NS TOOL

CORE LINE

「匠」心创先

CBN

CBN3刃长颈球头铣刀

CBN 3-Flute Long Neck Ball End Mill

SSPB320 New

3刃球头铣刀实现高能率·高精度加工

3-Flute ball end mill realizes high efficient and high precision machining

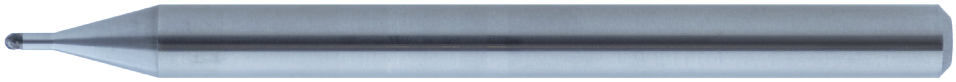
CBN3刃长颈球头铣刀

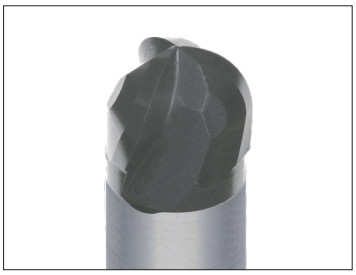
CBN 3-Flute Long Neck Ball End Mill

SSPB320 New

R0.1 ～ R0.5

共 24 种规格
Total 24 sizes





刀刃形状
Cutting edge shape

特长

Features

高效率
High efficiency

实现长寿命、高效率加工可降低总成本
Realizing long tool life and high-efficient machining that reduce total costs

与以往的 2 刃刀具相比，SSPB320 的刀具寿命约为其 2 倍，从而减少了所需使用的刀具数量。此外，加工时间也仅为以往 2 刃刀具的约 60%。

Tool life of SSPB320 is approximately twice in terms of cutting length compares to conventional products.
It realizes to reduce the number of tools used.
Furthermore, machining time is approximately 60% shorter than conventional 2-flute products.

■与以往 2 刃球头铣刀的加工成本比较

Cost comparison with conventional 2-flute ball end mills

R0.5× 颈长2.5mm
R0.5 × Under neck length 2.5

加工品示意图
Machining example

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

使用刀具 Tool	**SSPB320 (3刃 3-flute)**	以往产品 Conventional
使用数量 [支] Tool Q'ty [pcs]	**1**	2
刀具费用 Tool cost	**￥39,600 (￥39,600/pc)**	￥52,800 (￥26,400/pc)
加工时间 [分钟] Machining time [min]	**240**	360
机床使用费※ Machine charge fee	**￥20,000**	￥30,000
加工成本 Machining cost	**￥59,600**	￥82,800

与 2 刃刀具相比节约成本 **28%**
28% cost reduction compare with 2-flute ball end mills

■与以往 2 刃球头铣刀的寿命比较

Tool life comparison with conventional 2-flute ball end mills

R0.5× 颈长2.5mm
R0.5 × Under neck length 2.5

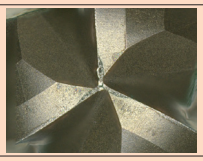
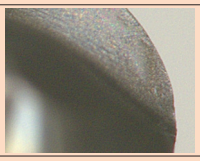
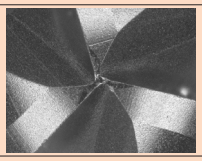
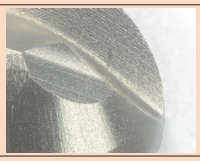
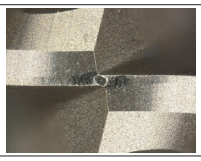
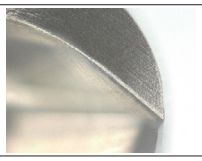
加工材料：HAP40 (64HRC)
Work material
冷却方式：油雾
Coolant　Oil mist

使用刀具 Tool	SSPB320 (3刃 3-flute)	以往产品 Conventional
主轴转速 [min⁻¹] Spindle speed	40,000	
进给速度 [mm/min] Feed	1,500	1,000
切深量 (ap×ae) Depth of cut [mm]	0.02 × 0.02	
余量 [mm] Stock allowance	0.01	

※每刃进给量：0.0125 mm/tooth
Feed per tooth

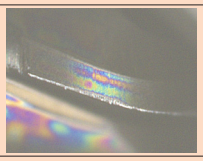
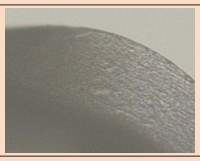
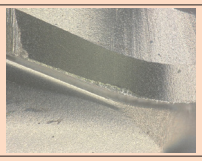
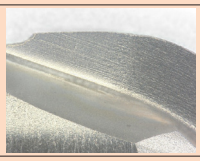
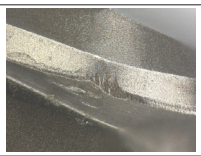
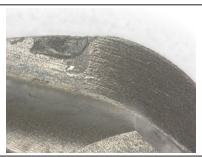
底面加工 后的刀具磨耗情况

