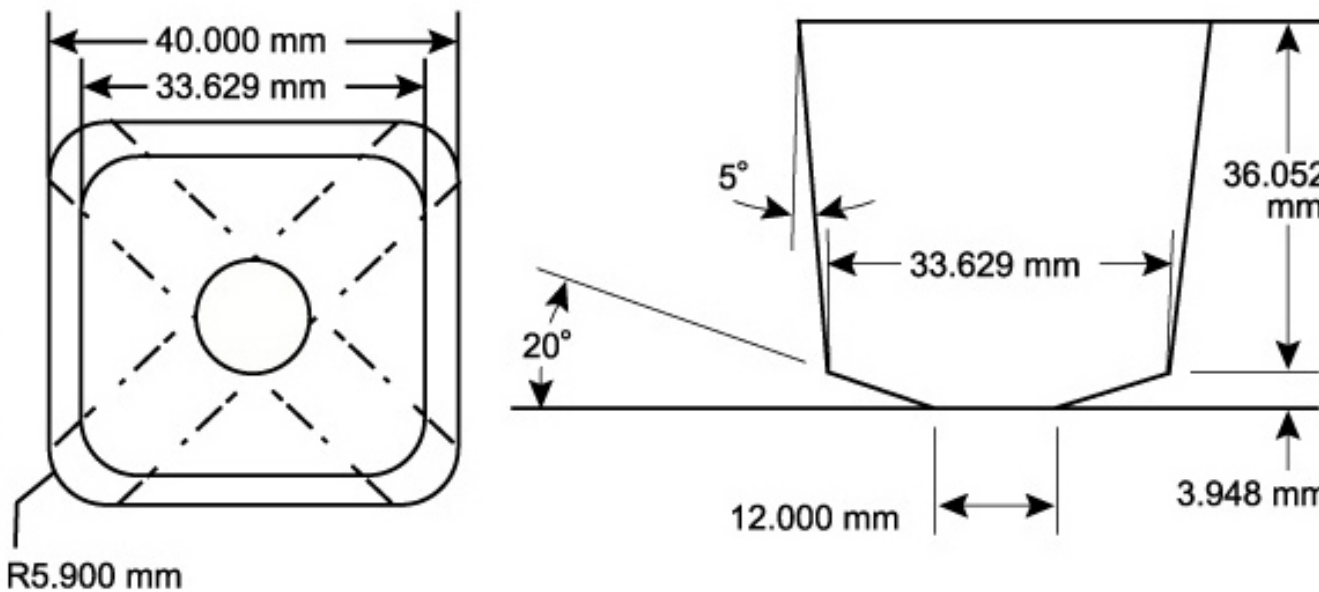


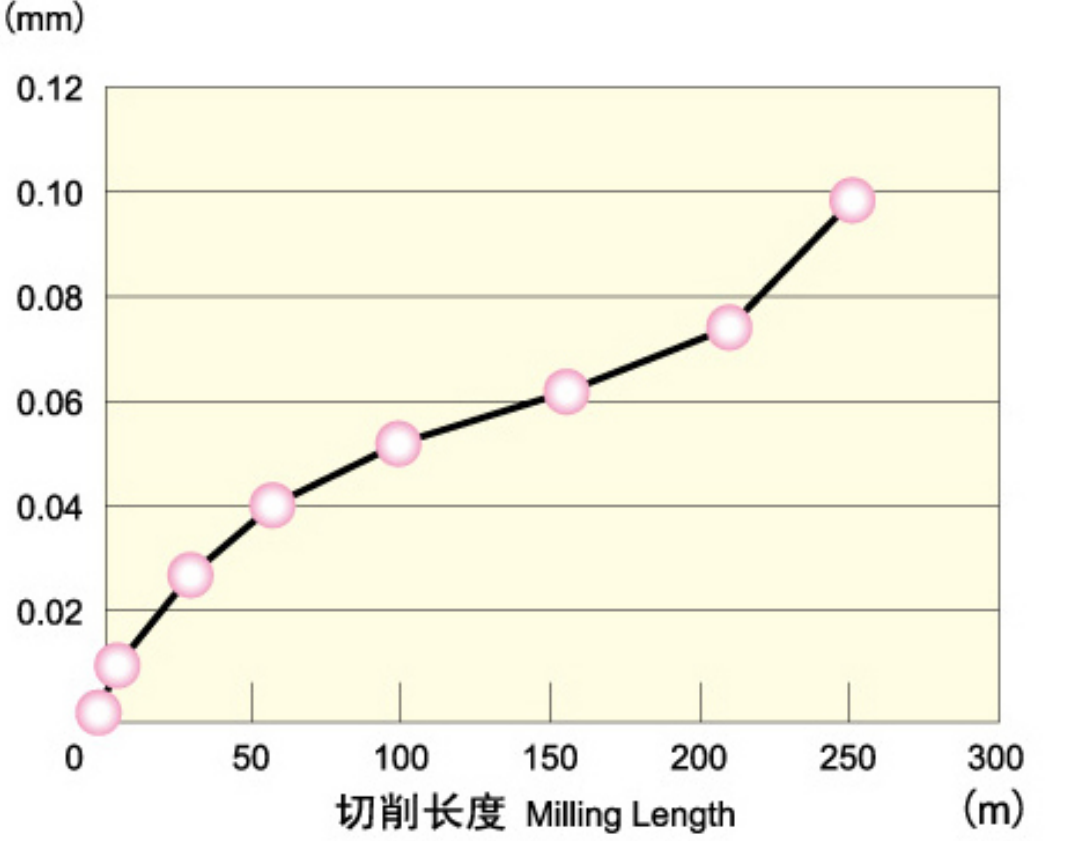
## ■60HRC进给速度为6,000mm/min

Machines 60HRC at a feed rate of 6,000mm/min

|                        |                                                                                                                                                                                                                                      |                                                                                    |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 尺寸<br>Size             | φ 10×R2                                                                                                                                                                                                                              |  |
| 加工材质<br>Work Material  | SKD11 (60HRC)                                                                                                                                                                                                                        |                                                                                    |
| 切削速度<br>Milling Speed  | 157m/min (5, 000min <sup>-1</sup> )                                                                                                                                                                                                  |                                                                                    |
| 进给速度<br>Feed           | 6, 000mm/min (0.3mm/t)                                                                                                                                                                                                               |                                                                                    |
