   |                    |
|---------------------------|----------------------------|-------------------------------------------------------------------|---------------|-------------------|--------------------|------------------------------------------|---------------|-------------------|--------------------|-------------------------------------------------|---------------|-------------------|--------------------|
| 경도 Hardness               |                            | 30 ~ 45HRC                                                        |               |                   |                    | 45 ~ 55HRC                               |               |                   |                    | 55 ~ 68HRC                                      |               |                   |                    |
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM                                                               | FEED          | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                      | FEED          | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                             | FEED          | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.4                      | 0.3                        | 50,000                                                            | 890           | 0.010             | 0.010              | 50,000                                   | 520           | 0.005             | 0.006              | 50,000                                          | 450           | 0.005             | 0.005              |
| "                         | 1                          | 50,000                                                            | 730           | 0.010             | 0.010              | 50,000                                   | 500           | 0.005             | 0.005              | 50,000                                          | 430           | 0.005             | 0.005              |
| "                         | 2                          | 50,000                                                            | 390           | 0.005             | 0.005              | 50,000                                   | 250           | 0.003             | 0.003              | 50,000                                          | 220           | 0.002             | 0.003              |
| ø0.5                      | 0.4                        | 50,000                                                            | 990           | 0.010             | 0.020              | 50,000                                   | 850           | 0.005             | 0.010              | 50,000                                          | 770           | 0.005             | 0.010              |
| "                         | 1                          | 50,000                                                            | 900           | 0.010             | 0.015              | 50,000                                   | 590           | 0.005             | 0.010              | 50,000                                          | 550           | 0.005             | 0.010              |
| "                         | 3                          | 50,000                                                            | 630           | 0.010             | 0.015              | 50,000                                   | 560           | 0.005             | 0.010              | 50,000                                          | 530           | 0.005             | 0.010              |
| ø0.8                      | 0.6                        | 50,000                                                            | 1,610         | 0.020             | 0.020              | 50,000                                   | 1,320         | 0.015             | 0.015              | 50,000                                          | 1,140         | 0.010             | 0.010              |
| "                         | 2                          | 50,000                                                            | 1,520         | 0.020             | 0.020              | 50,000                                   | 1,230         | 0.010             | 0.010              | 50,000                                          | 1,120         | 0.010             | 0.010              |
| "                         | 4                          | 40,000                                                            | 910           | 0.015             | 0.020              | 40,000                                   | 740           | 0.010             | 0.010              | 40,000                                          | 650           | 0.010             | 0.010              |
| "                         | 6                          | 30,000                                                            | 460           | 0.015             | 0.050              | 30,000                                   | 410           | 0.010             | 0.010              | 30,000                                          | 290           | 0.005             | 0.005              |
| ø1                        | 0.7                        | 50,000                                                            | 1,820         | 0.020             | 0.030              | 50,000                                   | 1,380         | 0.020             | 0.020              | 50,000                                          | 1,290         | 0.010             | 0.020              |
| "                         | 2                          | 40,000                                                            | 1,470         | 0.015             | 0.200              | 40,000                                   | 1,010         | 0.015             | 0.015              | 40,000                                          | 910           | 0.010             | 0.010              |
| "                         | 4                          | 30,000                                                            | 1,080         | 0.015             | 0.015              | 30,000                                   | 660           | 0.010             | 0.015              | 30,000                                          | 630           | 0.010             | 0.010              |
| "                         | 8                          | 24,000                                                            | 680           | 0.010             | 0.010              | 24,000                                   | 460           | 0.005             | 0.010              | 24,000                                          | 360           | 0.005             | 0.005              |
| ø1.5                      | 0.8                        | 40,000                                                            | 1,790         | 0.030             | 0.040              | 40,000                                   | 1,150         | 0.020             | 0.030              | 40,000                                          | 1,190         | 0.020             | 0.020              |
| "                         | 2                          | 30,000                                                            | 1,470         | 0.030             | 0.030              | 30,000                                   | 1,160         | 0.020             | 0.030              | 30,000                                          | 930           | 0.020             | 0.020              |
| "                         | 4                          | 30,000                                                            | 1,190         | 0.030             | 0.030              | 30,000                                   | 950           | 0.015             | 0.020              | 30,000                                          | 810           | 0.010             | 0.015              |
| "                         | 8                          | 24,000                                                            | 550           | 0.015             | 0.015              | 24,000                                   | 430           | 0.010             | 0.015              | 24,000                                          | 370           | 0.010             | 0.010              |
| ø2                        | 2                          | 40,000                                                            | 1,610         | 0.040             | 0.040              | 40,000                                   | 1,340         | 0.030             | 0.030              | 40,000                                          | 1,150         | 0.020             | 0.030              |
| "                         | 4                          | 30,000                                                            | 1,400         | 0.030             | 0.030              | 30,000                                   | 1,120         | 0.025             | 0.025              | 30,000                                          | 960           | 0.020             | 0.020              |
| "                         | 8                          | 30,000                                                            | 1,190         | 0.030             | 0.030              | 30,000                                   | 950           | 0.020             | 0.030              | 30,000                                          | 810           | 0.010             | 0.010              |
| ø2.5                      | 1.2                        | 40,000                                                            | 2,317         | 0.050             | 0.050              | 40,000                                   | 1,850         | 0.040             | 0.040              | 40,000                                          | 1,580         | 0.030             | 0.040              |
| "                         | 4                          | 40,000                                                            | 1,620         | 0.030             | 0.040              | 40,000                                   | 1,300         | 0.030             | 0.030              | 40,000                                          | 1,210         | 0.020             | 0.030              |
| "                         | 10                         | 24,000                                                            | 850           | 0.020             | 0.030              | 24,000                                   | 680           | 0.010             | 0.030              | 24,000                                          | 280           | 0.010             | 0.020              |
| ø3                        | 6                          | 40,000                                                            | 1,470         | 0.030             | 0.030              | 40,000                                   | 1,180         | 0.020             | 0.030              | 40,000                                          | 1,010         | 0.020             | 0.030              |
| "                         | 10                         | 21,000                                                            | 1,190         | 0.020             | 0.030              | 21,000                                   | 950           | 0.020             | 0.020              | 21,000                                          | 810           | 0.010             | 0.020              |
| "                         | 16                         | 16,000                                                            | 770           | 0.020             | 0.030              | 16,000                                   | 620           | 0.010             | 0.020              | 16,000                                          | 530           | 0.010             | 0.010              |
| ø4                        | 6                          | 40,000                                                            | 1,510         | 0.030             | 0.040              | 40,000                                   | 1,180         | 0.030             | 0.030              | 40,000                                          | 1,100         | 0.020             | 0.030              |
| "                         | 10                         | 21,000                                                            | 1,140         | 0.020             | 0.030              | 21,000                                   | 900           | 0.020             | 0.020              | 21,000                                          | 780           | 0.010             | 0.020              |
| "                         | 16                         | 16,000                                                            | 740           | 0.010             | 0.020              | 16,000                                   | 590           | 0.010             | 0.020              | 16,000                                          | 500           | 0.010             | 0.010              |
| ø6                        |                            | 16,000~<br>50,000                                                 | 740~<br>6,000 | 0.050             | 0.060              | 13,000~<br>50,000                        | 590~<br>4,000 | 0.050             | 0.060              | 11,000~<br>50,000                               | 390~<br>3,000 | 0.050             | 0.060              |

절입량  
Depth of Cut

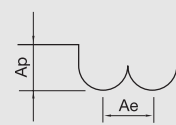
• Ap : Axial Depth
• Ae : Radial Depth

- HRC68 이상 고경도강 가공시 68HRC 조건의 같은 직경 파이에 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 4날 사용시 Feed 20% 증가, 절입량을 5% 감소하여 사용 하십시오.
- 측면 절삭시 코너 R 부분과 각도 내용을 참고하여 절삭 하시기 바랍니다.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 이 절삭 조건표는 절삭조건의 참고 수치 입니다. 실제 가공시에는 가공 목적, 적용 기계 등에 따라 조건을 조정 하십시오.
- 절삭조건이 없는 유효장은 비슷한 유효장에 비례하여 사용 하십시오.
- 길이가 긴 엔드밀의 경우 떨림, 이상음이 발생할 경우에는 상기표의 회전속도와 이송속도를 같은 비율로 내려서 사용해 주십시오.
- In case machining Hardened steel HRC upper 68, reduce 20% of cutting parameter on the table.
- In case of long effective length, reduce the RPM and feed by 30% or less.
- For using 4 flutes, reduce the feed by 20% and the depth of cut by 5%.
- For side milling, refer to the corner R section and the angle.
- For curved milling, set up a pitch below than corner radius of the tool diameter.
- For curved milling, raise the feed upto 30% at a stable speed.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If there is no effective length of your endmill on the table, use a similar type of effective length and apply the same proportion.
- In case of long length endmill shaking or abnormal sound, lower the rotation speed and feed speed of the table above by the same ratio.

| 파삭재<br>Material |                         | 고경도강<br>Hardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|-----------------|-------------------------|-------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness     |                         | 55 ~ 62HRC              |       |                   |                    | 62 ~ 66HRC              |       |                   |                    | 66 ~ 70HRC              |      |                   |                    |
| 반경<br>Radius    | 유효장<br>Effective Length | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.1           | 0.5                     | 60,000                  | 200   | 0.002             | 0.003              | 60,000                  | 130   | 0.002             | 0.003              | 45,000                  | 65   | 0.002             | 0.003              |
| "               | 1                       | 60,000                  | 200   | 0.002             | 0.003              | 60,000                  | 130   | 0.002             | 0.003              | 45,000                  | 65   | 0.002             | 0.003              |
| "               | 1.5                     | 48,000                  | 80    | 0.001             | 0.002              | 48,000                  | 65    | 0.001             | 0.002              | 36,000                  | 30   | 0.001             | 0.002              |
| "               | 2                       | 48,000                  | 50    | 0.001             | 0.001              | 48,000                  | 40    | 0.001             | 0.001              | 36,000                  | 20   | 0.001             | 0.001              |
| R 0.15          | 1                       | 45,000                  | 310   | 0.004             | 0.007              | 43,500                  | 180   | 0.003             | 0.005              | 32,500                  | 90   | 0.003             | 0.005              |
| "               | 1.5                     | 45,000                  | 310   | 0.004             | 0.007              | 43,500                  | 180   | 0.003             | 0.005              | 32,500                  | 90   | 0.003             | 0.005              |
| "               | 2                       | 45,000                  | 190   | 0.003             | 0.005              | 43,500                  | 110   | 0.002             | 0.004              | 32,500                  | 55   | 0.002             | 0.004              |
| "               | 3                       | 32,000                  | 80    | 0.002             | 0.004              | 32,000                  | 65    | 0.001             | 0.002              | 24,000                  | 30   | 0.001             | 0.002              |
| R 0.2           | 1                       | 37,500                  | 420   | 0.007             | 0.012              | 35,000                  | 240   | 0.005             | 0.008              | 26,250                  | 120  | 0.005             | 0.008              |
| "               | 2                       | 37,500                  | 420   | 0.007             | 0.012              | 35,000                  | 240   | 0.005             | 0.008              | 26,250                  | 120  | 0.005             | 0.008              |
| "               | 3                       | 31,900                  | 210   | 0.004             | 0.008              | 30,500                  | 160   | 0.003             | 0.005              | 22,800                  | 80   | 0.002             | 0.005              |
| "               | 4                       | 25,500                  | 150   | 0.002             | 0.004              | 24,300                  | 120   | 0.002             | 0.004              | 18,200                  | 60   | 0.002             | 0.004              |
| R 0.25          | 1                       | 33,000                  | 530   | 0.010             | 0.020              | 30,000                  | 300   | 0.007             | 0.010              | 22,500                  | 150  | 0.007             | 0.010              |
| "               | 2                       | 33,000                  | 530   | 0.010             | 0.020              | 30,000                  | 300   | 0.007             | 0.010              | 22,500                  | 150  | 0.007             | 0.010              |
| "               | 3                       | 31,000                  | 400   | 0.007             | 0.010              | 28,550                  | 230   | 0.005             | 0.008              | 21,400                  | 115  | 0.005             | 0.008              |
| "               | 4                       | 27,150                  | 150   | 0.003             | 0.008              | 25,650                  | 100   | 0.002             | 0.005              | 19,900                  | 50   | 0.002             | 0.005              |
| "               | 5                       | 24,200                  | 110   | 0.002             | 0.005              | 23,500                  | 75    | 0.002             | 0.004              | 17,600                  | 35   | 0.002             | 0.004              |
| "               | 6                       | 21,300                  | 75    | 0.001             | 0.003              | 21,300                  | 50    | 0.001             | 0.002              | 16,000                  | 25   | 0.001             | 0.002              |
| "               | 8                       | 15,900                  | 40    | 0.001             | 0.002              | 15,900                  | 25    | 0.001             | 0.002              | 11,950                  | 12   | 0.001             | 0.002              |
| R 0.3           | 1                       | 30,000                  | 1,500 | 0.030             | 0.130              | 26,500                  | 1,000 | 0.015             | 0.090              | 20,000                  | 500  | 0.015             | 0.090              |
| "               | 2                       | 30,000                  | 1,200 | 0.020             | 0.100              | 26,500                  | 800   | 0.010             | 0.075              | 20,000                  | 400  | 0.010             | 0.075              |
| "               | 3                       | 30,000                  | 800   | 0.015             | 0.090              | 26,500                  | 520   | 0.008             | 0.065              | 20,000                  | 260  | 0.008             | 0.065              |
| "               | 4                       | 30,000                  | 500   | 0.010             | 0.075              | 26,500                  | 340   | 0.006             | 0.050              | 20,000                  | 170  | 0.006             | 0.050              |
| "               | 5                       | 25,000                  | 390   | 0.007             | 0.050              | 23,000                  | 260   | 0.005             | 0.040              | 18,000                  | 130  | 0.005             | 0.040              |
| "               | 6                       | 21,000                  | 320   | 0.005             | 0.040              | 19,500                  | 210   | 0.004             | 0.030              | 15,000                  | 105  | 0.004             | 0.030              |
| "               | 8                       | 16,000                  | 240   | 0.003             | 0.020              | 16,000                  | 160   | 0.003             | 0.020              | 12,000                  | 80   | 0.003             | 0.020              |
| "               | 10                      | 14,900                  | 175   | 0.002             | 0.015              | 14,900                  | 115   | 0.002             | 0.015              | 11,100                  | 55   | 0.002             | 0.015              |
| "               | 12                      | 13,800                  | 110   | 0.001             | 0.010              | 13,800                  | 70    | 0.001             | 0.010              | 10,350                  | 35   | 0.001             | 0.010              |
| R 0.4           | 2                       | 27,000                  | 1,600 | 0.040             | 0.170              | 23,500                  | 1,000 | 0.020             | 0.120              | 17,500                  | 500  | 0.020             | 0.120              |
| "               | 4                       | 27,000                  | 1,200 | 0.025             | 0.135              | 23,500                  | 600   | 0.012             | 0.095              | 17,500                  | 300  | 0.012             | 0.095              |
| "               | 6                       | 23,000                  | 600   | 0.012             | 0.095              | 20,500                  | 400   | 0.006             | 0.065              | 15,500                  | 200  | 0.006             | 0.065              |
| "               | 8                       | 18,000                  | 375   | 0.007             | 0.070              | 17,000                  | 285   | 0.005             | 0.060              | 12,750                  | 140  | 0.005             | 0.060              |
| "               | 10                      | 14,700                  | 340   | 0.005             | 0.060              | 14,650                  | 225   | 0.004             | 0.050              | 11,000                  | 110  | 0.004             | 0.050              |
| R 0.5           | 2                       | 24,000                  | 2,000 | 0.100             | 0.300              | 21,000                  | 1,750 | 0.050             | 0.200              | 16,000                  | 875  | 0.050             | 0.200              |
| "               | 3                       | 24,000                  | 2,000 | 0.050             | 0.200              | 21,000                  | 1,750 | 0.030             | 0.170              | 16,000                  | 875  | 0.030             | 0.170              |
| "               | 4                       | 24,000                  | 2,000 | 0.050             | 0.200              | 21,000                  | 1,750 | 0.030             | 0.170              | 16,000                  | 875  | 0.030             | 0.170              |
| "               | 5                       | 24,000                  | 2,000 | 0.050             | 0.200              | 21,000                  | 1,750 | 0.030             | 0.170              | 16,000                  | 875  | 0.030             | 0.170              |
| "               | 6                       | 21,500                  | 1,250 | 0.030             | 0.170              | 19,700                  | 1,050 | 0.025             | 0.150              | 14,500                  | 525  | 0.025             | 0.150              |
| "               | 8                       | 18,500                  | 580   | 0.015             | 0.120              | 18,400                  | 480   | 0.015             | 0.120              | 13,800                  | 240  | 0.015             | 0.120              |
| "               | 10                      | 14,800                  | 430   | 0.010             | 0.090              | 14,700                  | 360   | 0.010             | 0.090              | 11,100                  | 180  | 0.010             | 0.090              |
| "               | 12                      | 13,400                  | 380   | 0.008             | 0.080              | 13,300                  | 290   | 0.008             | 0.080              | 9,950                   | 140  | 0.008             | 0.080              |
| "               | 14                      | 12,000                  | 350   | 0.007             | 0.080              | 12,000                  | 220   | 0.007             | 0.080              | 9,000                   | 110  | 0.007             | 0.080              |
| "               | 16                      | 10,500                  | 250   | 0.005             | 0.045              | 10,500                  | 160   | 0.005             | 0.045              | 7,850                   | 80   | 0.005             | 0.045              |
| "               | 18                      | 9,750                   | 200   | 0.004             | 0.035              | 9,750                   | 130   | 0.004             | 0.035              | 7,300                   | 85   | 0.004             | 0.035              |
| "               | 20                      | 9,000                   | 150   | 0.003             | 0.020              | 9,000                   | 100   | 0.003             | 0.020              | 6,750                   | 50   | 0.003             | 0.020              |
| "               | 22                      | 9,000                   | 110   | 0.002             | 0.012              | 9,000                   | 75    | 0.002             | 0.012              | 6,750                   | 35   | 0.002             | 0.012              |
| R 0.6           | 6                       | 20,000                  | 2,000 | 0.060             | 0.240              | 17,500                  | 1,750 | 0.036             | 0.200              | 13,100                  | 875  | 0.036             | 0.200              |
| "               | 8                       | 16,600                  | 900   | 0.025             | 0.170              | 15,850                  | 750   | 0.025             | 0.170              | 11,900                  | 375  | 0.025             | 0.170              |
| "               | 10                      | 15,500                  | 580   | 0.015             | 0.130              | 15,350                  | 480   | 0.015             | 0.130              | 11,500                  | 240  | 0.015             | 0.130              |
| R 0.7           | 8                       | 15,350                  | 1,250 | 0.040             | 0.230              | 14,050                  | 1,050 | 0.030             | 0.200              | 10,550                  | 525  | 0.030             | 0.200              |
| R 0.75          | 3                       | 17,000                  | 2,000 | 0.120             | 0.400              | 15,000                  | 1,750 | 0.060             | 0.290              | 11,250                  | 875  | 0.060             | 0.290              |
| "               | 4                       | 17,000                  | 2,000 | 0.120             | 0.400              | 15,000                  | 1,750 | 0.060             | 0.290              | 11,250                  | 875  | 0.060             | 0.290              |
| "               | 6                       | 17,000                  | 2,000 | 0.070             | 0.310              | 15,000                  | 1,750 | 0.040             | 0.240              | 11,250                  | 875  | 0.040             | 0.240              |
| "               | 8                       | 15,000                  | 1,250 | 0.045             | 0.250              | 14,000                  | 1,050 | 0.030             | 0.210              | 10,500                  | 525  | 0.030             | 0.210              |
| "               | 10                      | 15,000                  | 1,250 | 0.045             | 0.250              | 14,000                  | 1,050 | 0.030             | 0.210              | 10,500                  | 525  | 0.030             | 0.210              |
| "               | 12                      | 13,000                  | 580   | 0.020             | 0.170              | 13,000                  | 480   | 0.020             | 0.170              | 9,750                   | 240  | 0.020             | 0.170              |
| "               | 14                      | 10,900                  | 485   | 0.015             | 0.145              | 10,900                  | 385   | 0.015             | 0.145              | 8,200                   | 190  | 0.015             | 0.145              |
| "               | 16                      | 8,850                   | 390   | 0.012             | 0.130              | 8,800                   | 290   | 0.012             | 0.130              | 6,600                   | 145  | 0.012             | 0.130              |
| "               | 20                      | 8,000                   | 350   | 0.010             | 0.120              | 8,000                   | 220   | 0.010             | 0.120              | 6,000                   | 110  | 0.010             | 0.120              |
| R 0.8           | 8                       | 17,500                  | 2,100 | 0.080             | 0.320              | 15,300                  | 1,800 | 0.050             | 0.275              | 11,500                  | 900  | 0.050             | 0.275              |
| "               | 12                      | 13,500                  | 600   | 0.024             | 0.190              | 13,400                  | 490   | 0.024             | 0.190              | 10,050                  | 245  | 0.025             | 0.190              |
| "               | 16                      | 10,800                  | 450   | 0.016             | 0.150              | 10,700                  | 370   | 0.016             | 0.150              | 8,000                   | 185  | 0.016             | 0.150              |
| R 1             | 4                       | 14,000                  | 2,100 | 0.150             | 0.500              | 12,250                  | 1,800 | 0.080             | 0.350              | 9,200                   | 900  | 0.080             | 0.350              |
| "               | 6                       | 14,000                  | 2,100 | 0.100             | 0.400              | 12,250                  | 1,800 | 0.060             | 0.300              | 9,200                   | 900  | 0.060             | 0.300              |
| "               | 8                       | 14,000                  | 2,100 | 0.100             | 0.400              | 12,250                  | 1,800 | 0.060             | 0.300              | 9,200                   | 900  | 0.060             | 0.300              |
| "               | 10                      | 14,000                  | 2,100 | 0.100             | 0.400              | 12,250                  | 1,800 | 0.060             | 0.300              | 9,200                   | 900  | 0.060             | 0.300              |
| "               | 12                      | 12,400                  | 1,350 | 0.060             | 0.340              | 11,500                  | 1,100 | 0.045             | 0.270              | 8,650                   | 550  | 0.045             | 0.270              |
| "               | 14                      | 12,400                  | 1,350 | 0.060             | 0.340              | 11,500                  | 1,100 | 0.045             | 0.270              | 8,650                   | 550  | 0.045             | 0.270              |

| 파삭재<br>Material     |                         | 고경도강<br>Hardened Steels                                                                                                                                                                                                                                                     |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|---------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness         |                         | 55 ~ 62HRC                                                                                                                                                                                                                                                                  |       |                   |                    | 62 ~ 66HRC              |       |                   |                    | 66 ~ 70HRC              |       |                   |                    |
| 반경<br>Radius        | 유효장<br>Effective Length | RPM                                                                                                                                                                                                                                                                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| "                   | 16                      | 10,800                                                                                                                                                                                                                                                                      | 600   | 0.030             | 0.240              | 10,700                  | 490   | 0.030             | 0.240              | 8,000                   | 245   | 0.030             | 0.240              |
| "                   | 18                      | 9,700                                                                                                                                                                                                                                                                       | 520   | 0.025             | 0.220              | 9,650                   | 430   | 0.025             | 0.220              | 7,250                   | 215   | 0.025             | 0.220              |
| "                   | 20                      | 8,650                                                                                                                                                                                                                                                                       | 450   | 0.020             | 0.190              | 8,560                   | 370   | 0.020             | 0.190              | 6,400                   | 185   | 0.020             | 0.190              |
| "                   | 22                      | 8,200                                                                                                                                                                                                                                                                       | 440   | 0.018             | 0.180              | 8,200                   | 330   | 0.018             | 0.180              | 6,150                   | 165   | 0.018             | 0.180              |
| "                   | 25                      | 7,800                                                                                                                                                                                                                                                                       | 440   | 0.016             | 0.160              | 7,800                   | 290   | 0.016             | 0.160              | 5,850                   | 145   | 0.016             | 0.160              |
| "                   | 30                      | 7,000                                                                                                                                                                                                                                                                       | 350   | 0.014             | 0.160              | 7,000                   | 220   | 0.014             | 0.160              | 5,250                   | 110   | 0.014             | 0.160              |
| R 1.25              | 20                      | 9,600                                                                                                                                                                                                                                                                       | 630   | 0.040             | 0.310              | 9,600                   | 510   | 0.040             | 0.310              | 7,200                   | 255   | 0.040             | 0.310              |
| R 1.5               | 6                       | 10,500                                                                                                                                                                                                                                                                      | 2,200 | 0.200             | 0.700              | 9,200                   | 1,900 | 0.120             | 0.550              | 6,900                   | 950   | 0.120             | 0.550              |
| "                   | 8                       | 10,500                                                                                                                                                                                                                                                                      | 2,200 | 0.200             | 0.700              | 9,200                   | 1,900 | 0.120             | 0.550              | 6,900                   | 950   | 0.120             | 0.550              |
| "                   | 10                      | 10,500                                                                                                                                                                                                                                                                      | 2,200 | 0.150             | 0.650              | 9,200                   | 1,900 | 0.100             | 0.500              | 6,900                   | 950   | 0.100             | 0.500              |
| "                   | 12                      | 10,500                                                                                                                                                                                                                                                                      | 2,200 | 0.150             | 0.650              | 9,200                   | 1,900 | 0.100             | 0.500              | 6,900                   | 950   | 0.100             | 0.500              |
| "                   | 16                      | 10,500                                                                                                                                                                                                                                                                      | 2,200 | 0.150             | 0.650              | 9,200                   | 1,900 | 0.100             | 0.500              | 6,900                   | 950   | 0.100             | 0.500              |
| "                   | 20                      | 9,250                                                                                                                                                                                                                                                                       | 1,400 | 0.100             | 0.500              | 8,600                   | 1,150 | 0.075             | 0.450              | 6,450                   | 575   | 0.075             | 0.450              |
| "                   | 25                      | 8,000                                                                                                                                                                                                                                                                       | 630   | 0.050             | 0.380              | 8,000                   | 510   | 0.050             | 0.380              | 6,000                   | 255   | 0.050             | 0.380              |
| "                   | 30                      | 5,750                                                                                                                                                                                                                                                                       | 450   | 0.030             | 0.290              | 5,700                   | 370   | 0.030             | 0.290              | 4,275                   | 185   | 0.030             | 0.290              |
| "                   | 35                      | 5,350                                                                                                                                                                                                                                                                       | 440   | 0.025             | 0.270              | 5,350                   | 310   | 0.025             | 0.270              | 4,000                   | 155   | 0.025             | 0.270              |
| "                   | 40                      | 4,900                                                                                                                                                                                                                                                                       | 390   | 0.200             | 0.240              | 4,950                   | 250   | 0.020             | 0.240              | 3,700                   | 125   | 0.020             | 0.240              |
| R 2                 | 8                       | 9,000                                                                                                                                                                                                                                                                       | 2,300 | 0.250             | 0.950              | 7,900                   | 2,000 | 0.150             | 0.750              | 5,900                   | 1,000 | 0.150             | 0.750              |
| "                   | 10                      | 9,000                                                                                                                                                                                                                                                                       | 2,300 | 0.250             | 0.950              | 7,900                   | 2,000 | 0.150             | 0.750              | 5,900                   | 1,000 | 0.150             | 0.750              |
| "                   | 12                      | 9,000                                                                                                                                                                                                                                                                       | 2,300 | 0.200             | 0.850              | 7,900                   | 2,000 | 0.130             | 0.700              | 5,900                   | 1,000 | 0.130             | 0.700              |
| "                   | 16                      | 9,000                                                                                                                                                                                                                                                                       | 2,300 | 0.200             | 0.850              | 7,900                   | 2,000 | 0.130             | 0.700              | 5,900                   | 1,000 | 0.130             | 0.700              |
| "                   | 20                      | 9,000                                                                                                                                                                                                                                                                       | 2,300 | 0.200             | 0.850              | 7,900                   | 2,000 | 0.130             | 0.700              | 5,900                   | 1,000 | 0.130             | 0.700              |
| "                   | 25                      | 8,000                                                                                                                                                                                                                                                                       | 1,450 | 0.130             | 0.700              | 7,450                   | 1,250 | 0.090             | 0.550              | 5,600                   | 625   | 0.090             | 0.550              |
| "                   | 30                      | 7,000                                                                                                                                                                                                                                                                       | 660   | 0.060             | 0.450              | 7,000                   | 540   | 0.060             | 0.450              | 5,250                   | 270   | 0.060             | 0.450              |
| "                   | 35                      | 6,000                                                                                                                                                                                                                                                                       | 630   | 0.055             | 0.430              | 6,000                   | 510   | 0.055             | 0.430              | 4,500                   | 255   | 0.055             | 0.430              |
| "                   | 40                      | 4,300                                                                                                                                                                                                                                                                       | 450   | 0.040             | 0.390              | 4,300                   | 370   | 0.040             | 0.390              | 3,200                   | 185   | 0.040             | 0.390              |
| R 2.5               | 20                      | 7,200                                                                                                                                                                                                                                                                       | 2,300 | 0.250             | 1.050              | 6,350                   | 2,000 | 0.160             | 0.880              | 4,750                   | 1,000 | 0.160             | 0.880              |
| "                   | 30                      | 6,400                                                                                                                                                                                                                                                                       | 1,450 | 0.160             | 0.880              | 6,200                   | 1,250 | 0.110             | 0.730              | 4,650                   | 625   | 0.110             | 0.730              |
| "                   | 40                      | 6,000                                                                                                                                                                                                                                                                       | 690   | 0.080             | 0.625              | 6,000                   | 570   | 0.080             | 0.625              | 4,500                   | 285   | 0.080             | 0.625              |
| R 3                 | 15                      | 6,500                                                                                                                                                                                                                                                                       | 2,500 | 0.300             | 1.300              | 5,700                   | 2,200 | 0.200             | 1.000              | 4,300                   | 1,100 | 0.200             | 1.000              |
| R 4                 | 25                      | 5,200                                                                                                                                                                                                                                                                       | 2,200 | 0.400             | 1.700              | 4,500                   | 1,900 | 0.250             | 1.350              | 3,400                   | 950   | 0.250             | 1.350              |
| R 5                 | 30                      | 4,300                                                                                                                                                                                                                                                                       | 2,000 | 0.500             | 2.100              | 3,750                   | 1,750 | 0.300             | 1.700              | 2,800                   | 875   | 0.300             | 1.700              |
| R 6                 | 30                      | 3,600                                                                                                                                                                                                                                                                       | 1,750 | 0.600             | 2.600              | 3,150                   | 1,500 | 0.350             | 2.000              | 2,350                   | 750   | 0.350             | 2.000              |
| 절입량<br>Depth of Cut |                         |  <p>Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/> Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/> D : Outside Diameter 외경 (mm)<br/> n : Speed 회전속도 (min<sup>-1</sup>)<br/> Vf : Feed 이송속도 (mm/min)</p> |       |                   |                    |                         |       |                   |                    |                         |       |                   |                    |

- HRC55 이하 파삭재 (합금강, 공구강) 가공시 같은 파이에 대비 상기 절삭조건외 20% UP 해주십시오.
- 에어브로 혹은 미스트 쿨런트를 추천하며, 동 가공시 습식 쿨런트 추천 합니다.
- 상기 절삭 조건의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건 변경 요망 합니다.
- 진동이 적고 강성이 좋은 공작 기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것)
- 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.
- When milling workpiece HRC below 55 (Alloy steel, tool steel), Raise up 20% RPM and feed compared to the same diameter.
- Air blow or mist coolant is recommended, and wet coolants are recommended for copper milling.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use a machine with low vibration and good rigidity ( $\phi 1$  or less, the vibration tolerance management will be within 5 $\mu$ m).
- Note for chip emission, heat, or ignition.

| 피삭재<br>Material     |                         | 고경도강<br>Hardened Steels                                                                                                                                                                                                                                                                    |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|---------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness         |                         | 55 ~ 62HRC                                                                                                                                                                                                                                                                                 |       |                   |                    | 62 ~ 66HRC              |       |                   |                    | 66 ~ 70HRC              |       |                   |                    |
| 반경<br>Radius        | 유효장<br>Effective Length | RPM                                                                                                                                                                                                                                                                                        | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.5               | 4                       | 25,500                                                                                                                                                                                                                                                                                     | 2,360 | 0.050             | 0.200              | 21,000                  | 2,000 | 0.030             | 0.170              | 16,000                  | 960   | 0.030             | 0.170              |
| "                   | 8                       | 18,500                                                                                                                                                                                                                                                                                     | 760   | 0.015             | 0.120              | 18,400                  | 710   | 0.015             | 0.120              | 13,800                  | 287   | 0.015             | 0.120              |
| "                   | 12                      | 13,400                                                                                                                                                                                                                                                                                     | 540   | 0.008             | 0.080              | 13,300                  | 405   | 0.008             | 0.080              | 9,950                   | 189   | 0.008             | 0.080              |
| "                   | 16                      | 10,500                                                                                                                                                                                                                                                                                     | 320   | 0.005             | 0.045              | 10,500                  | 225   | 0.005             | 0.045              | 7,850                   | 115   | 0.005             | 0.045              |
| R 0.75              | 8                       | 15,000                                                                                                                                                                                                                                                                                     | 1,389 | 0.045             | 0.250              | 14,000                  | 1,280 | 0.030             | 0.210              | 10,500                  | 648   | 0.030             | 0.210              |
| "                   | 16                      | 8,850                                                                                                                                                                                                                                                                                      | 530   | 0.012             | 0.130              | 8,800                   | 489   | 0.012             | 0.130              | 6,600                   | 208   | 0.012             | 0.130              |
| R 1                 | 8                       | 14,000                                                                                                                                                                                                                                                                                     | 2,350 | 0.100             | 0.400              | 12,250                  | 1,960 | 0.060             | 0.300              | 9,200                   | 1,060 | 0.060             | 0.300              |
| "                   | 16                      | 10,800                                                                                                                                                                                                                                                                                     | 776   | 0.030             | 0.240              | 10,700                  | 580   | 0.030             | 0.240              | 8,000                   | 335   | 0.030             | 0.240              |
| "                   | 25                      | 7,800                                                                                                                                                                                                                                                                                      | 530   | 0.016             | 0.160              | 7,800                   | 380   | 0.016             | 0.160              | 5,850                   | 320   | 0.016             | 0.160              |
| R 1.5               | 16                      | 10,500                                                                                                                                                                                                                                                                                     | 2,500 | 0.150             | 0.650              | 9,200                   | 2,100 | 0.100             | 0.500              | 6,900                   | 1,100 | 0.100             | 0.500              |
| "                   | 25                      | 8,000                                                                                                                                                                                                                                                                                      | 820   | 0.050             | 0.380              | 8,000                   | 640   | 0.050             | 0.380              | 6,000                   | 355   | 0.050             | 0.380              |
| "                   | 40                      | 4,900                                                                                                                                                                                                                                                                                      | 530   | 0.200             | 0.240              | 4,950                   | 360   | 0.020             | 0.240              | 3,700                   | 220   | 0.020             | 0.240              |
| R 2                 | 20                      | 9,000                                                                                                                                                                                                                                                                                      | 2,680 | 0.200             | 0.850              | 7,900                   | 2,250 | 0.130             | 0.700              | 5,900                   | 1,240 | 0.130             | 0.700              |
| "                   | 30                      | 7,000                                                                                                                                                                                                                                                                                      | 845   | 0.060             | 0.450              | 7,000                   | 710   | 0.060             | 0.450              | 5,250                   | 374   | 0.060             | 0.450              |
| "                   | 40                      | 4,300                                                                                                                                                                                                                                                                                      | 640   | 0.040             | 0.390              | 4,300                   | 420   | 0.040             | 0.390              | 3,200                   | 267   | 0.040             | 0.390              |
| R 2.5               | 30                      | 6,400                                                                                                                                                                                                                                                                                      | 1,630 | 0.160             | 0.880              | 6,200                   | 1,430 | 0.110             | 0.730              | 4,650                   | 775   | 0.110             | 0.730              |
| "                   | 40                      | 6,000                                                                                                                                                                                                                                                                                      | 820   | 0.080             | 0.625              | 5,900                   | 760   | 0.080             | 0.625              | 4,500                   | 415   | 0.080             | 0.625              |
| "                   | 50                      | 5,300                                                                                                                                                                                                                                                                                      | 530   | 0.050             | 0.410              | 5,200                   | 490   | 0.040             | 0.400              | 4,300                   | 295   | 0.035             | 0.370              |
| R 3                 | 20                      | 6,500                                                                                                                                                                                                                                                                                      | 2,820 | 0.300             | 1.300              | 5,700                   | 2,390 | 0.200             | 1.000              | 4,300                   | 1,360 | 0.200             | 1.000              |
| "                   | 30                      | 6,400                                                                                                                                                                                                                                                                                      | 1,720 | 0.160             | 0.880              | 6,200                   | 1,538 | 0.110             | 0.730              | 4,650                   | 843   | 0.110             | 0.730              |
| R 4                 | 25                      | 5,200                                                                                                                                                                                                                                                                                      | 2,350 | 0.400             | 1.700              | 4,500                   | 2,100 | 0.250             | 1.350              | 3,400                   | 1,060 | 0.250             | 1.350              |
| "                   | 40                      | 3,600                                                                                                                                                                                                                                                                                      | 1,570 | 0.300             | 0.850              | 2,700                   | 1,260 | 0.150             | 0.720              | 2,040                   | 636   | 0.120             | 0.700              |
| R 5                 | 30                      | 4,300                                                                                                                                                                                                                                                                                      | 2,170 | 0.500             | 2.100              | 3,750                   | 1,860 | 0.300             | 1.700              | 2,800                   | 986   | 0.300             | 1.700              |
| "                   | 50                      | 3,400                                                                                                                                                                                                                                                                                      | 1,330 | 0.400             | 1.050              | 2,419                   | 1,200 | 0.200             | 0.750              | 1,806                   | 636   | 0.190             | 0.680              |
| R 6                 | 35                      | 3,600                                                                                                                                                                                                                                                                                      | 1,890 | 0.600             | 2.600              | 3,150                   | 1,680 | 0.350             | 2.000              | 2,350                   | 840   | 0.350             | 2.000              |
| "                   | 60                      | 2,700                                                                                                                                                                                                                                                                                      | 1,180 | 0.500             | 1.300              | 1,956                   | 1,043 | 0.250             | 0.900              | 1,459                   | 522   | 0.220             | 0.850              |
| 절입량<br>Depth of Cut |                         | <div>  <p> Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/> Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/> D : Outside Diameter 외경 (mm)<br/> n : Speed 회전속도 (min<sup>-1</sup>)<br/> Vf : Feed 이송속도 (mm/min) </p> </div> |       |                   |                    |                         |       |                   |                    |                         |       |                   |                    |

- HRC55 이하 피삭재 (합금강, 공구강) 가공시 같은 파이에 대비 상기 절삭조건 20% UP 해주십시오.
- 에어브로 혹은 미스트 쿨런트를 추천하며, 동 가공시 습식 쿨런트 추천 합니다.
- 상기 절삭조건 20% 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
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- When milling workpiece HRC below 55 (Alloy steel, tool steel), Raise up 20% RPM and feed compared to the same diameter.
- Air blow or mist coolant is recommended, and wet coolants are recommended for copper milling.
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- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management will be within 5 $\mu$ m).
- Note for chip emission, heat, or ignition.

| 파삭재<br>Material |                            |                      | 동/탄소강<br>Copper / Carbon Steels<br>Cu / S45C / S50C |       |                   | 프리하든강<br>Prehardened Steels |       |                   | 고경도강<br>Hardened Steels |      |                   | 고경도강<br>Hardened Steels |      |                   |
|-----------------|----------------------------|----------------------|-----------------------------------------------------|-------|-------------------|-----------------------------|-------|-------------------|-------------------------|------|-------------------|-------------------------|------|-------------------|
| 경도 Hardness     |                            |                      | 30 ~ 45HRC                                          |       |                   | 30 ~ 45HRC                  |       |                   | 45 ~ 55HRC              |      |                   | 55 ~ 68HRC              |      |                   |
| 반경<br>Radius    | 유효장<br>Effective<br>Length | 각도<br>Taper<br>Angle | RPM                                                 | FEED  | Ap<br>Axial Depth | RPM                         | FEED  | Ap<br>Axial Depth | RPM                     | FEED | Ap<br>Axial Depth | RPM                     | FEED | Ap<br>Axial Depth |
| R 0.1           | 1.5                        | 0°30                 | 42,000                                              | 630   | 0.007             | 28,350                      | 431   | 0.005             | 27,300                  | 326  | 0.005             | 27,300                  | 252  | 0.004             |
| "               | 2                          | 0°30                 | 32,550                                              | 368   | 0.005             | 22,575                      | 252   | 0.004             | 21,000                  | 200  | 0.003             | 21,000                  | 179  | 0.003             |
| "               | 1.5                        | 1°                   | 42,000                                              | 630   | 0.007             | 28,350                      | 431   | 0.005             | 27,300                  | 326  | 0.005             | 27,300                  | 252  | 0.004             |
| "               | 2                          | 1°                   | 32,550                                              | 368   | 0.005             | 22,575                      | 252   | 0.004             | 21,000                  | 200  | 0.003             | 21,000                  | 179  | 0.003             |
| "               | 2.5                        | 1°                   | 28,000                                              | 230   | 0.002             | 19,500                      | 180   | 0.001             | 17,000                  | 155  | 0.001             | 17,000                  | 155  | 0.001             |
| "               | 1.5                        | 1°30                 | 42,000                                              | 630   | 0.007             | 28,350                      | 431   | 0.005             | 27,300                  | 326  | 0.005             | 27,300                  | 252  | 0.004             |
| "               | 2                          | 1°30                 | 32,550                                              | 368   | 0.005             | 22,575                      | 252   | 0.004             | 21,000                  | 200  | 0.003             | 21,000                  | 179  | 0.003             |
| "               | 2.5                        | 1°30                 | 28,000                                              | 230   | 0.003             | 19,500                      | 180   | 0.001             | 17,000                  | 155  | 0.001             | 17,000                  | 155  | 0.001             |
| "               | 1.5                        | 2°                   | 42,000                                              | 630   | 0.007             | 28,350                      | 431   | 0.005             | 27,300                  | 326  | 0.005             | 27,300                  | 252  | 0.004             |
| "               | 2                          | 2°                   | 32,550                                              | 368   | 0.005             | 22,575                      | 252   | 0.004             | 21,000                  | 200  | 0.003             | 21,000                  | 179  | 0.003             |
| "               | 2.5                        | 2°                   | 28,000                                              | 230   | 0.004             | 19,500                      | 180   | 0.002             | 17,000                  | 155  | 0.001             | 17,000                  | 155  | 0.001             |
| "               | 1.5                        | 3°                   | 42,000                                              | 630   | 0.007             | 28,350                      | 431   | 0.005             | 27,300                  | 326  | 0.005             | 27,300                  | 252  | 0.004             |
| "               | 2                          | 3°                   | 32,550                                              | 368   | 0.005             | 22,575                      | 252   | 0.004             | 21,000                  | 200  | 0.003             | 21,000                  | 179  | 0.003             |
| "               | 2.5                        | 3°                   | 28,000                                              | 230   | 0.004             | 19,500                      | 180   | 0.002             | 17,000                  | 155  | 0.001             | 17,000                  | 155  | 0.001             |
| R 0.15          | 3                          | 0°30                 | 34,650                                              | 641   | 0.008             | 23,310                      | 399   | 0.006             | 21,525                  | 336  | 0.005             | 21,525                  | 294  | 0.004             |
| "               | 2                          | 1°                   | 34,650                                              | 641   | 0.008             | 23,310                      | 399   | 0.006             | 21,525                  | 336  | 0.005             | 21,525                  | 294  | 0.004             |
| "               | 3                          | 1°                   | 34,650                                              | 641   | 0.008             | 23,310                      | 399   | 0.006             | 21,525                  | 336  | 0.005             | 21,525                  | 294  | 0.004             |
| "               | 4                          | 1°                   | 32,550                                              | 494   | 0.005             | 22,050                      | 326   | 0.004             | 19,950                  | 242  | 0.003             | 19,950                  | 189  | 0.001             |
| "               | 5                          | 1°                   | 32,550                                              | 494   | 0.003             | 22,050                      | 326   | 0.002             | 19,950                  | 242  | 0.002             | 19,950                  | 189  | 0.001             |
| "               | 2                          | 1°30                 | 34,650                                              | 641   | 0.008             | 23,310                      | 399   | 0.006             | 21,525                  | 336  | 0.005             | 21,525                  | 294  | 0.004             |
| "               | 3                          | 1°30                 | 34,650                                              | 641   | 0.008             | 23,310                      | 399   | 0.006             | 21,525                  | 336  | 0.005             | 21,525                  | 294  | 0.004             |
| "               | 4                          | 1°30                 | 32,550                                              | 494   | 0.003             | 22,050                      | 326   | 0.002             | 19,950                  | 242  | 0.002             | 19,950                  | 189  | 0.002             |
| "               | 5                          | 1°30                 | 32,550                                              | 494   | 0.003             | 22,050                      | 326   | 0.002             | 19,950                  | 242  | 0.002             | 19,950                  | 189  | 0.002             |
| "               | 2                          | 2°                   | 34,650                                              | 641   | 0.008             | 23,310                      | 399   | 0.006             | 21,525                  | 336  | 0.005             | 21,525                  | 294  | 0.004             |
| "               | 3                          | 2°                   | 34,650                                              | 641   | 0.008             | 23,310                      | 399   | 0.006             | 21,525                  | 336  | 0.005             | 21,525                  | 294  | 0.004             |
| "               | 4                          | 2°                   | 32,550                                              | 494   | 0.003             | 22,050                      | 326   | 0.002             | 19,950                  | 242  | 0.002             | 19,950                  | 189  | 0.002             |
| "               | 5                          | 2°                   | 32,550                                              | 494   | 0.003             | 22,050                      | 326   | 0.002             | 19,950                  | 242  | 0.002             | 19,950                  | 189  | 0.002             |
| "               | 2                          | 3°                   | 34,650                                              | 641   | 0.008             | 23,310                      | 399   | 0.006             | 21,525                  | 336  | 0.005             | 21,525                  | 294  | 0.004             |
| "               | 3                          | 3°                   | 34,650                                              | 641   | 0.008             | 23,310                      | 399   | 0.006             | 21,525                  | 336  | 0.005             | 21,525                  | 294  | 0.004             |
| "               | 4                          | 3°                   | 32,550                                              | 494   | 0.004             | 22,050                      | 326   | 0.003             | 19,950                  | 242  | 0.002             | 19,950                  | 189  | 0.003             |
| "               | 5                          | 3°                   | 32,550                                              | 494   | 0.004             | 22,050                      | 326   | 0.003             | 19,950                  | 242  | 0.002             | 19,950                  | 189  | 0.003             |
| R 0.2           | 2                          | 0°30                 | 32,000                                              | 1,155 | 0.016             | 28,350                      | 788   | 0.013             | 26,250                  | 672  | 0.011             | 26,250                  | 473  | 0.008             |
| "               | 3                          | 0°30                 | 30,000                                              | 950   | 0.016             | 26,300                      | 650   | 0.013             | 23,800                  | 580  | 0.011             | 23,800                  | 395  | 0.008             |
| "               | 4                          | 0°30                 | 28,000                                              | 780   | 0.010             | 21,000                      | 500   | 0.008             | 19,000                  | 475  | 0.007             | 19,000                  | 325  | 0.005             |
| "               | 5                          | 0°30                 | 25,200                                              | 525   | 0.004             | 17,850                      | 326   | 0.003             | 16,800                  | 294  | 0.003             | 16,800                  | 252  | 0.002             |
| "               | 6                          | 0°30                 | 25,200                                              | 525   | 0.004             | 17,850                      | 326   | 0.003             | 16,800                  | 294  | 0.003             | 16,800                  | 252  | 0.002             |
| "               | 2                          | 1°                   | 32,000                                              | 1,155 | 0.016             | 28,350                      | 788   | 0.013             | 26,250                  | 672  | 0.011             | 26,250                  | 473  | 0.008             |
| "               | 3                          | 1°                   | 30,000                                              | 950   | 0.016             | 26,300                      | 650   | 0.013             | 23,800                  | 580  | 0.011             | 23,800                  | 395  | 0.008             |
| "               | 4                          | 1°                   | 28,000                                              | 780   | 0.010             | 21,000                      | 500   | 0.008             | 19,000                  | 475  | 0.007             | 19,000                  | 325  | 0.005             |
| "               | 5                          | 1°                   | 25,200                                              | 525   | 0.004             | 17,850                      | 326   | 0.003             | 16,800                  | 294  | 0.003             | 16,800                  | 252  | 0.002             |
| "               | 6                          | 1°                   | 25,200                                              | 525   | 0.004             | 17,850                      | 326   | 0.003             | 16,800                  | 294  | 0.003             | 16,800                  | 252  | 0.002             |
| "               | 2                          | 2°                   | 32,000                                              | 1,155 | 0.016             | 28,350                      | 788   | 0.013             | 26,250                  | 672  | 0.011             | 26,250                  | 473  | 0.008             |
| "               | 3                          | 2°                   | 30,000                                              | 950   | 0.016             | 26,300                      | 650   | 0.013             | 23,800                  | 580  | 0.011             | 23,800                  | 395  | 0.008             |
| "               | 4                          | 2°                   | 28,000                                              | 780   | 0.010             | 21,000                      | 500   | 0.008             | 19,000                  | 475  | 0.007             | 19,000                  | 325  | 0.005             |
| "               | 5                          | 2°                   | 25,200                                              | 525   | 0.004             | 17,850                      | 326   | 0.003             | 16,800                  | 294  | 0.003             | 16,800                  | 252  | 0.002             |
| "               | 6                          | 2°                   | 25,200                                              | 525   | 0.004             | 17,850                      | 326   | 0.003             | 16,800                  | 294  | 0.003             | 16,800                  | 252  | 0.002             |
| R 0.25          | 4                          | 0°30                 | 34,650                                              | 1,187 | 0.019             | 28,350                      | 861   | 0.015             | 24,675                  | 630  | 0.013             | 24,675                  | 609  | 0.011             |
| "               | 6                          | 0°30                 | 21,525                                              | 609   | 0.006             | 17,850                      | 431   | 0.005             | 15,750                  | 368  | 0.004             | 15,750                  | 326  | 0.003             |
| "               | 4                          | 1°                   | 34,650                                              | 1,187 | 0.019             | 28,350                      | 861   | 0.015             | 24,675                  | 630  | 0.013             | 24,675                  | 609  | 0.011             |
| "               | 6                          | 1°                   | 21,525                                              | 609   | 0.006             | 17,850                      | 431   | 0.005             | 15,750                  | 368  | 0.004             | 15,750                  | 326  | 0.003             |
| "               | 8                          | 1°                   | 21,525                                              | 609   | 0.005             | 17,850                      | 431   | 0.004             | 15,750                  | 368  | 0.003             | 15,750                  | 326  | 0.003             |
| "               | 10                         | 1°                   | 21,525                                              | 609   | 0.004             | 17,850                      | 431   | 0.003             | 15,750                  | 368  | 0.003             | 15,750                  | 326  | 0.003             |
| "               | 4                          | 1°30                 | 34,650                                              | 1,187 | 0.019             | 28,350                      | 861   | 0.015             | 24,675                  | 630  | 0.013             | 24,675                  | 609  | 0.011             |
| "               | 6                          | 1°30                 | 21,525                                              | 609   | 0.008             | 17,850                      | 431   | 0.005             | 15,750                  | 368  | 0.006             | 15,750                  | 326  | 0.005             |
| "               | 8                          | 1°30                 | 21,525                                              | 609   | 0.007             | 17,850                      | 431   | 0.005             | 15,750                  | 368  | 0.005             | 15,750                  | 326  | 0.004             |
| "               | 10                         | 1°30                 | 21,525                                              | 609   | 0.006             | 17,850                      | 431   | 0.005             | 15,750                  | 368  | 0.004             | 15,750                  | 326  | 0.003             |
| "               | 4                          | 2°                   | 34,650                                              | 1,187 | 0.019             | 28,350                      | 861   | 0.015             | 24,675                  | 630  | 0.013             | 24,675                  | 609  | 0.011             |
| "               | 6                          | 2°                   | 21,525                                              | 609   | 0.006             | 17,850                      | 431   | 0.005             | 15,750                  | 368  | 0.004             | 15,750                  | 326  | 0.003             |
| "               | 8                          | 2°                   | 21,525                                              | 609   | 0.006             | 17,850                      | 431   | 0.005             | 15,750                  | 368  | 0.004             | 15,750                  | 326  | 0.003             |
| "               | 10                         | 2°                   | 21,525                                              | 609   | 0.006             | 17,850                      | 431   | 0.005             | 15,750                  | 368  | 0.004             | 15,750                  | 326  | 0.003             |
| R 0.3           | 4                          | 0°30                 | 43,050                                              | 2,142 | 0.032             | 31,500                      | 1,418 | 0.022             | 23,625                  | 788  | 0.021             | 23,625                  | 704  | 0.016             |
| "               | 8                          | 0°30                 | 26,775                                              | 998   | 0.016             | 22,050                      | 735   | 0.013             | 16,800                  | 515  | 0.011             | 16,800                  | 410  | 0.008             |
| "               | 12                         | 0°30                 | 26,250                                              | 893   | 0.008             | 22,575                      | 714   | 0.006             | 14,700                  | 399  | 0.005             | 13,650                  | 336  | 0.004             |
| "               | 4                          | 1°                   | 43,050                                              | 2,142 | 0.032             | 31,500                      | 1,418 | 0.022             | 23,625                  | 788  | 0.021             | 23,625                  | 704  | 0.016             |
| "               | 8                          | 1°                   | 26,775                                              | 998   | 0.020             | 22,050                      | 735   | 0.015             | 16,800                  | 515  | 0.013             | 16,800                  | 410  | 0.009             |
| "               | 12                         | 1°                   | 26,250                                              | 893   | 0.010             | 22,575                      | 714   | 0.012             | 14,700                  | 399  | 0.008             | 13,650                  | 336  | 0.005             |

# 2JJTB Cutting Condition

•RPM : rev./min •Feed : mm/min

| 피삭재<br>Material |                         |                   | 동/탄소강<br>Copper / Carbon Steels<br>Cu / S45C / S50C |       |                   | 프리하든강<br>Prehardened Steels |       |                   | 고경도강<br>Hardened Steels |      |                   | 고경도강<br>Hardened Steels |      |                   |
|-----------------|-------------------------|-------------------|-----------------------------------------------------|-------|-------------------|-----------------------------|-------|-------------------|-------------------------|------|-------------------|-------------------------|------|-------------------|
| 경도 Hardness     |                         |                   | 30 ~ 45HRC                                          |       |                   | 30 ~ 45HRC                  |       |                   | 45 ~ 55HRC              |      |                   | 55 ~ 68HRC              |      |                   |
| 반경<br>Radius    | 유효장<br>Effective Length | 각도<br>Taper Angle | RPM                                                 | FEED  | Ap<br>Axial Depth | RPM                         | FEED  | Ap<br>Axial Depth | RPM                     | FEED | Ap<br>Axial Depth | RPM                     | FEED | Ap<br>Axial Depth |
| R 0.3           | 4                       | 1°30              | 43,050                                              | 2,142 | 0.032             | 31,500                      | 1,418 | 0.022             | 23,625                  | 788  | 0.021             | 23,625                  | 704  | 0.016             |
| "               | 8                       | 1°30              | 26,775                                              | 998   | 0.020             | 22,050                      | 735   | 0.015             | 16,800                  | 515  | 0.015             | 16,800                  | 410  | 0.010             |
| "               | 12                      | 1°30              | 26,250                                              | 893   | 0.010             | 22,575                      | 714   | 0.012             | 14,700                  | 399  | 0.010             | 13,650                  | 336  | 0.007             |
| "               | 4                       | 2°                | 43,050                                              | 2,142 | 0.032             | 31,500                      | 1,418 | 0.022             | 23,625                  | 788  | 0.021             | 23,625                  | 704  | 0.016             |
| "               | 8                       | 2°                | 26,775                                              | 998   | 0.022             | 22,050                      | 735   | 0.017             | 16,800                  | 515  | 0.016             | 16,800                  | 410  | 0.010             |
| "               | 12                      | 2°                | 26,250                                              | 893   | 0.012             | 22,575                      | 714   | 0.014             | 14,700                  | 399  | 0.012             | 13,650                  | 336  | 0.007             |
| R 0.4           | 4                       | 0°30              | 43,050                                              | 2,310 | 0.037             | 29,400                      | 1,470 | 0.028             | 24,150                  | 861  | 0.026             | 24,150                  | 714  | 0.016             |
| "               | 8                       | 0°30              | 26,775                                              | 1,365 | 0.021             | 18,900                      | 945   | 0.016             | 15,750                  | 630  | 0.016             | 15,750                  | 578  | 0.011             |
| "               | 12                      | 0°30              | 26,775                                              | 1,050 | 0.016             | 16,275                      | 525   | 0.013             | 12,600                  | 462  | 0.011             | 12,600                  | 420  | 0.007             |
| "               | 4                       | 1°                | 43,050                                              | 2,310 | 0.037             | 29,400                      | 1,470 | 0.028             | 24,150                  | 861  | 0.026             | 24,150                  | 714  | 0.016             |
| "               | 8                       | 1°                | 26,775                                              | 1,365 | 0.021             | 18,900                      | 945   | 0.016             | 15,750                  | 630  | 0.016             | 15,750                  | 578  | 0.011             |
| "               | 12                      | 1°                | 26,775                                              | 1,050 | 0.016             | 16,275                      | 525   | 0.013             | 12,600                  | 462  | 0.011             | 12,600                  | 420  | 0.007             |
| "               | 4                       | 1°30              | 43,050                                              | 2,310 | 0.037             | 29,400                      | 1,470 | 0.028             | 24,150                  | 861  | 0.026             | 24,150                  | 714  | 0.016             |
| "               | 8                       | 1°30              | 26,775                                              | 1,365 | 0.021             | 18,900                      | 945   | 0.016             | 15,750                  | 630  | 0.016             | 15,750                  | 578  | 0.011             |
| "               | 12                      | 1°30              | 26,775                                              | 1,050 | 0.016             | 16,275                      | 525   | 0.013             | 12,600                  | 462  | 0.011             | 12,600                  | 420  | 0.007             |
| "               | 4                       | 2°                | 43,050                                              | 2,310 | 0.037             | 29,400                      | 1,470 | 0.028             | 24,150                  | 861  | 0.026             | 24,150                  | 714  | 0.016             |
| "               | 8                       | 2°                | 26,775                                              | 1,365 | 0.021             | 18,900                      | 945   | 0.016             | 15,750                  | 630  | 0.016             | 15,750                  | 578  | 0.011             |
| "               | 12                      | 2°                | 26,775                                              | 1,050 | 0.016             | 16,275                      | 525   | 0.013             | 12,600                  | 462  | 0.011             | 12,600                  | 420  | 0.007             |

# 2JJTB/3JJTBS Cutting Condition

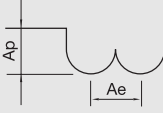
•RPM : rev./min •Feed : mm/min

| 피삭재<br>Material |                         |                   | 동/탄소강<br>Copper / Carbon Steels<br>Cu / S45C / S50C |       |                   | 프리하든강<br>Prehardened Steels |       |                   | 고경도강<br>Hardened Steels |       |                   | 고경도강<br>Hardened Steels |       |                   |
|-----------------|-------------------------|-------------------|-----------------------------------------------------|-------|-------------------|-----------------------------|-------|-------------------|-------------------------|-------|-------------------|-------------------------|-------|-------------------|
| 경도 Hardness     |                         |                   | 30 ~ 45HRC                                          |       |                   | 30 ~ 45HRC                  |       |                   | 45 ~ 55HRC              |       |                   | 55 ~ 68HRC              |       |                   |
| 반경<br>Radius    | 유효장<br>Effective Length | 각도<br>Taper Angle | RPM                                                 | FEED  | Ap<br>Axial Depth | RPM                         | FEED  | Ap<br>Axial Depth | RPM                     | FEED  | Ap<br>Axial Depth | RPM                     | FEED  | Ap<br>Axial Depth |
| R 0.5           | 6                       | 0°30              | 26,250                                              | 2,100 | 0.047             | 17,850                      | 1,365 | 0.037             | 17,850                  | 1,050 | 0.032             | 16,800                  | 861   | 0.026             |
| "               | 10                      | 0°30              | 17,850                                              | 1,103 | 0.023             | 12,600                      | 767   | 0.019             | 11,550                  | 683   | 0.017             | 11,550                  | 525   | 0.013             |
| "               | 20                      | 0°30              | 15,750                                              | 945   | 0.014             | 10,500                      | 683   | 0.011             | 9,450                   | 567   | 0.008             | 9,450                   | 462   | 0.008             |
| "               | 6                       | 1°                | 26,250                                              | 2,100 | 0.047             | 17,850                      | 1,365 | 0.037             | 17,850                  | 1,050 | 0.032             | 16,800                  | 861   | 0.026             |
| "               | 10                      | 1°                | 17,850                                              | 1,103 | 0.023             | 12,600                      | 767   | 0.019             | 11,550                  | 683   | 0.017             | 11,550                  | 525   | 0.013             |
| "               | 20                      | 1°                | 15,750                                              | 945   | 0.014             | 10,500                      | 683   | 0.011             | 9,450                   | 567   | 0.008             | 9,450                   | 462   | 0.008             |
| "               | 30                      | 1°                | 15,750                                              | 750   | 0.007             | 10,500                      | 540   | 0.005             | 9,450                   | 430   | 0.004             | 9,450                   | 360   | 0.004             |
| "               | 6                       | 1°30              | 26,250                                              | 2,100 | 0.047             | 17,850                      | 1,365 | 0.037             | 17,850                  | 1,050 | 0.032             | 16,800                  | 861   | 0.026             |
| "               | 10                      | 1°30              | 17,850                                              | 1,103 | 0.023             | 12,600                      | 767   | 0.019             | 11,550                  | 683   | 0.017             | 11,550                  | 525   | 0.013             |
| "               | 20                      | 1°30              | 15,750                                              | 945   | 0.014             | 10,500                      | 683   | 0.011             | 9,450                   | 567   | 0.008             | 9,450                   | 462   | 0.008             |
| "               | 30                      | 1°30              | 15,750                                              | 750   | 0.007             | 10,500                      | 540   | 0.005             | 9,450                   | 430   | 0.004             | 9,450                   | 360   | 0.004             |
| "               | 20                      | 2°                | 15,750                                              | 945   | 0.014             | 10,500                      | 683   | 0.011             | 9,450                   | 567   | 0.008             | 9,450                   | 462   | 0.008             |
| "               | 30                      | 2°                | 15,750                                              | 750   | 0.007             | 10,500                      | 540   | 0.005             | 9,450                   | 430   | 0.004             | 9,450                   | 360   | 0.004             |
| "               | 20                      | 3°                | 15,750                                              | 945   | 0.014             | 10,500                      | 683   | 0.011             | 9,450                   | 567   | 0.008             | 9,450                   | 462   | 0.008             |
| "               | 30                      | 3°                | 15,750                                              | 750   | 0.007             | 10,500                      | 540   | 0.005             | 9,450                   | 430   | 0.004             | 9,450                   | 360   | 0.004             |
| "               | 40                      | 3°                | 12,250                                              | 550   | 0.004             | 8,550                       | 420   | 0.002             | 7,800                   | 365   | 0.002             | 7,800                   | 285   | 0.002             |
| R 0.75          | 10                      | 0°30              | 18,900                                              | 2,205 | 0.063             | 12,600                      | 1,470 | 0.042             | 12,600                  | 1,155 | 0.037             | 12,600                  | 893   | 0.032             |
| "               | 20                      | 0°30              | 13,650                                              | 1,260 | 0.032             | 9,450                       | 945   | 0.021             | 9,450                   | 735   | 0.016             | 9,450                   | 630   | 0.014             |
| "               | 30                      | 0°30              | 9,450                                               | 893   | 0.016             | 7,350                       | 651   | 0.013             | 7,350                   | 546   | 0.011             | 7,350                   | 504   | 0.011             |
| "               | 10                      | 1°                | 18,900                                              | 2,205 | 0.063             | 12,600                      | 1,470 | 0.042             | 12,600                  | 1,155 | 0.037             | 12,600                  | 893   | 0.032             |
| "               | 20                      | 1°                | 13,650                                              | 1,260 | 0.032             | 9,450                       | 945   | 0.021             | 9,450                   | 735   | 0.016             | 9,450                   | 630   | 0.014             |
| "               | 30                      | 1°                | 9,450                                               | 893   | 0.016             | 7,350                       | 651   | 0.013             | 7,350                   | 546   | 0.011             | 7,350                   | 504   | 0.011             |
| "               | 10                      | 1°30              | 18,900                                              | 2,205 | 0.063             | 12,600                      | 1,470 | 0.042             | 12,600                  | 1,155 | 0.037             | 12,600                  | 893   | 0.032             |
| "               | 20                      | 1°30              | 13,650                                              | 1,260 | 0.036             | 9,450                       | 945   | 0.024             | 9,450                   | 735   | 0.018             | 9,450                   | 630   | 0.016             |
| "               | 30                      | 1°30              | 9,450                                               | 893   | 0.017             | 7,350                       | 651   | 0.014             | 7,350                   | 546   | 0.012             | 7,350                   | 504   | 0.011             |
| "               | 40                      | 1°30              | 8,400                                               | 675   | 0.010             | 6,300                       | 510   | 0.008             | 6,300                   | 420   | 0.007             | 6,300                   | 400   | 0.006             |
| "               | 10                      | 2°                | 18,900                                              | 2,205 | 0.063             | 12,600                      | 1,470 | 0.042             | 12,600                  | 1,155 | 0.037             | 12,600                  | 893   | 0.032             |
| "               | 20                      | 2°                | 13,650                                              | 1,260 | 0.036             | 9,450                       | 945   | 0.024             | 9,450                   | 735   | 0.018             | 9,450                   | 630   | 0.016             |
| "               | 30                      | 2°                | 9,450                                               | 893   | 0.017             | 7,350                       | 651   | 0.014             | 7,350                   | 546   | 0.012             | 7,350                   | 504   | 0.011             |
| "               | 40                      | 2°                | 8,400                                               | 675   | 0.010             | 6,300                       | 510   | 0.008             | 6,300                   | 420   | 0.007             | 6,300                   | 400   | 0.006             |
| R 1             | 12                      | 0°30              | 15,750                                              | 2,468 | 0.084             | 11,550                      | 1,785 | 0.068             | 11,025                  | 1,428 | 0.059             | 11,025                  | 1,124 | 0.048             |
| "               | 20                      | 0°30              | 10,500                                              | 1,470 | 0.063             | 8,400                       | 1,050 | 0.053             | 9,450                   | 1,050 | 0.047             | 9,450                   | 924   | 0.037             |
| "               | 30                      | 0°30              | 9,450                                               | 1,260 | 0.047             | 7,350                       | 840   | 0.037             | 7,350                   | 819   | 0.032             | 7,350                   | 672   | 0.026             |
| "               | 40                      | 0°30              | 9,450                                               | 1,260 | 0.037             | 7,035                       | 819   | 0.032             | 6,300                   | 735   | 0.026             | 6,300                   | 609   | 0.021             |
| "               | 12                      | 1°                | 15,750                                              | 2,468 | 0.084             | 11,550                      | 1,785 | 0.068             | 11,025                  | 1,428 | 0.059             | 11,025                  | 1,124 | 0.048             |
| "               | 20                      | 1°                | 10,500                                              | 1,470 | 0.063             | 8,400                       | 1,050 | 0.053             | 9,450                   | 1,050 | 0.047             | 9,450                   | 924   | 0.037             |

| 파삭재<br>Material |                            |                      | 동/탄소강<br>Copper / Carbon Steels<br>Cu / S45C / S50C |       |                   | 프리하든강<br>Prehardened Steels |       |                   | 고경도강<br>Hardened Steels |       |                   | 고경도강<br>Hardened Steels |       |                   |
|-----------------|----------------------------|----------------------|-----------------------------------------------------|-------|-------------------|-----------------------------|-------|-------------------|-------------------------|-------|-------------------|-------------------------|-------|-------------------|
| 경도 Hardness     |                            |                      | 30 ~ 45HRC                                          |       |                   | 30 ~ 45HRC                  |       |                   | 45 ~ 55HRC              |       |                   | 55 ~ 68HRC              |       |                   |
| 반경<br>Radius    | 유효장<br>Effective<br>Length | 각도<br>Taper<br>Angle | RPM                                                 | FEED  | Ap<br>Axial Depth | RPM                         | FEED  | Ap<br>Axial Depth | RPM                     | FEED  | Ap<br>Axial Depth | RPM                     | FEED  | Ap<br>Axial Depth |
| R 1             | 30                         | 1°                   | 9,450                                               | 1,260 | 0.047             | 7,350                       | 840   | 0.037             | 7,350                   | 819   | 0.032             | 7,350                   | 672   | 0.026             |
| "               | 40                         | 1°                   | 9,450                                               | 1,260 | 0.037             | 7,035                       | 819   | 0.032             | 6,300                   | 735   | 0.026             | 6,300                   | 609   | 0.021             |
| "               | 50                         | 1°                   | 7,900                                               | 990   | 0.027             | 6,650                       | 770   | 0.025             | 5,600                   | 655   | 0.022             | 5,600                   | 525   | 0.015             |
| "               | 12                         | 1°30                 | 15,750                                              | 2,468 | 0.090             | 11,550                      | 1,785 | 0.068             | 11,025                  | 1,428 | 0.065             | 11,025                  | 1,124 | 0.052             |
| "               | 20                         | 1°30                 | 10,500                                              | 1,470 | 0.074             | 8,400                       | 1,050 | 0.060             | 9,450                   | 1,050 | 0.054             | 9,450                   | 924   | 0.042             |
| "               | 30                         | 1°30                 | 9,450                                               | 1,260 | 0.055             | 7,350                       | 840   | 0.043             | 7,350                   | 819   | 0.038             | 7,350                   | 672   | 0.031             |
| "               | 40                         | 1°30                 | 9,450                                               | 1,260 | 0.043             | 7,035                       | 819   | 0.037             | 6,300                   | 735   | 0.033             | 6,300                   | 609   | 0.026             |
| "               | 50                         | 1°30                 | 7,900                                               | 990   | 0.030             | 6,650                       | 770   | 0.028             | 5,600                   | 655   | 0.029             | 5,600                   | 525   | 0.021             |
| "               | 30                         | 2°                   | 9,450                                               | 1,260 | 0.055             | 7,350                       | 840   | 0.043             | 7,350                   | 819   | 0.038             | 7,350                   | 672   | 0.031             |
| "               | 40                         | 2°                   | 9,450                                               | 1,260 | 0.043             | 7,035                       | 819   | 0.037             | 6,300                   | 735   | 0.033             | 6,300                   | 609   | 0.026             |
| "               | 50                         | 2°                   | 7,900                                               | 990   | 0.030             | 6,650                       | 770   | 0.028             | 5,600                   | 655   | 0.029             | 5,600                   | 525   | 0.021             |
| "               | 30                         | 3°                   | 9,450                                               | 1,260 | 0.055             | 7,350                       | 840   | 0.043             | 7,350                   | 819   | 0.038             | 7,350                   | 672   | 0.031             |
| "               | 40                         | 3°                   | 9,450                                               | 1,260 | 0.043             | 7,035                       | 819   | 0.037             | 6,300                   | 735   | 0.033             | 6,300                   | 609   | 0.026             |
| "               | 50                         | 3°                   | 7,900                                               | 990   | 0.030             | 6,650                       | 770   | 0.028             | 5,600                   | 655   | 0.029             | 5,600                   | 525   | 0.021             |
| R 1.5           | 20                         | 0°30                 | 10,500                                              | 2,310 | 0.095             | 8,400                       | 1,365 | 0.074             | 7,350                   | 1,260 | 0.063             | 7,350                   | 1,155 | 0.053             |
| "               | 30                         | 0°30                 | 9,450                                               | 1,890 | 0.079             | 7,350                       | 1,103 | 0.063             | 6,300                   | 1,050 | 0.053             | 6,300                   | 924   | 0.044             |
| "               | 40                         | 0°30                 | 7,875                                               | 1,470 | 0.063             | 5,250                       | 924   | 0.053             | 5,355                   | 840   | 0.042             | 5,355                   | 735   | 0.037             |
| "               | 50                         | 0°30                 | 7,875                                               | 1,365 | 0.042             | 5,250                       | 840   | 0.032             | 5,355                   | 788   | 0.026             | 5,355                   | 683   | 0.024             |
| "               | 20                         | 1°                   | 10,500                                              | 2,310 | 0.095             | 8,400                       | 1,365 | 0.074             | 7,350                   | 1,260 | 0.063             | 7,350                   | 1,155 | 0.053             |
| "               | 30                         | 1°                   | 9,450                                               | 1,890 | 0.079             | 7,350                       | 1,103 | 0.063             | 6,300                   | 1,050 | 0.053             | 6,300                   | 924   | 0.044             |
| "               | 40                         | 1°                   | 7,875                                               | 1,470 | 0.063             | 5,250                       | 924   | 0.053             | 5,155                   | 840   | 0.042             | 5,155                   | 735   | 0.037             |
| "               | 50                         | 1°                   | 7,875                                               | 1,365 | 0.042             | 5,250                       | 840   | 0.032             | 5,155                   | 788   | 0.026             | 5,155                   | 683   | 0.024             |
| "               | 60                         | 1°                   | 6,400                                               | 1,225 | 0.028             | 4,325                       | 710   | 0.021             | 4,300                   | 670   | 0.018             | 4,300                   | 540   | 0.016             |
| "               | 20                         | 1°30                 | 10,500                                              | 2,310 | 0.095             | 8,400                       | 1,365 | 0.074             | 7,350                   | 1,260 | 0.063             | 7,350                   | 1,155 | 0.053             |
| "               | 30                         | 1°30                 | 9,450                                               | 1,890 | 0.079             | 7,350                       | 1,103 | 0.063             | 6,300                   | 1,050 | 0.053             | 6,300                   | 924   | 0.044             |
| "               | 40                         | 1°30                 | 7,875                                               | 1,470 | 0.063             | 5,250                       | 924   | 0.053             | 5,355                   | 840   | 0.042             | 5,355                   | 735   | 0.037             |
| "               | 50                         | 1°30                 | 7,875                                               | 1,365 | 0.042             | 5,250                       | 840   | 0.032             | 5,355                   | 788   | 0.026             | 5,355                   | 683   | 0.024             |
| "               | 60                         | 1°30                 | 6,400                                               | 1,225 | 0.028             | 4,325                       | 710   | 0.021             | 4,300                   | 670   | 0.018             | 4,300                   | 540   | 0.016             |
| "               | 20                         | 2°                   | 10,500                                              | 2,310 | 0.095             | 8,400                       | 1,365 | 0.074             | 7,350                   | 1,260 | 0.063             | 7,350                   | 1,155 | 0.053             |
| "               | 30                         | 2°                   | 9,450                                               | 1,890 | 0.079             | 7,350                       | 1,103 | 0.063             | 6,300                   | 1,050 | 0.053             | 6,300                   | 924   | 0.044             |
| "               | 48                         | 2°                   | 7,875                                               | 1,365 | 0.042             | 5,250                       | 840   | 0.032             | 5,355                   | 788   | 0.026             | 5,355                   | 683   | 0.024             |
| "               | 60                         | 2°                   | 6,400                                               | 1,225 | 0.028             | 4,325                       | 710   | 0.021             | 4,300                   | 670   | 0.018             | 4,300                   | 540   | 0.016             |
| "               | 30                         | 3°                   | 9,450                                               | 1,890 | 0.079             | 7,350                       | 1,103 | 0.063             | 6,300                   | 1,050 | 0.053             | 6,300                   | 924   | 0.044             |
| "               | 50                         | 3°                   | 7,875                                               | 1,365 | 0.042             | 5,250                       | 840   | 0.032             | 5,355                   | 788   | 0.026             | 5,355                   | 683   | 0.024             |
| R 2             | 40                         | 0°30                 | 6,300                                               | 1,260 | 0.085             | 3,675                       | 630   | 0.068             | 3,360                   | 557   | 0.053             | 3,360                   | 525   | 0.045             |
| "               | 60                         | 0°30                 | 4,200                                               | 767   | 0.063             | 3,150                       | 473   | 0.047             | 2,940                   | 420   | 0.042             | 2,940                   | 368   | 0.033             |
| "               | 50                         | 1°                   | 5,250                                               | 1,010 | 0.074             | 3,450                       | 550   | 0.058             | 3,120                   | 480   | 0.048             | 3,110                   | 445   | 0.038             |
| "               | 60                         | 1°                   | 4,200                                               | 767   | 0.063             | 3,150                       | 473   | 0.047             | 2,940                   | 420   | 0.042             | 2,940                   | 368   | 0.033             |
| "               | 70                         | 1°                   | 3,200                                               | 540   | 0.048             | 2,760                       | 320   | 0.036             | 2,770                   | 360   | 0.036             | 2,770                   | 300   | 0.028             |
| "               | 45                         | 1°30                 | 5,250                                               | 1,010 | 0.074             | 3,450                       | 550   | 0.058             | 3,120                   | 480   | 0.048             | 3,110                   | 445   | 0.038             |
| "               | 60                         | 1°30                 | 4,200                                               | 767   | 0.063             | 3,150                       | 473   | 0.047             | 2,940                   | 420   | 0.042             | 2,940                   | 368   | 0.033             |
| "               | 70                         | 1°30                 | 3,200                                               | 540   | 0.048             | 2,760                       | 320   | 0.036             | 2,770                   | 360   | 0.036             | 2,770                   | 300   | 0.028             |
| "               | 25                         | 3°                   | 9,450                                               | 1,890 | 0.079             | 7,350                       | 1,103 | 0.063             | 6,300                   | 1,050 | 0.053             | 6,300                   | 924   | 0.044             |
| "               | 42                         | 3°                   | 7,875                                               | 1,365 | 0.042             | 5,250                       | 840   | 0.032             | 5,355                   | 788   | 0.026             | 5,355                   | 683   | 0.024             |
| R 2.5           | 40                         | 1°                   | 6,300                                               | 1,260 | 0.085             | 3,675                       | 630   | 0.068             | 3,360                   | 557   | 0.053             | 3,360                   | 525   | 0.045             |
| "               | 60                         | 1°                   | 4,200                                               | 767   | 0.063             | 3,150                       | 473   | 0.047             | 2,940                   | 420   | 0.042             | 2,940                   | 368   | 0.033             |
| "               | 90                         | 1°                   | 2,200                                               | 480   | 0.041             | 2,450                       | 280   | 0.030             | 2,470                   | 250   | 0.028             | 2,200                   | 237   | 0.023             |
| "               | 40                         | 1°30                 | 6,300                                               | 1,260 | 0.085             | 3,675                       | 630   | 0.068             | 3,360                   | 557   | 0.053             | 3,360                   | 525   | 0.045             |
| "               | 60                         | 1°30                 | 4,200                                               | 767   | 0.063             | 3,150                       | 473   | 0.047             | 2,940                   | 420   | 0.042             | 2,940                   | 368   | 0.033             |
| "               | 90                         | 1°30                 | 2,200                                               | 480   | 0.041             | 2,450                       | 280   | 0.030             | 2,470                   | 250   | 0.028             | 2,200                   | 237   | 0.023             |
| R 3             | 40                         | 1°                   | 9,450                                               | 2,205 | 0.147             | 7,350                       | 1,103 | 0.105             | 6,300                   | 998   | 0.084             | 6,300                   | 893   | 0.061             |
| "               | 50                         | 1°                   | 7,800                                               | 1,910 | 0.122             | 5,980                       | 980   | 0.088             | 5,000                   | 845   | 0.070             | 5,300                   | 760   | 0.055             |
| "               | 60                         | 1°                   | 6,100                                               | 1,670 | 0.105             | 5,285                       | 820   | 0.070             | 4,180                   | 760   | 0.062             | 4,300                   | 620   | 0.048             |
| "               | 70                         | 1°                   | 4,725                                               | 1,470 | 0.074             | 4,095                       | 735   | 0.063             | 3,570                   | 683   | 0.053             | 3,570                   | 578   | 0.042             |
| "               | 80                         | 1°                   | 3,540                                               | 1,320 | 0.061             | 3,400                       | 640   | 0.046             | 2,100                   | 510   | 0.040             | 2,100                   | 468   | 0.033             |
| "               | 49                         | 1°30                 | 7,800                                               | 1,910 | 0.122             | 5,980                       | 980   | 0.088             | 5,000                   | 845   | 0.070             | 5,300                   | 760   | 0.055             |
| "               | 85                         | 1°30                 | 3,360                                               | 1,220 | 0.055             | 3,100                       | 580   | 0.040             | 1,880                   | 460   | 0.035             | 1,880                   | 448   | 0.028             |
| "               | 60                         | 2°                   | 6,100                                               | 1,670 | 0.105             | 5,285                       | 820   | 0.070             | 4,180                   | 760   | 0.062             | 4,300                   | 620   | 0.048             |
| "               | 90                         | 2°                   | 3,000                                               | 1,050 | 0.055             | 2,870                       | 520   | 0.040             | 1,720                   | 410   | 0.035             | 1,720                   | 400   | 0.028             |
| R 4             | 50                         | 1°                   | 9,345                                               | 2,310 | 0.189             | 7,350                       | 1,155 | 0.147             | 6,300                   | 1,050 | 0.105             | 6,300                   | 840   | 0.086             |
| "               | 60                         | 1°                   | 7,150                                               | 1,846 | 0.138             | 5,330                       | 916   | 0.114             | 4,550                   | 820   | 0.080             | 4,550                   | 655   | 0.064             |
| "               | 80                         | 1°                   | 4,515                                               | 1,365 | 0.095             | 3,360                       | 683   | 0.084             | 3,045                   | 578   | 0.068             | 3,045                   | 473   | 0.042             |
| "               | 52                         | 1°30                 | 9,345                                               | 2,310 | 0.197             | 7,350                       | 1,155 | 0.154             | 6,300                   | 1,050 | 0.113             | 6,300                   | 840   | 0.094             |
| "               | 89                         | 1°30                 | 3,400                                               | 1,090 | 0.073             | 2,970                       | 578   | 0.046             | 1,890                   | 454   | 0.041             | 1,860                   | 443   | 0.033             |

# 2JJTB/3JJTBS Cutting Condition

•RPM : rev./min •Feed : mm/min

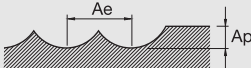
| 파삭재<br>Material     |                         |                   | 동/탄소강<br>Copper / Carbon Steels<br>Cu / S45C / S50C                                                                                                                                                                                                                   |       |                   | 프리하든강<br>Prehardened Steels |      |                   | 고경도강<br>Hardened Steels |      |                   | 고경도강<br>Hardened Steels |      |                   |
|---------------------|-------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|-----------------------------|------|-------------------|-------------------------|------|-------------------|-------------------------|------|-------------------|
| 경도 Hardness         |                         |                   | 30 ~ 45HRC                                                                                                                                                                                                                                                            |       |                   | 30 ~ 45HRC                  |      |                   | 45 ~ 55HRC              |      |                   | 55 ~ 68HRC              |      |                   |
| 반경<br>Radius        | 유효장<br>Effective Length | 각도<br>Taper Angle | RPM                                                                                                                                                                                                                                                                   | FEED  | Ap<br>Axial Depth | RPM                         | FEED | Ap<br>Axial Depth | RPM                     | FEED | Ap<br>Axial Depth | RPM                     | FEED | Ap<br>Axial Depth |
| R 5                 | 60                      | 1°                | 5,775                                                                                                                                                                                                                                                                 | 1,785 | 0.194             | 3,675                       | 893  | 0.168             | 3,570                   | 735  | 0.126             | 3,570                   | 630  | 0.084             |
| "                   | 75                      | 1°                | 4,200                                                                                                                                                                                                                                                                 | 998   | 0.093             | 3,150                       | 504  | 0.068             | 2,940                   | 420  | 0.053             | 2,940                   | 336  | 0.034             |
| "                   | 54                      | 1°30'             | 6,175                                                                                                                                                                                                                                                                 | 1,850 | 0.220             | 3,935                       | 923  | 0.185             | 3,760                   | 768  | 0.146             | 3,760                   | 678  | 0.097             |
| R 6                 | 85                      | 1°30'             | 2,940                                                                                                                                                                                                                                                                 | 336   | 0.063             | 1,995                       | 168  | 0.032             | 1,575                   | 158  | 0.016             | 1,575                   | 105  | 0.011             |
| "                   | 63                      | 3°                | 3,990                                                                                                                                                                                                                                                                 | 735   | 0.126             | 2,940                       | 368  | 0.086             | 2,625                   | 326  | 0.063             | 2,625                   | 231  | 0.047             |
| 절입량<br>Depth of Cut |                         |                   |  <p>Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/>Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/>D : Outside Diameter 외경 (mm)<br/>n : Speed 회전속도 (min<sup>-1</sup>)<br/>Vf : Feed 이송속도 (mm/min)</p> |       |                   |                             |      |                   |                         |      |                   |                         |      |                   |

- 절삭조건에 없는 각도는 같은 직경에 이전 각도와 비례하여 사용 하십시오.
- 이송속도 및 축 방향의 절입 깊이는 리브창과 테이퍼각에 따라 고려하시고, 절삭 상황에 맞추어 조정 하십시오.
- 에어브로 혹은 미스트 쿨런트를 추천하며, 동 가공시 습식 쿨런트 추천 합니다.
- 상기 절삭조건은 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.

- If there is no same taper angle of your endmill on the table, refer to the previous taper angle of diameter and apply the same proportion.
- Adjust the value of the feed and Ap based on the effective length and taper angle, and adjust the milling condition.
- Air blow or mist coolant is recommended, and wet coolants are recommended for copper milling.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Where the parameters exceed the machine's maximum spindle speed, the RPM and feedrate should be reduced proportionally.
- Note for chip emission, heat or ignition.

# 2JJSP Cutting Condition

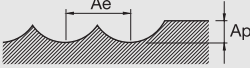
•RPM : rev./min •Feed : mm/min

| 파삭재<br>Material                                                                     | 합금강 / 공구강<br>Alloy Steels / Tool Steels                                             |       | 프리하든강<br>Prehardened Steels |       | 스테인레스강<br>Stainless Steels |       | 고경도강<br>Hardened Steels |       | 고경도강<br>Hardened Steels |                                                                                     |    |    |    |       |       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|-----------------------------|-------|----------------------------|-------|-------------------------|-------|-------------------------|-------------------------------------------------------------------------------------|----|----|----|-------|-------|
| 경도 Hardness                                                                         | ~ 30HRC                                                                             |       | 30 ~ 38HRC                  |       | 38 ~ 45HRC                 |       | 45 ~ 55HRC              |       | 55 ~ 70HRC              |                                                                                     |    |    |    |       |       |
| 반경 Radius                                                                           | RPM                                                                                 | FEED  | RPM                         | FEED  | RPM                        | FEED  | RPM                     | FEED  | RPM                     | FEED                                                                                |    |    |    |       |       |
| R 0.5                                                                               | 25,600                                                                              | 680   | 25,600                      | 680   | 25,600                     | 680   | 25,600                  | 680   | 25,600                  | 610                                                                                 |    |    |    |       |       |
| R 0.75                                                                              | 22,000                                                                              | 850   | 22,000                      | 850   | 22,000                     | 850   | 22,000                  | 850   | 22,000                  | 750                                                                                 |    |    |    |       |       |
| R 1                                                                                 | 19,200                                                                              | 1,080 | 19,200                      | 1,080 | 19,200                     | 1,080 | 19,200                  | 1,080 | 17,600                  | 960                                                                                 |    |    |    |       |       |
| R 2                                                                                 | 12,400                                                                              | 1,440 | 11,200                      | 1,240 | 10,800                     | 1,160 | 10,000                  | 1,080 | 8,800                   | 920                                                                                 |    |    |    |       |       |
| R 3                                                                                 | 8,400                                                                               | 1,480 | 7,600                       | 1,360 | 7,200                      | 1,280 | 6,800                   | 1,200 | 5,900                   | 1,040                                                                               |    |    |    |       |       |
| R 4                                                                                 | 6,400                                                                               | 1,120 | 5,700                       | 1,000 | 5,500                      | 960   | 5,100                   | 880   | 4,400                   | 790                                                                                 |    |    |    |       |       |
| R 5                                                                                 | 5,100                                                                               | 880   | 4,600                       | 800   | 4,400                      | 784   | 4,000                   | 720   | 3,600                   | 640                                                                                 |    |    |    |       |       |
| R 6                                                                                 | 4,800                                                                               | 840   | 3,800                       | 670   | 3,640                      | 640   | 3,400                   | 600   | 3,000                   | 540                                                                                 |    |    |    |       |       |
| 절입량<br>Depth of Cut                                                                 |  |       |                             |       |                            |       |                         |       |                         | <table><tr><td>Ap</td><td>Ae</td></tr><tr><td>0.05D</td><td>0.05D</td></tr></table> |    | Ap | Ae | 0.05D | 0.05D |
|                                                                                     |                                                                                     |       |                             |       |                            |       |                         |       |                         | Ap                                                                                  | Ae |    |    |       |       |
|                                                                                     | 0.05D                                                                               | 0.05D |                             |       |                            |       |                         |       |                         |                                                                                     |    |    |    |       |       |
| <table><tr><td>Ap</td><td>Ae</td></tr><tr><td>0.02D</td><td>0.05D</td></tr></table> |                                                                                     | Ap    | Ae                          | 0.02D | 0.05D                      |       |                         |       |                         |                                                                                     |    |    |    |       |       |
| Ap                                                                                  | Ae                                                                                  |       |                             |       |                            |       |                         |       |                         |                                                                                     |    |    |    |       |       |
| 0.02D                                                                               | 0.05D                                                                               |       |                             |       |                            |       |                         |       |                         |                                                                                     |    |    |    |       |       |

- 절삭조건인 ap, ae 수치는 황삭 및 황중삭의 수치 이므로, 견고한 조도의 가공을 원하시면 황삭 값의 50%를 적용 하십시오.
- 상기 절삭조건은 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과 하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- The values of ap and ae on the table are for roughing or semi-roughing. If you need a great surface roughness, apply 50% of the value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.

# 4JJSP/4JJSPM Cutting Condition

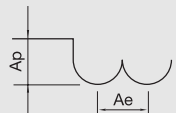
• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material     | 합금강 / 공구강<br>Alloy Steels / Tool Steels                                           |       | 프리트강<br>Prehardened Steels |       | 스테인리스강<br>Stainless Steels |       | 고경도강<br>Hardened Steels                                                             |       | 고경도강<br>Hardened Steels |       |       |       |                                                                                     |  |    |    |       |       |
|---------------------|-----------------------------------------------------------------------------------|-------|----------------------------|-------|----------------------------|-------|-------------------------------------------------------------------------------------|-------|-------------------------|-------|-------|-------|-------------------------------------------------------------------------------------|--|----|----|-------|-------|
| 경도 Hardness         | ~ 30HRC                                                                           |       | 30 ~ 38HRC                 |       | 38 ~ 45HRC                 |       | 45 ~ 55HRC                                                                          |       | 55 ~ 70HRC              |       |       |       |                                                                                     |  |    |    |       |       |
| 반경 Radius           | RPM                                                                               | FEED  | RPM                        | FEED  | RPM                        | FEED  | RPM                                                                                 | FEED  | RPM                     | FEED  |       |       |                                                                                     |  |    |    |       |       |
| R 0.5               | 25,600                                                                            | 806   | 25,600                     | 806   | 25,600                     | 806   | 25,600                                                                              | 806   | 25,600                  | 723   |       |       |                                                                                     |  |    |    |       |       |
| R 0.75              | 22,000                                                                            | 1,007 | 22,000                     | 1,007 | 22,000                     | 1,007 | 22,000                                                                              | 1,007 | 22,000                  | 889   |       |       |                                                                                     |  |    |    |       |       |
| R 1                 | 19,200                                                                            | 1,280 | 19,200                     | 1,280 | 19,200                     | 1,280 | 19,200                                                                              | 1,280 | 17,600                  | 1,138 |       |       |                                                                                     |  |    |    |       |       |
| R 2                 | 12,400                                                                            | 1,706 | 11,200                     | 1,469 | 10,800                     | 1,375 | 10,000                                                                              | 1,280 | 8,800                   | 1,090 |       |       |                                                                                     |  |    |    |       |       |
| R 3                 | 8,400                                                                             | 1,754 | 7,600                      | 1,612 | 7,200                      | 1,517 | 6,800                                                                               | 1,422 | 5,900                   | 1,232 |       |       |                                                                                     |  |    |    |       |       |
| R 4                 | 6,400                                                                             | 1,327 | 5,700                      | 1,185 | 5,500                      | 1,138 | 5,100                                                                               | 1,043 | 4,400                   | 936   |       |       |                                                                                     |  |    |    |       |       |
| R 5                 | 5,100                                                                             | 1,043 | 4,600                      | 948   | 4,400                      | 929   | 4,000                                                                               | 853   | 3,600                   | 758   |       |       |                                                                                     |  |    |    |       |       |
| R 6                 | 4,800                                                                             | 995   | 3,800                      | 794   | 3,640                      | 758   | 3,400                                                                               | 711   | 3,000                   | 640   |       |       |                                                                                     |  |    |    |       |       |
| 절입량<br>Depth of Cut |  |       |                            |       |                            |       | <table><tr><td>Ap</td><td>Ae</td></tr><tr><td>0.05D</td><td>0.05D</td></tr></table> |       | Ap                      | Ae    | 0.05D | 0.05D | <table><tr><td>Ap</td><td>Ae</td></tr><tr><td>0.02D</td><td>0.05D</td></tr></table> |  | Ap | Ae | 0.02D | 0.05D |
|                     |                                                                                   |       |                            |       |                            |       | Ap                                                                                  | Ae    |                         |       |       |       |                                                                                     |  |    |    |       |       |
|                     |                                                                                   |       |                            |       |                            |       | 0.05D                                                                               | 0.05D |                         |       |       |       |                                                                                     |  |    |    |       |       |
| Ap                  | Ae                                                                                |       |                            |       |                            |       |                                                                                     |       |                         |       |       |       |                                                                                     |  |    |    |       |       |
| 0.02D               | 0.05D                                                                             |       |                            |       |                            |       |                                                                                     |       |                         |       |       |       |                                                                                     |  |    |    |       |       |

- 절삭조건의 ap, ae 수치는 황삭 및 황중삭의 수치 이므로, 견고한 조도의 가공을 원하시면 황삭 값의 50%를 적용 하십시오.
- 상기 절삭조건의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스펀들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스펀들 속도와 이송 속도를 비례적으로 조정 하십시오.
- The values of ap and ae on the table are for roughing or semi-roughing. If you need a great surface roughness, apply 50% of the value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.

## 2JJSB/2JJB/3JJB/4JJSB/4JJB

- 3JJB/4JJSB/4JJB는 RPM 동일 FEED만 최대 50% Up 적용
- Use the same RPM and raise up the feed up to 50% for 3JJB/ 4JJSB/ 4JJB

| 파삭재<br>Material     | 고경도강<br>Hardened Steels                                                                                                                                                                                                                                                 |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness         | 55 ~ 62HRC                                                                                                                                                                                                                                                              |       |                   |                    | 62 ~ 65HRC              |       |                   |                    | 65 ~ 68HRC              |       |                   |                    |
| 반경 Radius           | RPM                                                                                                                                                                                                                                                                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.05              | 60,000                                                                                                                                                                                                                                                                  | 150   | 0.002             | 0.003              | 60,000                  | 100   | 0.001             | 0.0012             | 52,500                  | 30    | 0.001             | 0.002              |
| R 0.1               | 60,000                                                                                                                                                                                                                                                                  | 180   | 0.002             | 0.003              | 60,000                  | 120   | 0.002             | 0.003              | 45,000                  | 60    | 0.002             | 0.003              |
| R 0.15              | 45,000                                                                                                                                                                                                                                                                  | 310   | 0.004             | 0.007              | 43,500                  | 180   | 0.003             | 0.005              | 32,500                  | 90    | 0.003             | 0.005              |
| R 0.2               | 37,500                                                                                                                                                                                                                                                                  | 420   | 0.007             | 0.012              | 35,000                  | 240   | 0.005             | 0.008              | 26,250                  | 120   | 0.005             | 0.008              |
| R 0.25              | 33,000                                                                                                                                                                                                                                                                  | 530   | 0.010             | 0.02               | 30,000                  | 300   | 0.007             | 0.01               | 22,500                  | 150   | 0.007             | 0.01               |
| R 0.3               | 30,000                                                                                                                                                                                                                                                                  | 1,200 | 0.02              | 0.1                | 26,500                  | 800   | 0.01              | 0.075              | 20,000                  | 400   | 0.01              | 0.075              |
| R 0.4               | 27,000                                                                                                                                                                                                                                                                  | 1,600 | 0.04              | 0.17               | 23,500                  | 1,000 | 0.02              | 0.12               | 17,500                  | 500   | 0.02              | 0.12               |
| R 0.5               | 24,000                                                                                                                                                                                                                                                                  | 2,000 | 0.1               | 0.3                | 21,000                  | 1,750 | 0.05              | 0.2                | 16,000                  | 875   | 0.05              | 0.2                |
| R 0.6               | 21,000                                                                                                                                                                                                                                                                  | 2,000 | 0.1               | 0.3                | 18,000                  | 1,750 | 0.05              | 0.2                | 14,500                  | 875   | 0.05              | 0.2                |
| R 0.75              | 17,000                                                                                                                                                                                                                                                                  | 2,000 | 0.12              | 0.4                | 15,000                  | 1,750 | 0.06              | 0.29               | 11,250                  | 875   | 0.06              | 0.29               |
| R 1                 | 14,000                                                                                                                                                                                                                                                                  | 2,100 | 0.15              | 0.5                | 12,250                  | 1,800 | 0.08              | 0.35               | 9,200                   | 900   | 0.08              | 0.35               |
| R 1.25              | 12,250                                                                                                                                                                                                                                                                  | 2,150 | 0.17              | 0.6                | 10,700                  | 1,850 | 0.1               | 0.45               | 8,050                   | 925   | 0.1               | 0.45               |
| R 1.5               | 10,500                                                                                                                                                                                                                                                                  | 2,200 | 0.2               | 0.7                | 9,200                   | 1,900 | 0.12              | 0.55               | 6,900                   | 950   | 0.12              | 0.55               |
| R 2                 | 9,000                                                                                                                                                                                                                                                                   | 2,300 | 0.25              | 0.95               | 7,900                   | 2,000 | 0.15              | 0.75               | 5,900                   | 1,000 | 0.15              | 0.75               |
| R 2.5               | 7,800                                                                                                                                                                                                                                                                   | 2,500 | 0.25              | 1.05               | 6,800                   | 2,100 | 0.15              | 0.85               | 5,100                   | 1,050 | 0.15              | 0.85               |
| R 3                 | 6,500                                                                                                                                                                                                                                                                   | 2,500 | 0.3               | 1.3                | 5,700                   | 2,200 | 0.2               | 1                  | 4,300                   | 1,100 | 0.2               | 1                  |
| R 4                 | 5,200                                                                                                                                                                                                                                                                   | 2,200 | 0.4               | 1.7                | 4,500                   | 1,900 | 0.25              | 1.35               | 3,400                   | 950   | 0.25              | 1.35               |
| R 5                 | 4,300                                                                                                                                                                                                                                                                   | 2,000 | 0.5               | 2.1                | 3,750                   | 1,750 | 0.3               | 1.7                | 2,800                   | 875   | 0.3               | 1.7                |
| R 6                 | 3,600                                                                                                                                                                                                                                                                   | 1,750 | 0.6               | 2.6                | 3,150                   | 1,500 | 0.35              | 2                  | 2,350                   | 750   | 0.35              | 2                  |
| 절입량<br>Depth of Cut |  <p>Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/>Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/>D : Outside Diameter 외경 (mm)<br/>n : Speed 회전속도 (min<sup>-1</sup>)<br/>Vf : Feed 이송속도 (mm/min)</p> |       |                   |                    |                         |       |                   |                    |                         |       |                   |                    |

- HRC55 이하 파삭재 (합금강, 공구강) 가공시 같은 직경 파이에 대비 상기 절삭조건의 20% UP 해주십시오.
- 날 수 변화시 회전수는 유지하고, 피드는 안정적인 속도내에서 최대 50%까지 UP 해주십시오.(3JJB, 4JJSB, 4JJB)
- 상기 절삭조건의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스펀들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스펀들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 에어브로 혹은 미스트 쿨런트를 추천 합니다.
- When milling workpiece, HRC below 55 (Alloy steel, tool steel), Raise up 20% RPM and feed compared to the same diameter.
- Changing flutes from 3 to 4, use the same RPM and raise up the feed up to 50% in stable condition (3JJB, 4JJSB, 4JJB).
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity ( $\phi$ 1 or less, the vibration tolerance management will be within 5 $\mu$ m).
- Air blow or mist coolants are recommended.

| 파삭재<br>Material           |                            | 탄소강<br>Carbon Steels |       |                   |                    | 합금강<br>Alloy Steels |      |                   |                    | 프리하트강/ 경도강<br>Prehardened Steels/ Hardened Steels |      |                   |                    |
|---------------------------|----------------------------|----------------------|-------|-------------------|--------------------|---------------------|------|-------------------|--------------------|---------------------------------------------------|------|-------------------|--------------------|
| 경도 Hardness               |                            | 38 ~ 45HRC           |       |                   |                    | 45 ~ 55HRC          |      |                   |                    | 55 ~ 65HRC                                        |      |                   |                    |
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM                  | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                               | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1                        | 4                          | 24,480               | 936   | 0.100             | 0.100              | 21,600              | 699  | 0.100             | 0.100              | 20,160                                            | 563  | 0.100             | 0.100              |
| "                         | 6                          | 22,032               | 773   | 0.040             | 0.040              | 19,440              | 577  | 0.040             | 0.040              | 18,144                                            | 465  | 0.040             | 0.040              |
| "                         | 8                          | 22,032               | 773   | 0.040             | 0.040              | 19,440              | 577  | 0.040             | 0.040              | 18,144                                            | 465  | 0.040             | 0.040              |
| "                         | 10                         | 22,032               | 773   | 0.025             | 0.025              | 19,440              | 577  | 0.025             | 0.025              | 18,144                                            | 465  | 0.025             | 0.025              |
| "                         | 12                         | 19,584               | 502   | 0.025             | 0.025              | 17,280              | 443  | 0.025             | 0.025              | 16,128                                            | 348  | 0.025             | 0.025              |
| "                         | 14                         | 19,584               | 502   | 0.025             | 0.025              | 17,280              | 443  | 0.025             | 0.025              | 16,128                                            | 348  | 0.025             | 0.025              |
| "                         | 16                         | 19,584               | 476   | 0.015             | 0.015              | 17,280              | 373  | 0.015             | 0.015              | 16,128                                            | 283  | 0.015             | 0.015              |
| ø1.2                      | 6                          | 21,760               | 764   | 0.084             | 0.084              | 19,200              | 570  | 0.084             | 0.084              | 17,920                                            | 460  | 0.084             | 0.084              |
| "                         | 8                          | 19,584               | 687   | 0.048             | 0.048              | 17,280              | 513  | 0.048             | 0.048              | 16,128                                            | 414  | 0.048             | 0.048              |
| "                         | 10                         | 19,584               | 687   | 0.030             | 0.030              | 17,280              | 513  | 0.030             | 0.030              | 16,128                                            | 414  | 0.030             | 0.030              |
| "                         | 12                         | 19,584               | 687   | 0.030             | 0.030              | 17,280              | 513  | 0.030             | 0.030              | 16,128                                            | 414  | 0.030             | 0.030              |
| "                         | 16                         | 17,408               | 611   | 0.020             | 0.020              | 15,360              | 456  | 0.020             | 0.020              | 14,336                                            | 368  | 0.020             | 0.020              |
| ø1.4                      | 8                          | 19,040               | 668   | 0.100             | 0.100              | 16,800              | 499  | 0.100             | 0.100              | 15,680                                            | 402  | 0.100             | 0.100              |
| "                         | 10                         | 17,136               | 601   | 0.056             | 0.056              | 15,120              | 449  | 0.056             | 0.056              | 14,112                                            | 362  | 0.056             | 0.056              |
| "                         | 14                         | 17,136               | 601   | 0.035             | 0.035              | 15,120              | 449  | 0.035             | 0.035              | 14,112                                            | 362  | 0.035             | 0.035              |
| "                         | 16                         | 15,232               | 391   | 0.035             | 0.035              | 13,440              | 345  | 0.035             | 0.035              | 12,544                                            | 271  | 0.035             | 0.035              |
| ø1.5                      | 6                          | 19,040               | 668   | 0.110             | 0.110              | 16,800              | 499  | 0.110             | 0.110              | 15,680                                            | 402  | 0.110             | 0.110              |
| "                         | 8                          | 19,040               | 668   | 0.110             | 0.110              | 16,800              | 499  | 0.110             | 0.110              | 15,680                                            | 402  | 0.110             | 0.110              |
| "                         | 10                         | 17,136               | 601   | 0.060             | 0.060              | 15,120              | 449  | 0.060             | 0.060              | 14,112                                            | 362  | 0.060             | 0.060              |
| "                         | 12                         | 17,136               | 601   | 0.060             | 0.060              | 15,120              | 449  | 0.060             | 0.060              | 14,112                                            | 362  | 0.060             | 0.060              |
| "                         | 14                         | 17,136               | 601   | 0.060             | 0.060              | 15,120              | 449  | 0.060             | 0.060              | 14,112                                            | 362  | 0.060             | 0.060              |
| "                         | 16                         | 15,232               | 391   | 0.038             | 0.038              | 13,440              | 345  | 0.038             | 0.038              | 12,544                                            | 271  | 0.038             | 0.038              |
| "                         | 18                         | 15,232               | 391   | 0.038             | 0.038              | 13,440              | 345  | 0.038             | 0.038              | 12,544                                            | 271  | 0.038             | 0.038              |
| "                         | 20                         | 15,232               | 391   | 0.038             | 0.038              | 13,440              | 345  | 0.038             | 0.038              | 12,544                                            | 271  | 0.038             | 0.038              |
| "                         | 25                         | 11,424               | 278   | 0.023             | 0.023              | 10,080              | 218  | 0.023             | 0.023              | 9,408                                             | 165  | 0.023             | 0.023              |
| ø1.6                      | 10                         | 15,912               | 621   | 0.040             | 0.040              | 14,040              | 463  | 0.040             | 0.040              | 13,104                                            | 373  | 0.040             | 0.040              |
| "                         | 14                         | 15,912               | 621   | 0.040             | 0.040              | 14,040              | 463  | 0.040             | 0.040              | 13,104                                            | 373  | 0.040             | 0.040              |
| "                         | 18                         | 15,912               | 621   | 0.040             | 0.040              | 14,040              | 463  | 0.040             | 0.040              | 13,104                                            | 373  | 0.040             | 0.040              |
| ø1.8                      | 10                         | 15,912               | 621   | 0.072             | 0.072              | 14,040              | 463  | 0.072             | 0.072              | 13,104                                            | 373  | 0.072             | 0.072              |
| "                         | 14                         | 15,912               | 621   | 0.072             | 0.072              | 14,040              | 463  | 0.072             | 0.072              | 13,104                                            | 373  | 0.072             | 0.072              |
| "                         | 18                         | 15,912               | 621   | 0.072             | 0.072              | 14,040              | 463  | 0.072             | 0.072              | 13,104                                            | 373  | 0.072             | 0.072              |
| ø2                        | 6                          | 14,280               | 668   | 0.200             | 0.200              | 12,600              | 499  | 0.200             | 0.200              | 11,760                                            | 402  | 0.200             | 0.200              |
| "                         | 8                          | 14,280               | 668   | 0.140             | 0.140              | 12,600              | 499  | 0.140             | 0.140              | 11,760                                            | 402  | 0.140             | 0.140              |
| "                         | 10                         | 14,280               | 668   | 0.140             | 0.140              | 12,600              | 499  | 0.140             | 0.140              | 11,760                                            | 402  | 0.140             | 0.140              |
| "                         | 12                         | 12,852               | 601   | 0.080             | 0.080              | 11,340              | 449  | 0.080             | 0.080              | 10,584                                            | 362  | 0.080             | 0.080              |
| "                         | 14                         | 12,852               | 601   | 0.080             | 0.080              | 11,340              | 449  | 0.080             | 0.080              | 10,584                                            | 362  | 0.080             | 0.080              |
| "                         | 16                         | 12,852               | 601   | 0.080             | 0.080              | 11,340              | 449  | 0.080             | 0.080              | 10,584                                            | 362  | 0.080             | 0.080              |
| "                         | 18                         | 12,852               | 601   | 0.050             | 0.050              | 11,340              | 449  | 0.050             | 0.050              | 10,584                                            | 362  | 0.050             | 0.050              |
| "                         | 20                         | 12,852               | 601   | 0.050             | 0.050              | 11,340              | 449  | 0.050             | 0.050              | 10,584                                            | 362  | 0.050             | 0.050              |
| "                         | 25                         | 11,424               | 391   | 0.050             | 0.050              | 10,080              | 345  | 0.050             | 0.050              | 9,408                                             | 271  | 0.050             | 0.050              |
| "                         | 30                         | 11,424               | 391   | 0.030             | 0.030              | 10,080              | 345  | 0.030             | 0.030              | 9,408                                             | 271  | 0.030             | 0.030              |
| ø2.5                      | 12                         | 12,240               | 716   | 0.180             | 0.180              | 10,800              | 535  | 0.180             | 0.180              | 10,080                                            | 431  | 0.180             | 0.180              |
| "                         | 16                         | 11,116               | 644   | 0.100             | 0.100              | 9,720               | 388  | 0.100             | 0.100              | 9,072                                             | 388  | 0.100             | 0.100              |
| "                         | 20                         | 11,116               | 644   | 0.100             | 0.100              | 9,720               | 481  | 0.100             | 0.100              | 9,072                                             | 388  | 0.100             | 0.100              |
| ø3                        | 12                         | 10,880               | 636   | 0.210             | 0.210              | 9,600               | 475  | 0.210             | 0.210              | 8,960                                             | 383  | 0.210             | 0.210              |
| "                         | 16                         | 9,792                | 573   | 0.120             | 0.120              | 8,640               | 428  | 0.120             | 0.120              | 8,064                                             | 345  | 0.120             | 0.120              |
| "                         | 20                         | 9,792                | 573   | 0.12              | 0.120              | 8,640               | 428  | 0.12              | 0.120              | 8,064                                             | 345  | 0.12              | 0.120              |
| "                         | 25                         | 9,792                | 573   | 0.08              | 0.080              | 8,640               | 428  | 0.08              | 0.080              | 8,064                                             | 345  | 0.08              | 0.080              |
| "                         | 30                         | 9,792                | 573   | 0.08              | 0.080              | 8,640               | 428  | 0.08              | 0.080              | 8,064                                             | 345  | 0.08              | 0.080              |
| "                         | 40                         | 8,704                | 509   | 0.05              | 0.050              | 7,680               | 380  | 0.05              | 0.050              | 7,168                                             | 307  | 0.05              | 0.050              |
| ø4                        | 12                         | 8,000                | 1,358 | 0.4               | 0.400              | 7,050               | 902  | 0.4               | 0.400              | 6,580                                             | 727  | 0.4               | 0.400              |
| "                         | 16                         | 8,000                | 1,358 | 0.4               | 0.400              | 7,050               | 902  | 0.4               | 0.400              | 6,580                                             | 727  | 0.4               | 0.400              |
| "                         | 20                         | 7,800                | 1,200 | 0.3               | 0.300              | 6,800               | 800  | 0.3               | 0.300              | 6,200                                             | 720  | 0.3               | 0.300              |
| "                         | 25                         | 7,800                | 1,200 | 0.3               | 0.300              | 6,800               | 800  | 0.3               | 0.300              | 6,200                                             | 720  | 0.3               | 0.300              |
| "                         | 30                         | 7,800                | 1,200 | 0.3               | 0.300              | 6,800               | 800  | 0.3               | 0.300              | 6,200                                             | 720  | 0.3               | 0.300              |
| "                         | 35                         | 7,600                | 1,150 | 0.2               | 0.200              | 6,700               | 780  | 0.2               | 0.200              | 6,000                                             | 700  | 0.2               | 0.200              |
| "                         | 40                         | 7,600                | 1,150 | 0.2               | 0.200              | 6,700               | 780  | 0.2               | 0.200              | 6,000                                             | 700  | 0.2               | 0.200              |
| "                         | 45                         | 7,600                | 1,150 | 0.2               | 0.200              | 6,700               | 780  | 0.2               | 0.200              | 6,000                                             | 700  | 0.2               | 0.200              |
| "                         | 50                         | 7,600                | 1,150 | 0.2               | 0.200              | 6,700               | 780  | 0.2               | 0.200              | 6,000                                             | 700  | 0.2               | 0.200              |
| ø5                        | 16                         | 7,400                | 1,060 | 0.1               | 0.100              | 6,600               | 760  | 0.4               | 0.400              | 5,900                                             | 680  | 0.4               | 0.400              |
| "                         | 20                         | 7,400                | 1,060 | 0.1               | 0.100              | 6,600               | 760  | 0.4               | 0.400              | 5,900                                             | 680  | 0.4               | 0.400              |
| "                         | 25                         | 7,400                | 1,060 | 0.1               | 0.100              | 6,600               | 760  | 0.3               | 0.300              | 5,900                                             | 680  | 0.3               | 0.300              |
| "                         | 30                         | 7,200                | 1,000 | 0.09              | 0.090              | 6,200               | 740  | 0.2               | 0.200              | 5,800                                             | 650  | 0.2               | 0.200              |
| "                         | 35                         | 7,200                | 1,000 | 0.09              | 0.090              | 6,200               | 740  | 0.2               | 0.200              | 5,800                                             | 650  | 0.2               | 0.200              |
| "                         | 40                         | 7,000                | 980   | 0.09              | 0.090              | 6,000               | 700  | 0.2               | 0.200              | 5,600                                             | 620  | 0.2               | 0.200              |
| "                         | 50                         | 7,000                | 980   | 0.09              | 0.090              | 6,000               | 700  | 0.2               | 0.200              | 5,600                                             | 620  | 0.2               | 0.200              |
| ø6                        | 20                         | 6,800                | 950   | 0.08              | 0.080              | 5,800               | 680  | 0.1               | 0.100              | 5,400                                             | 600  | 0.1               | 0.100              |
| "                         | 30                         | 6,800                | 950   | 0.08              | 0.080              | 5,800               | 680  | 0.1               | 0.100              | 5,400                                             | 600  | 0.1               | 0.100              |

# 2JJRE/4JJRE

4JJRE는 RPM 동일 FEED만 최대 50% Up 적용  
Use the same RPM and raise up the feed up to 50% for 4JJRE.

• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material           |                            | 탄소강<br>Carbon Steels |      |                   |                    | 합금강<br>Alloy Steels |      |                   |                    | 프리하트강/경도강<br>Prehardened Steels/ Hardened Steels |      |                   |                    |
|---------------------------|----------------------------|----------------------|------|-------------------|--------------------|---------------------|------|-------------------|--------------------|--------------------------------------------------|------|-------------------|--------------------|
| 경도 Hardness               |                            | 38 ~ 45HRC           |      |                   |                    | 45 ~ 55HRC          |      |                   |                    | 55 ~ 65HRC                                       |      |                   |                    |
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                              | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| 40                        |                            | 6800                 | 950  | 0.08              | 0.080              | 5800                | 680  | 0.1               | 0.100              | 5400                                             | 600  | 0.1               | 0.100              |
| 50                        |                            | 6500                 | 900  | 0.05              | 0.050              | 5600                | 650  | 0.09              | 0.090              | 5000                                             | 560  | 0.09              | 0.090              |
| 60                        |                            | 6500                 | 900  | 0.05              | 0.050              | 5600                | 650  | 0.09              | 0.090              | 5000                                             | 560  | 0.09              | 0.090              |

절입량  
Depth of Cut

Slotting  
• Ap : Axial Depth  
• D : Outside Diameter

Side Milling  
• Ap : Axial Depth  
• Ae : Radial Depth

- 4날시 회전수는 유지하고, 피드는 안정적인 속도내에서 최대 50%까지 UP 해주십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC65 이상 경도강 가공시 65HRC 조건의 같은 직경 파이에 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø10이하 사용시 진동 허용 관리 5µm 이내 일것.)
- 에어로브, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- For 4JJRE, use the same RPM and raise up the feed up to 50% in stable condition.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling hardened material, HRC over 65, decrease by 20% RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management will be within 5 µm).
- Air blow or mist coolants are recommended and note for chip emission, heat or ignition.

## 4JJE Cutting Condition

4JJHE 6&8JJHE : RPM 동일 FEED만 최대 50% Up 적용  
Use the same RPM, raise up the feed up to 50%

| 파삭재<br>Material           | 경도강<br>Hardened Steels |       |            |       |
|---------------------------|------------------------|-------|------------|-------|
| 경도 Hardness               | 40 ~ 50HRC             |       | 50 ~ 55HRC |       |
| 외경<br>Outside<br>Diameter | RPM                    | FEED  | RPM        | FEED  |
| Ø1                        | 31,500                 | 1,050 | 20,300     | 710   |
| Ø2                        | 20,200                 | 1,250 | 14,300     | 840   |
| Ø3                        | 14,300                 | 1,250 | 8,500      | 840   |
| Ø4                        | 11,400                 | 1,300 | 7,200      | 880   |
| Ø5                        | 10,500                 | 1,500 | 6,700      | 1,000 |
| Ø6                        | 8,450                  | 1,400 | 5,600      | 950   |
| Ø7                        | 7,800                  | 1,380 | 4,200      | 900   |
| Ø8                        | 6,500                  | 1,350 | 3,830      | 840   |
| Ø9                        | 6,150                  | 1,260 | 3,500      | 840   |
| Ø10                       | 5,250                  | 1,260 | 2,800      | 800   |
| Ø11                       | 4,300                  | 1,150 | 2,500      | 800   |
| Ø12                       | 4,300                  | 1,150 | 2,300      | 760   |
| Ø14                       | 3,500                  | 1,050 | 2,100      | 760   |
| Ø16                       | 3,500                  | 1,050 | 2,000      | 700   |
| Ø18                       | 2,800                  | 1,000 | 2,000      | 700   |
| Ø20                       | 2,600                  | 980   | 1,800      | 650   |

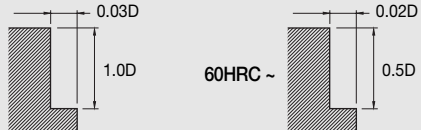
| 파삭재<br>Material           | 경도강<br>Hardened Steels |       |                   |                    | 경도강<br>Hardened Steels |       |                   |                    |
|---------------------------|------------------------|-------|-------------------|--------------------|------------------------|-------|-------------------|--------------------|
| 경도 Hardness               | 55 ~ 62HRC             |       |                   |                    | 62 ~ 68HRC             |       |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                    | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                    | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                        | 32,000                 | 800   | 0.5               | 0.02               | 28,000                 | 500   | 0.5               | 0.02               |
| Ø1.5                      | 30,000                 | 900   | 0.75              | 0.03               | 25,000                 | 550   | 0.75              | 0.03               |
| Ø2                        | 24,000                 | 1,000 | 1                 | 0.04               | 16,000                 | 600   | 1                 | 0.04               |
| Ø3                        | 38,400                 | 4,560 | 1.5               | 0.06               | 19,200                 | 2,280 | 1.5               | 0.06               |
| Ø4                        | 28,800                 | 5,280 | 2                 | 0.08               | 14,400                 | 2,640 | 2                 | 0.08               |
| Ø5                        | 24,000                 | 6,000 | 2.5               | 0.1                | 12,000                 | 3,000 | 2.5               | 0.1                |
| Ø6                        | 19,200                 | 6,960 | 3                 | 0.12               | 9,600                  | 3,480 | 3                 | 0.12               |
| Ø8                        | 14,400                 | 6,960 | 4                 | 0.16               | 7,200                  | 3,480 | 4                 | 0.16               |
| Ø10                       | 11,520                 | 6,960 | 5                 | 0.2                | 5,760                  | 3,480 | 5                 | 0.2                |
| Ø12                       | 9,600                  | 5,760 | 6                 | 0.24               | 4,800                  | 2,880 | 6                 | 0.24               |
| Ø16                       | 7,200                  | 4,320 | 8                 | 0.32               | 3,600                  | 2,160 | 8                 | 0.32               |
| Ø20                       | 5,760                  | 3,480 | 10                | 0.4                | 2,880                  | 1,680 | 10                | 0.4                |

절입량  
Depth of Cut

~ 55HRC

55HRC ~

- HRC55 이하 파삭재 (합금강, 공구강) 가공시 같은 직경 파이에 대비 상기 절삭조건의 20% UP 해주십시오.
- JJHE의 6~8날 가공시 회전수는 유지하고, 안정적인 속도내에서 피드를 최대 50%까지 UP 해주십시오.
- JJHE Series 제품은 홈절삭보다 측면절삭에 효율이 높은점 참고 바랍니다.
- 상기 절삭조건의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송속도를 비례적으로 조정 하십시오.
- 소재 및 가공 형상에 적합한 절삭유를 사용 하십시오.
- When milling workpiece, HRC below 55 (Alloy steel, tool steel), Raise up 20% RPM and feed compared to the same diameter.
- For 6-8 flutes of JJHE, keep the RPM and raise up the feed up to 50% in the stable milling condition.
- Note that JJHE series performs better in side milling rather than groove milling.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use suitable cutting oil for material and machining geometry.

| 피삭재<br>Material        | 홈 절삭 Slotting                                                                      |      |            |      |            |      | 측면 절삭 Side Cutting                                                                   |      |            |      |            |      |
|------------------------|------------------------------------------------------------------------------------|------|------------|------|------------|------|--------------------------------------------------------------------------------------|------|------------|------|------------|------|
|                        | 고경도강<br>Hardened Steels                                                            |      |            |      |            |      | 고경도강<br>Hardened Steels                                                              |      |            |      |            |      |
| 경도 Hardness            | 55 ~ 60HRC                                                                         |      | 60 ~ 65HRC |      | 65 ~ 68HRC |      | 55 ~ 60HRC                                                                           |      | 60 ~ 65HRC |      | 65 ~ 68HRC |      |
| 외경<br>Outside Diameter | RPM                                                                                | FEED | RPM        | FEED | RPM        | FEED | RPM                                                                                  | FEED | RPM        | FEED | RPM        | FEED |
| ø0.1                   | 33,000                                                                             | 50   | 33,000     | 40   | 26,400     | 30   | • 측면절삭 불가<br>• Side cutting is not possible.                                         |      |            |      |            |      |
| ø0.2                   | 33,000                                                                             | 60   | 33,000     | 45   | 20,000     | 35   |                                                                                      |      |            |      |            |      |
| ø0.3                   | 33,000                                                                             | 70   | 25,000     | 50   | 20,000     | 40   |                                                                                      |      |            |      |            |      |
| ø0.4                   | 33,000                                                                             | 90   | 25,000     | 55   | 20,000     | 60   |                                                                                      |      |            |      |            |      |
| ø0.5                   | 33,000                                                                             | 140  | 25,000     | 85   | 20,000     | 75   |                                                                                      |      |            |      |            |      |
| ø0.6                   | 30,000                                                                             | 160  | 25,000     | 105  | 15,200     | 80   |                                                                                      |      |            |      |            |      |
| ø0.8                   | 25,000                                                                             | 185  | 19,000     | 110  | 14,000     | 90   |                                                                                      |      |            |      |            |      |
| ø0.9                   | 22,700                                                                             | 205  | 17,500     | 125  | 12,500     | 85   |                                                                                      |      |            |      |            |      |
| ø1                     | 20,500                                                                             | 215  | 16,000     | 135  | 12,500     | 85   | 20,500                                                                               | 310  | 16,000     | 190  | 12,500     | 125  |
| ø2                     | 14,500                                                                             | 260  | 11,000     | 160  | 9,500      | 115  | 14,500                                                                               | 370  | 11,000     | 230  | 9,500      | 165  |
| ø3                     | 9,500                                                                              | 260  | 7,500      | 160  | 6,400      | 115  | 9,500                                                                                | 370  | 7,500      | 230  | 6,400      | 165  |
| ø4                     | 7,200                                                                              | 270  | 5,600      | 170  | 4,750      | 118  | 7,200                                                                                | 385  | 5,600      | 240  | 4,750      | 170  |
| ø5                     | 6,400                                                                              | 285  | 5,100      | 180  | 4,450      | 132  | 6,400                                                                                | 410  | 5,100      | 260  | 4,450      | 190  |
| ø6                     | 5,300                                                                              | 280  | 4,200      | 180  | 3,700      | 130  | 5,300                                                                                | 400  | 4,200      | 255  | 3,700      | 185  |
| ø8                     | 4,000                                                                              | 255  | 3,200      | 165  | 2,800      | 120  | 4,000                                                                                | 365  | 3,200      | 235  | 2,800      | 170  |
| ø10                    | 3,200                                                                              | 240  | 2,550      | 155  | 2,200      | 112  | 3,200                                                                                | 340  | 2,550      | 220  | 2,200      | 160  |
| ø12                    | 2,650                                                                              | 240  | 2,100      | 155  | 1,860      | 112  | 2,650                                                                                | 340  | 2,100      | 220  | 1,860      | 160  |
| ø16                    | 1,840                                                                              | 180  | 1,800      | 100  | 1,460      | 100  | 1,840                                                                                | 300  | 1,800      | 190  | 1,800      | 190  |
| ø18                    | 1,840                                                                              | 180  | 1,800      | 100  | 1,460      | 100  | 1,840                                                                                | 300  | 1,800      | 190  | 1,800      | 190  |
| ø20                    | 1,460                                                                              | 180  | 1,400      | 100  | 1,100      | 100  | 1,460                                                                                | 295  | 1,400      | 180  | 1,400      | 180  |
| 절입량<br>Depth of Cut    |  |      |            |      |            |      |  |      |            |      |            |      |

- HRC55 이하 피삭재 (합금강, 공구강) 가공시 같은 직경 파이에 대비 상기 절삭조건 20% UP 해주십시오.
- 상기 절삭조건은 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송속도를 비례적으로 조정 하십시오.
- 소재 및 가공 형상에 적합한 절삭유를 사용 하십시오.
- When milling workpiece, HRC below 55 (Alloy steel, tool steel), Raise up 20% RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use suitable cutting oil for material and machining geometry.

## 홈 절삭 Slotting

| 파삭재<br>Material           |                        | 고경도강<br>Hardened Steels |      |                   |                    |            |      |                   |                    |            |      |                   |                    |
|---------------------------|------------------------|-------------------------|------|-------------------|--------------------|------------|------|-------------------|--------------------|------------|------|-------------------|--------------------|
| 경도 Hardness               |                        | 55 ~ 60HRC              |      |                   |                    | 60 ~ 65HRC |      |                   |                    | 65 ~ 68HRC |      |                   |                    |
| 외경<br>Outside<br>Diameter | 반경<br>Corner<br>Radius | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.4                      | R 0.1                  | 33,000                  | 105  | 0.01              | 0.01               | 25,000     | 60   | 0.005             | 0.008              | 25,000     | 60   | 0.005             | 0.008              |
| ø0.5                      | R 0.1                  | 33,000                  | 110  | 0.015             | 0.02               | 25,000     | 65   | 0.007             | 0.010              | 20,000     | 40   | 0.007             | 0.010              |
| ø0.8                      | R 0.2                  | 30,000                  | 125  | 0.02              | 0.10               | 25,000     | 85   | 0.01              | 0.075              | 20,000     | 50   | 0.01              | 0.075              |
| ø1                        | R 0.3                  | 25,000                  | 145  | 0.04              | 0.15               | 19,000     | 90   | 0.02              | 0.12               | 16,000     | 55   | 0.02              | 0.12               |
| ø1.5                      | R 0.5                  | 20,500                  | 172  | 0.10              | 0.30               | 16,000     | 108  | 0.05              | 0.20               | 12,500     | 70   | 0.05              | 0.20               |
| ø2                        | R 0.5                  | 14,500                  | 208  | 0.15              | 0.50               | 11,000     | 128  | 0.1               | 0.25               | 9,500      | 92   | 0.10              | 0.30               |
| ø2.5                      | R 0.5                  | 9,500                   | 208  | 0.20              | 0.50               | 7,500      | 128  | 0.12              | 0.35               | 6,400      | 92   | 0.12              | 0.40               |
| ø3                        | R 0.5                  | 9,500                   | 208  | 0.20              | 0.50               | 7,500      | 128  | 0.12              | 0.35               | 6,400      | 92   | 0.12              | 0.40               |
| ø4                        | R 0.3                  | 7,200                   | 216  | 0.25              | 0.30               | 5,600      | 136  | 0.15              | 0.20               | 4,750      | 94   | 0.15              | 0.30               |
| ø5                        | R 0.5                  | 6,400                   | 228  | 0.25              | 0.50               | 5,100      | 144  | 0.15              | 0.50               | 4,450      | 105  | 0.15              | 0.40               |
| "                         | R 1                    | 6,400                   | 228  | 0.40              | 1.05               | 5,100      | 144  | 0.35              | 0.80               | 4,450      | 105  | 0.30              | 0.70               |
| ø6                        | R 0.5                  | 5,300                   | 224  | 0.20              | 0.70               | 4,200      | 144  | 0.2               | 0.60               | 3,700      | 104  | 0.20              | 0.50               |
| "                         | R 1                    | 5,300                   | 224  | 0.30              | 1.00               | 4,200      | 144  | 0.3               | 0.80               | 3,700      | 104  | 0.20              | 0.65               |
| "                         | R 1.5                  | 5,300                   | 224  | 0.50              | 1.30               | 4,200      | 144  | 0.4               | 1.00               | 3,700      | 104  | 0.30              | 0.80               |
| ø8                        | R 0.5                  | 4,000                   | 204  | 0.30              | 0.70               | 3,200      | 132  | 0.20              | 0.60               | 2,800      | 96   | 0.20              | 0.50               |
| "                         | R 1                    | 4,000                   | 204  | 0.40              | 1.00               | 3,200      | 132  | 0.25              | 0.90               | 2,800      | 96   | 0.25              | 0.70               |
| "                         | R 1.5                  | 4,000                   | 204  | 0.40              | 1.30               | 3,200      | 132  | 0.25              | 1.20               | 2,800      | 96   | 0.25              | 0.80               |
| ø10                       | R 0.5                  | 3,200                   | 192  | 0.40              | 0.80               | 2,550      | 124  | 0.2               | 0.60               | 2,200      | 90   | 0.20              | 0.50               |
| "                         | R 1                    | 3,200                   | 192  | 0.50              | 1.00               | 2,550      | 124  | 0.3               | 0.80               | 2,200      | 90   | 0.30              | 0.80               |
| "                         | R 2                    | 3,200                   | 192  | 0.50              | 1.70               | 2,550      | 124  | 0.3               | 1.50               | 2,200      | 90   | 0.30              | 1.30               |
| ø12                       | R 0.5                  | 2,650                   | 192  | 0.50              | 1.00               | 2,100      | 124  | 0.35              | 0.80               | 1,860      | 90   | 0.20              | 0.60               |
| "                         | R 1                    | 2,650                   | 192  | 0.60              | 1.30               | 2,100      | 124  | 0.35              | 1.20               | 1,860      | 90   | 0.30              | 1.00               |
| "                         | R 2                    | 2,650                   | 192  | 0.60              | 1.80               | 2,100      | 124  | 0.35              | 1.70               | 1,860      | 90   | 0.30              | 1.40               |
| "                         | R 3                    | 2,650                   | 192  | 0.60              | 2.50               | 2,100      | 124  | 0.40              | 2.00               | 1,860      | 90   | 0.30              | 1.80               |

## 측면 절삭 Side Cutting

| 파삭재<br>Material           |  | 고경도강<br>Hardened Steels |      |                   |                    |            |      |                   |                    |            |      |                   |                    |
|---------------------------|--|-------------------------|------|-------------------|--------------------|------------|------|-------------------|--------------------|------------|------|-------------------|--------------------|
| 경도 Hardness               |  | 55 ~ 60HRC              |      |                   |                    | 60 ~ 65HRC |      |                   |                    | 65 ~ 68HRC |      |                   |                    |
| 외경<br>Outside<br>Diameter |  | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.4                      |  | 33,000                  | 105  | 0.4               | 0.012              | 25,000     | 60   | 0.2               | 0.008              | 25,000     | 60   | 0.2               | 0.008              |
| ø0.5                      |  | 33,000                  | 110  | 0.5               | 0.015              | 25,000     | 65   | 0.25              | 0.010              | 20,000     | 40   | 0.25              | 0.010              |
| ø0.8                      |  | 30,000                  | 125  | 0.8               | 0.024              | 25,000     | 85   | 0.4               | 0.016              | 20,000     | 50   | 0.4               | 0.016              |
| ø1                        |  | 25,000                  | 145  | 1                 | 0.030              | 19,000     | 90   | 0.5               | 0.02               | 16,000     | 55   | 0.5               | 0.02               |
| ø2                        |  | 14,500                  | 208  | 2                 | 0.060              | 11,000     | 128  | 1                 | 0.04               | 9,500      | 92   | 1                 | 0.04               |
| ø3                        |  | 9,500                   | 208  | 3                 | 0.090              | 7,500      | 128  | 1.5               | 0.06               | 6,400      | 92   | 1.5               | 0.06               |
| ø4                        |  | 7,200                   | 216  | 4                 | 0.120              | 5,600      | 136  | 2                 | 0.08               | 4,750      | 94   | 2                 | 0.08               |
| ø6                        |  | 5,300                   | 224  | 6                 | 0.180              | 4,200      | 144  | 3                 | 0.12               | 3,700      | 104  | 3                 | 0.12               |
| ø8                        |  | 4,000                   | 204  | 8                 | 0.240              | 3,200      | 132  | 4                 | 0.16               | 2,800      | 96   | 4                 | 0.16               |
| ø10                       |  | 3,200                   | 192  | 10                | 0.300              | 2,550      | 124  | 5                 | 0.20               | 2,200      | 90   | 5                 | 0.20               |
| ø12                       |  | 2,650                   | 192  | 12                | 0.360              | 2,100      | 124  | 6                 | 0.24               | 1,860      | 90   | 6                 | 0.24               |

절입량  
Depth of Cut

~ 60HRC

60HRC ~

경사진 면 절삭  
Inclined Cutting

- HRC55이하 파삭재 (합금강, 공구강) 가공시 같은 직경 파이에 대비 상기 절삭조건 20% UP 해주십시오.
- 유효길이 긴 경우에는 회전수와 이송속도를 최대 30%이하로 줄이십시오.
- 측면 절삭시 코너 R 부분과 각도내용을 참고하여 절삭 하시기 바랍니다.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 상기 절삭조건 20%의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 에어브로 혹은 미스트 쿨란트를 추천하며 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.
- When milling workpiece, HRC below 55 (Alloy steel, tool steel), Raise up 20% RPM and feed compared to the same diameter.
- In case of long effective length, reduce the RPM and feed by 30% or less.
- For side milling, refer to the corner radius and
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed by 30% in stable condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

| 피삭재<br>Material           |                        | 고경도강<br>Hardened Steels |      |                   |                    |            |      |                   |                    |            |      |                   |                    |
|---------------------------|------------------------|-------------------------|------|-------------------|--------------------|------------|------|-------------------|--------------------|------------|------|-------------------|--------------------|
| 경도 Hardness               |                        | 55 ~ 60HRC              |      |                   |                    | 60 ~ 65HRC |      |                   |                    | 65 ~ 68HRC |      |                   |                    |
| 외경<br>Outside<br>Diameter | 반경<br>Corner<br>Radius | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.5                      | R 0.1                  | 33,000                  | 365  | 0.015             | 0.02               | 25,000     | 245  | 0.007             | 0.010              | 20,000     | 140  | 0.007             | 0.010              |
| ø0.6                      | R 0.1                  | 30,000                  | 380  | 0.02              | 0.10               | 25,000     | 250  | 0.01              | 0.075              | 20,000     | 150  | 0.01              | 0.075              |
| ø0.7                      | R 0.1                  | 28,000                  | 39   | 0.03              | 0.13               | 21,000     | 255  | 0.01              | 0.080              | 18,000     | 150  | 0.01              | 0.080              |
| ø0.8                      | R 0.1                  | 25,500                  | 400  | 0.04              | 0.15               | 19,000     | 260  | 0.02              | 0.12               | 16,000     | 155  | 0.02              | 0.12               |
| ø1                        | R 0.1                  | 20,500                  | 430  | 0.08              | 0.80               | 16,000     | 270  | 0.04              | 0.06               | 12,500     | 175  | 0.03              | 0.05               |
| "                         | R 0.3                  | 20,500                  | 430  | 0.10              | 0.40               | 16,000     | 270  | 0.05              | 0.08               | 12,500     | 175  | 0.05              | 0.06               |
| ø1.5                      | R 0.1                  | 18,000                  | 460  | 0.12              | 1.30               | 13,000     | 300  | 0.07              | 0.10               | 10,500     | 200  | 0.05              | 0.08               |
| "                         | R 0.5                  | 18,000                  | 460  | 0.15              | 0.50               | 13,000     | 300  | 0.10              | 0.12               | 10,500     | 200  | 0.07              | 0.10               |
| ø2                        | R 0.1                  | 14,500                  | 520  | 0.15              | 1.80               | 11,000     | 320  | 0.10              | 0.12               | 9,500      | 230  | 0.10              | 0.10               |
| "                         | R 0.5                  | 14,500                  | 520  | 0.18              | 1.00               | 11,000     | 320  | 0.10              | 0.14               | 9,500      | 230  | 0.10              | 0.12               |
| ø2.5                      | R 0.1                  | 11,500                  | 520  | 0.16              | 2.00               | 8,500      | 320  | 0.10              | 0.13               | 7,500      | 230  | 0.10              | 0.10               |
| "                         | R 0.5                  | 11,500                  | 520  | 0.19              | 1.50               | 8,500      | 320  | 0.10              | 0.15               | 7,500      | 230  | 0.10              | 0.12               |
| ø3                        | R 0.1                  | 9,500                   | 520  | 0.16              | 2.50               | 7,500      | 320  | 0.12              | 0.13               | 6,400      | 230  | 0.12              | 0.10               |
| "                         | R 0.5                  | 9,500                   | 520  | 0.18              | 2.00               | 7,500      | 320  | 0.12              | 0.14               | 6,400      | 230  | 0.12              | 0.12               |
| "                         | R 1                    | 9,500                   | 520  | 0.20              | 1.00               | 7,500      | 320  | 0.12              | 0.16               | 6,400      | 230  | 0.12              | 0.13               |
| ø4                        | R 0.1                  | 7,200                   | 540  | 0.20              | 3.50               | 5,600      | 335  | 0.12              | 0.16               | 4,750      | 240  | 0.12              | 0.13               |
| "                         | R 0.5                  | 7,200                   | 540  | 0.25              | 3.00               | 5,600      | 335  | 0.12              | 0.20               | 4,750      | 240  | 0.15              | 0.16               |
| "                         | R 1                    | 7,200                   | 540  | 0.25              | 2.00               | 5,600      | 335  | 0.15              | 0.20               | 4,750      | 240  | 0.15              | 0.16               |
| ø5                        | R 0.1                  | 6,400                   | 580  | 0.25              | 4.50               | 5,100      | 370  | 0.12              | 0.20               | 4,450      | 270  | 0.12              | 0.16               |
| "                         | R 0.5                  | 6,400                   | 580  | 0.28              | 4.00               | 5,100      | 370  | 0.15              | 0.22               | 4,450      | 270  | 0.15              | 0.18               |
| "                         | R 1                    | 6,400                   | 580  | 0.30              | 3.00               | 5,100      | 370  | 0.15              | 0.24               | 4,450      | 270  | 0.15              | 0.19               |
| ø6                        | R 0.1                  | 5,300                   | 560  | 0.30              | 5.50               | 4,200      | 350  | 0.20              | 0.24               | 3,700      | 260  | 0.20              | 0.19               |
| "                         | R 0.5                  | 5,300                   | 560  | 0.30              | 5.00               | 4,200      | 350  | 0.20              | 0.24               | 3,700      | 260  | 0.20              | 0.19               |
| "                         | R 1                    | 5,300                   | 560  | 0.40              | 4.00               | 4,200      | 350  | 0.25              | 0.32               | 3,700      | 260  | 0.25              | 0.26               |
| "                         | R 1.5                  | 5,300                   | 560  | 0.40              | 3.00               | 4,200      | 350  | 0.25              | 0.32               | 3,700      | 260  | 0.25              | 0.26               |
| ø8                        | R 0.5                  | 4,000                   | 520  | 0.30              | 7.50               | 3,200      | 330  | 0.20              | 0.24               | 2,800      | 240  | 0.20              | 0.19               |
| "                         | R 1                    | 4,000                   | 520  | 0.30              | 6.00               | 3,200      | 330  | 0.20              | 0.24               | 2,800      | 240  | 0.20              | 0.19               |
| "                         | R 1.5                  | 4,000                   | 520  | 0.40              | 5.00               | 3,200      | 330  | 0.25              | 0.32               | 2,800      | 240  | 0.25              | 0.26               |
| "                         | R 2                    | 4,000                   | 520  | 0.50              | 4.00               | 3,200      | 330  | 0.30              | 0.40               | 2,800      | 240  | 0.25              | 0.32               |
| ø10                       | R 0.5                  | 3,200                   | 480  | 0.40              | 9.50               | 2,550      | 310  | 0.20              | 0.32               | 2,200      | 220  | 0.20              | 0.26               |
| "                         | R 1                    | 3,200                   | 480  | 0.45              | 9.00               | 2,550      | 310  | 0.25              | 0.36               | 2,200      | 220  | 0.25              | 0.29               |
| "                         | R 1.5                  | 3,200                   | 480  | 0.50              | 7.00               | 2,550      | 310  | 0.30              | 0.40               | 2,200      | 220  | 0.30              | 0.32               |
| "                         | R 2                    | 3,200                   | 480  | 0.50              | 6.00               | 2,550      | 310  | 0.30              | 0.40               | 2,200      | 220  | 0.30              | 0.32               |
| "                         | R 2.5                  | 3,200                   | 480  | 0.50              | 5.00               | 2,550      | 310  | 0.30              | 0.40               | 2,200      | 220  | 0.30              | 0.32               |
| ø12                       | R 0.5                  | 2,650                   | 480  | 0.50              | 11.00              | 2,100      | 300  | 0.35              | 0.40               | 1,860      | 220  | 0.30              | 0.32               |
| "                         | R 1                    | 2,650                   | 480  | 0.70              | 10.00              | 2,100      | 300  | 0.35              | 0.56               | 1,860      | 220  | 0.35              | 0.45               |
| "                         | R 1.5                  | 2,650                   | 480  | 0.80              | 9.00               | 2,100      | 300  | 0.40              | 0.64               | 1,860      | 220  | 0.35              | 0.51               |
| "                         | R 2                    | 2,650                   | 480  | 0.80              | 8.00               | 2,100      | 300  | 0.40              | 0.64               | 1,860      | 220  | 0.35              | 0.51               |
| "                         | R 3                    | 2,650                   | 480  | 0.80              | 6.00               | 2,100      | 300  | 0.40              | 0.64               | 1,860      | 220  | 0.35              | 0.51               |

절입량  
Depth of Cut

~ 60HRC

60HRC ~

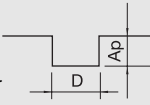
경사진면 절삭  
Inclined Cutting

- 상기 조건표는 홈 절삭 조건표이며, 측면 절삭시 절입기준표를 참고 바랍니다.
- HRC55 이하 피삭재 (합금강, 공구강) 가공시 같은 직경 파이에 대비 상기 절삭 조건의 20% UP 해주십시오.
- 유효장인 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 곡면 절삭시 날경의 코너 R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 6날시 회전수는 유지하고, 피드는 안정적인 속도 내에서 최대 50%까지 UP 해주십시오.
- Above the table is a reference for groove milling, and refer to the depth of cut for side milling.
- When milling workpiece, HRC below 55 (Alloy steel, tool steel), Raise up 20% RPM and feed compared to the same diameter.
- In case of long effective length, reduce the RPM and feed by 30% or less.
- For curved milling, use the lower value of pitch than corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable condition.
- With 6flutes milling, raise up the feed up to 50% in stable condition.

| 파삭재<br>Material           |                        | 고경도강<br>Hardened Steels |      |                   |                    |            |      |                   |                    |            |      |                   |                    |
|---------------------------|------------------------|-------------------------|------|-------------------|--------------------|------------|------|-------------------|--------------------|------------|------|-------------------|--------------------|
| 경도 Hardness               |                        | 55 ~ 60HRC              |      |                   |                    | 60 ~ 65HRC |      |                   |                    | 65 ~ 68HRC |      |                   |                    |
| 외경<br>Outside<br>Diameter | 반경<br>Corner<br>Radius | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.2                      | R 0.02                 | 40,000                  | 55   | 0.005             | 0.005              | 37,000     | 30   | 0.002             | 0.005              | 36,000     | 30   | 0.003             | 0.005              |
| ø0.3                      | R 0.02                 | 40,000                  | 60   | 0.007             | 0.007              | 37,000     | 35   | 0.003             | 0.006              | 36,000     | 35   | 0.004             | 0.006              |
| ø0.4                      | R 0.1                  | 33,000                  | 70   | 0.010             | 0.01               | 25,000     | 40   | 0.005             | 0.008              | 25,000     | 40   | 0.005             | 0.008              |
| ø0.5                      | R 0.1                  | 33,000                  | 80   | 0.015             | 0.02               | 25,000     | 45   | 0.007             | 0.010              | 20,000     | 30   | 0.007             | 0.010              |
| ø0.6                      | R 0.2                  | 30,000                  | 90   | 0.02              | 0.10               | 25,000     | 60   | 0.01              | 0.075              | 20,000     | 35   | 0.01              | 0.075              |
| ø0.8                      | R 0.2                  | 25,000                  | 100  | 0.04              | 0.15               | 19,000     | 65   | 0.02              | 0.12               | 16,000     | 40   | 0.02              | 0.12               |
| ø1                        | R 0.3                  | 20,500                  | 248  | 0.10              | 0.30               | 16,000     | 152  | 0.05              | 0.20               | 12,500     | 100  | 0.05              | 0.20               |
| ø1.5                      | R 0.1                  | 16,500                  | 265  | 0.12              | 0.35               | 13,000     | 168  | 0.07              | 0.30               | 10,500     | 118  | 0.07              | 0.30               |
| ø2                        | R 0.1                  | 14,500                  | 296  | 0.15              | 0.40               | 11,000     | 184  | 0.10              | 0.35               | 9,500      | 132  | 0.10              | 0.30               |
| ø2.5                      | R 0.1                  | 11,500                  | 296  | 0.20              | 0.60               | 8,800      | 184  | 0.12              | 0.40               | 7,400      | 132  | 0.10              | 0.35               |
| "                         | R 0.5                  | 11,500                  | 296  | 0.21              | 0.60               | 8,800      | 184  | 0.12              | 0.45               | 7,400      | 132  | 0.10              | 0.40               |
| ø3                        | R 0.1                  | 9,500                   | 300  | 0.20              | 0.50               | 7,500      | 188  | 0.15              | 0.55               | 6,400      | 134  | 0.12              | 0.45               |
| "                         | R 0.5                  | 9,500                   | 300  | 0.22              | 0.50               | 7,500      | 188  | 0.15              | 0.55               | 6,400      | 134  | 0.12              | 0.45               |
| "                         | R 1                    | 9,500                   | 300  | 0.25              | 0.70               | 7,500      | 188  | 0.20              | 0.65               | 6,400      | 134  | 0.16              | 0.55               |
| ø4                        | R 0.1                  | 7,200                   | 308  | 0.25              | 0.95               | 5,600      | 192  | 0.15              | 0.75               | 4,750      | 136  | 0.15              | 0.65               |
| "                         | R 0.5                  | 7,200                   | 308  | 0.25              | 0.95               | 5,600      | 192  | 0.15              | 0.75               | 4,750      | 136  | 0.15              | 0.65               |
| "                         | R 1                    | 7,200                   | 308  | 0.30              | 1.20               | 5,600      | 192  | 0.20              | 1.00               | 4,750      | 136  | 0.20              | 0.90               |
| ø5                        | R 0.1                  | 6,400                   | 328  | 0.20              | 0.90               | 5,100      | 208  | 0.15              | 0.70               | 4,450      | 152  | 0.15              | 0.85               |
| "                         | R 0.5                  | 6,400                   | 328  | 0.20              | 0.90               | 5,100      | 208  | 0.15              | 0.70               | 4,450      | 152  | 0.15              | 0.85               |
| "                         | R 1                    | 6,400                   | 328  | 0.25              | 1.10               | 5,100      | 208  | 0.20              | 0.90               | 4,450      | 152  | 0.20              | 1.00               |
| ø6                        | R 0.5                  | 5,300                   | 320  | 0.30              | 1.30               | 4,200      | 204  | 0.20              | 0.80               | 3,700      | 148  | 0.20              | 0.80               |
| "                         | R 1                    | 5,300                   | 320  | 0.30              | 1.30               | 4,200      | 204  | 0.20              | 0.80               | 3,700      | 148  | 0.20              | 0.80               |
| "                         | R 1.5                  | 5,300                   | 320  | 0.30              | 1.40               | 4,200      | 204  | 0.25              | 1.20               | 3,700      | 148  | 0.25              | 1.20               |
| "                         | R 2.5                  | 5,300                   | 320  | 0.30              | 1.40               | 4,200      | 204  | 0.25              | 1.20               | 3,700      | 148  | 0.25              | 1.20               |
| ø8                        | R 0.5                  | 4,000                   | 292  | 0.30              | 1.70               | 3,200      | 188  | 0.25              | 1.35               | 2,800      | 136  | 0.25              | 1.35               |
| "                         | R 1                    | 4,000                   | 292  | 0.30              | 1.70               | 3,200      | 188  | 0.25              | 1.35               | 2,800      | 136  | 0.25              | 1.35               |
| "                         | R 1.5                  | 4,000                   | 292  | 0.30              | 1.70               | 3,200      | 188  | 0.25              | 1.35               | 2,800      | 136  | 0.25              | 1.35               |
| "                         | R 2                    | 4,000                   | 292  | 0.40              | 2.00               | 3,200      | 188  | 0.25              | 1.50               | 2,800      | 136  | 0.30              | 1.40               |
| "                         | R 2.5                  | 4,000                   | 292  | 0.40              | 2.00               | 3,200      | 188  | 0.25              | 1.50               | 2,800      | 136  | 0.30              | 1.40               |
| "                         | R 3                    | 4,000                   | 292  | 0.40              | 2.00               | 3,200      | 188  | 0.25              | 1.50               | 2,800      | 136  | 0.30              | 1.40               |
| ø10                       | R 0.5                  | 3,200                   | 272  | 0.50              | 2.10               | 2,550      | 176  | 0.30              | 1.70               | 2,200      | 128  | 0.30              | 1.50               |
| "                         | R 1                    | 3,200                   | 272  | 0.50              | 2.10               | 2,550      | 176  | 0.30              | 1.70               | 2,200      | 128  | 0.30              | 1.50               |
| "                         | R 1.5                  | 3,200                   | 272  | 0.60              | 2.40               | 2,550      | 176  | 0.30              | 1.80               | 2,200      | 128  | 0.30              | 1.60               |
| "                         | R 2                    | 3,200                   | 272  | 0.60              | 2.40               | 2,550      | 176  | 0.30              | 1.80               | 2,200      | 128  | 0.30              | 1.60               |
| "                         | R 2.5                  | 3,200                   | 272  | 0.60              | 2.40               | 2,550      | 176  | 0.30              | 1.80               | 2,200      | 128  | 0.30              | 1.60               |
| ø12                       | R 0.5                  | 2,650                   | 272  | 0.80              | 2.50               | 2,100      | 176  | 0.40              | 2.00               | 1,860      | 128  | 0.35              | 1.80               |
| "                         | R 1                    | 2,650                   | 272  | 0.80              | 2.50               | 2,100      | 176  | 0.40              | 2.00               | 1,860      | 128  | 0.35              | 1.80               |
| "                         | R 1.5                  | 2,650                   | 272  | 0.80              | 2.50               | 2,100      | 176  | 0.40              | 2.00               | 1,860      | 128  | 0.35              | 1.80               |
| "                         | R 2                    | 2,650                   | 272  | 1.00              | 2.60               | 2,100      | 176  | 0.50              | 2.10               | 1,860      | 128  | 0.40              | 2.00               |
| "                         | R 2.5                  | 2,650                   | 272  | 1.00              | 2.60               | 2,100      | 176  | 0.50              | 2.10               | 1,860      | 128  | 0.40              | 2.00               |
| "                         | R 3                    | 2,650                   | 272  | 1.00              | 2.60               | 2,100      | 176  | 0.50              | 2.10               | 1,860      | 128  | 0.40              | 2.00               |

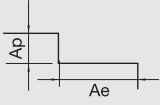
절입량  
Depth of Cut

Slotting  
• Ap : Axial Depth  
• D : Outside Diameter

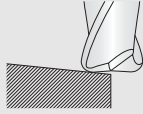


Side Milling

• Ap : Axial Depth  
• Ae : Radial Depth

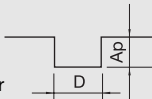
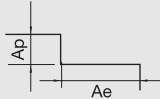
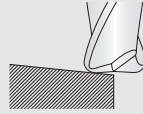


경사진 면 절삭  
Inclined Cutting



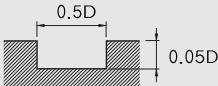
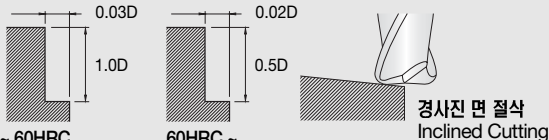
- 상기 조건표는 홈 절삭 조건표이며, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 적용 기계의 회전속도가 부족한 경우에는 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 에어브로 혹은 미스트 쿨란트를 추천하며 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.

- Above the table is a reference for groove milling, and adjust parameters depending on material shape, milling purpose, and CNC machine.
- For curved milling, set up the pitch value lower than corner radius value.
- For curved milling, raise up the feed up to 30% in stable condition.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.
- Air blow or mist coolant is recommended and note for chip emission, heat, or ignition.

| 피삭재<br>Material        |                     | 고경도강<br>Hardened Steels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                   |                    |            |      |                   |                    |            |      |                   |                    |
|------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|------------|------|-------------------|--------------------|------------|------|-------------------|--------------------|
| 경도 Hardness            |                     | 55 ~ 60HRC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                   |                    | 60 ~ 65HRC |      |                   |                    | 65 ~ 68HRC |      |                   |                    |
| 외경<br>Outside Diameter | 반경<br>Corner Radius | RPM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.5                   | R 0.1               | 33,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 85   | 0.01              | 0.01               | 25,000     | 55   | 0.01              | 0.01               | 25,000     | 45   | 0.01              | 0.01               |
| ø0.6                   | R 0.1               | 33,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 95   | 0.02              | 0.02               | 25,000     | 60   | 0.01              | 0.01               | 20,000     | 50   | 0.01              | 0.01               |
| ø0.7                   | R 0.1               | 30,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 115  | 0.02              | 0.10               | 25,000     | 75   | 0.01              | 0.08               | 20,000     | 55   | 0.01              | 0.08               |
| ø0.8                   | R 0.1               | 25,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 120  | 0.04              | 0.15               | 19,000     | 85   | 0.02              | 0.12               | 16,000     | 60   | 0.02              | 0.12               |
| ø0.9                   | R 0.1               | 23,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 160  | 0.06              | 0.18               | 17,500     | 110  | 0.03              | 0.15               | 14,500     | 95   | 0.03              | 0.14               |
| ø1                     | R 0.3               | 20,500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 344  | 0.10              | 0.30               | 16,000     | 216  | 0.05              | 0.20               | 12,500     | 140  | 0.05              | 0.20               |
| ø1.5                   | R 0.1               | 18,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 388  | 0.10              | 0.30               | 13,000     | 235  | 0.07              | 0.30               | 10,500     | 160  | 0.08              | 0.25               |
| "                      | R 0.5               | 18,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 388  | 0.13              | 0.40               | 13,000     | 235  | 0.07              | 0.30               | 10,500     | 160  | 0.08              | 0.25               |
| ø2                     | R 0.1               | 14,500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 416  | 0.15              | 0.50               | 11,000     | 256  | 0.10              | 0.45               | 9,500      | 184  | 0.10              | 0.45               |
| "                      | R 0.5               | 14,500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 416  | 0.15              | 0.50               | 11,000     | 256  | 0.10              | 0.45               | 9,500      | 184  | 0.10              | 0.45               |
| ø2.5                   | R 0.1               | 9,500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 416  | 0.20              | 0.70               | 7,500      | 256  | 0.12              | 0.55               | 6,400      | 184  | 0.12              | 0.55               |
| "                      | R 0.5               | 9,500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 416  | 0.20              | 0.70               | 7,500      | 256  | 0.12              | 0.55               | 6,400      | 184  | 0.12              | 0.55               |
| ø3                     | R 0.5               | 8,300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 424  | 0.23              | 0.80               | 6,400      | 268  | 0.13              | 0.60               | 5,600      | 192  | 0.13              | 0.60               |
| "                      | R 1                 | 8,300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 424  | 0.23              | 0.80               | 6,400      | 268  | 0.13              | 0.60               | 5,600      | 192  | 0.13              | 0.60               |
| ø3.5                   | R 0.5               | 7,800                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 432  | 0.25              | 0.90               | 6,000      | 268  | 0.13              | 0.70               | 5,200      | 192  | 0.14              | 0.70               |
| ø4                     | R 0.5               | 7,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 432  | 0.25              | 0.95               | 5,600      | 268  | 0.15              | 0.75               | 4,750      | 192  | 0.15              | 0.75               |
| "                      | R 1                 | 7,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 432  | 0.25              | 1.00               | 5,600      | 268  | 0.15              | 0.80               | 4,750      | 192  | 0.15              | 0.80               |
| ø4.5                   | R 0.5               | 6,400                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 464  | 0.25              | 1.05               | 5,100      | 296  | 0.15              | 0.85               | 4,450      | 216  | 0.15              | 0.85               |
| ø5                     | R 0.5               | 6,400                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 464  | 0.25              | 1.05               | 5,100      | 296  | 0.15              | 0.85               | 4,450      | 216  | 0.15              | 0.85               |
| "                      | R 1                 | 6,400                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 464  | 0.30              | 1.20               | 5,100      | 296  | 0.17              | 0.90               | 4,450      | 216  | 0.17              | 0.85               |
| ø6                     | R 0.5               | 5,300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 448  | 0.30              | 1.30               | 4,200      | 280  | 0.20              | 1.00               | 3,700      | 208  | 0.20              | 0.90               |
| "                      | R 1                 | 5,300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 448  | 0.30              | 1.40               | 4,200      | 296  | 0.20              | 1.00               | 3,700      | 216  | 0.20              | 0.90               |
| "                      | R 1.5               | 5,300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 448  | 0.35              | 1.50               | 4,200      | 280  | 0.23              | 1.20               | 3,700      | 208  | 0.22              | 1.20               |
| "                      | R 2                 | 5,300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 448  | 0.35              | 1.60               | 4,200      | 296  | 0.23              | 1.20               | 3,700      | 216  | 0.22              | 1.20               |
| ø8                     | R 0.5               | 4,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 416  | 0.40              | 1.70               | 3,200      | 264  | 0.25              | 1.35               | 2,800      | 192  | 0.25              | 1.30               |
| "                      | R 1                 | 4,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 416  | 0.40              | 1.70               | 3,200      | 264  | 0.25              | 1.35               | 2,800      | 192  | 0.25              | 1.30               |
| "                      | R 1.5               | 4,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 416  | 0.45              | 2.00               | 3,200      | 264  | 0.28              | 1.50               | 2,800      | 192  | 0.27              | 1.40               |
| "                      | R 2                 | 4,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 416  | 0.45              | 2.00               | 3,200      | 264  | 0.28              | 1.50               | 2,800      | 192  | 0.27              | 1.40               |
| ø10                    | R 0.5               | 3,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 0.50              | 2.10               | 2,550      | 248  | 0.30              | 1.70               | 2,200      | 176  | 0.30              | 1.70               |
| "                      | R 1                 | 3,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 0.50              | 2.10               | 2,550      | 248  | 0.30              | 1.70               | 2,200      | 176  | 0.30              | 1.70               |
| "                      | R 1.5               | 3,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 0.55              | 2.30               | 2,550      | 248  | 0.35              | 1.80               | 2,200      | 176  | 0.35              | 1.80               |
| "                      | R 2                 | 3,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 0.55              | 2.30               | 2,550      | 248  | 0.35              | 1.90               | 2,200      | 176  | 0.35              | 1.90               |
| "                      | R 2.5               | 3,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 0.60              | 2.30               | 2,550      | 248  | 0.35              | 1.90               | 2,200      | 176  | 0.35              | 1.90               |
| ø12                    | R 0.5               | 2,650                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 0.60              | 2.60               | 2,100      | 240  | 0.35              | 2.00               | 1,860      | 176  | 0.35              | 2.00               |
| "                      | R 1                 | 2,650                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 0.60              | 2.60               | 2,100      | 240  | 0.35              | 2.00               | 1,860      | 176  | 0.35              | 2.00               |
| "                      | R 1.5               | 2,650                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 0.60              | 2.60               | 2,100      | 240  | 0.35              | 2.00               | 1,860      | 176  | 0.35              | 2.00               |
| "                      | R 2                 | 2,650                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 0.60              | 2.60               | 2,100      | 240  | 0.35              | 2.00               | 1,860      | 176  | 0.35              | 2.00               |
| "                      | R 2.5               | 2,650                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 0.80              | 3.00               | 2,100      | 240  | 0.50              | 2.20               | 1,860      | 176  | 0.45              | 2.30               |
| "                      | R 3                 | 2,650                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 384  | 1.00              | 3.00               | 2,100      | 240  | 0.65              | 2.40               | 1,860      | 176  | 0.55              | 2.50               |
| 절입량<br>Depth of Cut    |                     | <div> <div>Slotting</div> <div>• Ap : Axial Depth</div> <div>• D : Outside Diameter</div>  </div> <div> <div>Side Milling</div> <div>• Ap : Axial Depth</div> <div>• Ae : Radial Depth</div>  </div> <div>  <div>경사면 절삭<br/>Inclined Cutting</div> </div> |      |                   |                    |            |      |                   |                    |            |      |                   |                    |

- 상기 조건표는 홈 절삭 조건표이며, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 곡면 절삭시 날경의 코너 R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- 에어브로 혹은 미스트 쿨런트를 추천하며 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.

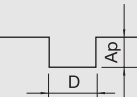
- Above the table is a reference for groove milling, and adjust parameters depending on material shape, milling purpose, and CNC machine.
- For curved milling, set up the pitch value lower than corner radius value.
- For curved milling, raise up the feed up to 30% in stable condition.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.
- Air blow or mist coolant is recommended and note for chip emission, heat, or ignition.

|                           | 홈 절삭 Slotting                                                                     |       |            |      |            |      | 측면 절삭 Side Cutting                                                                 |       |            |       |            |      |
|---------------------------|-----------------------------------------------------------------------------------|-------|------------|------|------------|------|------------------------------------------------------------------------------------|-------|------------|-------|------------|------|
| 파삭재<br>Material           | 고경도강<br>Hardened Steels                                                           |       |            |      |            |      | 고경도강<br>Hardened Steels                                                            |       |            |       |            |      |
| 경도 Hardness               | 35 ~ 45HRC                                                                        |       | 45 ~ 55HRC |      | 55 ~ 60HRC |      | 35 ~ 45HRC                                                                         |       | 45 ~ 55HRC |       | 55 ~ 60HRC |      |
| 외경<br>Outside<br>Diameter | RPM                                                                               | FEED  | RPM        | FEED | RPM        | FEED | RPM                                                                                | FEED  | RPM        | FEED  | RPM        | FEED |
| ø3                        | 7,800                                                                             | 800   | 6,900      | 400  | 6,000      | 220  | 11,500                                                                             | 1,100 | 10,500     | 860   | 9,500      | 650  |
| ø4                        | 7,150                                                                             | 800   | 6,100      | 450  | 5,750      | 250  | 9,200                                                                              | 1,100 | 7,600      | 900   | 7,100      | 680  |
| ø5                        | 6,500                                                                             | 900   | 5,700      | 510  | 5,100      | 300  | 7,200                                                                              | 1,200 | 6,400      | 950   | 6,000      | 720  |
| ø6                        | 6,100                                                                             | 1,000 | 5,150      | 520  | 4,850      | 320  | 6,200                                                                              | 1,300 | 5,300      | 1,040 | 4,950      | 810  |
| ø8                        | 5,800                                                                             | 1,100 | 4,810      | 520  | 4,150      | 330  | 4,800                                                                              | 1,400 | 4,100      | 1,120 | 3,900      | 820  |
| ø10                       | 5,500                                                                             | 1,200 | 4,200      | 500  | 3,850      | 310  | 3,700                                                                              | 1,300 | 3,000      | 1,030 | 2,600      | 810  |
| ø12                       | 5,100                                                                             | 1,100 | 3,950      | 450  | 3,500      | 290  | 3,000                                                                              | 1,200 | 2,700      | 980   | 2,100      | 780  |
| ø16                       | 4,750                                                                             | 1,100 | 3,700      | 430  | 3,200      | 290  | 2,750                                                                              | 1,200 | 2,450      | 980   | 1,950      | 760  |
| 절입량<br>Depth of Cut       |  |       |            |      |            |      |  |       |            |       |            |      |

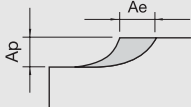
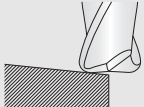
- 안정적인 절삭을 위해 홈 가공시 날경의 코너R을 유의하여  $\phi$  값을 설정 하십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30%이하로 줄어십시오.
- HRC60 이상인 경우 같은 직경의 같은 비율로 20% DOWN 시켜주십시오.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 상기 절삭조건에 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- 피삭재와 절삭형상을 위한 적절한 쿨런트 사용과 가공시 발열, 발화에 주의 하십시오.
- For stable cutting, set the ae value by paying attention to the corner radius during grooving machining.
- In case of long effective length, reduce the RPM and feed by 30% or less.
- In case the material of HRC over 60, reduce the RPM and feed by 20%.
- For curved milling, set up the pitch value lower than corner radius value.
- For curved milling, raise up the feed up to 30% in stable condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolant is recommended and note for chip emission, heat, or ignition.

## 4&6JJDR C Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material     | 날수<br>No. of<br>flutes | 고경도강<br>Hardened Steels                                                                                                                                                                                                                                                                                                                            |       |                      |                       | 고경도강<br>Hardened Steels |       |                      |                       | 고경도강<br>Hardened Steels |       |                      |                       | 고경도강<br>Hardened Steels |       |                      |                       |
|---------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------|-----------------------|-------------------------|-------|----------------------|-----------------------|-------------------------|-------|----------------------|-----------------------|-------------------------|-------|----------------------|-----------------------|
|                     |                        | 경도 Hardness                                                                                                                                                                                                                                                                                                                                        |       |                      |                       | 50 ~ 55HRC              |       |                      |                       | 55 ~ 62HRC              |       |                      |                       | 62 ~ 66HRC              |       |                      |                       |
|                     |                        | RPM                                                                                                                                                                                                                                                                                                                                                | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø1                  | 4                      | 30,250                                                                                                                                                                                                                                                                                                                                             | 4,700 | 0.04                 | 0.6                   | 20,700                  | 1,670 | 0.02                 | 0.6                   | 17,510                  | 1,370 | 0.018                | 0.6                   | 14,330                  | 690   | 0.013                | 0.5                   |
| ø2                  | 4                      | 15,100                                                                                                                                                                                                                                                                                                                                             | 4,700 | 0.08                 | 1.2                   | 10,350                  | 1,680 | 0.04                 | 1.2                   | 8,760                   | 1,370 | 0.036                | 1.2                   | 7,170                   | 690   | 0.026                | 1.0                   |
| ø3                  | 4                      | 10,000                                                                                                                                                                                                                                                                                                                                             | 4,900 | 0.12                 | 1.8                   | 6,900                   | 1,780 | 0.06                 | 1.8                   | 5,840                   | 1,285 | 0.054                | 1.8                   | 4,780                   | 720   | 0.039                | 1.5                   |
| ø4                  | 4                      | 7,560                                                                                                                                                                                                                                                                                                                                              | 4,670 | 0.16                 | 2.4                   | 5,170                   | 2,170 | 0.08                 | 2.4                   | 4,380                   | 1,314 | 0.072                | 2.4                   | 3,580                   | 860   | 0.052                | 2.0                   |
| ø5                  | 4                      | 6,050                                                                                                                                                                                                                                                                                                                                              | 4,840 | 0.20                 | 3.0                   | 4,140                   | 2,230 | 0.10                 | 3.0                   | 3,500                   | 1,330 | 0.090                | 3.0                   | 2,870                   | 920   | 0.065                | 2.5                   |
| ø6                  | 6                      | 5,040                                                                                                                                                                                                                                                                                                                                              | 7,500 | 0.24                 | 3.6                   | 3,450                   | 2,790 | 0.12                 | 3.6                   | 2,920                   | 2,010 | 0.108                | 3.6                   | 2,390                   | 1,140 | 0.078                | 3.0                   |
| ø8                  | 6                      | 3,780                                                                                                                                                                                                                                                                                                                                              | 7,900 | 0.28                 | 4.2                   | 2,590                   | 2,870 | 0.14                 | 4.2                   | 2,190                   | 2,100 | 0.144                | 4.2                   | 1,790                   | 1,220 | 0.091                | 3.5                   |
| ø10                 | 6                      | 3,025                                                                                                                                                                                                                                                                                                                                              | 7,740 | 0.32                 | 4.8                   | 2,070                   | 2,800 | 0.16                 | 4.8                   | 1,750                   | 2,000 | 0.181                | 4.8                   | 1,430                   | 1,240 | 0.104                | 4.0                   |
| ø12                 | 6                      | 2,520                                                                                                                                                                                                                                                                                                                                              | 7,410 | 0.36                 | 5.4                   | 1,720                   | 3,300 | 0.18                 | 5.4                   | 1,460                   | 1,840 | 0.217                | 5.4                   | 1,200                   | 1,200 | 0.117                | 4.5                   |
| 절입량<br>Depth of Cut |                        | <div>Slotting</div> <div>• Ap : Axial Depth</div> <div>• D : Outside Diameter</div>  <div>Side Milling</div> <div>• Ap : Axial Depth</div> <div>• Ae : Radial Depth</div>  |       |                      |                       |                         |       |                      |                       |                         |       |                      |                       |                         |       |                      |                       |

- 날경 보다 낮은 이동 PITCH를 설정 하십시오.(날경 보다 클 시 경우 CUSP가 남는다)
- 윤곽 가공시 가장 추천하며, 가능한 가공성이 좋은 기계를 사용 하십시오.
- 상기 절삭조건에 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 피삭재와 가공 모양에 따라 적절한 쿨런트를 사용 하십시오.
- Use lower value of pitch than tool diameter. If not, cusp will appear on the workpiece.
- Contouring machining method is the most recommended, and use great rigidity of CNC.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If your CNC machine cannot run enough RPM and Feed, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.

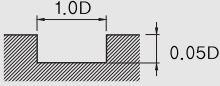
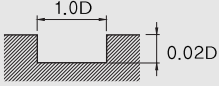
| 피삭재<br>Material           |                        | 합금강 / 공구강<br>Alloy Steels / Tool Steels                                                                                                                                  |        |                   |                    | 고경도강<br>Hardened Steels |        |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|---------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------------|--------------------|-------------------------|--------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness               |                        | 30 ~ 45HRC                                                                                                                                                               |        |                   |                    | 45 ~ 55HRC              |        |                   |                    | 55 ~ 62HRC              |       |                   |                    |
| 외경<br>Outside<br>Diameter | 반경<br>Corner<br>Radius | RPM                                                                                                                                                                      | FEED   | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED   | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1                        | R 0.2                  | 42,000                                                                                                                                                                   | 7,800  | 0.03              | 0.05               | 35,000                  | 6,800  | 0.02              | 0.05               | 25,000                  | 2,600 | 0.02              | 0.05               |
| ø1.5                      | R 0.5                  | 40,000                                                                                                                                                                   | 8,000  | 0.04              | 0.06               | 30,000                  | 7,000  | 0.03              | 0.60               | 21,000                  | 2,800 | 0.02              | 0.06               |
| ø2                        | R 0.5                  | 27,000                                                                                                                                                                   | 8,400  | 0.05              | 0.08               | 24,000                  | 7,500  | 0.04              | 0.80               | 16,000                  | 3,000 | 0.03              | 0.80               |
| ø3                        | R 0.5                  | 18,000                                                                                                                                                                   | 9,000  | 0.08              | 1.20               | 16,000                  | 8,500  | 0.06              | 1.20               | 11,000                  | 3,300 | 0.05              | 1.20               |
| ø4                        | R 0.5                  | 16,000                                                                                                                                                                   | 10,000 | 0.13              | 1.70               | 13,000                  | 10,000 | 0.09              | 1.70               | 9,000                   | 4,000 | 0.08              | 1.70               |
| ø5                        | R 1.0                  | 14,000                                                                                                                                                                   | 9,500  | 0.12              | 1.50               | 12,000                  | 8,800  | 0.08              | 1.50               | 8,000                   | 3,500 | 0.07              | 1.50               |
| ø5                        | R 0.5                  | 12,000                                                                                                                                                                   | 12,000 | 0.17              | 2.30               | 11,000                  | 10,000 | 0.12              | 2.30               | 7,300                   | 4,300 | 0.09              | 2.30               |
| ø5                        | R 1.0                  | 11,000                                                                                                                                                                   | 11,000 | 0.15              | 2.00               | 9,600                   | 9,500  | 0.10              | 2.00               | 6,400                   | 3,800 | 0.08              | 2.00               |
| ø6                        | R 0.3                  | 10,900                                                                                                                                                                   | 13,200 | 0.18              | 2.95               | 10,000                  | 13,000 | 0.12              | 2.95               | 6,500                   | 4,600 | 0.12              | 2.95               |
| ø6                        | R 0.5                  | 10,600                                                                                                                                                                   | 13,000 | 0.17              | 2.85               | 9,500                   | 12,000 | 0.11              | 2.85               | 6,300                   | 4,500 | 0.11              | 2.85               |
| ø6                        | R 1.0                  | 12,654                                                                                                                                                                   | 12,600 | 0.17              | 2.80               | 9,000                   | 11,000 | 0.11              | 2.80               | 5,800                   | 4,100 | 0.11              | 2.80               |
| ø6                        | R 1.5                  | 9,000                                                                                                                                                                    | 11,000 | 0.15              | 2.50               | 8,000                   | 9,600  | 0.10              | 2.50               | 5,300                   | 3,800 | 0.10              | 2.50               |
| ø8                        | R 0.3                  | 8,400                                                                                                                                                                    | 13,500 | 0.24              | 3.54               | 7,300                   | 15,000 | 0.18              | 3.54               | 4,700                   | 4,484 | 0.15              | 3.54               |
| ø8                        | R 0.5                  | 8,200                                                                                                                                                                    | 13,000 | 0.23              | 3.42               | 7,100                   | 13,000 | 0.17              | 3.42               | 4,600                   | 4,370 | 0.15              | 3.42               |
| ø8                        | R 1.0                  | 8,000                                                                                                                                                                    | 12,000 | 0.22              | 3.36               | 6,700                   | 11,000 | 0.17              | 3.36               | 4,520                   | 4,294 | 0.15              | 3.36               |
| ø8                        | R 2.0                  | 7,000                                                                                                                                                                    | 11,000 | 0.20              | 3.00               | 6,000                   | 9,600  | 0.15              | 3.00               | 4,000                   | 3,800 | 0.13              | 3.00               |
| ø10                       | R 0.3                  | 6,490                                                                                                                                                                    | 12,980 | 0.24              | 5.31               | 5,664                   | 11,210 | 0.18              | 5.31               | 3,776                   | 4,484 | 0.15              | 5.31               |
| ø10                       | R 0.5                  | 6,325                                                                                                                                                                    | 12,650 | 0.23              | 5.13               | 5,520                   | 10,925 | 0.17              | 5.13               | 3,680                   | 4,370 | 0.15              | 5.13               |
| ø10                       | R 1.0                  | 6,160                                                                                                                                                                    | 12,320 | 0.22              | 5.04               | 5,376                   | 10,640 | 0.17              | 5.04               | 3,584                   | 4,256 | 0.15              | 5.04               |
| ø10                       | R 2.0                  | 5,500                                                                                                                                                                    | 11,000 | 0.20              | 4.50               | 4,800                   | 9,500  | 0.15              | 4.50               | 3,200                   | 3,800 | 0.13              | 4.50               |
| ø12                       | R 0.5                  | 5,428                                                                                                                                                                    | 11,800 | 0.35              | 5.31               | 4,838                   | 10,620 | 0.30              | 5.31               | 3,186                   | 4,130 | 0.24              | 5.31               |
| ø12                       | R 1.0                  | 5,290                                                                                                                                                                    | 11,500 | 0.34              | 5.13               | 4,715                   | 10,350 | 0.29              | 5.13               | 3,105                   | 4,025 | 0.23              | 5.13               |
| ø12                       | R 2.0                  | 5,152                                                                                                                                                                    | 11,200 | 0.34              | 5.04               | 4,592                   | 10,080 | 0.28              | 5.04               | 3,024                   | 3,920 | 0.22              | 5.04               |
| ø12                       | R 3.0                  | 4,600                                                                                                                                                                    | 10,000 | 0.30              | 4.50               | 4,100                   | 9,000  | 0.25              | 4.50               | 2,700                   | 3,500 | 0.20              | 4.50               |
| ø16                       | R 1.0                  | 4,012                                                                                                                                                                    | 10,384 | 0.25              | 7.10               | 3,540                   | 9,204  | 0.22              | 7.15               | 2,360                   | 3,776 | 0.13              | 7.35               |
| ø16                       | R 2.0                  | 3,400                                                                                                                                                                    | 8,800  | 0.30              | 7.50               | 3,000                   | 7,800  | 0.25              | 7.50               | 2,000                   | 3,200 | 0.20              | 7.50               |
| 절입량<br>Depth of Cut       |                        |   |        |                   |                    |                         |        |                   |                    |                         |       |                   |                    |

## ■ Coefficients respective of tool overhang

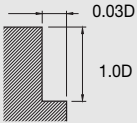
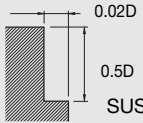
| Type       | Overhang | Revolution | Feed rate | Depth of Cut<br>ap |
|------------|----------|------------|-----------|--------------------|
| Straight   | L/D ≤ 5  | 100%       | 100%      | 100%               |
|            | L/D = 6  | 90%        | 80%       | 80%                |
|            | L/D = 7  | 80%        | 70%       | 70%                |
| Taper neck | L/D = 6  | 100%       | 100%      | 100%               |
|            | L/D = 8  | 90%        | 80%       | 80%                |
|            | L/D ≥ 10 | 80%        | 70%       | 70%                |

- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 상기 조건표는 4날 기준입니다.
- 날수에 따라 회전수는 유지하고, 피드는 안정적인 속도 내에서 최대 50%까지 UP 해주십시오.
- 상기 절삭조건은 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건 변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전속도와 이송속도를 같은 비율로 줄여 주십시오.
- 유효장 길이가 긴 경우, 위 표와같이 RPM과 FEED를 낮춰주세요.
- 절입 깊이가 얇은 경우, RPM과 FEED를 증가해 주세요
- 원활한 칩배출을 위하여 에어브로우나 오일 미스트를 추천 합니다.
- For curved milling, raise up the feed up to 30% in stable condition.
- The parameters on the table are based on 4 flutes.
- With 6 flutes milling, raise up the feed up to 50% in stable condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If your CNC machine cannot run enough RPM and Feed, reduce the RPM and feed in same proportion.
- In case of long effective length, reduce the RPM and feed by 30% or less.
- If you use small value of Ap, raise up the RPM and feed.
- Air blow or oil mist is recommended for smooth chip emission.

## 홈 절삭 Slotting

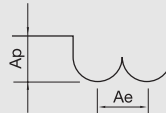
| 파삭재<br>Material           | 합금강<br>Alloy Steel<br>S45C / SCM440 / SS400                                                                                                                                                                                                 |      |                      |                       | 프리하든강/경도강<br>Prehardened Steel / Hardened Steel<br>NAK / SKD / SKT |      |                      |                       | 스테인레스강<br>Stainless Steel<br>SUS304 / SUS316 |      |                      |                       | 스테인레스강<br>Stainless Steel<br>SUS630 / SUS631 |      |                      |                       |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------|-----------------------|--------------------------------------------------------------------|------|----------------------|-----------------------|----------------------------------------------|------|----------------------|-----------------------|----------------------------------------------|------|----------------------|-----------------------|
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                                                                         | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                                                | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                          | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                          | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø6                        | 5,940                                                                                                                                                                                                                                       | 671  | 0.3                  | 6.0                   | 4,950                                                              | 405  | 0.3                  | 6.0                   | 4,050                                        | 270  | 0.12                 | 6.0                   | 3,105                                        | 225  | 0.12                 | 6.0                   |
| ø8                        | 4,410                                                                                                                                                                                                                                       | 765  | 0.4                  | 8.0                   | 3,762                                                              | 495  | 0.4                  | 8.0                   | 3,042                                        | 342  | 0.16                 | 8.0                   | 2,322                                        | 252  | 0.16                 | 8.0                   |
| ø10                       | 3,582                                                                                                                                                                                                                                       | 707  | 0.6                  | 10.0                  | 2,970                                                              | 495  | 0.6                  | 10.0                  | 2,430                                        | 315  | 0.20                 | 10.0                  | 1,863                                        | 234  | 0.20                 | 10.0                  |
| ø12                       | 2,979                                                                                                                                                                                                                                       | 689  | 0.8                  | 12.0                  | 2,502                                                              | 414  | 0.8                  | 12.0                  | 2,025                                        | 315  | 0.24                 | 12.0                  | 1,548                                        | 243  | 0.24                 | 12.0                  |
| ø16                       | 2,250                                                                                                                                                                                                                                       | 576  | 0.8                  | 16.0                  | 1,881                                                              | 342  | 0.8                  | 16.0                  | 1,521                                        | 225  | 0.32                 | 16.0                  | 1,170                                        | 207  | 0.32                 | 16.0                  |
| ø20                       | 1,791                                                                                                                                                                                                                                       | 495  | 1.0                  | 20.0                  | 1,503                                                              | 315  | 1.0                  | 20.0                  | 1,215                                        | 225  | 0.40                 | 20.0                  | 927                                          | 180  | 0.40                 | 20.0                  |
| 절입량<br>Depth of Cut       | <div> <div>일반강 General Steel</div>  </div> <div> <div>SUS</div>  </div> |      |                      |                       |                                                                    |      |                      |                       |                                              |      |                      |                       |                                              |      |                      |                       |

## 측면 절삭 Side Cutting

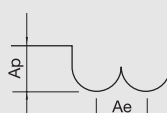
| 파삭재<br>Material           | 합금강<br>Alloy Steel<br>S45C / SCM440 / SS400                                                                                                                                                                                                    |      |                      |                       | 프리하든강/경도강<br>Prehardened Steel / Hardened Steel<br>NAK / SKD / SKT |      |                      |                       | 스테인레스강<br>Stainless Steel<br>SUS304 / SUS316 |      |                      |                       | 스테인레스강<br>Stainless Steel<br>SUS630 / SUS631 |      |                      |                       |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------|-----------------------|--------------------------------------------------------------------|------|----------------------|-----------------------|----------------------------------------------|------|----------------------|-----------------------|----------------------------------------------|------|----------------------|-----------------------|
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                                                                            | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                                                | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                          | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                          | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø6                        | 6,600                                                                                                                                                                                                                                          | 745  | 6                    | 0.18                  | 5,500                                                              | 450  | 6                    | 0.18                  | 4,500                                        | 300  | 3                    | 0.12                  | 3,450                                        | 250  | 3                    | 0.12                  |
| ø8                        | 4,900                                                                                                                                                                                                                                          | 850  | 8                    | 0.25                  | 4,180                                                              | 550  | 8                    | 0.25                  | 3,380                                        | 380  | 4                    | 0.16                  | 2,580                                        | 280  | 4                    | 0.16                  |
| ø10                       | 3,980                                                                                                                                                                                                                                          | 785  | 10                   | 0.3                   | 3,300                                                              | 550  | 10                   | 0.3                   | 2,700                                        | 350  | 5                    | 0.2                   | 2,070                                        | 260  | 5                    | 0.2                   |
| ø12                       | 3,310                                                                                                                                                                                                                                          | 765  | 12                   | 0.36                  | 2,780                                                              | 460  | 12                   | 0.36                  | 2,250                                        | 350  | 6                    | 0.24                  | 1,720                                        | 270  | 6                    | 0.24                  |
| ø16                       | 1,990                                                                                                                                                                                                                                          | 640  | 16                   | 0.48                  | 2,090                                                              | 380  | 16                   | 0.48                  | 1,690                                        | 250  | 8                    | 0.32                  | 1,300                                        | 230  | 8                    | 0.32                  |
| ø20                       | 2,500                                                                                                                                                                                                                                          | 550  | 20                   | 0.6                   | 1,670                                                              | 350  | 20                   | 0.6                   | 1,350                                        | 250  | 10                   | 0.4                   | 1,030                                        | 200  | 10                   | 0.4                   |
| 절입량<br>Depth of Cut       | <div> <div>일반강 General Steel</div>  </div> <div> <div>SUS</div>  </div> |      |                      |                       |                                                                    |      |                      |                       |                                              |      |                      |                       |                                              |      |                      |                       |

- 가능한 공구 길이 측정시 유압식 측정이 아닌 레이저식 도구 세터를 사용 하십시오.
- 가공 진입시 가능한 파삭재 밖에서 진입 하십시오.
- 상기 절삭가공 조건의 참고 수치이므로 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다 .
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할 시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다 .
- 파삭재와 가공 모양에 따라 적절한 쿨런트를 사용 하십시오.
- 스테인레스, 내열합금강 등의 절단 가공 시 수용성 절삭유가 가장 효과적 입니다.
- Use laser tool measurement instead of hydraulic measurement when measuring tool length as possible.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.
- For stainless and heat resistant alloy, water-soluble oil is the most effective.

| 파삭재<br>Material     |                         | 동<br>Copper                                                                                       |       |                   |                    | 프리하든강/고경도강<br>Prehardened Steel / Hardened Steel |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|---------------------|-------------------------|---------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|--------------------------------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness         |                         |                                                                                                   |       |                   |                    | 30 ~ 45HRC                                       |       |                   |                    | 45 ~ 55HRC              |       |                   |                    | 55 ~ 62HRC              |       |                   |                    |
| 반경<br>Radius        | 유효장<br>Effective Length | RPM                                                                                               | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                              | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R0.05               | 0.3                     | 50,000                                                                                            | 85    | 0.004             | 0.004              | 45,000                                           | 70    | 0.004             | 0.004              | 45,000                  | 50    | 0.002             | 0.002              | 45,000                  | 40    | 0.002             | 0.002              |
| "                   | 0.5                     | 50,000                                                                                            | 75    | 0.004             | 0.004              | 45,000                                           | 60    | 0.002             | 0.002              | 45,000                  | 30    | 0.002             | 0.002              | 45,000                  | 30    | 0.002             | 0.002              |
| R0.1                | 0.5                     | 50,000                                                                                            | 492   | 0.010             | 0.010              | 45,000                                           | 396   | 0.006             | 0.007              | 45,000                  | 260   | 0.006             | 0.006              | 45,000                  | 220   | 0.005             | 0.006              |
| "                   | 1                       | 50,000                                                                                            | 432   | 0.007             | 0.008              | 45,000                                           | 372   | 0.004             | 0.005              | 45,000                  | 276   | 0.004             | 0.004              | 45,000                  | 200   | 0.004             | 0.004              |
| "                   | 1.5                     | 50,000                                                                                            | 360   | 0.006             | 0.006              | 42,000                                           | 276   | 0.003             | 0.004              | 42,000                  | 216   | 0.003             | 0.004              | 42,000                  | 180   | 0.003             | 0.003              |
| R0.15               | 1                       | 50,000                                                                                            | 744   | 0.012             | 0.013              | 45,000                                           | 552   | 0.010             | 0.010              | 38,000                  | 420   | 0.090             | 0.010              | 38,000                  | 348   | 0.007             | 0.009              |
| "                   | 3                       | 48,000                                                                                            | 528   | 0.008             | 0.009              | 40,800                                           | 360   | 0.006             | 0.007              | 33,600                  | 264   | 0.005             | 0.005              | 33,600                  | 216   | 0.004             | 0.005              |
| "                   | 5                       | 39,600                                                                                            | 336   | 0.004             | 0.005              | 28,800                                           | 216   | 0.003             | 0.003              | 24,000                  | 168   | 0.003             | 0.003              | 21,600                  | 120   | 0.002             | 0.002              |
| R0.2                | 1                       | 61,200                                                                                            | 1,020 | 0.021             | 0.034              | 54,000                                           | 768   | 0.016             | 0.022              | 39,600                  | 516   | 0.013             | 0.022              | 39,600                  | 432   | 0.011             | 0.021              |
| "                   | 3                       | 55,200                                                                                            | 768   | 0.015             | 0.016              | 44,400                                           | 480   | 0.010             | 0.010              | 32,400                  | 312   | 0.009             | 0.010              | 32,400                  | 264   | 0.008             | 0.010              |
| "                   | 5                       | 39,600                                                                                            | 468   | 0.008             | 0.016              | 30,000                                           | 372   | 0.008             | 0.010              | 26,400                  | 288   | 0.006             | 0.010              | 26,400                  | 228   | 0.004             | 0.005              |
| R0.25               | 1                       | 63,600                                                                                            | 1,560 | 0.026             | 0.047              | 45,600                                           | 960   | 0.020             | 0.033              | 33,600                  | 636   | 0.014             | 0.032              | 33,600                  | 312   | 0.007             | 0.020              |
| "                   | 5                       | 52,800                                                                                            | 1,032 | 0.012             | 0.014              | 34,800                                           | 552   | 0.008             | 0.008              | 31,200                  | 444   | 0.007             | 0.010              | 31,200                  | 216   | 0.006             | 0.009              |
| "                   | 10                      | 38,400                                                                                            | 528   | 0.008             | 0.016              | 28,800                                           | 456   | 0.007             | 0.010              | 28,800                  | 372   | 0.005             | 0.010              | 27,600                  | 216   | 0.005             | 0.009              |
| R0.3                | 1                       | 63,600                                                                                            | 1,956 | 0.030             | 0.140              | 39,600                                           | 960   | 0.022             | 0.091              | 27,600                  | 600   | 0.019             | 0.091              | 26,400                  | 516   | 0.014             | 0.091              |
| "                   | 5                       | 50,400                                                                                            | 1,104 | 0.014             | 0.068              | 28,800                                           | 504   | 0.012             | 0.043              | 26,400                  | 396   | 0.008             | 0.042              | 26,400                  | 336   | 0.007             | 0.040              |
| "                   | 10                      | 31,200                                                                                            | 540   | 0.006             | 0.032              | 24,000                                           | 360   | 0.005             | 0.020              | 22,800                  | 312   | 0.004             | 0.020              | 22,800                  | 240   | 0.003             | 0.018              |
| R0.4                | 2                       | 61,200                                                                                            | 2,280 | 0.054             | 0.160              | 34,800                                           | 816   | 0.045             | 0.100              | 27,600                  | 552   | 0.038             | 0.100              | 26,400                  | 456   | 0.030             | 0.010              |
| "                   | 6                       | 51,600                                                                                            | 1,452 | 0.035             | 0.100              | 28,800                                           | 636   | 0.028             | 0.068              | 21,600                  | 420   | 0.020             | 0.068              | 21,600                  | 348   | 0.015             | 0.065              |
| "                   | 10                      | 31,000                                                                                            | 630   | 0.022             | 0.080              | 23,400                                           | 468   | 0.020             | 0.050              | 17,300                  | 408   | 0.015             | 0.050              | 16,800                  | 336   | 0.010             | 0.050              |
| R0.5                | 2                       | 50,400                                                                                            | 2,160 | 0.068             | 0.320              | 33,600                                           | 900   | 0.052             | 0.220              | 21,600                  | 540   | 0.040             | 0.220              | 18,000                  | 540   | 0.008             | 0.140              |
| "                   | 5                       | 50,400                                                                                            | 2,160 | 0.068             | 0.320              | 33,600                                           | 900   | 0.052             | 0.220              | 21,600                  | 540   | 0.040             | 0.220              | 18,000                  | 540   | 0.008             | 0.014              |
| "                   | 10                      | 30,000                                                                                            | 1,164 | 0.024             | 0.086              | 16,320                                           | 600   | 0.020             | 0.056              | 15,000                  | 456   | 0.014             | 0.056              | 13,680                  | 312   | 0.008             | 0.050              |
| "                   | 16                      | 17,640                                                                                            | 720   | 0.018             | 0.086              | 13,680                                           | 480   | 0.016             | 0.056              | 12,360                  | 384   | 0.012             | 0.056              | 11,520                  | 252   | 0.005             | 0.030              |
| R0.75               | 3                       | 31,200                                                                                            | 2,400 | 0.167             | 0.320              | 21,600                                           | 1,152 | 0.120             | 0.210              | 12,960                  | 672   | 0.100             | 0.210              | 12,000                  | 600   | 0.090             | 0.210              |
| "                   | 10                      | 26,400                                                                                            | 1,680 | 0.100             | 0.220              | 14,760                                           | 780   | 0.080             | 0.170              | 9,720                   | 480   | 0.062             | 0.170              | 9,720                   | 456   | 0.050             | 0.160              |
| "                   | 18                      | 12,120                                                                                            | 624   | 0.030             | 0.160              | 12,120                                           | 504   | 0.022             | 0.110              | 9,600                   | 432   | 0.020             | 0.110              | 9,600                   | 408   | 0.012             | 0.110              |
| "                   | 30                      | 9,840                                                                                             | 516   | 0.014             | 0.080              | 9,840                                            | 456   | 0.012             | 0.050              | 9,480                   | 420   | 0.010             | 0.050              | 9,480                   | 396   | 0.010             | 0.050              |
| R1                  | 4                       | 26,400                                                                                            | 2,448 | 0.220             | 0.520              | 21,000                                           | 1,392 | 0.180             | 0.350              | 14,640                  | 1,080 | 0.140             | 0.350              | 14,640                  | 900   | 0.120             | 0.350              |
| "                   | 10                      | 26,400                                                                                            | 2,256 | 0.180             | 0.350              | 21,000                                           | 1,224 | 0.140             | 0.230              | 14,640                  | 972   | 0.110             | 0.230              | 14,640                  | 792   | 0.090             | 0.230              |
| "                   | 20                      | 15,960                                                                                            | 1,164 | 0.090             | 0.165              | 15,960                                           | 600   | 0.060             | 0.110              | 12,720                  | 600   | 0.055             | 0.110              | 12,720                  | 492   | 0.035             | 0.110              |
| "                   | 30                      | 10,200                                                                                            | 636   | 0.025             | 0.070              | 10,200                                           | 480   | 0.020             | 0.050              | 10,200                  | 480   | 0.015             | 0.050              | 10,200                  | 384   | 0.015             | 0.045              |
| R1.5                | 6                       | 16,800                                                                                            | 3,240 | 0.250             | 0.500              | 14,400                                           | 1,824 | 0.200             | 0.340              | 9,840                   | 1,320 | 0.160             | 0.320              | 6,480                   | 732   | 0.160             | 0.320              |
| "                   | 10                      | 16,800                                                                                            | 3,240 | 0.250             | 0.500              | 14,400                                           | 1,824 | 0.200             | 0.340              | 9,840                   | 1,320 | 0.160             | 0.320              | 6,480                   | 732   | 0.160             | 0.300              |
| "                   | 20                      | 14,040                                                                                            | 2,244 | 0.200             | 0.450              | 12,360                                           | 1,476 | 0.145             | 0.320              | 8,520                   | 1,128 | 0.120             | 0.310              | 5,760                   | 660   | 0.080             | 0.300              |
| "                   | 30                      | 10,920                                                                                            | 1,620 | 0.120             | 0.220              | 9,360                                            | 816   | 0.100             | 0.150              | 8,520                   | 816   | 0.080             | 0.150              | 5,760                   | 384   | 0.070             | 0.300              |
| R2                  | 8                       | 12,600                                                                                            | 3,012 | 0.350             | 0.850              | 10,440                                           | 1,752 | 0.290             | 0.550              | 7,200                   | 1,332 | 0.220             | 0.500              | 7,200                   | 1,056 | 0.150             | 0.500              |
| "                   | 20                      | 12,600                                                                                            | 3,012 | 0.350             | 0.850              | 10,440                                           | 1,752 | 0.290             | 0.550              | 7,200                   | 1,332 | 0.220             | 0.500              | 7,200                   | 1,056 | 0.150             | 0.500              |
| "                   | 30                      | 11,160                                                                                            | 2,040 | 0.250             | 0.500              | 8,880                                            | 1,380 | 0.200             | 0.320              | 6,600                   | 1,056 | 0.150             | 0.300              | 6,600                   | 816   | 0.130             | 0.300              |
| "                   | 40                      | 8,160                                                                                             | 1,464 | 0.150             | 0.500              | 7,200                                            | 1,056 | 0.132             | 0.320              | 6,600                   | 1,056 | 0.100             | 0.300              | 6,600                   | 816   | 0.090             | 0.300              |
| R2.5                | 15                      | 10,800                                                                                            | 2,880 | 0.380             | 0.800              | 8,400                                            | 1,500 | 0.300             | 0.700              | 6,000                   | 1,140 | 0.220             | 0.700              | 6,000                   | 900   | 0.200             | 0.650              |
| "                   | 25                      | 10,800                                                                                            | 2,400 | 0.380             | 0.800              | 8,400                                            | 1,380 | 0.300             | 0.550              | 6,000                   | 1,080 | 0.220             | 0.550              | 6,000                   | 816   | 0.200             | 0.500              |
| "                   | 40                      | 9,360                                                                                             | 1,320 | 0.250             | 0.800              | 6,720                                            | 840   | 0.200             | 0.550              | 4,920                   | 660   | 0.150             | 0.550              | 4,920                   | 504   | 0.130             | 0.500              |
| R3                  | 15                      | 8,400                                                                                             | 2,676 | 0.500             | 1.000              | 8,160                                            | 1,764 | 0.420             | 0.800              | 5,760                   | 1,320 | 0.300             | 0.800              | 4,440                   | 864   | 0.300             | 0.800              |
| "                   | 30                      | 8,400                                                                                             | 1,812 | 0.380             | 0.900              | 7,200                                            | 1,680 | 0.300             | 0.650              | 5,040                   | 1,176 | 0.220             | 0.650              | 4,440                   | 792   | 0.220             | 0.600              |
| R4                  | 25                      | 8,160                                                                                             | 1,764 | 0.410             | 1.000              | 7,200                                            | 1,176 | 0.350             | 0.750              | 4,920                   | 912   | 0.180             | 0.600              | 4,560                   | 732   | 0.200             | 0.630              |
| "                   | 30                      | 7,680                                                                                             | 1,680 | 0.380             | 1.000              | 6,960                                            | 1,128 | 0.300             | 0.750              | 4,800                   | 864   | 0.160             | 0.600              | 4,320                   | 720   | 0.200             | 0.600              |
| R5                  | 30                      | 6,240                                                                                             | 1,344 | 0.560             | 1.200              | 5,880                                            | 1,128 | 0.370             | 0.900              | 4,800                   | 852   | 0.200             | 0.670              | 4,200                   | 708   | 0.200             | 0.650              |
| "                   | 35                      | 6,000                                                                                             | 1,296 | 0.500             | 1.000              | 5,400                                            | 1,080 | 0.350             | 0.850              | 4,560                   | 816   | 0.150             | 0.600              | 3,840                   | 648   | 0.200             | 0.600              |
| R6                  | 30                      | 5,160                                                                                             | 1,104 | 0.650             | 1.400              | 4,800                                            | 984   | 0.420             | 0.900              | 4,320                   | 828   | 0.250             | 0.600              | 3,600                   | 600   | 0.250             | 0.600              |
| "                   | 40                      | 4,920                                                                                             | 1,080 | 0.600             | 1.200              | 4,560                                            | 960   | 0.400             | 0.850              | 4,080                   | 780   | 0.200             | 0.600              | 3,600                   | 600   | 0.200             | 0.600              |
| 절입량<br>Depth of Cut |                         | • Ap : Axial Depth<br>• Ae : Radial Depth<br>• D : Outside Diameter<br>• n : Speed<br>• Vf : Feed |       |                   |                    |                                                  |       |                   |                    |                         |       |                   |                    |                         |       |                   |                    |



- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 주세요.
- 상기 절삭조건은 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 원활한 칩배출을 위하여 에어브로 혹은 미스트 콜런트 사용을 추천하며, 동 가공시 습식 콜런트를 추천 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity ( $\phi$ 1 or less, the vibration tolerance management should be within 5 $\mu$ m).
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.

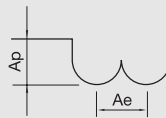
| 파삭재<br>Material     |                      | 동<br>Copper                                                                                       |       |                   |                    | 프리하튼강/고경도강<br>Prehardened Steel / Hardened Steel |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    | 고경도강<br>Hardened Steels  |       |                   |                    |
|---------------------|----------------------|---------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|--------------------------------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|--------------------------|-------|-------------------|--------------------|
| 경도 Hardness         |                      |                                                                                                   |       |                   |                    | 30 ~ 45HRC                                       |       |                   |                    | 45 ~ 55HRC              |       |                   |                    | 55 ~ 62HRC               |       |                   |                    |
| 반경<br>Radius        | 날장<br>Cutting Length | RPM                                                                                               | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                              | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                      | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R0.05               | 0.2                  | 40,000                                                                                            | 300   | 0.010             | 0.050              | 40,000                                           | 300   | 0.005             | 0.040              | 30,000                  | 200   | 0.004             | 0.040              | Cutting is not possible. |       |                   |                    |
| R0.1                | 0.2                  | 54,000                                                                                            | 430   | 0.012             | 0.008              | 54,000                                           | 630   | 0.020             | 0.060              | 44,300                  | 450   | 0.040             | 0.012              | 30,000                   | 300   | 0.023             | 0.008              |
| "                   | 0.4                  | 54,000                                                                                            | 430   | 0.007             | 0.008              | 54,000                                           | 430   | 0.020             | 0.051              | 44,300                  | 345   | 0.016             | 0.040              | 32,800                   | 260   | 0.010             | 0.023              |
| R0.15               | 0.3                  | 54,000                                                                                            | 720   | 0.020             | 0.013              | 54,000                                           | 750   | 0.030             | 0.090              | 44,300                  | 600   | 0.024             | 0.072              | 32,800                   | 450   | 0.015             | 0.042              |
| "                   | 0.6                  | 54,000                                                                                            | 720   | 0.012             | 0.013              | 54,000                                           | 715   | 0.030             | 0.075              | 44,300                  | 575   | 0.024             | 0.060              | 32,800                   | 430   | 0.015             | 0.035              |
| R0.2                | 0.4                  | 54,000                                                                                            | 870   | 0.028             | 0.016              | 54,000                                           | 1,000 | 0.040             | 0.120              | 44,300                  | 800   | 0.032             | 0.096              | 32,800                   | 600   | 0.020             | 0.056              |
| "                   | 0.8                  | 54,000                                                                                            | 870   | 0.016             | 0.016              | 54,000                                           | 880   | 0.040             | 0.105              | 44,300                  | 700   | 0.032             | 0.084              | 32,800                   | 525   | 0.020             | 0.049              |
| R0.25               | 0.5                  | 56,000                                                                                            | 1,250 | 0.035             | 0.022              | 53,000                                           | 1,250 | 0.050             | 0.150              | 43,500                  | 1,000 | 0.040             | 0.120              | 32,200                   | 750   | 0.025             | 0.070              |
| "                   | 1                    | 56,000                                                                                            | 1,380 | 0.021             | 0.022              | 50,000                                           | 1,000 | 0.050             | 0.125              | 41,350                  | 800   | 0.040             | 0.100              | 30,600                   | 600   | 0.025             | 0.058              |
| R0.3                | 0.6                  | 58,000                                                                                            | 1,510 | 0.042             | 0.026              | 52,000                                           | 1,380 | 0.060             | 0.180              | 42,650                  | 1,100 | 0.048             | 0.144              | 31,500                   | 825   | 0.030             | 0.084              |
| "                   | 1.2                  | 58,000                                                                                            | 1,710 | 0.025             | 0.026              | 48,500                                           | 1,020 | 0.060             | 0.155              | 40,500                  | 810   | 0.048             | 0.124              | 30,000                   | 610   | 0.030             | 0.072              |
| R0.4                | 0.8                  | 52,000                                                                                            | 1,870 | 0.056             | 0.036              | 48,000                                           | 1,500 | 0.080             | 0.240              | 39,500                  | 1,200 | 0.064             | 0.192              | 29,250                   | 900   | 0.040             | 0.112              |
| "                   | 2                    | 52,000                                                                                            | 1,970 | 0.033             | 0.036              | 45,000                                           | 1,085 | 0.080             | 0.200              | 37,500                  | 870   | 0.064             | 0.160              | 27,800                   | 650   | 0.040             | 0.093              |
| R0.5                | 1                    | 41,000                                                                                            | 1,660 | 0.063             | 0.040              | 38,540                                           | 1,560 | 0.100             | 0.300              | 36,900                  | 1,250 | 0.080             | 0.240              | 27,300                   | 940   | 0.050             | 0.140              |
| "                   | 2.5                  | 41,000                                                                                            | 1,880 | 0.022             | 0.040              | 38,540                                           | 1,000 | 0.100             | 0.200              | 31,500                  | 800   | 0.080             | 0.160              | 23,000                   | 600   | 0.050             | 0.090              |
| R0.6                | 3                    | 34,000                                                                                            | 2,120 | 0.072             | 0.051              | 31,960                                           | 1,550 | 0.120             | 0.360              | 32,800                  | 1,250 | 0.096             | 0.288              | 24,400                   | 940   | 0.060             | 0.168              |
| R0.75               | 1.5                  | 27,000                                                                                            | 2,280 | 0.087             | 0.068              | 25,380                                           | 1,600 | 0.150             | 0.450              | 28,700                  | 1,280 | 0.120             | 0.360              | 21,500                   | 960   | 0.075             | 0.210              |
| "                   | 4                    | 27,000                                                                                            | 1,830 | 0.052             | 0.068              | 25,380                                           | 1,000 | 0.150             | 0.325              | 26,000                  | 800   | 0.120             | 0.260              | 19,250                   | 600   | 0.075             | 0.152              |
| R1                  | 2                    | 32,700                                                                                            | 3,560 | 0.112             | 0.089              | 30,738                                           | 1,850 | 0.200             | 0.600              | 24,600                  | 1,480 | 0.160             | 0.480              | 18,250                   | 1,110 | 0.100             | 0.280              |
| "                   | 5                    | 32,700                                                                                            | 2,980 | 0.067             | 0.089              | 30,738                                           | 1,350 | 0.200             | 0.435              | 22,000                  | 1,080 | 0.160             | 0.348              | 16,250                   | 810   | 0.100             | 0.203              |
| R1.25               | 6                    | 30,600                                                                                            | 3,680 | 0.067             | 0.115              | 28,764                                           | 1,600 | 0.250             | 0.542              | 27,901                  | 1,280 | 0.200             | 0.430              | 15,500                   | 960   | 0.125             | 0.251              |
| R1.5                | 3                    | 26,100                                                                                            | 4,400 | 0.197             | 0.171              | 24,534                                           | 2,520 | 0.300             | 0.957              | 23,798                  | 2,050 | 0.240             | 0.766              | 15,500                   | 1,530 | 0.150             | 0.447              |
| "                   | 8                    | 26,100                                                                                            | 4,110 | 0.100             | 0.171              | 24,534                                           | 2,350 | 0.300             | 0.765              | 23,798                  | 1,880 | 0.240             | 0.612              | 15,500                   | 1,410 | 0.150             | 0.357              |
| R2                  | 4                    | 18,800                                                                                            | 4,160 | 0.266             | 0.208              | 17,672                                           | 2,450 | 0.400             | 1.380              | 17,142                  | 1,960 | 0.320             | 1.100              | 12,800                   | 1,470 | 0.200             | 0.644              |
| "                   | 8                    | 18,800                                                                                            | 3,920 | 0.134             | 0.208              | 17,672                                           | 2,350 | 0.400             | 1.020              | 17,142                  | 1,880 | 0.320             | 0.816              | 12,800                   | 1,410 | 0.200             | 0.476              |
| R2.5                | 5                    | 17,300                                                                                            | 3,980 | 0.215             | 0.240              | 16,262                                           | 2,560 | 0.500             | 1.660              | 15,774                  | 2,050 | 0.400             | 1.330              | 11,000                   | 1,530 | 0.250             | 0.770              |
| "                   | 10                   | 17,300                                                                                            | 3,660 | 0.180             | 0.240              | 16,262                                           | 2,300 | 0.500             | 1.275              | 15,774                  | 1,840 | 0.400             | 1.020              | 11,000                   | 1,380 | 0.250             | 0.595              |
| R3                  | 6                    | 16,500                                                                                            | 3,880 | 0.290             | 0.281              | 15,510                                           | 2,700 | 0.600             | 2.340              | 15,045                  | 2,160 | 0.480             | 1.870              | 9,600                    | 1,620 | 0.300             | 1.090              |
| "                   | 12                   | 16,500                                                                                            | 3,500 | 0.230             | 0.281              | 15,510                                           | 2,400 | 0.600             | 1.530              | 15,045                  | 1,920 | 0.480             | 1.225              | 9,600                    | 1,440 | 0.300             | 0.715              |
| R4                  | 8                    | 11,660                                                                                            | 4,000 | 0.400             | 0.175              | 10,960                                           | 2,300 | 0.800             | 3.100              | 10,632                  | 1,840 | 0.640             | 2.480              | 7,600                    | 1,380 | 0.400             | 1.446              |
| "                   | 14                   | 11,660                                                                                            | 3,850 | 0.400             | 0.175              | 10,960                                           | 2,000 | 0.800             | 2.050              | 10,632                  | 1,600 | 0.640             | 1.640              | 7,600                    | 1,200 | 0.400             | 0.957              |
| R5                  | 10                   | 9,560                                                                                             | 4,100 | 0.500             | 0.154              | 8,986                                            | 2,200 | 1.000             | 3.750              | 8,717                   | 1,780 | 0.800             | 3.000              | 6,400                    | 1,340 | 0.500             | 1.750              |
| "                   | 18                   | 9,560                                                                                             | 3,720 | 0.500             | 0.154              | 8,986                                            | 1,700 | 1.000             | 2.550              | 8,717                   | 1,360 | 0.800             | 2.040              | 6,400                    | 1,020 | 0.500             | 1.190              |
| R6                  | 12                   | 7,100                                                                                             | 4,000 | 0.600             | 0.159              | 6,674                                            | 1,850 | 1.200             | 4.420              | 6,474                   | 1,480 | 0.960             | 3.540              | 5,450                    | 1,110 | 0.600             | 2.060              |
| "                   | 22                   | 7,100                                                                                             | 3,250 | 0.600             | 0.159              | 6,674                                            | 1,600 | 1.200             | 3.050              | 6,474                   | 1,280 | 0.960             | 2.440              | 5,450                    | 960   | 0.600             | 1.423              |
| R8                  | 30                   | 4,650                                                                                             | 2,000 | 0.115             | 0.450              | 4,371                                            | 1,630 | 3.870             | 1.120              | 4,240                   | 1,100 | 2.350             | 0.790              | 4,000                    | 810   | 1.742             | 0.500              |
| R10                 | 38                   | 3,200                                                                                             | 2,200 | 0.100             | 0.400              | 3,008                                            | 1,450 | 4.120             | 1.100              | 2,918                   | 1,100 | 2.530             | 0.840              | 3,100                    | 800   | 1.866             | 0.520              |
| 절입량<br>Depth of Cut |                      | • Ap : Axial Depth<br>• Ae : Radial Depth<br>• D : Outside Diameter<br>• n : Speed<br>• Vf : Feed |       |                   |                    |                                                  |       |                   |                    |                         |       |                   |                    |                          |       |                   |                    |
|                     |                      |                |       |                   |                    |                                                  |       |                   |                    |                         |       |                   |                    |                          |       |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 주세요.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 원활한 칩배출을 위하여 에어브로 혹은 미스트 쿨런트 사용을 추천하며, 동 가공시 습식 쿨런트를 추천 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity ( $\phi$ 1 or less, the vibration tolerance management should be within 5 $\mu$ m).
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.

