



DLC Coated End Mills for Non-ferrous Materials

Vol.8

非铁金属加工用DLC铣刀

AE-TS-N · AE-TL-N · AE-VTS-N · AE-VTFE-N · PXAL

标准长刃型 AE-TL-N

Standard Long

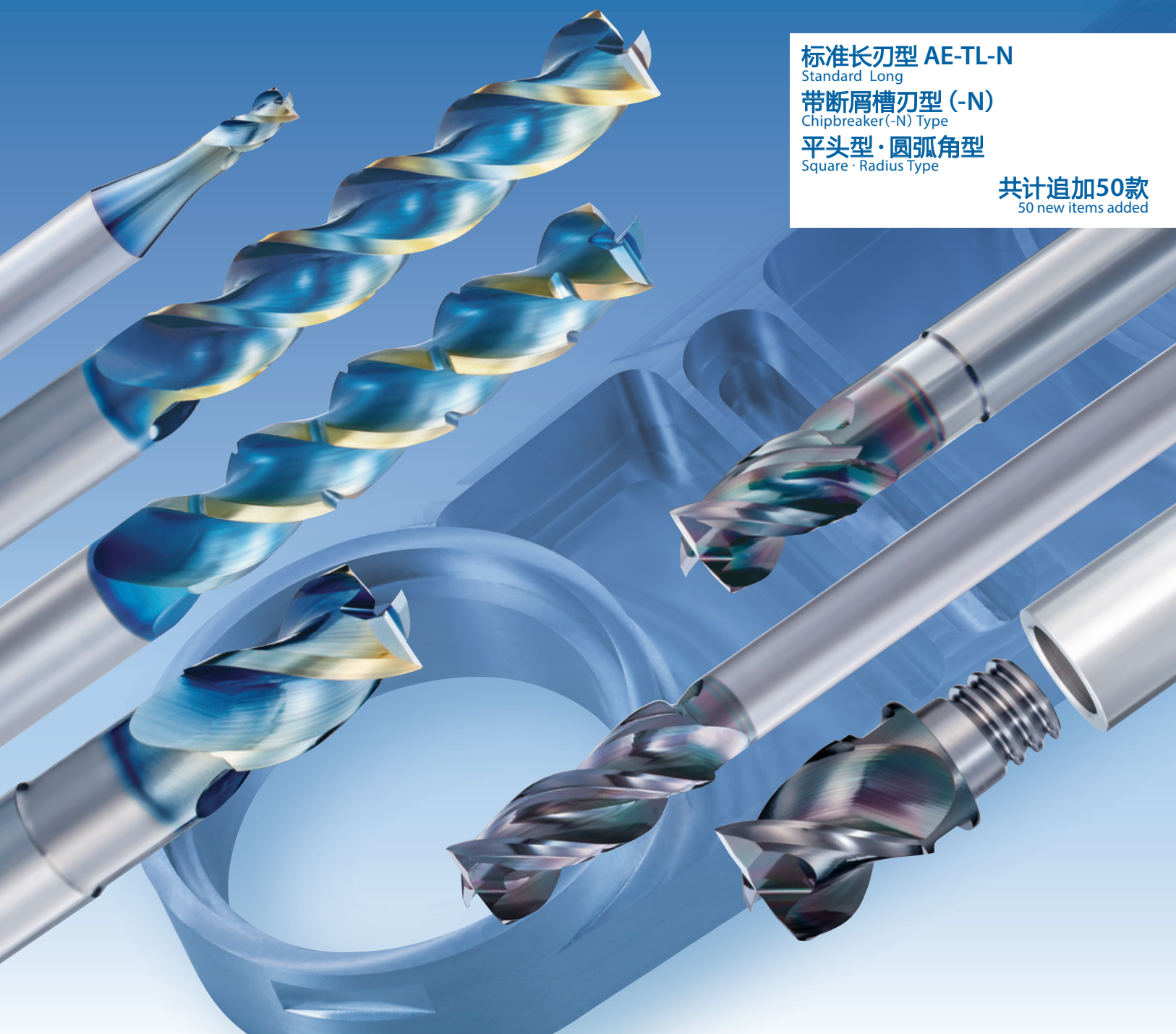
带断屑槽刃型 (-N)

Chipbreaker(-N) Type

平头型 · 圆弧角型

Square · Radius Type

共计追加50款
50 new items added



LINEUP

标准 — 适用于非铁金属加工的标准式样 —

Standard

Standard specification suitable for non-ferrous material processing

DLC-SUPER HARD 涂层 Coating

短刃型 Short

AE-TS-N 1.5D刃长(颈长3D) P.9

1.5 × D cutting length (Neck length 3 × D)

平头型 Square Type P.12

尖角型 (-SP) Sharp Corner Edge Type P.13

圆弧角型 Radius Type P.14



长刃型 Long

AE-TL-N 3D/5D刃长 P.9

3 × D / 5 × D cutting length

平头型 Square Type P.15

尖角型 (-SP) Sharp Corner Edge Type P.16



AE-TL-N 带断屑槽刃型(-N) 3D/5D刃长 P.17

With Chipbreaker 3 × D / 5 × D cutting length

平头型 Square Type P.18

圆弧角型 Radius Type P.19



高性能 — 对应多种加工的高性能型 —

High Performance

High performance type that supports a wide range of applications

DLC-IGUSS 涂层 Coating

短刃型 Short

AE-VTS-N 1.5D刃长(颈长3D) P.29

1.5 × D cutting length (Neck length 3 × D)

平头型 Square Type P.32

尖角型 (-SP) Sharp Corner Edge Type P.33

圆弧角型 Radius Type P.34



深壁加工型 For Deep Side Milling

AE-VTFE-N 2.5D刃长(粗刃长柄型) P.39

2.5 × D cutting length (Long length reduced shank type)

平头型 Square Type P.43

圆弧角型 Radius Type P.44



可换头式铣刀PXM Exchangeable Head End Mill

PXAL 1D刃长 P.47

1 × D cutting length

平头型 Square Type P.49

圆弧角型 Radius Type P.49

PXMZ 直柄刀杆 Straight Shank Holder for PXM P.51

PXMC PXM专用夹具 Collet for PXM Exchangeable Head End Mill P.55



Application 加工形态

加工形态 Application			槽铣 Slot Milling	余摆线 加工 Trochoidal Milling	侧铣 Side Milling	深壁加工 Deep Side Milling	沉孔加工 Plunging	螺旋加工 Helical Milling	轮廓加工 Contour Milling	斜线加工 Ramping
										
标准 Standard	AE-TS-N 短刃型 Short	1.5D 刃长 1.5 × D cutting length 平头型 Square 尖角型 Sharp Corner Edge 圆弧型 Radius	◎	☆	☆	○	◎	◎	◎	◎
	AE-TL-N 长刃型 Long	3D 刃长 3 × D cutting length 平头型 Square 尖角型 Sharp Corner Edge 带断屑槽刃 Chipbreaker	○	☆	◎	◎	○	◎	○	○
		5D 刃长 5 × D cutting length 平头型 Square 尖角型 Sharp Corner Edge 带断屑槽刃 Chipbreaker	△	☆	○	◎	△	○	△	△
高性能 High Performance	AE-VTS-N 短刃型 Short	1.5D 刃长 1.5 × D cutting length 平头型 Square 尖角型 Sharp Corner Edge 圆弧型 Radius	☆	☆	☆	☆	☆	☆	☆	☆
	AE-VTFE-N 深壁加工型 For Deep Side Milling	2.5D 刃长 2.5 × D cutting length 平头型 Square 尖角型 Sharp Corner Edge 圆弧型 Radius	△	◎	○	☆	△	○	△	△
	PXAL 可换头式 Exchangeable Head	1D 刃长 1 × D cutting length 平头型 Square 尖角型 Sharp Corner Edge 圆弧型 Radius	☆	☆	☆	☆	☆	☆	☆	☆

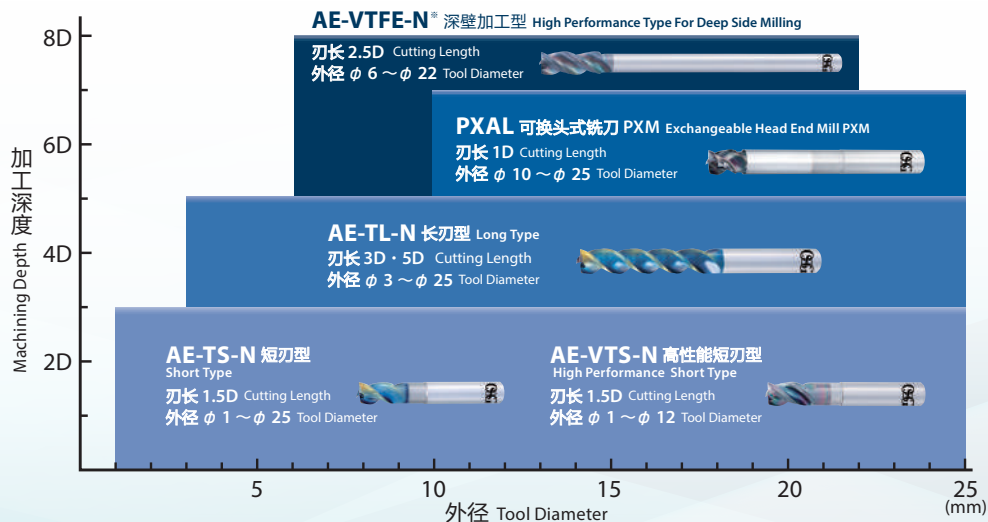
※如有切屑堆积问题，推荐使用带断屑槽刃型。

*For applications with large chip accumulation, the chipbreaker type end mill is recommended.

(适用) △ → ○ → ◎ → ☆ (最佳)
(Fair) (Best)

对应深壁加工的非铁金属加工用DLC铣刀

DLC coated end mills for deep side milling in non-ferrous metals



■ AE-TS-N · AE-VTS-N

- 刃长 1.5D
- 可对应至 3D
- Cutting Length 1.5 × D
- Supports up to 3 × D

■ AE-TL-N

- 刃长 3D · 5D
- 最大可对应至 5D
- Cutting Length 3 × D / 5 × D
- Supports up to 5 × D

■ PXAL

- 刃长 1D
- 最大可对应至 7D
- Cutting Length 1 × D
- Supports up to 7 × D

■ AE-VTFE-N®

- 粗刃·长柄型
- 最大可对应至 8D
- Long length reduced shank type
- Supports up to 8 × D

※外径 $\phi 22$ 的 AE-VTFE-N 请在 L/D = 7 以下使用。

*Please use the $\phi 22$ AE-VTFE-N at L/D = 7 or less.



