

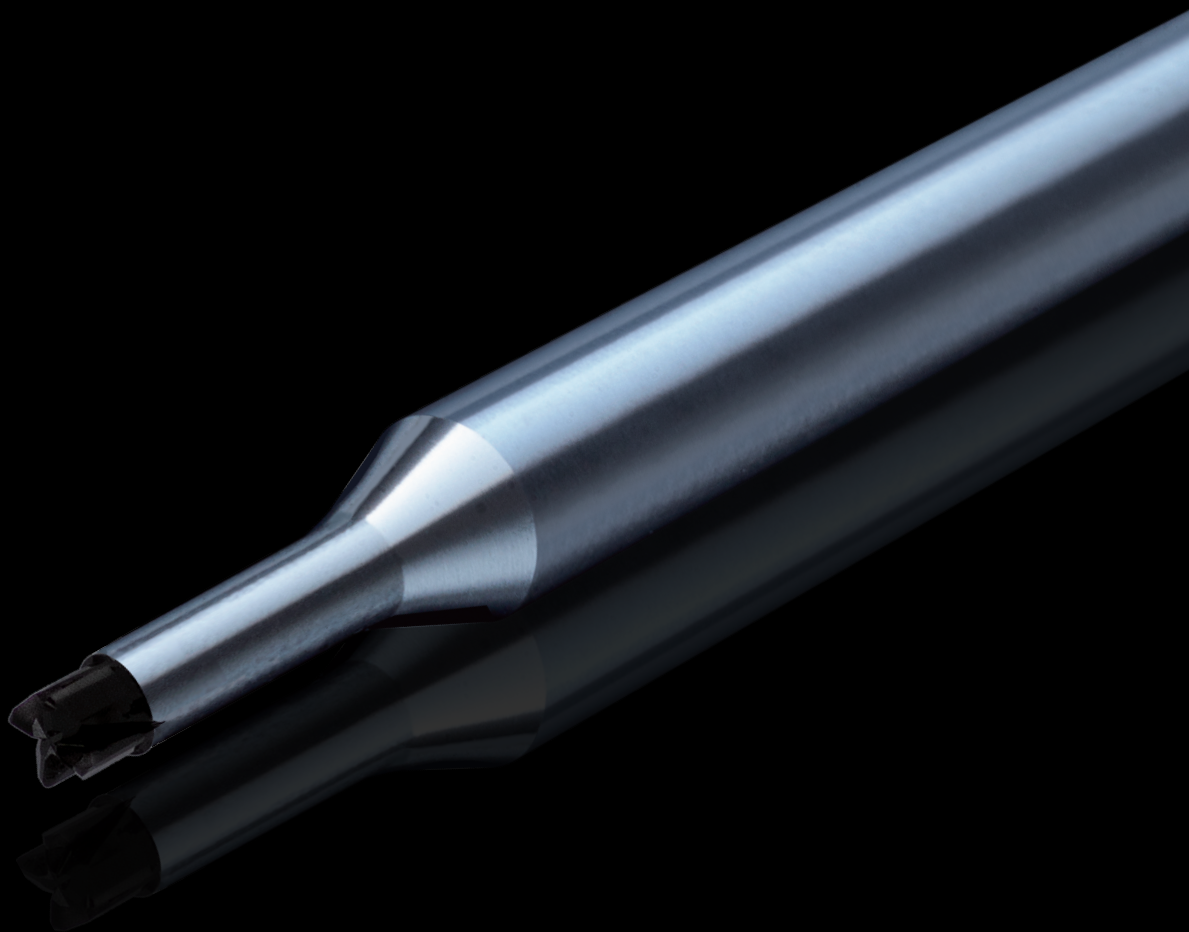
CBN

CBN4刃长颈圆鼻铣刀

CBN 4-Flute Long Neck Corner Radius End Mill

SSR400

New



高刚性的刀刃设计实现了高效率加工

Tool design with enhanced cutting edge rigidity achieves high efficient machining

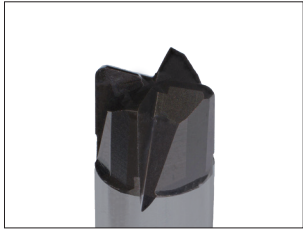
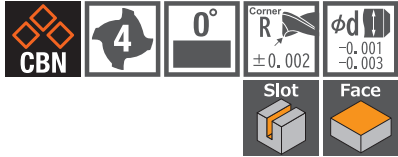
CBN4刃长颈圆鼻铣刀

CBN 4-Flute Long Neck Corner Radius End Mill

SSR400

New

φ 0.1 × R0.01 ~ φ 3 × R0.3 共 121 种规格
Total 121 sizes



刀刃形状
Cutting edge shape

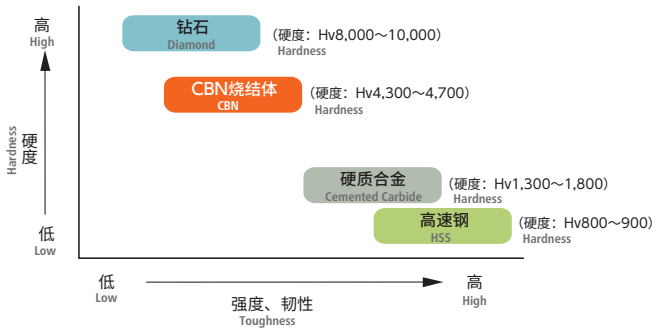
特长

Features

Feature
1

延长刀具寿命
Long tool life

CBN 烧结体实现延长刀具寿命
Long tool life due to CBN Sintered Alloy



CBN (Cubic Boron Nitride / 立方氮化硼) 烧结体, 硬度仅次于钻石, 约为硬质合金的 3 倍, 是具有更高耐热性、热传导性的刀具材料。但是, 同时也有强度和韧性低, 易崩刃的缺点。在刀具刀尖阻力较大的粗加工中, 容易出现崩刃的情况, 所以 CBN 刀具不适合用于粗加工。但在切削阻力小的精加工中, 由于 CBN 优异的硬度和耐热性, 可降低刀具磨损, 持久度刀具使用寿命, 尤其适用于高硬度材料的加工。

CBN(Cubic Boron Nitride) sintered alloy is 3 times harder than Tungsten carbide, second hardest material next to diamond, moreover strong heat-resistant and high thermal conductivity. However less tough characteristic of CBN often causes chipping of tool edge easily. Accordingly, CBN is recommended for finishing of hard materials with less cutting load on the tool edge, which guarantees extra long tool life.