Tool wear condition after machining on bottom surface

	使用刀具 Tool	加工 46m 后 After machining 46m		加工 92m 后 After machining 92m	
球刀中心附近 Near the center of the ball	SSPB320 R0.5 × 2.5	加工时间：28 分钟 Machining time : 28 min		加工时间：56 分钟 Machining time : 56 min	
					
		磨耗宽 Tool wear width **0.018 mm**	R后退量 R retreat amount **0.002 mm**	磨耗宽 Tool wear width **0.024 mm**	R后退量 R retreat amount **0.005 mm**
	以往产品 Conventional R0.5 × 2.5	加工时间：40 分钟 Machining time : 40 min		以往2刃刀具由于磨耗过大，仅切削 46m 后就终止 After machining 46m in cutting distance, the conventional 2-flute end mill reached to its tool life.	
					
		磨耗宽 Tool wear width 0.043 mm	R后退量 R retreat amount 0.006 mm		

侧面加工 后的刀具磨耗情况

Tool wear condition after machining on side surface

	使用刀具 Tool	加工 180m 后 After machining 180m		加工 360m 后 After machining 360m	
外周部 Peripheral	SSPB320 R0.5 × 2.5	加工时间：2 小时 Machining time : 2 hr		加工时间：4 小时 Machining time : 4 hr	
					
		磨耗宽 Tool wear width **0.018 mm**	R后退量 R retreat amount **0.002 mm**	磨耗宽 Tool wear width **0.020 mm**	R后退量 R retreat amount **0.005 mm**
	以往产品 Conventional R0.5 × 2.5	加工时间：3 小时 Machining time : 3 hr		以往2刃刀具由于磨耗过大，仅切削 180m 后就终止 After machining 180m in cutting distance, the conventional 2-flute end mill reached to its tool life	
					
		磨耗宽 Tool wear width 0.088 mm	R后退量 R retreat amount 0.009 mm		

SSPB320 New

规格
Size R0.1 ～ R0.5

CBN ≦70 HRC

CBN3刃长颈球头铣刀
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共 24 种规格
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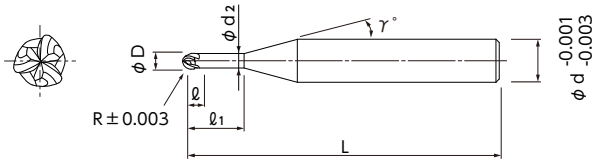
3刃球头铣刀实现高效率•高精度加工
3-flute ball end mill realizes high efficient and high precision machining

3 | 20° | R ±0.003 | ϕd -0.001 -0.003 | 3D



- 采用螺旋球头形状，提高了刀刃的锋利度。
- 从 R0.1 开始的3刃造型，即使是小径铣刀也能实现高效率加工。
- 通过采用增强型的倒锥形状减轻加工负荷和振刀。
- Adopt spiral ball shape to improve sharpness of cutting edge.
- 3-flute shape from R0.1 enables high efficiency machining even with small diameter.
- Strong back taper shape reduces cutting load and chattering.

在产品标签上以 1μm 单位显示实测的外径，并且显示实际外径的一半为基准值，进而支持高精度加工。
The product label indicates the actual outer diameter in 1μm increments, furthermore, the ball radius is shown as 1/2 of the actual outer diameter, which supports high-precision machining.

加工材料 Work Material

高硬度钢 Hardened Steel	H
～70HRC	
◎	

刀刃形状
Cutting edge shape

◆ 2025年5月发布 ※Release in May, 2025.