| 切削方式<br>Milling Method | 腔轮廓加工<br>Pocket Milling Operation                                                                                                                                                                                                    |                                                                                    |
| 切深量<br>Milling Depth   | a <sub>a</sub> =0.3mm a <sub>r</sub> =5mm                                                                                                                                                                                            |                                                                                    |
| 悬长量<br>Overhang Length | L/D=4 (40mm)                                                                                                                                                                                                                         |                                                                                    |
| 切削油剂<br>Coolant        | 气冷式<br>Air Blow                                                                                                                                                                                                                      |                                                                                    |
| 使用设备<br>Machine        | 立式加工中心 (BT40)<br>Vertical Machining Center                                                                                                                                                                                           |                                                                                    |
| 说明<br>Notes            | 即使是高硬度材料60HRC的加工, 也能实现高速进给加工, 一个产品加工完后, 铣刀没有发生崩刃可继续加工。<br>High-speed, high-feed milling was achieved in spite of high hardness of 60HRC. The end mill did not chip after 1 piece of component, making continuous machining possible. |                                                                                    |

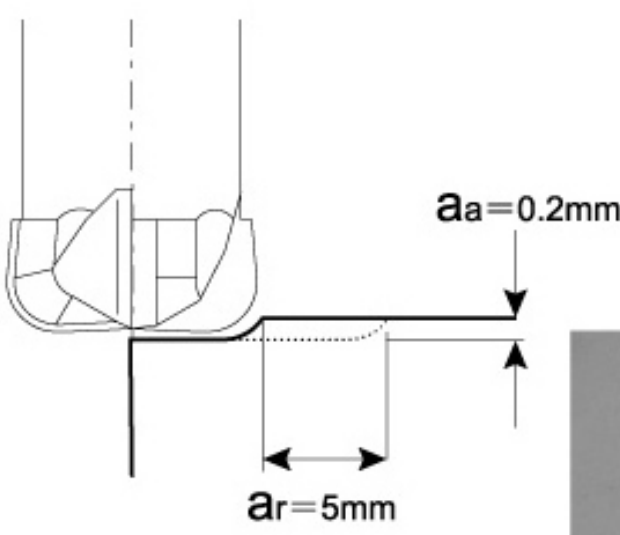
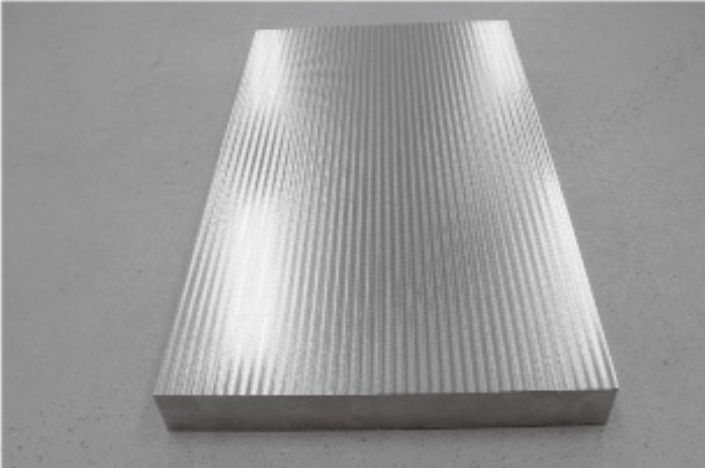
## ■50HRC进给速度为15, 000mm/min