DLC涂层改变了非铁金属加工!

DLC coating revolutionizes the processing of non-ferrous materials!

DLC涂层表面光滑! 通过表面的平滑度, 对需求耐溶着性和润滑性的铝合金等非铁金属发挥出众的威力。

OSG's DLC coating gives a shiny surface! This shiny and smooth surface optimizes end mill performance particularly in non-ferrous materials such as aluminum alloys, which require welding resistance and lubricity.

■ 结合用途分为2种DLC涂层 Two types of DLC coatings to accommodate specific application needs

DLC-IGUSS : 厚涂层型, 使用寿命长 Thick coating type for long tool life

厚涂层型可抑制刃尖磨损, 实现工具的高耐久性和长寿命化。
Thick coating type suppresses wear on the cutting edge to enable high durability and long tool life.

适用工具: AE-VTS-N · AE-VTFE-N · PXAL
Applicable tools

DLC-SUPER HARD : 薄涂层型, 重视锋利性 Thin coating type with emphasis on sharpness

对基材的附着性高, 实现高锋利性和高耐溶着性。
High adhesion to the base material to enable sharp cutting performance and high welding resistance.

适用工具: AE-TS-N · AE-TL-N
Applicable tools

涂层名称 Name of Coating	涂层色 Coating Color	涂层种类 Coating Type	硬度 (GPa) Hardness	氧化开始温度(℃) Oxidation Temperature	摩擦系数 Coefficient of Friction	标准涂层厚度 (μm) Coating Thickness	成膜温度 (℃) Coating Temperature	表面粗糙度 Surface Roughness	耐磨损性 Wear Resistance	耐溶着性 Welding Resistance	韧性 Toughness
DLC-IGUSS	干涉色 Interference Color	DLC (SP ³ Rich) SP ³ Rich	60	550	0.10	0.8	400	☆	◎	☆	○
DLC-SUPER HARD	干涉色 Interference Color	DLC (SP ³ Rich) SP ³ Rich	60	550	0.10	0.2	400	☆	◎	☆	○

(标准) ○ → ◎ → ☆ (最佳)
(Good) (Best)

■ 耐磨损性和耐溶着性 Abrasion resistance and welding resistance

OSG的DLC涂层耐磨损性和耐溶着性高, 易溶着的非铁金属加工中可实现工具寿命和加工的稳定化。

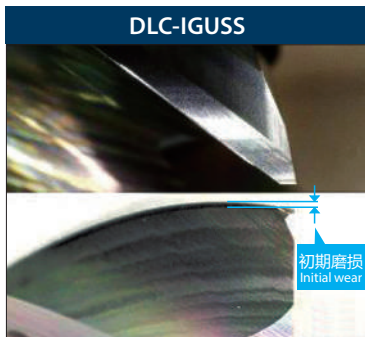
OSG's DLC coating has high wear resistance and anti-adhesion properties, which enable stable tool life in non-ferrous material applications with high tendency to weld.

耐磨损性 Wear Resistance

A5052的加工

Milling in A5052

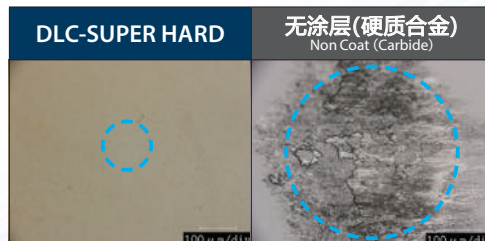
使用工具 Tool	硬质合金3刃平头型铣刀 φ10 Carbide Square End Mill 3 Flutes
加工材料 Work Material	A5052
切削速度 Cutting Speed	200m/min (6,370min ⁻¹)
进给速度 Feed	0.08mm/t (1,530mm/min)
切削深度 Depth of Cut	a _p = 5mm a _e = 8mm
切削油剂 Coolant	气冷式 Air-blow
使用机械 Machine	立式加工中心 Vertical Machining Center
切削长度 Milling Length	50m



耐溶着性 Welding Resistance

摩擦试验后的表面状况

Surface condition after pin-on-disc test



试验材料 Test Material	A7075
试验环境 Test Environment	大气中 Open Atmosphere

对应广泛的加工方法

Suitable for a wide range of applications

加工材料：A5052

Work Material

使用机械：5轴加工机

Machine : Five-axis Machining Center

主轴类型：HSK63

Main Spindle

最高转速：25,000min⁻¹

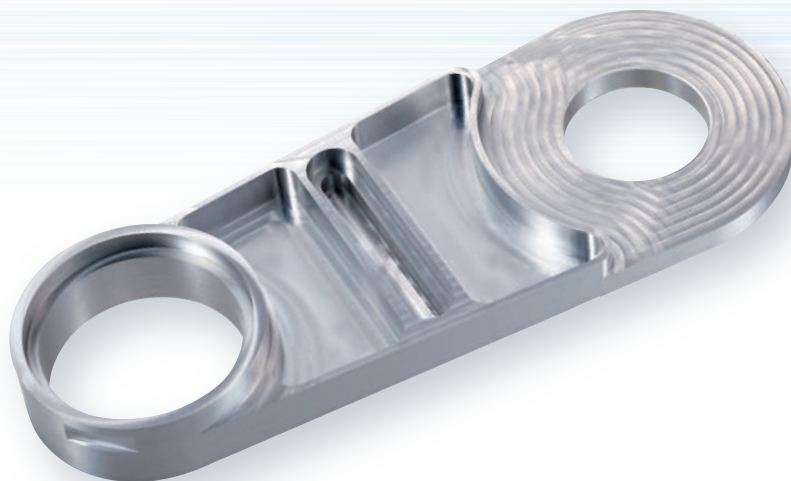
Maximum RPM

刀柄：热缩刀柄

Holder : Shrink Fit

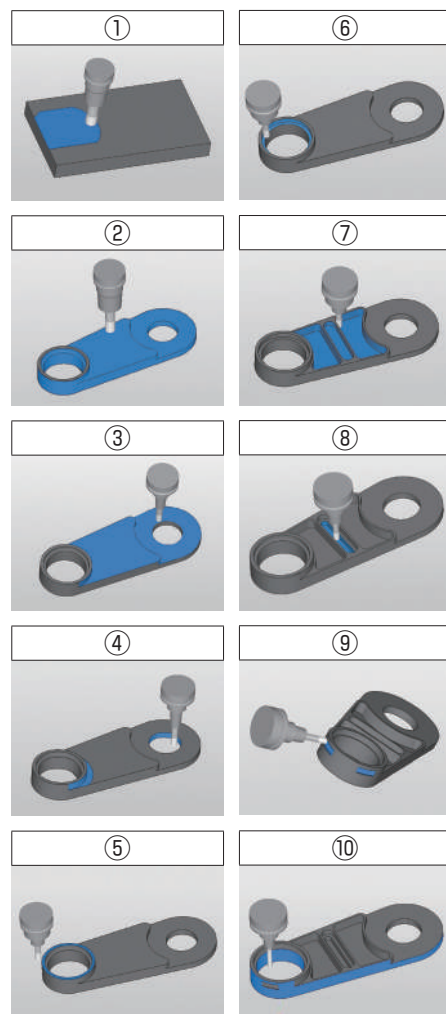
切削油剂：MQL[※]

Coolant



※因视频拍摄需要，使用MQL
MQL is used for filming the video

工序编号 Process	加工部位 Milling Part	加工方法 Processing Method	加工内容 Process	使用工具 Tool
①	上面 Top	平面加工 Face Milling	粗加工 Roughing	PXAL 250C25-03R100
②	全体 Overall	等高线加工 Contour Milling	粗加工 Roughing	PXAL 200C20-03R100
③	上面 Top	平面加工 Face Milling	精加工 Finishing	AE-TS- N $\phi 12 \times 36$
④	凸台·孔侧面 Boss, Hole Side	侧铣 Side Milling	精加工 Finishing	
⑤	孔上方 Hole Top	平面加工 Face Milling	精加工 Finishing	AE-VTS- N $\phi 12 \times 36$
⑥	沉孔部 Counterbore Wall	侧铣 Side Milling	精加工 Finishing	
⑦	槽部 Groove	型腔加工 Pocket Milling	粗加工 Roughing 精加工 Finishing	
⑧	底部 Bottom	型腔加工 Pocket Milling	粗加工 Roughing 精加工 Finishing	AE-VTS- N $\phi 10 \times 30$
⑨	键槽 Slot	槽加工(5轴) Slot Milling 5-axis	精加工 Finishing	AE-TS- N $\phi 10 \times 30$
⑩	外周·沉孔下层 Outer circumference, lower counterbore	侧铣 Side Milling	精加工 Finishing	AE-TL- N $\phi 8 \times 40$