Feature
2

缩减成本
Cost reduction

多刃设计实现高进给速度加工
Multi-flute design enables high feed machining

SSR400 与以往的 2 刃刀具相比, 刀具寿命大幅提升, 从而减少了所需使用的刀具数量; 此外, 加工时间也仅为以往 2 刃刀具的约 50%

The SSR400 has a significantly improved tool life compared to conventional 2-flute products, reducing the number of used tools and enabling machining in approximately 50% of the time compared to conventional 2-flute products



■ 与以往 2 刃圆鼻铣刀的成本比较

Cost comparison with conventional 2-flute corner radius end mills

φ 2 × R0.2 × 颈长 6
φ 2 × R0.2 × Under neck length 6

与 2 刃刀具相比节约成本

40%

40% cost reduction compare with
2-flute corner radius end mills

※机床使用费: 估算 5,000 日元/时
※Machine charge fee: JPY 5,000/h

使用刀具 Tool	SSR400 (4刃 4-flute)	以往产品 Conventional
使用数量 [支] Tool Q'ty [pcs]	1	2
刀具费用 Tool cost	¥ 30,600 (¥ 30,600/pc)	¥ 48,000 (¥ 24,000/pc)
加工时间 [分钟] Machining time [min]	150	300
机床使用费※ Machine charge fee	¥ 12,500	¥ 25,000
加工成本 Machining cost	¥ 43,100	¥ 73,000

Feature
3高效率
High efficiency

高刚性的刀刃设计实现高效率加工

High-rigidity cutting edge design enables high-efficiency machining

通过提升刃口刚性的刀具设计，即使是CBN 材质，在加工负荷较高的工件形状或切削条件下，也能实现稳定的加工。

The tool design enhances the cutting edge rigidity, and even with CBN material, it achieves stable machining on high-load workpiece shapes and cutting conditions

■ 与以往 2 刃产品及其他公司产品的加工寿命比较

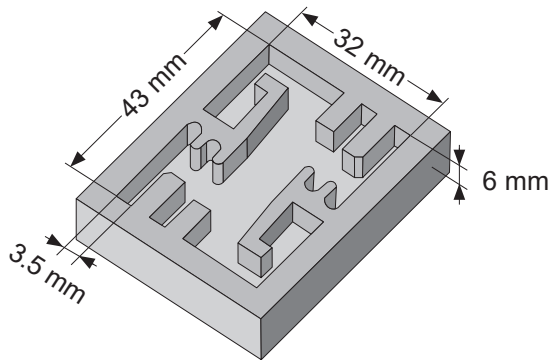
Tool life comparison with conventional 2-flute products and the other tool brand's products

加工材料：PD613 (60HRC)

Work material

冷却方式：油雾

Coolant Oil mist



脱模斜度 = 0°

Draft angle

角落部未进行圆角化处理

No corner filletting

加工工序 Process	底面精加工 Finishing (Bottom)		侧面精加工 Finishing (Side)	
刀具尺寸 Tool size	φ 2 × R0.2 × 6			
主轴转速 [min ⁻¹] Spindle speed	23,000			
刃数 Number of flute	4刃 4-flute	2刃 2-flute	4刃 4-flute	2刃 2-flute
进给速度 [mm/min] Feed	2,500	1,250	2,500	1,250
余量 [mm] Cutting depth	0.03			
切深量 [mm] Depth of cut	ae 0.6		ap 0.07	

即使是内角等加工负荷较高的工件形状，SSR400 仍能实现长时间加工，且没有出现显著的磨损。
Even under high-load workpiece geometries, such as sharp corners, SSR400 enables extended machining without major damage

刀具 Tool	SSR400	其他公司产品 Other tool brand	以往产品 Conventional
刃数 Number of flute	4刃 4-flute	4刃 4-flute	2刃 2-flute
刀具磨损状况 切削长度 加工时间 Tool wear Cutting distance Machining time	64 m 37 分钟 37 min	64 m 37 分钟 37 min	64 m 57 分钟 57 min
	256 m 2 小时 28 分钟 2 hr 28 min	256 m 2 小时 28 分钟 2 hr 28 min	256 m 3 小时 42 分钟 3 hr 42 min
	640 m 6 小时 10 分钟 6 hr 10 min	640 m 6 小时 10 分钟 6 hr 10 min	640 m 9 小时 8 分钟 9 hr 8 min

CBN4刃长颈圆鼻铣刀

CBN 4-Flute Long Neck Corner Radius End Mill

共 121 种规格

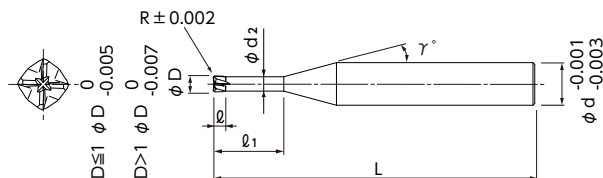
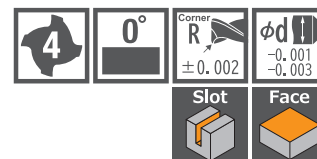
Total 121 sizes

提升刀刃刚性的刀具设计实现高效率加工

从最小径 $\phi 0.1$ 起的4刃圆鼻铣刀

Tool design with enhanced cutting edge rigidity achieves high efficient machining

4-flute corner radius end mill from Dia. 0.1mm



- 4刃造型的小径尺寸也可实现高进给速度。
- R角精度 $\pm 2\mu\text{m}$ 与实际外径标识支持高精度加工。
- 4-flute design realizes high feed rate even with small diameter.
- By providing corner R accuracy of $\pm 2\mu\text{m}$ and actual outer diameter indication supports high precision machining.

底刃在中心处没有刀刃，请注意切削残留量。

Beware of stocks because there is no blade to the shaft center of endteeth.

 $\phi 2.997$ 在产品标识上以 $1\mu\text{m}$ 为单位显示实测的刃径，实现高精度加工。

Actual diameter is indicated in 1 micron units on product label, and enables high precision machining.

※无法以 μm 为单位进行尺寸指定。

Micron units dimensions cannot be specified.

加工材料 Work Material

高硬度钢
Hardened Steel

~70HRC

刀刃形状
Cutting edge shape

◆ 2025年4月发布 ※Release in Apr, 2025.

单位 [规格: mm / 价格: 日元]
Unit [Size: mm / Retail Price: JPY]

2025年7月更新 点钻规格书 (mm) (¥)									
产品代码 Code No.	外径(D) Dia.	角半径(R) Corner Radius	颈长(L) Under Neck Length	刃长(l) Length of Cut	颈径(d2) Neck Dia.	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length	定价(日元) Retail Price
01-00491-01002	0.1	R0.01	0.2	0.04	0.09	15°	4	50	49,800
01-00491-01003			0.3	0.04	0.09	15°	4	50	50,400
01-00491-01005			0.5	0.04	0.09	15°	4	50	51,300
01-00491-01022		R0.02	0.2	0.04	0.09	15°	4	50	49,800
01-00491-01023			0.3	0.04	0.09	15°	4	50	50,400
01-00491-01025			0.5	0.04	0.09	15°	4	50	51,300
01-00491-01522	0.15	R0.02	0.2	0.06	0.14	15°	4	50	49,800
01-00491-01523			0.3	0.06	0.14	15°	4	50	50,400
01-00491-01525			0.5	0.06	0.14	15°	4	50	51,300
01-00491-01532		R0.03	0.2	0.06	0.14	15°	4	50	47,600
01-00491-01533			0.3	0.06	0.14	15°	4	50	48,300
01-00491-01535			0.5	0.06	0.14	15°	4	50	49,800
01-00491-02203	0.2	R0.02	0.3	0.08	0.19	15°	4	50	38,300
01-00491-02205			0.5	0.08	0.19	15°	4	50	38,300
01-00491-02207			0.75	0.08	0.19	15°	4	50	38,800
01-00491-02210			1	0.08	0.19	15°	4	50	39,300
01-00491-02303		R0.03	0.3	0.08	0.19	15°	4	50	34,500
01-00491-02305			0.5	0.08	0.19	15°	4	50	34,500
01-00491-02307			0.75	0.08	0.19	15°	4	50	35,000
01-00491-02310			1	0.08	0.19	15°	4	50	35,500
01-00491-03205	0.3	R0.02	0.5	0.13	0.285	15°	4	50	37,800
01-00491-03210			1	0.13	0.285	15°	4	50	38,300
01-00491-03215			1.5	0.13	0.285	15°	4	50	38,700
01-00491-03220			2	0.13	0.285	15°	4	50	39,300
01-00491-03305		R0.03	0.5	0.13	0.285	15°	4	50	34,200
01-00491-03310			1	0.13	0.285	15°	4	50	34,500
01-00491-03315			1.5	0.13	0.285	15°	4	50	35,000
01-00491-03320			2	0.13	0.285	15°	4	50	35,500
01-00491-04205	0.4	R0.02	0.5	0.24	0.37	15°	4	50	34,900
01-00491-04210			1	0.24	0.37	15°	4	50	36,200
01-00491-04215			1.5	0.24	0.37	15°	4	50	36,500
01-00491-04220			2	0.24	0.37	15°	4	50	36,900

