

CBN

CBN END MILL SERIES Vol.3

CBN 铣刀系列 Vol.3 **New** 中文版

日进工具株式会社

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最适合用于高硬度钢材长时间安定的精加工。

Suitable for long finishing operation in hardened steels

CBN 铣刀系列 CBN End Mill Series

采用CBN烧结体(硬度仅次于钻石)做为刀具刃口的母材。

利用CBN的高硬度和高耐氧化温度的特性制造出特殊的刃口形状, 实现了对高硬度钢材的超长时间加工和安定、高光、高精度的产品要求。

The hardness of CBN material is next to diamond which is adopted for the tool.

Unique tool design maximized the performance of CBN material as high hardness and high heat resistance.

Stable finishing surface and long tool life are realized on hardened steels.

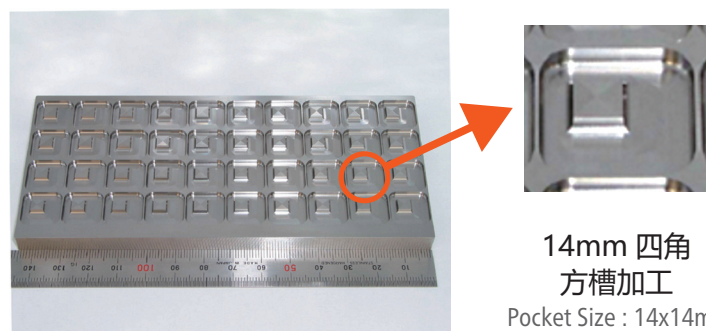


CBN 刀具和涂层刀具的寿命对比

Tool life comparison of CBN end mill and coated carbide end mill.

SKD11(60HRC) 精加工后面粗度对比验证 Comparison of finishing surface roughness on SKD11 60HRC.

(使用刀具: 球头铣刀 R0.5) Tool : Ball End Mill R0.5



14mm 四角
方槽加工
Pocket Size : 14x14mm

	CBN 刀具 CBN Tool	涂层刀具 Coated Tool
第 1 个 1st Pocket	0.9 μ m	1.0 μ m
第 10 个 10th Pocket	1.0 μ m	6.2 μ m
第 20 个 20th Pocket	1.2 μ m	—
第 30 个 30th Pocket	1.0 μ m	—

CBN 刀具加工30个方槽后依然能获得安定的加工面粗度!

CBN end mill continues to perform with stable finishing surface even after machining 30 pieces.

刀具可选性非常丰富, 可针对实际加工的形状来选定适用规格。

Selectable variation based on work profile.

平底铣刀 Square End Mill		球头铣刀 Ball End Mill				圆鼻铣刀 Radius End Mill			
SMEZ120 ϕ 0.03 ~ 0.1	SSE400 ϕ 0.1 SSE600 ϕ 0.2 ~ 1	SMB120 R0.01 ~ 0.05	SFB200 R0.1 ~ 1	SSPB220 R0.1 ~ 3 SSPBL220 SSPBTN220 R0.1 ~ 1	SSB200 R0.1 ~ 1 SSBL200 R0.05 ~ 1	SSR200 ϕ 0.1 ~ 2	SHR320 ϕ 0.5 ~ 2	SHPR400 ϕ 0.1 ~ 3	SSF120 ϕ 0.2 ~ 2 (平面加工用)
► P.4	► P.5	► P.7	► P.8	SSPB220 ► P.9 SSPBL220 ► P.10 SSPBTN220 ► P.11	SSB200 ► P.13 SSBL200 ► P.14	► P.22	► P.26	► P.27	► P.30

New

SHPR400

CBN超高精度圆鼻铣刀

CBN Super High Precision Radius End Mill

针对高硬度钢材进行精加工最适合的 CBN 铣刀!

The optimal choice of CBN end mill for finishing on hardened steels!

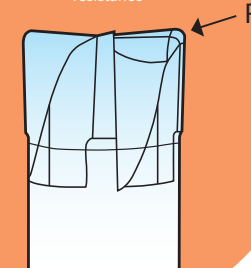
提升加工精度的新设计 4 刃圆鼻铣刀登场!

Cutting accuracy has leveled up by new designed 4-Flute corner radius end mills!

- 减轻切削阻力, 提高精加工精度的全新刀具设计!
New tool design has been developed to reduce the cutting resistance and upgrade the finishing accuracy!
- 从 ϕ 0.1 起采用 4 刃! 微细切削时实现高效率与稳定的刀具寿命!
Realized 4-Flute type from ϕ 0.1! Achieved higher efficient machining and more stable tool life in micro machining!
- 柄径公差在 -0.001mm ~ -0.003mm 的 2μ m 范围, 能对应超高精度热缩刀柄。
The shank diameter accuracy is 2μ m (-0.001 ~ -0.003), and also supports high precision shrink fit holders.
- 从 ϕ 0.1 到 ϕ 3, 共有 109 种规格。
Line up from ϕ 0.1 ~ ϕ 3, total 109 sizes.

减轻切削阻力的
全新刀刃造型

New tool design for reducing cutting
resistance



铣刀的选择决定了加工的结果!

Machining accuracy is determined by tool.

精度
Accuracy

- 外径公差为 0 ~ -0.005 ($D \leq 1$) / 0 ~ -0.007 ($D > 1$)
Diameter Tolerance 0 ~ -0.005 ($D \leq 1$) / 0 ~ -0.007 ($D > 1$)
- 角半径公差为 ± 0.002
Corner R Tolerance ± 0.002
- 刀柄径公差为 -0.001 ~ -0.003
Shank Tolerance -0.001 ~ -0.003

高精度设计!
High accuracy design!

形状
Shape

- 能实现减轻切削阻力减轻的刀刃设计
Tool design for reducing cutting resistance
- 从 ϕ 0.1起采用4刃设计
Adopting 4-Flute type from ϕ 0.1

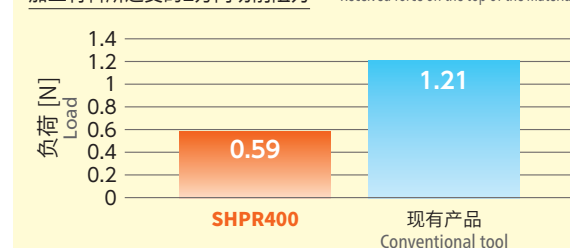
提升加工精度与加工速度!
Upgraded machining precision and speed!

减轻切削阻力的新刀刃形状

New tool design for reducing cutting resistance



加工材料所遭受的Z方向切削阻力 Received force on the top of the material



- 加工材料: DC53 60HRC Material: DC53 60HRC
- 冷却方式: 油雾 Coolant: Oil mist

使用刀具尺寸 Tool size	$\phi 1 \times R0.1 \times 3$
主轴转速 [min^{-1}] Spindle speed	40,000
进给速度 [mm/min] Feed	1,600
切深量 $a_p \times a_e$ [mm] Depth of cut	0.02 $\times$ 0.1

加工精度能提升!

Upgraded machining accuracy!

与其他公司相同刀具寿命比较

Comparison to other brand

- 加工材料: DC53 60HRC Material: DC53 60HRC
- 冷却方式: 油雾 Coolant: Oil mist

使用刀具尺寸 Tool size	$\phi 1 \times R0.1 \times 3$
主轴转速 [min^{-1}] Spindle speed	40,000
进给速度 [mm/min] Feed	1,600
切深量 $a_p \times a_e$ [mm] Depth of cut	0.02 $\times$ 0.1

精加工后的刀具磨损状态
Finishing tool wear

	SHPR400	其他公司 Other brand
底刃 End profile	 加工 8 个小时后还能继续加工 Available to continuous use after 8 hours machining	 加工约 7 个小时后崩损 Breakage after 7 hours machining
外周刃 Peripheral flute		

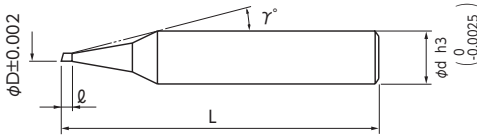
提高精加工效率的同时, 还能保护刀尖。

New tool design realized high efficient finishing, but protect cutting edge!

SMEZ120

获得专利 PAT. No. 5177982

超微细加工用CBN平底铣刀 “Micro Edge Z”
CBN “MICRO EDGE Z”



- NS的加工技术与精选CBN材质的完美结合而产生的锋利刀刃。
- 外径精度 $\pm 2\mu\text{m}$ 。
- 柄径公差 h3 (0 ~ -0.0025)。
- NS engineering technology and selected CBN material realize sharp edge.
- Tolerance of flute diameter is $\pm 2\mu\text{m}$.
- Tolerance of shank diameter is h3 (0 ~ -0.0025).



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

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

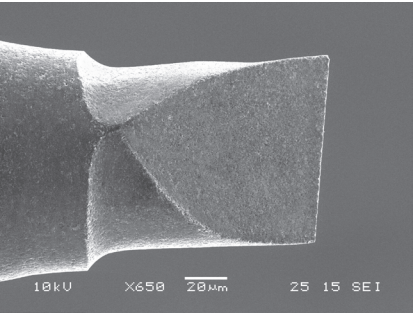
产品代码 Code No.	(D)外径 Dia.	(ℓ)刃长 Length of Cut	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00480-00030	0.03	0.03	15°	4	50	60,000
01-00480-00040	0.04	0.04	15°	4	50	50,000
01-00480-00050	0.05	0.05	15°	4	50	45,000
01-00480-00060	0.06	0.06	15°	4	50	42,000
01-00480-00070	0.07	0.07	15°	4	50	42,000
01-00480-00080	0.08	0.08	15°	4	50	39,000
01-00480-00090	0.09	0.09	15°	4	50	39,000
01-00480-00100	0.1	0.1	15°	4	50	34,000

订购方法

请指定SMEZ120 外径(D)。
When you order, indicate SMEZ120 (D).

※(γ)为参考值。
※(γ) is reference value.

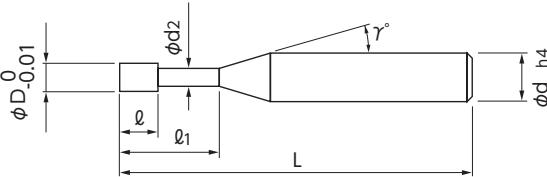
SMEZ120



CBN Micro Edge Z 独特的刀刃形状(PAT.P)
CBN Micro Edge Z original flute design.

SSE400

CBN超精加工用平底铣刀
CBN Square End Mill



- 可进行高硬度钢材的内角棱边部位的加工。
- 采用NS独创的多刃形状,提高了耐磨损性能!
- Possible to machine the corner edge of hardened steels.
- Intensified wear resistance by NS original design of cutting edge.



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		○	◎	◎					

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

产品代码 Code No.	(D)外径 Dia.	(ℓ ₁)颈长 Effective Length	(ℓ)刃长 Length of Cut	(d ₂)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00440-01002	0.1	0.2	0.04	0.075	15°	4	53	33,000
01-00440-01005		0.5	0.04	0.08	15°	4	53	35,000

订购方法

请指定SSE400 外径(D)×颈长(ℓ₁)。
When you order, indicate SSE400 (D)×(ℓ₁).

※(γ)为参考值。
※(γ) is reference value.

●切削参数参考表在P.6记载

●Recommended Milling Conditions are shown on page P.6.

SSE600

CBN超精加工用平底铣刀
CBN Square End Mill

- 可进行高硬度材的内角棱边部位的加工。
- 采用NS独创的多刃形状,提高了耐磨损性能!
- Possible to machine the corner edge of hardened steels.
- Intensified wear resistance by NS original design of cutting edge!

加工案例
Work Sample Data P.6



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		○	◎	◎					

★返修对应(柄长须在15mm以上。详情请咨询本公司。)

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

产品代码 Code No.	(D)外径 Dia.	(ℓ ₁)颈长 Effective Length	(ℓ)刃长 Length of Cut	(d ₂)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00450-02004	0.2	0.4	0.08	0.175	15°	4	53	31,000
01-00450-02010		1	0.08	0.175	15°	4	53	32,500
01-00450-03005	0.3	0.5	0.12	0.275	15°	4	49	31,000
01-00450-03015		1.5	0.12	0.275	15°	4	50	32,000
01-00450-04008	0.4	0.8	0.16	0.37	15°	4	49	29,500
01-00450-04020		2	0.16	0.37	15°	4	50	31,000
★01-00450-05010	0.5	1	0.2	0.46	15°	4	49	25,600
★01-00450-05025		2.5	0.2	0.46	15°	4	50	28,000
★01-00450-06012	0.6	1.2	0.24	0.56	15°	4	49	25,600
★01-00450-06030		3	0.24	0.56	15°	4	50	28,000
★01-00450-08015	0.8	1.5	0.32	0.76	15°	4	49	25,600
★01-00450-08040		4	0.32	0.76	15°	4	52	28,000
★01-00450-10020	1	2	0.4	0.95	15°	4	49	23,000
★01-00450-10050		5	0.4	0.95	15°	4	52	25,400

订购方法

请指定SSE600 外径(D)×颈长(ℓ₁)。
When you order, indicate SSE600 (D)×(ℓ₁).

※(γ)为参考值。
※(γ) is reference value.

●切削参数参考表在P.6记载

●Recommended Milling Conditions are shown on page P.6.

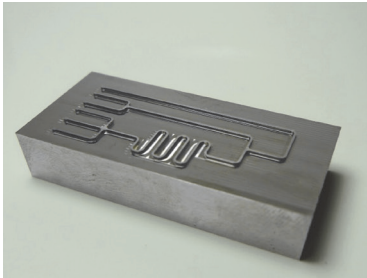
SSE400・SSE600

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material		高硬度钢 Hardened Steels HPM-38・STAVAX・SKD61 (~55HRC)				高硬度钢 Hardened Steels SKD11 (~62HRC)				高速钢 High Speed Tool Steels SKH (~65HRC)			
(D)外径 Dia.	颈长 Effective Length	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
		ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹
0.1	0.2	0.001	0.002	250	40,000	0.001	0.002	200	40,000	0.001	0.002	150	40,000
	0.5	0.001	0.002	200	40,000	0.001	0.002	150	40,000	0.001	0.001	100	40,000
0.2	0.4	0.003	0.002	400	40,000	0.002	0.002	300	40,000	0.002	0.002	200	40,000
	1	0.003	0.002	300	40,000	0.002	0.002	200	40,000	0.002	0.002	100	40,000
0.3	0.5	0.005	0.003	600	40,000	0.004	0.003	400	40,000	0.003	0.003	400	40,000
	1.5	0.005	0.002	500	40,000	0.004	0.002	300	40,000	0.003	0.002	200	40,000
0.4	0.8	0.007	0.004	700	40,000	0.005	0.003	600	40,000	0.003	0.003	600	40,000
	2	0.007	0.003	600	40,000	0.005	0.002	400	40,000	0.003	0.002	400	40,000
0.5	1	0.01	0.005	800	40,000	0.007	0.003	700	40,000	0.005	0.003	600	40,000
	2.5	0.01	0.004	800	40,000	0.007	0.002	500	40,000	0.005	0.002	400	40,000
0.6	1.2	0.01	0.005	800	40,000	0.007	0.003	700	40,000	0.005	0.003	600	40,000
	3	0.01	0.004	800	40,000	0.007	0.002	500	40,000	0.005	0.002	400	40,000
0.8	1.5	0.01	0.005	800	40,000	0.007	0.004	800	40,000	0.005	0.004	700	40,000
	3.5	0.01	0.004	800	40,000	0.007	0.003	600	40,000	0.005	0.003	500	40,000
1	2	0.01	0.006	800	40,000	0.007	0.006	800	40,000	0.005	0.006	800	40,000
	5	0.01	0.005	800	40,000	0.007	0.005	600	40,000	0.005	0.005	600	40,000
备注 Notes		※切深量是指进行等高线精加工时的最大值。 ※切深量的 ap 表示轴向切入量, ae 表示步距量。 ※建议使用油雾冷却方式。 ※请根据需要控制刀具的伸出量。 ※请尽量抑制刀具的偏摆量。(可能的话,请确认所用主轴转速下的动态跳动精度。) ※进行底面精加工时,进给速度请取切削参数参考表的约 50%,切深量 ap 取 φ0.1 : 0.001mm, φ0.2・φ0.3 : ~ 0.002mm, φ0.4 ~ φ1 : ~ 0.003mm,切深量 ae 取外径 ×0.05mm 作为参考值。 ※Depth of Cut is the maximum effective value for the contour line tool path. ※ap: Axial Depth of Cut, ae: Radial Depth of Cut. ※Recommended oil mist coolant. ※Minimize a possible tool overhang length. ※Minimize chucking runout. (Recommend to measure actual runout of activated spindle speed.) ※For the reference value, when finishing process of bottom surface, reduce the feed approx. 50% of the recommended milling conditions and Depth of Cut (ap): 0.001mm for Dia. 0.1mm, up to 0.002mm for Dia. 0.2mm and 0.3mm, for Dia. 0.4 to 1mm, up to 0.003mm, (ae): Dia. x 0.05mm.											

加工案例 1 Work Sample Data 1

微流道模具 Flow Channel Model



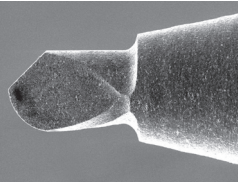
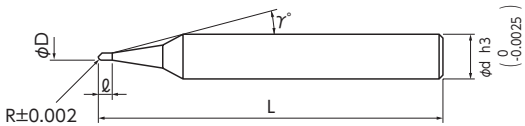
工件尺寸:40×20mm (加工深度0.5mm)
Work size:40×20mm Cutting depth:0.5mm

- 加工材料: HAP40 64HRC Material: HAP40 64HRC
- 冷却方式: 油雾 Coolant: Oil mist
- 总加工时间: 7 小时 30 分钟 Total cutting time: 7hr 30min

加工工序 Process	预加工 Pre-roughing	粗加工 (2支) Roughing (2 pcs)	中精加工 Semi-finishing	等高线精加工 Contour line finishing	底面精加工 Bottom finishing
使用刀具 Tool	MHRH430 φ2.5×8	MHRH430 φ1×4	SSR200 φ1×R0.02×1	SSE600	φ1×2
主轴转速 [min ⁻¹] Spindle speed	8,000	20,000	30,000		
进给速度 [mm/min] Feed	1,000		600	300	90
切深量 ap×ae[mm] Depth of cut	0.03×0.75	0.02×0.3	0.005×0.01~0.05	0.005×0.005	0.001×0.5
加工时间 Cutting time	13分钟 13min	1小时44分钟 1hr44min	1小时18分钟 1hr18min	4小时15分钟 4hr15min	

SMB120

超微细加工用CBN球头铣刀 “CBN Micro Ball”
CBN Ball End Mill for precision machining “CBN Micro Ball”



- 世界首创! CBN 材质的微型球头铣刀。
- 开拓精细切削加工的新领域。
- 球头半径从 R0.01 起实现标准化。
- 最大限度发挥 CBN 材质的特长,刀刃锋利。
- 从调质钢到高硬度钢材 (60HRC 以上),均可长时间加工。
- The world's first CBN Micro Ball End Mill.
- CBN Micro Ball develops new machining capability in high-precision technology.
- Standardized sizes from R0.01.
- Realized sharp edge by maximizing features of CBN.
- Long machining on pre-hardened to high-hardened steels (60HRC~).