高效率·高品质的深壁·型腔部加工

High efficiency and high quality deep side milling and pocket milling

零部件名：真空腔体

Part Name : Vacuum Chamber

加工材料：A5056

Work Material

使用机械：5轴加工机

Machine : Five-axis Machining Center

主轴类型：HSK-A63

Main Spindle

切削油剂：MQL※

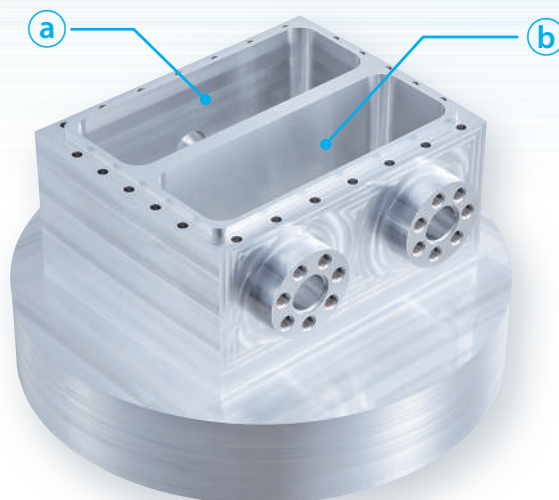
Coolant

※因视频拍摄需要，使用MQL

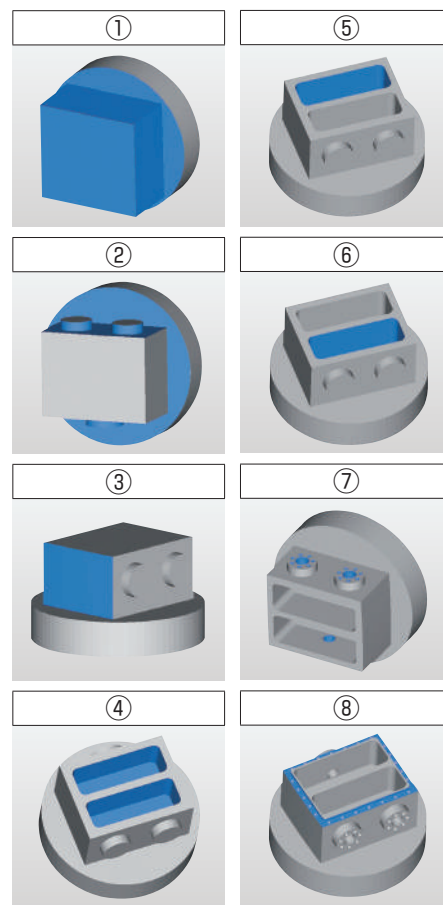
MQL is used for filming the video

但是，螺纹加工·孔加工使用水溶性切削油剂

However, water-soluble coolant is used for threading and drilling



工序编号 Process	加工部位 Processing Location	加工内容 Process	使用工具 Tool
①	上面·侧面 Top and Side	粗加工·精加工 Roughing · Finishing	PFAL04R100M25.4-8 $\phi 100$
②	侧面凸出部 Side Convex Part	粗加工·精加工 Roughing · Finishing	AE-VTFE-N $\phi 12$ (L/D=5.5 66mm)
③	侧面 Side	粗加工·精加工 Roughing · Finishing	AE-VTFE-N $\phi 12$ (L/D=8 96mm)
④	型腔部a、b Pocket	粗加工 Roughing	AE-TS-N $\phi 20 \times 60$
		底面精加工 Bottom Finishing	
⑤	型腔部a Pocket	半精加工 精加工 Semi-finishing · Finishing	AE-VTFE-N $\phi 12$ (L/D=5.5 66mm)
⑥	型腔部b Pocket	半精加工 精加工 Semi-finishing · Finishing	AE-TL-N $\phi 12 \times 60$
⑦	侧面凸出部 Side Convex Part	螺旋孔加工 Helical Milling	AE-VTFE-N $\phi 12$ (L/D=5.5 66mm)
		沉孔加工 Counterboring	
		倒角加工 Chamfering	PLDS11R002SS16-90 $\phi 14.4 \times 90^\circ$
		内螺纹加工 M8×1.25 Threading	AT-2 R-SPEC M8×1.25 6.2×16 P1.25 INT
⑧	密封面 Seal Surface	粗加工·精加工 Roughing · Finishing	AE-VTS-N $\phi 10 \times 30$
		孔加工 Drilling	NF-GDN $\phi 5$



高效率加工的最佳工具

Optimum tooling for highly efficient machining

共用时8分30秒完成4道工序的高效率加工

High-efficiency machining in which 4 processes are completed in a total of 8 minutes and 30 seconds

零部件名: 逆变器壳体

Part Name: Inverter Case

加工材料: AC4C

Work Material

使用机械: SPEEDIO 系列

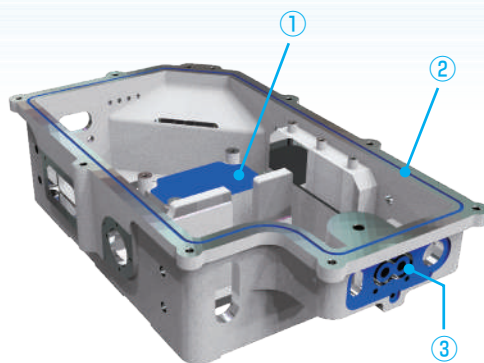
Machine: SPEEDIO series

主轴类型: BT30

Main Spindle

切削油剂: 水溶性切削油剂

Coolant: Water-soluble



合作: 兄弟工业株式会社

Cooperation: BROTHER INDUSTRIES, LTD.

SPEEDIO

介绍加工内容的一部分

Introduction of a part of the machining process

加工位置 Processing Location	使用工具 Tool	加工内容 Process	切削条件 Cutting Condition		切削深度 Depth of Cut	
			切削速度 Cutting Speed (m/min)	进给速度 Feed (mm/min)	a _p (mm)	a _e (mm)
①	刀头: PXAL200C20-03R000 φ20 Head 刀杆: PXMZ-C200SS20-S120 Holder	平面加工 Face Milling	500 (8,000min ⁻¹)	4,000 (0.167mm/t)	4	18
②	AE-TS-N φ3×9	槽铣 Slot Milling	150 (16,000min ⁻¹)	2,000 (0.042mm/t)	1	3
③	AE-VTS-N φ10×30	槽铣 Slot Milling	410 (13,000min ⁻¹)	3,820 (0.098mm/t)	1.5	10

使用工具列表 List of tools used

主要加工内容 Main Machining Processes	使用工具 Tool
基准面加工 Mating Surface Milling	PFAL04R063M22-8 φ63
平面加工 Face Milling	刀头: PXAL200C20-03R000 φ20 Head 刀杆: PXMZ-C200SS20-S120 Holder
轮廓加工 Contour Milling	刀头: PXAL200C20-03R000 φ20 Head 刀杆: PXMZ-C200SS20-S120 Holder AE-VTS-N φ10×30 AE-VML φ12×48-N
槽加工 Slot Milling	AE-TS-N φ3×9 AE-VTS-N φ10×30
孔加工 Drilling	ADO-SUS-3D φ2.8 ADO-SUS-3D φ3.5 ADO-SUS-3D φ4.2 ADO-SUS-3D φ7.9 P2D3000BT30M09 φ30 (非标BT30一体式可转位钻头) Special
平面加工 Flat Surface Drilling	ADF-2D φ13
倒角加工 Chamfering	AD-LDS φ8×90°
螺纹加工 Threading	A-SFT M4×0.5 A-SFT M5×0.8 S-XPFF M3×0.5 AT-2 R-SPEC M8×1.25 6.2×16 P1.25-INT
孔精加工 Hole Finishing	CRM φ8

实现大幅缩短加工时间! Enables dramatic reduction in machining time!

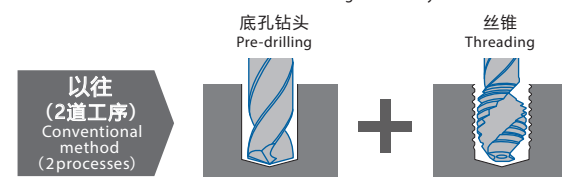
AT-2 R-SPEC

非铁金属用带底刃高效率螺纹铣刀

High-efficiency thread mill with end-cutting edge for non-ferrous metals

A
The A Brand

扫一扫
了解详情
Scan for details



AT-2 R-SPEC



通过一把刀具进行孔钻 & 螺纹一体化的螺旋连续加工
Achieves drilling and threading by continuous helical cutting with a single tool

用于防止铸造孔的加工位置错位!

Useful for preventing shifting of cutting position in cast hole



半导体插座模型的加工

Machining of semiconductor socket model

加工材料：PEEK树脂(30wt%玻璃纤维强化等级)
Work Material : PEEK Resin (30wt% Glass Fiber Reinforced Grade)

使用机械：SPEEDIO系列
Machine : SPEEDIO series

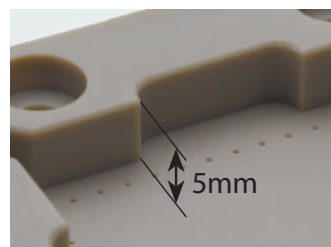
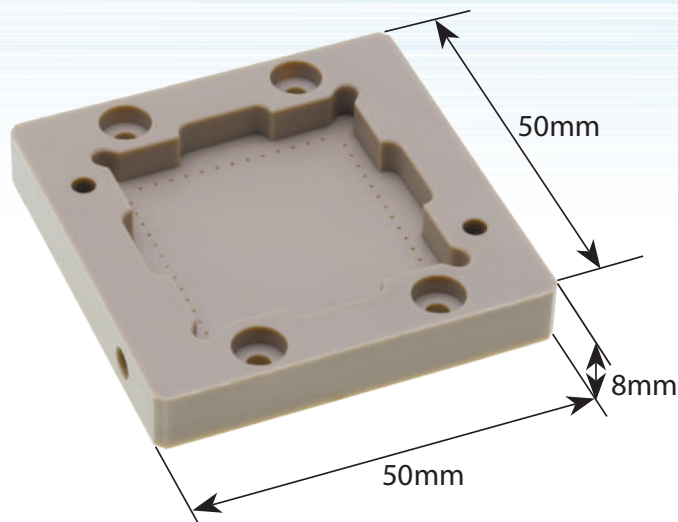
主轴类型：BT30
Main Spindle

工件固定方法：专用粘接剂
Workpiece Fixation Method : Double-sided Tape

切削油剂：气冷式
Coolant : Air-blow

合作：兄弟工业株式会社
Cooperation : BROTHER INDUSTRIES, LTD.

SPEEDIO



使用工具 Tool	加工方法 Processing Method	切削速度 Cutting Speed (m/min)	进给速度 Feed (mm/min)	切削深度 Depth of Cut	
				ap (mm)	ae (mm)
刀体：PFDC09R125M25.4-5($\phi 125 \times 5$ 刃) Body Flutes 刀片：SDHT09T308FR-NM (XP4610) Insert	平面加工 Face Milling	1,000 (2,540min ⁻¹)	838 (0.066mm/t)	0.9	50
AE-TS-N $\phi 10 \times 30$	外周侧铣 Outer Periphery Side Milling	60 (1,910min ⁻¹)	375 (0.065 mm/t)	8	0.45
SEP-EL $\phi 3 \times 9$	内侧粗加工 Inside Roughing	90 (9,550min ⁻¹)	2,865 (0.1mm/t)	2.4	2
SEP-EL $\phi 2 \times 6$	槽加工 Slot Milling	60 (9,550min ⁻¹)	3,820 (0.13mm/t)	2.4	2
	内侧半精加工 Inside Semi-finishing	60 (9,550min ⁻¹)	3,820 (0.13mm/t)	0.5	1.2
MRS-GDL $\phi 0.5$	型腔内孔加工 Pocket Inner Hole Drilling	10 (6,360min ⁻¹)	95 (0.015mm/rev) Step Feed = 0.2mm (G73)	5	—
CA-SCC $\phi 0.8 \times 45^\circ \times 3$	C0.2倒角加工 Chamfering	90 (9,550min ⁻¹)	955 (0.05mm/t)	0.2	0.2
ADF-2D $\phi 6.5$	沉孔加工 Counterboring	40 (1,950min ⁻¹)	390 (0.2mm/rev)	3	—
EX-SUS-GDS $\phi 3$	孔加工 Drilling	40 (4,240min ⁻¹)	382 (0.09mm/rev) Step Feed = 2mm (G73)	5	—
EX-SUS-GDS $\phi 4$	孔加工 Drilling	40 (3,180min ⁻¹)	382 (0.12mm/rev) Step Feed = 2mm (G73)	5	—

