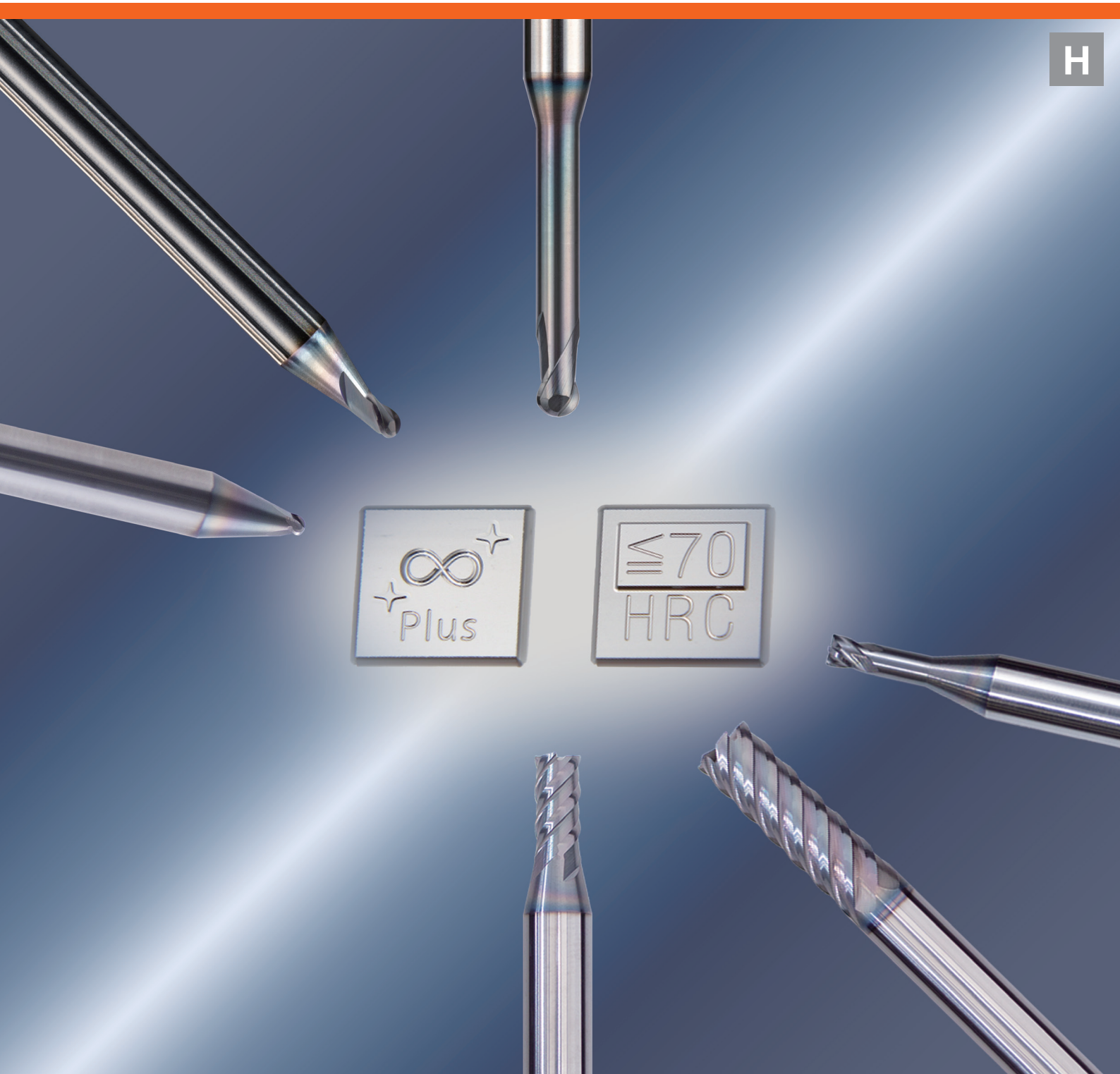
NS TOOL

「匠」心创先

无限白金Plus涂层系列铣刀

MUGEN COATING PREMIUM Plus End Mill Series

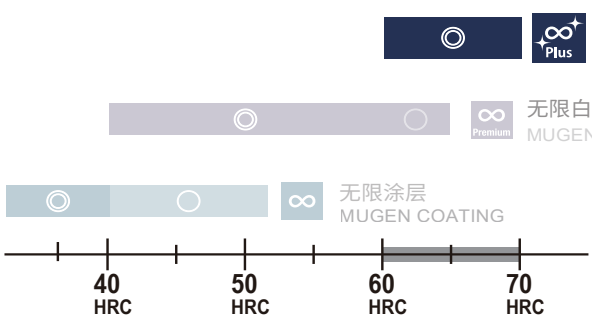
MHDSH445
MHDSH645
MSBSH230 New
MSBSH330-5X
MRBSH230SF
MRBSH330
MHDSH445R New
MHDSH645R New
MHRSH430RSF



无限白金Plus涂层系列铣刀的特长
Features of MUGEN COATING PREMIUM Plus End Mill series

最适合对应60～70HRC的高硬度钢加工
Optimized for machining hardened steels up to 60 to 70HRC

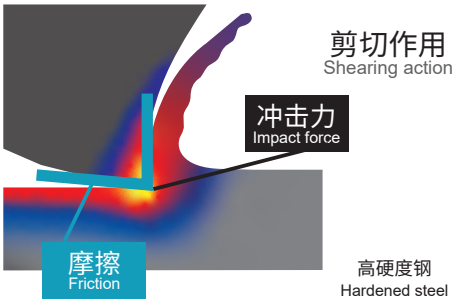
日进工具自主研发的涂层 不同材料硬度的对应范围表
Range of NS TOOL original coating by work material hardness



耐氧化性・耐磨损性优异，可对 60HRC 以上的加工材料发挥最佳效果。
MUGEN COATING PREMIUM Plus with high oxidation resistance and abrasion resistance is suitable for machining above 60HRC.

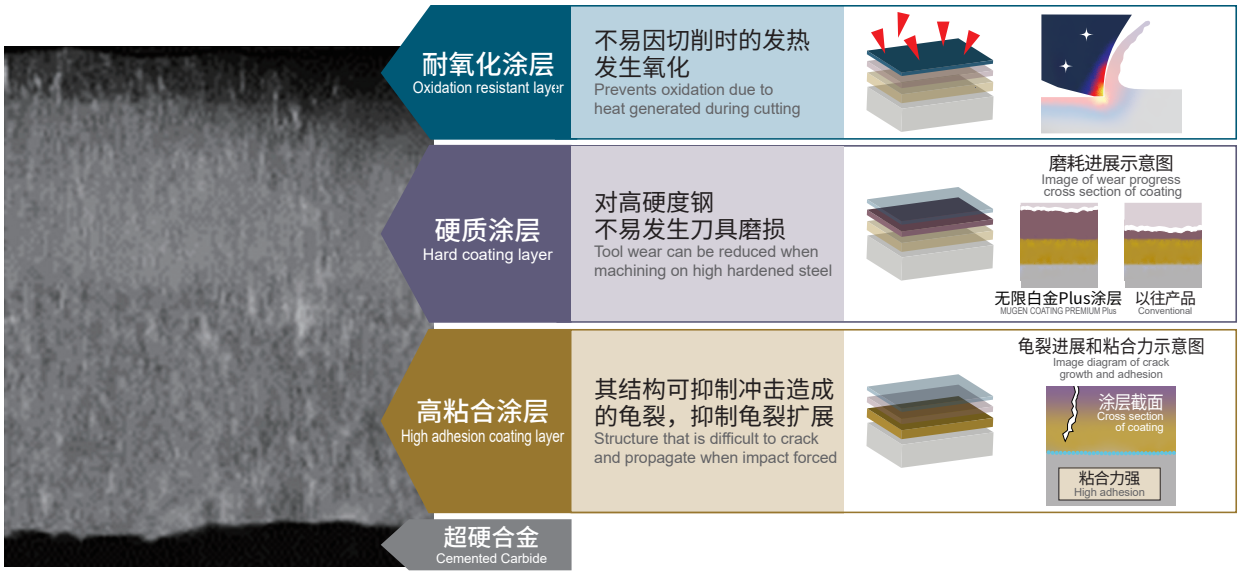
切削加工60～70HRC的高硬度钢时，会出现由于加工材料硬度及高韧性的影响，而导致加工时切削阻力过大的现象。因此，刀具的刀刃会因“剪切作用”发生以下情况：
As a phenomenon when machining hardened steel of 60 to 70 HRC, the cutting load during processing is extremely high because hardness and toughness of work material are high. Therefore, the "shearing action" at tool edge cause that…

- 刀具因发生“摩擦”而更快磨损
  Tools to wear easily causing frict
- 涂层因“切削热”而氧化，使硬度降低，容易磨损
  Tools tends to wear to reduced hardness of material on coating oxidizes of cutting heat
- “冲击力”大时刀具容易缺损
  Tool is easily damaged if impact force is large



无限白金Plus涂层的结构
Coating Structure for MUGEN COATING PREMIUM Plus

无限白金Plus涂层是由3层构造形成的涂层，可对60～70HRC的高硬度钢发挥优异的刀具寿命。
MUGEN COATING PREMIUM PLUS is made of a three-layer coating film and provides excellent tool life for hardened steels from 60 to 70 HRC.



延长刀具寿命和高精度设计
High precision and long tool life

高精度刀柄可实现无差异性的加工
High precision shank realize no fluctuate machining



高精度球头半径、R角尺寸等，可实现高精度加工
Achieved high precision machining with high accuracy ball radius or corner radius

MRBSH230SF

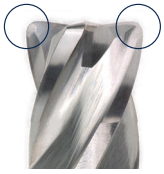
球头半径 R±0.003
Ball radius

R 精度以实际外径的 1/2 为基准值
R accuracy is based on a half value of actual diameter



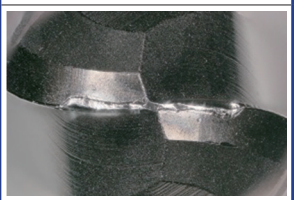
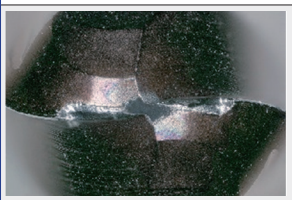
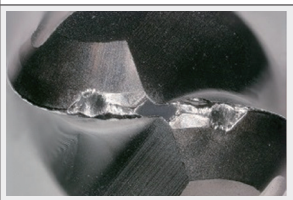
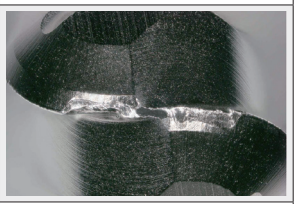
MHRSH430RSF

R角部 ±0.003
Corner radius
(D ≦ ϕ 2)



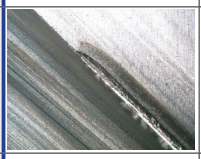
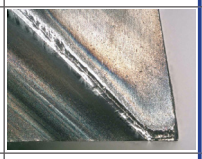
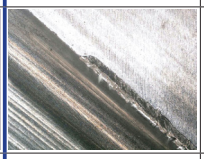
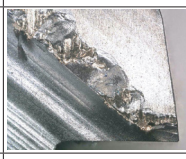
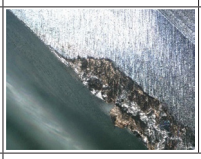
加工HAP40 (64HRC)时球头铣刀R1×6的磨损比较
Ball end mill tool life comparison to HAP40 (64HRC)

切削参数 n= 20,000min^{-1}, vf= 1,600mm/min, ap 0.15 × ae 0.3mm, 冷却方式: 油雾
Cutting condition　　Coolant: Oil mist

使用刀具 Tool	**MRBSH230SF**	其他公司产品 A Other tool brand A	其他公司产品 B Other tool brand B	其他公司产品 C Other tool brand C
加工 70 分钟后 After 70 min				
磨耗宽度 Tool wear	**0.102** mm	0.137 mm	0.190 mm	0.157 mm

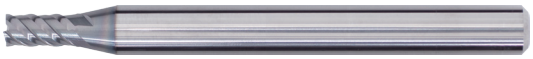
加工HAP40 (64HRC)时平底铣刀的磨损比较
Square end mill tool life comparison to HAP40 (64HRC)

切削参数 n= 4,200min^{-1}, vf= 600mm/min, ap 9 × ae 0.12 mm, 冷却方式: 油雾
Cutting condition　　Coolant: Oil mist

使用刀具 Tool	**MHDSH645 ϕ 6 × 18**		其他公司产品 A ϕ 6 × 15 Other tool brand A		其他公司产品 B ϕ 6 × 15 Other tool brand B	
磨耗位置 Wear position	边界部 Major flank notch	前端部 End edge	边界部 Major flank notch	前端部 End edge	边界部 Major flank notch	前端部 End edge
加工 120 分钟后 After 120 min						
磨耗宽度 Tool wear	**0.060** mm	**0.080** mm	0.097 mm	损伤大 无法测量磨耗宽度 Wear width cannot be measured because great damage	损伤大 无法测量磨耗宽度 Wear width cannot be measured because great damage	

无限白金Plus涂层铣刀全系列
Lineup of MUGEN COATING PREMIUM Plus End Mill series

共 481 种规格
Total 481 sizes

型号·刀具图 Model·Photo	产品名称 Product Name
平底铣刀 Square End Mill	
MHDSH445 	**无限白金Plus涂层** **高硬度钢材加工用4刃平底铣刀** MUGEN COATING PREMIUM Plus 4-Flute Square End Mill for Hardened Steel
MHDSH645 	**无限白金Plus涂层** **高硬度钢材加工用6刃平底铣刀** MUGEN COATING PREMIUM Plus 6-Flute Square End Mill for Hardened Steel
球头铣刀 Ball End Mill	
MSBSH230 New 	**无限白金Plus涂层** **高硬度钢材高精度加工用2刃球头铣刀** MUGEN COATING PREMIUM Plus 2-Flute Ball End Mill for Hardened Steel and High Accuracy Machining
MSBSH330-5X 	**无限白金Plus涂层** **5轴MC加工用3刃球头铣刀** MUGEN COATING PREMIUM Plus 3-Flute Ball End Mill for 5-axis machining
长颈球头铣刀 Long Neck Ball End Mill	
MRBSH230SF 	**无限白金Plus涂层** **高硬度钢材高精度加工用2刃长颈球头铣刀** **可对应热缩刀柄的短柄造型** MUGEN COATING PREMIUM Plus 2-Flute Long Neck Ball End Mill with Short Shank for Hardened Steel and High accuracy cutting
MRBSH330 	**无限白金Plus涂层** **高硬度钢材高效率加工用小径3刃长颈球头铣刀** MUGEN COATING PREMIUM Plus High Efficient 3-Flute Small-Diameter Long Neck Ball End Mill for Hardened Steel
圆鼻铣刀 Corner Radius End Mill	
MHDSH445R New 	**无限白金Plus涂层** **高硬度钢材加工用4刃圆鼻铣刀** MUGEN COATING PREMIUM Plus 4-Flute Corner Radius End Mill for Hardened Steel
MHDSH645R New 	**无限白金Plus涂层** **高硬度钢材加工用6刃圆鼻铣刀** MUGEN COATING PREMIUM Plus 6-Flute Corner Radius End Mill for Hardened Steel
长颈圆鼻铣刀 Long Neck Corner Radius End Mill	
MHRSH430RSF 增加规格 Size Expansion 	**无限白金Plus涂层** **高硬度钢材高精度加工用4刃长颈圆鼻铣刀** **可对应热缩刀柄的短柄造型** MUGEN COATING PREMIUM Plus 4-Flute Long Neck Corner Radius End Mill with Short Shank for Hardened Steel and High accuracy cutting

尺寸·规格数量 Size·Number of sizes	刃数·螺旋角·柄径公差 Number of Flute·Helix Angle·Shank Tolerance	特长 Features	页数 Page
φ1 ～ φ4 共 10 种规格 Total 10 sizes		采用可抑制偏斜的高刚性设计，加工最高70HRC的高硬度钢时也可实现延长刀具寿命 High rigidity tool design suppresses deflection and realizes long tool life on machining 70HRC hardened steel	6
φ5 ～ φ6 共 4 种规格 Total 4 sizes		采用可抑制偏斜的高刚性设计，加工最高70HRC的高硬度钢时也可实现延长刀具寿命 High rigidity tool design suppresses deflection and realizes long tool life on machining 70HRC hardened steel	6
R0.05 ～ R3 共 15 种规格 Total 15 sizes		针对冲压模具与锻造模具等高达70HRC的高硬度钢加工 Suitable for machining hardened steels up to 70HRC such as press dies and forging dies	12
R0.1 ～ R1 共 8 种规格 Total 8 sizes		利用5轴加工机床的特点，采用3刃和高刚性的球头造型，实现高精度的高效率加工，进而降低总成本 3-flute high rigidity ball design conforms features of 5-axis machine to reduce total manufacturing cost with high precision and high efficiency machining	16
R0.05 ～ R3 共 115 种规格 Total 115 sizes		对应70HRC的高硬度钢材加工也可实现延长刀具寿命和高精度加工 High precision and long tool life even for hardened steel up to 70HRC	20
R0.1 ～ R3 共 31 种规格 Total 31 sizes		提升刀刃刚性和排屑性能，进而实现“高效率”的高精度模具加工 High-efficiency high-precision die machining with improved cutting edge rigidity and chip evacuation	28
φ1×R0.1 ～ φ4×R0.5 共 15 种规格 Total 15 sizes		适用于冲压模具与锻造模具等高达70HRC的高硬度钢加工 Suitable for machining hardened steels up to 70HRC such as press dies and forging dies	32
φ5×R0.2 ～φ6×R1 共 14 种规格 Total 14 sizes		适用于冲压模具与锻造模具等高达70HRC的高硬度钢加工 Suitable for machining hardened steels up to 70HRC such as press dies and forging dies	35
φ0.1×R0.01 ～ φ6×R1 共 269 种规格 Total 269 sizes		提升表面粗糙度的刀刃形状和高精度R角，实现针对高硬度钢精加工的高精度 Specialized cutting edge and high precision corner R enhance finishing accuracy on hardened steels	38

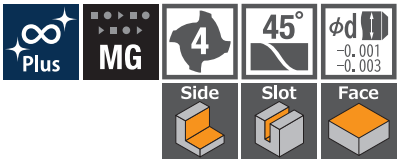
采用可抑制偏斜的高刚性设计，加工最高70HRC的高硬度钢时也可实现延长刀具寿命

High rigidity tool design suppresses deflection and realizes long tool life on machining 70HRC hardened steel

无限白金Plus涂层 高硬度钢材加工用4刃平底铣刀

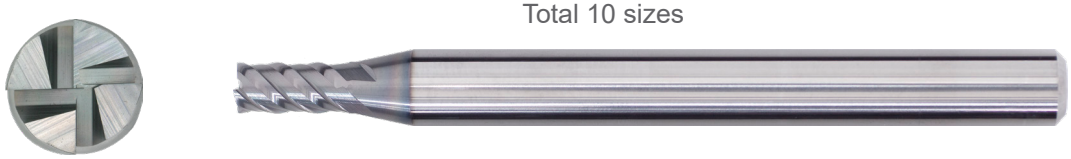
MUGEN COATING PREMIUM Plus 4-Flute Square End Mill for Hardened Steel

MHDSH445



φ 1 ～ φ 4.5

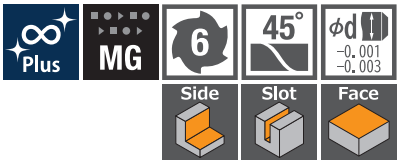
共 10 种规格
Total 10 sizes



无限白金Plus涂层 高硬度钢材加工用6刃平底铣刀

MUGEN COATING PREMIUM Plus 6-Flute Square End Mill for Hardened Steel

MHDSH645



φ 5 ～ φ 6

共 4 种规格
Total 4 sizes



特长

Features

Feature 1	延长刀具寿命 Long tool life	无限白金Plus涂层 MUGEN COATING PREMIUM Plus

粗加工
Roughing

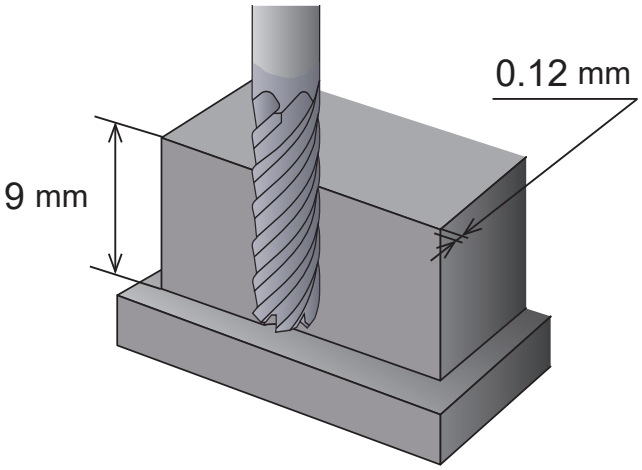
使用刀具 Tool　MHDSH645　φ6 × 刃长18 Length of Cut

加工材料 Work material　HAP40 (64HRC)

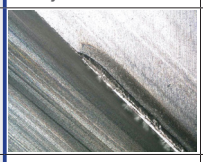
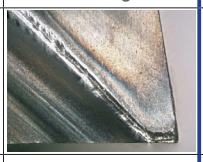
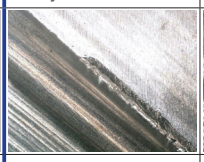
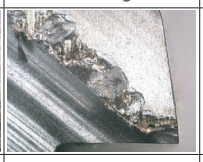
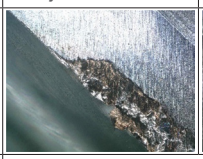
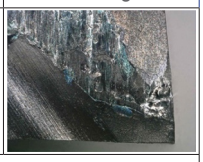
主轴转速 Spindle speed　4,200 min^{-1}

进给速度 Feed　600 mm/min

切深量 Depth of cut　ap 9 ×ae 0.12 mm



■ 粗加工比其他公司产品可实现更长的加工寿命
Achieves longer tool life compared to other tool brand at roughing

使用刀具 Tool	MHDSH645 ϕ 6 × 18		其他公司产品 A ϕ 6 × 15 Other tool brand A		其他公司产品 B ϕ 6 × 15 Other tool brand B	
磨耗位置 Wear position	边界部 Major flank notch	前端部 End edge	边界部 Major flank notch	前端部 End edge	边界部 Major flank notch	前端部 End edge
加工 120 分钟后 After 120 min						
磨耗宽度 Tool wear	**0.060** mm	**0.080** mm	0.097 mm	损伤大 无法测量磨耗宽度 Wear width cannot be measured because great damage	损伤大 无法测量磨耗宽度 Wear width cannot be measured because great damage	

Feature 2

高刚性设计 High rigidity tool design

抑制精加工时的偏斜 Suppress deflection at finishing

精加工 Finishing

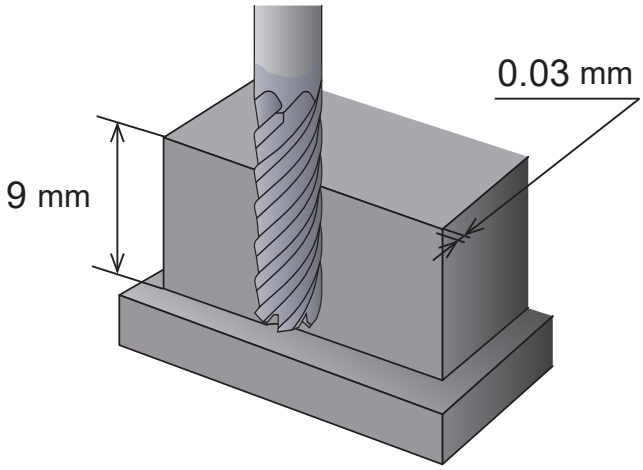
使用刀具 Tool　MHDSH645　ϕ6 × 刃长18 Length of Cut

加工材料 Work material　HAP40 (64HRC)

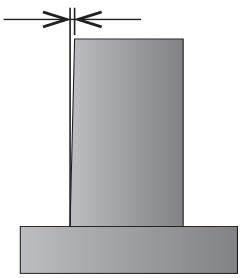
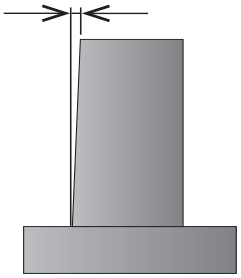
主轴转速 Spindle speed　4,200 min^{-1}

进给速度 Feed　600 mm/min

切深量 Depth of cut　ap 9 ×ae 0.03 mm



■ 精加工90分钟后的偏斜量
Amount of deflection after 90min finishing

使用刀具 Tool	MHDSH645 ϕ 6 × 18	其他公司产品 ϕ 6 × 15 Other tool brand
偏斜量 Deflection amount	 **0.010** mm	 0.018 mm

MHDSH645 在加工 HAP40（64HRC）时更能抑制偏斜
MHDSH645 has less deflection due to HAP40(64HRC) machining

MHDSH445

规格
Size ϕ 1 ～ ϕ 4

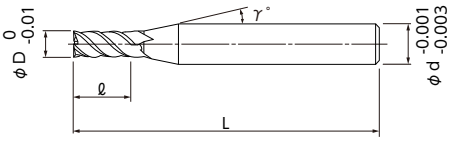
无限白金Plus涂层
高硬度钢材加工用4刃平底铣刀
MUGEN COATING PREMIUM Plus 4-Flute Square End Mill for Hardened Steel

共 10 种规格
Total 10 sizes

采用可抑制偏斜的高刚性设计，加工最高70HRC的高硬度钢时也可实现延长刀具寿命
High rigidity tool design suppresses deflection and realizes long tool life on machining 70HRC hardened steel







- 4 刃铣刀为刃长 2D、3D 造型的产品。
- 采用无限白金Plus涂层，加工70HRC 的高硬度钢时也可实现延长刀具寿命。
- 采用高刚性设计，可提高加工精度。
- 柄径公差为-0.001mm至-0.003mm的高精度规格。

- 4-flute is lineup of length of cut expands 2D and 3D.
- MUGEN COATING PREMIUM Plus realizes long tool life even for hardened steel up to 70HRC.
- High rigidity tool design improves machining accuracy.
- Shank diameter tolerance , high accuracy type, is - 0.001mm ～ - 0.003mm.

加工材料 Work Material

高硬度钢 Hardened Steel	H
60～70HRC	
◎	

单位 [规格：mm]
Unit [Size : mm]

产品代码 Code No.	外径(D) Dia.	刃长(ℓ) Length of Cut	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length
08-00429-00102	1	2	12°	6	60
08-00429-00103		3	12°	6	60
08-00429-00152	1.5	3	12°	6	60
08-00429-00153		4.5	12°	6	60
08-00429-00202	2	4	12°	6	60
08-00429-00203		6	12°	6	60
08-00429-00302	3	6	12°	6	60
08-00429-00303		9	12°	6	60
08-00429-00402	4	8	12°	6	60
08-00429-00403		12	12°	6	60

订购方法 How to Order
请指定MHDSH445 外径(D)×刃长(ℓ)。
When you order, indicate MHDSH445 (D)×(ℓ).

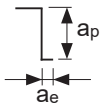
※(γ)为参考值。
※(γ) is reference value.

切削参数参考表 Recommended Conditions

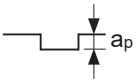
加工材料 Work Material			高硬度钢·高速钢 Hardened Steels/High Speed Steels SKD11·SKH51(～62HRC)				高速钢 High Speed Steels SKH55·HAP40(～66HRC)				高速钢 High Speed Steels SKH57·HAP72(～70HRC)			
	外径 Dia.	刃长 Length of Cut	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
			min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
侧面加工 Side Milling	1	2	25,000	500	1.5	0.02	20,000	240	1.5	0.02	16,000	160	1.5	0.02
		3	22,000	360	1.5	0.02	18,000	200	1.5	0.02	14,000	120	1.5	0.02
	1.5	3	16,000	560	2.25	0.03	14,000	330	2.25	0.03	10,000	240	2.25	0.03
		4.5	14,000	420	2.25	0.03	12,000	240	2.25	0.03	8,000	160	2.25	0.03
	2	4	12,000	630	3	0.04	10,000	480	3	0.04	8,000	320	3	0.04
		6	10,000	500	3	0.04	8,000	330	3	0.04	6,000	240	3	0.04
	3	6	8,000	700	4.5	0.06	7,000	560	4.5	0.06	5,600	400	4.5	0.06
		9	7,600	600	4.5	0.06	6,400	480	4.5	0.06	5,000	320	4.5	0.06
	4	8	7,000	800	6	0.08	6,000	600	6	0.08	5,000	400	6	0.08
		12	6,600	700	6	0.08	5,600	560	6	0.08	4,600	320	6	0.08
沟槽加工 Slotting	1	2	20,000	300	0.02	-	16,000	120	0.01	-	14,000	100	0.01	-
		3	18,000	240	0.02	-	14,000	80	0.01	-	12,000	50	0.01	-
	1.5	3	12,000	380	0.03	-	10,000	160	0.015	-	8,000	120	0.015	-
		4.5	10,000	260	0.03	-	9,000	100	0.015	-	7,500	60	0.015	-
	2	4	10,000	420	0.04	-	8,000	240	0.02	-	7,000	160	0.02	-
		6	8,000	300	0.04	-	7,000	120	0.02	-	6,000	80	0.02	-
	3	6	7,500	500	0.06	-	6,000	280	0.03	-	5,000	180	0.03	-
		9	7,000	320	0.06	-	5,600	140	0.03	-	4,500	100	0.03	-
	4	8	6,000	540	0.08	-	5,000	300	0.04	-	4,500	180	0.04	-
		12	5,600	360	0.08	-	4,800	160	0.04	-	4,000	100	0.04	-

备 注 Notes

侧面加工 Side Milling



沟槽加工 Slotting



※1 请使用刚性好、精度高的机床和夹具。
※2 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。
※3 请以相同的比率调整主轴转速和进给速度。
※4 建议使用油雾冷却方式。

※1 Use a rigid and precise machine and chuck holder.
※2 Adjust milling conditions according to the volume of Depth of Cut and rigidity of the machine.
※3 Adjust both spindle speed and feed at the same rate.
※4 Use oil mist coolant.