Machines 50HRC at a feed rate of 15,000mm/min

| 尺寸<br>Size             | φ 10×R2                                                                                                                                                                                        | <div>后刀面<br/>磨 损 量<br/>Flank Wear</div>  <table border="1"><caption>Flank Wear Data Points (Estimated from Graph)</caption><thead><tr><th>切削长度 (m)</th><th>后刀面磨损量 (mm)</th></tr></thead><tbody><tr><td>0</td><td>0.00</td></tr><tr><td>10</td><td>0.005</td></tr><tr><td>25</td><td>0.01</td></tr><tr><td>50</td><td>0.02</td></tr><tr><td>100</td><td>0.035</td></tr><tr><td>150</td><td>0.05</td></tr><tr><td>200</td><td>0.065</td></tr><tr><td>250</td><td>0.10</td></tr></tbody></table> <div>切削长度 Milling Length (m)</div> | 切削长度 (m) | 后刀面磨损量 (mm) | 0 | 0.00 | 10 | 0.005 | 25 | 0.01 | 50 | 0.02 | 100 | 0.035 | 150 | 0.05 | 200 | 0.065 | 250 | 0.10 |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|---|------|----|-------|----|------|----|------|-----|-------|-----|------|-----|-------|-----|------|
| 切削长度 (m)               | 后刀面磨损量 (mm)                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 0                      | 0.00                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 10                     | 0.005                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 25                     | 0.01                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 50                     | 0.02                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 100                    | 0.035                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 150                    | 0.05                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 200                    | 0.065                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 250                    | 0.10                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 加工材质<br>Work Material  | SKD11 (50HRC)                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 切削速度<br>Milling Speed  | 3000m/min (9, 550min <sup>-1</sup> )                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 进给速度<br>Feed           | 15, 000mm/min (0.4mm/t)                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 切削方式<br>Milling Method | 正面加工 (直线切割)<br>Face Milling (Straight Cut)                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 切深量<br>Milling Depth   | a <sub>a</sub> =0.3mm a <sub>r</sub> =5mm                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 悬长量<br>Overhang Length | L/D=4 (40mm)                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 切削油剂<br>Coolant        | 气冷式<br>Air Blow                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 使用设备<br>Machine        | 卧式加工中心 (BT40)<br>Horizontal Machining Center                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |
| 说明<br>Notes            | 能够实现硬度为50HRC, 工作台进给速度为15000/mm (0.4mm/t) 的高速高进给加工。<br>On a work material with a hardness of 50HRC, high-speed, high-feed milling was achieved at a table feed rate of 15,000mm/min (0.4 mm/t). |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |             |   |      |    |       |    |      |    |      |     |       |     |      |     |       |     |      |

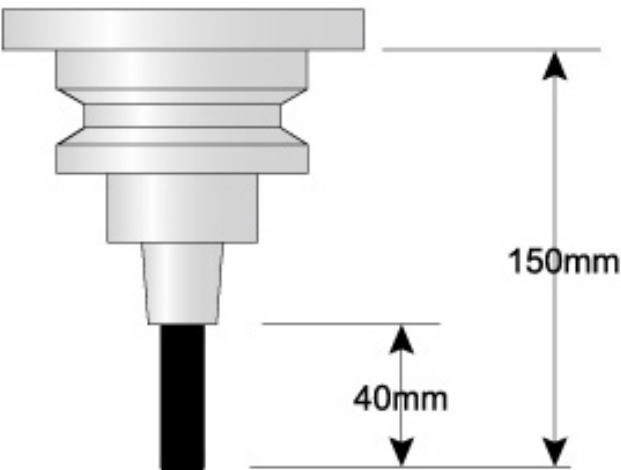
## ■40HRC进给速度为20, 000mm/min

Machines 40HRC at a feed rate of 20,000mm/min

|                        |                                                                                                                                                                   |                                                                                     |                                                                                      |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 尺寸<br>Size             | φ 10×R2                                                                                                                                                           |  |  |
| 加工材质<br>Work Material  | NAK80 (40HRC)                                                                                                                                                     |                                                                                     |                                                                                      |
| 切削速度<br>Milling Speed  | 200m/min (6, 400min <sup>-1</sup> )                                                                                                                               |                                                                                     |                                                                                      |
| 进给速度<br>Feed           | 20, 000mm/min (0.8mm/t)                                                                                                                                           |                                                                                     |                                                                                      |
| 切削方式<br>Milling Method | 正面加工 (直线切割)<br>Face Milling (Straight Cut)                                                                                                                        |                                                                                     |                                                                                      |
| 切深量<br>Milling Depth   | a <sub>a</sub> =0.2mm a <sub>r</sub> =5mm                                                                                                                         |                                                                                     |                                                                                      |
| 悬长量<br>Overhang Length | L/D=4 (40mm)                                                                                                                                                      |                                                                                     |                                                                                      |
| 切削油剂<br>Coolant        | 气冷式<br>Air Blow                                                                                                                                                   |                                                                                     |                                                                                      |
| 使用设备<br>Machine        | 卧式加工中心 (BT50)<br>Horizontal Machining Center                                                                                                                      |                                                                                     |                                                                                      |
| 说明<br>Notes            | 实现了惊人的工作平台进给速度为20, 000mm/min (0.8mm/t) 的高速高进给加工。<br>High-speed, high-feed milling was made possible at an astonishing table feed rate of 20,000mm/min (0.8 mm/t). |                                                                                     |                                                                                      |