订购方法
How to Order请指定 SSR400 外径 (D) × 角半径 (R) × 颈长 (l)。
When you order, indicate SSR400 (D)×(R)×(l1).

※ (γ) 为参考值。

※ (γ) is reference value.

CBN4刃长颈圆鼻铣刀

CBN 4-Flute Long Neck Corner Radius End Mill

单位 [规格 : mm / 价格 : 日元]
Unit [Size : mm / Retail Price : JPY]

产品代码 Code No.	外径(D) Dia.	角半径(R) Corner Radius	颈长(L) Under Neck Length	刃长(L) Length of Cut	颈径(d2) Neck Dia.	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length	定价(日元) Retail Price
01-00491-04305	0.4	R0.03	0.5	0.24	0.37	15°	4	50	33,500
01-00491-04310			1	0.24	0.37	15°	4	50	34,800
01-00491-04315			1.5	0.24	0.37	15°	4	50	35,100
01-00491-04320			2	0.24	0.37	15°	4	50	35,400
01-00491-04405		R0.05	0.5	0.24	0.37	15°	4	50	32,500
01-00491-04410			1	0.24	0.37	15°	4	50	32,700
01-00491-04415			1.5	0.24	0.37	15°	4	50	32,700
01-00491-04420			2	0.24	0.37	15°	4	50	33,400
01-00491-04505		R0.1	0.5	0.24	0.37	15°	4	50	32,500
01-00491-04510			1	0.24	0.37	15°	4	50	32,700
01-00491-04515			1.5	0.24	0.37	15°	4	50	32,700
01-00491-04520			2	0.24	0.37	15°	4	50	33,400
01-00491-05205	0.5	R0.02	0.5	0.3	0.46	15°	4	48	29,900
01-00491-05210			1	0.3	0.46	15°	4	50	30,100
01-00491-05215			1.5	0.3	0.46	15°	4	50	30,300
01-00491-05225			2.5	0.3	0.46	15°	4	50	33,100
01-00491-05305		R0.03	0.5	0.3	0.46	15°	4	48	28,800
01-00491-05310			1	0.3	0.46	15°	4	50	29,000
01-00491-05315			1.5	0.3	0.46	15°	4	50	29,200
01-00491-05325			2.5	0.3	0.46	15°	4	50	31,800
01-00491-05405		R0.05	0.5	0.3	0.46	15°	4	48	27,000
01-00491-05410			1	0.3	0.46	15°	4	50	27,200
01-00491-05415			1.5	0.3	0.46	15°	4	50	27,500
01-00491-05425			2.5	0.3	0.46	15°	4	50	29,900
01-00491-05505		R0.1	0.5	0.3	0.46	15°	4	48	27,000
01-00491-05510			1	0.3	0.46	15°	4	50	27,200
01-00491-05515			1.5	0.3	0.46	15°	4	50	27,500
01-00491-05525			2.5	0.3	0.46	15°	4	50	29,900
01-00491-06210	0.6	R0.02	1	0.3	0.56	15°	4	50	30,200
01-00491-06215			1.5	0.3	0.56	15°	4	50	30,400
01-00491-06225			2.5	0.3	0.56	15°	4	50	33,100
01-00491-06410		R0.05	1	0.3	0.56	15°	4	50	27,300
01-00491-06415			1.5	0.3	0.56	15°	4	50	27,600
01-00491-06425			2.5	0.3	0.56	15°	4	50	30,000
01-00491-06510		R0.1	1	0.3	0.56	15°	4	50	27,300
01-00491-06515			1.5	0.3	0.56	15°	4	50	27,600
01-00491-06525			2.5	0.3	0.56	15°	4	50	30,000
01-00491-08420	0.8	R0.05	2	0.56	0.76	15°	4	50	30,000
01-00491-08440			4	0.56	0.76	15°	4	53	30,900
01-00491-08520		R0.1	2	0.56	0.76	15°	4	50	30,000
01-00491-08540			4	0.56	0.76	15°	4	53	30,900
01-00491-10202	1	R0.02	2	0.7	0.95	15°	4	50	28,000
01-00491-10203			3	0.7	0.95	15°	4	50	28,000
01-00491-10205			5	0.7	0.95	15°	4	53	31,500
01-00491-10302		R0.03	2	0.7	0.95	15°	4	50	26,700
01-00491-10303			3	0.7	0.95	15°	4	50	26,700
01-00491-10305			5	0.7	0.95	15°	4	53	30,000
01-00491-10402		R0.05	2	0.7	0.95	15°	4	50	25,400
01-00491-10403			3	0.7	0.95	15°	4	50	25,400
01-00491-10405			5	0.7	0.95	15°	4	53	28,500
01-00491-10502		R0.1	2	0.7	0.95	15°	4	50	25,400
01-00491-10503			3	0.7	0.95	15°	4	50	25,400
01-00491-10505			5	0.7	0.95	15°	4	53	28,500
01-00491-10602		R0.2	2	0.7	0.95	15°	4	50	25,400
01-00491-10603			3	0.7	0.95	15°	4	50	25,400
01-00491-10605			5	0.7	0.95	15°	4	53	28,500

CBN4刃长颈圆鼻铣刀

CBN 4-Flute Long Neck Corner Radius End Mill

◆ 2025年4月发布 ※Release in Apr, 2025.