加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

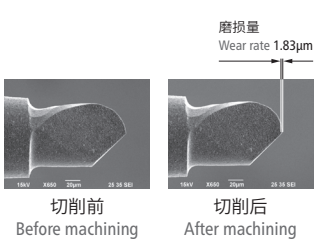
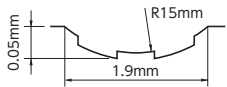
单位[规格:mm / 价格:日元] Unit [size : mm / Retail Price : JPY]

产品代码 Code No.	(R)球头半径 Radius	(L)刃长 Length of Cut	(D)外径 Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00460-00010	R0.01	0.02	0.02	15°	4	50	72,000
01-00460-00015	R0.015	0.03	0.03	15°	4	50	62,000
01-00460-00020	R0.02	0.04	0.04	15°	4	50	51,600
01-00460-00025	R0.025	0.05	0.05	15°	4	50	47,400
01-00460-00030	R0.03	0.06	0.06	15°	4	50	43,200
01-00460-00040	R0.04	0.08	0.08	15°	4	50	39,600
01-00460-00050	R0.05	0.1	0.1	15°	4	50	36,000

- 订购方法** 请指定SMB120 球头半径(R)。 When you order, indicate SMB120 (R). ※(γ)为参考值。 ※(γ) is reference value.
- 切削参数参考表在P.15记载
 - Recommended Milling Conditions are shown on page P.15.

加工案例 1 Work Sample Data 1

NS 文字加工 NS Logo



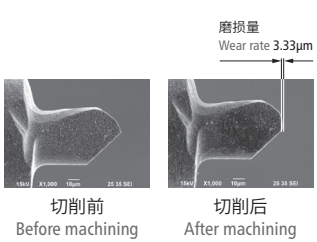
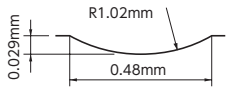
- 加工材料: STAVAX 52HRC Material: STAVAX 52HRC
- 冷却方式: 油雾 Coolant: Oil mist
- 总加工时间: 1 小时 50 分钟 Total cutting time: 1hr 50min

加工工序 Cutting process	粗加工 Roughing	精加工 Finishing
使用刀具 Tools	SMB120 R0.05	
主轴转速 [min ⁻¹] Spindle speed	80,000	
进给速度 [mm/min] Feed	200	50
切深量 ap×ae[μm] Depth of cut	2×5	2×2
加工长度 Cutting length	7.7m	

- 粗加工和精加工使用同一刀具进行。 Full process done by one tool.

加工案例 2 Work Sample Data 2

透镜阵列模型 Lens Array Model



- 加工材料: PD613 60HRC Material: PD613 60HRC
- 冷却方式: 油雾 Coolant: Oil mist
- 总加工时间: 4 小时 Total cutting time: 4hr

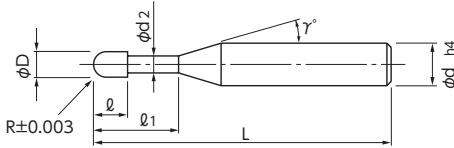
加工工序 Cutting process	粗加工 Roughing	精加工 Finishing
使用刀具 Tools	SMB120 R0.03	
主轴转速 [min ⁻¹] Spindle speed	80,000	
进给速度 [mm/min] Feed	50	30
切深量 ap×ae[μm] Depth of cut	1×2	1×1
加工长度 Cutting length	10.4m	

- 粗加工和精加工使用同一刀具进行。 Full process done by one tool.

SFB200

CBN超精加工用球头铣刀
CBN Super Finish Ball End Mill

获得专利 PAT. No. 3759098



- 采用新开发的刀刃形状,从刀口到 R 中心部均具有超强的锋利度。
- 硬度 60HRC 的高硬度钢材可实现连续 10 小时以上的精加工。
- 加工面精度可长时间保持 Rz1.0μm。
- 大幅缩短模具的研磨抛光时间。
- Sharpened edge at R-center improves shearing ability.
- Continuous 10 hours machining on hardened steel of 60HRC.
- Long-lasting high surface accuracy Rz1.0μm.
- Save significant time at polishing process.



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

★返修对应 (柄长须在15mm以上。详情请咨询本公司。)

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

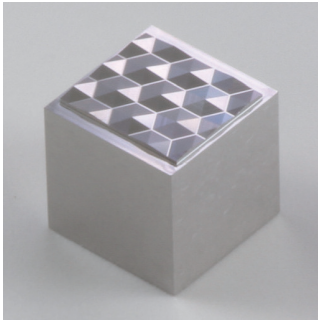
产品代码 Code No.	(R)球头半径 Radius	(L1)颈长 Effective Length	(L)刃长 Length of Cut	(D)外径 Dia.	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00500-00100	R0.1	0.5	0.15	0.2	0.19	12°	4	50	39,300
★ 01-00500-00200	R0.2	1	0.3	0.4	0.37	12°	4	50	36,000
★ 01-00500-00250	R0.25	1.25	0.38	0.5	0.46	12°	4	50	36,000
★ 01-00500-00300	R0.3	1.5	0.5	0.6	0.56	12°	4	50	32,900
★ 01-00500-00400	R0.4	2	0.6	0.8	0.76	12°	4	50	34,800
★ 01-00500-00500	R0.5	2.5	0.7	1	0.95	12°	4	50	31,700
★ 01-00500-00600	R0.6	3	0.8	1.2	1.15	12°	4	50	33,600
★ 01-00500-00700	R0.7	3.5	1	1.4	1.35	12°	4	52	35,800
★ 01-00500-00750	R0.75	3.8	1	1.5	1.45	12°	4	52	33,400
★ 01-00500-00800	R0.8	4	1	1.6	1.55	12°	4	52	35,300
★ 01-00500-00900	R0.9	4.5	1.2	1.8	1.75	12°	4	52	35,000
★ 01-00500-01000	R1	5	1.2	2	1.94	12°	4	52	30,000

订购方法

请指定SFB200 球头半径(R)。
When you order, indicate SFB200 (R).

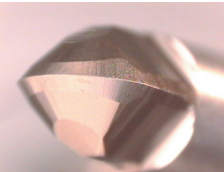
※(γ)为参考值。
※(γ) is reference value.

- 切削参数参考表在P.15记载
- Recommended Milling Conditions are shown on page P.15.



工件尺寸 : 长 20× 宽 20 (mm)
Work size : 20×20mm

SFB200



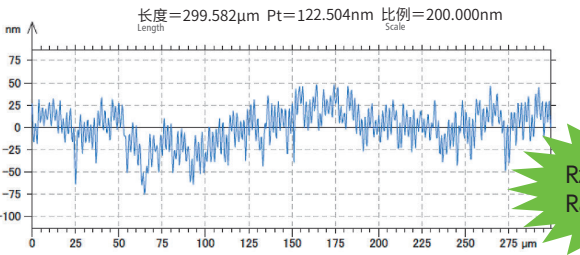
通过采用独创的刀刃设计,中心点也具有强力的切削性能。最适合于长时间的超精密精加工。
Sharp tooth edge guarantees long and consistent accuracy.

加工案例 1 Work Sample Data 1

反射板造型 Cutting Example 1 : Reflector

- 加工材料 : ELMAX 60HRC Material : ELMAX 60HRC
- 冷却方式 : 油雾 Coolant : Oil mist
- 总加工时间 : 19 小时 10 分钟 Total cutting time : 19hr 10min

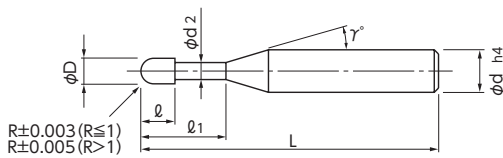
加工工序 Cutting process	粗加工 Roughing	中精加工 Semi-finishing	精加工 Finishing
使用刀具 Tool	MSBH230 R0.2	SSBL200 R0.2×1.2	SFB200 R0.2
主轴转速 [min ⁻¹] Spindle speed	40,000		
进给速度 [mm/min] Feed	800	700	400
切深量 ap×ae[mm] Depth of cut	0.015×0.05	0.005×0.01	0.004×0.002
加工时间 Cutting time	3小时23分钟 3hr 23min	2小时10分钟 2hr 10min	13小时37分钟 13hr 37min



Rz 79.6nm
Ra 13.1nm

SSPB220

CBN超精加工用螺旋球头铣刀
CBN Super Spiral Ball End Mill



- 采用螺旋球头形状,提高了刀刃的锋利度。
- 采用独特的刀刃形状,提高了耐崩刃性能。
- 外周刃与加工面接触,切削阻力增加会发生振刀,影响刀具的使用寿命和加工面的品质。通过采用增强型的倒锥形状,可以减轻该影响。
- 规格标准扩大到 R3,进一步扩展了加工范围。
- Adopted spiral ball shape to improve sharpness of cutting edge.
- Adopted cutting edge shape to improve the chipping resistance of cutting edge.
- When peripheral cutting edge makes contact with cutting surface, vibration occurs by an increase in cutting resistance and it affects tool life and cutting surface quality.The influence can be reduced by adoption of the strong back taper shape.
- Enlarged standard tool size up to R3 to extend application range.



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

★返修对应 (柄长须在15mm以上。详情请咨询本公司。)

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

产品代码 Code No.	(R)球头半径 Radius	(L1)颈长 Effective Length	(L)刃长 Length of Cut	(D)外径 Dia.	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00505-00101	R0.1	0.3	0.15	0.2	0.19	15°	4	50	30,500
01-00505-00100		0.6	0.15	0.2	0.19	15°	4	50	31,500
01-00505-00150	R0.15	0.3	0.23	0.3	0.28	15°	4	50	30,000
01-00505-00151		0.5	0.23	0.3	0.28	15°	4	50	30,500
01-00505-00152		0.75	0.23	0.3	0.28	15°	4	50	31,000
01-00505-00201	R0.2	0.5	0.3	0.4	0.37	15°	4	50	27,100
01-00505-00202		0.75	0.3	0.4	0.37	15°	4	50	27,600
01-00505-00203		1	0.3	0.4	0.37	15°	4	50	28,100
01-00505-00200		1.2	0.3	0.4	0.37	15°	4	50	28,600
01-00505-00251	R0.25	1	0.38	0.5	0.46	15°	4	50	28,100
★ 01-00505-00301	R0.3	1.2	0.5	0.6	0.56	15°	4	50	25,900
★ 01-00505-00300		1.5	0.5	0.6	0.56	15°	4	50	26,400
★ 01-00505-00401	R0.4	1.6	0.6	0.8	0.76	15°	4	50	25,900
★ 01-00505-00400		2	0.6	0.8	0.76	15°	4	50	26,400
★ 01-00505-00501	R0.5	2	0.7	1	0.95	15°	4	50	25,900
★ 01-00505-00500		2.5	0.7	1	0.95	15°	4	50	26,400
★ 01-00505-00601	R0.6	2.4	0.8	1.2	1.15	15°	4	50	27,000
★ 01-00505-00600		3	0.8	1.2	1.15	15°	4	50	27,500
★ 01-00505-00751	R0.75	3	1	1.5	1.45	15°	4	52	27,000
★ 01-00505-00750		3.8	1	1.5	1.45	15°	4	52	27,500
★ 01-00505-01000	R1	4	1.2	2	1.94	15°	4	52	27,500
★ 01-00505-01001		5	1.2	2	1.94	15°	4	52	27,500
★ 01-00505-01506	R1.5	6	1.8	3	2.85	12°	6	50	29,000
★ 01-00505-01509		9	1.8	3	2.85	12°	6	70	30,000
★ 01-00505-02008	R2	8	2.4	4	3.8	12°	6	50	35,000
★ 01-00505-02012		12	2.4	4	3.8	12°	6	70	36,000
★ 01-00505-02510	R2.5	10	3	5	4.8	12°	6	60	41,000
★ 01-00505-02515		15	3	5	4.8	12°	6	80	42,000
★ 01-00505-03012	R3	12	3.6	6	5.8	—	6	60	48,000
★ 01-00505-03018		18	3.6	6	5.8	—	6	80	49,000

订购方法

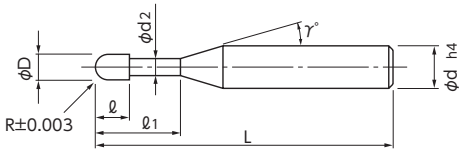
请指定SSPB220 球头半径(R)×颈长(L1)。
When you order, indicate SSPB220 (R)×(L1).

※(γ)为参考值。
※(γ) is reference value.

- 切削参数参考表在P.16记载
- Recommended Milling Conditions are shown on page P.16.

SSPBL220

CBN超精加工用长颈螺旋球头铣刀
CBN Super Spiral Long Neck Ball End Mill



- 进一步延长了 SSPB220 的颈长,规格实现了标准化。
- 采用兼具锋利度和耐崩刀性的螺旋球头形状以及较强的倒锥形状,在发挥 SSPB220 特长的同时能够对应深沟精加工。
- Added longer effective length type to SSPB220 series.
- Realized deeper milling by adoption of spiral ball shape and strong back taper shape to improve both sharpness and the chipping resistance of cutting edges.



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

★返修对应(柄长须在15mm以上。详情请咨询本公司。)

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

产品代码 Code No.	(R)球头半径 Radius	(Ø1)颈长 Effective Length	(Ø)刃长 Length of Cut	(D)外径 Dia.	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00506-00101	R0.1	1	0.15	0.2	0.19	15°	4	50	33,000
01-00506-00151	R0.15	0.9	0.23	0.3	0.28	15°	4	50	31,500
01-00506-00152		1.5	0.23	0.3	0.28	15°	4	50	31,500
01-00506-00201	R0.2	2	0.3	0.4	0.37	15°	4	50	30,000
01-00506-00202		3	0.3	0.4	0.37	15°	4	52	30,000
01-00506-00251	R0.25	1.5	0.38	0.5	0.46	15°	4	50	29,000
01-00506-00252		2.5	0.38	0.5	0.46	15°	4	50	29,000
01-00506-00253		3.5	0.38	0.5	0.46	15°	4	52	29,000
★ 01-00506-00301	R0.3	3	0.5	0.6	0.56	15°	4	50	28,000
★ 01-00506-00302		4	0.5	0.6	0.56	15°	4	53	28,000
★ 01-00506-00303		5	0.5	0.6	0.56	15°	4	53	28,500
★ 01-00506-00304		6	0.5	0.6	0.56	15°	4	53	28,500
★ 01-00506-00401	R0.4	4	0.6	0.8	0.76	15°	4	53	28,000
★ 01-00506-00402		6	0.6	0.8	0.76	15°	4	53	28,000
★ 01-00506-00501	R0.5	4	0.7	1	0.95	15°	4	51	28,000
★ 01-00506-00502		6	0.7	1	0.95	15°	4	53	28,000
★ 01-00506-00503		8	0.7	1	0.95	15°	4	53	28,500
★ 01-00506-00504		10	0.7	1	0.95	15°	4	53	28,500
★ 01-00506-00601	R0.6	6	0.8	1.2	1.15	15°	4	53	29,000
★ 01-00506-00751	R0.75	7.5	1	1.5	1.45	15°	4	52	29,000
★ 01-00506-00752		10	1	1.5	1.45	15°	4	52	29,000
★ 01-00506-00753		15	1	1.5	1.45	15°	4	52	29,000
★ 01-00506-01001	R1	6	1.2	2	1.94	15°	4	53	29,000
★ 01-00506-01002		8	1.2	2	1.94	15°	4	53	29,000
★ 01-00506-01003		10	1.2	2	1.94	15°	4	53	29,500
★ 01-00506-01004		14	1.2	2	1.94	15°	4	53	29,500
★ 01-00506-01005		20	1.2	2	1.94	15°	4	53	29,500

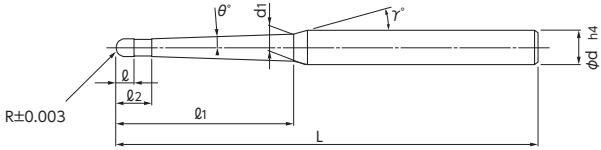
- 订购方法**

●切削参数参考表在P.17记载
●Recommended Milling Conditions are shown on page P.17.
- 请指定SSPBL220 球头半径(R)×颈长(Ø1)。
When you order, indicate SSPBL220 (R)×(Ø1).

※(γ)为参考值。
※(γ) is reference value.

SSPBTN220

CBN超精加工用长颈锥形螺旋球头铣刀
CBN Super Spiral Long Taper Neck Ball End Mill



- CBN长颈球头铣刀采用锥颈形状,可实现高刚性。
- 搭配螺旋球头形状,提高了锋利度,提升了深沟精加工的精度与效率。
- To realize more rigid, CBN long neck ball end mill with taper neck are adopted.
- Both efficiency and accuracy are increasing by taper neck design and spiral ball shape with improved sharpness in finish machining on deep milling.



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

★返修对应(柄长须在15mm以上。详情请咨询本公司。)

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

产品代码 Code No.	(R)球头半径 Radius	(θ)颈角 Neck Taper Angle	(Ø1)颈长 Effective Length	(α)有效斜度 Effective Indined Angle	(d1)颈径 Neck Dia.	(Ø)刃长 Length of Cut	(Ø2)颈长 Under Neck Taper Length	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00507-01020	R0.1	30′	1.5	0° 15′	0.22	0.15	0.25	15°	4	50	38,000
01-00507-01021			2	0° 15′	0.22	0.15	0.25	15°	4	50	38,500
01-00507-01030		1°	1.5	0° 45′	0.24	0.15	0.25	15°	4	50	38,000
01-00507-01031			2	0° 45′	0.25	0.15	0.25	15°	4	50	38,500
01-00507-01040		1° 30′	1.5	1° 15′	0.27	0.15	0.25	15°	4	50	38,000
01-00507-01041			2	1° 15′	0.29	0.15	0.25	15°	4	50	38,500
01-00507-01050		2°	1.5	1° 45′	0.29	0.15	0.25	15°	4	50	38,000
01-00507-01051			2	1° 45′	0.32	0.15	0.25	15°	4	50	38,500
01-00507-01520	R0.15	30′	2	0° 16′	0.32	0.23	0.38	15°	4	50	36,000
01-00507-01521			3	0° 16′	0.33	0.23	0.38	15°	4	52	36,500
01-00507-01530		1°	2	0° 46′	0.35	0.23	0.38	15°	4	50	36,000
01-00507-01531			3	0° 46′	0.38	0.23	0.38	15°	4	52	36,500
01-00507-01540		1° 30′	2	1° 16′	0.39	0.23	0.38	15°	4	50	36,000
01-00507-01541			3	1° 16′	0.43	0.23	0.38	15°	4	52	36,500
01-00507-01550		2°	2	1° 46′	0.42	0.23	0.38	15°	4	50	36,000
01-00507-01551			3	1° 46′	0.48	0.23	0.38	15°	4	52	36,500
01-00507-02020	R0.2	30′	3	0° 18′	0.43	0.3	0.5	15°	4	50	34,500
01-00507-02021			4	0° 18′	0.44	0.3	0.5	15°	4	52	35,000
01-00507-02030		1°	3	0° 48′	0.48	0.3	0.5	15°	4	50	34,500
01-00507-02031			4	0° 48′	0.51	0.3	0.5	15°	4	52	35,000
01-00507-02040		1° 30′	3	1° 18′	0.53	0.3	0.5	15°	4	50	34,500
01-00507-02041			4	1° 18′	0.58	0.3	0.5	15°	4	52	35,000
01-00507-02050		2°	3	1° 48′	0.58	0.3	0.5	15°	4	50	34,500
01-00507-02051			4	1° 48′	0.64	0.3	0.5	15°	4	52	35,000
01-00507-02520	R0.25	30′	4	0° 18′	0.54	0.38	0.62	15°	4	52	33,500
01-00507-02521			5	0° 18′	0.55	0.38	0.62	15°	4	52	34,000
01-00507-02530		1°	4	0° 48′	0.61	0.38	0.62	15°	4	52	33,500
01-00507-02531			5	0° 48′	0.64	0.38	0.62	15°	4	52	34,000
01-00507-02540		1° 30′	4	1° 18′	0.67	0.38	0.62	15°	4	52	33,500
01-00507-02541			5	1° 18′	0.72	0.38	0.62	15°	4	52	34,000
01-00507-02550		2°	4	1° 48′	0.74	0.38	0.62	15°	4	52	33,500
01-00507-02551			5	1° 48′	0.8	0.38	0.62	15°	4	52	34,000

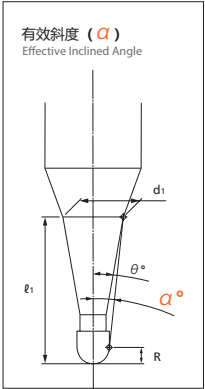
- 订购方法**

●切削参数参考表在P.18记载
●Recommended Milling Conditions are shown on page P.18.
- 请指定SSPBTN220 球头半径(R)×颈角(θ)×颈长(Ø1)。
When you order, indicate SSPBTN220 (R)×(θ)×(Ø1).