## ■高速轮廓加工

High speed contouring

|                        |                                                                                                                                                                                                                                                  |               |                                                                                     |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------|
| 尺寸<br>Size             | φ 10×R2                                                                                                                                                                                                                                          |               |   |
| 加工材质<br>Work Material  | NAK80 (40HRC)                                                                                                                                                                                                                                    |               |                                                                                     |
| 切削速度<br>Milling Speed  | 200m/min (6,400min <sup>-1</sup> )                                                                                                                                                                                                               |               |                                                                                     |
| 进给速度<br>Feed           | 10,000mm/min (0.4mm/t)                                                                                                                                                                                                                           |               |                                                                                     |
| 切削方式<br>Milling Method | 型腔轮廓加工<br>Pocket Milling Operation                                                                                                                                                                                                               |               |                                                                                     |
| 加工深度<br>Milled Depth   | 30mm                                                                                                                                                                                                                                             |               |                                                                                     |
| 切深量<br>Milling Depth   | aa=0.3mm ar=5mm                                                                                                                                                                                                                                  |               |                                                                                     |
| 工具<br>Tooling          | 夹具<br>Holder                                                                                                                                                                                                                                     | BT50-SLK12-75 |  |
|                        | 夹头<br>Shrink Collect                                                                                                                                                                                                                             | CR12-10-35    |                                                                                     |
| 切削油剂<br>Coolant        | 气冷式<br>Air Blow                                                                                                                                                                                                                                  |               |                                                                                     |
| 使用设备<br>Machine        | 卧式加工中心 (BT10)<br>Horizontal Machining Center                                                                                                                                                                                                     |               |                                                                                     |
| 说明<br>Notes            | 使用具有优越夹持力的热压配合导流时, 即使对于悬长为150mm, 也能实现工作台进给10, 000mm/min的高速高进给轮廓加工。<br>Through the use of the shrink-fit system that excels in gripping force, a high-speed, high-feed, deep-cut milling has been achieved at a table feed rate of 10,000 mm/min. |               |                                                                                     |

## ■低速度、高进给加工

Low-speed, high-feed milling

|            |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 尺寸<br>Size | φ10×R2 | <div><div>(mm)</div><div><div><div></div><div>WX-CRE</div></div><div><div></div><div>其他厂家 Competitor</div></div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div><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### ！安全须知

- 工具使用时有破损的危险, 请务必使用保护罩、保护镜、安全靴等。
- 手不要直接碰刀刃。
- 请不要用手接触碎屑。
- 刀具的刃刃不良时请停止使用。
- 如发生异常声音及振动时请立刻停止使用。
- 请不要擅自修改工具。
- 加工前请确认工具尺寸。

### ！Safe use of cutting tools

- Use safety cover, safety glasses and safety shoes during operation.
- Do not touch cutting edges with bare hands.
- Do not touch cutting chips with bare hands. Chips will be hot after cutting.
- Stop cutting when the tool becomes dull.
- Stop cutting operation immediately if you hear any strange cutting sounds.
- Do not modify tools.
- Please use correct tools for the operation. Check dimensions to ensure proper selection.