MHDSH645

规格
Size φ 5 ～ φ 6

Plus ≦70 HRC

无限白金Plus涂层
高硬度钢材加工用6刃平底铣刀
MUGEN COATING PREMIUM Plus 6-Flute Square End Mill for Hardened Steel

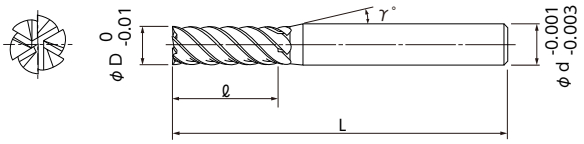
共 4 种规格
Total 4 sizes

采用可抑制偏斜的高刚性设计，加工最高70HRC的高硬度钢时也可实现延长刀具寿命
High rigidity tool design suppresses deflection and realizes long tool life on machining 70HRC hardened steel

MG | 6 | 45° | φd 0 -0.001 -0.003

Side | Slot | Face





- 6 刃铣刀为刃长 2D、3D 造型的产品。
- 采用无限白金Plus涂层，加工70HRC 的高硬度钢时也可实现延长刀具寿命。
- 采用高刚性设计，可提高加工精度。
- 柄径公差为-0.001mm至-0.003mm的高精度规格。

- 6-flute is lineup of length of cut expands 2D and 3D.
- MUGEN COATING PREMIUM Plus realizes long tool life even for hardened steel up to 70HRC.
- High rigidity tool design improves machining accuracy.
- Shank diameter tolerance , high accuracy type, is - 0.001mm ～ - 0.003mm.

加工材料 Work Material

高硬度钢 Hardened Steel	H
60～70HRC	
◎	

单位 [规格：mm]
Unit [Size : mm]

产品代码 Code No.	外径(D) Dia.	刃长(ℓ) Length of Cut	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length
08-00430-00502	**5**	**10**	12°	6	60
08-00430-00503		**15**	12°	6	65
08-00430-00602	**6**	**12**	-	6	60
08-00430-00603		**18**	-	6	65

订购方法 How to Order
请指定MHDSH645 外径(D)×刃长(ℓ)。
When you order, indicate MHDSH645 (D)×(ℓ).

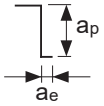
※(γ)为参考值。
※(γ) is reference value.

切削参数参考表 Recommended Conditions

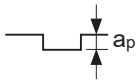
加工材料 Work Material			高硬度钢·高速钢 Hardened Steels/High Speed Steels SKD11·SKH51(～62HRC)				高速钢 High Speed Steels SKH55·HAP40(～66HRC)				高速钢 High Speed Steels SKH57·HAP72(～70HRC)			
	外径 Dia.	刃长 Length of Cut	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
			min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
侧面加工 Side Milling	5	10	6,200	1,200	7.5	0.1	5,300	800	7.5	0.1	4,600	560	7.5	0.1
		15	5,600	1,000	7.5	0.1	4,800	600	7.5	0.1	4,200	480	7.5	0.1
	6	12	5,300	1,200	9	0.12	4,600	800	9	0.12	4,000	560	9	0.12
		18	4,800	1,000	9	0.12	4,200	600	9	0.12	3,600	480	9	0.12
沟槽加工 Slotting	5	10	5,600	600	0.1	-	4,800	350	0.05	-	4,000	200	0.05	-
		15	5,000	400	0.1	-	4,200	200	0.05	-	3,600	120	0.05	-
	6	12	4,800	600	0.12	-	4,200	350	0.06	-	3,600	200	0.06	-
		18	4,200	400	0.12	-	3,600	200	0.06	-	3,200	120	0.06	-

备 注 Notes

侧面加工 Side Milling



沟槽加工 Slotting



※1 请使用刚性好、精度高的机床和夹具。
※2 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。
※3 请以相同的比率调整主轴转速和进给速度。
※4 建议使用油雾冷却方式。

※1 Use a rigid and precise machine and chuck holder.
※2 Adjust milling conditions according to the volume of Depth of Cut and rigidity of the machine.
※3 Adjust both spindle speed and feed at the same rate.
※4 Use oil mist coolant.

MSBSH230

New

规格
Size R0.05 ～ R3

Plus ≦70 HRC

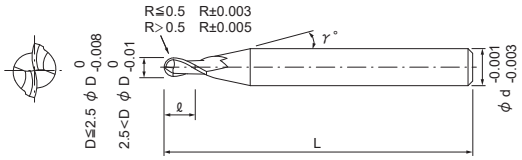
无限白金Plus涂层
高硬度钢材高精度加工用2刃长颈球头铣刀
MUGEN COATING PREMIUM Plus 2-Flute Ball End Mill for Hardened Steel and High Accuracy Machining

共 15 种规格
Total 15 sizes

针对冲压模具、锻造模具等最高可达 70HRC 的高硬度钢加工，
提供从粗加工到精加工各工序的切削参数参考表，使加工更安心可靠
Suitable for machining hardened steels up to 70HRC, such as press dies and forging dies
Recommended cutting conditions cover roughing to finishing to ensure stable machining

SMG | 2 | 30° | R ±0.003 (R≦0.5) | R ±0.005 (R>0.5) | φd -0.001 -0.003 | 3D





※ R 角精度以实际外径的 1/2 为基准值
※ R accuracy is based on a half value of actual diameter

- 标准型高硬度钢加工用球头铣刀。
- 采用无限白金 Plus 涂层，最适合对硬度达 70HRC 的高硬度钢进行高精度三次元加工。
- 柄径公差为 -0.001mm 至 -0.003mm 的高精度规格。
- Standard type ball end mill for machining on hardened steel.
- MUGEN COATING PREMIUM Plus provides optimal performance for high precision 3D machining of hardened steels up to 70HRC.
- Shank diameter tolerance, high accuracy type, is - 0.001mm ～ - 0.003mm.

加工材料 Work Material

高硬度钢 Hardened Steel	H
60～70HRC	
◎	

◆ 2026年3月发布 ※Release in Mar, 2026.

单位 [规格：mm]
Unit [Size : mm]

产品代码 Code No.	球头半径(R) Radius	刃长(ℓ) Length of Cut	外径(D) Dia.	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length
◆ 08-00502-00005	**R0.05**	0.1	0.1	12°	4	45
◆ 08-00502-00007	**R0.075**	0.15	0.15	12°	4	45
◆ 08-00502-00010	**R0.1**	0.2	0.2	12°	4	45
◆ 08-00502-00015	**R0.15**	0.3	0.3	12°	4	45
◆ 08-00502-00020	**R0.2**	0.6	0.4	12°	4	45
◆ 08-00502-00025	**R0.25**	0.8	0.5	12°	4	45
◆ 08-00502-00030	**R0.3**	0.9	0.6	12°	4	45
◆ 08-00502-00040	**R0.4**	1.2	0.8	12°	4	45
◆ 08-00502-00050	**R0.5**	1.5	1	12°	4	45
◆ 08-00502-00075	**R0.75**	2.3	1.5	12°	4	45
◆ 08-00502-00100	**R1**	3	2	12°	4	45
◆ 08-00502-00150	**R1.5**	5	3	12°	6	60
◆ 08-00502-00200	**R2**	6	4	12°	6	60
◆ 08-00502-00250	**R2.5**	8	5	12°	6	60
◆ 08-00502-00300	**R3**	10	6	-	6	60

订购方法 How to Order
请指定MSBSH230 球头半径(R)。
When you order, indicate MSBSH230 (R).

※ (γ) 为参考值。
※ (γ) is reference value.

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 Steels SKD11·SKH51(～62HRC)									
	粗加工 Roughing						清角加工 Stock removal (Inner Corner)			
R球头半径 Radius	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		余量 Stock allowance	切屑排出量 Material removal rate	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	余量 Stock allowance
	min^{-1}	mm/min	a_p mm	a_e mm	mm	mm^3/min	min^{-1}	mm/min	a_p mm 或 a_e mm	mm
R0.05	40,000	100	0.003	0.005	0.005	0.002	40,000	90	0.003	0.005
R0.075	40,000	150	0.003	0.005	0.006	0.002	40,000	130	0.003	0.006
R0.1	40,000	320	0.01	0.01	0.009	0.032	40,000	280	0.009	0.009
R0.15	40,000	360	0.01	0.02	0.012	0.072	40,000	320	0.009	0.012
R0.2	40,000	820	0.02	0.05	0.015	0.82	40,000	730	0.018	0.015
R0.25	40,000	1,000	0.025	0.05	0.019	1.3	40,000	900	0.023	0.019
R0.3	40,000	1,200	0.03	0.06	0.022	2.2	40,000	1,080	0.027	0.022
R0.4	40,000	1,800	0.07	0.1	0.027	13	40,000	1,620	0.063	0.027
R0.5	30,000	2,000	0.1	0.2	0.036	40	30,000	1,800	0.09	0.036
R0.75	30,000	2,500	0.1	0.3	0.048	75	30,000	2,250	0.09	0.048
R1	25,000	2,500	0.2	0.5	0.06	250	25,000	2,250	0.18	0.06
R1.5	18,000	2,500	0.2	0.6	0.065	300	18,000	2,250	0.18	0.065
R2	16,000	2,500	0.2	0.8	0.065	400	16,000	2,250	0.18	0.065
R2.5	12,000	2,500	0.2	1.2	0.065	600	12,000	2,250	0.18	0.065
R3	8,000	2,500	0.3	1.2	0.065	900	8,000	2,250	0.27	0.065

加工材料 Work Material	高硬度钢·高速钢 Hardened Steels/High Speed Steels SKD11·SKH51(～62HRC)							
	中精加工 Semi-Finishing				精加工 Finishing			
R球头半径 Radius	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	余量 Stock allowance	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	余量 Stock allowance
	min^{-1}	mm/min	a_p mm 或 a_e mm	mm	min^{-1}	mm/min	a_p mm 或 a_e mm	mm
R0.05	40,000	270	0.003	0.002	40,000	160	0.002	0
R0.075	40,000	390	0.005	0.003	40,000	270	0.003	0
R0.1	40,000	450	0.006	0.004	40,000	320	0.004	0
R0.15	40,000	610	0.008	0.005	40,000	480	0.006	0
R0.2	40,000	780	0.01	0.006	40,000	560	0.007	0
R0.25	40,000	1,010	0.013	0.008	40,000	710	0.009	0
R0.3	40,000	1,170	0.015	0.009	40,000	780	0.01	0
R0.4	40,000	1,430	0.018	0.011	40,000	1,010	0.013	0
R0.5	30,000	1,410	0.024	0.015	30,000	1,000	0.017	0
R0.75	30,000	1,910	0.032	0.02	30,000	1,310	0.022	0
R1	25,000	2,000	0.04	0.025	25,000	1,410	0.028	0
R1.5	18,000	1,760	0.049	0.03	18,000	1,240	0.035	0
R2	16,000	1,810	0.057	0.03	16,000	1,280	0.04	0
R2.5	12,000	1,510	0.063	0.03	12,000	1,070	0.045	0
R3	8,000	1,100	0.069	0.03	8,000	780	0.049	0

备 注 Notes

※1 切深量的ap表示为轴向切深量，ae表示步距量。
※2 请根据机床刚性和工件的夹持状态等调整切削参数。
※3 发生振刀等情况时，请根据需要调整切深参数。
※4 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。
※5 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。
※6 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。
※7 请尽量缩短刀具的伸出量。
※8 建议使用油雾冷却方式。
※9 清角加工，中精加工和精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。
※10 清角加工是指，前一道工序(粗加工)使用直径约为本次使用工具 1.5 倍的球头铣刀加工后所留下的状态，作为参考标准。
请根据前一道工序(粗加工)的残留量调整切削深度和进给速度。

※1 Depth of Cut: ap=Axial Depth of Cut / ae=Radial Depth of Cut.
※2 Adjust milling condition according to machine rigidity and clamp condition of work material.
※3 In case of chattering etc., please adjust milling conditions if necessary.
※4 If the cutting load is high at corners, etc., set the milling conditions and tool path carefully to reduce the cutting load.
※5 In case high-efficient machining, increase spindle speed and feed rate at the same rate.
※6 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.
※7 Minimize a possible tool overhang length.
※8 We recommend using oil mist coolant.
※9 The stock allowance and depth of cut at semi-finishing and finishing for this tool are guideline, please adjust them according to the machining condition of the previous process and required accuracy.
※10 The parameters for the Stock Removal (Inner Corner) process are reference values based on the condition after roughing, where a ball end mill approximately 1.5 times lager than the tool used in this process was applied. Please adjust the depth of cut and feed rate according to the amount of remaining material from the previous roughing operation.

MSBSH230 New

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material	高速钢 High Speed Steels SKH55·HAP40(～66HRC)									
	粗加工 Roughing						清角加工 Stock removal (Inner Corner)			
R球头半径 Radius	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		余量 Stock allowance	切屑排出量 Material removal rate	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	余量 Stock allowance
	min^{-1}	mm/min	a_p mm	a_e mm	mm	mm^3/min	min^{-1}	mm/min	a_p mm 或 a_e mm	mm
R0.05	40,000	60	0.002	0.005	0.004	0.001	40,000	50	0.002	0.004
R0.075	40,000	100	0.002	0.005	0.004	0.001	40,000	90	0.002	0.004
R0.1	40,000	240	0.003	0.005	0.006	0.004	40,000	210	0.003	0.006
R0.15	40,000	300	0.005	0.01	0.01	0.015	40,000	270	0.005	0.01
R0.2	40,000	480	0.01	0.02	0.012	0.096	40,000	430	0.009	0.012
R0.25	40,000	600	0.015	0.03	0.016	0.27	40,000	540	0.014	0.016
R0.3	30,000	720	0.02	0.05	0.019	0.72	30,000	640	0.018	0.019
R0.4	30,000	1,200	0.05	0.1	0.023	6	30,000	1,080	0.045	0.023
R0.5	25,000	1,400	0.08	0.1	0.031	11	25,000	1,260	0.072	0.031
R0.75	25,000	2,000	0.1	0.2	0.041	40	25,000	1,800	0.09	0.041
R1	20,000	2,000	0.15	0.3	0.052	90	20,000	1,800	0.135	0.052
R1.5	14,000	2,000	0.2	0.5	0.062	200	14,000	1,800	0.18	0.062
R2	12,000	2,000	0.2	0.6	0.065	240	12,000	1,800	0.18	0.065
R2.5	9,200	2,000	0.2	0.7	0.065	280	9,200	1,800	0.18	0.065
R3	7,000	2,000	0.2	1	0.065	400	7,000	1,800	0.18	0.065

加工材料 Work Material	高速钢 High Speed Steels SKH55·HAP40(～66HRC)							
	中精加工 Semi-Finishing				精加工 Finishing			
R球头半径 Radius	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	余量 Stock allowance	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	余量 Stock allowance
	min^{-1}	mm/min	a_p mm 或 a_e mm	mm	min^{-1}	mm/min	a_p mm 或 a_e mm	mm
R0.05	40,000	270	0.003	0.002	40,000	160	0.002	0
R0.075	40,000	390	0.005	0.002	40,000	270	0.003	0
R0.1	40,000	450	0.005	0.003	40,000	320	0.004	0
R0.15	40,000	610	0.008	0.005	40,000	480	0.006	0
R0.2	40,000	780	0.01	0.005	40,000	560	0.007	0
R0.25	40,000	1,010	0.013	0.007	40,000	710	0.009	0
R0.3	30,000	880	0.015	0.008	30,000	580	0.01	0
R0.4	30,000	1,070	0.018	0.01	30,000	750	0.013	0
R0.5	25,000	1,180	0.024	0.013	25,000	830	0.017	0
R0.75	25,000	1,590	0.032	0.017	25,000	1,090	0.022	0
R1	20,000	1,600	0.04	0.022	20,000	1,130	0.028	0
R1.5	14,000	1,370	0.049	0.027	14,000	960	0.035	0
R2	12,000	1,350	0.057	0.03	12,000	960	0.04	0
R2.5	9,200	1,160	0.063	0.03	9,200	820	0.045	0
R3	7,000	960	0.069	0.03	7,000	680	0.049	0

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material	高速钢 High Speed Steels SKH57·HAP72(～70HRC)									
R球头半径 Radius	粗加工 Roughing						清角加工 Stock removal (Inner Corner)			
	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		余量 Stock allowance	切屑排出量 Material removal rate	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	余量 Stock allowance
	min^{-1}	mm/min	a_p mm	a_e mm	mm	mm^3/min	min^{-1}	mm/min	a_p mm 或 a_e mm	mm
R0.05	40,000	40	0.002	0.003	0.004	0.0002	40,000	30	0.002	0.004
R0.075	40,000	80	0.002	0.003	0.004	0.0005	40,000	70	0.002	0.004
R0.1	40,000	190	0.003	0.003	0.006	0.002	40,000	170	0.003	0.006
R0.15	40,000	240	0.005	0.005	0.009	0.006	40,000	210	0.005	0.009
R0.2	35,000	330	0.01	0.02	0.011	0.066	35,000	290	0.009	0.011
R0.25	30,000	360	0.015	0.02	0.014	0.108	30,000	320	0.014	0.014
R0.3	25,000	540	0.02	0.05	0.016	0.54	25,000	480	0.018	0.016
R0.4	25,000	900	0.03	0.1	0.02	2.7	25,000	810	0.027	0.02
R0.5	20,000	1,000	0.05	0.1	0.027	5	20,000	900	0.045	0.027
R0.75	20,000	1,500	0.06	0.2	0.036	18	20,000	1,350	0.054	0.036
R1	16,000	1,500	0.1	0.3	0.045	45	16,000	1,350	0.09	0.045
R1.5	12,000	1,500	0.12	0.5	0.056	90	12,000	1,350	0.108	0.056
R2	9,500	1,500	0.15	0.6	0.063	135	9,500	1,350	0.135	0.063
R2.5	8,000	1,500	0.15	0.7	0.065	158	8,000	1,350	0.135	0.065
R3	5,500	1,500	0.15	1	0.065	225	5,500	1,350	0.135	0.065

加工材料 Work Material	高速钢 High Speed Steels SKH57·HAP72(～70HRC)							
R球头半径 Radius	中精加工 Semi-Finishing				精加工 Finishing			
	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	余量 Stock allowance	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	余量 Stock allowance
	min^{-1}	mm/min	a_p mm 或 a_e mm	mm	min^{-1}	mm/min	a_p mm 或 a_e mm	mm
R0.05	40,000	270	0.003	0.002	40,000	160	0.002	0
R0.075	40,000	390	0.003	0.002	40,000	270	0.003	0
R0.1	40,000	450	0.003	0.003	40,000	320	0.003	0
R0.15	40,000	610	0.005	0.004	40,000	480	0.005	0
R0.2	35,000	680	0.01	0.005	35,000	490	0.007	0
R0.25	30,000	750	0.013	0.006	30,000	530	0.009	0
R0.3	25,000	730	0.015	0.007	25,000	480	0.01	0
R0.4	25,000	890	0.018	0.009	25,000	630	0.013	0
R0.5	20,000	940	0.024	0.012	20,000	660	0.017	0
R0.75	20,000	1,270	0.032	0.016	20,000	870	0.022	0
R1	16,000	1,280	0.04	0.02	16,000	900	0.028	0
R1.5	12,000	1,170	0.049	0.025	12,000	830	0.035	0
R2	9,500	1,070	0.057	0.028	9,500	760	0.04	0
R2.5	8,000	1,010	0.063	0.03	8,000	710	0.045	0
R3	5,500	760	0.069	0.03	5,500	530	0.049	0

备 注 Notes

※1 切深量的ap表示为轴向切深量，ae表示步距量。
※2 请根据机床刚性和工件的夹持状态等调整切削参数。
※3 发生振刀等情况时，请根据需要调整切深参数。
※4 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。
※5 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。
※6 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。
※7 请尽量缩短刀具的伸出量。
※8 建议使用油雾冷却方式。
※9 清角加工，中精加工和精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。
※10 清角加工是指，前一道工序(粗加工)使用直径约为本次使用工具 1.5 倍的球头铣刀加工后所留下的状态，作为参考标准。
请根据前一道工序(粗加工)的残留量调整切削深度和进给速度。

※1 Depth of Cut: ap=Axial Depth of Cut / ae=Radial Depth of Cut.
※2 Adjust milling condition according to machine rigidity and clamp condition of work material.
※3 In case of chattering etc., please adjust milling conditions if necessary.
※4 If the cutting load is high at corners, etc., set the milling conditions and tool path carefully to reduce the cutting load.
※5 In case high-efficient machining, increase spindle speed and feed rate at the same rate.
※6 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.
※7 Minimize a possible tool overhang length.
※8 We recommend using oil mist coolant.
※9 The stock allowance and depth of cut at semi-finishing and finishing for this tool are guideline, please adjust them according to the machining condition of the previous process and required accuracy.
※10 The parameters for the Stock Removal (Inner Corner) process are reference values based on the condition after roughing, where a ball end mill approximately 1.5 times lager than the tool used in this process was applied. Please adjust the depth of cut and feed rate according to the amount of remaining material from the previous roughing operation.

利用5轴加工机床的特点，采用3刃和高刚性的球头造型，实现高精度的高效率加工，进而降低总成本

3-flute high rigidity ball design conforms features of 5-axis machine to reduce total manufacturing cost with high precision and high efficiency machining

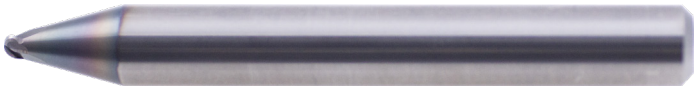
无限白金Plus涂层
5轴MC加工用3刃球头铣刀

MUGEN COATING PREMIUM Plus
3-Flute Ball End Mill for 5-axis machining

MSBSH330-5X

R0.1 ～ R1

共 8 种规格
Total 8 sizes



特长
Features

Feature 1 涂层 Coating — 无限白金Plus涂层 MUGEN COATING PREMIUM Plus

使用具备耐氧化性和耐磨损性的「无限白金Plus涂层」，能在硬度60HRC以上的加工材料上发挥最佳效果。即使在52～60HRC的材料上，也能展现与「无限白金涂层」相同的性能。

Most suitable for 60HRC and above with MUGEN COATING PREMIUM Plus, high oxidation resistance and abrasion resistance.
Demonstrate same performance with MUGEN COATING PREMIUM even at 52 - 60HRC

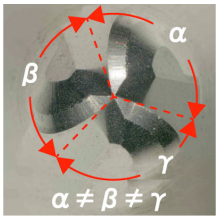
高硬度钢 Hardened Steel H	
52～60HRC	60～70HRC
○	◎

Feature 2 高效率 High efficiency — 3 刃・不等分割・刀刃前角设计 3-Flute · Unequal flute spacing · Positive rake angle

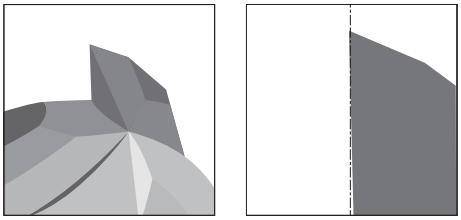
采用了3刃与不等分割设计，有效抑制振动，同时实现更高的进给速度。
此外，为了提高耐崩损性，选用了重视抗崩损性能的超硬合金，并采用了锐角的前角刃口设计，以降低切削负荷。

3-flute with unequal flute spacing reduces chattering and realizes high feed
In addition, adopt positive cutting edge to carbide material with fracture resistance ability to reduce cutting load

不等分割防止振刀
Unequal flute
Prevent chattering



锐角刃口
Positive cutting edge



Feature 3

高刚性
Highly rigid

高刚性的刀具设计
High rigidity tool design

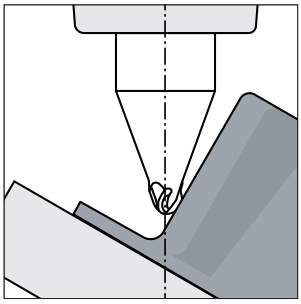
采用了专为5轴加工设计的颈部形状，即使在小径规格中也统一使用φ6的刀柄，
可大幅抑制刀具受力时的挠曲量

Specialized neck design for 5-axis machining, and ϕ6 shank even for the smaller diameter suppress a tool deflection excellently

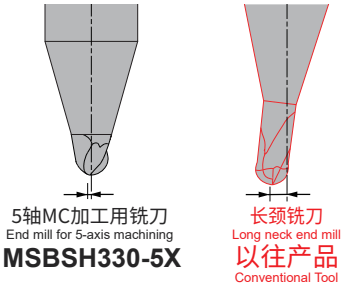
高刚性的颈部形状
Highly rigid neck design shape



充分发挥5轴加工优势的高刚性刀具形状
Tool design for high rigidity to maximize advantages of 5-axis machining



抑制挠曲量
Suppressing the amount of deflection



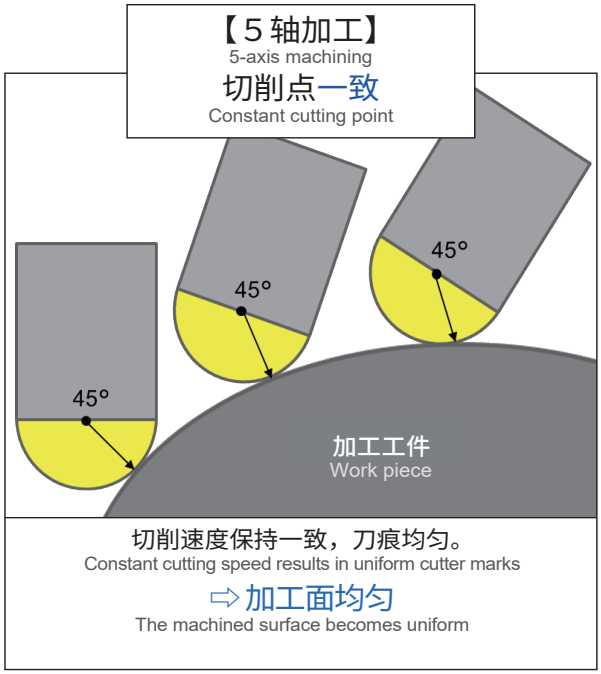
Feature 4

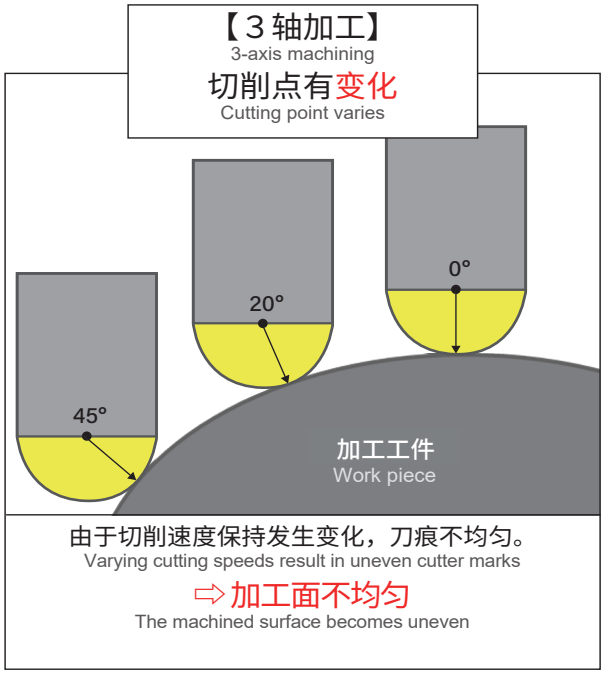
提升加工面品质
Improving machined surface quality

切削点保持一致使加工面更均匀
Achieve an uniform machined surface by keeping the cutting point constant

在5轴加工中，通过使刀具与工件的切削位置（切削点）保持一致，可实现均匀的加工表面，
进而提升加工面品质

In 5-axis machining, maintaining the cutting point of the tool results in a uniform machined surface, which leads to improved surface quality





MSBSH330-5X

规格
Size R0.1 ～ R1

Plus ≦70 HRC

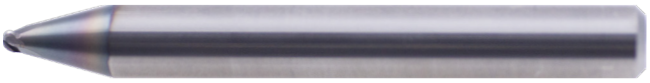
无限白金Plus涂层
5轴MC加工用3刃球头铣刀
MUGEN COATING PREMIUM Plus 3-Flute Ball End Mill for 5-axis machining

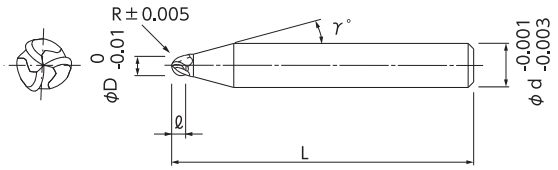
共 8 种规格
Total 8 sizes

SMG 3 30° R ±0.005 φd -0.001 -0.003 3D

利用5轴加工机床的特点，采用3刃和高刚性的球头造型，
实现高精度的高效率加工，进而降低总成本

3-flute high rigidity ball design conforms features of 5-axis machine to reduce total manufacturing cost with high precision and high efficiency machining





※ R 角精度以实际外径的 1/2 为基准值
※ R accuracy is based on a half value of actual diameter

- 利用5轴加工机床的特点，采用3刃和高刚性的球头造型，实现高精度的高效率加工，进而降低总成本。
- 对52 ～ 70HRC的高硬度钢也可实现延长刀具寿命、高效率加工。
- 利用3刃和不等分割设计抑制振刀现象，在注重耐崩损性的超硬合金上采用锐角刃口，减少切削阻力，从而实现高效率加工。
- R精度为±0.005mm(R角精度以实际外径的1/2为基准值)。
- 柄径公差为-0.001mm至-0.003mm的高精度规格。

- 3-flute high rigidity ball design conforms features of 5-axis machine to reduce total manufacturing cost with high precision and high efficiency machining.
- Even hardened steel of 52 to 70HRC can be machining with long tool life and high efficiency.
- By adopting positive cutting edge for carbide material emphasized breakage resistance that suppresses chattering by 3-flute and unequal flute.
- R accuracy is ±0.005mm (R accuracy is based on a half value of actual diameter).
- Shank diameter tolerance , high accuracy type, is - 0.001mm ～ - 0.003mm.