※(γ)为参考值。
※(γ) is reference value.

SSPBTN220

CBN超精加工用长颈锥形螺旋球头铣刀
CBN Super Spiral Long Taper Neck Ball End Mill



★返修对应(柄长须在15mm以上。详情请咨询本公司。)

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

产品代码 Code No.	(R)球头半径 Radius	(θ)颈角 Neck Taper Angle	(ℓ1)颈长 Effective Length	(α)有效斜度 Effective Inclined Angle	(d1)颈径 Neck Dia.	(ℓ)刃长 Length of Cut	(ℓ2)颈长 Under Neck Taper Length	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
★ 01-00507-03020	R0.3	30′	5	0° 18′	0.65	0.5	0.75	15°	4	53	32,500
★ 01-00507-03021			6	0° 18′	0.66	0.5	0.75	15°	4	53	33,000
★ 01-00507-03030		1°	5	0° 48′	0.74	0.5	0.75	15°	4	53	32,500
★ 01-00507-03031			6	0° 48′	0.76	0.5	0.75	15°	4	53	33,000
★ 01-00507-03040		1° 30′	5	1° 18′	0.82	0.5	0.75	15°	4	53	32,500
★ 01-00507-03041			6	1° 18′	0.86	0.5	0.75	15°	4	53	33,000
★ 01-00507-03050		2°	5	1° 48′	0.9	0.5	0.75	15°	4	53	32,500
★ 01-00507-03051			6	1° 48′	0.96	0.5	0.75	15°	4	53	33,000
★ 01-00507-05020	R0.5	30′	8	0° 21′	1.1	0.7	1.25	15°	4	53	32,000
★ 01-00507-05021			10	0° 21′	1.12	0.7	1.25	15°	4	53	32,500
★ 01-00507-05030		1°	8	0° 51′	1.23	0.7	1.25	15°	4	53	32,000
★ 01-00507-05031			10	0° 51′	1.29	0.7	1.25	15°	4	53	32,500
★ 01-00507-05040		1° 30′	8	1° 21′	1.36	0.7	1.25	15°	4	53	32,000
★ 01-00507-05041			10	1° 21′	1.45	0.7	1.25	15°	4	53	32,500
★ 01-00507-05050		2°	8	1° 51′	1.49	0.7	1.25	15°	4	53	32,000
★ 01-00507-05051			10	1° 51′	1.62	0.7	1.25	15°	4	53	32,500
★ 01-00507-07520	R0.75	30′	10	0° 22′	1.62	1	1.9	15°	4	52	33,500
★ 01-00507-07521			15	0° 22′	1.69	1	1.9	15°	4	52	34,000
★ 01-00507-07530		1°	10	0° 52′	1.78	1	1.9	15°	4	52	33,500
★ 01-00507-07531			15	0° 52′	1.94	1	1.9	15°	4	52	34,000
★ 01-00507-07540		1° 30′	10	1° 22′	1.95	1	1.9	15°	4	52	33,500
★ 01-00507-07541			15	1° 22′	2.18	1	1.9	15°	4	52	34,000
★ 01-00507-07550		2°	10	1° 52′	2.11	1	1.9	15°	4	52	33,500
★ 01-00507-07551			15	1° 52′	2.43	1	1.9	15°	4	52	34,000
★ 01-00507-10020	R1	30′	16	0° 24′	2.21	1.2	2.5	15°	4	53	33,500
★ 01-00507-10021			20	0° 24′	2.27	1.2	2.5	15°	4	53	34,000
★ 01-00507-10030		1°	16	0° 54′	2.48	1.2	2.5	15°	4	53	33,500
★ 01-00507-10031			20	0° 54′	2.6	1.2	2.5	15°	4	53	34,000
★ 01-00507-10040		1° 30′	16	1° 24′	2.74	1.2	2.5	15°	4	53	33,500
★ 01-00507-10041			20	1° 24′	2.93	1.2	2.5	15°	4	53	34,000
★ 01-00507-10050		2°	16	1° 54′	3	1.2	2.5	15°	4	53	33,500
★ 01-00507-10051			20	1° 54′	3.26	1.2	2.5	15°	4	53	34,000

订购方法

请指定SSPBTN220 球头半径(R)×颈角(θ)×颈长(ℓ1)。
When you order, indicate SSPBTN220 (R)×(θ)×(ℓ1).

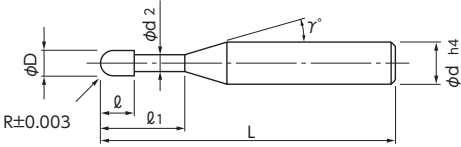
※(γ)为参考值。
※(γ) is reference value.

●切削参数参考表在P.18记载

●Recommended Milling Conditions are shown on page P.18.

SSB200

CBN超精加工用球头铣刀
CBN Super Speed Ball End Mill



- 是高效率的 CBN 球头铣刀,兼具 CBN 的长寿命高精度和钨钢的使用便利性。
- 可设定与钨钢铣刀精加工同等的切深。
- 采用独创的刀刃形状,R 精度达 ±0.003,并提高了耐崩刃性能!
- R 刃和外周刃的接线平滑无段差。
- ~68HRC 的高硬度钢材也能加工!
- This CBN Ball End Mill has realized both advantages of CBN and Carbide.
- Depth of Cut can be increased at the equivalent level to Carbide.
- Unique flute design with R-accuracy ±0.003 prevents chipping!
- Flute is smoothly tangent from straight line to R-curve.
- Applicable for hardened materials up to 68HRC!

加工案例

P.37



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

★返修对应(柄长须在15mm以上。详情请咨询本公司。)

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

产品代码 Code No.	(R)球头半径 Radius	(ℓ1)颈长 Effective Length	(ℓ)刃长 Length of Cut	(D)外径 Dia.	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00510-00100	R0.1	0.3	0.15	0.2	0.19	15°	4	50	26,000
01-00510-00150	R0.15	0.3	0.23	0.3	0.28	15°	4	50	26,000
01-00510-00151		0.5	0.23	0.3	0.28	15°	4	50	26,000
01-00510-00152		0.75	0.23	0.3	0.28	15°	4	50	26,500
★ 01-00510-00200	R0.2	0.5	0.3	0.4	0.37	15°	4	50	25,000
★ 01-00510-00201		0.75	0.3	0.4	0.37	15°	4	50	25,500
★ 01-00510-00202		1	0.3	0.4	0.37	15°	4	50	25,500
★ 01-00510-00250	R0.25	1	0.38	0.5	0.46	15°	4	50	25,000
★ 01-00510-00300	R0.3	1.5	0.5	0.6	0.56	15°	4	50	24,000
★ 01-00510-00400	R0.4	2	0.6	0.8	0.76	15°	4	50	24,000
★ 01-00510-00500	R0.5	2.5	0.7	1	0.95	15°	4	50	24,000
★ 01-00510-00600	R0.6	3	0.8	1.2	1.15	15°	4	50	25,000
★ 01-00510-00750	R0.75	3.8	1	1.5	1.45	15°	4	52	25,000
★ 01-00510-01001	R1	4	1.2	2	1.94	15°	4	52	25,000
★ 01-00510-01000		5	1.2	2	1.94	15°	4	52	25,000

订购方法

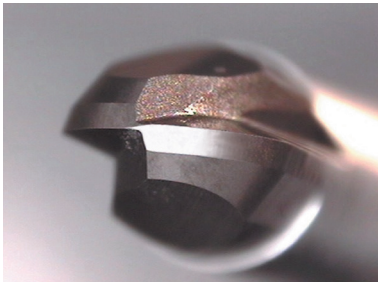
请指定SSB200 球头半径(R)×颈长(ℓ1)。
When you order, indicate SSB200 (R)×(ℓ1).

※(γ)为参考值。
※(γ) is reference value.

●切削参数参考表在P.20记载

●Recommended Milling Conditions are shown on page P.20.

SSB200



排屑性能优越,可设定与钨钢铣刀(精加工)同等的切深,最适合于高效率加工。
Bigger cutting depth was realized with better chip disposal.

SSBL200

CBN超精加工用长颈球头铣刀

CBN Super Speed Long Neck Ball End Mill



- 可适用于深沟加工。长颈型已经实现系列化！共有 25 种规格！
- 最大颈长 10mm。与以往的 CBN 刀具相比,可支持更深的沟槽加工。
- CBN的长寿命及长颈设计扩大了加工领域。
- 极小径规格从 R0.05 起已经实现标准化！
- 采用独创的刀刃形状,R 精度达 ±0.003,并提高了耐崩刃性能！
- Lineup of CBN tool with long neck applicable to deep milling, available 25 sizes in total.
- Enables milling more deeply by long effective length up to 10mm comparing with conventional CBN tools.
- Enables wider application for milling by long neck in addition to long life and accurate finishing.
- Standardized in R0.05 at smallest.
- Unique flute design with R-accuracy ±0.003 prevents chipping!



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

★返修对应(柄长须在15mm以上。详情请咨询本公司。)

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

产品代码 Code No.	(R)球头半径 Radius	(ℓ1)颈长 Effective Length	(ℓ)刃长 Length of Cut	(D)外径 Dia.	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00511-00051	R0.05	0.3	0.08	0.1	0.09	15°	4	50	38,200
01-00511-00052		0.5	0.08	0.1	0.09	15°	4	50	39,800
01-00511-00075	R0.075	0.45	0.12	0.15	0.14	15°	4	50	38,200
01-00511-00076		0.75	0.12	0.15	0.14	15°	4	50	39,800
01-00511-00101	R0.1	0.6	0.15	0.2	0.19	15°	4	50	28,600
01-00511-00102		1	0.15	0.2	0.19	15°	4	50	30,000
01-00511-00151	R0.15	0.9	0.23	0.3	0.28	15°	4	50	28,600
01-00511-00152		1.5	0.23	0.3	0.28	15°	4	50	30,000
★01-00511-00201	R0.2	1.2	0.3	0.4	0.37	15°	4	50	26,000
★01-00511-00202		2	0.3	0.4	0.37	15°	4	50	27,600
★01-00511-00251	R0.25	1.5	0.38	0.5	0.46	15°	4	50	26,000
★01-00511-00252		2.5	0.38	0.5	0.46	15°	4	50	27,600
★01-00511-00301	R0.3	3	0.5	0.6	0.56	15°	4	50	25,600
★01-00511-00302		4	0.5	0.6	0.56	15°	4	52	25,600
★01-00511-00303		5	0.5	0.6	0.56	15°	4	52	26,000
★01-00511-00401	R0.4	4	0.6	0.8	0.76	12°	4	53	25,600
★01-00511-00501	R0.5	4	0.7	1	0.95	12°	4	53	25,600
★01-00511-00502		5	0.7	1	0.95	12°	4	53	25,600
★01-00511-00504		6	0.7	1	0.95	15°	4	53	25,600
★01-00511-00506		8	0.7	1	0.95	15°	4	53	26,000
★01-00511-00508		10	0.7	1	0.95	15°	4	53	26,600
★01-00511-00751	R0.75	7.5	1	1.5	1.45	15°	4	52	27,600
★01-00511-01001	R1	6	1.2	2	1.94	15°	4	52	25,000
★01-00511-01003		8	1.2	2	1.94	15°	4	52	27,600
★01-00511-01005		10	1.2	2	1.94	15°	4	52	27,600

- 订购方法

请指定 SSBL200 球头半径(R)×颈长(ℓ1)。
When you order, indicate SSBL200 (R)×{ℓ1}.
- ※(γ)为参考值。
※(γ) is reference value.
- 切削参数参考表在P.21记载

●Recommended Milling Conditions are shown on page P.21.

SMB120

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material	高硬度钢 Hardened Steels STAVAX・SKD11・PD613 (~62HRC)				
	切深量 Depth of Cut		进给速度 Feed	进刀速度 Approaching Feed	主轴转速 Spindle Speed
(R)球头半径 Radius	ap mm	ae mm	mm/min	mm/min	min ⁻¹
0.01	0.0005	0.001	5	3	80,000
0.02	0.001	0.001	30	5	80,000
0.03	0.001	0.002	70	10	80,000
0.04	0.002	0.003	100	30	80,000
0.05	0.002	0.005	200	30	80,000
备注 Notes	※切深量的 ap 表示轴向切入量,ae 表示步距量。 ※拆装或者预调刀具时请务必小心。 ※建议使用油雾冷却方式。 ※请尽量抑制刀具偏摆量。(可能的话,请确认所用主轴转速下的动态偏摆精度。) ※进刀速度角度请设在 3° 以下。 ※增加切深量会导致刀具折断。特别须注意 ap 值的设定。 ※Depth of Cut : ap=Axial Depth of Cut / ae=Radial Depth of Cut. ※Handle with care when exchanging and presetting tool. ※We recommend using oil mist coolant. ※Minimize chucking runoff. (Recommend to measure actual runoff at activated spindle speed.) ※Tool approaching angle must be 3 degrees or below. ※Increase of Depth of Cut may cause a tool breakage, especially careful for Axial Depth of Cut.				

SFB200

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material	调质钢・高硬度钢・高速钢 Prehardened Steels・Hardened Steels・High Speed Tool Steels NAK・SKD・SKH・HAP (～68HRC)					
(R)球头半径 Radius	切深量 Depth of Cut		一般参数 Normal Speed		高速参数 High Speed	
			进给速度 Feed	主轴转速 Spindle Speed	进给速度 Feed	主轴转速 Spindle Speed
	ap mm	ae mm	mm/min	min ⁻¹	mm/min	min ⁻¹
0.1～0.2	0.005	0.01	600	20,000	1,500	50,000
0.25～0.3	0.01	0.01	800		2,000	
0.4～0.6	0.01	0.02	1,200		3,000	
0.7～0.8	0.01	0.02	1,600		4,000	
0.9～1	0.02	0.05	2,000		5,000	
备注 Notes	※超精密加工专用的铣刀。请在完成钨钢铣刀的精加工后使用。 ※请将切深量固定为切削参数参考表内的数值使用。 ※R角加工时请特别注意参数设定（刀路轨迹等）。 ※建议使用油雾冷却方式。 ※建议使用刚性较大的铣刀刀柄和机床。 ※SFB200 is a Super-Finish Ball End Mill recommended to use after the finish process of carbide end mill. ※Cutting depth must be fixed all through the milling process according to the recommended milling conditions. ※Pay a special attention when choosing tool path and deciding a milling condition for corner milling. ※We recommend using oil mist coolant. ※Machine, tool chuck must be sufficiently accurate.					

SSPB220

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material		调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・STAVAX・SKD61 (~52HRC)				高硬度钢 Hardened Steels SKD11・ELMAX (~62HRC)				高速钢 High Speed Tool Steels SKH・HAP (~68HRC)			
(R)球头半径 Radius	颈长 Effective Length	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
		ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹
0.1	0.3	0.005	0.005	600	40,000	0.005	0.005	450	40,000	0.003	0.003	300	40,000
	0.6	0.005	0.005	500	40,000	0.005	0.005	350	40,000	0.003	0.003	250	40,000
0.15	0.3	0.005	0.005	800	40,000	0.005	0.005	600	40,000	0.003	0.003	450	40,000
	0.5	0.005	0.005	750	40,000	0.005	0.005	550	40,000	0.003	0.003	400	40,000
0.2	0.75	0.005	0.005	700	40,000	0.005	0.005	500	40,000	0.003	0.003	400	40,000
	0.5	0.005	0.01	1,200	40,000	0.005	0.01	900	40,000	0.005	0.005	600	40,000
	0.75	0.005	0.01	1,100	40,000	0.005	0.01	850	40,000	0.005	0.005	550	40,000
	1	0.005	0.01	1,000	40,000	0.005	0.01	800	40,000	0.005	0.005	500	40,000
0.2	1.2	0.005	0.01	1,000	40,000	0.005	0.01	800	40,000	0.005	0.005	500	40,000
0.25	1	0.01	0.01	1,200	40,000	0.01	0.01	1,000	40,000	0.005	0.005	700	40,000
0.3	1.2	0.01	0.02	1,800	40,000	0.01	0.02	1,500	40,000	0.005	0.01	1,000	40,000
	1.5	0.01	0.02	1,500	40,000	0.01	0.02	1,200	40,000	0.005	0.01	800	40,000
0.4	1.6	0.01	0.02	1,800	40,000	0.01	0.02	1,500	40,000	0.005	0.01	1,000	40,000
	2	0.01	0.02	1,500	40,000	0.01	0.02	1,200	40,000	0.005	0.01	800	40,000
0.5	2	0.02	0.04	2,500	40,000	0.02	0.03	1,800	40,000	0.01	0.02	1,200	40,000
	2.5	0.02	0.04	2,000	40,000	0.02	0.03	1,500	40,000	0.01	0.02	1,000	40,000
0.6	2.4	0.02	0.04	2,500	40,000	0.02	0.03	2,000	40,000	0.01	0.02	1,500	40,000
	3	0.02	0.04	2,500	40,000	0.02	0.03	2,000	40,000	0.01	0.02	1,500	40,000
0.75	3	0.03	0.05	3,000	40,000	0.03	0.05	3,000	40,000	0.02	0.03	2,000	30,000
	3.8	0.03	0.05	3,000	40,000	0.03	0.05	3,000	40,000	0.02	0.03	2,000	30,000
1	4	0.05	0.1	3,000	30,000	0.03	0.05	3,000	30,000	0.03	0.03	2,000	25,000
	5	0.05	0.1	3,000	30,000	0.03	0.05	3,000	30,000	0.03	0.03	2,000	25,000
1.5	6	0.08	0.15	2,300	20,000	0.05	0.075	2,100	20,000	0.04	0.06	1,300	15,000
	9	0.06	0.12	2,200	20,000	0.04	0.06	2,000	20,000	0.04	0.05	1,200	15,000
2	8	0.1	0.18	2,300	17,000	0.06	0.09	2,100	15,000	0.05	0.07	1,300	12,000
	12	0.08	0.15	2,000	17,000	0.05	0.08	1,700	15,000	0.04	0.06	1,200	12,000
2.5	10	0.11	0.21	2,200	13,000	0.08	0.12	1,800	12,000	0.07	0.1	1,300	11,000
	15	0.1	0.18	1,900	13,000	0.06	0.1	1,500	12,000	0.06	0.08	1,100	11,000
3	12	0.13	0.24	2,000	10,000	0.09	0.15	1,600	10,000	0.08	0.12	1,200	10,000
	18	0.11	0.21	1,700	10,000	0.08	0.12	1,400	10,000	0.07	0.1	1,000	10,000
备注 Notes		※切深量为中精加工、精加工时的最大值。请根据机床刚性和要求精度进行调整。 ※预加工（中精加工）时请注意精加工余量相对于加工面需保持均匀。 ※R角等负载大的加工部位，请注意参数设定和刀路轨迹等。 ※需要高品质的加工面时，加工时请将切深量调整为 70%，进给速度调整为约 70%。 ※建议使用油雾冷却方式。 ※因加工机床的原因要调整主轴转速时，必须按照相同的比率调整进给速度。 ※Max. Depth of Cut for semi-finishing and finishing. Adjust milling conditions depending on the rigidity of the machine and desired accuracy. ※Obtain uniform stock amount on the cutting surface in the pre-stage cutting (semi-finishing). ※Required careful set up of milling conditions, tool path and etc. at cutting parts, such as corners where will become overloaded. ※Adjust both Depth of Cut and feed rate at 70% of the recommended milling conditions for high quality milling surface. ※Oil mist coolant is recommended. ※Adjust feed rate at same rate as spindle speed if necessary to adjust spindle speed from recommended milling conditions.											