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

产品代码 Code No.	球头半径(R) Radius	颈长(ℓ1) Under Neck Length	刃长(ℓ) Length of Cut	外径(D) Dia.	颈径(d2) Neck Dia.	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length	定价(日元) Retail Price
◆ 01-00508-01003	R0.1	**0.3**	0.15	0.2	0.19	15°	4	50	45,700
◆ 01-00508-01004		**0.4**	0.15	0.2	0.19	15°	4	50	46,200
◆ 01-00508-01005		**0.5**	0.15	0.2	0.19	15°	4	50	46,700
◆ 01-00508-01006		**0.6**	0.15	0.2	0.19	15°	4	50	47,200
◆ 01-00508-01503	R0.15	**0.3**	0.23	0.3	0.28	15°	4	50	45,000
◆ 01-00508-01505		**0.5**	0.23	0.3	0.28	15°	4	50	45,700
◆ 01-00508-01507		**0.75**	0.23	0.3	0.28	15°	4	50	46,500
◆ 01-00508-01509		**0.9**	0.23	0.3	0.28	15°	4	50	47,200
◆ 01-00508-02005	R0.2	**0.5**	0.3	0.4	0.37	15°	4	50	40,600
◆ 01-00508-02007		**0.75**	0.3	0.4	0.37	15°	4	50	41,400
◆ 01-00508-02010		**1**	0.3	0.4	0.37	15°	4	50	42,100
◆ 01-00508-02012		**1.2**	0.3	0.4	0.37	15°	4	50	42,900
◆ 01-00508-02505	R0.25	**0.5**	0.38	0.5	0.46	15°	4	49	40,700
◆ 01-00508-02510		**1**	0.38	0.5	0.46	15°	4	50	42,100
◆ 01-00508-02515		**1.5**	0.38	0.5	0.46	15°	4	50	43,500
◆ 01-00508-03007	R0.3	**0.75**	0.5	0.6	0.56	15°	4	49	37,800
◆ 01-00508-03010		**1**	0.5	0.6	0.56	15°	4	50	38,300
◆ 01-00508-03012		**1.2**	0.5	0.6	0.56	15°	4	50	38,800
◆ 01-00508-03015		**1.5**	0.5	0.6	0.56	15°	4	50	39,600
◆ 01-00508-04020	R0.4	**2**	0.6	0.8	0.76	15°	4	50	39,600
◆ 01-00508-05010	R0.5	**1**	0.7	1	0.95	15°	4	49	38,000
◆ 01-00508-05020		**2**	0.7	1	0.95	15°	4	50	38,800
◆ 01-00508-05025		**2.5**	0.7	1	0.95	15°	4	50	39,600
◆ 01-00508-05030		**3**	0.7	1	0.95	15°	4	50	40,400

订购方式 How to Order
请指定 SSPB320 球头半径 (R) × 颈长 (ℓ1)。
When you order, indicate SSPB320 (R)×(ℓ1).

(γ) 为参考值。
(γ) is reference value.