加工材料 Work Material

高硬度钢 Hardened Steel	H
52～60HRC	60～70HRC
○	◎

单位 [规格：mm]
Unit [Size : mm]

产品代码 Code No.	球头半径(R) Radius	刃长(ℓ) Length of Cut	外径(D) Dia.	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length
08-00610-00100	**R0.1**	0.12	0.2	15°	6	50
08-00610-00150	**R0.15**	0.18	0.3	15°	6	50
08-00610-00200	**R0.2**	0.24	0.4	15°	6	50
08-00610-00250	**R0.25**	0.3	0.5	15°	6	50
08-00610-00300	**R0.3**	0.36	0.6	15°	6	50
08-00610-00500	**R0.5**	0.6	1	15°	6	50
08-00610-00750	**R0.75**	0.9	1.5	15°	6	50
08-00610-01000	**R1**	1.2	2	15°	6	50

订购方法 How to Order
请指定MSBSH330-5X 球头半径(R)。
When you order, indicate MSBSH330-5X(R).

※(γ)为参考值。
※(γ) is reference value.

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material	高硬度钢 Hardened Steels STAVAX·SKD11（～60HRC）				高速钢 High Speed Steels SKH51·HAP40（～65HRC）				高速钢 High Speed Steels SKH57·HAP72（～70HRC）			
R球头半径 Radius	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}
R0.1	0.005 ～ 0.007	0.005	400	40,000	0.003 ～ 0.005	0.003	300	40,000	0.003 ～ 0.005	0.003	220	40,000
R0.15	0.005 ～ 0.007	0.007	450	40,000	0.003 ～ 0.005	0.005	400	40,000	0.003 ～ 0.005	0.005	270	40,000
R0.2	0.02 ～ 0.03	0.03	1,100	40,000	0.008 ～ 0.012	0.02	850	40,000	0.008 ～ 0.012	0.02	650	35,000
R0.25	0.02 ～ 0.03	0.03	1,300	40,000	0.01 ～ 0.015	0.02	1,000	35,000	0.01 ～ 0.015	0.02	700	30,000
R0.3	0.03 ～ 0.045	0.06	1,500	40,000	0.02 ～ 0.03	0.05	1,100	30,000	0.02 ～ 0.03	0.05	800	25,000
R0.5	0.1 ～ 0.15	0.2	3,000	30,000	0.08 ～ 0.12	0.1	2,000	25,000	0.05 ～ 0.075	0.1	1,500	20,000
R0.75	0.1 ～ 0.15	0.3	3,800	30,000	0.1 ～ 0.15	0.2	3,000	25,000	0.06 ～ 0.09	0.2	2,200	20,000
R1	0.2 ～ 0.3	0.5	3,800	25,000	0.15 ～ 0.22	0.3	3,000	20,000	0.1 ～ 0.15	0.3	2,200	16,000

备 注 Notes

※1 切深量 ap 表示轴向切深量，ae 表示径向切深量。
※2 请根据机床刚性和工件的夹持状态等调整切削参数。
※3 颈角为 15°，设定倾斜角时请注意避免与颈部发生干涉。
※4 刀具、加工材料的倾斜角和刀具的行进方向导致切削抵抗较大时，请根据需要调整切削参数。
※5 切深量 ap 是基于刀具、加工材料倾斜角的参考数值。
※6 发生振刀等情况时，请根据需要调整切削参数。
※7 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。
※8 请以相同的比率调整主轴转速和进给速度。
※9 排屑不良时可能会导致刀具崩刃和折损，敬请注意。
※10 建议使用油雾冷却方式。

※1 Depth of cut ap indicates Axial Depth of Cut, ae indicates Radial Depth of Cut.
※2 Adjust milling condition according to machine rigidity and clamp condition of work material.
※3 Since the neck angle is 15 °, please be careful to set the inclined angle to avoid interfering.
※4 Adjust milling condition with necessity when high cutting load occurred by angle of tool or work material and feed direction.
※5 The depth of cut ap is a guideline value according to the inclined angle of the tool or work material.
※6 In case of chattering etc., please adjust cutting conditions if necessary.
※7 At point where cutting load is high such as at corners, pay attention to setting cutting conditions and tool paths particularly.
※8 Adjust both spindle speed and feed at the same rate.
※9 Attention to a risk of chipping and breakage when insufficient chip flow.
※10 We recommend using oil mist coolant.

70HRC的高硬度钢材也能实现长时间·高精度的加工
High precision and long tool life even for hardened steel up to 70HRC

无限白金Plus涂层
高硬度钢材高精度加工用 2 刃长颈球头铣刀
可对应热缩刀柄的短柄造型
MUGEN COATING PREMIUM Plus
2-Flute Long Neck Ball End Mill with Short Shank for Hardened Steel and High accuracy cutting

MRBSH230SF

R0.05 ～ R3

共 115 规格
Total 115 sizes



R 角精度以实际刃径的 1/2 为基准值
R accuracy is based on a half value of actual diameter

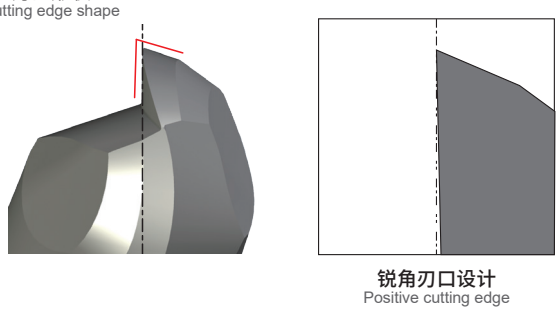
特长
Features

Feature 1 提升切削性能 Improved machinability — 锐角切削刃形状 Positive cutting edge

采用锐角设计，可减轻切削抵抗提高切削性能的刃口造型，并配合耐崩损性好的新母材。
实现了对高硬度钢材的长寿命切高精度的切削加工
Sharp cutting edge with reduced cutting load and new material with fracture resistance realizes long tool life and high precision for hardened steel

MRBSH230SF

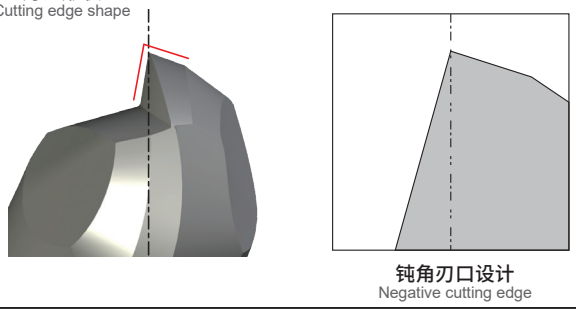
刃口形状
Cutting edge shape



刃口采用锐角造型来减轻切削抵抗并使用新素材制作出
加工高硬度钢材也不易崩刃的造型
Cutting load is reduced by positive cutting edge and by adopting a new material
Super micro grain carbide prevent chipping even with hardened steel

一般高硬度用铣刀
General end mill for hardened steel

刃口形状
Cutting edge shape



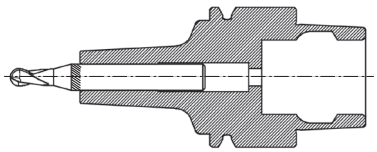
切削抵抗大的钝角造型
Negative cutting edge shape with high cutting load

Feature 2 提升加工精度 Improved cutting accuracy — 最合适的刀具伸出量 Optimal overhung length

MRBSH230SF

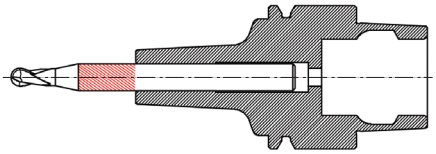
刀具夹持伸出量较短，可在高刚性状态下加工
Possible to machining with high rigidity, with short tool overhung

短柄设计
short shank



一般柄长设计
Normal shank length

刀具夹持伸出量较长，低刚性状态
Tool overhung length is long, and tool rigidity is low

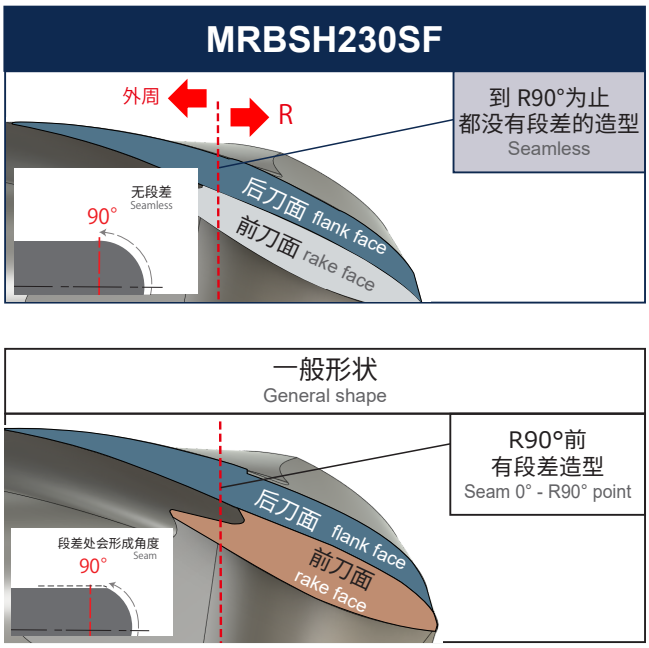


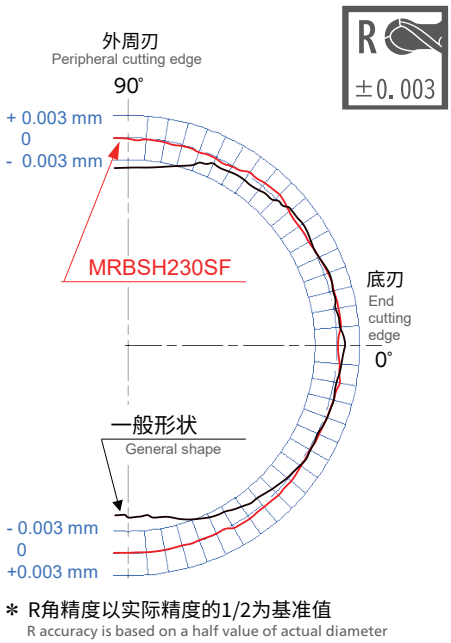
Feature 3

高精度 R 角
High accuracy R

R角的高精度化
Highly accurate R

从R角到外周刃的接续位置，前、后刀面都采用无段差设计，实现R角的高精度化
Seamless design on rake face and flank face from R-curve to peripheral cutting edge. Realized high precision R accuracy



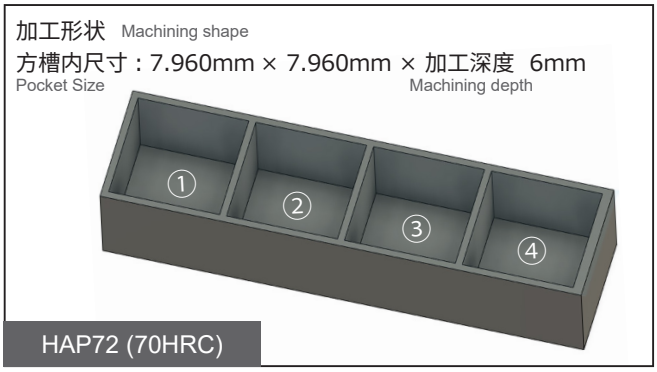


＊ R角精度以实际精度的1/2为基准值
R accuracy is based on a half value of actual diameter

尺寸精度比较
Comparison of dimensional accuracy

HAP72 (70HRC) ：粗加工后的尺寸精度对比
Comparison of dimensional accuracy after rough cutting

使用刀具 Tool：MRBSH230SF R1 × 6
加工内容 ：等高线粗加工 4 个方槽
Machining content : Roughing contour lines for 4 pockets
余量 Stock ：0.02mm
目标值 Target ：7.960mm
加工时间 Machining time：20 分钟 / 个 min per pocket
刀路轨迹 Tool path ：等高线粗加工 Roughing contour line

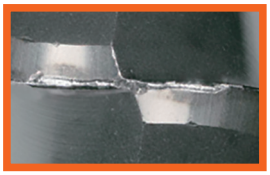


粗加工
Roughing

n= 16,000min^{-1} vf = 1,200mm/min ap 0.1 × ae 0.3mm 油雾 Oil Mist

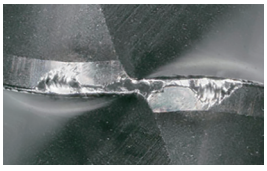
加工 80 分钟后的刀具磨耗状态
Tool wear condition after 80min machining

MRBSH230SF



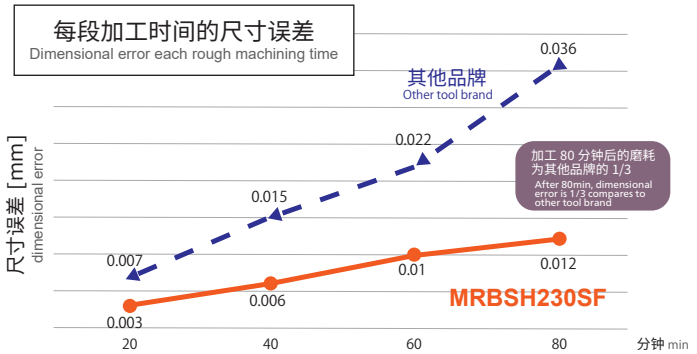
后刀面磨耗宽度
Frank wear width
0.055mm

其他品牌 Other tool brand



后刀面磨耗宽度
Frank wear width
0.102mm

每段加工时间的尺寸误差
Dimensional error each rough machining time



相对于其他品牌可实现更安定的余量管理
Realized stable demensional accurasy compares to other tool brand

MRBSH230SF

规格
Size R0.05 ～ R3

Plus ≦70 HRC

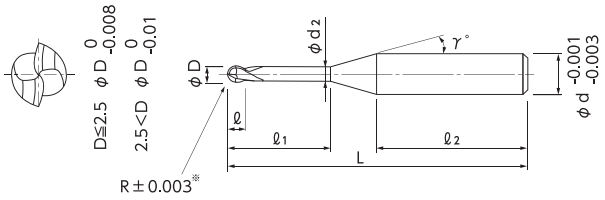
无限白金Plus涂层
高硬度钢材高精度加工用 2 刃长颈球头铣刀可对应热缩刀柄的短柄造型
MUGEN COATING PREMIUM Plus 2-Flute Long Neck Ball End Mill with Short Shank for Hardened Steel and High accuracy cutting

共 115 种规格
Total 115 sizes

70HRC的高硬度钢材也能实现长时间•高精度的加工
High precision and long tool life even for hardened steel up to 70HRC

SMG | 2 | 30° | R ±0.003 | φd -0.001 -0.003 | 3D





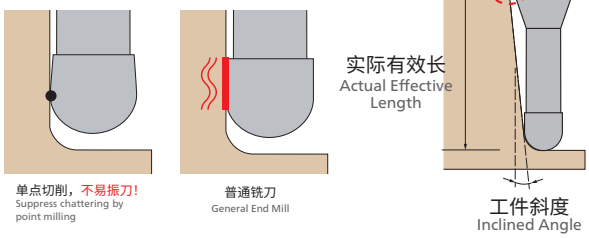
R角精度以实际刃径的1/2为基准值
R accuracy is based on a half value of actual diameter

- 70HRC的高硬度钢材也可实现长时间稳定的切削性能。
- 新研发出的无限白金Plus涂层，提升耐氧化性・耐磨耗性。
- 采用提升耐崩损性的新母材与减轻切削抵抗的刀刃设计。
- R角精度为 ±0.003mm（R角精度以实际刃径的1/2为基准值）。
- 柄径公差为 -0.001mm~-0.003mm 的高精度规格。

- Realize stable cutting performance even for 70 HRC hardened steels.
- Developed new MUGEN COATING PREMIUM Plus to upgrade oxidation resistance and abration resistance.
- Adopt optimized new tool material and tool design to reduce cutting load.
- R accuracy is ±0.003mm (R accuracy is based on a half value of actual diameter).
- Shank diameter tolerance , high accuracy type, is - 0.001mm ～ - 0.003mm.

加工材料 Work Material

高硬度钢 Hardened Steel	H
60～70HRC	
◎	



单位 [规格：mm]
Unit [Size : mm]

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.	柄长(ℓ2) Shank Length	全长 (L) Overall Length	相对于工件斜度的有效长 Actual effective length depending on inclined angle of workpiece				
										30´	1°	1°30´	2°	3°
08-00537-00052	R0.05	**0.2**	0.07	0.1	0.085	15°	**4**	27.4	35	0.23	0.24	0.24	0.25	0.27
08-00537-00056		**0.25**	0.07	0.1	0.085	15°	**4**	27.4	35	0.28	0.29	0.30	0.31	0.33
08-00537-00053		**0.3**	0.07	0.1	0.085	15°	**4**	27.3	35	0.33	0.34	0.35	0.36	0.39
08-00537-00054		**0.4**	0.07	0.1	0.085	15°	**4**	27.2	35	0.44	0.45	0.46	0.48	0.52
08-00537-00055		**0.5**	0.07	0.1	0.085	15°	**4**	27.1	35	0.54	0.56	0.57	0.59	0.64
08-00537-00076	R0.075	**0.25**	0.1	0.15	0.13	15°	**4**	27.5	35	0.29	0.30	0.31	0.31	0.33
08-00537-00072		**0.3**	0.1	0.15	0.13	15°	**4**	27.4	35	0.34	0.35	0.36	0.37	0.40
08-00537-00077		**0.4**	0.1	0.15	0.13	15°	**4**	27.3	35	0.44	0.46	0.47	0.49	0.52
08-00537-00073		**0.5**	0.1	0.15	0.13	15°	**4**	27.2	35	0.55	0.56	0.58	0.60	0.65
08-00537-00074		**0.6**	0.1	0.15	0.13	15°	**4**	27.1	35	0.65	0.67	0.69	0.72	0.77
08-00537-00075		**0.7**	0.1	0.15	0.13	15°	**4**	27.0	35	0.75	0.78	0.80	0.83	0.89
08-00537-00101	R0.1	**0.3**	0.15	0.2	0.18	15°	**4**	27.5	35	0.34	0.35	0.36	0.37	0.39
08-00537-00106		**0.4**	0.15	0.2	0.18	15°	**4**	27.4	35	0.44	0.46	0.47	0.48	0.51
08-00537-00102		**0.5**	0.15	0.2	0.18	15°	**4**	27.3	35	0.55	0.56	0.58	0.60	0.64
08-00537-00107		**0.6**	0.15	0.2	0.18	15°	**4**	27.2	35	0.65	0.67	0.69	0.71	0.76
08-00537-00103		**0.75**	0.15	0.2	0.18	15°	**4**	27.1	35	0.81	0.83	0.86	0.89	0.95
08-00537-00104		**0.85**	0.15	0.2	0.18	15°	**4**	27.0	35	0.91	0.94	0.97	1.00	1.07
08-00537-00105		**1**	0.15	0.2	0.18	15°	**4**	26.8	35	1.06	1.10	1.13	1.17	1.26
08-00537-00150	R0.15	**0.5**	0.2	0.3	0.28	15°	**4**	27.5	35	0.55	0.56	0.57	0.59	0.63
08-00537-00151		**0.6**	0.2	0.3	0.28	15°	**4**	27.4	35	0.65	0.67	0.69	0.71	0.75
08-00537-00152		**0.75**	0.2	0.3	0.28	15°	**4**	27.3	35	0.80	0.83	0.85	0.88	0.94
08-00537-00153		**1**	0.2	0.3	0.28	15°	**4**	27.0	35	1.06	1.09	1.13	1.17	1.25
08-00537-00154		**1.25**	0.2	0.3	0.28	15°	**4**	26.8	35	1.32	1.36	1.41	1.45	1.56
08-00537-00155		**1.5**	0.2	0.3	0.28	15°	**4**	26.5	35	1.58	1.63	1.68	1.74	1.87
08-00537-00201	R0.2	**0.5**	0.3	0.4	0.37	15°	**4**	27.7	35	0.56	0.58	0.59	0.60	0.64
08-00537-00207		**0.65**	0.3	0.4	0.37	15°	**4**	27.6	35	0.72	0.74	0.76	0.78	0.83
08-00537-00202		**0.8**	0.3	0.4	0.37	15°	**4**	27.4	35	0.87	0.90	0.92	0.95	1.01

订购方法 How to Order

请指定MRBSH230SF 球头半径(R)×颈长(ℓ1)×柄径(d)。
When you order, indicate MRBSH230SF(R)×(ℓ1)×(d).

※(γ) 为参考值。
※(γ) is reference value.

单位［规格：mm］
Unit [Size : mm]

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.	柄长(ℓ2) Shank Length	全长(L) Overall Length	相对于工件斜度的有效长 Actual effective length depending on inclined angle of workpiece				
										30´	1°	1°30´	2°	3°
08-00537-00203	R0.2	1	0.3	0.4	0.37	15°	4	27.2	35	1.08	1.11	1.14	1.18	1.26
08-00537-00208		1.25	0.3	0.4	0.37	15°	4	27.0	35	1.34	1.38	1.42	1.47	1.57
08-00537-00204		1.5	0.3	0.4	0.37	15°	4	26.7	35	1.60	1.65	1.70	1.75	1.88
08-00537-00209		1.75	0.3	0.4	0.37	15°	4	26.5	35	1.86	1.91	1.98	2.04	2.19
08-00537-00205		2	0.3	0.4	0.37	15°	4	26.2	35	2.11	2.18	2.25	2.33	2.50
08-00537-00210		2.25	0.3	0.4	0.37	15°	4	26.0	35	2.37	2.45	2.53	2.62	2.81
08-00537-00206		2.5	0.3	0.4	0.37	15°	4	25.7	35	2.63	2.72	2.81	2.90	3.13
08-00537-00251	R0.25	0.5	0.35	0.5	0.46	15°	4	27.8	35	0.58	0.59	0.61	0.62	0.65
08-00537-00252		1	0.35	0.5	0.46	15°	4	27.3	35	1.10	1.13	1.16	1.19	1.27
08-00537-00253		1.5	0.35	0.5	0.46	15°	4	26.8	35	1.61	1.66	1.71	1.77	1.89
08-00537-00254		2	0.35	0.5	0.46	15°	4	26.3	35	2.13	2.20	2.27	2.34	2.51
08-00537-00255		2.5	0.35	0.5	0.46	15°	4	25.8	35	2.65	2.73	2.82	2.92	3.14
08-00537-00256		3	0.35	0.5	0.46	15°	4	25.3	35	3.16	3.27	3.38	3.49	3.76
08-00537-00307	R0.3	0.6	0.45	0.6	0.56	15°	4	27.9	35	0.68	0.70	0.71	0.73	0.76
08-00537-00300		1	0.45	0.6	0.56	15°	4	27.5	35	1.10	1.12	1.15	1.19	1.26
08-00537-00301		1.5	0.45	0.6	0.56	15°	4	27.0	35	1.61	1.66	1.71	1.76	1.88
08-00537-00302		2	0.45	0.6	0.56	15°	4	26.5	35	2.13	2.19	2.26	2.34	2.50
08-00537-00303		2.5	0.45	0.6	0.56	15°	4	26.0	35	2.65	2.73	2.82	2.91	3.12
08-00537-00304		3	0.45	0.6	0.56	15°	4	25.5	35	3.16	3.26	3.37	3.49	3.75
08-00537-00305		3.5	0.45	0.6	0.56	15°	4	25.0	35	3.68	3.80	3.92	4.06	4.37
08-00537-00306		4	0.45	0.6	0.56	15°	4	29.5	40	4.20	4.33	4.48	4.64	4.99
08-00537-00401	R0.4	1	0.6	0.8	0.76	15°	4	27.9	35	1.09	1.12	1.14	1.17	1.24
08-00537-00402		2	0.6	0.8	0.76	15°	4	26.9	35	2.13	2.19	2.25	2.32	2.48
08-00537-00403		3	0.6	0.8	0.76	15°	4	25.9	35	3.16	3.26	3.36	3.47	3.72
08-00537-00405		4	0.6	0.8	0.76	15°	4	24.9	35	4.19	4.33	4.47	4.62	4.97
08-00537-00406		5	0.6	0.8	0.76	15°	4	28.9	40	5.23	5.40	5.58	5.77	6.21
08-00537-00507	R0.5	1	0.75	1	0.95	15°	4	28.3	35	1.11	1.13	1.15	1.18	1.24
08-00537-00508		1.5	0.75	1	0.95	15°	4	27.8	35	1.63	1.66	1.71	1.75	1.86
08-00537-00501		2	0.75	1	0.95	15°	4	27.3	35	2.14	2.20	2.26	2.33	2.48
08-00537-00502		2.5	0.75	1	0.95	15°	4	26.8	35	2.66	2.73	2.82	2.90	3.10
08-00537-00503		3	0.75	1	0.95	15°	4	26.3	35	3.18	3.27	3.37	3.48	3.72
08-00537-00504		4	0.75	1	0.95	15°	4	25.3	35	4.21	4.34	4.48	4.63	4.97
08-00537-00505		5	0.75	1	0.95	15°	4	29.3	40	5.24	5.41	5.59	5.78	6.21
08-00537-00506		6	0.75	1	0.95	15°	4	28.3	40	6.28	6.48	6.69	6.93	7.45
08-00537-00602	R0.6	2.4	0.9	1.2	1.15	15°	4	27.2	35	2.55	2.62	2.69	2.77	2.95
08-00537-00603		4	0.9	1.2	1.15	15°	4	25.6	35	4.21	4.33	4.47	4.61	4.94
08-00537-00605		6	0.9	1.2	1.15	15°	4	28.6	40	6.27	6.47	6.68	6.91	7.43
08-00537-00606		8	0.9	1.2	1.15	15°	4	26.6	40	8.34	8.61	8.90	9.21	9.91
08-00537-00751	R0.75	2	1.1	1.5	1.45	15°	4	28.2	35	2.13	2.18	2.23	2.29	2.42
08-00537-00752		3	1.1	1.5	1.45	15°	4	27.2	35	3.17	3.25	3.34	3.44	3.66
08-00537-00753		4	1.1	1.5	1.45	15°	4	26.2	35	4.20	4.32	4.45	4.59	4.91
08-00537-00754		6	1.1	1.5	1.45	15°	4	29.2	40	6.27	6.46	6.67	6.89	7.39
08-00537-00755		8	1.1	1.5	1.45	15°	4	27.2	40	8.34	8.60	8.88	9.19	9.88
08-00537-00756		10	1.1	1.5	1.45	15°	4	25.2	40	10.40	10.74	11.10	11.49	12.36
08-00537-00805	R0.8	8	1.2	1.6	1.55	15°	4	27.4	40	8.33	8.60	8.88	9.18	9.87
08-00537-00901	R0.9	3	1.3	1.8	1.74	15°	4	27.8	35	3.18	3.26	3.35	3.44	3.65
08-00537-00902		4	1.3	1.8	1.74	15°	4	26.8	35	4.22	4.33	4.46	4.59	4.89
08-00537-00903		6	1.3	1.8	1.74	15°	4	29.8	40	6.28	6.47	6.67	6.89	7.38
08-00537-00904		8	1.3	1.8	1.74	15°	4	27.8	40	8.35	8.61	8.89	9.19	9.87
08-00537-00905		10	1.3	1.8	1.74	15°	4	25.8	40	10.42	10.75	11.11	11.49	12.35
08-00537-01006	R1	2	1.5	2	1.94	15°	4	29.1	35	2.14	2.19	2.23	2.28	2.38
08-00537-01000		3	1.5	2	1.94	15°	4	28.1	35	3.18	3.25	3.34	3.43	3.63
08-00537-01001		4	1.5	2	1.94	15°	4	27.1	35	4.21	4.32	4.45	4.58	4.87
08-00537-01002		6	1.5	2	1.94	15°	4	25.1	35	6.28	6.46	6.66	6.88	7.36