SSPBL220

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material		调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・STAVAX・SKD61 (~52HRC)				高硬度钢 Hardened Steels SKD11・ELMAX (~62HRC)				高速钢 High Speed Tool Steels SKH・HAP (~68HRC)			
(R)球头半径 Radius	颈长 Effective Length	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
		ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹
0.1	1	0.005	0.005	200	40,000	0.005	0.005	150	40,000	0.003	0.003	100	40,000
0.15	0.9	0.005	0.005	600	40,000	0.005	0.005	400	40,000	0.003	0.005	300	40,000
	1.5	0.005	0.005	320	40,000	0.005	0.005	240	40,000	0.003	0.005	160	40,000
0.2	2	0.005	0.01	500	40,000	0.005	0.01	400	40,000	0.005	0.005	320	40,000
	3	0.005	0.005	250	40,000	0.005	0.005	200	40,000	0.003	0.005	120	40,000
0.25	1.5	0.01	0.01	1,200	40,000	0.01	0.01	1,000	40,000	0.005	0.01	600	40,000
	2.5	0.01	0.01	720	40,000	0.01	0.01	600	40,000	0.005	0.01	480	40,000
	3.5	0.01	0.01	400	36,000	0.005	0.01	320	36,000	0.005	0.005	240	36,000
0.3	3	0.01	0.02	1,200	40,000	0.01	0.02	800	40,000	0.01	0.01	600	40,000
	4	0.01	0.01	540	36,000	0.01	0.01	400	36,000	0.005	0.01	320	36,000
	5	0.01	0.01	360	30,000	0.005	0.01	320	30,000	0.005	0.005	240	30,000
	6	0.005	0.005	240	24,000	0.005	0.005	200	24,000	0.003	0.003	160	24,000
0.4	4	0.01	0.015	1,000	40,000	0.01	0.015	800	40,000	0.005	0.01	600	40,000
	6	0.005	0.01	720	30,000	0.005	0.01	540	30,000	0.005	0.005	400	30,000
0.5	4	0.02	0.03	1,600	40,000	0.02	0.02	1,200	40,000	0.01	0.015	800	40,000
	6	0.015	0.02	1,200	30,000	0.015	0.015	900	30,000	0.01	0.01	600	30,000
	8	0.01	0.015	720	20,000	0.01	0.01	540	20,000	0.005	0.01	400	20,000
	10	0.01	0.01	540	16,000	0.005	0.01	400	16,000	0.005	0.005	300	16,000
0.6	6	0.02	0.02	1,400	32,000	0.015	0.02	1,000	32,000	0.01	0.015	720	32,000
0.75	7.5	0.02	0.03	1,600	32,000	0.015	0.03	1,400	32,000	0.01	0.01	1,000	32,000
	10	0.015	0.02	900	20,000	0.01	0.02	720	20,000	0.01	0.01	540	20,000
	15	0.01	0.02	480	12,000	0.01	0.01	400	12,000	0.005	0.01	300	12,000
1	6	0.03	0.05	2,400	40,000	0.03	0.03	2,000	40,000	0.02	0.02	1,600	40,000
	8	0.03	0.03	2,000	36,000	0.02	0.03	1,400	36,000	0.01	0.02	1,000	36,000
	10	0.02	0.03	1,600	32,000	0.015	0.03	800	32,000	0.01	0.015	600	32,000
	14	0.02	0.02	900	20,000	0.01	0.02	720	20,000	0.01	0.01	540	20,000
	20	0.02	0.02	360	8,000	0.01	0.02	320	8,000	0.01	0.01	240	8,000
备注 Notes		※切深量为中精加工、精加工时的最大值。请根据机床刚性和要求精度进行调整。 ※预加工（中精加工）时请注意使精加工余量相对于加工面保持均匀。 ※发生振刀时，请以相同的比率降低主轴转速和进给速度。此外，主轴转速过低时，也以相同的比率降低。 ※R角等负载大的加工部位，请特别注意参数设定和刀路轨迹等。 ※加工深沟时，请充分注意冷却液的供油及排屑是否顺畅。 ※建议使用油雾冷却方式。 ※Max. Depth of Cut for semi-finishing and finishing. Adjust milling conditions depending on the rigidity of the machine and desired accuracy. ※Obtain uniform stock amount on the cutting surface in the pre-stage cutting (semi-finishing). ※Reduce both spindle speed and feed at same rate for chattering and also for insufficient spindle speed of a machine. ※Required careful set up of milling conditions, tool path and etc. at cutting parts, such as corners where will become overloaded. ※Coolant supply and chip disposal in the deep portion are very important. ※Oil mist coolant is recommended.											

SSPBTN220

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切削参数参考表 Recommended Milling Conditions

加工材料 Work Material			调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・STAVAX・SKD61 (~52HRC)				高硬度钢 Hardened Steels SKD11・ELMAX (~62HRC)				高速钢 High Speed Tool Steels SKH・HAP (~68HRC)			
(R)球头半径 Radius	颈角 Neck Taper Angle	颈长 Effective Length	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
			ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹
0.1	30′	1.5	0.003	0.005	140	40,000	0.003	0.003	120	40,000	0.002	0.003	100	40,000
		2	0.003	0.003	120	40,000	0.002	0.003	100	40,000	0.002	0.002	80	40,000
	1°	1.5	0.003	0.005	160	40,000	0.003	0.003	140	40,000	0.002	0.003	120	40,000
		2	0.003	0.003	140	40,000	0.002	0.003	120	40,000	0.002	0.002	90	40,000
	1° 30′	1.5	0.003	0.005	200	40,000	0.003	0.003	160	40,000	0.002	0.003	140	40,000
		2	0.003	0.003	160	40,000	0.002	0.003	140	40,000	0.002	0.002	100	40,000
	2°	1.5	0.003	0.005	240	40,000	0.003	0.003	200	40,000	0.002	0.003	160	40,000
		2	0.003	0.003	200	40,000	0.002	0.003	160	40,000	0.002	0.002	120	40,000
0.15	30′	2	0.005	0.005	200	40,000	0.005	0.005	160	40,000	0.003	0.005	120	40,000
		3	0.003	0.005	160	40,000	0.003	0.003	120	40,000	0.002	0.003	100	40,000
	1°	2	0.005	0.005	240	40,000	0.005	0.005	200	40,000	0.003	0.005	160	40,000
		3	0.003	0.005	200	40,000	0.003	0.003	160	40,000	0.002	0.003	120	40,000
	1° 30′	2	0.005	0.005	320	40,000	0.005	0.005	240	40,000	0.003	0.005	200	40,000
		3	0.003	0.005	240	40,000	0.003	0.003	200	40,000	0.002	0.003	160	40,000
	2°	2	0.005	0.005	400	40,000	0.005	0.005	300	40,000	0.003	0.005	240	40,000
		3	0.003	0.005	300	40,000	0.003	0.003	240	40,000	0.002	0.003	180	40,000
0.2	30′	3	0.007	0.01	320	40,000	0.005	0.01	240	40,000	0.005	0.005	160	40,000
		4	0.005	0.005	240	36,000	0.005	0.005	180	36,000	0.003	0.005	120	36,000
	1°	3	0.007	0.01	400	40,000	0.005	0.01	300	40,000	0.005	0.005	200	40,000
		4	0.005	0.005	320	36,000	0.005	0.005	240	36,000	0.003	0.005	160	36,000
	1° 30′	3	0.007	0.01	480	40,000	0.005	0.01	360	40,000	0.005	0.005	240	40,000
		4	0.005	0.005	400	36,000	0.005	0.005	320	36,000	0.003	0.005	200	36,000
	2°	3	0.007	0.01	540	40,000	0.005	0.01	400	40,000	0.005	0.005	300	40,000
		4	0.005	0.005	480	36,000	0.005	0.005	360	36,000	0.003	0.005	240	36,000
0.25	30′	4	0.01	0.01	400	36,000	0.005	0.01	320	36,000	0.005	0.005	240	36,000
		5	0.005	0.01	320	32,000	0.005	0.005	240	32,000	0.003	0.005	160	32,000
	1°	4	0.01	0.01	480	36,000	0.005	0.01	400	36,000	0.005	0.005	300	36,000
		5	0.005	0.01	400	32,000	0.005	0.005	320	32,000	0.003	0.005	240	32,000
	1° 30′	4	0.01	0.01	640	36,000	0.005	0.01	480	36,000	0.005	0.005	360	36,000
		5	0.005	0.01	540	32,000	0.005	0.005	400	32,000	0.003	0.005	300	32,000
	2°	4	0.01	0.01	720	36,000	0.005	0.01	540	36,000	0.005	0.005	400	36,000
		5	0.005	0.01	640	32,000	0.005	0.005	480	32,000	0.003	0.005	360	32,000
0.3	30′	5	0.01	0.01	480	36,000	0.005	0.01	400	36,000	0.005	0.005	300	36,000
		6	0.005	0.01	400	32,000	0.005	0.005	360	32,000	0.003	0.005	240	32,000
	1°	5	0.01	0.01	640	36,000	0.005	0.01	480	36,000	0.005	0.005	400	36,000
		6	0.005	0.01	540	32,000	0.005	0.005	400	32,000	0.003	0.005	300	32,000
	1° 30′	5	0.01	0.01	800	36,000	0.005	0.01	640	36,000	0.005	0.005	480	36,000
		6	0.005	0.01	720	32,000	0.005	0.005	540	32,000	0.003	0.005	400	32,000
	2°	5	0.01	0.01	900	36,000	0.005	0.01	720	36,000	0.005	0.005	540	36,000
		6	0.005	0.01	800	32,000	0.005	0.005	640	32,000	0.003	0.005	480	32,000

加工材料 Work Material			调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・STAVAX・SKD61 (~52HRC)				高硬度钢 Hardened Steels SKD11・ELMAX (~62HRC)				高速钢 High Speed Tool Steels SKH・HAP (~68HRC)			
(R)球头半径 Radius	颈角 Neck Taper Angle	颈长 Effective Length	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
			ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹
0.5	30′	8	0.01	0.02	900	20,000	0.01	0.02	800	20,000	0.01	0.01	640	20,000
		10	0.01	0.02	720	16,000	0.005	0.01	640	16,000	0.005	0.005	480	16,000
	1°	8	0.01	0.02	1,000	20,000	0.01	0.02	900	20,000	0.01	0.01	800	20,000
		10	0.01	0.02	800	16,000	0.005	0.01	720	16,000	0.005	0.005	640	16,000
	1°30′	8	0.01	0.02	1,200	20,000	0.01	0.02	1,000	20,000	0.01	0.01	900	20,000
		10	0.01	0.02	900	16,000	0.005	0.01	800	16,000	0.005	0.005	720	16,000
	2°	8	0.01	0.02	1,400	20,000	0.01	0.02	1,200	20,000	0.01	0.01	1,000	20,000
		10	0.01	0.02	1,000	16,000	0.005	0.01	900	16,000	0.005	0.005	800	16,000
0.75	30′	10	0.02	0.02	800	16,000	0.015	0.02	900	16,000	0.01	0.015	600	16,000
		15	0.01	0.02	540	12,000	0.01	0.01	480	12,000	0.005	0.01	400	12,000
	1°	10	0.02	0.02	900	16,000	0.015	0.02	1,000	16,000	0.01	0.015	720	16,000
		15	0.01	0.02	680	12,000	0.01	0.01	600	12,000	0.005	0.01	540	12,000
	1°30′	10	0.02	0.02	1,200	20,000	0.015	0.02	1,000	20,000	0.01	0.015	900	20,000
		15	0.01	0.02	900	16,000	0.01	0.01	800	16,000	0.005	0.01	720	16,000
	2°	10	0.02	0.02	1,400	20,000	0.015	0.02	1,200	20,000	0.01	0.015	1,000	20,000
		15	0.01	0.02	1,000	16,000	0.01	0.01	900	16,000	0.005	0.01	800	16,000
1	30′	16	0.02	0.03	720	12,000	0.015	0.03	540	12,000	0.01	0.02	400	12,000
		20	0.02	0.02	400	8,000	0.01	0.02	360	8,000	0.01	0.01	240	8,000
	1°	16	0.02	0.03	1,000	16,000	0.015	0.03	800	16,000	0.01	0.02	600	16,000
		20	0.02	0.02	600	12,000	0.01	0.02	540	12,000	0.01	0.01	400	12,000
	1°30′	16	0.02	0.03	1,200	20,000	0.015	0.03	1,000	20,000	0.01	0.02	800	20,000
		20	0.02	0.02	900	16,000	0.01	0.02	800	16,000	0.01	0.01	600	16,000
	2°	16	0.02	0.03	1,400	20,000	0.015	0.03	1,200	20,000	0.01	0.02	1,000	20,000
		20	0.02	0.02	1,000	16,000	0.01	0.02	900	16,000	0.01	0.01	800	16,000
备注 Notes			※切深量为中精加工、精加工时的最大值。请根据机床刚性和要求精度进行调整。 ※预加工（中精加工）时请注意使精加工余量相对于加工面保持均匀。 ※发生振刀时, 请以相同的比率降低主轴转速和进给速度。此外, 主轴转速过低时, 也以相同的比率降低。 ※R角等负载大的加工部位, 请特别注意参数设定和刀路轨迹等。 ※加工深沟时, 请充分注意冷却液的供油及排屑是否顺畅。 ※建议使用油雾冷却方式。 ※Max. Depth of Cut for semi-finishing and finishing. Adjust milling conditions depending on the rigidity of the machine and desired accuracy. ※Obtain uniform stock amount on the cutting surface in the pre-stage cutting (semi-finishing). ※Reduce both spindle speed and feed at same rate for chattering and also for insufficient spindle speed of a machine. ※Required careful set up of milling conditions, tool path and etc. at cutting parts, such as corners where will become overloaded. ※Coolant supply and chip disposal in the deep portion are very important. ※Oil mist coolant is recommended.											

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切削参数参考表 Recommended Milling Conditions

加工材料 Work Material		调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・STAVAX・SKD61 (～52HRC)				高硬度钢 Hardened Steels SKD11 (～62HRC)				高速钢 High Speed Tool Steels SKH・HAP (～68HRC)			
(R)球头半径 Radius	颈长 Effective Length	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
		ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹
0.1	0.3	0.005	0.005	720	50,000	0.005	0.005	540	50,000	0.003	0.003	360	50,000
0.15	0.3	0.005	0.01	1,400		0.005	0.01	800		0.005	0.005	500	
	0.5	0.005	0.005	1,200		0.005	0.005	640		0.003	0.005	460	
	0.75	0.005	0.005	1,000		0.005	0.005	540		0.003	0.005	400	
0.2	0.5	0.01	0.01	1,800		0.01	0.01	1,200		0.005	0.01	640	
	0.75	0.005	0.01	1,600		0.005	0.01	1,000		0.005	0.01	540	
	1	0.005	0.01	1,400		0.005	0.01	900		0.005	0.005	460	
0.25	1	0.015	0.015	1,800		0.01	0.015	1,500		0.01	0.01	1,100	
0.3	1.5	0.02	0.03	2,000		0.01	0.02	2,000		0.01	0.02	1,500	
0.4	2	0.03	0.05	2,000		0.02	0.03	2,000		0.01	0.03	1,500	
0.5	2.5	0.05	0.05	3,000		0.03	0.05	3,000		0.02	0.03	2,000	
0.6	3	0.05	0.05	3,000		0.03	0.05	3,000		0.02	0.03	2,000	
0.75	3.8	0.05	0.1	4,000		0.05	0.05	4,000		0.02	0.05	3,000	
1	4	0.1	0.1	5,000		0.05	0.05	5,000		0.03	0.05	3,000	
	5	0.1	0.1	5,000		0.05	0.05	5,000		0.03	0.05	3,000	
备注 Notes		※切深量为中精加工、精加工时的最大值。 ※切深量的 ap 表示轴向切入量, ae 表示步距量。 ※建议使用油雾冷却方式。 ※请以相同的比率调整主轴转速和进给速度。 ※加工参数会因切深量和机床刚性的状况而有所不同。请每次调整后再使用。 ※请根据需要控制刀具的伸出量。 ※Depth of Cut shows the maximum value for semi-finishing and finishing. ※Depth of Cut : ap = Axial Depth of Cut / ae = Radial Depth of Cut. ※We recommend using oil mist coolant. ※Adjust both spindle speed and feed at the same rate. ※Adjust milling conditions according to the volume of Depth of Cut and rigidity of machine. ※Length of tool overhang must be as short as possible.											

CBN铣刀 使用要点

加工环境

Advise 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.

精加工余量 (余量)

Advice on Finishing Allowance (stock amount)

● 使用小径CBN铣刀时, 精加工余量 (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.

Points on Use

工件顶面 Top of work material

中精加工表面 Surface for semi-finishing

最终精加工表面 Surface for finishing

注意R角部位! No uniformity at corner area

SSBL200

切削参数参考表 Recommended Milling Conditions

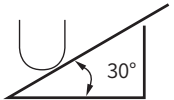
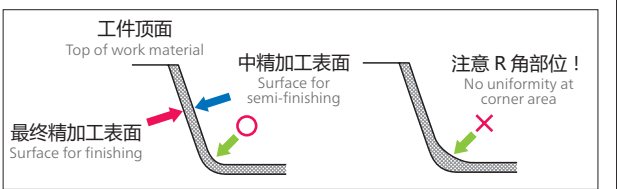
加工材料 Work Material			调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・STAVAX・SKD61 (~52HRC)				高硬度钢 Hardened Steels SKD11 (~62HRC)				高速钢 High Speed Tool Steels SKH (~68HRC)			
(R)球头半径 Radius	颈长 Effective Length	L(颈长) D(外径) L/D	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
			ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹
0.05	0.3	3	0.005	0.005	200	50,000	0.003	0.005	150	50,000	0.002	0.003	120	50,000
	0.5	5	0.003	0.003	120	50,000	0.003	0.003	100	50,000	0.002	0.003	80	50,000
0.075	0.45	3	0.005	0.005	300	50,000	0.003	0.005	200	50,000	0.002	0.003	150	50,000
	0.75	5	0.003	0.003	200	50,000	0.003	0.003	150	50,000	0.002	0.003	100	50,000
0.1	0.6	3	0.005	0.005	500	50,000	0.005	0.005	380	50,000	0.003	0.003	280	50,000
	1	5	0.005	0.005	300	50,000	0.005	0.005	260	50,000	0.003	0.003	120	50,000
0.15	0.9	3	0.005	0.005	800	50,000	0.005	0.005	460	50,000	0.003	0.005	360	50,000
	1.5	5	0.005	0.005	480	50,000	0.005	0.005	320	50,000	0.003	0.005	280	50,000
0.2	1.2	3	0.005	0.01	1,200	50,000	0.005	0.01	820	50,000	0.005	0.005	580	50,000
	2	5	0.005	0.01	620	50,000	0.005	0.01	580	50,000	0.005	0.005	380	50,000
0.25	1.5	3	0.01	0.01	1,500	50,000	0.01	0.01	1,200	50,000	0.005	0.01	860	50,000
	2.5	5	0.01	0.01	800	50,000	0.01	0.01	680	50,000	0.005	0.01	540	50,000
0.3	3	5	0.01	0.02	1,600	40,000	0.01	0.02	1,200	40,000	0.01	0.01	920	40,000
	4	6.7	0.01	0.01	1,200	30,000	0.01	0.01	960	30,000	0.005	0.01	640	30,000
	5	8.3	0.01	0.01	800	30,000	0.005	0.01	680	30,000	0.005	0.005	480	30,000
0.4	4	5	0.01	0.03	1,500	30,000	0.01	0.02	1,200	30,000	0.01	0.01	920	30,000
0.5	4	4	0.03	0.05	2,400	40,000	0.02	0.03	2,400	40,000	0.02	0.02	1,500	40,000
	5	5	0.02	0.05	2,000	32,000	0.02	0.03	2,000	32,000	0.01	0.02	1,200	32,000
	6	6	0.02	0.03	1,500	25,000	0.01	0.02	1,500	25,000	0.01	0.01	1,000	25,000
	8	8	0.01	0.03	1,200	16,000	0.01	0.02	1,000	16,000	0.01	0.01	840	16,000
0.75	10	10	0.01	0.02	800	12,000	0.005	0.01	720	12,000	0.005	0.005	620	12,000
	7.5	5	0.02	0.03	2,000	32,000	0.01	0.03	1,800	32,000	0.01	0.01	1,200	32,000
1	6	3	0.05	0.05	4,000	40,000	0.03	0.03	4,000	40,000	0.02	0.03	2,600	40,000
	8	4	0.03	0.05	3,000	32,000	0.02	0.03	2,600	32,000	0.01	0.02	1,800	32,000
	10	5	0.02	0.03	2,000	24,000	0.01	0.03	1,600	24,000	0.01	0.02	1,200	24,000
备注 Notes			※切深量为中精加工、精加工时的最大值。 ※切深量的 ap 表示轴向切入量, ae 表示步距量。 ※建议使用油雾冷却方式。 ※请以相同的比率调整主轴转速和进给速度。 ※加工参数会因切深量和机床刚性的状况而有所不同。请每次调整后再使用。 ※请根据需要控制刀具的伸出量。 ※Depth of Cut shows the maximum value for semi-finishing and finishing. ※Depth of Cut : ap = Axial Depth of Cut / ae = Radial Depth of Cut. ※We recommend using oil mist coolant. ※Adjust both spindle speed and feed at the same rate. ※Adjust milling conditions according to the volume of Depth of Cut and rigidity of machine. ※Length of tool overhang must be as short as possible.											