阀体加工

Machining of Valve

加工材料：PTFE 树脂

Work Material : PTFE Resin

使用机械：SPEEDIO 系列

Machine : SPEEDIO series

主轴类型：BT30

Main Spindle

工件固定方法：专用粘接剂

Workpiece Fixation Method : Double-sided Tape

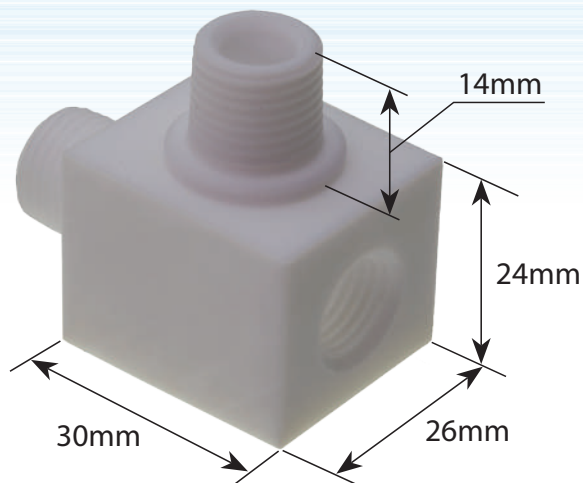
切削油剂：气冷式

Coolant : Air-blow

合作：兄弟工业株式会社

Cooperation : BROTHER INDUSTRIES, LTD.

SPEEDIO



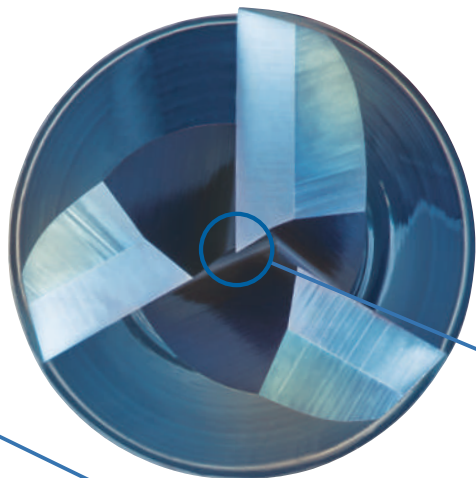
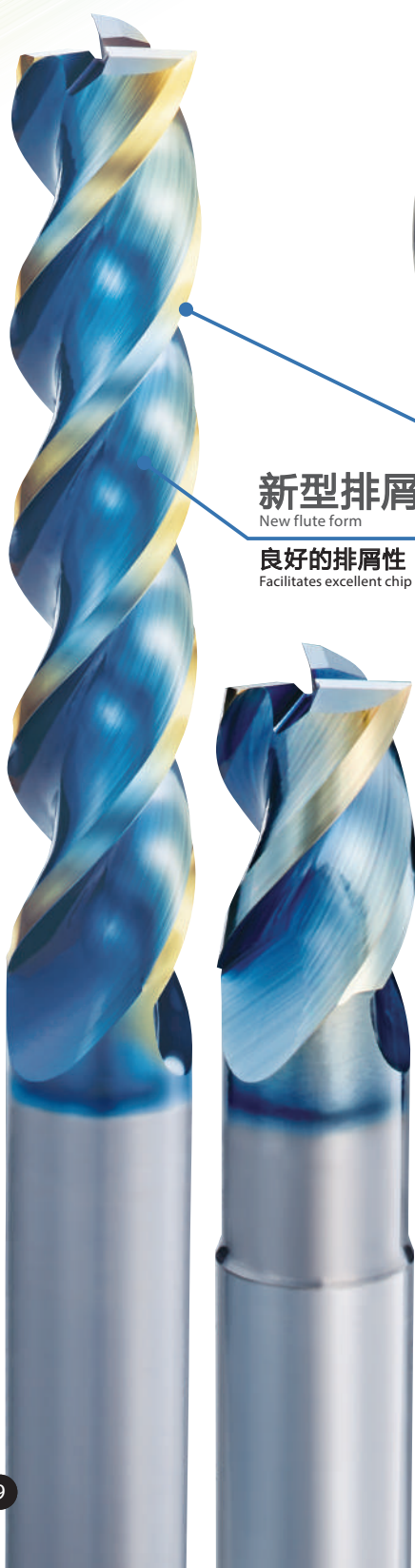
使用工具 Tool	加工方法 Processing Method	切削速度 Cutting Speed (m/min)	进给速度 Feed (mm/min)	切削深度 Depth of Cut	
				a _p (mm)	a _e (mm)
EX-SUS-GDS φ8	孔加工 Drilling	40 (1,590min ⁻¹)	382 (0.24mm/rev) Step Feed = 3mm (G83)	—	—
AE-TS-N φ10×30	R1/4外螺纹部粗加工 External Thread Roughing	90 (2,860min ⁻¹)	1,716 (0.2mm/t)	8	5
AT-1 9.67×14.7 Rc19	R1/4-19外螺纹加工 External Threading	80 (2,890min ⁻¹)	723	9.71	—
CA-SCC φ0.8×45°×3	C0.5倒角加工 Chamfering	50 (5,300min ⁻¹)	530 (0.05mm/t)	0.5	0.5
ADF-2D φ10.9	底孔加工 Pilot Hole Drilling	40 (1,169min ⁻¹)	383 (0.33mm/rev)	11	—
AT-1 9.67×14.7 Rc19	Rc1/4-19内螺纹加工 Internal Threading	80 (2,890min ⁻¹)	723	9.4	—
CA-SCC φ0.8×45°×3	C0.5倒角加工 Chamfering	50 (5,300min ⁻¹)	530 (0.05mm/t)	0.5	0.5

非铁金属加工用DLC硬质合金铣刀
DLC Coated Carbide End Mills for Non-Ferrous Materials

AE-TS-N·AE-TL-N

适用于非铁金属加工的标准式样

Standard specification suitable for non-ferrous material processing



大芯厚

Large core design

高刚性, 防止振动

High rigidity prevents chattering

带中心刃

Center cutting edge

可插铣加工

Can be used for plunging

新型排屑槽

New flute form

良好的排屑性

Facilitates excellent chip evacuation

兼具刚性与锋利性的刃尖式样

Cutting edge specification that achieves both rigidity and sharpness

实现高耐久性和良好的加工面精度

Achieves high durability and good surface finish

Superior Surface Quality

加工面品质

DLC-SUPER HARD涂层

DLC-SUPER HARD Coating

通过涂层表面的平滑度, 对需求耐溶着性和润滑性的铝合金等非铁金属发挥出众的威力。此外, 良好的锋利性可抑制毛刺, 实现优异的加工面品质。

Due to the smoothness of the coating surface, it is extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity. Furthermore, its excellent sharpness and ability to suppress burrs enable superior surface finish.

New Flute Form

新型排屑槽

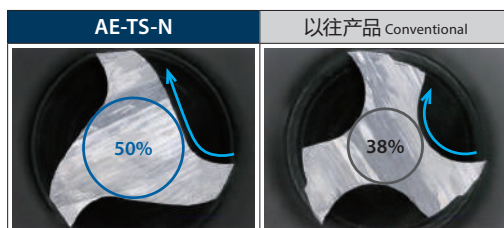
兼具刚性与排屑性

Balancing rigidity and chip evacuation capability

通过大芯厚来提高刚性, 抑制振动。

另外, 采用排屑性良好的新型排屑槽形状, 兼顾刚性与排屑性。

Rigidity is enhanced by increasing the core thickness, which enables the suppression of chattering. By adopting an optimal flute form, high rigidity can be maintained while ensuring trouble-free chip evacuation.



箭头: 排屑示意图 Arrow: indicates chip discharge direction



采用 DLC 涂层, 刀具寿命长

Long tool life with DLC coating

工具的长寿命化可以减少废弃物的产生, 有利于节约资源。

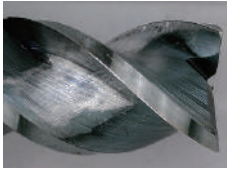
此外, 通过再研磨·再涂层、硬质合金的再循环, 实现了资源循环型的加工环境。

The extension of tool life leads to the reduction of waste, which contributes to resource conservation. Furthermore, a recycling-oriented manufacturing system is achieved through tool regrinding, tool recoating and material recycling.

采用 DLC 涂层, 发挥高耐溶着性, 实现长寿命化。

Demonstrates high welding resistance by adopting the DLC coating, which prolongs tool life.

使用工具 Tool	AE-TS-N φ10×30	其他公司无涂层产品 Non-coated Competitor φ10 3刃 Flutes
加工材料 Work Material	A7075	
加工方法 Processing Method	槽铣 Slot Milling	
切削速度 Cutting Speed	300m/min (9,550min ⁻¹)	
进给速度 Feed	1,430mm/min (0.05mm/t)	
切削深度 Depth of Cut	ap=10mm	
切削油剂 Coolant	气冷式* Air-blow	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	

切削长度 Milling Length	AE-TS-N	其他公司产品 Competitor
11.2m		
56m		

※为了确认 DLC 涂层的效果, 采用气冷式进行试验。
Air-blow was used for the cutting trial to confirm the effect of the DLC coating.

也可对应树脂加工

Also compatible with resin processing

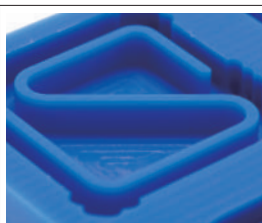
即使使用气冷, 也能实现高效率且良好的加工面品质。

Achieves high efficiency and good machined surface quality even with air-blow.