# 3HCB/4HSB/4HCB

■ 3HCB는 RPM 동일 FEED만 최대 20% Down 적용  
 ■ Use the same RPM, reduce the feed rate up to 20% for 3HCB

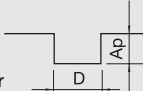
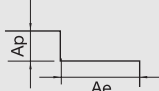
| 파삭재<br>Material     | 동<br>Copper                                                                                       |      |                      |                       | 프리하든강/고경도강<br>Prehardened Steel / Hardened Steel |      |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       |
|---------------------|---------------------------------------------------------------------------------------------------|------|----------------------|-----------------------|--------------------------------------------------|------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|
| 경도 Hardness         |                                                                                                   |      |                      |                       | 30 ~ 45HRC                                       |      |                      |                       | 45 ~ 55HRC              |      |                      |                       | 55 ~ 62HRC              |      |                      |                       |
| 반경<br>Radius        | RPM                                                                                               | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                              | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| R 0.5               | 41,000                                                                                            | 1990 | 0.063                | 0.040                 | 38,540                                           | 1870 | 0.100                | 0.300                 | 36,900                  | 1500 | 0.080                | 0.240                 | 27,300                  | 1120 | 0.050                | 0.140                 |
| R 0.75              | 27,000                                                                                            | 2740 | 0.087                | 0.068                 | 25,380                                           | 1920 | 0.150                | 0.450                 | 28,700                  | 1530 | 0.120                | 0.360                 | 21,500                  | 1150 | 0.075                | 0.210                 |
| R 1                 | 32,700                                                                                            | 4200 | 0.112                | 0.089                 | 30,738                                           | 2220 | 0.200                | 0.600                 | 24,600                  | 1770 | 0.160                | 0.480                 | 18,250                  | 1330 | 0.100                | 0.280                 |
| R 1.25              | 30,600                                                                                            | 4400 | 0.067                | 0.115                 | 28,764                                           | 1920 | 0.250                | 0.542                 | 27,901                  | 1540 | 0.200                | 0.430                 | 15,500                  | 1150 | 0.125                | 0.251                 |
| R 1.5               | 26,100                                                                                            | 5280 | 0.197                | 0.171                 | 24,534                                           | 3020 | 0.300                | 0.957                 | 23,798                  | 1820 | 0.240                | 0.766                 | 15,500                  | 1840 | 0.150                | 0.447                 |
| R 2                 | 18,800                                                                                            | 4990 | 0.266                | 0.208                 | 17,672                                           | 2940 | 0.400                | 1.380                 | 17,142                  | 1850 | 0.320                | 1.100                 | 12,800                  | 1760 | 0.200                | 0.644                 |
| R 2.5               | 17,300                                                                                            | 4770 | 0.215                | 0.240                 | 16,262                                           | 3070 | 0.500                | 1.660                 | 15,774                  | 1870 | 0.400                | 1.330                 | 11,000                  | 1800 | 0.250                | 0.770                 |
| R 3                 | 16,500                                                                                            | 4650 | 0.290                | 0.281                 | 15,510                                           | 3240 | 0.600                | 2.340                 | 15,045                  | 1900 | 0.480                | 1.870                 | 9,600                   | 2000 | 0.300                | 1.090                 |
| R 4                 | 11,660                                                                                            | 4800 | 0.400                | 0.175                 | 10,960                                           | 2760 | 0.800                | 3.100                 | 10,632                  | 1820 | 0.640                | 2.480                 | 7,600                   | 1650 | 0.400                | 1.446                 |
| R 5                 | 9,560                                                                                             | 4920 | 0.500                | 0.154                 | 8,986                                            | 2640 | 1.000                | 3.750                 | 8,717                   | 1850 | 0.800                | 3.000                 | 6,400                   | 1600 | 0.500                | 1.750                 |
| R 6                 | 7,100                                                                                             | 4800 | 0.600                | 0.159                 | 6,674                                            | 2220 | 1.200                | 4.420                 | 6,474                   | 1770 | 0.960                | 3.540                 | 5,450                   | 1650 | 0.600                | 2.060                 |
| R 8                 | 4,650                                                                                             | 3900 | 0.115                | 0.450                 | 4,371                                            | 1950 | 3.870                | 1.120                 | 4,240                   | 1760 | 2.350                | 0.790                 | 4,000                   | 1670 | 1.742                | 0.500                 |
| R 10                | 3,200                                                                                             | 3950 | 0.100                | 0.400                 | 3,008                                            | 1740 | 4.120                | 1.100                 | 2,918                   | 1750 | 2.530                | 0.840                 | 3,100                   | 1680 | 1.866                | 0.520                 |
| 절입량<br>Depth of Cut | • Ap : Axial Depth<br>• Ae : Radial Depth<br>• D : Outside Diameter<br>• n : Speed<br>• Vf : Feed |      |                      |                       |                                                  |      |                      |                       |                         |      |                      |                       |                         |      |                      |                       |



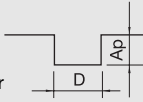
- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 주세요.
- 상기 조건표는 4날 기준이며, 3날시 회전수는 유지하고, 피드는 안정적인 속도내로 최대 20%까지 DOWN 해주십시오.(3HCB)
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 원활한 칩배출을 위하여 에어브로 혹은 미스트 쿨런트 사용을 추천하며, 동 가공시 습식 쿨런트를 추천 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- The parameters on the table is based on 4flutes. For using 3 flutes (3HCB), use the same RPM and reduce the feed maximum 20% in stable milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity ( $\phi 1$  or less, the vibration tolerance management should be within 5 $\mu$ m).
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.

| 파삭재<br>Material           |                            | 탄소강<br>Carbon Steels |       |                      |                       | 합금강<br>Alloy steel |       |                      |                       | 프리트하트강/고경도강<br>Prehardened Steel / Hardened Steel |       |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       |
|---------------------------|----------------------------|----------------------|-------|----------------------|-----------------------|--------------------|-------|----------------------|-----------------------|---------------------------------------------------|-------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|
| 경도 Hardness               |                            | S45C / S50C (~225HB) |       |                      |                       | 225 ~ 325HB        |       |                      |                       | 35 ~ 45HRC                                        |       |                      |                       | 45 ~ 60HRC              |      |                      |                       |
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM                  | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                               | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø0.2                      | 0.5                        | 56,000               | 340   | 0.006                | 0.16                  | 56,000             | 310   | 0.005                | 0.16                  | 56,000                                            | 270   | 0.003                | 0.16                  | 44,800                  | 180  | 0.002                | 0.144                 |
| "                         | 1                          | 50,900               | 290   | 0.005                | 0.02                  | 50,900             | 260   | 0.005                | 0.02                  | 50,900                                            | 230   | 0.004                | 0.02                  | 40,800                  | 160  | 0.003                | 0.018                 |
| "                         | 1.5                        | 48,200               | 250   | 0.003                | 0.006                 | 48,200             | 230   | 0.003                | 0.006                 | 48,200                                            | 200   | 0.002                | 0.006                 | 38,500                  | 140  | 0.002                | 0.0054                |
| ø0.3                      | 1                          | 60,000               | 560   | 0.009                | 0.101                 | 60,000             | 500   | 0.008                | 0.101                 | 60,000                                            | 400   | 0.006                | 0.101                 | 52,100                  | 330  | 0.004                | 0.0909                |
| "                         | 1.5                        | 50,800               | 460   | 0.008                | 0.057                 | 50,800             | 410   | 0.007                | 0.057                 | 50,800                                            | 360   | 0.005                | 0.057                 | 42,700                  | 260  | 0.004                | 0.0513                |
| "                         | 2                          | 41,500               | 350   | 0.006                | 0.013                 | 41,500             | 320   | 0.005                | 0.013                 | 41,500                                            | 280   | 0.004                | 0.013                 | 33,200                  | 190  | 0.003                | 0.0117                |
| "                         | 3                          | 31,900               | 240   | 0.002                | 0.004                 | 31,900             | 220   | 0.002                | 0.004                 | 31,900                                            | 190   | 0.001                | 0.004                 | 25,500                  | 130  | 0.001                | 0.0036                |
| "                         | 4                          | 26,200               | 170   | 0.001                | 0.003                 | 26,200             | 160   | 0.001                | 0.003                 | 26,200                                            | 140   | 0.001                | 0.003                 | 20,900                  | 100  | 0.001                | 0.0027                |
| "                         | 5                          | 20,400               | 100   | 0.001                | 0.002                 | 20,400             | 90    | 0.001                | 0.002                 | 20,400                                            | 80    | 0.001                | 0.002                 | 16,300                  | 60   | 0.001                | 0.0018                |
| ø0.4                      | 1                          | 52,700               | 660   | 0.012                | 0.054                 | 57,700             | 640   | 0.010                | 0.054                 | 48,100                                            | 470   | 0.008                | 0.054                 | 38,500                  | 320  | 0.005                | 0.0486                |
| "                         | 5                          | 38,500               | 380   | 0.003                | 0.003                 | 34,200             | 300   | 0.003                | 0.003                 | 30,100                                            | 240   | 0.002                | 0.003                 | 24,100                  | 160  | 0.001                | 0.0027                |
| "                         | 10                         | 33,700               | 260   | 0.001                | 0.001                 | 27,300             | 190   | 0.001                | 0.001                 | 24,600                                            | 150   | 0.001                | 0.001                 | 19,700                  | 100  | 0.001                | 0.0009                |
| ø0.5                      | 2                          | 56,800               | 900   | 0.020                | 0.098                 | 54,000             | 760   | 0.016                | 0.098                 | 40,600                                            | 510   | 0.014                | 0.098                 | 32,500                  | 350  | 0.010                | 0.0882                |
| "                         | 3                          | 44,200               | 660   | 0.080                | 0.016                 | 39,900             | 530   | 0.090                | 0.016                 | 32,200                                            | 370   | 0.008                | 0.016                 | 25,700                  | 260  | 0.006                | 0.0144                |
| "                         | 4                          | 40,600               | 580   | 0.009                | 0.012                 | 36,100             | 460   | 0.008                | 0.012                 | 29,700                                            | 330   | 0.008                | 0.012                 | 23,700                  | 230  | 0.005                | 0.0108                |
| "                         | 5                          | 37,000               | 500   | 0.080                | 0.008                 | 32,300             | 390   | 0.008                | 0.008                 | 27,200                                            | 290   | 0.006                | 0.008                 | 21,700                  | 200  | 0.004                | 0.0072                |
| "                         | 6                          | 33,400               | 420   | 0.005                | 0.004                 | 28,500             | 320   | 0.005                | 0.004                 | 24,700                                            | 250   | 0.003                | 0.004                 | 19,700                  | 170  | 0.002                | 0.0036                |
| "                         | 8                          | 29,100               | 320   | 0.002                | 0.002                 | 24,100             | 240   | 0.002                | 0.002                 | 21,600                                            | 190   | 0.001                | 0.002                 | 17,400                  | 130  | 0.001                | 0.0018                |
| "                         | 10                         | 26,100               | 250   | 0.001                | 0.001                 | 21,200             | 180   | 0.001                | 0.001                 | 19,600                                            | 150   | 0.001                | 0.001                 | 15,600                  | 100  | 0.001                | 0.0009                |
| "                         | 14                         | 21,500               | 120   | 0.001                | 0.001                 | 16,700             | 80    | 0.001                | 0.001                 | 16,300                                            | 70    | 0.001                | 0.001                 | 13,000                  | 50   | 0.001                | 0.0009                |
| ø0.6                      | 2                          | 63,600               | 1,240 | 0.025                | 0.203                 | 53,300             | 930   | 0.020                | 0.203                 | 39,100                                            | 600   | 0.016                | 0.203                 | 31,300                  | 410  | 0.011                | 0.1827                |
| "                         | 3                          | 52,500               | 990   | 0.018                | 0.114                 | 44,000             | 740   | 0.016                | 0.114                 | 33,500                                            | 500   | 0.013                | 0.114                 | 26,800                  | 340  | 0.009                | 0.1026                |
| "                         | 4                          | 41,300               | 740   | 0.012                | 0.025                 | 34,700             | 550   | 0.011                | 0.025                 | 27,900                                            | 390   | 0.009                | 0.025                 | 22,300                  | 270  | 0.006                | 0.0225                |
| "                         | 5                          | 36,700               | 630   | 0.010                | 0.017                 | 30,900             | 470   | 0.009                | 0.017                 | 25,500                                            | 340   | 0.007                | 0.017                 | 20,400                  | 240  | 0.005                | 0.0153                |
| "                         | 6                          | 32,100               | 520   | 0.007                | 0.008                 | 27,000             | 390   | 0.006                | 0.008                 | 23,000                                            | 290   | 0.005                | 0.008                 | 18,400                  | 200  | 0.003                | 0.0072                |
| "                         | 8                          | 26,800               | 390   | 0.004                | 0.003                 | 22,600             | 300   | 0.004                | 0.003                 | 20,000                                            | 230   | 0.003                | 0.003                 | 16,000                  | 160  | 0.002                | 0.0027                |
| "                         | 10                         | 23,400               | 30    | 0.002                | 0.002                 | 19,700             | 230   | 0.002                | 0.002                 | 17,900                                            | 180   | 0.002                | 0.002                 | 14,300                  | 130  | 0.001                | 0.0018                |
| "                         | 12                         | 20,900               | 240   | 0.002                | 0.001                 | 17,600             | 180   | 0.001                | 0.001                 | 16,400                                            | 150   | 0.001                | 0.001                 | 13,100                  | 100  | 0.001                | 0.0009                |
| "                         | 16                         | 16,200               | 100   | 0.001                | 0.001                 | 13,700             | 80    | 0.001                | 0.001                 | 13,500                                            | 70    | 0.001                | 0.001                 | 10,800                  | 50   | 0.001                | 0.0009                |
| ø0.7                      | 2                          | 59,800               | 1,380 | 0.030                | 0.038                 | 50,200             | 1,040 | 0.027                | 0.038                 | 36,100                                            | 660   | 0.021                | 0.038                 | 28,800                  | 430  | 0.015                | 0.0342                |
| "                         | 4                          | 38,900               | 840   | 0.017                | 0.047                 | 32,700             | 630   | 0.015                | 0.047                 | 25,800                                            | 440   | 0.012                | 0.047                 | 20,600                  | 290  | 0.009                | 0.0423                |
| "                         | 6                          | 30,200               | 600   | 0.010                | 0.014                 | 25,400             | 450   | 0.009                | 0.014                 | 21,200                                            | 330   | 0.007                | 0.014                 | 16,900                  | 230  | 0.005                | 0.0126                |
| "                         | 8                          | 25,300               | 460   | 0.006                | 0.006                 | 21,300             | 350   | 0.005                | 0.006                 | 18,400                                            | 260   | 0.004                | 0.006                 | 14,700                  | 190  | 0.003                | 0.0054                |
| "                         | 10                         | 22,000               | 360   | 0.004                | 0.003                 | 18,500             | 270   | 0.003                | 0.003                 | 16,500                                            | 220   | 0.003                | 0.003                 | 13,200                  | 160  | 0.002                | 0.0027                |
| ø0.8                      | 2                          | 41,200               | 1,050 | 0.033                | 0.108                 | 34,500             | 460   | 0.029                | 0.108                 | 26,200                                            | 530   | 0.023                | 0.108                 | 21,000                  | 370  | 0.016                | 0.0972                |
| "                         | 4                          | 37,100               | 930   | 0.027                | 0.08                  | 31,100             | 700   | 0.024                | 0.08                  | 24,100                                            | 480   | 0.019                | 0.08                  | 19,300                  | 330  | 0.013                | 0.072                 |
| "                         | 6                          | 28,800               | 680   | 0.015                | 0.024                 | 24,200             | 510   | 0.013                | 0.024                 | 19,800                                            | 370   | 0.010                | 0.024                 | 15,800                  | 250  | 0.007                | 0.0216                |
| "                         | 8                          | 24,100               | 520   | 0.009                | 0.01                  | 20,300             | 390   | 0.008                | 0.01                  | 17,200                                            | 300   | 0.006                | 0.01                  | 13,800                  | 200  | 0.004                | 0.009                 |
| "                         | 10                         | 21,000               | 420   | 0.006                | 0.005                 | 17,700             | 320   | 0.005                | 0.005                 | 15,500                                            | 240   | 0.004                | 0.005                 | 12,400                  | 170  | 0.003                | 0.0045                |
| "                         | 12                         | 18,700               | 340   | 0.004                | 0.003                 | 15,800             | 260   | 0.003                | 0.003                 | 14,100                                            | 200   | 0.003                | 0.003                 | 11,300                  | 140  | 0.002                | 0.0027                |
| "                         | 14                         | 15,600               | 230   | 0.002                | 0.001                 | 13,200             | 180   | 0.020                | 0.001                 | 12,300                                            | 150   | 0.001                | 0.001                 | 980                     | 100  | 0.001                | 0.0009                |
| ø0.9                      | 6                          | 27,600               | 790   | 0.019                | 0.019                 | 23,000             | 590   | 0.017                | 0.019                 | 18,500                                            | 420   | 0.013                | 0.019                 | 14,800                  | 290  | 0.010                | 0.0171                |
| "                         | 8                          | 23,000               | 600   | 0.012                | 0.012                 | 19,300             | 450   | 0.011                | 0.012                 | 16,100                                            | 330   | 0.008                | 0.012                 | 12,900                  | 230  | 0.006                | 0.0108                |
| "                         | 10                         | 20,000               | 470   | 0.008                | 0.008                 | 16,800             | 360   | 0.007                | 0.008                 | 14,500                                            | 270   | 0.005                | 0.008                 | 11,600                  | 190  | 0.004                | 0.0072                |
| ø1.0                      | 2                          | 37,900               | 1,340 | 0.048                | 0.263                 | 31,500             | 990   | 0.043                | 0.263                 | 23,400                                            | 6,500 | 0.034                | 0.263                 | 18,700                  | 440  | 0.237                | 0.237                 |
| "                         | 3                          | 37,900               | 1,340 | 0.048                | 0.263                 | 31,500             | 990   | 0.043                | 0.263                 | 23,400                                            | 6,500 | 0.034                | 0.263                 | 18,700                  | 440  | 0.237                | 0.237                 |
| "                         | 4                          | 34,100               | 1,170 | 0.040                | 0.195                 | 28,400             | 870   | 0.036                | 0.195                 | 21,500                                            | 580   | 0.028                | 0.195                 | 17,200                  | 400  | 0.176                | 0.176                 |
| "                         | 5                          | 30,300               | 1,000 | 0.032                | 0.013                 | 25,300             | 750   | 0.029                | 0.013                 | 19,600                                            | 510   | 0.022                | 0.013                 | 15,700                  | 360  | 0.011                | 0.011                 |
| "                         | 6                          | 26,500               | 850   | 0.023                | 0.058                 | 22,100             | 630   | 0.021                | 0.058                 | 17,600                                            | 440   | 0.016                | 0.058                 | 14,100                  | 310  | 0.052                | 0.052                 |
| "                         | 8                          | 22,100               | 660   | 0.014                | 0.024                 | 18,600             | 490   | 0.013                | 0.024                 | 15,300                                            | 360   | 0.010                | 0.024                 | 12,300                  | 250  | 0.022                | 0.022                 |
| "                         | 10                         | 19,200               | 530   | 0.010                | 0.013                 | 16,200             | 400   | 0.009                | 0.013                 | 13,800                                            | 300   | 0.007                | 0.013                 | 11,000                  | 210  | 0.012                | 0.012                 |
| "                         | 12                         | 17,200               | 440   | 0.007                | 0.007                 | 14,500             | 330   | 0.006                | 0.007                 | 12,600                                            | 250   | 0.005                | 0.007                 | 10,100                  | 170  | 0.006                | 0.006                 |
| "                         | 14                         | 15,600               | 360   | 0.005                | 0.005                 | 13,200             | 270   | 0.004                | 0.005                 | 11,700                                            | 210   | 0.003                | 0.005                 | 9,400                   | 150  | 0.005                | 0.005                 |
| "                         | 16                         | 14,300               | 300   | 0.004                | 0.003                 | 12,100             | 230   | 0.003                | 0.003                 | 11,000                                            | 180   | 0.003                | 0.003                 | 8,800                   | 130  | 0.003                | 0.003                 |
| "                         | 20                         | 12,500               | 200   | 0.003                | 0.001                 | 10,600             | 160   | 0.003                | 0.001                 | 9,800                                             | 130   | 0.002                | 0.001                 | 7,900                   | 90   | 0.001                | 0.001                 |
| "                         | 25                         | 10,800               | 120   | 0.003                | 0.001                 | 9,200              | 90    | 0.002                | 0.001                 | 8,800                                             | 80    | 0.002                | 0.001                 | 7,100                   | 50   | 0.001                | 0.001                 |
| "                         | 30                         | 9,700                | 50    | 0.002                | 0.001                 | 8,200              | 40    | 0.002                | 0.001                 | 8,100                                             | 30    | 0.001                | 0.001                 | 6,500                   | 30   | 0.001                | 0.0009                |
| ø1.2                      | 4                          | 28,900               | 1,180 | 0.050                | 0.189                 | 24,100             | 870   | 0.047                | 0.189                 | 18,300                                            | 580   | 0.036                | 0.189                 | 14,500                  | 400  | 0.170                | 0.170                 |
| "                         | 6                          | 24,800               | 970   | 0.037                | 0.120                 | 20,700             | 720   | 0.034                | 0.120                 | 16,100                                            | 490   | 0.026                | 0.120                 | 12,800                  | 340  | 0.108                | 0.108                 |
| "                         | 8                          | 20,700               | 760   | 0.024                | 0.051                 | 17,300             | 570   | 0.021                | 0.051                 | 13,900                                            | 400   | 0.016                | 0.051                 | 11,100                  | 280  | 0.046                | 0.046                 |
| "                         | 10                         | 18,000               | 620   | 0.016                | 0.026                 | 15,100             | 470   | 0.014                | 0.026                 | 12,400                                            | 340   | 0.011                | 0.026                 | 9,900                   | 230  | 0.023                | 0.023                 |
| "                         | 12                         | 16,100               | 520   | 0.011                | 0.015                 | 13,500             | 390   | 0.010                | 0.015                 | 11,400                                            | 290   | 0.008                | 0.015                 | 9,100                   | 200  | 0.014                | 0.014                 |
| "                         | 16                         | 13,400               | 380   | 0.006                | 0.006                 | 11,300             | 290   | 0.005                | 0.006                 | 9,800                                             | 220   | 0.004                | 0.006                 | 7,900                   | 150  | 0.005                | 0.005                 |
| "                         | 20                         | 11,700               | 280   | 0.004                | 0.003                 | 9,900              | 210   | 0.004                | 0.003                 | 8,800                                             | 170   | 0.003                | 0.003                 | 7,000                   | 120  | 0.003                | 0.003                 |
| "                         | 25                         | 10,800               | 120   | 0.003                | 0.001                 | 9,200              | 90    | 0.002                | 0.001                 | 8,800                                             | 80    | 0.002                | 0.001                 | 7,100                   | 50   | 0.001                | 0.001                 |
| "                         | 30                         | 9,700                | 50    | 0.002                | 0.001                 | 8,200              | 40    | 0.002                | 0.001                 | 8,100                                             | 30    | 0.001                | 0.001                 | 6,500                   | 30   | 0.001                | 0.0009                |

| 파삭재<br>Material           |                            | 탄소강<br>Carbon Steels |       |                      |                       | 합금강<br>Alloy steel |       |                      |                       | 프리트강/고경도강<br>Prehardened Steel / Hardened Steel |      |                      |                       | 고경도강<br>Hardened Steels |       |                      |                       |
|---------------------------|----------------------------|----------------------|-------|----------------------|-----------------------|--------------------|-------|----------------------|-----------------------|-------------------------------------------------|------|----------------------|-----------------------|-------------------------|-------|----------------------|-----------------------|
| 경도 Hardness               |                            | S45C / S50C (~225HB) |       |                      |                       | 225 ~ 325HB        |       |                      |                       | 35 ~ 45HRC                                      |      |                      |                       | 45 ~ 60HRC              |       |                      |                       |
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM                  | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                             | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø1.4                      | 6                          | 23,300               | 1,070 | 0.052                | 0.222                 | 19,400             | 800   | 0.047                | 0.222                 | 14,800                                          | 540  | 0.060                | 0.222                 | 11,900                  | 370   | 0.200                | 0.200                 |
| "                         | 8                          | 19,500               | 850   | 0.035                | 0.094                 | 16,300             | 640   | 0.032                | 0.094                 | 12,900                                          | 440  | 0.025                | 0.094                 | 10,300                  | 310   | 0.085                | 0.085                 |
| "                         | 10                         | 16,900               | 710   | 0.025                | 0.048                 | 14,200             | 530   | 0.022                | 0.048                 | 11,500                                          | 380  | 0.017                | 0.048                 | 9,200                   | 260   | 0.043                | 0.043                 |
| "                         | 14                         | 13,700               | 510   | 0.013                | 0.018                 | 11,500             | 390   | 0.012                | 0.018                 | 9,700                                           | 290  | 0.009                | 0.018                 | 7,800                   | 200   | 0.016                | 0.016                 |
| "                         | 16                         | 12,600               | 450   | 0.010                | 0.012                 | 10,600             | 340   | 0.009                | 0.012                 | 9,100                                           | 250  | 0.007                | 0.012                 | 7,300                   | 180   | 0.011                | 0.011                 |
| "                         | 20                         | 10,300               | 300   | 0.006                | 0.005                 | 8,700              | 230   | 0.005                | 0.005                 | 7,800                                           | 180  | 0.004                | 0.005                 | 6,200                   | 120   | 0.005                | 0.005                 |
| ø1.5                      | 4                          | 26,600               | 1,340 | 0.073                | 0.462                 | 22,100             | 1,000 | 0.065                | 0.462                 | 16,300                                          | 640  | 0.051                | 0.462                 | 13,000                  | 440   | 0.416                | 0.416                 |
| "                         | 6                          | 22,800               | 1,120 | 0.057                | 0.293                 | 19,000             | 840   | 0.051                | 0.293                 | 14,400                                          | 550  | 0.040                | 0.293                 | 11,500                  | 380   | 0.264                | 0.264                 |
| "                         | 8                          | 19,000               | 900   | 0.041                | 0.124                 | 15,900             | 670   | 0.037                | 0.124                 | 12,500                                          | 460  | 0.029                | 0.124                 | 10,000                  | 320   | 0.112                | 0.112                 |
| "                         | 10                         | 16,600               | 750   | 0.030                | 0.063                 | 13,800             | 560   | 0.027                | 0.063                 | 11,200                                          | 390  | 0.021                | 0.063                 | 8,900                   | 270   | 0.057                | 0.057                 |
| "                         | 12                         | 14,800               | 630   | 0.023                | 0.037                 | 12,400             | 470   | 0.020                | 0.037                 | 10,200                                          | 340  | 0.016                | 0.037                 | 8,200                   | 240   | 0.033                | 0.033                 |
| "                         | 14                         | 13,400               | 550   | 0.017                | 0.023                 | 11,200             | 410   | 0.016                | 0.023                 | 9,500                                           | 300  | 0.012                | 0.023                 | 7,600                   | 210   | 0.021                | 0.021                 |
| "                         | 16                         | 12,300               | 480   | 0.013                | 0.015                 | 10,300             | 360   | 0.012                | 0.015                 | 8,900                                           | 270  | 0.009                | 0.015                 | 7,100                   | 190   | 0.014                | 0.014                 |
| "                         | 18                         | 11,500               | 420   | 0.011                | 0.011                 | 9,600              | 310   | 0.010                | 0.011                 | 8,400                                           | 240  | 0.007                | 0.011                 | 6,700                   | 170   | 0.010                | 0.010                 |
| "                         | 20                         | 10,700               | 370   | 0.009                | 0.008                 | 9,000              | 280   | 0.008                | 0.008                 | 7,900                                           | 220  | 0.006                | 0.008                 | 6,300                   | 150   | 0.007                | 0.007                 |
| "                         | 25                         | 9,300                | 270   | 0.005                | 0.004                 | 7,800              | 200   | 0.005                | 0.004                 | 7,100                                           | 160  | 0.004                | 0.004                 | 5,700                   | 110   | 0.004                | 0.004                 |
| "                         | 30                         | 8,300                | 200   | 0.004                | 0.002                 | 7,000              | 150   | 0.004                | 0.002                 | 6,500                                           | 120  | 0.003                | 0.002                 | 5,200                   | 90    | 0.002                | 0.002                 |
| ø1.6                      | 10                         | 16,100               | 780   | 0.035                | 0.082                 | 13,500             | 580   | 0.032                | 0.082                 | 10,800                                          | 410  | 0.025                | 0.082                 | 8,600                   | 280   | 0.018                | 0.074                 |
| "                         | 14                         | 13,000               | 580   | 0.020                | 0.030                 | 10,900             | 430   | 0.018                | 0.030                 | 9,100                                           | 320  | 0.014                | 0.030                 | 7,300                   | 220   | 0.010                | 0.027                 |
| "                         | 18                         | 11,100               | 450   | 0.013                | 0.014                 | 9,300              | 340   | 0.012                | 0.014                 | 8,000                                           | 260  | 0.009                | 0.014                 | 6,400                   | 180   | 0.006                | 0.013                 |
| ø2                        | 4                          | 23,000               | 1,500 | 0.070                | 0.966                 | 20,000             | 1,200 | 0.060                | 0.966                 | 14,000                                          | 750  | 0.052                | 0.966                 | 12,000                  | 500   | 0.040                | 0.869                 |
| "                         | 6                          | 20,300               | 1,350 | 0.064                | 0.926                 | 17,400             | 1,030 | 0.058                | 0.926                 | 12,500                                          | 650  | 0.045                | 0.926                 | 10,000                  | 450   | 0.032                | 0.833                 |
| "                         | 8                          | 17,000               | 1,090 | 0.054                | 0.391                 | 14,500             | 830   | 0.048                | 0.391                 | 10,800                                          | 540  | 0.038                | 0.391                 | 8,700                   | 380   | 0.027                | 0.352                 |
| "                         | 10                         | 14,800               | 920   | 0.045                | 0.200                 | 12,600             | 700   | 0.040                | 0.200                 | 9,700                                           | 470  | 0.031                | 0.200                 | 7,800                   | 330   | 0.022                | 0.180                 |
| "                         | 12                         | 13,200               | 790   | 0.037                | 0.116                 | 11,200             | 600   | 0.034                | 0.116                 | 8,900                                           | 420  | 0.026                | 0.116                 | 7,100                   | 290   | 0.019                | 0.104                 |
| "                         | 14                         | 12,000               | 700   | 0.031                | 0.073                 | 10,200             | 530   | 0.028                | 0.073                 | 8,200                                           | 370  | 0.022                | 0.073                 | 6,600                   | 260   | 0.016                | 0.066                 |
| "                         | 16                         | 11,100               | 620   | 0.026                | 0.049                 | 9,400              | 470   | 0.024                | 0.049                 | 7,700                                           | 340  | 0.018                | 0.049                 | 6,100                   | 230   | 0.013                | 0.044                 |
| "                         | 18                         | 10,300               | 550   | 0.022                | 0.034                 | 8,700              | 420   | 0.020                | 0.034                 | 7,200                                           | 310  | 0.015                | 0.034                 | 5,800                   | 210   | 0.011                | 0.031                 |
| "                         | 20                         | 9,600                | 500   | 0.018                | 0.025                 | 8,100              | 380   | 0.016                | 0.025                 | 6,900                                           | 280  | 0.013                | 0.025                 | 5,500                   | 190   | 0.009                | 0.023                 |
| "                         | 22                         | 8,700                | 420   | 0.014                | 0.018                 | 7,500              | 320   | 0.014                | 0.018                 | 6,500                                           | 250  | 0.010                | 0.018                 | 5,200                   | 170   | 0.008                | 0.016                 |
| "                         | 25                         | 8,400                | 390   | 0.012                | 0.013                 | 7,100              | 290   | 0.011                | 0.013                 | 6,200                                           | 230  | 0.008                | 0.013                 | 4,900                   | 160   | 0.006                | 0.012                 |
| "                         | 30                         | 7,500                | 310   | 0.008                | 0.007                 | 6,300              | 230   | 0.007                | 0.007                 | 5,600                                           | 180  | 0.005                | 0.007                 | 4,500                   | 130   | 0.004                | 0.006                 |
| ø2.5                      | 8                          | 15,000               | 1,340 | 0.077                | 0.954                 | 12,800             | 1,020 | 0.069                | 0.954                 | 9,600                                           | 670  | 0.054                | 0.954                 | 7,700                   | 460   | 0.039                | 0.859                 |
| "                         | 10                         | 13,100               | 1,140 | 0.068                | 0.488                 | 11,100             | 860   | 0.061                | 0.488                 | 8,600                                           | 590  | 0.048                | 0.488                 | 6,900                   | 400   | 0.034                | 0.439                 |
| "                         | 12                         | 11,800               | 1,000 | 0.060                | 0.283                 | 10,000             | 750   | 0.054                | 0.283                 | 7,900                                           | 520  | 0.042                | 0.283                 | 6,300                   | 360   | 0.030                | 0.255                 |
| "                         | 16                         | 9,900                | 790   | 0.045                | 0.119                 | 8,400              | 590   | 0.040                | 0.119                 | 6,800                                           | 430  | 0.031                | 0.119                 | 5,500                   | 290   | 0.022                | 0.107                 |
| "                         | 20                         | 8,700                | 650   | 0.033                | 0.061                 | 7,300              | 490   | 0.030                | 0.061                 | 6,100                                           | 360  | 0.023                | 0.061                 | 4,900                   | 250   | 0.017                | 0.055                 |
| "                         | 25                         | 7,600                | 520   | 0.022                | 0.031                 | 6,400              | 390   | 0.019                | 0.031                 | 5,500                                           | 300  | 0.015                | 0.031                 | 4,400                   | 210   | 0.011                | 0.028                 |
| "                         | 30                         | 6,800                | 430   | 0.014                | 0.018                 | 5,700              | 320   | 0.012                | 0.018                 | 5,000                                           | 250  | 0.010                | 0.018                 | 4,000                   | 1,700 | 0.007                | 0.016                 |
| "                         | 35                         | 6,200                | 380   | 0.009                | 0.012                 | 5,200              | 280   | 0.008                | 0.012                 | 4,800                                           | 190  | 0.007                | 0.012                 | 3,800                   | 1,400 | 0.005                | 0.011                 |
| "                         | 40                         | 5,700                | 290   | 0.005                | 0.008                 | 4,800              | 220   | 0.004                | 0.008                 | 4,400                                           | 170  | 0.003                | 0.008                 | 3,500                   | 120   | 0.002                | 0.007                 |
| "                         | 50                         | 5,000                | 190   | 0.001                | 0.004                 | 4,200              | 140   | 0.001                | 0.004                 | 3,900                                           | 120  | 0.001                | 0.004                 | 3,100                   | 80    | 0.001                | 0.004                 |
| ø3                        | 6                          | 13,200               | 1,470 | 0.103                | 1.978                 | 10,900             | 1,080 | 0.093                | 1.978                 | 8,000                                           | 700  | 0.072                | 1.978                 | 6,400                   | 480   | 0.052                | 1.780                 |
| "                         | 10                         | 11,600               | 1,270 | 0.092                | 1.013                 | 9,600              | 930   | 0.083                | 1.013                 | 7,200                                           | 620  | 0.064                | 1.013                 | 5,800                   | 430   | 0.046                | 0.912                 |
| "                         | 12                         | 10,500               | 1,110 | 0.081                | 0.586                 | 8,700              | 830   | 0.073                | 0.586                 | 6,700                                           | 560  | 0.057                | 0.586                 | 5,300                   | 380   | 0.041                | 0.527                 |
| "                         | 16                         | 8,900                | 900   | 0.064                | 0.247                 | 7,400              | 670   | 0.058                | 0.247                 | 5,900                                           | 470  | 0.045                | 0.247                 | 4,700                   | 320   | 0.032                | 0.222                 |
| "                         | 20                         | 7,800                | 750   | 0.050                | 0.127                 | 6,600              | 560   | 0.045                | 0.127                 | 5,300                                           | 400  | 0.035                | 0.127                 | 4,300                   | 280   | 0.025                | 0.114                 |
| "                         | 25                         | 6,900                | 620   | 0.036                | 0.065                 | 5,800              | 460   | 0.032                | 0.065                 | 4,800                                           | 340  | 0.025                | 0.065                 | 3,900                   | 230   | 0.018                | 0.059                 |
| "                         | 30                         | 6,200                | 520   | 0.026                | 0.038                 | 5,200              | 390   | 0.023                | 0.038                 | 4,500                                           | 290  | 0.018                | 0.038                 | 3,600                   | 200   | 0.013                | 0.034                 |
| "                         | 35                         | 5,700                | 440   | 0.018                | 0.024                 | 4,800              | 330   | 0.016                | 0.024                 | 4,200                                           | 250  | 0.013                | 0.024                 | 3,300                   | 170   | 0.009                | 0.022                 |
| "                         | 40                         | 5,300                | 370   | 0.013                | 0.016                 | 4,500              | 280   | 0.012                | 0.016                 | 3,900                                           | 220  | 0.009                | 0.016                 | 3,100                   | 150   | 0.006                | 0.014                 |
| "                         | 45                         | 5,000                | 330   | 0.008                | 0.012                 | 4,200              | 230   | 0.008                | 0.012                 | 3,700                                           | 180  | 0.006                | 0.012                 | 2,900                   | 130   | 0.005                | 0.011                 |
| "                         | 50                         | 4,700                | 270   | 0.006                | 0.008                 | 3,900              | 200   | 0.005                | 0.008                 | 3,600                                           | 160  | 0.004                | 0.008                 | 2,800                   | 110   | 0.003                | 0.007                 |
| "                         | 60                         | 4,500                | 250   | 0.003                | 0.005                 | 3,600              | 180   | 0.003                | 0.005                 | 3,200                                           | 130  | 0.003                | 0.005                 | 2,500                   | 90    | 0.002                | 0.005                 |
| ø4                        | 8                          | 10,000               | 1,600 | 0.014                | 1.990                 | 8,800              | 1,100 | 0.014                | 1.990                 | 6,800                                           | 770  | 0.093                | 1.990                 | 5,300                   | 500   | 0.070                | 1.791                 |
| "                         | 10                         | 9,200                | 1,400 | 0.120                | 1.960                 | 8,000              | 1,000 | 0.120                | 1.960                 | 5,900                                           | 690  | 0.085                | 1.960                 | 4,700                   | 460   | 0.066                | 1.764                 |
| "                         | 12                         | 8,500                | 1,280 | 0.112                | 1.852                 | 7,100              | 950   | 0.101                | 1.852                 | 5,100                                           | 600  | 0.078                | 1.852                 | 4,100                   | 410   | 0.056                | 1.667                 |
| "                         | 16                         | 7,200                | 1,050 | 0.093                | 0.781                 | 6,000              | 770   | 0.084                | 0.781                 | 4,400                                           | 510  | 0.065                | 0.781                 | 3,600                   | 350   | 0.046                | 0.703                 |
| "                         | 20                         | 6,300                | 880   | 0.077                | 0.400                 | 5,200              | 650   | 0.069                | 0.400                 | 4,000                                           | 440  | 0.054                | 0.400                 | 3,200                   | 300   | 0.038                | 0.360                 |
| "                         | 25                         | 5,600                | 750   | 0.061                | 0.205                 | 4,600              | 540   | 0.055                | 0.205                 | 3,600                                           | 380  | 0.042                | 0.205                 | 2,900                   | 260   | 0.030                | 0.185                 |
| "                         | 30                         | 5,000                | 630   | 0.048                | 0.119                 | 4,100              | 460   | 0.043                | 0.119                 | 3,300                                           | 330  | 0.033                | 0.119                 | 2,600                   | 230   | 0.024                | 0.107                 |
| "                         | 35                         | 4,600                | 540   | 0.038                | 0.075                 | 3,800              | 400   | 0.034                | 0.075                 | 3,100                                           | 290  | 0.026                | 0.075                 | 2,500                   | 200   | 0.019                | 0.068                 |
| "                         | 40                         | 4,200                | 470   | 0.030                | 0.050                 | 3,500              | 350   | 0.027                | 0.050                 | 2,900                                           | 250  | 0.021                | 0.050                 | 2,300                   | 180   | 0.015                | 0.045                 |
| "                         | 45                         | 3,900                | 410   | 0.023                | 0.035                 | 3,300              | 300   | 0.021                | 0.035                 | 2,700                                           | 230  | 0.016                | 0.035                 | 2,200                   | 160   | 0.012                | 0.032                 |
| "                         | 50                         | 3,700                | 360   | 0.018                | 0.026                 | 3,100              | 270   | 0.016                | 0.026                 | 2,600                                           | 200  | 0.013                | 0.026                 | 2,100                   | 140   | 0.009                | 0.023                 |
| "                         | 55                         | 3,500                | 320   | 0.015                | 0.020                 | 2,950              | 250   | 0.015                | 0.020                 | 2,500                                           | 180  | 0.010                | 0.020                 | 2,000                   | 130   | 0.007                | 0.018                 |
| "                         | 60                         | 3,300                | 280   | 0.011                | 0.015                 | 2,800              | 210   | 0.010                | 0.015                 | 2,400                                           | 160  | 0.008                | 0.015                 | 1,900                   | 110   | 0.006                | 0.014                 |

| 파삭재<br>Material        |                         | 탄소강<br>Carbon Steels                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |                   |                    | 합금강<br>Alloy steel |      |                   |                    | 포리하든강/고경도강<br>Prehardened Steel / Hardened Steel |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|--------------------|------|-------------------|--------------------|--------------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            |                         | S45C / S50C (~225HB)                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |                   |                    | 225 ~ 325HB        |      |                   |                    | 35 ~ 45HRC                                       |      |                   |                    | 45 ~ 60HRC              |      |                   |                    |
| 외경<br>Outside Diameter | 유효장<br>Effective Length | RPM                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                              | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø5                     | 16                      | 6,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1,140 | 0.127             | 1.907              | 5,100              | 860  | 0.114             | 1.907              | 3,500                                            | 520  | 0.089             | 1.907              | 2,800                   | 360  | 0.064             | 1.716              |
| "                      | 20                      | 5,300                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 980   | 0.121             | 0.977              | 4,400              | 730  | 0.109             | 0.977              | 3,100                                            | 440  | 0.085             | 0.977              | 2,500                   | 310  | 0.061             | 0.879              |
| "                      | 25                      | 4,600                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 820   | 0.109             | 0.500              | 3,800              | 600  | 0.099             | 0.500              | 2,800                                            | 390  | 0.077             | 0.500              | 2,200                   | 270  | 0.055             | 0.450              |
| "                      | 30                      | 4,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 710   | 0.094             | 0.289              | 3,400              | 510  | 0.085             | 0.289              | 2,500                                            | 340  | 0.066             | 0.289              | 2,000                   | 230  | 0.047             | 0.260              |
| "                      | 35                      | 3,800                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 620   | 0.077             | 0.182              | 3,100              | 450  | 0.069             | 0.182              | 2,300                                            | 300  | 0.054             | 0.182              | 1,900                   | 210  | 0.038             | 0.164              |
| "                      | 40                      | 3,500                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 540   | 0.060             | 0.122              | 2,800              | 390  | 0.054             | 0.122              | 2,200                                            | 270  | 0.042             | 0.122              | 1,700                   | 180  | 0.030             | 0.110              |
| "                      | 50                      | 3,100                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 430   | 0.031             | 0.063              | 2,400              | 300  | 0.028             | 0.063              | 1,900                                            | 210  | 0.022             | 0.063              | 1,500                   | 150  | 0.016             | 0.057              |
| "                      | 60                      | 2,800                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 350   | 0.013             | 0.036              | 2,100              | 240  | 0.012             | 0.036              | 1,800                                            | 170  | 0.009             | 0.036              | 1,400                   | 120  | 0.007             | 0.032              |
| ø6                     | 20                      | 4,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 960   | 0.126             | 2.025              | 3,800              | 780  | 0.114             | 2.025              | 2,600                                            | 470  | 0.088             | 2.025              | 2,100                   | 330  | 0.063             | 1.823              |
| "                      | 30                      | 3,400                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 730   | 0.109             | 0.600              | 2,800              | 540  | 0.099             | 0.600              | 2,000                                            | 340  | 0.077             | 0.600              | 1,600                   | 240  | 0.055             | 0.540              |
| "                      | 40                      | 3,000                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 600   | 0.083             | 0.253              | 2,300              | 410  | 0.074             | 0.253              | 1,700                                            | 260  | 0.058             | 0.253              | 1,300                   | 170  | 0.041             | 0.228              |
| "                      | 50                      | 2,600                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 480   | 0.054             | 0.130              | 1,900              | 310  | 0.049             | 0.130              | 1,500                                            | 220  | 0.038             | 0.130              | 1,200                   | 160  | 0.027             | 0.117              |
| "                      | 60                      | 2,400                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 410   | 0.031             | 0.075              | 1,700              | 260  | 0.028             | 0.075              | 1,300                                            | 170  | 0.022             | 0.075              | 1,000                   | 120  | 0.016             | 0.068              |
| ø8                     | 20                      | 3,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 910   | 0.180             | 1.600              | 2,800              | 710  | 0.160             | 1.600              | 2,300                                            | 450  | 0.130             | 1.600              | 1,700                   | 330  | 0.090             | 1.440              |
| "                      | 40                      | 2,600                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 600   | 0.120             | 0.200              | 2,000              | 410  | 0.100             | 0.200              | 1,500                                            | 250  | 0.080             | 0.200              | 1,100                   | 160  | 0.060             | 0.180              |
| ø10                    | 25                      | 2,900                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 890   | 0.200             | 1.760              | 2,700              | 680  | 0.180             | 1.760              | 2,100                                            | 430  | 0.130             | 1.760              | 1,500                   | 310  | 0.080             | 1.584              |
| "                      | 45                      | 2,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 580   | 0.140             | 0.240              | 2,000              | 400  | 0.120             | 0.240              | 1,300                                            | 220  | 0.700             | 0.240              | 900                     | 150  | 0.050             | 0.216              |
| 절입량<br>Depth of Cut    |                         | <div> <div>Slotting</div> <div>                     • Ap : Axial Depth<br/>                     • D : Outside Diameter                 </div>  </div> <div> <div>Side Milling</div> <div>                     • Ap : Axial Depth<br/>                     • Ae : Radial Depth                 </div>  </div> |       |                   |                    |                    |      |                   |                    |                                                  |      |                   |                    |                         |      |                   |                    |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC60 이상 고경도강 가공시 60HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (ø10이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece, HRC over 60 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use a machine with low vibration and good rigidity (ø1 or less, the vibration tolerance management should be within 5 $\mu$ m).
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

| 파삭재<br>Material           |                            | 탄소강<br>Carbon Steels                                                                                                                                                                                                                                                                                                                               |       |                      |                       | 합금강<br>Alloy steel |       |                      |                       | 프리하트강/고경도강<br>Prehardened Steel / Hardened Steel |      |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       |
|---------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------|-----------------------|--------------------|-------|----------------------|-----------------------|--------------------------------------------------|------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|
| 경도 Hardness               |                            | S45C / S50C (~225HB)                                                                                                                                                                                                                                                                                                                               |       |                      |                       | 225 ~ 325HB        |       |                      |                       | 30 ~ 45HRC                                       |      |                      |                       | 45 ~ 60HRC              |      |                      |                       |
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM                                                                                                                                                                                                                                                                                                                                                | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                              | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø0.8                      | 8                          | 25,000                                                                                                                                                                                                                                                                                                                                             | 750   | 0.009                | 0.01                  | 21,600             | 560   | 0.008                | 0.01                  | 18,300                                           | 450  | 0.006                | 0.01                  | 15,900                  | 300  | 0.004                | 0.009                 |
| "                         | 16                         | 16,800                                                                                                                                                                                                                                                                                                                                             | 340   | 0.002                | 0.001                 | 15,700             | 270   | 0.020                | 0.001                 | 13,300                                           | 240  | 0.001                | 0.001                 | 10,400                  | 200  | 0.001                | 0.001                 |
| ø1                        | 8                          | 24,000                                                                                                                                                                                                                                                                                                                                             | 720   | 0.014                | 0.024                 | 20,300             | 490   | 0.013                | 0.024                 | 16,900                                           | 390  | 0.010                | 0.024                 | 14,200                  | 265  | 0.007                | 0.022                 |
| "                         | 16                         | 15,800                                                                                                                                                                                                                                                                                                                                             | 325   | 0.004                | 0.003                 | 14,300             | 250   | 0.003                | 0.003                 | 12,200                                           | 220  | 0.003                | 0.003                 | 9,200                   | 178  | 0.002                | 0.003                 |
| "                         | 25                         | 12,600                                                                                                                                                                                                                                                                                                                                             | 165   | 0.003                | 0.001                 | 11,200             | 120   | 0.002                | 0.001                 | 10,800                                           | 105  | 0.002                | 0.001                 | 8,300                   | 88   | 0.001                | 0.001                 |
| ø1.5                      | 8                          | 21,000                                                                                                                                                                                                                                                                                                                                             | 980   | 0.041                | 0.124                 | 18,800             | 740   | 0.037                | 0.124                 | 14,600                                           | 520  | 0.029                | 0.124                 | 12,400                  | 355  | 0.020                | 0.112                 |
| "                         | 16                         | 13,600                                                                                                                                                                                                                                                                                                                                             | 544   | 0.013                | 0.015                 | 12,200             | 410   | 0.012                | 0.015                 | 10,500                                           | 322  | 0.009                | 0.015                 | 8,000                   | 230  | 0.007                | 0.014                 |
| "                         | 25                         | 11,400                                                                                                                                                                                                                                                                                                                                             | 318   | 0.005                | 0.004                 | 10,500             | 240   | 0.005                | 0.004                 | 8,600                                            | 196  | 0.004                | 0.004                 | 6,200                   | 138  | 0.003                | 0.004                 |
| ø2                        | 8                          | 19,600                                                                                                                                                                                                                                                                                                                                             | 1,197 | 0.054                | 0.391                 | 17,000             | 970   | 0.048                | 0.391                 | 12,800                                           | 630  | 0.038                | 0.391                 | 10,600                  | 470  | 0.027                | 0.352                 |
| "                         | 16                         | 12,300                                                                                                                                                                                                                                                                                                                                             | 740   | 0.026                | 0.049                 | 11,600             | 574   | 0.024                | 0.049                 | 9,800                                            | 378  | 0.018                | 0.049                 | 7,300                   | 268  | 0.013                | 0.044                 |
| "                         | 25                         | 10,100                                                                                                                                                                                                                                                                                                                                             | 456   | 0.012                | 0.013                 | 9,700              | 348   | 0.011                | 0.013                 | 7,900                                            | 262  | 0.008                | 0.013                 | 6,400                   | 184  | 0.006                | 0.012                 |
| ø2.5                      | 10                         | 16,600                                                                                                                                                                                                                                                                                                                                             | 1,240 | 0.068                | 0.488                 | 14,300             | 1,035 | 0.061                | 0.488                 | 10,200                                           | 689  | 0.048                | 0.488                 | 8,350                   | 510  | 0.034                | 0.439                 |
| "                         | 16                         | 11,600                                                                                                                                                                                                                                                                                                                                             | 890   | 0.045                | 0.119                 | 9,800              | 710   | 0.040                | 0.119                 | 7,220                                            | 480  | 0.031                | 0.119                 | 6,700                   | 326  | 0.022                | 0.107                 |
| "                         | 25                         | 8,700                                                                                                                                                                                                                                                                                                                                              | 630   | 0.022                | 0.031                 | 8,300              | 460   | 0.019                | 0.031                 | 6,360                                            | 338  | 0.015                | 0.031                 | 5,500                   | 273  | 0.011                | 0.028                 |
| ø3                        | 8                          | 14,800                                                                                                                                                                                                                                                                                                                                             | 1,390 | 0.092                | 1.978                 | 12,100             | 1,100 | 0.083                | 1.978                 | 8,800                                            | 736  | 0.064                | 1.978                 | 6,900                   | 553  | 0.046                | 1.780                 |
| "                         | 16                         | 10,200                                                                                                                                                                                                                                                                                                                                             | 968   | 0.064                | 0.247                 | 8,600              | 816   | 0.058                | 0.247                 | 6,300                                            | 543  | 0.045                | 0.247                 | 5,890                   | 362  | 0.032                | 0.222                 |
| "                         | 25                         | 7,600                                                                                                                                                                                                                                                                                                                                              | 740   | 0.036                | 0.038                 | 7,100              | 518   | 0.032                | 0.038                 | 5,880                                            | 397  | 0.025                | 0.038                 | 3,900                   | 293  | 0.018                | 0.034                 |
| "                         | 35                         | 6,200                                                                                                                                                                                                                                                                                                                                              | 415   | 0.018                | 0.024                 | 5,300              | 374   | 0.016                | 0.024                 | 4,730                                            | 322  | 0.013                | 0.024                 | 3,300                   | 216  | 0.009                | 0.022                 |
| ø4                        | 8                          | 12,300                                                                                                                                                                                                                                                                                                                                             | 1,830 | 0.14                 | 1.990                 | 10,200             | 1,210 | 0.140                | 1.990                 | 7,400                                            | 848  | 0.093                | 1.990                 | 6,300                   | 500  | 0.070                | 1.791                 |
| "                         | 16                         | 8,600                                                                                                                                                                                                                                                                                                                                              | 1,240 | 0.093                | 0.781                 | 7,200              | 860   | 0.084                | 0.781                 | 5,100                                            | 573  | 0.065                | 0.781                 | 5,150                   | 397  | 0.046                | 0.703                 |
| "                         | 25                         | 6,400                                                                                                                                                                                                                                                                                                                                              | 890   | 0.061                | 0.205                 | 5,000              | 590   | 0.055                | 0.205                 | 4,180                                            | 433  | 0.042                | 0.205                 | 3,180                   | 304  | 0.030                | 0.185                 |
| "                         | 40                         | 4,950                                                                                                                                                                                                                                                                                                                                              | 510   | 0.030                | 0.050                 | 3,900              | 385   | 0.027                | 0.050                 | 3,300                                            | 341  | 0.021                | 0.050                 | 2,770                   | 208  | 0.015                | 0.045                 |
| ø5                        | 16                         | 7,200                                                                                                                                                                                                                                                                                                                                              | 1,280 | 0.127                | 1.907                 | 6,400              | 944   | 0.114                | 1.907                 | 4,387                                            | 554  | 0.089                | 1.907                 | 4,220                   | 378  | 0.064                | 1.716                 |
| "                         | 25                         | 5,400                                                                                                                                                                                                                                                                                                                                              | 955   | 0.109                | 0.500                 | 4,600              | 665   | 0.099                | 0.500                 | 3,668                                            | 412  | 0.077                | 0.500                 | 2,740                   | 280  | 0.055                | 0.450                 |
| "                         | 40                         | 4,100                                                                                                                                                                                                                                                                                                                                              | 660   | 0.060                | 0.122                 | 3,300              | 470   | 0.054                | 0.122                 | 3,655                                            | 298  | 0.042                | 0.122                 | 2,320                   | 180  | 0.030                | 0.110                 |
| ø6                        | 20                         | 4,880                                                                                                                                                                                                                                                                                                                                              | 1,088 | 0.126                | 2.025                 | 4,433              | 726   | 0.114                | 2.025                 | 2,980                                            | 528  | 0.088                | 2.025                 | 2,640                   | 356  | 0.063                | 1.823                 |
| "                         | 40                         | 3,800                                                                                                                                                                                                                                                                                                                                              | 720   | 0.083                | 0.253                 | 2,950              | 497   | 0.074                | 0.253                 | 2,100                                            | 326  | 0.058                | 0.253                 | 2,078                   | 226  | 0.041                | 0.228                 |
| ø8                        | 20                         | 4,460                                                                                                                                                                                                                                                                                                                                              | 980   | 0.180                | 1.600                 | 3,600              | 787   | 0.160                | 1.600                 | 2,540                                            | 487  | 0.130                | 1.600                 | 2,430                   | 343  | 0.090                | 1.440                 |
| "                         | 40                         | 3,400                                                                                                                                                                                                                                                                                                                                              | 780   | 0.120                | 0.200                 | 2,460              | 516   | 0.100                | 0.200                 | 1,890                                            | 297  | 0.080                | 0.200                 | 1,770                   | 211  | 0.060                | 0.180                 |
| ø10                       | 25                         | 3,400                                                                                                                                                                                                                                                                                                                                              | 926   | 0.200                | 1.760                 | 3,160              | 726   | 0.180                | 1.760                 | 2,360                                            | 467  | 0.130                | 1.760                 | 1,650                   | 326  | 0.080                | 1.584                 |
| "                         | 35                         | 2,170                                                                                                                                                                                                                                                                                                                                              | 640   | 0.140                | 0.240                 | 2,120              | 615   | 0.120                | 0.240                 | 1,780                                            | 412  | 0.090                | 0.240                 | 1,180                   | 192  | 0.070                | 0.216                 |
| ø12                       | 30                         | 2,500                                                                                                                                                                                                                                                                                                                                              | 710   | 0.220                | 1.840                 | 2,300              | 580   | 0.200                | 1.840                 | 2,000                                            | 400  | 0.140                | 1.840                 | 1,400                   | 280  | 0.080                | 1.656                 |
| "                         | 40                         | 1,880                                                                                                                                                                                                                                                                                                                                              | 526   | 0.120                | 0.280                 | 1,820              | 474   | 0.110                | 0.280                 | 1,690                                            | 345  | 0.080                | 0.280                 | 1,020                   | 184  | 0.060                | 0.252                 |
| 절입량<br>Depth of Cut       |                            | <div>Slotting</div> <div>• Ap : Axial Depth</div> <div>• D : Outside Diameter</div>  <div>Side Milling</div> <div>• Ap : Axial Depth</div> <div>• Ae : Radial Depth</div>  |       |                      |                       |                    |       |                      |                       |                                                  |      |                      |                       |                         |      |                      |                       |

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- HRC60 이상 고경도강 가공시 60HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5µm 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece, HRC over 60 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5µm).
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

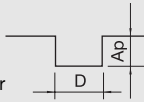
## 홈 절삭 Slotting

| 파삭재<br>Material        | 합금강<br>Alloy Steel                                              |       | 프리하든강/고경도강<br>Prehardened Steel / Hardened Steel |      | 고경도강<br>Hardened Steels |      | 고경도강<br>Hardened Steels |      |
|------------------------|-----------------------------------------------------------------|-------|--------------------------------------------------|------|-------------------------|------|-------------------------|------|
| 경도 Hardness            | 30 ~ 40HRC                                                      |       | 40 ~ 50HRC                                       |      | 50 ~ 55HRC              |      | 55 ~ 60HRC              |      |
| 외경<br>Outside Diameter | RPM                                                             | FEED  | RPM                                              | FEED | RPM                     | FEED | RPM                     | FEED |
| Ø 0.1                  | 50,000                                                          | 100   | 45,000                                           | 100  | 40,000                  | 90   | 33,000                  | 50   |
| Ø 0.2                  | 50,000                                                          | 130   | 45,000                                           | 115  | 40,000                  | 95   | 33,000                  | 60   |
| Ø 0.3                  | 50,000                                                          | 190   | 45,000                                           | 140  | 40,000                  | 115  | 33,000                  | 70   |
| Ø 0.4                  | 50,000                                                          | 235   | 45,000                                           | 180  | 40,000                  | 140  | 33,000                  | 90   |
| Ø 0.5                  | 50,000                                                          | 370   | 45,000                                           | 280  | 40,000                  | 220  | 33,000                  | 140  |
| Ø 0.6                  | 50,000                                                          | 470   | 45,000                                           | 360  | 40,000                  | 285  | 30,000                  | 160  |
| Ø 0.8                  | 50,000                                                          | 600   | 40,000                                           | 440  | 30,000                  | 295  | 25,000                  | 185  |
| Ø 0.9                  | 49,000                                                          | 655   | 39,000                                           | 520  | 27,800                  | 330  | 22,700                  | 205  |
| Ø 1                    | 48,000                                                          | 750   | 38,000                                           | 570  | 25,500                  | 360  | 20,500                  | 215  |
| Ø 2                    | 33,300                                                          | 850   | 26,000                                           | 680  | 17,500                  | 420  | 14,500                  | 260  |
| Ø 3                    | 21,800                                                          | 850   | 17,300                                           | 680  | 11,500                  | 420  | 9,500                   | 260  |
| Ø 4                    | 16,700                                                          | 880   | 13,200                                           | 700  | 8,800                   | 440  | 7,200                   | 270  |
| Ø 5                    | 15,700                                                          | 1,000 | 12,500                                           | 805  | 8,300                   | 500  | 6,400                   | 285  |
| Ø 6                    | 13,100                                                          | 950   | 10,350                                           | 770  | 6,900                   | 480  | 5,300                   | 280  |
| Ø 8                    | 9,880                                                           | 930   | 7,800                                            | 720  | 5,200                   | 445  | 4,000                   | 255  |
| Ø 10                   | 7,800                                                           | 850   | 6,150                                            | 680  | 4,100                   | 415  | 3,200                   | 240  |
| Ø 12                   | 6,650                                                           | 850   | 5,250                                            | 680  | 3,500                   | 415  | 2,650                   | 240  |
| Ø 16                   | 5,540                                                           | 780   | 4,340                                            | 610  | 2,600                   | 360  | 1,840                   | 180  |
| Ø 18                   | 5,540                                                           | 780   | 4,340                                            | 610  | 2,600                   | 360  | 1,840                   | 180  |
| Ø 20                   | 4,640                                                           | 720   | 4,340                                            | 570  | 2,100                   | 300  | 1,460                   | 180  |
| 절입량<br>Depth of Cut    | <div> <div>~ 55HRC</div> </div> <div> <div>55HRC ~</div> </div> |       |                                                  |      |                         |      |                         |      |

## 측면 절삭 Side Cutting

| 파삭재<br>Material        | 합금강<br>Alloy Steel                                              |       | 프리하든강/고경도강<br>Prehardened Steel / Hardened Steel |       | 고경도강<br>Hardened Steels |      | 고경도강<br>Hardened Steels |      |
|------------------------|-----------------------------------------------------------------|-------|--------------------------------------------------|-------|-------------------------|------|-------------------------|------|
| 경도 Hardness            | 30 ~ 40HRC                                                      |       | 40 ~ 50HRC                                       |       | 50 ~ 55HRC              |      | 55 ~ 60HRC              |      |
| 외경<br>Outside Diameter | RPM                                                             | FEED  | RPM                                              | FEED  | RPM                     | FEED | RPM                     | FEED |
| Ø 1                    | 48,000                                                          | 1,050 | 38,000                                           | 820   | 25,500                  | 510  | 20,500                  | 310  |
| Ø 2                    | 33,300                                                          | 1,200 | 26,000                                           | 970   | 17,500                  | 600  | 14,500                  | 370  |
| Ø 3                    | 21,800                                                          | 1,200 | 17,300                                           | 970   | 11,500                  | 600  | 9,500                   | 370  |
| Ø 4                    | 16,700                                                          | 1,250 | 13,200                                           | 1,000 | 8,800                   | 625  | 7,200                   | 385  |
| Ø 5                    | 15,700                                                          | 1,450 | 12,500                                           | 1,150 | 8,300                   | 710  | 6,400                   | 410  |
| Ø 6                    | 13,100                                                          | 1,350 | 10,350                                           | 1,100 | 6,900                   | 690  | 5,300                   | 400  |
| Ø 8                    | 9,880                                                           | 1,320 | 7,800                                            | 1,030 | 5,200                   | 635  | 4,000                   | 365  |
| Ø 10                   | 7,800                                                           | 1,200 | 6,150                                            | 970   | 4,100                   | 590  | 3,200                   | 340  |
| Ø 12                   | 6,650                                                           | 1,200 | 5,250                                            | 970   | 3,500                   | 590  | 2,650                   | 340  |
| Ø 16                   | 5,540                                                           | 1,000 | 4,340                                            | 880   | 2,600                   | 530  | 1,840                   | 300  |
| Ø 18                   | 5,540                                                           | 1,000 | 4,200                                            | 880   | 2,450                   | 530  | 1,650                   | 300  |
| Ø 20                   | 4,640                                                           | 950   | 3,650                                            | 800   | 2,100                   | 500  | 1,460                   | 295  |
| 절입량<br>Depth of Cut    | <div> <div>~ 55HRC</div> </div> <div> <div>55HRC ~</div> </div> |       |                                                  |       |                         |      |                         |      |

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- HRC60 이상 고경도강 가공시 60HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
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- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø10이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
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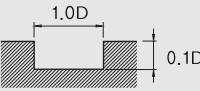
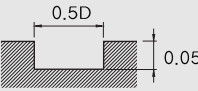
| 홈 절삭 Slotting             |                                                                                                                                            |       |                      |                       |                                                  |      |                      |                       |                         |      |                      |                       |                         |      |                      |                       |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------|-----------------------|--------------------------------------------------|------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|
| 파삭재<br>Material           | 합금강/공구강<br>Alloy Steel/ Tool Steel                                                                                                         |       |                      |                       | 프리하트강/고경도강<br>Prehardened Steel / Hardened Steel |      |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       |
| 경도 Hardness               | 30 ~ 40HRC                                                                                                                                 |       |                      |                       | 40 ~ 50HRC                                       |      |                      |                       | 50 ~ 55HRC              |      |                      |                       | 55 ~ 60HRC              |      |                      |                       |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                        | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                              | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø0.3                      | 50,000                                                                                                                                     | 190   | 0.03                 | 0.3                   | 45,000                                           | 140  | 0.03                 | 0.3                   | 40,000                  | 115  | 0.02                 | 0.150                 | 33,000                  | 70   | 0.01                 | 0.075                 |
| ø0.4                      | 50,000                                                                                                                                     | 235   | 0.04                 | 0.4                   | 45,000                                           | 180  | 0.04                 | 0.4                   | 40,000                  | 140  | 0.02                 | 0.200                 | 33,000                  | 90   | 0.01                 | 0.100                 |
| ø0.5                      | 50,000                                                                                                                                     | 370   | 0.05                 | 0.5                   | 45,000                                           | 280  | 0.05                 | 0.5                   | 40,000                  | 220  | 0.03                 | 0.250                 | 33,000                  | 140  | 0.01                 | 0.125                 |
| ø0.6                      | 50,000                                                                                                                                     | 470   | 0.06                 | 0.6                   | 45,000                                           | 360  | 0.06                 | 0.6                   | 40,000                  | 285  | 0.03                 | 0.300                 | 30,000                  | 160  | 0.02                 | 0.150                 |
| ø0.8                      | 50,000                                                                                                                                     | 600   | 0.08                 | 0.8                   | 40,000                                           | 440  | 0.08                 | 0.8                   | 30,000                  | 295  | 0.04                 | 0.400                 | 25,000                  | 185  | 0.02                 | 0.200                 |
| ø0.9                      | 49,000                                                                                                                                     | 655   | 0.09                 | 0.9                   | 39,000                                           | 520  | 0.09                 | 0.9                   | 27,800                  | 330  | 0.05                 | 0.450                 | 22,700                  | 205  | 0.02                 | 0.225                 |
| ø1                        | 48,000                                                                                                                                     | 1,050 | 0.1                  | 1.0                   | 38,000                                           | 684  | 0.1                  | 1.0                   | 25,500                  | 430  | 0.05                 | 0.500                 | 20,500                  | 260  | 0.03                 | 0.250                 |
| ø2                        | 33,300                                                                                                                                     | 1,190 | 0.2                  | 2.0                   | 26,000                                           | 816  | 0.2                  | 2.0                   | 17,500                  | 500  | 0.10                 | 1.000                 | 14,500                  | 310  | 0.05                 | 0.500                 |
| ø3                        | 21,800                                                                                                                                     | 1,190 | 0.3                  | 3.0                   | 17,300                                           | 816  | 0.3                  | 3.0                   | 11,500                  | 500  | 0.15                 | 1.500                 | 9,500                   | 310  | 0.08                 | 0.750                 |
| ø4                        | 16,700                                                                                                                                     | 1,232 | 0.4                  | 4.0                   | 13,200                                           | 840  | 0.4                  | 4.0                   | 8,800                   | 530  | 0.20                 | 2.000                 | 7,200                   | 325  | 0.10                 | 1.000                 |
| ø5                        | 15,700                                                                                                                                     | 1,400 | 0.5                  | 5.0                   | 12,500                                           | 966  | 0.5                  | 5.0                   | 8,300                   | 600  | 0.25                 | 2.500                 | 6,400                   | 340  | 0.13                 | 1.250                 |
| ø6                        | 13,100                                                                                                                                     | 1,330 | 0.6                  | 6.0                   | 10,350                                           | 924  | 0.6                  | 6.0                   | 6,900                   | 575  | 0.30                 | 3.000                 | 5,300                   | 335  | 0.15                 | 1.500                 |
| ø8                        | 9,880                                                                                                                                      | 1,300 | 0.8                  | 8.0                   | 7,800                                            | 864  | 0.8                  | 8.0                   | 5,200                   | 535  | 0.40                 | 4.000                 | 4,000                   | 300  | 0.20                 | 2.000                 |
| ø10                       | 7,800                                                                                                                                      | 1,190 | 1.0                  | 10.0                  | 6,150                                            | 816  | 1.0                  | 10.0                  | 4,100                   | 500  | 0.50                 | 5.000                 | 3,200                   | 290  | 0.25                 | 2.500                 |
| ø12                       | 6,650                                                                                                                                      | 1,190 | 1.2                  | 12.0                  | 5,250                                            | 816  | 1.2                  | 12.0                  | 3,500                   | 500  | 0.60                 | 6.000                 | 2,650                   | 290  | 0.30                 | 3.000                 |
| ø16                       | 5,540                                                                                                                                      | 1,090 | 1.6                  | 16.0                  | 4,340                                            | 732  | 1.6                  | 16.0                  | 2,600                   | 430  | 0.80                 | 8.000                 | 1,840                   | 215  | 0.40                 | 4.000                 |
| ø18                       | 5,540                                                                                                                                      | 1,090 | 1.8                  | 18.0                  | 4,340                                            | 730  | 1.8                  | 18.0                  | 2,600                   | 430  | 0.90                 | 9.000                 | 1,840                   | 215  | 0.45                 | 4.500                 |
| ø20                       | 4,640                                                                                                                                      | 1,008 | 2.0                  | 20.0                  | 4,340                                            | 730  | 2.0                  | 20.0                  | 2,600                   | 430  | 1.00                 | 10.000                | 1,840                   | 215  | 0.50                 | 5.000                 |
| 절입량<br>Depth of Cut       | Slotting<br>• Ap : Axial Depth<br>• D : Outside Diameter  |       |                      |                       |                                                  |      |                      |                       |                         |      |                      |                       |                         |      |                      |                       |

| 측면 절삭 Side Cutting        |                                                                                                                                                                                      |       |                      |                       |                                                  |       |                      |                       |                         |      |                      |                       |                         |      |                      |                       |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------|-----------------------|--------------------------------------------------|-------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|
| 파삭재<br>Material           | 합금강/공구강<br>Alloy Steel/ Tool Steel                                                                                                                                                   |       |                      |                       | 프리하트강/고경도강<br>Prehardened Steel / Hardened Steel |       |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       |
| 경도 Hardness               | 30 ~ 40HRC                                                                                                                                                                           |       |                      |                       | 40 ~ 50HRC                                       |       |                      |                       | 50 ~ 55HRC              |      |                      |                       | 55 ~ 60HRC              |      |                      |                       |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                  | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                              | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø0.3                      | 50,000                                                                                                                                                                               | 228   | 0.3                  | 0.009                 | 45,000                                           | 168   | 0.3                  | 0.009                 | 40,000                  | 138  | 0.15                 | 0.006                 | 33,000                  | 84   | 0.08                 | 0.003                 |
| ø0.4                      | 50,000                                                                                                                                                                               | 282   | 0.4                  | 0.012                 | 45,000                                           | 216   | 0.4                  | 0.012                 | 40,000                  | 168  | 0.20                 | 0.008                 | 33,000                  | 108  | 0.10                 | 0.004                 |
| ø0.5                      | 50,000                                                                                                                                                                               | 444   | 0.5                  | 0.015                 | 45,000                                           | 336   | 0.5                  | 0.015                 | 40,000                  | 264  | 0.25                 | 0.010                 | 33,000                  | 168  | 0.13                 | 0.005                 |
| ø0.6                      | 50,000                                                                                                                                                                               | 564   | 0.6                  | 0.018                 | 45,000                                           | 432   | 0.6                  | 0.018                 | 40,000                  | 342  | 0.30                 | 0.012                 | 30,000                  | 192  | 0.15                 | 0.006                 |
| ø0.8                      | 50,000                                                                                                                                                                               | 720   | 0.8                  | 0.024                 | 40,000                                           | 528   | 0.8                  | 0.024                 | 30,000                  | 354  | 0.40                 | 0.016                 | 25,000                  | 222  | 0.20                 | 0.008                 |
| ø0.9                      | 49,000                                                                                                                                                                               | 786   | 0.9                  | 0.027                 | 39,000                                           | 624   | 0.9                  | 0.027                 | 27,800                  | 396  | 0.45                 | 0.018                 | 22,700                  | 246  | 0.23                 | 0.009                 |
| ø1                        | 48,000                                                                                                                                                                               | 1,260 | 1.0                  | 0.030                 | 38,000                                           | 821   | 1.0                  | 0.030                 | 25,500                  | 516  | 0.50                 | 0.020                 | 20,500                  | 312  | 0.25                 | 0.010                 |
| ø2                        | 33,300                                                                                                                                                                               | 1,428 | 2.0                  | 0.060                 | 26,000                                           | 979   | 2.0                  | 0.060                 | 17,500                  | 600  | 1.00                 | 0.040                 | 14,500                  | 372  | 0.50                 | 0.020                 |
| ø3                        | 21,800                                                                                                                                                                               | 1,428 | 3.0                  | 0.090                 | 17,300                                           | 979   | 3.0                  | 0.090                 | 11,500                  | 600  | 1.50                 | 0.060                 | 9,500                   | 372  | 0.75                 | 0.030                 |
| ø4                        | 16,700                                                                                                                                                                               | 1,478 | 4.0                  | 0.120                 | 13,200                                           | 1,008 | 4.0                  | 0.120                 | 8,800                   | 636  | 2.00                 | 0.080                 | 7,200                   | 390  | 1.00                 | 0.040                 |
| ø5                        | 15,700                                                                                                                                                                               | 1,680 | 5.0                  | 0.150                 | 12,500                                           | 1,159 | 5.0                  | 0.150                 | 8,300                   | 720  | 2.50                 | 0.100                 | 6,400                   | 408  | 1.25                 | 0.050                 |
| ø6                        | 13,100                                                                                                                                                                               | 1,596 | 6.0                  | 0.180                 | 10,350                                           | 1,109 | 6.0                  | 0.180                 | 6,900                   | 690  | 3.00                 | 0.120                 | 5,300                   | 402  | 1.50                 | 0.060                 |
| ø8                        | 9,880                                                                                                                                                                                | 1,560 | 8.0                  | 0.240                 | 7,800                                            | 1,037 | 8.0                  | 0.240                 | 5,200                   | 642  | 4.00                 | 0.160                 | 4,000                   | 360  | 2.00                 | 0.080                 |
| ø10                       | 7,800                                                                                                                                                                                | 1,428 | 10.0                 | 0.300                 | 6,150                                            | 979   | 10.0                 | 0.300                 | 4,100                   | 600  | 5.00                 | 0.200                 | 3,200                   | 348  | 2.50                 | 0.100                 |
| ø12                       | 6,650                                                                                                                                                                                | 1,428 | 12.0                 | 0.360                 | 5,250                                            | 979   | 12.0                 | 0.360                 | 3,500                   | 600  | 6.00                 | 0.240                 | 2,650                   | 348  | 3.00                 | 0.120                 |
| ø16                       | 5,540                                                                                                                                                                                | 1,308 | 16.0                 | 0.480                 | 4,340                                            | 878   | 16.0                 | 0.480                 | 2,600                   | 516  | 8.00                 | 0.320                 | 1,840                   | 258  | 4.00                 | 0.160                 |
| ø18                       | 5,540                                                                                                                                                                                | 1,308 | 18.0                 | 0.540                 | 4,340                                            | 876   | 18.0                 | 0.540                 | 2,600                   | 516  | 9.00                 | 0.360                 | 1,840                   | 258  | 4.50                 | 0.180                 |
| ø20                       | 4,640                                                                                                                                                                                | 1,210 | 20.0                 | 0.600                 | 4,340                                            | 876   | 20.0                 | 0.600                 | 2,600                   | 516  | 10.00                | 0.400                 | 1,840                   | 258  | 5.00                 | 0.200                 |
| 절입량<br>Depth of Cut       | <div>Side Milling</div> <div>• Ap : Axial Depth</div> <div>• Ae : Radial Depth</div> <div></div> |       |                      |                       |                                                  |       |                      |                       |                         |      |                      |                       |                         |      |                      |                       |
|                           |                                                                                                                                                                                      |       |                      |                       |                                                  |       |                      |                       |                         |      |                      |                       |                         |      |                      |                       |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC60 이상 고경도강 가공시 60HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨란트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece, HRC over 60 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5 $\mu$ m).
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

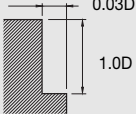
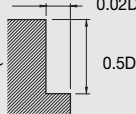
## 홈 절삭 Slotting

| 파삭재<br>Material           | 합금강/공구강<br>Alloy Steel/ Tool Steel |      | 프리하트강/고경도강<br>Prehardened Steel / Hardened Steel |      | 고경도강<br>Hardened Steels |      | 고경도강<br>Hardened Steels |      |
|---------------------------|------------------------------------|------|--------------------------------------------------|------|-------------------------|------|-------------------------|------|
| 경도 Hardness               | 30 ~ 40HRC                         |      | 40 ~ 50HRC                                       |      | 50 ~ 55HRC              |      | 55 ~ 62HRC              |      |
| 외경<br>Outside<br>Diameter | RPM                                | FEED | RPM                                              | FEED | RPM                     | FEED | RPM                     | FEED |
| Ø 1                       | 13,000                             | 60   | 9,000                                            | 35   | 5,700                   | 15   | 6,500                   | 20   |
| Ø 1.5                     | 10,000                             | 60   | 6,000                                            | 45   | 4,500                   | 15   | 4,500                   | 35   |
| Ø 2                       | 6,400                              | 60   | 4,800                                            | 45   | 3,000                   | 15   | 3,500                   | 30   |
| Ø 3                       | 4,200                              | 60   | 3,400                                            | 55   | 2,100                   | 20   | 2,600                   | 40   |
| Ø 4                       | 3,400                              | 60   | 2,700                                            | 30   | 1,700                   | 20   | 1,600                   | 20   |
| Ø 5                       | 2,900                              | 60   | 2,300                                            | 40   | 1,500                   | 20   | 1,350                   | 25   |
| Ø 6                       | 2,500                              | 60   | 2,000                                            | 50   | 1,300                   | 25   | 1,100                   | 30   |
| Ø 8                       | 1,900                              | 60   | 1,500                                            | 50   | 1,000                   | 25   | 900                     | 35   |
| Ø 10                      | 1,600                              | 60   | 1,300                                            | 50   | 800                     | 25   | 710                     | 30   |
| Ø 12                      | 1,300                              | 60   | 1,100                                            | 45   | 670                     | 20   | 600                     | 25   |
| Ø 16                      | 1,000                              | 40   | 820                                              | 30   | 500                     | 15   | 450                     | 20   |
| Ø 20                      | 800                                | 30   | 650                                              | 25   | 400                     | 13   | 360                     | 15   |
| Ø 25                      | 650                                | 25   | 520                                              | 20   | 320                     | 10   | 280                     | 12   |

| 절입량<br>Depth of Cut |  |  |  |  |  |  |  |  |
|---------------------|-----------------------------------------------------------------------------------|--|--|--|-------------------------------------------------------------------------------------|--|--|--|
|---------------------|-----------------------------------------------------------------------------------|--|--|--|-------------------------------------------------------------------------------------|--|--|--|

## 측면 절삭 Side Cutting

| 파삭재<br>Material           | 합금강/공구강<br>Alloy Steel/ Tool Steel |      | 프리하트강/고경도강<br>Prehardened Steel / Hardened Steel |      | 고경도강<br>Hardened Steels |      | 고경도강<br>Hardened Steels |      |
|---------------------------|------------------------------------|------|--------------------------------------------------|------|-------------------------|------|-------------------------|------|
| 경도 Hardness               | 30 ~ 40HRC                         |      | 40 ~ 50HRC                                       |      | 50 ~ 55HRC              |      | 55 ~ 62HRC              |      |
| 외경<br>Outside<br>Diameter | RPM                                | FEED | RPM                                              | FEED | RPM                     | FEED | RPM                     | FEED |
| Ø 1                       | 13,000                             | 60   | 9,000                                            | 35   | 6,500                   | 20   | 6,500                   | 20   |
| Ø 1.5                     | 10,000                             | 60   | 6,000                                            | 45   | 5,000                   | 35   | 4,500                   | 25   |
| Ø 2                       | 6,400                              | 60   | 4,800                                            | 45   | 3,500                   | 30   | 3,500                   | 25   |
| Ø 3                       | 4,200                              | 65   | 3,400                                            | 55   | 2,600                   | 40   | 2,600                   | 30   |
| Ø 4                       | 3,400                              | 80   | 2,700                                            | 65   | 2,100                   | 50   | 1,600                   | 35   |
| Ø 5                       | 2,900                              | 100  | 2,300                                            | 80   | 1,800                   | 60   | 1,350                   | 40   |
| Ø 6                       | 2,500                              | 120  | 2,000                                            | 100  | 1,500                   | 75   | 1,100                   | 50   |
| Ø 8                       | 1,900                              | 130  | 1,500                                            | 100  | 1,200                   | 85   | 900                     | 50   |
| Ø 10                      | 1,600                              | 130  | 1,300                                            | 100  | 950                     | 75   | 710                     | 50   |
| Ø 12                      | 1,300                              | 120  | 1,100                                            | 90   | 800                     | 60   | 600                     | 40   |
| Ø 16                      | 1,000                              | 80   | 820                                              | 65   | 600                     | 45   | 450                     | 30   |
| Ø 20                      | 800                                | 65   | 650                                              | 50   | 480                     | 40   | 360                     | 25   |
| Ø 25                      | 650                                | 50   | 520                                              | 40   | 380                     | 30   | 280                     | 20   |

| 절입량<br>Depth of Cut |  |  |  |  |  |  |  |  |
|---------------------|-------------------------------------------------------------------------------------|--|--|--|--------------------------------------------------------------------------------------|--|--|--|
|---------------------|-------------------------------------------------------------------------------------|--|--|--|--------------------------------------------------------------------------------------|--|--|--|

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- 상기 조건표는 2날 기준이며, 4날시 회전수는 유지하고, 피드는 안정적인 속도내에서 최대 50%까지 UP 해주십시오.
- HRC55 이상 고경도강 가공시 55HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø10이하 사용시 진동 허용 관리 5 $\mu$ m이내 일것.)
- 에어브로, 절삭유, 오일 미스트 콜러트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- The parameters on the table is based on 2 flutes. For using 4 flutes, use the same RPM and raise up the feed up to 50% in stable milling condition.
- When milling workpiece, HRC over 60 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- When milling workpiece, HRC over 60 hardened steel, reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use a machine with low vibration and good rigidity (  $\phi$ 10 or less, the vibration tolerance management should be within 5 $\mu$ m).
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

| 측면 절삭 Side Cutting        |                                                                                                                                                                                 |       |                      |                       |                         |       |                      |                       |                         |       |                      |                       |                         |       |                      |                       |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------|-----------------------|-------------------------|-------|----------------------|-----------------------|-------------------------|-------|----------------------|-----------------------|-------------------------|-------|----------------------|-----------------------|
| 파삭재<br>Material           | 합금강<br>Alloy Steel                                                                                                                                                              |       |                      |                       | 고경도강<br>Hardened Steels |       |                      |                       | 고경도강<br>Hardened Steels |       |                      |                       | 고경도강<br>Hardened Steels |       |                      |                       |
| 경도 Hardness               | 30 ~ 40HRC                                                                                                                                                                      |       |                      |                       | 40 ~ 50HRC              |       |                      |                       | 50 ~ 55HRC              |       |                      |                       | 55 ~ 60HRC              |       |                      |                       |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                             | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø1                        | 40,000                                                                                                                                                                          | 1,200 | 1.5                  | 0.05                  | 45,000                  | 1,100 | 1.5                  | 0.05                  | 40,000                  | 770   | 0.5                  | 0.03                  | 38,000                  | 308   | 0.5                  | 0.06                  |
| ø1.5                      | 40,000                                                                                                                                                                          | 1,500 | 2.25                 | 0.075                 | 40,000                  | 1,250 | 2.25                 | 0.075                 | 38,500                  | 875   | 0.75                 | 0.045                 | 35,600                  | 350   | 0.75                 | 0.24                  |
| ø2                        | 40,000                                                                                                                                                                          | 2,000 | 3                    | 0.1                   | 38,000                  | 1,800 | 3                    | 0.1                   | 36,500                  | 1,260 | 1                    | 0.06                  | 31,000                  | 504   | 1                    | 0.045                 |
| ø3                        | 38,400                                                                                                                                                                          | 4,560 | 4.5                  | 0.15                  | 34,560                  | 4,104 | 4.5                  | 0.15                  | 27,648                  | 2,873 | 1.5                  | 0.09                  | 22,118                  | 1,149 | 1.5                  | 0.3                   |
| ø4                        | 28,800                                                                                                                                                                          | 5,280 | 6                    | 0.2                   | 25,920                  | 4,752 | 6                    | 0.2                   | 20,736                  | 3,326 | 2                    | 0.12                  | 16,589                  | 1,331 | 2                    | 0.03                  |
| ø5                        | 24,000                                                                                                                                                                          | 6,000 | 7.5                  | 0.25                  | 21,600                  | 5,400 | 7.5                  | 0.25                  | 17,280                  | 3,780 | 2.5                  | 0.15                  | 13,824                  | 1,512 | 2.5                  | 0.09                  |
| ø6                        | 19,200                                                                                                                                                                          | 6,960 | 9                    | 0.3                   | 17,280                  | 6,264 | 9                    | 0.3                   | 13,824                  | 4,385 | 3                    | 0.18                  | 11,059                  | 1,754 | 3                    | 0.12                  |
| ø8                        | 14,400                                                                                                                                                                          | 6,960 | 12                   | 0.4                   | 12,960                  | 6,264 | 12                   | 0.4                   | 10,368                  | 4,385 | 4                    | 0.24                  | 8,294                   | 1,754 | 4                    | 0.75                  |
| ø10                       | 11,520                                                                                                                                                                          | 6,960 | 15                   | 0.5                   | 10,368                  | 6,264 | 15                   | 0.5                   | 8,294                   | 4,385 | 5                    | 0.3                   | 6,636                   | 1,754 | 5                    | 0.6                   |
| ø12                       | 9,600                                                                                                                                                                           | 5,760 | 18                   | 0.6                   | 8,640                   | 5,184 | 18                   | 0.6                   | 6,912                   | 3,629 | 6                    | 0.36                  | 5,530                   | 1,452 | 6                    | 0.48                  |
| ø16                       | 7,200                                                                                                                                                                           | 4,320 | 24                   | 0.8                   | 6,480                   | 3,888 | 24                   | 0.8                   | 5,184                   | 2,722 | 8                    | 0.48                  | 4,147                   | 1,089 | 8                    | 0.36                  |
| ø20                       | 5,760                                                                                                                                                                           | 3,480 | 30                   | 1                     | 5,184                   | 3,132 | 30                   | 1                     | 4,147                   | 2,192 | 10                   | 0.6                   | 3,318                   | 877   | 10                   | 0.15                  |
| ø25                       | 5,150                                                                                                                                                                           | 3,120 | 37.5                 | 1.25                  | 4,635                   | 2,808 | 37.5                 | 1.25                  | 3,708                   | 2,246 | 12.5                 | 0.75                  | 2,966                   | 899   | 12.5                 | 0.18                  |
| 절입량<br>Depth of Cut       | <div><div><div>~ 50HRC</div><div><div><div>0.05D</div><div>1.5D</div></div></div></div><div><div>50HRC ~</div><div><div><div>0.03D</div><div>0.5D</div></div></div></div></div> |       |                      |                       |                         |       |                      |                       |                         |       |                      |                       |                         |       |                      |                       |

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- 상기 조건표는 4날 기준이며, 6&8날시 회전수는 유지하고 피드는 안정적인 속도 내에서 최대 50%까지 UP 해주십시오.
- HRC62 이상 고경도강 가공시 62HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 유효장이 길게 체결할시 회전수와 피드를 같은 비율로 DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- The parameters on the table is based on 4flutes. For using 6 or 8flutes, use the same RPM and raise up the feed up to 50% in stable milling condition.
- When milling workpiece, HRC over 60 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

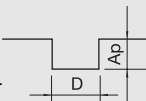
| 파삭재<br>Material           |                            | 동<br>Copper |       |                      |                       | 프리하트강/고경도강<br>Prehardened Steel / Hardened Steel |       |                      |                       | 고경도강<br>Hardened Steels |       |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       |
|---------------------------|----------------------------|-------------|-------|----------------------|-----------------------|--------------------------------------------------|-------|----------------------|-----------------------|-------------------------|-------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|
| 경도 Hardness               |                            |             |       |                      |                       | 30 ~ 45HRC                                       |       |                      |                       | 45 ~ 55HRC              |       |                      |                       | 55 ~ 62HRC              |      |                      |                       |
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM         | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                              | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø0.2                      | 1                          | 50,000      | 352   | 0.264                | 0.020                 | 50,000                                           | 196   | 0.006                | 0.020                 | 34,500                  | 150   | 0.004                | 0.020                 | 14,950                  | 24   | 0.001                | 0.015                 |
| "                         | 1.5                        | 50,000      | 311   | 0.017                | 0.010                 | 50,000                                           | 173   | 0.005                | 0.010                 | 26,450                  | 104   | 0.003                | 0.010                 | 11,730                  | 20   | 0.001                | 0.007                 |
| ø0.3                      | 1                          | 50,000      | 890   | 0.029                | 0.020                 | 50,000                                           | 495   | 0.007                | 0.020                 | 34,500                  | 345   | 0.005                | 0.015                 | 21,505                  | 34   | 0.004                | 0.015                 |
| "                         | 3                          | 50,000      | 393   | 0.029                | 0.015                 | 50,000                                           | 219   | 0.006                | 0.015                 | 24,150                  | 81    | 0.003                | 0.010                 | 14,605                  | 20   | 0.002                | 0.010                 |
| ø0.4                      | 1                          | 47,150      | 890   | 0.047                | 0.062                 | 50,000                                           | 495   | 0.013                | 0.070                 | 39,675                  | 368   | 0.011                | 0.070                 | 23,575                  | 39   | 0.004                | 0.070                 |
| "                         | 3                          | 33,350      | 683   | 0.026                | 0.053                 | 26,450                                           | 380   | 0.008                | 0.026                 | 26,450                  | 276   | 0.007                | 0.026                 | 15,755                  | 29   | 0.003                | 0.026                 |
| ø0.5                      | 1                          | 48,300      | 2,008 | 0.079                | 0.114                 | 48,300                                           | 1,116 | 0.033                | 0.119                 | 39,100                  | 840   | 0.029                | 0.119                 | 24,150                  | 92   | 0.013                | 0.119                 |
| "                         | 3                          | 31,050      | 1,118 | 0.056                | 0.088                 | 31,050                                           | 621   | 0.022                | 0.110                 | 25,415                  | 460   | 0.020                | 0.110                 | 15,755                  | 51   | 0.008                | 0.110                 |
| "                         | 5                          | 25,760      | 827   | 0.026                | 0.044                 | 25,760                                           | 459   | 0.011                | 0.010                 | 20,700                  | 345   | 0.010                | 0.010                 | 12,995                  | 38   | 0.004                | 0.010                 |
| ø0.6                      | 2                          | 27,945      | 890   | 0.111                | 0.158                 | 27,945                                           | 495   | 0.010                | 0.214                 | 23,000                  | 380   | 0.010                | 0.214                 | 14,835                  | 42   | 0.004                | 0.214                 |
| "                         | 6                          | 16,445      | 435   | 0.035                | 0.044                 | 16,445                                           | 242   | 0.003                | 0.010                 | 13,570                  | 184   | 0.003                | 0.010                 | 8,740                   | 21   | 0.001                | 0.010                 |
| ø0.8                      | 4                          | 17,250      | 787   | 0.129                | 0.194                 | 17,020                                           | 437   | 0.014                | 0.114                 | 14,720                  | 345   | 0.015                | 0.114                 | 9,890                   | 40   | 0.007                | 0.114                 |
| "                         | 8                          | 12,650      | 475   | 0.029                | 0.098                 | 12,650                                           | 264   | 0.005                | 0.088                 | 10,695                  | 184   | 0.004                | 0.088                 | 7,475                   | 20   | 0.002                | 0.088                 |
| ø1                        | 4                          | 13,800      | 1,449 | 0.196                | 0.396                 | 13,800                                           | 805   | 0.029                | 0.264                 | 11,730                  | 655   | 0.034                | 0.264                 | 8,280                   | 78   | 0.017                | 0.264                 |
| "                         | 10                         | 8,625       | 559   | 0.047                | 0.308                 | 8,625                                            | 311   | 0.011                | 0.123                 | 7,475                   | 264   | 0.013                | 0.123                 | 5,290                   | 31   | 0.006                | 0.123                 |
| "                         | 16                         | 6,900       | 331   | 0.018                | 0.220                 | 6,900                                            | 184   | 0.004                | 0.026                 | 5,980                   | 161   | 0.005                | 0.026                 | 4,255                   | 19   | 0.002                | 0.026                 |
| ø1.2                      | 6                          | 9,200       | 1,035 | 0.182                | 0.457                 | 9,200                                            | 575   | 0.018                | 0.088                 | 8,165                   | 483   | 0.215                | 0.088                 | 6,095                   | 59   | 0.011                | 0.088                 |
| "                         | 12                         | 6,670       | 662   | 0.053                | 0.396                 | 6,670                                            | 368   | 0.007                | 0.070                 | 5,980                   | 299   | 0.008                | 0.070                 | 4,370                   | 37   | 0.004                | 0.070                 |
| ø1.5                      | 4                          | 12,880      | 1,925 | 0.293                | 0.660                 | 12,880                                           | 1,070 | 0.044                | 0.440                 | 11,730                  | 920   | 0.059                | 0.440                 | 8,970                   | 121  | 0.032                | 0.440                 |
| "                         | 10                         | 8,280       | 1,325 | 0.147                | 0.554                 | 8,280                                            | 736   | 0.031                | 0.282                 | 7,590                   | 633   | 0.041                | 0.282                 | 5,865                   | 83   | 0.022                | 0.282                 |
| "                         | 20                         | 5,865       | 725   | 0.041                | 0.352                 | 6,350                                            | 403   | 0.005                | 0.106                 | 4,160                   | 345   | 0.006                | 0.106                 | 3,870                   | 45   | 0.003                | 0.106                 |
| ø2                        | 6                          | 12,535      | 1,801 | 0.314                | 0.836                 | 12,535                                           | 1,001 | 0.042                | 0.792                 | 11,730                  | 909   | 0.059                | 0.792                 | 9,430                   | 130  | 0.035                | 0.792                 |
| "                         | 12                         | 9,200       | 1,449 | 0.182                | 0.704                 | 9,200                                            | 805   | 0.030                | 0.440                 | 8,280                   | 725   | 0.043                | 0.440                 | 6,785                   | 105  | 0.025                | 0.440                 |
| "                         | 20                         | 6,900       | 1,139 | 0.091                | 0.651                 | 6,200                                            | 633   | 0.017                | 0.194                 | 3,520                   | 564   | 0.023                | 0.194                 | 3,226                   | 82   | 0.014                | 0.194                 |
| "                         | 30                         | 5,865       | 973   | 0.049                | 0.440                 | 3,300                                            | 541   | 0.005                | 0.132                 | 2,860                   | 495   | 0.005                | 0.132                 | 2,386                   | 68   | 0.002                | 0.132                 |
| ø2.5                      | 10                         | 10,350      | 1,801 | 0.331                | 0.836                 | 10,350                                           | 1,001 | 0.051                | 0.528                 | 9,775                   | 943   | 0.073                | 0.528                 | 8,165                   | 151  | 0.047                | 0.528                 |
| "                         | 30                         | 6,210       | 787   | 0.067                | 0.616                 | 6,210                                            | 437   | 0.011                | 0.176                 | 5,865                   | 414   | 0.016                | 0.176                 | 4,830                   | 65   | 0.010                | 0.176                 |
| ø3                        | 12                         | 10,350      | 2,029 | 0.381                | 0.831                 | 10,350                                           | 1,127 | 0.103                | 0.616                 | 9,775                   | 874   | 0.103                | 0.655                 | 8,740                   | 196  | 0.073                | 0.655                 |
| "                         | 20                         | 8,165       | 1,553 | 0.254                | 0.762                 | 6,050                                            | 863   | 0.071                | 0.567                 | 3,420                   | 667   | 0.071                | 0.567                 | 3,108                   | 147  | 0.043                | 0.567                 |
| "                         | 30                         | 6,900       | 1,263 | 0.137                | 0.674                 | 3,300                                            | 702   | 0.049                | 0.371                 | 2,890                   | 541   | 0.049                | 0.371                 | 2,440                   | 115  | 0.028                | 0.352                 |
| ø4                        | 12                         | 8,740       | 1,904 | 0.401                | 1.525                 | 8,740                                            | 1,058 | 0.081                | 1.124                 | 7,360                   | 920   | 0.117                | 1.124                 | 6,210                   | 210  | 0.083                | 1.124                 |
| "                         | 20                         | 6,785       | 1,458 | 0.375                | 1.325                 | 5,880                                            | 810   | 0.053                | 0.880                 | 5,750                   | 840   | 0.078                | 0.880                 | 4,830                   | 194  | 0.057                | 0.880                 |
| "                         | 30                         | 5,750       | 752   | 0.196                | 1.210                 | 2,950                                            | 418   | 0.028                | 0.671                 | 2,540                   | 656   | 0.041                | 0.671                 | 2,160                   | 149  | 0.030                | 0.708                 |
| "                         | 45                         | 4,715       | 500   | 0.096                | 1.118                 | 2,300                                            | 278   | 0.007                | 0.326                 | 2,015                   | 322   | 0.010                | 0.326                 | 1,800                   | 75   | 0.007                | 0.326                 |
| ø5                        | 15                         | 7,705       | 3,064 | 0.697                | 2.277                 | 7,705                                            | 1,702 | 0.106                | 1.346                 | 5,520                   | 1,139 | 0.150                | 1.346                 | 4,600                   | 342  | 0.110                | 1.346                 |
| "                         | 30                         | 5,290       | 1,470 | 0.342                | 1.760                 | 2,780                                            | 817   | 0.053                | 1.035                 | 3,795                   | 541   | 0.075                | 1.035                 | 3,220                   | 164  | 0.055                | 1.035                 |
| ø6                        | 20                         | 5,980       | 2,194 | 0.600                | 2.194                 | 5,460                                            | 1,219 | 0.476                | 1.356                 | 3,565                   | 1,035 | 0.186                | 1.356                 | 3,105                   | 393  | 0.145                | 1.356                 |
| "                         | 40                         | 4,600       | 1,635 | 0.565                | 2.049                 | 2,380                                            | 909   | 0.410                | 1.304                 | 2,160                   | 759   | 0.164                | 1.304                 | 2,040                   | 304  | 0.123                | 1.304                 |
| ø8                        | 22                         | 5,520       | 1,946 | 0.528                | 2.542                 | 5,520                                            | 1,081 | 0.419                | 1.518                 | 3,220                   | 909   | 0.164                | 1.518                 | 2,760                   | 346  | 0.128                | 1.518                 |
| "                         | 40                         | 4,140       | 1,449 | 0.497                | 2.277                 | 2,120                                            | 805   | 0.361                | 1.323                 | 2,080                   | 667   | 0.144                | 1.323                 | 1,955                   | 268  | 0.108                | 1.323                 |
| ø10                       | 24                         | 4,600       | 1,656 | 0.449                | 2.887                 | 4,485                                            | 920   | 0.356                | 1.645                 | 2,760                   | 771   | 0.139                | 1.645                 | 2,300                   | 294  | 0.108                | 1.645                 |
| "                         | 45                         | 3,450       | 1,221 | 0.423                | 2.438                 | 3,450                                            | 679   | 0.307                | 1.334                 | 1,955                   | 564   | 0.122                | 1.334                 | 1,725                   | 228  | 0.092                | 1.334                 |
| ø12                       | 26                         | 3,795       | 1,387 | 0.377                | 3.013                 | 3,795                                            | 771   | 0.299                | 2.024                 | 2,300                   | 644   | 0.117                | 2.024                 | 1,955                   | 247  | 0.091                | 2.024                 |
| "                         | 50                         | 2,875       | 1,035 | 0.355                | 2.415                 | 2,875                                            | 575   | 0.258                | 1.403                 | 1,725                   | 483   | 0.103                | 1.403                 | 1,380                   | 191  | 0.077                | 1.403                 |
| ø16                       | 35                         | 2,990       | 1,097 | 0.302                | 2.921                 | 2,990                                            | 610   | 0.239                | 2.162                 | 1,725                   | 518   | 0.094                | 2.162                 | 1,610                   | 198  | 0.073                | 2.162                 |

절입량  
Depth of Cut

Slotting

• Ap : Axial Depth

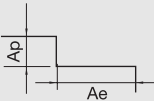
• D : Outside Diameter



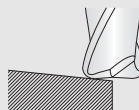
Side Milling

• Ap : Axial Depth

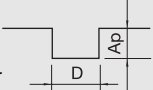
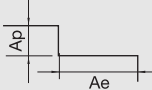
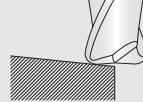
• Ae : Radial Depth



경사진면 절삭  
Inclined Cutting



- HRC62 이상인 경우 같은 직경의 같은 비율로 20% DOWN 시켜주십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- Ae값 설정시 코너R 치수를 고려 해주십시오.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도내 에서 피드를 최대 30%까지 UP 해주십시오.
- When milling workpiece HRC over 62, reduce 20% of the RPM and feed with the same diameter.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- Consider the corner radius value when you set up the Ae value.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.

| 피삭재<br>Material        |                         | 프리하든강/고경도강<br>Prehardened Steel / Hardened Steel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness            |                         | 30 ~ 45HRC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                   |                    | 45 ~ 55HRC              |       |                   |                    |
| 외경<br>Outside Diameter | 유효장<br>Effective Length | RPM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1                     | 4                       | 13,455                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1,265 | 0.038             | 0.264              | 11,730                  | 1,046 | 0.030             | 0.238              |
| "                      | 10                      | 8,625                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 495   | 0.011             | 0.123              | 7,475                   | 495   | 0.009             | 0.098              |
| ø1.2                   | 4                       | 12,880                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1,380 | 0.031             | 0.440              | 11,730                  | 1,070 | 0.023             | 0.293              |
| "                      | 10                      | 8,855                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 782   | 0.017             | 0.176              | 7,130                   | 587   | 0.009             | 0.147              |
| ø1.5                   | 6                       | 11,385                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1,265 | 0.040             | 0.475              | 10,350                  | 1,150 | 0.037             | 0.435              |
| "                      | 12                      | 9,280                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 817   | 0.028             | 0.317              | 6,790                   | 759   | 0.025             | 0.290              |
| ø2                     | 6                       | 12,650                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1,265 | 0.063             | 0.633              | 11,730                  | 1,173 | 0.059             | 0.713              |
| "                      | 12                      | 9,970                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1,012 | 0.045             | 0.396              | 8,280                   | 943   | 0.043             | 0.396              |
| ø2.5                   | 10                      | 10,580                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1,380 | 0.065             | 0.528              | 9,775                   | 1,150 | 0.065             | 0.528              |
| "                      | 20                      | 8,160                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1,150 | 0.047             | 0.264              | 7,845                   | 655   | 0.030             | 0.220              |
| ø3                     | 10                      | 11,040                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2,070 | 0.094             | 0.684              | 10,235                  | 2,070 | 0.059             | 0.684              |
| "                      | 20                      | 7,340                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1,495 | 0.057             | 0.567              | 6,230                   | 1,495 | 0.035             | 0.567              |
| ø4                     | 13                      | 9,085                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1,576 | 0.105             | 1.150              | 7,590                   | 1,530 | 0.082             | 1.150              |
| "                      | 20                      | 7,130                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1,380 | 0.069             | 0.920              | 5,980                   | 1,288 | 0.054             | 0.920              |
| "                      | 30                      | 6,325                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1,104 | 0.043             | 0.745              | 5,290                   | 1,058 | 0.033             | 0.745              |
| ø6                     | 20                      | 5,635                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1,691 | 0.176             | 2.305              | 3,335                   | 978   | 0.176             | 1.281              |
| "                      | 40                      | 2,875                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 782   | 0.098             | 1.320              | 1,610                   | 460   | 0.098             | 0.733              |
| ø8                     | 22                      | 4,600                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1,840 | 0.212             | 2.921              | 2,760                   | 782   | 0.212             | 1.518              |
| ø10                    | 24                      | 3,680                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2,013 | 0.242             | 3.140              | 2,185                   | 621   | 0.253             | 1.645              |
| ø12                    | 26                      | 2,875                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2,070 | 0.265             | 3.105              | 1,725                   | 495   | 0.276             | 1.714              |
| 절입량<br>Depth of Cut    |                         | <div> <div>Slotting</div> <div>                     • Ap : Axial Depth<br/>                     • D : Outside Diameter                 </div>  </div> <div> <div>Side Milling</div> <div>                     • Ap : Axial Depth<br/>                     • Ae : Radial Depth                 </div>  </div> <div>  <div>경사진면 절삭<br/>Inclined Cutting</div> </div> |       |                   |                    |                         |       |                   |                    |

- HRC62 이상인 경우 같은 직경의 같은 비율로 20% DOWN 시켜주십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- Ae값 설정시 코너R 치수를 고려 해주십시오.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
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- If the effective length is long, reduce the RPM and feed maximum 30%.
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- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.