CBN 铣刀 使用注意事项

Main points to ensure an effective use of cBN End Mill.

整个加工表面的加工余量必须保持均匀 (尤其须注意R角部位)。
否则, 会影响加工精度和刀具寿命。

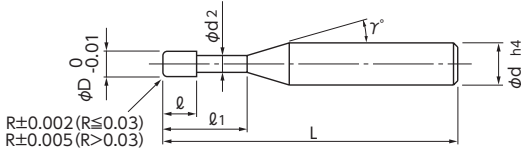
Uniforming removal stock is important for machining accuracy and tool life, especially at corner area.



SSR200

CBN超精加工用圆鼻铣刀
CBN Super Speed Radius End Mill

SSR200



- CBN超群的耐磨性实现了对角部 R 的高效加工
- 切削刃采用连续平滑的刀刃设计! 实现超群的加工表面精度。
- 可支持调质 (预硬) 钢~68HRC 的高硬度钢材。
- 规格扩大至 $\phi 0.1$, 起共有 172 个规格。
- Realized high efficient machining with radius flute along with excellent wear resistance of CBN.
- Realized excellent surface roughness by introducing smooth tangent on all over flute.
- Applicable for work materials from tempered steel to hardened steel (up to 68 HRC).
- Lineup expansion from Dia.0.1mm. 172 sizes in total.

加工案例
Work Sample Data

P.37

Slot

Face

CBN

2

0°

≤68
HRC

加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・ Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

★返修对应(柄长须在15mm以上。详情请咨询本公司。)

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

产品代码 Code No.	(D)外径 Dia.	(R)角半径 Corner Radius	(ℓ1)颈长 Effective Length	(ℓ)刃长 Length of Cut	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00490-01022	0.1	R0.02	0.2	0.04	0.09	15°	4	50	40,200
01-00490-01023			0.3	0.04	0.09	15°	4	50	40,800
01-00490-01024			0.5	0.04	0.09	15°	4	50	42,000
01-00490-01032		R0.03	0.2	0.04	0.09	15°	4	50	38,400
01-00490-01033			0.3	0.04	0.09	15°	4	50	39,000
01-00490-01034			0.5	0.04	0.09	15°	4	50	40,200
01-00490-01522	0.15	R0.02	0.2	0.06	0.14	15°	4	50	40,200
01-00490-01523			0.3	0.06	0.14	15°	4	50	40,800
01-00490-01524			0.5	0.06	0.14	15°	4	50	42,000
01-00490-01532		R0.03	0.2	0.06	0.14	15°	4	50	38,400
01-00490-01533			0.3	0.06	0.14	15°	4	50	39,000
01-00490-01534			0.5	0.06	0.14	15°	4	50	40,200
01-00490-02020	0.2	R0.02	0.3	0.08	0.19	15°	4	50	30,600
01-00490-02021			0.5	0.08	0.19	15°	4	50	30,600
01-00490-02022			1	0.08	0.19	15°	4	50	31,500
01-00490-02030			0.3	0.08	0.19	15°	4	50	27,500
01-00490-02031		R0.03	0.5	0.08	0.19	15°	4	50	27,500
01-00490-02032			1	0.08	0.19	15°	4	50	28,300
01-00490-02050			0.3	0.08	0.19	15°	4	50	27,500
01-00490-02051		R0.05	0.5	0.08	0.19	15°	4	50	27,500
01-00490-02052			1	0.08	0.19	15°	4	50	28,300
01-00490-03021			0.5	0.13	0.28	15°	4	50	30,200
01-00490-03020	0.3	R0.02	0.75	0.13	0.28	15°	4	50	30,400
01-00490-03022			1	0.13	0.28	15°	4	50	30,600
01-00490-03023			1.5	0.13	0.28	15°	4	50	31,000
01-00490-03024			2	0.13	0.28	15°	4	50	31,500
01-00490-03031			0.5	0.13	0.28	15°	4	50	27,200
01-00490-03030			0.75	0.13	0.28	15°	4	50	27,400
01-00490-03032		R0.03	1	0.13	0.28	15°	4	50	27,500
01-00490-03033			1.5	0.13	0.28	15°	4	50	27,900
01-00490-03034			2	0.13	0.28	15°	4	50	28,300
01-00490-03051			0.5	0.13	0.28	15°	4	50	27,200
01-00490-03050			0.75	0.13	0.28	15°	4	50	27,400
01-00490-03052		R0.05	1	0.13	0.28	15°	4	50	27,500
01-00490-03053			1.5	0.13	0.28	15°	4	50	27,900
01-00490-03054			2	0.13	0.28	15°	4	50	28,300

订购方法

请指定SSR200 外径(D)×角半径(R)×颈长(ℓ1)。
When you order, indicate SSR200 (D)×(R)×(ℓ1).

※(γ)为参考值。
※(γ) is reference value.

●切削参数参考表在P.31记载

●Recommended Milling Conditions are shown on page P.31.

产品代码 Code No.	(D)外径 Dia.	(R)角半径 Corner Radius	(ℓ1)颈长 Effective Length	(ℓ)刃长 Length of Cut	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00490-04021	0.4	R0.02	0.5	0.24	0.37	15°	4	50	28,700
01-00490-04022			1	0.24	0.37	15°	4	50	28,900
01-00490-04023			1.5	0.24	0.37	15°	4	50	29,200
01-00490-04024			2	0.24	0.37	15°	4	50	29,600
01-00490-04031		R0.03	0.5	0.24	0.37	15°	4	50	25,800
01-00490-04032			1	0.24	0.37	15°	4	50	26,000
01-00490-04033			1.5	0.24	0.37	15°	4	50	26,200
01-00490-04034			2	0.24	0.37	15°	4	50	26,600
01-00490-04051		R0.05	0.5	0.24	0.37	15°	4	50	25,800
01-00490-04052			1	0.24	0.37	15°	4	50	26,000
01-00490-04053			1.5	0.24	0.37	15°	4	50	26,000
01-00490-04054			2	0.24	0.37	15°	4	50	26,600
01-00490-04101		R0.1	0.5	0.24	0.37	15°	4	50	25,800
01-00490-04102			1	0.24	0.37	15°	4	50	26,000
01-00490-04103			1.5	0.24	0.37	15°	4	50	26,000
01-00490-04104			2	0.24	0.37	15°	4	50	26,000
★ 01-00490-05020	0.5	R0.02	0.5	0.3	0.46	15°	4	48	23,600
★ 01-00490-05022			1	0.3	0.46	15°	4	50	23,800
★ 01-00490-05021			1.5	0.3	0.46	15°	4	50	24,000
★ 01-00490-05023			2.5	0.3	0.46	15°	4	50	26,300
★ 01-00490-05030		R0.03	0.5	0.3	0.46	15°	4	48	21,200
★ 01-00490-05032			1	0.3	0.46	15°	4	50	21,400
★ 01-00490-05031			1.5	0.3	0.46	15°	4	50	21,600
★ 01-00490-05033			2.5	0.3	0.46	15°	4	50	23,600
★ 01-00490-05050		R0.05	0.5	0.3	0.46	15°	4	48	21,200
★ 01-00490-05052			1	0.3	0.46	15°	4	50	21,400
★ 01-00490-05051			1.5	0.3	0.46	15°	4	50	21,600
★ 01-00490-05053			2.5	0.3	0.46	15°	4	50	23,600
★ 01-00490-05100		R0.1	0.5	0.3	0.46	15°	4	48	21,200
★ 01-00490-05102			1	0.3	0.46	15°	4	50	21,400
★ 01-00490-05101			1.5	0.3	0.46	15°	4	50	21,600
★ 01-00490-05103			2.5	0.3	0.46	15°	4	50	23,600
★ 01-00490-06021		R0.02	0.5	0.3	0.56	15°	4	48	23,600
★ 01-00490-06022			1	0.3	0.56	15°	4	50	23,800
★ 01-00490-06023			1.5	0.3	0.56	15°	4	50	24,000
★ 01-00490-06024			2.5	0.3	0.56	15°	4	50	26,300
★ 01-00490-06031		R0.03	0.5	0.3	0.56	15°	4	48	21,200
★ 01-00490-06032			1	0.3	0.56	15°	4	50	21,400
★ 01-00490-06033			1.5	0.3	0.56	15°	4	50	21,600
★ 01-00490-06034			2.5	0.3	0.56	15°	4	50	23,600
★ 01-00490-06051		R0.05	0.5	0.3	0.56	15°	4	48	21,200
★ 01-00490-06052			1	0.3	0.56	15°	4	50	21,400
★ 01-00490-06053			1.5	0.3	0.56	15°	4	50	21,600
★ 01-00490-06054			2.5	0.3	0.56	15°	4	50	23,600
★ 01-00490-06101		R0.1	0.5	0.3	0.56	15°	4	48	21,200
★ 01-00490-06102			1	0.3	0.56	15°	4	50	21,400
★ 01-00490-06103			1.5	0.3	0.56	15°	4	50	21,600
★ 01-00490-06104			2.5	0.3	0.56	15°	4	50	23,600
★ 01-00490-08021	0.8	R0.02	1.5	0.56	0.76	15°	4	50	24,000
★ 01-00490-08022			2.5	0.56	0.76	15°	4	50	26,300
★ 01-00490-08023			5	0.56	0.76	15°	4	53	27,200
★ 01-00490-08031		R0.03	1.5	0.56	0.76	15°	4	50	21,600
★ 01-00490-08032			2.5	0.56	0.76	15°	4	50	23,600
★ 01-00490-08033			5	0.56	0.76	15°	4	53	24,400

SSR200

CBN超精加工用圆鼻铣刀
CBN Super Speed Radius End Mill

SSR200

★返修对应(柄长须在15mm以上。详情请咨询本公司。)

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

产品代码 Code No.	(D)外径 Dia.	(R)角半径 Corner Radius	(ℓ1)颈长 Effective Length	(ℓ)刃长 Length of Cut	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
★ 01-00490-08051	0.8	R0.05	1.5	0.56	0.76	15°	4	50	21,600
★ 01-00490-08052			2.5	0.56	0.76	15°	4	50	23,600
★ 01-00490-08053			5	0.56	0.76	15°	4	53	24,400
★ 01-00490-08101		R0.1	1.5	0.56	0.76	15°	4	50	21,600
★ 01-00490-08102			2.5	0.56	0.76	15°	4	50	23,600
★ 01-00490-08103			5	0.56	0.76	15°	4	53	24,400
★ 01-00490-10020	1	R0.02	1	0.7	0.95	15°	4	49	22,000
★ 01-00490-10022			2	0.7	0.95	15°	4	50	22,000
★ 01-00490-10021			3	0.7	0.95	15°	4	50	22,000
★ 01-00490-10023			5	0.7	0.95	15°	4	53	24,900
★ 01-00490-10030		R0.03	1	0.7	0.95	15°	4	49	19,800
★ 01-00490-10032			2	0.7	0.95	15°	4	50	19,800
★ 01-00490-10031			3	0.7	0.95	15°	4	50	19,800
★ 01-00490-10033			5	0.7	0.95	15°	4	53	22,400
★ 01-00490-10050		R0.05	1	0.7	0.95	15°	4	49	19,800
★ 01-00490-10052			2	0.7	0.95	15°	4	50	19,800
★ 01-00490-10051			3	0.7	0.95	15°	4	50	19,800
★ 01-00490-10053			5	0.7	0.95	15°	4	53	22,400
★ 01-00490-10100		R0.1	1	0.7	0.95	15°	4	49	19,800
★ 01-00490-10102			2	0.7	0.95	15°	4	50	19,800
★ 01-00490-10101			3	0.7	0.95	15°	4	50	19,800
★ 01-00490-10103			5	0.7	0.95	15°	4	53	22,400
★ 01-00490-10200		R0.2	1	0.7	0.95	15°	4	49	19,800
★ 01-00490-10202			2	0.7	0.95	15°	4	50	19,800
★ 01-00490-10201			3	0.7	0.95	15°	4	50	19,800
★ 01-00490-10203			5	0.7	0.95	15°	4	53	22,400
★ 01-00490-10300		R0.3	1	0.7	0.95	15°	4	49	19,800
★ 01-00490-10302			2	0.7	0.95	15°	4	50	19,800
★ 01-00490-10301			3	0.7	0.95	15°	4	50	19,800
★ 01-00490-10303			5	0.7	0.95	15°	4	53	22,400
★ 01-00490-15022	1.5	R0.02	2	1	1.45	15°	4	52	25,900
★ 01-00490-15020			3	1	1.45	15°	4	52	25,900
★ 01-00490-15021			4.5	1	1.45	15°	4	52	25,900
★ 01-00490-15023			7.5	1	1.45	15°	4	52	29,400
★ 01-00490-15032		R0.03	2	1	1.45	15°	4	52	23,300
★ 01-00490-15030			3	1	1.45	15°	4	52	23,300
★ 01-00490-15031			4.5	1	1.45	15°	4	52	23,300
★ 01-00490-15033			7.5	1	1.45	15°	4	52	26,400
★ 01-00490-15052		R0.05	2	1	1.45	15°	4	52	23,300
★ 01-00490-15050			3	1	1.45	15°	4	52	23,300
★ 01-00490-15051			4.5	1	1.45	15°	4	52	23,300
★ 01-00490-15053			7.5	1	1.45	15°	4	52	26,400
★ 01-00490-15102		R0.1	2	1	1.45	15°	4	52	23,300
★ 01-00490-15100			3	1	1.45	15°	4	52	23,300
★ 01-00490-15101			4.5	1	1.45	15°	4	52	23,300
★ 01-00490-15103			7.5	1	1.45	15°	4	52	26,400
★ 01-00490-15202		R0.2	2	1	1.45	15°	4	52	23,300
★ 01-00490-15200			3	1	1.45	15°	4	52	23,300
★ 01-00490-15201			4.5	1	1.45	15°	4	52	23,300
★ 01-00490-15203			7.5	1	1.45	15°	4	52	26,400
★ 01-00490-15302		R0.3	2	1	1.45	15°	4	52	23,300
★ 01-00490-15300			3	1	1.45	15°	4	52	23,300
★ 01-00490-15301			4.5	1	1.45	15°	4	52	23,300
★ 01-00490-15303			7.5	1	1.45	15°	4	52	26,400

订购方法

请指定SSR200 外径(D)×角半径(R)×颈长(ℓ1)。
When you order, indicate SSR200 (D)×(R)×(ℓ1).

※(γ)为参考值。
※(γ) is reference value.

●切削参数参考表在P.31记载

●Recommended Milling Conditions are shown on page P.31.

产品代码 Code No.	(D)外径 Dia.	(R)角半径 Corner Radius	(ℓ1)颈长 Effective Length	(ℓ)刃长 Length of Cut	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
★ 01-00490-20022	2	R0.02	3	1.2	1.94	15°	4	53	26,700
★ 01-00490-20020			4	1.2	1.94	15°	4	53	26,700
★ 01-00490-20021			6	1.2	1.94	15°	4	53	26,700
★ 01-00490-20023			10	1.2	1.94	15°	4	53	29,800
★ 01-00490-20032		R0.03	3	1.2	1.94	15°	4	53	24,000
★ 01-00490-20030			4	1.2	1.94	15°	4	53	24,000
★ 01-00490-20031			6	1.2	1.94	15°	4	53	24,000
★ 01-00490-20033			10	1.2	1.94	15°	4	53	26,800
★ 01-00490-20052		R0.05	3	1.2	1.94	15°	4	53	24,000
★ 01-00490-20050			4	1.2	1.94	15°	4	53	24,000
★ 01-00490-20051			6	1.2	1.94	15°	4	53	24,000
★ 01-00490-20053			10	1.2	1.94	15°	4	53	26,800
★ 01-00490-20102		R0.1	3	1.2	1.94	15°	4	53	24,000
★ 01-00490-20100			4	1.2	1.94	15°	4	53	24,000
★ 01-00490-20101			6	1.2	1.94	15°	4	52	24,000
★ 01-00490-20103			10	1.2	1.94	15°	4	52	26,800
★ 01-00490-20202		R0.2	3	1.2	1.94	15°	4	53	24,000
★ 01-00490-20200			4	1.2	1.94	15°	4	53	24,000
★ 01-00490-20201			6	1.2	1.94	15°	4	52	24,000
★ 01-00490-20203			10	1.2	1.94	15°	4	52	26,700
★ 01-00490-20302		R0.3	3	1.2	1.94	15°	4	53	24,000
★ 01-00490-20300			4	1.2	1.94	15°	4	53	24,000
★ 01-00490-20301			6	1.2	1.94	15°	4	52	24,000
★ 01-00490-20303			10	1.2	1.94	15°	4	52	26,700
★ 01-00490-20502		R0.5	3	1.2	1.94	15°	4	53	24,000
★ 01-00490-20500			4	1.2	1.94	15°	4	53	24,000
★ 01-00490-20501			6	1.2	1.94	15°	4	52	24,000
★ 01-00490-20503			10	1.2	1.94	15°	4	52	26,700

SHR320

CBN高效率圆鼻铣刀

CBN High Efficient Radius End Mill



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

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

产品代码 Code No.	(D)外径 Dia.	(R)角半径 Corner Radius	(ℓ1)颈长 Effective Length	(ℓ)刃长 Length of Cut	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00495-05011	0.5	R0.1	1.5	0.25	0.46	15°	4	50	26,000
01-00495-05012		R0.1	2.5	0.25	0.46	15°	4	50	29,000
01-00495-10011	1	R0.1	3	0.5	0.95	15°	4	50	24,000
01-00495-10012		R0.1	5	0.5	0.95	15°	4	52	27,000
01-00495-10021		R0.2	3	0.5	0.95	15°	4	50	24,000
01-00495-10022		R0.2	5	0.5	0.95	15°	4	52	27,000
01-00495-15011	1.5	R0.1	4.5	0.75	1.45	15°	4	52	28,000
01-00495-15012		R0.1	7.5	0.75	1.45	15°	4	52	31,000
01-00495-15021		R0.2	4.5	0.75	1.45	15°	4	52	28,000
01-00495-15022		R0.2	7.5	0.75	1.45	15°	4	52	31,000
01-00495-20011	2	R0.1	6	1	1.94	15°	4	52	29,000
01-00495-20012		R0.1	10	1	1.94	15°	4	52	32,000
01-00495-20031		R0.3	6	1	1.94	15°	4	52	29,000
01-00495-20032		R0.3	10	1	1.94	15°	4	52	32,000

订购方法

请指定SHR320 外径(D)×角半径(R)×颈长(ℓ1)。
When you order, indicate SHR320 (D)×(R)×(ℓ1).

●切削参数参考表在P.33记载
●Recommended Milling Conditions are shown on page P.33.