MRBSH230SF

无限白金Plus涂层
高硬度钢材高精度加工用 2 刃长颈球头铣刀可对应热缩刀柄的短柄造型

MUGEN COATING PREMIUM Plus 2-Flute Long Neck Ball End Mill with Short Shank for Hardened Steel and High accuracy cutting

单位 [规格：mm]
Unit [Size : mm]

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.	柄长(ℓ2) Shank Length	全长(L) Overall Length	相对于工件斜度的有效长 Actual effective length depending on inclined angle of workpiece				
										30´	1°	1°30´	2°	3°
08-00537-01003	R1	8	1.5	2	1.94	15°	4	28.1	40	8.35	8.60	8.88	9.18	9.84
08-00537-01004		10	1.5	2	1.94	15°	4	26.1	40	10.41	10.74	11.10	11.48	12.33
08-00537-01005		12	1.5	2	1.94	15°	4	29.1	45	12.48	12.88	13.31	13.77	14.82
08-00537-01251	R1.25	4	2.3	2.5	2.4	15°	4	28.0	35	4.28	4.39	4.50	4.62	4.90
08-00537-01252		6	2.3	2.5	2.4	15°	4	26.0	35	6.35	6.53	6.72	6.92	7.39
08-00537-01253		8	2.3	2.5	2.4	15°	4	29.0	40	8.42	8.67	8.93	9.22	9.88
08-00537-01254		10	2.3	2.5	2.4	15°	4	27.0	40	10.48	10.81	11.15	11.52	12.36
08-00537-01256		15	2.3	2.5	2.4	15°	4	27.0	45	15.65	16.15	16.69	17.27	Free
08-00537-01500	R1.5	6	2.5	3	2.85	15°	6	33.1	45	6.44	6.61	6.79	7.00	7.45
08-00537-01501		8	2.5	3	2.85	15°	6	31.1	45	8.50	8.75	9.01	9.29	9.93
08-00537-01502		10	2.5	3	2.85	15°	6	29.1	45	10.57	10.89	11.23	11.59	12.42
08-00537-01503		12	2.5	3	2.85	15°	6	27.1	45	12.64	13.03	13.44	13.89	14.91
08-00537-01504		14	2.5	3	2.85	15°	6	30.1	50	14.71	15.17	15.66	16.19	17.39
08-00537-01505		16	2.5	3	2.85	15°	6	28.1	50	16.77	17.31	17.88	18.49	19.88
08-00537-01507		18	2.5	3	2.85	15°	6	31.1	55	18.84	19.45	20.09	20.79	22.36
08-00537-01506		20	2.5	3	2.85	15°	6	29.1	55	20.91	21.58	22.31	23.09	24.85
08-00537-02000	R2	8	3	4	3.8	15°	6	32.8	45	8.58	8.81	9.06	9.33	9.93
08-00537-02001		10	3	4	3.8	15°	6	30.8	45	10.65	10.95	11.28	11.63	12.42
08-00537-02002		12	3	4	3.8	15°	6	28.8	45	12.72	13.09	13.49	13.93	14.90
08-00537-02004		15	3	4	3.8	15°	6	30.8	50	15.82	16.30	16.82	17.38	18.63
08-00537-02005		20	3	4	3.8	15°	6	30.8	55	20.99	21.65	22.36	23.13	Free
08-00537-02006		25	3	4	3.8	15°	6	30.8	60	26.16	27.00	27.90	28.88	Free
08-00537-02502	R2.5	10	3.5	5	4.8	15°	6	32.7	45	10.63	10.92	11.22	11.55	Free
08-00537-02503		15	3.5	5	4.8	15°	6	27.7	45	15.80	16.27	16.77	Free	Free
08-00537-02504		20	3.5	5	4.8	15°	6	27.7	50	20.97	21.62	Free	Free	Free
08-00537-02505		25	3.5	5	4.8	15°	6	27.7	55	26.14	26.96	Free	Free	Free
08-00537-02506		30	3.5	5	4.8	15°	6	27.7	60	31.31	Free	Free	Free	Free
08-00537-03000	R3	10	6	6	5.7	-	6	34.4	45	Free	Free	Free	Free	Free
08-00537-03001		15	6	6	5.7	-	6	29.4	45	Free	Free	Free	Free	Free
08-00537-03002		20	6	6	5.7	-	6	29.4	50	Free	Free	Free	Free	Free
08-00537-03003		25	6	6	5.7	-	6	29.4	55	Free	Free	Free	Free	Free
08-00537-03004		30	6	6	5.7	-	6	29.4	60	Free	Free	Free	Free	Free
08-00537-03005		35	6	6	5.7	-	6	29.4	65	Free	Free	Free	Free	Free
08-00537-03006		40	6	6	5.7	-	6	29.4	70	Free	Free	Free	Free	Free

订购方法 How to Order

请指定MRBSH230SF 球头半径(R)×颈长(ℓ1)×柄径(d)。
When you order, indicate MRBSH230SF (R)×(ℓ1)×(d).

※(γ) 为参考值。
※(γ) is reference value.

加工材料 Work Material			高硬度钢・高速钢 Hardened Steels/High Speed Steels SKH51・SKD11(～62HRC)				高速钢 High Speed Steels SKH55・HAP40(～66HRC)				高速钢 High Speed Steels SKH57・HAP72(～70HRC)			
球头半径(R) Radius	颈长 Under Neck Length	L(颈长)/D(外径)	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
			a_p mm	a_e mm	mm/min	min^{-1}	a_p mm	a_e mm	mm/min	min^{-1}	a_p mm	a_e mm	mm/min	min^{-1}
R0.05	0.2	2	0.002	0.005	100	40,000	0.002	0.003	70	40,000	0.002	0.003	50	40,000
	0.25	2.5	0.002	0.005	80	40,000	0.002	0.003	50	40,000	0.002	0.003	40	40,000
	0.3	3	0.002	0.005	70	40,000	0.002	0.003	50	40,000	0.002	0.003	40	40,000
	0.4	4	0.001	0.005	70	40,000	0.001	0.003	50	40,000	0.001	0.002	30	40,000
	0.5	5	0.001	0.003	50	40,000	0.001	0.002	30	40,000	0.001	0.002	20	40,000
R0.075	0.25	1.7	0.002	0.005	160	40,000	0.002	0.003	120	40,000	0.002	0.003	100	40,000
	0.3	2	0.002	0.005	150	40,000	0.002	0.003	100	40,000	0.002	0.003	80	40,000
	0.4	2.7	0.002	0.005	120	40,000	0.002	0.003	70	40,000	0.002	0.003	50	40,000
	0.5	3.3	0.002	0.005	120	40,000	0.002	0.003	70	40,000	0.002	0.003	50	40,000
	0.6	4	0.001	0.003	100	40,000	0.001	0.002	50	40,000	0.001	0.002	40	40,000
	0.7	4.7	0.001	0.003	80	40,000	0.001	0.002	40	40,000	0.001	0.002	30	40,000
R0.1	0.3	1.5	0.005	0.005	300	40,000	0.003	0.003	200	40,000	0.003	0.003	150	40,000
	0.4	2	0.005	0.005	290	40,000	0.003	0.003	200	40,000	0.003	0.003	150	40,000
	0.5	2.5	0.005	0.005	280	40,000	0.003	0.003	180	40,000	0.003	0.003	130	40,000
	0.6	3	0.003	0.005	250	40,000	0.002	0.003	160	40,000	0.002	0.003	120	40,000
	0.75	3.75	0.003	0.005	200	40,000	0.002	0.003	150	40,000	0.002	0.003	110	40,000
	0.85	4.3	0.002	0.005	180	40,000	0.001	0.003	130	40,000	0.001	0.002	100	40,000
	1	5	0.002	0.003	160	40,000	0.001	0.002	120	40,000	0.001	0.002	90	40,000
R0.15	0.5	1.7	0.007	0.01	300	40,000	0.003	0.005	280	40,000	0.003	0.005	210	40,000
	0.6	2	0.005	0.007	300	40,000	0.003	0.005	250	40,000	0.003	0.005	180	40,000
	0.75	2.5	0.005	0.007	280	40,000	0.003	0.005	230	40,000	0.003	0.005	170	40,000
	1	3.3	0.005	0.007	250	40,000	0.003	0.005	200	40,000	0.003	0.005	150	40,000
	1.25	4.2	0.003	0.005	200	40,000	0.002	0.003	160	40,000	0.002	0.003	120	40,000
	1.5	5	0.003	0.005	180	40,000	0.002	0.003	120	40,000	0.002	0.003	90	40,000
R0.2	0.5	1.25	0.03	0.03	720	40,000	0.009	0.02	580	40,000	0.009	0.02	420	35,000
	0.65	1.6	0.025	0.03	720	40,000	0.009	0.02	580	40,000	0.009	0.02	420	35,000
	0.8	2	0.02	0.03	720	40,000	0.008	0.02	580	40,000	0.008	0.02	420	35,000
	1	2.5	0.02	0.03	720	40,000	0.008	0.02	580	40,000	0.008	0.02	400	35,000
	1.25	3.1	0.015	0.02	620	40,000	0.006	0.02	470	40,000	0.006	0.02	320	35,000
	1.5	3.75	0.01	0.02	500	40,000	0.005	0.01	400	40,000	0.005	0.01	280	35,000
	1.75	4.4	0.01	0.02	450	40,000	0.005	0.01	340	40,000	0.005	0.01	250	35,000
	2	5	0.007	0.01	380	40,000	0.005	0.007	300	40,000	0.005	0.007	220	35,000
	2.25	5.6	0.005	0.01	330	40,000	0.003	0.005	280	40,000	0.003	0.005	200	35,000
	2.5	6.25	0.005	0.007	300	40,000	0.003	0.005	260	40,000	0.003	0.005	190	35,000
R0.25	0.5	1	0.03	0.04	860	40,000	0.015	0.03	650	40,000	0.015	0.02	450	30,000
	1	2	0.02	0.03	860	40,000	0.01	0.02	650	35,000	0.01	0.02	450	30,000
	1.5	3	0.01	0.03	720	40,000	0.007	0.02	520	35,000	0.007	0.02	350	30,000
	2	4	0.01	0.02	650	40,000	0.007	0.01	400	35,000	0.007	0.01	270	30,000
	2.5	5	0.007	0.01	530	40,000	0.005	0.007	360	35,000	0.005	0.007	240	30,000
	3	6	0.007	0.01	420	35,000	0.005	0.007	320	35,000	0.005	0.007	220	30,000
R0.3	0.6	1	0.03	0.08	1,000	40,000	0.02	0.05	720	35,000	0.02	0.05	540	28,000
	1	1.7	0.03	0.06	1,000	40,000	0.02	0.05	720	30,000	0.02	0.05	540	25,000
	1.5	2.5	0.03	0.06	1,000	40,000	0.02	0.05	720	30,000	0.02	0.05	540	25,000
	2	3.3	0.03	0.06	1,000	40,000	0.02	0.05	720	30,000	0.02	0.05	540	25,000
	2.5	4.1	0.02	0.04	840	40,000	0.02	0.03	640	30,000	0.02	0.03	480	25,000
	3	5	0.02	0.04	840	40,000	0.02	0.03	600	30,000	0.02	0.03	450	25,000
	3.5	5.9	0.01	0.03	600	30,000	0.01	0.02	420	30,000	0.01	0.02	310	25,000
	4	6.7	0.01	0.03	600	30,000	0.01	0.02	420	30,000	0.01	0.02	310	25,000
R0.4	1	1.3	0.08	0.12	1,600	38,000	0.06	0.1	1,200	35,000	0.035	0.1	900	28,000
	2	2.5	0.07	0.1	1,600	35,000	0.05	0.1	1,200	30,000	0.03	0.1	900	25,000
	3	3.75	0.05	0.1	1,600	35,000	0.05	0.05	1,200	30,000	0.03	0.05	900	25,000
	4	5	0.04	0.06	1,200	30,000	0.03	0.05	860	25,000	0.02	0.05	640	20,000
	5	6.25	0.03	0.05	1,000	25,000	0.02	0.03	620	25,000	0.015	0.03	460	20,000

MRBSH230SF

切削参数参考表 Recommended Conditions

加工材料 Work Material			高硬度钢・高速钢 Hardened Steels/High Speed Steels SKH51・SKD11(～62HRC)				高速钢 High Speed Steels SKH55・HAP40(～66HRC)				高速钢 High Speed Steels SKH57・HAP72(～70HRC)			
球头半径(R) Radius	颈长 Under Neck Length	L(颈长)/D(外径)	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
			a_p mm	a_e mm	mm/min	min^{-1}	a_p mm	a_e mm	mm/min	min^{-1}	a_p mm	a_e mm	mm/min	min^{-1}
R0.5	1	1	0.1	0.2	2,000	30,000	0.08	0.12	1,400	25,000	0.05	0.12	1,000	20,000
	1.5	1.5	0.1	0.2	2,000	30,000	0.08	0.12	1,400	25,000	0.05	0.12	1,000	20,000
	2	2	0.1	0.2	2,000	30,000	0.08	0.1	1,400	25,000	0.05	0.1	1,000	20,000
	2.5	2.5	0.1	0.2	2,000	30,000	0.08	0.1	1,400	25,000	0.05	0.1	1,000	20,000
	3	3	0.1	0.2	2,000	30,000	0.08	0.1	1,400	25,000	0.05	0.1	1,000	20,000
	4	4	0.05	0.15	1,600	28,000	0.05	0.1	1,200	25,000	0.03	0.1	900	20,000
	5	5	0.04	0.1	1,400	25,000	0.03	0.05	920	20,000	0.02	0.05	700	16,000
	6	6	0.04	0.05	1,200	22,000	0.02	0.05	740	20,000	0.015	0.05	550	16,000
R0.6	2.4	2	0.1	0.2	2,000	30,000	0.08	0.1	1,600	25,000	0.05	0.1	1,200	20,000
	4	3.3	0.1	0.2	2,000	30,000	0.06	0.1	1,600	25,000	0.05	0.1	1,200	20,000
	6	5	0.05	0.1	1,400	25,000	0.03	0.07	1,000	20,000	0.02	0.07	750	16,000
	8	6.7	0.03	0.07	1,200	22,000	0.02	0.05	850	20,000	0.015	0.05	650	16,000
R0.75	2	1.3	0.1	0.3	2,500	30,000	0.1	0.2	2,000	25,000	0.06	0.2	1,500	20,000
	3	2	0.1	0.3	2,500	30,000	0.1	0.2	2,000	25,000	0.06	0.2	1,500	20,000
	4	2.7	0.1	0.3	2,000	25,000	0.1	0.2	1,600	22,000	0.06	0.2	1,200	18,000
	6	4	0.1	0.2	1,600	22,000	0.1	0.1	1,200	20,000	0.06	0.1	950	16,000
	8	5.3	0.05	0.2	1,400	20,000	0.05	0.1	1,000	18,000	0.03	0.1	700	13,000
	10	6.7	0.05	0.1	1,200	18,000	0.05	0.05	850	16,000	0.03	0.05	650	13,000
R0.8	8	5	0.07	0.2	1,400	20,000	0.05	0.1	1,000	16,000	0.03	0.1	750	13,000
R0.9	3	1.7	0.12	0.3	2,500	25,000	0.1	0.25	2,000	20,000	0.08	0.2	1,500	16,000
	4	2.2	0.12	0.25	2,500	25,000	0.1	0.2	1,800	20,000	0.08	0.2	1,500	16,000
	6	3.3	0.12	0.25	2,500	25,000	0.1	0.2	1,600	18,000	0.08	0.2	1,200	16,000
	8	4.4	0.08	0.2	2,300	23,000	0.08	0.15	1,400	17,000	0.06	0.1	750	13,000
	10	5.6	0.08	0.2	1,700	18,000	0.08	0.12	1,100	14,000	0.03	0.1	750	11,000
R1	2	1	0.2	0.5	2,500	25,000	0.15	0.3	2,000	20,000	0.1	0.3	1,500	16,000
	3	1.5	0.2	0.5	2,500	25,000	0.15	0.3	2,000	20,000	0.1	0.3	1,500	16,000
	4	2	0.2	0.5	2,500	25,000	0.15	0.3	2,000	20,000	0.1	0.3	1,500	16,000
	6	3	0.2	0.3	2,000	22,000	0.15	0.3	1,600	20,000	0.1	0.3	1,200	16,000
	8	4	0.1	0.2	1,600	18,000	0.1	0.15	1,200	16,000	0.06	0.15	950	13,000
	10	5	0.1	0.2	1,400	16,000	0.1	0.1	1,000	14,000	0.06	0.1	750	11,000
	12	6	0.07	0.1	1,200	14,000	0.05	0.1	850	12,000	0.03	0.1	650	9,500
R1.25	4	1.6	0.2	0.5	2,500	20,000	0.15	0.4	2,000	18,000	0.1	0.4	1,500	14,000
	6	2.4	0.2	0.5	2,500	20,000	0.15	0.4	2,000	18,000	0.1	0.4	1,500	14,000
	8	3.2	0.2	0.3	2,100	20,000	0.15	0.3	1,800	18,000	0.1	0.3	1,300	14,000
	10	4	0.15	0.2	1,800	18,000	0.1	0.15	1,500	16,000	0.06	0.15	1,100	13,000
	15	6	0.07	0.15	1,200	14,000	0.05	0.1	900	12,000	0.03	0.1	700	9,500
R1.5	6	2	0.2	0.6	2,500	18,000	0.2	0.5	2,000	15,000	0.12	0.5	1,500	12,000
	8	2.7	0.2	0.6	2,500	18,000	0.2	0.5	2,000	15,000	0.12	0.5	1,500	12,000
	10	3.3	0.2	0.4	2,100	18,000	0.15	0.3	1,800	15,000	0.1	0.3	1,300	12,000
	12	4	0.2	0.4	2,000	18,000	0.1	0.3	1,500	15,000	0.06	0.3	1,100	12,000
	14	4.7	0.1	0.3	1,600	16,000	0.1	0.2	1,200	12,000	0.06	0.2	900	10,000
	16	5.3	0.1	0.3	1,600	16,000	0.1	0.2	1,200	12,000	0.06	0.2	900	10,000
	18	6	0.1	0.2	1,400	16,000	0.1	0.15	960	12,000	0.06	0.15	750	9,500
	20	6.7	0.08	0.2	1,200	14,000	0.08	0.1	850	12,000	0.06	0.1	650	9,500
R2	8	2	0.2	0.8	2,500	15,000	0.2	0.6	2,000	12,000	0.15	0.6	1,500	9,500
	10	2.5	0.2	0.8	2,500	15,000	0.2	0.6	2,000	12,000	0.15	0.6	1,500	9,500
	12	3	0.2	0.8	2,500	15,000	0.2	0.6	2,000	12,000	0.15	0.6	1,500	9,500
	15	3.75	0.2	0.8	2,000	15,000	0.15	0.6	1,600	12,000	0.12	0.6	1,200	9,500
	20	5	0.1	0.6	1,700	14,000	0.1	0.4	1,200	10,000	0.08	0.4	900	8,000
	25	6.25	0.1	0.4	1,200	14,000	0.1	0.2	850	10,000	0.08	0.2	650	8,000
R2.5	10	2	0.2	1.2	2,500	12,000	0.2	0.7	2,000	10,000	0.15	0.7	1,500	8,000
	15	3	0.2	1.2	2,500	12,000	0.2	0.7	2,000	10,000	0.15	0.7	1,500	8,000
	20	4	0.2	1	2,000	10,000	0.15	0.6	1,600	8,500	0.12	0.6	1,200	6,500

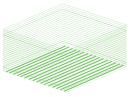
加工材料 Work Material			高硬度钢・高速钢 Hardened Steels/High Speed Steels SKH51・SKD11(～62HRC)				高速钢 High Speed Steels SKH55・HAP40(～66HRC)				高速钢 High Speed Steels SKH57・HAP72(～70HRC)			
球头半径(R) Radius	颈长 Under Neck Length	L(颈长)/D(外径)	切深量 Depth of Cut		进给速度 Feed	主轴转速 Spindle Speed	切深量 Depth of Cut		进给速度 Feed	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}
R2.5	25	5	0.15	0.8	1,800	8,600	0.1	0.3	1,200	7,200	0.08	0.3	1,000	6,500
	30	6	0.15	0.5	1,500	7,600	0.1	0.2	860	6,400	0.08	0.2	750	6,000
R3	10	1.7	0.3	1.2	2,500	8,000	0.2	1	2,000	7,000	0.15	1	1,500	5,500
	15	2.5	0.3	1.2	2,500	8,000	0.2	1	2,000	7,000	0.15	1	1,500	5,500
	20	3.3	0.3	1.2	2,500	8,000	0.2	1	2,000	7,000	0.15	1	1,500	5,500
	25	4.1	0.2	1	2,200	8,000	0.15	0.7	1,600	7,000	0.12	0.7	1,200	5,500
	30	5	0.2	1	1,800	7,000	0.15	0.7	1,300	6,500	0.12	0.7	950	5,000
	35	5.8	0.17	0.8	1,600	6,800	0.12	0.5	1,200	5,800	0.1	0.5	800	4,500
	40	6.7	0.15	0.6	1,200	6,400	0.1	0.4	1,000	5,200	0.08	0.4	650	4,000
备注 Notes			※1 切深量的ap表示轴向切深量，ae表示径向切深量。 ※2 发生振刀等情况时，请根据需要调整切削参数。 ※3 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。 ※4 请以相同的比率调整主轴转速和进给速度。 ※5 刀具的夹持方法建议采用热缩刀柄型。使用弹簧筒夹型等夹持方法时，请确认最小夹持长度。 ※6 建议使用油雾冷却方式。 ※1 Depth of Cut ap indicates Axial Depth of Cut, ae indicates Radial Depth of Cut. ※2 In case of chattering etc., please adjust cutting conditions if necessary. ※3 At point where cutting load is high such as at corners,pay attention to setting cutting conditions and tool paths particularly. ※4 Adjust both spindle speed and feed at the same rate. ※5 A shrink fit type is recommended for tool holder. When using collet type or others,strictly adhere to minimum gripping length. ※6 We recommend using oil mist coolant.											

尺寸精度比较
Comparison of dimensional accuracy

HAP72 (70HRC) : 精加工后的尺寸精度对比
HAP72 (70HRC) : Comparison of dimensional accuracy after finish cutting

使用刀具 Tool : MRBSH230SF R1 × 6
加工内容 : 精加工 1 个方槽
Machining content : Finishing cutting for 1 pocket

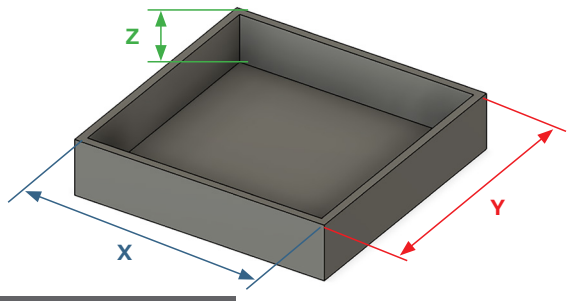
加工时间 Machining time : 32 分钟 / 个 min per pocket
刀路轨迹 Tool path : 等高线精加工（侧面）
Contour line finishing
平行线精加工（底面）
Scanning line finishing



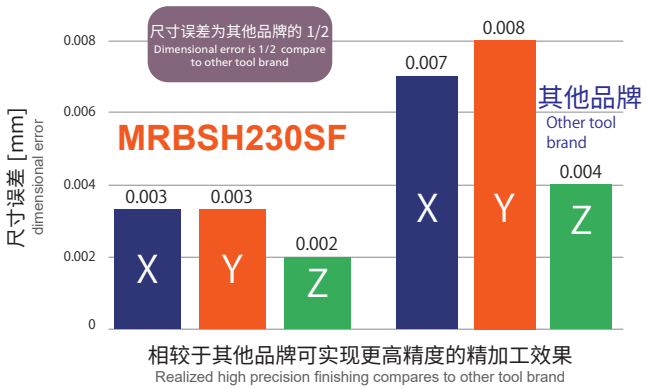
精加工
Finishing

n= 16,000min^{-1} vf= 1,000mm/min ap 0.03 × ae 0.03mm 油雾 Oil Mist

加工形状 Machining shape
方槽内尺寸：30 mm × 30 mm × 加工深度 6 mm
Pocket Size Machining depth



HAP72 (70HRC)



相较于其他品牌可实现更高精度的精加工效果
Realized high precision finishing compares to other tool brand

无限白金Plus涂层
高硬度钢材高效率加工用小径3刃长颈球头铣刀

MUGEN COATING PREMIUM Plus
High Efficient 3-Flute Small-Diameter Long Neck Ball End Mill for Hardened Steel

MRBSH330

R0.1 ～ R3

共 31 种规格
Total 31 sizes





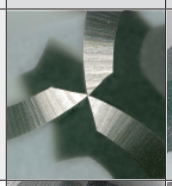
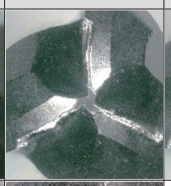
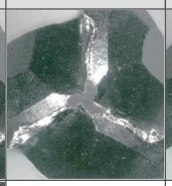
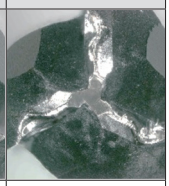
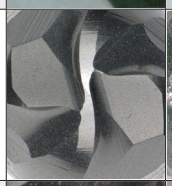
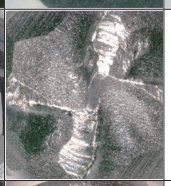
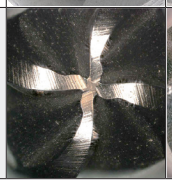
特长
Features

Feature 1 — 延长刀具寿命 Long tool life — 无限白金 Plus 涂层 MUGEN COATING PREMIUM Plus

■与其他公司产品的粗加工比较
Comparison with other tool brand on roughing process

- 刀具尺寸：R1
  Tool size
- 加工材料：HAP40 (64HRC)
  Work Material
- 主轴转速：20,000 min^{-1}
  Spindle speed
- 进给速度：2,400 mm/min
  Feed

切深量 ap 0.23 × ae 0.3 mm 条件下的加工比较
Under the same rate of depth of cut

	使用前 Before use	60 分钟后 After 60min	90 分钟后 After 90min	120 分钟后 After 120min
MRBSH330 R1×6				
其他公司 A Other tool brand A 4刃球头铣刀 R1 4-flute ball end mill				
其他公司 B Other tool brand B 4刃球头铣刀 R1 4-flute ball end mill				

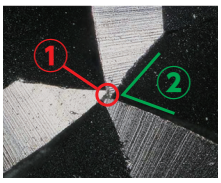
与其他公司同等级的刀具相比，高进给的粗加工也可实现长寿命
Realize long tool life during high speed machining even comparing with the other brand tool

Feature 2

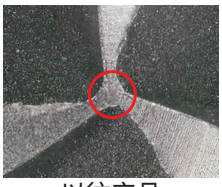
高效率
High efficiency

中心刃形状・不等分割・3刃・排屑性能
Cutting edge shape・Unequal flute spacing・3-Flute・Chip evacuation

2-1
优化中心刃形状减轻切削负荷进而可设定大切深量
Optimized center ball shape reduces cutting load to enable high depth of cut

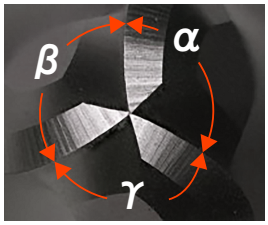


MRBSH330


以往产品
Conventional

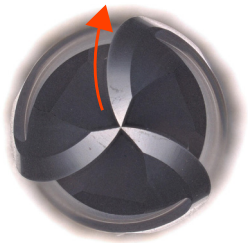
2-2
采用没有影响切屑排除性能的排屑槽形状
Optimized chip pocket design realizes smooth chip removal

2-3
不等分割抑制振刀现象
Unequal flute prevent chattering



$\alpha \neq \beta \neq \gamma$

2-4
加工负荷大的大径刀具
采用强螺旋设计
切断切屑提升排屑性能
(R ≧ 1.5)
Adopting strong spiral gash for the large diameters to reduce cutting load, break up the chips to improve the chip removal ability unequal flute prevent chattering (R ≧ 1.5)




MRBSH330


以往产品
Conventional

■与以往产品加工效率比较
Machining efficiency comparison with conventional product

・加工材料：YXR7 (63HRC)
Work Material
・冷却方式：油雾
Coolant : Oil mist
・工件尺寸：50 × 50 mm
Work size



加工工序 Process	MRBSH330		以往 2 刃球头铣刀 Conventional 2-flute ball end mill	
	菱形槽部 Diamond shape pocket	圆形槽部 Circle shape pocket	菱形槽部 Diamond shape pocket	圆形槽部 Circle shape pocket
刀具尺寸 Tool size	R3 × 20	R1.5 × 10	R3 × 20	R1.5 × 10
主轴转速 (min^{-1}) Spindle speed	7,000	15,000	7,000	15,000
进给速度 (mm/min) Feed	3,000	2,600	2,000	1,800
切深量 (ap × ae mm) Depth of cut	0.25 × 1	0.25 × 0.5	0.2 × 1	0.15 × 0.3
加工时间 Machining time	42 分钟 9 秒 42 min 9 sec	16 分钟 23 秒 16 min 23 sec	73 分钟 11 秒 73 min 11 sec	55 分钟 34 秒 55 min 34 sec

总加工时间 约减少55%!
Total machining time reduced by 55%

MRBSH330

规格
Size R0.1 ～ R3

Plus ≦70 HRC

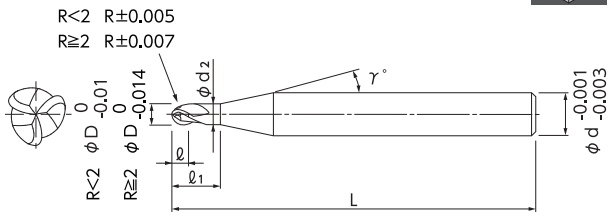
无限白金Plus涂层
高硬度钢材高效率加工用小径3刃长颈球头铣刀
MUGEN COATING PREMIUM Plus High Efficient 3-Flute small-diameter Long Neck Ball End Mill for Hardened Steel

共 31 种规格
Total 31 sizes

提升刀刃刚性和排屑性能，进而实现“高效率”的高精度模具加工
High-efficiency high-precision die machining with improved cutting edge rigidity and chip evacuation

MG | 3 | 30° | R ±0.005 (R<2) | φd -0.001 -0.003 | 3D



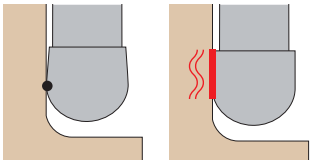


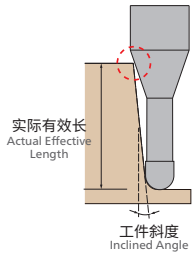
- 优化了中心刃形状，可实现大切深量的高效3刃球头铣刀。
- 对60 ～ 70HRC的高硬度钢材也兼具锋利度和耐磨损性，可实现长寿命、高效率加工。
- 柄径公差为 -0.001mm ~ -0.003mm 的高精度规格。

- High-efficiency 3-flute ball end mill optimizes a shape of central edge and enables high depth of cutting.
- Even hardened steel of 60 to 70HRC can be machining with long tool life and high efficiency.
- Shank diameter tolerance , high accuracy type, is - 0.001mm ～ - 0.003mm.