使用工具 Tool	AE-TL-N φ3×9-SP			
加工材料 Work Material	① PP ② MC 尼龙 ③ PPS 树脂 (GF: 40wt%) MC Nylon PPS Resin			
加工方法 Processing Method	插铣加工 Plunging	槽加工 Slot Milling	型腔加工 Pocket Milling	侧面精加工 Side Finishing
切削速度 Cutting Speed	80m/min (8,500min ⁻¹)			
进给速度 Feed	300mm/min (0.035mm/rev)	2,040mm/min (0.08mm/t)	2,040mm/min (0.08mm/t)	1,020mm/min (0.04mm/t)
切削深度 Depth of Cut	ap=1mm (5次) +0.7mm Pass	ap=1mm (5次) +0.7mm Pass	ap=1mm (5次) +0.7mm ae=1.5mm Pass	ap=5.7mm ae=0.3mm
切削油剂 Coolant	气冷式 Air-blow			
使用机械 Machine	立式加工中心 (BT30) Vertical Machining Center			
工件固定方法 Workpiece Fixation Method	专用粘接剂 Double-sided Tape			



① PP



② MC 尼龙
MC Nylon



③ PPS 树脂
PPS Resin

高精度
High Precision

良好的加工面品质 Good machined surface quality

DLC涂层和适用于非铁金属加工的刃尖式样所取得的效果

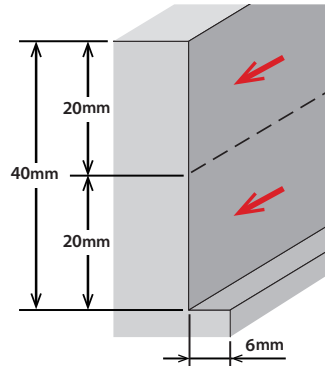
Effects by the combination of DLC coating and unique cutting edge specification for non-ferrous metal machining

实现良好的加工面品质。

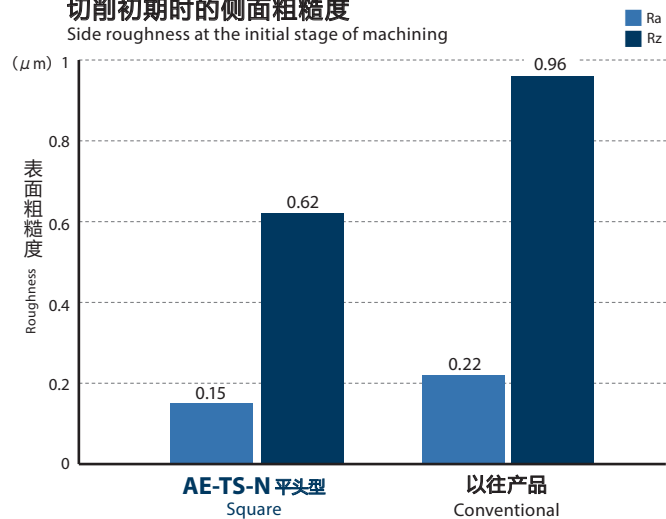
Achieves good machined surface quality.

使用工具 Tool	AE-TS-N 平头型 φ20 Square	以往产品 Conventional
加工材料 Work Material	A7075	
加工方法 Processing Method	侧面分段铣削 Side Step Milling	
切削速度 Cutting Speed	300m/min (4,750min ⁻¹)	
进给速度 Feed	700mm/min (0.05mm/t)*	
切削深度 Depth of Cut	ap=20mm×2次 ae=6mm 2 times	
切削油剂 Coolant	水溶性切削油剂 Water-soluble	
使用机械 Machine	卧式加工中心 (BT50) Horizontal Machining Center	

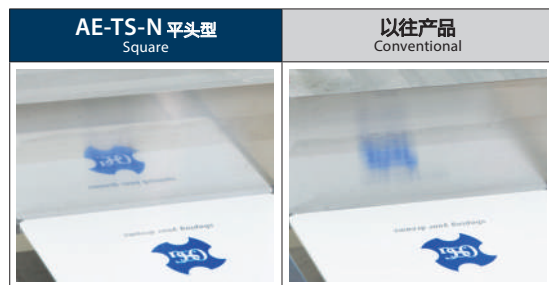
※为了进行切削试验，降低进给速度进行加工。
*Machined at a reduced feed rate for the cutting trial.



切削初期时的侧面粗糙度
Side roughness at the initial stage of machining



良好的加工面 Good machined surface



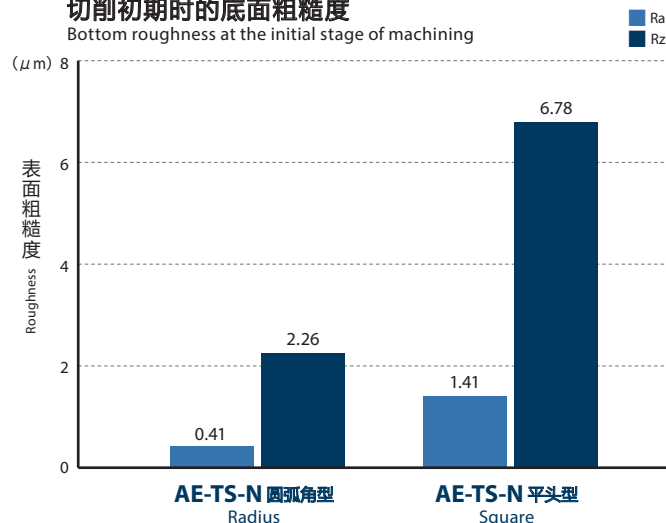
圆弧角型的效果 Effects of the radius type

圆弧角型能有效提高底面加工面的品质。

The radius type is effective in improving the machined surface quality of the bottom surface.

使用工具 Tool	AE-TS-N 圆弧角型 φ6×18×R0.5 Radius	AE-TS-N 平头型 φ6×18 Square
加工材料 Work Material	A7075	
加工方法 Processing Method	槽铣 Slot Milling	
切削速度 Cutting Speed	Vc=350m/min(18,568min ⁻¹)	
进给速度 Feed	Vf=2,785mm/min (0.05mm/t)	
切削深度 Depth of Cut	ap=6mm (1D)	
切削油剂 Coolant	水溶性切削油剂 Water-soluble	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	

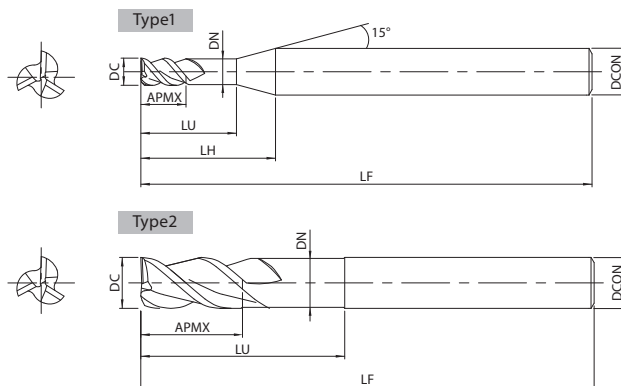
切削初期时的底面粗糙度
Bottom roughness at the initial stage of machining



AE-TS-N 平头型 Square



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.



1.5D 刃长(颈长3D) $1.5 \times D$ cutting length (Neck length $3 \times D$)

单位:mm Unit:mm

商品号 EDP No.	外径×颈长 DC×LU	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	形状 Type	库存 Stock
8557235	1 × 3	45	1.5	8.6	4	0.95	1	●
8557236	1.5 × 4.5	45	2.3	9.3	4	1.45	1	●
8557237	2 × 6	45	3	10.1	4	1.9	1	●
8557238	2.5 × 7.5	45	3.8	10.6	4	2.4	1	●
8557330	3 × 9	55	4.5	14.8	6	2.85	1	●
8557331	4 × 12	55	6	15.9	6	3.8	1	●
8557332	5 × 15	55	7.5	17	6	4.8	1	●
8557333	6 × 18	60	9	—	6	5.8	2	●
8557334	8 × 24	70	12	—	8	7.7	2	●
8557335	10 × 30	75	15	—	10	9.7	2	●
8557336	12 × 36	80	18	—	12	11.7	2	●
8557337	16 × 48	110	24	—	16	15.7	2	●
8557338	20 × 60	120	30	—	20	19.7	2	●
8557339	25 × 75	140	37.5	—	25	24.7	2	●

● = 标准库存品 ● = Standard stock item

标识说明 Guide for Icons

1 材质 Tool Materials

CARBIDE 硬质合金
Tungsten Carbide

2 表面处理 Surface Treatment

DLC DLC 涂层
DLC Coating

DLC-IGUSS DLC-IGUSS 涂层
DLC-IGUSS Coating

3 螺旋角 Helix Angle

41° 表示铣刀排屑槽的螺旋角
Helix angle of flute for end mills

4 R 容许差 Tolerance of Radius

R ±0.02 表示圆弧角铣刀的 R 容许值
Identifies the tolerance of the radius for end mills

5 外径的容许差 Tolerance for milling diameter

表示铣刀的外径
Tolerance for milling diameter

6 圆弧角形状 Corner Form

表示铣刀的圆弧角为尖角
Indicates that the end mill has a sharp corner edge

7 柄部 Shank

SHRINK FIT 也推荐使用热缩刀柄
Suitable for the shrink holder system

8 切削条件 Cutting Condition

SPEED FEED 表示切削条件基准表所在页码
Indicates page number for cutting conditions

标准
Standard

高性能
High Performance

短刃型
Short
AE-TS-N

长刃型
Long
AE-TL-N

长刃带断屑槽刃型
Long With Chipbreaker
AE-TL-N(-N)

短刃型
Short
AE-VTS-N

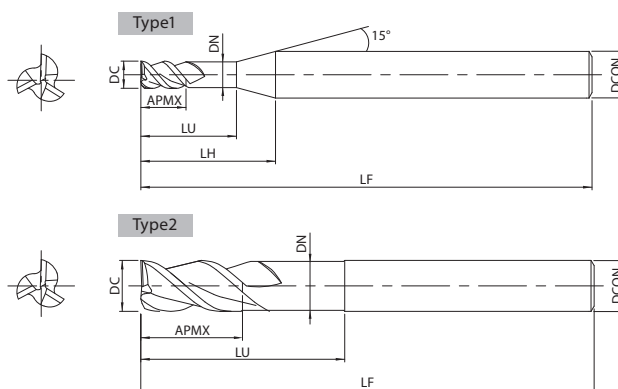
深壁加工型
For Deep Side Milling
AE-VTFE-N

可换头式
Exchangeable Head
PXAL

AE-TS-N 尖角型 Sharp Corner Edge



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.