单位 [规格 : mm / 价格 : 日元]
Unit [Size : mm / Retail Price : JPY]

产品代码 Code No.	外径 (D) Dia.	角半径 (R) Corner Radius	颈长 (ℓ) Under Neck Length	刃长 (ℓ) Length of Cut	颈径 (d ₂) Neck Dia.	颈角 (γ) Neck Taper Angle	柄径 (d) Shank Dia.	全长 (L) Overall Length	定价 (日元) Retail Price
◆ 01-00491-15402	1.5	R0.05	2	1	1.45	15°	4	52	29,800
◆ 01-00491-15403			3	1	1.45	15°	4	52	29,800
◆ 01-00491-15502		R0.1	2	1	1.45	15°	4	52	29,800
◆ 01-00491-15503			3	1	1.45	15°	4	52	29,800
◆ 01-00491-15602		R0.2	2	1	1.45	15°	4	52	29,800
◆ 01-00491-15603			3	1	1.45	15°	4	52	29,800
◆ 01-00491-20404	2	R0.05	4	1.2	1.94	15°	4	53	30,600
◆ 01-00491-20406			6	1.2	1.94	15°	4	53	30,600
◆ 01-00491-20410			10	1.2	1.94	15°	4	53	34,000
◆ 01-00491-20504		R0.1	4	1.2	1.94	15°	4	53	30,600
◆ 01-00491-20506			6	1.2	1.94	15°	4	53	30,600
◆ 01-00491-20510			10	1.2	1.94	15°	4	53	34,000
◆ 01-00491-20604		R0.2	4	1.2	1.94	15°	4	53	30,600
◆ 01-00491-20606			6	1.2	1.94	15°	4	53	30,600
◆ 01-00491-20610			10	1.2	1.94	15°	4	53	34,000
◆ 01-00491-20704		R0.3	4	1.2	1.94	15°	4	53	30,600
◆ 01-00491-20706			6	1.2	1.94	15°	4	53	30,600
◆ 01-00491-20710			10	1.2	1.94	15°	4	53	34,000
◆ 01-00491-20804		R0.5	4	1.2	1.94	15°	4	53	30,600
◆ 01-00491-20806			6	1.2	1.94	15°	4	53	30,600
◆ 01-00491-20810			10	1.2	1.94	15°	4	53	34,000
◆ 01-00491-30406	3	R0.05	6	1.8	2.85	15°	6	53	39,200
◆ 01-00491-30409			9	1.8	2.85	15°	6	53	40,000
◆ 01-00491-30415			15	1.8	2.85	15°	6	63	41,600
◆ 01-00491-30506		R0.1	6	1.8	2.85	15°	6	53	39,200
◆ 01-00491-30509			9	1.8	2.85	15°	6	53	40,000
◆ 01-00491-30515			15	1.8	2.85	15°	6	63	41,600
◆ 01-00491-30606		R0.2	6	1.8	2.85	15°	6	53	39,200
◆ 01-00491-30609			9	1.8	2.85	15°	6	53	40,000
◆ 01-00491-30615			15	1.8	2.85	15°	6	63	41,600
◆ 01-00491-30706		R0.3	6	1.8	2.85	15°	6	53	39,200
◆ 01-00491-30709			9	1.8	2.85	15°	6	53	40,000
◆ 01-00491-30715			15	1.8	2.85	15°	6	63	41,600

订购方法
How to Order

请指定 SSR400 外径 (D) × 角半径 (R) × 颈长 (ℓ)。
When you order, indicate SSR400 (D)×(R)×(ℓ).

※ (γ) 为参考值。
※ (γ) is reference value.

切削参数参考表 Recommended Conditions

加工材料 Work Material				高硬度钢 Hardened Steels SKD61・STAVAX (~52HRC)					高硬度钢 Hardened Steels SKD11・ELMAX (~62HRC)					高速钢 High Speed Steels SKH・HAP (~68HRC)				
外径 Dia.	角半径 Corner Radius	颈长 Under Neck Length	L(颈长) /D(外径) L/D	主轴 转速 Spindle Speed	进给 速度 Feed	切深量 Depth of Cut		使用此 刀具前 的余量 Stock before using this tool	主轴 转速 Spindle Speed	进给 速度 Feed	切深量 Depth of Cut		使用此 刀具前 的余量 Stock before using this tool	主轴 转速 Spindle Speed	进给 速度 Feed	切深量 Depth of Cut		使用此 刀具前 的余量 Stock before using this tool
				min ⁻¹	mm/min	ap mm	ae mm	mm	min ⁻¹	mm/min	ap mm	ae mm	mm	min ⁻¹	mm/min	ap mm	ae mm	mm
0.1	R0.01	0.2	2	50,000	320	0.002	0.015	0.002	50,000	240	0.002	0.010	0.002	50,000	120	0.001	0.010	0.002
		0.3	3	50,000	240	0.001	0.010	0.002	50,000	160	0.001	0.008	0.002	50,000	60	0.001	0.008	0.002
		0.5	5	50,000	200	0.001	0.010	0.002	50,000	140	0.001	0.008	0.002	50,000	50	0.001	0.008	0.002
	R0.02	0.2	2	50,000	400	0.002	0.015	0.002	50,000	300	0.002	0.010	0.002	50,000	200	0.001	0.010	0.002
		0.3	3	50,000	300	0.001	0.010	0.002	50,000	200	0.001	0.008	0.002	50,000	100	0.001	0.008	0.002
		0.5	5	50,000	260	0.001	0.010	0.002	50,000	180	0.001	0.008	0.002	50,000	80	0.001	0.008	0.002
0.15	R0.02	0.2	1.3	50,000	500	0.003	0.020	0.002	50,000	400	0.003	0.020	0.002	50,000	300	0.002	0.015	0.002
		0.3	2	50,000	500	0.003	0.020	0.002	50,000	400	0.003	0.020	0.002	50,000	300	0.002	0.015	0.002
		0.5	3.3	50,000	400	0.002	0.015	0.002	50,000	300	0.002	0.015	0.002	50,000	200	0.001	0.010	0.002
	R0.03	0.2	1.3	50,000	500	0.003	0.020	0.002	50,000	400	0.003	0.020	0.002	50,000	300	0.002	0.015	0.002
		0.3	2	50,000	500	0.003	0.020	0.002	50,000	400	0.003	0.020	0.002	50,000	300	0.002	0.015	0.002