## 홈 절삭 Slotting

| 파삭재<br>Material        | 합금강<br>Alloy Steel                                              |       |                   |                    | 프리카하튼강/고경도강<br>Prehardened Steel / Hardened Steel |       |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|-----------------------------------------------------------------|-------|-------------------|--------------------|---------------------------------------------------|-------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            | 30 ~ 40HRC                                                      |       |                   |                    | 40 ~ 45HRC                                        |       |                   |                    | 45 ~ 55HRC              |      |                   |                    | 55 ~ 62HRC              |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                             | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                               | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.4                   | 50,000                                                          | 662   | 0.020             | 0.32               | 45,000                                            | 315   | 0.020             | 0.32               | 40,000                  | 126  | 0.008             | 0.20               | 33,000                  | 70   | 0.008             | 0.20               |
| ø0.5                   | 50,000                                                          | 756   | 0.025             | 0.4                | 45,000                                            | 360   | 0.025             | 0.4                | 40,000                  | 144  | 0.01              | 0.25               | 33,000                  | 80   | 0.01              | 0.25               |
| ø0.6                   | 50,000                                                          | 851   | 0.03              | 0.48               | 45,000                                            | 405   | 0.03              | 0.48               | 40,000                  | 162  | 0.012             | 0.3                | 30,000                  | 90   | 0.012             | 0.3                |
| ø0.8                   | 50,000                                                          | 945   | 0.04              | 0.64               | 45,000                                            | 450   | 0.04              | 0.64               | 30,000                  | 180  | 0.016             | 0.4                | 25,000                  | 100  | 0.016             | 0.4                |
| ø1                     | 48,000                                                          | 2,344 | 0.05              | 0.8                | 38,000                                            | 1,116 | 0.05              | 0.8                | 25,500                  | 446  | 0.02              | 0.5                | 20,500                  | 248  | 0.02              | 0.5                |
| ø2                     | 33,300                                                          | 2,797 | 0.1               | 1.6                | 26,000                                            | 1,332 | 0.1               | 1.6                | 17,500                  | 533  | 0.04              | 1                  | 14,500                  | 296  | 0.04              | 1                  |
| ø3                     | 21,800                                                          | 2,835 | 0.15              | 2.4                | 17,300                                            | 1,350 | 0.15              | 2.4                | 11,500                  | 540  | 0.06              | 1.5                | 9,500                   | 300  | 0.06              | 1.5                |
| ø4                     | 16,700                                                          | 2,911 | 0.2               | 3.2                | 13,200                                            | 1,386 | 0.2               | 3.2                | 8,800                   | 554  | 0.08              | 2                  | 7,200                   | 308  | 0.08              | 2                  |
| ø5                     | 15,700                                                          | 3,100 | 0.25              | 4                  | 12,500                                            | 1,476 | 0.25              | 4                  | 8,300                   | 590  | 0.1               | 2.5                | 6,400                   | 328  | 0.1               | 2.5                |
| ø6                     | 13,100                                                          | 3,024 | 0.3               | 4.8                | 10,350                                            | 1,440 | 0.3               | 4.8                | 6,900                   | 576  | 0.12              | 3                  | 5,300                   | 320  | 0.12              | 3                  |
| ø8                     | 9,880                                                           | 2,759 | 0.4               | 6.4                | 7,800                                             | 1,314 | 0.4               | 6.4                | 5,200                   | 526  | 0.16              | 4                  | 4,000                   | 292  | 0.16              | 4                  |
| ø10                    | 7,800                                                           | 2,570 | 0.5               | 8                  | 6,150                                             | 1,224 | 0.5               | 8                  | 4,100                   | 490  | 0.2               | 5                  | 3,200                   | 272  | 0.2               | 5                  |
| ø12                    | 6,650                                                           | 2,570 | 0.6               | 9.6                | 5,250                                             | 1,224 | 0.6               | 9.6                | 3,500                   | 490  | 0.24              | 6                  | 2,650                   | 272  | 0.24              | 6                  |
| ø16                    | 6,150                                                           | 2,400 | 0.8               | 12.8               | 5,500                                             | 1,180 | 0.8               | 12.8               | 3,210                   | 450  | 0.32              | 8                  | 2,420                   | 250  | 0.32              | 8                  |
| 절입량<br>Depth of Cut    | <div> <div>~ 45HRC</div> </div> <div> <div>45HRC ~</div> </div> |       |                   |                    |                                                   |       |                   |                    |                         |      |                   |                    |                         |      |                   |                    |

## 측면 절삭 Side Cutting

| 파삭재<br>Material        | 합금강<br>Alloy Steel                                              |       |                   |                    | 프리카하튼강/고경도강<br>Prehardened Steel / Hardened Steel |       |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|-----------------------------------------------------------------|-------|-------------------|--------------------|---------------------------------------------------|-------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            | 30 ~ 40HRC                                                      |       |                   |                    | 40 ~ 45HRC                                        |       |                   |                    | 45 ~ 55HRC              |      |                   |                    | 55 ~ 62HRC              |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                             | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                               | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.4                   | 50,000                                                          | 278   | 0.4               | 0.01               | 45,000                                            | 250   | 0.4               | 0.01               | 40,000                  | 150  | 0.20              | 0.01               | 33,000                  | 70   | 0.20              | 0.01               |
| ø0.5                   | 50,000                                                          | 308   | 0.5               | 0.015              | 45,000                                            | 277   | 0.5               | 0.015              | 40,000                  | 166  | 0.25              | 0.01               | 33,000                  | 80   | 0.25              | 0.01               |
| ø0.6                   | 50,000                                                          | 309   | 0.6               | 0.018              | 45,000                                            | 278   | 0.6               | 0.018              | 40,000                  | 167  | 0.30              | 0.012              | 30,000                  | 90   | 0.30              | 0.012              |
| ø0.8                   | 50,000                                                          | 503   | 0.8               | 0.024              | 40,000                                            | 452   | 0.8               | 0.024              | 30,000                  | 271  | 0.40              | 0.016              | 25,000                  | 100  | 0.40              | 0.016              |
| ø1                     | 48,000                                                          | 980   | 1                 | 0.03               | 38,000                                            | 882   | 1                 | 0.03               | 25,500                  | 529  | 0.50              | 0.02               | 20,500                  | 248  | 0.50              | 0.02               |
| ø2                     | 33,300                                                          | 1,440 | 2                 | 0.06               | 26,000                                            | 1,296 | 2                 | 0.06               | 17,500                  | 778  | 1.00              | 0.04               | 14,500                  | 296  | 1.00              | 0.04               |
| ø3                     | 21,800                                                          | 1,470 | 3                 | 0.09               | 17,300                                            | 1,323 | 3                 | 0.09               | 11,500                  | 794  | 1.50              | 0.06               | 9,500                   | 296  | 1.50              | 0.06               |
| ø4                     | 16,700                                                          | 1,500 | 4                 | 0.12               | 13,200                                            | 1,350 | 4                 | 0.12               | 8,800                   | 810  | 2.00              | 0.08               | 7,200                   | 308  | 2.00              | 0.08               |
| ø5                     | 15,700                                                          | 1,740 | 5                 | 0.15               | 12,500                                            | 1,566 | 5                 | 0.15               | 8,300                   | 940  | 2.50              | 0.1                | 6,400                   | 328  | 2.50              | 0.1                |
| ø6                     | 13,100                                                          | 1,620 | 6                 | 0.18               | 10,350                                            | 1,458 | 6                 | 0.18               | 6,900                   | 875  | 3.00              | 0.12               | 5,300                   | 320  | 3.00              | 0.12               |
| ø8                     | 9,880                                                           | 1,584 | 8                 | 0.24               | 7,800                                             | 1,426 | 8                 | 0.24               | 5,200                   | 855  | 4.00              | 0.16               | 4,000                   | 292  | 4.00              | 0.16               |
| ø10                    | 7,800                                                           | 1,440 | 10                | 0.3                | 6,150                                             | 1,296 | 10                | 0.3                | 4,100                   | 778  | 5.00              | 0.2                | 3,200                   | 272  | 5.00              | 0.2                |
| ø12                    | 6,650                                                           | 1,440 | 12                | 0.36               | 5,250                                             | 1,296 | 12                | 0.36               | 3,500                   | 778  | 6.00              | 0.24               | 2,650                   | 272  | 6.00              | 0.24               |
| ø16                    | 6,280                                                           | 1,290 | 16                | 0.48               | 5,100                                             | 1,120 | 16                | 0.48               | 3,410                   | 750  | 8.00              | 0.32               | 2,440                   | 250  | 8.00              | 0.32               |
| 절입량<br>Depth of Cut    | <div> <div>~ 45HRC</div> </div> <div> <div>45HRC ~</div> </div> |       |                   |                    |                                                   |       |                   |                    |                         |      |                   |                    |                         |      |                   |                    |

- HRC62 이상인 경우 같은 직경의 같은 비율로 20% DOWN 시켜 주십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 상기 절삭조건표는 2날 기준이며, 4날시 회전수는 유지하고, 피드는 안정적인 속도 내에서 최대 30%까지 UP 해주십시오.
- 홈 절삭시 날경의 코너R 대비 Ae 값을 설정 하십시오.
- 상기 절삭조건표의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 파삭재와 절삭 형상을 위한 적절한 클런트 사용과 가공시 발열, 발화에 주의 하십시오.
- When milling workpiece HRC over 62, reduce 20% of the RPM and feed with the same diameter.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.
- The parameters on the table is based on 2flutes. For using 4flutes, use the same RPM and raise up the feed up to 50% in stable milling condition.
- For groove milling, set up the Ae value by considering of corner radius value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

## 홈 절삭 Slotting

| 피삭재<br>Material           | 합금강<br>Alloy Steel |      |                      |                       |            |      |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       |            |      |                      |                       |
|---------------------------|--------------------|------|----------------------|-----------------------|------------|------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|------------|------|----------------------|-----------------------|
| 경도 Hardness               | 200 ~ 250HB        |      |                      |                       | 25 ~ 35HRC |      |                      |                       | 35 ~ 45HRC              |      |                      |                       | 45 ~ 62HRC |      |                      |                       |
| 외경<br>Outside<br>Diameter | RPM                | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM        | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM        | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø1                        | 19,250             | 150  | 0.50                 | 1                     | 19,250     | 150  | 0.50                 | 1                     | 17,280                  | 122  | 0.50                 | 1                     | 15,552     | 98   | 0.2                  | 0.8                   |
| ø1.5                      | 12,845             | 230  | 0.75                 | 2                     | 12,800     | 220  | 0.75                 | 2                     | 11,520                  | 178  | 0.75                 | 2                     | 10,368     | 142  | 0.3                  | 1.2                   |
| ø2                        | 9,600              | 345  | 1.00                 | 2                     | 9,500      | 330  | 1.00                 | 2                     | 8,550                   | 267  | 1.00                 | 2                     | 7,695      | 212  | 0.4                  | 1.6                   |
| ø3                        | 6,400              | 490  | 1.50                 | 3                     | 6,400      | 440  | 1.50                 | 3                     | 5,800                   | 360  | 1.50                 | 3                     | 5,300      | 240  | 0.6                  | 2.4                   |
| ø4                        | 4,800              | 550  | 2.00                 | 4                     | 4,800      | 500  | 2.00                 | 4                     | 4,400                   | 410  | 2.00                 | 4                     | 4,000      | 280  | 0.8                  | 3.2                   |
| ø5                        | 3,850              | 600  | 2.50                 | 5                     | 3,800      | 550  | 2.50                 | 5                     | 3,420                   | 446  | 2.50                 | 5                     | 3,078      | 356  | 1.0                  | 4.0                   |
| ø6                        | 3,200              | 610  | 3.00                 | 6                     | 3,200      | 550  | 3.00                 | 6                     | 2,900                   | 450  | 3.00                 | 6                     | 2,700      | 310  | 1.2                  | 4.8                   |
| ø8                        | 2,400              | 650  | 4.00                 | 8                     | 2,400      | 590  | 4.00                 | 8                     | 2,200                   | 480  | 4.00                 | 8                     | 2,000      | 330  | 1.6                  | 6.4                   |
| ø10                       | 1,900              | 580  | 5.00                 | 10                    | 1,900      | 520  | 5.00                 | 10                    | 1,800                   | 440  | 5.00                 | 10                    | 1,600      | 290  | 2.0                  | 8.0                   |
| ø12                       | 1,600              | 540  | 6.00                 | 12                    | 1,600      | 480  | 6.00                 | 12                    | 1,500                   | 400  | 6.00                 | 12                    | 1,300      | 260  | 2.4                  | 9.6                   |
| ø16                       | 1,200              | 520  | 8.00                 | 16                    | 1,200      | 510  | 8.00                 | 16                    | 1,080                   | 413  | 8.00                 | 16                    | 972        | 328  | 3.2                  | 12.8                  |
| ø20                       | 960                | 510  | 10.00                | 20                    | 950        | 500  | 10.00                | 20                    | 855                     | 405  | 10.00                | 20                    | 770        | 324  | 4.0                  | 1.6                   |

절입량  
Depth of Cut

경사진 면 절삭  
Inclined Cutting

## 측면 절삭 Side Cutting

| 피삭재<br>Material           | 합금강<br>Alloy Steel |       |                      |                       |            |       |                      |                       | 고경도강<br>Hardened Steels |      |                      |                       |            |      |                      |                       |
|---------------------------|--------------------|-------|----------------------|-----------------------|------------|-------|----------------------|-----------------------|-------------------------|------|----------------------|-----------------------|------------|------|----------------------|-----------------------|
| 경도 Hardness               | 200 ~ 250HB        |       |                      |                       | 25 ~ 35HRC |       |                      |                       | 35 ~ 45HRC              |      |                      |                       | 45 ~ 62HRC |      |                      |                       |
| 외경<br>Outside<br>Diameter | RPM                | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM        | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM        | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø1                        | 28,790             | 115   | 1                    | 0.1                   | 25,911     | 104   | 1                    | 0.1                   | 22,024                  | 88   | 0.5                  | 0.03                  | 17,619     | 70   | 0.5                  | 0.03                  |
| ø1.5                      | 19,200             | 403   | 2                    | 0.2                   | 17,280     | 363   | 2                    | 0.2                   | 14,688                  | 308  | 0.8                  | 0.045                 | 11,750     | 247  | 0.8                  | 0.045                 |
| ø2                        | 14,400             | 690   | 2                    | 0.2                   | 12,960     | 621   | 2                    | 0.2                   | 11,016                  | 528  | 1.0                  | 0.06                  | 8,813      | 422  | 1.0                  | 0.06                  |
| ø3                        | 9,600              | 860   | 3                    | 0.3                   | 9,600      | 770   | 3                    | 0.3                   | 8,500                   | 610  | 1.5                  | 0.09                  | 7,400      | 460  | 1.5                  | 0.09                  |
| ø4                        | 7,200              | 920   | 4                    | 0.4                   | 7,200      | 830   | 4                    | 0.4                   | 6,400                   | 660  | 2.0                  | 0.12                  | 5,600      | 500  | 2.0                  | 0.12                  |
| ø5                        | 5,750              | 960   | 5                    | 0.5                   | 5,175      | 864   | 5                    | 0.5                   | 4,399                   | 734  | 2.5                  | 0.15                  | 3,519      | 588  | 2.5                  | 0.15                  |
| ø6                        | 4,800              | 1,080 | 6                    | 0.6                   | 4,800      | 970   | 6                    | 0.6                   | 5,100                   | 720  | 3.0                  | 0.18                  | 3,700      | 580  | 3.0                  | 0.18                  |
| ø8                        | 3,600              | 1,150 | 8                    | 0.8                   | 3,600      | 1,040 | 8                    | 0.8                   | 4,200                   | 750  | 4.0                  | 0.24                  | 2,800      | 630  | 4.0                  | 0.24                  |
| ø10                       | 2,900              | 1,070 | 10                   | 1.0                   | 2,900      | 960   | 10                   | 1.0                   | 2,500                   | 740  | 5.0                  | 0.3                   | 2,200      | 570  | 5.0                  | 0.3                   |
| ø12                       | 2,400              | 1,000 | 12                   | 1.2                   | 2,400      | 900   | 12                   | 1.2                   | 2,100                   | 700  | 6.0                  | 0.36                  | 1,900      | 550  | 6.0                  | 0.36                  |
| ø16                       | 1,800              | 1,000 | 16                   | 1.6                   | 1,620      | 900   | 16                   | 1.6                   | 1,377                   | 765  | 8.0                  | 0.48                  | 1,102      | 612  | 8.0                  | 0.48                  |
| ø20                       | 1,440              | 930   | 20                   | 2.0                   | 1,296      | 837   | 20                   | 2.0                   | 1,102                   | 711  | 10.0                 | 0.6                   | 881        | 569  | 10.0                 | 0.6                   |

절입량  
Depth of Cut

- 상기 조건표는 4날 기준이며, 6날 가공시 회전수는 유지하고, 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주시요.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 측면 절삭시 코너 R 참고하여 절삭 하시기 바랍니다.
- 곡면 절삭시 날경의 코너 R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주시요.
- 상기 절삭조건에 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스펙들 속도를 초과 하거나 버 및 적열 현상이 발생할 때 스펙들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 소재 및 가공 형상에 적합한 절삭유를 사용 하십시오.
- The parameters on the table is based on 4flutes. For using 6flutes, use the same RPM and raise up the feed up to 30% in stable milling condition.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- For side milling, refer to the corner radius value.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use suitable cutting oil for material and machining geometry.

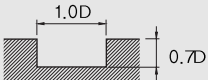
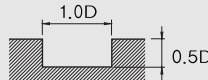
| 파삭재<br>Material           |              | 합금강<br>Alloy Steel                                                                   |        |                      |                       | 합금강/ 공구강<br>Alloy Steels/ Tool Steels |        |                      |                       | 고경도강<br>Hardened Steels |        |                      |                       | 고경도강<br>Hardened Steels |       |                      |                       |
|---------------------------|--------------|--------------------------------------------------------------------------------------|--------|----------------------|-----------------------|---------------------------------------|--------|----------------------|-----------------------|-------------------------|--------|----------------------|-----------------------|-------------------------|-------|----------------------|-----------------------|
| 경도 Hardness               |              | ~ 30HRC                                                                              |        |                      |                       | 30 ~ 45HRC                            |        |                      |                       | 45 ~ 55HRC              |        |                      |                       | 55 ~ 62HRC              |       |                      |                       |
| 외경<br>Outside<br>Diameter | 반경<br>Radius | RPM                                                                                  | FEED   | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                   | FEED   | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED   | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                     | FEED  | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø1                        | R0.2         | 45,000                                                                               | 7,000  | 0.05                 | 0.06                  | 42,000                                | 7,800  | 0.03                 | 0.05                  | 35,000                  | 6,800  | 0.02                 | 0.05                  | 25,000                  | 2,600 | 0.02                 | 0.05                  |
| ø1.5                      | R0.5         | 40,000                                                                               | 9,000  | 0.06                 | 0.72                  | 40,000                                | 8,000  | 0.04                 | 0.65                  | 30,000                  | 7,000  | 0.03                 | 0.60                  | 21,000                  | 2,800 | 0.02                 | 0.06                  |
| ø2                        | R0.5         | 33,000                                                                               | 10,000 | 0.08                 | 0.96                  | 27,000                                | 8,400  | 0.05                 | 0.86                  | 24,000                  | 7,500  | 0.04                 | 0.80                  | 16,000                  | 3,000 | 0.03                 | 0.80                  |
| ø3                        | R0.5         | 22,000                                                                               | 11,000 | 0.12                 | 1.44                  | 18,000                                | 9,000  | 0.08                 | 1.30                  | 16,000                  | 8,500  | 0.06                 | 1.20                  | 11,000                  | 3,300 | 0.05                 | 1.20                  |
| ø4                        | R0.5         | 19,000                                                                               | 13,000 | 0.17                 | 2.04                  | 16,000                                | 10,000 | 0.13                 | 1.84                  | 13,000                  | 10,000 | 0.09                 | 1.70                  | 900                     | 4,000 | 0.08                 | 1.70                  |
| "                         | R1.0         | 17,000                                                                               | 12,000 | 0.15                 | 1.80                  | 14,000                                | 9,500  | 0.12                 | 1.62                  | 12,000                  | 8,800  | 0.08                 | 1.50                  | 8,000                   | 3,500 | 0.07                 | 1.50                  |
| ø5                        | R0.5         | 15,000                                                                               | 14,000 | 0.23                 | 2.76                  | 12,000                                | 12,000 | 0.17                 | 2.48                  | 11,000                  | 10,000 | 0.12                 | 2.30                  | 7,300                   | 4,300 | 0.09                 | 2.30                  |
| "                         | R1.0         | 13,000                                                                               | 13,000 | 0.20                 | 2.40                  | 11,000                                | 11,000 | 0.15                 | 2.16                  | 9,600                   | 9,500  | 0.10                 | 2.00                  | 6,400                   | 3,800 | 0.08                 | 2.00                  |
| ø6                        | R0.3         | 13,310                                                                               | 15,730 | 0.30                 | 3.54                  | 10,900                                | 13,200 | 0.18                 | 3.19                  | 10,000                  | 13,000 | 0.12                 | 2.95                  | 6,500                   | 4,600 | 0.12                 | 2.95                  |
| "                         | R0.5         | 12,980                                                                               | 15,340 | 0.29                 | 3.42                  | 10,600                                | 13,000 | 0.17                 | 3.08                  | 9,500                   | 12,000 | 0.11                 | 2.85                  | 6,300                   | 4,500 | 0.11                 | 2.85                  |
| "                         | R1.0         | 12,600                                                                               | 12,600 | 0.28                 | 3.36                  | 12,654                                | 12,600 | 0.17                 | 3.02                  | 9,000                   | 11,000 | 0.11                 | 2.80                  | 5,800                   | 4,100 | 0.11                 | 2.80                  |
| "                         | R1.5         | 11,000                                                                               | 13,000 | 0.25                 | 3.00                  | 9,000                                 | 11,000 | 0.15                 | 2.70                  | 8,000                   | 9,600  | 0.10                 | 2.50                  | 5,300                   | 3,800 | 0.10                 | 2.50                  |
| ø8                        | R0.3         | 9,800                                                                                | 17,500 | 0.35                 | 4.25                  | 8,400                                 | 13,500 | 0.24                 | 3.82                  | 7,300                   | 15,000 | 0.18                 | 3.54                  | 4,700                   | 4,484 | 0.15                 | 3.54                  |
| "                         | R0.5         | 8,800                                                                                | 16,500 | 0.34                 | 4.10                  | 8,200                                 | 13,000 | 0.23                 | 3.69                  | 7,100                   | 13,000 | 0.17                 | 3.42                  | 4,600                   | 4,370 | 0.15                 | 3.42                  |
| "                         | R1.0         | 8,400                                                                                | 15,000 | 0.34                 | 4.03                  | 8,000                                 | 12,000 | 0.22                 | 3.63                  | 6,700                   | 11,000 | 0.17                 | 3.36                  | 4,520                   | 4,294 | 0.15                 | 3.36                  |
| "                         | R2.0         | 8,200                                                                                | 13,000 | 0.30                 | 3.60                  | 7,000                                 | 11,000 | 0.20                 | 3.24                  | 6,000                   | 9,600  | 0.15                 | 3.00                  | 4,000                   | 3,800 | 0.13                 | 3.00                  |
| ø10                       | R0.3         | 7,670                                                                                | 15,340 | 0.35                 | 6.37                  | 6,490                                 | 12,980 | 0.24                 | 5.73                  | 5,664                   | 11,210 | 0.18                 | 5.31                  | 3,776                   | 4,484 | 0.15                 | 5.31                  |
| "                         | R0.5         | 7,475                                                                                | 14,950 | 0.34                 | 6.16                  | 6,325                                 | 12,650 | 0.23                 | 5.54                  | 5,520                   | 10,925 | 0.17                 | 5.13                  | 3,680                   | 4,370 | 0.15                 | 5.13                  |
| "                         | R1.0         | 7,280                                                                                | 14,560 | 0.34                 | 6.05                  | 6,160                                 | 12,320 | 0.22                 | 5.44                  | 5,376                   | 10,640 | 0.17                 | 5.04                  | 3,584                   | 4,256 | 0.15                 | 5.04                  |
| "                         | R2.0         | 6,500                                                                                | 13,000 | 0.30                 | 5.40                  | 5,500                                 | 11,000 | 0.20                 | 4.86                  | 4,800                   | 9,500  | 0.15                 | 4.50                  | 3,200                   | 3,800 | 0.13                 | 4.50                  |
| ø12                       | R0.5         | 7,000                                                                                | 1,500  | 0.53                 | 6.37                  | 5,428                                 | 11,800 | 0.35                 | 5.73                  | 4,838                   | 10,620 | 0.30                 | 5.31                  | 3,186                   | 4,130 | 0.24                 | 5.31                  |
| "                         | R1.0         | 6,400                                                                                | 14,000 | 0.51                 | 6.16                  | 5,290                                 | 11,500 | 0.34                 | 5.54                  | 4,715                   | 10,350 | 0.29                 | 5.13                  | 3,105                   | 4,025 | 0.23                 | 5.13                  |
| "                         | R2.0         | 6,000                                                                                | 12,500 | 0.50                 | 6.05                  | 5,152                                 | 11,200 | 0.34                 | 5.44                  | 4,592                   | 10,080 | 0.28                 | 5.04                  | 3,024                   | 3,920 | 0.22                 | 5.04                  |
| "                         | R3.0         | 5,500                                                                                | 12,000 | 0.45                 | 5.40                  | 4,600                                 | 10,000 | 0.30                 | 4.86                  | 4,100                   | 9,000  | 0.25                 | 4.50                  | 2,700                   | 3,500 | 0.20                 | 4.50                  |
| ø16                       | R1.0         | 4,838                                                                                | 11,800 | 0.42                 | 8.58                  | 4,012                                 | 10,384 | 0.25                 | 7.72                  | 3,540                   | 9,204  | 0.22                 | 7.15                  | 2,360                   | 3,776 | 0.13                 | 7.35                  |
| "                         | R2.0         | 4,100                                                                                | 10,000 | 0.45                 | 9.00                  | 3,400                                 | 8,800  | 0.30                 | 8.10                  | 3,000                   | 7,800  | 0.25                 | 7.50                  | 2,000                   | 3,200 | 0.20                 | 7.50                  |
| 절입량<br>Depth of Cut       |              |  |        |                      |                       |                                       |        |                      |                       |                         |        |                      |                       |                         |       |                      |                       |

## ■ Coefficients respective of tool overhang

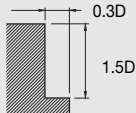
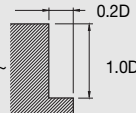
| Type       | Overhang | Revolution | Feed rate | Depth of Cut<br>ap |
|------------|----------|------------|-----------|--------------------|
| Straight   | L/D ≤ 5  | 100%       | 100%      | 100%               |
|            | L/D = 6  | 90%        | 80%       | 80%                |
|            | L/D = 7  | 80%        | 70%       | 70%                |
| Taper neck | L/D = 6  | 100%       | 100%      | 100%               |
|            | L/D = 8  | 90%        | 80%       | 80%                |
|            | L/D ≥ 10 | 80%        | 70%       | 70%                |

- 상기 조건표는 4날 기준이며, 6날 가공시 회전수는 유지하고, 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 측면 절삭시 코너 R 참고하여 절삭 하시기 바랍니다.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 상기 절삭조건에 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- 유효장 길이가 긴 경우, 위 표와같이 RPM과 FEED를 낮춰주세요.
- 절입깊이가 얇은 경우, RPM과 FEED를 증가해주세요.
- 원활한 칩배출을 위하여 에어브로우나 오일 미스트를 추천합니다.
- The parameters on the table is based on 4flutes. For using 6flutes, use the same RPM and raise up the feed up to 30% in stable milling condition.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- For side milling, refer to the corner radius value.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.
- If the effective length is long, refer to the table (Coefficients respective of tool overhang) and adjust the RPM and feed.
- If you use small value of Ap, raise up the RPM and feed.
- Air blow or oil mist is recommended for smooth chip emission.

## 홈 절삭 Slotting

| 피삭재<br>Material           | 일반구조강/ 탄소강<br>Mild Steels/ Carbon Steels                                                                                                                                                                                             |      |                      |                       | 합금강/ 공구강<br>Alloy Steels/ Tool Steels |      |                      |                       | 공구강/ 프리하드강<br>Tool Steels/ Prehardened Steels |      |                      |                       | 공구강/ 스테인레스강<br>Tool Steels/ Stainless Steels |      |                      |                       |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------|-----------------------|---------------------------------------|------|----------------------|-----------------------|-----------------------------------------------|------|----------------------|-----------------------|----------------------------------------------|------|----------------------|-----------------------|
| 경도 Hardness               | ~ 750N/mm <sup>2</sup>                                                                                                                                                                                                               |      |                      |                       | ~ 30HRC                               |      |                      |                       | 30 ~ 38HRC                                    |      |                      |                       | 38 ~ 45HRC                                   |      |                      |                       |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                                                                  | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                   | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                           | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                          | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø4                        | 4,000                                                                                                                                                                                                                                | 430  | 2.8                  | 4                     | 3,800                                 | 200  | 2.8                  | 4                     | 2,800                                         | 140  | 2                    | 4                     | 2,400                                        | 110  | 2                    | 4                     |
| ø5                        | 4,000                                                                                                                                                                                                                                | 430  | 3.5                  | 5                     | 3,400                                 | 220  | 3.5                  | 5                     | 2,500                                         | 160  | 2.5                  | 5                     | 2,200                                        | 130  | 2.5                  | 5                     |
| ø6                        | 3,600                                                                                                                                                                                                                                | 430  | 4.2                  | 6                     | 3,000                                 | 240  | 4.2                  | 6                     | 2,300                                         | 185  | 3                    | 6                     | 1,900                                        | 150  | 3                    | 6                     |
| ø8                        | 2,700                                                                                                                                                                                                                                | 430  | 5.6                  | 8                     | 2,200                                 | 270  | 5.6                  | 8                     | 1,800                                         | 210  | 4                    | 8                     | 1,400                                        | 180  | 4                    | 8                     |
| ø10                       | 2,200                                                                                                                                                                                                                                | 430  | 7                    | 10                    | 1,800                                 | 290  | 7                    | 10                    | 1,400                                         | 220  | 5                    | 10                    | 1,200                                        | 185  | 5                    | 10                    |
| ø12                       | 1,800                                                                                                                                                                                                                                | 430  | 8.4                  | 12                    | 1,500                                 | 300  | 8.4                  | 12                    | 1,200                                         | 230  | 6                    | 12                    | 960                                          | 190  | 6                    | 12                    |
| ø16                       | 1,400                                                                                                                                                                                                                                | 430  | 11.2                 | 16                    | 1,100                                 | 310  | 11.2                 | 16                    | 900                                           | 250  | 8                    | 16                    | 720                                          | 200  | 8                    | 16                    |
| ø20                       | 1,100                                                                                                                                                                                                                                | 410  | 14                   | 20                    | 900                                   | 310  | 14                   | 20                    | 700                                           | 240  | 10                   | 20                    | 560                                          | 185  | 10                   | 20                    |
| 절입량<br>Depth of Cut       | <div> <div>~ 30HRC</div>  </div> <div> <div>30HRC ~</div>  </div> |      |                      |                       |                                       |      |                      |                       |                                               |      |                      |                       |                                              |      |                      |                       |

## 측면 절삭 Side Cutting

| 피삭재<br>Material           | 일반구조강/ 탄소강<br>Mild Steels/ Carbon Steels                                                                                                                                                                                                 |      |                      |                       | 합금강/ 공구강<br>Alloy Steels/ Tool Steels |      |                      |                       | 공구강/ 프리하드강<br>Tool Steels/ Prehardened Steels |      |                      |                       | 공구강/ 스테인레스강<br>Tool Steels/ Stainless Steels |      |                      |                       |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------|-----------------------|---------------------------------------|------|----------------------|-----------------------|-----------------------------------------------|------|----------------------|-----------------------|----------------------------------------------|------|----------------------|-----------------------|
| 경도 Hardness               | ~ 750N/mm <sup>2</sup>                                                                                                                                                                                                                   |      |                      |                       | ~ 30HRC                               |      |                      |                       | 30 ~ 38HRC                                    |      |                      |                       | 38 ~ 45HRC                                   |      |                      |                       |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                                                                      | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                   | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                           | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                          | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø4                        | 5,000                                                                                                                                                                                                                                    | 510  | 6                    | 1.2                   | 4,200                                 | 260  | 6                    | 1.2                   | 3,600                                         | 180  | 6                    | 1.2                   | 2,800                                        | 130  | 4                    | 0.8                   |
| ø5                        | 5,000                                                                                                                                                                                                                                    | 510  | 7.5                  | 1.5                   | 4,200                                 | 270  | 7.5                  | 1.5                   | 3,200                                         | 200  | 7.5                  | 1.5                   | 2,400                                        | 150  | 5                    | 1                     |
| ø6                        | 4,200                                                                                                                                                                                                                                    | 510  | 9                    | 1.8                   | 3,600                                 | 290  | 9                    | 1.8                   | 2,800                                         | 220  | 9                    | 1.8                   | 2,100                                        | 170  | 6                    | 1.2                   |
| ø8                        | 3,200                                                                                                                                                                                                                                    | 510  | 12                   | 2.4                   | 2,700                                 | 330  | 12                   | 2.4                   | 2,100                                         | 250  | 12                   | 2.4                   | 1,600                                        | 190  | 8                    | 1.6                   |
| ø10                       | 2,600                                                                                                                                                                                                                                    | 510  | 15                   | 3                     | 2,200                                 | 345  | 15                   | 3                     | 1,600                                         | 260  | 15                   | 3                     | 1,300                                        | 210  | 10                   | 2                     |
| ø12                       | 2,100                                                                                                                                                                                                                                    | 510  | 18                   | 3.6                   | 1,800                                 | 360  | 18                   | 3.6                   | 1,400                                         | 270  | 18                   | 3.6                   | 1,100                                        | 215  | 12                   | 2.4                   |
| ø16                       | 1,600                                                                                                                                                                                                                                    | 510  | 24                   | 4.8                   | 1,400                                 | 385  | 24                   | 4.8                   | 1,000                                         | 290  | 24                   | 4.8                   | 800                                          | 220  | 16                   | 3.2                   |
| ø20                       | 1,300                                                                                                                                                                                                                                    | 480  | 30                   | 6                     | 1,100                                 | 375  | 30                   | 6                     | 800                                           | 280  | 30                   | 6                     | 640                                          | 210  | 20                   | 4                     |
| 절입량<br>Depth of Cut       | <div> <div>~ 38HRC</div>  </div> <div> <div>38HRC ~</div>  </div> |      |                      |                       |                                       |      |                      |                       |                                               |      |                      |                       |                                              |      |                      |                       |

- 가능한 공구 길이 측정시 유압식 측정이 아닌 레이저식 도구 세터를 사용 하십시오.
- 가공 진입시 가능한 피삭재 밖에서 진입 하십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 상기 절삭조건은 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우, 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 피삭재와 가공 모양에 따라 적절한 쿨런트를 사용 하십시오.
- 스테인레스, 내열합금강 등의 절단 가공시 수용성 절삭유가 가장 효과적 입니다.
- Use laser tool measurement instead of hydraulic measurement when measuring tool length as possible.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.
- For stainless and heat resistant alloy, water-soluble oil is the most effective.

## 홈 절삭 Slotting

| 파삭재<br>Material        | 일반구조강/ 탄소강<br>Mild Steels/ Carbon Steels                        |      |                   |                    | 합금강/ 공구강<br>Alloy Steels/ Tool Steels |      |                   |                    | 공구강/ 프리하트강<br>Tool Steels/ Prehardened Steels |      |                   |                    | 공구강/ 스테인레스강<br>Tool Steels/ Stainless Steels |      |                   |                    |
|------------------------|-----------------------------------------------------------------|------|-------------------|--------------------|---------------------------------------|------|-------------------|--------------------|-----------------------------------------------|------|-------------------|--------------------|----------------------------------------------|------|-------------------|--------------------|
| 경도 Hardness            | ~ 750N/mm <sup>2</sup>                                          |      |                   |                    | ~ 30HRC                               |      |                   |                    | 30 ~ 38HRC                                    |      |                   |                    | 38 ~ 45HRC                                   |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                             | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                           | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                          | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø4                     | 4,600                                                           | 500  | 3.2               | 4                  | 4,400                                 | 230  | 3.2               | 4                  | 3,200                                         | 160  | 3.2               | 4                  | 2,800                                        | 130  | 2.4               | 4                  |
| ø5                     | 4,600                                                           | 500  | 4                 | 5                  | 4,000                                 | 250  | 4                 | 5                  | 2,900                                         | 180  | 4                 | 5                  | 2,500                                        | 150  | 3                 | 5                  |
| ø6                     | 4,100                                                           | 500  | 4.8               | 6                  | 3,500                                 | 280  | 4.8               | 6                  | 2,700                                         | 210  | 4.8               | 6                  | 2,200                                        | 170  | 3.6               | 6                  |
| ø8                     | 3,100                                                           | 500  | 6.4               | 8                  | 2,500                                 | 310  | 6.4               | 8                  | 2,100                                         | 240  | 6.4               | 8                  | 1,700                                        | 210  | 4.8               | 8                  |
| ø10                    | 2,500                                                           | 500  | 8                 | 10                 | 2,100                                 | 330  | 8                 | 10                 | 1,600                                         | 250  | 8                 | 10                 | 1,300                                        | 210  | 6                 | 10                 |
| ø12                    | 2,100                                                           | 500  | 9.6               | 12                 | 1,700                                 | 350  | 9.6               | 12                 | 1,400                                         | 270  | 9.6               | 12                 | 1,100                                        | 220  | 7.2               | 12                 |
| ø16                    | 1,600                                                           | 500  | 12.8              | 16                 | 1,300                                 | 360  | 12.8              | 16                 | 1,000                                         | 290  | 12.8              | 16                 | 800                                          | 230  | 4.8               | 16                 |
| ø20                    | 1,300                                                           | 480  | 16                | 20                 | 1,000                                 | 360  | 16                | 20                 | 800                                           | 270  | 16                | 20                 | 650                                          | 210  | 12                | 20                 |
| 절입량<br>Depth of Cut    | <div> <div>~ 38HRC</div> </div> <div> <div>38HRC ~</div> </div> |      |                   |                    |                                       |      |                   |                    |                                               |      |                   |                    |                                              |      |                   |                    |

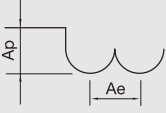
## 측면 절삭 Side Cutting

| 파삭재<br>Material        | 일반구조강/ 탄소강<br>Mild Steels/ Carbon Steels                        |      |                   |                    | 합금강/ 공구강<br>Alloy Steels/ Tool Steels |      |                   |                    | 공구강/ 프리하트강<br>Tool Steels/ Prehardened Steels |      |                   |                    | 공구강/ 스테인레스강<br>Tool Steels/ Stainless Steels |      |                   |                    |
|------------------------|-----------------------------------------------------------------|------|-------------------|--------------------|---------------------------------------|------|-------------------|--------------------|-----------------------------------------------|------|-------------------|--------------------|----------------------------------------------|------|-------------------|--------------------|
| 경도 Hardness            | ~ 750N/mm <sup>2</sup>                                          |      |                   |                    | ~ 30HRC                               |      |                   |                    | 30 ~ 38HRC                                    |      |                   |                    | 38 ~ 45HRC                                   |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                             | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                           | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                          | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø4                     | 5,800                                                           | 600  | 6                 | 2                  | 4,800                                 | 300  | 6                 | 2                  | 4,100                                         | 200  | 6                 | 2                  | 3,200                                        | 150  | 4                 | 1.6                |
| ø5                     | 5,800                                                           | 600  | 7.5               | 2.5                | 4,800                                 | 310  | 7.5               | 2.5                | 3,700                                         | 230  | 7.5               | 2.5                | 2,800                                        | 170  | 5                 | 2                  |
| ø6                     | 4,800                                                           | 600  | 9                 | 3                  | 4,200                                 | 330  | 9                 | 3                  | 3,200                                         | 250  | 9                 | 3                  | 2,400                                        | 200  | 6                 | 2.4                |
| ø8                     | 3,700                                                           | 600  | 12                | 4                  | 3,100                                 | 380  | 12                | 4                  | 2,400                                         | 290  | 12                | 4                  | 1,800                                        | 220  | 8                 | 3.2                |
| ø10                    | 3,000                                                           | 600  | 15                | 5                  | 2,500                                 | 400  | 15                | 5                  | 1,800                                         | 300  | 15                | 5                  | 1,500                                        | 250  | 10                | 4                  |
| ø12                    | 2,400                                                           | 600  | 18                | 6                  | 2,100                                 | 410  | 18                | 6                  | 1,600                                         | 310  | 18                | 6                  | 1,300                                        | 250  | 12                | 4.8                |
| ø16                    | 1,850                                                           | 600  | 24                | 8                  | 1,600                                 | 440  | 24                | 8                  | 1,200                                         | 330  | 24                | 8                  | 1,000                                        | 250  | 16                | 6.4                |
| ø20                    | 1,500                                                           | 550  | 30                | 10                 | 1,300                                 | 430  | 30                | 10                 | 900                                           | 320  | 30                | 10                 | 750                                          | 240  | 20                | 8                  |
| 절입량<br>Depth of Cut    | <div> <div>~ 38HRC</div> </div> <div> <div>38HRC ~</div> </div> |      |                   |                    |                                       |      |                   |                    |                                               |      |                   |                    |                                              |      |                   |                    |

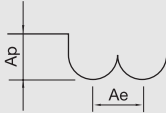
- 가능한 공구 길이 측정식 유압식 측정이 아닌 레이저식 도구 세터를 사용 하십시오.
- 가공 진입시 가능한 파삭재 밖에서 진입 하십시오.
- 유효장치가 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 상기 절삭조건에 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우, 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 파삭재와 가공 모양에 따라 적절한 쿨런트를 사용 하십시오.
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- Use laser tool measurement instead of hydraulic measurement when measuring tool length as possible.
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- If the effective length is long, reduce the RPM and feed maximum 30%.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.
- For stainless and heat resistant alloy, water-soluble oil is the most effective.

| 피삭재<br>Material        |                            | 합금강<br>Alloy Steels |       |                   |                    | 프리하든강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|----------------------------|---------------------|-------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            |                            | 30 ~ 40HRC          |       |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 반경<br>Corner<br>Radius | 유효장<br>Effective<br>Length | RPM                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.1                  | 0.5                        | 54,000              | 430   | 0.010             | 0.010              | 48,000                      | 350  | 0.006             | 0.007              | 48,000                  | 280  | 0.006             | 0.007              |
| "                      | 1                          | 54,000              | 380   | 0.008             | 0.008              | 48,000                      | 330  | 0.005             | 0.005              | 48,000                  | 250  | 0.005             | 0.005              |
| "                      | 1.5                        | 47,000              | 320   | 0.006             | 0.006              | 47,000                      | 250  | 0.004             | 0.004              | 47,000                  | 200  | 0.004             | 0.004              |
| "                      | 2                          | 42,000              | 290   | 0.004             | 0.004              | 42,000                      | 200  | 0.003             | 0.003              | 42,000                  | 200  | 0.003             | 0.003              |
| R 0.15                 | 1                          | 54,000              | 640   | 0.014             | 0.015              | 48,000                      | 480  | 0.010             | 0.010              | 41,000                  | 370  | 0.009             | 0.010              |
| "                      | 2                          | 49,000              | 530   | 0.011             | 0.011              | 43,000                      | 370  | 0.008             | 0.008              | 37,000                  | 270  | 0.008             | 0.008              |
| "                      | 3                          | 43,000              | 460   | 0.009             | 0.010              | 38,000                      | 320  | 0.007             | 0.006              | 32,000                  | 240  | 0.006             | 0.006              |
| "                      | 4                          | 37,000              | 300   | 0.004             | 0.006              | 28,000                      | 200  | 0.003             | 0.004              | 24,000                  | 160  | 0.003             | 0.004              |
| R 0.2                  | 1                          | 54,000              | 870   | 0.023             | 0.036              | 48,000                      | 660  | 0.018             | 0.024              | 37,000                  | 450  | 0.015             | 0.024              |
| "                      | 2                          | 54,000              | 790   | 0.022             | 0.036              | 48,000                      | 590  | 0.018             | 0.024              | 37,000                  | 400  | 0.015             | 0.020              |
| "                      | 3                          | 50,000              | 660   | 0.017             | 0.018              | 41,000                      | 420  | 0.012             | 0.012              | 31,000                  | 280  | 0.011             | 0.012              |
| "                      | 4                          | 50,000              | 640   | 0.012             | 0.018              | 38,000                      | 400  | 0.009             | 0.012              | 30,000                  | 270  | 0.009             | 0.012              |
| "                      | 5                          | 37,000              | 410   | 0.009             | 0.018              | 29,000                      | 330  | 0.008             | 0.012              | 26,000                  | 260  | 0.007             | 0.012              |
| "                      | 6                          | 37,000              | 360   | 0.006             | 0.010              | 29,000                      | 260  | 0.005             | 0.006              | 26,000                  | 200  | 0.004             | 0.006              |
| "                      | 8                          | 27,000              | 200   | 0.003             | 0.006              | 27,000                      | 170  | 0.003             | 0.003              | 23,000                  | 150  | 0.002             | 0.003              |
| R 0.25                 | 1                          | 57,000              | 1,380 | 0.029             | 0.054              | 42,000                      | 830  | 0.023             | 0.036              | 32,000                  | 550  | 0.018             | 0.036              |
| "                      | 2                          | 57,000              | 1,250 | 0.028             | 0.054              | 42,000                      | 750  | 0.022             | 0.036              | 32,000                  | 500  | 0.018             | 0.036              |
| "                      | 3                          | 55,000              | 1,010 | 0.021             | 0.036              | 38,000                      | 580  | 0.017             | 0.024              | 31,000                  | 400  | 0.014             | 0.024              |
| "                      | 4                          | 55,000              | 1,010 | 0.021             | 0.036              | 38,000                      | 580  | 0.017             | 0.024              | 31,000                  | 400  | 0.014             | 0.024              |
| "                      | 5                          | 48,000              | 800   | 0.016             | 0.018              | 33,000                      | 480  | 0.012             | 0.012              | 30,000                  | 390  | 0.009             | 0.012              |
| "                      | 6                          | 36,000              | 610   | 0.009             | 0.018              | 28,000                      | 400  | 0.008             | 0.012              | 27,000                  | 330  | 0.005             | 0.012              |
| "                      | 8                          | 36,000              | 590   | 0.009             | 0.018              | 28,000                      | 400  | 0.008             | 0.012              | 27,000                  | 330  | 0.005             | 0.012              |
| "                      | 10                         | 36,000              | 460   | 0.009             | 0.018              | 28,000                      | 400  | 0.008             | 0.012              | 27,000                  | 330  | 0.005             | 0.012              |
| "                      | 12                         | 24,000              | 280   | 0.004             | 0.010              | 26,000                      | 280  | 0.004             | 0.006              | 24,000                  | 280  | 0.002             | 0.006              |
| R 0.3                  | 1                          | 57,000              | 1,670 | 0.035             | 0.144              | 37,000                      | 840  | 0.027             | 0.096              | 27,000                  | 540  | 0.023             | 0.096              |
| "                      | 2                          | 57,000              | 1,540 | 0.034             | 0.144              | 37,000                      | 770  | 0.027             | 0.096              | 27,000                  | 500  | 0.021             | 0.096              |
| "                      | 3                          | 57,000              | 1,540 | 0.034             | 0.144              | 37,000                      | 770  | 0.027             | 0.096              | 27,000                  | 500  | 0.021             | 0.096              |
| "                      | 4                          | 54,000              | 1,130 | 0.026             | 0.108              | 35,000                      | 600  | 0.020             | 0.072              | 26,000                  | 380  | 0.016             | 0.072              |
| "                      | 5                          | 46,000              | 960   | 0.019             | 0.072              | 28,000                      | 460  | 0.016             | 0.048              | 26,000                  | 370  | 0.012             | 0.048              |
| "                      | 6                          | 46,000              | 960   | 0.019             | 0.072              | 28,000                      | 460  | 0.016             | 0.048              | 26,000                  | 370  | 0.012             | 0.048              |
| "                      | 8                          | 30,000              | 570   | 0.010             | 0.054              | 24,000                      | 400  | 0.009             | 0.036              | 23,000                  | 320  | 0.006             | 0.036              |
| "                      | 10                         | 30,000              | 490   | 0.007             | 0.036              | 24,000                      | 330  | 0.006             | 0.024              | 23,000                  | 290  | 0.004             | 0.024              |
| "                      | 12                         | 30,000              | 490   | 0.007             | 0.036              | 24,000                      | 330  | 0.006             | 0.024              | 23,000                  | 290  | 0.004             | 0.024              |
| "                      | 14                         | 20,000              | 300   | 0.004             | 0.027              | 22,000                      | 300  | 0.004             | 0.018              | 20,000                  | 250  | 0.002             | 0.018              |
| R 0.35                 | 2                          | 56,000              | 1,800 | 0.050             | 0.162              | 35,000                      | 740  | 0.039             | 0.108              | 27,000                  | 500  | 0.031             | 0.108              |
| "                      | 4                          | 54,500              | 1,500 | 0.045             | 0.063              | 33,000                      | 600  | 0.035             | 0.042              | 26,500                  | 410  | 0.029             | 0.096              |
| "                      | 8                          | 32,000              | 800   | 0.019             | 0.072              | 12,215                      | 420  | 0.020             | 0.048              | 22,500                  | 355  | 0.012             | 0.048              |
| "                      | 10                         | 26,500              | 540   | 0.017             | 0.063              | 22,500                      | 380  | 0.014             | 0.042              | 21,500                  | 330  | 0.011             | 0.042              |
| "                      | 12                         | 23,000              | 420   | 0.017             | 0.063              | 21,500                      | 380  | 0.012             | 0.032              | 21,500                  | 320  | 0.010             | 0.042              |
| R 0.4                  | 2                          | 55,000              | 2,060 | 0.063             | 0.180              | 33,000                      | 710  | 0.050             | 0.120              | 27,000                  | 500  | 0.041             | 0.120              |
| "                      | 4                          | 55,000              | 1,860 | 0.063             | 0.180              | 31,000                      | 600  | 0.050             | 0.120              | 27,000                  | 440  | 0.041             | 0.120              |
| "                      | 6                          | 47,000              | 1,410 | 0.038             | 0.108              | 28,000                      | 570  | 0.030             | 0.072              | 22,000                  | 390  | 0.024             | 0.072              |
| "                      | 8                          | 34,000              | 1,040 | 0.027             | 0.090              | 21,000                      | 430  | 0.021             | 0.060              | 22,000                  | 390  | 0.018             | 0.060              |
| "                      | 10                         | 23,000              | 600   | 0.027             | 0.090              | 21,000                      | 430  | 0.021             | 0.060              | 20,000                  | 370  | 0.017             | 0.060              |
| "                      | 12                         | 16,000              | 350   | 0.027             | 0.090              | 19,000                      | 430  | 0.018             | 0.040              | 20,000                  | 350  | 0.016             | 0.060              |
| R 0.45                 | 6                          | 50,500              | 1,900 | 0.067             | 0.190              | 32,000                      | 685  | 0.054             | 0.130              | 24,500                  | 460  | 0.043             | 0.180              |
| R 0.5                  | 2                          | 46,000              | 2,000 | 0.072             | 0.360              | 32,000                      | 770  | 0.057             | 0.240              | 22,000                  | 480  | 0.045             | 0.240              |
| "                      | 3                          | 46,000              | 2,000 | 0.072             | 0.360              | 32,000                      | 770  | 0.057             | 0.240              | 22,000                  | 480  | 0.045             | 0.240              |
| "                      | 4                          | 46,000              | 2,000 | 0.071             | 0.360              | 32,000                      | 770  | 0.057             | 0.240              | 22,000                  | 480  | 0.045             | 0.240              |
| "                      | 5                          | 46,000              | 2,000 | 0.071             | 0.360              | 32,000                      | 770  | 0.057             | 0.240              | 22,000                  | 480  | 0.045             | 0.240              |
| "                      | 6                          | 39,000              | 1,500 | 0.071             | 0.180              | 26,000                      | 760  | 0.055             | 0.120              | 17,600                  | 480  | 0.009             | 0.120              |
| "                      | 8                          | 39,000              | 1,500 | 0.043             | 0.180              | 26,000                      | 760  | 0.034             | 0.120              | 17,600                  | 480  | 0.027             | 0.120              |
| "                      | 10                         | 29,000              | 1,110 | 0.028             | 0.090              | 17,600                      | 530  | 0.024             | 0.060              | 16,500                  | 420  | 0.018             | 0.060              |
| "                      | 12                         | 18,700              | 660   | 0.027             | 0.090              | 17,600                      | 530  | 0.024             | 0.060              | 16,500                  | 420  | 0.018             | 0.060              |
| "                      | 14                         | 18,700              | 640   | 0.022             | 0.090              | 15,400                      | 440  | 0.018             | 0.060              | 14,300                  | 360  | 0.014             | 0.060              |
| "                      | 16                         | 18,700              | 640   | 0.022             | 0.090              | 15,400                      | 440  | 0.018             | 0.060              | 14,300                  | 360  | 0.014             | 0.060              |
| "                      | 18                         | 18,700              | 540   | 0.017             | 0.090              | 14,300                      | 440  | 0.013             | 0.060              | 13,200                  | 360  | 0.009             | 0.060              |
| "                      | 20                         | 18,700              | 540   | 0.017             | 0.054              | 14,300                      | 360  | 0.013             | 0.036              | 13,200                  | 300  | 0.009             | 0.036              |
| "                      | 22                         | 18,700              | 540   | 0.017             | 0.054              | 14,300                      | 360  | 0.013             | 0.036              | 13,200                  | 300  | 0.009             | 0.036              |
| "                      | 25                         | 18,700              | 540   | 0.016             | 0.052              | 14,300                      | 360  | 0.013             | 0.030              | 13,200                  | 300  | 0.009             | 0.030              |
| R 0.6                  | 4                          | 38,000              | 2,000 | 0.085             | 0.360              | 26,000                      | 770  | 0.068             | 0.240              | 18,200                  | 480  | 0.054             | 0.240              |
| "                      | 6                          | 38,000              | 2,000 | 0.085             | 0.360              | 26,000                      | 770  | 0.068             | 0.240              | 18,200                  | 480  | 0.054             | 0.240              |
| "                      | 8                          | 32,000              | 1,490 | 0.084             | 0.360              | 21,000                      | 700  | 0.067             | 0.240              | 15,100                  | 440  | 0.054             | 0.240              |
| "                      | 10                         | 24,000              | 1,080 | 0.036             | 0.180              | 16,400                      | 530  | 0.027             | 0.120              | 15,100                  | 420  | 0.022             | 0.120              |
| "                      | 12                         | 24,000              | 1,080 | 0.036             | 0.180              | 15,300                      | 530  | 0.027             | 0.120              | 14,100                  | 420  | 0.022             | 0.120              |
| "                      | 16                         | 15,400              | 580   | 0.024             | 0.144              | 13,100                      | 460  | 0.019             | 0.096              | 11,900                  | 380  | 0.016             | 0.096              |
| "                      | 20                         | 15,400              | 580   | 0.017             | 0.090              | 12,100                      | 380  | 0.013             | 0.060              | 11,000                  | 320  | 0.009             | 0.060              |
| "                      | 24                         | 15,400              | 580   | 0.010             | 0.060              | 11,100                      | 320  | 0.009             | 0.040              | 9,800                   | 290  | 0.070             | 0.040              |

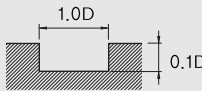
| 파삭재<br>Material        |                            | 합금강<br>Alloy Steels |       |                   |                    | 프리하든강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|----------------------------|---------------------|-------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            |                            | 30 ~ 40HRC          |       |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 반경<br>Corner<br>Radius | 유효장<br>Effective<br>Length | RPM                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.7                  | 6                          | 28,000              | 1,470 | 0.099             | 0.270              | 17,600                      | 680  | 0.076             | 0.180              | 13,600                  | 440  | 0.063             | 0.180              |
| "                      | 8                          | 28,000              | 1,470 | 0.099             | 0.270              | 17,600                      | 680  | 0.079             | 0.180              | 13,600                  | 440  | 0.063             | 0.180              |
| "                      | 12                         | 19,800              | 1,080 | 0.042             | 0.270              | 13,800                      | 530  | 0.033             | 0.180              | 13,600                  | 420  | 0.027             | 0.180              |
| "                      | 16                         | 13,200              | 620   | 0.033             | 0.180              | 13,100                      | 480  | 0.027             | 0.120              | 11,900                  | 390  | 0.021             | 0.120              |
| R 0.75                 | 3                          | 30,000              | 2,200 | 0.171             | 0.324              | 21,000                      | 1060 | 0.137             | 0.216              | 14,800                  | 660  | 0.110             | 0.216              |
| "                      | 4                          | 30,000              | 2,200 | 0.171             | 0.324              | 21,000                      | 1060 | 0.137             | 0.216              | 14,800                  | 660  | 0.110             | 0.216              |
| "                      | 6                          | 30,000              | 1,980 | 0.147             | 0.324              | 21,000                      | 940  | 0.117             | 0.216              | 14,800                  | 580  | 0.090             | 0.216              |
| "                      | 8                          | 26,000              | 1,500 | 0.106             | 0.270              | 16,300                      | 700  | 0.084             | 0.180              | 12,100                  | 450  | 0.069             | 0.180              |
| "                      | 10                         | 26,000              | 1,500 | 0.106             | 0.270              | 16,300                      | 700  | 0.084             | 0.180              | 12,100                  | 450  | 0.069             | 0.180              |
| "                      | 12                         | 26,000              | 1,500 | 0.106             | 0.270              | 16,300                      | 700  | 0.084             | 0.180              | 12,100                  | 450  | 0.069             | 0.180              |
| "                      | 14                         | 18,700              | 1,100 | 0.045             | 0.180              | 12,600                      | 530  | 0.036             | 0.120              | 12,100                  | 440  | 0.027             | 0.120              |
| "                      | 16                         | 12,100              | 620   | 0.036             | 0.180              | 12,400                      | 480  | 0.027             | 0.120              | 11,600                  | 390  | 0.022             | 0.120              |
| "                      | 18                         | 12,100              | 620   | 0.036             | 0.180              | 12,400                      | 480  | 0.027             | 0.120              | 11,600                  | 390  | 0.022             | 0.120              |
| "                      | 20                         | 12,100              | 620   | 0.019             | 0.090              | 12,400                      | 480  | 0.016             | 0.060              | 11,600                  | 390  | 0.012             | 0.060              |
| "                      | 22                         | 12,100              | 620   | 0.019             | 0.090              | 12,400                      | 480  | 0.016             | 0.060              | 11,000                  | 390  | 0.012             | 0.060              |
| "                      | 25                         | 11,000              | 500   | 0.019             | 0.090              | 12,400                      | 440  | 0.016             | 0.060              | 11,000                  | 390  | 0.012             | 0.060              |
| "                      | 30                         | 10,700              | 450   | 0.019             | 0.090              | 10,900                      | 400  | 0.016             | 0.060              | 11,000                  | 390  | 0.012             | 0.060              |
| R 0.8                  | 6                          | 27,040              | 2,600 | 0.220             | 0.580              | 18,900                      | 1200 | 0.180             | 0.390              | 1,650                   | 760  | 0.150             | 0.390              |
| "                      | 8                          | 26,000              | 1,970 | 0.157             | 0.324              | 18,900                      | 940  | 0.126             | 0.216              | 13,800                  | 580  | 0.102             | 0.216              |
| "                      | 12                         | 25,000              | 1,490 | 0.112             | 0.180              | 15,100                      | 700  | 0.090             | 0.120              | 11,500                  | 440  | 0.072             | 0.120              |
| "                      | 16                         | 17,600              | 110   | 0.046             | 0.144              | 12,300                      | 530  | 0.036             | 0.096              | 11,400                  | 440  | 0.030             | 0.096              |
| "                      | 20                         | 11,000              | 630   | 0.036             | 0.090              | 11,500                      | 480  | 0.030             | 0.060              | 10,900                  | 400  | 0.024             | 0.060              |
| R 0.9                  | 6                          | 32,000              | 2,600 | 0.230             | 0.021              | 18,400                      | 1200 | 0.185             | 0.320              | 18,400                  | 738  | 0.150             | 0.320              |
| "                      | 8                          | 26,000              | 1,950 | 0.165             | 0.270              | 16,300                      | 930  | 0.132             | 0.240              | 13,800                  | 570  | 0.108             | 0.240              |
| "                      | 12                         | 21,000              | 1,480 | 0.120             | 0.270              | 13,800                      | 700  | 0.094             | 0.180              | 10,300                  | 440  | 0.077             | 0.180              |
| "                      | 16                         | 15,400              | 1,080 | 0.048             | 0.180              | 10,800                      | 530  | 0.039             | 0.120              | 9,900                   | 420  | 0.031             | 0.120              |
| "                      | 20                         | 10,500              | 630   | 0.039             | 0.090              | 10,200                      | 480  | 0.031             | 0.060              | 9,700                   | 400  | 0.025             | 0.060              |
| R 1                    | 4                          | 22,000              | 2,140 | 0.232             | 0.540              | 18,500                      | 1260 | 0.185             | 0.360              | 13,200                  | 960  | 0.150             | 0.360              |
| "                      | 6                          | 22,000              | 2,140 | 0.232             | 0.540              | 18,500                      | 1260 | 0.185             | 0.360              | 13,200                  | 960  | 0.150             | 0.360              |
| "                      | 8                          | 22,000              | 1,920 | 0.185             | 0.360              | 18,500                      | 1120 | 0.147             | 0.240              | 13,200                  | 870  | 0.120             | 0.240              |
| "                      | 10                         | 22,000              | 1,920 | 0.185             | 0.360              | 18,500                      | 1120 | 0.147             | 0.240              | 13,200                  | 870  | 0.120             | 0.240              |
| "                      | 12                         | 18,700              | 1,470 | 0.166             | 0.360              | 16,000                      | 990  | 0.133             | 0.240              | 11,700                  | 780  | 0.107             | 0.240              |
| "                      | 14                         | 18,700              | 1,470 | 0.166             | 0.360              | 16,000                      | 990  | 0.133             | 0.240              | 11,700                  | 780  | 0.107             | 0.240              |
| "                      | 16                         | 18,700              | 1,470 | 0.148             | 0.360              | 16,000                      | 990  | 0.118             | 0.240              | 11,700                  | 780  | 0.090             | 0.240              |
| "                      | 18                         | 14,300              | 1,070 | 0.093             | 0.180              | 14,700                      | 580  | 0.074             | 0.120              | 11,600                  | 580  | 0.061             | 0.120              |
| "                      | 20                         | 14,300              | 1,070 | 0.093             | 0.180              | 14,700                      | 580  | 0.074             | 0.120              | 11,600                  | 580  | 0.061             | 0.120              |
| "                      | 22                         | 9,500               | 630   | 0.074             | 0.180              | 10,600                      | 450  | 0.058             | 0.120              | 10,200                  | 450  | 0.045             | 0.120              |
| "                      | 25                         | 9,500               | 630   | 0.074             | 0.180              | 10,600                      | 450  | 0.058             | 0.120              | 10,200                  | 450  | 0.045             | 0.120              |
| "                      | 30                         | 9,500               | 530   | 0.033             | 0.090              | 10,600                      | 450  | 0.026             | 0.060              | 10,200                  | 380  | 0.021             | 0.060              |
| R 1.25                 | 8                          | 18,400              | 2,400 | 0.232             | 0.360              | 14,500                      | 1400 | 0.185             | 0.240              | 9,700                   | 1080 | 0.150             | 0.240              |
| "                      | 10                         | 18,400              | 2,400 | 0.232             | 0.360              | 14,500                      | 1400 | 0.185             | 0.240              | 9,700                   | 1080 | 0.150             | 0.240              |
| "                      | 16                         | 16,100              | 1,810 | 0.208             | 0.360              | 13,500                      | 1230 | 0.166             | 0.240              | 8,400                   | 980  | 0.135             | 0.240              |
| "                      | 20                         | 11,500              | 1,330 | 0.116             | 0.180              | 10,200                      | 950  | 0.093             | 0.120              | 8,400                   | 980  | 0.074             | 0.120              |
| "                      | 25                         | 6,900               | 770   | 0.093             | 0.180              | 8,400                       | 540  | 0.074             | 0.120              | 8,400                   | 560  | 0.061             | 0.120              |
| "                      | 30                         | 6,900               | 770   | 0.040             | 0.090              | 8,400                       | 540  | 0.033             | 0.060              | 8,400                   | 560  | 0.026             | 0.060              |
| R 1.5                  | 6                          | 15,000              | 2,890 | 0.278             | 0.540              | 12,900                      | 1680 | 0.222             | 0.360              | 9,200                   | 1300 | 0.180             | 0.360              |
| "                      | 8                          | 15,000              | 2,890 | 0.278             | 0.540              | 12,900                      | 1680 | 0.222             | 0.360              | 9,200                   | 1300 | 0.180             | 0.360              |
| "                      | 10                         | 15,000              | 2,600 | 0.278             | 0.540              | 12,900                      | 1680 | 0.222             | 0.360              | 9,200                   | 1300 | 0.180             | 0.360              |
| "                      | 12                         | 15,000              | 2,600 | 0.278             | 0.540              | 12,900                      | 1510 | 0.222             | 0.360              | 9,200                   | 1170 | 0.180             | 0.360              |
| "                      | 16                         | 12,700              | 1,970 | 0.029             | 0.504              | 11,300                      | 1330 | 0.166             | 0.360              | 8,100                   | 1040 | 0.135             | 0.360              |
| "                      | 20                         | 12,700              | 1,970 | 0.029             | 0.504              | 11,300                      | 1330 | 0.166             | 0.360              | 8,100                   | 1040 | 0.135             | 0.360              |
| "                      | 25                         | 10,100              | 1,450 | 0.139             | 0.270              | 8,800                       | 1040 | 0.111             | 0.180              | 8,100                   | 1040 | 0.090             | 0.180              |
| "                      | 30                         | 10,100              | 1,450 | 0.139             | 0.270              | 8,800                       | 780  | 0.111             | 0.180              | 8,100                   | 780  | 0.090             | 0.180              |
| "                      | 35                         | 6,600               | 840   | 0.073             | 0.270              | 7,900                       | 620  | 0.055             | 0.180              | 7,500                   | 650  | 0.045             | 0.180              |
| "                      | 40                         | 6,600               | 840   | 0.073             | 0.270              | 7,900                       | 620  | 0.055             | 0.180              | 7,500                   | 520  | 0.045             | 0.180              |
| "                      | 45                         | 4,500               | 500   | 0.040             | 0.270              | 6,200                       | 500  | 0.035             | 0.100              | 7,000                   | 450  | 0.023             | 0.180              |
| R 2                    | 8                          | 11,500              | 2,710 | 0.370             | 0.900              | 9,700                       | 1560 | 0.297             | 0.600              | 6,800                   | 1210 | 0.241             | 0.600              |
| "                      | 10                         | 11,500              | 2,710 | 0.370             | 0.900              | 9,700                       | 1560 | 0.297             | 0.600              | 6,800                   | 1210 | 0.241             | 0.600              |
| "                      | 12                         | 11,500              | 2,710 | 0.390             | 0.900              | 9,700                       | 1560 | 0.297             | 0.600              | 6,800                   | 1210 | 0.241             | 0.600              |
| "                      | 16                         | 11,500              | 2,710 | 0.390             | 0.900              | 9,700                       | 1560 | 0.297             | 0.600              | 6,800                   | 1210 | 0.241             | 0.600              |
| "                      | 20                         | 11,500              | 2,710 | 0.390             | 0.900              | 9,700                       | 1560 | 0.297             | 0.600              | 6,800                   | 1210 | 0.241             | 0.600              |
| "                      | 25                         | 10,300              | 1,850 | 0.279             | 0.540              | 8,400                       | 1250 | 0.223             | 0.360              | 6,000                   | 980  | 0.180             | 0.360              |
| "                      | 30                         | 10,300              | 1,850 | 0.279             | 0.540              | 8,400                       | 1250 | 0.223             | 0.360              | 6,000                   | 980  | 0.180             | 0.361              |
| "                      | 35                         | 7,500               | 1,360 | 0.185             | 0.540              | 6,600                       | 950  | 0.148             | 0.360              | 6,000                   | 700  | 0.120             | 0.360              |
| "                      | 40                         | 7,500               | 1,360 | 0.185             | 0.540              | 6,600                       | 950  | 0.148             | 0.360              | 6,000                   | 700  | 0.120             | 0.360              |
| "                      | 45                         | 5,000               | 780   | 0.093             | 0.360              | 5,900                       | 470  | 0.074             | 0.240              | 5,600                   | 490  | 0.060             | 0.240              |

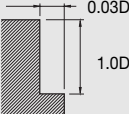
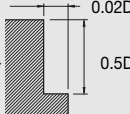
| 피삭재<br>Material     |                         | 합금강<br>Alloy Steels                                                                                                                                                                                                                                                       |       |                   |                    | 프리하트강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|---------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness         |                         | 30 ~ 40HRC                                                                                                                                                                                                                                                                |       |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 반경<br>Corner Radius | 유효장<br>Effective Length | RPM                                                                                                                                                                                                                                                                       | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 2.5               | 16                      | 9,600                                                                                                                                                                                                                                                                     | 2,590 | 0.406             | 0.900              | 7,800                       | 1350 | 0.324             | 0.800              | 5,600                   | 1050 | 0.252             | 0.800              |
| "                   | 20                      | 9,600                                                                                                                                                                                                                                                                     | 2,100 | 0.406             | 0.900              | 7,800                       | 1240 | 0.324             | 0.600              | 5,600                   | 950  | 0.252             | 0.600              |
| "                   | 25                      | 9,600                                                                                                                                                                                                                                                                     | 2,100 | 0.406             | 0.900              | 7,800                       | 1240 | 0.324             | 0.600              | 5,600                   | 950  | 0.252             | 0.600              |
| "                   | 30                      | 8,200                                                                                                                                                                                                                                                                     | 1,320 | 0.305             | 0.900              | 7,800                       | 760  | 0.243             | 0.600              | 4,800                   | 600  | 0.197             | 0.600              |
| "                   | 40                      | 7,000                                                                                                                                                                                                                                                                     | 830   | 0.230             | 0.900              | 7,800                       | 470  | 0.200             | 0.600              | 4,300                   | 380  | 0.154             | 0.600              |
| R 3                 | 15                      | 8,000                                                                                                                                                                                                                                                                     | 2,530 | 0.555             | 1.800              | 7,400                       | 1670 | 0.443             | 1.200              | 5,200                   | 1300 | 0.360             | 1.200              |
| R 4                 | 25                      | 9,000                                                                                                                                                                                                                                                                     | 2,400 | 0.600             | 1.500              | 7,200                       | 1200 | 0.500             | 1.000              | 5,200                   | 920  | 0.350             | 1.000              |
| R 5                 | 30                      | 7,800                                                                                                                                                                                                                                                                     | 1,300 | 0.300             | 0.900              | 6,800                       | 720  | 0.230             | 0.600              | 4,600                   | 570  | 0.190             | 0.570              |
| R 6                 | 30                      | 7,410                                                                                                                                                                                                                                                                     | 1,235 | 0.285             | 0.855              | 6,350                       | 684  | 0.210             | 0.570              | 4,370                   | 541  | 0.181             | 0.550              |
| 절입량<br>Depth of Cut |                         |  <p>Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/> Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/> D : Outside Diameter 외경 (mm)<br/> n : Speed 회전속도 (min<sup>-1</sup>)<br/> Vf : Feed 이송속도 (mm/min)</p> |       |                   |                    |                             |      |                   |                    |                         |      |                   |                    |

- HRC52 이상 고경도강 가공시 52HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 유효장이 없는 절삭조건은 같은 직경에 더 짧은 유효장 대비 같은 비율로 DOWN 해주십시오.
- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 에어브로 혹은 미스트 쿨런트를 추천하며, 동가공시 습식 쿨런트 추천 합니다.
- 상기 절삭조건의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5 $\mu$ m이내 일것).
- 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.
- When milling workpiece HRC over 52 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- If the effective length of your tool does not show above the table, use the shorten effective length of parameter and reduce the parameters in the same proportion.
- In case of long effective length, reduce the RPM and feed in same proportion.
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5 $\mu$ m).
- During the chip evacuation, note for heat and ignition.

| 파삭재<br>Material     | 합금강<br>Alloy Steels                                                                                                                                                                                                                                                                      |      |                   |                    | 프리하든강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness         | 30 ~ 40HRC                                                                                                                                                                                                                                                                               |      |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 반경<br>Corner Radius | RPM                                                                                                                                                                                                                                                                                      | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.15              | 35,100                                                                                                                                                                                                                                                                                   | 728  | 0.100             | 0.015              | 31,200                      | 598  | 0.093             | 0.015              | 25,740                  | 364  | 0.088             | 0.015              |
| R 0.2               | 35,100                                                                                                                                                                                                                                                                                   | 936  | 0.200             | 0.020              | 31,200                      | 728  | 0.186             | 0.020              | 25,740                  | 468  | 0.176             | 0.020              |
| R 0.25              | 35,100                                                                                                                                                                                                                                                                                   | 1456 | 0.300             | 0.025              | 31,200                      | 1144 | 0.279             | 0.025              | 25,740                  | 728  | 0.264             | 0.025              |
| R 0.3               | 35,100                                                                                                                                                                                                                                                                                   | 1872 | 0.350             | 0.030              | 31,200                      | 1482 | 0.326             | 0.030              | 23,400                  | 832  | 0.308             | 0.030              |
| R 0.35              | 31,200                                                                                                                                                                                                                                                                                   | 2288 | 0.400             | 0.040              | 23,400                      | 1534 | 0.372             | 0.040              | 19,500                  | 962  | 0.352             | 0.040              |
| R0.4                | 30,420                                                                                                                                                                                                                                                                                   | 2704 | 0.450             | 0.045              | 21,684                      | 1716 | 0.419             | 0.045              | 17,706                  | 1066 | 0.396             | 0.045              |
| R0.5                | 29,640                                                                                                                                                                                                                                                                                   | 2964 | 0.450             | 0.050              | 19,890                      | 1872 | 0.419             | 0.050              | 15,990                  | 1118 | 0.396             | 0.050              |
| R0.75               | 24,960                                                                                                                                                                                                                                                                                   | 3250 | 0.525             | 0.075              | 16,770                      | 2028 | 0.488             | 0.075              | 13,650                  | 1235 | 0.462             | 0.075              |
| R 1                 | 20,280                                                                                                                                                                                                                                                                                   | 3536 | 0.600             | 0.100              | 13,650                      | 2184 | 0.558             | 0.100              | 11,310                  | 1352 | 0.528             | 0.100              |
| R1.25               | 16,887                                                                                                                                                                                                                                                                                   | 3536 | 0.700             | 0.125              | 11,310                      | 2184 | 0.651             | 0.125              | 9,360                   | 1352 | 0.616             | 0.125              |
| R1.5                | 13,494                                                                                                                                                                                                                                                                                   | 3536 | 0.800             | 0.150              | 8,970                       | 2184 | 0.744             | 0.150              | 7,410                   | 1352 | 0.704             | 0.150              |
| R2                  | 10,296                                                                                                                                                                                                                                                                                   | 3640 | 1.000             | 0.200              | 6,864                       | 2288 | 0.930             | 0.200              | 5,616                   | 1404 | 0.880             | 0.200              |
| R2.5                | 9,750                                                                                                                                                                                                                                                                                    | 4186 | 1.200             | 0.250              | 6,474                       | 2600 | 1.116             | 0.250              | 4,992                   | 1482 | 1.056             | 0.250              |
| R3                  | 8,073                                                                                                                                                                                                                                                                                    | 4004 | 1.500             | 0.300              | 5,382                       | 2496 | 1.395             | 0.300              | 4,134                   | 1456 | 1.320             | 0.300              |
| R4                  | 6,084                                                                                                                                                                                                                                                                                    | 3744 | 2.000             | 0.400              | 4,056                       | 2314 | 1.860             | 0.400              | 3,120                   | 1326 | 1.760             | 0.400              |
| R5                  | 4,797                                                                                                                                                                                                                                                                                    | 3536 | 2.500             | 1.000              | 3,198                       | 2158 | 2.325             | 1.000              | 2,496                   | 1248 | 2.200             | 1.000              |
| R6                  | 4,095                                                                                                                                                                                                                                                                                    | 3536 | 3.000             | 1.200              | 2,730                       | 2158 | 2.790             | 1.200              | 2,067                   | 1248 | 2.640             | 1.200              |
| R8                  | 3,385                                                                                                                                                                                                                                                                                    | 3172 | 4.000             | 1.600              | 2,028                       | 1872 | 3.720             | 1.600              | 1,435                   | 935  | 3.520             | 1.600              |
| 절입량<br>Depth of Cut | <div>  <p> Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/> Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/> D : Outside Diameter 외경 (mm)<br/> n : Speed 회전속도 (min<sup>-1</sup>)<br/> Vf : Feed 이송속도 (mm/min) </p> </div> |      |                   |                    |                             |      |                   |                    |                         |      |                   |                    |

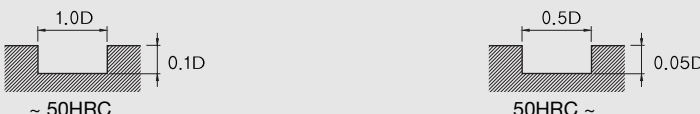
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- 유효장이 없는 절삭조건은 같은 직경에 더 짧은 유효장 대비 같은 비율로 DOWN 해주십시오.
- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
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- During the chip evacuation, note for heat and ignition.

| 홈 절삭 Slotting             |                                                                                   |       |                   |                    |                             |      |                   |                    |                         |      |                   |                    |
|---------------------------|-----------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 파삭재<br>Material           | 합금강<br>Alloy Steels                                                               |       |                   |                    | 프리하든강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
| 경도 Hardness               | 30 ~ 40HRC                                                                        |       |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                               | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø 0.2                     | 50,000                                                                            | 230   | 0.02              | 0.15               | 45,000                      | 207  | 0.02              | 0.15               | 40,000                  | 176  | 0.02              | 0.15               |
| ø 0.5                     | 50,000                                                                            | 660   | 0.05              | 0.45               | 45,000                      | 594  | 0.05              | 0.45               | 40,000                  | 505  | 0.05              | 0.45               |
| ø 0.7                     | 50,000                                                                            | 810   | 0.07              | 0.65               | 45,000                      | 729  | 0.07              | 0.65               | 37,500                  | 620  | 0.07              | 0.65               |
| ø 0.9                     | 49,000                                                                            | 1,180 | 0.09              | 0.80               | 39,000                      | 1062 | 0.09              | 0.80               | 27,800                  | 903  | 0.09              | 0.80               |
| ø 1                       | 48,000                                                                            | 1,350 | 0.10              | 1.00               | 38,000                      | 1215 | 0.10              | 1.00               | 25,500                  | 1033 | 0.10              | 1.00               |
| ø 1.5                     | 42,000                                                                            | 1,440 | 0.15              | 1.50               | 30,000                      | 1296 | 0.15              | 1.50               | 21,500                  | 1102 | 0.15              | 1.50               |
| ø 2                       | 33,300                                                                            | 1,530 | 0.20              | 2.00               | 26,000                      | 1377 | 0.20              | 2.00               | 17,500                  | 1170 | 0.20              | 2.00               |
| ø 2.5                     | 26,500                                                                            | 1,530 | 0.25              | 2.50               | 22,500                      | 1377 | 0.25              | 2.50               | 15,800                  | 1170 | 0.25              | 2.50               |
| ø 3                       | 21,800                                                                            | 1,800 | 0.30              | 3.00               | 17,300                      | 1620 | 0.30              | 3.00               | 11,500                  | 1377 | 0.30              | 3.00               |
| ø 4                       | 16,700                                                                            | 2,160 | 0.40              | 4.00               | 13,200                      | 1944 | 0.40              | 4.00               | 8,800                   | 1652 | 0.40              | 4.00               |
| ø 5                       | 15,700                                                                            | 2,610 | 0.50              | 5.00               | 12,500                      | 2349 | 0.50              | 5.00               | 8,300                   | 1997 | 0.50              | 5.00               |
| ø 6                       | 13,100                                                                            | 2,700 | 0.60              | 6.00               | 10,350                      | 2430 | 0.60              | 6.00               | 6,900                   | 2066 | 0.60              | 6.00               |
| ø 8                       | 9,880                                                                             | 2,375 | 0.80              | 8.00               | 7,800                       | 2137 | 0.80              | 8.00               | 5,200                   | 1817 | 0.80              | 8.00               |
| ø 10                      | 7,800                                                                             | 2,050 | 1.00              | 10.00              | 6,150                       | 1845 | 1.00              | 10.00              | 4,100                   | 1568 | 1.00              | 10.00              |
| ø 12                      | 6,650                                                                             | 1,710 | 1.20              | 12.00              | 5,250                       | 1539 | 1.20              | 12.00              | 3,500                   | 1308 | 1.20              | 12.00              |
| ø 16                      | 5,540                                                                             | 1,670 | 1.60              | 16.00              | 4,340                       | 1503 | 1.60              | 16.00              | 2,600                   | 1278 | 1.60              | 16.00              |
| 절입량<br>Depth of Cut       |  |       |                   |                    |                             |      |                   |                    |                         |      |                   |                    |

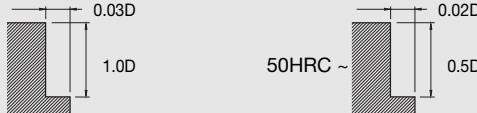
| 측면 절삭 Side Cutting        |                                                                                                                                                                                                                                                                    |       |                   |                    |                             |      |                   |                    |                         |      |                   |                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 파삭재<br>Material           | 합금강<br>Alloy Steels                                                                                                                                                                                                                                                |       |                   |                    | 프리하든강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
| 경도 Hardness               | 30 ~ 40HRC                                                                                                                                                                                                                                                         |       |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                                                                                                | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1                        | 48,000                                                                                                                                                                                                                                                             | 1,260 | 1.00              | 0.03               | 38,000                      | 980  | 1.00              | 0.03               | 25,500                  | 610  | 1.00              | 0.02               |
| ø2                        | 33,300                                                                                                                                                                                                                                                             | 1,440 | 2.00              | 0.06               | 26,000                      | 1160 | 2.00              | 0.06               | 17,500                  | 720  | 2.00              | 0.04               |
| ø3                        | 21,800                                                                                                                                                                                                                                                             | 1,440 | 3.00              | 0.09               | 17,300                      | 1160 | 3.00              | 0.09               | 11,500                  | 720  | 3.00              | 0.06               |
| ø4                        | 16,700                                                                                                                                                                                                                                                             | 1,500 | 4.00              | 0.12               | 13,200                      | 1200 | 4.00              | 0.12               | 8,800                   | 750  | 4.00              | 0.08               |
| ø5                        | 15,700                                                                                                                                                                                                                                                             | 1,740 | 5.00              | 0.15               | 12,500                      | 1380 | 5.00              | 0.15               | 8,300                   | 850  | 5.00              | 0.10               |
| ø6                        | 13,100                                                                                                                                                                                                                                                             | 1,620 | 6.00              | 0.18               | 10,350                      | 1320 | 6.00              | 0.18               | 6,900                   | 830  | 6.00              | 0.12               |
| ø8                        | 9,880                                                                                                                                                                                                                                                              | 1,584 | 8.00              | 0.24               | 7,800                       | 1230 | 8.00              | 0.24               | 5,200                   | 760  | 8.00              | 0.16               |
| ø10                       | 7,800                                                                                                                                                                                                                                                              | 1,440 | 10.00             | 0.30               | 6,150                       | 1160 | 10.00             | 0.30               | 4,100                   | 700  | 10.00             | 0.20               |
| ø12                       | 6,650                                                                                                                                                                                                                                                              | 1,440 | 12.00             | 0.36               | 5,250                       | 1160 | 12.00             | 0.36               | 3,500                   | 700  | 12.00             | 0.24               |
| ø16                       | 5,540                                                                                                                                                                                                                                                              | 1,200 | 16.00             | 0.39               | 4,340                       | 1055 | 16.00             | 0.39               | 2,600                   | 630  | 16.00             | 0.32               |
| 절입량<br>Depth of Cut       | <div><div><div>~ 50HRC</div><div></div></div><div><div>50HRC ~</div><div></div></div></div> |       |                   |                    |                             |      |                   |                    |                         |      |                   |                    |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC52 이상 고경도강 가공시 52HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭 조건표는 2날 기준이며, 4날시 회전수는 유지하고, 피드는 안정적인 속도 내에서 최대 30%까지 UP 해주십시오.
- 상기 절삭조건치의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (ø1이하 사용시 진동 허용 관리 5μm 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece HRC over 52 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- The parameters on the table is based on 2flutes. For using 4flutes, use the same RPM and raise up the feed up to 30% in stable milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (ø1 or less, the vibration tolerance management should be within 5μm).
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

## 홈 절삭 Slotting

| 피삭재<br>Material        | 합금강<br>Alloy Steels                                                                |      |                   |                    | 프리하든강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|------------------------------------------------------------------------------------|------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            | 30 ~ 40HRC                                                                         |      |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                                | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                     | 13,000                                                                             | 60   | 0.10              | 1.0                | 9,000                       | 40   | 0.10              | 1.0                | 5,700                   | 15   | 0.05              | 0.50               |
| Ø1.5                   | 10,000                                                                             | 60   | 0.15              | 1.5                | 6,000                       | 50   | 0.15              | 1.5                | 4,500                   | 15   | 0.08              | 0.75               |
| Ø2                     | 6,400                                                                              | 60   | 0.20              | 2.0                | 4,800                       | 50   | 0.20              | 2.0                | 3,000                   | 15   | 0.10              | 1.00               |
| Ø3                     | 4,200                                                                              | 65   | 0.30              | 3.0                | 3,400                       | 60   | 0.30              | 3.0                | 2,100                   | 20   | 0.15              | 1.50               |
| Ø4                     | 3,400                                                                              | 65   | 0.40              | 4.0                | 2,700                       | 33   | 0.40              | 4.0                | 1,700                   | 20   | 0.20              | 2.00               |
| Ø5                     | 2,900                                                                              | 65   | 0.50              | 5.0                | 2,300                       | 44   | 0.50              | 5.0                | 1,500                   | 20   | 0.25              | 2.50               |
| Ø6                     | 2,500                                                                              | 70   | 0.60              | 6.0                | 2,000                       | 55   | 0.60              | 6.0                | 1,300                   | 28   | 0.30              | 3.00               |
| Ø8                     | 1,900                                                                              | 70   | 0.80              | 8.0                | 1,500                       | 55   | 0.80              | 8.0                | 1,000                   | 28   | 0.40              | 4.00               |
| Ø10                    | 1,600                                                                              | 70   | 1.00              | 10.0               | 1,300                       | 55   | 1.00              | 10.0               | 800                     | 28   | 0.50              | 5.00               |
| Ø12                    | 1,300                                                                              | 65   | 1.20              | 12.0               | 1,100                       | 50   | 1.20              | 12.0               | 670                     | 22   | 0.60              | 6.00               |
| 절입량<br>Depth of Cut    |  |      |                   |                    |                             |      |                   |                    |                         |      |                   |                    |

## 측면 절삭 Side Cutting

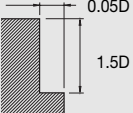
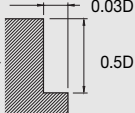
| 피삭재<br>Material        | 합금강<br>Alloy Steels                                                                  |      |                   |                    | 프리하든강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|--------------------------------------------------------------------------------------|------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            | 30 ~ 40HRC                                                                           |      |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                     | 13,000                                                                               | 60   | 1                 | 0.030              | 9,000                       | 35   | 1                 | 0.030              | 5,700                   | 20   | 0.50              | 0.02               |
| Ø1.5                   | 10,000                                                                               | 60   | 2                 | 0.045              | 6,000                       | 45   | 2                 | 0.045              | 4,500                   | 35   | 0.75              | 0.03               |
| Ø2                     | 6,400                                                                                | 60   | 2                 | 0.060              | 4,800                       | 45   | 2                 | 0.060              | 3,000                   | 30   | 1.00              | 0.04               |
| Ø3                     | 4,200                                                                                | 65   | 3                 | 0.090              | 3,400                       | 55   | 3                 | 0.090              | 2,100                   | 40   | 1.50              | 0.06               |
| Ø4                     | 3,400                                                                                | 80   | 4                 | 0.120              | 2,700                       | 65   | 4                 | 0.120              | 1,700                   | 50   | 2.00              | 0.08               |
| Ø5                     | 2,900                                                                                | 100  | 5                 | 0.150              | 2,300                       | 80   | 5                 | 0.150              | 1,500                   | 60   | 2.50              | 0.10               |
| Ø6                     | 2,500                                                                                | 120  | 6                 | 0.180              | 2,000                       | 100  | 6                 | 0.180              | 1,300                   | 75   | 3.00              | 0.12               |
| Ø8                     | 1,900                                                                                | 130  | 8                 | 0.240              | 1,500                       | 100  | 8                 | 0.240              | 1,000                   | 85   | 4.00              | 0.16               |
| Ø10                    | 1,600                                                                                | 130  | 10                | 0.300              | 1,300                       | 100  | 10                | 0.300              | 800                     | 75   | 5.00              | 0.20               |
| Ø12                    | 1,300                                                                                | 120  | 12                | 0.360              | 1,100                       | 90   | 12                | 0.360              | 670                     | 60   | 6.00              | 0.24               |
| 절입량<br>Depth of Cut    |  |      |                   |                    |                             |      |                   |                    |                         |      |                   |                    |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC55 이상 고경도강 가공시 55HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭 조건표는 3날 기준이며, 4날시 회전수는 유지하고, 피드는 안정적인 속도 내에서 최대 50%까지 UP 해주십시오.
- 상기 절삭조건의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece HRC over 55 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- The parameters on the table is based on 3flutes. For using 4flutes, use the same RPM and raise up the feed up to 50% in stable milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

| 측면 절삭 Side Cutting        |                                                               |       |                   |                    |                             |      |                   |                    |                         |      |                   |                    |
|---------------------------|---------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 파삭재<br>Material           | 합금강<br>Alloy Steels                                           |       |                   |                    | 프리하든강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
| 경도 Hardness               | 30 ~ 40HRC                                                    |       |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                           | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1                        | 40,000                                                        | 960   | 1.5               | 0.050              | 40,000                      | 880  | 1.5               | 0.050              | 40,000                  | 615  | 0.50              | 0.03               |
| ø1.5                      | 40,000                                                        | 1,200 | 2.3               | 0.075              | 40,000                      | 1000 | 2.3               | 0.075              | 38,500                  | 700  | 0.75              | 0.05               |
| ø2                        | 40,000                                                        | 1,600 | 3.0               | 0.100              | 38,000                      | 1440 | 3.0               | 0.100              | 36,500                  | 1000 | 1.00              | 0.06               |
| ø3                        | 38,400                                                        | 3,650 | 4.5               | 0.150              | 34,560                      | 3280 | 4.5               | 0.150              | 27,650                  | 2300 | 1.50              | 0.09               |
| ø4                        | 28,800                                                        | 4,220 | 6.0               | 0.200              | 25,920                      | 3800 | 6.0               | 0.200              | 20,730                  | 2660 | 2.00              | 0.12               |
| ø5                        | 24,000                                                        | 4,800 | 7.5               | 0.250              | 21,600                      | 4320 | 7.5               | 0.250              | 17,280                  | 3020 | 2.50              | 0.15               |
| ø6                        | 19,200                                                        | 5,570 | 9.0               | 0.300              | 17,280                      | 5010 | 9.0               | 0.300              | 13,820                  | 3500 | 2.50              | 0.18               |
| ø8                        | 14,400                                                        | 5,570 | 12.0              | 0.400              | 12,960                      | 5010 | 12.0              | 0.400              | 10,370                  | 3500 | 3.00              | 0.24               |
| ø10                       | 11,520                                                        | 5,570 | 15.0              | 0.500              | 10,360                      | 5010 | 15.0              | 0.500              | 8,290                   | 3500 | 4.00              | 0.30               |
| ø12                       | 9,600                                                         | 4,600 | 18.0              | 0.600              | 8,640                       | 4140 | 18.0              | 0.600              | 6,900                   | 2900 | 6.00              | 0.36               |
| ø14                       | 8,950                                                         | 4,130 | 21.0              | 0.700              | 8,140                       | 3740 | 21.0              | 0.700              | 6,120                   | 2460 | 7.00              | 0.42               |
| ø16                       | 7,200                                                         | 3,460 | 24.0              | 0.800              | 6,480                       | 3110 | 24.0              | 0.800              | 5,190                   | 2180 | 8.00              | 0.48               |
| 절입량<br>Depth of Cut       | <div><div><p>~ 50HRC</p></div><div><p>50HRC ~</p></div></div> |       |                   |                    |                             |      |                   |                    |                         |      |                   |                    |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC52 이상 고경도강 가공시 52HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 유효장이 길게 체결할시 회전수와 피드를 같은 비율로 DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece HRC over 52 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- If you clamp the endmill with long overhang of effective length, reduce the RPM and feed in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

| 홈 절삭 Slotting             |                                                                                                             |       |                   |                    |                             |       |                   |                    |                         |      |                   |                    |
|---------------------------|-------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 피삭재<br>Material           | 합금강<br>Alloy Steels                                                                                         |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
| 경도 Hardness               | 30 ~ 40HRC                                                                                                  |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1                        | 43,200                                                                                                      | 2,040 | 0.05              | 1.0                | 24,200                      | 990   | 0.05              | 1.0                | 22,950                  | 400  | 0.02              | 0.80               |
| ø1.5                      | 28,250                                                                                                      | 2,160 | 0.08              | 1.5                | 23,850                      | 1,090 | 0.08              | 1.5                | 20,340                  | 440  | 0.03              | 1.20               |
| ø2                        | 29,970                                                                                                      | 2,430 | 0.10              | 2.0                | 15,570                      | 1,200 | 0.10              | 2.0                | 15,750                  | 470  | 0.04              | 1.60               |
| ø3                        | 19,620                                                                                                      | 2,470 | 0.15              | 3.0                | 11,880                      | 1,230 | 0.15              | 3.0                | 10,350                  | 480  | 0.06              | 2.40               |
| ø4                        | 15,030                                                                                                      | 2,530 | 0.20              | 4.0                | 11,250                      | 1,310 | 0.20              | 4.0                | 7,920                   | 490  | 0.08              | 3.20               |
| ø5                        | 14,130                                                                                                      | 2,700 | 0.25              | 5.0                | 9,315                       | 1,280 | 0.25              | 5.0                | 7,470                   | 520  | 0.10              | 4.00               |
| ø6                        | 11,790                                                                                                      | 2,630 | 0.30              | 6.0                | 7,020                       | 1,170 | 0.30              | 6.0                | 6,210                   | 510  | 0.12              | 4.80               |
| ø8                        | 8,890                                                                                                       | 2,400 | 0.40              | 8.0                | 5,530                       | 1,090 | 0.40              | 8.0                | 4,680                   | 470  | 0.16              | 6.40               |
| ø10                       | 7,020                                                                                                       | 2,240 | 0.50              | 10.0               | 4,720                       | 1,090 | 0.50              | 10.0               | 3,690                   | 440  | 0.20              | 8.00               |
| ø12                       | 5,985                                                                                                       | 2,240 | 0.60              | 12.0               | 4,350                       | 1,050 | 0.60              | 12.0               | 3,150                   | 440  | 0.24              | 9.60               |
| 절입량<br>Depth of Cut       | <div><div><p>~ 50HRC</p></div><div><p>50HRC ~</p></div><div><p>경사진면 절삭<br/>Inclined Cutting</p></div></div> |       |                   |                    |                             |       |                   |                    |                         |      |                   |                    |

| 측면 절삭 Side Cutting        |                                                                                                                                                                                                                                                                    |       |                   |                    |                             |       |                   |                    |                         |      |                   |                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 파삭재<br>Material           | 합금강<br>Alloy Steels                                                                                                                                                                                                                                                |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
| 경도 Hardness               | 30 ~ 40HRC                                                                                                                                                                                                                                                         |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                                                                                                | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1                        | 43,200                                                                                                                                                                                                                                                             | 870   | 1.5               | 0.050              | 34,200                      | 780   | 1.5               | 0.050              | 22,950                  | 470  | 0.50              | 0.03               |
| ø1.5                      | 37,080                                                                                                                                                                                                                                                             | 980   | 2.3               | 0.075              | 29,250                      | 890   | 2.3               | 0.075              | 19,350                  | 550  | 0.75              | 0.05               |
| ø2                        | 29,970                                                                                                                                                                                                                                                             | 1,280 | 3.0               | 0.100              | 23,400                      | 1,150 | 3.0               | 0.100              | 15,750                  | 690  | 1.00              | 0.06               |
| ø3                        | 19,620                                                                                                                                                                                                                                                             | 1,300 | 4.5               | 0.150              | 15,570                      | 1,180 | 4.5               | 0.150              | 13,500                  | 700  | 1.50              | 0.09               |
| ø4                        | 15,030                                                                                                                                                                                                                                                             | 1,330 | 6.0               | 0.200              | 11,880                      | 1,200 | 6.0               | 0.200              | 7,920                   | 720  | 2.00              | 0.12               |
| ø5                        | 14,130                                                                                                                                                                                                                                                             | 1,550 | 7.5               | 0.250              | 11,250                      | 1,400 | 7.5               | 0.250              | 7,470                   | 840  | 2.50              | 0.15               |
| ø6                        | 11,790                                                                                                                                                                                                                                                             | 1,440 | 9.0               | 0.300              | 9,310                       | 1,300 | 9.0               | 0.300              | 6,210                   | 780  | 2.50              | 0.18               |
| ø8                        | 8,890                                                                                                                                                                                                                                                              | 1,410 | 12.0              | 0.400              | 7,020                       | 1,270 | 12.0              | 0.400              | 4,680                   | 760  | 3.00              | 0.24               |
| ø10                       | 7,020                                                                                                                                                                                                                                                              | 1,280 | 15.0              | 0.500              | 5,530                       | 1,150 | 15.0              | 0.500              | 3,690                   | 690  | 4.00              | 0.30               |
| ø12                       | 5,980                                                                                                                                                                                                                                                              | 1,280 | 18.0              | 0.600              | 4,720                       | 1,150 | 18.0              | 0.600              | 3,150                   | 690  | 6.00              | 0.36               |
| 절입량<br>Depth of Cut       | <div><div><div>~ 50HRC</div><div></div></div><div><div>50HRC ~</div><div></div></div></div> |       |                   |                    |                             |       |                   |                    |                         |      |                   |                    |

- 상기 절삭조건표는 2날 기준이며, 4날시 회전수는 유지하고 피드는 안정적인 속도 내에서 최대 30%까지 UP 해주십시오.
- HRC52 이상인 경우 같은 직경의 같은 비율로 20% DOWN 시켜 주십시오.
- 유효길이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 홈 절삭시 날경의 코너R 대비 Ae 값을 설정 하십시오.
- 상기 절삭조건표의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 피삭재와 절삭형상을 위한 적절한 쿨런트 사용과 가공시 발열, 발화에 주의 하십시오.
- The parameters on the table is based on 2 flutes. For using 4 flutes, use the same RPM and raise up the feed up to 30% in stable milling condition.
- When milling workpiece HRC over 52 hardened steel, reduce 20% of the RPM and feed compared to the same diameter.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.
- For groove milling, set up the Ae value by considering of corner radius value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use the adequate coolant for work material and machining geometry and note for heat and ignition.

| 피삭재<br>Material           |                        | 합금강<br>Alloy Steels |        |                   |                    | 프리하트강<br>Prehardened Steels |        |                   |                    | 고경도강<br>Hardened Steels |        |                   |                    |
|---------------------------|------------------------|---------------------|--------|-------------------|--------------------|-----------------------------|--------|-------------------|--------------------|-------------------------|--------|-------------------|--------------------|
| 경도 Hardness               |                        | 30 ~ 40HRC          |        |                   |                    | 40 ~ 50HRC                  |        |                   |                    | 50 ~ 52HRC              |        |                   |                    |
| 외경<br>Outside<br>Diameter | 반경<br>Corner<br>Radius | RPM                 | FEED   | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED   | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED   | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                        | R0.2                   | 40,500              | 6,230  | 0.05              | 0.06               | 37,800                      | 6,940  | 0.03              | 0.05               | 31,500                  | 6,050  | 0.02              | 0.05               |
| Ø1.5                      | R0.5                   | 36,000              | 8,010  | 0.06              | 0.72               | 36,000                      | 7,120  | 0.04              | 0.65               | 27,000                  | 6,230  | 0.03              | 0.60               |
| Ø2                        | R0.5                   | 29,700              | 8,900  | 0.08              | 0.96               | 24,300                      | 7,480  | 0.05              | 0.86               | 21,600                  | 6,670  | 0.04              | 0.80               |
| Ø3                        | R0.5                   | 19,800              | 9,790  | 0.12              | 1.44               | 16,200                      | 8,010  | 0.08              | 1.30               | 14,400                  | 7,560  | 0.06              | 1.20               |
| Ø4                        | R0.5                   | 17,100              | 11,570 | 0.17              | 2.04               | 14,400                      | 8,900  | 0.13              | 1.84               | 11,700                  | 8,900  | 0.09              | 1.70               |
| "                         | R1.0                   | 15,300              | 10,680 | 0.15              | 1.80               | 12,600                      | 8,450  | 0.12              | 1.62               | 10,800                  | 7,830  | 0.08              | 1.50               |
| Ø5                        | R0.5                   | 13,500              | 12,460 | 0.23              | 2.76               | 10,800                      | 10,680 | 0.17              | 2.48               | 9,900                   | 8,900  | 0.12              | 2.30               |
| "                         | R1.0                   | 11,700              | 11,570 | 0.20              | 2.40               | 9,900                       | 9,790  | 0.15              | 2.16               | 8,640                   | 8,450  | 0.10              | 2.00               |
| Ø6                        | R0.5                   | 11,680              | 13,650 | 0.29              | 3.42               | 9,540                       | 11,570 | 0.17              | 3.08               | 8,550                   | 10,680 | 0.11              | 2.85               |
| "                         | R1.0                   | 11,340              | 11,210 | 0.28              | 3.36               | 8,930                       | 11,210 | 0.17              | 3.02               | 8,100                   | 9,790  | 0.11              | 2.80               |
| "                         | R1.5                   | 9,900               | 11,570 | 0.25              | 3.00               | 8,100                       | 9,790  | 0.15              | 2.70               | 7,200                   | 8,540  | 0.10              | 2.50               |
| Ø8                        | R0.5                   | 7,920               | 14,680 | 0.34              | 4.10               | 7,380                       | 11,570 | 0.23              | 3.69               | 6,390                   | 11,570 | 0.17              | 3.42               |
| "                         | R1.0                   | 7,560               | 13,350 | 0.34              | 4.03               | 7,200                       | 10,680 | 0.22              | 3.63               | 6,030                   | 9,790  | 0.17              | 3.36               |
| "                         | R2.0                   | 7,380               | 11,570 | 0.30              | 3.60               | 6,300                       | 9,790  | 0.20              | 3.24               | 5,400                   | 8,540  | 0.15              | 3.00               |
| Ø10                       | R0.5                   | 6,730               | 13,300 | 0.34              | 6.16               | 5,700                       | 11,260 | 0.23              | 5.54               | 4,970                   | 9,720  | 0.17              | 5.13               |
| "                         | R1.0                   | 6,550               | 12,960 | 0.34              | 6.05               | 5,540                       | 10,960 | 0.22              | 5.44               | 4,840                   | 9,470  | 0.17              | 5.04               |
| "                         | R2.0                   | 5,850               | 11,570 | 0.30              | 5.40               | 4,950                       | 9,790  | 0.20              | 4.86               | 4,320                   | 8,450  | 0.15              | 4.50               |
| Ø12                       | R0.5                   | 6,300               | 13,350 | 0.53              | 6.37               | 4,880                       | 10,502 | 0.35              | 5.73               | 4,350                   | 9,450  | 0.30              | 5.31               |
| "                         | R1.0                   | 5,760               | 12,460 | 0.51              | 6.16               | 4,760                       | 10,230 | 0.34              | 5.54               | 4,240                   | 9,210  | 0.29              | 5.13               |
| "                         | R2.0                   | 5,400               | 11,120 | 0.50              | 6.05               | 4,640                       | 9,970  | 0.34              | 5.44               | 4,130                   | 8,970  | 0.28              | 5.04               |
| "                         | R3.0                   | 4,950               | 10,680 | 0.45              | 5.40               | 4,140                       | 8,900  | 0.30              | 4.86               | 3,690                   | 8,010  | 0.25              | 4.50               |

절입량  
Depth of Cut

경사진 면 절삭  
Inclined Cutting

## ■ Coefficients respective of tool overhang

| Type       | Overhang | Revolution | Feed rate | Depth of Cut<br>ap |
|------------|----------|------------|-----------|--------------------|
| Straight   | L/D ≤ 5  | 100%       | 100%      | 100%               |
|            | L/D = 6  | 90%        | 80%       | 80%                |
|            | L/D = 7  | 80%        | 70%       | 70%                |
| Taper neck | L/D = 6  | 100%       | 100%      | 100%               |
|            | L/D = 8  | 90%        | 80%       | 80%                |
|            | L/D ≥ 10 | 80%        | 70%       | 70%                |

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 측면 절삭시 코너 R 참고하여 절삭 하시기 바랍니다.
- 곡면 절삭시 날경의 코너 R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 상기 절삭조건외의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- 유효장 길이가 긴 경우, 위 표와같이 RPM과 FEED를 낮춰주세요.
- 절입깊이가 얇은 경우, RPM과 FEED를 증가해주세요.
- 원활한 칩배출을 위하여 에어브로우나 오일 미스트를 추천합니다.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- For side milling, refer to the corner radius value.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.
- If the effective length is long, refer to the table (Coefficients respective of tool overhang) and adjust the RPM and feed.
- If you use small value of Ap, raise up the RPM and feed.
- Air blow or oil mist is recommended for smooth chip emission.