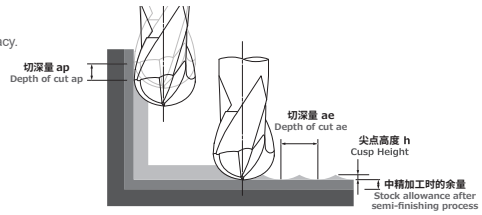
切削参数参考表 Recommended Conditions

加工材料 Work Material			高硬度钢 Hardened Steels SKD61·STAVAX (~52HRC)				高硬度钢 Hardened Steels SKD11·ELMAX (~62HRC)				高速钢 High Speed Steels SKH·HAP (~68HRC)			
R球头半径 Radius	颈长 Under Neck Length	L(颈长)/D(外径) L/D	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	使用此刀具前的余量 Stock before using this tool	主轴转数 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	使用此刀具前的余量 Stock before using this tool	主轴转数 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	使用此刀具前的余量 Stock before using this tool
			min^{-1}	mm/min	a_p mm 或 a_e mm	mm	min^{-1}	mm/min	a_p mm 或 a_e mm	mm	min^{-1}	mm/min	a_p mm 或 a_e mm	mm
0.1	0.3	1.5	40,000	900	0.005	0.002	40,000	670	0.005	0.002	40,000	450	0.003	0.002
	0.4	2	40,000	850	0.005	0.002	40,000	620	0.005	0.002	40,000	420	0.003	0.002
	0.5	2.5	40,000	800	0.005	0.002	40,000	580	0.005	0.002	40,000	390	0.003	0.002
	0.6	3	40,000	750	0.005	0.002	40,000	520	0.005	0.002	40,000	360	0.003	0.002
0.15	0.3	1	40,000	1,200	0.005	0.003	40,000	900	0.005	0.003	40,000	670	0.003	0.003
	0.5	1.7	40,000	1,100	0.005	0.003	40,000	800	0.005	0.003	40,000	600	0.003	0.003
	0.75	2.5	40,000	1,000	0.005	0.003	40,000	750	0.005	0.003	40,000	550	0.003	0.003
	0.9	3	40,000	900	0.005	0.003	40,000	600	0.005	0.003	40,000	450	0.003	0.003
0.2	0.5	1.3	40,000	1,800	0.005	0.004	40,000	1,350	0.005	0.004	40,000	900	0.005	0.004
	0.75	1.9	40,000	1,700	0.005	0.004	40,000	1,250	0.005	0.004	40,000	820	0.005	0.004
	1	2.5	40,000	1,500	0.005	0.004	40,000	1,200	0.005	0.004	40,000	750	0.005	0.004
	1.2	3	40,000	1,400	0.005	0.004	40,000	1,000	0.005	0.004	40,000	650	0.005	0.004
0.25	0.5	1	40,000	1,900	0.01	0.005	40,000	1,500	0.01	0.005	40,000	1,100	0.005	0.005
	1	2	40,000	1,800	0.01	0.005	40,000	1,400	0.01	0.005	40,000	1,000	0.005	0.005
	1.5	3	40,000	1,600	0.01	0.005	40,000	1,300	0.01	0.005	40,000	800	0.005	0.005
0.3	0.75	1.3	40,000	2,600	0.01	0.007	40,000	2,400	0.01	0.007	40,000	1,700	0.005	0.007
	1	1.7	40,000	2,500	0.01	0.007	40,000	2,200	0.01	0.007	40,000	1,600	0.005	0.007
	1.2	2	40,000	2,400	0.01	0.007	40,000	2,000	0.01	0.007	40,000	1,400	0.005	0.007
	1.5	2.5	40,000	2,200	0.01	0.007	40,000	1,700	0.01	0.007	40,000	1,100	0.005	0.007
0.4	2	2.5	40,000	2,300	0.01	0.008	40,000	1,800	0.01	0.008	40,000	1,200	0.005	0.008
0.5	1	1	40,000	3,400	0.02	0.01	40,000	3,000	0.02	0.01	40,000	1,800	0.01	0.01
	2	2	40,000	3,000	0.02	0.01	40,000	2,700	0.02	0.01	40,000	1,700	0.01	0.01
	2.5	2.5	40,000	2,600	0.02	0.01	40,000	2,200	0.02	0.01	40,000	1,500	0.01	0.01
	3	3	40,000	2,400	0.02	0.01	40,000	2,000	0.02	0.01	40,000	1,400	0.01	0.01

备 注 Notes

※1 切深量的 ap 表示为轴向切深量，ae 表示步距量。
※2 切削量是中精加工和精加工时的参考值。请根据机械刚性、要求精度和加工形状进行调整。
※3 对于 Z 轴方向的切削进给方法，建议使用螺旋(Helical)及倾斜(Ramp)方式。
※4 请注意本刀具使用前的状态(中精加工)，以确保最终精加工的余量均匀。
※5 发生振刀等情况时，请根据需要调整切深参数。
※6 R 角等切削阻力大的部位，请特别注意参数设定和刀路轨迹等。
※7 进行高效率加工时，请以相同比率提升主轴转速和进给速度。
※8 当机床的最高主轴转速低于以上参考值时，请以相同比率调整主轴转速和进给速度。
※9 请尽量缩短刀具的伸出量。
※10 建议使用油雾冷却方式。
※11 加工的余量为参考值，请根据前一工序的加工状态和要求精度进行调整。

※1 Depth of Cut: ap=Axial Depth of Cut / ae=Radial Depth of Cut.
※2 Depth of Cut shows the reference value for semi-finishing and finishing.
Adjust milling conditions depending on the rigidity of the machine, work shape and requested accuracy.
※3 Recommend to apply helical or ramping for approaching into axial direction.
※4 Be careful to obtain uniform stock amount on cutting surface before using this tool.
※5 In case of chattering etc., please adjust milling conditions if necessary.
※6 If the cutting load is high at corners, etc., set the milling conditions and tool path carefully to reduce the cutting load.
※7 Increase both spindle speed and feed at the same rate for high efficient machining.
※8 If the maximum spindle speed of the machine tool is lower than the reference value, please reduce the spindle speed and feed rate in the same proportion.
※9 Minimize a possible tool overhang length.
※10 We recommend using oil mist coolant.
※11 The stock allowance for this tool is a guideline, please adjust it according to the machining condition of the previous process and the required accuracy.