		0.5	3.3	50,000	400	0.002	0.015	0.002	50,000	300	0.002	0.015	0.002	50,000	200	0.001	0.010	0.002
0.2	R0.02	0.3	1.5	50,000	800	0.003	0.030	0.002	50,000	700	0.003	0.030	0.002	50,000	500	0.002	0.020	0.002
		0.5	2.5	50,000	600	0.003	0.030	0.002	50,000	500	0.003	0.030	0.002	50,000	400	0.002	0.020	0.002
		0.75	3.8	50,000	400	0.002	0.020	0.002	50,000	400	0.002	0.020	0.002	50,000	200	0.001	0.010	0.002
		1	5	50,000	360	0.002	0.020	0.002	50,000	360	0.002	0.020	0.002	50,000	180	0.001	0.010	0.002
	R0.03	0.3	1.5	50,000	800	0.003	0.030	0.002	50,000	700	0.003	0.030	0.002	50,000	500	0.002	0.020	0.002
		0.5	2.5	50,000	600	0.003	0.030	0.002	50,000	500	0.003	0.030	0.002	50,000	400	0.002	0.020	0.002
		0.75	3.8	50,000	400	0.002	0.020	0.002	50,000	400	0.002	0.020	0.002	50,000	200	0.001	0.010	0.002
		1	5	50,000	360	0.002	0.020	0.002	50,000	360	0.002	0.020	0.002	50,000	180	0.001	0.010	0.002
0.3	R0.02	0.5	1.7	50,000	1,000	0.003	0.050	0.003	50,000	800	0.003	0.050	0.003	50,000	600	0.002	0.030	0.002
		1	3.3	50,000	800	0.002	0.030	0.003	50,000	600	0.002	0.030	0.003	50,000	400	0.001	0.020	0.002
		1.5	5	50,000	600	0.002	0.030	0.003	50,000	500	0.002	0.030	0.003	50,000	360	0.001	0.020	0.002
		2	6.7	50,000	600	0.002	0.030	0.003	50,000	500	0.002	0.030	0.003	50,000	360	0.001	0.020	0.002
	R0.03	0.5	1.7	50,000	1,000	0.003	0.050	0.003	50,000	800	0.003	0.050	0.003	50,000	600	0.002	0.030	0.002
		1	3.3	50,000	800	0.002	0.030	0.003	50,000	600	0.002	0.030	0.003	50,000	400	0.001	0.020	0.002
		1.5	5	50,000	600	0.002	0.030	0.003	50,000	500	0.002	0.030	0.003	50,000	360	0.001	0.020	0.002
		2	6.7	50,000	600	0.002	0.030	0.003	50,000	500	0.002	0.030	0.003	50,000	360	0.001	0.020	0.002
0.4	R0.02	0.5	1.3	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1	2.5	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1.5	3.8	50,000	1,000	0.004	0.050	0.004	50,000	800	0.004	0.050	0.004	50,000	600	0.002	0.020	0.003
		2	5	50,000	800	0.004	0.050	0.004	50,000	700	0.004	0.050	0.004	50,000	500	0.002	0.020	0.003
	R0.03	0.5	1.3	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1	2.5	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1.5	3.8	50,000	1,000	0.004	0.050	0.004	50,000	800	0.004	0.050	0.004	50,000	600	0.002	0.020	0.003
		2	5	50,000	800	0.004	0.050	0.004	50,000	700	0.004	0.050	0.004	50,000	500	0.002	0.020	0.003
	R0.05	0.5	1.3	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1	2.5	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1.5	3.8	50,000	1,000	0.004	0.050	0.004	50,000	800	0.004	0.050	0.004	50,000	600	0.002	0.020	0.003
		2	5	50,000	800	0.004	0.050	0.004	50,000	700	0.004	0.050	0.004	50,000	500	0.002	0.020	0.003
	R0.1	0.5	1.3	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1	2.5	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1.5	3.8	50,000	1,000	0.004	0.050	0.004	50,000	800	0.004	0.050	0.004	50,000	600	0.002	0.020	0.003
		2	5	50,000	800	0.004	0.050	0.004	50,000	700	0.004	0.050	0.004	50,000	500	0.002	0.020	0.003
0.5	R0.02	0.5	1	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.004	50,000	1,000	0.003	0.100	0.003
		1	2	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.004	50,000	1,000	0.003	0.100	0.003
		1.5	3	50,000	1,200	0.004	0.100	0.005	50,000	1,000	0.004	0.100	0.004	50,000	800	0.002	0.050	0.003
		2.5	5	50,000	1,000	0.004	0.100	0.005	50,000	800	0.004	0.100	0.004	50,000	700	0.002	0.050	0.003
	R0.03	0.5	1	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.004	50,000	1,000	0.003	0.100	0.003
		1	2	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.004	50,000	1,000	0.003	0.100	0.003
		1.5	3	50,000	1,200	0.004	0.100	0.005	50,000	1,000	0.004	0.100	0.004	50,000	800	0.002	0.050	0.003
		2.5	5	50,000	1,000	0.004	0.100	0.005	50,000	800	0.004	0.100	0.004	50,000	700	0.002	0.050	0.003