※(γ)为参考值。
※(γ) is reference value.

SHPR400

CBN超高精度圆鼻铣刀

CBN Super High Precision Radius End Mill

New



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

★返修对应(柄长须在15mm以上。详情请咨询本公司。)

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

NEW	产品代码 Code No.	(D)外径 Dia.	(R)角半径 Corner Radius	(ℓ1)颈长 Under Neck Length	(ℓ)刃长 Length of Cut	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
	01-00485-01002	0.1	R0.01	0.2	0.04	0.09	15°	4	50	48,300
	01-00485-01003			0.3	0.04	0.09	15°	4	50	48,900
	01-00485-01005			0.5	0.04	0.09	15°	4	50	49,800
	01-00485-01022		R0.02	0.2	0.04	0.09	15°	4	50	48,300
	01-00485-01023			0.3	0.04	0.09	15°	4	50	48,900
	01-00485-01025			0.5	0.04	0.09	15°	4	50	49,800
	01-00485-01522	0.15	R0.02	0.2	0.06	0.14	15°	4	50	48,300
	01-00485-01523			0.3	0.06	0.14	15°	4	50	48,900
	01-00485-01525			0.5	0.06	0.14	15°	4	50	49,800
	01-00485-01532		R0.03	0.2	0.06	0.14	15°	4	50	46,100
	01-00485-01533			0.3	0.06	0.14	15°	4	50	46,800
	01-00485-01535			0.5	0.06	0.14	15°	4	50	48,300
	01-00485-02203	0.2	R0.02	0.3	0.08	0.19	15°	4	50	36,800
	01-00485-02205			0.5	0.08	0.19	15°	4	50	36,800
	01-00485-02210			1	0.08	0.19	15°	4	50	37,800
	01-00485-02303		R0.03	0.3	0.08	0.19	15°	4	50	33,000
	01-00485-02305			0.5	0.08	0.19	15°	4	50	33,000
	01-00485-02310			1	0.08	0.19	15°	4	50	34,000
	01-00485-03205	0.3	R0.02	0.5	0.13	0.285	15°	4	50	36,300
	01-00485-03207			0.75	0.13	0.285	15°	4	50	36,500
	01-00485-03210			1	0.13	0.285	15°	4	50	36,800
	01-00485-03215			1.5	0.13	0.285	15°	4	50	37,200
	01-00485-03220			2	0.13	0.285	15°	4	50	37,800
	01-00485-03405		R0.05	0.5	0.13	0.285	15°	4	50	32,700
	01-00485-03407			0.75	0.13	0.285	15°	4	50	32,900
	01-00485-03410			1	0.13	0.285	15°	4	50	33,000
	01-00485-03415			1.5	0.13	0.285	15°	4	50	33,500
	01-00485-03420			2	0.13	0.285	15°	4	50	34,000

订购方法

请指定SHPR400 外径(D)×角半径(R)×颈长(ℓ1)。
When you order, indicate SHPR400 (D)×(R)×(ℓ1).

●切削参数参考表在P.34记载
●Recommended Milling Conditions are shown on page P.34.

※(γ)为参考值。
※(γ) is reference value.

SHPR400

CBN超高精度圆鼻铣刀
CBN Super High Precision Radius End Mill

SHPR400New

★返修对应(柄长须在15mm以上。详情请咨询本公司。)

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

NEW	产品代码 Code No.	(D)外径 Dia.	(R)角半径 Corner Radius	($\varnothing$ 1)颈长 Under Neck Length	($\varnothing$)刃长 Length of Cut	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
★NEW	01-00485-04205	0.4	R0.02	0.5	0.24	0.37	15°	4	50	34,400
★NEW	01-00485-04210			1	0.24	0.37	15°	4	50	34,700
★NEW	01-00485-04215			1.5	0.24	0.37	15°	4	50	35,000
★NEW	01-00485-04220			2	0.24	0.37	15°	4	50	35,400
★NEW	01-00485-04225			2.5	0.24	0.37	15°	4	50	36,000
★NEW	01-00485-04405		R0.05	0.5	0.24	0.37	15°	4	50	31,000
★NEW	01-00485-04410			1	0.24	0.37	15°	4	50	31,200
★NEW	01-00485-04415			1.5	0.24	0.37	15°	4	50	31,200
★NEW	01-00485-04420			2	0.24	0.37	15°	4	50	31,900
★NEW	01-00485-04425			2.5	0.24	0.37	15°	4	50	32,400
★NEW	01-00485-04505		R0.1	0.5	0.24	0.37	15°	4	50	31,000
★NEW	01-00485-04510			1	0.24	0.37	15°	4	50	31,200
★NEW	01-00485-04515			1.5	0.24	0.37	15°	4	50	31,200
★NEW	01-00485-04520			2	0.24	0.37	15°	4	50	31,900
★NEW	01-00485-04525			2.5	0.24	0.37	15°	4	50	32,400
★	01-00485-05205	0.5	R0.02	0.5	0.3	0.46	15°	4	48	28,400
★	01-00485-05210			1	0.3	0.46	15°	4	50	28,600
★	01-00485-05215			1.5	0.3	0.46	15°	4	50	28,800
★NEW	01-00485-05220			2	0.3	0.46	15°	4	50	30,200
★	01-00485-05225			2.5	0.3	0.46	15°	4	50	31,600
★	01-00485-05405		R0.05	0.5	0.3	0.46	15°	4	48	25,500
★	01-00485-05410			1	0.3	0.46	15°	4	50	25,700
★	01-00485-05415			1.5	0.3	0.46	15°	4	50	26,000
★NEW	01-00485-05420			2	0.3	0.46	15°	4	50	27,200
★	01-00485-05425			2.5	0.3	0.46	15°	4	50	28,400
★	01-00485-05505		R0.1	0.5	0.3	0.46	15°	4	48	25,500
★	01-00485-05510			1	0.3	0.46	15°	4	50	25,700
★	01-00485-05515			1.5	0.3	0.46	15°	4	50	26,000
★NEW	01-00485-05520			2	0.3	0.46	15°	4	50	27,200
★	01-00485-05525			2.5	0.3	0.46	15°	4	50	28,400
★NEW	01-00485-06205	0.6	R0.02	0.5	0.3	0.56	15°	4	48	28,400
★NEW	01-00485-06210			1	0.3	0.56	15°	4	50	28,600
★NEW	01-00485-06215			1.5	0.3	0.56	15°	4	50	28,800
★NEW	01-00485-06220			2	0.3	0.56	15°	4	50	31,200
★NEW	01-00485-06225			2.5	0.3	0.56	15°	4	50	31,500
★NEW	01-00485-06405		R0.05	0.5	0.3	0.56	15°	4	48	25,500
★NEW	01-00485-06410			1	0.3	0.56	15°	4	50	25,700
★NEW	01-00485-06415			1.5	0.3	0.56	15°	4	50	26,000
★NEW	01-00485-06420			2	0.3	0.56	15°	4	50	27,000
★NEW	01-00485-06425			2.5	0.3	0.56	15°	4	50	28,400
★NEW	01-00485-06505		R0.1	0.5	0.3	0.56	15°	4	48	25,500
★NEW	01-00485-06510			1	0.3	0.56	15°	4	50	25,700
★NEW	01-00485-06515			1.5	0.3	0.56	15°	4	50	26,000
★NEW	01-00485-06520			2	0.3	0.56	15°	4	50	27,000
★NEW	01-00485-06525			2.5	0.3	0.56	15°	4	50	28,400
★	01-00485-08215	0.8	R0.02	1.5	0.56	0.76	15°	4	50	28,800
★	01-00485-08225			2.5	0.56	0.76	15°	4	50	31,600
★	01-00485-08250			5	0.56	0.76	15°	4	53	32,700
★	01-00485-08415		R0.05	1.5	0.56	0.76	15°	4	50	26,000
★	01-00485-08425			2.5	0.56	0.76	15°	4	50	28,400
★	01-00485-08450			5	0.56	0.76	15°	4	53	29,300
★	01-00485-08515		R0.1	1.5	0.56	0.76	15°	4	50	26,000
★	01-00485-08525			2.5	0.56	0.76	15°	4	50	28,400
★	01-00485-08550			5	0.56	0.76	15°	4	53	29,300

订购方法

请指定SHPR400 外径(D)×角半径(R)×颈长($\varnothing$ 1)
When you order, indicate SHPR400 (D)×(R)×(ℓ1).

※(γ)为参考值。
※(γ) is reference value.

●切削参数参考表在P.34记载

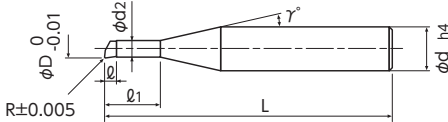
●Recommended Milling Conditions are shown on page P.34.

NEW	产品代码 Code No.	(D)外径 Dia.	(R)角半径 Corner Radius	($\varnothing$ 1)颈长 Under Neck Length	($\varnothing$)刃长 Length of Cut	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
	01-00485-10201	1	R0.02	1	0.7	0.95	15°	4	49	26,400
	01-00485-10202			2	0.7	0.95	15°	4	50	26,400
	01-00485-10203			3	0.7	0.95	15°	4	50	26,400
	01-00485-10205			5	0.7	0.95	15°	4	53	29,900
	01-00485-10401		R0.05	1	0.7	0.95	15°	4	49	23,800
	01-00485-10402			2	0.7	0.95	15°	4	50	23,800
	01-00485-10403			3	0.7	0.95	15°	4	50	23,800
	01-00485-10405			5	0.7	0.95	15°	4	53	26,900
	01-00485-10501		R0.1	1	0.7	0.95	15°	4	49	23,800
	01-00485-10502			2	0.7	0.95	15°	4	50	23,800
	01-00485-10503			3	0.7	0.95	15°	4	50	23,800
	01-00485-10505			5	0.7	0.95	15°	4	53	26,900
	01-00485-10601		R0.2	1	0.7	0.95	15°	4	49	23,800
	01-00485-10602			2	0.7	0.95	15°	4	50	23,800
	01-00485-10603			3	0.7	0.95	15°	4	50	23,800
	01-00485-10605			5	0.7	0.95	15°	4	53	26,900
	01-00485-15202	1.5	R0.02	2	1	1.45	15°	4	52	31,100
	01-00485-15203			3	1	1.45	15°	4	52	31,100
	01-00485-15204			4.5	1	1.45	15°	4	52	31,100
	01-00485-15207			7.5	1	1.45	15°	4	52	35,300
	01-00485-15402		R0.05	2	1	1.45	15°	4	52	28,000
	01-00485-15403			3	1	1.45	15°	4	52	28,000
	01-00485-15404			4.5	1	1.45	15°	4	52	28,000
	01-00485-15407			7.5	1	1.45	15°	4	52	31,700
	01-00485-15502		R0.1	2	1	1.45	15°	4	52	28,000
	01-00485-15503			3	1	1.45	15°	4	52	28,000
	01-00485-15504			4.5	1	1.45	15°	4	52	28,000
	01-00485-15507			7.5	1	1.45	15°	4	52	31,700
	01-00485-15602		R0.2	2	1	1.45	15°	4	52	28,000
	01-00485-15603			3	1	1.45	15°	4	52	28,000
	01-00485-15604			4.5	1	1.45	15°	4	52	28,000
	01-00485-15607			7.5	1	1.45	15°	4	52	31,700
	01-00485-20203	2	R0.02	3	1.2	1.94	15°	4	53	32,100
	01-00485-20204			4	1.2	1.94	15°	4	53	32,100
	01-00485-20206			6	1.2	1.94	15°	4	53	32,100
	01-00485-20210			10	1.2	1.94	15°	4	53	35,800
	01-00485-20403		R0.05	3	1.2	1.94	15°	4	53	28,800
	01-00485-20404			4	1.2	1.94	15°	4	53	28,800
	01-00485-20406			6	1.2	1.94	15°	4	53	28,800
	01-00485-20410			10	1.2	1.94	15°	4	53	32,200
	01-00485-20503		R0.1	3	1.2	1.94	15°	4	53	28,800
	01-00485-20504			4	1.2	1.94	15°	4	53	28,800
	01-00485-20506			6	1.2	1.94	15°	4	53	28,800
	01-00485-20510			10	1.2	1.94	15°	4	53	32,200
	01-00485-20603		R0.2	3	1.2	1.94	15°	4	53	28,800
	01-00485-20604			4	1.2	1.94	15°	4	53	28,800
	01-00485-20606			6	1.2	1.94	15°	4	53	28,800
	01-00485-20610			10	1.2	1.94	15°	4	53	32,100
	01-00485-30406	3	R0.05	6	1.8	2.85	15°	6	53	37,200
	01-00485-30409			9	1.8	2.85	15°	6	53	38,000
	01-00485-30412			12	1.8	2.85	15°	6	63	38,800
	01-00485-30415			15	1.8	2.85	15°	6	63	39,600
	01-00485-30506		R0.1	6	1.8	2.85	15°	6	53	37,200
	01-00485-30509			9	1.8	2.85	15°	6	53	38,000
	01-00485-30512			12	1.8	2.85	15°	6	63	38,800
	01-00485-30515			15	1.8	2.85	15°	6	63	39,600
	01-00485-30606	R0.2	6	1.8	2.85	15°	6	53	37,200	
	01-00485-30609		9	1.8	2.85	15°	6	53	38,000	
	01-00485-30612		12	1.8	2.85	15°	6	63	38,800	
	01-00485-30615		15	1.8	2.85	15°	6	63	39,600	

SSF120

CBN超精加工用圆鼻铣刀

CBN Super Surface End Mill



- 最适合精细加工时的基准面加工。
- 采用 NS 独创的形状和圆角 R, 实现稳定的加工表面。
- Appropriate for datum plane machining on precision machining.
- NS original design and corner R to realize stable machining surface.



加工材料 Work Material

碳素钢 Carbon Steels	合金钢・工具钢 Alloy Steels・Tool Steels	调质钢 Prehardened Steels	高硬度钢 Hardened Steels		不锈钢 Stainless Steels	钛合金 Titanium Alloy	铝合金 Aluminum Alloy	铜 Copper	树脂 Resin
			~ 55HRC	55HRC ~					
		◎	◎	◎					

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

产品代码 Code No.	(D)外径 Dia.	(R)角半径 Corner Radius	(L)刃长 Length of Cut	(L1)颈长 Effective Length	(d2)颈径 Neck Dia.	(γ)颈角 Neck Taper Angle	(d)柄径 Shank Dia.	(L)全长 Overall Length	定价(日元) Retail Price
01-00470-00020	0.2	R0.05	0.1	0.5	0.19	15°	4	50	35,000
01-00470-00030	0.3	R0.05	0.15	0.75	0.28	15°	4	50	30,000
01-00470-00040	0.4	R0.05	0.2	1	0.37	15°	4	50	25,000
01-00470-00050	0.5	R0.05	0.25	1.25	0.46	15°	4	50	22,000
01-00470-00060	0.6	R0.05	0.3	1.5	0.56	15°	4	50	24,000
01-00470-00080	0.8	R0.05	0.4	2	0.76	15°	4	50	23,000
01-00470-00100	1	R0.1	0.5	2.5	0.95	15°	4	50	22,000
01-00470-00150	1.5	R0.1	0.75	3.8	1.45	15°	4	52	23,000
01-00470-00200	2	R0.1	1	5	1.94	15°	4	52	25,000

- 订购方法

请指定SSF120 外径(D)。
When you order, indicate SSF120 (D).

※(γ)为参考值。
※(γ) is reference value.
- 切削参数参考表在P.33记载

● Recommended Milling Conditions are shown on page P.33.

SSR200

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material			调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・SKD61・STAVAX (~52HRC)				高硬度钢 Hardened Steels DC53・ELMAX・PD613 (~62HRC)				高速钢 High Speed Tool Steels DRM3・YXR3 (~68HRC)				
(D)外径 Dia.	(R)角半径 Corner Radius	颈长 Effective Length	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	
			ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	
0.1	0.02・0.03	0.2	0.002	0.015	200	50,000	0.002	0.01	150	50,000	0.001	0.01	100	50,000	
		0.3	0.002	0.015	150	50,000	0.001	0.01	100	50,000	0.001	0.01	50	50,000	
		0.5	0.002	0.01	150	50,000	0.001	0.01	100	50,000	0.001	0.01	50	50,000	
0.15	0.02・0.03	0.2	0.003	0.02	250	50,000	0.003	0.02	200	50,000	0.002	0.015	150	50,000	
		0.3	0.003	0.02	200	50,000	0.003	0.02	150	50,000	0.002	0.015	100	50,000	
		0.5	0.002	0.02	200	50,000	0.002	0.02	150	50,000	0.001	0.015	100	50,000	
0.2	0.02・0.03・0.05	0.3	0.003	0.03	400	50,000	0.003	0.03	350	50,000	0.002	0.02	250	50,000	
		0.5	0.003	0.03	300	50,000	0.003	0.03	300	50,000	0.002	0.02	200	50,000	
		1	0.003	0.02	200	50,000	0.003	0.02	200	50,000	0.002	0.01	100	50,000	
0.3	0.02・0.03・0.05	0.5・0.75・1	0.003	0.05	500	50,000	0.003	0.05	400	50,000	0.002	0.03	300	50,000	
		1.5・2	0.003	0.03	400	50,000	0.003	0.03	300	50,000	0.002	0.02	200	50,000	
0.4	0.02・0.03・0.05・0.1	0.5・1	0.005	0.1	700	50,000	0.005	0.1	600	50,000	0.003	0.03	400	50,000	
		1.5・2	0.005	0.05	500	50,000	0.005	0.05	400	50,000	0.003	0.02	300	50,000	
0.5	0.02・0.03	0.5・1・1.5	0.005	0.2	600	50,000	0.005	0.2	600	50,000	0.003	0.1	500	50,000	
		2.5	0.005	0.1	600	50,000	0.005	0.1	600	50,000	0.003	0.05	500	50,000	
	0.05	0.5・1・1.5	0.01	0.2	600	50,000	0.01	0.2	600	50,000	0.005	0.2	500	50,000	
		2.5	0.01	0.1	600	50,000	0.01	0.1	600	50,000	0.005	0.1	500	50,000	
	0.1	0.5・1・1.5	0.02	0.2	800	50,000	0.02	0.2	800	50,000	0.01	0.1	700	50,000	
		2.5	0.01	0.1	800	50,000	0.01	0.1	800	50,000	0.01	0.05	700	50,000	
0.6	0.02・0.03	0.5・1・1.5	0.005	0.2	600	50,000	0.005	0.2	600	50,000	0.003	0.1	500	50,000	
		2.5	0.005	0.1	600	50,000	0.005	0.1	600	50,000	0.003	0.05	500	50,000	
	0.05	0.5・1・1.5	0.01	0.2	600	50,000	0.01	0.2	600	50,000	0.005	0.2	500	50,000	
		2.5	0.01	0.1	600	50,000	0.01	0.1	600	50,000	0.005	0.1	500	50,000	
	0.1	0.5・1・1.5	0.02	0.2	1,000	50,000	0.02	0.2	1,000	50,000	0.01	0.1	700	50,000	
		2.5	0.01	0.1	1,000	50,000	0.01	0.1	1,000	50,000	0.01	0.05	700	50,000	
0.8	0.02・0.03	1.5・2.5	0.005	0.2	800	50,000	0.005	0.2	800	50,000	0.003	0.1	600	40,000	
		5	0.005	0.1	800	50,000	0.005	0.1	800	50,000	0.003	0.05	600	40,000	
	0.05	1.5・2.5	0.02	0.3	1,000	50,000	0.02	0.2	1,000	50,000	0.01	0.1	700	40,000	
		5	0.01	0.2	1,000	50,000	0.01	0.1	1,000	50,000	0.01	0.05	700	40,000	
	0.1	1.5・2.5	0.02	0.3	1,400	50,000	0.02	0.2	1,200	50,000	0.01	0.1	1,000	40,000	
		5	0.01	0.2	1,400	50,000	0.01	0.1	1,200	50,000	0.01	0.05	1,000	40,000	
1	0.02・0.03	1・2		0.005	0.4	800	48,000	0.005	0.3	800	48,000	0.005	0.2	600	32,000
	0.05			0.01	0.4	1,000	48,000	0.01	0.3	1,000	48,000	0.01	0.2	800	32,000
	0.1・0.2・0.3			0.03	0.4	1,500	48,000	0.03	0.3	1,200	48,000	0.01	0.2	1,000	32,000
	0.02・0.03	3・5		0.005	0.3	800	48,000	0.005	0.2	800	48,000	0.005	0.1	600	32,000
	0.05			0.01	0.3	1,000	48,000	0.01	0.2	1,000	48,000	0.01	0.1	800	32,000
	0.1・0.2・0.3			0.02	0.3	1,500	48,000	0.02	0.2	1,200	48,000	0.01	0.1	1,000	32,000