| 파삭재<br>Material |                         | 동<br>Copper |       |                   |                    | 프리하튼강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|-----------------|-------------------------|-------------|-------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness     |                         |             |       |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 반경<br>Radius    | 유효장<br>Effective Length | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R0.05           | —                       | 54,000      | 85    | 0.004             | 0.004              | 48,000                      | 75   | 0.004             | 0.004              | 48,000                  | 55   | 0.002             | 0.002              |
|                 | 0.5                     | 54,000      | 430   | 0.010             | 0.010              | 48,000                      | 350  | 0.006             | 0.007              | 48,000                  | 280  | 0.006             | 0.007              |
| R0.1            | 1                       | 54,000      | 380   | 0.008             | 0.008              | 48,000                      | 330  | 0.005             | 0.005              | 48,000                  | 250  | 0.005             | 0.005              |
|                 | 1.5                     | 47,000      | 320   | 0.006             | 0.006              | 47,000                      | 250  | 0.004             | 0.004              | 47,000                  | 200  | 0.004             | 0.004              |
|                 | 2                       | 42,000      | 290   | 0.004             | 0.004              | 42,000                      | 200  | 0.003             | 0.003              | 42,000                  | 200  | 0.003             | 0.003              |
|                 | 1.5                     | 54,000      | 640   | 0.014             | 0.015              | 48,000                      | 480  | 0.010             | 0.010              | 41,000                  | 370  | 0.009             | 0.010              |
|                 | 2                       | 49,000      | 530   | 0.011             | 0.011              | 43,000                      | 370  | 0.008             | 0.008              | 37,000                  | 270  | 0.008             | 0.008              |
| R0.15           | 3                       | 43,000      | 460   | 0.009             | 0.010              | 38,000                      | 320  | 0.007             | 0.006              | 32,000                  | 240  | 0.006             | 0.006              |
|                 | 4                       | 37,000      | 300   | 0.004             | 0.006              | 28,000                      | 200  | 0.003             | 0.004              | 24,000                  | 160  | 0.003             | 0.004              |
|                 | 5                       | 31,000      | 200   | 0.002             | 0.004              | 26,000                      | 125  | 0.001             | 0.003              | 18,000                  | 110  | 0.002             | 0.003              |
|                 | 1                       | 54,000      | 870   | 0.023             | 0.036              | 48,000                      | 660  | 0.018             | 0.024              | 37,000                  | 450  | 0.015             | 0.024              |
|                 | 2                       | 54,000      | 790   | 0.022             | 0.036              | 48,000                      | 590  | 0.018             | 0.024              | 37,000                  | 400  | 0.015             | 0.020              |
| R0.2            | 3                       | 50,000      | 660   | 0.017             | 0.018              | 41,000                      | 420  | 0.012             | 0.012              | 31,000                  | 280  | 0.011             | 0.012              |
|                 | 4                       | 50,000      | 640   | 0.012             | 0.018              | 38,000                      | 400  | 0.009             | 0.012              | 30,000                  | 270  | 0.009             | 0.012              |
|                 | 5                       | 37,000      | 410   | 0.009             | 0.018              | 29,000                      | 330  | 0.008             | 0.012              | 26,000                  | 260  | 0.007             | 0.012              |
|                 | 6                       | 37,000      | 360   | 0.006             | 0.010              | 29,000                      | 260  | 0.005             | 0.006              | 26,000                  | 200  | 0.004             | 0.006              |
|                 | 8                       | 27,000      | 200   | 0.003             | 0.006              | 27,000                      | 170  | 0.003             | 0.003              | 23,000                  | 150  | 0.002             | 0.003              |
|                 | 10                      | 20,000      | 110   | 0.002             | 0.004              | 25,000                      | 110  | 0.002             | 0.002              | 20,000                  | 110  | 0.001             | 0.002              |
|                 | 1                       | 57,000      | 1,380 | 0.029             | 0.054              | 42,000                      | 830  | 0.023             | 0.036              | 32,000                  | 550  | 0.018             | 0.036              |
|                 | 2                       | 57,000      | 1,250 | 0.028             | 0.054              | 42,000                      | 750  | 0.022             | 0.036              | 32,000                  | 500  | 0.018             | 0.036              |
|                 | 3                       | 55,000      | 1,010 | 0.021             | 0.036              | 38,000                      | 580  | 0.017             | 0.024              | 31,000                  | 400  | 0.014             | 0.024              |
| R0.25           | 4                       | 55,000      | 1,010 | 0.021             | 0.036              | 38,000                      | 580  | 0.017             | 0.024              | 31,000                  | 400  | 0.014             | 0.024              |
|                 | 5                       | 48,000      | 800   | 0.016             | 0.018              | 33,000                      | 480  | 0.012             | 0.012              | 30,000                  | 390  | 0.009             | 0.012              |
|                 | 6                       | 36,000      | 610   | 0.009             | 0.018              | 28,000                      | 400  | 0.008             | 0.012              | 27,000                  | 330  | 0.005             | 0.012              |
|                 | 8                       | 36,000      | 590   | 0.009             | 0.018              | 28,000                      | 400  | 0.008             | 0.012              | 27,000                  | 330  | 0.005             | 0.012              |
|                 | 10                      | 36,000      | 460   | 0.009             | 0.018              | 28,000                      | 400  | 0.008             | 0.012              | 27,000                  | 330  | 0.005             | 0.012              |
|                 | 12                      | 24,000      | 280   | 0.004             | 0.010              | 26,000                      | 280  | 0.004             | 0.006              | 24,000                  | 280  | 0.002             | 0.006              |
|                 | 14                      | 16,000      | 170   | 0.001             | 0.006              | 24,000                      | 200  | 0.002             | 0.003              | 21,000                  | 240  | 0.001             | 0.003              |
|                 | 1                       | 57,000      | 1,670 | 0.035             | 0.144              | 37,000                      | 840  | 0.027             | 0.096              | 27,000                  | 540  | 0.023             | 0.096              |
|                 | 2                       | 57,000      | 1,540 | 0.034             | 0.144              | 37,000                      | 770  | 0.027             | 0.096              | 27,000                  | 500  | 0.021             | 0.096              |
|                 | 3                       | 57,000      | 1,540 | 0.034             | 0.144              | 37,000                      | 770  | 0.027             | 0.096              | 27,000                  | 500  | 0.021             | 0.096              |
|                 | 4                       | 54,000      | 1,130 | 0.026             | 0.108              | 35,000                      | 600  | 0.020             | 0.072              | 26,000                  | 380  | 0.016             | 0.072              |
| R0.3            | 5                       | 46,000      | 960   | 0.019             | 0.072              | 28,000                      | 460  | 0.016             | 0.048              | 26,000                  | 370  | 0.012             | 0.048              |
|                 | 6                       | 46,000      | 960   | 0.019             | 0.072              | 28,000                      | 460  | 0.016             | 0.048              | 26,000                  | 370  | 0.012             | 0.048              |
|                 | 8                       | 30,000      | 570   | 0.010             | 0.054              | 24,000                      | 400  | 0.009             | 0.036              | 23,000                  | 320  | 0.006             | 0.036              |
|                 | 10                      | 30,000      | 490   | 0.007             | 0.036              | 24,000                      | 330  | 0.006             | 0.024              | 23,000                  | 290  | 0.004             | 0.024              |
|                 | 12                      | 30,000      | 490   | 0.007             | 0.036              | 24,000                      | 330  | 0.006             | 0.024              | 23,000                  | 290  | 0.004             | 0.024              |
|                 | 14                      | 20,000      | 300   | 0.004             | 0.027              | 22,000                      | 300  | 0.004             | 0.018              | 20,000                  | 250  | 0.002             | 0.018              |
|                 | 16                      | 13,000      | 180   | 0.002             | 0.020              | 21,000                      | 260  | 0.002             | 0.014              | 18,000                  | 220  | 0.001             | 0.014              |
|                 | 2                       | 56,000      | 1,800 | 0.050             | 0.162              | 35,000                      | 740  | 0.039             | 0.108              | 27,000                  | 500  | 0.031             | 0.108              |
| R0.35           | 4                       | 54,500      | 1,500 | 0.045             | 0.063              | 33,000                      | 600  | 0.035             | 0.042              | 26,500                  | 410  | 0.029             | 0.096              |
|                 | 8                       | 32,000      | 800   | 0.019             | 0.072              | 12,215                      | 420  | 0.020             | 0.048              | 22,500                  | 355  | 0.012             | 0.048              |
|                 | 10                      | 26,500      | 540   | 0.017             | 0.063              | 22,500                      | 380  | 0.014             | 0.042              | 21,500                  | 330  | 0.011             | 0.042              |
|                 | 12                      | 23,000      | 420   | 0.017             | 0.063              | 21,500                      | 380  | 0.012             | 0.032              | 21,500                  | 320  | 0.010             | 0.042              |
|                 | 2                       | 55,000      | 2,060 | 0.063             | 0.180              | 33,000                      | 710  | 0.050             | 0.120              | 27,000                  | 500  | 0.041             | 0.120              |
|                 | 4                       | 55,000      | 1,860 | 0.063             | 0.018              | 31,000                      | 600  | 0.050             | 0.012              | 27,000                  | 440  | 0.041             | 0.120              |
| R0.4            | 6                       | 47,000      | 1,410 | 0.038             | 0.108              | 28,000                      | 570  | 0.030             | 0.072              | 22,000                  | 390  | 0.024             | 0.072              |
|                 | 8                       | 34,000      | 1,040 | 0.027             | 0.090              | 21,000                      | 430  | 0.021             | 0.060              | 22,000                  | 390  | 0.018             | 0.060              |
|                 | 10                      | 23,000      | 600   | 0.027             | 0.090              | 21,000                      | 430  | 0.021             | 0.060              | 20,000                  | 370  | 0.017             | 0.060              |
|                 | 12                      | 16,000      | 350   | 0.027             | 0.090              | 19,000                      | 430  | 0.018             | 0.040              | 20,000                  | 350  | 0.016             | 0.060              |
|                 | 14                      | 11,000      | 200   | 0.027             | 0.090              | 19,000                      | 430  | 0.015             | 0.027              | 20,000                  | 330  | 0.015             | 0.060              |
|                 | 16                      | 7,600       | 115   | 0.027             | 0.090              | 16,000                      | 430  | 0.013             | 0.018              | 20,000                  | 310  | 0.014             | 0.060              |
| R0.45           | 4                       | 50,500      | 1,900 | 0.067             | 0.190              | 32,000                      | 685  | 0.054             | 0.130              | 24,500                  | 460  | 0.043             | 0.180              |
|                 | 2                       | 46,000      | 2,000 | 0.072             | 0.360              | 32,000                      | 770  | 0.057             | 0.240              | 22,000                  | 480  | 0.045             | 0.240              |
|                 | 3                       | 46,000      | 2,000 | 0.072             | 0.360              | 32,000                      | 770  | 0.057             | 0.240              | 22,000                  | 480  | 0.045             | 0.240              |
|                 | 4                       | 46,000      | 2,000 | 0.071             | 0.360              | 32,000                      | 770  | 0.057             | 0.240              | 22,000                  | 480  | 0.045             | 0.240              |
|                 | 5                       | 46,000      | 2,000 | 0.071             | 0.360              | 32,000                      | 770  | 0.057             | 0.240              | 22,000                  | 480  | 0.045             | 0.240              |
|                 | 6                       | 39,000      | 1,500 | 0.071             | 0.180              | 26,000                      | 760  | 0.055             | 0.120              | 17,600                  | 480  | 0.009             | 0.120              |
| R0.5            | 8                       | 39,000      | 1,500 | 0.043             | 0.180              | 26,000                      | 760  | 0.034             | 0.120              | 17,600                  | 480  | 0.027             | 0.120              |
|                 | 10                      | 29,000      | 1,110 | 0.028             | 0.090              | 17,600                      | 530  | 0.024             | 0.060              | 16,500                  | 420  | 0.018             | 0.060              |
|                 | 12                      | 18,700      | 660   | 0.027             | 0.090              | 17,600                      | 530  | 0.024             | 0.060              | 16,500                  | 420  | 0.018             | 0.060              |
|                 | 14                      | 18,700      | 640   | 0.022             | 0.090              | 15,400                      | 440  | 0.018             | 0.060              | 14,300                  | 360  | 0.014             | 0.060              |
|                 | 16                      | 18,700      | 640   | 0.022             | 0.090              | 15,400                      | 440  | 0.018             | 0.060              | 14,300                  | 360  | 0.014             | 0.060              |
|                 | 18                      | 18,700      | 540   | 0.017             | 0.090              | 14,300                      | 440  | 0.013             | 0.060              | 13,200                  | 360  | 0.009             | 0.060              |
|                 | 20                      | 18,700      | 540   | 0.017             | 0.054              | 14,300                      | 360  | 0.013             | 0.036              | 13,200                  | 300  | 0.009             | 0.036              |
|                 | 22                      | 18,700      | 540   | 0.017             | 0.054              | 14,300                      | 360  | 0.013             | 0.036              | 13,200                  | 300  | 0.009             | 0.036              |
|                 | 25                      | 18,700      | 540   | 0.016             | 0.052              | 14,300                      | 360  | 0.013             | 0.030              | 13,200                  | 300  | 0.009             | 0.030              |

| 파삭재<br>Material |                         | 동<br>Copper |       |                   |                    | 프리하든강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|-----------------|-------------------------|-------------|-------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness     |                         |             |       |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 반경<br>Radius    | 유효장<br>Effective Length | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R0.6            | 4                       | 38,000      | 2,000 | 0.085             | 0.360              | 26,000                      | 770  | 0.068             | 0.024              | 18,200                  | 480  | 0.054             | 0.240              |
|                 | 6                       | 38,000      | 2,000 | 0.085             | 0.360              | 26,000                      | 770  | 0.068             | 0.240              | 18,200                  | 480  | 0.054             | 0.240              |
|                 | 8                       | 32,000      | 1,490 | 0.084             | 0.360              | 21,000                      | 700  | 0.067             | 0.240              | 15,100                  | 440  | 0.054             | 0.240              |
|                 | 10                      | 24,000      | 1,080 | 0.036             | 0.180              | 16,400                      | 530  | 0.027             | 0.120              | 15,100                  | 420  | 0.022             | 0.120              |
|                 | 12                      | 24,000      | 1,080 | 0.036             | 0.018              | 15,300                      | 530  | 0.027             | 0.120              | 14,100                  | 420  | 0.022             | 0.120              |
|                 | 16                      | 15,400      | 580   | 0.024             | 0.144              | 13,100                      | 460  | 0.019             | 0.096              | 11,900                  | 380  | 0.016             | 0.096              |
|                 | 20                      | 15,400      | 580   | 0.017             | 0.090              | 12,100                      | 380  | 0.013             | 0.060              | 11,000                  | 320  | 0.009             | 0.060              |
|                 | 24                      | 15,400      | 580   | 0.010             | 0.060              | 11,100                      | 320  | 0.009             | 0.040              | 9,800                   | 290  | 0.070             | 0.040              |
| R0.7            | 6                       | 28,000      | 1,470 | 0.099             | 0.270              | 17,600                      | 680  | 0.076             | 0.180              | 13,600                  | 440  | 0.063             | 0.180              |
|                 | 8                       | 28,000      | 1,470 | 0.099             | 0.270              | 17,600                      | 680  | 0.079             | 0.180              | 13,600                  | 440  | 0.063             | 0.180              |
|                 | 12                      | 19,800      | 1,080 | 0.042             | 0.270              | 13,800                      | 530  | 0.033             | 0.180              | 13,600                  | 420  | 0.027             | 0.180              |
|                 | 16                      | 13,200      | 620   | 0.033             | 0.180              | 13,100                      | 480  | 0.027             | 0.120              | 11,900                  | 390  | 0.021             | 0.120              |
| R0.75           | 3                       | 30,000      | 2,200 | 0.171             | 0.324              | 21,000                      | 1060 | 0.137             | 0.216              | 14,800                  | 660  | 0.110             | 0.216              |
|                 | 4                       | 30,000      | 2,200 | 0.171             | 0.324              | 21,000                      | 1060 | 0.137             | 0.216              | 14,800                  | 660  | 0.110             | 0.216              |
|                 | 6                       | 30,000      | 1,980 | 0.147             | 0.324              | 21,000                      | 940  | 0.117             | 0.216              | 14,800                  | 580  | 0.090             | 0.216              |
|                 | 8                       | 26,000      | 1,500 | 0.106             | 0.270              | 16,300                      | 700  | 0.084             | 0.180              | 12,100                  | 450  | 0.069             | 0.180              |
|                 | 10                      | 26,000      | 1,500 | 0.106             | 0.270              | 16,300                      | 700  | 0.084             | 0.180              | 12,100                  | 450  | 0.069             | 0.180              |
|                 | 12                      | 26,000      | 1,500 | 0.106             | 0.270              | 16,300                      | 700  | 0.084             | 0.180              | 12,100                  | 450  | 0.069             | 0.180              |
|                 | 14                      | 18,700      | 1,100 | 0.045             | 0.180              | 12,600                      | 530  | 0.036             | 0.120              | 12,100                  | 440  | 0.027             | 0.120              |
|                 | 16                      | 12,100      | 620   | 0.036             | 0.180              | 12,400                      | 480  | 0.027             | 0.120              | 11,600                  | 390  | 0.022             | 0.120              |
|                 | 18                      | 12,100      | 620   | 0.036             | 0.180              | 12,400                      | 480  | 0.027             | 0.120              | 11,600                  | 390  | 0.022             | 0.120              |
|                 | 20                      | 12,100      | 620   | 0.019             | 0.090              | 12,400                      | 480  | 0.016             | 0.060              | 11,600                  | 390  | 0.012             | 0.060              |
|                 | 22                      | 12,100      | 620   | 0.019             | 0.090              | 12,400                      | 480  | 0.016             | 0.060              | 11,000                  | 390  | 0.012             | 0.060              |
|                 | 25                      | 11,000      | 500   | 0.019             | 0.090              | 12,400                      | 440  | 0.016             | 0.060              | 11,000                  | 390  | 0.012             | 0.060              |
|                 | 30                      | 10,700      | 450   | 0.019             | 0.090              | 10,900                      | 400  | 0.016             | 0.060              | 11,000                  | 390  | 0.012             | 0.060              |
|                 | 35                      | 10,700      | 410   | 0.019             | 0.090              | 9,000                       | 380  | 0.016             | 0.060              | 11,000                  | 390  | 0.012             | 0.060              |
| R0.8            | 6                       | 27,040      | 2,600 | 0.220             | 0.580              | 18,900                      | 1200 | 0.180             | 0.390              | 16,500                  | 760  | 0.150             | 0.390              |
|                 | 8                       | 26,000      | 1,970 | 0.157             | 0.324              | 18,900                      | 940  | 0.126             | 0.216              | 13,800                  | 580  | 0.102             | 0.216              |
|                 | 12                      | 25,000      | 1,490 | 0.112             | 0.180              | 15,100                      | 700  | 0.090             | 0.120              | 11,500                  | 440  | 0.072             | 0.120              |
|                 | 16                      | 17,600      | 1,100 | 0.046             | 0.144              | 12,300                      | 530  | 0.036             | 0.096              | 11,400                  | 440  | 0.030             | 0.096              |
|                 | 20                      | 11,000      | 630   | 0.036             | 0.090              | 11,500                      | 480  | 0.030             | 0.060              | 10,900                  | 400  | 0.024             | 0.060              |
| R0.9            | 6                       | 32,000      | 2,600 | 0.230             | 0.021              | 18,400                      | 1200 | 0.185             | 0.320              | 18,400                  | 738  | 0.150             | 0.320              |
|                 | 8                       | 26,000      | 1,950 | 0.165             | 0.270              | 16,300                      | 930  | 0.132             | 0.240              | 13,800                  | 570  | 0.108             | 0.240              |
|                 | 12                      | 21,000      | 1,480 | 0.120             | 0.270              | 13,800                      | 700  | 0.094             | 0.180              | 10,300                  | 440  | 0.077             | 0.180              |
|                 | 16                      | 15,400      | 1,080 | 0.048             | 0.180              | 10,800                      | 530  | 0.039             | 0.120              | 9,900                   | 420  | 0.031             | 0.120              |
|                 | 20                      | 10,500      | 630   | 0.039             | 0.090              | 10,200                      | 480  | 0.031             | 0.060              | 9,700                   | 400  | 0.025             | 0.060              |
| R1              | 4                       | 22,000      | 2,140 | 0.232             | 0.540              | 18,500                      | 1260 | 0.185             | 0.360              | 13,200                  | 960  | 0.150             | 0.360              |
|                 | 6                       | 22,000      | 2,140 | 0.232             | 0.540              | 18,500                      | 1260 | 0.185             | 0.360              | 13,200                  | 960  | 0.150             | 0.360              |
|                 | 8                       | 22,000      | 1,920 | 0.185             | 0.360              | 18,500                      | 1120 | 0.147             | 0.240              | 13,200                  | 870  | 0.120             | 0.240              |
|                 | 10                      | 22,000      | 1,920 | 0.185             | 0.360              | 18,500                      | 1120 | 0.147             | 0.240              | 13,200                  | 870  | 0.120             | 0.240              |
|                 | 12                      | 18,700      | 1,470 | 0.166             | 0.360              | 16,000                      | 990  | 0.133             | 0.240              | 11,700                  | 780  | 0.107             | 0.240              |
|                 | 14                      | 18,700      | 1,470 | 0.166             | 0.360              | 16,000                      | 990  | 0.133             | 0.240              | 11,700                  | 780  | 0.107             | 0.240              |
|                 | 16                      | 18,700      | 1,470 | 0.148             | 0.360              | 16,000                      | 990  | 0.118             | 0.240              | 11,700                  | 780  | 0.090             | 0.240              |
|                 | 18                      | 14,300      | 1,070 | 0.093             | 0.180              | 14,700                      | 580  | 0.074             | 0.120              | 11,600                  | 580  | 0.061             | 0.120              |
|                 | 20                      | 14,300      | 1,070 | 0.093             | 0.180              | 14,700                      | 580  | 0.074             | 0.120              | 11,600                  | 580  | 0.061             | 0.120              |
|                 | 22                      | 9,500       | 630   | 0.074             | 0.180              | 10,600                      | 450  | 0.058             | 0.120              | 10,200                  | 450  | 0.045             | 0.120              |
|                 | 25                      | 9,500       | 630   | 0.074             | 0.180              | 10,600                      | 450  | 0.058             | 0.120              | 10,200                  | 450  | 0.045             | 0.120              |
|                 | 30                      | 9,500       | 530   | 0.033             | 0.090              | 10,600                      | 450  | 0.026             | 0.060              | 10,200                  | 380  | 0.021             | 0.060              |
|                 | 35                      | 9,500       | 530   | 0.026             | 0.090              | 10,600                      | 380  | 0.019             | 0.060              | 10,200                  | 380  | 0.017             | 0.060              |
|                 | 40                      | 9,500       | 530   | 0.026             | 0.090              | 10,600                      | 380  | 0.019             | 0.060              | 10,200                  | 380  | 0.017             | 0.060              |
|                 | 45                      | 9,500       | 445   | 0.011             | 0.045              | 10,000                      | 380  | 0.009             | 0.030              | 10,200                  | 320  | 0.008             | 0.030              |
| R1.25           | 8                       | 18,400      | 2,400 | 0.232             | 0.360              | 14,500                      | 1400 | 0.185             | 0.240              | 9,700                   | 1080 | 0.150             | 0.240              |
|                 | 10                      | 18,400      | 2,400 | 0.232             | 0.360              | 14,500                      | 1400 | 0.185             | 0.240              | 9,700                   | 1080 | 0.150             | 0.240              |
|                 | 16                      | 16,100      | 1,810 | 0.208             | 0.360              | 13,500                      | 1230 | 0.166             | 0.240              | 8,400                   | 980  | 0.135             | 0.240              |
|                 | 20                      | 11,500      | 1,330 | 0.116             | 0.180              | 10,200                      | 950  | 0.093             | 0.120              | 8,400                   | 980  | 0.074             | 0.120              |
|                 | 25                      | 6,900       | 770   | 0.093             | 0.180              | 8,400                       | 540  | 0.074             | 0.120              | 8,400                   | 560  | 0.061             | 0.120              |
|                 | 30                      | 6,900       | 770   | 0.040             | 0.090              | 8,400                       | 540  | 0.033             | 0.060              | 8,400                   | 560  | 0.026             | 0.060              |
| R1.5            | 35                      | 6,900       | 770   | 0.018             | 0.050              | 8,400                       | 540  | 0.015             | 0.030              | 8,400                   | 560  | 0.011             | 0.030              |
|                 | 6                       | 15,000      | 2,890 | 0.278             | 0.540              | 12,900                      | 1680 | 0.222             | 0.360              | 9,200                   | 1300 | 0.180             | 0.360              |
|                 | 8                       | 15,000      | 2,890 | 0.278             | 0.540              | 12,900                      | 1680 | 0.222             | 0.360              | 9,200                   | 1300 | 0.180             | 0.360              |
|                 | 10                      | 15,000      | 2,600 | 0.278             | 0.540              | 12,900                      | 1680 | 0.222             | 0.360              | 9,200                   | 1300 | 0.180             | 0.360              |
|                 | 12                      | 15,000      | 2,600 | 0.278             | 0.540              | 12,900                      | 1510 | 0.222             | 0.360              | 9,200                   | 1170 | 0.180             | 0.360              |
|                 | 16                      | 12,700      | 1,970 | 0.029             | 0.504              | 11,300                      | 1330 | 0.166             | 0.360              | 8,100                   | 1040 | 0.135             | 0.360              |
|                 | 20                      | 12,700      | 1,970 | 0.029             | 0.504              | 11,300                      | 1330 | 0.166             | 0.360              | 8,100                   | 1040 | 0.135             | 0.360              |
|                 | 25                      | 10,100      | 1,450 | 0.139             | 0.270              | 8,800                       | 1040 | 0.111             | 0.180              | 8,100                   | 1040 | 0.090             | 0.180              |
|                 | 30                      | 10,100      | 1,450 | 0.139             | 0.270              | 8,800                       | 780  | 0.111             | 0.180              | 8,100                   | 780  | 0.090             | 0.180              |
|                 | 35                      | 6,600       | 840   | 0.073             | 0.270              | 7,900                       | 620  | 0.055             | 0.180              | 7,500                   | 650  | 0.045             | 0.180              |

| 파삭재<br>Material                                                                                   |                         | 동<br>Copper |       |                   |                    | 프리하든강<br>Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|---------------------------------------------------------------------------------------------------|-------------------------|-------------|-------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness                                                                                       |                         |             |       |                   |                    | 40 ~ 50HRC                  |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 반경<br>Radius                                                                                      | 유효장<br>Effective Length | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R1.5                                                                                              | 40                      | 6,600       | 840   | 0.073             | 0.270              | 7,900                       | 620  | 0.055             | 0.180              | 7,500                   | 520  | 0.045             | 0.180              |
|                                                                                                   | 45                      | 4,500       | 500   | 0.040             | 0.270              | 6,200                       | 500  | 0.035             | 0.100              | 7,000                   | 450  | 0.023             | 0.180              |
|                                                                                                   | 50                      | 4,300       | 490   | 0.040             | 0.270              | 6,200                       | 500  | 0.030             | 0.090              | 7,000                   | 350  | 0.023             | 0.180              |
|                                                                                                   | 60                      | 3,700       | 420   | 0.034             | 0.360              | 5,900                       | 450  | 0.030             | 0.080              | 6,000                   | 300  | 0.020             | 0.150              |
|                                                                                                   | 8                       | 11,500      | 2,710 | 0.370             | 0.900              | 9,700                       | 1560 | 0.297             | 0.600              | 6,800                   | 1210 | 0.241             | 0.600              |
|                                                                                                   | 10                      | 11,500      | 2,710 | 0.370             | 0.900              | 9,700                       | 1560 | 0.297             | 0.600              | 6,800                   | 1210 | 0.241             | 0.600              |
|                                                                                                   | 12                      | 11,500      | 2,710 | 0.390             | 0.900              | 9,700                       | 1560 | 0.297             | 0.600              | 6,800                   | 1210 | 0.241             | 0.600              |
|                                                                                                   | 16                      | 11,500      | 2,710 | 0.390             | 0.900              | 9,700                       | 1560 | 0.297             | 0.600              | 6,800                   | 1210 | 0.241             | 0.600              |
|                                                                                                   | 20                      | 11,500      | 2,710 | 0.390             | 0.900              | 9,700                       | 1560 | 0.297             | 0.600              | 6,800                   | 1210 | 0.241             | 0.600              |
|                                                                                                   | 25                      | 10,300      | 1,850 | 0.279             | 0.540              | 8,400                       | 1250 | 0.223             | 0.360              | 6,000                   | 980  | 0.180             | 0.360              |
|                                                                                                   | 30                      | 10,300      | 1,850 | 0.279             | 0.540              | 8,400                       | 1250 | 0.223             | 0.360              | 6,000                   | 980  | 0.180             | 0.361              |
|                                                                                                   | 35                      | 7,500       | 1,360 | 0.185             | 0.540              | 6,600                       | 950  | 0.148             | 0.360              | 6,000                   | 700  | 0.120             | 0.360              |
| R2                                                                                                | 40                      | 7,500       | 1,360 | 0.185             | 0.540              | 6,600                       | 950  | 0.148             | 0.360              | 6,000                   | 700  | 0.120             | 0.360              |
|                                                                                                   | 45                      | 5,000       | 780   | 0.093             | 0.360              | 5,900                       | 470  | 0.074             | 0.240              | 5,600                   | 490  | 0.060             | 0.240              |
|                                                                                                   | 50                      | 5,000       | 780   | 0.093             | 0.360              | 5,900                       | 470  | 0.074             | 0.240              | 5,600                   | 490  | 0.060             | 0.240              |
|                                                                                                   | 55                      | 4,500       | 640   | 0.090             | 0.330              | 5,200                       | 375  | 0.068             | 0.225              | 5,400                   | 370  | 0.050             | 0.251              |
|                                                                                                   | 60                      | 4,000       | 500   | 0.078             | 0.300              | 5,000                       | 280  | 0.062             | 0.210              | 5,200                   | 250  | 0.040             | 0.180              |
|                                                                                                   | 15                      | 9,600       | 2,590 | 0.406             | 0.900              | 7,800                       | 1350 | 0.324             | 0.800              | 5,600                   | 1050 | 0.252             | 0.800              |
|                                                                                                   | 20                      | 9,600       | 2,100 | 0.406             | 0.900              | 7,800                       | 1240 | 0.324             | 0.600              | 5,600                   | 950  | 0.252             | 0.600              |
|                                                                                                   | 25                      | 9,600       | 2,100 | 0.406             | 0.900              | 7,800                       | 1240 | 0.324             | 0.600              | 5,600                   | 950  | 0.252             | 0.600              |
| R2.5                                                                                              | 30                      | 8,200       | 1,320 | 0.305             | 0.900              | 7,800                       | 760  | 0.243             | 0.600              | 4,800                   | 600  | 0.197             | 0.600              |
|                                                                                                   | 40                      | 7,000       | 830   | 0.230             | 0.900              | 7,800                       | 470  | 0.200             | 0.600              | 4,300                   | 380  | 0.154             | 0.600              |
|                                                                                                   | 45                      | 5,000       | 520   | 0.173             | 0.900              | 6,800                       | 290  | 0.165             | 0.600              | 3,900                   | 240  | 0.120             | 0.600              |
|                                                                                                   | 50                      | 4,500       | 330   | 0.131             | 0.900              | 6,800                       | 180  | 0.135             | 0.600              | 3,500                   | 150  | 0.094             | 0.600              |
|                                                                                                   | 60                      | 4,000       | 300   | 0.099             | 0.800              | 6,800                       | 110  | 0.112             | 0.600              | 3,300                   | 100  | 0.074             | 0.600              |
|                                                                                                   | 15                      | 8,000       | 2,530 | 0.555             | 1.800              | 7,400                       | 1670 | 0.443             | 1.200              | 5,200                   | 1300 | 0.360             | 1.200              |
|                                                                                                   | 30                      | 8,000       | 1,810 | 0.418             | 1.080              | 7,400                       | 1500 | 0.334             | 0.720              | 4,600                   | 1170 | 0.270             | 0.720              |
|                                                                                                   | 25                      | 9,000       | 2,400 | 0.600             | 1.500              | 7,200                       | 1200 | 0.500             | 1.000              | 5,200                   | 920  | 0.350             | 1.000              |
| R4                                                                                                | 30                      | 7,700       | 1,500 | 0.450             | 1.200              | 7,200                       | 740  | 0.380             | 0.800              | 4,500                   | 580  | 0.300             | 0.800              |
|                                                                                                   | 30                      | 7,800       | 1,300 | 0.300             | 0.900              | 6,800                       | 720  | 0.230             | 0.600              | 4,600                   | 570  | 0.190             | 0.570              |
| R5                                                                                                | 35                      | 7,125       | 1,292 | 0.176             | 0.513              | 6,800                       | 902  | 0.140             | 0.340              | 5,700                   | 665  | 0.110             | 0.340              |
|                                                                                                   | 30                      | 7,410       | 1,235 | 0.285             | 0.855              | 6,350                       | 684  | 0.210             | 0.570              | 4,370                   | 541  | 0.181             | 0.550              |
| R6                                                                                                | 40                      | 6,800       | 1,100 | 0.260             | 0.780              | 6,350                       | 630  | 0.200             | 0.520              | 4,020                   | 500  | 0.160             | 0.500              |
|                                                                                                   | 절입량<br>Depth of Cut     |             |       |                   |                    |                             |      |                   |                    |                         |      |                   |                    |
| • Ap : Axial Depth<br>• Ae : Radial Depth<br>• D : Outside Diameter<br>• n : Speed<br>• Vf : Feed |                         |             |       |                   |                    |                             |      |                   |                    |                         |      |                   |                    |
|               |                         |             |       |                   |                    |                             |      |                   |                    |                         |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 주세요.
- 절삭조건이 없는 직경 및 유효장은 비슷한 직경 및 유효장에 비례하여 UP&DOWN 하여 설정 하십시오.
- HRC52 이상 고경도강 가공시 52HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø10이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 원활한 칩배출을 위하여 에어브로 혹은 미스트 쿨런트 사용을 추천하며, 동 가공시 습식 쿨런트를 추천 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- If the effective length or overall length of your tool are not show above the table, adjust your parameter with upper or lower diameter of parameter.
- When milling workpiece HRC over 52 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5 $\mu$ m).
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.

| 파삭재<br>Material |                         | 동<br>Copper |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|-----------------|-------------------------|-------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness     |                         |             |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 반경<br>Radius    | 유효장<br>Effective Length | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R0.05           | 0.2                     | 54,000      | 360   | 0.010             | 0.050              | 43,200                      | 306   | 0.009             | 0.045              | 34,560                  | 245   | 0.007             | 0.036              |
| R0.075          | 0.15                    | 54,000      | 456   | 0.010             | 0.030              | 43,200                      | 388   | 0.009             | 0.027              | 34,560                  | 310   | 0.007             | 0.022              |
| R0.1            | 0.2                     | 54,000      | 516   | 0.012             | 0.008              | 43,200                      | 439   | 0.011             | 0.007              | 34,560                  | 351   | 0.009             | 0.006              |
|                 | 0.4                     | 54,000      | 516   | 0.005             | 0.008              | 43,200                      | 439   | 0.005             | 0.007              | 34,560                  | 351   | 0.004             | 0.006              |
| R0.1.5          | 0.3                     | 54,000      | 864   | 0.020             | 0.013              | 43,200                      | 734   | 0.018             | 0.012              | 34,560                  | 588   | 0.014             | 0.009              |
|                 | 0.6                     | 54,000      | 864   | 0.010             | 0.013              | 43,200                      | 734   | 0.009             | 0.012              | 34,560                  | 588   | 0.007             | 0.009              |
| R0.2            | 0.4                     | 54,000      | 1,044 | 0.028             | 0.016              | 43,200                      | 887   | 0.025             | 0.014              | 34,560                  | 710   | 0.020             | 0.012              |
|                 | 0.8                     | 54,000      | 1,044 | 0.014             | 0.016              | 43,200                      | 887   | 0.013             | 0.014              | 34,560                  | 710   | 0.010             | 0.012              |
| R0.25           | 0.5                     | 56,000      | 1,500 | 0.035             | 0.022              | 44,800                      | 1,275 | 0.032             | 0.020              | 35,840                  | 1,020 | 0.025             | 0.016              |
| R0.3            | 0.6                     | 58,000      | 1,812 | 0.042             | 0.026              | 46,400                      | 1,540 | 0.038             | 0.023              | 37,120                  | 1,232 | 0.030             | 0.019              |
| R0.35           | 0.7                     | 55,000      | 2,028 | 0.049             | 0.031              | 44,000                      | 1,724 | 0.044             | 0.028              | 35,200                  | 1,379 | 0.035             | 0.022              |
| R0.4            | 0.8                     | 52,000      | 2,244 | 0.056             | 0.036              | 41,600                      | 1,907 | 0.050             | 0.032              | 33,280                  | 1,526 | 0.040             | 0.026              |
|                 | 2                       | 52,000      | 2,244 | 0.300             | 0.036              | 41,600                      | 1,907 | 0.270             | 0.032              | 33,280                  | 1,526 | 0.216             | 0.026              |
| R0.5            | 1                       | 41,000      | 1,992 | 0.063             | 0.040              | 32,800                      | 1,693 | 0.057             | 0.036              | 26,240                  | 1,355 | 0.045             | 0.029              |
|                 | 2.5                     | 41,000      | 1,992 | 0.022             | 0.040              | 32,800                      | 1,693 | 0.020             | 0.036              | 26,240                  | 1,355 | 0.016             | 0.029              |
| R0.6            | 3                       | 34,000      | 2,088 | 0.650             | 0.400              | 27,200                      | 1,775 | 0.585             | 0.360              | 21,760                  | 1,420 | 0.468             | 0.288              |
| R0.75           | 1.5                     | 27,000      | 2,196 | 0.087             | 0.068              | 21,600                      | 1,867 | 0.078             | 0.061              | 17,280                  | 1,493 | 0.063             | 0.049              |
|                 | 4                       | 27,000      | 2,196 | 0.052             | 0.068              | 21,600                      | 1,867 | 0.047             | 0.061              | 17,280                  | 1,493 | 0.037             | 0.049              |
| R1              | 2                       | 20,000      | 2,136 | 0.112             | 0.089              | 16,000                      | 1,816 | 0.101             | 0.080              | 12,800                  | 1,452 | 0.081             | 0.064              |
|                 | 5                       | 20,000      | 2,136 | 0.070             | 0.091              | 16,000                      | 1,816 | 0.063             | 0.082              | 12,800                  | 1,452 | 0.050             | 0.066              |
| R1.25           | 6                       | 16,000      | 2,208 | 0.067             | 0.115              | 12,800                      | 1,877 | 0.060             | 0.104              | 10,240                  | 1,501 | 0.048             | 0.083              |
| R1.5            | 3                       | 13,000      | 2,664 | 0.197             | 0.171              | 10,400                      | 2,264 | 0.177             | 0.154              | 8,320                   | 1,812 | 0.142             | 0.123              |
|                 | 8                       | 13,000      | 2,664 | 0.100             | 0.171              | 10,400                      | 2,264 | 0.090             | 0.154              | 8,320                   | 1,812 | 0.072             | 0.123              |
| R1.75           | 8                       | 11,500      | 2,580 | 0.183             | 0.190              | 9,200                       | 2,193 | 0.165             | 0.171              | 7,360                   | 1,754 | 0.132             | 0.136              |
| R2              | 4                       | 10,000      | 2,496 | 0.266             | 0.208              | 8,000                       | 2,122 | 0.239             | 0.187              | 6,400                   | 1,697 | 0.192             | 0.150              |
|                 | 8                       | 10,000      | 2,496 | 0.134             | 0.208              | 8,000                       | 2,122 | 0.121             | 0.187              | 6,400                   | 1,697 | 0.096             | 0.150              |
| R2.5            | 5                       | 8,300       | 2,388 | 0.215             | 0.240              | 6,640                       | 2,030 | 0.194             | 0.216              | 5,312                   | 1,624 | 0.155             | 0.173              |
|                 | 8                       | 8,300       | 2,388 | 0.200             | 0.240              | 6,640                       | 2,030 | 0.180             | 0.216              | 5,312                   | 1,624 | 0.144             | 0.173              |
| R3              | 10                      | 8,300       | 2,388 | 0.190             | 0.240              | 6,640                       | 2,030 | 0.171             | 0.216              | 5,312                   | 1,624 | 0.137             | 0.173              |
|                 | 6                       | 6,900       | 2,328 | 0.290             | 0.281              | 5,520                       | 1,979 | 0.261             | 0.253              | 4,416                   | 1,583 | 0.209             | 0.202              |
| R3.5            | 10                      | 6,900       | 2,328 | 0.250             | 0.281              | 5,520                       | 1,979 | 0.225             | 0.253              | 4,416                   | 1,583 | 0.180             | 0.202              |
|                 | 12                      | 6,900       | 2,328 | 0.230             | 0.281              | 5,520                       | 1,979 | 0.207             | 0.253              | 4,416                   | 1,583 | 0.166             | 0.202              |
| R4              | 14                      | 6,310       | 1,764 | 0.315             | 0.228              | 5,048                       | 1,499 | 0.284             | 0.205              | 4,038                   | 1,200 | 0.227             | 0.164              |
| R4.5            | 8                       | 5,720       | 1,200 | 0.400             | 0.175              | 4,576                       | 1,020 | 0.360             | 0.158              | 3,661                   | 816   | 0.288             | 0.126              |
|                 | 14                      | 5,720       | 1,200 | 0.400             | 0.175              | 4,576                       | 1,020 | 0.360             | 0.158              | 3,661                   | 816   | 0.288             | 0.126              |
| R5              | 15                      | 4,550       | 840   | 0.500             | 0.154              | 3,640                       | 714   | 0.450             | 0.139              | 2,912                   | 571   | 0.360             | 0.111              |
| R5.5            | 18                      | 4,550       | 840   | 0.500             | 0.154              | 3,640                       | 714   | 0.450             | 0.139              | 2,912                   | 571   | 0.360             | 0.111              |
|                 | 20                      | 4,160       | 780   | 0.550             | 0.157              | 3,328                       | 663   | 0.495             | 0.141              | 2,662                   | 530   | 0.396             | 0.113              |
| R6              | 18                      | 3,770       | 720   | 0.600             | 0.159              | 3,016                       | 612   | 0.540             | 0.143              | 2,413                   | 490   | 0.432             | 0.114              |
|                 | 22                      | 3,770       | 720   | 0.600             | 0.159              | 3,016                       | 612   | 0.540             | 0.143              | 2,413                   | 490   | 0.432             | 0.114              |
| R6.5            | 24                      | 3,728       | 784   | 0.549             | 0.156              | 2,982                       | 666   | 0.494             | 0.140              | 2,386                   | 533   | 0.395             | 0.112              |
| R7              | 24                      | 3,686       | 847   | 0.498             | 0.153              | 2,948                       | 720   | 0.448             | 0.137              | 2,359                   | 576   | 0.359             | 0.110              |
| R8              | 30                      | 2,985       | 720   | 0.413             | 0.147              | 2,388                       | 612   | 0.372             | 0.132              | 1,911                   | 490   | 0.298             | 0.106              |
| R10             | 38                      | 2,429       | 432   | 0.276             | 0.133              | 1,943                       | 367   | 0.248             | 0.120              | 1,554                   | 294   | 0.198             | 0.096              |

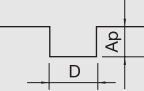
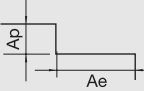
절입량  
Depth of Cut

• Ap : Axial Depth  
 • Ae : Radial Depth  
 • D : Outside Diameter  
 • n : Speed  
 • Vf : Feed

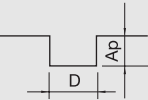
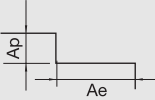
- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 주세요.
- 절삭조건이 없는 직경 및 유효장은 비슷한 직경 및 유효장에 비례하여 UP&DOWN 하여 설정 하십시오.
- HRC52 이상 고경도강 가공시 52HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5µm 이내 일것.)
- 원활한 칩배출을 위하여 에어브로 혹은 미스트 쿨런트 사용을 추천하며, 동 가공시 습식 쿨런트를 추천 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- If the effective length or overall length of your tool are not show above the table, adjust your parameter with upper or lower diameter of parameter.
- When milling workpiece HRC over 52 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5µm).
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.

| 파삭재<br>Material           |                            | 동<br>Copper |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|---------------------------|----------------------------|-------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness               |                            |             |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø0.1                      | 0.3                        | 56,000      | 544   | 0.006             | 0.16               | 47,600                      | 435   | 0.005             | 0.144              | 42,840                  | 392   | 0.005             | 0.122              |
| "                         | 0.5                        | 50,900      | 464   | 0.005             | 0.02               | 43,265                      | 371   | 0.005             | 0.018              | 38,939                  | 334   | 0.004             | 0.015              |
| Ø0.2                      | 0.5                        | 56,000      | 544   | 0.006             | 0.16               | 47,600                      | 435   | 0.005             | 0.144              | 42,840                  | 392   | 0.005             | 0.122              |
| "                         | 1                          | 50,900      | 464   | 0.005             | 0.02               | 43,265                      | 371   | 0.005             | 0.018              | 38,939                  | 334   | 0.004             | 0.015              |
| "                         | 2                          | 48,200      | 400   | 0.003             | 0.006              | 40,970                      | 320   | 0.003             | 0.005              | 36,873                  | 288   | 0.002             | 0.005              |
| Ø0.3                      | 1                          | 60,000      | 896   | 0.009             | 0.101              | 51,000                      | 717   | 0.008             | 0.091              | 45,900                  | 645   | 0.007             | 0.077              |
| "                         | 1.5                        | 50,800      | 736   | 0.008             | 0.057              | 43,180                      | 589   | 0.007             | 0.051              | 38,862                  | 530   | 0.006             | 0.044              |
| "                         | 2                          | 41,500      | 560   | 0.006             | 0.013              | 35,275                      | 448   | 0.005             | 0.012              | 31,748                  | 403   | 0.005             | 0.010              |
| "                         | 3                          | 31,900      | 384   | 0.002             | 0.004              | 27,115                      | 307   | 0.002             | 0.004              | 24,404                  | 276   | 0.002             | 0.003              |
| "                         | 4                          | 26,200      | 272   | 0.001             | 0.003              | 22,270                      | 218   | 0.001             | 0.003              | 20,043                  | 196   | 0.001             | 0.002              |
| "                         | 5                          | 20,400      | 160   | 0.001             | 0.002              | 17,340                      | 128   | 0.001             | 0.002              | 15,606                  | 115   | 0.001             | 0.002              |
| Ø0.4                      | 1                          | 52,700      | 1,056 | 0.012             | 0.054              | 44,795                      | 845   | 0.011             | 0.049              | 40,316                  | 760   | 0.009             | 0.041              |
| "                         | 5                          | 38,500      | 608   | 0.003             | 0.003              | 32,725                      | 486   | 0.003             | 0.003              | 29,453                  | 438   | 0.002             | 0.002              |
| "                         | 10                         | 33,700      | 416   | 0.001             | 0.001              | 28,645                      | 333   | 0.001             | 0.001              | 25,781                  | 300   | 0.001             | 0.001              |
| Ø0.5                      | 2                          | 56,800      | 1,440 | 0.020             | 0.098              | 48,280                      | 1,152 | 0.018             | 0.088              | 43,452                  | 1,037 | 0.015             | 0.075              |
| "                         | 3                          | 44,200      | 1,056 | 0.080             | 0.016              | 37,570                      | 845   | 0.072             | 0.014              | 33,813                  | 760   | 0.061             | 0.012              |
| "                         | 4                          | 40,600      | 928   | 0.009             | 0.012              | 34,510                      | 742   | 0.008             | 0.011              | 31,059                  | 668   | 0.007             | 0.009              |
| "                         | 5                          | 37,000      | 800   | 0.080             | 0.008              | 31,450                      | 640   | 0.072             | 0.007              | 28,305                  | 576   | 0.061             | 0.006              |
| "                         | 6                          | 33,400      | 672   | 0.005             | 0.004              | 28,390                      | 538   | 0.005             | 0.004              | 25,551                  | 484   | 0.004             | 0.003              |
| "                         | 8                          | 29,100      | 512   | 0.002             | 0.002              | 24,735                      | 410   | 0.002             | 0.002              | 22,262                  | 369   | 0.002             | 0.002              |
| "                         | 10                         | 26,100      | 400   | 0.001             | 0.001              | 22,185                      | 320   | 0.001             | 0.001              | 19,967                  | 288   | 0.001             | 0.001              |
| "                         | 14                         | 21,500      | 192   | 0.001             | 0.001              | 18,275                      | 154   | 0.001             | 0.001              | 16,448                  | 138   | 0.001             | 0.001              |
| Ø0.6                      | 2                          | 63,600      | 1,984 | 0.025             | 0.203              | 54,060                      | 1,587 | 0.023             | 0.183              | 48,654                  | 1,428 | 0.019             | 0.155              |
| "                         | 3                          | 52,500      | 1,584 | 0.018             | 0.114              | 44,625                      | 1,267 | 0.016             | 0.103              | 40,163                  | 1,140 | 0.014             | 0.087              |
| "                         | 4                          | 41,300      | 1,184 | 0.012             | 0.025              | 35,105                      | 947   | 0.011             | 0.023              | 31,595                  | 852   | 0.009             | 0.019              |
| "                         | 5                          | 36,700      | 1,008 | 0.010             | 0.017              | 31,195                      | 806   | 0.009             | 0.015              | 28,076                  | 726   | 0.008             | 0.013              |
| "                         | 6                          | 32,100      | 832   | 0.007             | 0.008              | 27,285                      | 666   | 0.006             | 0.007              | 24,557                  | 599   | 0.005             | 0.006              |
| "                         | 8                          | 26,800      | 624   | 0.004             | 0.003              | 22,780                      | 499   | 0.004             | 0.003              | 20,502                  | 449   | 0.003             | 0.002              |
| "                         | 10                         | 23,400      | 48    | 0.002             | 0.002              | 19,890                      | 38    | 0.002             | 0.002              | 17,901                  | 35    | 0.002             | 0.002              |
| "                         | 12                         | 20,900      | 384   | 0.002             | 0.001              | 17,765                      | 307   | 0.002             | 0.001              | 15,989                  | 276   | 0.002             | 0.001              |
| "                         | 16                         | 16,200      | 160   | 0.001             | 0.001              | 13,770                      | 128   | 0.001             | 0.001              | 12,393                  | 115   | 0.001             | 0.001              |
| Ø0.7                      | 2                          | 59,800      | 2,208 | 0.030             | 0.038              | 50,830                      | 1,766 | 0.027             | 0.034              | 45,747                  | 1,590 | 0.023             | 0.029              |
| "                         | 4                          | 38,900      | 1,344 | 0.017             | 0.047              | 33,065                      | 1,075 | 0.015             | 0.042              | 29,759                  | 968   | 0.013             | 0.036              |
| "                         | 6                          | 30,200      | 960   | 0.010             | 0.014              | 25,670                      | 768   | 0.009             | 0.013              | 23,103                  | 691   | 0.008             | 0.011              |
| "                         | 8                          | 25,300      | 736   | 0.006             | 0.006              | 21,505                      | 589   | 0.005             | 0.005              | 19,355                  | 530   | 0.005             | 0.005              |
| "                         | 10                         | 22,000      | 576   | 0.004             | 0.003              | 18,700                      | 461   | 0.004             | 0.003              | 16,830                  | 415   | 0.003             | 0.002              |
| Ø0.8                      | 2                          | 41,200      | 1,680 | 0.033             | 0.108              | 35,020                      | 1,344 | 0.030             | 0.097              | 31,518                  | 1,210 | 0.025             | 0.083              |
| "                         | 4                          | 37,100      | 1,488 | 0.027             | 0.08               | 31,535                      | 1,190 | 0.024             | 0.072              | 28,382                  | 1,071 | 0.021             | 0.061              |
| "                         | 6                          | 28,800      | 1,088 | 0.015             | 0.024              | 24,480                      | 870   | 0.014             | 0.022              | 22,032                  | 783   | 0.011             | 0.018              |
| "                         | 8                          | 24,100      | 832   | 0.009             | 0.01               | 20,485                      | 666   | 0.008             | 0.009              | 18,437                  | 599   | 0.007             | 0.008              |
| "                         | 10                         | 21,000      | 672   | 0.006             | 0.005              | 17,850                      | 538   | 0.005             | 0.005              | 16,065                  | 484   | 0.005             | 0.004              |
| "                         | 12                         | 18,700      | 544   | 0.004             | 0.003              | 15,895                      | 435   | 0.004             | 0.003              | 14,306                  | 392   | 0.003             | 0.002              |
| "                         | 14                         | 15,600      | 368   | 0.002             | 0.001              | 13,260                      | 294   | 0.002             | 0.001              | 11,934                  | 265   | 0.002             | 0.001              |
| Ø0.9                      | 6                          | 27,600      | 1,264 | 0.019             | 0.019              | 23,460                      | 1,011 | 0.017             | 0.017              | 21,114                  | 910   | 0.015             | 0.015              |
| "                         | 8                          | 23,000      | 960   | 0.012             | 0.012              | 19,550                      | 768   | 0.011             | 0.011              | 17,595                  | 691   | 0.009             | 0.009              |
| "                         | 10                         | 20,000      | 752   | 0.008             | 0.008              | 17,000                      | 602   | 0.007             | 0.007              | 15,300                  | 541   | 0.006             | 0.006              |
| Ø1.0                      | 2                          | 37,900      | 2,144 | 0.048             | 0.263              | 30,320                      | 1,822 | 0.038             | 0.210              | 27,288                  | 1,640 | 0.033             | 0.179              |
| "                         | 3                          | 37,900      | 2,144 | 0.048             | 0.263              | 30,320                      | 1,822 | 0.038             | 0.210              | 27,288                  | 1,640 | 0.033             | 0.179              |
| "                         | 4                          | 34,100      | 1,872 | 0.040             | 0.195              | 27,280                      | 1,591 | 0.032             | 0.156              | 24,552                  | 1,432 | 0.027             | 0.133              |
| "                         | 5                          | 30,300      | 1,600 | 0.032             | 0.013              | 24,240                      | 1,360 | 0.026             | 0.010              | 21,816                  | 1,224 | 0.022             | 0.009              |
| "                         | 6                          | 26,500      | 1,360 | 0.023             | 0.058              | 21,200                      | 1,156 | 0.018             | 0.046              | 19,080                  | 1,040 | 0.016             | 0.039              |
| "                         | 8                          | 22,100      | 1,056 | 0.014             | 0.024              | 17,680                      | 898   | 0.011             | 0.019              | 15,912                  | 808   | 0.010             | 0.016              |
| "                         | 10                         | 19,200      | 848   | 0.010             | 0.013              | 15,360                      | 721   | 0.008             | 0.010              | 13,824                  | 649   | 0.007             | 0.009              |
| "                         | 12                         | 17,200      | 704   | 0.007             | 0.007              | 13,760                      | 598   | 0.006             | 0.006              | 12,384                  | 539   | 0.005             | 0.005              |
| "                         | 14                         | 15,600      | 576   | 0.005             | 0.005              | 12,480                      | 490   | 0.004             | 0.004              | 11,232                  | 441   | 0.003             | 0.003              |
| "                         | 16                         | 14,300      | 480   | 0.004             | 0.003              | 11,440                      | 408   | 0.003             | 0.002              | 10,296                  | 367   | 0.003             | 0.002              |
| "                         | 20                         | 12,500      | 320   | 0.003             | 0.001              | 10,000                      | 272   | 0.002             | 0.001              | 9,000                   | 245   | 0.002             | 0.001              |
| "                         | 25                         | 10,800      | 192   | 0.003             | 0.001              | 8,640                       | 163   | 0.002             | 0.001              | 7,776                   | 147   | 0.002             | 0.001              |
| "                         | 30                         | 9,700       | 80    | 0.002             | 0.001              | 7,760                       | 68    | 0.002             | 0.001              | 6,984                   | 61    | 0.001             | 0.001              |
| Ø1.2                      | 4                          | 28,900      | 1,888 | 0.050             | 0.189              | 23,120                      | 1,605 | 0.040             | 0.151              | 20,808                  | 1,444 | 0.034             | 0.129              |
| "                         | 6                          | 24,800      | 1,552 | 0.037             | 0.120              | 19,840                      | 1,319 | 0.030             | 0.096              | 17,856                  | 1,187 | 0.025             | 0.082              |
| "                         | 8                          | 20,700      | 1,216 | 0.024             | 0.051              | 16,560                      | 1,034 | 0.019             | 0.041              | 14,904                  | 930   | 0.016             | 0.035              |
| "                         | 10                         | 18,000      | 992   | 0.016             | 0.026              | 14,400                      | 843   | 0.013             | 0.021              | 12,960                  | 759   | 0.011             | 0.018              |
| "                         | 12                         | 16,100      | 832   | 0.011             | 0.015              | 12,880                      | 707   | 0.009             | 0.012              | 11,592                  | 636   | 0.007             | 0.010              |
| "                         | 16                         | 13,400      | 608   | 0.006             | 0.006              | 10,720                      | 517   | 0.005             | 0.005              | 9,648                   | 465   | 0.004             | 0.004              |
| "                         | 20                         | 11,700      | 448   | 0.004             | 0.003              | 9,360                       | 381   | 0.003             | 0.002              | 8,424                   | 343   | 0.003             | 0.002              |
| "                         | 25                         | 10,800      | 192   | 0.003             | 0.001              | 8,640                       | 163   | 0.002             | 0.001              | 7,776                   | 147   | 0.002             | 0.001              |
| "                         | 30                         | 9,700       | 80    | 0.002             | 0.001              | 7,760                       | 68    | 0.002             | 0.001              | 6,984                   | 61    | 0.001             | 0.001              |

| 파삭재<br>Material           |                            | 동<br>Copper |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|---------------------------|----------------------------|-------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness               |                            |             |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1.4                      | 6                          | 23,300      | 1,712 | 0.052             | 0.222              | 18,640                      | 1,455 | 0.042             | 0.178              | 16,776                  | 1,310 | 0.035             | 0.151              |
| "                         | 8                          | 19,500      | 1,360 | 0.035             | 0.094              | 15,600                      | 1,156 | 0.028             | 0.075              | 14,040                  | 1,040 | 0.024             | 0.064              |
| "                         | 10                         | 16,900      | 1,136 | 0.025             | 0.048              | 13,520                      | 966   | 0.020             | 0.038              | 12,168                  | 869   | 0.017             | 0.033              |
| "                         | 14                         | 13,700      | 816   | 0.013             | 0.018              | 10,960                      | 694   | 0.010             | 0.014              | 9,864                   | 624   | 0.009             | 0.012              |
| "                         | 16                         | 12,600      | 720   | 0.010             | 0.012              | 10,080                      | 612   | 0.008             | 0.010              | 9,072                   | 551   | 0.007             | 0.008              |
| "                         | 20                         | 10,300      | 480   | 0.006             | 0.005              | 8,240                       | 408   | 0.005             | 0.004              | 7,416                   | 367   | 0.004             | 0.003              |
| ø1.5                      | 4                          | 26,600      | 2,144 | 0.073             | 0.462              | 21,280                      | 1,822 | 0.058             | 0.370              | 19,152                  | 1,640 | 0.050             | 0.314              |
| "                         | 6                          | 22,800      | 1,792 | 0.057             | 0.293              | 18,240                      | 1,523 | 0.046             | 0.234              | 16,416                  | 1,371 | 0.039             | 0.199              |
| "                         | 8                          | 19,000      | 1,440 | 0.041             | 0.124              | 15,200                      | 1,224 | 0.033             | 0.099              | 13,680                  | 1,102 | 0.028             | 0.084              |
| "                         | 10                         | 16,600      | 1,200 | 0.030             | 0.063              | 13,280                      | 1,020 | 0.024             | 0.050              | 11,952                  | 918   | 0.020             | 0.043              |
| "                         | 12                         | 14,800      | 1,008 | 0.023             | 0.037              | 11,840                      | 857   | 0.018             | 0.030              | 10,656                  | 771   | 0.016             | 0.025              |
| "                         | 14                         | 13,400      | 880   | 0.017             | 0.023              | 10,720                      | 748   | 0.014             | 0.018              | 9,648                   | 673   | 0.012             | 0.016              |
| "                         | 16                         | 12,300      | 768   | 0.013             | 0.015              | 9,840                       | 653   | 0.010             | 0.012              | 8,856                   | 588   | 0.009             | 0.010              |
| "                         | 18                         | 11,500      | 672   | 0.011             | 0.011              | 9,200                       | 571   | 0.009             | 0.009              | 8,280                   | 514   | 0.007             | 0.007              |
| "                         | 20                         | 10,700      | 592   | 0.009             | 0.008              | 8,560                       | 503   | 0.007             | 0.006              | 7,704                   | 453   | 0.006             | 0.005              |
| "                         | 25                         | 9,300       | 432   | 0.005             | 0.004              | 7,440                       | 367   | 0.004             | 0.003              | 6,696                   | 330   | 0.003             | 0.003              |
| "                         | 30                         | 8,300       | 320   | 0.004             | 0.002              | 6,640                       | 272   | 0.003             | 0.002              | 5,976                   | 245   | 0.003             | 0.001              |
| ø1.6                      | 10                         | 16,100      | 1,248 | 0.035             | 0.082              | 12,880                      | 1,061 | 0.028             | 0.066              | 11,592                  | 955   | 0.024             | 0.056              |
| "                         | 14                         | 13,000      | 928   | 0.020             | 0.030              | 10,400                      | 789   | 0.016             | 0.024              | 9,360                   | 710   | 0.014             | 0.020              |
| "                         | 18                         | 11,100      | 720   | 0.013             | 0.014              | 8,880                       | 612   | 0.010             | 0.011              | 7,992                   | 551   | 0.009             | 0.010              |
| ø2.0                      | 4                          | 23,000      | 2,400 | 0.070             | 0.966              | 18,400                      | 2,040 | 0.056             | 0.773              | 16,560                  | 1,836 | 0.048             | 0.657              |
| "                         | 6                          | 20,300      | 2,160 | 0.064             | 0.926              | 16,240                      | 1,836 | 0.051             | 0.741              | 14,616                  | 1,652 | 0.044             | 0.630              |
| "                         | 8                          | 17,000      | 1,744 | 0.054             | 0.391              | 13,600                      | 1,482 | 0.043             | 0.313              | 12,240                  | 1,334 | 0.037             | 0.266              |
| "                         | 10                         | 14,800      | 1,472 | 0.045             | 0.200              | 11,840                      | 1,251 | 0.036             | 0.160              | 10,656                  | 1,126 | 0.031             | 0.136              |
| "                         | 12                         | 13,200      | 1,264 | 0.037             | 0.116              | 10,560                      | 1,074 | 0.030             | 0.093              | 9,504                   | 967   | 0.025             | 0.079              |
| "                         | 14                         | 12,000      | 1,120 | 0.031             | 0.073              | 9,600                       | 952   | 0.025             | 0.058              | 8,640                   | 857   | 0.021             | 0.050              |
| "                         | 16                         | 11,100      | 992   | 0.026             | 0.049              | 8,880                       | 843   | 0.021             | 0.039              | 7,992                   | 759   | 0.018             | 0.033              |
| "                         | 18                         | 10,300      | 880   | 0.022             | 0.034              | 8,240                       | 748   | 0.018             | 0.027              | 7,416                   | 673   | 0.015             | 0.023              |
| "                         | 20                         | 9,600       | 800   | 0.018             | 0.025              | 7,680                       | 680   | 0.014             | 0.020              | 6,912                   | 612   | 0.012             | 0.017              |
| "                         | 22                         | 8,700       | 672   | 0.014             | 0.018              | 6,960                       | 571   | 0.011             | 0.014              | 6,264                   | 514   | 0.010             | 0.012              |
| "                         | 25                         | 8,400       | 624   | 0.012             | 0.013              | 6,720                       | 530   | 0.010             | 0.010              | 6,048                   | 477   | 0.008             | 0.009              |
| "                         | 30                         | 7,500       | 496   | 0.008             | 0.007              | 6,000                       | 422   | 0.006             | 0.006              | 5,400                   | 379   | 0.005             | 0.005              |
| ø2.5                      | 8                          | 15,000      | 2,144 | 0.077             | 0.954              | 12,000                      | 1,822 | 0.062             | 0.763              | 10,800                  | 1,640 | 0.052             | 0.649              |
| "                         | 10                         | 13,100      | 1,824 | 0.068             | 0.488              | 10,480                      | 1,550 | 0.054             | 0.390              | 9,432                   | 1,395 | 0.046             | 0.332              |
| "                         | 12                         | 11,800      | 1,600 | 0.060             | 0.283              | 9,440                       | 1,360 | 0.048             | 0.226              | 8,496                   | 1,224 | 0.041             | 0.192              |
| "                         | 16                         | 9,900       | 1,264 | 0.045             | 0.119              | 7,920                       | 1,074 | 0.036             | 0.095              | 7,128                   | 967   | 0.031             | 0.081              |
| "                         | 20                         | 8,700       | 1,040 | 0.033             | 0.061              | 6,960                       | 884   | 0.026             | 0.049              | 6,264                   | 796   | 0.022             | 0.041              |
| "                         | 25                         | 7,600       | 832   | 0.022             | 0.031              | 6,080                       | 707   | 0.018             | 0.025              | 5,472                   | 636   | 0.015             | 0.021              |
| "                         | 30                         | 6,800       | 688   | 0.014             | 0.018              | 5,440                       | 585   | 0.011             | 0.014              | 4,896                   | 526   | 0.010             | 0.012              |
| "                         | 35                         | 6,200       | 608   | 0.009             | 0.012              | 4,960                       | 517   | 0.007             | 0.010              | 4,464                   | 465   | 0.006             | 0.008              |
| "                         | 40                         | 5,700       | 464   | 0.005             | 0.008              | 4,560                       | 394   | 0.004             | 0.006              | 4,104                   | 355   | 0.003             | 0.005              |
| "                         | 50                         | 5,000       | 304   | 0.001             | 0.004              | 4,000                       | 258   | 0.001             | 0.003              | 3,600                   | 233   | 0.001             | 0.003              |
| ø3                        | 6                          | 13,200      | 2,352 | 0.103             | 1.978              | 10,560                      | 1,999 | 0.082             | 1.582              | 9,504                   | 1,799 | 0.070             | 1.345              |
| "                         | 10                         | 11,600      | 2,032 | 0.092             | 1.013              | 9,280                       | 1,727 | 0.074             | 0.810              | 8,352                   | 1,554 | 0.063             | 0.689              |
| "                         | 12                         | 10,500      | 1,776 | 0.081             | 0.586              | 8,400                       | 1,510 | 0.065             | 0.469              | 7,560                   | 1,359 | 0.055             | 0.398              |
| "                         | 16                         | 8,900       | 1,440 | 0.064             | 0.247              | 7,120                       | 1,224 | 0.051             | 0.198              | 6,408                   | 1,102 | 0.044             | 0.168              |
| "                         | 20                         | 7,800       | 1,200 | 0.050             | 0.127              | 6,240                       | 1,020 | 0.040             | 0.102              | 5,616                   | 918   | 0.034             | 0.086              |
| "                         | 25                         | 6,900       | 992   | 0.036             | 0.065              | 5,520                       | 843   | 0.029             | 0.052              | 4,968                   | 759   | 0.024             | 0.044              |
| "                         | 30                         | 6,200       | 832   | 0.026             | 0.038              | 4,960                       | 707   | 0.021             | 0.030              | 4,464                   | 636   | 0.018             | 0.026              |
| "                         | 35                         | 5,700       | 704   | 0.018             | 0.024              | 4,560                       | 598   | 0.014             | 0.019              | 4,104                   | 539   | 0.012             | 0.016              |
| "                         | 40                         | 5,300       | 592   | 0.013             | 0.016              | 4,240                       | 503   | 0.010             | 0.013              | 3,816                   | 453   | 0.009             | 0.011              |
| "                         | 45                         | 5,000       | 528   | 0.008             | 0.012              | 4,000                       | 449   | 0.006             | 0.010              | 3,600                   | 404   | 0.005             | 0.008              |
| "                         | 50                         | 4,700       | 432   | 0.006             | 0.008              | 3,760                       | 367   | 0.005             | 0.006              | 3,384                   | 330   | 0.004             | 0.005              |
| "                         | 60                         | 4,500       | 400   | 0.003             | 0.005              | 3,600                       | 340   | 0.002             | 0.004              | 3,240                   | 306   | 0.002             | 0.003              |
| ø4                        | 8                          | 10,000      | 2,560 | 0.014             | 1.990              | 8,000                       | 2,176 | 0.011             | 1.592              | 7,200                   | 1,958 | 0.010             | 1.353              |
| "                         | 10                         | 9,200       | 2,240 | 0.120             | 1.960              | 7,360                       | 1,904 | 0.096             | 1.568              | 6,624                   | 1,714 | 0.082             | 1.333              |
| "                         | 12                         | 8,500       | 2,048 | 0.112             | 1.852              | 6,800                       | 1,741 | 0.090             | 1.482              | 6,120                   | 1,567 | 0.076             | 1.259              |
| "                         | 16                         | 7,200       | 1,680 | 0.093             | 0.781              | 5,760                       | 1,428 | 0.074             | 0.625              | 5,184                   | 1,285 | 0.063             | 0.531              |
| "                         | 20                         | 6,300       | 1,408 | 0.077             | 0.400              | 5,040                       | 1,197 | 0.062             | 0.320              | 4,536                   | 1,077 | 0.052             | 0.272              |
| "                         | 25                         | 5,600       | 1,200 | 0.061             | 0.205              | 4,480                       | 1,020 | 0.049             | 0.164              | 4,032                   | 918   | 0.041             | 0.139              |
| "                         | 30                         | 5,000       | 1,008 | 0.048             | 0.119              | 4,000                       | 857   | 0.038             | 0.095              | 3,600                   | 771   | 0.033             | 0.081              |
| "                         | 35                         | 4,600       | 864   | 0.038             | 0.075              | 3,680                       | 734   | 0.030             | 0.060              | 3,312                   | 661   | 0.026             | 0.051              |
| "                         | 40                         | 4,200       | 752   | 0.030             | 0.050              | 3,360                       | 639   | 0.024             | 0.040              | 3,024                   | 575   | 0.020             | 0.034              |
| "                         | 45                         | 3,900       | 656   | 0.023             | 0.035              | 3,120                       | 558   | 0.018             | 0.028              | 2,808                   | 502   | 0.016             | 0.024              |
| "                         | 50                         | 3,700       | 576   | 0.018             | 0.026              | 2,960                       | 490   | 0.014             | 0.021              | 2,664                   | 441   | 0.012             | 0.018              |
| "                         | 55                         | 3,500       | 512   | 0.015             | 0.020              | 2,800                       | 435   | 0.012             | 0.016              | 2,520                   | 392   | 0.010             | 0.014              |
| "                         | 60                         | 3,300       | 448   | 0.011             | 0.015              | 2,640                       | 381   | 0.009             | 0.012              | 2,376                   | 343   | 0.007             | 0.010              |

| 파삭재<br>Material        |                         | 동<br>Copper                                                                                                                                                                                                                                                                                                                     |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness            |                         |                                                                                                                                                                                                                                                                                                                                 |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 외경<br>Outside Diameter | 유효장<br>Effective Length | RPM                                                                                                                                                                                                                                                                                                                             | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø5                     | 16                      | 6,000                                                                                                                                                                                                                                                                                                                           | 1,824 | 0.127             | 1.907              | 4,800                       | 1,550 | 0.102             | 1.526              | 4,320                   | 1,395 | 0.086             | 1.297              |
| "                      | 20                      | 5,300                                                                                                                                                                                                                                                                                                                           | 1,568 | 0.121             | 0.977              | 4,240                       | 1,333 | 0.097             | 0.782              | 3,816                   | 1,200 | 0.082             | 0.664              |
| "                      | 25                      | 4,600                                                                                                                                                                                                                                                                                                                           | 1,312 | 0.109             | 0.500              | 3,680                       | 1,115 | 0.087             | 0.400              | 3,312                   | 1,004 | 0.074             | 0.340              |
| "                      | 30                      | 4,200                                                                                                                                                                                                                                                                                                                           | 1,136 | 0.094             | 0.289              | 3,360                       | 966   | 0.075             | 0.231              | 3,024                   | 869   | 0.064             | 0.197              |
| "                      | 35                      | 3,800                                                                                                                                                                                                                                                                                                                           | 992   | 0.077             | 0.182              | 3,040                       | 843   | 0.062             | 0.146              | 2,736                   | 759   | 0.052             | 0.124              |
| "                      | 40                      | 3,500                                                                                                                                                                                                                                                                                                                           | 864   | 0.060             | 0.122              | 2,800                       | 734   | 0.048             | 0.098              | 2,520                   | 661   | 0.041             | 0.083              |
| "                      | 50                      | 3,100                                                                                                                                                                                                                                                                                                                           | 688   | 0.031             | 0.063              | 2,480                       | 585   | 0.025             | 0.050              | 2,232                   | 526   | 0.021             | 0.043              |
| "                      | 60                      | 2,800                                                                                                                                                                                                                                                                                                                           | 560   | 0.013             | 0.036              | 2,240                       | 476   | 0.010             | 0.029              | 2,016                   | 428   | 0.009             | 0.024              |
| Ø6                     | 20                      | 4,200                                                                                                                                                                                                                                                                                                                           | 1,536 | 0.126             | 2.025              | 3,360                       | 1,306 | 0.101             | 1.620              | 3,024                   | 1,175 | 0.086             | 1.377              |
| "                      | 30                      | 3,400                                                                                                                                                                                                                                                                                                                           | 1,168 | 0.109             | 0.600              | 2,720                       | 993   | 0.087             | 0.480              | 2,448                   | 894   | 0.074             | 0.408              |
| "                      | 40                      | 3,000                                                                                                                                                                                                                                                                                                                           | 960   | 0.083             | 0.253              | 2,400                       | 816   | 0.066             | 0.202              | 2,160                   | 734   | 0.056             | 0.172              |
| "                      | 50                      | 2,600                                                                                                                                                                                                                                                                                                                           | 768   | 0.054             | 0.130              | 2,080                       | 653   | 0.043             | 0.104              | 1,872                   | 588   | 0.037             | 0.088              |
| "                      | 60                      | 2,400                                                                                                                                                                                                                                                                                                                           | 656   | 0.031             | 0.075              | 1,920                       | 558   | 0.025             | 0.060              | 1,728                   | 502   | 0.021             | 0.051              |
| Ø8                     | 20                      | 3,200                                                                                                                                                                                                                                                                                                                           | 1,456 | 0.180             | 1.600              | 2,560                       | 1,238 | 0.144             | 1.280              | 2,304                   | 1,114 | 0.122             | 1.088              |
| "                      | 40                      | 2,600                                                                                                                                                                                                                                                                                                                           | 960   | 0.120             | 0.200              | 2,080                       | 816   | 0.096             | 0.160              | 1,872                   | 734   | 0.082             | 0.136              |
| Ø10                    | 25                      | 2,900                                                                                                                                                                                                                                                                                                                           | 1,424 | 0.200             | 1.760              | 2,320                       | 1,210 | 0.160             | 1.408              | 2,088                   | 1,089 | 0.136             | 1.197              |
| "                      | 45                      | 2,200                                                                                                                                                                                                                                                                                                                           | 928   | 0.140             | 0.240              | 1,760                       | 789   | 0.112             | 0.192              | 1,584                   | 710   | 0.095             | 0.163              |
| Ø12                    | 30                      | 2,000                                                                                                                                                                                                                                                                                                                           | 1,296 | 0.190             | 1.650              | 1,600                       | 1,102 | 0.152             | 1.320              | 1,440                   | 991   | 0.129             | 1.122              |
| "                      | 50                      | 1,950                                                                                                                                                                                                                                                                                                                           | 912   | 0.150             | 0.250              | 1,560                       | 775   | 0.120             | 0.200              | 1,404                   | 698   | 0.102             | 0.170              |
| 절입량<br>Depth of Cut    |                         | <div> Slotting <div> • Ap : Axial Depth • D : Outside Diameter </div>  </div> <div> Side Milling <div> • Ap : Axial Depth • Ae : Radial Depth </div>  </div> |       |                   |                    |                             |       |                   |                    |                         |       |                   |                    |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC52 이상 고경도강 가공시 52HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과 하거나 버 및 적열 현상이 발생할때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø10이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece HRC over 52 hardened steel, reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity ( $\phi 1$  or less, the vibration tolerance management should be within 5 $\mu$ m).
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.

| 파삭재<br>Material        |                         | 동<br>Copper                                                                                                                                                                                                                                                                                                                                                                                            |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness            |                         |                                                                                                                                                                                                                                                                                                                                                                                                        |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 외경<br>Outside Diameter | 유효장<br>Effective Length | RPM                                                                                                                                                                                                                                                                                                                                                                                                    | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.8                   | 8                       | 24,100                                                                                                                                                                                                                                                                                                                                                                                                 | 1,235 | 0.009             | 0.01               | 20,485                      | 988   | 0.008             | 0.01               | 18,430                  | 840   | 0.006             | 0.01               |
| "                      | 12                      | 18,700                                                                                                                                                                                                                                                                                                                                                                                                 | 707   | 0.004             | 0.003              | 15,895                      | 566   | 0.004             | 0.003              | 14,306                  | 481   | 0.003             | 0.002              |
| ø1                     | 8                       | 22,100                                                                                                                                                                                                                                                                                                                                                                                                 | 1,373 | 0.014             | 0.024              | 17,680                      | 1,098 | 0.011             | 0.019              | 15,912                  | 934   | 0.010             | 0.016              |
| "                      | 16                      | 14,300                                                                                                                                                                                                                                                                                                                                                                                                 | 624   | 0.004             | 0.003              | 11,440                      | 499   | 0.003             | 0.002              | 10,296                  | 424   | 0.003             | 0.002              |
| "                      | 25                      | 10,800                                                                                                                                                                                                                                                                                                                                                                                                 | 250   | 0.003             | 0.001              | 8,640                       | 200   | 0.002             | 0.001              | 7,776                   | 170   | 0.002             | 0.001              |
| ø1.5                   | 8                       | 19,000                                                                                                                                                                                                                                                                                                                                                                                                 | 1,872 | 0.041             | 0.124              | 15,200                      | 1,498 | 0.033             | 0.099              | 13,680                  | 1,273 | 0.028             | 0.084              |
| "                      | 16                      | 12,300                                                                                                                                                                                                                                                                                                                                                                                                 | 998   | 0.013             | 0.015              | 9,840                       | 799   | 0.010             | 0.012              | 8,856                   | 679   | 0.009             | 0.010              |
| "                      | 25                      | 9,300                                                                                                                                                                                                                                                                                                                                                                                                  | 562   | 0.005             | 0.004              | 7,440                       | 449   | 0.004             | 0.003              | 6,696                   | 382   | 0.003             | 0.003              |
| ø2                     | 8                       | 17,000                                                                                                                                                                                                                                                                                                                                                                                                 | 2,267 | 0.054             | 0.391              | 13,600                      | 1,814 | 0.043             | 0.313              | 12,240                  | 1,542 | 0.037             | 0.266              |
| "                      | 16                      | 11,100                                                                                                                                                                                                                                                                                                                                                                                                 | 1,290 | 0.026             | 0.049              | 8,880                       | 1,032 | 0.021             | 0.039              | 7,992                   | 877   | 0.018             | 0.033              |
| "                      | 25                      | 8,400                                                                                                                                                                                                                                                                                                                                                                                                  | 811   | 0.012             | 0.013              | 6,720                       | 649   | 0.010             | 0.010              | 6,048                   | 552   | 0.008             | 0.009              |
| ø2.5                   | 10                      | 13,100                                                                                                                                                                                                                                                                                                                                                                                                 | 2,371 | 0.068             | 0.488              | 10,480                      | 1,897 | 0.054             | 0.390              | 9,432                   | 1,612 | 0.046             | 0.332              |
| "                      | 16                      | 9,900                                                                                                                                                                                                                                                                                                                                                                                                  | 1,643 | 0.045             | 0.119              | 7,920                       | 1,315 | 0.036             | 0.095              | 7,128                   | 1,117 | 0.031             | 0.081              |
| "                      | 30                      | 6,800                                                                                                                                                                                                                                                                                                                                                                                                  | 894   | 0.014             | 0.018              | 5,440                       | 716   | 0.011             | 0.014              | 4,896                   | 608   | 0.010             | 0.012              |
| ø3                     | 10                      | 11,600                                                                                                                                                                                                                                                                                                                                                                                                 | 2,642 | 0.092             | 1.013              | 9,280                       | 2,113 | 0.074             | 0.810              | 8,352                   | 1,796 | 0.063             | 0.689              |
| "                      | 16                      | 8,900                                                                                                                                                                                                                                                                                                                                                                                                  | 1,872 | 0.064             | 0.247              | 7,120                       | 1,498 | 0.051             | 0.198              | 6,408                   | 1,273 | 0.044             | 0.168              |
| "                      | 25                      | 6,900                                                                                                                                                                                                                                                                                                                                                                                                  | 1,290 | 0.036             | 0.065              | 5,520                       | 1,032 | 0.029             | 0.052              | 4,968                   | 877   | 0.024             | 0.044              |
| "                      | 35                      | 5,700                                                                                                                                                                                                                                                                                                                                                                                                  | 915   | 0.018             | 0.024              | 4,560                       | 732   | 0.014             | 0.019              | 4,104                   | 622   | 0.012             | 0.016              |
| ø4                     | 10                      | 9,200                                                                                                                                                                                                                                                                                                                                                                                                  | 2,912 | 0.120             | 1.960              | 7,360                       | 2,330 | 0.096             | 1.568              | 6,624                   | 1,980 | 0.082             | 1.333              |
| "                      | 16                      | 7,200                                                                                                                                                                                                                                                                                                                                                                                                  | 2,184 | 0.093             | 0.781              | 5,760                       | 1,747 | 0.074             | 0.625              | 5,184                   | 1,485 | 0.063             | 0.531              |
| "                      | 25                      | 5,600                                                                                                                                                                                                                                                                                                                                                                                                  | 1,560 | 0.061             | 0.205              | 4,480                       | 1,248 | 0.049             | 0.164              | 4,032                   | 1,061 | 0.041             | 0.139              |
| "                      | 40                      | 4,200                                                                                                                                                                                                                                                                                                                                                                                                  | 978   | 0.030             | 0.050              | 3,360                       | 782   | 0.024             | 0.040              | 3,024                   | 665   | 0.020             | 0.034              |
| ø5                     | 15                      | 6,000                                                                                                                                                                                                                                                                                                                                                                                                  | 2,371 | 0.127             | 1.907              | 4,800                       | 1,897 | 0.102             | 1.526              | 4,320                   | 1,612 | 0.086             | 1.297              |
| "                      | 25                      | 4,600                                                                                                                                                                                                                                                                                                                                                                                                  | 1,706 | 0.109             | 0.500              | 3,680                       | 1,364 | 0.087             | 0.400              | 3,312                   | 1,160 | 0.074             | 0.340              |
| "                      | 40                      | 3,500                                                                                                                                                                                                                                                                                                                                                                                                  | 1,123 | 0.060             | 0.122              | 2,800                       | 899   | 0.048             | 0.098              | 2,520                   | 764   | 0.041             | 0.083              |
| ø6                     | 20                      | 4,200                                                                                                                                                                                                                                                                                                                                                                                                  | 1,997 | 0.126             | 2.025              | 3,360                       | 1,597 | 0.101             | 1.620              | 3,024                   | 1,358 | 0.086             | 1.377              |
| "                      | 40                      | 3,000                                                                                                                                                                                                                                                                                                                                                                                                  | 1,248 | 0.083             | 0.253              | 2,400                       | 998   | 0.066             | 0.202              | 2,160                   | 849   | 0.056             | 0.172              |
| ø8                     | 20                      | 3,200                                                                                                                                                                                                                                                                                                                                                                                                  | 1,893 | 0.180             | 1.600              | 2,560                       | 1,514 | 0.144             | 1.280              | 2,304                   | 1,287 | 0.122             | 1.088              |
| "                      | 40                      | 2,600                                                                                                                                                                                                                                                                                                                                                                                                  | 1,248 | 0.120             | 0.200              | 2,080                       | 998   | 0.096             | 0.160              | 1,872                   | 849   | 0.082             | 0.136              |
| ø10                    | 25                      | 2,900                                                                                                                                                                                                                                                                                                                                                                                                  | 1,851 | 0.200             | 1.760              | 2,320                       | 1,481 | 0.160             | 1.408              | 2,088                   | 1,259 | 0.136             | 1.197              |
| "                      | 45                      | 2,200                                                                                                                                                                                                                                                                                                                                                                                                  | 1,206 | 0.140             | 0.240              | 1,760                       | 965   | 0.112             | 0.192              | 1,584                   | 820   | 0.095             | 0.163              |
| ø12                    | 30                      | 2,000                                                                                                                                                                                                                                                                                                                                                                                                  | 1,685 | 0.190             | 1.650              | 1,600                       | 1,348 | 0.152             | 1.320              | 1,440                   | 1,146 | 0.129             | 1.122              |
| "                      | 50                      | 1,950                                                                                                                                                                                                                                                                                                                                                                                                  | 1,186 | 0.150             | 0.250              | 1,560                       | 948   | 0.120             | 0.200              | 1,404                   | 806   | 0.102             | 0.170              |
| 절입량<br>Depth of Cut    |                         | <div> <div>Slotting</div> <div> <div>• Ap : Axial Depth</div> <div>• D : Outside Diameter</div>  </div> </div> <div> <div>Side Milling</div> <div> <div>• Ap : Axial Depth</div> <div>• Ae : Radial Depth</div>  </div> </div> |       |                   |                    |                             |       |                   |                    |                         |       |                   |                    |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC52 이상 고경도강 가공시 52HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과 하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (ø10이하 사용시 진동 허용 관리 5μm 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨란트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece HRC over 52 hardened steel, reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (ø1 or less, the vibration tolerance management should be within 5μm).
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.

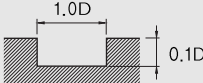
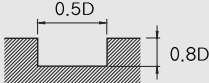
### 홈 절삭 Slotting

| 파삭재<br>Material        | 동<br>Copper                                                     |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|------------------------|-----------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness            |                                                                 |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 외경<br>Outside Diameter | RPM                                                             | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø0.1                   | 50,000                                                          | 300   | 0.01              | 0.1                | 45,000                      | 240   | 0.01              | 0.1                | 40,500                  | 168   | 0.08              | 0.05               |
| Ø0.2                   | 50,000                                                          | 390   | 0.02              | 0.2                | 45,000                      | 312   | 0.02              | 0.2                | 40,500                  | 218   | 0.16              | 0.10               |
| Ø0.3                   | 50,000                                                          | 570   | 0.03              | 0.3                | 45,000                      | 456   | 0.03              | 0.3                | 40,500                  | 319   | 0.24              | 0.15               |
| Ø0.4                   | 50,000                                                          | 705   | 0.04              | 0.4                | 45,000                      | 564   | 0.04              | 0.4                | 40,500                  | 395   | 0.32              | 0.20               |
| Ø0.5                   | 50,000                                                          | 1,110 | 0.05              | 0.5                | 45,000                      | 888   | 0.05              | 0.5                | 40,500                  | 622   | 0.40              | 0.25               |
| Ø0.6                   | 50,000                                                          | 1,410 | 0.06              | 0.6                | 45,000                      | 1,128 | 0.06              | 0.6                | 40,500                  | 790   | 0.48              | 0.30               |
| Ø0.8                   | 50,000                                                          | 1,800 | 0.08              | 0.8                | 40,000                      | 1,440 | 0.08              | 0.8                | 30,000                  | 1,008 | 0.64              | 0.40               |
| Ø0.9                   | 49,000                                                          | 1,965 | 0.09              | 0.9                | 39,000                      | 1,572 | 0.09              | 0.9                | 27,800                  | 1,100 | 0.72              | 0.45               |
| Ø1                     | 48,000                                                          | 2,250 | 0.10              | 1.0                | 38,000                      | 1,800 | 0.10              | 1.0                | 25,500                  | 1,260 | 0.80              | 0.50               |
| Ø2                     | 33,300                                                          | 2,550 | 0.20              | 2.0                | 26,000                      | 2,040 | 0.20              | 2.0                | 17,500                  | 1,428 | 1.60              | 1.00               |
| Ø3                     | 21,800                                                          | 2,550 | 0.30              | 3.0                | 17,300                      | 2,040 | 0.30              | 3.0                | 11,500                  | 1,428 | 2.40              | 1.50               |
| Ø4                     | 16,700                                                          | 2,640 | 0.40              | 4.0                | 13,200                      | 2,112 | 0.40              | 4.0                | 8,800                   | 1,478 | 3.20              | 2.00               |
| Ø5                     | 15,700                                                          | 3,000 | 0.50              | 5.0                | 12,500                      | 2,400 | 0.50              | 5.0                | 8,300                   | 1,680 | 4.00              | 2.50               |
| Ø6                     | 13,000                                                          | 2,850 | 0.60              | 6.0                | 10,350                      | 2,280 | 0.60              | 6.0                | 6,900                   | 1,596 | 4.80              | 3.00               |
| Ø8                     | 9,880                                                           | 2,790 | 0.80              | 8.0                | 7,800                       | 2,232 | 0.80              | 8.0                | 5,200                   | 1,562 | 6.40              | 4.00               |
| Ø10                    | 7,800                                                           | 2,550 | 1.00              | 10.0               | 6,150                       | 2,040 | 1.00              | 10.0               | 4,100                   | 1,428 | 8.00              | 5.00               |
| Ø12                    | 6,650                                                           | 2,550 | 1.20              | 12.0               | 5,250                       | 2,040 | 1.20              | 12.0               | 3,500                   | 1,428 | 9.60              | 6.00               |
| Ø16                    | 5,540                                                           | 2,340 | 1.60              | 16.0               | 4,340                       | 1,872 | 1.60              | 16.0               | 2,600                   | 1,310 | 12.80             | 8.00               |
| Ø18                    | 5,540                                                           | 2,340 | 1.80              | 18.0               | 4,340                       | 1,872 | 1.80              | 18.0               | 2,600                   | 1,310 | 14.40             | 9.00               |
| Ø20                    | 4,640                                                           | 2,160 | 2.00              | 20.0               | 4,340                       | 1,728 | 2.00              | 20.0               | 2,100                   | 1,210 | 16.00             | 10.00              |
| 절입량<br>Depth of Cut    | <div> <div>~ 50HRC</div> </div> <div> <div>50HRC ~</div> </div> |       |                   |                    |                             |       |                   |                    |                         |       |                   |                    |

### 측면 절삭 Side Cutting

| 파삭재<br>Material        | 동<br>Copper                                                     |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|-----------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            |                                                                 |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                             | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                     | 48,000                                                          | 1,050 | 1                 | 0.03               | 38,000                      | 735   | 1                 | 0.03               | 25,500                  | 515  | 0.50              | 0.02               |
| Ø2                     | 33,300                                                          | 1,200 | 2                 | 0.06               | 26,000                      | 840   | 2                 | 0.06               | 17,500                  | 588  | 1.00              | 0.04               |
| Ø3                     | 21,800                                                          | 1,200 | 3                 | 0.09               | 17,300                      | 840   | 3                 | 0.09               | 11,500                  | 588  | 1.50              | 0.06               |
| Ø4                     | 16,700                                                          | 1,250 | 4                 | 0.12               | 13,200                      | 875   | 4                 | 0.12               | 8,800                   | 613  | 2.00              | 0.08               |
| Ø5                     | 15,700                                                          | 1,450 | 5                 | 0.15               | 12,500                      | 1,015 | 5                 | 0.15               | 8,300                   | 711  | 2.50              | 0.10               |
| Ø6                     | 13,000                                                          | 1,350 | 6                 | 0.18               | 10,350                      | 945   | 6                 | 0.18               | 6,900                   | 662  | 3.00              | 0.12               |
| Ø8                     | 9,880                                                           | 1,320 | 8                 | 0.24               | 7,800                       | 924   | 8                 | 0.24               | 5,200                   | 647  | 4.00              | 0.16               |
| Ø10                    | 7,800                                                           | 1,200 | 10                | 0.30               | 6,150                       | 840   | 10                | 0.30               | 4,100                   | 588  | 5.00              | 0.20               |
| Ø12                    | 6,650                                                           | 1,200 | 12                | 0.36               | 5,250                       | 840   | 12                | 0.36               | 3,500                   | 588  | 6.00              | 0.24               |
| Ø16                    | 5,540                                                           | 1,000 | 16                | 0.48               | 4,340                       | 700   | 16                | 0.48               | 2,600                   | 490  | 8.00              | 0.32               |
| Ø18                    | 5,540                                                           | 1,000 | 18                | 0.54               | 4,340                       | 700   | 18                | 0.54               | 2,600                   | 490  | 9.00              | 0.36               |
| Ø20                    | 4,640                                                           | 950   | 20                | 0.60               | 4,340                       | 760   | 20                | 0.60               | 2,100                   | 532  | 10.00             | 0.40               |
| 절입량<br>Depth of Cut    | <div> <div>~ 50HRC</div> </div> <div> <div>50HRC ~</div> </div> |       |                   |                    |                             |       |                   |                    |                         |      |                   |                    |

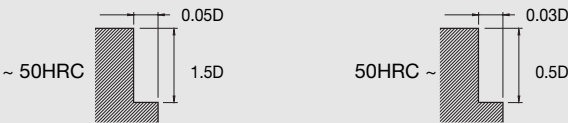
- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC52 이상 고경도강 가공시 52HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과 하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø10이하 사용시 진동 허용 관리 5µm이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece HRC over 52 hardened steel, reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5µm).
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.

| 홈 절삭 Slotting             |                                                                                                                                                                                                                                                       |       |                   |                    |                             |       |                   |                    |                         |       |                   |                    |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 파삭재<br>Material           | 동<br>Copper                                                                                                                                                                                                                                           |       |                   |                    | 프리하트강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
| 경도 Hardness               |                                                                                                                                                                                                                                                       |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                                                                                   | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                        | 48,000                                                                                                                                                                                                                                                | 2,700 | 0.10              | 1.0                | 38,000                      | 2,160 | 0.10              | 1.0                | 25,500                  | 1,512 | 0.80              | 0.50               |
| Ø2                        | 33,300                                                                                                                                                                                                                                                | 3,060 | 0.20              | 2.0                | 26,000                      | 2,448 | 0.20              | 2.0                | 17,500                  | 1,714 | 1.60              | 1.00               |
| Ø3                        | 21,800                                                                                                                                                                                                                                                | 3,060 | 0.30              | 3.0                | 17,300                      | 2,448 | 0.30              | 3.0                | 11,500                  | 1,714 | 2.40              | 1.50               |
| Ø4                        | 16,700                                                                                                                                                                                                                                                | 3,168 | 0.40              | 4.0                | 13,200                      | 2,534 | 0.40              | 4.0                | 8,800                   | 1,774 | 3.20              | 2.00               |
| Ø5                        | 15,700                                                                                                                                                                                                                                                | 3,600 | 0.50              | 5.0                | 12,500                      | 2,880 | 0.50              | 5.0                | 8,300                   | 2,016 | 4.00              | 2.50               |
| Ø6                        | 13,000                                                                                                                                                                                                                                                | 3,420 | 0.60              | 6.0                | 10,350                      | 2,736 | 0.60              | 6.0                | 6,900                   | 1,915 | 4.80              | 3.00               |
| Ø8                        | 9,880                                                                                                                                                                                                                                                 | 3,348 | 0.80              | 8.0                | 7,800                       | 2,678 | 0.80              | 8.0                | 5,200                   | 1,875 | 6.40              | 4.00               |
| Ø10                       | 7,800                                                                                                                                                                                                                                                 | 3,060 | 1.00              | 10.0               | 6,150                       | 2,448 | 1.00              | 10.0               | 4,100                   | 1,714 | 8.00              | 5.00               |
| Ø12                       | 6,650                                                                                                                                                                                                                                                 | 3,060 | 1.20              | 12.0               | 5,250                       | 2,448 | 1.20              | 12.0               | 3,500                   | 1,714 | 9.60              | 6.00               |
| Ø16                       | 5,540                                                                                                                                                                                                                                                 | 2,808 | 1.60              | 16.0               | 4,340                       | 2,246 | 1.60              | 16.0               | 2,600                   | 1,572 | 12.80             | 8.00               |
| Ø18                       | 5,540                                                                                                                                                                                                                                                 | 2,808 | 1.80              | 18.0               | 4,340                       | 2,246 | 1.80              | 18.0               | 2,600                   | 1,572 | 14.40             | 9.00               |
| Ø20                       | 4,640                                                                                                                                                                                                                                                 | 2,592 | 2.00              | 20.0               | 4,340                       | 2,074 | 2.00              | 20.0               | 2,100                   | 1,452 | 16.00             | 10.00              |
| 절입량<br>Depth of Cut       | <div><div>~ 50HRC</div><div></div></div> <div><div>50HRC ~</div><div></div></div> |       |                   |                    |                             |       |                   |                    |                         |       |                   |                    |

| 측면 절삭 Side Cutting        |                                                                                                                                                                      |       |                   |                    |                             |       |                   |                    |                         |      |                   |                    |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 파삭재<br>Material           | 동<br>Copper                                                                                                                                                          |       |                   |                    | 프리하트강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
| 경도 Hardness               |                                                                                                                                                                      |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                  | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                        | 48,000                                                                                                                                                               | 1,155 | 1                 | 0.03               | 38,000                      | 809   | 1                 | 0.03               | 25,500                  | 566  | 0.50              | 0.02               |
| Ø2                        | 33,300                                                                                                                                                               | 1,320 | 2                 | 0.06               | 26,000                      | 924   | 2                 | 0.06               | 17,500                  | 647  | 1.00              | 0.04               |
| Ø3                        | 21,800                                                                                                                                                               | 1,320 | 3                 | 0.09               | 17,300                      | 924   | 3                 | 0.09               | 11,500                  | 647  | 1.50              | 0.06               |
| Ø4                        | 16,700                                                                                                                                                               | 1,375 | 4                 | 0.12               | 13,200                      | 963   | 4                 | 0.12               | 8,800                   | 674  | 2.00              | 0.08               |
| Ø5                        | 15,700                                                                                                                                                               | 1,595 | 5                 | 0.15               | 12,500                      | 1,117 | 5                 | 0.15               | 8,300                   | 782  | 2.50              | 0.10               |
| Ø6                        | 13,000                                                                                                                                                               | 1,485 | 6                 | 0.18               | 10,350                      | 1,040 | 6                 | 0.18               | 6,900                   | 728  | 3.00              | 0.12               |
| Ø8                        | 9,880                                                                                                                                                                | 1,452 | 8                 | 0.24               | 7,800                       | 1,016 | 8                 | 0.24               | 5,200                   | 711  | 4.00              | 0.16               |
| Ø10                       | 7,800                                                                                                                                                                | 1,320 | 10                | 0.30               | 6,150                       | 924   | 10                | 0.30               | 4,100                   | 647  | 5.00              | 0.20               |
| Ø12                       | 6,650                                                                                                                                                                | 1,320 | 12                | 0.36               | 5,250                       | 924   | 12                | 0.36               | 3,500                   | 647  | 6.00              | 0.24               |
| Ø16                       | 5,540                                                                                                                                                                | 1,100 | 16                | 0.48               | 4,340                       | 770   | 16                | 0.48               | 2,600                   | 539  | 8.00              | 0.32               |
| Ø18                       | 5,540                                                                                                                                                                | 1,100 | 18                | 0.54               | 4,340                       | 770   | 18                | 0.54               | 2,600                   | 539  | 9.00              | 0.36               |
| Ø20                       | 4,640                                                                                                                                                                | 1,045 | 20                | 0.60               | 4,340                       | 836   | 20                | 0.60               | 2,100                   | 585  | 10.00             | 0.40               |
| 절입량<br>Depth of Cut       | <div><div><div><div>0.03D</div><div>1.0D</div></div><div>~ 50HRC</div></div><div><div><div><div>0.02D</div><div>0.5D</div></div><div>50HRC ~</div></div></div></div> |       |                   |                    |                             |       |                   |                    |                         |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC52 이상 고경도강 가공시 52HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과 하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5 $\mu$ m이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece HRC over 52 hardened steel, reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5 $\mu$ m).
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.

## 측면 절삭 Side Cutting

| 파삭재<br>Material        | 합금강<br>Alloy Steel                                                                 |       |                   |                    | 프리하튼강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|------------------------|------------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness            | 30 ~ 40HRC                                                                         |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                                | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                     | 40,000                                                                             | 720   | 1.5               | 0.05               | 40,000                      | 660   | 1.5               | 0.05               | 40,000                  | 308   | 0.5               | 0.03               |
| Ø1.5                   | 40,000                                                                             | 900   | 2.25              | 0.075              | 40,000                      | 750   | 2.25              | 0.075              | 38,500                  | 350   | 0.75              | 0.045              |
| Ø2                     | 40,000                                                                             | 1,200 | 3                 | 0.1                | 38,000                      | 1,080 | 3                 | 0.1                | 36,500                  | 504   | 1                 | 0.06               |
| Ø3                     | 38,400                                                                             | 2,736 | 4.5               | 0.15               | 34,560                      | 2,462 | 4.5               | 0.15               | 27,648                  | 1,149 | 1.5               | 0.09               |
| Ø4                     | 28,800                                                                             | 3,168 | 6                 | 0.2                | 25,920                      | 2,851 | 6                 | 0.2                | 20,736                  | 1,331 | 2                 | 0.12               |
| Ø5                     | 24,000                                                                             | 3,600 | 7.5               | 0.25               | 21,600                      | 3,240 | 7.5               | 0.25               | 17,280                  | 1,512 | 2.5               | 0.15               |
| Ø6                     | 19,200                                                                             | 4,176 | 9                 | 0.3                | 17,280                      | 3,758 | 9                 | 0.3                | 13,824                  | 1,754 | 3                 | 0.18               |
| Ø8                     | 14,400                                                                             | 4,176 | 12                | 0.4                | 12,960                      | 3,758 | 12                | 0.4                | 10,368                  | 1,754 | 4                 | 0.24               |
| Ø10                    | 11,520                                                                             | 4,176 | 15                | 0.5                | 10,368                      | 3,758 | 15                | 0.5                | 8,294                   | 1,754 | 5                 | 0.3                |
| Ø12                    | 9,600                                                                              | 3,456 | 18                | 0.6                | 8,640                       | 3,110 | 18                | 0.6                | 6,912                   | 1,452 | 6                 | 0.36               |
| Ø16                    | 7,200                                                                              | 2,592 | 24                | 0.8                | 6,480                       | 2,333 | 24                | 0.8                | 5,184                   | 1,089 | 8                 | 0.48               |
| Ø20                    | 5,760                                                                              | 2,088 | 30                | 1                  | 5,184                       | 1,879 | 30                | 1                  | 4,147                   | 877   | 10                | 0.6                |
| 절입량<br>Depth of Cut    |  |       |                   |                    |                             |       |                   |                    |                         |       |                   |                    |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- HRC52 이상 고경도강 가공시 52HRC 조건의 같은 직경 대비 상기 절삭조건의 20% DOWN 해주십시오.
- 유효장이 길게 체결할시 회전수와 피드를 같은 비율로 DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스펴들 속도를 초과 하거나 버 및 적열 현상이 발생할때 스펴들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 콜런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When milling workpiece HRC over 52 hardened steel, reduce 20% of the RPM and feed compared to the same diameter.
- If you clamp the endmill with long overhang of effective length, reduce the RPM and feed in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or oil mist is recommended for smooth chip emission, and dry milling is recommended for copper material.