加工材料 Work Material

高硬度钢 Hardened Steel
60～70HRC
◎





单位 [规格：mm]
Unit [Size : mm]

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	相对于工件斜度的有效长 Actual effective length depending on inclined angle of workpiece				
									30′	1°	1°30′	2°	3°
08-00634-01003	R0.1	0.3	0.15	0.2	0.18	12°	4	45	0.35	0.36	0.38	0.39	0.42
08-00634-01005		0.5	0.15	0.2	0.18	12°	4	45	0.56	0.58	0.61	0.63	0.69
08-00634-01505	R0.15	0.5	0.2	0.3	0.28	12°	4	45	0.56	0.58	0.60	0.62	0.67
08-00634-01506		0.6	0.2	0.3	0.28	12°	4	45	0.66	0.69	0.71	0.74	0.81
08-00634-01507		0.75	0.2	0.3	0.28	12°	4	45	0.82	0.85	0.88	0.92	1.01
08-00634-01510		1	0.2	0.3	0.28	12°	4	45	1.08	1.12	1.17	1.22	1.34
08-00634-02005	R0.2	0.5	0.3	0.4	0.37	12°	4	45	0.58	0.60	0.62	0.64	0.69
08-00634-02008		0.8	0.3	0.4	0.37	12°	4	45	0.89	0.93	0.96	1.00	1.09
08-00634-02010		1	0.3	0.4	0.37	12°	4	45	1.10	1.14	1.19	1.24	1.35
08-00634-02510	R0.25	1	0.35	0.5	0.46	12°	4	45	1.13	1.16	1.21	1.26	1.37
08-00634-02515		1.5	0.35	0.5	0.46	12°	4	45	1.65	1.71	1.78	1.85	2.03
08-00634-03010	R0.3	1	0.45	0.6	0.56	12°	4	45	1.12	1.16	1.20	1.25	1.35
08-00634-03015		1.5	0.45	0.6	0.56	12°	4	45	1.64	1.71	1.77	1.84	2.02
08-00634-03020		2	0.45	0.6	0.56	12°	4	45	2.17	2.25	2.34	2.44	2.68
08-00634-05020	R0.5	2	0.75	1	0.95	12°	4	45	2.18	2.26	2.34	2.43	2.65
08-00634-05025		2.5	0.75	1	0.95	12°	4	45	2.70	2.80	2.91	3.03	3.31
08-00634-05030		3	0.75	1	0.95	12°	4	45	3.22	3.35	3.48	3.63	3.97
08-00634-07503	R0.75	3	1.1	1.5	1.45	12°	4	45	3.21	3.33	3.45	3.58	3.89
08-00634-07504		4	1.1	1.5	1.45	12°	4	45	4.26	4.41	4.59	4.78	5.22
08-00634-10003	R1	3	1.5	2	1.94	12°	4	45	3.23	3.33	3.44	3.56	3.85
08-00634-10004		4	1.5	2	1.94	12°	4	45	4.27	4.42	4.58	4.76	5.17
08-00634-10006		6	1.5	2	1.94	12°	4	45	6.36	6.60	6.86	7.15	7.83
08-00634-15006	R1.5	6	2.5	3	2.85	12°	6	60	6.56	6.78	7.03	7.31	7.95
08-00634-15008		8	2.5	3	2.85	12°	6	60	8.64	8.96	9.31	9.70	10.60
08-00634-15010		10	2.5	3	2.85	12°	6	60	10.73	11.14	11.59	12.09	13.26
08-00634-20008	R2	8	3	4	3.8	12°	6	65	8.74	9.05	9.38	9.74	10.60
08-00634-20010		10	3	4	3.8	12°	6	65	10.83	11.22	11.66	12.14	13.25
08-00634-20012		12	3	4	3.8	12°	6	65	12.91	13.40	13.94	14.53	15.91
08-00634-30010	R3	10	6	6	5.7	-	6	65	Free	Free	Free	Free	Free
08-00634-30015		15	6	6	5.7	-	6	65	Free	Free	Free	Free	Free
08-00634-30020		20	6	6	5.7	-	6	65	Free	Free	Free	Free	Free

订购方式 How to Order

请指定 MRBSH330 球头半径(R)×颈长(ℓ1)。
When you order, indicate MRBSH330(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·高速钢 Hardened Steels/High Speed Steels SKH51·SKD11（～62HRC）				高速钢 High Speed Steels SKH55·HAP40（～66HRC）				高速钢 High Speed Steels SKH57·HAP72（～70HRC）			
R球头半径 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
			a_p mm	a_e mm	mm/min	min^{-1}	a_p mm	a_e mm	mm/min	min^{-1}	a_p mm	a_e mm	mm/min	min^{-1}
R0.1	0.3	1.5	0.006	0.007	450	40,000	0.004	0.005	300	40,000	0.004	0.005	220	40,000
	0.5	2.5	0.006	0.007	400	40,000	0.004	0.005	250	40,000	0.004	0.005	190	40,000
R0.15	0.5	1.7	0.01	0.01	450	40,000	0.005	0.005	400	40,000	0.005	0.005	300	40,000
	0.6	2	0.007	0.007	450	40,000	0.005	0.005	350	40,000	0.005	0.005	270	40,000
	0.75	2.5	0.007	0.007	400	40,000	0.005	0.005	350	40,000	0.005	0.005	250	40,000
	1	3.3	0.007	0.007	350	40,000	0.005	0.005	300	40,000	0.005	0.005	220	40,000
R0.2	0.5	1.25	0.035	0.04	1,100	40,000	0.013	0.02	850	40,000	0.013	0.02	650	35,000
	0.8	2	0.03	0.03	1,000	40,000	0.012	0.02	850	40,000	0.012	0.02	600	35,000
	1	2.5	0.03	0.03	1,000	40,000	0.012	0.02	850	40,000	0.012	0.02	600	35,000
R0.25	1	2	0.03	0.03	1,300	40,000	0.015	0.02	1,000	35,000	0.015	0.02	700	30,000
	1.5	3	0.015	0.03	1,000	40,000	0.01	0.02	800	35,000	0.01	0.02	500	30,000
R0.3	1	1.7	0.045	0.06	1,500	40,000	0.03	0.05	1,100	30,000	0.03	0.05	800	25,000
	1.5	2.5	0.045	0.06	1,500	40,000	0.03	0.05	1,100	30,000	0.03	0.05	800	25,000
	2	3.3	0.045	0.06	1,500	40,000	0.03	0.05	1,100	30,000	0.03	0.05	800	25,000
R0.5	2	2	0.15	0.2	3,000	30,000	0.12	0.1	2,000	25,000	0.075	0.1	1,500	20,000
	2.5	2.5	0.15	0.2	3,000	30,000	0.12	0.1	2,000	25,000	0.075	0.1	1,500	20,000
	3	3	0.15	0.2	3,000	30,000	0.12	0.1	2,000	25,000	0.075	0.1	1,500	20,000
R0.75	3	2	0.15	0.3	3,800	30,000	0.15	0.2	3,000	25,000	0.09	0.2	2,200	20,000
	4	2.7	0.15	0.3	3,000	25,000	0.15	0.2	2,400	22,000	0.09	0.2	1,800	18,000
R1	3	1.5	0.3	0.5	3,800	25,000	0.22	0.3	3,000	20,000	0.15	0.3	2,200	16,000
	4	2	0.3	0.5	3,800	25,000	0.22	0.3	3,000	20,000	0.15	0.3	2,200	16,000
	6	3	0.3	0.3	3,000	22,000	0.22	0.3	2,400	20,000	0.15	0.3	1,800	16,000
R1.5	6	2	0.3	0.6	3,800	18,000	0.25	0.5	3,000	15,000	0.15	0.5	2,250	12,000
	8	2.7	0.3	0.6	3,800	18,000	0.25	0.5	3,000	15,000	0.15	0.5	2,250	12,000
	10	3.3	0.3	0.6	3,200	18,000	0.25	0.5	2,600	15,000	0.15	0.5	2,000	12,000
R2	8	2	0.3	0.8	3,800	15,000	0.25	0.6	3,000	12,000	0.18	0.6	2,250	9,500
	10	2.5	0.3	0.8	3,800	15,000	0.25	0.6	3,000	12,000	0.18	0.6	2,250	9,500
	12	3	0.3	0.8	3,800	15,000	0.25	0.6	3,000	12,000	0.18	0.6	2,250	9,500
R3	10	1.7	0.38	1.2	3,800	8,000	0.25	1	3,000	7,000	0.18	1	2,250	5,500
	15	2.5	0.38	1.2	3,800	8,000	0.25	1	3,000	7,000	0.18	1	2,250	5,500
	20	3.3	0.38	1.2	3,800	8,000	0.25	1	3,000	7,000	0.18	1	2,250	5,500

备 注 Notes

※1 切深量的ap表示为轴向切深量，ae表示步距量。
※2 请根据机床刚性和工件的夹持状态等调整切削参数。
※3 发生振刀等情况时，请根据需要调整切深参数。
※4 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。
※5 加工过程中的机械振动较大时，请根据需要调整进给速度。
※6 排除不良可能会导致刀具崩刃的和折损，敬请注意。
※7 请以相同的比率调整主轴转速和进给速度。
※8 请尽量缩短刀具的伸出量。
※9 建议使用油雾冷却方式。

※1 Depth of Cut：ap = Axial Depth of Cut / ae = Radial Depth of Cut.
※2 Adjust milling condition according to machine rigidity and clamp condition of work material.
※3 In case of chattering etc., please adjust cutting conditions if necessary.
※4 At point where cutting load is high such as at corners, pay attention to setting cutting conditions and tool paths particularly.
※5 If machine tool vibration is high during machining, adjust the feed rate as necessary.
※6 Attention to a risk of chipping and breakage when insufficient chip flow.
※7 Adjust both spindle speed and feed at the same rate.
※8 Overhang of end mill should be as short as possible from spindle nose.
※9 We recommend using oil mist coolant.

MHDSH445R New

规格 Size φ 1 × R0.1 ～ φ 4 × R0.5

Plus ≦70 HRC

无限白金Plus涂层
高硬度钢材加工用4刃圆鼻铣刀
MUGEN COATING PREMIUM Plus 4-Flute Corner Radius End Mill for Hardened Steel

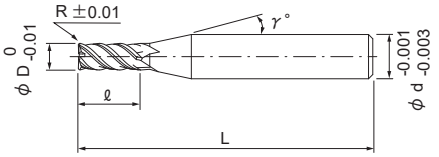
共 15 种规格
Total 15 sizes

适用于冲压模具与锻造模具等高达 70HRC 的高硬度钢加工
采用高刚性多刃造型与强螺旋角设计，最适合加工高速钢等难切削材料
Suitable for machining hardened steels up to 70HRC, such as press dies and forging dies
Adopt multi-flute design with high rigidity and strong helix angle to realize machining on tough materials, such as high speed steel

MG | 4 | 45° | φd −0.001 −0.003
Side | Slot | Face







- 采用 4 刃设计，提供刃长为 2D、3D 的造型（D ≧ 3）。
- 采用无限白金Plus涂层，即使在 70HRC 的高硬度钢加工中也能实现长寿命。
- 通过提升刚性的多刃设计，改善加工精度。
- 柄径公差为 -0.001mm~-0.003mm 的高精度规格。
- 4-flute is lineup of length of cut expands 2D and 3D (D ≧ 3).
- MUGEN COATING PREMIUM Plus realizes long tool life even for hardened steel up to 70HRC.
- Improved machining accuracy with high rigidity multi-flute design.
- Shank diameter tolerance, high accuracy type, is - 0.001mm ～ - 0.003mm.

加工材料 Work Material

高硬度钢 Hardened Steel	H
60～70HRC	
◎	

◆ 2026年3月发布 ※Release in Mar, 2026.

单位 [规格：mm]
Unit [Size : mm]

产品代码 Code No.	外径(D) Dia.	角半径(R) Corner Radius	刃长(ℓ) Length of Cut	颈角(γ) Neck Taper Angle	柄径 (d) Shank Dia.	全长(L) Overall Length
◆ 08-00439-10012	**1**	**R0.1**	**2**	12°	6	60
◆ 08-00439-15012	**1.5**	**R0.1**	**3**	12°	6	60
◆ 08-00439-20012	**2**	**R0.1**	**4**	12°	6	60
◆ 08-00439-30022	**3**	**R0.2**	**6**	12°	6	60
◆ 08-00439-30023			**9**	12°	6	60
◆ 08-00439-30032		**R0.3**	**6**	12°	6	60
◆ 08-00439-30033			**9**	12°	6	60
◆ 08-00439-30052		**R0.5**	**6**	12°	6	60
◆ 08-00439-30053			**9**	12°	6	60
◆ 08-00439-40022	**4**	**R0.2**	**8**	12°	6	60
◆ 08-00439-40023			**12**	12°	6	60
◆ 08-00439-40032		**R0.3**	**8**	12°	6	60
◆ 08-00439-40033			**12**	12°	6	60
◆ 08-00439-40052		**R0.5**	**8**	12°	6	60
◆ 08-00439-40053			**12**	12°	6	60

订购方法 How to Order
请指定MHDSH445R 外径(D)×角半径(R)× 刃长(ℓ)。
When you order, indicate MHDSH445R (D)×(R)×(ℓ).

※(γ)为参考值。
※ (γ) is reference value.

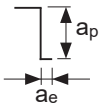
切削参数参考表 Recommended Milling Conditions

加工材料 Work Material			高硬度钢·高速钢 Hardened Steels/High Speed Steels SKD11·SKH51（～62HRC）							
			侧面加工 Side milling				沟槽加工 Slotting			
外径 Dia.	角半径 Corner Radius	刃长 Length of Cut	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
			min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
1	R0.1	2	22,000	500	1.5	0.02	18,000	300	0.01	-
1.5	R0.1	3	15,000	560	2.25	0.03	12,000	380	0.015	-
2	R0.1	4	11,000	630	3	0.04	10,000	420	0.02	-
3	R0.2	6	7,500	700	4.5	0.06	7,200	500	0.03	-
		9	7,100	600	4.5	0.06	6,800	320	0.03	-
	R0.3	6	7,500	700	4.5	0.06	7,200	500	0.03	-
		9	7,100	600	4.5	0.06	6,800	320	0.03	-
	R0.5	6	7,500	700	4.5	0.06	7,200	500	0.03	-
		9	7,100	600	4.5	0.06	6,800	320	0.03	-
4	R0.2	8	6,300	800	6	0.08	5,800	540	0.04	-
		12	6,000	700	6	0.08	5,400	360	0.04	-
	R0.3	8	6,300	800	6	0.08	5,800	540	0.04	-
		12	6,000	700	6	0.08	5,400	360	0.04	-
	R0.5	8	6,300	800	6	0.08	5,800	540	0.04	-
		12	6,000	700	6	0.08	5,400	360	0.04	-

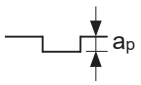
加工材料 Work Material			高速钢 High Speed Steels SKH55·HAP40（～66HRC）							
			侧面加工 Side milling				沟槽加工 Slotting			
外径 Dia.	角半径 Corner Radius	刃长 Length of Cut	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
			min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
1	R0.1	2	20,000	240	1.5	0.02	15,000	120	0.01	-
1.5	R0.1	3	13,000	330	2.25	0.03	10,000	160	0.015	-
2	R0.1	4	10,000	480	3	0.04	8,000	240	0.02	-
3	R0.2	6	6,800	560	4.5	0.06	5,900	280	0.03	-
		9	6,100	480	4.5	0.06	5,500	140	0.03	-
	R0.3	6	6,800	560	4.5	0.06	5,900	280	0.03	-
		9	6,100	480	4.5	0.06	5,500	140	0.03	-
	R0.5	6	6,800	560	4.5	0.06	5,900	280	0.03	-
		9	6,100	480	4.5	0.06	5,500	140	0.03	-
4	R0.2	8	5,700	600	6	0.08	4,900	300	0.04	-
		12	5,300	560	6	0.08	4,700	160	0.04	-
	R0.3	8	5,700	600	6	0.08	4,900	300	0.04	-
		12	5,300	560	6	0.08	4,700	160	0.04	-
	R0.5	8	5,700	600	6	0.08	4,900	300	0.04	-
		12	5,300	560	6	0.08	4,700	160	0.04	-

备 注 Notes

侧面加工 Side Milling



沟槽加工 Slotting



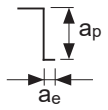
※1 建议使用铣刀刀柄，并尽可能选用刚性较高的机械设备。
※2 请尽量缩短刀具的伸出量。
※3 请根据机床刚性和工件的夹持状态等调整切削参数。
此外，在实际加工时，请依据加工形状、加工目的及所使用的机械等条件进行调整。
※4 请以相同比率提升主轴转速和进给速度。
※5 建议使用油雾冷却方式。

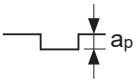
※1 Use a rigid and precise machine and chuck holder.
※2 Overhang of end mill should be as short as possible from spindle nose.
※3 Adjust milling condition conforming with machine rigidity and clamping condition. Final milling conditions are subject to machining profile, purpose and machine status.
※4 Adjust both spindle speed and feed at the same rate.
※5 We recommend using oil mist coolant.

MHDSH445R New

切削参数参考表 Recommended Milling Conditions

加工材料 Work Material			高速钢 High Speed Steels SKH57·HAP72(～70HRC)							
			侧面加工 Side milling				沟槽加工 Slotting			
外径 Dia.	角半径 Corner Radius	刃长 Length of Cut	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
			min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
1	R0.1	2	15,000	160	1.5	0.02	14,000	100	0.01	-
1.5	R0.1	3	10,000	240	2.25	0.03	8,000	120	0.015	-
2	R0.1	4	8,000	320	3	0.04	7,000	160	0.02	-
3	R0.2	6	5,600	400	4.5	0.06	5,000	180	0.03	-
		9	5,000	320	4.5	0.06	4,500	100	0.03	-
	R0.3	6	5,600	400	4.5	0.06	5,000	180	0.03	-
		9	5,000	320	4.5	0.06	4,500	100	0.03	-
	R0.5	6	5,600	400	4.5	0.06	5,000	180	0.03	-
		9	5,000	320	4.5	0.06	4,500	100	0.03	-
4	R0.2	8	4,900	400	6	0.08	4,500	180	0.04	-
		12	4,500	320	6	0.08	4,000	100	0.04	-
	R0.3	8	4,900	400	6	0.08	4,500	180	0.04	-
		12	4,500	320	6	0.08	4,000	100	0.04	-
	R0.5	8	4,900	400	6	0.08	4,500	180	0.04	-
		12	4,500	320	6	0.08	4,000	100	0.04	-





备 注 Notes

※1 建议使用铣刀刀柄，并尽可能选用刚性较高的机械设备。
※2 请尽量缩短刀具的伸出量。
※3 请根据机床刚性和工件的夹持状态等调整切削参数。
此外，在实际加工时，请依据加工形状、加工目的及所使用的机械等条件进行调整。
※4 请以相同比率提升主轴转速和进给速度。
※5 建议使用油雾冷却方式。

※1 Use a rigid and precise machine and chuck holder.
※2 Overhang of end mill should be as short as possible from spindle nose.
※3 Adjust milling condition conforming with machine rigidity and clamping condition. Final milling conditions are subject to machining profile, purpose and machine status.
※4 Adjust both spindle speed and feed at the same rate.
※5 We recommend using oil mist coolant.

MHDSH645R New

规格 Size φ 5 × R0.2 ～ φ 6 × R1

Plus ≦70 HRC

无限白金Plus涂层
高硬度钢材加工用6刃圆鼻铣刀
MUGEN COATING PREMIUM Plus 6-Flute Corner Radius End Mill for Hardened Steel

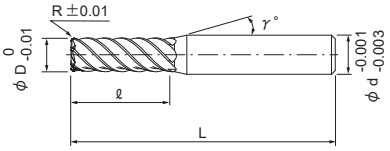
共 14 种规格
Total 14 sizes

适用于冲压模具与锻造模具等高达 70HRC 的高硬度钢加工
采用高刚性多刃造型与强螺旋角设计，最适合加工高速钢等难切削材料
Suitable for machining hardened steels up to 70HRC, such as press dies and forging dies
Adopt multi-flute design with high rigidity and strong helix angle to realize machining on tough materials, such as high speed steel

MG | 6 | 45° | φd -0.001 -0.003
Side | Slot | Face







- 采用 6 刃设计，提供刃长为 2D、3D 的造型（D ≧ 3）。
- 采用无限白金Plus涂层，即使在 70HRC 的高硬度钢加工中也能实现长寿命。
- 通过提升刚性的多刃设计，改善加工精度。
- 柄径公差为 -0.001mm~-0.003mm 的高精度规格。
- 6-flute is lineup of length of cut expands 2D and 3D.
- MUGEN COATING PREMIUM Plus realizes long tool life even for hardened steel up to 70HRC.
- Improved machining accuracy with high rigidity multi-flute design.
- Shank diameter tolerance, high accuracy type, is - 0.001mm ～ - 0.003mm.

加工材料 Work Material

高硬度钢 Hardened Steel	H
60～70HRC	
◎	

◆ 2026年3月发布 ※Release in Mar, 2026.

单位 [规格：mm]
Unit [Size : mm]

产品代码 Code No.	外径(D) Dia.	角半径(R) Corner Radius	刃长(ℓ) Length of Cut	颈角(γ) Neck Taper Angle	柄径 (d) Shank Dia.	全长(L) Overall Length
◆ 08-00440-50022	5	R0.2	10	12°	6	60
◆ 08-00440-50023			15	12°	6	65
◆ 08-00440-50032		R0.3	10	12°	6	60
◆ 08-00440-50033			15	12°	6	65
◆ 08-00440-50052		R0.5	10	12°	6	60
◆ 08-00440-50053			15	12°	6	65
◆ 08-00440-60022	6	R0.2	12	-	6	60
◆ 08-00440-60023			18	-	6	65
◆ 08-00440-60032		R0.3	12	-	6	60
◆ 08-00440-60033			18	-	6	65
◆ 08-00440-60052		R0.5	12	-	6	60
◆ 08-00440-60053			18	-	6	65
◆ 08-00440-60102		R1	12	-	6	60
◆ 08-00440-60103			18	-	6	65

订购方法 How to Order

请指定MHDSH645R 外径(D)×角半径(R)× 刃长（ℓ）。
When you order, indicate MHDSH645R (D)×(R)×(ℓ).

※（γ）为参考值。
※ (γ) is reference value.

MHDSH645R New

切削参数参考表 Recommended Milling Conditions

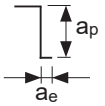
加工材料 Work Material			高硬度钢·高速钢 Hardened Steels/High Speed Steels SKD11·SKH51（～62HRC）							
			侧面加工 Side milling				沟槽加工 Slotting			
外径 Dia.	角半径 Corner Radius	刃长 Length of Cut	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
			min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
5	R0.2	10	5,600	1,200	7.5	0.1	5,400	600	0.05	-
		15	5,200	1,000	7.5	0.1	4,700	400	0.05	-
	R0.3	10	5,600	1,200	7.5	0.1	5,400	600	0.05	-
		15	5,200	1,000	7.5	0.1	4,700	400	0.05	-
	R0.5	10	5,600	1,200	7.5	0.1	5,400	600	0.05	-
		15	5,200	1,000	7.5	0.1	4,700	400	0.05	-
6	R0.2	12	4,800	1,200	9	0.12	4,600	600	0.06	-
		18	4,500	1,000	9	0.12	4,000	400	0.06	-
	R0.3	12	4,800	1,200	9	0.12	4,600	600	0.06	-
		18	4,500	1,000	9	0.12	4,000	400	0.06	-
	R0.5	12	4,800	1,200	9	0.12	4,600	600	0.06	-
		18	4,500	1,000	9	0.12	4,000	400	0.06	-
	R1	12	4,800	1,200	9	0.12	4,600	600	0.06	-
		18	4,500	1,000	9	0.12	4,000	400	0.06	-

加工材料 Work Material			高速钢 High Speed Steels SKH55·HAP40（～66HRC）							
			侧面加工 Side milling				沟槽加工 Slotting			
外径 Dia.	角半径 Corner Radius	刃长 Length of Cut	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
			min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
5	R0.2	10	5,100	800	7.5	0.1	4,700	350	0.05	-
		15	4,600	600	7.5	0.1	4,100	200	0.05	-
	R0.3	10	5,100	800	7.5	0.1	4,700	350	0.05	-
		15	4,600	600	7.5	0.1	4,100	200	0.05	-
	R0.5	10	5,100	800	7.5	0.1	4,700	350	0.05	-
		15	4,600	600	7.5	0.1	4,100	200	0.05	-
6	R0.2	12	4,400	800	9	0.12	4,100	350	0.06	-
		18	4,000	600	9	0.12	3,500	200	0.06	-
	R0.3	12	4,400	800	9	0.12	4,100	350	0.06	-
		18	4,000	600	9	0.12	3,500	200	0.06	-
	R0.5	12	4,400	800	9	0.12	4,100	350	0.06	-
		18	4,000	600	9	0.12	3,500	200	0.06	-
	R1	12	4,400	800	9	0.12	4,100	350	0.06	-
		18	4,000	600	9	0.12	3,500	200	0.06	-

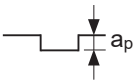
切削参数参考表 Recommended Milling Conditions

加工材料 Work Material			高速钢 High Speed Steels SKH57·HAP72(～70HRC)							
			侧面加工 Side milling				沟槽加工 Slotting			
外径 Dia.	角半径 Corner Radius	刃长 Length of Cut	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
			min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
5	R0.2	10	4,500	560	7.5	0.1	4,000	200	0.05	-
		15	4,100	480	7.5	0.1	3,600	120	0.05	-
	R0.3	10	4,500	560	7.5	0.1	4,000	200	0.05	-
		15	4,100	480	7.5	0.1	3,600	120	0.05	-
	R0.5	10	4,500	560	7.5	0.1	4,000	200	0.05	-
		15	4,100	480	7.5	0.1	3,600	120	0.05	-
6	R0.2	12	3,900	560	9	0.12	3,600	200	0.06	-
		18	3,500	480	9	0.12	3,200	120	0.06	-
	R0.3	12	3,900	560	9	0.12	3,600	200	0.06	-
		18	3,500	480	9	0.12	3,200	120	0.06	-
	R0.5	12	3,900	560	9	0.12	3,600	200	0.06	-
		18	3,500	480	9	0.12	3,200	120	0.06	-
	R1	12	3,900	560	9	0.12	3,600	200	0.06	-
		18	3,500	480	9	0.12	3,200	120	0.06	-

侧面加工 Side Milling



沟槽加工 Slotting



备 注 Notes

※1 建议使用铣刀刀柄，并尽可能选用刚性较高的机械设备。
※2 请尽量缩短刀具的伸出量。
※3 请根据机床刚性和工件的夹持状态等调整切削参数。
此外，在实际加工时，请依据加工形状、加工目的及所使用的机械等条件进行调整。
※4 请以相同比率提升主轴转速和进给速度。
※5 建议使用油雾冷却方式。

※1 Use a rigid and precise machine and chuck holder.
※2 Overhang of end mill should be as short as possible from spindle nose.
※3 Adjust milling condition conforming with machine rigidity and clamping condition. Final milling conditions are subject to machining profile, purpose and machine status.
※4 Adjust both spindle speed and feed at the same rate.
※5 We recommend using oil mist coolant.