SSR200

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material			调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・SKD61・STAVAX (~52HRC)				高硬度钢 Hardened Steels DC53・ELMAX・PD613 (~62HRC)				高速钢 High Speed Tool Steels DRM3・YXR3 (~68HRC)			
(D)外径 Dia.	(R)角半径 Corner Radius	颈长 Effective Length	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
			ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹
1.5	0.02・0.03	2	0.005	0.7	1,200	32,000	0.005	0.6	1,100	32,000	0.005	0.3	900	20,000
	0.05		0.02	0.7	1,200	32,000	0.01	0.6	1,100	32,000	0.01	0.3	900	20,000
	0.1・0.2・0.3		0.04	0.7	2,400	32,000	0.04	0.6	1,800	32,000	0.01	0.3	1,300	20,000
	0.02・0.03	3・4.5	0.005	0.7	1,000	32,000	0.005	0.6	1,000	32,000	0.005	0.3	800	20,000
	0.05		0.02	0.7	1,000	32,000	0.01	0.6	1,000	32,000	0.01	0.3	800	20,000
	0.1・0.2・0.3		0.04	0.7	2,000	32,000	0.04	0.6	1,500	32,000	0.01	0.3	1,200	20,000
	0.02・0.03	7.5	0.005	0.5	1,000	32,000	0.005	0.4	1,000	32,000	0.005	0.2	800	20,000
	0.05		0.02	0.5	1,000	32,000	0.01	0.4	1,000	32,000	0.01	0.2	800	20,000
	0.1・0.2・0.3		0.03	0.5	2,000	32,000	0.03	0.4	1,500	32,000	0.01	0.2	1,200	20,000
2	0.02・0.03	3	0.005	0.8	1,200	24,000	0.005	0.7	1,100	24,000	0.005	0.5	900	16,000
	0.05		0.02	0.8	1,200	24,000	0.01	0.7	1,100	24,000	0.01	0.5	900	16,000
	0.1・0.2・0.3・0.5		0.05	0.8	2,400	24,000	0.05	0.7	1,800	24,000	0.01	0.5	1,300	16,000
	0.02・0.03	4・6	0.005	0.8	1,000	24,000	0.005	0.7	1,000	24,000	0.005	0.5	800	16,000
	0.05		0.02	0.8	1,000	24,000	0.01	0.7	1,000	24,000	0.01	0.5	800	16,000
	0.1・0.2・0.3・0.5		0.05	0.8	2,000	24,000	0.05	0.7	1,500	24,000	0.01	0.5	1,200	16,000
	0.02・0.03	10	0.005	0.6	1,000	24,000	0.005	0.5	1,000	24,000	0.005	0.3	800	16,000
	0.05		0.02	0.6	1,000	24,000	0.01	0.5	1,000	24,000	0.01	0.3	800	16,000
	0.1・0.2・0.3・0.5		0.03	0.6	2,000	24,000	0.03	0.5	1,500	24,000	0.01	0.3	1,200	16,000
备注 Notes			※切深量为中精加工、精加工时的最大值。请根据机床刚性和加工方法进行调整。 ※切深量的 ap 表示轴向切入量, ae 表示步距量。 ※轴向进刀建议采用螺旋进刀及倾斜进刀方式。 ※建议使用油雾冷却方式。 ※请以相同的比率调整主轴转速和进给速度。 ※加工参数会因切深量和机床刚性的状况而有所不同。请每次调整后再使用。 ※请根据需要控制刀具的伸出量。 ※建议使用刚性较大的铣刀刀柄和机床。 ※Depth of Cut shows the maximum value for semi-finishing and finishing. Adjust milling conditions depending on the rigidity of the machine and desired accuracy. ※Depth of Cut : ap = Axial Depth of Cut / ae = Radial Depth of Cut. ※Recommend to apply helical or ramping for approaching into axial direction. ※We recommend using oil mist coolant. ※Adjust both spindle speed and feed at the same rate. ※Adjust milling conditions according to the volume of Depth of Cut and rigidity of machine. ※Length of tool overhang must be as short as possible. ※Machine, tool chuck must be sufficiently accurate.											

SHR320

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material			调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・STAVAX・SKD61 (～52HRC)				高硬度钢 Hardened Steels SKD11・ELMAX (～62HRC)				高速钢 High Speed Tool Steels SKH・HAP (～68HRC)			
(D)外径 Dia.	(R)角半径 Corner Radius	颈长 Effective Length	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
			ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹
0.5	0.1	1.5	0.008	0.2	1,500	50,000	0.005	0.15	800	50,000	0.003	0.1	600	50,000
		2.5	0.006	0.15	1,000	40,000	0.005	0.1	500	40,000	0.003	0.05	300	40,000
1	0.1・0.2	3	0.012	0.4	2,000	40,000	0.007	0.25	1,000	40,000	0.006	0.15	800	35,000
		5	0.008	0.3	1,500	30,000	0.005	0.15	800	30,000	0.004	0.1	400	25,000
1.5	0.1・0.2	4.5	0.015	0.6	2,500	35,000	0.008	0.4	1,200	35,000	0.007	0.2	1,000	30,000
		7.5	0.012	0.4	1,800	25,000	0.006	0.3	1,000	25,000	0.005	0.15	500	20,000
2	0.1・0.3	6	0.02	0.8	3,000	30,000	0.01	0.6	1,500	30,000	0.008	0.3	1,200	25,000
		10	0.015	0.6	2,000	20,000	0.008	0.4	1,000	20,000	0.006	0.2	600	18,000
备注 Notes			※切深量是指进行等高线加工时的大概标准。请根据机床刚性和加工方法进行调整。 ※建议以倾斜切入方式进刀。请将此时的切入角度设定在 3°以内。 ※使用 CBN 工具前。请注意加工余量的均匀性。 ※加工 R 角等负载大的部位或复杂的形状时, 请特别注意参数设定和刀路轨迹等。 ※请以相同的比率调整主轴转速和进给速度。 ※建议使用油雾冷却方式。 ※Depth of Cut is for contour line milling as the value of reference. Please adjust it depending on machine rigidity and machining method. ※Ramping approach with angle 3° or smaller is recommended. ※Recommend leaving uniform finishing allowance on the machined surface in the pre-stage cutting (semi-finishing). ※When cutting high load sections or complex shapes, it requires attention to condition setting and tool path. ※Adjust both spindle speed and feed at the same rate. ※Oil mist coolant is recommended.											

SSF120

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material	高硬度钢・高速钢 Hardened Steels・High Speed Tool Steels STAVAX・SKD11・SKH (~68HRC)			
(D)外径 Dia.	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
	ap mm	ae mm	mm/min	min ⁻¹
0.2	0.002	0.003	50	60,000
0.3	0.002	0.003	100	60,000
0.4	0.002	0.003	150	60,000
0.5	0.003	0.005	200	60,000
0.6	0.003	0.005	240	60,000
0.8	0.003	0.008	280	60,000
1	0.005	0.01	300	60,000
1.5	0.005	0.02	400	60,000
2	0.005	0.03	500	60,000
备注 Notes	※切深量的 ap 表示轴向切入量, ae 表示步距量。 ※建议使用油雾冷却方式。 ※建议使用刚性较大的铣刀刀柄和机床。 ※请根据需要控制刀具的伸出量。 ※Depth of Cut: ap=Axial Depth of Cut / ae=Radial Depth of Cut. ※We recommend using oil mist coolant. ※Machine, tool chuck must be sufficiently accurate. ※Length of tool overhang must be as short as possible.			

SHPR400

SHPR400

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material				调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・STAVAX・SKD61 (~52HRC)				高硬度钢 Hardened Steels DC53・ELMAX・PD613 (~62HRC)				高速钢 High Speed Tool Steels DRM3・YXR3 (~70HRC)			
外径 Dia.	(R)角半径 Corner Radius	颈长 Under Neck Length	L(颈长) D(外径) L/D	切深量 Depth of Cut		进给速度 Feed mm/min	主轴转速 Spindle Speed min ⁻¹	切深量 Depth of Cut		进给速度 Feed mm/min	主轴转速 Spindle Speed min ⁻¹	切深量 Depth of Cut		进给速度 Feed mm/min	主轴转速 Spindle Speed min ⁻¹
				ap mm	ae mm			ap mm	ae mm			ap mm	ae mm		
0.1	R0.01	0.2	2	0.002	0.015	320	50,000	0.002	0.01	240	50,000	0.001	0.01	120	50,000
		0.3	3	0.002	0.015	240	50,000	0.001	0.01	160	50,000	0.001	0.01	60	50,000
		0.5	5	0.002	0.01	240	50,000	0.001	0.01	160	50,000	0.001	0.01	60	50,000
	R0.02	0.2	2	0.002	0.015	400	50,000	0.002	0.01	300	50,000	0.001	0.01	200	50,000
		0.3	3	0.002	0.015	300	50,000	0.001	0.01	200	50,000	0.001	0.01	100	50,000
		0.5	5	0.002	0.01	300	50,000	0.001	0.01	200	50,000	0.001	0.01	100	50,000
0.15	R0.02	0.2	1.3	0.003	0.02	500	50,000	0.003	0.02	400	50,000	0.002	0.015	300	50,000
		0.3	2	0.003	0.02	400	50,000	0.003	0.02	300	50,000	0.002	0.015	200	50,000
		0.5	3.3	0.002	0.02	400	50,000	0.002	0.02	300	50,000	0.001	0.015	200	50,000
	R0.03	0.2	1.3	0.003	0.02	500	50,000	0.003	0.02	400	50,000	0.002	0.015	300	50,000
		0.3	2	0.003	0.02	400	50,000	0.003	0.02	300	50,000	0.002	0.015	200	50,000
		0.5	3.3	0.002	0.02	400	50,000	0.002	0.02	300	50,000	0.001	0.015	200	50,000
0.2	R0.02	0.3	1.5	0.003	0.03	800	50,000	0.003	0.03	700	50,000	0.002	0.02	500	50,000
		0.5	2.5	0.003	0.03	600	50,000	0.003	0.03	600	50,000	0.002	0.02	400	50,000
		1	5	0.003	0.02	400	50,000	0.003	0.02	400	50,000	0.002	0.01	200	50,000
	R0.03	0.3	1.5	0.003	0.03	800	50,000	0.003	0.03	700	50,000	0.002	0.02	500	50,000
		0.5	2.5	0.003	0.03	600	50,000	0.003	0.03	600	50,000	0.002	0.02	400	50,000
		1	5	0.003	0.02	400	50,000	0.003	0.02	400	50,000	0.002	0.01	200	50,000
0.3	R0.02	0.5	1.7	0.003	0.05	800	50,000	0.003	0.05	700	50,000	0.002	0.03	500	50,000
		0.75	2.5	0.003	0.05	800	50,000	0.003	0.05	640	50,000	0.002	0.03	480	50,000
		1	3.3	0.003	0.05	800	50,000	0.003	0.05	640	50,000	0.002	0.03	480	50,000
		1.5	5	0.003	0.03	640	50,000	0.003	0.03	480	50,000	0.002	0.02	320	50,000
		2	6.7	0.003	0.03	640	50,000	0.003	0.03	480	50,000	0.002	0.02	320	50,000
	R0.05	0.5	1.7	0.003	0.05	1,000	50,000	0.003	0.05	800	50,000	0.002	0.03	600	50,000
		0.75	2.5	0.003	0.05	1,000	50,000	0.003	0.05	800	50,000	0.002	0.03	600	50,000
		1	3.3	0.003	0.05	1,000	50,000	0.003	0.05	800	50,000	0.002	0.03	600	50,000
		1.5	5	0.003	0.03	800	50,000	0.003	0.03	600	50,000	0.002	0.02	400	50,000
		2	6.7	0.003	0.03	800	50,000	0.003	0.03	600	50,000	0.002	0.02	400	50,000
0.4	R0.02	0.5	1.3	0.004	0.1	900	50,000	0.004	0.1	800	50,000	0.003	0.08	600	50,000
		1	2.5	0.004	0.1	900	50,000	0.004	0.1	800	50,000	0.003	0.08	600	50,000
		1.5	3.8	0.004	0.1	900	50,000	0.004	0.1	800	50,000	0.003	0.08	600	50,000
		2	5	0.004	0.08	800	50,000	0.004	0.08	700	50,000	0.003	0.05	500	50,000
		2.5	6.3	0.004	0.08	800	50,000	0.004	0.08	700	50,000	0.003	0.05	500	50,000
		0.5	1.3	0.005	0.1	1,100	50,000	0.005	0.1	1,000	50,000	0.004	0.08	800	50,000
	R0.05	1	2.5	0.005	0.1	1,100	50,000	0.005	0.1	1,000	50,000	0.004	0.08	800	50,000
		1.5	3.8	0.005	0.1	1,100	50,000	0.005	0.1	1,000	50,000	0.004	0.08	800	50,000
		2	5	0.005	0.08	1,000	50,000	0.005	0.08	800	50,000	0.004	0.05	600	50,000
		2.5	6.3	0.005	0.08	1,000	50,000	0.005	0.08	800	50,000	0.004	0.05	600	50,000
		0.5	1.3	0.008	0.1	1,200	50,000	0.008	0.1	1,100	50,000	0.005	0.08	900	50,000
		1	2.5	0.008	0.1	1,200	50,000	0.008	0.1	1,100	50,000	0.005	0.08	900	50,000
	R0.1	1.5	3.8	0.008	0.1	1,200	50,000	0.008	0.1	1,100	50,000	0.005	0.08	900	50,000
		2	5	0.005	0.08	1,200	50,000	0.005	0.08	1,100	50,000	0.004	0.05	900	50,000
		2.5	6.3	0.005	0.08	1,200	50,000	0.005	0.08	1,100	50,000	0.004	0.05	900	50,000
		0.5	1	0.005	0.15	1,000	50,000	0.005	0.15	1,000	50,000	0.003	0.1	800	50,000
		1	2	0.005	0.15	1,000	50,000	0.005	0.15	1,000	50,000	0.003	0.1	800	50,000
		1.5	3	0.005	0.15	1,000	50,000	0.005	0.15	1,000	50,000	0.003	0.1	800	50,000
0.5	R0.02	2	4	0.005	0.1	1,000	50,000	0.005	0.1	1,000	50,000	0.003	0.08	800	50,000
		2.5	5	0.005	0.08	1,000	50,000	0.005	0.08	1,000	50,000	0.003	0.05	800	50,000
		0.5	1	0.01	0.15	1,200	50,000	0.01	0.15	1,200	50,000	0.007	0.1	1,000	50,000
		1	2	0.01	0.15	1,200	50,000	0.01	0.15	1,200	50,000	0.007	0.1	1,000	50,000
		1.5	3	0.01	0.15	1,200	50,000	0.01	0.15	1,200	50,000	0.007	0.1	1,000	50,000
	R0.05	2	4	0.007	0.12	1,200	50,000	0.007	0.12	1,200	50,000	0.005	0.08	1,000	50,000
		2.5	5	0.007	0.1	1,200	50,000	0.007	0.1	1,200	50,000	0.005	0.07	1,000	50,000
		0.5	1	0.02	0.15	1,600	50,000	0.02	0.15	1,500	50,000	0.01	0.1	1,400	50,000
		1	2	0.02	0.15	1,600	50,000	0.02	0.15	1,500	50,000	0.01	0.1	1,400	50,000
		1.5	3	0.02	0.15	1,600	50,000	0.02	0.15	1,500	50,000	0.01	0.1	1,400	50,000
	R0.1	2	4	0.01	0.12	1,600	50,000	0.01	0.12	1,500	50,000	0.008	0.08	1,400	50,000
		2.5	5	0.008	0.1	1,600	50,000	0.008	0.1	1,500	50,000	0.005	0.07	1,400	50,000
		0.5	0.8	0.005	0.18	1,200	50,000	0.005	0.18	1,200	50,000	0.003	0.15	1,000	50,000
		1	1.7	0.005	0.18	1,200	50,000	0.005	0.18	1,200	50,000	0.003	0.15	1,000	50,000
0.6	R0.02	1.5	2.5	0.005	0.18	1,200	50,000	0.005	0.18	1,200	50,000	0.003	0.15	1,000	50,000
		2	3.3	0.005	0.18	1,200	50,000	0.005	0.18	1,200	50,000	0.003	0.15	1,000	50,000
		2.5	4.2	0.01	0.15	1,400	50,000	0.01	0.15	1,400	50,000	0.007	0.12	1,200	50,000
		0.5	0.8	0.002	0.2	1,800	50,000	0.002	0.2	1,800	50,000	0.001	0.15	1,400	50,000
		1	1.7	0.02	0.2	1,800	50,000	0.02	0.2	1,800	50,000	0.01	0.15	1,400	50,000