切削参数参考表 Recommended Conditions

加工材料 Work Material				高硬度钢 Hardened Steels SKD61・STAVAX (~52HRC)					高硬度钢 Hardened Steels SKD11・ELMAX (~62HRC)					高速钢 High Speed Steels SKH・HAP (~68HRC)				
外径 Dia.	角半径 Corner Radius	颈长 Under Neck Length	L(颈长) /D(外径) L/D	主轴 转速 Spindle Speed	进给 速度 Feed	切深量 Depth of Cut		使用此 刀具前 的余量 Stock before using this tool	主轴 转速 Spindle Speed	进给 速度 Feed	切深量 Depth of Cut		使用此 刀具前 的余量 Stock before using this tool	主轴 转速 Spindle Speed	进给 速度 Feed	切深量 Depth of Cut		使用此 刀具前 的余量 Stock before using this tool
				min ⁻¹	mm/min	ap mm	ae mm	mm	min ⁻¹	mm/min	ap mm	ae mm	mm	min ⁻¹	mm/min	ap mm	ae mm	mm
0.5	R0.05	0.5	1	50,000	1,400	0.010	0.200	0.005	50,000	1,200	0.010	0.200	0.005	50,000	1,000	0.005	0.150	0.004
		1	2	50,000	1,400	0.010	0.200	0.005	50,000	1,200	0.010	0.200	0.005	50,000	1,000	0.005	0.150	0.004
		1.5	3	50,000	1,200	0.008	0.100	0.005	50,000	1,000	0.008	0.100	0.005	50,000	800	0.004	0.100	0.004
		2.5	5	50,000	1,000	0.008	0.100	0.005	50,000	800	0.008	0.100	0.005	50,000	700	0.004	0.050	0.004
	R0.1	0.5	1	50,000	1,600	0.020	0.200	0.005	50,000	1,600	0.020	0.200	0.005	50,000	1,400	0.010	0.150	0.004
		1	2	50,000	1,600	0.020	0.200	0.005	50,000	1,600	0.020	0.200	0.005	50,000	1,400	0.010	0.150	0.004
		1.5	3	50,000	1,400	0.015	0.100	0.005	50,000	1,400	0.015	0.100	0.005	50,000	1,200	0.008	0.100	0.004
		2.5	5	50,000	1,200	0.015	0.100	0.005	50,000	1,200	0.015	0.100	0.005	50,000	1,000	0.008	0.050	0.004
0.6	R0.02	1	1.7	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.005	50,000	1,000	0.003	0.100	0.003
		1.5	2.5	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.005	50,000	1,000	0.003	0.100	0.003
		2.5	4.2	50,000	1,200	0.004	0.100	0.005	50,000	1,000	0.004	0.100	0.005	50,000	800	0.002	0.050	0.003
	R0.05	1	1.7	50,000	1,400	0.010	0.200	0.006	50,000	1,200	0.010	0.200	0.005	50,000	1,000	0.005	0.150	0.004
		1.5	2.5	50,000	1,400	0.010	0.200	0.006	50,000	1,200	0.010	0.200	0.005	50,000	1,000	0.005	0.100	0.004
		2.5	4.2	50,000	1,200	0.008	0.100	0.006	50,000	1,000	0.008	0.100	0.005	50,000	800	0.004	0.050	0.004
	R0.1	1	1.7	50,000	2,000	0.020	0.200	0.006	50,000	2,000	0.020	0.200	0.005	50,000	1,400	0.010	0.150	0.004
		1.5	2.5	50,000	2,000	0.020	0.200	0.006	50,000	2,000	0.020	0.200	0.005	50,000	1,400	0.010	0.100	0.004
0.8	R0.05	2	2.5	50,000	2,000	0.020	0.300	0.008	50,000	2,000	0.020	0.200	0.007	42,000	1,400	0.010	0.100	0.006
		4	5	50,000	1,600	0.015	0.200	0.008	50,000	1,600	0.015	0.100	0.007	42,000	1,200	0.008	0.050	0.006
	R0.1	2	2.5	50,000	2,800	0.020	0.300	0.008	50,000	2,400	0.020	0.200	0.007	42,000	2,000	0.010	0.100	0.006
		4	5	50,000	2,400	0.015	0.200	0.008	50,000	2,000	0.015	0.100	0.007	42,000	1,600	0.008	0.050	0.006
1	R0.02	2	2	48,000	1,600	0.005	0.400	0.005	48,000	1,600	0.005	0.300	0.005	40,000	1,200	0.005	0.200	0.004
		3	3	48,000	1,400	0.004	0.300	0.005	48,000	1,400	0.004	0.200	0.005	40,000	1,000	0.004	0.100	0.004
		5	5	48,000	1,200	0.004	0.300	0.005	48,000	1,200	0.004	0.200	0.005	40,000	800	0.004	0.100	0.004
	R0.03	2	2	48,000	1,600	0.005	0.400	0.007	48,000	1,600	0.005	0.300	0.006	40,000	1,200	0.005	0.200	0.005
		3	3	48,000	1,400	0.004	0.300	0.007	48,000	1,400	0.004	0.200	0.006	40,000	1,000	0.004	0.100	0.005
		5	5	48,000	1,200	0.004	0.300	0.007	48,000	1,200	0.004	0.200	0.006	40,000	800	0.004	0.100	0.005
	R0.05	2	2	48,000	2,000	0.010	0.400	0.010	48,000	2,000	0.010	0.300	0.009	40,000	1,600	0.010	0.200	0.008
		3	3	48,000	1,800	0.008	0.300	0.010	48,000	1,800	0.008	0.200	0.009	40,000	1,400	0.008	0.100	0.008
		5	5	48,000	1,600	0.008	0.300	0.010	48,000	1,600	0.008	0.200	0.009	40,000	1,200	0.008	0.100	0.008
	R0.1	2	2	48,000	3,000	0.030	0.400	0.010	48,000	2,400	0.030	0.300	0.009	40,000	2,000	0.020	0.200	0.008
		3	3	48,000	2,600	0.020	0.300	0.010	48,000	2,200	0.020	0.200	0.009	40,000	1,800	0.015	0.100	0.008
		5	5	48,000	2,400	0.020	0.300	0.010	48,000	2,000	0.020	0.200	0.009	40,000	1,600	0.015	0.100	0.008
	R0.2	2	2	48,000	3,000	0.030	0.400	0.010	48,000	2,400	0.030	0.300	0.009	40,000	2,000	0.020	0.200	0.008
		3	3	48,000	2,600	0.020	0.300	0.010	48,000	2,200	0.020	0.200	0.009	40,000	1,800	0.015	0.100	0.008
		5	5	48,000	2,400	0.020	0.300	0.010	48,000	2,000	0.020	0.200	0.009	40,000	1,600	0.015	0.100	0.008
	1.5	R0.05	2	1.3	32,000	2,400	0.020	0.700	0.012	32,000	2,200	0.010	0.600	0.010	27,000	1,600	0.010	0.300
3			2	32,000	2,400	0.020	0.700	0.012	32,000	2,200	0.010	0.600	0.010	27,000	1,600	0.010	0.300	0.009
R0.1		2	1.3	32,000	4,000	0.040	0.700	0.015	32,000	3,000	0.040	0.600	0.013	27,000	2,400	0.020	0.300	0.011
		3	2	32,000	4,000	0.040	0.700	0.015	32,000	3,000	0.040	0.600	0.013	27,000	2,400	0.020	0.300	0.011
R0.2		2	1.3	32,000	4,000	0.040	0.700	0.015	32,000	3,000	0.040	0.600	0.013	27,000	2,400	0.020	0.300	0.011
		3	2	32,000	4,000	0.040	0.700	0.015	32,000	3,000	0.040	0.600	0.013	27,000	2,400	0.020	0.300	0.011
2	R0.05	4	2	24,000	2,000	0.020	0.800	0.012	24,000	2,000	0.010	0.700	0.010	20,000	1,600	0.010	0.500	0.009
		6	3	24,000	1,800	0.015	0.600	0.012	24,000	1,800	0.008	0.500	0.010	20,000	1,400	0.008	0.300	0.009
		10	5	24,000	1,600	0.015	0.600	0.012	24,000	1,600	0.008	0.500	0.010	20,000	1,200	0.008	0.300	0.009
	R0.1	4	2	24,000	4,000	0.050	0.800	0.015	24,000	3,000	0.050	0.700	0.013	20,000	2,400	0.020	0.500	0.011
		6	3	24,000	3,600	0.030	0.600	0.015	24,000	2,800	0.030	0.500	0.013	20,000	2,200	0.015	0.300	0.011
		10	5	24,000	3,200	0.030	0.600	0.015	24,000	2,600	0.030	0.500	0.013	20,000	2,000	0.015	0.300	0.011
	R0.2	4	2	24,000	4,000	0.050	0.800	0.015	24,000	3,000	0.050	0.700	0.013	20,000	2,400	0.020	0.500	0.011
		6	3	24,000	3,600	0.030	0.600	0.015	24,000	2,800	0.030	0.500	0.013	20,000	2,200	0.015	0.300	0.011
10	5	24,000	3,200	0.030	0.600	0.015	24,000	2,600	0.030	0.500	0.013	20,000	2,000	0.015	0.300	0.011		