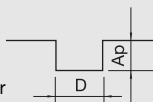
| 파삭재<br>Material        |                         | 동<br>Copper |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|------------------------|-------------------------|-------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness            |                         |             |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 외경<br>Outside Diameter | 유효장<br>Effective Length | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø0.2                   | 1                       | 50,000      | 352   | 0.264             | 0.020              | 50,000                      | 196   | 0.006             | 0.020              | 34,500                  | 150   | 0.004             | 0.020              |
| "                      | 1.5                     | 50,000      | 311   | 0.017             | 0.010              | 50,000                      | 173   | 0.005             | 0.010              | 26,450                  | 104   | 0.003             | 0.010              |
| Ø0.3                   | 1                       | 50,000      | 890   | 0.029             | 0.020              | 50,000                      | 495   | 0.007             | 0.020              | 34,500                  | 345   | 0.005             | 0.015              |
| "                      | 3                       | 50,000      | 393   | 0.029             | 0.015              | 50,000                      | 219   | 0.006             | 0.015              | 24,150                  | 81    | 0.003             | 0.010              |
| Ø0.4                   | 1                       | 47,150      | 890   | 0.047             | 0.062              | 50,000                      | 495   | 0.013             | 0.070              | 39,675                  | 368   | 0.011             | 0.070              |
| "                      | 3                       | 33,350      | 683   | 0.026             | 0.053              | 26,450                      | 380   | 0.008             | 0.026              | 26,450                  | 276   | 0.007             | 0.026              |
| Ø0.5                   | 1                       | 48,300      | 2,008 | 0.079             | 0.114              | 48,300                      | 1,116 | 0.033             | 0.119              | 39,100                  | 840   | 0.029             | 0.119              |
| "                      | 3                       | 31,050      | 1,118 | 0.056             | 0.088              | 31,050                      | 621   | 0.022             | 0.110              | 25,415                  | 460   | 0.020             | 0.110              |
| "                      | 5                       | 25,760      | 827   | 0.026             | 0.044              | 25,760                      | 459   | 0.011             | 0.010              | 20,700                  | 345   | 0.010             | 0.010              |
| Ø0.6                   | 2                       | 27,945      | 890   | 0.111             | 0.158              | 27,945                      | 495   | 0.010             | 0.214              | 23,000                  | 380   | 0.010             | 0.214              |
| "                      | 6                       | 16,445      | 435   | 0.035             | 0.044              | 16,445                      | 242   | 0.003             | 0.010              | 13,570                  | 184   | 0.003             | 0.010              |
| Ø0.8                   | 4                       | 17,250      | 787   | 0.129             | 0.194              | 17,020                      | 437   | 0.014             | 0.114              | 14,720                  | 345   | 0.015             | 0.114              |
| "                      | 8                       | 12,650      | 475   | 0.029             | 0.098              | 12,650                      | 264   | 0.005             | 0.088              | 10,695                  | 184   | 0.004             | 0.088              |
| Ø1                     | 4                       | 13,800      | 1,449 | 0.196             | 0.396              | 13,800                      | 805   | 0.029             | 0.264              | 11,730                  | 655   | 0.034             | 0.264              |
| "                      | 10                      | 8,625       | 559   | 0.047             | 0.308              | 8,625                       | 311   | 0.011             | 0.123              | 7,475                   | 264   | 0.013             | 0.123              |
| "                      | 16                      | 6,900       | 331   | 0.018             | 0.220              | 6,900                       | 184   | 0.004             | 0.026              | 5,980                   | 161   | 0.005             | 0.026              |
| Ø1.2                   | 6                       | 9,200       | 1,035 | 0.182             | 0.457              | 9,200                       | 575   | 0.018             | 0.088              | 8,165                   | 483   | 0.215             | 0.088              |
| "                      | 12                      | 6,670       | 662   | 0.053             | 0.396              | 6,670                       | 368   | 0.007             | 0.070              | 5,980                   | 299   | 0.008             | 0.070              |
| Ø1.5                   | 4                       | 12,880      | 1,925 | 0.293             | 0.660              | 12,880                      | 1,070 | 0.044             | 0.440              | 11,730                  | 920   | 0.059             | 0.440              |
| "                      | 10                      | 8,280       | 1,325 | 0.147             | 0.554              | 8,280                       | 736   | 0.031             | 0.282              | 7,590                   | 633   | 0.041             | 0.282              |
| "                      | 20                      | 5,865       | 725   | 0.041             | 0.352              | 6,350                       | 403   | 0.005             | 0.106              | 4,160                   | 345   | 0.006             | 0.106              |
| Ø2                     | 6                       | 12,535      | 1,801 | 0.314             | 0.836              | 12,535                      | 1,001 | 0.042             | 0.792              | 11,730                  | 909   | 0.059             | 0.792              |
| "                      | 12                      | 9,200       | 1,449 | 0.182             | 0.704              | 9,200                       | 805   | 0.030             | 0.440              | 8,280                   | 725   | 0.043             | 0.440              |
| "                      | 20                      | 6,900       | 1,139 | 0.091             | 0.651              | 6,200                       | 633   | 0.017             | 0.194              | 3,520                   | 564   | 0.023             | 0.194              |
| "                      | 30                      | 5,865       | 973   | 0.049             | 0.440              | 3,300                       | 541   | 0.005             | 0.132              | 2,860                   | 495   | 0.005             | 0.132              |
| Ø2.5                   | 10                      | 10,350      | 1,801 | 0.331             | 0.836              | 10,350                      | 1,001 | 0.051             | 0.528              | 9,775                   | 943   | 0.073             | 0.528              |
| "                      | 30                      | 6,210       | 787   | 0.067             | 0.616              | 6,210                       | 437   | 0.011             | 0.176              | 5,865                   | 414   | 0.016             | 0.176              |
| Ø3                     | 12                      | 10,350      | 2,029 | 0.381             | 0.831              | 10,350                      | 1,127 | 0.103             | 0.616              | 9,775                   | 874   | 0.103             | 0.655              |
| "                      | 20                      | 8,165       | 1,553 | 0.254             | 0.762              | 6,050                       | 863   | 0.071             | 0.567              | 3,420                   | 667   | 0.071             | 0.567              |
| "                      | 30                      | 6,900       | 1,263 | 0.137             | 0.674              | 3,300                       | 702   | 0.049             | 0.371              | 2,890                   | 541   | 0.049             | 0.371              |
| Ø4                     | 12                      | 8,740       | 1,904 | 0.401             | 1.525              | 8,740                       | 1,058 | 0.081             | 1.124              | 7,360                   | 920   | 0.117             | 1.124              |
| "                      | 20                      | 6,785       | 1,458 | 0.375             | 1.325              | 5,880                       | 810   | 0.053             | 0.880              | 5,750                   | 840   | 0.078             | 0.880              |
| "                      | 30                      | 5,750       | 752   | 0.196             | 1.210              | 2,950                       | 418   | 0.028             | 0.671              | 2,540                   | 656   | 0.041             | 0.671              |
| "                      | 45                      | 4,715       | 500   | 0.096             | 1.118              | 2,300                       | 278   | 0.007             | 0.326              | 2,015                   | 322   | 0.010             | 0.326              |
| Ø5                     | 15                      | 7,705       | 3,064 | 0.697             | 2.277              | 7,705                       | 1,702 | 0.106             | 1.346              | 5,520                   | 1,139 | 0.150             | 1.346              |
| "                      | 30                      | 5,290       | 1,470 | 0.342             | 1.760              | 2,780                       | 817   | 0.053             | 1.035              | 3,795                   | 541   | 0.075             | 1.035              |
| Ø6                     | 20                      | 5,980       | 2,194 | 0.600             | 2.194              | 5,460                       | 1,219 | 0.476             | 1.356              | 3,565                   | 1,035 | 0.186             | 1.356              |
| "                      | 40                      | 4,600       | 1,635 | 0.565             | 2.049              | 2,380                       | 909   | 0.410             | 1.304              | 2,160                   | 759   | 0.164             | 1.304              |
| Ø8                     | 22                      | 5,520       | 1,946 | 0.528             | 2.542              | 5,520                       | 1,081 | 0.419             | 1.518              | 3,220                   | 909   | 0.164             | 1.518              |
| "                      | 40                      | 4,140       | 1,449 | 0.497             | 2.277              | 2,120                       | 805   | 0.361             | 1.323              | 2,080                   | 667   | 0.144             | 1.323              |
| Ø10                    | 24                      | 4,600       | 1,656 | 0.449             | 2.887              | 4,485                       | 920   | 0.356             | 1.645              | 2,760                   | 771   | 0.139             | 1.645              |
| "                      | 45                      | 3,450       | 1,221 | 0.423             | 2.438              | 3,450                       | 679   | 0.307             | 1.334              | 1,955                   | 564   | 0.122             | 1.334              |
| Ø12                    | 26                      | 3,795       | 1,387 | 0.377             | 3.013              | 3,795                       | 771   | 0.299             | 2.024              | 2,300                   | 644   | 0.117             | 2.024              |
| "                      | 50                      | 2,875       | 1,035 | 0.355             | 2.415              | 2,875                       | 575   | 0.258             | 1.403              | 1,725                   | 483   | 0.103             | 1.403              |
| Ø16                    | 35                      | 2,990       | 1,097 | 0.302             | 2.921              | 2,990                       | 610   | 0.239             | 2.162              | 1,725                   | 518   | 0.094             | 2.162              |

절입량  
Depth of Cut

Slotting

• Ap : Axial Depth

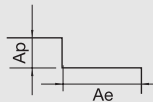
• D : Outside Diameter



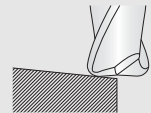
Side Milling

• Ap : Axial Depth

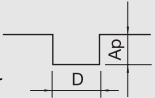
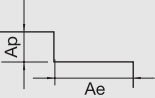
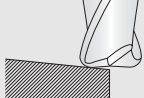
• Ae : Radial Depth



경사진 면 절삭  
Inclined Cutting



- HRC52 이상인 경우 같은 직경의 같은 비율로 20% DOWN 시켜 주십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- Ae 값 설정시 코너R 치수를 고려해 주십시오.
- 곡면 절삭시 날경의 코너R 보다 낮은 이송 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- When milling workpiece HRC over 52 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- Consider the corner radius value when you set up the Ae value.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.

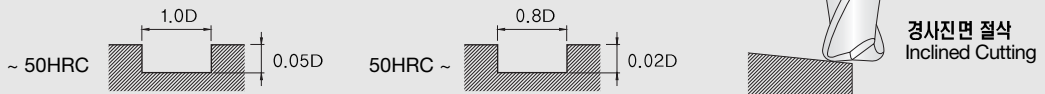
| 파삭재<br>Material        |                         | 탄소강/ 합금강<br>Carbon Steel/ Alloy Steels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |                   |                    | 프리하든강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-----------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness            |                         | ~ 35HRC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                   |                    | 40 ~ 50HRC                  |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 외경<br>Outside Diameter | 유효장<br>Effective Length | RPM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1                     | 4                       | 13,110                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1,884 | 0.216             | 0.435              | 13,110                      | 1,047 | 0.032             | 0.290              | 11,144                  | 851   | 0.038             | 0.290              |
| "                      | 10                      | 8,194                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 727   | 0.052             | 0.339              | 8,194                       | 404   | 0.012             | 0.135              | 7,101                   | 343   | 0.014             | 0.135              |
| ø1.2                   | 4                       | 8,740                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1,346 | 0.200             | 0.503              | 8,740                       | 748   | 0.019             | 0.097              | 7,757                   | 628   | 0.237             | 0.097              |
| "                      | 10                      | 6,337                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 861   | 0.058             | 0.435              | 6,337                       | 478   | 0.008             | 0.077              | 5,681                   | 389   | 0.009             | 0.077              |
| ø1.5                   | 6                       | 12,236                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2,503 | 0.323             | 0.726              | 12,236                      | 1,390 | 0.048             | 0.484              | 11,144                  | 1,196 | 0.065             | 0.484              |
| "                      | 12                      | 7,866                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1,722 | 0.161             | 0.610              | 7,866                       | 957   | 0.034             | 0.310              | 7,211                   | 822   | 0.045             | 0.310              |
| ø2                     | 6                       | 11,908                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2,341 | 0.345             | 0.919              | 11,908                      | 1,301 | 0.046             | 0.871              | 11,144                  | 1,181 | 0.065             | 0.871              |
| "                      | 12                      | 8,740                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1,884 | 0.200             | 0.774              | 8,740                       | 1,047 | 0.033             | 0.484              | 7,866                   | 942   | 0.047             | 0.484              |
| ø2.5                   | 10                      | 9,833                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2,341 | 0.365             | 0.919              | 9,833                       | 1,301 | 0.056             | 0.581              | 9,286                   | 1,226 | 0.081             | 0.581              |
| "                      | 20                      | 5,900                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1,023 | 0.074             | 0.677              | 5,900                       | 568   | 0.012             | 0.194              | 5,572                   | 538   | 0.017             | 0.194              |
| ø3                     | 10                      | 9,833                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2,637 | 0.419             | 0.914              | 9,833                       | 1,465 | 0.113             | 0.678              | 9,286                   | 1,136 | 0.113             | 0.720              |
| "                      | 20                      | 7,757                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2,018 | 0.280             | 0.839              | 5,748                       | 1,121 | 0.078             | 0.624              | 3,249                   | 867   | 0.078             | 0.624              |
| ø4                     | 12                      | 8,303                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2,476 | 0.441             | 1.677              | 8,303                       | 1,375 | 0.089             | 1.237              | 6,992                   | 1,196 | 0.129             | 1.237              |
| "                      | 20                      | 6,446                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1,895 | 0.413             | 1.457              | 5,586                       | 1,053 | 0.058             | 0.968              | 5,463                   | 1,091 | 0.086             | 0.968              |
| "                      | 30                      | 5,463                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 978   | 0.215             | 1.331              | 2,803                       | 543   | 0.031             | 0.738              | 2,413                   | 852   | 0.046             | 0.738              |
| ø6                     | 20                      | 5,681                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2,852 | 0.660             | 2.414              | 5,187                       | 1,585 | 0.524             | 1.491              | 3,387                   | 1,346 | 0.205             | 1.491              |
| "                      | 40                      | 4,370                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2,126 | 0.622             | 2.254              | 2,261                       | 1,181 | 0.451             | 1.435              | 2,052                   | 987   | 0.180             | 1.435              |
| ø8                     | 22                      | 5,244                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2,530 | 0.581             | 2.796              | 5,244                       | 1,405 | 0.461             | 1.670              | 3,059                   | 1,181 | 0.180             | 1.670              |
| ø10                    | 24                      | 4,370                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2,153 | 0.494             | 3.175              | 4,261                       | 1,196 | 0.392             | 1.809              | 2,622                   | 1,002 | 0.153             | 1.809              |
| ø12                    | 26                      | 3,605                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1,803 | 0.415             | 3.314              | 3,605                       | 1,002 | 0.329             | 2.226              | 2,185                   | 837   | 0.129             | 2.226              |
| 절입량<br>Depth of Cut    |                         | <div> Slotting <ul style="list-style-type: none"> <li>• Ap : Axial Depth</li> <li>• D : Outside Diameter</li> </ul>  </div> <div> Side Milling <ul style="list-style-type: none"> <li>• Ap : Axial Depth</li> <li>• Ae : Radial Depth</li> </ul>  </div> <div> 경사진 면 절삭<br/>Inclined Cutting  </div> |       |                   |                    |                             |       |                   |                    |                         |       |                   |                    |

- HRC52 이상인 경우 같은 직경의 같은 비율로 20% DOWN 시켜 주십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- Ae 값 설정시 코너R 치수를 고려해 주십시오.
- 곡면 절삭시 날경의 코너R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- When milling workpiece HRC over 52 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- Consider the corner radius value when you set up the Ae value.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.

**홈 절삭 Slotting**

| 파삭재<br>Material        | 탄소강/합금강<br>Carbon Steel/ Alloy Steels |       |                   |                    | 프리카하튼강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|---------------------------------------|-------|-------------------|--------------------|------------------------------|-------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            | ~ 35HRC                               |       |                   |                    | 40 ~ 50HRC                   |       |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                   | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                          | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.4                   | 42,500                                | 562   | 0.020             | 0.4                | 38,250                       | 268   | 0.020             | 0.4                | 34,000                  | 107  | 0.008             | 0.32               |
| ø0.5                   | 42,500                                | 643   | 0.025             | 0.5                | 38,250                       | 306   | 0.025             | 0.5                | 34,000                  | 122  | 0.01              | 0.4                |
| ø0.6                   | 42,500                                | 723   | 0.03              | 0.6                | 38,250                       | 344   | 0.03              | 0.6                | 34,000                  | 138  | 0.012             | 0.48               |
| ø0.8                   | 42,500                                | 803   | 0.04              | 0.8                | 38,250                       | 383   | 0.04              | 0.8                | 25,500                  | 153  | 0.016             | 0.64               |
| ø1                     | 40,800                                | 1,992 | 0.05              | 1                  | 32,300                       | 949   | 0.05              | 1                  | 21,675                  | 379  | 0.02              | 0.8                |
| ø2                     | 28,305                                | 2,378 | 0.1               | 2                  | 22,100                       | 1,132 | 0.1               | 2                  | 14,875                  | 453  | 0.04              | 1.6                |
| ø3                     | 18,530                                | 2,410 | 0.15              | 3                  | 14,705                       | 1,148 | 0.15              | 3                  | 9,775                   | 459  | 0.06              | 2.4                |
| ø4                     | 14,195                                | 2,474 | 0.2               | 4                  | 11,220                       | 1,178 | 0.2               | 4                  | 7,480                   | 471  | 0.08              | 3.2                |
| ø5                     | 13,345                                | 2,635 | 0.25              | 5                  | 10,625                       | 1,255 | 0.25              | 5                  | 7,055                   | 502  | 0.1               | 4                  |
| ø6                     | 11,135                                | 2,570 | 0.3               | 6                  | 8,798                        | 1,224 | 0.3               | 6                  | 5,865                   | 490  | 0.12              | 4.8                |
| ø8                     | 8,398                                 | 2,345 | 0.4               | 8                  | 6,630                        | 1,117 | 0.4               | 8                  | 4,420                   | 447  | 0.16              | 6.4                |
| ø10                    | 6,630                                 | 2,185 | 0.5               | 10                 | 5,228                        | 1,040 | 0.5               | 10                 | 3,485                   | 416  | 0.2               | 8                  |
| ø12                    | 5,653                                 | 2,185 | 0.6               | 12                 | 4,463                        | 1,040 | 0.6               | 12                 | 2,975                   | 416  | 0.24              | 9.6                |

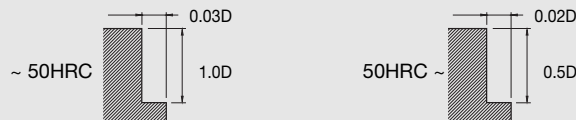
절입량  
Depth of Cut



**측면 절삭 Side Cutting**

| 파삭재<br>Material        | 탄소강/합금강<br>Carbon Steel/ Alloy Steels |       |                   |                    | 프리카하튼강<br>Prehardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|---------------------------------------|-------|-------------------|--------------------|------------------------------|-------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            | ~ 35HRC                               |       |                   |                    | 40 ~ 50HRC                   |       |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                   | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                          | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.4                   | 42,500                                | 236   | 0.4               | 0.01               | 38,250                       | 212   | 0.4               | 0.01               | 34,000                  | 127  | 0.20              | 0.01               |
| ø0.5                   | 42,500                                | 261   | 0.5               | 0.015              | 38,250                       | 235   | 0.5               | 0.015              | 34,000                  | 141  | 0.25              | 0.01               |
| ø0.6                   | 42,500                                | 263   | 0.6               | 0.018              | 38,250                       | 236   | 0.6               | 0.018              | 34,000                  | 142  | 0.30              | 0.012              |
| ø0.8                   | 42,500                                | 427   | 0.8               | 0.024              | 34,000                       | 384   | 0.8               | 0.024              | 25,500                  | 231  | 0.40              | 0.016              |
| ø1                     | 40,800                                | 833   | 1                 | 0.03               | 32,300                       | 750   | 1                 | 0.03               | 21,675                  | 450  | 0.50              | 0.02               |
| ø2                     | 28,305                                | 1,224 | 2                 | 0.06               | 22,100                       | 1,102 | 2                 | 0.06               | 14,875                  | 661  | 1.00              | 0.04               |
| ø3                     | 18,530                                | 1,250 | 3                 | 0.09               | 14,705                       | 1,125 | 3                 | 0.09               | 9,775                   | 675  | 1.50              | 0.06               |
| ø4                     | 14,195                                | 1,275 | 4                 | 0.12               | 11,220                       | 1,148 | 4                 | 0.12               | 7,480                   | 689  | 2.00              | 0.08               |
| ø5                     | 13,345                                | 1,479 | 5                 | 0.15               | 10,625                       | 1,331 | 5                 | 0.15               | 7,055                   | 799  | 2.50              | 0.1                |
| ø6                     | 11,135                                | 1,377 | 6                 | 0.18               | 8,798                        | 1,239 | 6                 | 0.18               | 5,865                   | 744  | 3.00              | 0.12               |
| ø8                     | 8,398                                 | 1,346 | 8                 | 0.24               | 6,630                        | 1,212 | 8                 | 0.24               | 4,420                   | 727  | 4.00              | 0.16               |
| ø10                    | 6,630                                 | 1,224 | 10                | 0.3                | 5,228                        | 1,102 | 10                | 0.3                | 3,485                   | 661  | 5.00              | 0.2                |
| ø12                    | 5,653                                 | 1,200 | 12                | 0.36               | 4,463                        | 1,100 | 12                | 0.36               | 2,975                   | 635  | 6.00              | 0.24               |

절입량  
Depth of Cut



- HRC52 이상인 경우, 같은 직경의 같은 비율로 20% DOWN 시켜 주십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 곡면 절삭시 날경의 코너 R 보다 낮은 이동 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 30%까지 UP 해주십시오.
- 상기 절삭조건표는 2날 기준이며, 4날시 회전수는 유지하고, 피드는 안정적인 속도 내에서 최대 30%까지 UP 해주십시오.
- 홈 절삭시 날경의 코너R 대비 Ae 값을 설정 하십시오.
- 상기 절삭조건표의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 피삭재와 절삭형상을 위한 적절한 쿨런트 사용과 가공시 발열, 발화에 주의 하십시오. .
- When milling workpiece is over HRC 52 hardened steel, reduce 20% of the RPM and feed compared to the same diameter.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 30% in stable milling condition.
- The parameters on the table is based on 2 flutes. For using 4 flutes, use the same RPM and raise up the feed up to 30% in stable milling condition.
- For groove milling, set up the Ae value by considering of corner radius value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use the adequate coolant for work material and machining geometry and note for heat and ignition.

## 홈 절삭 Slotting

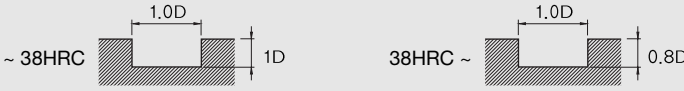
| 파삭재<br>Material        | 일반구조강/ 탄소강<br>Mild Steels/ Carbon Steels                        |      |                   |                    | 합금강/ 공구강<br>Alloy Steels/ Tool Steels |      |                   |                    | 공구강/ 프리하트강<br>Tool Steels/ Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|-----------------------------------------------------------------|------|-------------------|--------------------|---------------------------------------|------|-------------------|--------------------|-----------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            | ~ 750N/mm <sup>2</sup>                                          |      |                   |                    | ~ 30HRC                               |      |                   |                    | 30 ~ 38HRC                                    |      |                   |                    | 38 ~ 45HRC              |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                             | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                           | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø4                     | 3,870                                                           | 395  | 4                 | 4                  | 3,251                                 | 201  | 4                 | 4                  | 2,786                                         | 139  | 4                 | 4                  | 2,167                   | 101  | 3.2               | 4                  |
| ø5                     | 3,870                                                           | 395  | 5                 | 5                  | 3,251                                 | 209  | 5                 | 5                  | 2,477                                         | 155  | 5                 | 5                  | 1,858                   | 116  | 4                 | 5                  |
| ø6                     | 3,251                                                           | 395  | 6                 | 6                  | 2,786                                 | 224  | 6                 | 6                  | 2,167                                         | 170  | 6                 | 6                  | 1,625                   | 132  | 4.8               | 6                  |
| ø8                     | 2,477                                                           | 395  | 8                 | 8                  | 2,090                                 | 255  | 8                 | 8                  | 1,625                                         | 194  | 8                 | 8                  | 1,238                   | 147  | 6.4               | 8                  |
| ø10                    | 2,012                                                           | 395  | 10                | 10                 | 1,703                                 | 267  | 10                | 10                 | 1,238                                         | 201  | 10                | 10                 | 1,006                   | 163  | 8                 | 10                 |
| ø12                    | 1,625                                                           | 395  | 12                | 12                 | 1,393                                 | 279  | 12                | 12                 | 1,084                                         | 209  | 12                | 12                 | 851                     | 166  | 9.6               | 12                 |
| ø16                    | 1,238                                                           | 395  | 16                | 16                 | 1,084                                 | 298  | 16                | 16                 | 774                                           | 224  | 16                | 16                 | 619                     | 170  | 12.8              | 16                 |
| ø20                    | 1,006                                                           | 372  | 20                | 20                 | 851                                   | 290  | 20                | 20                 | 619                                           | 217  | 20                | 20                 | 495                     | 163  | 16                | 20                 |
| 절입량<br>Depth of Cut    | <div> <div>~ 38HRC</div> </div> <div> <div>38HRC ~</div> </div> |      |                   |                    |                                       |      |                   |                    |                                               |      |                   |                    |                         |      |                   |                    |

## 측면 절삭 Side Cutting

| 파삭재<br>Material        | 일반구조강/ 탄소강<br>Mild Steels/ Carbon Steels                        |      |                   |                    | 합금강/ 공구강<br>Alloy Steels/ Tool Steels |      |                   |                    | 공구강/ 프리하트강<br>Tool Steels/ Prehardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|-----------------------------------------------------------------|------|-------------------|--------------------|---------------------------------------|------|-------------------|--------------------|-----------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            | ~ 750N/mm <sup>2</sup>                                          |      |                   |                    | ~ 30HRC                               |      |                   |                    | 30 ~ 38HRC                                    |      |                   |                    | 38 ~ 45HRC              |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                             | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                           | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø4                     | 4,300                                                           | 439  | 6                 | 2                  | 3,612                                 | 224  | 6                 | 2                  | 3,096                                         | 155  | 6                 | 2                  | 2,408                   | 112  | 4                 | 1.2                |
| ø5                     | 4,300                                                           | 439  | 7.5               | 2.5                | 3,612                                 | 232  | 7.5               | 2.5                | 2,752                                         | 172  | 7.5               | 2.5                | 2,064                   | 129  | 5                 | 1.5                |
| ø6                     | 3,612                                                           | 439  | 9                 | 3                  | 3,096                                 | 249  | 9                 | 3                  | 2,408                                         | 189  | 9                 | 3                  | 1,806                   | 146  | 6                 | 1.8                |
| ø8                     | 2,752                                                           | 439  | 12                | 4                  | 2,322                                 | 284  | 12                | 4                  | 1,806                                         | 215  | 12                | 4                  | 1,376                   | 163  | 8                 | 2.4                |
| ø10                    | 2,236                                                           | 439  | 15                | 5                  | 1,892                                 | 297  | 15                | 5                  | 1,376                                         | 224  | 15                | 5                  | 1,118                   | 181  | 10                | 3                  |
| ø12                    | 1,806                                                           | 439  | 18                | 6                  | 1,548                                 | 310  | 18                | 6                  | 1,204                                         | 232  | 18                | 6                  | 946                     | 185  | 12                | 3.6                |
| ø16                    | 1,376                                                           | 439  | 24                | 8                  | 1,204                                 | 331  | 24                | 8                  | 860                                           | 249  | 24                | 8                  | 688                     | 189  | 16                | 4.8                |
| ø20                    | 1,118                                                           | 413  | 30                | 10                 | 946                                   | 323  | 30                | 10                 | 688                                           | 241  | 30                | 10                 | 550                     | 181  | 20                | 6                  |
| 절입량<br>Depth of Cut    | <div> <div>~ 38HRC</div> </div> <div> <div>38HRC ~</div> </div> |      |                   |                    |                                       |      |                   |                    |                                               |      |                   |                    |                         |      |                   |                    |

- 가능한 공구 길이 측정식 유압식 측정이 아닌 레이저식 도구 세터를 사용 하십시오.
- 가공 진입시 가능한 파삭재 밖에서 진입 하십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 상기 절삭조건은 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우, 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 파삭재와 가공 모양에 따라 적절한 쿨런트를 사용 하십시오.
- 스테인레스, 내열합금강 등의 절단 가공시 수용성 절삭유가 가장 효과적 입니다.
- Use laser tool measurement instead of hydraulic measurement when measuring tool length as possible.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.
- For stainless and heat resistant alloy, water-soluble oil is the most effective.

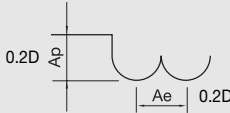
## 홈 절삭 Slotting

| 피삭재<br>Material           | 일반구조강/ 탄소강<br>Mild Steels/ Carbon Steels                                           |      |                      |                       | 합금강/ 공구강<br>Alloy Steels/ Tool Steels |      |                      |                       | 공구강/ 프리하트강<br>Tool Steels/ Prehardened Steels |      |                      |                       | 공구강/ 스테인레스강<br>Tool Steels/ Stainless Steels |      |                      |                       |
|---------------------------|------------------------------------------------------------------------------------|------|----------------------|-----------------------|---------------------------------------|------|----------------------|-----------------------|-----------------------------------------------|------|----------------------|-----------------------|----------------------------------------------|------|----------------------|-----------------------|
| 경도 Hardness               | ~ 750N/mm <sup>2</sup>                                                             |      |                      |                       | ~ 30HRC                               |      |                      |                       | 30 ~ 38HRC                                    |      |                      |                       | 38 ~ 45HRC                                   |      |                      |                       |
| 외경<br>Outside<br>Diameter | RPM                                                                                | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                   | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                           | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                          | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø4                        | 4,698                                                                              | 486  | 4                    | 4                     | 3,888                                 | 243  | 4                    | 4                     | 3,321                                         | 162  | 4                    | 4                     | 2,592                                        | 122  | 3.2                  | 4                     |
| ø5                        | 4,698                                                                              | 486  | 5                    | 5                     | 3,888                                 | 251  | 5                    | 5                     | 2,997                                         | 186  | 5                    | 5                     | 2,268                                        | 138  | 4                    | 5                     |
| ø6                        | 3,888                                                                              | 486  | 6                    | 6                     | 3,402                                 | 267  | 6                    | 6                     | 2,592                                         | 203  | 6                    | 6                     | 1,944                                        | 162  | 4.8                  | 6                     |
| ø8                        | 2,997                                                                              | 486  | 8                    | 8                     | 2,511                                 | 307  | 8                    | 8                     | 1,944                                         | 235  | 8                    | 8                     | 1,458                                        | 178  | 6.4                  | 8                     |
| ø10                       | 2,430                                                                              | 486  | 10                   | 10                    | 2,025                                 | 324  | 10                   | 10                    | 1,458                                         | 243  | 10                   | 10                    | 1,215                                        | 203  | 8                    | 10                    |
| ø12                       | 1,944                                                                              | 486  | 12                   | 12                    | 1,701                                 | 332  | 12                   | 12                    | 1,296                                         | 251  | 12                   | 12                    | 1,053                                        | 203  | 9.6                  | 12                    |
| ø16                       | 1,499                                                                              | 486  | 16                   | 16                    | 1,296                                 | 356  | 16                   | 16                    | 972                                           | 267  | 16                   | 16                    | 810                                          | 203  | 12.8                 | 16                    |
| ø20                       | 1,215                                                                              | 446  | 20                   | 20                    | 1,053                                 | 348  | 20                   | 20                    | 729                                           | 259  | 20                   | 20                    | 608                                          | 194  | 16                   | 20                    |
| 절입량<br>Depth of Cut       |  |      |                      |                       |                                       |      |                      |                       |                                               |      |                      |                       |                                              |      |                      |                       |

## 측면 절삭 Side Cutting

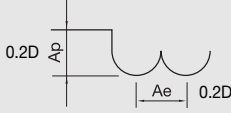
| 피삭재<br>Material           | 일반구조강/ 탄소강<br>Mild Steels/ Carbon Steels                                             |      |                      |                       | 합금강/ 공구강<br>Alloy Steels/ Tool Steels |      |                      |                       | 공구강/ 프리하트강<br>Tool Steels/ Prehardened Steels |      |                      |                       | 공구강/ 스테인레스강<br>Tool Steels/ Stainless Steels |      |                      |                       |
|---------------------------|--------------------------------------------------------------------------------------|------|----------------------|-----------------------|---------------------------------------|------|----------------------|-----------------------|-----------------------------------------------|------|----------------------|-----------------------|----------------------------------------------|------|----------------------|-----------------------|
| 경도 Hardness               | ~ 750N/mm <sup>2</sup>                                                               |      |                      |                       | ~ 30HRC                               |      |                      |                       | 30 ~ 38HRC                                    |      |                      |                       | 38 ~ 45HRC                                   |      |                      |                       |
| 외경<br>Outside<br>Diameter | RPM                                                                                  | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                   | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                           | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth | RPM                                          | FEED | Ap<br>Axial<br>Depth | Ae<br>Radial<br>Depth |
| ø4                        | 5,220                                                                                | 540  | 6                    | 2                     | 4,320                                 | 270  | 6                    | 2                     | 3,690                                         | 180  | 6                    | 2                     | 2,880                                        | 135  | 4                    | 1.6                   |
| ø5                        | 5,220                                                                                | 540  | 7.5                  | 2.5                   | 4,320                                 | 279  | 7.5                  | 2.5                   | 3,330                                         | 207  | 7.5                  | 2.5                   | 2,520                                        | 153  | 5                    | 2                     |
| ø6                        | 4,320                                                                                | 540  | 9                    | 3                     | 3,780                                 | 297  | 9                    | 3                     | 2,880                                         | 225  | 9                    | 3                     | 2,160                                        | 180  | 6                    | 2.4                   |
| ø8                        | 3,330                                                                                | 540  | 12                   | 4                     | 2,790                                 | 342  | 12                   | 4                     | 2,160                                         | 261  | 12                   | 4                     | 1,620                                        | 198  | 8                    | 3.2                   |
| ø10                       | 2,700                                                                                | 540  | 15                   | 5                     | 2,250                                 | 360  | 15                   | 5                     | 1,620                                         | 270  | 15                   | 5                     | 1,350                                        | 225  | 10                   | 4                     |
| ø12                       | 2,160                                                                                | 540  | 18                   | 6                     | 1,890                                 | 369  | 18                   | 6                     | 1,440                                         | 279  | 18                   | 6                     | 1,170                                        | 225  | 12                   | 4.8                   |
| ø16                       | 1,665                                                                                | 540  | 24                   | 8                     | 1,440                                 | 396  | 24                   | 8                     | 1,080                                         | 297  | 24                   | 8                     | 900                                          | 225  | 16                   | 6.4                   |
| ø20                       | 1,350                                                                                | 495  | 30                   | 10                    | 1,170                                 | 387  | 30                   | 10                    | 810                                           | 288  | 30                   | 10                    | 675                                          | 216  | 20                   | 8                     |
| 절입량<br>Depth of Cut       |  |      |                      |                       |                                       |      |                      |                       |                                               |      |                      |                       |                                              |      |                      |                       |

- 가능한 공구 길이 측정시 유압식 측정이 아닌 레이저식 도구 세터를 사용 하십시오.
- 가공 진입시 가능한 피삭재 밖에서 진입 하십시오.
- 유효장이가 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 상기 절삭조건은의 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우, 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 피삭재와 가공 모양에 따라 적절한 쿨런트를 사용 하십시오.
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- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.
- For stainless and heat resistant alloy, water-soluble oil is the most effective.

| 파삭재 Material        |                         | 흑연 Graphite                                                                        |       |                   |                    |
|---------------------|-------------------------|------------------------------------------------------------------------------------|-------|-------------------|--------------------|
| 반경<br>Radius        | 유효장<br>Effective Length | RPM                                                                                | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.25              | 5                       | 25,000                                                                             | 320   | 0.05              | 0.05               |
| R 0.5               | 10                      | 21,850                                                                             | 380   | 0.10              | 0.10               |
| "                   | 20                      | 19,665                                                                             | 342   | 0.09              | 0.09               |
| "                   | 30                      | 18,682                                                                             | 325   | 0.08              | 0.08               |
| R 0.75              | 10                      | 21,850                                                                             | 646   | 0.15              | 0.15               |
| "                   | 20                      | 19,665                                                                             | 630   | 0.14              | 0.14               |
| "                   | 30                      | 18,682                                                                             | 580   | 0.11              | 0.11               |
| R 1                 | 15                      | 19,950                                                                             | 760   | 0.20              | 0.20               |
| "                   | 20                      | 17,955                                                                             | 684   | 0.18              | 0.18               |
| "                   | 30                      | 16,160                                                                             | 616   | 0.16              | 0.16               |
| "                   | 40                      | 13,736                                                                             | 523   | 0.13              | 0.13               |
| "                   | 50                      | 10,988                                                                             | 419   | 0.10              | 0.10               |
| R 1.5               | 20                      | 17,575                                                                             | 1,378 | 0.30              | 0.30               |
| "                   | 30                      | 15,818                                                                             | 1,240 | 0.27              | 0.27               |
| "                   | 40                      | 14,236                                                                             | 1,116 | 0.24              | 0.24               |
| "                   | 50                      | 12,100                                                                             | 948   | 0.22              | 0.22               |
| R 2                 | 20                      | 15,200                                                                             | 1,995 | 0.40              | 0.40               |
| "                   | 35                      | 13,680                                                                             | 1,796 | 0.36              | 0.36               |
| "                   | 45                      | 12,312                                                                             | 1,616 | 0.31              | 0.31               |
| R 2.5               | 25                      | 14,725                                                                             | 2,423 | 0.50              | 0.50               |
| "                   | 50                      | 11,780                                                                             | 1,938 | 0.40              | 0.40               |
| R 3                 | 25                      | 14,250                                                                             | 2,803 | 0.60              | 0.60               |
| R 4                 | 30                      | 12,350                                                                             | 2,850 | 0.80              | 0.80               |
| R 5                 | -                       | 10,925                                                                             | 2,898 | 1.00              | 1.00               |
| R 6                 | -                       | 9,975                                                                              | 2,993 | 1.20              | 1.20               |
| R 8                 | -                       | 7,600                                                                              | 2,375 | 1.60              | 1.60               |
| R 10                | -                       | 6,175                                                                              | 1,900 | 2.00              | 2.00               |
| 절입량<br>Depth of Cut |                         |  |       |                   |                    |

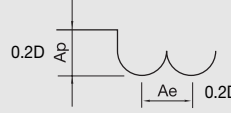
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 절삭 조건표에 없는 유효장은 같은 직경과 비례하여 DOWN 시켜주십시오.
- 상기 절삭조건은 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우, 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- If the effective length of your tool does not show above the table, use the shorten effective length of parameter and reduce the parameters in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.

## 2TGB Cutting Condition

| 파삭재 Material        |                         | 흑연 Graphite                                                                       |        |       |                   |                    |
|---------------------|-------------------------|-----------------------------------------------------------------------------------|--------|-------|-------------------|--------------------|
| 반경<br>Radius        | 유효장<br>Effective Length | Angle<br>$\theta$                                                                 | RPM    | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.5               | 20                      | 0°30                                                                              | 18,000 | 300   | 0.10              | 0.10               |
| "                   | 30                      | 0°30                                                                              | 17,100 | 285   | 0.10              | 0.10               |
| "                   | 40                      | 0°30                                                                              | 16,245 | 271   | 0.09              | 0.09               |
| "                   | 25                      | 1°                                                                                | 16,740 | 279   | 0.10              | 0.10               |
| "                   | 35                      | 1°                                                                                | 15,903 | 265   | 0.09              | 0.09               |
| "                   | 50                      | 1°                                                                                | 15,108 | 252   | 0.08              | 0.08               |
| R 0.75              | 30                      | 0°30                                                                              | 17,000 | 320   | 0.15              | 0.15               |
| "                   | 40                      | 0°30                                                                              | 16,150 | 304   | 0.14              | 0.14               |
| "                   | 50                      | 0°30                                                                              | 15,343 | 289   | 0.12              | 0.12               |
| "                   | 30                      | 1°                                                                                | 15,300 | 288   | 0.14              | 0.14               |
| "                   | 50                      | 1°                                                                                | 14,229 | 268   | 0.13              | 0.13               |
| "                   | 60                      | 1°                                                                                | 13,233 | 249   | 0.12              | 0.12               |
| R 1                 | 40                      | 0°30                                                                              | 16,500 | 600   | 0.20              | 0.20               |
| "                   | 50                      | 0°30                                                                              | 14,850 | 540   | 0.19              | 0.19               |
| "                   | 70                      | 0°30                                                                              | 13,365 | 486   | 0.18              | 0.18               |
| "                   | 60                      | 1°                                                                                | 12,029 | 437   | 0.20              | 0.20               |
| "                   | 90                      | 1°                                                                                | 10,224 | 372   | 0.19              | 0.19               |
| R 2                 | 70                      | 0°30                                                                              | 13,500 | 1,600 | 0.40              | 0.40               |
| "                   | 80                      | 1°                                                                                | 12,825 | 1,520 | 0.36              | 0.36               |
| R 3                 | 100                     | 0°30                                                                              | 11,000 | 2,200 | 0.60              | 0.60               |
| "                   | 100                     | 1°                                                                                | 10,780 | 2,156 | 0.59              | 0.59               |
| R 5                 | 83                      | 0°30                                                                              | 9,600  | 2,250 | 1.00              | 1.00               |
| R 6                 | 110                     | 0°30                                                                              | 7,500  | 2,300 | 1.20              | 1.20               |
| 절입량<br>Depth of Cut |                         |  |        |       |                   |                    |

## 3TBD

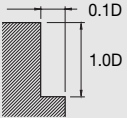
• RPM : rev./min • Feed : mm/min

| 파삭재 Material        |                         | 흑연 Graphite                                                                         |        |       |                   |                    |
|---------------------|-------------------------|-------------------------------------------------------------------------------------|--------|-------|-------------------|--------------------|
| 반경<br>Radius        | 유효장<br>Effective Length | Angle<br>$\theta$                                                                   | RPM    | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.5               | 20                      | 0°30                                                                                | 18,900 | 360   | 0.10              | 0.10               |
| "                   | 30                      | 0°30                                                                                | 17,955 | 342   | 0.10              | 0.10               |
| "                   | 40                      | 0°30                                                                                | 17,057 | 325   | 0.09              | 0.09               |
| "                   | 25                      | 1°                                                                                  | 17,577 | 335   | 0.10              | 0.10               |
| "                   | 35                      | 1°                                                                                  | 16,698 | 318   | 0.09              | 0.09               |
| "                   | 50                      | 1°                                                                                  | 15,863 | 302   | 0.08              | 0.08               |
| R 0.75              | 30                      | 0°30                                                                                | 17,850 | 384   | 0.15              | 0.15               |
| "                   | 40                      | 0°30                                                                                | 16,958 | 365   | 0.14              | 0.14               |
| "                   | 50                      | 0°30                                                                                | 16,110 | 347   | 0.12              | 0.12               |
| "                   | 40                      | 1°                                                                                  | 16,065 | 346   | 0.14              | 0.14               |
| "                   | 50                      | 1°                                                                                  | 14,940 | 321   | 0.13              | 0.13               |
| "                   | 60                      | 1°                                                                                  | 13,895 | 299   | 0.12              | 0.12               |
| R 1                 | 40                      | 0°30                                                                                | 17,325 | 720   | 0.20              | 0.20               |
| "                   | 50                      | 0°30                                                                                | 15,593 | 648   | 0.19              | 0.19               |
| "                   | 60                      | 0°30                                                                                | 14,702 | 559   | 0.19              | 0.19               |
| "                   | 50                      | 1°                                                                                  | 14,524 | 588   | 0.20              | 0.20               |
| "                   | 60                      | 1°                                                                                  | 12,630 | 525   | 0.20              | 0.20               |
| "                   | 70                      | 1°                                                                                  | 11,367 | 472   | 0.19              | 0.19               |
| R 2                 | 80                      | 0°30                                                                                | 13,466 | 1,824 | 0.40              | 0.40               |
| "                   | 100                     | 1°                                                                                  | 12,120 | 1,642 | 0.36              | 0.36               |
|                     |                         |                                                                                     |        |       |                   |                    |
|                     |                         |                                                                                     |        |       |                   |                    |
| 절입량<br>Depth of Cut |                         |  |        |       |                   |                    |

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 절삭조건표에 없는 유효장은 같은 직경과 비례하여 DOWN 시켜주십시오.
- 절삭조건에 없는 각도는 같은 직경에 이전 각도와 비례하여 사용 하십시오.
- 이송속도 및 축 방향의 절입 깊이는 리브창과 테이퍼각에 따라 고려하시고, 절삭 상황에 맞추어 조정 하십시오.
- 상기 절삭조건에 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우, 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- If the effective length of your tool does not show above the table, use the shorten effective length of parameter and reduce the parameters in the same proportion.
- If there is no parameter for the angle of your tool, refer to the previous angle, and adjust compare to it.
- Adjust the value of the feed and Ap based on the effective length and taper angle, and adjust the milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.

## 2GEM/4GEM/6GEM Cutting Condition

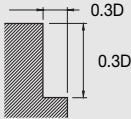
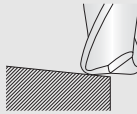
• RPM : rev./min • Feed : mm/min

|                           | 2GEM                                                                              |       |                   |                    | 4GEM        |       |                   |                    | 6GEM        |       |                   |                    |
|---------------------------|-----------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------|-------|-------------------|--------------------|-------------|-------|-------------------|--------------------|
| 파삭재<br>Material           | 흑연 Graphite                                                                       |       |                   |                    | 흑연 Graphite |       |                   |                    | 흑연 Graphite |       |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                               | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                        | 8,000                                                                             | 160   | 1.00              | 0.10               | -           | -     | 1.00              | 0.10               | -           | -     | 1.00              | 0.10               |
| Ø2                        | 8,000                                                                             | 250   | 2.00              | 0.20               | -           | -     | 2.00              | 0.20               | -           | -     | 2.00              | 0.20               |
| Ø3                        | 8,000                                                                             | 380   | 3.00              | 0.30               | 8,000       | 430   | 3.00              | 0.30               | -           | -     | 3.00              | 0.30               |
| Ø4                        | 8,000                                                                             | 510   | 4.00              | 0.40               | 8,000       | 570   | 4.00              | 0.40               | -           | -     | 4.00              | 0.40               |
| Ø5                        | 8,000                                                                             | 640   | 5.00              | 0.50               | 8,000       | 720   | 5.00              | 0.50               | -           | -     | 5.00              | 0.50               |
| Ø6                        | 8,000                                                                             | 770   | 6.00              | 0.60               | 8,000       | 860   | 6.00              | 0.60               | 8,000       | 960   | 6.00              | 0.60               |
| Ø8                        | 8,000                                                                             | 1,000 | 8.00              | 0.80               | 8,000       | 1,100 | 8.00              | 0.80               | 8,000       | 1,300 | 8.00              | 0.80               |
| Ø10                       | 8,000                                                                             | 1,250 | 10.00             | 1.00               | 8,000       | 1,400 | 10.00             | 1.00               | 8,000       | 1,600 | 10.00             | 1.00               |
| Ø12                       | 8,000                                                                             | 1,500 | 12.00             | 1.20               | 7,000       | 1,400 | 12.00             | 1.20               | 7,000       | 1,600 | 12.00             | 1.20               |
| Ø16                       | 8,000                                                                             | 1,600 | 16.00             | 1.60               | 7,000       | 1,500 | 16.00             | 1.60               | 7,000       | 1,800 | 16.00             | 1.60               |
| Ø20                       | 8,000                                                                             | 1,600 | 20.00             | 2.00               | 7,000       | 1,500 | 20.00             | 2.00               | 7,000       | 1,800 | 20.00             | 2.00               |
| 절입량<br>Depth of Cut       |  |       |                   |                    |             |       |                   |                    |             |       |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 주세요.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 절삭조건은 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과 하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø10이하 사용시 진동 허용 관리 5µm이하 일것.)
- 흑연 가공시 에어브로를 추천 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5µm).
- For graphite milling, air blow method is recommended.

## 2DCR/4DCR Cutting Condition

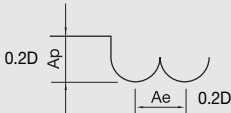
• RPM : rev./min • Feed : mm/min

|                           | 2DCR                                                                                                                                                                                                  |       |                   |                    | 4DCR        |       |                   |                    |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------|-------|-------------------|--------------------|
| 파삭재 Material              | 흑연 Graphite                                                                                                                                                                                           |       |                   |                    | 흑연 Graphite |       |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                                   | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø0.2                      | 40,000                                                                                                                                                                                                | 100   | 0.06              | 0.06               | -           | -     | -                 | -                  |
| Ø0.4                      | 40,000                                                                                                                                                                                                | 200   | 0.12              | 0.12               | -           | -     | -                 | -                  |
| Ø0.5                      | 40,000                                                                                                                                                                                                | 300   | 0.15              | 0.15               | -           | -     | -                 | -                  |
| Ø0.6                      | 40,000                                                                                                                                                                                                | 400   | 0.18              | 0.18               | -           | -     | -                 | -                  |
| Ø0.8                      | 40,000                                                                                                                                                                                                | 500   | 0.24              | 0.24               | -           | -     | -                 | -                  |
| Ø1                        | 40,000                                                                                                                                                                                                | 900   | 0.30              | 0.30               | -           | -     | -                 | -                  |
| Ø2                        | 36,000                                                                                                                                                                                                | 900   | 0.60              | 0.60               | 40,000      | 2,800 | 0.60              | 0.60               |
| Ø3                        | 32,000                                                                                                                                                                                                | 1,300 | 0.90              | 0.90               | 40,000      | 3,150 | 0.90              | 0.90               |
| Ø4                        | 26,000                                                                                                                                                                                                | 1,500 | 1.20              | 1.20               | 40,000      | 3,500 | 1.2               | 1.2                |
| Ø5                        | 24,000                                                                                                                                                                                                | 1,100 | 1.50              | 1.50               | -           | -     | -                 | -                  |
| Ø6                        | 21,000                                                                                                                                                                                                | 1,100 | 1.80              | 1.80               | 40,000      | 5,600 | 1.8               | 1.8                |
| Ø8                        | -                                                                                                                                                                                                     | -     | -                 | -                  | 32,000      | 5,600 | 2.4               | 2.4                |
| Ø10                       | -                                                                                                                                                                                                     | -     | -                 | -                  | 26,000      | 5,700 | 3.0               | 3.0                |
| Ø12                       | -                                                                                                                                                                                                     | -     | -                 | -                  | 21,000      | 5,500 | 3.6               | 3.6                |
| Ø16                       | -                                                                                                                                                                                                     | -     | -                 | -                  | 15,800      | 5,500 | 4.8               | 4.8                |
| 절입량<br>Depth of Cut       |   경사진 면 절삭<br>Inclined Cutting |       |                   |                    |             |       |                   |                    |

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 곡면 절삭시 날경의 코너R 보다 낮은 이송 PITCH를 설정 하십시오.
- 곡면 절삭시 안정적인 속도 내에서 피드를 최대 50%까지 UP 해주십시오.
- 홈 절삭시 날경의 코너R 대비 Ae 값을 설정 하십시오.
- 상기 절삭조건은 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적절한 쿨런트 사용과 가공시 발열, 발화에 주의 하십시오.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- For curved milling, set up the lower value of the pitch than the corner radius value of tool diameter.
- For curved milling, raise up the feed up to 50% in stable milling condition.
- For groove milling, set up the Ae value by considering of corner radius value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Use the adequate coolant for work material and machining geometry and note for heat and ignition.

## 2DBE/3DBE/4DBE Cutting Condition

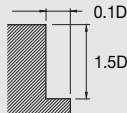
• RPM : rev./min • Feed : mm/min

|                           | 2DBE                                                                              |       |                   |                    | 3DBE        |       |                   |                    | 4DBE        |       |                   |                    |
|---------------------------|-----------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------|-------|-------------------|--------------------|-------------|-------|-------------------|--------------------|
| 파삭재<br>Material           | 흑연 Graphite                                                                       |       |                   |                    | 흑연 Graphite |       |                   |                    | 흑연 Graphite |       |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                               | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                        | 16,000                                                                            | 400   | 0.20              | 0.20               | 16,000      | 480   | 0.20              | 0.20               | 16,000      | 700   | 0.20              | 0.20               |
| Ø2                        | 16,000                                                                            | 800   | 0.40              | 0.40               | 16,000      | 960   | 0.40              | 0.40               | 16,000      | 1,200 | 0.40              | 0.40               |
| Ø3                        | 16,000                                                                            | 1,450 | 0.60              | 0.60               | 16,000      | 1,740 | 0.60              | 0.60               | 16,000      | 2,000 | 0.60              | 0.60               |
| Ø4                        | 16,000                                                                            | 2,100 | 0.80              | 0.80               | 16,000      | 2,520 | 0.80              | 0.80               | 16,000      | 3,100 | 0.80              | 0.80               |
| Ø5                        | 15,500                                                                            | 2,550 | 1.00              | 1.00               | 15,500      | 3,060 | 1.00              | 1.00               | 15,000      | 3,800 | 1.00              | 1.00               |
| Ø6                        | 15,000                                                                            | 2,950 | 1.20              | 1.20               | 15,000      | 3,540 | 1.20              | 1.20               | 15,000      | 4,400 | 1.20              | 1.20               |
| Ø8                        | 13,000                                                                            | 3,000 | 1.60              | 1.60               | 13,000      | 3,600 | 1.60              | 1.60               | 13,000      | 4,500 | 1.60              | 1.60               |
| Ø10                       | 11,500                                                                            | 3,000 | 2.00              | 2.00               | 12,000      | 3,600 | 2.00              | 2.00               | 12,000      | 4,600 | 2.00              | 2.00               |
| Ø12                       | 10,700                                                                            | 3,200 | 2.40              | 2.40               | 10,000      | 3,840 | 2.40              | 2.40               | 10,000      | 4,700 | 2.40              | 2.40               |
| 절입량<br>Depth of Cut       |  |       |                   |                    |             |       |                   |                    |             |       |                   |                    |

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 절삭 조건표에 없는 유효장은 같은 직경과 비례하여 DOWN 시켜주십시오.
- 상기 절삭조건에 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할 시 조건표에 회전 속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- If the effective length is long, reduce the RPM and feed maximum 20%.
- If the effective length of your tool does not show above the table, use the shorten effective length of parameter and reduce the parameters in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.

## 2DEM/3DEM/4&6DEM Cutting Condition

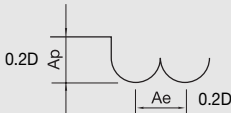
• RPM : rev./min • Feed : mm/min

|                           | 2DEM                                                                                |       |                   |                    | 4DEM        |       |                   |                    | 6DEM        |       |                   |                    |
|---------------------------|-------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------|-------|-------------------|--------------------|-------------|-------|-------------------|--------------------|
| 파삭재<br>Material           | 흑연 Graphite                                                                         |       |                   |                    | 흑연 Graphite |       |                   |                    | 흑연 Graphite |       |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø0.2                      | 40,000                                                                              | 100   | 0.3               | 0.02               | -           | -     | -                 | -                  | -           | -     | -                 | -                  |
| Ø0.4                      | 40,000                                                                              | 200   | 0.6               | 0.04               | -           | -     | -                 | -                  | -           | -     | -                 | -                  |
| Ø0.6                      | 40,000                                                                              | 350   | 0.9               | 0.06               | -           | -     | -                 | -                  | -           | -     | -                 | -                  |
| Ø0.8                      | 40,000                                                                              | 550   | 1.2               | 0.08               | -           | -     | -                 | -                  | -           | -     | -                 | -                  |
| Ø1                        | 40,000                                                                              | 700   | 1.5               | 0.10               | -           | -     | -                 | -                  | -           | -     | -                 | -                  |
| Ø2                        | 25,000                                                                              | 800   | 3.0               | 0.20               | -           | -     | -                 | -                  | -           | -     | -                 | -                  |
| Ø3                        | 20,000                                                                              | 800   | 4.5               | 0.30               | 20,000      | 1,600 | 4.5               | 0.3                | -           | -     | -                 | -                  |
| Ø4                        | 18,000                                                                              | 950   | 6.0               | 0.40               | 18,000      | 1,900 | 6.0               | 0.4                | -           | -     | -                 | -                  |
| Ø5                        | 14,000                                                                              | 1,200 | 7.5               | 0.50               | 14,000      | 2,400 | 7.5               | 0.5                | -           | -     | -                 | -                  |
| Ø6                        | 11,000                                                                              | 1,400 | 9.0               | 0.60               | 11,000      | 2,800 | 9.0               | 0.6                | 22,200      | 8,000 | 9                 | 0.6                |
| Ø8                        | 8,000                                                                               | 1,300 | 12.0              | 0.80               | 8,000       | 2,600 | 12.0              | 0.8                | 16,800      | 8,000 | 12                | 0.8                |
| Ø10                       | 6,500                                                                               | 1,200 | 15.0              | 1.00               | 6,500       | 2,400 | 15.0              | 1.0                | 13,400      | 8,000 | 15                | 1.0                |
| Ø12                       | 5,500                                                                               | 1,200 | 18.0              | 1.20               | 5,500       | 2,400 | 18.0              | 1.2                | 11,350      | 6,700 | 18                | 1.2                |
| Ø16                       | 5,500                                                                               | 1,200 | 24.0              | 1.60               | -           | -     | -                 | -                  | 8,400       | 5,000 | 24                | 1.6                |
| 절입량<br>Depth of Cut       |  |       |                   |                    |             |       |                   |                    |             |       |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 주세요.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 절삭조건에 참고는 수치 이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과 하거나 버 및 적열 현상이 발생할때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø1이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 흑연 가공시 에어브로를 추천 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5 $\mu$ m).
- For graphite milling, air blow method is recommended.

## 2CPB Cutting Condition

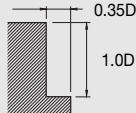
• RPM : rev./min • Feed : mm/min

| 피삭재 Material        | CFRP                                                                              |       |                   |                    | GFRP   |       |                   |                    |
|---------------------|-----------------------------------------------------------------------------------|-------|-------------------|--------------------|--------|-------|-------------------|--------------------|
| 반경<br>Radius        | RPM                                                                               | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM    | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.25              | 28,000                                                                            | 273   | 0.05              | 0.05               | 13,720 | 112   | 0.05              | 0.05               |
| R 0.3               | 25,760                                                                            | 315   | 0.06              | 0.06               | 12,622 | 129   | 0.06              | 0.06               |
| R 0.4               | 18,816                                                                            | 399   | 0.08              | 0.08               | 9,220  | 164   | 0.08              | 0.08               |
| R 0.5               | 17,920                                                                            | 420   | 0.1               | 0.1                | 8,781  | 172   | 0.1               | 0.1                |
| R 1                 | 17,920                                                                            | 840   | 0.2               | 0.2                | 8,781  | 344   | 0.2               | 0.2                |
| R 2                 | 17,920                                                                            | 2,205 | 0.4               | 0.4                | 8,781  | 904   | 0.4               | 0.4                |
| R 3                 | 16,800                                                                            | 3,098 | 0.6               | 0.6                | 8,232  | 1,270 | 0.6               | 0.6                |
| R 4                 | 14,560                                                                            | 3,150 | 0.8               | 0.8                | 7,134  | 1,292 | 0.8               | 0.8                |
| R 5                 | 12,880                                                                            | 3,360 | 1                 | 1                  | 6,311  | 1,378 | 1                 | 1                  |
| R 6                 | 11,200                                                                            | 3,308 | 1.2               | 1.2                | 5,488  | 1,356 | 1.2               | 1.2                |
| 절입량<br>Depth of Cut |  |       |                   |                    |        |       |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 최대 20% 이하로 줄이십시오.
- 유효장에 따라 같은 직경에 비례하여 회전수와 이송속도를 DOWN 시켜주십시오.
- 상기 절삭 가공조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우, 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- If the effective length of your tool does not show above the table, use the shorten effective length of parameter and reduce the parameters in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.

## 8 ~ 12CPE Cutting Condition

• RPM : rev./min • Feed : mm/min

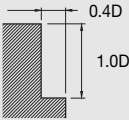
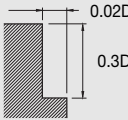
| 피삭재 Material           | CFRP                                                                                |      |                   |                    | GFRP |      |                   |                    |
|------------------------|-------------------------------------------------------------------------------------|------|-------------------|--------------------|------|------|-------------------|--------------------|
| 외경<br>Outside Diameter | RPM                                                                                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø6                     | 8,400                                                                               | 840  | 6                 | 2.1                | 4116 | 378  | 6                 | 2.1                |
| ø8                     | 6,200                                                                               | 860  | 8                 | 2.8                | 3038 | 387  | 8                 | 2.8                |
| ø10                    | 5,100                                                                               | 780  | 10                | 3.5                | 2499 | 351  | 10                | 3.5                |
| ø12                    | 4,150                                                                               | 750  | 12                | 4.2                | 2034 | 338  | 12                | 4.2                |
| 절입량<br>Depth of Cut    |  |      |                   |                    |      |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 최대 20% 이하로 줄이십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 조건은 8날 기준이며 날 수가 증가시 같은 직경에 비례하여 회전수와 이송속도를 UP 시켜주십시오.
- 상기 절삭 가공조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송 속도를 비례적으로 조정하십시오.
- 에어브로, 절삭유, 오일 미스트 콜러트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- In case of long effective length, reduce the RPM and feed by 20% or less.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Above the value of the table is based on 8 flutes. If you use more than 8 flutes of endmill, raise up the RPM and Feed in a same proportion compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

| 파삭재 Material           | CFRP  |      |                   |                    |
|------------------------|-------|------|-------------------|--------------------|
| 외경<br>Outside Diameter | RPM   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø6                     | 8,000 | 600  | 6                 | 2.4                |
| ø8                     | 6,000 | 600  | 8                 | 3.2                |
| ø10                    | 4,800 | 540  | 10                | 4.0                |
| ø12                    | 4,000 | 540  | 12                | 4.8                |

## 4&6CPR DIA Coating

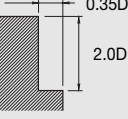
• RPM : rev./min • Feed : mm/min

|                        | 4CPR                                                                              |       |                   |                    |       |      |                   |                    | 6CPR                                                                                |       |                   |                    |       |       |                   |                    |
|------------------------|-----------------------------------------------------------------------------------|-------|-------------------|--------------------|-------|------|-------------------|--------------------|-------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------|-------|-------------------|--------------------|
| 파삭재 Material           | CFRP                                                                              |       |                   |                    | GFRP  |      |                   |                    | CFRP                                                                                |       |                   |                    | GFRP  |       |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                               | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM   | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø6                     | 7,900                                                                             | 1,100 | 6                 | 2.4                | 4,200 | 430  | 6                 | 2.4                | 10,500                                                                              | 1,950 | 1.8               | 0.12               | 5,300 | 7,400 | 1.8               | 0.12               |
| ø8                     | 5,960                                                                             | 1,600 | 8                 | 3.2                | 3,200 | 590  | 8                 | 3.2                | 7,970                                                                               | 2,950 | 2.4               | 0.16               | 3,900 | 950   | 2.4               | 0.16               |
| ø10                    | 4,750                                                                             | 1,500 | 10                | 4.0                | 2,550 | 560  | 10                | 4.0                | 6,350                                                                               | 2,930 | 3                 | 0.20               | 3,120 | 850   | 3                 | 0.20               |
| ø12                    | 3,950                                                                             | 2,060 | 12                | 4.8                | 2,120 | 725  | 12                | 4.8                | 5,300                                                                               | 3,900 | 3.6               | 0.24               | 2,600 | 1,050 | 3.6               | 0.24               |
| 절입량<br>Depth of Cut    |  |       |                   |                    |       |      |                   |                    |  |       |                   |                    |       |       |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 최대 20% 이하로 줄이십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정하십시오.
- 상기 절삭 가공조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송 속도를 비례 적으로 조정하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨러를 추천하며, 칩을 잘 제거하고 가공 시의 발열과 발화에 주의하십시오
- In case of long effective length, reduce the RPM and feed by 20% or less.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

## 6 ~ 16CPO Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재 Material           | CFRP                                                                                |       |                   |                    | GFRP   |       |                   |                    |
|------------------------|-------------------------------------------------------------------------------------|-------|-------------------|--------------------|--------|-------|-------------------|--------------------|
| 외경<br>Outside Diameter | RPM                                                                                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM    | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø4                     | 15,900                                                                              | 1,400 | 8                 | 1.4                | 15,900 | 1,400 | 8                 | 1.4                |
| ø5                     | 13,000                                                                              | 1,900 | 10                | 1.8                | 13,000 | 1,900 | 10                | 1.8                |
| ø6                     | 10,600                                                                              | 2,200 | 12                | 2.1                | 10,600 | 2,200 | 12                | 2.1                |
| ø8                     | 7,950                                                                               | 2,600 | 16                | 2.8                | 7,950  | 2,600 | 16                | 2.8                |
| ø10                    | 6300                                                                                | 3050  | 20                | 3.5                | 6300   | 3050  | 20                | 3.5                |
| ø12                    | 5300                                                                                | 3300  | 24                | 4.2                | 5300   | 3300  | 24                | 4.2                |
| 절입량<br>Depth of Cut    |  |       |                   |                    |        |       |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰 최대 20% 이하로 줄이십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 조건은 8날 기준이며 날 수가 증가시 같은 직경에 비례하여 회전수와 이송속도를 UP 시켜주십시오.
- 상기 절삭 가공조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할때 스피드 속도와 이송 속도를 비례적으로 조정하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨러를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- In case of long effective length, reduce the RPM and feed by 20% or less.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Above the value of the table is based on 8 flutes. If you use more than 8 flutes of endmill, raise up the RPM and Feed in a same proportion compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

| 파삭재 Material              | CFRP   |      |           |             |
|---------------------------|--------|------|-----------|-------------|
| 외경<br>Outside<br>Diameter | RPM    | FEED | V/C       | Fz          |
| ø2                        | 15,900 | 960  | 100 ~ 150 | 0.03 ~ 0.07 |
| ø2.5                      | 12,700 | 760  | "         | "           |
| ø3                        | 10,600 | 630  | "         | "           |
| ø4                        | 7,960  | 480  | "         | "           |
| ø5                        | 6,370  | 380  | "         | "           |
| ø6                        | 5,300  | 320  | "         | "           |
| ø8                        | 3,980  | 240  | "         | "           |
| ø9                        | 3,540  | 210  | "         | "           |
| ø10                       | 3,180  | 190  | "         | "           |
| ø11                       | 2,890  | 175  | "         | "           |
| ø12                       | 2,650  | 160  | "         | "           |

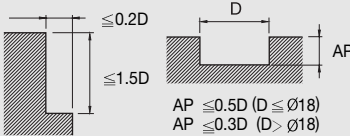
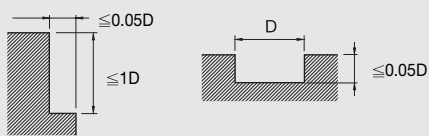
- 상기 조건은 V/C 100 , Fz 0.03 기준이며, 실 가공시 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스펀들 속도를 초과할시 스펀들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오.
- Above the parameters are based on V/C 100 with Fz 0.03. Actual machining can be changed depending on your machining purpose and condition of your machine.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

## 3SUE Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재 Material              | 스테인레스강/ 티탄합금<br>Stainless Steels / Titanium Alloy Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    | 초내열합금/ 인코넬<br>Heat Resistant Alloy / Inconel |      |                   |                    |
|---------------------------|----------------------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|----------------------------------------------|------|-------------------|--------------------|
| 경도 Hardness               |                                                          |      |                   |                    | 45 ~ 55HRC              |      |                   |                    |                                              |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                      | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                          | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.8                      | 6,400                                                    | 60   | 1.2               | 0.16               | 3,900                   | 30   | 0.8               | 0.04               | 2,000                                        | 10   | 0.8               | 0.04               |
| ø1                        | 5,600                                                    | 70   | 1.5               | 0.20               | 3,500                   | 30   | 1.0               | 0.05               | 1,700                                        | 15   | 1.0               | 0.05               |
| ø2                        | 4,800                                                    | 80   | 3.0               | 0.40               | 2,900                   | 34   | 1.5               | 0.08               | 1,400                                        | 20   | 1.5               | 0.08               |
| ø3                        | 4,000                                                    | 90   | 4.5               | 0.60               | 2,200                   | 45   | 2.5               | 0.13               | 1,400                                        | 25   | 2.5               | 0.13               |
| ø4                        | 3,300                                                    | 140  | 6.0               | 0.80               | 1,800                   | 70   | 3.0               | 0.15               | 1,200                                        | 35   | 3.0               | 0.15               |
| ø5                        | 2,700                                                    | 170  | 7.5               | 1.00               | 1,500                   | 90   | 4.0               | 0.20               | 1,000                                        | 45   | 4.0               | 0.20               |
| ø6                        | 2,400                                                    | 180  | 9.0               | 1.20               | 1,400                   | 90   | 5.0               | 0.25               | 900                                          | 45   | 5.0               | 0.25               |
| ø8                        | 1,800                                                    | 190  | 12.0              | 1.50               | 1,000                   | 100  | 7.0               | 0.35               | 720                                          | 40   | 7.0               | 0.35               |
| ø10                       | 1,400                                                    | 190  | 14.0              | 1.80               | 900                     | 110  | 9.0               | 0.45               | 600                                          | 40   | 9.0               | 0.45               |
| ø12                       | 1,200                                                    | 150  | 17.0              | 2.00               | 700                     | 90   | 10.0              | 0.50               | 500                                          | 35   | 10.0              | 0.50               |
| ø16                       | 900                                                      | 120  | 23.0              | 2.50               | 550                     | 60   | 15.0              | 0.75               | 360                                          | 30   | 15.0              | 0.75               |

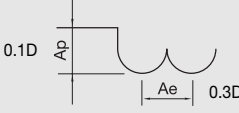
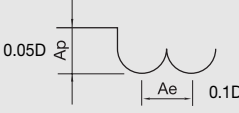
  

|                     |                                                                                     |                                                                                      |
|---------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 절입량<br>Depth of Cut |  |  |
|---------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 절삭 조건이 없는 직경 및 유효장은 비슷한 직경 및 유효장에 비례하여 UP&DOWN 하여 설정 하십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 절삭조건에 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스펀들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스펀들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø10이하 사용시 진동 허용 관리 5 $\mu$ m이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- If the diameter or effective length of your tool are not on the table, adjust it compared similarity value on the table.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (ø1 or less, the vibration tolerance management should be within 5 $\mu$ m).
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.

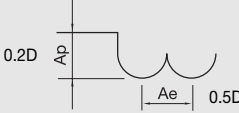
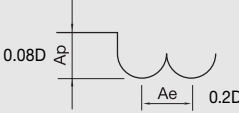
## 3SUB Cutting Condition

• RPM : rev./min • Feed : mm/min

| 피삭재<br>Material     | 합금강/ 주철<br>Alloy Steels/ Cast iron                                                |      |                   |                    | 스테인레스강<br>Stainless steels |      |                   |                    | 고경도강<br>Hardened Steels                                                             |      |                   |                    |
|---------------------|-----------------------------------------------------------------------------------|------|-------------------|--------------------|----------------------------|------|-------------------|--------------------|-------------------------------------------------------------------------------------|------|-------------------|--------------------|
| 경도 Hardness         | 30 ~ 40HRC                                                                        |      |                   |                    |                            |      |                   |                    | 45 ~ 55HRC                                                                          |      |                   |                    |
| 반경<br>Corner Radius | RPM                                                                               | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                        | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R0.5                | 45000                                                                             | 1300 | 0.05              | 0.15               | 34600                      | 800  | 0.05              | 0.15               | 9000                                                                                | 130  | 0.025             | 0.05               |
| R0.75               | 38000                                                                             | 1850 | 0.075             | 0.225              | 29200                      | 1135 | 0.075             | 0.225              | 7600                                                                                | 185  | 0.0375            | 0.075              |
| R1                  | 32000                                                                             | 2250 | 0.1               | 0.3                | 24600                      | 1380 | 0.1               | 0.3                | 6400                                                                                | 225  | 0.05              | 0.1                |
| R1.5                | 27300                                                                             | 2560 | 0.15              | 0.45               | 20800                      | 1520 | 0.15              | 0.45               | 5460                                                                                | 272  | 0.075             | 0.15               |
| R2                  | 20800                                                                             | 2240 | 0.2               | 0.6                | 15600                      | 1360 | 0.2               | 0.6                | 4160                                                                                | 208  | 0.1               | 0.2                |
| R3                  | 13780                                                                             | 1680 | 0.3               | 0.9                | 10400                      | 1120 | 0.3               | 0.9                | 2730                                                                                | 168  | 0.15              | 0.3                |
| R4                  | 10400                                                                             | 1520 | 0.4               | 1.2                | 7800                       | 1120 | 0.4               | 1.2                | 2080                                                                                | 152  | 0.2               | 0.4                |
| R5                  | 8320                                                                              | 1440 | 0.5               | 1.5                | 6240                       | 1040 | 0.5               | 1.5                | 1690                                                                                | 144  | 0.25              | 0.5                |
| R6                  | 6890                                                                              | 1400 | 0.6               | 1.8                | 5200                       | 1000 | 0.6               | 1.8                | 1430                                                                                | 100  | 0.3               | 0.6                |
| 절임량<br>Depth of Cut |  |      |                   |                    |                            |      |                   |                    |  |      |                   |                    |

## 4SUB Cutting Condition

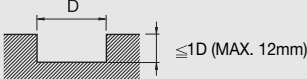
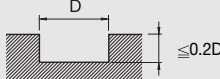
• RPM : rev./min • Feed : mm/min

| 피삭재<br>Material     | 합금강/ 주철<br>Alloy Steels/ Cast iron                                                  |       |                   |                    | 스테인레스강<br>Stainless steels |       |                   |                    | 고경도강<br>Hardened Steels                                                               |      |                   |                    |
|---------------------|-------------------------------------------------------------------------------------|-------|-------------------|--------------------|----------------------------|-------|-------------------|--------------------|---------------------------------------------------------------------------------------|------|-------------------|--------------------|
| 경도 Hardness         | 30 ~ 40HRC                                                                          |       |                   |                    |                            |       |                   |                    | 45 ~ 55HRC                                                                            |      |                   |                    |
| 반경<br>Corner Radius | RPM                                                                                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                        | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R1.5                | 21,000                                                                              | 3,200 | 0.3               | 0.75               | 16,000                     | 1,900 | 0.25              | 0.75               | 4200                                                                                  | 340  | 0.12              | 0.3                |
| R2                  | 16,000                                                                              | 2,800 | 0.4               | 1                  | 12,000                     | 1,700 | 0.33              | 1                  | 3200                                                                                  | 260  | 0.16              | 0.4                |
| R2.5                | 12,700                                                                              | 2,600 | 0.5               | 1.25               | 9,600                      | 1,500 | 0.42              | 1.25               | 2500                                                                                  | 250  | 0.2               | 0.5                |
| R3                  | 10,600                                                                              | 2,100 | 0.6               | 1.5                | 8,000                      | 1,400 | 0.5               | 1.5                | 2100                                                                                  | 210  | 0.24              | 0.6                |
| R4                  | 8,000                                                                               | 1,900 | 0.8               | 2                  | 6,000                      | 1,400 | 0.8               | 2                  | 1600                                                                                  | 190  | 0.32              | 0.8                |
| R5                  | 6,400                                                                               | 1,800 | 1                 | 2.5                | 4,800                      | 1,300 | 1                 | 2.5                | 1300                                                                                  | 180  | 0.4               | 1                  |
| R6                  | 5,300                                                                               | 1,800 | 1.2               | 3                  | 4,000                      | 1,300 | 1.2               | 3                  | 1100                                                                                  | 150  | 0.48              | 1.2                |
| 절임량<br>Depth of Cut |  |       |                   |                    |                            |       |                   |                    |  |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 절삭 조건이 없는 직경 및 유효장은 비슷한 직경 및 유효장에 비례하여 UP&DOWN 하여 설정 하십시오.
- HRC55 이상 고경도강 가공시 55HRC 조건의 같은 직경 대비 상기 절삭 조건의 20% DOWN 해주십시오.
- 상기 절삭조건의 참고는 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- 원활한 칩배출을 위하여 에어브로 혹은 미스트 쿨런트 사용을 추천 합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- If the diameter or effective length of your tool are not on the table, adjust it compared similarity value on the table.
- When milling workpiece, HRC over 55 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, reduce the RPM and feed in the same proportion.
- Air blow or oil mist is recommended for smooth chip emission.

# 4SURE Cutting Condition

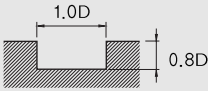
• RPM : rev./min • Feed : mm/min

| 피삭재<br>Material        | 합금강/공구강<br>Alloy Steels / Tools Steel                                             |      |                   |                    | 스테인레스강/티탄합금<br>Stainless Steels / Titanium Alloy Steels                            |      |                   |                    | 고경도강<br>Hardened Steels                                                             |      |                   |                    |
|------------------------|-----------------------------------------------------------------------------------|------|-------------------|--------------------|------------------------------------------------------------------------------------|------|-------------------|--------------------|-------------------------------------------------------------------------------------|------|-------------------|--------------------|
|                        | SKD61 / NAK                                                                       |      |                   |                    | SUS304 / SUS 316 / Ti6A                                                            |      |                   |                    | Inconel 718                                                                         |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                               | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                     | 13760                                                                             | 496  | 1                 | 1                  | 12600                                                                              | 464  | 0.5               | 1                  | 6000                                                                                | 80   | 0.2               | 1                  |
| Ø2                     | 11740                                                                             | 720  | 2                 | 2                  | 10920                                                                              | 464  | 1                 | 2                  | 4990                                                                                | 112  | 0.4               | 2                  |
| Ø3                     | 8390                                                                              | 816  | 3                 | 3                  | 8270                                                                               | 704  | 1.5               | 3                  | 4370                                                                                | 160  | 0.6               | 3                  |
| Ø4                     | 6150                                                                              | 912  | 4                 | 4                  | 6240                                                                               | 800  | 2                 | 4                  | 3330                                                                                | 184  | 0.8               | 4                  |
| Ø5                     | 5370                                                                              | 1232 | 5                 | 5                  | 4990                                                                               | 832  | 2.5               | 5                  | 2600                                                                                | 208  | 1                 | 5                  |
| Ø6                     | 4480                                                                              | 1440 | 6                 | 6                  | 4130                                                                               | 832  | 3                 | 6                  | 2180                                                                                | 208  | 1.2               | 6                  |
| Ø8                     | 3350                                                                              | 1040 | 8                 | 8                  | 3120                                                                               | 784  | 4                 | 8                  | 1660                                                                                | 208  | 1.6               | 8                  |
| Ø10                    | 2680                                                                              | 912  | 10                | 10                 | 2500                                                                               | 640  | 5                 | 10                 | 1350                                                                                | 176  | 2                 | 10                 |
| Ø12                    | 2240                                                                              | 800  | 12                | 12                 | 2100                                                                               | 640  | 6                 | 12                 | 1140                                                                                | 144  | 2.4               | 12                 |
| Ø16                    | 1680                                                                              | 752  | 16                | 16                 | 1560                                                                               | 464  | 8                 | 16                 | 830                                                                                 | 112  | 3.2               | 16                 |
| Ø20                    | 1340                                                                              | 561  | 20                | 20                 | 1250                                                                               | 416  | 10                | 20                 | 620                                                                                 | 80   | 4                 | 20                 |
| 절입량<br>Depth of Cut    |  |      |                   |                    |  |      |                   |                    |  |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 절삭 조건이 없는 직경 및 유효장은 비슷한 직경 및 유효장에 비례하여 UP&DOWN 하여 설정 하십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 절삭조건에 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø10이하 사용시 진동 허용 관리 5 $\mu$ m 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- If the diameter or effective length of your tool are not on the table, adjust it compared similarity value on the table.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity ( $\phi$ 1 or less, the vibration tolerance management should be within 5 $\mu$ m).
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.

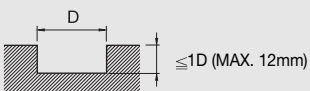
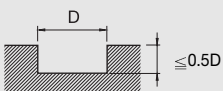
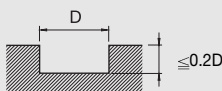
# 4SLE Cutting Condition

• RPM : rev./min • Feed : mm/min

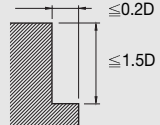
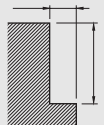
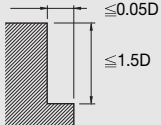
| 피삭재<br>Material        | 합금강/공구강<br>Alloy Steels / Tools Steel                                                |      |                   |                    | 스테인레스강/티탄합금<br>Stainless Steels / Titanium Alloy Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|--------------------------------------------------------------------------------------|------|-------------------|--------------------|---------------------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
|                        | SKD61 / NAK                                                                          |      |                   |                    | SUS304 / SUS 316 / Ti6A                                 |      |                   |                    | Inconel 718             |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø3                     | 13,270                                                                               | 740  | 2.4               | 3.0                | 5,840                                                   | 260  | 2.4               | 3.0                | 3,185                   | 115  | 2.4               | 3.0                |
| Ø4                     | 9,950                                                                                | 710  | 3.2               | 4.0                | 4,380                                                   | 245  | 3.2               | 4.0                | 2,390                   | 115  | 3.2               | 4.0                |
| Ø6                     | 6,630                                                                                | 720  | 4.8               | 6.0                | 2,920                                                   | 245  | 4.8               | 6.0                | 1,590                   | 115  | 4.8               | 6.0                |
| Ø8                     | 4,970                                                                                | 800  | 6.4               | 8.0                | 2,190                                                   | 245  | 6.4               | 8.0                | 1,190                   | 115  | 6.4               | 8.0                |
| Ø10                    | 3,980                                                                                | 800  | 8.0               | 10.0               | 1,750                                                   | 245  | 8.0               | 10.0               | 955                     | 115  | 8.0               | 10.0               |
| Ø12                    | 3,320                                                                                | 800  | 9.6               | 12.0               | 1,460                                                   | 245  | 9.6               | 12.0               | 796                     | 115  | 9.6               | 12.0               |
| Ø16                    | 2,490                                                                                | 800  | 12.8              | 16.0               | 1,095                                                   | 245  | 12.8              | 16.0               | 597                     | 115  | 12.8              | 16.0               |
| Ø20                    | 1,990                                                                                | 800  | 16.0              | 20.0               | 880                                                     | 245  | 16.0              | 20.0               | 480                     | 115  | 16.0              | 20.0               |
| 절입량<br>Depth of Cut    |  |      |                   |                    |                                                         |      |                   |                    |                         |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 가공 진입시 가능한 피삭재 밖에서 진입 하십시오.
- 절삭 조건이 없는 직경 및 유효장은 비슷한 직경 및 유효장에 비례하여 UP&DOWN 하여 설정 하십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 절삭조건에 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- If the diameter or effective length of your tool are not on the table, adjust it compared similarity value on the table.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

## 홈 절삭 Slotting

| 피삭재<br>Material        | 합금강 / 공구강<br>Alloy Steels / Tools Steel                                           |      |                   |                    | 스테인레스강 / 티탄합금<br>Stainless Steels / Titanium Alloy Steels                          |      |                   |                    | 고경도강<br>Hardened Steels                                                             |      |                   |                    |
|------------------------|-----------------------------------------------------------------------------------|------|-------------------|--------------------|------------------------------------------------------------------------------------|------|-------------------|--------------------|-------------------------------------------------------------------------------------|------|-------------------|--------------------|
|                        | SKD61 / NAK                                                                       |      |                   |                    | SUS304 / SUS 316 / Ti6A                                                            |      |                   |                    | Inconel 718                                                                         |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                               | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø2                     | 10,000                                                                            | 400  | 2                 | 2                  | 9,600                                                                              | 310  | 1                 | 2                  | 3,200                                                                               | 80   | 0.4               | 2                  |
| ø3                     | 6,900                                                                             | 410  | 3                 | 3                  | 7,400                                                                              | 380  | 1.5               | 3                  | 2,700                                                                               | 110  | 0.6               | 3                  |
| ø4                     | 5,600                                                                             | 490  | 4                 | 4                  | 5,600                                                                              | 400  | 2                 | 4                  | 2,000                                                                               | 120  | 0.8               | 4                  |
| ø5                     | 4,500                                                                             | 630  | 5                 | 5                  | 4,500                                                                              | 410  | 2.5               | 5                  | 1,600                                                                               | 130  | 1                 | 5                  |
| ø6                     | 3,700                                                                             | 740  | 6                 | 6                  | 3,700                                                                              | 440  | 3                 | 6                  | 1,300                                                                               | 160  | 1.2               | 6                  |
| ø7                     | 3,200                                                                             | 700  | 7                 | 7                  | 3,200                                                                              | 410  | 3.5               | 7                  | 1,100                                                                               | 140  | 1.4               | 7                  |
| ø8                     | 2,800                                                                             | 670  | 8                 | 8                  | 2,800                                                                              | 390  | 4                 | 8                  | 1,000                                                                               | 130  | 1.6               | 8                  |
| ø9                     | 2,500                                                                             | 600  | 9                 | 9                  | 2,500                                                                              | 350  | 4.5               | 9                  | 900                                                                                 | 130  | 1.8               | 9                  |
| ø10                    | 2,200                                                                             | 530  | 10                | 10                 | 2,200                                                                              | 350  | 5                 | 10                 | 800                                                                                 | 130  | 2                 | 10                 |
| ø11                    | 2,000                                                                             | 530  | 11                | 11                 | 2,000                                                                              | 320  | 5.5               | 11                 | 720                                                                                 | 120  | 2.2               | 11                 |
| ø12                    | 1,900                                                                             | 530  | 12                | 12                 | 1,900                                                                              | 300  | 6                 | 12                 | 660                                                                                 | 110  | 2.4               | 12                 |
| ø16                    | 1,400                                                                             | 390  | 16                | 16                 | 1,400                                                                              | 280  | 8                 | 16                 | 500                                                                                 | 80   | 3.2               | 16                 |
| ø20                    | 1,100                                                                             | 350  | 20                | 20                 | 1,100                                                                              | 260  | 10                | 20                 | 400                                                                                 | 60   | 4                 | 20                 |
| 절입량<br>Depth of Cut    |  |      |                   |                    |  |      |                   |                    |  |      |                   |                    |

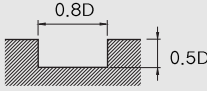
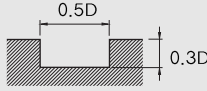
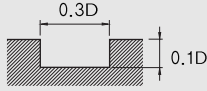
## 측면 절삭 Side Cutting

| 피삭재<br>Material        | 합금강 / 공구강<br>Alloy Steels / Tools Steel                                             |       |                   |                    | 스테인레스강 / 티탄합금<br>Stainless Steels / Titanium Alloy Steels                           |       |                   |                    | 고경도강<br>Hardened Steels                                                               |      |                   |                    |
|------------------------|-------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------------------------------------------------------------------------------|-------|-------------------|--------------------|---------------------------------------------------------------------------------------|------|-------------------|--------------------|
|                        | SKD61 / NAK                                                                         |       |                   |                    | SUS304 / SUS 316 / Ti6A                                                             |       |                   |                    | Inconel 718                                                                           |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø2                     | 21,000                                                                              | 1,100 | 3                 | 0.4                | 14,000                                                                              | 560   | 3                 | 0.2                | 4,800                                                                                 | 130  | 3                 | 0.1                |
| ø3                     | 15,000                                                                              | 1,250 | 4.5               | 0.6                | 10,600                                                                              | 850   | 4.5               | 0.3                | 4,200                                                                                 | 200  | 4.5               | 0.15               |
| ø4                     | 11,000                                                                              | 1,400 | 6                 | 0.8                | 8,000                                                                               | 960   | 6                 | 0.4                | 3,200                                                                                 | 220  | 6                 | 0.2                |
| ø5                     | 9,600                                                                               | 1,900 | 7.5               | 1                  | 6,400                                                                               | 1,000 | 7.5               | 0.5                | 2,500                                                                                 | 250  | 7.5               | 0.25               |
| ø6                     | 8,000                                                                               | 2,200 | 9                 | 1.2                | 5,300                                                                               | 1,000 | 9                 | 0.6                | 2,100                                                                                 | 250  | 9                 | 0.3                |
| ø7                     | 6,800                                                                               | 1,900 | 10.5              | 1.4                | 4,500                                                                               | 1,000 | 10.5              | 0.7                | 1,800                                                                                 | 260  | 10.5              | 0.35               |
| ø8                     | 6,000                                                                               | 1,600 | 12                | 1.6                | 4,000                                                                               | 960   | 12                | 0.8                | 1,600                                                                                 | 260  | 12                | 0.4                |
| ø9                     | 5,300                                                                               | 1,480 | 13.5              | 1.8                | 3,500                                                                               | 840   | 13.5              | 0.9                | 1,400                                                                                 | 220  | 13.5              | 0.45               |
| ø10                    | 4,800                                                                               | 1,440 | 15                | 2                  | 3,200                                                                               | 770   | 15                | 1                  | 1,300                                                                                 | 210  | 15                | 0.5                |
| ø11                    | 4,400                                                                               | 1,350 | 16.5              | 2.2                | 2,900                                                                               | 760   | 16.5              | 1.1                | 1,200                                                                                 | 190  | 16.5              | 0.55               |
| ø12                    | 4,000                                                                               | 1,250 | 18                | 2.4                | 2,700                                                                               | 760   | 18                | 1.2                | 1,100                                                                                 | 180  | 18                | 0.6                |
| ø16                    | 3,000                                                                               | 1,140 | 24                | 3.2                | 2,000                                                                               | 560   | 24                | 1.6                | 800                                                                                   | 130  | 24                | 0.8                |
| ø20                    | 2,400                                                                               | 860   | 30                | 4                  | 1,600                                                                               | 510   | 30                | 2                  | 600                                                                                   | 100  | 30                | 1                  |
| 절입량<br>Depth of Cut    |  |       |                   |                    |  |       |                   |                    |  |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 가공 진입시 가능한 피삭재 밖에서 진입 하십시오.
- 절삭 조건이 없는 직경 및 유효장은 비슷한 직경 및 유효장에 비례하여 UP&DOWN 하여 설정 하십시오.
- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 절삭조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- If the diameter or effective length of your tool are not on the table, adjust it compared similarity value on the table.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

# 4SUCR Cutting Condition

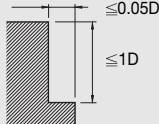
• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material        | 합금강/공구강<br>Alloy Steels / Tools Steel                                             |      |                   |                    | 스테인레스강/티탄합금<br>Stainless Steels / Titanium Alloy Steels                           |      |                   |                    | 고경도강<br>Hardened Steels                                                             |      |                   |                    |
|------------------------|-----------------------------------------------------------------------------------|------|-------------------|--------------------|-----------------------------------------------------------------------------------|------|-------------------|--------------------|-------------------------------------------------------------------------------------|------|-------------------|--------------------|
|                        | SKD61 / NAK                                                                       |      |                   |                    | SUS304 / SUS 316 / Ti6A                                                           |      |                   |                    | Inconel 718                                                                         |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                               | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                               | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1                     | 13,210                                                                            | 476  | 0.5               | 0.8                | 10,836                                                                            | 399  | 0.3               | 0.5                | 5,820                                                                               | 78   | 0.1               | 0.3                |
| ø2                     | 11,270                                                                            | 691  | 1.0               | 1.6                | 9,391                                                                             | 399  | 0.6               | 1.0                | 4,840                                                                               | 109  | 0.2               | 0.6                |
| ø3                     | 8,054                                                                             | 783  | 1.5               | 2.4                | 7,112                                                                             | 605  | 0.9               | 1.5                | 4,239                                                                               | 155  | 0.3               | 0.9                |
| ø4                     | 5,904                                                                             | 876  | 2.0               | 3.2                | 5,366                                                                             | 688  | 1.2               | 2.0                | 3,230                                                                               | 178  | 0.4               | 1.2                |
| ø5                     | 5,155                                                                             | 1183 | 2.5               | 4.0                | 4,291                                                                             | 716  | 1.5               | 2.5                | 2,522                                                                               | 202  | 0.5               | 1.5                |
| ø6                     | 4,301                                                                             | 1382 | 3.0               | 4.8                | 3,552                                                                             | 716  | 1.8               | 3.0                | 2,115                                                                               | 202  | 0.6               | 1.8                |
| ø8                     | 3,216                                                                             | 998  | 4.0               | 6.4                | 2,683                                                                             | 674  | 2.4               | 4.0                | 1,610                                                                               | 202  | 0.8               | 2.4                |
| ø10                    | 2,573                                                                             | 876  | 5.0               | 8.0                | 2,150                                                                             | 550  | 3.0               | 5.0                | 1,310                                                                               | 171  | 1.0               | 3.0                |
| ø12                    | 2,150                                                                             | 768  | 6.0               | 9.6                | 1,806                                                                             | 550  | 3.6               | 6.0                | 1,106                                                                               | 140  | 1.2               | 3.6                |
| ø16                    | 1,613                                                                             | 722  | 8.0               | 12.8               | 1,342                                                                             | 399  | 4.8               | 8.0                | 805                                                                                 | 109  | 1.6               | 4.8                |
| ø20                    | 1,286                                                                             | 538  | 10.0              | 16.0               | 1,075                                                                             | 358  | 6.0               | 10.0               | 601                                                                                 | 78   | 2.0               | 6.0                |
| 절입량<br>Depth of Cut    |  |      |                   |                    |  |      |                   |                    |  |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 절삭 조건이 없는 직경 및 유효장은 비슷한 직경 및 유효장에 비례하여 UP&DOWN 하여 설정 하십시오.
- 날 경의 코너R 대비 Ae 값을 설정 하십시오.
- 상기 절삭조건에 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (Ø10이하 사용시 진동 허용 관리 5µm 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨란트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- If the diameter or effective length of your tool are not on the table, adjust it compared similarity value on the table.
- Consider the corner radius value when you set up the Ae value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (ø1 or less, the vibration tolerance management should be within 5µm).
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.

# 5&6TROE Cutting Condition

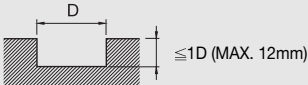
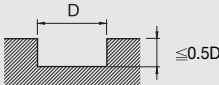
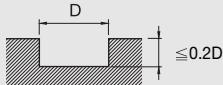
• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material        | 합금강/공구강<br>Alloy Steels / Tools Steel                                               |      |                   |                    | 스테인레스강/티탄합금<br>Stainless Steels / Titanium Alloy Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|-------------------------------------------------------------------------------------|------|-------------------|--------------------|---------------------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
|                        | SKD61 / NAK                                                                         |      |                   |                    | SUS304 / SUS 316 / Ti6A                                 |      |                   |                    | Inconel 718             |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø6                     | 3,700                                                                               | 450  | 6                 | 0.3                | 3,200                                                   | 380  | 6                 | 0.3                | 1,100                   | 65   | 6                 | 0.3                |
| ø8                     | 2,800                                                                               | 400  | 8                 | 0.4                | 2,350                                                   | 420  | 8                 | 0.4                | 950                     | 60   | 8                 | 0.4                |
| ø10                    | 2,250                                                                               | 325  | 10                | 0.5                | 1,990                                                   | 350  | 10                | 0.5                | 750                     | 60   | 10                | 0.5                |
| ø12                    | 1,990                                                                               | 300  | 12                | 0.6                | 1,550                                                   | 270  | 12                | 0.6                | 600                     | 55   | 12                | 0.6                |
| ø16                    | 1,550                                                                               | 250  | 16                | 0.8                | 1,250                                                   | 250  | 16                | 0.8                | 500                     | 50   | 16                | 0.8                |
| ø20                    | 1,200                                                                               | 180  | 20                | 1                  | 900                                                     | 150  | 20                | 1                  | 350                     | 50   | 20                | 1                  |
| 절입량<br>Depth of Cut    |  |      |                   |                    |                                                         |      |                   |                    |                         |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 가공 진입시 가능한 파삭재 밖에서 진입 하십시오.
- 절삭 조건이 없는 직경 및 유효장은 비슷한 직경 및 유효장에 비례하여 UP&DOWN 하여 설정 하십시오.
- 상기 절삭조건에 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨란트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- If the diameter or effective length of your tool are not on the table, adjust it compared similarity value on the table.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

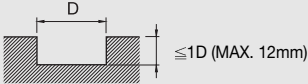
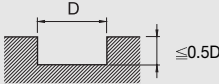
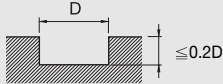
# 4LSUC Cutting Condition

•RPM : rev./min •Feed : mm/min

| 파삭재<br>Material           | 합금강 / 공구강<br>Alloy Steels / Tools Steel                                           |      |                   |                    | 스테인레스강 / 티탄합금<br>Stainless Steels / Titanium Alloy Steels                          |      |                   |                    | 고경도강<br>Hardened Steels                                                             |      |                   |                    |
|---------------------------|-----------------------------------------------------------------------------------|------|-------------------|--------------------|------------------------------------------------------------------------------------|------|-------------------|--------------------|-------------------------------------------------------------------------------------|------|-------------------|--------------------|
|                           | SKD61 / NAK                                                                       |      |                   |                    | SUS304 / SUS 316 / Ti6A                                                            |      |                   |                    | Inconel 718                                                                         |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                               | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø1                        | 10,000                                                                            | 400  | 1                 | 1                  | 9,600                                                                              | 310  | 0.5               | 1                  | 3,200                                                                               | 80   | 0.2               | 1                  |
| ø2                        | 10,000                                                                            | 400  | 2                 | 2                  | 9,600                                                                              | 310  | 1                 | 2                  | 3,200                                                                               | 80   | 0.4               | 2                  |
| ø3                        | 6,900                                                                             | 410  | 3                 | 3                  | 7,400                                                                              | 380  | 1.5               | 3                  | 2,700                                                                               | 110  | 0.6               | 3                  |
| ø4                        | 5,600                                                                             | 490  | 4                 | 4                  | 5,600                                                                              | 400  | 2                 | 4                  | 2,000                                                                               | 120  | 0.8               | 4                  |
| ø5                        | 4,500                                                                             | 630  | 5                 | 5                  | 4,500                                                                              | 410  | 2.5               | 5                  | 1,600                                                                               | 130  | 1                 | 5                  |
| ø6                        | 3,700                                                                             | 740  | 6                 | 6                  | 3,700                                                                              | 440  | 3                 | 6                  | 1,300                                                                               | 160  | 1.2               | 6                  |
| ø7                        | 3,200                                                                             | 700  | 7                 | 7                  | 3,200                                                                              | 410  | 3.5               | 7                  | 1,100                                                                               | 140  | 1.4               | 7                  |
| ø8                        | 2,800                                                                             | 670  | 8                 | 8                  | 2,800                                                                              | 390  | 4                 | 8                  | 1,000                                                                               | 130  | 1.6               | 8                  |
| ø10                       | 2,200                                                                             | 530  | 10                | 10                 | 2,200                                                                              | 350  | 5                 | 10                 | 800                                                                                 | 130  | 2                 | 10                 |
| ø11                       | 2,000                                                                             | 530  | 11                | 11                 | 2,000                                                                              | 320  | 5.5               | 11                 | 720                                                                                 | 120  | 2.2               | 11                 |
| ø12                       | 1,900                                                                             | 530  | 12                | 12                 | 1,900                                                                              | 300  | 6                 | 12                 | 660                                                                                 | 110  | 2.4               | 12                 |
| ø16                       | 1,400                                                                             | 390  | 16                | 16                 | 1,400                                                                              | 280  | 8                 | 16                 | 500                                                                                 | 80   | 3.2               | 16                 |
| ø20                       | 1,100                                                                             | 350  | 20                | 20                 | 1,100                                                                              | 260  | 10                | 20                 | 400                                                                                 | 60   | 4                 | 20                 |
| 절임량<br>Depth of Cut       |  |      |                   |                    |  |      |                   |                    |  |      |                   |                    |

# 7SUC Cutting Condition

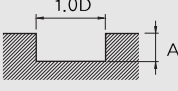
•RPM : rev./min •Feed : mm/min

| 파삭재<br>Material           | 합금강 / 공구강<br>Alloy Steels / Tools Steel                                             |      |                   |                    | 스테인레스강 / 티탄합금<br>Stainless Steels / Titanium Alloy Steels                            |      |                   |                    | 고경도강<br>Hardened Steels                                                               |      |                   |                    |
|---------------------------|-------------------------------------------------------------------------------------|------|-------------------|--------------------|--------------------------------------------------------------------------------------|------|-------------------|--------------------|---------------------------------------------------------------------------------------|------|-------------------|--------------------|
|                           | SKD61 / NAK                                                                         |      |                   |                    | SUS304 / SUS 316 / Ti6A                                                              |      |                   |                    | Inconel 718                                                                           |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø6                        | 4,070                                                                               | 925  | 6                 | 6                  | 4,070                                                                                | 550  | 3                 | 6                  | 1,430                                                                                 | 200  | 1.2               | 6                  |
| ø8                        | 3,080                                                                               | 838  | 8                 | 8                  | 3,080                                                                                | 488  | 4                 | 8                  | 1,100                                                                                 | 163  | 1.6               | 8                  |
| ø10                       | 2,420                                                                               | 663  | 10                | 10                 | 2,420                                                                                | 438  | 5                 | 10                 | 880                                                                                   | 163  | 2                 | 10                 |
| ø12                       | 2,090                                                                               | 663  | 12                | 12                 | 2,090                                                                                | 375  | 6                 | 12                 | 726                                                                                   | 138  | 2.4               | 12                 |
| ø16                       | 1,540                                                                               | 488  | 16                | 16                 | 1,540                                                                                | 350  | 8                 | 16                 | 550                                                                                   | 100  | 3.2               | 16                 |
| ø20                       | 1,210                                                                               | 438  | 20                | 20                 | 1,210                                                                                | 325  | 10                | 20                 | 440                                                                                   | 75   | 4                 | 20                 |
| 절임량<br>Depth of Cut       |  |      |                   |                    |  |      |                   |                    |  |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 가공 진입시 가능한 파삭재 밖에서 진입 하십시오.
- 절삭 조건이 없는 직경 및 유효장은 비슷한 직경 및 유효장에 비례하여 UP&DOWN 하여 설정 하십시오.
- 상기 절삭조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- If the diameter or effective length of your tool are not on the table, adjust it compared similarity value on the table.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

# 3&4&5SUR Cutting Condition

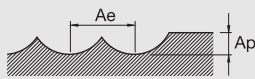
• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material           | 스테인레스강/ 티탄합금<br>Stainless Steels / Titanium Alloy Steels                                                                                                                                                                                                      |      |                   |                    |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|
|                           | SUS304 / SUS 316 / Ti6A                                                                                                                                                                                                                                       |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                                                                                           | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø3                        | 5,000                                                                                                                                                                                                                                                         | 380  | 0.9               | 3                  |
| ø4                        | 4,800                                                                                                                                                                                                                                                         | 350  | 1.2               | 4                  |
| ø5                        | 4,700                                                                                                                                                                                                                                                         | 350  | 1.5               | 5                  |
| ø6                        | 4,400                                                                                                                                                                                                                                                         | 340  | 1.5               | 6                  |
| ø7                        | 3,800                                                                                                                                                                                                                                                         | 340  | 1.75              | 7                  |
| ø8                        | 3,300                                                                                                                                                                                                                                                         | 340  | 2                 | 8                  |
| ø9                        | 3,000                                                                                                                                                                                                                                                         | 340  | 2.25              | 9                  |
| ø10                       | 2,700                                                                                                                                                                                                                                                         | 330  | 2.5               | 10                 |
| ø12                       | 2,200                                                                                                                                                                                                                                                         | 330  | 1.8               | 12                 |
| ø14                       | 2,000                                                                                                                                                                                                                                                         | 310  | 2.1               | 14                 |
| ø16                       | 1,750                                                                                                                                                                                                                                                         | 300  | 2.4               | 16                 |
| ø20                       | 1,300                                                                                                                                                                                                                                                         | 210  | 2                 | 20                 |
| 절입량<br>Depth of Cut       |  $A : \begin{aligned} \phi 3 \sim 5 &= 0.3 \times D \\ \phi 6 \sim 10 &= 0.25 \times D \\ \phi 12 \sim 16 &= 0.15 \times D \\ \phi 18 \sim 20 &= 0.1 \times D \end{aligned}$ |      |                   |                    |

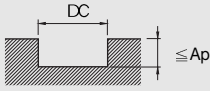
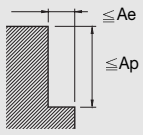
- 가공 진입시 가능한 파삭재 밖에서 진입 하십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 30% 이하로 줄이십시오.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할시 조건표에 회전 속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 파삭재와 가공 모양에 따라 적절한 쿨란트를 사용 하십시오.
- 스테인레스, 내열합금강 등의 절단 가공시 수용성 절삭유가 가장 효과적입니다.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- If the effective length is long, reduce the RPM and feed maximum 30%.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.
- For parting off stainless or hear resistant alloy, using water-soluble oil is the most effective way.