TOOL COMMUNICATION  
**OSG CORPORATION**  
欧士机 (上海) 精密工具有限公司

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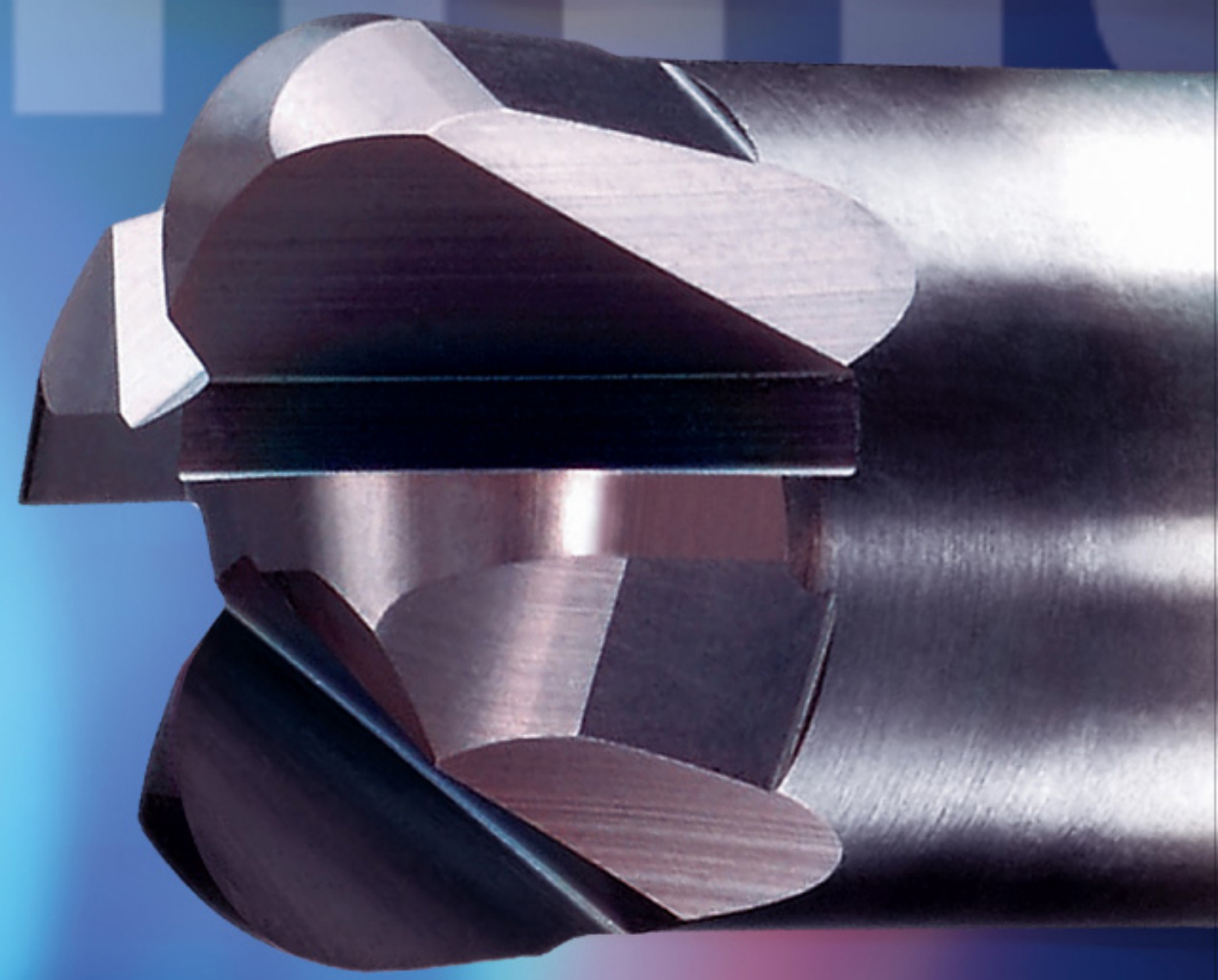


**WX 高进给圆弧角型 (超短刃) 立铣刀** **WX-CRE**  
WX Super Radius End Mills **PAT.P. Vol.2**

**NEW 新款上市**



**3D加工的顶峰**



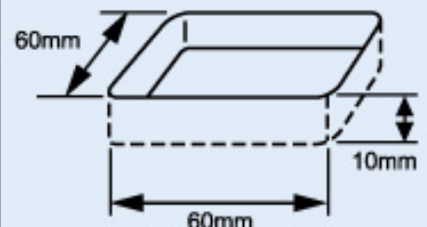
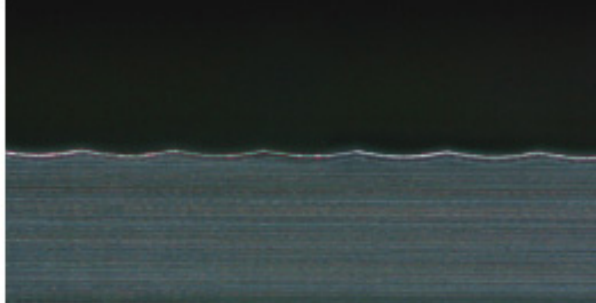
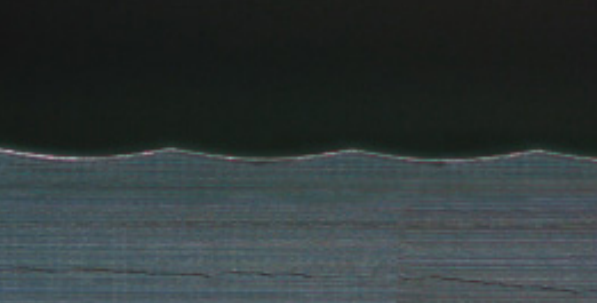
**Three-dimensional milling achieved by the WX Super Radius End Mill**



# WX-CRE 性能出色!!

WX-CRE is outstanding!

## 1. 在平面加工较多的情况下，能发挥超强威力!! Shows its great power in milling workpieces with many flat areas!

| 工具<br>Tool                                                                       | WX-CRE                                                                            | 2刃球头立铣刀<br>2 Flutes Ball-End                                                      | 2刃球头立铣刀<br>2 Flutes Ball-End                                                       |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|  |  |  |  |
| 底面粗糙度<br>Surface Roughness                                                       | 4.8Ry                                                                             | 19.7Ry                                                                            | 44.3Ry                                                                             |
| 加工时间<br>Cutting Time                                                             | 13分57秒<br>13 minutes 57 seconds                                                   | 39分<br>39 minutes                                                                 | 16分57秒<br>16 minutes 57 seconds                                                    |
| 切削速度<br>Cutting Speed                                                            | 149m/min (4,750min <sup>-1</sup> )                                                | 250m/min (7,960min <sup>-1</sup> )                                                | 250m/min (7,960min <sup>-1</sup> )                                                 |
| 进给速度<br>Feed                                                                     | 9,950mm/min (0.52mm/t)                                                            | 2,230mm/min (0.07mm/t)                                                            | 2,230mm/min (0.07mm/t)                                                             |
| 切深度<br>Depth of cut                                                              | aa=0.2mm Pf=5mm                                                                   | aa=0.8mm Pf=0.8mm                                                                 | aa=0.8mm Pf=2mm                                                                    |