通过能提升表面粗糙度的刀刃形状与高精度R角，改善针对高硬度钢的精加工精度

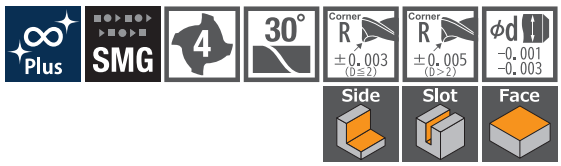
Specialized cutting edge and high precision corner R enhance finishing accuracy on hardened steels

无限白金Plus涂层
高硬度钢 高精度加工用 4刃长颈圆鼻刀
可对应热缩刀柄的短柄造型

MUGEN COATING PREMIUM Plus
4-Flute Long Neck Corner Radius End Mill with short shank for Hardened Steel and High accuracy cutting

MHRSH430RSF

增加规格
Size Expansion



φ 0.1 × R0.01 ～ φ 6 × R1

共 269 种规格
Total 269 sizes



特长
Features

Feature 1

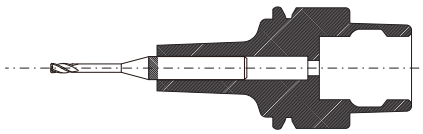
提升加工面品质与精度
Excellent accuracy and surface roughness

短刀柄设计，实现最适突出量、高精度 R 角与修光刃
Optimal overhung length by short shank　High accuracy corner R and wiper

MHRSH430RSF

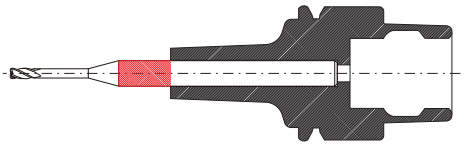
可缩短刀具突出长度，实现高刚性状态下的稳定加工
Possible to machining with high rigidity, with short tool overhung

短柄刀具
Short shank

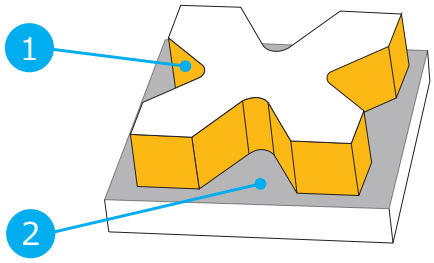


一般刀柄长度
Normal shank length

刀具突出长度较长，刚性较低的状态
Tool overhung length is long, and tool rigidity is low



加工60分钟后的面粗度与刀具磨耗状态
Surface roughness and wear after 60 mins machining



使用刀具 Tool	MHRSH430RSF φ2×R0.2×6
加工材料 Work material	HAP40 (64HRC)
主轴转速 Spindle speed	12,000 min^{-1}
进给速度 Feed	1,000 mm/min
切深量 Depth of cut	ap 0.02×ae 0.05 mm

面粗度 Surface roughness

1 0°直壁面 Wall



Ra 0.052μm

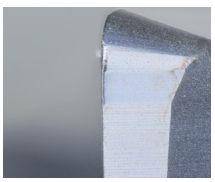
2 平面 Bottom



Ra 0.010μm

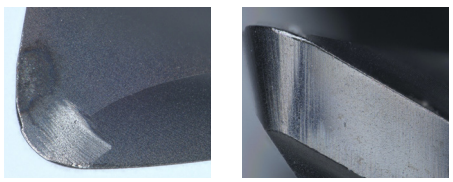
刀具磨耗 Tool wear

底刃 End tooth



后刀面磨耗宽度
Frank wear width
0.023mm

R角部 Corner R



R后退量
R retreat amount
0.003mm

追求加工精度与表面粗糙度的圆鼻铣刀
Corner radius end mill to pursue accuracy and surface roughness

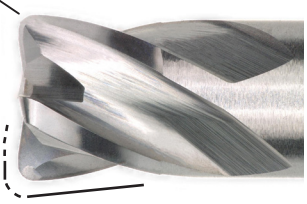


＜底刃形状＞无中心刃
End tooth profile no center tooth
φ 0.1 × R0.01 ～φ 2 × R0.5



＜底刃形状＞有中心刃
End tooth profile with center tooth
φ 3 × R0.05 ～φ 6 × R1

高精度R角造型
High accuracy corner R

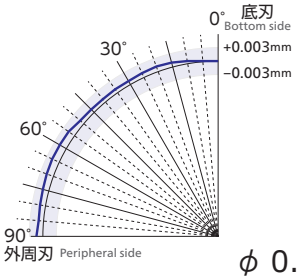


修光刃造型
Wiper

强倒锥造型
Strong back taper

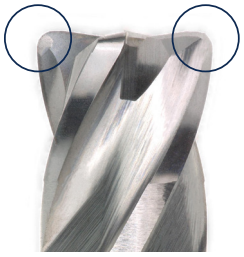
可提升侧面加工的表面粗糙度与加工精度

高精度R角与无段差设计
Enhances surface roughness and accuracy on side machining
High accuracy corner R and Seamless

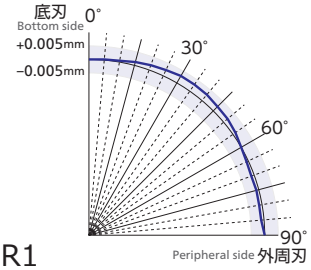




φ 0.1 × R0.01 ～φ 2 × R0.5
R 角精度 ±0.003 mm
Corner Radius



φ 3 × R0.05 ～φ 6 × R1
R 角精度 ±0.005 mm
Corner Radius

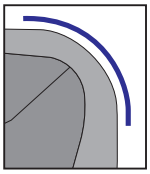


从底刃到外周刃采用无段差造型的刃口设计不仅可提升R角本身的精度更能提高加工面的品质 (D≧φ0.4)

Corner R and peripheral cutting edge are seamlessly connected, and the smooth cutting edge improves the surface roughness on side machining

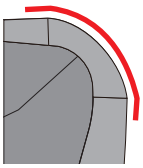
MHRSH430RSF

无段差设计
Seamless



无段差
Seamless

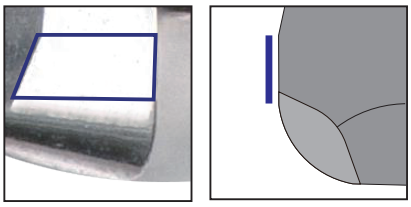
一般的R角造型
General Corner Radius



有段差
Seam

可提升平面加工的表面粗糙度

修光刃造型
Improves surface roughness on bottom by wiper
(D≧φ0.4)

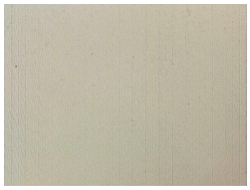
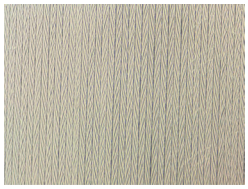
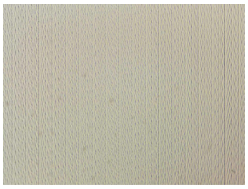


底刃采用修光刃造型，可提升平面加工时的表面粗糙度品质

By adopting wiper at the end tooth, improves the surface roughness on bottom surface machining

平面加工后的表面粗糙度比较
Surface roughness comparison after bottom surface finishing

加工材料
Work material
HAP40 (64HRC)
刀具尺寸
Tool size
φ2×R0.2×6
拍摄倍率400倍
Magnification rate

MHRSH430RSF	现有产品 Conventional	其他品牌A Other tool brand A	其他品牌B Other tool brand B
			
Ra 0.010μm	Ra 0.028μm	Ra 0.029μm	Ra 0.026μm

MHRSH430RSF

增加规格 Size Expansion

规格 Size φ0.1×R0.01 ～ φ6×R1

Plus ≦70 HRC

无限白金Plus涂层
高硬度钢材高精度加工用4刃长颈圆鼻铣刀可对应热缩刀柄的短柄造型

MUGEN COATING PREMIUM Plus 4-Flute Long Neck Corner Radius End Mill with Short Shank for Hardened Steel and High Accuracy Cutting

共 269 种规格
Total 269 sizes

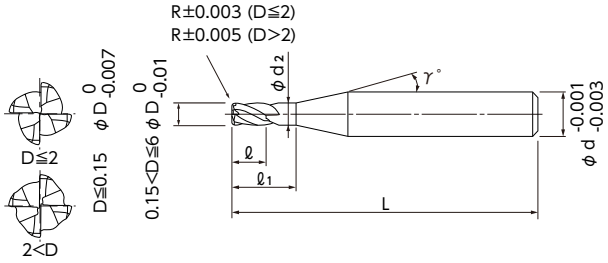
通过能提升表面粗糙度的刀刃形状与高精度R角，改善针对高硬度钢的精加工精度

Specialized cutting edge and high precision corner R enhance finishing accuracy on hardened steels

SMG | 4 | 30° | Corner R ±0.003 (D≦2) | Corner R ±0.005 (D>2) | φd -0.001 -0.003

Side | Slot | Face



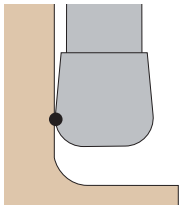


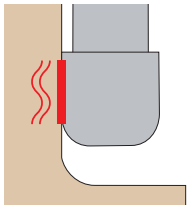
- 采用适用于高硬度钢的无限白金 Plus 涂层与强倒锥造型设计，有效抑制加工振动，实现长寿命与稳定的高品质精加工表面。
- 可实现高效率加工的 4 刃造型。
- 4 刃刀具最小径从 φ0.1 ～ φ6，共 269 种规格。
- 柄径公差为 -0.001mm~-0.003mm 的高精度规格。
- MUGEN COATING PREMIUM Plus for hardened steels with strong back taper reduce chattering to realize long tool life and excellent finishing surface.
- 4-flute end mill for high efficiency machining.
- 4-flute end mill has 269 sizes in total that lineup from the smallest diameter φ 0.1 to φ 6.
- Shank diameter tolerance, high accuracy type, is - 0.001mm ～ - 0.003mm.

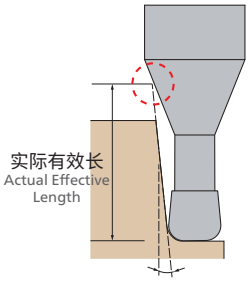
φ0.1 ～ φ2 的底刃在中心位置无切削刃，请注意可能产生的切削残料。
Please be aware of stock since φ0.1-φ2 sizes have no center cutting edge.

加工材料 Work Material

高硬度钢 Hardened Steel	H
60～70HRC	
◎	


单点切削，不易振刀！
No chattering


普通铣刀
General End Mill



◆ 2025年12月发布 ※Release in Dec, 2025.

单位 [规格：mm]
Unit [Size : mm]

产品代码 Code No.	外径(D) Dia.	角半径(R) Corner Radius	颈长(ℓ1) Under Neck Length	刃长(ℓ) Length of Cut	颈径(d2) Neck Dia.	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length	相对于工件斜度的有效长 Actual effective length depending on inclined angle of workpiece				
									30′	1°	1°30′	2°	3°
08-00239-01002	0.1	R0.01	0.2	0.08	0.085	15°	4	35	0.23	0.24	0.25	0.26	0.28
◆ 08-00239-01001			0.25	0.08	0.085	15°	4	35	0.28	0.29	0.3	0.31	0.34
08-00239-01003			0.3	0.08	0.085	15°	4	35	0.33	0.35	0.36	0.37	0.4
◆ 08-00239-01004			0.4	0.08	0.085	15°	4	35	0.44	0.45	0.47	0.49	0.52
◆ 08-00239-01005			0.5	0.08	0.085	15°	4	35	0.54	0.56	0.58	0.6	0.65
08-00239-01503	0.15	R0.01	0.3	0.12	0.135	15°	4	35	0.33	0.35	0.36	0.37	0.4
◆ 08-00239-01504			0.4	0.12	0.135	15°	4	35	0.44	0.45	0.47	0.49	0.52
08-00239-01505			0.5	0.12	0.135	15°	4	35	0.54	0.56	0.58	0.6	0.65
◆ 08-00239-01506			0.6	0.12	0.135	15°	4	35	0.64	0.67	0.69	0.72	0.77
◆ 08-00239-01507			0.75	0.12	0.135	15°	4	35	0.8	0.83	0.86	0.89	0.96
08-00239-01523		R0.02	0.3	0.12	0.135	15°	4	35	0.33	0.34	0.36	0.37	0.4
◆ 08-00239-01524			0.4	0.12	0.135	15°	4	35	0.44	0.45	0.47	0.48	0.52
08-00239-01525			0.5	0.12	0.135	15°	4	35	0.54	0.56	0.58	0.6	0.65
◆ 08-00239-01526			0.6	0.12	0.135	15°	4	35	0.64	0.67	0.69	0.71	0.77
◆ 08-00239-01527			0.75	0.12	0.135	15°	4	35	0.8	0.83	0.86	0.89	0.96
08-00239-02203	0.2	R0.02	0.3	0.15	0.18	15°	4	35	0.34	0.35	0.37	0.38	0.41
◆ 08-00239-02204			0.4	0.15	0.18	15°	4	35	0.45	0.46	0.48	0.49	0.53
08-00239-02205			0.5	0.15	0.18	15°	4	35	0.55	0.57	0.59	0.61	0.66
08-00239-02207			0.75	0.15	0.18	15°	4	35	0.81	0.84	0.87	0.9	0.97
08-00239-02210			1	0.15	0.18	15°	4	35	1.07	1.1	1.14	1.18	1.28
08-00239-02403		R0.05	0.3	0.15	0.18	15°	4	35	0.34	0.35	0.36	0.38	0.4
◆ 08-00239-02404			0.4	0.15	0.18	15°	4	35	0.45	0.46	0.47	0.49	0.53
08-00239-02405			0.5	0.15	0.18	15°	4	35	0.55	0.57	0.59	0.61	0.65
08-00239-02407			0.75	0.15	0.18	15°	4	35	0.81	0.83	0.86	0.89	0.96
08-00239-02410			1	0.15	0.18	15°	4	35	1.07	1.1	1.14	1.18	1.27

订购方法 How to Order

请指定MHRSH430RSF 外径(D)×角半径(R)×颈长(ℓ1) 。
When you order, indicate MHRSH430RSF (D)×(R)×(ℓ1).

※(γ)为参考值。
※(γ) is reference value.

单位 [规格：mm]
Unit [Size : mm]

	产品代码 Code No.	外径(D) Dia.	角半径(R) Corner Radius	颈长(ℓ_1) Under Neck Length	刃长(ℓ) Length of Cut	颈径(d_2) Neck Dia.	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length	相对于工件斜度的有效长 Actual effective length depending on inclined angle of workpiece				
										30′	1°	1°30′	2°	3°
	08-00239-03205	0.3	R0.02	0.5	0.25	0.28	15°	4	35	0.55	0.57	0.59	0.61	0.66
◆	08-00239-03206			0.6	0.25	0.28	15°	4	35	0.65	0.68	0.7	0.72	0.78
	08-00239-03207			0.75	0.25	0.28	15°	4	35	0.81	0.84	0.87	0.9	0.97
	08-00239-03210			1	0.25	0.28	15°	4	35	1.07	1.1	1.14	1.18	1.28
◆	08-00239-03212			1.25	0.25	0.28	15°	4	35	1.32	1.37	1.42	1.47	1.59
	08-00239-03215			1.5	0.25	0.28	15°	4	35	1.58	1.64	1.7	1.76	1.9
	08-00239-03405		R0.05	0.5	0.25	0.28	15°	4	35	0.55	0.57	0.59	0.61	0.65
◆	08-00239-03406			0.6	0.25	0.28	15°	4	35	0.65	0.67	0.7	0.72	0.78
	08-00239-03407			0.75	0.25	0.28	15°	4	35	0.81	0.83	0.86	0.89	0.96
	08-00239-03410			1	0.25	0.28	15°	4	35	1.07	1.1	1.14	1.18	1.27
◆	08-00239-03412			1.25	0.25	0.28	15°	4	35	1.32	1.37	1.42	1.47	1.58
	08-00239-03415			1.5	0.25	0.28	15°	4	35	1.58	1.64	1.69	1.76	1.89
	08-00239-04205	0.4	R0.02	0.5	0.3	0.37	15°	4	35	0.57	0.59	0.61	0.63	0.68
◆	08-00239-04207			0.75	0.3	0.37	15°	4	35	0.83	0.86	0.89	0.92	0.99
	08-00239-04210			1	0.3	0.37	15°	4	35	1.09	1.12	1.16	1.21	1.3
	08-00239-04215			1.5	0.3	0.37	15°	4	35	1.6	1.66	1.72	1.78	1.92
	08-00239-04220			2	0.3	0.37	15°	4	35	2.12	2.19	2.27	2.36	2.55
	08-00239-04405		R0.05	0.5	0.3	0.37	15°	4	35	0.57	0.59	0.61	0.63	0.67
◆	08-00239-04407			0.75	0.3	0.37	15°	4	35	0.83	0.85	0.88	0.91	0.99
	08-00239-04410			1	0.3	0.37	15°	4	35	1.08	1.12	1.16	1.2	1.3
	08-00239-04415			1.5	0.3	0.37	15°	4	35	1.6	1.66	1.71	1.78	1.92
	08-00239-04420			2	0.3	0.37	15°	4	35	2.12	2.19	2.27	2.35	2.54
◆	08-00239-04505		R0.1	0.5	0.3	0.37	15°	4	35	0.57	0.58	0.6	0.62	0.66
◆	08-00239-04507			0.75	0.3	0.37	15°	4	35	0.82	0.85	0.88	0.91	0.97
◆	08-00239-04510			1	0.3	0.37	15°	4	35	1.08	1.12	1.15	1.19	1.28
◆	08-00239-04515			1.5	0.3	0.37	15°	4	35	1.6	1.65	1.71	1.77	1.91
◆	08-00239-04520			2	0.3	0.37	15°	4	35	2.12	2.19	2.26	2.34	2.53
	08-00239-05210	0.5	R0.02	1	0.4	0.46	15°	4	35	1.11	1.14	1.18	1.23	1.33
	08-00239-05215			1.5	0.4	0.46	15°	4	35	1.62	1.68	1.74	1.8	1.95
	08-00239-05220			2	0.4	0.46	15°	4	35	2.14	2.21	2.29	2.38	2.57
	08-00239-05225			2.5	0.4	0.46	15°	4	35	2.66	2.75	2.85	2.95	3.19
	08-00239-05410		R0.05	1	0.4	0.46	15°	4	35	1.1	1.14	1.18	1.22	1.32
	08-00239-05415			1.5	0.4	0.46	15°	4	35	1.62	1.68	1.73	1.8	1.94
	08-00239-05420			2	0.4	0.46	15°	4	35	2.14	2.21	2.29	2.37	2.56
	08-00239-05425			2.5	0.4	0.46	15°	4	35	2.65	2.75	2.84	2.95	3.18
	08-00239-05510		R0.1	1	0.4	0.46	15°	4	35	1.1	1.14	1.18	1.22	1.31
	08-00239-05515			1.5	0.4	0.46	15°	4	35	1.62	1.67	1.73	1.79	1.93
	08-00239-05520			2	0.4	0.46	15°	4	35	2.14	2.21	2.28	2.37	2.55
	08-00239-05525			2.5	0.4	0.46	15°	4	35	2.65	2.74	2.84	2.94	3.17
	08-00239-06210	0.6	R0.02	1	0.5	0.56	15°	4	35	1.11	1.14	1.18	1.23	1.33
◆	08-00239-06215			1.5	0.5	0.56	15°	4	35	1.62	1.68	1.74	1.8	1.95
	08-00239-06220			2	0.5	0.56	15°	4	35	2.14	2.21	2.29	2.38	2.57
◆	08-00239-06225			2.5	0.5	0.56	15°	4	35	2.66	2.75	2.85	2.95	3.19
	08-00239-06230			3	0.5	0.56	15°	4	35	3.17	3.28	3.4	3.53	3.81
	08-00239-06410		R0.05	1	0.5	0.56	15°	4	35	1.1	1.14	1.18	1.22	1.32
◆	08-00239-06415			1.5	0.5	0.56	15°	4	35	1.62	1.68	1.73	1.8	1.94
	08-00239-06420			2	0.5	0.56	15°	4	35	2.14	2.21	2.29	2.37	2.56
◆	08-00239-06425			2.5	0.5	0.56	15°	4	35	2.65	2.75	2.84	2.95	3.18
	08-00239-06430			3	0.5	0.56	15°	4	35	3.17	3.28	3.4	3.52	3.81
	08-00239-06510		R0.1	1	0.5	0.56	15°	4	35	1.1	1.14	1.18	1.22	1.31
◆	08-00239-06515			1.5	0.5	0.56	15°	4	35	1.62	1.67	1.73	1.79	1.93
	08-00239-06520			2	0.5	0.56	15°	4	35	2.14	2.21	2.28	2.37	2.55
◆	08-00239-06525			2.5	0.5	0.56	15°	4	35	2.65	2.74	2.84	2.94	3.17
	08-00239-06530			3	0.5	0.56	15°	4	35	3.17	3.28	3.39	3.52	3.79
	08-00239-08202	0.8	R0.02	2	0.65	0.76	15°	4	35	2.14	2.21	2.29	2.38	2.57
◆	08-00239-08225			2.5	0.65	0.76	15°	4	35	2.66	2.75	2.85	2.95	3.19
	08-00239-08203			3	0.65	0.76	15°	4	35	3.17	3.28	3.4	3.53	3.81
◆	08-00239-08235			3.5	0.65	0.76	15°	4	35	3.69	3.82	3.95	4.1	4.43
	08-00239-08204			4	0.65	0.76	15°	4	35	4.21	4.35	4.51	4.68	5.06

MHRSH430RSF 增加规格 Size Expansion

无限白金Plus涂层
高硬度钢材高精度加工用4刃长颈圆鼻铣刀可对应热缩刀柄的短柄造型

MUGEN COATING PREMIUM Plus 4-Flute Long Neck Corner Radius End Mill with Short Shank for Hardened Steel and High Accuracy Cutting

◆ 2025年12月发布 ※Release in Dec, 2025.

单位 [规格：mm]
Unit [Size : mm]

产品代码 Code No.	外径(D) Dia.	角半径(R) Corner Radius	颈长(ℓ1) Under Neck Length	刃长(ℓ) Length of Cut	颈径(d2) Neck Dia.	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length	相对于工件斜度的有效长 Actual effective length depending on inclined angle of workpiece				
									30′	1°	1°30′	2°	3°
08-00239-08402	0.8	R0.05	2	0.65	0.76	15°	4	35	2.14	2.21	2.29	2.37	2.56
◆ 08-00239-08425			2.5	0.65	0.76	15°	4	35	2.65	2.75	2.84	2.95	3.18
08-00239-08403			3	0.65	0.76	15°	4	35	3.17	3.28	3.4	3.52	3.81
◆ 08-00239-08435			3.5	0.65	0.76	15°	4	35	3.69	3.82	3.95	4.1	4.43
08-00239-08404			4	0.65	0.76	15°	4	35	4.21	4.35	4.51	4.67	5.05
08-00239-08502		R0.1	2	0.65	0.76	15°	4	35	2.14	2.21	2.28	2.37	2.55
◆ 08-00239-08525			2.5	0.65	0.76	15°	4	35	2.65	2.74	2.84	2.94	3.17
08-00239-08503			3	0.65	0.76	15°	4	35	3.17	3.28	3.39	3.52	3.79
◆ 08-00239-08535			3.5	0.65	0.76	15°	4	35	3.69	3.81	3.95	4.09	4.42
08-00239-08504			4	0.65	0.76	15°	4	35	4.2	4.35	4.5	4.67	5.04
08-00239-08602		R0.2	2	0.65	0.76	15°	4	35	2.13	2.2	2.27	2.35	2.53
◆ 08-00239-08625			2.5	0.65	0.76	15°	4	35	2.65	2.74	2.83	2.93	3.15
08-00239-08603			3	0.65	0.76	15°	4	35	3.17	3.27	3.38	3.5	3.77
◆ 08-00239-08635			3.5	0.65	0.76	15°	4	35	3.68	3.8	3.94	4.08	4.39
08-00239-08604			4	0.65	0.76	15°	4	35	4.2	4.34	4.49	4.65	5.01
08-00239-10202	1	R0.02	2	0.8	0.95	15°	4	35	2.16	2.23	2.31	2.4	2.59
08-00239-10203			3	0.8	0.95	15°	4	35	3.19	3.3	3.42	3.55	3.84
08-00239-10204			4	0.8	0.95	15°	4	35	4.23	4.37	4.53	4.7	5.08
08-00239-10205			5	0.8	0.95	15°	4	40	5.26	5.44	5.64	5.85	6.32
08-00239-10402		R0.05	2	0.8	0.95	15°	4	35	2.16	2.23	2.31	2.39	2.59
08-00239-10403			3	0.8	0.95	15°	4	35	3.19	3.3	3.42	3.54	3.83
08-00239-10404			4	0.8	0.95	15°	4	35	4.22	4.37	4.53	4.69	5.07
08-00239-10405			5	0.8	0.95	15°	4	40	5.26	5.44	5.63	5.84	6.31
08-00239-10502		R0.1	2	0.8	0.95	15°	4	35	2.16	2.23	2.3	2.39	2.57
08-00239-10503			3	0.8	0.95	15°	4	35	3.19	3.3	3.41	3.54	3.82
08-00239-10504			4	0.8	0.95	15°	4	35	4.22	4.37	4.52	4.69	5.06
08-00239-10505			5	0.8	0.95	15°	4	40	5.26	5.44	5.63	5.84	6.3
08-00239-10602		R0.2	2	0.8	0.95	15°	4	35	2.15	2.22	2.29	2.37	2.55
08-00239-10603			3	0.8	0.95	15°	4	35	3.19	3.29	3.4	3.52	3.79
08-00239-10604			4	0.8	0.95	15°	4	35	4.22	4.36	4.51	4.67	5.04
08-00239-10605			5	0.8	0.95	15°	4	40	5.25	5.43	5.62	5.82	6.28
08-00239-10702		R0.3	2	0.8	0.95	15°	4	35	2.15	2.21	2.28	2.36	2.53
08-00239-10703			3	0.8	0.95	15°	4	35	3.18	3.28	3.39	3.51	3.77
08-00239-10704			4	0.8	0.95	15°	4	35	4.22	4.35	4.5	4.66	5.01
08-00239-10705			5	0.8	0.95	15°	4	40	5.25	5.42	5.61	5.81	6.26
08-00239-15203	1.5	R0.02	3	1.2	1.43	15°	4	35	3.23	3.34	3.46	3.59	3.88
08-00239-15204			4	1.2	1.43	15°	4	35	4.26	4.41	4.57	4.74	5.13
08-00239-15206			6	1.2	1.43	15°	4	40	6.33	6.55	6.79	7.04	7.61
08-00239-15208			8	1.2	1.43	15°	4	40	8.4	8.69	9	9.34	10.1
08-00239-15403		R0.05	3	1.2	1.43	15°	4	35	3.23	3.34	3.46	3.59	3.87
08-00239-15404			4	1.2	1.43	15°	4	35	4.26	4.41	4.57	4.74	5.12
08-00239-15406			6	1.2	1.43	15°	4	40	6.33	6.55	6.78	7.04	7.6
08-00239-15408			8	1.2	1.43	15°	4	40	8.4	8.69	9	9.34	10.09
08-00239-15503		R0.1	3	1.2	1.43	15°	4	35	3.23	3.34	3.45	3.58	3.86
08-00239-15504			4	1.2	1.43	15°	4	35	4.26	4.41	4.56	4.73	5.11
08-00239-15506			6	1.2	1.43	15°	4	40	6.33	6.55	6.78	7.03	7.59
08-00239-15508			8	1.2	1.43	15°	4	40	8.4	8.69	9	9.33	10.08
08-00239-15603		R0.2	3	1.2	1.43	15°	4	35	3.22	3.33	3.44	3.57	3.84
08-00239-15604			4	1.2	1.43	15°	4	35	4.26	4.4	4.55	4.72	5.08
08-00239-15606			6	1.2	1.43	15°	4	40	6.33	6.54	6.77	7.01	7.57
08-00239-15608			8	1.2	1.43	15°	4	40	8.39	8.68	8.98	9.31	10.06
08-00239-15703		R0.3	3	1.2	1.43	15°	4	35	3.22	3.32	3.43	3.55	3.82
08-00239-15704			4	1.2	1.43	15°	4	35	4.25	4.39	4.54	4.7	5.06
08-00239-15706			6	1.2	1.43	15°	4	40	6.32	6.53	6.76	7	7.55
08-00239-15708			8	1.2	1.43	15°	4	40	8.39	8.67	8.97	9.3	10.03
08-00239-15803		R0.5	3	1.2	1.43	15°	4	35	3.21	3.31	3.41	3.52	3.77
08-00239-15804			4	1.2	1.43	15°	4	35	4.25	4.38	4.52	4.67	5.01
08-00239-15806			6	1.2	1.43	15°	4	40	6.32	6.52	6.74	6.97	7.5
08-00239-15808			8	1.2	1.43	15°	4	40	8.38	8.66	8.95	9.27	9.98

订购方法 How to Order

请指定MHRSH430RSF 外径(D)×角半径(R)×颈长(ℓ1)。
When you order, indicate MHRSH430RSF (D)×(R)×(ℓ1).