# 2COB Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재 Material           | 동 합금 Copper Alloys                                                                  |        |                   |                    |                     |       |                   |                    |
|------------------------|-------------------------------------------------------------------------------------|--------|-------------------|--------------------|---------------------|-------|-------------------|--------------------|
| 반경<br>Corner<br>Radius | $\alpha \leq 15^\circ$                                                              |        |                   |                    | $\alpha > 15^\circ$ |       |                   |                    |
|                        | RPM                                                                                 | FEED   | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.5                  | 40,000                                                                              | 8,000  | 0.06              | 0.1                | 40,000              | 3,200 | 0.06              | 0.1                |
| R 0.75                 | 40,000                                                                              | 9,600  | 0.09              | 0.15               | 40,000              | 4,000 | 0.09              | 0.15               |
| R 1                    | 40,000                                                                              | 9,600  | 0.11              | 0.2                | 39,000              | 4,700 | 0.11              | 0.2                |
| R 1.5                  | 40,000                                                                              | 12,000 | 0.12              | 0.3                | 30,000              | 4,500 | 0.12              | 0.3                |
| R 2                    | 40,000                                                                              | 12,000 | 0.13              | 0.4                | 27,000              | 4,300 | 0.13              | 0.4                |
| R 2.5                  | 32,000                                                                              | 11,000 | 0.15              | 0.5                | 20,000              | 3,600 | 0.15              | 0.5                |
| R 3                    | 25,000                                                                              | 9,000  | 0.2               | 0.6                | 16,000              | 2,900 | 0.2               | 0.6                |
| R 4                    | 21,000                                                                              | 8,400  | 0.25              | 0.8                | 13,000              | 2,600 | 0.25              | 0.8                |
| R 5                    | 16,000                                                                              | 6,400  | 0.3               | 1                  | 10,000              | 2,000 | 0.3               | 1                  |
| R 6                    | 13,000                                                                              | 5,200  | 0.5               | 1.2                | 8,000               | 1,700 | 0.5               | 1.2                |
| R 8                    | 9,000                                                                               | 3,600  | 0.5               | 1.6                | 6,000               | 1,300 | 0.5               | 1.6                |
| 절입량<br>Depth of Cut    |  |        |                   |                    |                     |       |                   |                    |

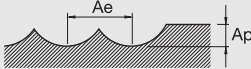
- $\alpha$ 란 가공면의 경사각입니다.
- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 원활한 칩배출을 위하여 수용성 절삭유제의 사용을 추천합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- $\alpha$  value represents a slope of workpiece.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- Using Water-soluble oil is recommended for smooth chip emission.
- If the parameters exceed the maximum RPM and feed of your machine, reduce the RPM and feed in the same proportion.

|                           |                        |                            | 홈절삭 Slotting                                                                      |       |                   |                    | 측면 절삭 Side Cutting                                                                  |        |                   |                    |
|---------------------------|------------------------|----------------------------|-----------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------------------------------------------------------------------------------|--------|-------------------|--------------------|
| 피삭재 Material              |                        |                            | 동 / 동 합금 Copper / Copper Alloys                                                   |       |                   |                    | 동 / 동 합금 Copper / Copper Alloys                                                     |        |                   |                    |
| 외경<br>Outside<br>Diameter | 반경<br>Corner<br>Radius | 유효장<br>Effective<br>Length | RPM                                                                               | FEED  | Ap<br>Axial Depth | Ap<br>Radial Depth | RPM                                                                                 | FEED   | Ap<br>Axial Depth | Ap<br>Radial Depth |
| ø1                        | R0.1, R0.2             | 3                          | 45,000                                                                            | 2,500 | 0.036             | 1                  | 45,000                                                                              | 4,500  | 0.036             | 0.2                |
| "                         | "                      | 6                          | 40,000                                                                            | 2,000 | 0.03              | 1                  | 40,000                                                                              | 3,000  | 0.03              | 0.2                |
| "                         | "                      | 10                         | 35,000                                                                            | 1,600 | 0.025             | 1                  | 35,000                                                                              | 2,000  | 0.025             | 0.2                |
| ø1.5                      | R0.1, R0.2             | 5                          | 23,000                                                                            | 1,800 | 0.08              | 1.5                | 50,000                                                                              | 6,000  | 0.08              | 0.3                |
| "                         | "                      | 8                          | 26,000                                                                            | 1,600 | 0.06              | 1.5                | 45,000                                                                              | 5,500  | 0.06              | 0.3                |
| "                         | "                      | 12                         | 30,000                                                                            | 1,500 | 0.05              | 1.5                | 40,000                                                                              | 4,500  | 0.04              | 0.3                |
| ø2                        | R0.1, R0.2             | 6                          | 35,000                                                                            | 1,800 | 0.14              | 2                  | 45,000                                                                              | 5,000  | 0.12              | 0.8                |
| "                         | "                      | 10                         | 30,000                                                                            | 1,600 | 0.12              | 2                  | 40,000                                                                              | 4,700  | 0.1               | 0.6                |
| "                         | "                      | 14                         | 30,000                                                                            | 1,200 | 0.08              | 2                  | 30,000                                                                              | 3,800  | 0.06              | 0.4                |
| ø3                        | R0.2, R0.3             | 10                         | 30,000                                                                            | 2,200 | 0.14              | 3                  | 40,000                                                                              | 6,500  | 0.12              | 1                  |
| "                         | "                      | 16                         | 20,000                                                                            | 2,000 | 0.12              | 3                  | 35,000                                                                              | 6,000  | 0.1               | 0.6                |
| "                         | "                      | 20                         | 20,000                                                                            | 2,000 | 0.12              | 3                  | 35,000                                                                              | 6,000  | 0.1               | 0.6                |
| "                         | R0.5                   | 10                         | 20,000                                                                            | 2,600 | 0.14              | 3                  | 38,000                                                                              | 10,000 | 0.12              | 0.8                |
| "                         | "                      | 16                         | 20,000                                                                            | 2,200 | 0.12              | 3                  | 35,000                                                                              | 8,000  | 0.1               | 0.6                |
| "                         | "                      | 20                         | 20,000                                                                            | 2,200 | 0.12              | 3                  | 35,000                                                                              | 8,000  | 0.1               | 0.6                |
| ø4                        | R0.2, R0.3             | 12                         | 20,000                                                                            | 2,600 | 0.5               | 4                  | 40,000                                                                              | 8,000  | 0.18              | 0.12               |
| "                         | "                      | 16                         | 15,000                                                                            | 2,400 | 0.3               | 4                  | 32,000                                                                              | 5,000  | 0.16              | 0.1                |
| "                         | "                      | 20                         | 15,000                                                                            | 2,000 | 0.25              | 4                  | 32,000                                                                              | 5,000  | 0.15              | 0.8                |
| "                         | R0.5                   | 12                         | 20,000                                                                            | 2,400 | 0.5               | 4                  | 35,000                                                                              | 10,000 | 0.3               | 0.1                |
| "                         | "                      | 16                         | 15,000                                                                            | 2,200 | 0.25              | 4                  | 32,000                                                                              | 7,000  | 0.15              | 0.8                |
| "                         | "                      | 20                         | 15,000                                                                            | 2,200 | 0.25              | 4                  | 32,000                                                                              | 7,000  | 0.15              | 0.8                |
| 절입량<br>Depth of Cut       |                        |                            |  |       |                   |                    |  |        |                   |                    |

- 상기 조건은 V/C 100, Fz 0.03 기준이며, 실 가공시 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과할시 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- Above the parameters are based on V/C 100 with Fz 0.03. Actual machining can be changed depending on your machining purpose and condition of your machine.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

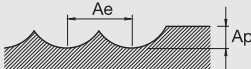
## 2DRB Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재 Material        | 알루미늄 합금재<br>Aluminum Alloy Expanding Material<br>A7075                            |       |                            |       | 알루미늄합금주물 / 다이캐스팅<br>Aluminum Alloys Casting / Die Casting<br>Si1 3% |       |                            |       | 탄소섬유 / 동합금<br>Magnesium Alloy / Copper Alloy / CFRP<br>AZ91 / AZ80A / C1100 |       | 동합금<br>Copper Alloy<br>C1100 |       |
|---------------------|-----------------------------------------------------------------------------------|-------|----------------------------|-------|---------------------------------------------------------------------|-------|----------------------------|-------|-----------------------------------------------------------------------------|-------|------------------------------|-------|
|                     | 일반가공<br>Regular Milling                                                           |       | 고속가공<br>High Speed Milling |       | 일반가공<br>Regular Milling                                             |       | 고속가공<br>High Speed Milling |       | 일반가공<br>Regular Milling                                                     |       | 고속가공<br>High Speed Milling   |       |
| 반경 Radius           | RPM                                                                               | FEED  | RPM                        | FEED  | RPM                                                                 | FEED  | RPM                        | FEED  | RPM                                                                         | FEED  | RPM                          | FEED  |
| R0.1                | 32,000                                                                            | 220   | 45,000                     | 290   | 32,000                                                              | 220   | 45,000                     | 290   | 32,000                                                                      | 220   | 45,000                       | 290   |
| R0.3                | 32,000                                                                            | 480   | 45,000                     | 660   | 32,000                                                              | 480   | 45,000                     | 660   | 32,000                                                                      | 480   | 45,000                       | 660   |
| R0.5                | 28,800                                                                            | 760   | 45,000                     | 1,100 | 28,800                                                              | 760   | 45,000                     | 1,100 | 28,800                                                                      | 760   | 45,000                       | 1,100 |
| R0.8                | 28,800                                                                            | 850   | 45,000                     | 1,400 | 28,800                                                              | 850   | 45,000                     | 1,400 | 25,200                                                                      | 850   | 35,900                       | 1,300 |
| R1                  | 28,600                                                                            | 1,400 | 45,000                     | 2,000 | 28,600                                                              | 1,400 | 43,000                     | 1,900 | 21,500                                                                      | 1,000 | 35,900                       | 1,600 |
| R1.5                | 19,100                                                                            | 1,400 | 45,000                     | 3,000 | 19,100                                                              | 1,400 | 28,600                     | 1,900 | 14,300                                                                      | 1,000 | 23,900                       | 1,600 |
| R2                  | 14,300                                                                            | 1,400 | 35,900                     | 3,200 | 14,300                                                              | 1,400 | 21,400                     | 1,900 | 10,700                                                                      | 1,000 | 17,900                       | 1,600 |
| R3                  | 9,500                                                                             | 1,400 | 23,900                     | 3,200 | 9,500                                                               | 1,400 | 14,300                     | 1,900 | 7,200                                                                       | 1,000 | 12,000                       | 1,600 |
| R4                  | 7,200                                                                             | 1,800 | 17,600                     | 4,100 | 7,200                                                               | 1,800 | 10,700                     | 2,400 | 5,400                                                                       | 1,300 | 8,900                        | 2,000 |
| R5                  | 5,700                                                                             | 1,600 | 14,000                     | 3,600 | 5,700                                                               | 1,600 | 8,600                      | 2,200 | 4,300                                                                       | 1,200 | 7,200                        | 1,800 |
| R6                  | 4,800                                                                             | 1,500 | 11,700                     | 3,400 | 4,800                                                               | 1,500 | 7,200                      | 2,000 | 3,600                                                                       | 1,100 | 5,900                        | 1,700 |
| 절입량<br>Depth of Cut | Ap                                                                                | Ae    | Ap                         | Ae    | Ap                                                                  | Ae    | Ap                         | Ae    | Ap                                                                          | Ae    | Ap                           | Ae    |
|                     | 0.1D                                                                              | 0.2D  | 0.05D                      | 0.1D  | 0.1D                                                                | 0.2D  | 0.05D                      | 0.1D  | 0.1D                                                                        | 0.2D  | 0.02D                        | 0.05D |
|                     |  |       |                            |       |                                                                     |       |                            |       |                                                                             |       |                              |       |

## 2DLB Cutting Condition

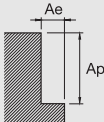
• RPM : rev./min • Feed : mm/min

| 파삭재 Material        | 알루미늄 합금재<br>Aluminum Alloy Expanding Material<br>A7075                              |       |                            |       | 알루미늄합금주물 / 다이캐스팅<br>Aluminum Alloys Casting / Die Casting<br>Si1 3% |       |                            |       | 탄소섬유 / 동합금<br>Magnesium Alloy / Copper Alloy / CFRP<br>AZ91 / AZ80A / C1100 |      | 동합금<br>Copper Alloy<br>C1100 |       |
|---------------------|-------------------------------------------------------------------------------------|-------|----------------------------|-------|---------------------------------------------------------------------|-------|----------------------------|-------|-----------------------------------------------------------------------------|------|------------------------------|-------|
|                     | 일반가공<br>Regular Milling                                                             |       | 고속가공<br>High Speed Milling |       | 일반가공<br>Regular Milling                                             |       | 고속가공<br>High Speed Milling |       | 일반가공<br>Regular Milling                                                     |      | 고속가공<br>High Speed Milling   |       |
| 반경 Radius           | RPM                                                                                 | FEED  | RPM                        | FEED  | RPM                                                                 | FEED  | RPM                        | FEED  | RPM                                                                         | FEED | RPM                          | FEED  |
| R0.3                | 28,800                                                                              | 350   | 40,000                     | 490   | 28,800                                                              | 350   | 36,100                     | 480   | 28,800                                                                      | 350  | 31,600                       | 420   |
| R0.5                | 23,400                                                                              | 720   | 31,500                     | 950   | 23,400                                                              | 720   | 25,200                     | 900   | 23,400                                                                      | 720  | 20,700                       | 800   |
| R0.8                | 23,400                                                                              | 760   | 35,900                     | 1,120 | 23,400                                                              | 760   | 25,200                     | 1,000 | 22,500                                                                      | 720  | 20,700                       | 800   |
| R1                  | 22,500                                                                              | 950   | 31,500                     | 1,260 | 22,500                                                              | 950   | 25,200                     | 1,100 | 17,100                                                                      | 720  | 20,700                       | 800   |
| R1.5                | 15,300                                                                              | 950   | 20,700                     | 1,260 | 15,300                                                              | 950   | 16,700                     | 1,100 | 11,300                                                                      | 720  | 13,500                       | 800   |
| R2                  | 11,300                                                                              | 950   | 15,800                     | 1,260 | 11,300                                                              | 950   | 12,600                     | 1,100 | 8,600                                                                       | 720  | 10,400                       | 800   |
| R3                  | 9,000                                                                               | 950   | 13,200                     | 1,260 | 9,000                                                               | 950   | 12,600                     | 1,100 | 5,900                                                                       | 720  | 8,900                        | 800   |
| R4                  | 6,400                                                                               | 1,150 | 11,600                     | 1,260 | 6,400                                                               | 1,150 | 9,800                      | 1,000 | 4,800                                                                       | 880  | 6,400                        | 950   |
| R5                  | 5,200                                                                               | 1,050 | 9,400                      | 1,120 | 5,200                                                               | 1,050 | 7,800                      | 860   | 3,900                                                                       | 760  | 5,300                        | 880   |
| R6                  | 4,100                                                                               | 1,000 | 6,700                      | 950   | 4,100                                                               | 1,000 | 5,400                      | 520   | 3,000                                                                       | 740  | 4,600                        | 840   |
| 절입량<br>Depth of Cut | Ap                                                                                  | Ae    | Ap                         | Ae    | Ap                                                                  | Ae    | Ap                         | Ae    | Ap                                                                          | Ae   | Ap                           | Ae    |
|                     | 0.1D                                                                                | 0.2D  | 0.05D                      | 0.1D  | 0.1D                                                                | 0.2D  | 0.05D                      | 0.1D  | 0.1D                                                                        | 0.2D | 0.02D                        | 0.05D |
|                     |  |       |                            |       |                                                                     |       |                            |       |                                                                             |      |                              |       |

- 상기 절삭 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로 혹은 미스트 쿨런트를 추천 합니다.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolant is recommended.

## 2DRE/3DRE Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재 Material          | 알루미늄 합금재<br>Aluminum Alloy Expanding Material                                                                                                                                                        |      |                            |       | 알루미늄합금주물 / 다이캐스팅<br>Aluminum Alloys Casting / Die Casting |      |                            |       | 탄소섬유 / 동합금<br>Magnesium Alloy /<br>Copper Alloy / CFRP<br>AZ91 / AZ80A / C1100 |      | 동합금<br>Copper Alloy        |       |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------|-------|-----------------------------------------------------------|------|----------------------------|-------|--------------------------------------------------------------------------------|------|----------------------------|-------|
|                       | A7075                                                                                                                                                                                                |      |                            |       | Si1.3%                                                    |      |                            |       |                                                                                |      | C1100                      |       |
|                       | 일반가공<br>Regular Milling                                                                                                                                                                              |      | 고속가공<br>High Speed Milling |       | 일반가공<br>Regular Milling                                   |      | 고속가공<br>High Speed Milling |       | 일반가공<br>Regular Milling                                                        |      | 고속가공<br>High Speed Milling |       |
| 외경 Outside Diameter   | RPM                                                                                                                                                                                                  | FEED | RPM                        | FEED  | RPM                                                       | FEED | RPM                        | FEED  | RPM                                                                            | FEED | RPM                        | FEED  |
| ø0.5                  | 28,800                                                                                                                                                                                               | 160  | 45,000                     | 500   | 28,800                                                    | 160  | 45,000                     | 450   | 28,800                                                                         | 140  | 45,000                     | 410   |
| ø0.6                  | 28,800                                                                                                                                                                                               | 180  | 45,000                     | 590   | 28,800                                                    | 180  | 45,000                     | 540   | 28,800                                                                         | 160  | 45,000                     | 500   |
| ø0.8                  | 28,800                                                                                                                                                                                               | 200  | 45,000                     | 770   | 28,800                                                    | 200  | 45,000                     | 720   | 26,100                                                                         | 180  | 45,000                     | 590   |
| ø1                    | 28,800                                                                                                                                                                                               | 200  | 45,000                     | 900   | 28,800                                                    | 200  | 45,000                     | 960   | 20,700                                                                         | 200  | 37,800                     | 630   |
| ø1.2                  | 28,800                                                                                                                                                                                               | 210  | 45,000                     | 1,100 | 28,800                                                    | 210  | 45,000                     | 1,000 | 17,100                                                                         | 200  | 32,400                     | 630   |
| ø1.5                  | 28,800                                                                                                                                                                                               | 250  | 45,000                     | 1,400 | 28,800                                                    | 250  | 45,000                     | 1,100 | 14,000                                                                         | 200  | 26,600                     | 630   |
| ø2                    | 28,800                                                                                                                                                                                               | 400  | 45,000                     | 1,800 | 28,800                                                    | 380  | 45,000                     | 1,100 | 13,000                                                                         | 200  | 25,200                     | 680   |
| ø2.5                  | 22,500                                                                                                                                                                                               | 540  | 43,200                     | 1,900 | 22,500                                                    | 540  | 27,900                     | 1,100 | 8,600                                                                          | 230  | 18,000                     | 680   |
| ø3                    | 18,900                                                                                                                                                                                               | 630  | 36,000                     | 1,900 | 18,900                                                    | 630  | 23,400                     | 1,100 | 7,200                                                                          | 230  | 15,300                     | 680   |
| ø4                    | 14,000                                                                                                                                                                                               | 650  | 29,700                     | 2,000 | 14,000                                                    | 650  | 18,000                     | 1,200 | 5,400                                                                          | 250  | 12,600                     | 720   |
| ø5                    | 11,300                                                                                                                                                                                               | 680  | 27,900                     | 2,500 | 11,300                                                    | 680  | 17,280                     | 1,500 | 4,300                                                                          | 270  | 11,300                     | 860   |
| ø6                    | 9,500                                                                                                                                                                                                | 750  | 23,400                     | 2,500 | 9,500                                                     | 750  | 14,310                     | 1,500 | 3,600                                                                          | 280  | 9,500                      | 900   |
| ø8                    | 7,200                                                                                                                                                                                                | 800  | 17,550                     | 2,600 | 7,200                                                     | 800  | 10,800                     | 1,600 | 2,600                                                                          | 270  | 7,100                      | 900   |
| ø10                   | 5,700                                                                                                                                                                                                | 900  | 13,950                     | 2,900 | 5,700                                                     | 900  | 8,640                      | 1,700 | 2,100                                                                          | 330  | 5,700                      | 1,000 |
| ø12                   | 4,800                                                                                                                                                                                                | 950  | 11,700                     | 2,900 | 4,800                                                     | 950  | 7,200                      | 1,700 | 1,800                                                                          | 350  | 4,800                      | 1,000 |
| 측면 절삭<br>Side Cutting | Ap                                                                                                                                                                                                   | Ae   | Ap                         | Ae    | Ap                                                        | Ae   | Ap                         | Ae    | Ap                                                                             | Ae   | Ap                         | Ae    |
|                       | 1.5D                                                                                                                                                                                                 | 0.1D | 1D                         | 0.1D  | 1.5D                                                      | 0.1D | 1D                         | 0.1D  | 1.5D                                                                           | 0.1D | 1D                         | 0.05D |
| 홈 절삭<br>Slotting      | Ap                                                                                                                                                                                                   |      | Ap                         |       | Ap                                                        |      | Ap                         |       | Ap                                                                             |      | Ap                         |       |
|                       | 0.3D < ø1 < 0.5D                                                                                                                                                                                     |      | 0.15D                      |       | 0.3D < ø1 < 0.5D                                          |      | 0.15D                      |       | 0.3D < ø1 < 0.5D                                                               |      | 0.1D                       |       |
| 절입량<br>Depth of Cut   | <div><div></div><div></div></div> |      |                            |       |                                                           |      |                            |       |                                                                                |      |                            |       |

## 2DLE Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재 Material          | 알루미늄 합금재<br>Aluminum Alloy Expanding Material<br>A7075                                                    |      |                            |       | 알루미늄 합금 주물 / 다이캐스팅<br>Aluminum Alloys Casting / Die Casting<br>Si1 3% |      |                            |       | 탄소섬유 / 동합금<br>Magnesium Alloy /<br>Copper Alloy / CFRP<br>AZ91 / AZ80A / C1100 |      | 동합금<br>Copper Alloy<br>C1100 |       |
|-----------------------|-----------------------------------------------------------------------------------------------------------|------|----------------------------|-------|-----------------------------------------------------------------------|------|----------------------------|-------|--------------------------------------------------------------------------------|------|------------------------------|-------|
|                       | 일반가공<br>Regular Milling                                                                                   |      | 고속가공<br>High Speed Milling |       | 일반가공<br>Regular Milling                                               |      | 고속가공<br>High Speed Milling |       | 일반가공<br>Regular Milling                                                        |      | 고속가공<br>High Speed Milling   |       |
| 외경 Outside Diameter   | RPM                                                                                                       | FEED | RPM                        | FEED  | RPM                                                                   | FEED | RPM                        | FEED  | RPM                                                                            | FEED | RPM                          | FEED  |
| ø0.1                  | 32,000                                                                                                    | 35   | 45,000                     | 120   | 32,000                                                                | 35   | 45,000                     | 120   | 32,000                                                                         | 35   | 45,000                       | 100   |
| ø0.3                  | 32,000                                                                                                    | 60   | 45,000                     | 300   | 32,000                                                                | 60   | 45,000                     | 300   | 32,000                                                                         | 60   | 45,000                       | 210   |
| ø0.5                  | 28,800                                                                                                    | 90   | 45,000                     | 500   | 28,800                                                                | 90   | 45,000                     | 500   | 28,800                                                                         | 90   | 45,000                       | 390   |
| ø0.8                  | 28,800                                                                                                    | 120  | 45,000                     | 700   | 28,800                                                                | 130  | 45,000                     | 700   | 23,000                                                                         | 110  | 45,000                       | 500   |
| ø1                    | 28,800                                                                                                    | 170  | 45,000                     | 900   | 28,800                                                                | 170  | 45,000                     | 900   | 20,700                                                                         | 125  | 37,800                       | 630   |
| ø1.5                  | 28,800                                                                                                    | 230  | 40,500                     | 1,100 | 28,800                                                                | 230  | 40,500                     | 1,100 | 14,000                                                                         | 130  | 26,700                       | 630   |
| ø2                    | 23,000                                                                                                    | 270  | 30,600                     | 1,100 | 23,000                                                                | 270  | 30,600                     | 1,100 | 10,400                                                                         | 135  | 21,600                       | 675   |
| ø3                    | 15,300                                                                                                    | 460  | 20,700                     | 1,100 | 15,300                                                                | 460  | 20,700                     | 1,100 | 7,200                                                                          | 200  | 15,300                       | 675   |
| ø4                    | 11,300                                                                                                    | 470  | 15,300                     | 1,100 | 11,300                                                                | 470  | 15,300                     | 1,100 | 5,400                                                                          | 210  | 11,700                       | 675   |
| ø5                    | 9,000                                                                                                     | 490  | 12,200                     | 1,100 | 9,000                                                                 | 490  | 12,200                     | 1,100 | 4,300                                                                          | 225  | 9,000                        | 675   |
| ø6                    | 7,700                                                                                                     | 540  | 10,000                     | 1,100 | 7,700                                                                 | 540  | 10,000                     | 1,100 | 3,600                                                                          | 225  | 7,200                        | 675   |
| ø8                    | 6,000                                                                                                     | 600  | 8,200                      | 1,200 | 6,000                                                                 | 600  | 8,200                      | 1,200 | 2,600                                                                          | 300  | 5,900                        | 720   |
| ø10                   | 4,500                                                                                                     | 650  | 6,000                      | 1,400 | 4,500                                                                 | 650  | 6,000                      | 1,400 | 2,100                                                                          | 300  | 4,300                        | 800   |
| ø12                   | 3,100                                                                                                     | 690  | 4,500                      | 1,500 | 3,100                                                                 | 690  | 4,500                      | 1,500 | 1,600                                                                          | 320  | 3,200                        | 850   |
| 측면 절삭<br>Side Cutting | Ap                                                                                                        | Ae   | Ap                         | Ae    | Ap                                                                    | Ae   | Ap                         | Ae    | Ap                                                                             | Ae   | Ap                           | Ae    |
|                       | 1.2D                                                                                                      | 0.1D | 1D                         | 0.1D  | 1.2D                                                                  | 0.1D | 1D                         | 0.1D  | 1D                                                                             | 0.1D | 1D                           | 0.05D |
| 홈 절삭<br>Slotting      | Ap                                                                                                        |      | Ap                         |       | Ap                                                                    |      | Ap                         |       | Ap                                                                             |      | Ap                           |       |
|                       | 0.3D                                                                                                      |      | 0.15D                      |       | 0.3D                                                                  |      | 0.15D                      |       | 0.3D                                                                           |      | 0.1D                         |       |
| 절입량<br>Depth of Cut   | <div><div><div></div><div>Ae</div><div>Ap</div></div><div></div><div><div></div><div>Ap</div></div></div> |      |                            |       |                                                                       |      |                            |       |                                                                                |      |                              |       |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 절삭 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망 합니다 (ø1이하 사용시 진동 허용 관리 5μm 이내 일것.)
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (ø1 or less, the vibration tolerance management should be within 5μm).
- Air blow or mist coolant is recommended and note for chip emission, heat, or ignition.

## 2DLC Cutting Condition

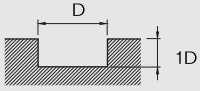
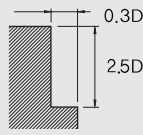
• RPM : rev./min • Feed : mm/min

| 파삭재 Material          | 알루미늄 합금재<br>Aluminum Alloy Expanding Material<br>A7075                                         |      |                            |       | 알루미늄합금주물 / 다이캐스팅<br>Aluminum Alloys Casting / Die Casting<br>Si1 3% |      |                            |       | 탄소섬유 / 동합금<br>Magnesium Alloy / Copper Alloy / CFRP<br>AZ91 / AZ80A / C1100 |      | 동합금<br>Copper Alloy<br>C1100 |       |
|-----------------------|------------------------------------------------------------------------------------------------|------|----------------------------|-------|---------------------------------------------------------------------|------|----------------------------|-------|-----------------------------------------------------------------------------|------|------------------------------|-------|
|                       | 일반가공<br>Regular Milling                                                                        |      | 고속가공<br>High Speed Milling |       | 일반가공<br>Regular Milling                                             |      | 고속가공<br>High Speed Milling |       | 일반가공<br>Regular Milling                                                     |      | 고속가공<br>High Speed Milling   |       |
|                       | 외경 Outside Diameter                                                                            | RPM  | FEED                       | RPM   | FEED                                                                | RPM  | FEED                       | RPM   | FEED                                                                        | RPM  | FEED                         | RPM   |
| Ø1                    | 37,500                                                                                         | 220  | 50,000                     | 1,170 | 37,400                                                              | 220  | 50,000                     | 1,170 | 27,000                                                                      | 160  | 49,000                       | 820   |
| Ø1.5                  | 37,500                                                                                         | 300  | 50,000                     | 1,430 | 37,400                                                              | 300  | 50,000                     | 1,430 | 18,000                                                                      | 170  | 34,700                       | 820   |
| Ø2                    | 30,000                                                                                         | 350  | 40,000                     | 1,430 | 30,000                                                              | 350  | 40,000                     | 1,430 | 13,500                                                                      | 180  | 28,000                       | 880   |
| Ø3                    | 20,000                                                                                         | 600  | 27,000                     | 1,430 | 20,000                                                              | 600  | 27,000                     | 1,430 | 9,400                                                                       | 260  | 20,000                       | 880   |
| Ø4                    | 15,000                                                                                         | 610  | 20,000                     | 1,430 | 14,700                                                              | 610  | 20,000                     | 1,430 | 7,000                                                                       | 270  | 15,200                       | 880   |
| Ø6                    | 10,000                                                                                         | 700  | 13,000                     | 1,430 | 10,000                                                              | 700  | 13,000                     | 1,430 | 4,700                                                                       | 290  | 9,400                        | 880   |
| Ø8                    | 7,800                                                                                          | 780  | 11,000                     | 1,560 | 7,800                                                               | 780  | 10,700                     | 1,560 | 3,400                                                                       | 390  | 7,700                        | 940   |
| Ø10                   | 5,900                                                                                          | 850  | 7,800                      | 1,820 | 5,900                                                               | 850  | 7,800                      | 1,820 | 2,700                                                                       | 390  | 5,600                        | 1,000 |
| Ø12                   | 4,000                                                                                          | 900  | 5,900                      | 1,950 | 4,000                                                               | 900  | 5,900                      | 1,950 | 2,100                                                                       | 410  | 4,200                        | 1,100 |
| 측면 절삭<br>Side Cutting | Ap                                                                                             | Ae   | Ap                         | Ae    | Ap                                                                  | Ae   | Ap                         | Ae    | Ap                                                                          | Ae   | Ap                           | Ae    |
|                       | 1.2D                                                                                           | 0.1D | 1D                         | 0.1D  | 1.2D                                                                | 0.1D | 1D                         | 0.1D  | 1D                                                                          | 0.1D | 1D                           | 0.05D |
| 홈 절삭<br>Slotting      | Ap                                                                                             |      | Ap                         |       | Ap                                                                  |      | Ap                         |       | Ap                                                                          |      | Ap                           |       |
|                       | 0.3D                                                                                           |      | 0.15D                      |       | 0.3D                                                                |      | 0.15D                      |       | 0.3D                                                                        |      | 0.1D                         |       |
| 절입량<br>Depth of Cut   | <div><div><div></div><div>Ae</div><div>Ap</div></div><div><div></div><div>Ap</div></div></div> |      |                            |       |                                                                     |      |                            |       |                                                                             |      |                              |       |
|                       |                                                                                                |      |                            |       |                                                                     |      |                            |       |                                                                             |      |                              |       |

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 측면 절삭시 코너 R 부분을 참고하여 절삭하시기 바랍니다.
- 홈 절삭시 날경의 코너R 대비 Ae 값을 설정 하십시오.
- 상기 절삭 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 에어브로 혹은 미스트 쿨란트를 추천하며 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- Refer to the corner radius value for side milling
- Consider the corner radius value when you set up the Ae value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Air blow or mist coolant is recommended and note for chip emission, heat, or ignition.

## 3FALE Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재 Material           | 홈절삭 Slotting                                                                        |       |                   |                    | 측면 절삭 Side Cutting                                                                    |       |                   |                    |
|------------------------|-------------------------------------------------------------------------------------|-------|-------------------|--------------------|---------------------------------------------------------------------------------------|-------|-------------------|--------------------|
|                        | 알루미늄 합금 Aluminum Alloys                                                             |       |                   |                    | 알루미늄 합금 Aluminum Alloys                                                               |       |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                   | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø6                     | 8,000                                                                               | 1,000 | 6                 | 6                  | 8,000                                                                                 | 1,200 | 15                | 1.8                |
| Ø8                     | 6,000                                                                               | 1,000 | 8                 | 8                  | 6,000                                                                                 | 1,200 | 20                | 2.4                |
| Ø10                    | 4,800                                                                               | 1,000 | 10                | 10                 | 4,800                                                                                 | 1,200 | 25                | 3                  |
| Ø12                    | 4,000                                                                               | 1,000 | 12                | 12                 | 4,000                                                                                 | 1,200 | 30                | 3.6                |
| Ø16                    | 3,000                                                                               | 1,000 | 16                | 16                 | 3,000                                                                                 | 1,200 | 40                | 4.8                |
| 절입량<br>Depth of Cut    |  |       |                   |                    |  |       |                   |                    |

- 가공 진입시 가능한 파삭재 밖에서 진입 하십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20%이하로 줄이십시오.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할시 조건표에 회전 속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 파삭재와 가공 모양에 따라 적절한 쿨란트를 사용 하십시오.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.

| 파삭재 Material           | 알루미늄 합금 Aluminum Alloys etc. |             |             |                    |        |             |             |                    |
|------------------------|------------------------------|-------------|-------------|--------------------|--------|-------------|-------------|--------------------|
| 외경<br>Outside Diameter | 3ALR                         |             |             |                    | 3ALE   |             |             |                    |
|                        | RPM                          | FEED        |             |                    | RPM    | FEED        |             |                    |
|                        |                              | 수직 Vertical | 홀절삭 Solting | 측면 절삭 Side Milling |        | 수직 Vertical | 홀절삭 Solting | 측면 절삭 Side Milling |
| ø1                     | 30,000                       | 150         | 900         | 1,100              | 25,500 | 130         | 770         | 930                |
| ø2                     | 30,000                       | 225         | 1,800       | 2,150              | 25,500 | 190         | 1,530       | 1,800              |
| ø3                     | 21,600                       | 225         | 2,000       | 2,400              | 18,400 | 190         | 1,700       | 2,000              |
| ø4                     | 16,200                       | 300         | 2,000       | 2,400              | 14,000 | 255         | 1,700       | 2,000              |
| ø5                     | 13,000                       | 300         | 2,000       | 2,400              | 11,000 | 255         | 1,700       | 2,000              |
| ø6                     | 10,800                       | 300         | 2,000       | 2,400              | 9,200  | 255         | 1,700       | 2,000              |
| ø8                     | 8,100                        | 300         | 2,000       | 2,400              | 7,000  | 255         | 1,700       | 2,000              |
| ø10                    | 6,480                        | 250         | 2,000       | 2,400              | 5,500  | 210         | 1,700       | 2,000              |
| ø12                    | 5,400                        | 200         | 2,000       | 2,400              | 4,400  | 170         | 1,700       | 2,000              |
| ø16                    | -                            | -           | -           | -                  | 3,200  | 130         | 1,530       | 1,900              |
| ø20                    | -                            | -           | -           | -                  | 2,000  | 85          | 1,360       | 1,700              |
| Milling Amount (mm)    |                              | Ap=0.75D    | Ap=0.75D    | Ap=0.75D/ Ae=0.3D  |        | Ap=0.75D    | Ap=0.75D    | Ap=0.75D/ Ae=0.3D  |
| 절입량<br>Depth of Cut    |                              |             |             |                    |        |             |             |                    |

## 2ALE

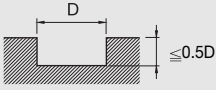
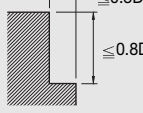
•RPM : rev./min •Feed : mm/min

| 파삭재 Material           | 알루미늄 합금 Aluminum Alloys |       |             |       | 알루미늄 합금 주물 Aluminum Alloys |       |             |      |
|------------------------|-------------------------|-------|-------------|-------|----------------------------|-------|-------------|------|
| 외경<br>Outside Diameter | 측면 가공 Side Milling      |       | 홀가공 Solting |       | 측면 가공 Side Milling         |       | 홀가공 Solting |      |
|                        | RPM                     | FEED  | RPM         | FEED  | RPM                        | FEED  | RPM         | FEED |
| ø1                     | 34,000                  | 500   | 34,000      | 400   | 34,000                     | 400   | 34,000      | 300  |
| ø2                     | 34,000                  | 950   | 32,300      | 720   | 32,300                     | 720   | 27,200      | 470  |
| ø3                     | 27,200                  | 1,200 | 21,300      | 800   | 21,300                     | 800   | 18,000      | 510  |
| ø4                     | 20,400                  | 1,300 | 16,000      | 850   | 16,000                     | 850   | 14,000      | 550  |
| ø5                     | 16,200                  | 1,400 | 13,000      | 850   | 13,000                     | 850   | 11,000      | 600  |
| ø6                     | 13,600                  | 1,600 | 11,000      | 940   | 11,000                     | 940   | 9,400       | 640  |
| ø8                     | 10,200                  | 1,600 | 8,000       | 1,000 | 8,000                      | 1,000 | 6,800       | 680  |
| ø10                    | 8,100                   | 1,600 | 6,500       | 1,000 | 6,500                      | 1,000 | 5,400       | 680  |
| ø12                    | 6,800                   | 1,600 | 5,400       | 1,000 | 5,400                      | 1,000 | 4,500       | 680  |
| ø16                    | 5,100                   | 1,600 | 4,100       | 1,000 | 4,100                      | 1,000 | 3,400       | 610  |
| ø20                    | 4,100                   | 1,300 | 3,200       | 850   | 3,200                      | 850   | 2,700       | 560  |
| 절입량<br>Depth of Cut    |                         |       |             |       |                            |       |             |      |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오.
- 상기 절삭 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

## 3ALC Cutting Condition

• RPM : rev./min • Feed : mm/min

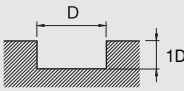
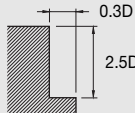
| 피삭재 Material              | 홈절삭 Slotting                                                                      |       |                   |                    | 측면 절삭 Side Cutting                                                                  |       |                   |                    |
|---------------------------|-----------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------------------------------------------------------------------------------|-------|-------------------|--------------------|
|                           | 알루미늄 합금 Aluminum Alloys                                                           |       |                   |                    | 알루미늄 합금 Aluminum Alloys                                                             |       |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                               | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                                                                                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø6                        | 20,000                                                                            | 6,600 | 6                 | 6                  | 20,000                                                                              | 8,400 | 4.8               | 1.8                |
| ø8                        | 18,000                                                                            | 5,400 | 8                 | 8                  | 18,000                                                                              | 7,500 | 6.4               | 2.4                |
| ø10                       | 15,000                                                                            | 4,000 | 10                | 10                 | 15,000                                                                              | 6,000 | 8                 | 3                  |
| ø12                       | 13,000                                                                            | 3,200 | 12                | 12                 | 13,000                                                                              | 5,400 | 9.6               | 3.6                |
| ø16                       | 10,000                                                                            | 3,200 | 16                | 16                 | 10,000                                                                              | 5,400 | 12.8              | 4.8                |
| ø20                       | 8,000                                                                             | 3,000 | 10                | 10                 | 8,000                                                                               | 5,000 | 16                | 6                  |
| 절입량<br>Depth of Cut       |  |       |                   |                    |  |       |                   |                    |

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20%이하로 줄이십시오.
- 측면 절삭시 코너 R 부분을 참고하여 절삭 하시기 바랍니다.
- 홈 절삭시 날경의 코너R 대비 Ae 값을 설정 하십시오.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 에어브로 혹은 미스트 쿨란트를 추천하며 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.

- In case of long effective length, reduce the RPM and feed by 20% or less.
- Refer to the corner radius value for side milling.
- Consider the corner radius value when you set up the Ae value.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

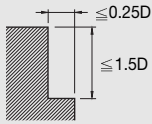
## 3ARE/3ARC Cutting Condition

• RPM : rev./min • Feed : mm/min

| 피삭재 Material              | 동 Copper                                                                            |       |                   |                    |                    |                    | 알루미늄 Aluminum                                                                         |       |                   |                    |                    |                    |
|---------------------------|-------------------------------------------------------------------------------------|-------|-------------------|--------------------|--------------------|--------------------|---------------------------------------------------------------------------------------|-------|-------------------|--------------------|--------------------|--------------------|
|                           |                                                                                     |       | 홈절삭 Slotting      |                    | 측면 절삭 Side Cutting |                    |                                                                                       |       | 홈절삭 Slotting      |                    | 측면 절삭 Side Cutting |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                 | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | Ap<br>Axial Depth  | Ae<br>Radial Depth | RPM                                                                                   | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | Ap<br>Axial Depth  | Ae<br>Radial Depth |
| ø6                        | 4,200                                                                               | 1,500 | 6                 | 6                  | 15                 | 1.8                | 8,000                                                                                 | 1,800 | 6                 | 6                  | 15                 | 1.8                |
| ø8                        | 3,200                                                                               | 1,500 | 8                 | 8                  | 20                 | 2.4                | 6,000                                                                                 | 1,800 | 8                 | 8                  | 20                 | 2.4                |
| ø10                       | 2,600                                                                               | 1,500 | 10                | 10                 | 25                 | 3                  | 4,800                                                                                 | 1,800 | 10                | 10                 | 25                 | 3                  |
| ø12                       | 2,100                                                                               | 1,500 | 12                | 12                 | 30                 | 3.6                | 4,000                                                                                 | 1,800 | 12                | 12                 | 30                 | 3.6                |
| ø16                       | 1,600                                                                               | 1,500 | 16                | 16                 | 40                 | 4.8                | 3,000                                                                                 | 1,800 | 16                | 16                 | 40                 | 4.8                |
| ø20                       | 1,300                                                                               | 1,500 | 20                | 20                 | 50                 | 6                  | 2,400                                                                                 | 1,800 | 20                | 20                 | 50                 | 6                  |
| 절입량<br>Depth of Cut       |  |       |                   |                    |                    |                    |  |       |                   |                    |                    |                    |

- 가공 진입시 가능한 피삭재 밖에서 진입 하십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할시 조건표에 회전 속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 피삭재와 가공 모양에 따라 적절한 쿨란트를 사용 하십시오.

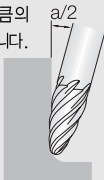
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.

| 파삭재 Material              | 측면 절삭 Side Cutting                                                                 |       |                   |                    |                         |       |                   |                    |
|---------------------------|------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
|                           | 알루미늄 합금 Aluminum Alloys                                                            |       |                   |                    | 알루미늄 합금 Aluminum Alloys |       |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø4                        | 30,000                                                                             | 4,200 | 6                 | 1                  | 16,000                  | 1,800 | 6                 | 1                  |
| ø5                        | 27,000                                                                             | 4,900 | 7.5               | 1.25               | 14,400                  | 2,000 | 7.5               | 1.25               |
| ø6                        | 24,300                                                                             | 5,500 | 9                 | 1.5                | 11,700                  | 2,100 | 9                 | 1.5                |
| ø8                        | 18,000                                                                             | 5,400 | 12                | 2                  | 9,000                   | 2,200 | 12                | 2                  |
| ø10                       | 14,400                                                                             | 5,200 | 15                | 2.5                | 7,200                   | 2,100 | 15                | 2.5                |
| ø12                       | 11,700                                                                             | 4,800 | 18                | 3                  | 5,900                   | 1,900 | 18                | 3                  |
| ø16                       | 9,000                                                                              | 4,600 | 24                | 4                  | 4,500                   | 1,800 | 24                | 4                  |
| ø20                       | 7,200                                                                              | 4,300 | 30                | 5                  | 3,600                   | 1,700 | 30                | 5                  |
| 절입량<br>Depth of Cut       |  |       |                   |                    |                         |       |                   |                    |

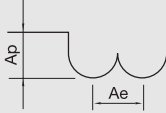
- 가공 진입시 가능한 파삭재 밖에서 진입 하십시오.
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할시 조건표에 회전 속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 파삭재와 가공 모양에 따라 적절한 쿨란트를 사용 하십시오.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- In case of long effective length, reduce the RPM and feed by 20% or less.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Depending on the workpiece and shape, use adequate coolant.

## 4&6CTDB : 6CTDB는 RPM 동일 FEED만 최대 30% Up 적용.

• RPM : rev./min • Feed : mm/min

| 파삭재 Material        |                                                                                                                                                                                                                                                                                                      | 흑연 Graphite |       |                   |                    | 고경도강 Hardened Steels |       |                   |                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------|-------------------|--------------------|----------------------|-------|-------------------|--------------------|
| 경도 Hardness         |                                                                                                                                                                                                                                                                                                      |             |       |                   |                    | < 35HRC              |       |                   |                    |
| 반경<br>Radius        | a/2                                                                                                                                                                                                                                                                                                  | RPM         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                  | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.5               | 10                                                                                                                                                                                                                                                                                                   | 35,000      | 4,200 | 0.22              | 0.05               | 42,000               | 3,000 | 0.09              | 0.3                |
| R 0.75              | 10                                                                                                                                                                                                                                                                                                   | 33,000      | 5,250 | 0.27              | 0.05               | 39,000               | 4,400 | 0.10              | 0.3                |
| R 1                 | 10                                                                                                                                                                                                                                                                                                   | 32,000      | 6,300 | 0.32              | 0.10               | 38,500               | 5,400 | 0.20              | 0.6                |
| R 1                 | 15                                                                                                                                                                                                                                                                                                   | 25,000      | 6,000 | 1.18              | 0.10               | 30,000               | 4,200 | 0.20              | 0.6                |
| R 1.5               | 10                                                                                                                                                                                                                                                                                                   | 25,000      | 6,000 | 0.39              | 0.10               | 30,000               | 4,800 | 0.30              | 0.8                |
| R 2                 | 10                                                                                                                                                                                                                                                                                                   | 16,000      | 4,500 | 0.45              | 0.10               | 20,000               | 3,500 | 0.40              | 1.1                |
| R 2                 | 30                                                                                                                                                                                                                                                                                                   | 14,500      | 3,700 | 1.18              | 0.10               | 18,000               | 3,000 | 0.40              | 1.1                |
| R 3                 | 10                                                                                                                                                                                                                                                                                                   | 12,000      | 4,250 | 0.49              | 0.10               | 14,000               | 3,400 | 0.60              | 1.4                |
| R 3                 | 20                                                                                                                                                                                                                                                                                                   | 10,500      | 4,000 | 1.18              | 0.10               | 13,200               | 3,100 | 0.60              | 1.4                |
| R 4                 | 5                                                                                                                                                                                                                                                                                                    | 9,500       | 4,100 | 0.45              | 0.10               | 11,000               | 3,200 | 0.80              | 1.6                |
| R 4                 | 10                                                                                                                                                                                                                                                                                                   | 8,000       | 3,850 | 0.45              | 0.10               | 10,000               | 3,000 | 0.80              | 1.6                |
| 절입량<br>Depth of Cut | <p>a/2 각도 만큼의 절삭을 권장합니다.</p>  <p>Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/>Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/>D : Outside Diameter 외경 (mm)<br/>n : Speed 회전속도 (min<sup>-1</sup>)<br/>Vf : Feed 이송속도 (mm/min)</p> |             |       |                   |                    |                      |       |                   |                    |

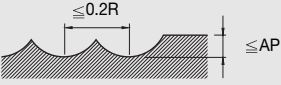
- 절삭 조건표는 4날 기준이며, 6날시에는 회전수는 유지하고, 피드는 안정적인 속도 내에서 최대 30%까지 UP 해주십시오.
- 절삭 조건에 없는 각도는 같은 직경에 이전 각도와 비례하여 사용 하십시오.
- 이송속도 및 축 방향의 절입 깊이는 테이퍼각에 따라 고려하시고, 절삭 상황에 맞추어 조정 하십시오.
- 5축 가공시 유효장 부분을 확인 하여 주십시오.
- 절삭량이 작은 경우, Feed를 최대 20% 까지 UP 시켜 주십시오.
- 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.
- The parameters on the table is based on 4 flutes. For using 6 flutes, use the same RPM and raise up the feed up to 30% in stable milling condition.
- If there is no parameter for the angle of your tool, refer to the previous angle, and adjust compare to it.
- Consider the RPM and feed based on the taper angle and adjust it with milling condition.
- For 5-axis milling, check the length of the effective length before milling.
- If you want to increase metal removal rates, raise up the feed up to 20%.
- During the chip evacuation, note for heat and ignition.

| 파삭재<br>Material     |                            |                      | 프리하트강/고경도강<br>Prehardened Steels/ Hardened Steels                                                                                                                                                                                                                           |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|---------------------|----------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness         |                            |                      | 30 ~ 45HRC                                                                                                                                                                                                                                                                  |       |                   |                    | 45 ~ 55HRC              |       |                   |                    | 55~ 62HRC               |       |                   |                    |
| 반경<br>Radius        | 유효장<br>Effective<br>Length | 각도<br>Taper<br>Angle | RPM                                                                                                                                                                                                                                                                         | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.5               | 12                         | 1°                   | 38,000                                                                                                                                                                                                                                                                      | 2,500 | 0.110             | 0.16               | 35,000                  | 1,600 | 0.080             | 0.13               | 25,000                  | 800   | 0.050             | 0.08               |
| "                   | 20                         | 1°                   | 38,000                                                                                                                                                                                                                                                                      | 2,500 | 0.060             | 0.09               | 35,000                  | 1,600 | 0.050             | 0.07               | 25,000                  | 800   | 0.030             | 0.05               |
| "                   | 15                         | 2°                   | 38,000                                                                                                                                                                                                                                                                      | 2,500 | 0.090             | 0.14               | 35,000                  | 1,600 | 0.070             | 0.11               | 25,000                  | 800   | 0.050             | 0.07               |
| "                   | 20                         | 2°                   | 38,000                                                                                                                                                                                                                                                                      | 2,500 | 0.060             | 0.09               | 35,000                  | 1,600 | 0.050             | 0.07               | 25,000                  | 800   | 0.030             | 0.05               |
| "                   | 15                         | 3°                   | 38,000                                                                                                                                                                                                                                                                      | 2,500 | 0.090             | 0.14               | 35,000                  | 1,600 | 0.070             | 0.11               | 25,000                  | 800   | 0.050             | 0.07               |
| "                   | 20                         | 3°                   | 38,000                                                                                                                                                                                                                                                                      | 2,500 | 0.060             | 0.09               | 35,000                  | 1,600 | 0.050             | 0.07               | 25,000                  | 800   | 0.030             | 0.05               |
| "                   | 20                         | 4°                   | 38,000                                                                                                                                                                                                                                                                      | 2,500 | 0.070             | 0.1                | 35,000                  | 1,600 | 0.060             | 0.08               | 25,000                  | 800   | 0.030             | 0.05               |
| "                   | 20                         | 5°                   | 38,000                                                                                                                                                                                                                                                                      | 2,500 | 0.080             | 0.11               | 35,000                  | 1,600 | 0.060             | 0.09               | 25,000                  | 800   | 0.040             | 0.06               |
| "                   | 20                         | 7°                   | 38,000                                                                                                                                                                                                                                                                      | 2,500 | 0.080             | 0.11               | 35,000                  | 1,600 | 0.060             | 0.09               | 25,000                  | 800   | 0.040             | 0.06               |
| R 1                 | 12                         | 1°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.180             | 0.27               | 30,000                  | 1,800 | 0.140             | 0.22               | 15,000                  | 1,000 | 0.090             | 0.14               |
| "                   | 20                         | 1°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.400             | 0.21               | 30,000                  | 1,800 | 0.110             | 0.17               | 15,000                  | 1,000 | 0.070             | 0.11               |
| "                   | 15                         | 2°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.160             | 0.24               | 30,000                  | 1,800 | 0.130             | 0.19               | 15,000                  | 1,000 | 0.080             | 0.12               |
| "                   | 20                         | 2°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.400             | 0.21               | 30,000                  | 1,800 | 0.110             | 0.17               | 15,000                  | 1,000 | 0.070             | 0.11               |
| "                   | 15                         | 3°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.160             | 0.24               | 30,000                  | 1,800 | 0.130             | 0.19               | 15,000                  | 1,000 | 0.080             | 0.12               |
| "                   | 20                         | 3°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.400             | 0.21               | 30,000                  | 1,800 | 0.110             | 0.17               | 15,000                  | 1,000 | 0.070             | 0.11               |
| "                   | 30                         | 3°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.3               | 0.2                | 30,000                  | 1,800 | 0.12              | 0.18               | 15,000                  | 1,000 | 0.08              | 0.12               |
| "                   | 20                         | 4°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.400             | 0.21               | 30,000                  | 1,800 | 0.110             | 0.17               | 15,000                  | 1,000 | 0.070             | 0.11               |
| "                   | 20                         | 5°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.15              | 0.22               | 30,000                  | 1,800 | 0.12              | 0.18               | 15,000                  | 1,000 | 0.08              | 0.12               |
| "                   | 30                         | 5°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.13              | 0.2                | 30,000                  | 1,800 | 0.11              | 0.18               | 15,000                  | 1,000 | 0.07              | 0.12               |
| "                   | 29                         | 6°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.14              | 0.2                | 30,000                  | 1,800 | 0.1               | 0.18               | 15,000                  | 1,000 | 0.07              | 0.12               |
| "                   | 25                         | 7°                   | 35,000                                                                                                                                                                                                                                                                      | 2,800 | 0.15              | 0.25               | 30,000                  | 1,800 | 0.12              | 0.18               | 15,000                  | 1,000 | 0.07              | 0.11               |
| R 2                 | 20                         | 1°                   | 24,000                                                                                                                                                                                                                                                                      | 3,500 | 0.23              | 0.34               | 20,000                  | 2,500 | 0.18              | 0.27               | 12,000                  | 1,500 | 0.11              | 0.17               |
| "                   | 20                         | 2°                   | 24,000                                                                                                                                                                                                                                                                      | 3,500 | 0.23              | 0.34               | 20,000                  | 2,500 | 0.18              | 0.27               | 12,000                  | 1,500 | 0.11              | 0.17               |
| "                   | 21                         | 3°                   | 24,000                                                                                                                                                                                                                                                                      | 3,500 | 0.23              | 0.34               | 20,000                  | 2,500 | 0.18              | 0.27               | 12,000                  | 1,500 | 0.11              | 0.17               |
| "                   | 20                         | 4°                   | 24,000                                                                                                                                                                                                                                                                      | 3,500 | 0.23              | 0.34               | 20,000                  | 2,500 | 0.18              | 0.27               | 12,000                  | 1,500 | 0.11              | 0.17               |
| "                   | 20                         | 5°                   | 24,000                                                                                                                                                                                                                                                                      | 3,500 | 0.24              | 0.37               | 20,000                  | 2,500 | 0.19              | 0.29               | 12,000                  | 1,500 | 0.12              | 0.18               |
| "                   | 20                         | 6°                   | 24,000                                                                                                                                                                                                                                                                      | 3,500 | 0.22              | 0.32               | 20,000                  | 2,500 | 0.17              | 0.25               | 12,000                  | 1,500 | 0.1               | 0.16               |
| "                   | 18                         | 7°                   | 24,000                                                                                                                                                                                                                                                                      | 3,500 | 0.23              | 0.34               | 20,000                  | 2,500 | 0.18              | 0.27               | 12,000                  | 1,500 | 0.11              | 0.17               |
| R 3                 | 32                         | 1°                   | 16,000                                                                                                                                                                                                                                                                      | 3,500 | 0.23              | 0.41               | 13,500                  | 2,500 | 0.23              | 0.35               | 8,000                   | 1,500 | 0.14              | 0.21               |
| "                   | 30                         | 2°                   | 16,000                                                                                                                                                                                                                                                                      | 3,500 | 0.25              | 0.42               | 13,500                  | 2,500 | 0.23              | 0.35               | 8,000                   | 1,500 | 0.14              | 0.21               |
| "                   | 22                         | 3°                   | 16,000                                                                                                                                                                                                                                                                      | 3,500 | 0.3               | 0.45               | 13,500                  | 2,500 | 0.24              | 0.36               | 8,000                   | 1,500 | 0.15              | 0.23               |
| "                   | 40                         | 3°                   | 16,000                                                                                                                                                                                                                                                                      | 3,500 | 0.2               | 0.4                | 13,500                  | 2,500 | 0.2               | 0.35               | 8,000                   | 1,500 | 0.13              | 0.19               |
| "                   | 25                         | 4°                   | 16,000                                                                                                                                                                                                                                                                      | 3,500 | 0.22              | 0.43               | 13,500                  | 2,500 | 0.22              | 0.36               | 8,000                   | 1,500 | 0.14              | 0.2                |
| "                   | 21                         | 5°                   | 16,000                                                                                                                                                                                                                                                                      | 3,500 | 0.25              | 0.45               | 13,500                  | 2,500 | 0.23              | 0.36               | 8,000                   | 1,500 | 0.14              | 0.23               |
| "                   | 21                         | 6°                   | 16,000                                                                                                                                                                                                                                                                      | 3,500 | 0.25              | 0.45               | 13,500                  | 2,500 | 0.23              | 0.36               | 8,000                   | 1,500 | 0.14              | 0.23               |
| "                   | 19                         | 7°                   | 16,000                                                                                                                                                                                                                                                                      | 3,500 | 0.21              | 0.43               | 13,500                  | 2,500 | 0.25              | 0.36               | 8,000                   | 1,500 | 0.15              | 0.25               |
| 절입량<br>Depth of Cut |                            |                      |  <p>Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/> Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/> D : Outside Diameter 외경 (mm)<br/> n : Speed 회전속도 (min<sup>-1</sup>)<br/> Vf : Feed 이송속도 (mm/min)</p> |       |                   |                    |                         |       |                   |                    |                         |       |                   |                    |

- 절삭 조건에 없는 각도는 같은 직경에 이전 각도와 비례하여 사용 하십시오.
- 이송속도 및 축 방향의 절입 깊이는 테이퍼각에 따라 고려하시고, 절삭 상황에 맞추어 조정 하십시오.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 절삭 양이 작은 경우, Feed를 최대 20% 까지 UP 시켜 주십시오.
- 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.
- If there is no parameter for the angle of your tool, refer to the previous angle, and adjust compare to it.
- Consider the RPM and feed based on the taper angle and adjust it with milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If you want to increase metal removal rates, raise up the feed up to 20%.
- During the chip evacuation, note for heat and ignition.

## 2CTB Cutting Condition

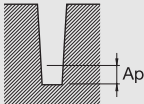
• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material     | 합금강/ 주철/ 합금강/ 프리하든강<br>Alloy/ Tools Steels/ Prehardened Steels                    |       |                     |       |             |              | 고경도강<br>Hardened Steels |       |                     |       |             |                                                                                     |
|---------------------|-----------------------------------------------------------------------------------|-------|---------------------|-------|-------------|--------------|-------------------------|-------|---------------------|-------|-------------|-------------------------------------------------------------------------------------|
| 경도 Hardness         | 30 ~ 45HRC                                                                        |       |                     |       |             |              | 45~ 55HRC               |       |                     |       |             |                                                                                     |
| 반경 Radius           | $\alpha \leq 15^\circ$                                                            |       | $\alpha > 15^\circ$ |       | Ap          | Ae           | $\alpha \leq 15^\circ$  |       | $\alpha > 15^\circ$ |       | Ap          | Ae                                                                                  |
|                     | RPM                                                                               | FEED  | RPM                 | FEED  | Axial Depth | Radial Depth | RPM                     | FEED  | RPM                 | FEED  | Axial Depth | Radial Depth                                                                        |
| R0.5                | 40,000                                                                            | 5,600 | 40,000              | 3,200 | 0.06        | 0.1          | 40,000                  | 5,600 | 40,000              | 3,000 | 0.05        | 0.1                                                                                 |
| R0.75               | 40,000                                                                            | 6,500 | 40,000              | 4,000 | 0.09        | 0.15         | 40,000                  | 6,500 | 32,000              | 3,200 | 0.08        | 0.15                                                                                |
| R1                  | 40,000                                                                            | 6,500 | 39,000              | 4,700 | 0.11        | 0.2          | 40,000                  | 6,500 | 31,000              | 3,500 | 0.11        | 0.2                                                                                 |
| R1.25               | 40,000                                                                            | 7,000 | 30,000              | 4,500 | 0.12        | 0.25         | 36,000                  | 6,500 | 26,000              | 3,500 | 0.12        | 0.25                                                                                |
| R1.5                | 40,000                                                                            | 7,500 | 27,000              | 4,300 | 0.13        | 0.3          | 32,000                  | 6,000 | 22,000              | 3,400 | 0.13        | 0.3                                                                                 |
| R2                  | 32,000                                                                            | 7,500 | 20,000              | 3,600 | 0.15        | 0.4          | 25,000                  | 6,000 | 16,000              | 2,700 | 0.15        | 0.4                                                                                 |
| R2.5                | 25,000                                                                            | 6,000 | 16,000              | 2,900 | 0.2         | 0.5          | 20,000                  | 5,400 | 13,000              | 2,300 | 0.2         | 0.5                                                                                 |
| R3                  | 21,000                                                                            | 5,800 | 13,000              | 2,600 | 0.25        | 0.6          | 17,000                  | 4,700 | 10,000              | 2,000 | 0.25        | 0.6                                                                                 |
| R4                  | 16,000                                                                            | 4,500 | 10,000              | 2,000 | 0.3         | 0.8          | 13,000                  | 3,600 | 8,000               | 1,500 | 0.3         | 0.8                                                                                 |
| R5                  | 13,000                                                                            | 3,600 | 8,000               | 1,700 | 0.5         | 1            | 10,000                  | 2,900 | 6,400               | 1,200 | 0.5         | 1                                                                                   |
| R6                  | 9,000                                                                             | 2,500 | 6,000               | 1,300 | 0.5         | 1.2          | 7,200                   | 2,000 | 4,800               | 1,000 | 0.5         | 1.2                                                                                 |
| 절입량<br>Depth of Cut |  |       |                     |       |             |              |                         |       |                     |       |             |  |

- $\alpha$  란 가공면의 경사각입니다.
- 이송속도 및 축 방향의 절입 깊이는 테이퍼각에 따라 고려하시고, 절삭 상황에 맞추어 조정하십시오.
- 에어브로 혹은 미스트 쿨란트를 추천합니다.
- 상기 절삭 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 칩 제거 주의 및 가공시 발열, 발화에 주의 하십시오.
- $\alpha$  value represents the inclined angle.
- Consider the RPM and feed based on the taper angle and adjust it with milling condition.
- Air blow or mist coolant is recommended.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- During the chip evacuation, note for heat and ignition.

## 4RTE Cutting Condition

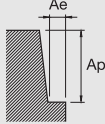
• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material        | 합금강 / 공구강<br>Alloy Steels / Tool Steels<br>SCM / SKT / SKS / SKD                    |      |             | 고경도강/ 프리하든강<br>Prehardened Steels / Hardened Steels<br>SKT / SKD / NAK55 / HPM1 |      |             | 고경도강/ 스테인레스강<br>Hardened Steels / Stainless Steels<br>SUS304 / SKD |      |             | 고경도강<br>Hardened Steels |      |             |
|------------------------|-------------------------------------------------------------------------------------|------|-------------|---------------------------------------------------------------------------------|------|-------------|--------------------------------------------------------------------|------|-------------|-------------------------|------|-------------|
| 경도 Hardness            | ~ 30HRc                                                                             |      |             | 30HRc ~ 38HRc                                                                   |      |             | 38HRc ~ 45HRc                                                      |      |             | 45HRc ~ 55HRc           |      |             |
| 외경<br>Outside Diameter | RPM                                                                                 | FEED | Ap          | RPM                                                                             | FEED | Ap          | RPM                                                                | FEED | Ap          | RPM                     | FEED | Ap          |
| Ø0.5                   | 31,500                                                                              | 565  | 0.01~0.025  | 31,500                                                                          | 475  | 0.01~0.025  | 31,500                                                             | 440  | 0.01~0.025  | 19,000                  | 250  | 0.005~0.01  |
| Ø0.6                   | 31,500                                                                              | 680  | 0.012~0.03  | 29,500                                                                          | 530  | 0.012~0.03  | 26,500                                                             | 445  | 0.012~0.03  | 15,500                  | 260  | 0.006~0.012 |
| Ø0.7                   | 27,000                                                                              | 680  | 0.014~0.035 | 25,000                                                                          | 530  | 0.014~0.035 | 22,500                                                             | 445  | 0.014~0.035 | 13,500                  | 260  | 0.007~0.014 |
| Ø0.8                   | 23,500                                                                              | 680  | 0.016~0.04  | 22,000                                                                          | 630  | 0.016~0.04  | 19,500                                                             | 445  | 0.016~0.04  | 11,500                  | 260  | 0.008~0.016 |
| Ø0.9                   | 21,000                                                                              | 680  | 0.018~0.045 | 19,500                                                                          | 530  | 0.018~0.045 | 17,500                                                             | 445  | 0.018~0.045 | 10,500                  | 260  | 0.009~0.018 |
| Ø1                     | 19,000                                                                              | 680  | 0.02~0.05   | 17,500                                                                          | 530  | 0.02~0.05   | 15,500                                                             | 445  | 0.02~0.05   | 9,500                   | 260  | 0.01~0.02   |
| Ø1.2                   | 15,500                                                                              | 680  | 0.024~0.06  | 14,500                                                                          | 530  | 0.024~0.06  | 13,000                                                             | 445  | 0.024~0.06  | 7,950                   | 260  | 0.012~0.024 |
| Ø1.5                   | 12,500                                                                              | 680  | 0.03~0.075  | 11,500                                                                          | 530  | 0.03~0.075  | 10,500                                                             | 445  | 0.03~0.075  | 6,350                   | 260  | 0.015~0.03  |
| Ø2                     | 9,500                                                                               | 680  | 0.04~0.1    | 8,900                                                                           | 530  | 0.04~0.1    | 7,950                                                              | 445  | 0.04~0.1    | 4,750                   | 260  | 0.02~0.04   |
| Ø2.5                   | 7,600                                                                               | 680  | 0.05~0.125  | 7,100                                                                           | 530  | 0.05~0.125  | 7,950                                                              | 445  | 0.04~0.1    | 4,750                   | 260  | 0.02~0.04   |
| 절입량<br>Depth of Cut    |  |      |             |                                                                                 |      |             |                                                                    |      |             |                         |      |             |

- 날 깊이를 얻기 위해서는, 순차적으로 하나씩 목부깊이를 맞추는 것이 가장 효과적 입니다.
- 이송속도 및 축 방향의 절입 깊이는 테이퍼각에 따라 고려하시고, 절삭 상황에 맞추어 조정 하십시오.
- 코너 작업시에는 피드값을 50% 줄여 주십시오.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨란트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의하십시오
- Consider the RPM and feed based on the taper angle and adjust it with milling condition.
- Reduce the feed by 50% for corner milling.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

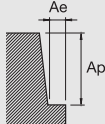
## 2CTE Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material     | 일반구조용강/ 탄소강<br>Mild Steels / Carbon Steels<br>SS400 / S55C                                                                                                                |      | 합금강 / 공구강<br>Alloy Steels / Tool Steels<br>SCM / SKT / SKS / SKD |      | 고경도강 / 프리하트강<br>Hardened Steels /<br>Prehardened Steels<br>SKT / SKD / NAK55 / HPM1 |      | 고경도강 / 스테인레스강<br>Hardened Steels /<br>Stainless Steels<br>SUS304 / SKD |      | 고경도강<br>Hardened Steels |      |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------|------|-------------------------------------------------------------------------------------|------|------------------------------------------------------------------------|------|-------------------------|------|
| 경도 Hardness         | ~750HN/mm <sup>2</sup>                                                                                                                                                    |      | ~ 30HRC                                                          |      | 30 ~ 38HRC                                                                          |      | 38 ~ 45HRC                                                             |      | 45 ~ 55HRC              |      |
| 외경 Outside Diameter | RPM                                                                                                                                                                       | FEED | RPM                                                              | FEED | RPM                                                                                 | FEED | RPM                                                                    | FEED | RPM                     | FEED |
| ø1                  | 15,500                                                                                                                                                                    | 155  | 15,500                                                           | 130  | 13,000                                                                              | 90   | 12,000                                                                 | 90   | 10,500                  | 40   |
| ø1.5                | 10,500                                                                                                                                                                    | 155  | 10,500                                                           | 130  | 8,900                                                                               | 90   | 8,250                                                                  | 90   | 7,000                   | 40   |
| ø2                  | 7,950                                                                                                                                                                     | 155  | 7,950                                                            | 130  | 6,650                                                                               | 90   | 6,200                                                                  | 90   | 5,250                   | 40   |
| ø2.5                | 6,200                                                                                                                                                                     | 145  | 6,200                                                            | 125  | 5,300                                                                               | 90   | 4,950                                                                  | 90   | 4,200                   | 40   |
| ø3                  | 5,150                                                                                                                                                                     | 145  | 5,150                                                            | 125  | 4,450                                                                               | 90   | 4,100                                                                  | 90   | 3,500                   | 40   |
| ø4                  | 3,850                                                                                                                                                                     | 145  | 3,850                                                            | 125  | 3,300                                                                               | 90   | 3,100                                                                  | 85   | 2,600                   | 40   |
| ø5                  | 3,100                                                                                                                                                                     | 145  | 3,100                                                            | 125  | 2,650                                                                               | 90   | 2,450                                                                  | 85   | 2,100                   | 40   |
| ø6                  | 2,600                                                                                                                                                                     | 145  | 2,600                                                            | 125  | 2,200                                                                               | 90   | 2,050                                                                  | 85   | 1,750                   | 40   |
| ø8                  | 1,950                                                                                                                                                                     | 145  | 1,950                                                            | 125  | 1,650                                                                               | 90   | 1,550                                                                  | 85   | 1,300                   | 40   |
| ø10                 | 1,550                                                                                                                                                                     | 145  | 1,550                                                            | 120  | 1,300                                                                               | 90   | 1,200                                                                  | 85   | 1,050                   | 40   |
| 절입량<br>Depth of Cut | <div> <div>Ap</div> <div>Ae</div> </div> <div> <div>2.5D</div> <div>0.02D</div> </div>  |      |                                                                  |      |                                                                                     |      |                                                                        |      |                         |      |
|                     |                                                                                                                                                                           |      |                                                                  |      |                                                                                     |      |                                                                        |      |                         |      |

## 4CTE

• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material     | 일반구조용강/ 탄소강<br>Mild Steels / Carbon Steels<br>SS400 / S55C                                                                                                                  |      | 합금강 / 공구강<br>Alloy Steels / Tool Steels<br>SCM / SKT / SKS / SKD |      | 고경도강 / 프리하트강<br>Hardened Steels /<br>Prehardened Steels<br>SKT / SKD / NAK55 / HPM1 |      | 고경도강 / 스테인레스강<br>Hardened Steels /<br>Stainless Steels<br>SUS304 / SKD |      | 고경도강<br>Hardened Steels |      |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------|------|-------------------------------------------------------------------------------------|------|------------------------------------------------------------------------|------|-------------------------|------|
| 경도 Hardness         | ~750HN/mm <sup>2</sup>                                                                                                                                                      |      | ~ 30HRc                                                          |      | 30 ~ 38HRc                                                                          |      | 38 ~ 45HRc                                                             |      | 45 ~ 55HRc              |      |
| 외경 Outside Diameter | RPM                                                                                                                                                                         | FEED | RPM                                                              | FEED | RPM                                                                                 | FEED | RPM                                                                    | FEED | RPM                     | FEED |
| ø3                  | 5,300                                                                                                                                                                       | 225  | 4,450                                                            | 225  | 4,450                                                                               | 180  | 4,100                                                                  | 130  | 3,500                   | 130  |
| ø4                  | 3,950                                                                                                                                                                       | 245  | 3,300                                                            | 245  | 3,300                                                                               | 195  | 3,100                                                                  | 150  | 2,600                   | 150  |
| ø5                  | 3,150                                                                                                                                                                       | 275  | 2,650                                                            | 275  | 2,650                                                                               | 225  | 2,450                                                                  | 160  | 2,100                   | 160  |
| ø6                  | 2,200                                                                                                                                                                       | 275  | 2,200                                                            | 275  | 2,200                                                                               | 225  | 2,050                                                                  | 175  | 1,750                   | 175  |
| ø8                  | 1,950                                                                                                                                                                       | 270  | 1,650                                                            | 270  | 1,650                                                                               | 225  | 1,550                                                                  | 190  | 1,300                   | 190  |
| ø10                 | 1,550                                                                                                                                                                       | 270  | 1,300                                                            | 270  | 1,300                                                                               | 225  | 1,200                                                                  | 180  | 1,050                   | 180  |
| 절입량<br>Depth of Cut | <div> <div>Ap</div> <div>Ae</div> </div> <div> <div>2.5D</div> <div>0.02D</div> </div>  |      |                                                                  |      |                                                                                     |      |                                                                        |      |                         |      |
|                     |                                                                                                                                                                             |      |                                                                  |      |                                                                                     |      |                                                                        |      |                         |      |

- 절입기준은 2CTE, 4CTE 동일 합니다.
- 이송속도 및 축 방향의 절입 깊이는 테이블각에 따라 고려하시고, 절삭 상황에 맞추어 조정 하십시오.
- 가급적 열박음 척을 사용하여 주십시오.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의하십시오
- 2CTE and 4CTE type can be used the same depth of cut.
- Consider the RPM and feed based on the taper angle and adjust it with milling condition.
- Using shrink-fit chuck is recommended.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

## 2CRC Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material     | 탄소강<br>Carbon Steels |      | 합금강<br>Alloy Steels |      | 고경도강<br>Hardened Steels |      |
|---------------------|----------------------|------|---------------------|------|-------------------------|------|
| 경도 Hardness         |                      |      |                     |      | 35~ 40HRC               |      |
| 외경 Outside Diameter | RPM                  | FEED | RPM                 | FEED | RPM                     | FEED |
| ø1.9                | 3,200                | 60   | 2,300               | 50   | 2,500                   | 40   |
| ø2.9                | 2,500                | 60   | 1,800               | 50   | 1,800                   | 40   |
| ø3.9                | 1,850                | 60   | 1,400               | 50   | 1,400                   | 40   |
| ø4.9                | 1,600                | 60   | 1,100               | 50   | 1,200                   | 40   |
| ø5.9                | 1,400                | 60   | 900                 | 50   | 1,000                   | 40   |

## 4CRC

• RPM : rev./min • Feed : mm/min

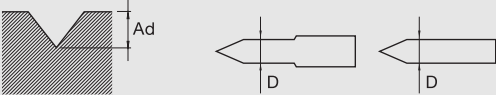
| 파삭재<br>Material     | 탄소강<br>Carbon Steels |       | 합금강<br>Alloy Steels |       | 고경도강<br>Hardened Steels |      |
|---------------------|----------------------|-------|---------------------|-------|-------------------------|------|
| 경도 Hardness         |                      |       |                     |       | 35~ 40HRC               |      |
| 외경 Outside Diameter | RPM                  | FEED  | RPM                 | FEED  | RPM                     | FEED |
| ø1.9                | 5,940                | 1,260 | 4,950               | 1,050 | 3,960                   | 840  |
| ø2.9                | 5,280                | 1,130 | 4,400               | 940   | 3,520                   | 750  |
| ø3.9                | 4,700                | 1,010 | 3,910               | 840   | 3,100                   | 670  |
| ø4.9                | 4,200                | 910   | 3,400               | 750   | 2,800                   | 600  |
| ø5.9                | 3,700                | 820   | 3,000               | 670   | 2,400                   | 540  |

- 가공 진입시 가능한 파삭재 밖에서 진입 하십시오.
- R 게이지를 통해 절삭 후 측정 바랍니다.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- Measure after cutting through the R gauge.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.

## 1STE/2STE/4STE

• RPM : rev./min • Feed : mm/min

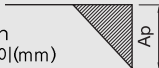
| 파삭재<br>Material     | 기계구조용 탄소강<br>S45C ~ S55C |      | 합금강<br>SKD/ SUS/ SCM |      | 고경도강<br>NAK/HPM |      |
|---------------------|--------------------------|------|----------------------|------|-----------------|------|
| 외경 Outside Diameter | RPM                      | FEED | RPM                  | FEED | RPM             | FEED |
| ø2                  | 5,500                    | 85   | 4,000                | 75   | 3,000           | 50   |
| ø3                  | 4,000                    | 70   | 3,000                | 55   | 2,000           | 40   |
| ø4                  | 3,000                    | 60   | 2,500                | 45   | 1,800           | 35   |
| ø5                  | 2,500                    | 50   | 2,000                | 40   | 1,500           | 30   |
| ø6                  | 2,000                    | 45   | 1,600                | 35   | 1,200           | 25   |
| ø7                  | 1,800                    | 40   | 1,300                | 30   | 1,150           | 25   |
| ø8                  | 1,500                    | 35   | 1,250                | 30   | 900             | 23   |
| ø9                  | 1,350                    | 35   | 1,100                | 30   | 850             | 20   |
| ø10                 | 1,200                    | 35   | 900                  | 25   | 800             | 20   |
| ø11                 | 1,100                    | 35   | 850                  | 25   | 750             | 20   |
| ø12                 | 1,000                    | 30   | 800                  | 25   | 600             | 15   |

|                     |                                                                                                              |  |  |  |  |
|---------------------|--------------------------------------------------------------------------------------------------------------|--|--|--|--|
| 절입량<br>Depth of Cut | <div>Ad : 0.05D이하</div>  |  |  |  |  |
|---------------------|--------------------------------------------------------------------------------------------------------------|--|--|--|--|

- 상기 조건은 2날 기준이며 날수의 변경시 같은 직경에 비례하여 회전수와 이송속도를 UP/DOWN 시켜주십시오.
- 조각 가공시 엔드밀의 날 끝을 확인해 주십시오.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- The parameters on the table is based on 2 flutes. To change the number of flutes, refer to the same diameter of other parameters and then adjust it.
- For engrave machining, check the edge of the flutes.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.

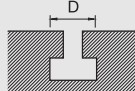
# 2CHA/3CHA Cutting Condition

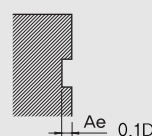
• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material     | 탄소강<br>Carbon Steels                                                                                                               |      | 합금강<br>Alloy Steels |      | 경도강<br>Hardened Steels |      |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------|------|---------------------|------|------------------------|------|
| 경도 Hardness         | ~ 225 HB                                                                                                                           |      | 225 ~ 325 HB        |      | 35~ 40HRC              |      |
| 외경 Outside Diameter | RPM                                                                                                                                | FEED | RPM                 | FEED | RPM                    | FEED |
| ø3                  | 4,200                                                                                                                              | 70   | 3,000               | 55   | 2,500                  | 40   |
| ø4                  | 3,000                                                                                                                              | 60   | 2,500               | 45   | 1,800                  | 35   |
| ø6                  | 2,000                                                                                                                              | 40   | 1,500               | 35   | 1,200                  | 25   |
| ø8                  | 1,500                                                                                                                              | 35   | 1,200               | 30   | 900                    | 25   |
| ø10                 | 1,200                                                                                                                              | 35   | 1,000               | 25   | 900                    | 20   |
| ø12                 | 1,000                                                                                                                              | 30   | 850                 | 25   | 600                    | 20   |
| 절입량<br>Depth of Cut | Ap : 0.1d<br>Ap : Axial Depth<br>축 방향의 절입 깊이(mm)  |      |                     |      |                        |      |

- 상기 조건은 2날 기준이며 날 수의 변경시 같은 직경에 비례하여 회전수와 이송속도를 UP/DOWN 시켜주십시오.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 에어브로 혹은 수용성 절삭유 또는 유성 절삭유를 추천합니다.
- The parameters on the table is based on 2 flutes. To change the number of flutes, refer to the same diameter of other parameters and then adjust it.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Air blow, water-soluble oil, or oil mist is recommended.

## 4TES/4TRS/3TRC/4&6TDA/4&6TAC : 3TRC는 RPM 동일, FEED만 최대 30% Down 적용. Use the same RPM and reduce the feed by 30% for 3TRC.

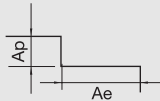
| 홈절삭 Slotting        |                                                                                     |      |                     |      |                             |      |
|---------------------|-------------------------------------------------------------------------------------|------|---------------------|------|-----------------------------|------|
| 파삭재<br>Material     | 일반구조용강/ 탄소강<br>Mild Steels / Carbon Steels                                          |      | 합금강<br>Alloy Steels |      | 프리하트강<br>Prehardened Steels |      |
| 외경 Outside Diameter | RPM                                                                                 | FEED | RPM                 | FEED | RPM                         | FEED |
| ø1.5                | 3,050                                                                               | 117  | 1,890               | 77   | 1,530                       | 59   |
| ø2                  | 2,850                                                                               | 110  | 1,790               | 72   | 1,440                       | 55   |
| ø2.5                | 2,680                                                                               | 99   | 1,700               | 66   | 1,350                       | 50   |
| ø3                  | 2,500                                                                               | 92   | 1,610               | 60   | 1,260                       | 45   |
| ø4                  | 2,150                                                                               | 81   | 1,430               | 54   | 1,080                       | 41   |
| ø5                  | 1,800                                                                               | 70   | 1,200               | 47   | 900                         | 35   |
| ø6                  | 1,430                                                                               | 59   | 950                 | 39   | 720                         | 30   |
| ø8                  | 1,070                                                                               | 44   | 720                 | 30   | 540                         | 22   |
| ø10                 | 860                                                                                 | 35   | 580                 | 23   | 430                         | 17   |
| ø12                 | 720                                                                                 | 30   | 480                 | 20   | 360                         | 14   |
| 절입량<br>Depth of Cut |  |      |                     |      |                             |      |

| 측면 절삭 Side Cutting  |                                                                                     |      |                     |      |                             |      |
|---------------------|-------------------------------------------------------------------------------------|------|---------------------|------|-----------------------------|------|
| 파삭재<br>Material     | 일반구조용강/ 탄소강<br>Mild Steels / Carbon Steels                                          |      | 합금강<br>Alloy Steels |      | 프리하트강<br>Prehardened Steels |      |
| 외경 Outside Diameter | RPM                                                                                 | FEED | RPM                 | FEED | RPM                         | FEED |
| ø1.5                | 3,050                                                                               | 162  | 1,890               | 94   | 1,530                       | 76   |
| ø2                  | 2,850                                                                               | 149  | 1,790               | 88   | 1,440                       | 70   |
| ø2.5                | 2,680                                                                               | 135  | 1,700               | 83   | 1,350                       | 65   |
| ø3                  | 2,500                                                                               | 122  | 1,610               | 79   | 1,260                       | 59   |
| ø4                  | 2,150                                                                               | 108  | 1,430               | 72   | 1,080                       | 54   |
| ø5                  | 1,800                                                                               | 95   | 1,200               | 65   | 900                         | 49   |
| ø6                  | 1,430                                                                               | 86   | 950                 | 58   | 720                         | 43   |
| ø8                  | 1,070                                                                               | 64   | 720                 | 43   | 540                         | 32   |
| ø10                 | 860                                                                                 | 52   | 580                 | 34   | 430                         | 26   |
| ø12                 | 720                                                                                 | 43   | 480                 | 29   | 360                         | 22   |
| 절입량<br>Depth of Cut |  |      |                     |      |                             |      |

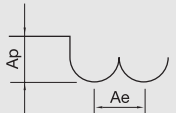
- 공구 진입 시 파삭재 밖에서 진입하십시오. • 상기 절삭 조건은 4날 기준이며, 3TRC의 경우 회전수는 유지하고 Feed를 30% 줄여서 사용하십시오.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송 속도를 비례 적으로 조정하십시오.
- 측면절삭 시 떨림이 발생한 경우 절삭조건의 Feed를 줄여주십시오.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- The parameters on the table is based on 4 flutes. For using 3TRC , use the same RPM and reduce the feed by 30%.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- If a vibration is occurred while side milling, reduce the feed.

| 파삭재<br>Material        | 일반구조용강/ 탄소강<br>Mild Steels/ Carbon Steels                                         |      |                   | 합금강/ 공구강<br>Alloy Steels/ Tool Steels |      |                   | 프리트하트강<br>Prehardened Steels (30~45HRC) |      |                   | 알루미늄 합금<br>Aluminum Alloys |      |                   |
|------------------------|-----------------------------------------------------------------------------------|------|-------------------|---------------------------------------|------|-------------------|-----------------------------------------|------|-------------------|----------------------------|------|-------------------|
| 외경<br>Outside Diameter | RPM                                                                               | FEED | Ap<br>Axial Depth | RPM                                   | FEED | Ap<br>Axial Depth | RPM                                     | FEED | Ap<br>Axial Depth | RPM                        | FEED | Ap<br>Axial Depth |
| Ø2                     | 1,400                                                                             | 100  | 2                 | 800                                   | 50   | 2                 | 650                                     | 40   | 1                 | 4,800                      | 280  | 2                 |
| Ø3                     | 1,400                                                                             | 100  | 3                 | 800                                   | 50   | 3                 | 650                                     | 40   | 1.5               | 4,800                      | 280  | 3                 |
| Ø4                     | 1,280                                                                             | 100  | 4                 | 690                                   | 50   | 4                 | 580                                     | 40   | 2                 | 4,200                      | 280  | 4                 |
| Ø5                     | 1,300                                                                             | 100  | 5                 | 640                                   | 50   | 5                 | 520                                     | 40   | 2.5               | 3,300                      | 280  | 5                 |
| Ø6                     | 1,150                                                                             | 100  | 6                 | 600                                   | 50   | 6                 | 480                                     | 40   | 3                 | 2,900                      | 280  | 6                 |
| Ø8                     | 1,000                                                                             | 100  | 8                 | 530                                   | 50   | 8                 | 420                                     | 40   | 4                 | 2,600                      | 280  | 8                 |
| Ø10                    | 850                                                                               | 90   | 10                | 490                                   | 40   | 10                | 390                                     | 30   | 5                 | 2,400                      | 260  | 10                |
| Ø12                    | 720                                                                               | 90   | 12                | 410                                   | 40   | 12                | 310                                     | 30   | 6                 | 1,900                      | 260  | 12                |
| Ø14                    | 610                                                                               | 90   | 14                | 340                                   | 40   | 14                | 270                                     | 30   | 7                 | 1,700                      | 240  | 14                |
| Ø16                    | 550                                                                               | 90   | 16                | 310                                   | 40   | 16                | 250                                     | 30   | 8                 | 1,500                      | 230  | 16                |
| 절입량<br>Depth of Cut    |  |      |                   |                                       |      |                   |                                         |      |                   |                            |      |                   |

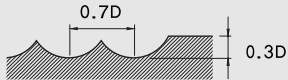
## 2CENE/2CCMC

| 파삭재<br>Material        | 일반구조용강/ 탄소강<br>Mild Steels/ Carbon Steels                                                                                                                    |      |      |      | 합금강<br>Alloy Steels |      |      |      | 프리트하트강<br>Prehardened Steels (30~45HRC) |      |      |      | 동<br>Copper |      |      |     | 알루미늄<br>Aluminum |      |      |     |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------------|------|------|------|-----------------------------------------|------|------|------|-------------|------|------|-----|------------------|------|------|-----|
| 외경<br>Outside Diameter | RPM                                                                                                                                                          | FEED | Ap   | Ae   | RPM                 | FEED | Ap   | Ae   | RPM                                     | FEED | Ap   | Ae   | RPM         | FEED | Ap   | Ae  | RPM              | FEED | Ap   | Ae  |
| Ø1                     | 28,000                                                                                                                                                       | 230  | 1.5  | 0.05 | 24,500              | 180  | 1.5  | 0.05 | 17,500                                  | 120  | 1.5  | 0.05 | 23,000      | 150  | 1.5  | 0.1 | 50,000           | 400  | 1.5  | 0.2 |
| Ø1.5                   | 18,700                                                                                                                                                       | 340  | 2.0  | 0.10 | 16,300              | 180  | 2.0  | 0.10 | 11,700                                  | 120  | 2.0  | 0.10 | 13,000      | 150  | 2.0  | 0.3 | 40,900           | 400  | 2.0  | 0.3 |
| Ø2                     | 14,000                                                                                                                                                       | 360  | 2.5  | 0.15 | 12,300              | 220  | 2.5  | 0.15 | 8,800                                   | 170  | 2.5  | 0.15 | 11,500      | 150  | 2.5  | 0.4 | 31,800           | 400  | 2.5  | 0.4 |
| Ø3                     | 9,300                                                                                                                                                        | 390  | 4.0  | 0.30 | 8,200               | 240  | 4.0  | 0.30 | 5,800                                   | 170  | 4.0  | 0.30 | 8,000       | 200  | 4.0  | 0.6 | 21,200           | 400  | 4.0  | 0.6 |
| Ø4                     | 7,000                                                                                                                                                        | 390  | 5.0  | 0.40 | 6,100               | 240  | 5.0  | 0.40 | 4,400                                   | 180  | 5.0  | 0.40 | 6,000       | 200  | 5.0  | 0.8 | 15,900           | 500  | 5.0  | 0.8 |
| Ø5                     | 5,600                                                                                                                                                        | 470  | 6.0  | 0.50 | 4,900               | 260  | 6.0  | 0.50 | 3,500                                   | 200  | 6.0  | 0.50 | 5,000       | 200  | 6.0  | 1   | 12,700           | 500  | 6.0  | 1   |
| Ø6                     | 4,700                                                                                                                                                        | 480  | 8.0  | 0.60 | 4,100               | 270  | 8.0  | 0.60 | 2,900                                   | 200  | 8.0  | 0.60 | 4,000       | 200  | 8.0  | 1.2 | 10,600           | 500  | 8.0  | 1.2 |
| Ø8                     | 3,500                                                                                                                                                        | 470  | 10.0 | 1.00 | 3,100               | 270  | 10.0 | 1.00 | 2,200                                   | 200  | 10.0 | 1.00 | 3,000       | 200  | 10.0 | 1.6 | 8,000            | 600  | 10.0 | 1.6 |
| Ø10                    | 2,800                                                                                                                                                        | 480  | 12.0 | 1.20 | 2,500               | 280  | 12.0 | 1.20 | 1,800                                   | 200  | 12.0 | 1.20 | 2,400       | 200  | 12.0 | 2   | 6,400            | 600  | 12.0 | 2   |
| Ø12                    | 2,300                                                                                                                                                        | 470  | 15.0 | 1.50 | 2,000               | 260  | 15.0 | 1.50 | 1,500                                   | 200  | 15.0 | 1.50 | 2,000       | 200  | 15.0 | 2.4 | 5,300            | 700  | 15.0 | 2.4 |
| 절입량<br>Depth of Cut    | <p>Side Milling</p> <p>• Ap : Axial Depth</p> <p>• Ae : Radial Depth</p>  |      |      |      |                     |      |      |      |                                         |      |      |      |             |      |      |     |                  |      |      |     |

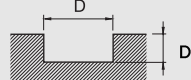
- 2CENE는 홈 절삭이 불가능하며, 2CCMC는 홈 절삭을 추천하지 않습니다.
- 상기 절삭 조건은 측면 절삭조건 입니다.
- 상기 절삭 가공 조건의 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 에어브로 혹은 수냉성 절삭유 또는 유성 절삭유를 추천합니다.
- Grooving with 2CENE is not possible and 2CCMC is also not recommended.
- Above parameters are for side milling.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- If a vibration is occurred while side milling, reduce the feed.

| 파삭재 Material           |                            | 알루미늄 합금 Aluminum Alloys                                                                                                                                                                                                                                                                                                                 |       |                   |                    | 플라스틱 Plastic |       |                   |                    |
|------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|--------------|-------|-------------------|--------------------|
| 반경<br>Corner<br>Radius | 유효장<br>Effective<br>Length | RPM                                                                                                                                                                                                                                                                                                                                     | FEED  | Ap<br>Axial Depth | Ap<br>Radial Depth | RPM          | FEED  | Ap<br>Axial Depth | Ap<br>Radial Depth |
| R 0.1                  | 1                          | 35,000                                                                                                                                                                                                                                                                                                                                  | 420   | 0.003             | 0.03               | 35,000       | 1,000 | 0.05              | 0.03               |
| R 0.15                 | 2                          | 35,000                                                                                                                                                                                                                                                                                                                                  | 490   | 0.004             | 0.04               | 35,000       | 1,050 | 0.06              | 0.04               |
| R 0.2                  | 3                          | 35,000                                                                                                                                                                                                                                                                                                                                  | 560   | 0.005             | 0.06               | 35,000       | 1,100 | 0.07              | 0.06               |
| R 0.25                 | 4                          | 35,000                                                                                                                                                                                                                                                                                                                                  | 700   | 0.006             | 0.07               | 28,000       | 1,200 | 0.08              | 0.07               |
| "                      | 10                         | 27,300                                                                                                                                                                                                                                                                                                                                  | 504   | 0.004             | 0.05               | 21,840       | 864   | 0.06              | 0.04               |
| R 0.3                  | 4                          | 35,000                                                                                                                                                                                                                                                                                                                                  | 910   | 0.007             | 0.09               | 24,000       | 1,200 | 0.1               | 0.09               |
| "                      | 10                         | 27,300                                                                                                                                                                                                                                                                                                                                  | 655   | 0.005             | 0.07               | 18,720       | 864   | 0.07              | 0.05               |
| R 0.4                  | 4                          | 26,000                                                                                                                                                                                                                                                                                                                                  | 940   | 0.008             | 0.12               | 18,000       | 900   | 0.13              | 0.12               |
| "                      | 10                         | 19,500                                                                                                                                                                                                                                                                                                                                  | 658   | 0.006             | 0.1                | 13,500       | 576   | 0.11              | 0.1                |
| R 0.5                  | 6                          | 21,000                                                                                                                                                                                                                                                                                                                                  | 970   | 0.008             | 0.15               | 14,000       | 700   | 0.17              | 0.15               |
| "                      | 16                         | 14,700                                                                                                                                                                                                                                                                                                                                  | 631   | 0.006             | 0.1                | 9,800        | 455   | 0.1               | 0.09               |
| R 0.6                  | 6                          | 18,000                                                                                                                                                                                                                                                                                                                                  | 1,010 | 0.009             | 0.18               | 12,000       | 600   | 0.2               | 0.18               |
| "                      | 16                         | 12,780                                                                                                                                                                                                                                                                                                                                  | 616   | 0.007             | 0.11               | 8,520        | 366   | 0.13              | 0.12               |
| R 0.7                  | 6                          | 15,000                                                                                                                                                                                                                                                                                                                                  | 1,020 | 0.01              | 0.21               | 10,000       | 500   | 0.23              | 0.21               |
| "                      | 16                         | 10,800                                                                                                                                                                                                                                                                                                                                  | 622   | 0.008             | 0.16               | 7,200        | 305   | 0.17              | 0.15               |
| R 0.75                 | 6                          | 14,000                                                                                                                                                                                                                                                                                                                                  | 1,010 | 0.012             | 0.24               | 9,500        | 480   | 0.25              | 0.24               |
| "                      | 16                         | 10,220                                                                                                                                                                                                                                                                                                                                  | 636   | 0.01              | 0.19               | 6,935        | 302   | 0.19              | 0.17               |
| "                      | 25                         | 8,483                                                                                                                                                                                                                                                                                                                                   | 477   | 0.08              | 0.14               | 5,756        | 227   | 0.13              | 0.11               |
| R 1                    | 8                          | 11,000                                                                                                                                                                                                                                                                                                                                  | 1,100 | 0.18              | 0.35               | 7,000        | 350   | 0.4               | 0.35               |
| "                      | 20                         | 8,140                                                                                                                                                                                                                                                                                                                                   | 704   | 0.16              | 0.3                | 5,180        | 224   | 0.35              | 0.33               |
| "                      | 30                         | 6,919                                                                                                                                                                                                                                                                                                                                   | 528   | 0.14              | 0.25               | 4,403        | 168   | 0.3               | 0.28               |
| R 1.5                  | 8                          | 6,900                                                                                                                                                                                                                                                                                                                                   | 760   | 0.2               | 0.5                | 4,800        | 240   | 0.5               | 0.5                |
| "                      | 20                         | 5,313                                                                                                                                                                                                                                                                                                                                   | 486   | 0.18              | 0.45               | 4,080        | 151   | 0.45              | 0.45               |
| "                      | 30                         | 4,516                                                                                                                                                                                                                                                                                                                                   | 365   | 0.16              | 0.4                | 3,142        | 113   | 0.4               | 0.4                |
| R 2                    | 16                         | 5,200                                                                                                                                                                                                                                                                                                                                   | 690   | 0.25              | 0.65               | 3,600        | 180   | 0.6               | 0.65               |
| "                      | 25                         | 4,056                                                                                                                                                                                                                                                                                                                                   | 449   | 0.22              | 0.6                | 3,060        | 113   | 0.56              | 0.61               |
| "                      | 35                         | 3,488                                                                                                                                                                                                                                                                                                                                   | 336   | 0.2               | 0.55               | 2,356        | 85    | 0.54              | 0.57               |
| R 2.5                  | 16                         | 4,200                                                                                                                                                                                                                                                                                                                                   | 590   | 0.3               | 0.8                | 2,900        | 150   | 0.8               | 0.85               |
| "                      | 25                         | 3,234                                                                                                                                                                                                                                                                                                                                   | 401   | 0.27              | 0.75               | 2,233        | 102   | 0.76              | 0.81               |
| "                      | 35                         | 2,652                                                                                                                                                                                                                                                                                                                                   | 309   | 0.24              | 0.7                | 1,831        | 79    | 0.72              | 0.75               |
| R 3                    | 25                         | 3,500                                                                                                                                                                                                                                                                                                                                   | 550   | 0.35              | 0.9                | 2,400        | 120   | 1                 | 1.2                |
| "                      | 35                         | 2,940                                                                                                                                                                                                                                                                                                                                   | 468   | 0.33              | 0.8                | 2,016        | 102   | 0.95              | 1.1                |
| "                      | 50                         | 2,323                                                                                                                                                                                                                                                                                                                                   | 355   | 0.3               | 0.7                | 1,593        | 78    | 0.9               | 1                  |
| 절입량<br>Depth of Cut    |                            |  <p>           Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/>           Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/>           D : Outside Diameter 외경 (mm)<br/>           n : Speed 회전속도 (min<sup>-1</sup>)<br/>           Vf : Feed 이송속도 (mm/min)         </p> |       |                   |                    |              |       |                   |                    |

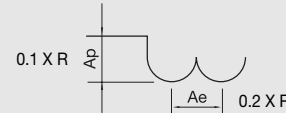
- 상기 절삭조건은 2날 기준이며, 3날 가공시 회전수와 Feed를 10% UP 시켜주십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- The parameters on the table is based on 2 flutes. For using 3 flutes, increase RPM and feed by 10% in stable milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.

| 파삭재 Material        | ABS 수지 / Acrylic                                                                  |      |                   |                    |
|---------------------|-----------------------------------------------------------------------------------|------|-------------------|--------------------|
| 반경 Radius           | RPM                                                                               | FEED | Ap<br>Axial Depth | Ap<br>Radial Depth |
| R 0.1               | 37,000                                                                            | 50   | 0.06              | 0.14               |
| R 0.2               | 37,000                                                                            | 100  | 0.12              | 0.28               |
| R 0.3               | 37,000                                                                            | 140  | 0.18              | 0.42               |
| R 0.4               | 37,000                                                                            | 190  | 0.24              | 0.56               |
| R 0.5               | 32,000                                                                            | 210  | 0.30              | 0.7                |
| R 1                 | 16,000                                                                            | 210  | 0.60              | 1.4                |
| R 1.5               | 11,000                                                                            | 210  | 0.90              | 2.1                |
| R 2                 | 8,200                                                                             | 210  | 1.20              | 2.8                |
| R 2.5               | 6,000                                                                             | 250  | 1.50              | 3.5                |
| R 3                 | 5,500                                                                             | 250  | 1.80              | 4.2                |
| R 4                 | 4,100                                                                             | 280  | 2.40              | 5.6                |
| R 5                 | 3,200                                                                             | 280  | 3.00              | 7.0                |
| R 6                 | 2,700                                                                             | 330  | 3.60              | 8.4                |
| R 8                 | 2,200                                                                             | 330  | 4.80              | 11.2               |
| 절입량<br>Depth of Cut |  |      |                   |                    |

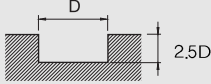
- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공형상, 가공목적, 적용기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.

| 파삭재 Material        | ABS 수지 / Acrylic                                                                    |      |                   |                    |
|---------------------|-------------------------------------------------------------------------------------|------|-------------------|--------------------|
| 외경 Outside Diameter | RPM                                                                                 | FEED | Ap<br>Axial Depth | Ap<br>Radial Depth |
| Ø 0.2               | 50,000                                                                              | 100  | 0.2               | 0.2                |
| Ø 0.4               | 50,000                                                                              | 200  | 0.4               | 0.4                |
| Ø 0.5               | 50,000                                                                              | 240  | 0.5               | 0.5                |
| Ø 0.6               | 40,000                                                                              | 240  | 0.6               | 0.6                |
| Ø 0.8               | 30,000                                                                              | 240  | 0.8               | 0.8                |
| Ø 1                 | 24,000                                                                              | 240  | 1                 | 1                  |
| Ø 2                 | 12,000                                                                              | 240  | 2                 | 2                  |
| Ø 3                 | 8,000                                                                               | 240  | 3                 | 3                  |
| Ø 4                 | 6,000                                                                               | 240  | 4                 | 4                  |
| Ø 5                 | 4,800                                                                               | 240  | 5                 | 5                  |
| Ø 6                 | 4,000                                                                               | 260  | 6                 | 6                  |
| Ø 8                 | 3,000                                                                               | 260  | 8                 | 8                  |
| Ø 10                | 3,000                                                                               | 260  | 10                | 10                 |
| Ø 12                | 2,000                                                                               | 260  | 12                | 12                 |
| Ø 16                | 1,400                                                                               | 260  | 16                | 16                 |
| 절입량<br>Depth of Cut |  |      |                   |                    |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정하십시오.
- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공형상, 가공목적, 적용기계에 따라 조건변경 요망 합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.

| 파삭재 Material        | 탄소강 Carbon Steels                                                                   |      |                   |                    | 합금강 Alloy Steels |      |                   |                    | 프리하든강 Prehardened Steels |      |                   |                    |
|---------------------|-------------------------------------------------------------------------------------|------|-------------------|--------------------|------------------|------|-------------------|--------------------|--------------------------|------|-------------------|--------------------|
| 반경 Corner Radius    | RPM                                                                                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM              | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                      | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 0.2               | 36,000                                                                              | 630  | 0.02              | 0.04               | 34,200           | 520  | 0.02              | 0.04               | 33,174                   | 400  | 0.02              | 0.04               |
| R 0.3               | 24,300                                                                              | 630  | 0.03              | 0.06               | 23,085           | 520  | 0.03              | 0.06               | 22,392                   | 400  | 0.03              | 0.06               |
| R 0.4               | 21,000                                                                              | 630  | 0.04              | 0.08               | 19,950           | 520  | 0.04              | 0.08               | 19,352                   | 400  | 0.04              | 0.08               |
| R 0.5               | 12,000                                                                              | 630  | 0.05              | 0.10               | 12,300           | 520  | 0.1               | 0.10               | 10,179                   | 400  | 0.05              | 0.10               |
| R 1                 | 11,400                                                                              | 630  | 0.10              | 0.20               | 10,000           | 520  | 0.1               | 0.20               | 8,700                    | 400  | 0.10              | 0.20               |
| R 1.5               | 7,700                                                                               | 630  | 0.15              | 0.30               | 6,700            | 520  | 0.2               | 0.30               | 5,800                    | 400  | 0.15              | 0.30               |
| R 2                 | 5,800                                                                               | 630  | 0.20              | 0.40               | 5,000            | 520  | 0.2               | 0.40               | 4,300                    | 400  | 0.20              | 0.40               |
| R 3                 | 3,800                                                                               | 630  | 0.30              | 0.60               | 3,300            | 520  | 0.3               | 0.60               | 2,900                    | 400  | 0.30              | 0.60               |
| R 4                 | 2,900                                                                               | 630  | 0.40              | 0.80               | 2,500            | 520  | 0.4               | 0.80               | 2,200                    | 400  | 0.40              | 0.80               |
| R 5                 | 2,300                                                                               | 630  | 0.50              | 1.00               | 2,000            | 520  | 0.5               | 1.00               | 1,700                    | 400  | 0.50              | 1.00               |
| R 6                 | 1,900                                                                               | 630  | 0.60              | 1.20               | 1,700            | 520  | 0.6               | 1.20               | 1,400                    | 400  | 0.60              | 1.20               |
| 절입량<br>Depth of Cut |  |      |                   |                    |                  |      |                   |                    |                          |      |                   |                    |

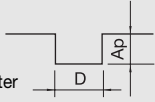
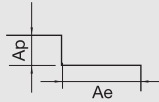
- 상기 절삭조건은 2날 기준이며 3날 가공시 회전수와 Feed를 10% UP 시켜주십시오.
- R0.5 이하 제품은 절삭조건인 Feed 보다 낮게 시작하여 점차 올려 주십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망합니다.
- 적용 기계의 회전속도가 부족한 경우에는 회전 속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- The parameters on the table is based on 2 flutes. For using 3 flutes, increase RPM and feed by 10% in stable milling condition.
- Below 0.5mm of front diameter tool, set up the lower RPM
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.

| 피삭재 Material        | 아크릴 Acrylic                                                                        |       |                  | 합금강 Alloy Steels |       |                  |
|---------------------|------------------------------------------------------------------------------------|-------|------------------|------------------|-------|------------------|
| 외경 Outside Diameter | RPM                                                                                | FEED  | Ap (Axial Depth) | RPM              | FEED  | Ap (Axial Depth) |
| Ø1                  | 32,000                                                                             | 2,000 | 2.5              | 23,000           | 1,300 | 2.5              |
| Ø2                  | 32,000                                                                             | 2,200 | 5                | 23,000           | 1,500 | 5                |
| Ø3                  | 25,000                                                                             | 2,400 | 7.5              | 18,000           | 1,700 | 7.5              |
| Ø4                  | 20,000                                                                             | 2,400 | 10               | 15,000           | 1,800 | 10               |
| Ø5                  | 15,000                                                                             | 2,200 | 12.5             | 12,000           | 1,800 | 12.5             |
| Ø6                  | 13,500                                                                             | 2,300 | 15               | 10,000           | 1,800 | 15               |
| Ø8                  | 10,000                                                                             | 2,400 | 20               | 7,800            | 1,900 | 20               |
| Ø10                 | 8,000                                                                              | 2,400 | 25               | 6,000            | 2,000 | 25               |
| Ø12                 | 7,000                                                                              | 2,200 | 30               | 5,000            | 1,900 | 30               |
| 절입량<br>Depth of Cut |  |       |                  |                  |       |                  |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오
- 공구 진입시 피삭재 밖에서 진입 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.