工具尺寸:  $\phi 10$  加工材质: NAK80 悬长度L/D=3  
Size Work Material Overhang Length

## 2. 角部加工也能发挥超强威力!! Powerful capability of machining at corner areas!

WX-CRE

即使是高速进给加工也能抑制振刀  
Prevents chattering even in high feed rate

必要最小限度的短刃且具有高刚性  
High rigidity with minimized length of cutting edge.

切深量 aa

进给速度 Feed 9,550mm/min

4刃圆弧角立铣刀

产生振刀  
Chattering occurred

切深量 aa

进给速度 Feed 670mm/min

## 3. 超高速进给的秘密!!

Mechanism of ultra high feed rate!

WX-CRE

由于切屑薄，能够提高每刃的进给量  
Thin chip  
Feed per tooth can be raised up to the same chip thickness as the conventional type of end mill.

a > b

一般立铣刀  
End Mill

切屑厚度与每刃进给量成比例  
Thick chip  
Thick chip in proportion to feed per tooth.

a ÷ b

## WX-CRE 形状尺寸表

NEW SIZES

●材质

Tool Material

●表面处理

Surface Treatment

●R公差

Tolerance for Ball Nose

●刀刃直径公差

Outer diameter tolerance

超微粒子硬质合金

Micro Grain Carbide

WX涂层

WX coating

±0.010mm

0~-0.030mm

3刃

3Flutes

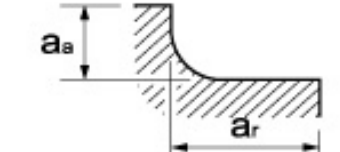
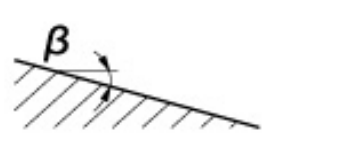
4刃

4Flutes

○=库存中心标准库存品○=Inventory center stock item.

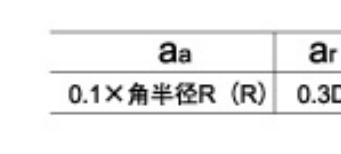
## 标准条件(低速高进给加工) REGULAR MILLING(LOW-SPEED,HIGH-FEED MILLING)

使用高速高精度加工中心的切削标准表。 The conditions below are for high speed / high precision machining centers.