※(γ)为参考值。
※(γ) is reference value.

单位 [规格：mm]
Unit [Size : mm]

产品代码 Code No.	外径(D) Dia.	角半径(R) Corner Radius	颈长(ℓ1) Under Neck Length	刃长(ℓ) Length of Cut	颈径(d2) Neck Dia.	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length	相对于工件斜度的有效长 Actual effective length depending on inclined angle of workpiece				
									30′	1°	1°30′	2°	3°
08-00239-20204	2	R0.02	4	1.6	1.91	15°	4	35	4.3	4.45	4.61	4.78	5.17
08-00239-20206			6	1.6	1.91	15°	4	35	6.37	6.59	6.83	7.08	7.66
08-00239-20208			8	1.6	1.91	15°	4	40	8.44	8.73	9.05	9.38	10.14
08-00239-20210			10	1.6	1.91	15°	4	40	10.5	10.87	11.26	11.68	12.63
08-00239-20404		R0.05	4	1.6	1.91	15°	4	35	4.3	4.45	4.61	4.78	5.16
08-00239-20406			6	1.6	1.91	15°	4	35	6.37	6.59	6.83	7.08	7.65
08-00239-20408			8	1.6	1.91	15°	4	40	8.44	8.73	9.04	9.38	10.14
08-00239-20410			10	1.6	1.91	15°	4	40	10.5	10.87	11.26	11.68	12.62
08-00239-20504		R0.1	4	1.6	1.91	15°	4	35	4.3	4.45	4.6	4.77	5.15
08-00239-20506			6	1.6	1.91	15°	4	35	6.37	6.59	6.82	7.07	7.64
08-00239-20508			8	1.6	1.91	15°	4	40	8.43	8.73	9.04	9.37	10.13
08-00239-20510			10	1.6	1.91	15°	4	40	10.5	10.86	11.25	11.67	12.61
08-00239-20604		R0.2	4	1.6	1.91	15°	4	35	4.3	4.44	4.59	4.76	5.13
08-00239-20606			6	1.6	1.91	15°	4	35	6.36	6.58	6.81	7.06	7.62
08-00239-20608			8	1.6	1.91	15°	4	40	8.43	8.72	9.03	9.36	10.1
08-00239-20610			10	1.6	1.91	15°	4	40	10.5	10.86	11.24	11.66	12.59
08-00239-20704		R0.3	4	1.6	1.91	15°	4	35	4.29	4.43	4.58	4.74	5.11
08-00239-20706			6	1.6	1.91	15°	4	35	6.36	6.57	6.8	7.04	7.59
08-00239-20708			8	1.6	1.91	15°	4	40	8.43	8.71	9.02	9.34	10.08
08-00239-20710			10	1.6	1.91	15°	4	40	10.5	10.85	11.23	11.64	12.56
08-00239-20804		R0.5	4	1.6	1.91	15°	4	35	4.29	4.42	4.56	4.71	5.06
08-00239-20806			6	1.6	1.91	15°	4	35	6.35	6.56	6.78	7.01	7.54
08-00239-20808			8	1.6	1.91	15°	4	40	8.42	8.7	8.99	9.31	10.03
08-00239-20810			10	1.6	1.91	15°	4	40	10.49	10.84	11.21	11.61	12.52
◆ 08-00239-25406	2.5	R0.05	6	2	2.39	15°	4	35	6.41	6.63	6.87	7.12	7.7
◆ 08-00239-25408			8	2	2.39	15°	4	40	8.47	8.77	9.08	9.42	10.18
◆ 08-00239-25410			10	2	2.39	15°	4	40	10.54	10.91	11.3	11.72	12.67
◆ 08-00239-25412			12	2	2.39	15°	4	40	12.61	13.05	13.52	14.02	Free
◆ 08-00239-25506		R0.1	6	2	2.39	15°	4	35	6.41	6.63	6.86	7.12	7.69
◆ 08-00239-25508			8	2	2.39	15°	4	40	8.47	8.77	9.08	9.42	10.17
◆ 08-00239-25510			10	2	2.39	15°	4	40	10.54	10.9	11.29	11.71	12.66
◆ 08-00239-25512			12	2	2.39	15°	4	40	12.61	13.04	13.51	14.01	Free
◆ 08-00239-25606		R0.2	6	2	2.39	15°	4	35	6.4	6.62	6.85	7.1	7.66
◆ 08-00239-25608			8	2	2.39	15°	4	40	8.47	8.76	9.07	9.4	10.15
◆ 08-00239-25610			10	2	2.39	15°	4	40	10.54	10.9	11.28	11.7	12.63
◆ 08-00239-25612			12	2	2.39	15°	4	40	12.6	13.04	13.5	14	Free
◆ 08-00239-25706		R0.3	6	2	2.39	15°	4	35	6.4	6.61	6.84	7.09	7.64
◆ 08-00239-25708			8	2	2.39	15°	4	40	8.47	8.75	9.06	9.39	10.12
◆ 08-00239-25710			10	2	2.39	15°	4	40	10.53	10.89	11.27	11.69	12.61
◆ 08-00239-25712			12	2	2.39	15°	4	40	12.6	13.03	13.49	13.99	Free
◆ 08-00239-25806		R0.5	6	2	2.39	15°	4	35	6.39	6.6	6.82	7.06	7.59
◆ 08-00239-25808			8	2	2.39	15°	4	40	8.46	8.74	9.04	9.36	10.08
◆ 08-00239-25810			10	2	2.39	15°	4	40	10.53	10.88	11.25	11.66	12.56
◆ 08-00239-25812			12	2	2.39	15°	4	40	12.59	13.02	13.47	13.96	Free
08-00239-30404	3	R0.05	4	2.5	2.85	15°	6	45	4.42	4.57	4.73	4.91	5.3
08-00239-30406			6	2.5	2.85	15°	6	45	6.48	6.71	6.95	7.21	7.79
08-00239-30408			8	2.5	2.85	15°	6	45	8.55	8.85	9.17	9.51	10.28
08-00239-30410			10	2.5	2.85	15°	6	50	10.62	10.99	11.38	11.81	12.76
08-00239-30412			12	2.5	2.85	15°	6	50	12.69	13.13	13.6	14.11	15.25
08-00239-30415			15	2.5	2.85	15°	6	55	15.79	16.34	16.92	17.56	18.98
08-00239-30504		R0.1	4	2.5	2.85	15°	6	45	4.42	4.57	4.73	4.9	5.29
08-00239-30506			6	2.5	2.85	15°	6	45	6.48	6.71	6.94	7.2	7.78
08-00239-30508			8	2.5	2.85	15°	6	45	8.55	8.84	9.16	9.5	10.26
08-00239-30510			10	2.5	2.85	15°	6	50	10.62	10.98	11.38	11.8	12.75
08-00239-30512			12	2.5	2.85	15°	6	50	12.68	13.12	13.59	14.1	15.24
08-00239-30515			15	2.5	2.85	15°	6	55	15.79	16.33	16.92	17.55	18.97
08-00239-30604		R0.2	4	2.5	2.85	15°	6	45	4.41	4.56	4.72	4.89	5.27
08-00239-30606			6	2.5	2.85	15°	6	45	6.48	6.7	6.93	7.19	7.75
08-00239-30608			8	2.5	2.85	15°	6	45	8.55	8.84	9.15	9.49	10.24
08-00239-30610			10	2.5	2.85	15°	6	50	10.61	10.98	11.37	11.79	12.73
08-00239-30612			12	2.5	2.85	15°	6	50	12.68	13.12	13.58	14.09	15.21
08-00239-30615			15	2.5	2.85	15°	6	55	15.78	16.33	16.91	17.54	18.94

MHRSH430RSF 增加规格 Size Expansion

无限白金Plus涂层
高硬度钢材高精度加工用4刃长颈圆鼻铣刀可对应热缩刀柄的短柄造型

MUGEN COATING PREMIUM Plus 4-Flute Long Neck Corner Radius End Mill with Short Shank for Hardened Steel and High Accuracy Cutting

◆ 2025年12月发布 ※Release in Dec, 2025.

单位 [规格：mm]
Unit [Size : mm]

产品代码 Code No.	外径(D) Dia.	角半径(R) Corner Radius	颈长(ℓ1) Under Neck Length	刃长(ℓ) Length of Cut	颈径(d2) Neck Dia.	颈角(γ) Neck Taper Angle	柄径(d) Shank Dia.	全长(L) Overall Length	相对于工件斜度的有效长 Actual effective length depending on inclined angle of workpiece				
									30′	1°	1°30′	2°	3°
08-00239-30704	3	R0.3	4	2.5	2.85	15°	6	45	4.41	4.55	4.71	4.87	5.24
08-00239-30706			6	2.5	2.85	15°	6	45	6.48	6.69	6.92	7.17	7.73
08-00239-30708			8	2.5	2.85	15°	6	45	8.54	8.83	9.14	9.47	10.22
08-00239-30710			10	2.5	2.85	15°	6	50	10.61	10.97	11.36	11.77	12.7
08-00239-30712			12	2.5	2.85	15°	6	50	12.68	13.11	13.57	14.07	15.19
08-00239-30715			15	2.5	2.85	15°	6	55	15.78	16.32	16.9	17.52	18.92
08-00239-30804		R0.5	4	2.5	2.85	15°	6	45	4.4	4.54	4.69	4.84	5.2
08-00239-30806			6	2.5	2.85	15°	6	45	6.47	6.68	6.9	7.14	7.68
08-00239-30808			8	2.5	2.85	15°	6	45	8.54	8.82	9.12	9.44	10.17
08-00239-30810			10	2.5	2.85	15°	6	50	10.6	10.96	11.33	11.74	12.66
08-00239-30812			12	2.5	2.85	15°	6	50	12.67	13.1	13.55	14.04	15.14
08-00239-30815			15	2.5	2.85	15°	6	55	15.77	16.31	16.88	17.49	18.87
◆ 08-00239-40408	4	R0.05	8	3.2	3.8	15°	6	45	8.65	8.95	9.27	9.62	10.39
◆ 08-00239-40412			12	3.2	3.8	15°	6	50	12.78	13.23	13.7	14.22	15.36
◆ 08-00239-40416			16	3.2	3.8	15°	6	55	16.92	17.51	18.14	18.81	Free
◆ 08-00239-40420			20	3.2	3.8	15°	6	55	21.05	21.78	22.57	23.41	Free
08-00239-40508		R0.1	8	3.2	3.8	15°	6	45	8.65	8.94	9.26	9.61	10.38
08-00239-40512			12	3.2	3.8	15°	6	50	12.78	13.22	13.7	14.21	15.35
08-00239-40516			16	3.2	3.8	15°	6	55	16.92	17.5	18.13	18.81	Free
08-00239-40520			20	3.2	3.8	15°	6	55	21.05	21.78	22.56	23.41	Free
08-00239-40608		R0.2	8	3.2	3.8	15°	6	45	8.64	8.94	9.25	9.59	10.36
08-00239-40612			12	3.2	3.8	15°	6	50	12.78	13.22	13.69	14.19	15.33
08-00239-40616			16	3.2	3.8	15°	6	55	16.91	17.5	18.12	18.79	Free
08-00239-40620			20	3.2	3.8	15°	6	55	21.05	21.77	22.55	23.39	Free
08-00239-40708		R0.3	8	3.2	3.8	15°	6	45	8.64	8.93	9.24	9.58	10.33
08-00239-40712			12	3.2	3.8	15°	6	50	12.77	13.21	13.68	14.18	15.31
08-00239-40716			16	3.2	3.8	15°	6	55	16.91	17.49	18.11	18.78	Free
08-00239-40720			20	3.2	3.8	15°	6	55	21.04	21.77	22.54	23.38	Free
08-00239-40808		R0.5	8	3.2	3.8	15°	6	45	8.63	8.92	9.22	9.55	10.29
08-00239-40812			12	3.2	3.8	15°	6	50	12.77	13.2	13.65	14.15	15.26
08-00239-40816			16	3.2	3.8	15°	6	55	16.9	17.47	18.09	18.75	Free
08-00239-40820			20	3.2	3.8	15°	6	55	21.04	21.75	22.52	23.35	Free
08-00239-50515	5	R0.1	15	4	4.75	15°	6	50	15.98	16.53	17.13	Free	Free
08-00239-50520			20	4	4.75	15°	6	55	21.15	21.88	Free	Free	Free
◆ 08-00239-50525			25	4	4.75	15°	6	55	26.32	27.23	Free	Free	Free
08-00239-50615		R0.2	15	4	4.75	15°	6	50	15.98	16.53	17.12	Free	Free
08-00239-50620			20	4	4.75	15°	6	55	21.14	21.87	Free	Free	Free
◆ 08-00239-50625			25	4	4.75	15°	6	55	26.31	27.22	Free	Free	Free
08-00239-50715		R0.3	15	4	4.75	15°	6	50	15.97	16.52	17.1	Free	Free
08-00239-50720			20	4	4.75	15°	6	55	21.14	21.87	Free	Free	Free
◆ 08-00239-50725			25	4	4.75	15°	6	55	26.31	27.22	Free	Free	Free
08-00239-50815		R0.5	15	4	4.75	15°	6	50	15.97	16.5	17.08	Free	Free
08-00239-50820			20	4	4.75	15°	6	55	21.13	21.85	Free	Free	Free
◆ 08-00239-50825			25	4	4.75	15°	6	55	26.3	27.2	Free	Free	Free
08-00239-60512	6	R0.1	12	5	5.7	-	6	45	Free	Free	Free	Free	Free
08-00239-60518			18	5	5.7	-	6	50	Free	Free	Free	Free	Free
08-00239-60524			24	5	5.7	-	6	60	Free	Free	Free	Free	Free
08-00239-60530			30	5	5.7	-	6	65	Free	Free	Free	Free	Free
08-00239-60612		R0.2	12	5	5.7	-	6	45	Free	Free	Free	Free	Free
08-00239-60618			18	5	5.7	-	6	50	Free	Free	Free	Free	Free
08-00239-60624			24	5	5.7	-	6	60	Free	Free	Free	Free	Free
08-00239-60630			30	5	5.7	-	6	65	Free	Free	Free	Free	Free
08-00239-60712		R0.3	12	5	5.7	-	6	45	Free	Free	Free	Free	Free
08-00239-60718			18	5	5.7	-	6	50	Free	Free	Free	Free	Free
08-00239-60724			24	5	5.7	-	6	60	Free	Free	Free	Free	Free
08-00239-60730			30	5	5.7	-	6	65	Free	Free	Free	Free	Free
08-00239-60812		R0.5	12	5	5.7	-	6	45	Free	Free	Free	Free	Free
08-00239-60818			18	5	5.7	-	6	50	Free	Free	Free	Free	Free
08-00239-60824			24	5	5.7	-	6	60	Free	Free	Free	Free	Free
08-00239-60830			30	5	5.7	-	6	65	Free	Free	Free	Free	Free
08-00239-60912		R1	12	5	5.7	-	6	45	Free	Free	Free	Free	Free
08-00239-60918			18	5	5.7	-	6	50	Free	Free	Free	Free	Free
08-00239-60924			24	5	5.7	-	6	60	Free	Free	Free	Free	Free
08-00239-60930			30	5	5.7	-	6	65	Free	Free	Free	Free	Free

订购方法 How to Order

请指定MHRSH430RSF 外径(D)×角半径(R)×颈长(ℓ1)。
When you order, indicate MHRSH430RSF (D)×(R)×(ℓ1).

※(γ)为参考值。
※(γ) is reference value.

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 Steels SKH51·SKD11(～62HRC)				高速钢 High Speed Steels SKH55·HAP40(～66HRC)				高速钢 High Speed Steels SKH57·HAP72(～70HRC)			
外径 Dia.	角半径 Corner Radius	颈长 Under Neck Length	L(颈长)/D(外径) L/D	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
				min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
0.1	0.01	0.2	2	40,000	200	0.002	0.01	40,000	150	0.002	0.01	40,000	120	0.002	0.01
		0.25	2.5	40,000	180	0.002	0.01	40,000	130	0.002	0.01	40,000	100	0.002	0.01
		0.3	3	40,000	160	0.002	0.01	40,000	120	0.002	0.01	40,000	90	0.002	0.01
		0.4	4	40,000	140	0.001	0.01	40,000	100	0.001	0.01	40,000	70	0.001	0.01
		0.5	5	40,000	120	0.001	0.01	40,000	90	0.001	0.01	40,000	60	0.001	0.01
0.15	0.01	0.3	2	40,000	240	0.002	0.015	40,000	180	0.002	0.01	40,000	140	0.002	0.01
		0.4	2.7	40,000	200	0.002	0.015	40,000	150	0.002	0.01	40,000	110	0.002	0.01
		0.5	3.3	40,000	160	0.002	0.015	40,000	120	0.002	0.01	40,000	90	0.002	0.01
		0.6	4	40,000	140	0.001	0.015	40,000	100	0.001	0.01	40,000	70	0.001	0.01
		0.75	5	40,000	120	0.001	0.015	40,000	90	0.001	0.01	40,000	60	0.001	0.01
	0.02	0.3	2	40,000	240	0.002	0.015	40,000	180	0.002	0.01	40,000	140	0.002	0.01
		0.4	2.7	40,000	200	0.002	0.015	40,000	150	0.002	0.01	40,000	110	0.002	0.01
		0.5	3.3	40,000	160	0.002	0.015	40,000	120	0.002	0.01	40,000	90	0.002	0.01
		0.6	4	40,000	140	0.001	0.015	40,000	100	0.001	0.01	40,000	70	0.001	0.01
		0.75	5	40,000	120	0.001	0.015	40,000	90	0.001	0.01	40,000	60	0.001	0.01
0.2	0.02	0.3	1.5	30,000	360	0.003	0.02	30,000	280	0.003	0.01	30,000	220	0.003	0.01
		0.4	2	30,000	340	0.003	0.02	30,000	260	0.003	0.01	30,000	200	0.003	0.01
		0.5	2.5	30,000	320	0.003	0.02	30,000	240	0.003	0.01	30,000	180	0.003	0.01
		0.75	3.8	30,000	270	0.003	0.02	30,000	190	0.003	0.01	30,000	150	0.003	0.01
		1	5	30,000	240	0.002	0.02	30,000	160	0.002	0.01	30,000	120	0.002	0.01
	0.05	0.3	1.5	30,000	360	0.003	0.02	30,000	280	0.003	0.01	30,000	220	0.003	0.01
		0.4	2	30,000	340	0.003	0.02	30,000	260	0.003	0.01	30,000	200	0.003	0.01
		0.5	2.5	30,000	320	0.003	0.02	30,000	240	0.003	0.01	30,000	180	0.003	0.01
		0.75	3.8	30,000	270	0.003	0.02	30,000	190	0.003	0.01	30,000	150	0.003	0.01
		1	5	30,000	240	0.003	0.02	30,000	160	0.003	0.01	30,000	120	0.003	0.01
0.3	0.02	0.5	1.7	30,000	600	0.003	0.04	30,000	500	0.003	0.03	30,000	400	0.003	0.03
		0.6	2	30,000	580	0.003	0.04	30,000	480	0.003	0.03	30,000	380	0.003	0.03
		0.75	2.5	30,000	560	0.003	0.04	30,000	460	0.003	0.03	30,000	360	0.003	0.03
		1	3.3	30,000	500	0.003	0.04	30,000	400	0.003	0.03	30,000	300	0.003	0.03
		1.25	4.2	30,000	400	0.003	0.04	30,000	300	0.003	0.03	30,000	220	0.003	0.03
		1.5	5	30,000	320	0.003	0.04	30,000	240	0.003	0.03	30,000	180	0.003	0.03
	0.05	0.5	1.7	30,000	600	0.003	0.04	30,000	500	0.003	0.03	30,000	400	0.003	0.03
		0.6	2	30,000	580	0.003	0.04	30,000	480	0.003	0.03	30,000	380	0.003	0.03
		0.75	2.5	30,000	560	0.003	0.04	30,000	460	0.003	0.03	30,000	360	0.003	0.03
		1	3.3	30,000	500	0.003	0.04	30,000	400	0.003	0.03	30,000	300	0.003	0.03
		1.25	4.2	30,000	400	0.003	0.04	30,000	300	0.003	0.03	30,000	220	0.003	0.03
		1.5	5	30,000	320	0.003	0.04	30,000	240	0.003	0.03	30,000	180	0.003	0.03
0.4	0.02	0.5	1.3	28,000	760	0.005	0.05	25,000	650	0.004	0.04	22,000	480	0.004	0.04
		0.75	1.9	28,000	730	0.005	0.05	25,000	620	0.004	0.04	22,000	460	0.004	0.04
		1	2.5	28,000	700	0.005	0.05	25,000	600	0.004	0.04	22,000	450	0.004	0.04
		1.5	3.8	28,000	600	0.005	0.05	25,000	520	0.004	0.04	22,000	390	0.004	0.04
		2	5	25,000	500	0.005	0.05	25,000	440	0.003	0.04	22,000	330	0.003	0.04
	0.05	0.5	1.3	28,000	760	0.005	0.05	25,000	650	0.005	0.04	22,000	480	0.005	0.04
		0.75	1.9	28,000	730	0.005	0.05	25,000	620	0.005	0.04	22,000	460	0.005	0.04
		1	2.5	28,000	700	0.005	0.05	25,000	600	0.005	0.04	22,000	450	0.005	0.04
		1.5	3.8	28,000	600	0.005	0.05	25,000	520	0.005	0.04	22,000	390	0.005	0.04
		2	5	25,000	500	0.005	0.05	25,000	440	0.005	0.04	22,000	330	0.005	0.04
	0.1	0.5	1.3	28,000	760	0.005	0.05	25,000	650	0.005	0.04	22,000	480	0.005	0.04
		0.75	1.9	28,000	730	0.005	0.05	25,000	620	0.005	0.04	22,000	460	0.005	0.04
		1	2.5	28,000	700	0.005	0.05	25,000	600	0.005	0.04	22,000	450	0.005	0.04
		1.5	3.8	28,000	600	0.005	0.05	25,000	520	0.005	0.04	22,000	390	0.005	0.04
		2	5	25,000	500	0.005	0.05	25,000	440	0.005	0.04	22,000	330	0.005	0.04
0.5	0.02	1	2	23,000	900	0.006	0.1	20,000	800	0.004	0.08	18,000	600	0.004	0.08
		1.5	3	23,000	800	0.006	0.1	20,000	640	0.004	0.08	18,000	480	0.004	0.08
		2	4	23,000	720	0.005	0.1	20,000	600	0.003	0.08	18,000	450	0.003	0.08
		2.5	5	23,000	680	0.005	0.1	20,000	580	0.003	0.08	18,000	420	0.003	0.08

MHRSH430RSF 增加规格 Size Expansion

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 Steels SKH51·SKD11（～62HRC）				高速钢 High Speed Steels SKH55·HAP40（～66HRC）				高速钢 High Speed Steels SKH57·HAP72（～70HRC）			
外径 Dia.	角半径 Corner Radius	颈长 Under Neck Length	L（颈长）/D（外径） L/D	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
				min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
0.5	0.05	1	2	23,000	900	0.007	0.1	20,000	800	0.005	0.08	18,000	600	0.005	0.08
		1.5	3	23,000	800	0.007	0.1	20,000	640	0.005	0.08	18,000	480	0.005	0.08
		2	4	23,000	720	0.007	0.1	20,000	600	0.005	0.08	18,000	450	0.005	0.08
		2.5	5	23,000	680	0.006	0.1	20,000	580	0.004	0.08	18,000	420	0.004	0.08
	0.1	1	2	23,000	900	0.007	0.1	20,000	800	0.005	0.08	18,000	600	0.005	0.08
		1.5	3	23,000	800	0.007	0.1	20,000	640	0.005	0.08	18,000	480	0.005	0.08
		2	4	23,000	720	0.007	0.1	20,000	600	0.005	0.08	18,000	450	0.005	0.08
		2.5	5	23,000	680	0.006	0.1	20,000	580	0.004	0.08	18,000	420	0.004	0.08
0.6	0.02	1	1.7	23,000	1,000	0.006	0.15	20,000	850	0.004	0.1	17,000	640	0.004	0.1
		1.5	2.5	23,000	900	0.006	0.15	20,000	740	0.004	0.1	17,000	540	0.004	0.1
		2	3.3	23,000	800	0.006	0.15	20,000	640	0.004	0.1	17,000	480	0.004	0.1
		2.5	4.2	23,000	750	0.005	0.15	20,000	620	0.003	0.1	17,000	460	0.003	0.1
		3	5	23,000	700	0.005	0.15	20,000	600	0.003	0.1	17,000	450	0.003	0.1
	0.05	1	1.7	23,000	1,000	0.01	0.15	20,000	850	0.01	0.1	17,000	640	0.008	0.1
		1.5	2.5	23,000	900	0.01	0.15	20,000	740	0.008	0.1	17,000	540	0.007	0.1
		2	3.3	23,000	800	0.01	0.15	20,000	640	0.007	0.1	17,000	480	0.006	0.1
		2.5	4.2	23,000	750	0.009	0.15	20,000	620	0.006	0.1	17,000	460	0.005	0.1
		3	5	23,000	700	0.008	0.15	20,000	600	0.006	0.1	17,000	450	0.005	0.1
	0.1	1	1.7	23,000	1,000	0.01	0.15	20,000	850	0.01	0.1	17,000	640	0.008	0.1
		1.5	2.5	23,000	900	0.01	0.15	20,000	740	0.008	0.1	17,000	540	0.007	0.1
		2	3.3	23,000	800	0.01	0.15	20,000	640	0.007	0.1	17,000	480	0.006	0.1
		2.5	4.2	23,000	750	0.009	0.15	20,000	620	0.006	0.1	17,000	460	0.005	0.1
		3	5	23,000	700	0.008	0.15	20,000	600	0.006	0.1	17,000	450	0.005	0.1
0.8	0.02	2	2.5	23,000	1,400	0.006	0.16	20,000	1,000	0.005	0.14	17,000	700	0.005	0.14
		2.5	3.1	23,000	1,350	0.006	0.16	20,000	950	0.004	0.14	17,000	670	0.004	0.14
		3	3.8	23,000	1,300	0.005	0.16	20,000	900	0.003	0.14	17,000	650	0.003	0.14
		3.5	4.4	23,000	1,250	0.005	0.16	20,000	850	0.003	0.14	17,000	620	0.003	0.14
		4	5	23,000	1,200	0.005	0.16	20,000	800	0.003	0.14	17,000	600	0.003	0.14
	0.05	2	2.5	23,000	1,400	0.02	0.16	20,000	1,000	0.015	0.14	17,000	700	0.012	0.14
		2.5	3.1	23,000	1,350	0.017	0.16	20,000	950	0.012	0.14	17,000	670	0.010	0.14
		3	3.8	23,000	1,300	0.015	0.16	20,000	900	0.01	0.14	17,000	650	0.008	0.14
		3.5	4.4	23,000	1,250	0.015	0.16	20,000	850	0.01	0.14	17,000	620	0.007	0.14
		4	5	23,000	1,200	0.015	0.16	20,000	800	0.01	0.14	17,000	600	0.006	0.14
	0.1	2	2.5	23,000	1,400	0.02	0.16	20,000	1,000	0.015	0.14	17,000	700	0.012	0.14
		2.5	3.1	23,000	1,350	0.017	0.16	20,000	950	0.012	0.14	17,000	670	0.010	0.14
		3	3.8	23,000	1,300	0.015	0.16	20,000	900	0.01	0.14	17,000	650	0.008	0.14
		3.5	4.4	23,000	1,250	0.015	0.16	20,000	850	0.01	0.14	17,000	620	0.007	0.14
		4	5	23,000	1,200	0.015	0.16	20,000	800	0.01	0.14	17,000	600	0.006	0.14
	0.2	2	2.5	23,000	1,400	0.02	0.16	20,000	1,000	0.015	0.14	17,000	700	0.012	0.14
		2.5	3.1	23,000	1,350	0.017	0.16	20,000	950	0.012	0.14	17,000	670	0.010	0.14
		3	3.8	23,000	1,300	0.015	0.16	20,000	900	0.01	0.14	17,000	650	0.008	0.14
		3.5	4.4	23,000	1,250	0.015	0.16	20,000	850	0.01	0.14	17,000	620	0.007	0.14
		4	5	23,000	1,200	0.015	0.16	20,000	800	0.01	0.14	17,000	600	0.006	0.14
1	0.02	2	2	21,000	2,000	0.01	0.25	17,000	1,400	0.008	0.2	15,000	1,000	0.005	0.2
		3	3	20,000	1,800	0.01	0.25	16,000	1,300	0.008	0.2	14,000	900	0.005	0.2
		4	4	18,000	1,500	0.008	0.25	14,000	1,100	0.005	0.2	12,000	750	0.003	0.2
		5	5	16,000	1,400	0.005	0.25	13,000	1,000	0.003	0.2	11,000	650	0.003	0.2
	0.05	2	2	21,000	2,000	0.04	0.25	17,000	1,400	0.03	0.2	15,000	1,000	0.018	0.2
		3	3	20,000	1,800	0.04	0.25	16,000	1,300	0.03	0.2	14,000	900	0.018	0.2
		4	4	18,000	1,500	0.03	0.25	14,000	1,100	0.02	0.2	12,000	750	0.012	0.2
		5	5	16,000	1,400	0.02	0.25	13,000	1,000	0.01	0.2	11,000	650	0.006	0.2
	0.1	2	2	21,000	2,000	0.04	0.25	17,000	1,400	0.03	0.2	15,000	1,000	0.018	0.2
		3	3	20,000	1,800	0.04	0.25	16,000	1,300	0.03	0.2	14,000	900	0.018	0.2
		4	4	18,000	1,500	0.03	0.25	14,000	1,100	0.02	0.2	12,000	750	0.012	0.2
		5	5	16,000	1,400	0.02	0.25	13,000	1,000	0.01	0.2	11,000	650	0.006	0.2