加工材料 Work Material				调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・STAVAX・SKD61 (~52HRC)				高硬度钢 Hardened Steels DC53・ELMAX・PD613 (~62HRC)				高速钢 High Speed Tool Steels DRM3・YXR3 (~70HRC)				
外径 Dia.	(R)角半径 Corner Radius	颈长 Under Neck Length	L(颈长) D(外径) L/D	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	
				ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	
0.6	R0.05	0.5	0.8	0.01	0.18	1,400	50,000	0.01	0.18	1,400	50,000	0.007	0.15	1,200	50,000	
		1	1.7	0.01	0.18	1,400	50,000	0.01	0.18	1,400	50,000	0.007	0.15	1,200	50,000	
		1.5	2.5	0.01	0.18	1,400	50,000	0.01	0.18	1,400	50,000	0.007	0.15	1,200	50,000	
		2	3.3	0.01	0.18	1,400	50,000	0.01	0.18	1,400	50,000	0.007	0.15	1,200	50,000	
		2.5	4.2	0.01	0.15	1,400	50,000	0.01	0.15	1,400	50,000	0.007	0.12	1,200	50,000	
	R0.1	0.5	0.8	0.02	0.2	1,800	50,000	0.02	0.18	1,600	50,000	0.01	0.15	1,400	50,000	
		1	1.7	0.02	0.2	1,800	50,000	0.02	0.18	1,600	50,000	0.01	0.15	1,400	50,000	
		1.5	2.5	0.02	0.2	1,800	50,000	0.02	0.18	1,600	50,000	0.01	0.15	1,400	50,000	
		2	3.3	0.02	0.2	1,800	50,000	0.02	0.18	1,600	50,000	0.01	0.15	1,400	50,000	
		2.5	4.2	0.02	0.18	1,800	50,000	0.02	0.15	1,600	50,000	0.01	0.12	1,400	50,000	
0.8	R0.02	1.5	1.9	0.005	0.2	1,400	45,000	0.005	0.2	1,400	45,000	0.003	0.1	1,000	40,000	
		2.5	3.1	0.005	0.2	1,400	45,000	0.005	0.2	1,400	45,000	0.003	0.1	1,000	40,000	
		5	6.3	0.005	0.1	1,400	45,000	0.005	0.1	1,400	45,000	0.003	0.05	1,000	40,000	
	R0.05	1.5	1.9	0.01	0.25	1,800	45,000	0.01	0.2	1,600	45,000	0.007	0.1	1,200	40,000	
		2.5	3.1	0.01	0.25	1,800	45,000	0.01	0.2	1,600	45,000	0.007	0.1	1,200	40,000	
		5	6.3	0.01	0.2	1,800	45,000	0.01	0.15	1,600	45,000	0.005	0.1	1,200	40,000	
	R0.1	1.5	1.9	0.02	0.3	2,200	45,000	0.02	0.2	1,800	45,000	0.01	0.1	1,400	40,000	
		2.5	3.1	0.02	0.3	2,200	45,000	0.02	0.2	1,800	45,000	0.01	0.1	1,400	40,000	
		5	6.3	0.01	0.2	2,200	45,000	0.01	0.15	1,800	45,000	0.005	0.1	1,400	40,000	
1	R0.02	1	1	0.005	0.4	1,400	40,000	0.005	0.3	1,400	40,000	0.005	0.2	1,200	36,000	
		2	2	0.005	0.4	1,400	40,000	0.005	0.3	1,400	40,000	0.005	0.2	1,200	36,000	
		3	3	0.005	0.3	1,400	40,000	0.005	0.2	1,400	40,000	0.005	0.1	1,200	36,000	
		5	5	0.005	0.3	1,400	40,000	0.005	0.2	1,400	40,000	0.005	0.1	1,200	36,000	
	R0.05	1	1	0.015	0.4	2,000	40,000	0.01	0.3	1,600	40,000	0.01	0.2	1,200	36,000	
		2	2	0.015	0.4	2,000	40,000	0.01	0.3	1,600	40,000	0.01	0.2	1,200	36,000	
		3	3	0.015	0.3	2,000	40,000	0.01	0.2	1,600	40,000	0.01	0.1	1,200	36,000	
		5	5	0.01	0.3	1,800	40,000	0.01	0.2	1,600	40,000	0.005	0.1	1,200	36,000	
	R0.1	1	1	0.02	0.4	2,200	40,000	0.02	0.3	2,000	40,000	0.01	0.2	1,500	36,000	
		2	2	0.02	0.4	2,200	40,000	0.02	0.3	2,000	40,000	0.01	0.2	1,500	36,000	
		3	3	0.02	0.3	2,200	40,000	0.02	0.2	2,000	40,000	0.01	0.1	1,500	36,000	
		5	5	0.015	0.3	2,200	40,000	0.015	0.2	2,000	40,000	0.007	0.1	1,500	36,000	
	R0.2	1	1	0.03	0.4	2,500	40,000	0.03	0.3	2,000	40,000	0.01	0.2	1,500	36,000	
		2	2	0.03	0.4	2,500	40,000	0.03	0.3	2,000	40,000	0.01	0.2	1,500	36,000	
		3	3	0.02	0.3	2,500	40,000	0.02	0.2	2,000	40,000	0.01	0.1	1,500	36,000	
		5	5	0.02	0.3	2,500	40,000	0.02	0.2	2,000	40,000	0.007	0.1	1,500	36,000	
	1.5	R0.02	2	1.3	0.005	0.6	2,200	36,000	0.005	0.5	1,800	30,000	0.005	0.3	1,300	24,000
			3	2	0.005	0.6	2,200	36,000	0.005	0.5	1,800	30,000	0.005	0.3	1,300	24,000
			4.5	3	0.005	0.6	2,200	36,000	0.005	0.5	1,800	30,000	0.005	0.3	1,200	24,000
			7.5	5	0.005	0.5	2,000	36,000	0.005	0.4	1,700	30,000	0.005	0.2	1,200	24,000
R0.05		2	1.3	0.02	0.6	2,500	36,000	0.02	0.5	2,000	30,000	0.01	0.3	1,500	24,000	
		3	2	0.02	0.6	2,500	36,000	0.02	0.5	2,000	30,000	0.01	0.3	1,500	24,000	
		4.5	3	0.02	0.6	2,500	36,000	0.01	0.5	2,000	30,000	0.01	0.3	1,500	24,000	
		7.5	5	0.02	0.5	2,400	36,000	0.01	0.4	2,000	30,000	0.01	0.2	1,400	24,000	
R0.1		2	1.3	0.04	0.6	4,000	36,000	0.03	0.5	3,200	30,000	0.015	0.3	2,000	24,000	
		3	2	0.04	0.6	3,500	36,000	0.03	0.5	2,800	30,000	0.015	0.3	1,800	24,000	
		4.5	3	0.04	0.6	3,500	36,000	0.03	0.5	2,800	30,000	0.01	0.3	1,800	24,000	
		7.5	5	0.03	0.5	3,000	36,000	0.02	0.4	2,500	30,000	0.01	0.2	1,600	24,000	
R0.2	2	1.3	0.04	0.6	4,000	36,000	0.03	0.5	3,200	30,000	0.015	0.3	2,000	24,000		
	3	2	0.04	0.6	3,500	36,000	0.03	0.5	2,800	30,000	0.015	0.3	1,800	24,000		
	4.5	3	0.04	0.6	3,500	36,000	0.03	0.5	2,800	30,000	0.01	0.3	1,800	24,000		
	7.5	5	0.03	0.5	3,000	36,000	0.02	0.4	2,500	30,000	0.01	0.2	1,600	24,000		
2	R0.02	3	1.5	0.005	0.8	2,500	30,000	0.005	0.7	2,000	24,000	0.005	0.4	1,200	16,000	
		4	2	0.005	0.8	2,300	30,000	0.005	0.7	1,800	24,000	0.005	0.4	1,100	16,000	
		6	3	0.005	0.8	2,300	30,000	0.005	0.7	1,800	24,000	0.005	0.4	1,100	16,000	
		10	5	0.005	0.6	2,200	30,000	0.005	0.5	1,700	24,000	0.005	0.3	1,000	16,000	
	R0.05	3	1.5	0.025	0.8	2,700	30,000	0.02	0.7	2,200	24,000	0.015	0.4	1,300	16,000	
		4	2	0.025	0.8	2,700	30,000	0.02	0.7	2,200	24,000	0.015	0.3	1,300	16,000	
		6	3	0.025	0.8	2,700	30,000	0.02	0.7	2,200	24,000	0.015	0.3	1,300	16,000	
		10	5	0.02	0.6	2,500	30,000	0.015	0.5	2,000	24,000	0.01	0.3	1,200	16,000	
	R0.1	3	1.5	0.05	0.8	4,000	30,000	0.04	0.7	3,200	24,000	0.02	0.4	1,500	16,000	
		4	2	0.05	0.8	3,500	30,000	0.04	0.7	2,800	24,000	0.02	0.3	1,500	16,000	
6		3	0.04	0.8	3,500	30,000	0.03	0.7	2,800	24,000	0.02	0.3	1,500	16,000		
10		5	0.03	0.6	3,000	30,000	0.02	0.5	2,400	24,000	0.01	0.3	1,300	16,000		

SHPR400

加工材料 Work Material				调质钢・高硬度钢 Prehardened Steels・Hardened Steels NAK80・STAVAX・SKD61 (~52HRC)				高硬度钢 Hardened Steels DC53・ELMAX・PD613 (~62HRC)				高速钢 High Speed Tool Steels DRM3・YXR3 (~70HRC)			
外径 Dia.	(R)角半径 Corner Radius	颈长 Under Neck Length	L(颈长) D(外径) L/D	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed
				ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹	ap mm	ae mm	mm/min	min ⁻¹
2	R0.2	3	1.5	0.05	0.8	4,000	30,000	0.04	0.7	3,200	24,000	0.02	0.4	1,500	16,000
		4	2	0.05	0.8	3,500	30,000	0.04	0.7	2,800	24,000	0.02	0.3	1,500	16,000
		6	3	0.04	0.8	3,500	30,000	0.03	0.7	2,800	24,000	0.02	0.3	1,500	16,000
		10	5	0.03	0.6	3,000	30,000	0.02	0.5	2,400	24,000	0.01	0.3	1,300	16,000
3	R0.05	6	2	0.03	1	2,700	24,000	0.02	0.85	2,200	20,000	0.015	0.6	1,300	12,000
		9	3	0.03	1	2,700	24,000	0.02	0.85	2,200	20,000	0.015	0.6	1,300	12,000
		12	4	0.03	0.85	2,700	24,000	0.02	0.7	2,200	20,000	0.015	0.5	1,300	12,000
		15	5	0.02	0.85	2,500	24,000	0.02	0.7	2,000	20,000	0.01	0.5	1,200	12,000
	R0.1	6	2	0.05	1	4,000	24,000	0.04	0.85	3,200	20,000	0.02	0.6	1,500	12,000
		9	3	0.05	1	3,500	24,000	0.04	0.85	2,800	20,000	0.02	0.6	1,500	12,000
		12	4	0.04	0.85	3,500	24,000	0.04	0.7	2,800	20,000	0.02	0.5	1,500	12,000
		15	5	0.03	0.85	3,000	24,000	0.03	0.7	2,400	20,000	0.015	0.5	1,300	12,000
	R0.2	6	2	0.05	1	4,000	24,000	0.04	0.85	3,200	20,000	0.02	0.6	1,500	12,000
		9	3	0.05	1	3,500	24,000	0.04	0.85	2,800	20,000	0.02	0.6	1,500	12,000
		12	4	0.04	0.85	3,500	24,000	0.04	0.7	2,800	20,000	0.02	0.5	1,500	12,000
		15	5	0.03	0.85	3,000	24,000	0.03	0.7	2,400	20,000	0.015	0.5	1,300	12,000
备注 Notes				※切深量为中精加工,精加工的最大值。请根据机床刚性、要求精度和加工形状进行调整 ※切深量的 ap 表示轴向切入量,ae 表示步距量。 ※为得到良好的加工面,使用 CBN 工具前请注意加工余量的均匀性。 ※R角等负载大的加工部位,请特别注意参数设定和刀路轨迹等。 ※轴向进刀建议采用螺旋进刀及倾斜进刀方式。 ※发生振刀时,请以相同的比率降低主轴转速和进给速度。此外,主轴转速过低时,也以相同的比率调整。 ※建议使用油雾冷却方式。 ※Depth of Cut shows maximum value for semi-finishing and finishing. Adjust milling conditions depending on rigidity of machine, desired accuracy and milling shape. ※Depth of Cut : ap = Axial Depth of Cut / ae = Radial Depth of Cut. ※To achieve better cutting surface, obtain uniform stock amount on cutting surface in semi-finishing. ※When machining at high load area, such as corners, please pay attention to set cutting condition and tool paths. ※Recommend to apply helical or ramping for approaching into axial direction. ※Reduce both spindle speed and feed at same rate for chattering and also for insufficient spindle speed of a machine. ※We recommend using oil mist coolant.											

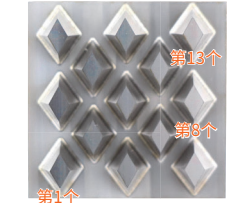
加工案例 1Work Sample Data 1SSB200►P.13

高速钢 HAP40 冲压模造型Cutting Example 1 : HSS HAP40 Punch Model

- 加工材料：**HAP40 (粉末高速钢 HSS) 64HRC**Material: HAP40 (Powder HSS) 64HRC

• 冷却方式：**油雾**Coolant : Oil mist

• 总加工时间：**20 小时 39 分钟**Total cutting time : 20hr 39min
- 工件尺寸：30×30mm（加工高度 5mm,斜度 10°）
Work size : 30×30mm (Height : 5mm, Inclined angle : 10 °)

	加工工序 Cutting process	粗加工 Roughing	中精加工① Semi-finishing ①	清角加工 Stock removal	中精加工② Semi-finishing ②	精加工 Finishing
	使用刀具 Tool	MRBH230 R1×6	MRBH230 R1×6	MRBH230 R0.5×2.5	SSB200 R0.5	SSPB220 R0.5×2.5
	主轴转速 [min ⁻¹] Spindle speed	30,000	30,000	40,000	40,000	40,000
	进给速度 [mm/min] Feed	1,000	800	500	700	600
	切深量 ap×ae[mm] Depth of cut	0.1×0.3	等高线:0.01×0.015 Contour 扫描线:0.015×0.01 Scanline	0.03×0.1	等高线:0.01×0切削 Contour : 0.01×Zero-cut 扫描线:0切削×0.01 Scanline : Zero-cut×0.01	等高线:0.01×0.005 Contour 扫描线:0.005×0.01 Scanline
	加工余量 [mm] Stock	0.02	0.005	0.005	0.005	—
	加工时间 Cutting time	3小时20分钟 3hr 20min	4小时4分钟 4hr 4min	57分钟 57min	5小时40分钟 5hr 40min	6小时38分钟 6hr 38min

- 侧面加工时可实现表面粗糙度低于 Rz0.6μm 的具有光泽的加工表面！
Realized glossy surface roughness Rz0.6μm and under on side face!

加工案例 2Work Sample Data 2SSR200►P.22

细微复合加工形状Cutting Example 2 : Combined micro-machining.

- 加工材料：**PD613 60HRC**Material: PD613 60HRC

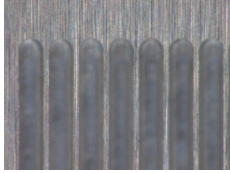
• 冷却方式：**油雾**Coolant : Oil mist

• 总加工时间：**14 小时 47 分钟（含粗加工时间）**Total cutting time : 14hr 47min including roughing

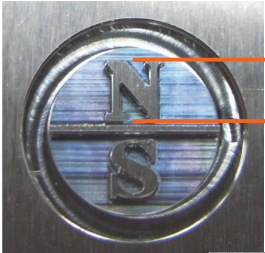


① 沟槽形状
Slot

槽宽：0.2mm
Slot width
深度：0.5mm
Depth
长度：5mm
Length
槽数：36 个
Number of groove

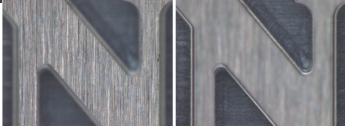


放大图
Magnified photo



② 文字形状
NS Logo

2.001mm
(目标值 2.000mm)
Target

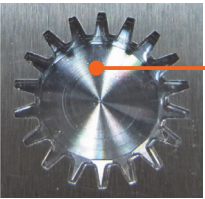


③ 齿轮形状
Gear

顶部
Top

底面
Bottom

工件尺寸：长 30× 宽 30 (mm)
Work size : 30×30mm



③ 齿轮形状
Gear
(齿轮直径：8mm)
Gear dia.

底面粗糙度
Bottom surface roughness
Rz 0.25μm

精加工后的刀具
Corner radius after finishing

放大倍率：1,000
Magnification rate

加工部位 Cutting part	① 沟槽形状 Slot		② 文字形状 NS Logo		③ 齿轮形状 Gear	
加工工序 Cutting process	沟槽加工 至Z-0.03 Slotting (to Z-0.03)	沟槽加工 至Z-0.5 Slotting (to Z-0.5)	侧面精加工 Finishing (Side)	底面精加工 Finishing (Bottom)	侧面精加工 Finishing (Side)	底面精加工 Finishing (Bottom)
使用刀具 Tool	SSR200 φ0.2×R0.02×0.5				SSR200 φ0.2×R0.02×1	
主轴转速 [min ⁻¹] Spindle speed	40,000					
进给速度 [mm/min] Feed	100	300	300		200	
切深量 ap×ae[mm] Depth of cut	ap 0.001	ap 0.003	0.001×0.005	0.005×0.005	0.003×0.005	0.005×0.005
加工时间 Cutting time	1小时8分钟 1hr 8min	2小时19分钟 2hr 19min	1小时55分钟 1hr 55min	20分钟 20min	1小时45分钟 1hr 45min	30分钟 30min

- 针对 60HRC 的高硬度钢材加工,即使是φ0.2的微小径,CBN 铣刀可长时间加工的同时可实现安定的加工表面及良好的加工精度。
SSR200, CBN End Mill ensures high quality surface and accuracy for a long time machining of hardened steels (HRC60) even with 0.2mm cutter diameter.

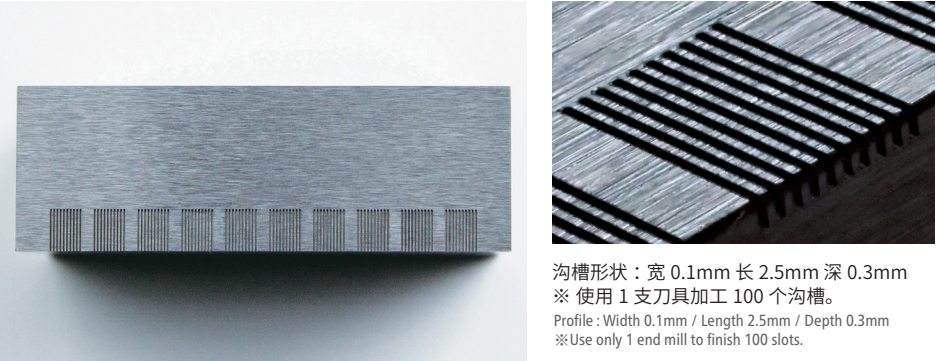
φ0.1 微细沟槽加工φ 0.1 micro slotting

- 加工材料：DC53 60HRC

Material : DC53 60HRC
- 冷却方式：油雾

Coolant : Oil mist
- 总加工时间：3 小时 53 分钟

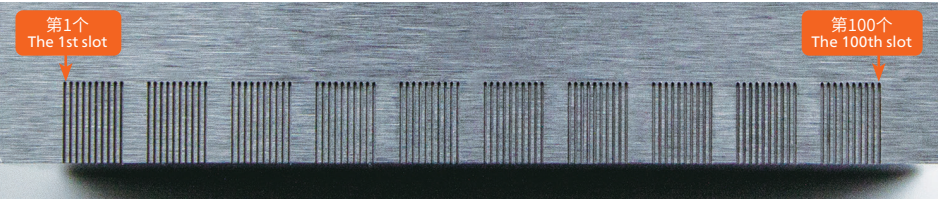
Total machining time : 3hr 53min

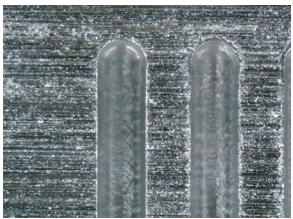
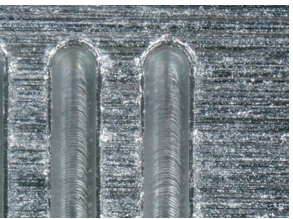


工件尺寸：30×10mm (加工深度：0.3mm)
Work size : 30x10mm (Cutting depth: 0.3mm)

加工工序 Cutting process	沟槽加工 Slotting
使用刀具 Tool	SHPR400 φ0.1×R0.02×0.3
主轴转速 [min ⁻¹] Spindle speed	120,000
进给速度 [mm/min] Feed	300
切深量 ap[mm] Depth of cut	0.002

加工精度Measurment of work



	第1个 The 1st slot	第100个 The 100th slot
槽宽 Slot width 目标值 Target 0.1mm		
实测值 Actual	0.101mm	0.098mm
槽深 Slot depth 目标值 Target 0.3mm		
实测值 Actual	0.299mm	0.297mm

测量仪：尼康 MM40（显微镜）
Mesuring instrument : Nikon microscope MM40

测量放大倍率：100 倍
Magnification rate : 100



手机官网



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警告 CAUTION 使用上的安全注意事项 Attention on Safety

- 1) 拿起刀具使用时，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，使用刀具时请带防护眼镜。

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。
- 1) When removing tools from cases, be careful of getting-out of tools and don't touch directly the cutting edges.

2) Never touch the cutting edges directly with bare hand.

3) Use safety covers and eye protection, as tools may be broken.

4) Use holders, etc. that match the tools and nature of the processing operations. The tool should be firmly attached to the holder to prevent shaking.

5) The work materials clamp firmly.

6) Make sure of dimensions of tools and work pieces before starting operation.

7) It is necessary to adjust conditions according to the dimensions of work materials and the machine.

8) Select a cutting fluid appropriate to the particular usage. Using a water insoluble 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.

9) If abnormal sound, etc. occurs during processing, stop the machine immediately.

10) Don't modify tools.

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22'08



■ 本册中列出的产品规格将来可能会发生改变，恕不另行通知。
Specifications may change without notice for improvement.