加工材料 Work Material				高硬度钢 Hardened Steels SKD61・STAVAX (~52HRC)					高硬度钢 Hardened Steels SKD11・ELMAX (~62HRC)					高速钢 High Speed Steels SKH・HAP (~68HRC)					
外径 Dia.	角半径 Corner Radius	颈长 Under Neck Length	L(颈长) /D(外径) L/D	主轴 转速 Spindle Speed	进给 速度 Feed	切深量 Depth of Cut		使用此 刀具前 的余量 Stock before using this tool	主轴 转速 Spindle Speed	进给 速度 Feed	切深量 Depth of Cut		使用此 刀具前 的余量 Stock before using this tool	主轴 转速 Spindle Speed	进给 速度 Feed	切深量 Depth of Cut		使用此 刀具前 的余量 Stock before using this tool	
				min ⁻¹	mm/min	ap mm	ae mm	mm	min ⁻¹	mm/min	ap mm	ae mm	mm	min ⁻¹	mm/min	ap mm	ae mm	mm	
2	R0.3	4	2	24,000	4,000	0.050	0.800	0.015	24,000	3,000	0.050	0.700	0.013	20,000	2,400	0.020	0.500	0.011	
		6	3	24,000	3,600	0.030	0.600	0.015	24,000	2,800	0.030	0.500	0.013	20,000	2,200	0.015	0.300	0.011	
		10	5	24,000	3,200	0.030	0.600	0.015	24,000	2,600	0.030	0.500	0.013	20,000	2,000	0.015	0.300	0.011	
	R0.5	4	2	24,000	4,000	0.050	0.800	0.015	24,000	3,000	0.050	0.700	0.013	20,000	2,400	0.020	0.500	0.011	
		6	3	24,000	3,600	0.030	0.600	0.015	24,000	2,800	0.030	0.500	0.013	20,000	2,200	0.015	0.300	0.011	
		10	5	24,000	3,200	0.030	0.600	0.015	24,000	2,600	0.030	0.500	0.013	20,000	2,000	0.015	0.300	0.011	
3	R0.05	6	2	22,000	3,000	0.030	1.000	0.012	20,000	2,600	0.020	0.850	0.010	17,000	1,800	0.015	0.600	0.009	
		9	3	22,000	2,600	0.020	0.850	0.012	20,000	2,400	0.015	0.700	0.010	17,000	1,600	0.010	0.500	0.009	
		15	5	22,000	2,400	0.020	0.850	0.012	20,000	2,200	0.015	0.700	0.010	17,000	1,400	0.010	0.500	0.009	
	R0.1	6	2	22,000	4,000	0.050	1.000	0.015	20,000	3,500	0.040	0.850	0.013	17,000	2,200	0.020	0.600	0.011	
		9	3	22,000	3,600	0.030	0.850	0.015	20,000	3,200	0.030	0.700	0.013	17,000	2,000	0.015	0.500	0.011	
		15	5	22,000	3,200	0.030	0.850	0.015	20,000	2,800	0.030	0.700	0.013	17,000	1,800	0.015	0.500	0.011	
	R0.2	6	2	22,000	4,000	0.050	1.000	0.015	20,000	3,500	0.040	0.850	0.013	17,000	2,200	0.020	0.600	0.011	
		9	3	22,000	3,600	0.030	0.850	0.015	20,000	3,200	0.030	0.700	0.013	17,000	2,000	0.015	0.500	0.011	
		15	5	22,000	3,200	0.030	0.850	0.015	20,000	2,800	0.030	0.700	0.013	17,000	1,800	0.015	0.500	0.011	
	R0.3	6	2	22,000	4,000	0.050	1.000	0.015	20,000	3,500	0.040	0.850	0.013	17,000	2,200	0.020	0.600	0.011	
		9	3	22,000	3,600	0.030	0.850	0.015	20,000	3,200	0.030	0.700	0.013	17,000	2,000	0.015	0.500	0.011	
		15	5	22,000	3,200	0.030	0.850	0.015	20,000	2,800	0.030	0.700	0.013	17,000	1,800	0.015	0.500	0.011	
	备 注 Notes				※1 切深量的 ap 表示为轴向切深量, ae 表示步距量。 ※2 切削量是中精加工和精加工时的参考值。请根据机械刚性、要求精度和加工形状进行调整。 ※3 对于 Z 轴方向的切削进给方法,建议使用螺旋(Helical)及倾斜(Ramp)方式。 ※4 请注意本刀具使用前的状态(中精加工),以确保最终精加工的余量均匀。 ※5 发生振刀等情况时,请根据需要调整切深参数。 ※6 R 角等切削阻力大的部位, 请特别注意参数设定和刀路轨迹等。 ※7 进行高效率加工时,请以相同比率提升主轴转速和进给速度。 ※8 当机床的最高主轴转速低于以上参考值时,请以相同比率调整主轴转速和进给速度。 ※9 请尽量缩短刀具的伸出量。 ※10 建议使用油雾冷却方式。 ※11 加工的余量为参考值,请根据前一工序的加工状态和要求精度进行调整。														
					※1 Depth of Cut: ap=Axial Depth of Cut / ae=Radial Depth of Cut. ※2 Depth of Cut shows the reference value for semi-finishing and finishing. Adjust milling conditions depending on the rigidity of the machine, work shape and requested accuracy. ※3 Recommend to apply helical or ramping for approaching into axial direction. ※4 Be careful to obtain uniform stock amount on cutting surface before using this tool. ※5 In case of chattering etc., please adjust milling conditions if necessary. ※6 If the cutting load is high at corners, etc., set the milling conditions and tool path carefully to reduce the cutting load. ※7 Increase both spindle speed and feed at the same rate for high efficient machining. ※8 If the maximum spindle speed of the machine tool is lower than the reference value, please reduce the spindle speed and feed rate in the same proportion. ※9 Minimize a possible tool overhang length. ※10 We recommend using oil mist coolant. ※11 The stock allowance for this tool is a guideline, please adjust it according to the machining condition of the previous process and the required accuracy.														

使用注意事项

Points in Use

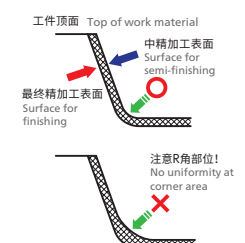
加工环境 Advice on Cutting Environment

- 刀具偏摆量越小越好。
Minimize the deflection of cutting edge.

- 掌握机床主轴的伸缩量以及机床的水平状态,需要时采取恰当的措施。
To understand the nature of the expansion of the main spindle and machine posture transformation, and take measures against them.

精加工量(余量) Advice on Finishing Allowance (stock amount)

- 使用小径CBN铣刀时,精加工量(余量)均匀性非常重要。
When using small CBN End Mill, uniform finishing allowance (stock amount) is important.
- 粗加工・中精加工使用刀具磨损过大时,中精加工和精加工的余量会变大,从而影响刀具寿命和加工精度,所以预加工时留有均匀的加工余量非常重要。
When tool is used on roughing and semi-finishing and it has a big abrasion, finishing allowance (stock amount) on semi-finishing and finishing is increasing and it affects tool life and cutting accuracy. Therefore, it is important to get uniform stock amount in the pre-stage cutting.



PD613 (57HRC) 格纹沟槽加工

PD613 (57HRC) Tartan Check Pattern Slotting

即使在切削负荷较高的高效率加工中, 较少的刀具磨损可实现长寿命加工与保持稳定的加工面品质

By using multi-flute tools, high efficient machining is realized with stable surface quality
Long tool life with minimal tool wear even when machining on difficult-to-cut materials

加工材料 : PD613 (57HRC)