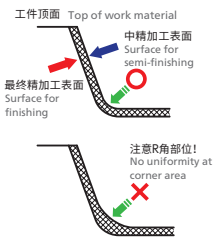
使用注意事项 Points in Use

加工环境 *Advice on Cutting Environment*

- 刀具偏摆量越小越好。
  Minimize the deflection of cutting edge.
- 掌握机床主轴的伸缩量以及机床的水平状态，需要时采取恰当的措施。
  To understand the nature of the expansion of the main spindle and machine posture transformation, and take measures against them.

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

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



YXR7（64HRC）复合冲压造型模具 YXR7 (64HRC) Composite press mold

使用多刃刀具可以实现高效且稳定的表面品质加工，即使是难加工的工件材料，也能以较少的刀具磨损达到长寿命

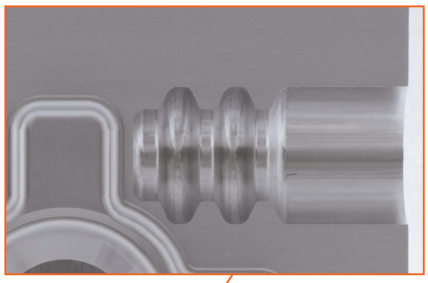
By using multi-flute tools, high efficient machining is realized with stable surface quality
Long tool life with minimal tool wear even when machining on difficult-to-cut materials

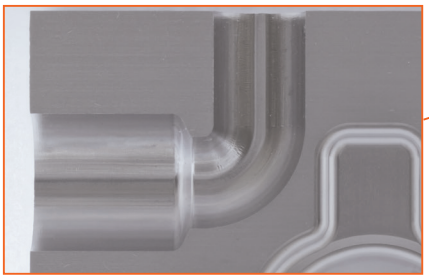
加工材料： YXR7（64HRC）
Work material

工件尺寸：30 × 30 × 15 mm
Work size

冷却方式：油雾
Coolant : Oil mist

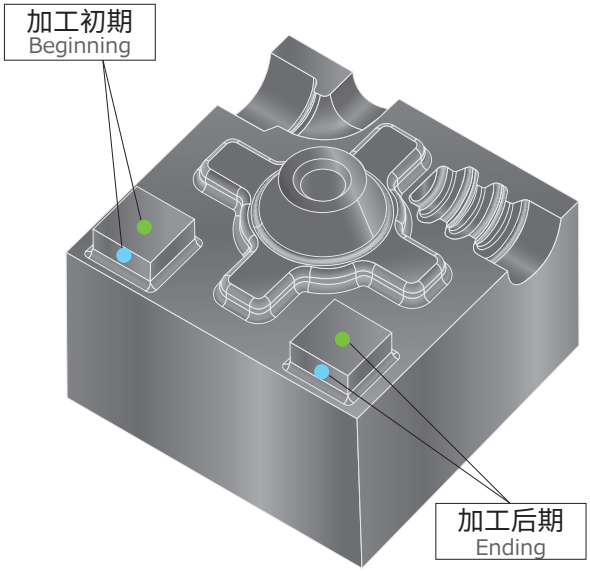
总加工时间：3 小时 28 分钟
Total machining time : 3 hr 28 min

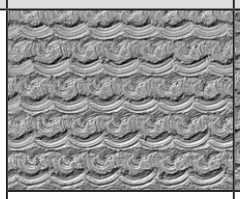
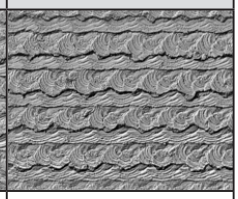
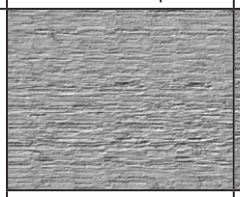
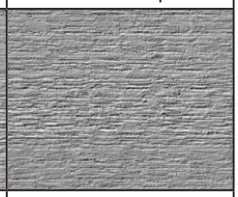