1.5D刃长(颈长3D) 1.5 × D cutting length (Neck length 3 × D)

单位:mm Unit:mm

商品号 EDP No.	外径×颈长 DC×LU	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	形状 Type	库存 Stock
8557239	1 × 3 -SP	45	1.5	8.6	4	0.95	1	●
8557240	1.5 × 4.5 -SP	45	2.3	9.3	4	1.45	1	●
8557241	2 × 6 -SP	45	3	10.1	4	1.9	1	●
8557242	2.5 × 7.5 -SP	45	3.8	10.6	4	2.4	1	●
8557430	3 × 9 -SP	55	4.5	14.8	6	2.85	1	●
8557431	4 × 12 -SP	55	6	15.9	6	3.8	1	●
8557432	5 × 15 -SP	55	7.5	17	6	4.8	1	●
8557433	6 × 18 -SP	60	9	—	6	5.8	2	●
8557434	8 × 24 -SP	70	12	—	8	7.7	2	●
8557435	10 × 30 -SP	75	15	—	10	9.7	2	●
8557436	12 × 36 -SP	80	18	—	12	11.7	2	●

· 标识说明请参考 p.12。

· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item

可以切削出完全垂直壁面的 尖角型 铣刀

Sharp corner edge type for milling straight corners

所谓尖角型是没有尖角保护的刃尖式样。可以加工出直角。

The sharp corner edge type is designed without a gash land cutting edge specification, enabling it to mill straight corners.

适用于不可有切削残余的圆弧角形状的加工。

Effective corner milling with no uncut residue left behind.



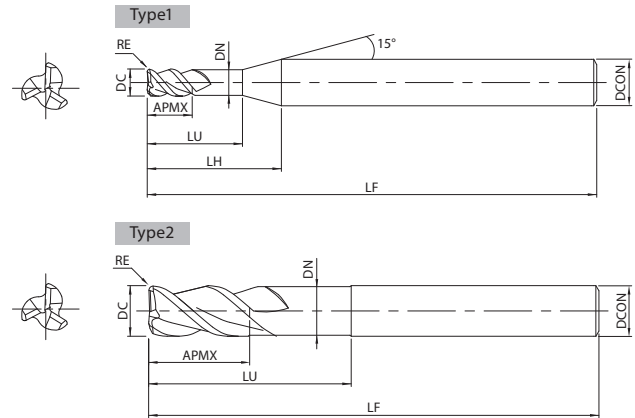
尖角型(-SP)
Sharp Corner Edge

平头型
Square Type

AE-TS-N 圆弧角型 Radius



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.



1.5D 刃长(颈长3D) 1.5 × D cutting length (Neck length 3 × D)

单位:mm Unit:mm

商品号 EDP No.	外径×颈长×圆弧半径 DC×LU×RE	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	形状 Type	库存 Stock
8557370	3 × 9 × R0.2	55	4.5	14.8	6	2.85	1	●
8557371	3 × 9 × R0.5							●
8557372	4 × 12 × R0.2	55	6	15.9	6	3.8	1	●
8557373	4 × 12 × R0.5							●
8557374	4 × 12 × R1							●
8557375	5 × 15 × R0.2	55	7.5	17	6	4.8	1	●
8557376	5 × 15 × R0.5							●
8557377	5 × 15 × R1							●
8557378	6 × 18 × R0.3	60	9	—	6	5.8	2	●
8557379	6 × 18 × R0.5							●
8557380	6 × 18 × R1							●
8557381	8 × 24 × R0.3	70	12	—	8	7.7	2	●
8557382	8 × 24 × R0.5							●
8557383	8 × 24 × R1							●
8557384	8 × 24 × R1.5							●
8557385	8 × 24 × R2							●
8557386	10 × 30 × R0.3	75	15	—	10	9.7	2	●
8557387	10 × 30 × R0.5							●
8557388	10 × 30 × R1							●
8557389	10 × 30 × R1.5							●
8557390	10 × 30 × R2							●
8557391	10 × 30 × R3	80	18	—	12	11.7	2	●
8557392	12 × 36 × R0.3							●
8557393	12 × 36 × R0.5							●
8557394	12 × 36 × R1							●
8557395	12 × 36 × R1.5							●
8557396	12 × 36 × R2							●
8557397	12 × 36 × R3							●

· 标识说明请参考 p.12.

· See p.12 for explanation of icons.

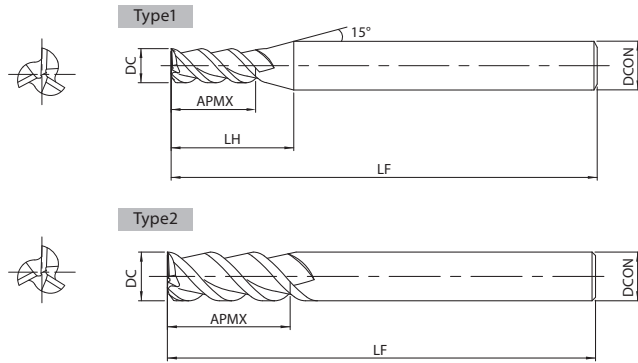
● = 标准库存品 ● = Standard stock item



AE-TL-N 平头型 Square



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.



3D刃长 3 × D cutting length

单位:mm Unit:mm

商品号 EDP No.	外径×刃长 DC×APMX	L/D	全长 LF	LH	柄径 DCON	形状 Type	库存 Stock
8557340	3 × 9	3	55	16.6	6	1	●
8557341	4 × 12	3	55	17.7	6	1	●
8557342	5 × 15	3	55	18.9	6	1	●
8557343	6 × 18	3	60	—	6	2	●
8557344	8 × 24	3	70	—	8	2	●
8557345	10 × 30	3	75	—	10	2	●
8557346	12 × 36	3	80	—	12	2	●
8557347	16 × 48	3	120	—	16	2	●
8557348	20 × 60	3	135	—	20	2	●
8557349	25 × 75	3	155	—	25	2	●

· 标识说明请参考 p.12.

· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item

5D刃长 5 × D cutting length

单位:mm Unit:mm

商品号 EDP No.	外径×刃长 DC×APMX	L/D	全长 LF	LH	柄径 DCON	形状 Type	库存 Stock
8557350	3 × 15	5	55	22.6	6	1	●
8557351	4 × 20	5	60	25.7	6	1	●
8557352	5 × 25	5	65	28.9	6	1	●
8557353	6 × 30	5	75	—	6	2	●
8557354	8 × 40	5	90	—	8	2	●
8557355	10 × 50	5	100	—	10	2	●
8557356	12 × 60	5	110	—	12	2	●
8557357	16 × 80	5	150	—	16	2	●
8557358	20 × 100	5	175	—	20	2	●
8557359	25 × 125	5	205	—	25	2	●

· 标识说明请参考 p.12.

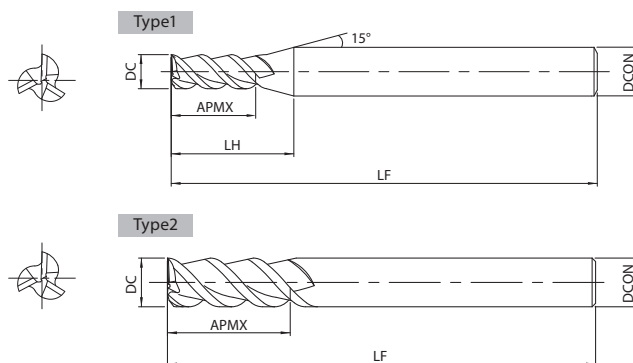
· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item

AE-TL-N 尖角型 Sharp Corner Edge



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.



3D刃长 3 × D cutting length

单位:mm Unit:mm

商品号 EDP No.	外径×刃长 DC×APMX	L/D	全长 LF	LH	柄径 DCON	形状 Type	库存 Stock
8557440	3 × 9-SP	3	55	16.6	6	1	●
8557441	4 × 12-SP	3	55	17.7	6	1	●
8557442	5 × 15-SP	3	55	18.9	6	1	●
8557443	6 × 18-SP	3	60	—	6	2	●
8557444	8 × 24-SP	3	70	—	8	2	●
8557445	10 × 30-SP	3	75	—	10	2	●
8557446	12 × 36-SP	3	80	—	12	2	●

· 标识说明请参考 p.12.

· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item

5D刃长 5 × D cutting length

单位:mm Unit:mm

商品号 EDP No.	外径×刃长 DC×APMX	L/D	全长 LF	LH	柄径 DCON	形状 Type	库存 Stock
8557450	3 × 15-SP	5	55	22.6	6	1	●
8557451	4 × 20-SP	5	60	25.7	6	1	●
8557452	5 × 25-SP	5	65	28.9	6	1	●
8557453	6 × 30-SP	5	75	—	6	2	●
8557454	8 × 40-SP	5	90	—	8	2	●
8557455	10 × 50-SP	5	100	—	10	2	●
8557456	12 × 60-SP	5	110	—	12	2	●

· 标识说明请参考 p.12.

· See p.12 for explanation of icons.

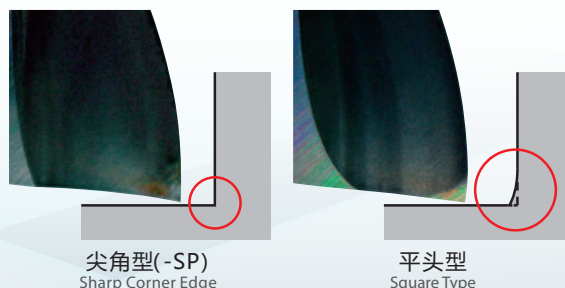
● = 标准库存品 ● = Standard stock item

可以切削出完全垂直壁面的 尖角型 铣刀 Sharp corner edge type for milling straight corners

所谓尖角型是没有尖角保护的刃尖式样。可以加工出直角。

The sharp corner edge type is designed without a gash land cutting edge specification, enabling it to mill straight corners.

适用于不可有切削残余的圆角形状的加工。
Effective corner milling with no uncut residue left behind.

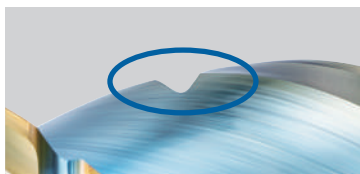


AE-TL-N 带断屑槽刃型(-N)

With Chipbreaker

采用独特的R形刃口断屑槽设计，可有效防止崩刃，同时降低加工面的切削痕残留。

Adding a radius (R) to the chipbreaker corner helps prevent chipping and minimizes streaks on the machined surface.



是否为切屑堆积问题而困扰？

Troubled by long and stringy chip accumulation?

非铁金属具有出色的可加工性，可实现高效率加工。然而，加工过程中会产生大量的切屑，若堆积在机床工作台或床身上，可能会影响加工的稳定性和效率。

Non-ferrous materials offer excellent machinability, enabling high-efficiency processing. However, during machining, large volumes of chips can accumulate on the machine table or bed, potentially impacting stability and overall efficiency.