| 加工材质<br>WORK MATERIAL     | 一般构造用钢 碳钢 铸铁<br>MILD STEELS-CARBON<br>STEELS-CAST IRON<br>SS400, S55C, FC250<br>(~750N/mm <sup>2</sup> ) | 合金钢 工具钢<br>ALLOY STEELS<br>TOOL STEELS<br>SCM, SKT, SKS, SKD<br>(~30HRC) | 调质钢 预硬钢<br>HARDENED STEELS<br>PREHARDENED STEELS<br>SKT, SKD, NAK55, HPM1<br>(30~38HRC) | 不锈钢 调质钢 预硬钢<br>STAINLESS STEELS-HARDENED<br>STEELS-PREHARDENED STEELS<br>SUS304, SKD, NAK80, HPM50<br>(38~45HRC) | 调质钢<br>HARDENED STEELS<br>(45~55HRC)                                                | 调质钢<br>HARDENED STEELS<br>(55~60HRC) |
|---------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------|
| 刀具尺寸<br>MILL DIA.<br>(mm) | 回转速度<br>SPEED<br>(min <sup>-1</sup> )                                                                    | 进给速度<br>FEED<br>(mm/min)                                                 | 回转速度<br>SPEED<br>(min <sup>-1</sup> )                                                   | 进给速度<br>FEED<br>(mm/min)                                                                                         | 回转速度<br>SPEED<br>(min <sup>-1</sup> )                                               | 进给速度<br>FEED<br>(mm/min)             |
| 2 xR0.5                   | 16,000                                                                                                   | 5,250                                                                    | 16,000                                                                                  | 4,750                                                                                                            | 12,500                                                                              | 3,800                                |
| 3 xR0.75                  | 10,500                                                                                                   | 6,250                                                                    | 10,500                                                                                  | 5,600                                                                                                            | 8,500                                                                               | 4,500                                |
| 4 xR1                     | 7,950                                                                                                    | 6,600                                                                    | 7,950                                                                                   | 6,000                                                                                                            | 6,350                                                                               | 4,800                                |
| 5 xR1.2                   | 6,350                                                                                                    | 7,000                                                                    | 6,350                                                                                   | 6,350                                                                                                            | 5,100                                                                               | 5,100                                |
| 6 xR1.5                   | 5,300                                                                                                    | 7,000                                                                    | 5,300                                                                                   | 6,350                                                                                                            | 4,250                                                                               | 5,100                                |
| 7 xR1.5                   | 4,550                                                                                                    | 6,000                                                                    | 4,550                                                                                   | 5,450                                                                                                            | 3,650                                                                               | 4,350                                |
| 8 xR2                     | 4,000                                                                                                    | 7,000                                                                    | 4,000                                                                                   | 6,350                                                                                                            | 3,200                                                                               | 5,100                                |
| 9 xR2                     | 3,550                                                                                                    | 6,200                                                                    | 3,550                                                                                   | 5,650                                                                                                            | 2,850                                                                               | 4,550                                |
| 10 xR2                    | 3,200                                                                                                    | 7,000                                                                    | 3,200                                                                                   | 6,350                                                                                                            | 2,550                                                                               | 5,100                                |
| 11 xR2                    | 2,900                                                                                                    | 6,350                                                                    | 2,900                                                                                   | 5,800                                                                                                            | 2,300                                                                               | 4,650                                |
| 12 xR3                    | 2,650                                                                                                    | 7,000                                                                    | 2,650                                                                                   | 6,350                                                                                                            | 2,100                                                                               | 5,100                                |
| 13 xR3                    | 2,450                                                                                                    | 6,450                                                                    | 2,450                                                                                   | 5,900                                                                                                            | 1,950                                                                               | 4,700                                |
| 切深量<br>DEPTH<br>OF CUT    |                       |                                                                          |      |                                                                                                                  |  |                                      |
|                           | R≤2 0.2×角半径R (R) 0.5D                                                                                    |                                                                          | R≤2 0.2×角半径R (R) 0.5D                                                                   |                                                                                                                  | R≤2 0.1×角半径R (R) 0.5D                                                               |                                      |
|                           | 2<R 0.5mm 0.5D                                                                                           |                                                                          | 2<R 0.4mm 0.5D                                                                          |                                                                                                                  | 2<R 0.2mm 0.5D                                                                      |                                      |

## 高速条件 HIGH SPEED MILLING

使用高速高精度加工中心的切削标准表。 The conditions below are for high speed / high precision machining centers.

| 加工材质<br>WORK MATERIAL     | 一般构造用钢 碳钢 铸铁<br>MILD STEELS-CARBON<br>STEELS-CAST IRON<br>SS400, S55C, FC250<br>(~750N/mm <sup>2</sup> ) | 合金钢 工具钢<br>ALLOY STEELS<br>TOOL STEELS<br>SCM, SKT, SKS, SKD<br>(~30HRC) | 调质钢 预硬钢<br>HARDENED STEELS<br>PREHARDENED STEELS<br>SKT, SKD, NAK55, HPM1<br>(30~38HRC) | 不锈钢 调质钢 预硬钢<br>STAINLESS STEELS-HARDENED<br>STEELS-PREHARDENED STEELS<br>SUS304, SKD, NAK80, HPM50<br>(38~45HRC) | 调质钢<br>HARDENED STEELS<br>(45~55HRC)                                                 | 调质钢<br>HARDENED STEELS<br>(55~60HRC) |
|---------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------|
| 刀具尺寸<br>MILL DIA.<br>(mm) | 回转速度<br>SPEED<br>(min <sup>-1</sup> )                                                                    | 进给速度<br>FEED<br>(mm/min)                                                 | 回转速度<br>SPEED<br>(min <sup>-1</sup> )                                                   | 进给速度<br>FEED<br>(mm/min)                                                                                         | 回转速度<br>SPEED<br>(min <sup>-1</sup> )                                                | 进给速度<br>FEED<br>(mm/min)             |
| 2 xR0.5                   | 31,850                                                                                                   | 10,500                                                                   | 32,000                                                                                  | 9,550                                                                                                            | 32,000                                                                               | 9,550                                |
| 3 xR0.75                  | 21,000                                                                                                   | 12,500                                                                   | 21,000                                                                                  | 11,000                                                                                                           | 21,000                                                                               | 12,000                               |
| 4 xR1                     | 16,000                                                                                                   | 13,000                                                                   | 16,000                                                                                  | 12,000                                                                                                           | 16,000                                                                               | 12,000                               |
| 5 xR1.2                   | 12,500                                                                                                   | 14,000                                                                   | 12,500                                                                                  | 12,500                                                                                                           | 12,500                                                                               | 9,550                                |
| 6 xR1.5                   | 10,600                                                                                                   | 14,000                                                                   | 10,600                                                                                  | 12,700                                                                                                           | 10,600                                                                               | 12,700                               |
| 7 xR1.5                   | 9,100                                                                                                    | 12,000                                                                   | 9,100                                                                                   | 10,900                                                                                                           | 9,100                                                                                | 10,900                               |
| 8 xR2                     | 7,950                                                                                                    | 14,000                                                                   | 7,950                                                                                   | 12,700                                                                                                           | 7,950                                                                                | 9,550                                |
| 9 xR2                     | 7,050                                                                                                    | 12,400                                                                   | 7,050                                                                                   | 11,300                                                                                                           | 7,050                                                                                | 8,200                                |
| 10 xR2                    | 6,350                                                                                                    | 14,000                                                                   | 6,350                                                                                   | 12,700                                                                                                           | 6,350                                                                                | 9,550                                |
| 11 xR2                    | 5,800                                                                                                    | 12,700                                                                   | 5,800                                                                                   | 11,600                                                                                                           | 5,800                                                                                | 8,700                                |
| 12 xR3                    | 5,300                                                                                                    | 14,000                                                                   | 5,300                                                                                   | 12,700                                                                                                           | 5,300                                                                                | 9,550                                |
| 13 xR3                    | 4,900                                                                                                    | 12,900                                                                   | 4,900                                                                                   | 11,800                                                                                                           | 4,900                                                                                | 8,800                                |
| 切深量<br>DEPTH<br>OF CUT    |                      |                                                                          |     |                                                                                                                  |  |                                      |
|                           | R≤2 0.1×角半径R (R) 0.3D                                                                                    |                                                                          | R≤2 0.05×角半径R (R) 0.3D                                                                  |                                                                                                                  | R≤2 0.1×角半径R (R) 0.3D                                                                |                                      |
|                           | 2<R 0.2mm 0.3D                                                                                           |                                                                          | 2<R 0.1mm 0.3D                                                                          |                                                                                                                  | 2<R 0.1mm 0.3D                                                                       |                                      |