Work material

工件尺寸 : 50 × 80 × 50 mm

Work size

最大加工深度 : 3 mm

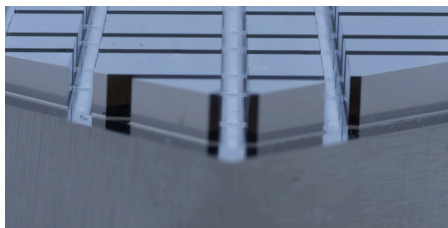
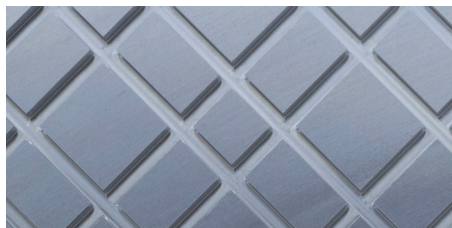
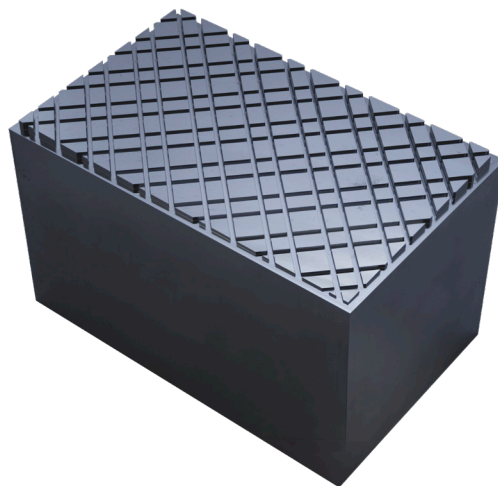
Maximum machining depth

冷却方式 : 油雾

Coolant : Oil mist

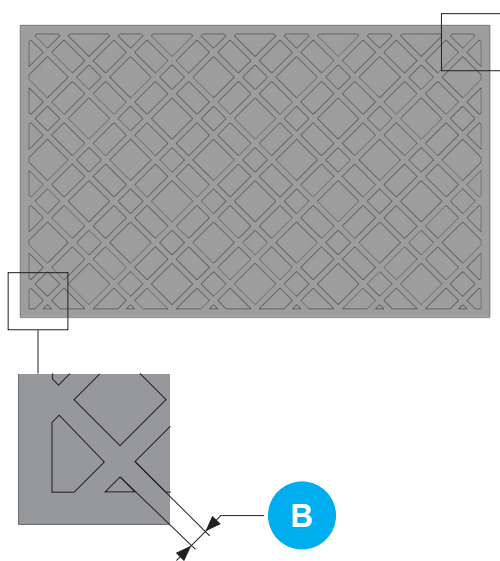
总加工时间 : 12 小时 16 分钟

Total machining time : 12 hr 16 min



加工工序 Process	侧面 Side	粗加工 Roughing	中精加工 Semi-finishing	精加工(上面) Finishing (Top)	沟槽 Slot	精加工(侧面) Finishing (Side)
使用刀具 Tool	MHDSH445 φ 3 × 6	MRBSH330 R1 × 3		SSR400 φ 1 × R0.1 × 3		
主轴转速 [min ⁻¹] Spindle speed	8,000	25,000		30,000		
进给速度 [mm/min] Feed	700	3,800	2,500	1,500		400
切深量 [mm] ap × ae Depth of cut	3 × 0.05	0.2 × 0.4	pf 0.05	pf 0.02	0.02	0.05 × 0.005
余量 Stock	-	0.05	0.005	-		
加工时间 Machining time	12 分钟 12 min	36 分钟 36 min	37 分钟 37 min	2 小时 18 分钟 2 hr 18 min	2 小时 50 分钟 2 hr 50 min	5 小时 43 分钟 5 hr 43 min

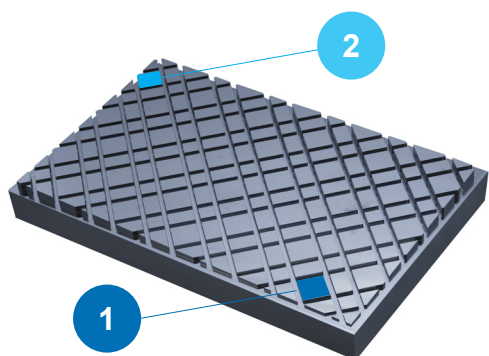
加工精度 Accuracy



单位 [mm]
Unit

测量位置 Measurement Position	目标值 Target	实际值 Actual	误差 Error
A 加工初期 Beginning	1.010	1.009	-0.001
B 加工后期 Ending		1.010	0

面粗度 Surface Roughness



测量位置 Measurement Position	加工面 Surface	面粗度 [μm] Surface roughness
1 加工初期 Beginning		Ra : 0.086 Rz : 0.628
2 加工后期 Ending		Ra : 0.108 Rz : 0.877

刀具磨损状态 Tool wear

加工工序 Process	粗加工、中精加工后 After roughing and semi-finishing		沟槽、精加工后 After slot finishing	
加工时间 Machining time	1 小时 13 分钟 1 hr 13 min		10 小时 51 分钟 10 hr 51 min	
使用刀具 Tool	MRBSH330 R1 × 3		SSR400 φ1 × R0.1 × 3	
	前刀面 Rake	先端部 End	前刀面 Rake	先端部 End
工具磨损状态 Tool wear				
最大磨损宽 Max. wear width	0.041mm		0.036mm	

日进工具株式会社

总公司・海外营业部

140-0014 东京都品川区大井1-28-1 住友不动产大井町站前大厦6 F
TEL. +81(3)-6423-1191 FAX. +81(3)-6423-1192
www.ns-tool.com

日进工具香港有限公司

香港九龙尖沙咀亚士厘道33号 九龙中心大厦10 楼1001-02室
TEL. +852-2736-8686 FAX. +852-2736-0070
www.ns-tool.com.en

日进工具香港有限公司 深圳代表处

广东省深圳市罗湖区人民南路2008号 深圳嘉里中心大厦1221室
TEL. +86(755)-2265-2275

日进工具香港有限公司 苏州办事处

江苏省苏州市工业园区星港街199号 东方之门大厦北楼22楼
TEL. +86(512)-6866-2275

www.ns-tool.com.cn (手机官网)



使用上的安全注意事项

Attention on Safety

- 1) 拿取刀具使用时, 请特别小心避免损坏刀刃。
- 2) 请勿空手触摸刀刃
- 3) 为了安全, 使用刀具时请佩戴护眼镜。
- 4) 选用适合刀具和实际加工内容的刀柄。刀柄装夹后将刀柄的偏摆量控制最低。
- 5) 加工工件必须固定好。
- 6) 请预先测量刀具及加工材料的尺寸。
- 7) 请根据工件形状和使用设备情况来调节切削参数。
- 8) 根据实际用途请选择适合的冷却方式。使用切削油时, 请采取防火措施以免发生火花引起火灾等发生。
- 9) 加工过程中如发生异常现象(异常声音或烟雾)时, 请立即停止机床。
- 10) 请勿改造刀具。

- 01) When removing tools from cases, be careful of getting-out of tools and don't touch the cutting edges directly.
- 02) Never touch the cutting edges directly with bare hand.
- 03) Use safety covers and eye protection, as tools may be broken.
- 04) Use holders, etc. that match the tools and nature of the processing operations.
- 04) The tool should be firmly attached to the holder to prevent shaking.
- 05) The work materials clamp firmly.
- 06) Make sure of dimensions of tools and work pieces before starting operation.
- 07) It is necessary to adjust conditions according to the dimensions of work materials and the machine.
- 08) Select a cutting fluid appropriate to the particular usage. Using a non-water cutting fluid could lead to fires due to sparks generated during processing or heat caused by breakage. Ensure that you take proper fire-prevention measures.
- 09) If abnormal sound, etc. occurs during processing, stop the machine immediately.
- 10) Don't modify tools.