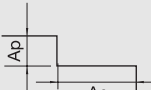
## 3MRE

• RPM : rev./min • Feed : mm/min

| 피삭재 Material           |                                                                                                                                                                                                                                                                                                           | ABS / MC Nylon |       |                   |                    | Acrylic / Polyacetal |      |                   |                    | Polycarbonate |       |                   |                    |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------|-------------------|--------------------|----------------------|------|-------------------|--------------------|---------------|-------|-------------------|--------------------|
| 외경<br>Outside Diameter | 유효장<br>Effective Length                                                                                                                                                                                                                                                                                   | RPM            | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM           | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                     | 10                                                                                                                                                                                                                                                                                                        | 6,360          | 560   | 0.30              | 0.03               | 10,812               | 264  | 0.30              | 0.03               | 8,250         | 1,568 | 0.30              | 0.03               |
| "                      | 15                                                                                                                                                                                                                                                                                                        | 6,360          | 560   | 0.30              | 0.02               | 9,328                | 172  | 0.30              | 0.02               | 7,360         | 1,120 | 0.30              | 0.02               |
| "                      | 20                                                                                                                                                                                                                                                                                                        | 6,360          | 560   | 0.30              | 0.01               | 8,056                | 103  | 0.30              | 0.01               | 6,750         | 840   | 0.30              | 0.01               |
| Ø1.5                   | 10                                                                                                                                                                                                                                                                                                        | 6,360          | 851   | 0.50              | 0.05               | 10,812               | 370  | 0.50              | 0.05               | 7,950         | 1,568 | 0.50              | 0.05               |
| "                      | 15                                                                                                                                                                                                                                                                                                        | 6,360          | 818   | 0.50              | 0.03               | 9,328                | 280  | 0.50              | 0.03               | 7,102         | 1,120 | 0.50              | 0.03               |
| "                      | 20                                                                                                                                                                                                                                                                                                        | 6,254          | 784   | 0.50              | 0.02               | 8,056                | 202  | 0.50              | 0.02               | 6,466         | 840   | 0.50              | 0.02               |
| Ø2                     | 10                                                                                                                                                                                                                                                                                                        | 6,330          | 1,100 | 1.00              | 0.10               | 10,339               | 471  | 1.00              | 0.10               | 8,124         | 1,795 | 1.00              | 0.10               |
| "                      | 15                                                                                                                                                                                                                                                                                                        | 6,225          | 1,043 | 1.00              | 0.05               | 9,284                | 404  | 1.00              | 0.05               | 7,491         | 1,571 | 1.00              | 0.05               |
| "                      | 20                                                                                                                                                                                                                                                                                                        | 6,014          | 999   | 1.00              | 0.03               | 8,440                | 337  | 1.00              | 0.03               | 6,858         | 1,346 | 1.00              | 0.03               |
| "                      | 25                                                                                                                                                                                                                                                                                                        | 5,908          | 954   | 1.00              | 0.03               | 7,596                | 281  | 1.00              | 0.03               | 6,330         | 1,234 | 1.00              | 0.03               |
| Ø3                     | 20                                                                                                                                                                                                                                                                                                        | 5,863          | 1,466 | 1.50              | 0.20               | 6,701                | 496  | 1.50              | 0.20               | 6,596         | 2,030 | 1.50              | 0.20               |
| "                      | 30                                                                                                                                                                                                                                                                                                        | 5,444          | 1,241 | 1.50              | 0.10               | 4,712                | 327  | 1.50              | 0.10               | 5,026         | 1,354 | 1.50              | 0.10               |
| Ø4                     | 20                                                                                                                                                                                                                                                                                                        | 5,026          | 1,579 | 2.00              | 0.30               | 6,282                | 496  | 2.00              | 0.30               | 5,340         | 1,466 | 2.00              | 0.30               |
| "                      | 30                                                                                                                                                                                                                                                                                                        | 4,712          | 1,466 | 2.00              | 0.20               | 4,921                | 384  | 2.00              | 0.20               | 4,607         | 1,241 | 2.00              | 0.20               |
| Ø6                     | 30                                                                                                                                                                                                                                                                                                        | 3,186          | 1,224 | 3.00              | 0.40               | 3,451                | 306  | 3.00              | 0.40               | 2,522         | 969   | 3.00              | 0.40               |
| "                      | 40                                                                                                                                                                                                                                                                                                        | 2,791          | 1,093 | 3.00              | 0.30               | 2,411                | 209  | 3.00              | 0.30               | 2,157         | 823   | 3.00              | 0.30               |
| Ø8                     | 40                                                                                                                                                                                                                                                                                                        | 2,568          | 1,028 | 4.00              | 0.50               | 2,218                | 196  | 4.00              | 0.50               | 1,984         | 774   | 4.00              | 0.50               |
| "                      | 50                                                                                                                                                                                                                                                                                                        | 1,977          | 863   | 4.00              | 0.40               | 1,708                | 165  | 4.00              | 0.40               | 1,528         | 650   | 4.00              | 0.40               |
| Ø10                    | 50                                                                                                                                                                                                                                                                                                        | 1,740          | 803   | 5.00              | 0.60               | 1,503                | 153  | 5.00              | 0.60               | 1,345         | 604   | 5.00              | 0.60               |
| "                      | 60                                                                                                                                                                                                                                                                                                        | 1,305          | 337   | 5.00              | 0.50               | 1,127                | 64   | 5.00              | 0.50               | 1,008         | 254   | 5.00              | 0.50               |
| Ø12                    | 60                                                                                                                                                                                                                                                                                                        | 1,109          | 307   | 6.00              | 0.60               | 958                  | 59   | 6.00              | 0.60               | 857           | 231   | 6.00              | 0.60               |
| 절입량<br>Depth of Cut    | <div>                     Slotting                      </div> <div>                     Side Milling                      </div> |                |       |                   |                    |                      |      |                   |                    |               |       |                   |                    |

- 날 끝이 정밀하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오
- 가공 진입시 가능한 피삭재 밖에서 진입 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- 진동이 적고 강성이 좋은 공작기계 사용 요망합니다 (Ø1 이하 사용시 진동 허용 관리 5μm 이내 일것.)
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5μm).

| 파삭재 Material              |                            | ABS / MC Nylon |       |                   |                    | Acrylic / Polyacetal |      |                   |                    | Polycarbonate |       |                   |                    |
|---------------------------|----------------------------|----------------|-------|-------------------|--------------------|----------------------|------|-------------------|--------------------|---------------|-------|-------------------|--------------------|
| 외경<br>Outside<br>Diameter | 유효장<br>Effective<br>Length | RPM            | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM           | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø0.5                      | 2                          | 6,000          | 300   | 0.20              | 0.005              | 15,000               | 300  | 0.20              | 0.005              | 9,000         | 300   | 0.20              | 0.005              |
| "                         | 4                          | 6,000          | 300   | 0.20              | 0.003              | 15,000               | 300  | 0.20              | 0.003              | 9,000         | 300   | 0.20              | 0.003              |
| "                         | 6                          | 6,000          | 300   | 0.20              | 0.001              | 15,000               | 300  | 0.20              | 0.001              | 9,000         | 300   | 0.20              | 0.001              |
| ø0.6                      | 4                          | 6,000          | 340   | 0.20              | 0.005              | 14,400               | 300  | 0.20              | 0.005              | 8,800         | 540   | 0.20              | 0.005              |
| "                         | 6                          | 6,000          | 340   | 0.20              | 0.003              | 14,400               | 300  | 0.20              | 0.003              | 8,800         | 540   | 0.20              | 0.003              |
| ø0.7                      | 4                          | 6,000          | 380   | 0.20              | 0.01               | 13,800               | 300  | 0.20              | 0.01               | 8,600         | 780   | 0.20              | 0.01               |
| "                         | 6                          | 6,000          | 380   | 0.20              | 0.008              | 13,800               | 300  | 0.20              | 0.008              | 8,600         | 780   | 0.20              | 0.008              |
| ø0.8                      | 6                          | 6,000          | 420   | 0.20              | 0.008              | 13,200               | 300  | 0.20              | 0.008              | 8,400         | 1,000 | 0.20              | 0.008              |
| "                         | 8                          | 6,000          | 420   | 0.20              | 0.005              | 12,900               | 280  | 0.20              | 0.005              | 8,200         | 960   | 0.20              | 0.005              |
| ø0.9                      | 6                          | 6,000          | 460   | 0.20              | 0.08               | 12,600               | 300  | 0.20              | 0.08               | 8,200         | 1,300 | 0.20              | 0.08               |
| "                         | 10                         | 6,000          | 460   | 0.20              | 0.03               | 11,800               | 260  | 0.20              | 0.03               | 7,800         | 1,000 | 0.20              | 0.03               |
| ø1                        | 6                          | 6,000          | 500   | 0.30              | 0.05               | 12,000               | 300  | 0.30              | 0.05               | 8,000         | 1,500 | 0.30              | 0.05               |
| "                         | 8                          | 6,000          | 500   | 0.30              | 0.05               | 11,500               | 270  | 0.30              | 0.05               | 7,700         | 1,400 | 0.30              | 0.05               |
| "                         | 10                         | 6,000          | 500   | 0.30              | 0.03               | 11,000               | 240  | 0.30              | 0.03               | 7,500         | 1,200 | 0.30              | 0.03               |
| "                         | 12                         | 6,000          | 500   | 0.30              | 0.03               | 10,400               | 220  | 0.30              | 0.03               | 7,200         | 1,100 | 0.30              | 0.03               |
| "                         | 16                         | 6,000          | 500   | 0.30              | 0.02               | 9,300                | 160  | 0.30              | 0.02               | 6,700         | 830   | 0.30              | 0.02               |
| "                         | 20                         | 6,000          | 500   | 0.30              | 0.01               | 8,000                | 90   | 0.30              | 0.01               | 6,000         | 500   | 0.30              | 0.01               |
| ø1.2                      | 6                          | 6,000          | 610   | 0.40              | 0.05               | 11,700               | 330  | 0.40              | 0.05               | 8,000         | 1,500 | 0.40              | 0.05               |
| "                         | 8                          | 6,000          | 610   | 0.40              | 0.05               | 11,200               | 300  | 0.40              | 0.05               | 7,700         | 1,400 | 0.40              | 0.05               |
| "                         | 10                         | 6,000          | 600   | 0.40              | 0.03               | 10,700               | 280  | 0.40              | 0.03               | 7,500         | 1,300 | 0.40              | 0.03               |
| "                         | 12                         | 6,000          | 600   | 0.40              | 0.03               | 10,200               | 250  | 0.40              | 0.03               | 7,200         | 1,200 | 0.40              | 0.03               |
| ø1.4                      | 6                          | 6,000          | 720   | 0.40              | 0.05               | 11,340               | 360  | 0.40              | 0.05               | 8,000         | 1,600 | 0.40              | 0.05               |
| "                         | 10                         | 6,000          | 700   | 0.40              | 0.03               | 10,700               | 310  | 0.40              | 0.03               | 7,700         | 1,400 | 0.40              | 0.03               |
| "                         | 16                         | 6,000          | 680   | 0.40              | 0.01               | 9,800                | 230  | 0.40              | 0.01               | 7,200         | 1,000 | 0.40              | 0.01               |
| ø1.5                      | 6                          | 6,100          | 780   | 0.50              | 0.05               | 11,200               | 380  | 0.50              | 0.05               | 8,000         | 1,600 | 0.50              | 0.05               |
| "                         | 10                         | 6,000          | 760   | 0.50              | 0.05               | 10,200               | 330  | 0.50              | 0.05               | 7,500         | 1,400 | 0.50              | 0.05               |
| "                         | 14                         | 6,000          | 730   | 0.50              | 0.03               | 9,600                | 270  | 0.50              | 0.03               | 7,000         | 1,100 | 0.50              | 0.03               |
| "                         | 16                         | 6,000          | 730   | 0.50              | 0.03               | 8,800                | 250  | 0.50              | 0.03               | 6,700         | 1,000 | 0.50              | 0.03               |
| "                         | 20                         | 5,900          | 700   | 0.50              | 0.02               | 7,600                | 180  | 0.50              | 0.02               | 6,100         | 750   | 0.50              | 0.02               |
| ø1.6                      | 6                          | 6,100          | 830   | 0.80              | 0.05               | 11,000               | 390  | 0.80              | 0.05               | 8,000         | 1,600 | 0.80              | 0.05               |
| ø2                        | 8                          | 6,100          | 1,000 | 1.00              | 0.10               | 10,100               | 440  | 1.00              | 0.10               | 7,900         | 1,700 | 1.00              | 0.10               |
| "                         | 10                         | 6,000          | 980   | 1.00              | 0.10               | 9,800                | 420  | 1.00              | 0.10               | 7,700         | 1,600 | 1.00              | 0.10               |
| "                         | 12                         | 6,000          | 970   | 1.00              | 0.08               | 9,500                | 400  | 1.00              | 0.08               | 7,500         | 1,600 | 1.00              | 0.08               |
| "                         | 14                         | 5,900          | 950   | 1.00              | 0.08               | 9,100                | 380  | 1.00              | 0.08               | 7,300         | 1,500 | 1.00              | 0.08               |
| "                         | 16                         | 5,900          | 930   | 1.00              | 0.05               | 8,800                | 360  | 1.00              | 0.05               | 7,100         | 1,400 | 1.00              | 0.05               |
| "                         | 18                         | 5,800          | 920   | 1.00              | 0.05               | 8,500                | 340  | 1.00              | 0.05               | 6,900         | 1,300 | 1.00              | 0.05               |
| "                         | 20                         | 5,700          | 890   | 1.00              | 0.03               | 8,000                | 300  | 1.00              | 0.03               | 6,500         | 1,200 | 1.00              | 0.03               |
| "                         | 25                         | 5,600          | 850   | 1.00              | 0.03               | 7,200                | 250  | 1.00              | 0.03               | 6,000         | 1,100 | 1.00              | 0.03               |
| "                         | 30                         | 5,400          | 800   | 1.00              | 0.02               | 6,200                | 190  | 1.00              | 0.02               | 5,400         | 850   | 1.00              | 0.02               |
| ø2.5                      | 12                         | 6,000          | 1,300 | 1.20              | 0.20               | 8,600                | 480  | 1.20              | 0.20               | 7,400         | 1,600 | 1.20              | 0.20               |
| "                         | 20                         | 5,700          | 1,100 | 1.00              | 0.10               | 6,800                | 350  | 1.00              | 0.10               | 6,200         | 1,300 | 1.00              | 0.10               |
| ø3                        | 8                          | 6,200          | 1,600 | 1.50              | 0.30               | 8,700                | 610  | 1.50              | 0.30               | 8,000         | 1,900 | 1.50              | 0.30               |
| "                         | 12                         | 6,000          | 1,500 | 1.50              | 0.25               | 8,000                | 560  | 1.50              | 0.25               | 7,500         | 1,800 | 1.50              | 0.25               |
| "                         | 16                         | 5,800          | 1,400 | 1.50              | 0.20               | 7,300                | 510  | 1.50              | 0.20               | 7,000         | 1,700 | 1.50              | 0.20               |
| "                         | 20                         | 5,600          | 1,300 | 1.50              | 0.20               | 6,400                | 440  | 1.50              | 0.20               | 6,300         | 1,800 | 1.50              | 0.20               |
| "                         | 25                         | 5,400          | 1,200 | 1.50              | 0.15               | 5,500                | 370  | 1.50              | 0.15               | 5,600         | 1,400 | 1.50              | 0.15               |
| "                         | 30                         | 5,200          | 1,100 | 1.50              | 0.10               | 4,500                | 290  | 1.50              | 0.10               | 4,800         | 1,200 | 1.50              | 0.10               |
| "                         | 40                         | 4,800          | 960   | 1.50              | 0.10               | 2,700                | 160  | 1.50              | 0.10               | 3,500         | 840   | 1.50              | 0.10               |
| ø4                        | 12                         | 5,000          | 1,400 | 2.00              | 0.35               | 7,000                | 520  | 2.00              | 0.35               | 5,800         | 1,500 | 2.00              | 0.35               |
| "                         | 16                         | 4,900          | 1,400 | 2.00              | 0.30               | 6,500                | 480  | 2.00              | 0.30               | 5,500         | 1,400 | 2.00              | 0.30               |
| "                         | 18                         | 4,800          | 1,400 | 2.00              | 0.30               | 6,300                | 470  | 2.00              | 0.30               | 5,400         | 1,400 | 2.00              | 0.30               |
| "                         | 20                         | 4,800          | 1,400 | 2.00              | 0.30               | 6,000                | 440  | 2.00              | 0.30               | 5,100         | 1,300 | 2.00              | 0.30               |
| "                         | 25                         | 4,700          | 1,300 | 2.00              | 0.25               | 5,600                | 410  | 2.00              | 0.25               | 4,900         | 1,300 | 2.00              | 0.25               |
| "                         | 30                         | 4,500          | 1,300 | 2.00              | 0.20               | 4,700                | 340  | 2.00              | 0.20               | 4,400         | 1,100 | 2.00              | 0.20               |
| "                         | 35                         | 4,300          | 1,300 | 2.00              | 0.20               | 4,200                | 300  | 2.00              | 0.20               | 4,100         | 1,100 | 2.00              | 0.20               |
| "                         | 40                         | 4,200          | 1,300 | 2.00              | 0.10               | 3,600                | 250  | 2.00              | 0.10               | 3,600         | 960   | 2.00              | 0.10               |
| "                         | 50                         | 3,900          | 1,200 | 2.00              | 0.10               | 2,400                | 160  | 2.00              | 0.10               | 2,900         | 780   | 2.00              | 0.10               |
| ø5                        | 16                         | 3,400          | 1,200 | 2.50              | 0.50               | 5,800                | 470  | 2.50              | 0.50               | 4,000         | 1,200 | 2.50              | 0.50               |
| "                         | 35                         | 3,200          | 1,100 | 2.50              | 0.30               | 3,900                | 260  | 2.50              | 0.30               | 2,900         | 910   | 2.50              | 0.30               |
| ø6                        | 35                         | 2,400          | 960   | 3.00              | 0.40               | 2,600                | 240  | 3.00              | 0.40               | 1,900         | 760   | 3.00              | 0.40               |
| "                         | 50                         | 2,200          | 890   | 3.00              | 0.30               | 1,900                | 170  | 3.00              | 0.30               | 1,700         | 670   | 3.00              | 0.30               |
| "                         | 60                         | 2,000          | 800   | 3.00              | 0.20               | 1,000                | 90   | 3.00              | 0.20               | 1,500         | 600   | 3.00              | 0.20               |

|                     |                                                                                                      |                                                                                     |                                                                                                   |                                                                                       |
|---------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 절입량<br>Depth of Cut | Slotting                                                                                             |  | Side Milling                                                                                      |  |
|                     | <ul style="list-style-type: none"> <li>• Ap : Axial Depth</li> <li>• D : Outside Diameter</li> </ul> |                                                                                     | <ul style="list-style-type: none"> <li>• Ap : Axial Depth</li> <li>• Ae : Radial Depth</li> </ul> |                                                                                       |

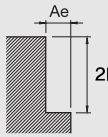
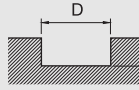
| 파삭재<br>Material           | 탄소강<br>Carbon Steels |      |                   |                    | 합금강<br>Alloy Steels |      |                   |                    | 알루미늄<br>Aluminum |      |                   |                    |
|---------------------------|----------------------|------|-------------------|--------------------|---------------------|------|-------------------|--------------------|------------------|------|-------------------|--------------------|
| 외경<br>Outside<br>Diameter | RPM                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM              | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                        | 12,900               | 125  | 0.15              | 0.07               | 11,400              | 90   | 0.15              | 0.07               | 43,000           | 510  | 0.15              | 0.07               |
| Ø1.5                      | 8,600                | 125  | 0.75              | 0.11               | 7,700               | 90   | 0.75              | 0.11               | 29,000           | 580  | 0.75              | 0.11               |
| Ø2                        | 6,500                | 125  | 1.00              | 0.14               | 5,800               | 110  | 1.00              | 0.14               | 22,000           | 650  | 1.00              | 0.14               |
| Ø2.5                      | 5,100                | 150  | 1.25              | 0.18               | 4,600               | 110  | 1.25              | 0.18               | 17,200           | 680  | 1.25              | 0.18               |
| Ø3                        | 4,300                | 170  | 1.50              | 0.45               | 3,800               | 120  | 1.50              | 0.45               | 14,300           | 720  | 1.50              | 0.45               |
| Ø4                        | 3,200                | 200  | 3.00              | 0.60               | 2,900               | 120  | 3.00              | 0.60               | 10,700           | 750  | 3.00              | 0.60               |
| Ø5                        | 2,600                | 210  | 3.75              | 0.75               | 2,300               | 135  | 3.75              | 0.75               | 8,600            | 775  | 3.75              | 0.75               |
| Ø6                        | 2,200                | 220  | 4.50              | 0.90               | 1,900               | 150  | 4.50              | 0.90               | 7,200            | 790  | 4.50              | 0.90               |
| Ø8                        | 1,600                | 200  | 6.00              | 1.20               | 1,400               | 145  | 6.00              | 1.20               | 5,400            | 700  | 6.00              | 1.20               |
| Ø10                       | 1,300                | 180  | 7.50              | 1.50               | 1,200               | 145  | 7.50              | 1.50               | 4,300            | 650  | 7.50              | 1.50               |
| Ø12                       | 1,100                | 170  | 9.00              | 1.80               | 1,000               | 135  | 9.00              | 1.80               | 3,600            | 610  | 9.00              | 1.80               |

# 3MEM

| 파삭재<br>Material           | 탄소강<br>Carbon Steels |      |                   |                    | 합금강<br>Alloy Steels |      |                   |                    | 알루미늄<br>Aluminum |      |                   |                    |
|---------------------------|----------------------|------|-------------------|--------------------|---------------------|------|-------------------|--------------------|------------------|------|-------------------|--------------------|
| 외경<br>Outside<br>Diameter | RPM                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM              | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                        | 13,674               | 141  | 0.15              | 0.07               | 12,084              | 101  | 0.15              | 0.07               | 45,580           | 566  | 0.15              | 0.07               |
| Ø1.5                      | 9,116                | 141  | 0.75              | 0.11               | 8,162               | 101  | 0.75              | 0.11               | 30,740           | 644  | 0.75              | 0.11               |
| Ø2                        | 6,890                | 141  | 1.00              | 0.14               | 6,148               | 123  | 1.00              | 0.14               | 23,320           | 722  | 1.00              | 0.14               |
| Ø2.5                      | 5,406                | 170  | 1.25              | 0.18               | 4,876               | 123  | 1.25              | 0.18               | 18,232           | 769  | 1.25              | 0.18               |
| Ø3                        | 4,558                | 192  | 1.50              | 0.45               | 4,028               | 134  | 1.50              | 0.45               | 15,158           | 799  | 1.50              | 0.45               |
| Ø4                        | 3,392                | 226  | 3.00              | 0.60               | 3,074               | 134  | 3.00              | 0.60               | 11,342           | 833  | 3.00              | 0.60               |
| Ø6                        | 2,332                | 249  | 4.50              | 0.90               | 2,014               | 168  | 4.50              | 0.90               | 7,632            | 877  | 4.50              | 0.90               |

# 4MEM

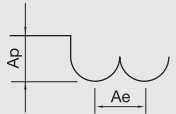
| 파삭재<br>Material           | 탄소강<br>Carbon Steels |      |                   |                    | 합금강<br>Alloy Steels |      |                   |                    | 프리하트강<br>Prehardened Steels |      |                   |                    |
|---------------------------|----------------------|------|-------------------|--------------------|---------------------|------|-------------------|--------------------|-----------------------------|------|-------------------|--------------------|
| 외경<br>Outside<br>Diameter | RPM                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                 | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                         | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø1                        | 14,084               | 153  | 0.15              | 0.07               | 12,483              | 107  | 0.15              | 0.07               | 46,583                      | 594  | 0.15              | 0.07               |
| Ø1.5                      | 9,389                | 153  | 0.75              | 0.11               | 8,431               | 107  | 0.75              | 0.11               | 31,416                      | 676  | 0.75              | 0.11               |
| Ø2                        | 7,097                | 153  | 1.00              | 0.14               | 6,351               | 131  | 1.00              | 0.14               | 23,833                      | 758  | 1.00              | 0.14               |
| Ø2.5                      | 5,568                | 183  | 1.25              | 0.18               | 5,037               | 131  | 1.25              | 0.18               | 18,633                      | 808  | 1.25              | 0.18               |
| Ø3                        | 4,695                | 207  | 1.50              | 0.45               | 4,161               | 142  | 1.50              | 0.45               | 15,491                      | 839  | 1.50              | 0.45               |
| Ø4                        | 3,494                | 244  | 3.00              | 0.60               | 3,175               | 142  | 3.00              | 0.60               | 11,592                      | 874  | 3.00              | 0.60               |
| Ø6                        | 2,402                | 268  | 4.50              | 0.90               | 2,080               | 178  | 4.50              | 0.90               | 7,800                       | 921  | 4.50              | 0.90               |
| Ø8                        | 2,509                | 258  | 6.00              | 1.20               | 1,957               | 156  | 6.00              | 1.20               | 6,006                       | 889  | 6.00              | 1.20               |
| Ø10                       | 1,720                | 234  | 7.50              | 1.50               | 1,342               | 133  | 7.50              | 1.50               | 4,625                       | 826  | 7.50              | 1.50               |
| Ø12                       | 1,279                | 210  | 9.00              | 1.80               | 998                 | 116  | 9.00              | 1.80               | 3,561                       | 744  | 9.00              | 1.80               |

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |  |  |  |  |  |  |  |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| 절입량<br>Depth of Cut | <div>  <div> <math>Ae</math><br/> <math>2D</math> </div> </div> <div> <math>Ae</math><br/> <math>\varnothing 1 \sim 2.9 = 0.07D</math><br/> <math>\varnothing 3 \sim = 0.15D</math> </div> <div>  <div> <math>D</math><br/> <math>Ap</math> </div> </div> <div> <math>Ap</math><br/> <math>\varnothing 1 \sim 1.2 = 0.15D</math><br/> <math>\varnothing 1.5 \sim 3.5 = 0.5D</math><br/> <math>\varnothing 4 \sim = 0.75D</math> </div> |  |  |  |  |  |  |  |  |  |  |  |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|

- 날 끝이 정확하게 연삭되어 있습니다. 파손을 피하기 위해 가능하면 비접촉 방식으로 측정 하십시오
- 공구 진입시 파삭재 밖에서 진입 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생할 때 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- The edge of the flute precisely grinded. If you want to measure the tool, and to avoid damaging on the flutes, use non-contact measuring method.
- When entering the tool to the workpiece, enter the tool from outside to the workpiece.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.

# 2HHINB/2JJINB Cutting Condition

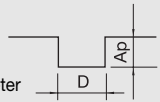
• RPM : rev./min • Feed : mm/min

| 피삭재<br>Material     | 포리하튼강<br>Prehardened Steels                                                                                                                                                                                                                                           |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness         | 30 ~ 40HRC                                                                                                                                                                                                                                                            |      |                   |                    | 40 ~ 50HRC              |      |                   |                    | 50 ~ 60HRC              |      |                   |                    |
| 반경<br>Corner Radius | RPM                                                                                                                                                                                                                                                                   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 5                 | 7320                                                                                                                                                                                                                                                                  | 2930 | 0.2               | 0.8                | 6700                    | 2000 | 0.1               | 0.8                | 5400                    | 2170 | 0.1               | 0.8                |
| R 5.5               | 6660                                                                                                                                                                                                                                                                  | 2660 | 0.2               | 0.8                | 6000                    | 1800 | 0.1               | 0.8                | 4900                    | 2000 | 0.1               | 0.8                |
| R 6                 | 6100                                                                                                                                                                                                                                                                  | 2440 | 0.2               | 0.9                | 5570                    | 1670 | 0.2               | 0.9                | 4500                    | 1800 | 0.1               | 0.9                |
| R 6.5               | 5630                                                                                                                                                                                                                                                                  | 2250 | 0.2               | 0.9                | 5150                    | 1550 | 0.2               | 0.9                | 4160                    | 1660 | 0.1               | 0.9                |
| R 8                 | 4580                                                                                                                                                                                                                                                                  | 1800 | 0.6               | 1.1                | 4180                    | 1250 | 0.5               | 1.1                | 3380                    | 1350 | 0.4               | 1.1                |
| R 8.5               | 4300                                                                                                                                                                                                                                                                  | 1720 | 0.6               | 1.1                | 3900                    | 1180 | 0.5               | 1.1                | 3180                    | 1270 | 0.4               | 1.1                |
| R 10                | 3660                                                                                                                                                                                                                                                                  | 1460 | 0.7               | 1.5                | 3340                    | 1000 | 0.6               | 1.5                | 2700                    | 1080 | 0.4               | 1.5                |
| R 10.5              | 3500                                                                                                                                                                                                                                                                  | 1390 | 0.7               | 1.5                | 3180                    | 950  | 0.6               | 1.5                | 2580                    | 1030 | 0.4               | 1.5                |
| R 12.5              | 2930                                                                                                                                                                                                                                                                  | 1170 | 0.9               | 1.8                | 2670                    | 800  | 0.7               | 1.8                | 2170                    | 870  | 0.6               | 1.8                |
| R 13                | 2800                                                                                                                                                                                                                                                                  | 1130 | 0.9               | 1.8                | 2600                    | 770  | 0.7               | 1.8                | 2080                    | 830  | 0.6               | 1.8                |
| R 15                | 2440                                                                                                                                                                                                                                                                  | 1000 | 1.1               | 2.4                | 2230                    | 700  | 0.9               | 2.4                | 1800                    | 720  | 0.7               | 2.4                |
| 절입량<br>Depth of Cut |  <p>Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/>Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/>D : Outside Diameter 외경 (mm)<br/>n : Speed 회전속도 (min<sup>-1</sup>)<br/>Vt : Feed 이송속도 (mm/min)</p> |      |                   |                    |                         |      |                   |                    |                         |      |                   |                    |

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 인서트 체결 및 볼트의 조임을 확인 후 가공 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 에어브로, 절삭유, 오일 미스트 쿨란트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- In case of long effective length, reduce the RPM and feed by 20% or less.
- After the heat the shrink-fit, check the clamping and bolt status, and then use.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

# 2HHINC/2JJINC Cutting Condition

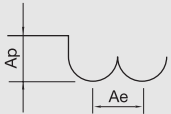
• RPM : rev./min • Feed : mm/min

| 피삭재<br>Material        | 포리하튼강<br>Prehardened Steels                                                                                                                            |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness            | 30 ~ 40HRC                                                                                                                                             |      |                   |                    | 40 ~ 50HRC              |      |                   |                    | 50 ~ 60HRC              |      |                   |                    |
| 외경<br>Outside Diameter | RPM                                                                                                                                                    | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø10                    | 9550                                                                                                                                                   | 950  | 0.3               | 10                 | 8900                    | 890  | 0.1               | 10                 | 7000                    | 700  | 0.125             | 10                 |
| Ø11                    | 8690                                                                                                                                                   | 870  | 0.3               | 11                 | 8100                    | 810  | 0.1               | 11                 | 6370                    | 640  | 0.125             | 11                 |
| Ø12                    | 7960                                                                                                                                                   | 800  | 0.3               | 12                 | 7430                    | 740  | 0.2               | 12                 | 5840                    | 580  | 0.15              | 12                 |
| Ø13                    | 7350                                                                                                                                                   | 730  | 0.3               | 13                 | 6860                    | 690  | 0.2               | 13                 | 5390                    | 540  | 0.15              | 13                 |
| Ø16                    | 5970                                                                                                                                                   | 600  | 0.8               | 16                 | 5570                    | 550  | 0.4               | 16                 | 4380                    | 440  | 0.4               | 16                 |
| Ø17                    | 5620                                                                                                                                                   | 560  | 0.8               | 17                 | 5240                    | 520  | 0.4               | 17                 | 4120                    | 410  | 0.4               | 17                 |
| Ø20                    | 4780                                                                                                                                                   | 480  | 1.0               | 20                 | 4460                    | 450  | 0.5               | 20                 | 3500                    | 350  | 0.5               | 20                 |
| Ø21                    | 4550                                                                                                                                                   | 450  | 1.0               | 21                 | 4250                    | 425  | 0.5               | 21                 | 3340                    | 330  | 0.5               | 21                 |
| Ø25                    | 3800                                                                                                                                                   | 380  | 1.3               | 25                 | 3670                    | 350  | 0.6               | 25                 | 2800                    | 280  | 0.625             | 25                 |
| Ø26                    | 3670                                                                                                                                                   | 360  | 1.3               | 26                 | 3400                    | 340  | 0.6               | 26                 | 2700                    | 270  | 0.625             | 26                 |
| Ø30                    | 3200                                                                                                                                                   | 320  | 1.6               | 30                 | 2980                    | 290  | 0.8               | 30                 | 2330                    | 230  | 0.8               | 30                 |
| 절입량<br>Depth of Cut    |  <p>Slotting<br/>• Ap : Axial Depth<br/>• D : Outside Diameter</p> |      |                   |                    |                         |      |                   |                    |                         |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 인서트 체결 및 볼트의 조임을 확인 후 가공 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생 시 스피들 속도와 이송 속도를 비례 적으로 조정하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨란트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- After the heat the shrink-fit, check the clamping and bolt status, and then use.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

## 2GINB Cutting Condition

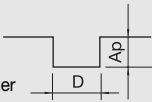
• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material        | 프리하든강<br>Prehardened Steels                                                                                                                                                                                                                                                        |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    | 고경도강<br>Hardened Steels |       |                   |                    |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|-------------------------|-------|-------------------|--------------------|
| 경도 Hardness            | 30 ~ 40HRC                                                                                                                                                                                                                                                                         |       |                   |                    | 40 ~ 50HRC              |       |                   |                    | 50 ~ 52HRC              |       |                   |                    |
| 반경<br>Corner<br>Radius | RPM                                                                                                                                                                                                                                                                                | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED  | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 5                    | 6,220                                                                                                                                                                                                                                                                              | 2,500 | 0.2               | 0.8                | 5,700                   | 1,700 | 0.1               | 0.8                | 4,590                   | 1,840 | 0.1               | 0.8                |
| R 5.5                  | 5,660                                                                                                                                                                                                                                                                              | 2,260 | 0.2               | 0.8                | 5,100                   | 1,530 | 0.1               | 0.8                | 4,160                   | 1,700 | 0.1               | 0.8                |
| R 6                    | 5,180                                                                                                                                                                                                                                                                              | 2,070 | 0.2               | 0.9                | 4,740                   | 1,420 | 0.2               | 0.9                | 3,800                   | 1,530 | 0.1               | 0.9                |
| R 6.5                  | 4,800                                                                                                                                                                                                                                                                              | 1,900 | 0.2               | 0.9                | 4,380                   | 1,320 | 0.2               | 0.9                | 3,530                   | 1,400 | 0.1               | 0.9                |
| R 8                    | 3,900                                                                                                                                                                                                                                                                              | 1,530 | 0.6               | 1.1                | 3,550                   | 1,060 | 0.5               | 1.1                | 2,870                   | 1,150 | 0.4               | 1.1                |
| R 8.5                  | 3,660                                                                                                                                                                                                                                                                              | 1,460 | 0.6               | 1.1                | 3,300                   | 1,000 | 0.5               | 1.1                | 2,700                   | 1,080 | 0.4               | 1.1                |
| R 10                   | 3,120                                                                                                                                                                                                                                                                              | 1,240 | 0.7               | 1.5                | 2,840                   | 850   | 0.6               | 1.5                | 2,300                   | 920   | 0.4               | 1.5                |
| R 10.5                 | 3,000                                                                                                                                                                                                                                                                              | 1,180 | 0.7               | 1.5                | 2,700                   | 800   | 0.6               | 1.5                | 2,200                   | 880   | 0.4               | 1.5                |
| R 12.5                 | 2,500                                                                                                                                                                                                                                                                              | 990   | 0.9               | 1.8                | 2,270                   | 680   | 0.7               | 1.8                | 1,830                   | 740   | 0.6               | 1.8                |
| R 13                   | 2,380                                                                                                                                                                                                                                                                              | 960   | 0.9               | 1.8                | 2,210                   | 650   | 0.7               | 1.8                | 1,760                   | 700   | 0.6               | 1.8                |
| R 15                   | 2,080                                                                                                                                                                                                                                                                              | 850   | 1.1               | 2.4                | 1,990                   | 600   | 0.9               | 2.4                | 1,530                   | 610   | 0.7               | 2.4                |
| 절입량<br>Depth of Cut    | <div>  <p>Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/>Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/>D : Outside Diameter 외경 (mm)<br/>n : Speed 회전속도 (min<sup>-1</sup>)<br/>Vf : Feed 이송속도 (mm/min)</p> </div> |       |                   |                    |                         |       |                   |                    |                         |       |                   |                    |

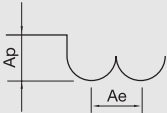
- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 인서트 체결 및 볼트의 조임을 확인 후 가공 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 에어브로, 절삭유, 오일 미스트 쿨란트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- In case of long effective length, reduce the RPM and feed by 20% or less.
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- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
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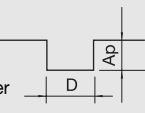
## 2GINC Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재<br>Material           | 프리하든강<br>Prehardened Steels                                                                                                                                        |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 경도 Hardness               | 30 ~ 40HRC                                                                                                                                                         |      |                   |                    | 40 ~ 50HRC              |      |                   |                    | 50 ~ 52HRC              |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| Ø10                       | 8,200                                                                                                                                                              | 800  | 0.3               | 10                 | 7,560                   | 760  | 0.1               | 10                 | 5,950                   | 590  | 0.125             | 10                 |
| Ø11                       | 7,400                                                                                                                                                              | 740  | 0.3               | 11                 | 6,900                   | 690  | 0.1               | 11                 | 5,410                   | 540  | 0.125             | 11                 |
| Ø12                       | 6,770                                                                                                                                                              | 680  | 0.3               | 12                 | 6,320                   | 630  | 0.2               | 12                 | 4,960                   | 490  | 0.15              | 12                 |
| Ø13                       | 6,250                                                                                                                                                              | 620  | 0.3               | 13                 | 5,830                   | 590  | 0.2               | 13                 | 4,580                   | 460  | 0.15              | 13                 |
| Ø16                       | 5,070                                                                                                                                                              | 510  | 0.8               | 16                 | 4,740                   | 470  | 0.4               | 16                 | 3,720                   | 370  | 0.4               | 16                 |
| Ø17                       | 4,780                                                                                                                                                              | 480  | 0.8               | 17                 | 4,450                   | 440  | 0.4               | 17                 | 3,500                   | 350  | 0.4               | 17                 |
| Ø20                       | 4,060                                                                                                                                                              | 400  | 1.0               | 20                 | 3,790                   | 380  | 0.5               | 20                 | 2,970                   | 300  | 0.5               | 20                 |
| Ø21                       | 3,870                                                                                                                                                              | 380  | 1.0               | 21                 | 3,610                   | 360  | 0.5               | 21                 | 2,840                   | 280  | 0.5               | 21                 |
| Ø25                       | 3,230                                                                                                                                                              | 320  | 1.3               | 25                 | 3,120                   | 300  | 0.6               | 25                 | 2,380                   | 240  | 0.625             | 25                 |
| Ø26                       | 3,120                                                                                                                                                              | 300  | 1.3               | 26                 | 2,890                   | 290  | 0.6               | 26                 | 2,300                   | 230  | 0.625             | 26                 |
| Ø30                       | 2,720                                                                                                                                                              | 270  | 1.6               | 30                 | 2,530                   | 250  | 0.8               | 30                 | 1,980                   | 200  | 0.8               | 30                 |
| 절입량<br>Depth of Cut       | <div>  <p>Slotting<br/>• Ap : Axial Depth<br/>• D : Outside Diameter</p> </div> |      |                   |                    |                         |      |                   |                    |                         |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 인서트 체결 및 볼트의 조임을 확인 후 가공 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생 시 스피드 속도와 이송 속도를 비례 적으로 조정하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨란트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- After the heat the shrink-fit, check the clamping and bolt status, and then use.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

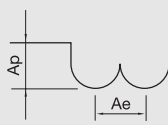
| 파삭재 Material        | 흑연 Graphite                                                                                                                                                                                                      |      |                   |                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|
| 반경 Radius           | RPM                                                                                                                                                                                                              | FEED | Ap<br>Axial Depth | Ap<br>Radial Depth |
| R 5                 | 12740                                                                                                                                                                                                            | 3000 | 0.3               | 0.8                |
| R 5.5               | 11580                                                                                                                                                                                                            | 2780 | 0.33              | 0.8                |
| R 6                 | 10600                                                                                                                                                                                                            | 2550 | 0.36              | 0.9                |
| R 6.5               | 9800                                                                                                                                                                                                             | 2350 | 0.39              | 0.9                |
| R 8                 | 7960                                                                                                                                                                                                             | 1900 | 0.48              | 1.1                |
| R 8.5               | 7490                                                                                                                                                                                                             | 1800 | 0.51              | 1.1                |
| R 10                | 6370                                                                                                                                                                                                             | 1530 | 0.6               | 1.5                |
| R 10.5              | 6000                                                                                                                                                                                                             | 1450 | 0.63              | 1.5                |
| R 12.5              | 5100                                                                                                                                                                                                             | 1220 | 0.75              | 1.8                |
| R 13                | 4900                                                                                                                                                                                                             | 1180 | 0.78              | 1.8                |
| R 15                | 4250                                                                                                                                                                                                             | 1000 | 0.9               | 2.4                |
| 절입량<br>Depth of Cut |  <p>Ap : Axial Depth<br/>Ae : Radial Depth<br/>D : Outside Diameter<br/>n : Speed (min<sup>-1</sup>)<br/>Vf : Feed (mm/min)</p> |      |                   |                    |

| 파삭재 Material        | 흑연 Graphite                                                                                                                                                 |      |                   |                    |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|
| 외경 Outside Diameter | RPM                                                                                                                                                         | FEED | Ap<br>Axial Depth | Ap<br>Radial Depth |
| Ø10                 | 16560                                                                                                                                                       | 1440 | 1                 | 10                 |
| Ø11                 | 15000                                                                                                                                                       | 1330 | 1.1               | 11                 |
| Ø12                 | 13780                                                                                                                                                       | 1220 | 1.2               | 12                 |
| Ø13                 | 12740                                                                                                                                                       | 1130 | 1.3               | 13                 |
| Ø16                 | 10350                                                                                                                                                       | 910  | 1.6               | 16                 |
| Ø17                 | 9740                                                                                                                                                        | 860  | 1.7               | 17                 |
| Ø20                 | 8280                                                                                                                                                        | 730  | 2                 | 20                 |
| Ø21                 | 7800                                                                                                                                                        | 700  | 2.1               | 21                 |
| Ø25                 | 6630                                                                                                                                                        | 590  | 2.5               | 25                 |
| Ø26                 | 6370                                                                                                                                                        | 570  | 2.6               | 26                 |
| Ø30                 | 5520                                                                                                                                                        | 480  | 3                 | 30                 |
| 절입량<br>Depth of Cut | <p>Slotting</p> <p>• Ap : Axial Depth</p> <p>• D : Outside Diameter</p>  |      |                   |                    |

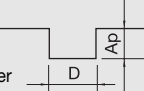
- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮추주세요.
- 인서트 체결 및 볼트의 조임을 확인 후 가공 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생 시 스피드 속도와 이송 속도를 비례 적으로 조정하십시오.
- 흑연 가공 에어브로를 추천합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- After the heat the shrink-fit, check the clamping and bolt status, and then use.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow is recommended for graphite milling.

## 4SFJB Cutting Condition

• RPM : rev./min • Feed : mm/min

| 파삭재 Material        | 프리하든강 Prehardened Steels                                                                                                                                                                                                                                                |      |                   |                    | 고경도강 Hardened Steels |      |                   |                    | 고경도강 Hardened Steels |      |                   |                    |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|----------------------|------|-------------------|--------------------|----------------------|------|-------------------|--------------------|
| 경도 Hardness         | 30 ~ 40HRC                                                                                                                                                                                                                                                              |      |                   |                    | 40 ~ 50HRC           |      |                   |                    | 50 ~ 60HRC           |      |                   |                    |
| 반경 Corner Radius    | RPM                                                                                                                                                                                                                                                                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                  | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 5                 | 6370                                                                                                                                                                                                                                                                    | 2800 | 0.3               | 0.1                | 4750                 | 1700 | 0.3               | 0.1                | 3100                 | 620  | 0.3               | 0.1                |
| R 5.5               | 5800                                                                                                                                                                                                                                                                    | 2500 | 0.3               | 0.1                | 4300                 | 1550 | 0.3               | 0.1                | 2840                 | 570  | 0.3               | 0.1                |
| R 6                 | 5300                                                                                                                                                                                                                                                                    | 2330 | 0.3               | 0.1                | 3950                 | 1420 | 0.3               | 0.1                | 2600                 | 520  | 0.3               | 0.1                |
| R 6.5               | 4900                                                                                                                                                                                                                                                                    | 2160 | 0.3               | 0.1                | 3650                 | 1300 | 0.3               | 0.1                | 2400                 | 480  | 0.3               | 0.1                |
| R 8                 | 4000                                                                                                                                                                                                                                                                    | 1750 | 0.4               | 0.2                | 3000                 | 1070 | 0.4               | 0.2                | 1950                 | 390  | 0.4               | 0.2                |
| R 8.5               | 3750                                                                                                                                                                                                                                                                    | 1650 | 0.4               | 0.2                | 2800                 | 1000 | 0.4               | 0.2                | 1800                 | 370  | 0.4               | 0.2                |
| R 10                | 3180                                                                                                                                                                                                                                                                    | 1400 | 0.5               | 0.2                | 2370                 | 850  | 0.5               | 0.2                | 1560                 | 300  | 0.5               | 0.2                |
| R 10.5              | 3000                                                                                                                                                                                                                                                                    | 1330 | 0.5               | 0.2                | 2260                 | 800  | 0.5               | 0.2                | 1500                 | 300  | 0.5               | 0.2                |
| 절입량<br>Depth of Cut |  <p>Ap : Axial Depth 축 방향의 절입 깊이 (mm)<br/>Ae : Radial Depth 반경 방향의 절입 깊이 (mm)<br/>D : Outside Diameter 외경 (mm)<br/>n : Speed 회전속도 (min<sup>-1</sup>)<br/>Vf : Feed 이송속도 (mm/min)</p> |      |                   |                    |                      |      |                   |                    |                      |      |                   |                    |

- 유효장이 긴 경우에는 회전수와 이송속도를 최대 20% 이하로 줄이십시오.
- 열박음 후 완전히 밀착되었는지 확인 후 가공 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용 합니다.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- In case of long effective length, reduce the RPM and feed by 20% or less.
- After the heat the shrink-fit, check the clamping and bolt status, and then use.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- In case of workpiece and machine do not have enough rigidity and make vibration, reduce the RPM and feed in same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

| 홈절삭 Slotting              |                                                                                                                                            |      |                   |                         |      |                   |                         |      |                   |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|-------------------------|------|-------------------|-------------------------|------|-------------------|
| 파삭재<br>Material           | 프리하든강<br>Prehardened Steels                                                                                                                |      |                   | 고경도강<br>Hardened Steels |      |                   | 고경도강<br>Hardened Steels |      |                   |
| 경도 Hardness               | 30 ~ 40HRC                                                                                                                                 |      |                   | 40 ~ 50HRC              |      |                   | 50 ~ 60HRC              |      |                   |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                        | FEED | Ap<br>Axial Depth | RPM                     | FEED | Ap<br>Axial Depth | RPM                     | FEED | Ap<br>Axial Depth |
| ø10                       | 1600                                                                                                                                       | 320  | 3                 | 1440                    | 288  | 2                 | 800                     | 130  | 1                 |
| ø11                       | 1450                                                                                                                                       | 290  | 3.3               | 1305                    | 261  | 2.2               | 725                     | 120  | 1.1               |
| ø12                       | 1330                                                                                                                                       | 265  | 3.6               | 1197                    | 239  | 2.4               | 660                     | 100  | 1.2               |
| ø13                       | 1225                                                                                                                                       | 245  | 3.9               | 1103                    | 221  | 2.6               | 610                     | 100  | 1.3               |
| ø16                       | 1000                                                                                                                                       | 200  | 4.8               | 900                     | 180  | 3.2               | 500                     | 80   | 1.6               |
| ø17                       | 940                                                                                                                                        | 190  | 5.1               | 846                     | 171  | 3.4               | 470                     | 75   | 1.7               |
| ø20                       | 800                                                                                                                                        | 160  | 6                 | 720                     | 144  | 4                 | 400                     | 65   | 2                 |
| ø21                       | 760                                                                                                                                        | 150  | 6.3               | 684                     | 135  | 4.2               | 380                     | 60   | 2.1               |
| 절입량<br>Depth of Cut       | Slotting<br>• Ap : Axial Depth<br>• D : Outside Diameter  |      |                   |                         |      |                   |                         |      |                   |

| 측면 절삭 Side Cutting        |                                                                                                                                               |      |                   |                    |                         |      |                   |                    |                         |      |                   |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|
| 파삭재<br>Material           | 프리하든강<br>Prehardened Steels                                                                                                                   |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |
| 경도 Hardness               | 30 ~ 40HRC                                                                                                                                    |      |                   |                    | 40 ~ 50HRC              |      |                   |                    | 50 ~ 60HRC              |      |                   |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                           | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth |
| ø10                       | 2050                                                                                                                                          | 500  | 5                 | 1                  | 2050                    | 480  | 5                 | 0.5                | 800                     | 130  | 3                 |
| ø11                       | 1880                                                                                                                                          | 450  | 5.5               | 1.1                | 1880                    | 420  | 5.5               | 0.6                | 730                     | 120  | 3.3               |
| ø12                       | 1720                                                                                                                                          | 410  | 6                 | 1.2                | 1720                    | 380  | 6                 | 0.6                | 660                     | 100  | 3.6               |
| ø13                       | 1600                                                                                                                                          | 380  | 6.5               | 1.3                | 1600                    | 350  | 6.5               | 0.7                | 610                     | 100  | 3.9               |
| ø16                       | 1300                                                                                                                                          | 310  | 8                 | 1.6                | 1300                    | 300  | 8                 | 0.8                | 500                     | 80   | 4.8               |
| ø17                       | 1220                                                                                                                                          | 300  | 8.5               | 1.7                | 1220                    | 285  | 8.5               | 0.9                | 470                     | 75   | 5.1               |
| ø20                       | 1000                                                                                                                                          | 250  | 10                | 2                  | 1000                    | 240  | 10                | 1.0                | 400                     | 65   | 6                 |
| ø21                       | 980                                                                                                                                           | 230  | 10.5              | 2.1                | 980                     | 220  | 10.5              | 1.1                | 380                     | 60   | 6.3               |
| 절입량<br>Depth of Cut       | Side Milling<br>• Ap : Axial Depth<br>• Ae : Radial Depth  |      |                   |                    |                         |      |                   |                    |                         |      |                   |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 열박음 후 완전히 밀착되었는지 확인 후 가공 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생 시 스피들 속도와 이송 속도를 비례 적으로 조정하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- After the heat the shrink-fit, check the clamping and bolt status, and then use.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

| 측면 절삭 Side Cutting        |                                                                                                                                                                                                       |      |                   |                    |                         |      |                   |                    |                         |      |                   |                    |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|-------------------------|------|-------------------|--------------------|
| 파삭재<br>Material           | 프리하든강<br>Prehardened Steels                                                                                                                                                                           |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    | 고경도강<br>Hardened Steels |      |                   |                    |
| 경도 Hardness               | 30 ~ 40HRC                                                                                                                                                                                            |      |                   |                    | 40 ~ 50HRC              |      |                   |                    | 50 ~ 60HRC              |      |                   |                    |
| 외경<br>Outside<br>Diameter | RPM                                                                                                                                                                                                   | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth | RPM                     | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø10                       | 3075                                                                                                                                                                                                  | 1150 | 5                 | 0.2                | 3075                    | 1104 | 3                 | 0.2                | 1200                    | 299  | 3                 | 0.2                |
| ø11                       | 2820                                                                                                                                                                                                  | 1035 | 5.5               | 0.2                | 2820                    | 966  | 3.3               | 0.2                | 1095                    | 276  | 3.3               | 0.2                |
| ø12                       | 2580                                                                                                                                                                                                  | 943  | 6                 | 0.2                | 2580                    | 874  | 3.6               | 0.2                | 990                     | 230  | 3.6               | 0.2                |
| ø13                       | 2400                                                                                                                                                                                                  | 874  | 6.5               | 0.3                | 2400                    | 805  | 3.9               | 0.3                | 915                     | 230  | 3.9               | 0.3                |
| ø16                       | 1950                                                                                                                                                                                                  | 713  | 8                 | 0.3                | 1950                    | 690  | 4.8               | 0.3                | 750                     | 184  | 4.8               | 0.3                |
| ø17                       | 1830                                                                                                                                                                                                  | 690  | 8.5               | 0.3                | 1830                    | 656  | 5.1               | 0.3                | 705                     | 173  | 5.1               | 0.3                |
| ø20                       | 1500                                                                                                                                                                                                  | 575  | 10                | 0.4                | 1500                    | 552  | 6                 | 0.4                | 600                     | 150  | 6                 | 0.4                |
| ø21                       | 1470                                                                                                                                                                                                  | 529  | 10.5              | 0.4                | 1470                    | 506  | 6.3               | 0.4                | 570                     | 138  | 6.3               | 0.4                |
| 절입량<br>Depth of Cut       | <div>Side Milling</div> <div><div><div>• Ap : Axial Depth</div><div>• Ae : Radial Depth</div></div><div></div></div> |      |                   |                    |                         |      |                   |                    |                         |      |                   |                    |

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 열박음 후 완전히 밀착되었는지 확인 후 가공 하십시오.
- 상기 절삭 조건은 6날 기준이며 날 수 증가시 안정적인 속도 내에서 FEED를 UP 해주십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생 시 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 에어브로, 절삭유, 오일 미스트 쿨런트를 추천하며, 칩을 잘 제거하고 가공시의 발열과 발화에 주의 하십시오
- If the effective length is long, reduce the RPM and feed in the same proportion.
- After the heat the shrink-fit, check the clamping and bolt status, and then use.
- Above the table value is based on 6 flutes. If you use more than 6 flutes of endmill, raise up the feed in stable milling condition.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow or mist coolants are recommended and note for chip emission, heat, or ignition.

## 4SFDB

| 파삭재<br>Material        | 흑연<br>Graphite |      |                   |                    |
|------------------------|----------------|------|-------------------|--------------------|
| 반경<br>Corner<br>Radius | RPM            | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| R 5                    | 9550           | 3050 | 2                 | 1                  |
| R 5.5                  | 8700           | 2800 | 2.2               | 1.1                |
| R 6                    | 7960           | 2550 | 2.4               | 1.2                |
| R 6.5                  | 7350           | 2350 | 2.6               | 1.3                |
| R 8                    | 5970           | 1900 | 3.2               | 1.6                |
| R 8.5                  | 5620           | 1800 | 3.4               | 1.7                |
| R 10                   | 4780           | 1530 | 4                 | 2                  |
| R 10.5                 | 4550           | 1460 | 4.2               | 2.1                |

절입량  
Depth  
of Cut

Ap : Axial Depth  
Ae : Radial Depth  
D : Outside Diameter  
n : Speed (min<sup>-1</sup>)  
Vf : Feed (mm/min)

## 4SFDC

| 파삭재<br>Material           | 흑연<br>Graphite |      |                   |                    |
|---------------------------|----------------|------|-------------------|--------------------|
| 외경<br>Outside<br>Diameter | RPM            | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø10                       | 5100           | 1600 | 1.6               | 10                 |
| ø11                       | 4630           | 1480 | 1.8               | 11                 |
| ø12                       | 4250           | 1360 | 1.9               | 12                 |
| ø13                       | 3920           | 1250 | 2.1               | 13                 |
| ø16                       | 3180           | 1020 | 2.6               | 16                 |
| ø17                       | 3000           | 960  | 2.7               | 17                 |
| ø20                       | 2550           | 800  | 3.2               | 20                 |
| ø21                       | 2430           | 780  | 3.4               | 21                 |

절입량  
Depth  
of Cut

Slotting

• Ap : Axial Depth

• D : Outside Diameter

## 6~12SFDC

| 파삭재<br>Material           | 흑연<br>Graphite |      |                   |                    |
|---------------------------|----------------|------|-------------------|--------------------|
| 외경<br>Outside<br>Diameter | RPM            | FEED | Ap<br>Axial Depth | Ae<br>Radial Depth |
| ø10                       | 5400           | 2600 | 1.3               | 10                 |
| ø11                       | 4900           | 1770 | 1.4               | 11                 |
| ø12                       | 4500           | 1620 | 1.5               | 12                 |
| ø13                       | 4160           | 1500 | 1.7               | 13                 |
| ø16                       | 3380           | 1220 | 2.0               | 16                 |
| ø17                       | 3180           | 1150 | 2.2               | 17                 |
| ø20                       | 2700           | 970  | 2.6               | 20                 |
| ø21                       | 2580           | 930  | 2.7               | 21                 |

절입량  
Depth  
of Cut

Slotting

• Ap : Axial Depth

• D : Outside Diameter

- 유효장 길이가 긴 경우, RPM과 FEED를 동일 비율로 낮춰주세요.
- 열박음 후 완전히 밀착되었는지 확인 후 가공 하십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피들 속도를 초과하거나 버 및 적열 현상이 발생 시 스피들 속도와 이송 속도를 비례적으로 조정 하십시오.
- 흑연 가공 에어브로를 추천합니다.
- If the effective length is long, reduce the RPM and feed in the same proportion.
- After the heat the shrink-fit, check the clamping and bolt status, and then use.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.
- Air blow is recommended for graphite milling.

## PCD End Mill Cutting Condition

•RPM : rev./min •Feed : mm/min

| 파삭재 Material     | VC<br>m/min | FEED RATE (fz) |              |             |            |
|------------------|-------------|----------------|--------------|-------------|------------|
|                  |             | 2 ~ 3mm        | 4 ~ 6mm      | 7 ~ 11mm    | 12 ~ 20mm  |
| AL-alloy Si <1%  | 150 ~ 6,000 | 0.007 ~ 0.05   | 0.02 ~ 0.150 | 0.02 ~ 0.20 | 0.04 ~ 0.3 |
| AL-alloy Si <12% | 150 ~ 4,000 | 0.007 ~ 0.05   | 0.02 ~ 0.150 | 0.02 ~ 0.20 | 0.04 ~ 0.3 |
| AL-alloy Si >12% | 150 ~ 2,000 | 0.007 ~ 0.05   | 0.02 ~ 0.150 | 0.02 ~ 0.20 | 0.04 ~ 0.3 |
| Magnesium alloy  | 150 ~ 6,000 | 0.007 ~ 0.05   | 0.02 ~ 0.150 | 0.02 ~ 0.20 | 0.04 ~ 0.3 |
| Cooper alloy     | 150 ~ 5,000 | 0.007 ~ 0.05   | 0.02 ~ 0.150 | 0.02 ~ 0.20 | 0.04 ~ 0.3 |
| Brass ally       | 150 ~ 5,001 | 0.007 ~ 0.05   | 0.02 ~ 0.150 | 0.02 ~ 0.20 | 0.04 ~ 0.3 |
| GFRP             | 150 ~ 3,000 | 0.007 ~ 0.05   | 0.02 ~ 0.150 | 0.02 ~ 0.20 | 0.04 ~ 0.3 |
| CFRP             | 150 ~ 4,000 | 0.007 ~ 0.05   | 0.02 ~ 0.150 | 0.02 ~ 0.20 | 0.04 ~ 0.3 |
| Graphite         | 150 ~ 3,000 | 0.007 ~ 0.05   | 0.02 ~ 0.150 | 0.02 ~ 0.20 | 0.04 ~ 0.3 |

## 2SPO Cutting Condition

•RPM : rev./min •Feed : mm/min

| 파삭재 Material        | 구조용강 / 탄소강 / 회주철<br>SS / SC / FC |         | 합금강 / 프리하든강<br>SCM / NAK / HPM |         | 금형강 / 열처리강<br>SKD |         |
|---------------------|----------------------------------|---------|--------------------------------|---------|-------------------|---------|
| 경도 Hardness         | ~ 200 HB                         |         | 20~ 30HRC                      |         | 30~ 40HRC         |         |
| 외경 Outside Diameter | 절삭속도 (V/C)                       | 이송량 (f) | 절삭속도 (V/C)                     | 이송량 (f) | 절삭속도 (V/C)        | 이송량 (f) |
| Ø1                  | 23,800                           | 500     | 2,000                          | 400     | 19,100            | 380     |
| Ø2                  | 12,000                           | 700     | 10,350                         | 400     | 9,550             | 380     |
| Ø3                  | 8,000                            | 800     | 6,900                          | 550     | 6,400             | 510     |
| Ø4                  | 5,900                            | 800     | 5,200                          | 620     | 4,800             | 570     |
| Ø6                  | 3,980                            | 700     | 3,450                          | 550     | 3,180             | 510     |
| Ø8                  | 3,000                            | 600     | 2,600                          | 520     | 2,400             | 480     |
| Ø10                 | 2,400                            | 580     | 2,070                          | 500     | 2,000             | 460     |
| Ø12                 | 2,000                            | 560     | 1,720                          | 480     | 1,600             | 450     |
| Ø16                 | 1,500                            | 500     | 1,300                          | 400     | 1,200             | 380     |

## 2STD Cutting Condition

•RPM : min<sup>-1</sup> •Feed : mm/min

| 파삭재 Material | 구조용강/탄소강/회주철<br>SS / SC / FC<br>~200HB |            | 합금강/프리하든강<br>SCM / NAK / HPM<br>20 ~ 30HRC |            | 금형강/열처리강<br>SKD<br>30 ~ 40HRC |            | 덕타일 주철<br>FCD |            | 스테인레스강<br>SUS304 |            | 알루미늄 합금<br>A7075 |            | 인코넬<br>Inconel |             |
|--------------|----------------------------------------|------------|--------------------------------------------|------------|-------------------------------|------------|---------------|------------|------------------|------------|------------------|------------|----------------|-------------|
| 직경 Diameter  | 절삭속도 V/C                               | 이송량 f      | 절삭속도 V/C                                   | 이송량 f      | 절삭속도 V/C                      | 이송량 f      | 절삭속도 V/C      | 이송량 f      | 절삭속도 V/C         | 이송량 f      | 절삭속도 V/C         | 이송량 f      | 절삭속도 V/C       | 이송량 f       |
| Ø3.4         | 60 ~ 100                               | 0.1 ~ 0.2  | 60 ~ 100                                   | 0.1 ~ 0.2  | 20 ~ 60                       | 0.05 ~ 0.1 | 40 ~ 70       | 0.07 ~ 0.2 | 20 ~ 60          | 0.05 ~ 0.2 | 80 ~ 120         | 0.1 ~ 0.2  | 10 ~ 30        | 0.05 ~ 0.15 |
| Ø4.3         | 60 ~ 100                               | 0.1 ~ 0.2  | 60 ~ 100                                   | 0.1 ~ 0.2  | 20 ~ 60                       | 0.05 ~ 0.1 | 40 ~ 70       | 0.07 ~ 0.2 | 20 ~ 60          | 0.05 ~ 0.2 | 80 ~ 120         | 0.1 ~ 0.2  | 10 ~ 30        | 0.05 ~ 0.15 |
| Ø5.1         | 60 ~ 100                               | 0.1 ~ 0.2  | 60 ~ 100                                   | 0.1 ~ 0.2  | 20 ~ 60                       | 0.05 ~ 0.1 | 40 ~ 70       | 0.07 ~ 0.2 | 20 ~ 60          | 0.05 ~ 0.2 | 80 ~ 120         | 0.1 ~ 0.2  | 10 ~ 30        | 0.05 ~ 0.15 |
| Ø6.9         | 60 ~ 100                               | 0.15 ~ 0.3 | 60 ~ 100                                   | 0.15 ~ 0.3 | 20 ~ 60                       | 0.08 ~ 0.2 | 40 ~ 70       | 0.1 ~ 0.2  | 20 ~ 60          | 0.1 ~ 0.2  | 80 ~ 120         | 0.15 ~ 0.2 | 10 ~ 30        | 0.05 ~ 0.15 |
| Ø8.6         | 60 ~ 100                               | 0.15 ~ 0.3 | 60 ~ 100                                   | 0.15 ~ 0.3 | 20 ~ 60                       | 0.08 ~ 0.2 | 40 ~ 70       | 0.1 ~ 0.2  | 20 ~ 60          | 0.1 ~ 0.2  | 80 ~ 120         | 0.15 ~ 0.2 | 10 ~ 30        | 0.05 ~ 0.15 |
| Ø10.3        | 60 ~ 100                               | 0.2 ~ 0.4  | 60 ~ 100                                   | 0.2 ~ 0.4  | 20 ~ 60                       | 0.1 ~ 0.2  | 40 ~ 70       | 0.2 ~ 0.4  | 20 ~ 60          | 0.15 ~ 0.3 | 80 ~ 120         | 0.2 ~ 0.4  | 10 ~ 30        | 0.1 ~ 0.2   |

## 2DED Cutting Condition

•RPM : rev./min •Feed : mm/min

| 파삭재 Material | 알루미늄 합금 Aluminum Alloys |               | 수지 Resin |               |
|--------------|-------------------------|---------------|----------|---------------|
| 직경 Diameter  | RPM                     | 이송량 (f)       | RPM      | 이송량 (f)       |
| Ø0.1 ~ 0.3   | 25,000                  | 0.001 ~ 0.003 | 22,000   | 0.001 ~ 0.003 |
| Ø0.3 ~ 0.5   | 20,000                  | 0.005 ~ 0.02  | 22,000   | 0.005 ~ 0.01  |
| Ø0.5 ~ 0.8   | 18,000                  | 0.01 ~ 0.03   | 15,000   | 0.01 ~ 0.03   |
| Ø0.8 ~ 1     | 15,000                  | 0.02 ~ 0.04   | 13,000   | 0.02 ~ 0.05   |
| Ø1~1.5       | 12,000                  | 0.03 ~ 0.05   | 8,000    | 0.02 ~ 0.05   |
| Ø1.5 ~ 2     | 9,000                   | 0.03 ~ 0.05   | 6,000    | 0.02 ~ 0.05   |
| Ø2 ~ 3       | 7,000                   | 0.03 ~ 0.05   | 4,500    | 0.05          |
| Ø3 ~ 4       | 3,500                   | 0.03 ~ 0.05   | 3,200    | 0.05          |
| Ø4 ~ 5       | 2,800                   | 0.03 ~ 0.05   | 2,500    | 0.05          |
| Ø5 ~ 6       | 2,200                   | 0.03 ~ 0.05   | 2,000    | 0.05          |

- 진동이 적고 강성이 좋은 공작기계 사용 요망합니다 (Ø1 이하 사용시 진동 허용 관리 3 $\mu$ m 이내 일것.)
- 가급적 열박을 척을 추천합니다.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 조건표가 기계의 최대 스피드 속도를 초과하거나 버 및 적열 현상이 발생할때 스피드 속도와 이송 속도를 비례적으로 조정 하십시오.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 3 $\mu$ m).
- Using shrink-fit chuck is recommended.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, or found red heat on the material, adjust RPM and feed in the same proportion.

## 2FDR Cutting Condition

• RPM : min<sup>-1</sup> • Feed : mm/min

| 파삭재<br>Material | 구조용강/탄소강/회주철<br>SS / SC / FC<br>~200HB |               | 합금강/모하든강<br>SCM / NAK / HPM<br>20 ~30HRC |               | 금형강/열처리강<br>SKD<br>30 ~ 40HRC |               | 고경도강<br>Hardened steels<br>40 ~ 50HRC |               | 덕틸 주철<br>FCD |               | 스테인레스강<br>SUS304 |               | 알루미늄 합금<br>A7075 |               | 알루미늄 합금 주물<br>AC / ADC |               |
|-----------------|----------------------------------------|---------------|------------------------------------------|---------------|-------------------------------|---------------|---------------------------------------|---------------|--------------|---------------|------------------|---------------|------------------|---------------|------------------------|---------------|
| 직경<br>Diameter  | 회전수<br>RPM                             | 이송 속도<br>FEED | 회전수<br>RPM                               | 이송 속도<br>FEED | 회전수<br>RPM                    | 이송 속도<br>FEED | 회전수<br>RPM                            | 이송 속도<br>FEED | 회전수<br>RPM   | 이송 속도<br>FEED | 회전수<br>RPM       | 이송 속도<br>FEED | 회전수<br>RPM       | 이송 속도<br>FEED | 회전수<br>RPM             | 이송 속도<br>FEED |
| Ø0.2            | 33000                                  | 35            | 29500                                    | 40            | 16500                         | 25            | 14000                                 | 15            | 29500        | 30            | 16200            | 15            | 59500            | 130           | 55000                  | 110           |
| Ø0.3            | 31500                                  | 55            | 25000                                    | 40            | 15500                         | 30            | 12500                                 | 15            | 26500        | 35            | 15300            | 15            | 59000            | 200           | 52500                  | 120           |
| Ø0.4            | 27500                                  | 75            | 23800                                    | 50            | 14500                         | 35            | 11500                                 | 20            | 23200        | 40            | 14500            | 20            | 58500            | 230           | 50000                  | 165           |
| Ø0.5            | 25800                                  | 85            | 22000                                    | 60            | 13200                         | 40            | 11000                                 | 25            | 21500        | 45            | 13200            | 20            | 58300            | 280           | 48500                  | 190           |
| Ø0.6            | 24600                                  | 115           | 20500                                    | 85            | 12000                         | 55            | 10000                                 | 25            | 20000        | 60            | 12000            | 25            | 55000            | 320           | 45000                  | 230           |
| Ø0.7            | 22500                                  | 135           | 19500                                    | 115           | 11000                         | 70            | 9000                                  | 30            | 18500        | 90            | 11500            | 30            | 51000            | 400           | 41000                  | 280           |
| Ø0.8            | 21000                                  | 180           | 18000                                    | 150           | 10500                         | 80            | 8000                                  | 35            | 17000        | 120           | 10000            | 35            | 46000            | 500           | 35000                  | 330           |
| Ø0.9            | 20500                                  | 240           | 16800                                    | 190           | 9500                          | 95            | 7500                                  | 35            | 16000        | 145           | 9850             | 40            | 43000            | 630           | 31500                  | 380           |
| Ø1              | 19500                                  | 300           | 16000                                    | 230           | 9450                          | 110           | 6800                                  | 35            | 15700        | 180           | 9600             | 50            | 40000            | 710           | 27500                  | 430           |
| Ø2              | 12000                                  | 340           | 10000                                    | 290           | 5800                          | 150           | 4100                                  | 60            | 10000        | 230           | -                | -             | 24500            | 750           | 18000                  | 510           |
| Ø3              | 8000                                   | 410           | 7100                                     | 330           | 3800                          | 165           | 2700                                  | 70            | 7100         | 280           | -                | -             | 18000            | 950           | 13000                  | 650           |
| Ø4              | 6100                                   | 425           | 5200                                     | 380           | 2700                          | 170           | 2100                                  | 80            | 5250         | 300           | -                | -             | 13000            | 1000          | 10000                  | 680           |
| Ø5              | 4900                                   | 425           | 4200                                     | 280           | 2350                          | 175           | 1650                                  | 80            | 4250         | 300           | -                | -             | 10000            | 1000          | 7800                   | 680           |
| Ø6              | 4150                                   | 425           | 3550                                     | 330           | 1800                          | 175           | 1350                                  | 80            | 3550         | 300           | -                | -             | 8600             | 1000          | 6500                   | 680           |
| Ø8              | 3100                                   | 430           | 2700                                     | 350           | 1500                          | 175           | 1000                                  | 80            | 2700         | 300           | -                | -             | 6500             | 1000          | 4850                   | 680           |
| Ø10             | 2600                                   | 430           | 2200                                     | 360           | 1100                          | 175           | 850                                   | 80            | 2000         | 300           | -                | -             | 5200             | 1000          | 3850                   | 680           |
| Ø12             | 2100                                   | 430           | 1750                                     | 360           | 950                           | 175           | 630                                   | 80            | 1800         | 310           | -                | -             | 4300             | 1000          | 3300                   | 680           |
| Ø18             | 1600                                   | 430           | 1400                                     | 360           | 750                           | 175           | 520                                   | 80            | 1350         | 310           | -                | -             | 3300             | 1000          | 2550                   | 680           |
| Ø20             | 1250                                   | 430           | 1100                                     | 360           | 600                           | 175           | 430                                   | 80            | 1000         | 310           | -                | -             | 2600             | 1000          | 2000                   | 680           |

- 절삭 조건표 참조는 수용성 절삭유 사용이 전제입니다. 절삭유를 사용하지 않을 시, 회전과 속도를 20% 줄여 사용하십시오.
- 드릴링의 깊이가 직경의 2배나 그 이하일 때, 드릴링을 직경의 2배 이상 가공하는 것을 추천하지 않습니다.
- 스테인레스 드릴링 시(SUS304, 316 등등) 직경 1.9mm나 그 이하 직경을 사용하십시오.
- 경사 드릴 가공시, 경사진 각도에 따라 (절삭 조건을) 조절하십시오. 경사각이 30도 이하일 때, 피드를 50% 낮추십시오. 경사각이 30도 이상일 때, 회전을 70% 이하, 피드를 30% 이하로 줄이십시오.
- 측면 가공용으로는 사용하지 마십시오.
- 절삭 조건을 기계 강성이나 클램프 상태에 따라 조절하십시오.
- Use the water soluble cutting oil. In case if you do not use water soluble cutting oil, reduce the RPM and the feed by 20%.
- Drilling for the depth of 2 x Dc or Less than 2 x Dc is recommended.
- For stainless drilling, we recommend that the tool diameter is 1.9mm or less.
- If you use for inclined angle as slope drilling, reduce the feed by 50% for inclined angle less than 30°, and reduce below 70% of the RPM and 30% of the feed for inclined angle over 30°.
- Do not use for side milling.
- Change cutting conditions depending on work variables; rigidity of machine, work clamp or material shape.

## 2FDRL Cutting Condition

• RPM : min<sup>-1</sup> • Feed : mm/min

| 파삭재<br>Material | 구조용강/탄소강/회주철<br>SS / SC / FC<br>~200HB |               | 합금강/모하든강<br>SCM / NAK / HPM<br>20 ~30HRC |               | 금형강/프리아든강<br>SKD<br>30 ~ 40HRC |               | 고경도강<br>Hardened steels<br>40 ~ 50HRC |               | 덕틸 주철<br>FCD |               | 알루미늄 합금<br>A7075 |               |
|-----------------|----------------------------------------|---------------|------------------------------------------|---------------|--------------------------------|---------------|---------------------------------------|---------------|--------------|---------------|------------------|---------------|
| 직경<br>Diameter  | 회전수<br>RPM                             | 이송 속도<br>FEED | 회전수<br>RPM                               | 이송 속도<br>FEED | 회전수<br>RPM                     | 이송 속도<br>FEED | 회전수<br>RPM                            | 이송 속도<br>FEED | 회전수<br>RPM   | 이송 속도<br>FEED | 회전수<br>RPM       | 이송 속도<br>FEED |
| Ø3              | 11000                                  | 800           | 9500                                     | 580           | 7500                           | 320           | 5000                                  | 220           | 9300         | 400           | 13000            | 1000          |
| Ø4              | 8000                                   | 800           | 7200                                     | 580           | 5600                           | 320           | 4100                                  | 220           | 7300         | 400           | 10000            | 1000          |
| Ø5              | 6500                                   | 800           | 5550                                     | 580           | 4500                           | 320           | 3300                                  | 220           | 6000         | 400           | 7800             | 1000          |
| Ø6              | 5500                                   | 810           | 4800                                     | 590           | 3550                           | 320           | 2700                                  | 220           | 5000         | 400           | 6600             | 1000          |
| Ø8              | 4100                                   | 810           | 3600                                     | 590           | 2850                           | 320           | 2000                                  | 220           | 3800         | 400           | 4650             | 1050          |
| Ø10             | 3300                                   | 810           | 3000                                     | 590           | 2350                           | 320           | 1650                                  | 220           | 3000         | 410           | 3900             | 1050          |
| Ø12             | 2750                                   | 820           | 2450                                     | 600           | 2000                           | 320           | 1480                                  | 220           | 2480         | 410           | 3250             | 1050          |
| Ø16             | 2100                                   | 820           | 1800                                     | 600           | 1550                           | 330           | 1000                                  | 220           | 1850         | 410           | 2450             | 1100          |
| Ø20             | 1650                                   | 820           | 1550                                     | 600           | 1250                           | 330           | 850                                   | 220           | 1550         | 410           | 2000             | 1100          |

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- 드릴링 깊이가 직경의 2배 이하가 되게 절삭조건표를 사용하십시오.
- 스테인레스 소재에는 사용하지 마십시오. 스테인레스 소재에는 2FDRW 혹은 2FDRLW 사용을 추천합니다.
- 측면 가공용으로는 사용하지 마십시오.
- 절삭 조건을 기계 강성이나 클램프 상태에 따라 조절하십시오.
- Use the water soluble cutting oil. In case if you do not use water soluble cutting oil, reduce the RPM and the feed by 20%.
- Use the cutting parameters for the depth of 2 x Dc or less.
- Do not use for stainless material. We recommend using 2FDRW or 2FDRLW for stainless material.
- Do not use for side milling.
- Change cutting conditions depending on work variables; rigidity of machine, work clamp or material shape.

## 2FDRW (3D) Cutting Condition

• RPM : min<sup>-1</sup> • Feed : mm/min

| 파삭재<br>Material | 구조용강/탄소강/화주철<br>SS / SC / FC<br>~200HB |               | 합금강/프리하트강<br>SCM / NAK / HPM<br>20 ~30HRC |               | 금형강/열처리강<br>SKD<br>30 ~ 40HRC |               | 고경도강<br>Hardened steels<br>40 ~ 50HRC |               | 덕틸 주철<br>FCD |               | 스테인레스강<br>SUS304 |               | 알루미늄 합금<br>A7075 |               |
|-----------------|----------------------------------------|---------------|-------------------------------------------|---------------|-------------------------------|---------------|---------------------------------------|---------------|--------------|---------------|------------------|---------------|------------------|---------------|
| 직경<br>Diameter  | 회전수<br>RPM                             | 이송 속도<br>FEED | 회전수<br>RPM                                | 이송 속도<br>FEED | 회전수<br>RPM                    | 이송 속도<br>FEED | 회전수<br>RPM                            | 이송 속도<br>FEED | 회전수<br>RPM   | 이송 속도<br>FEED | 회전수<br>RPM       | 이송 속도<br>FEED | 회전수<br>RPM       | 이송 속도<br>FEED |
| Ø1              | 16000                                  | 120           | 13000                                     | 70            | 9500                          | 40            | 8000                                  | 40            | 13000        | 50            | 1000             | 20            | 22500            | 200           |
| Ø1.5            | 10000                                  | 130           | 8500                                      | 80            | 6500                          | 40            | 5300                                  | 40            | 9000         | 50            | 6500             | 20            | 15000            | 200           |
| Ø2              | 9500                                   | 150           | 8000                                      | 95            | 5500                          | 50            | 4800                                  | 50            | 8000         | 70            | 6500             | 35            | 13000            | 230           |
| Ø2.5            | 12000                                  | 450           | 9500                                      | 300           | 9600                          | 200           | 5800                                  | 120           | 9500         | 220           | 8800             | 210           | 13000            | 650           |
| Ø3              | 12500                                  | 900           | 10000                                     | 600           | 7500                          | 300           | 6500                                  | 270           | 10000        | 450           | 10000            | 600           | 14500            | 1200          |
| Ø4              | 9500                                   | 930           | 8000                                      | 620           | 5500                          | 300           | 4800                                  | 270           | 8000         | 450           | 8000             | 600           | 12000            | 1200          |
| Ø5              | 7500                                   | 930           | 6500                                      | 620           | 4500                          | 300           | 3800                                  | 270           | 6300         | 460           | 6300             | 620           | 9000             | 1200          |
| Ø6              | 6500                                   | 950           | 5400                                      | 630           | 3700                          | 330           | 3200                                  | 280           | 5400         | 470           | 5500             | 620           | 7500             | 1300          |
| Ø8              | 4800                                   | 950           | 4000                                      | 630           | 2900                          | 330           | 2500                                  | 280           | 4000         | 470           | 4000             | 620           | 5600             | 1300          |
| Ø10             | 3800                                   | 950           | 3300                                      | 630           | 2450                          | 330           | 2000                                  | 280           | 3200         | 470           | 3300             | 620           | 4500             | 1300          |
| Ø12             | 3300                                   | 950           | 2800                                      | 630           | 2000                          | 330           | 1600                                  | 280           | 2800         | 470           | 2900             | 620           | 3900             | 1300          |
| Ø16             | 2500                                   | 950           | 2000                                      | 630           | 1500                          | 330           | 1300                                  | 280           | 2000         | 470           | 2000             | 620           | 2800             | 1300          |

- 절삭 조건표 참조는 수용성 절삭유 사용이 전제입니다. 절삭유를 사용하지 않을 시, 회전과 속도를 20% 줄여 사용하십시오.
- 드릴 깊이는 3xDc를 넘기지 마십시오. 칩 배출 상태가 좋지 않을 경우, 펙드릴링 방식을 사용하십시오.
- 스테인레스 소재에는 펙드릴 방식을 사용하십시오.
- 펙드릴 간격은 0.1Dc ~ 0.5Dc 사이를 권장합니다.
- 측면 가공용으로는 사용하지 마십시오.
- 절삭 조건을 기계 강성이나 클램프 상태에 따라 조절하십시오.

- Use the water soluble cutting oil. In case if you do not use water soluble cutting oil, reduce the RPM and the feed by 20%.
- Do not over the drilling depth of 3 x Dc. If the state of chip emission is not good enough, use peck drilling method.
- For the stainless material, use peck drilling method.
- Peck drill interval is recommended between 0.1 Dc to 0.5 Dc.
- Side milling is not possible.
- Change cutting conditions depending on work variables; rigidity of machine, work clamp or material shape.

## 2FDRLW (5D) Cutting Condition

• RPM : min<sup>-1</sup> • Feed : mm/min

| 파삭재<br>Material | 구조용강/탄소강/화주철<br>SS / SC / FC<br>~200HB |               | 합금강/프라이하트강<br>SCM / NAK / HPM<br>20 ~30HRC |               | 금형강/열처리강<br>SKD<br>30 ~ 40HRC |               | 고경도강<br>Hardened steels<br>40 ~ 50HRC |               | 덕틸 주철<br>FCD |               | 스테인레스강<br>SUS304 |               | 알루미늄 합금<br>A7075 |               |
|-----------------|----------------------------------------|---------------|--------------------------------------------|---------------|-------------------------------|---------------|---------------------------------------|---------------|--------------|---------------|------------------|---------------|------------------|---------------|
| 직경<br>Diameter  | 회전수<br>RPM                             | 이송 속도<br>FEED | 회전수<br>RPM                                 | 이송 속도<br>FEED | 회전수<br>RPM                    | 이송 속도<br>FEED | 회전수<br>RPM                            | 이송 속도<br>FEED | 회전수<br>RPM   | 이송 속도<br>FEED | 회전수<br>RPM       | 이송 속도<br>FEED | 회전수<br>RPM       | 이송 속도<br>FEED |
| Ø1              | 19000                                  | 200           | 16000                                      | 100           | 10000                         | 50            | 10000                                 | 45            | 15000        | 75            | 13000            | 60            | 25000            | 230           |
| Ø1.5            | 13000                                  | 200           | 10000                                      | 100           | 7600                          | 50            | 6500                                  | 45            | 10000        | 75            | 8500             | 60            | 17000            | 230           |
| Ø2              | 10000                                  | 300           | 9500                                       | 200           | 6800                          | 95            | 5600                                  | 70            | 9500         | 120           | 8000             | 100           | 14500            | 400           |
| Ø2.5            | 13000                                  | 700           | 10000                                      | 350           | 7000                          | 180           | 5800                                  | 150           | 10000        | 250           | 9500             | 300           | 15500            | 850           |
| Ø3              | 15000                                  | 1250          | 10000                                      | 600           | 7300                          | 300           | 6500                                  | 270           | 10000        | 460           | 10000            | 600           | 17000            | 1350          |
| Ø4              | 11000                                  | 1300          | 8000                                       | 600           | 5500                          | 300           | 4800                                  | 270           | 8000         | 460           | 8000             | 620           | 14000            | 1400          |
| Ø5              | 9000                                   | 1300          | 6400                                       | 600           | 4500                          | 300           | 3800                                  | 270           | 6500         | 460           | 6500             | 620           | 10000            | 1400          |
| Ø6              | 7500                                   | 1350          | 5300                                       | 630           | 3700                          | 320           | 3200                                  | 280           | 5300         | 480           | 5300             | 630           | 9500             | 1500          |
| Ø8              | 5600                                   | 1350          | 4000                                       | 630           | 2800                          | 320           | 2500                                  | 280           | 4000         | 480           | 4000             | 630           | 6500             | 1500          |
| Ø10             | 4500                                   | 1350          | 3200                                       | 630           | 2300                          | 320           | 2000                                  | 280           | 3200         | 480           | 3300             | 630           | 5100             | 1600          |
| Ø12             | 3700                                   | 1350          | 2800                                       | 630           | 2000                          | 320           | 1700                                  | 280           | 2900         | 480           | 2800             | 630           | 4300             | 1600          |
| Ø16             | 2850                                   | 1350          | 2100                                       | 630           | 1500                          | 320           | 1300                                  | 280           | 2100         | 480           | 2100             | 630           | 3300             | 1600          |

- 절삭 조건표 참조는 수용성 절삭유 사용이 전제입니다. 절삭유를 사용하지 않을 시, 회전과 속도를 20% 줄여 사용하십시오.
- 드릴 깊이는 5xDc를 넘기지 마십시오. 칩 배출 상태가 좋지 않을 경우, 펙드릴링 방식을 사용하십시오.
- 스테인레스 소재에는 펙드릴 방식을 사용하십시오.
- 펙드릴 간격은 0.1Dc ~ 0.5Dc 사이를 권장합니다.
- 측면 가공용으로는 사용하지 마십시오.
- 절삭 조건을 기계 강성이나 클램프 상태에 따라 조절하십시오.

- Use the water soluble cutting oil. In case if you do not use water soluble cutting oil, reduce the RPM and the feed by 20%.
- Do not over the drilling depth of 5 x Dc. If the state of chip emission is not good enough, use peck drilling method.
- For the stainless material, use peck drilling method.
- Peck drill interval is recommended between 0.1 Dc to 0.5 Dc.
- Side milling is not possible.
- Change cutting conditions depending on work variables; rigidity of machine, work clamp or material shape.

## 4ETM Cutting Condition

| 피삭재<br>Material | 합금강 / 공구강<br>Alloy Steel/ Tool Steel |             | 고경도강<br>Hardened Steels |              | 알루미늄<br>Aluminum |             | 스테인레스강<br>Stainless Steel |               |
|-----------------|--------------------------------------|-------------|-------------------------|--------------|------------------|-------------|---------------------------|---------------|
| 경도 Hardness     | ~ 30HRC                              |             | 35 ~ 45HRC              |              |                  |             |                           |               |
| TAP             | V/C                                  | FZ          | V/C                     | FZ           | V/C              | FZ          | V/C                       | FZ            |
| M3              | 50 ~ 70                              | 0.01 ~ 0.02 | 45 ~ 55                 | 0.005 ~ 0.01 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 80                   | 0.015 ~ 0.025 |
| M4              | 50 ~ 70                              | 0.01 ~ 0.02 | 45 ~ 55                 | 0.005 ~ 0.01 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 80                   | 0.015 ~ 0.025 |
| M5              | 50 ~ 70                              | 0.01 ~ 0.02 | 45 ~ 55                 | 0.005 ~ 0.01 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 80                   | 0.015 ~ 0.025 |
| M6              | 50 ~ 70                              | 0.02 ~ 0.03 | 45 ~ 55                 | 0.01 ~ 0.015 | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 80                   | 0.025 ~ 0.035 |
| M8              | 50 ~ 70                              | 0.02 ~ 0.03 | 45 ~ 55                 | 0.01 ~ 0.015 | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 80                   | 0.03 ~ 0.04   |
| M10             | 50 ~ 70                              | 0.02 ~ 0.03 | 45 ~ 55                 | 0.015 ~ 0.02 | 100 ~ 130        | 0.05 ~ 0.06 | 70 ~ 80                   | 0.03 ~ 0.04   |
| M12             | 50 ~ 70                              | 0.03 ~ 0.04 | 45 ~ 55                 | 0.02 ~ 0.025 | 100 ~ 130        | 0.06 ~ 0.07 | 70 ~ 80                   | 0.03 ~ 0.04   |
| M16             | 50 ~ 70                              | 0.03 ~ 0.04 | 45 ~ 55                 | 0.02 ~ 0.025 | 100 ~ 130        | 0.06 ~ 0.07 | 70 ~ 80                   | 0.04 ~ 0.05   |

## 4MTM Cutting Condition

| 피삭재<br>Material | 합금강 / 공구강<br>Alloy Steel/ Tool Steel |              | 고경도강<br>Hardened Steels |              | 알루미늄<br>Aluminum |             | 스테인레스강<br>Stainless Steel |              |
|-----------------|--------------------------------------|--------------|-------------------------|--------------|------------------|-------------|---------------------------|--------------|
| 경도 Hardness     | ~ 30HRC                              |              | 35 ~ 45HRC              |              |                  |             |                           |              |
| TAP             | V/C                                  | FZ           | V/C                     | FZ           | V/C              | FZ          | V/C                       | FZ           |
| M1              | 50 ~ 70                              | 0.005 ~ 0.01 | 55 ~ 65                 | 0.005 ~ 0.01 | 100 ~ 130        | 0.02 ~ 0.34 | 70 ~ 85                   | 0.005 ~ 0.01 |
| M2              | 50 ~ 70                              | 0.005 ~ 0.01 | 55 ~ 65                 | 0.005 ~ 0.01 | 100 ~ 130        | 0.02 ~ 0.34 | 70 ~ 85                   | 0.005 ~ 0.01 |
| M3              | 50 ~ 70                              | 0.01 ~ 0.02  | 55 ~ 65                 | 0.01 ~ 0.02  | 100 ~ 130        | 0.02 ~ 0.34 | 70 ~ 85                   | 0.005 ~ 0.01 |
| M4              | 50 ~ 70                              | 0.01 ~ 0.02  | 55 ~ 65                 | 0.01 ~ 0.02  | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.01 ~ 0.02  |
| M5              | 50 ~ 70                              | 0.02 ~ 0.03  | 55 ~ 65                 | 0.02 ~ 0.03  | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.01 ~ 0.02  |
| M6              | 50 ~ 70                              | 0.02 ~ 0.03  | 55 ~ 65                 | 0.02 ~ 0.03  | 100 ~ 130        | 0.05 ~ 0.06 | 70 ~ 85                   | 0.02 ~ 0.03  |

## 4STM Cutting Condition

| 피삭재<br>Material | 합금강 / 공구강<br>Alloy Steel/ Tool Steel |             | 고경도강<br>Hardened Steels |              | 알루미늄<br>Aluminum |             | 스테인레스강<br>Stainless Steel |             |
|-----------------|--------------------------------------|-------------|-------------------------|--------------|------------------|-------------|---------------------------|-------------|
| 경도 Hardness     | ~ 30HRC                              |             | 35 ~ 45HRC              |              |                  |             |                           |             |
| TAP             | V/C                                  | FZ          | V/C                     | FZ           | V/C              | FZ          | V/C                       | FZ          |
| M3              | 50 ~ 70                              | 0.01 ~ 0.02 | 55 ~ 65                 | 0.008 ~ 0.01 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.01 ~ 0.02 |
| M4              | 50 ~ 70                              | 0.01 ~ 0.02 | 55 ~ 65                 | 0.008 ~ 0.01 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.01 ~ 0.02 |
| M5              | 50 ~ 70                              | 0.01 ~ 0.02 | 55 ~ 65                 | 0.01 ~ 0.02  | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.01 ~ 0.02 |
| M6              | 50 ~ 70                              | 0.01 ~ 0.02 | 55 ~ 65                 | 0.01 ~ 0.02  | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.02 ~ 0.03 |
| M8              | 50 ~ 70                              | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03  | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.02 ~ 0.03 |
| M10             | 50 ~ 70                              | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03  | 100 ~ 130        | 0.05 ~ 0.06 | 70 ~ 85                   | 0.03 ~ 0.04 |
| M12             | 50 ~ 70                              | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03  | 100 ~ 130        | 0.06 ~ 0.07 | 70 ~ 85                   | 0.05 ~ 0.06 |
| M16             | 50 ~ 70                              | 0.03 ~ 0.04 | 55 ~ 65                 | 0.03 ~ 0.04  | 100 ~ 130        | 0.06 ~ 0.07 | 70 ~ 85                   | 0.05 ~ 0.06 |

## 4HTM Cutting Condition

| 피삭재<br>Material | 합금강 / 공구강<br>Alloy Steel/ Tool Steel |             | 고경도강<br>Hardened Steels |               | 알루미늄<br>Aluminum |             | 스테인레스강<br>Stainless Steel |             |
|-----------------|--------------------------------------|-------------|-------------------------|---------------|------------------|-------------|---------------------------|-------------|
| 경도 Hardness     | ~ 30HRC                              |             | 35 ~ 45HRC              |               |                  |             |                           |             |
| TAP             | V/C                                  | FZ          | V/C                     | FZ            | V/C              | FZ          | V/C                       | FZ          |
| M3              | 50 ~ 70                              | 0.01 ~ 0.02 | 50 ~ 60                 | 0.005 ~ 0.008 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.01 ~ 0.02 |
| M4              | 50 ~ 70                              | 0.01 ~ 0.02 | 50 ~ 60                 | 0.005 ~ 0.008 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.01 ~ 0.02 |
| M5              | 50 ~ 70                              | 0.01 ~ 0.02 | 50 ~ 60                 | 0.01 ~ 0.02   | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.01 ~ 0.02 |
| M6              | 50 ~ 70                              | 0.01 ~ 0.02 | 50 ~ 60                 | 0.01 ~ 0.02   | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.02 ~ 0.03 |
| M8              | 50 ~ 70                              | 0.02 ~ 0.03 | 50 ~ 60                 | 0.02 ~ 0.03   | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.02 ~ 0.03 |
| M10             | 50 ~ 70                              | 0.02 ~ 0.03 | 50 ~ 60                 | 0.02 ~ 0.03   | 100 ~ 130        | 0.05 ~ 0.06 | 70 ~ 85                   | 0.03 ~ 0.04 |
| M12             | 50 ~ 70                              | 0.02 ~ 0.03 | 50 ~ 60                 | 0.02 ~ 0.03   | 100 ~ 130        | 0.06 ~ 0.07 | 70 ~ 85                   | 0.05 ~ 0.06 |
| M16             | 50 ~ 70                              | 0.03 ~ 0.04 | 50 ~ 60                 | 0.03 ~ 0.04   | 100 ~ 130        | 0.06 ~ 0.07 | 70 ~ 85                   | 0.05 ~ 0.06 |

- 가급적 열박음 척을 추천합니다.
- 공구 진입시 이송 f (mm/tooth)를 나사 가공 이송 대비 30% 수준으로 낮춰 주십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 절삭시 내,외부 급유형 쿨런트 사용을 추천 합니다.
- Using shrink-fit chuck is recommended.
- When the tool approaches the work material, reduce the feed by 30%.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Internal and external coolants are recommended for milling.

## 4NKT<sup>TM</sup> Cutting Condition

| 파삭재<br>Material | 합금강/ 공구강<br>Alloy Steel/ Tool Steel |             | 고경도강<br>Hardened Steels |              | 알루미늄<br>Aluminum |             | 스테인레스강<br>Stainless Steel |             |
|-----------------|-------------------------------------|-------------|-------------------------|--------------|------------------|-------------|---------------------------|-------------|
| 경도 Hardness     | ~ 30HRC                             |             | 35 ~ 45HRC              |              |                  |             |                           |             |
| TAP             | V/C                                 | FZ          | V/C                     | FZ           | V/C              | FZ          | V/C                       | FZ          |
| M3              | 50 ~ 70                             | 0.01 ~ 0.02 | 55 ~ 65                 | 0.008 ~ 0.01 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.01 ~ 0.02 |
| M4              | 50 ~ 70                             | 0.01 ~ 0.02 | 55 ~ 65                 | 0.008 ~ 0.01 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.01 ~ 0.02 |
| M5              | 50 ~ 70                             | 0.01 ~ 0.02 | 55 ~ 65                 | 0.01 ~ 0.02  | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.01 ~ 0.02 |
| M6              | 50 ~ 70                             | 0.01 ~ 0.02 | 55 ~ 65                 | 0.01 ~ 0.02  | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.02 ~ 0.03 |
| M8              | 50 ~ 70                             | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03  | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.02 ~ 0.03 |
| M10             | 50 ~ 70                             | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03  | 100 ~ 130        | 0.05 ~ 0.06 | 70 ~ 85                   | 0.03 ~ 0.04 |
| M12             | 50 ~ 70                             | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03  | 100 ~ 130        | 0.06 ~ 0.07 | 70 ~ 85                   | 0.05 ~ 0.06 |
| M16             | 50 ~ 70                             | 0.03 ~ 0.04 | 55 ~ 65                 | 0.03 ~ 0.04  | 100 ~ 130        | 0.06 ~ 0.07 | 70 ~ 85                   | 0.05 ~ 0.06 |
| M20             | 50 ~ 70                             | 0.03 ~ 0.04 | 55 ~ 65                 | 0.03 ~ 0.04  | 100 ~ 130        | 0.06 ~ 0.07 | 70 ~ 85                   | 0.05 ~ 0.06 |

## 4NPT<sup>TM</sup> Cutting Condition

| 파삭재<br>Material  | 합금강/ 공구강<br>Alloy Steel/ Tool Steel |             | 고경도강<br>Hardened Steels |             | 알루미늄<br>Aluminum |             | 스테인레스강<br>Stainless Steel |             |
|------------------|-------------------------------------|-------------|-------------------------|-------------|------------------|-------------|---------------------------|-------------|
| 경도 Hardness      | ~ 30HRC                             |             | 35 ~ 45HRC              |             |                  |             |                           |             |
| TAP              | V/C                                 | FZ          | V/C                     | FZ          | V/C              | FZ          | V/C                       | FZ          |
| 1/16-27C NPT     | 50 ~ 70                             | 0.01 ~ 0.02 | 55 ~ 65                 | 0.01 ~ 0.02 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.02 ~ 0.03 |
| 1/8-27C NPT      | 50 ~ 70                             | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.02 ~ 0.03 |
| 1/4-18C NPT      | 50 ~ 70                             | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.03 ~ 0.04 |
| 3/8-18C NPT      | 50 ~ 70                             | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03 | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.05 ~ 0.06 |
| 1/2(3/4)-14C NPT | 50 ~ 70                             | 0.03 ~ 0.04 | 55 ~ 65                 | 0.03 ~ 0.04 | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.05 ~ 0.06 |

## 4BST<sup>TM</sup> Cutting Condition

| 파삭재<br>Material   | 합금강/ 공구강<br>Alloy Steel/ Tool Steel |             | 고경도강<br>Hardened Steels |             | 알루미늄<br>Aluminum |             | 스테인레스강<br>Stainless Steel |             |
|-------------------|-------------------------------------|-------------|-------------------------|-------------|------------------|-------------|---------------------------|-------------|
| 경도 Hardness       | ~ 30HRC                             |             | 35 ~ 45HRC              |             |                  |             |                           |             |
| TAP               | V/C                                 | FZ          | V/C                     | FZ          | V/C              | FZ          | V/C                       | FZ          |
| 1/16-28C BSPT     | 50 ~ 70                             | 0.01 ~ 0.02 | 55 ~ 65                 | 0.01 ~ 0.02 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.02 ~ 0.03 |
| 1/8-28C BSPT      | 50 ~ 70                             | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.02 ~ 0.03 |
| 1/4-19C BSPT      | 50 ~ 70                             | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03 | 100 ~ 130        | 0.03 ~ 0.04 | 70 ~ 85                   | 0.03 ~ 0.04 |
| 3/8-19C BSPT      | 50 ~ 70                             | 0.02 ~ 0.03 | 55 ~ 65                 | 0.02 ~ 0.03 | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.05 ~ 0.06 |
| 1/2(3/4)-14C BSPT | 50 ~ 70                             | 0.03 ~ 0.04 | 55 ~ 65                 | 0.03 ~ 0.04 | 100 ~ 130        | 0.04 ~ 0.05 | 70 ~ 85                   | 0.05 ~ 0.06 |

## 2DT<sup>TM</sup> Cutting Condition

| 파삭재<br>Material | 알루미늄<br>Aluminum |             |
|-----------------|------------------|-------------|
| TAP             | V/C              | FZ          |
| M3              | 90 ~ 130         | 0.03 ~ 0.04 |
| M4              | 90 ~ 130         | 0.03 ~ 0.04 |
| M5              | 90 ~ 130         | 0.03 ~ 0.04 |
| M6              | 90 ~ 130         | 0.04 ~ 0.05 |
| M8              | 90 ~ 130         | 0.04 ~ 0.05 |
| M10             | 90 ~ 130         | 0.05 ~ 0.06 |
| M12             | 90 ~ 130         | 0.06 ~ 0.07 |
| M16             | 90 ~ 130         | 0.06 ~ 0.07 |

## 4IM<sup>TM</sup> Cutting Condition

| 파삭재<br>Material | 티타늄<br>Titanium Alloys |              |
|-----------------|------------------------|--------------|
| TAP             | V/C                    | FZ           |
| M0.8 ~ M1       | 20 ~ 80                | 0.005 ~ 0.01 |
| M1 ~ M2         | 20 ~ 80                | 0.005 ~ 0.01 |
| M 2.5           | 20 ~ 80                | 0.01 ~ 0.02  |
|                 |                        |              |
|                 |                        |              |
|                 |                        |              |

- 가급적 열박음 척을 추천합니다.
- 공구 진입시 이송 f (mm/tooth)를 나서가공 이송 대비 30% 수준으로 낮춰 주십시오.
- 상기 절삭조건은 참고 수치이므로, 실 가공시 가공 형상, 가공 목적, 적용 기계에 따라 조건변경 요망 합니다.
- 절삭시 내,외부 급유형 쿨런트 사용을 추천 합니다.
- Using shrink-fit chuck is recommended.
- When the tool approaches the work material, reduce the feed by 30%.
- Use this table for your reference. Adjust the parameters depending on your machining geometry, machining purpose and CNC.
- Internal and external coolants are recommended for milling.

# 엔드밀 재연삭 가격 안내

## 초경 Ball & Radius 엔드밀

• 부등분할: X1.5 • C작업시: X0.9

| 날 경     |           | 6이하    | 10 이하  | 12이하   | 16 이하  | 20 이하  | 25이하   |
|---------|-----------|--------|--------|--------|--------|--------|--------|
| 무코팅     | 2 날       | 6,100  | 6,600  | 7,700  | 9,900  | 13,200 | 16,500 |
|         | 3, 4, 6 날 | 8,300  | 9,400  | 11,000 | 12,100 | 16,500 | 22,000 |
| T5IN 코팅 | 2 날       | 8,300  | 9,500  | 10,900 | 13,400 | 19,100 | 20,900 |
|         | 3, 4, 6 날 | 10,300 | 12,500 | 13,400 | 15,200 | 23,800 | 26,400 |

## 초경 엔드밀 절단 & 밀날

• 부등분할: X1.1 • 라핑시: X1.1

| 날 경     |           | 6이하   | 10 이하 | 12이하  | 16 이하  | 20 이하  | 25이하   |
|---------|-----------|-------|-------|-------|--------|--------|--------|
| 무코팅     | 2 날       | 4,200 | 4,800 | 6,400 | 8,500  | 10,700 | 13,900 |
|         | 3, 4, 6 날 | 5,300 | 5,900 | 7,500 | 10,700 | 12,300 | 17,100 |
| T5IN 코팅 | 2 날       | 4,800 | 5,200 | 7,100 | 10,100 | 12,400 | 15,200 |
|         | 3, 4, 6 날 | 5,800 | 6,300 | 8,500 | 12,400 | 13,800 | 18,200 |

## 초경 다이아 절단 & 밀날

| 날 경       |  | 6이하    | 10 이하  | 12이하   | 16 이하  | 20 이하  | 25이하   |
|-----------|--|--------|--------|--------|--------|--------|--------|
| 2 날       |  | 9,500  | 10,750 | 14,500 | 19,250 | 24,250 | 31,500 |
| 3, 4, 6 날 |  | 12,000 | 13,250 | 17,000 | 24,250 | 27,750 | 38,750 |

## 초경 Taper 엔드밀 외경연삭

• 30도 미만 제작수리: X2  
• 30도 이상 제작수리: X1.5

| 생크경 (Ø) | 6이하    | 8이하    | 10이하   | 12이하   | 16이하   | 20이하   | 25이하   | 32이하   |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| 2° 미만   | 10,900 | 12,100 | 13,400 | 14,600 | 18,200 | 24,200 | 30,300 | 36,300 |
| 2° 이상   | 10,900 | 12,100 | 14,600 | 17,000 | 21,800 | 29,100 | 33,900 | 38,800 |
| 30° 이상  | 7,300  | 8,500  | 9,700  | 10,900 | 13,400 | 18,200 | 23,000 | 30,300 |

## HSS Taper 엔드밀

• Long : X1.5 • 제작수리: X2 • 역: X2

| 생크경 (Ø) | 16이하  | 20 이하  | 25이하   | 32이하   | 35이하   |
|---------|-------|--------|--------|--------|--------|
| 2° 미만   | 8,500 | 9,700  | 10,900 | 14,600 | 18,200 |
| 2° 이상   | 9,700 | 12,100 | 14,600 | 18,200 | 21,800 |
| 30° 이상  | 7,300 | 8,500  | 9,700  | 12,100 | 14,600 |

## 초경 엔드밀 외경연삭

• Long : X1.2 • EX. Long : X1.5

| 날 경 | 6이하   | 12이하  | 16이하  | 20 이하  | 25 이하  | 30 이하  |
|-----|-------|-------|-------|--------|--------|--------|
| 2 날 | 4,900 | 6,100 | 8,500 | 12,100 | 18,200 | 25,500 |
| 4 날 | 6,100 | 7,300 | 9,700 | 14,600 | 21,800 | 30,300 |

• 골수리(홈연삭) : X1.5

## HSS 엔드밀 외경연삭

• Long : X1.5 • EX. Long : X2

| 날 경 | 20 이하 | 30 이하 | 40 이하 | 50 이하  |
|-----|-------|-------|-------|--------|
| 2 날 | 3,700 | 4,900 | 8,500 | 14,600 |
| 4 날 | 4,900 | 6,100 | 9,700 | 18,200 |

• 골수리(홈연삭) : X1.5

## 초경 High Helix 엔드밀 외경연삭

• Long : X1.2 • EX. Long : X1.5

| 날 경 | 6이하    | 12 이하  | 16 이하  | 20 이하  | 25 이하  | 32이하   |
|-----|--------|--------|--------|--------|--------|--------|
| 4 날 | 11,000 | 13,200 | 16,500 | 19,800 | 30,800 | 36,300 |
| 6 날 | 12,100 | 14,600 | 18,200 | 21,800 | 33,900 | 40,000 |

• 골수리(홈연삭) : X1.5

## HSS Roughing 엔드밀

• Long : X1.5 • EX. Long : X2

| 날 경 | 20 이하 | 30 이하 | 40이하  | 50 이하  |
|-----|-------|-------|-------|--------|
| -   | 4,900 | 6,100 | 8,500 | 10,900 |

## 날붙이(BG) 초경 엔드밀 외경연삭

• Long : X1.5 • EX. Long : X2

| 날 경 | 20이하  | 30이하   | 40 이하  | 50 이하  |
|-----|-------|--------|--------|--------|
| 2 날 | 6,100 | 9,700  | 12,100 | 18,200 |
| 4 날 | 7,300 | 10,900 | 14,600 | 24,200 |

• 골수리(홈연삭) : X1.5

## HITACHI Ball & Radius 인서트

| R × D    | R6×12,13 | R8×16,17 | R10×20,21 | R12.5×25,26 | R15×30 |
|----------|----------|----------|-----------|-------------|--------|
| 무코팅      | 6,600    | 7,700    | 8,800     | 9,900       | 13,200 |
| TIALN 코팅 | 11,000   | 13,200   | 14,300    | 15,400      | 18,700 |

## 초경 엔드밀 T5IN 코팅 가격

• Long : X1.5 (전장 150L 이상)

| 날 경 | 6이하   | 8이하   | 10 이하 | 12이하  | 16 이하 | 20 이하  | 25 이하  | 32 이하  |
|-----|-------|-------|-------|-------|-------|--------|--------|--------|
| -   | 2,100 | 2,600 | 3,500 | 4,700 | 8,800 | 10,500 | 15,200 | 21,100 |

## 초경 엔드밀 JJ 코팅 가격

• Long : X1.5 (전장 150L 이상)

| 날 경 | 6이하   | 8이하   | 10 이하 | 12이하  | 16 이하  | 20 이하  | 25 이하  | 32 이하  |
|-----|-------|-------|-------|-------|--------|--------|--------|--------|
| -   | 2,500 | 3,100 | 4,200 | 5,600 | 10,500 | 12,700 | 18,300 | 25,400 |

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