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 Steels SKH51·SKD11（～62HRC）				高速钢 High Speed Steels SKH55·HAP40（～66HRC）				高速钢 High Speed Steels SKH57·HAP72（～70HRC）			
外径 Dia.	角半径 Corner Radius	颈长 Under Neck Length	L（颈长）/D（外径） L/D	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
				min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
1	0.2	2	2	21,000	2,000	0.04	0.25	17,000	1,400	0.03	0.2	15,000	1,000	0.018	0.2
		3	3	20,000	1,800	0.04	0.25	16,000	1,300	0.03	0.2	14,000	900	0.018	0.2
		4	4	18,000	1,500	0.03	0.25	14,000	1,100	0.02	0.2	12,000	750	0.012	0.2
		5	5	16,000	1,400	0.02	0.25	13,000	1,000	0.01	0.2	11,000	650	0.006	0.2
	0.3	2	2	21,000	2,000	0.04	0.25	17,000	1,400	0.03	0.2	15,000	1,000	0.018	0.2
		3	3	20,000	1,800	0.04	0.25	16,000	1,300	0.03	0.2	14,000	900	0.018	0.2
		4	4	18,000	1,500	0.03	0.25	14,000	1,100	0.02	0.2	12,000	750	0.012	0.2
		5	5	16,000	1,400	0.02	0.25	13,000	1,000	0.01	0.2	11,000	650	0.006	0.2
1.5	0.02	3	2	20,000	2,000	0.01	0.4	16,000	1,400	0.008	0.3	14,000	1,000	0.006	0.3
		4	2.7	18,000	1,700	0.01	0.4	14,000	1,200	0.008	0.3	12,000	800	0.006	0.3
		6	4	16,000	1,500	0.008	0.4	13,000	1,100	0.005	0.3	11,000	750	0.004	0.3
		8	5.3	14,000	1,300	0.008	0.4	11,000	900	0.003	0.3	10,000	600	0.003	0.3
	0.05	3	2	20,000	2,000	0.04	0.4	16,000	1,400	0.03	0.3	14,000	1,000	0.018	0.3
		4	2.7	18,000	1,700	0.04	0.4	14,000	1,200	0.03	0.3	12,000	800	0.018	0.3
		6	4	16,000	1,500	0.03	0.4	13,000	1,100	0.02	0.3	11,000	750	0.012	0.3
		8	5.3	14,000	1,300	0.025	0.4	11,000	900	0.01	0.3	10,000	600	0.006	0.3
	0.1	3	2	20,000	2,000	0.04	0.4	16,000	1,400	0.03	0.3	14,000	1,000	0.018	0.3
		4	2.7	18,000	1,700	0.04	0.4	14,000	1,200	0.03	0.3	12,000	800	0.018	0.3
		6	4	16,000	1,500	0.03	0.4	13,000	1,100	0.02	0.3	11,000	750	0.012	0.3
		8	5.3	14,000	1,300	0.025	0.4	11,000	900	0.01	0.3	10,000	600	0.006	0.3
	0.2	3	2	20,000	2,000	0.04	0.4	16,000	1,400	0.03	0.3	14,000	1,000	0.018	0.3
		4	2.7	18,000	1,700	0.04	0.4	14,000	1,200	0.03	0.3	12,000	800	0.018	0.3
		6	4	16,000	1,500	0.03	0.4	13,000	1,100	0.02	0.3	11,000	750	0.012	0.3
		8	5.3	14,000	1,300	0.025	0.4	11,000	900	0.01	0.3	10,000	600	0.006	0.3
	0.3	3	2	20,000	2,000	0.04	0.4	16,000	1,400	0.03	0.3	14,000	1,000	0.018	0.3
		4	2.7	18,000	1,700	0.04	0.4	14,000	1,200	0.03	0.3	12,000	800	0.018	0.3
		6	4	16,000	1,500	0.03	0.4	13,000	1,100	0.02	0.3	11,000	750	0.012	0.3
		8	5.3	14,000	1,300	0.025	0.4	11,000	900	0.01	0.3	10,000	600	0.006	0.3
	0.5	3	2	20,000	2,000	0.04	0.4	16,000	1,400	0.03	0.3	14,000	1,000	0.018	0.3
		4	2.7	18,000	1,700	0.04	0.4	14,000	1,200	0.03	0.3	12,000	800	0.018	0.3
		6	4	16,000	1,500	0.03	0.4	13,000	1,100	0.02	0.3	11,000	750	0.012	0.3
		8	5.3	14,000	1,300	0.025	0.4	11,000	900	0.01	0.3	10,000	600	0.006	0.3
2	0.02	4	2	17,000	2,000	0.012	0.5	14,000	1,400	0.008	0.35	12,000	1,000	0.006	0.35
		6	3	15,000	1,800	0.012	0.5	12,000	1,200	0.008	0.35	11,000	900	0.006	0.35
		8	4	14,000	1,500	0.01	0.5	11,000	1,100	0.005	0.35	10,000	750	0.004	0.35
		10	5	12,000	1,300	0.01	0.5	10,000	1,000	0.003	0.35	9,000	650	0.003	0.35
	0.05	4	2	17,000	2,000	0.05	0.5	14,000	1,400	0.03	0.35	12,000	1,000	0.018	0.35
		6	3	15,000	1,800	0.05	0.5	12,000	1,200	0.03	0.35	11,000	900	0.018	0.35
		8	4	14,000	1,500	0.04	0.5	11,000	1,100	0.02	0.35	10,000	750	0.012	0.35
		10	5	12,000	1,300	0.04	0.5	10,000	1,000	0.02	0.35	9,000	650	0.012	0.35
	0.1	4	2	17,000	2,000	0.05	0.5	14,000	1,400	0.03	0.35	12,000	1,000	0.018	0.35
		6	3	15,000	1,800	0.05	0.5	12,000	1,200	0.03	0.35	11,000	900	0.018	0.35
		8	4	14,000	1,500	0.04	0.5	11,000	1,100	0.02	0.35	10,000	750	0.012	0.35
		10	5	12,000	1,300	0.04	0.5	10,000	1,000	0.02	0.35	9,000	650	0.012	0.35
	0.2	4	2	17,000	2,000	0.05	0.5	14,000	1,400	0.03	0.35	12,000	1,000	0.018	0.35
		6	3	15,000	1,800	0.05	0.5	12,000	1,200	0.03	0.35	11,000	900	0.018	0.35
		8	4	14,000	1,500	0.04	0.5	11,000	1,100	0.02	0.35	10,000	750	0.012	0.35
		10	5	12,000	1,300	0.04	0.5	10,000	1,000	0.02	0.35	9,000	650	0.012	0.35
	0.3	4	2	17,000	2,000	0.05	0.5	14,000	1,400	0.03	0.35	12,000	1,000	0.018	0.35
		6	3	15,000	1,800	0.05	0.5	12,000	1,200	0.03	0.35	11,000	900	0.018	0.35
		8	4	14,000	1,500	0.04	0.5	11,000	1,100	0.02	0.35	10,000	750	0.012	0.35
		10	5	12,000	1,300	0.04	0.5	10,000	1,000	0.02	0.35	9,000	650	0.012	0.35
	0.5	4	2	17,000	2,000	0.05	0.5	14,000	1,400	0.03	0.35	12,000	1,000	0.018	0.35
		6	3	15,000	1,800	0.05	0.5	12,000	1,200	0.03	0.35	11,000	900	0.018	0.35
		8	4	14,000	1,500	0.04	0.5	11,000	1,100	0.02	0.35	10,000	750	0.012	0.35
		10	5	12,000	1,300	0.04	0.5	10,000	1,000	0.02	0.35	9,000	650	0.012	0.35

MHRSH430RSF 增加规格 Size Expansion

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 Steels SKH51·SKD11(～62HRC)				高速钢 High Speed Steels SKH55·HAP40(～66HRC)				高速钢 High Speed Steels SKH57·HAP72(～70HRC)			
外径 Dia.	角半径 Corner Radius	颈长 Under Neck Length	L(颈长)/D(外径) L/D	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
				min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
2.5	0.05	6	2.4	14,000	1,800	0.05	0.5	12,000	1,300	0.03	0.5	9,000	900	0.018	0.5
		8	3.2	12,000	1,700	0.05	0.5	10,000	1,200	0.03	0.5	7,500	800	0.018	0.5
		10	4	11,000	1,500	0.04	0.5	9,000	1,100	0.03	0.5	7,000	750	0.018	0.5
		12	4.8	10,000	1,300	0.03	0.5	8,000	1,000	0.02	0.5	6,700	650	0.012	0.5
	0.1	6	2.4	14,000	1,800	0.06	0.5	12,000	1,300	0.03	0.5	9,000	900	0.018	0.5
		8	3.2	12,000	1,700	0.05	0.5	10,000	1,200	0.03	0.5	7,500	800	0.018	0.5
		10	4	11,000	1,500	0.05	0.5	9,000	1,100	0.03	0.5	7,000	750	0.018	0.5
		12	4.8	10,000	1,300	0.04	0.5	8,000	1,000	0.02	0.5	6,700	650	0.012	0.5
	0.2	6	2.4	14,000	1,800	0.06	0.5	12,000	1,300	0.03	0.5	9,000	900	0.018	0.5
		8	3.2	12,000	1,700	0.05	0.5	10,000	1,200	0.03	0.5	7,500	800	0.018	0.5
		10	4	11,000	1,500	0.05	0.5	9,000	1,100	0.03	0.5	7,000	750	0.018	0.5
		12	4.8	10,000	1,300	0.04	0.5	8,000	1,000	0.02	0.5	6,700	650	0.012	0.5
	0.3	6	2.4	14,000	1,800	0.06	0.5	12,000	1,300	0.03	0.5	9,000	900	0.018	0.5
		8	3.2	12,000	1,700	0.05	0.5	10,000	1,200	0.03	0.5	7,500	800	0.018	0.5
		10	4	11,000	1,500	0.05	0.5	9,000	1,100	0.03	0.5	7,000	750	0.018	0.5
		12	4.8	10,000	1,300	0.04	0.5	8,000	1,000	0.02	0.5	6,700	650	0.012	0.5
	0.5	6	2.4	14,000	1,800	0.06	0.5	12,000	1,300	0.03	0.5	9,000	900	0.018	0.5
		8	3.2	12,000	1,700	0.05	0.5	10,000	1,200	0.03	0.5	7,500	800	0.018	0.5
		10	4	11,000	1,500	0.05	0.5	9,000	1,100	0.03	0.5	7,000	750	0.018	0.5
		12	4.8	10,000	1,300	0.04	0.5	8,000	1,000	0.02	0.5	6,700	650	0.012	0.5
3	0.05	4	1.3	13,000	2,000	0.05	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6
		6	2	11,500	1,700	0.05	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6
		8	2.7	10,500	1,500	0.05	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6
		10	3.3	10,000	1,350	0.05	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6
		12	4	10,000	1,350	0.04	0.7	7,500	1,000	0.04	0.6	6,000	750	0.024	0.6
		15	5	9,000	1,200	0.03	0.7	7,000	900	0.03	0.6	5,500	650	0.018	0.6
	0.1	4	1.3	13,000	2,000	0.07	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6
		6	2	11,500	1,700	0.07	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6
		8	2.7	10,500	1,500	0.07	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6
		10	3.3	10,000	1,350	0.07	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6
		12	4	10,000	1,350	0.06	0.7	7,500	1,000	0.04	0.6	6,000	750	0.024	0.6
		15	5	9,000	1,200	0.05	0.7	7,000	900	0.03	0.6	5,500	650	0.018	0.6
	0.2	4	1.3	13,000	2,000	0.07	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6
		6	2	11,500	1,700	0.07	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6
		8	2.7	10,500	1,500	0.07	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6
		10	3.3	10,000	1,350	0.07	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6
		12	4	10,000	1,350	0.06	0.7	7,500	1,000	0.04	0.6	6,000	750	0.024	0.6
		15	5	9,000	1,200	0.05	0.7	7,000	900	0.03	0.6	5,500	650	0.018	0.6
	0.3	4	1.3	13,000	2,000	0.07	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6
		6	2	11,500	1,700	0.07	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6
		8	2.7	10,500	1,500	0.07	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6
		10	3.3	10,000	1,350	0.07	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6
		12	4	10,000	1,350	0.06	0.7	7,500	1,000	0.04	0.6	6,000	750	0.024	0.6
		15	5	9,000	1,200	0.05	0.7	7,000	900	0.03	0.6	5,500	650	0.018	0.6
	0.5	4	1.3	13,000	2,000	0.07	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6
		6	2	11,500	1,700	0.07	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6
		8	2.7	10,500	1,500	0.07	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6
		10	3.3	10,000	1,350	0.07	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6
		12	4	10,000	1,350	0.06	0.7	7,500	1,000	0.04	0.6	6,000	750	0.024	0.6
		15	5	9,000	1,200	0.05	0.7	7,000	900	0.03	0.6	5,500	650	0.018	0.6
4	0.05	8	2	8,500	1,800	0.07	1	7,000	1,300	0.06	0.8	5,500	1,000	0.03	0.8
		12	3	8,500	1,800	0.06	1	7,000	1,300	0.05	0.8	5,500	1,000	0.03	0.8
		16	4	7,500	1,500	0.05	1	5,500	1,000	0.05	0.8	5,200	900	0.024	0.8
		20	5	6,000	1,200	0.04	1	4,500	800	0.04	0.8	4,000	650	0.018	0.8
	0.1	8	2	8,500	1,800	0.08	1	7,000	1,300	0.06	0.8	5,500	1,000	0.036	0.8
		12	3	8,500	1,800	0.07	1	7,000	1,300	0.05	0.8	5,500	1,000	0.03	0.8
		16	4	7,500	1,500	0.06	1	5,500	1,000	0.05	0.8	5,200	900	0.03	0.8
		20	5	6,000	1,200	0.06	1	4,500	800	0.05	0.8	4,000	650	0.03	0.8

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 Steels SKH51·SKD11(～62HRC)				高速钢 High Speed Steels SKH55·HAP40(～66HRC)				高速钢 High Speed Steels SKH57·HAP72(～70HRC)			
外径 Dia.	角半径 Corner Radius	颈长 Under Neck Length	L(颈长)/D(外径) L/D	主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut		主轴转速 Spindle Speed	进给速度 Feed	切深量 Depth of Cut	
				min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
4	0.2	8	2	8,500	1,800	0.08	1	7,000	1,300	0.06	0.8	5,500	1,000	0.036	0.8
		12	3	8,500	1,800	0.07	1	7,000	1,300	0.05	0.8	5,500	1,000	0.03	0.8
		16	4	7,500	1,500	0.06	1	5,500	1,000	0.05	0.8	5,200	900	0.03	0.8
		20	5	6,000	1,200	0.06	1	4,500	800	0.05	0.8	4,000	650	0.03	0.8
	0.3	8	2	8,500	1,800	0.08	1	7,000	1,300	0.06	0.8	5,500	1,000	0.036	0.8
		12	3	8,500	1,800	0.07	1	7,000	1,300	0.05	0.8	5,500	1,000	0.03	0.8
		16	4	7,500	1,500	0.06	1	5,500	1,000	0.05	0.8	5,200	900	0.03	0.8
		20	5	6,000	1,200	0.06	1	4,500	800	0.05	0.8	4,000	650	0.03	0.8
	0.5	8	2	8,500	1,800	0.08	1	7,000	1,300	0.06	0.8	5,500	1,000	0.036	0.8
		12	3	8,500	1,800	0.07	1	7,000	1,300	0.05	0.8	5,500	1,000	0.03	0.8
		16	4	7,500	1,500	0.06	1	5,500	1,000	0.05	0.8	5,200	900	0.03	0.8
		20	5	6,000	1,200	0.06	1	4,500	800	0.05	0.8	4,000	650	0.03	0.8
5	0.1	15	3	7,000	1,700	0.08	1.6	5,500	1,300	0.06	1.2	4,400	900	0.036	1.2
		20	4	6,000	1,400	0.07	1.6	5,000	1,100	0.05	1.2	4,000	750	0.03	1.2
		25	5	4,800	1,100	0.06	1.6	4,000	900	0.05	1.2	3,200	550	0.03	1.2
	0.2	15	3	7,000	1,700	0.08	1.6	5,500	1,300	0.06	1.2	4,400	900	0.036	1.2
		20	4	6,000	1,400	0.07	1.6	5,000	1,100	0.05	1.2	4,000	750	0.03	1.2
		25	5	4,800	1,100	0.06	1.6	4,000	900	0.05	1.2	3,200	550	0.03	1.2
	0.3	15	3	7,000	1,700	0.08	1.6	5,500	1,300	0.06	1.2	4,400	900	0.036	1.2
		20	4	6,000	1,400	0.07	1.6	5,000	1,100	0.05	1.2	4,000	750	0.03	1.2
		25	5	4,800	1,100	0.06	1.6	4,000	900	0.05	1.2	3,200	550	0.03	1.2
	0.5	15	3	7,000	1,700	0.08	1.6	5,500	1,300	0.06	1.2	4,400	900	0.036	1.2
		20	4	6,000	1,400	0.07	1.6	5,000	1,100	0.05	1.2	4,000	750	0.03	1.2
		25	5	4,800	1,100	0.06	1.6	4,000	900	0.05	1.2	3,200	550	0.03	1.2
6	0.1	12	2	5,500	1,800	0.08	2	4,500	1,400	0.06	1.5	3,600	1,000	0.036	1.5
		18	3	5,000	1,500	0.08	2	4,000	1,100	0.06	1.5	3,000	800	0.036	1.5
		24	4	4,500	1,300	0.07	2	3,500	900	0.05	1.5	2,700	700	0.036	1.5
		30	5	3,000	800	0.07	2	3,000	650	0.05	1.5	2,300	500	0.03	1.5
	0.2	12	2	5,500	1,800	0.08	2	4,500	1,400	0.06	1.5	3,600	1,000	0.036	1.5
		18	3	5,000	1,500	0.08	2	4,000	1,100	0.06	1.5	3,000	800	0.036	1.5
		24	4	4,500	1,300	0.07	2	3,500	900	0.05	1.5	2,700	700	0.036	1.5
		30	5	3,000	800	0.07	2	3,000	650	0.05	1.5	2,300	500	0.03	1.5
	0.3	12	2	5,500	1,800	0.08	2	4,500	1,400	0.06	1.5	3,600	1,000	0.036	1.5
		18	3	5,000	1,500	0.08	2	4,000	1,100	0.06	1.5	3,000	800	0.036	1.5
		24	4	4,500	1,300	0.07	2	3,500	900	0.05	1.5	2,700	700	0.036	1.5
		30	5	3,000	800	0.07	2	3,000	650	0.05	1.5	2,300	500	0.03	1.5
	0.5	12	2	5,500	1,800	0.08	2	4,500	1,400	0.06	1.5	3,600	1,000	0.036	1.5
		18	3	5,000	1,500	0.08	2	4,000	1,100	0.06	1.5	3,000	800	0.036	1.5
		24	4	4,500	1,300	0.07	2	3,500	900	0.05	1.5	2,700	700	0.036	1.5
		30	5	3,000	800	0.07	2	3,000	650	0.05	1.5	2,300	500	0.03	1.5
	1	12	2	5,500	1,800	0.08	2	4,500	1,400	0.06	1.5	3,600	1,000	0.036	1.5
		18	3	5,000	1,500	0.08	2	4,000	1,100	0.06	1.5	3,000	800	0.036	1.5
		24	4	4,500	1,300	0.07	2	3,500	900	0.05	1.5	2,700	700	0.036	1.5
		30	5	3,000	800	0.07	2	3,000	650	0.05	1.5	2,300	500	0.03	1.5

备注 Notes

※1 切深量的ap表示轴向切深量，ae表示径向切深量。
※2 请根据机械刚性和加工材料的夹持状态等调整切削条件。
※3 发生振刀时，请于相同的比率调整切削条件。
※4 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。
※5 轴向进刀时建议采用螺旋进刀及倾斜进刀方式。
※6 沟槽切削时建议参考切削参数表，切深量：ap 及进给速度设定为50%以下，并采用来回切削加工方式。
※7 请以相同的比率调整主轴转速与进给速度。
※8 建议使用热缩式刀柄。如使用筒夹式刀柄时请确认刀具所需要的最短夹持量。
※9 建议使用油雾冷却方式。

※1 Depth of Cut : a_p = Axial Depth of Cut / a_e = Radial Depth of Cut.
※2 Adjust milling condition according to machine rigidity and clamp condition of work material.
※3 In case of chattering etc., please adjust cutting conditions if necessary.
※4 At point where cutting load is high such as at corners, pay attention to setting cutting conditions and tool paths particularly.
※5 Recommend to apply helical or ramping for approaching into axial direction.
※6 For slotting, recommend reciprocating milling by adjusting feed & a_p in below 50% of recommended milling condition.
※7 Adjust both spindle speed and feed at the same rate.
※8 A shrink fit type is recommended for tool holder. When using collet type or others, strictly adhere to minimum gripping length.
※9 We recommend using oil mist coolant.

加工案例 Machining case

齿轮造型 HAP40 (64HRC)
Gear model

可提升刀具寿命的无限白金Plus涂层与高精度的刀具设计 即使长时间加工也能维持高精度的加工需求

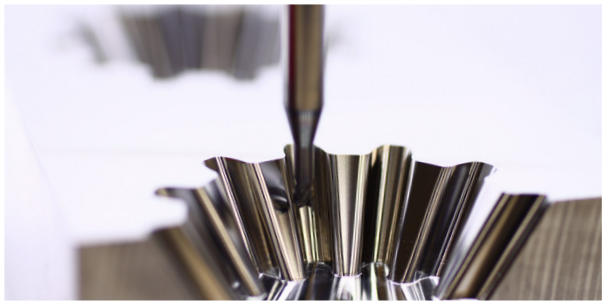
High precision tool design combines MUGEN COATING PREMIUM Plus extends tool life maintain high surface quality and accuracy even after long time machining

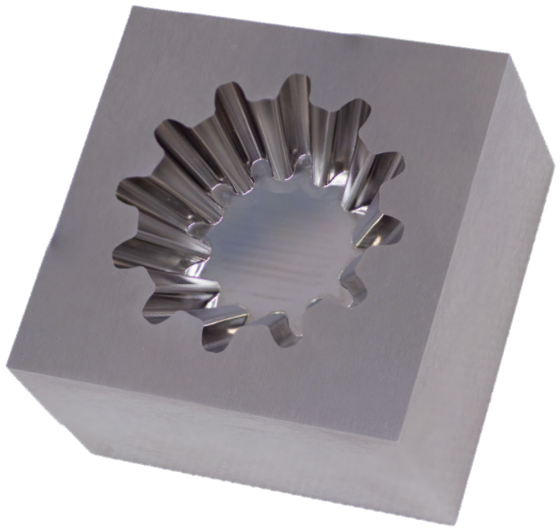
加工材料：HAP40（64HRC）
Work material

工件尺寸：50 × 50 mm（加工深度 10 mm）
Work size　Machining depth

冷却方式：油雾
Coolant :　Oil mist

总加工时间：7 小时 26 分钟
Total machining time : 7 hr 26 min



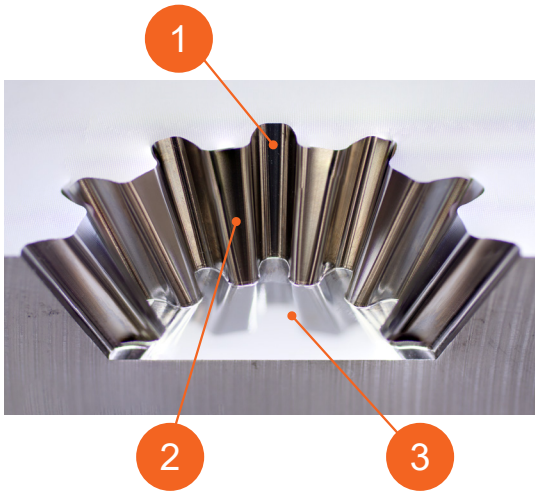


加工工序 Process	粗加工※ Roughing	中精加工 Semi-finishing		精加工 Finishing	
		底面 Bottom	侧面 Side	底面 Bottom	侧面 Side
使用刀具 Tool	MHRSH430RSF φ2 × R0.2 × 6	MHRSH430RSF φ2 × R0.2 × 6		MHRSH430RSF φ2 × R0.2 × 6	
主轴转速 [min^{-1}] Spindle speed	12,000	12,000		12,000	
进给速度 [mm/min] Feed	1,300	650	1,300	650	1,300
切深量 ap × ae [mm] Depth of cut	0.04 × 0.5	pf 0.1	pf 0.08	pf 0.05	pf 0.04
余量 [mm] Stock	0.03	0.01		-	
加工时间 Machining time	4 小时 25 分钟 4 hr 25 min	1 小时 5 分钟 1 hr 5 min		1 小时 56 分钟 1 hr 56 min	

※ 粗加工时使用2支刀具。
※ Using 2 tools for roughing

面粗度
Surface Roughness

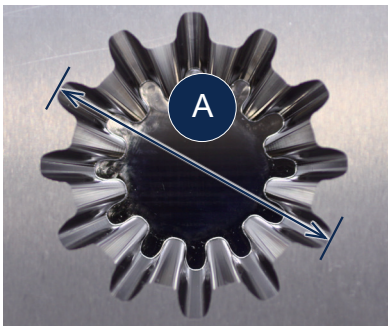
测定位置 Measuring position	1	2	3
Ra [μm]	0.189	0.228	0.036
Rz [μm]	1.169	1.131	0.352



加工精度
Accuracy

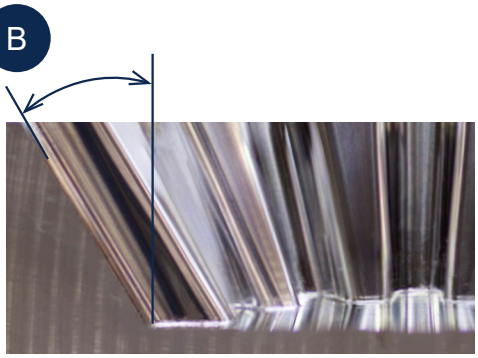
测定位置 Measuring position	A
目标值 Target	37.100 mm
实测值 Actual	37.099 mm
尺寸误差 Error	0.001 mm

齿轮直径
Tip circle diameter

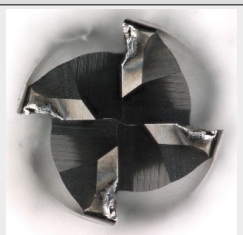
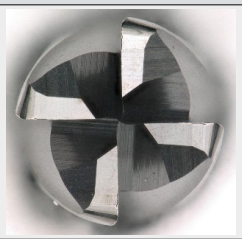
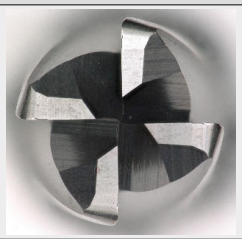
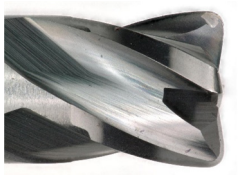


测定位置 Measuring position	B
目标值 Target	30°45′
实测值 Actual	30°44′48″
尺寸误差 Error	0°0′12″

角度
Angle



加工后的刀尖状态
Cutting edge condition after machining

	粗加工 Roughing	中精加工 Semi-finishing	精加工 Finishing
底刃 Bottom edge			
外周刃·前刀面 Peripheral cutting edge Rake face			

对HAP40 (64HRC）进行粗加工时，即使加工约2个小时后也能维持稳定加工。
即使是中精加工・精加工也只产生微小磨耗，实现了可维持高精度的加工。
Realized stable machining on HAP40 (64HRC) for about 2 hours. Maintain high accuracy with less wear even after semi-finishing and finishing.

日进工具株式会社

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

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

日进工具香港有限公司 深圳代表处
广东省深圳市罗湖区人民南路2008号 深圳嘉里中心大厦1221室
TEL. ＋86(755)-2265-2275

日进工具香港有限公司 苏州办事处
江苏省苏州市工业园区星港街199号 东方之门大厦北楼22楼
TEL. ＋86(512)-6866-2275

www.ns-tool.com.cn（手机官网）

警告 CAUTION 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。

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 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.
9) If abnormal sound, etc. occurs during processing, stop the machine immediately.
10) Don't modify tools.

360
26’ 04
ISO 9001 JQA-QM6096 ISO 14001 JQA-EM3712

■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.
■本册采用环保印刷。
This print uses environmentally friendly inks.