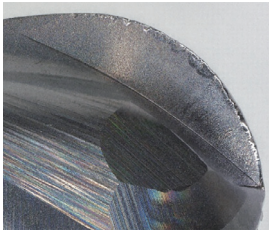
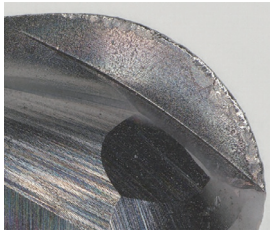
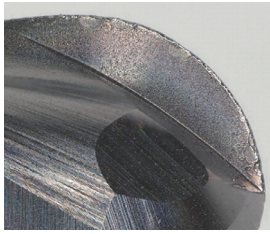
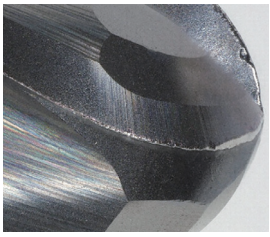
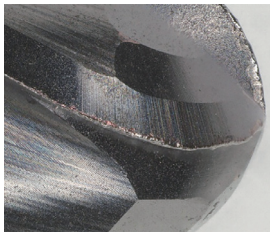
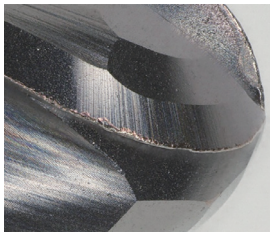
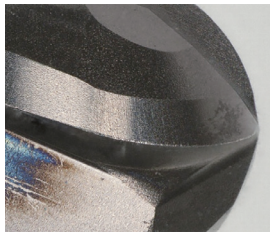
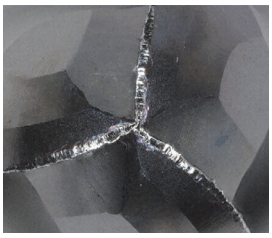
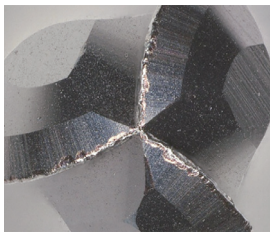
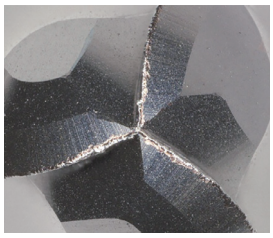
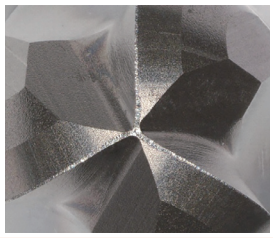
加工工序 Process	粗加工 Roughing	中精加工 Semi-finishing	清角加工 Stock removal	中精加工 Semi-finishing	精加工 Finishing
使用刀具 Tool	MRBSH330 R1 × 3		MRBSH330 R0.5 × 2.5	MRBSH330 R0.5 × 2.5	**SSPB320 R0.5 × 2.5**
主轴转速 [min^{-1}] Spindle speed	20,000		25,000		40,000
进给速度 [mm/min] Feed	3,000	2,000	1,000	2,000	1,500
切深量 [mm] ap × ae Depth of cut	0.22 × 0.3	pf : 0.1	pf : 0.07	pf : 0.05	pf : 0.02
余量 [mm] Stock	0.03			0.01	-
加工时间 Machining time	53 分钟 53 min	9 分钟 9 min	25 分钟 25 min	32 分钟 32 min	1 小时 29 分钟 1 hr 29 min

面粗度
Surface Roughness



测量位置 Measuring position	加工初期 Beginning	加工后期 Ending
平坦部(0°) Flat	 Ra 0.604 μm	 Ra 0.797 μm
侧面部(90°) Side	 Ra 0.133 μm	 Ra 0.164 μm

刀具磨耗
Tool wear

加工工序 Process	粗加工+中精加工 Roughing+Semi-finishing	清角加工 Stock removal	中精加工 Semi-finishing	精加工 Finishing
使用刀具 Tool	MRBSH330 R1 × 3	MRBSH330 R0.5 × 2.5	MRBSH330 R0.5 × 2.5	SSPB320 R0.5 × 2.5
前刀面 Rake side				
外周刃 Peripheral cutting edge				
球刀中心附近 Near the center of the ball				

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使用上的安全注意事项 Attention on Safety

1）拿取刀具使用时，请特别小心避免损坏刀刃。
2）请勿空手触摸刀刃
3）为了安全，使用刀具时请带防护眼镜。
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。

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

25'09
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