细小分断切屑！

Breaks chips into small pieces!

机械可连续运转

Enables continuous machine operation

带断屑槽刃型(-N)可细小分断切屑。因此，用气冷或切削油剂很容易去除切屑。(如果需要高品质的加工面时，推荐使用无断屑槽刃的AE-TL-N)

The chipbreaker (-N) creates small chips that can be easily evacuated by air or cutting oil. (For high-quality machined surfaces, we recommend the AE-TL-N type without chipbreaker.)



减少机械停止时间，节约能源

Energy conservation by reducing machine downtime

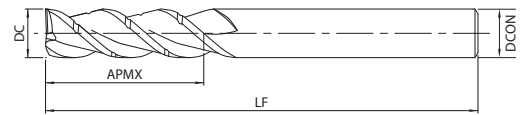
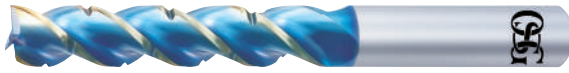
减少因切屑堆积而导致的机械停止时间。

Reduction of machine downtime caused by chip accumulation.

使用工具 Tool	AE-TL-N $\phi 12 \times 60$ -N (带断屑槽刃型) (With chipbreaker)
加工材料 Work Material	A7075
加工方法 Processing Method	余摆线加工 Trochoidal Milling
切削速度 Cutting Speed	100m/min (2,700min ⁻¹)
进给速度 Feed	1,050mm/min (0.13mm/t)
切削深度 Depth of Cut	$a_p=60$ mm $a_e=1.2$ mm
切削油剂 Coolant	气冷式 Air-blow
使用机械 Machine	立式加工中心 (HSK-A63) Vertical Machining Center



AE-TL-N 带断屑槽刃 平头型 Square With Chipbreaker



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.



3D 刃长 3 × D cutting length

单位:mm Unit:mm

商品号 EDP No.	外径×刃长 DC×APMX	L/D	全长 LF	柄径 DCON	库存 Stock
8558200	6 × 18 -N	3	60	6	●
8558201	8 × 24 -N	3	70	8	●
8558202	10 × 30 -N	3	75	10	●
8558203	12 × 36 -N	3	80	12	●
8558204	16 × 48 -N	3	120	16	●
8558205	20 × 60 -N	3	135	20	●

· 标识说明请参考 p.12.

· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item

5D 刃长 5 × D cutting length

单位:mm Unit:mm

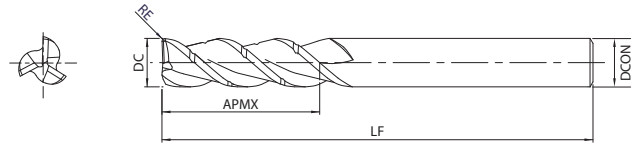
商品号 EDP No.	外径×刃长 DC×APMX	L/D	全长 LF	柄径 DCON	库存 Stock
8558210	6 × 30 -N	5	75	6	●
8558211	8 × 40 -N	5	90	8	●
8558212	10 × 50 -N	5	100	10	●
8558213	12 × 60 -N	5	110	12	●
8558214	16 × 80 -N	5	150	16	●
8558215	20 × 100 -N	5	175	20	●

· 标识说明请参考 p.12.

· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item

AE-TL-N 带断屑槽刃 圆弧角型 Radius With Chipbreaker



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.



3D刃长 3 × D cutting length

单位:mm Unit:mm

商品号 EDP No.	外径×刃长×圆弧半径 DC×APMX×RE	L/D	全长 LF	柄径 DCON	库存 Stock
8558300	6 × 18 × R0.3 -N	3	60	6	●
8558301	6 × 18 × R0.5 -N				●
8558302	6 × 18 × R1 -N				●
8558303	8 × 24 × R0.3 -N	3	70	8	●
8558304	8 × 24 × R0.5 -N				●
8558305	8 × 24 × R1 -N				●
8558306	8 × 24 × R2 -N				●
8558307	10 × 30 × R0.3 -N	3	75	10	●
8558308	10 × 30 × R0.5 -N				●
8558309	10 × 30 × R1 -N				●
8558310	10 × 30 × R2 -N				●
8558311	10 × 30 × R3 -N				●
8558312	12 × 36 × R0.3 -N	3	80	12	●
8558313	12 × 36 × R0.5 -N				●
8558314	12 × 36 × R1 -N				●
8558315	12 × 36 × R2 -N				●
8558316	12 × 36 × R3 -N				●
8558317	16 × 48 × R0.5 -N	3	120	16	●
8558318	20 × 60 × R0.5 -N	3	135	20	●

· 标识说明请参考 p.12。

· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item



5D刃长 5×D cutting length

单位:mm Unit:mm

商品号 EDP No.	外径×刃长×圆弧半径 DC×APMX×RE	L/D	全长 LF	柄径 DCON	库存 Stock
8558350	6 × 30 × R0.3 -N	5	75	6	●
8558351	6 × 30 × R0.5 -N				●
8558352	6 × 30 × R1 -N				●
8558353	8 × 40 × R0.3 -N	5	90	8	●
8558354	8 × 40 × R0.5 -N				●
8558355	8 × 40 × R1 -N				●
8558356	8 × 40 × R2 -N				●
8558357	10 × 50 × R0.3 -N	5	100	10	●
8558358	10 × 50 × R0.5 -N				●
8558359	10 × 50 × R1 -N				●
8558360	10 × 50 × R2 -N				●
8558361	10 × 50 × R3 -N				●
8558362	12 × 60 × R0.3 -N	5	110	12	●
8558363	12 × 60 × R0.5 -N				●
8558364	12 × 60 × R1 -N				●
8558365	12 × 60 × R2 -N				●
8558366	12 × 60 × R3 -N				●
8558367	16 × 80 × R0.5 -N	5	150	16	●
8558368	20 × 100 × R0.5 -N	5	175	20	●

● = 标准库存品 ● = Standard stock item

AE-TS-N 切削条件基准表 Cutting Condition

平头型/尖角型/圆弧角型通用 Applies to square/sharp corner edge/radius type

槽铣 Slot Milling

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	300		300		150	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	32,000	1,200	32,000	1,200	16,000	540
1.5 × 4.5	32,000	1,350	32,000	1,350	16,000	610
2 × 6	32,000	1,540	32,000	1,540	16,000	660
2.5 × 7.5	32,000	1,630	32,000	1,630	16,000	810
3 × 9	32,000	1,720	32,000	1,720	16,000	960
4 × 12	24,000	1,780	24,000	1,780	12,000	1,030
5 × 15	19,200	1,840	19,200	1,840	9,600	1,090
6 × 18	16,000	1,900	16,000	1,900	8,000	1,160
8 × 24	12,000	2,030	12,000	2,030	6,000	1,300
10 × 30	9,600	2,150	9,600	2,150	4,800	1,430
12 × 36	8,000	2,270	8,000	2,270	4,000	1,560
16 × 48	6,000	2,380	6,000	2,380	3,000	1,630
20 × 60	4,800	2,490	4,800	2,490	2,400	1,700
25 × 75	3,850	2,600	3,850	2,600	1,900	1,780
切削深度 Depth of Cut	ap 1D				ap 0.5D	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC尼龙 · ABS树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	90		70		90		90	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	25,500	1,910	19,100	1,150	25,500	1,150	25,500	1,150
1.5 × 4.5	17,000	1,530	12,700	950	17,000	770	17,000	770
2 × 6	12,700	1,330	9,500	860	12,700	760	12,700	760
2.5 × 7.5	10,200	1,220	7,600	800	10,200	610	10,200	610
3 × 9	8,500	1,150	6,400	770	8,500	510	8,500	510
4 × 12	6,400	1,090	4,800	750	6,400	480	6,400	480
5 × 15	5,100	1,070	3,800	740	5,100	460	5,100	460
6 × 18	4,200	1,010	3,200	740	4,200	440	4,200	440
8 × 24	3,200	960	2,600	740	3,200	390	3,200	390
10 × 30	2,900	870	2,200	630	2,900	390	2,900	390
12 × 36	2,400	790	2,000	630	2,400	360	2,400	360
16 × 48	2,000	720	1,600	550	2,000	360	2,000	360
20 × 60	1,600	620	1,300	490	1,600	340	1,600	340
25 × 75	1,300	590	1,000	440	1,300	310	1,300	310
切削深度 Depth of Cut			DC ≤ 12 12 < DC		ap 1D 0.5D			

上表适用于使用气冷的情况。

The table above is for when using air-blow.

- 请使用高刚性，高精度的机械、刀柄。
- 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
- 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
- 悬伸较长的情况下，请参考「根据悬伸量变化的切削条件调整参考值」来调整转速及进给速度(参考 p.24)。
- 切屑缠绕时，请下调转速和进给速度。
- 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
- 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
- 对于更高质量的树脂加工，推荐使用水溶性切削油剂(尼龙系和酚醛塑料除外)。

- Use a rigid and precise machine and holder.
- Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
- Reduce speed and feed as well as depth of cut when high precision is required.
- Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.24).
- When the chips wind around the end mill, reduce the speed and feed.
- Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
- When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
- For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).



平头型 / 尖角型 / 圆弧角型通用 Applies to square/sharp corner edge/radius type

侧铣 Side Milling

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	300		300		150	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	32,000	1,300	32,000	1,300	16,000	600
1.5 × 4.5	32,000	1,430	32,000	1,430	16,000	660
2 × 6	32,000	1,730	32,000	1,730	16,000	720
2.5 × 7.5	32,000	1,920	32,000	1,920	16,000	900
3 × 9	32,000	2,150	32,000	2,150	16,000	1,200
4 × 12	24,000	2,230	24,000	2,230	12,000	1,290
5 × 15	19,200	2,300	19,200	2,300	9,600	1,360
6 × 18	16,000	2,380	16,000	2,380	8,000	1,450
8 × 24	12,000	2,540	12,000	2,540	6,000	1,620
10 × 30	9,600	2,690	9,600	2,690	4,800	1,780
12 × 36	8,000	2,840	8,000	2,840	4,000	1,950
16 × 48	6,000	2,980	6,000	2,980	3,000	2,040
20 × 60	4,800	3,100	4,800	3,100	2,400	2,130
25 × 75	3,850	3,200	3,850	3,200	1,900	2,200
切削深度 Depth of Cut			ap 1.5D		ae 0.2D	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC尼龙 · ABS树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	110		90		110		110	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	31,800	2,390	25,500	1,530	31,800	1,430	31,800	1,430
1.5 × 4.5	21,200	1,910	17,000	1,280	21,200	950	21,200	950
2 × 6	15,900	1,670	12,700	1,140	15,900	950	15,900	950
2.5 × 7.5	12,700	1,520	10,200	1,070	12,700	760	12,700	760
3 × 9	10,600	1,430	8,500	1,020	10,600	640	10,600	640
4 × 12	8,000	1,370	6,400	1,000	8,000	600	8,000	600
5 × 15	6,400	1,340	5,100	990	6,400	580	6,400	580
6 × 18	5,300	1,270	4,200	950	5,300	560	5,300	560
8 × 24	4,000	1,200	3,400	870	4,000	480	4,000	480
10 × 30	3,500	1,050	2,900	830	3,500	470	3,500	470
12 × 36	2,900	960	2,500	790	2,900	440	2,900	440
16 × 48	2,400	860	2,000	690	2,400	430	2,400	430
20 × 60	1,900	740	1,600	600	1,900	400	1,900	400
25 × 75	1,500	680	1,300	570	1,500	360	1,500	360
切削深度 Depth of Cut			ap 1.5D		ae 0.5D			

上表适用于使用气冷的情况。

The table above is for when using air-blow.