- 请选用刚性好的、精度高的设备和夹具。
- 此切削条件表是以角部圆弧补偿为动为前提的条件下，如不使用该法加工，请把上表回转速度降低50~70%、切深量降低50~80%。
- 请使用吹气冷却或MQL雾状冷却。
- 请根据加工形状、切深量、机械刚性、工作持续时间等使用状况来调整回转速度、进给速度及切深量。
- 进入Z轴时，由于倾斜角度 $\beta \leq 2^\circ$ ，请根据上表的回转速度降低30~60%后使用。
- 此切削条件是等高线加工，工具悬长为4D的标准（刃径×4倍以下），当突出部量较大时容易发生振刀，请参考系数调整回转速度、进给速度和切深量。

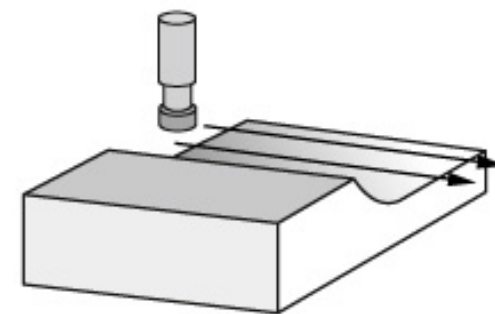
- Use a rigid and precise machine and holder.
- These milling conditions are based on milling with circular interpolation at corners. For milling without circular interpolation (such as right angle corners), reduce the speed to 50~70% and the cutting depth to 50~80% of the above conditions.
- We suggest using an air blow or MQL (mist).
- Please adjust the speed, feed and cutting depth according to actual cutting conditions.
- When WX-CRE enters in Z axis, reduce the feed speed to 30~60% of the above conditions with machining incline angle ( $\beta \leq 2^\circ$ ).
- These milling conditions are for a tool extension length: less than 4 x D. For a longer tool extension, reduce the speed, feed rate, and the cutting depth in accordance with the respective coefficients, to prevent chattering.

## 工具悬长量系数(%) Tool extension coefficients

| 工具悬长量<br>Overhang<br>Length | 标准条件 (低速高进给) REGULAR MILLING |             |              | 高速条件 HIGH SPEED MILLING |             |              |
|-----------------------------|------------------------------|-------------|--------------|-------------------------|-------------|--------------|
|                             | 切削速度<br>Cutting Speed        | 轴方向切深<br>aa | 进给速度<br>Feed | 切削速度<br>Cutting Speed   | 轴方向切深<br>aa | 进给速度<br>Feed |
| L/D≤4                       | 100                          | 100         | 100          | 100                     | 100         | 100          |
| L/D=5                       | 80~100                       | 70~90       | 80~90        | 60~80                   | 60~80       | 70~90        |
| L/D=6                       | 60~80                        | 50~70       | 60~80        | 40~60                   | 40~60       | 60~80        |

## 超高速条件 Ultra-high speed conditions

- 如图负荷稳定的平坦部位加工，在高速条件下的回转速度，进给速度还可提高150~200%
- 工具悬长量以4D为基准（刃径×4倍以下）请不要在工具悬长量超过4D时使用。



- When milling flat areas with a stable load, the speed and the feed rate of the high-speed conditions can be further increased to 150 - 200%.
- The ultra-high speed conditions are for a tool extension length: less than 4 x D. If the tool extension length is over 4 x D, do not refer to it.