

## RECOMMENDED CUTTING CONDITIONS

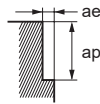
### ■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the K009 page correction factor by overhang length.

(mm)

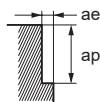
| Dia.<br>DC | Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys<br>AISI 1045, AISI 4140, ASTM A36, AISI 1010 |                                 |                       |                    |                 |                 | Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel<br>AISI P21, AISI P20, AISI 4340, SKD, SKT |                                 |                       |                    |                 |                 | Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy<br>AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V |                                 |                       |                    |                 |                 |
|------------|-----------------------------------------------------------------------------------------------------------|---------------------------------|-----------------------|--------------------|-----------------|-----------------|------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------------|--------------------|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------------|--------------------|-----------------|-----------------|
|            | Cutting Speed (m/min)                                                                                     | Revolution (min <sup>-1</sup> ) | Feed per Tooth (mm/t) | Feed rate (mm/min) | Depth of cut ap | Width of Cut ae | Cutting Speed (m/min)                                                                                      | Revolution (min <sup>-1</sup> ) | Feed per Tooth (mm/t) | Feed rate (mm/min) | Depth of cut ap | Width of Cut ae | Cutting Speed (m/min)                                                                                                                                                                    | Revolution (min <sup>-1</sup> ) | Feed per Tooth (mm/t) | Feed rate (mm/min) | Depth of cut ap | Width of Cut ae |
| <b>10</b>  | 150                                                                                                       | 4800                            | 0.09                  | 1700               | 10              | 2               | 120                                                                                                        | 3800                            | 0.06                  | 910                | 10              | 2               | 100                                                                                                                                                                                      | 3200                            | 0.075                 | 960                | 10              | 2               |
| <b>12</b>  | 150                                                                                                       | 4000                            | 0.09                  | 1400               | 12              | 2.4             | 120                                                                                                        | 3200                            | 0.065                 | 830                | 12              | 2.4             | 100                                                                                                                                                                                      | 2700                            | 0.08                  | 860                | 12              | 2.4             |
| <b>16</b>  | 150                                                                                                       | 3000                            | 0.1                   | 1200               | 16              | 3.2             | 120                                                                                                        | 2400                            | 0.075                 | 720                | 16              | 3.2             | 100                                                                                                                                                                                      | 2000                            | 0.09                  | 720                | 16              | 3.2             |
| <b>20</b>  | 150                                                                                                       | 2400                            | 0.1                   | 960                | 20              | 4               | 120                                                                                                        | 1900                            | 0.075                 | 570                | 20              | 4               | 100                                                                                                                                                                                      | 1600                            | 0.09                  | 580                | 20              | 4               |
| <b>25</b>  | 150                                                                                                       | 1900                            | 0.12                  | 910                | 25              | 5               | 120                                                                                                        | 1500                            | 0.075                 | 450                | 25              | 5               | 100                                                                                                                                                                                      | 1300                            | 0.09                  | 470                | 25              | 5               |

Depth of cut



| Dia.<br>DC | Precipitation-hardening stainless steel, Cobalt chromium alloy<br>AISI 630, AISI 631 |                                 |                       |                    |                 |                 | Heat resistant alloys<br>Inconel718 |                                 |                       |                    |                 |                 |
|------------|--------------------------------------------------------------------------------------|---------------------------------|-----------------------|--------------------|-----------------|-----------------|-------------------------------------|---------------------------------|-----------------------|--------------------|-----------------|-----------------|
|            | Cutting Speed (m/min)                                                                | Revolution (min <sup>-1</sup> ) | Feed per Tooth (mm/t) | Feed rate (mm/min) | Depth of cut ap | Width of Cut ae | Cutting Speed (m/min)               | Revolution (min <sup>-1</sup> ) | Feed per Tooth (mm/t) | Feed rate (mm/min) | Depth of cut ap | Width of Cut ae |
| <b>10</b>  | 75                                                                                   | 2400                            | 0.06                  | 580                | 10              | 2               | 40                                  | 1300                            | 0.04                  | 210                | 10              | 1               |
| <b>12</b>  | 75                                                                                   | 2000                            | 0.065                 | 520                | 12              | 2.4             | 40                                  | 1100                            | 0.045                 | 200                | 12              | 1.2             |
| <b>16</b>  | 75                                                                                   | 1500                            | 0.075                 | 450                | 16              | 3.2             | 40                                  | 800                             | 0.05                  | 160                | 16              | 1.6             |
| <b>20</b>  | 75                                                                                   | 1200                            | 0.075                 | 360                | 20              | 4               | 40                                  | 640                             | 0.05                  | 130                | 20              | 2               |
| <b>25</b>  | 75                                                                                   | 950                             | 0.075                 | 290                | 25              | 5               | 40                                  | 510                             | 0.05                  | 100                | 25              | 2.5             |

Depth of cut



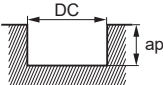
Note 1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.

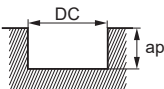
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.

Note 3) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.

## Slot milling

(mm)

| Workpiece Material | Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys                                 |                                 |                       |                    |                 | Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel |                                 |                       |                    |                 | Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy           |                                 |                       |                    |                 |
|--------------------|----------------------------------------------------------------------------------------------|---------------------------------|-----------------------|--------------------|-----------------|-----------------------------------------------------------------|---------------------------------|-----------------------|--------------------|-----------------|-------------------------------------------------------------------------------------------------|---------------------------------|-----------------------|--------------------|-----------------|
|                    | AISI 1045, AISI 4140, ASTM A36, AISI 1010                                                    |                                 |                       |                    |                 | AISI P21, AISI P20, AISI 4340, SKD, SKT                         |                                 |                       |                    |                 | AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V |                                 |                       |                    |                 |
| Dia. DC            | Cutting Speed (m/min)                                                                        | Revolution (min <sup>-1</sup> ) | Feed per Tooth (mm/t) | Feed rate (mm/min) | Depth of cut ap | Cutting Speed (m/min)                                           | Revolution (min <sup>-1</sup> ) | Feed per Tooth (mm/t) | Feed rate (mm/min) | Depth of cut ap | Cutting Speed (m/min)                                                                           | Revolution (min <sup>-1</sup> ) | Feed per Tooth (mm/t) | Feed rate (mm/min) | Depth of cut ap |
| 10                 | 100                                                                                          | 3200                            | 0.04                  | 510                | 5               | 80                                                              | 2500                            | 0.03                  | 300                | 5               | 75                                                                                              | 2400                            | 0.03                  | 290                | 5               |
| 12                 | 100                                                                                          | 2700                            | 0.05                  | 540                | 6               | 80                                                              | 2100                            | 0.04                  | 340                | 6               | 75                                                                                              | 2000                            | 0.04                  | 320                | 6               |
| 16                 | 100                                                                                          | 2000                            | 0.07                  | 560                | 8               | 80                                                              | 1600                            | 0.05                  | 320                | 8               | 75                                                                                              | 1500                            | 0.06                  | 360                | 8               |
| 20                 | 100                                                                                          | 1600                            | 0.07                  | 450                | 10              | 80                                                              | 1300                            | 0.05                  | 260                | 10              | 75                                                                                              | 1200                            | 0.06                  | 290                | 10              |
| 25                 | 100                                                                                          | 1300                            | 0.08                  | 420                | 12              | 80                                                              | 1000                            | 0.05                  | 200                | 12              | 75                                                                                              | 950                             | 0.06                  | 230                | 12              |
| Depth of cut       | <div></div> |                                 |                       |                    |                 |                                                                 |                                 |                       |                    |                 |                                                                                                 |                                 |                       |                    |                 |
|                    |                                                                                              |                                 |                       |                    |                 |                                                                 |                                 |                       |                    |                 |                                                                                                 |                                 |                       |                    |                 |

| Workpiece Material | Precipitation-hardening stainless steel, Cobalt chromium alloy                                 |                                 |                       |                    |                 | Heat resistant alloys |                                 |                       |                    |                 |
|--------------------|------------------------------------------------------------------------------------------------|---------------------------------|-----------------------|--------------------|-----------------|-----------------------|---------------------------------|-----------------------|--------------------|-----------------|
|                    | AISI 630, AISI 631                                                                             |                                 |                       |                    |                 | Inconel718            |                                 |                       |                    |                 |
| Dia. DC            | Cutting Speed (m/min)                                                                          | Revolution (min <sup>-1</sup> ) | Feed per Tooth (mm/t) | Feed rate (mm/min) | Depth of cut ap | Cutting Speed (m/min) | Revolution (min <sup>-1</sup> ) | Feed per Tooth (mm/t) | Feed rate (mm/min) | Depth of cut ap |
| 10                 | 60                                                                                             | 1900                            | 0.025                 | 190                | 5               | 30                    | 950                             | 0.02                  | 76                 | 2               |
| 12                 | 60                                                                                             | 1600                            | 0.035                 | 220                | 6               | 30                    | 800                             | 0.03                  | 96                 | 2.4             |
| 16                 | 60                                                                                             | 1200                            | 0.05                  | 240                | 8               | 30                    | 600                             | 0.05                  | 120                | 3.2             |
| 20                 | 60                                                                                             | 950                             | 0.05                  | 190                | 10              | 30                    | 480                             | 0.05                  | 96                 | 4               |
| 25                 | 60                                                                                             | 760                             | 0.05                  | 150                | 12              | 30                    | 380                             | 0.05                  | 76                 | 5               |
| Depth of cut       | <div></div> |                                 |                       |                    |                 |                       |                                 |                       |                    |                 |
|                    |                                                                                                |                                 |                       |                    |                 |                       |                                 |                       |                    |                 |

Note 1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.

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