1. 请使用高刚性，高精度的机械、刀柄。
2. 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
3. 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
4. 悬伸较长的情况下，请参考「根据悬伸量变化的切削条件调整参考值」来调整转速及进给速度(参考p.24)。
5. 切屑缠绕时，请下调转速和进给速度。
6. 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
7. 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
8. 对于更高质量的树脂加工，推荐使用水溶性切削油剂(尼龙系和酚醛塑料除外)。

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
3. Reduce speed and feed as well as depth of cut when high precision is required.
4. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.24).
5. When the chips wind around the end mill, reduce the speed and feed.
6. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
7. When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
8. For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).

AE-TS-N 切削条件基准表 Cutting Condition

平头型 / 尖角型 / 圆弧角型通用 Applies to square/sharp corner edge/radius type

插铣 Plunging

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	80		80		60	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	16,000	350	16,000	350	10,000	100
1.5 × 4.5	16,000	350	16,000	350	9,000	100
2 × 6	12,750	350	12,750	350	8,500	100
2.5 × 7.5	10,000	350	10,000	350	8,000	100
3 × 9	8,500	400	8,500	400	6,400	120
4 × 12	6,400	400	6,400	400	4,800	120
5 × 15	5,100	400	5,100	400	3,800	120
6 × 18	4,200	450	4,200	450	3,100	130
8 × 24	3,200	500	3,200	500	2,400	150
10 × 30	2,550	500	2,550	500	1,900	150
12 × 36	2,100	500	2,100	500	1,600	150
16 × 48	1,600	550	1,600	550	1,200	170
20 × 60	1,300	550	1,300	550	960	170
25 × 75	1,020	550	1,020	550	770	170
切削深度 Depth of Cut	ap 1D				ap 0.5D	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC尼龙 · ABS树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	90		70		90		90	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	25,500	480	19,100	290	25,500	290	25,500	290
1.5 × 4.5	17,000	380	12,700	240	17,000	190	17,000	190
2 × 6	12,700	330	9,500	210	12,700	190	12,700	190
2.5 × 7.5	10,200	310	7,600	200	10,200	150	10,200	150
3 × 9	8,500	290	6,400	190	8,500	130	8,500	130
4 × 12	6,400	270	4,800	190	6,400	120	6,400	120
5 × 15	5,100	270	3,800	190	5,100	110	5,100	110
6 × 18	4,200	250	3,200	190	4,200	110	4,200	110
8 × 24	3,200	250	2,600	190	3,200	110	3,200	110
10 × 30	2,900	250	2,200	180	2,900	110	2,900	110
12 × 36	2,400	250	2,000	180	2,400	110	2,400	110
16 × 48	2,000	240	1,600	180	2,000	110	2,000	110
20 × 60	1,600	210	1,300	160	1,600	110	1,600	110
25 × 75	1,300	200	1,000	150	1,300	100	1,300	100
切削深度 Depth of Cut								
	ap							
	1D							

上表适用于使用气冷的情况。

The table above is for when using air-blow.

1. 请使用高刚性，高精度的机械、刀柄。
2. 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
3. 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
4. 悬伸较长的情况下，请参考「根据悬伸量变化的切削条件调整参考值」来调整转速及进给速度(参考 p.24)。
5. 切屑缠绕时，请下调转速和进给速度。
6. 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
7. 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
8. 对于更高质量的树脂加工，推荐使用水溶性切削油剂(尼龙系和酚醛塑料除外)。
9. 插铣加工树脂时，请进行阶梯进给。

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
3. Reduce speed and feed as well as depth of cut when high precision is required.
4. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.24).
5. When the chips wind around the end mill, reduce the speed and feed.
6. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
7. When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
8. For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).
9. Please step feed when processing resin by plunging.



平头型 / 尖角型 / 圆弧角型通用 Applies to square/sharp corner edge/radius type

根据悬伸量变化的切削条件调整参考值(DC = $\phi 6$ 、 $\phi 8$) Cutting Condition Guide for Changes in Overhang Length

	加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
	悬长 L/D	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
槽铣 Slot Milling	5	70%		70%		70%	
	6	40%		40%		40%	
侧铣 Side Milling	5	70%		70%		70%	
	6	50%		50%		50%	
插铣 Plunging	5	80%		80%		80%	
	6	60%		60%		60%	

AE-TL-N 切削条件基准表 Cutting Condition

3D刃长 3 × D cutting length

平头型 / 尖角型 / 带断屑槽刃型通用 Applies to square/sharp corner edge /chipbreaker type

槽铣 Slot Milling

加工材料 Work Material	铝合金延伸材 · 镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	240		240		120	
外径 × 刃长 DC × APMX	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
3 × 9	25,600	1,380	25,600	1,380	12,800	770
4 × 12	19,200	1,420	19,200	1,420	9,600	820
5 × 15	15,360	1,470	15,360	1,470	7,680	870
6 × 18	12,800	1,520	12,800	1,520	6,400	930
8 × 24	9,600	1,620	9,600	1,620	4,800	1,040
10 × 30	7,680	1,720	7,680	1,720	3,840	1,140
12 × 36	6,400	1,820	6,400	1,820	3,200	1,250
16 × 48	4,800	1,920	4,800	1,920	2,400	1,320
20 × 60	3,800	2,020	3,800	2,020	1,900	1,390
25 × 75	3,060	2,120	3,060	2,120	1,530	1,460
切削深度 Depth of Cut	ap 1D				ap 0.5D	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC 尼龙 · ABS 树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	90		70		90		90	
外径 × 刃长 DC × APMX	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
3 × 9	8,500	1,150	6,400	770	8,500	510	8,500	510
4 × 12	6,400	1,090	4,800	750	6,400	480	6,400	480
5 × 15	5,100	1,070	3,800	740	5,100	460	5,100	460
6 × 18	4,200	1,010	3,200	740	4,200	440	4,200	440
8 × 24	3,200	960	2,600	740	3,200	390	3,200	390
10 × 30	2,900	870	2,200	630	2,900	390	2,900	390
12 × 36	2,400	790	2,000	630	2,400	360	2,400	360
16 × 48	2,000	720	1,600	550	2,000	360	2,000	360
20 × 60	1,600	620	1,300	490	1,600	340	1,600	340
25 × 75	1,300	590	1,000	440	1,300	310	1,300	310
切削深度 Depth of Cut			DC ≤ 12		ap 1D		12 < DC	
							0.5D	

上表适用于使用气冷的情况。

The table above is for when using air-blow.

- 1. 请使用高刚性，高精度的机械、刀柄。
- 2. 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
- 3. 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
- 4. 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
- 5. 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
- 6. 对于更高质量的树脂加工，推荐使用水溶性切削油剂（尼龙系和酚醛塑料除外）。

- 1. Use a rigid and precise machine and holder.
- 2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
- 3. Reduce speed and feed as well as depth of cut when high precision is required.
- 4. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
- 5. When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
- 6. For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).



3D刃长 $3 \times D$ cutting length

平头型 / 尖角型 / 带断屑槽刃型通用 Applies to square/sharp corner edge /chipbreaker type

侧铣 Side Milling

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	240		240		120	
外径×刃长 DC×APMX	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
3 × 9	25,600	1,720	25,600	1,720	12,800	960
4 × 12	19,200	1,780	19,200	1,780	9,600	1,020
5 × 15	15,360	1,840	15,360	1,840	7,680	1,080
6 × 18	12,800	1,900	12,800	1,900	6,400	1,160
8 × 24	9,600	2,030	9,600	2,030	4,800	1,300
10 × 30	7,680	2,150	7,680	2,150	3,840	1,420
12 × 36	6,400	2,270	6,400	2,270	3,200	1,550
16 × 48	4,800	2,390	4,800	2,390	2,400	1,630
20 × 60	3,800	2,510	3,800	2,510	1,900	1,710
25 × 75	3,060	2,640	3,060	2,640	1,530	1,800
切削深度 Depth of Cut			a_p 3D		a_e 0.1D	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC尼龙 · ABS树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	110		90		110		110	
外径×刃长 DC×APMX	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
3 × 9	10,600	1,430	8,500	1,020	10,600	640	10,600	640
4 × 12	8,000	1,370	6,400	1,000	8,000	600	8,000	600
5 × 15	6,400	1,340	5,100	990	6,400	580	6,400	580
6 × 18	5,300	1,270	4,200	950	5,300	560	5,300	560
8 × 24	4,000	1,200	3,400	870	4,000	480	4,000	480
10 × 30	3,500	1,050	2,900	830	3,500	470	3,500	470
12 × 36	2,900	960	2,500	790	2,900	440	2,900	440
16 × 48	2,400	860	2,000	690	2,400	430	2,400	430
20 × 60	1,900	740	1,600	600	1,900	400	1,900	400
25 × 75	1,500	680	1,300	570	1,500	360	1,500	360
切削深度 Depth of Cut			a_p 3D		a_e 0.2D			

上表适用于使用气冷的情况。

The table above is for when using air-blow.

- 请使用高刚性，高精度的机械、刀柄。
- 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
- 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
- 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
- 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
- 对于更高质量的树脂加工，推荐使用水溶性切削油剂（尼龙系和酚醛塑料除外）。

- Use a rigid and precise machine and holder.
- Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
- Reduce speed and feed as well as depth of cut when high precision is required.
- Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
- When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
- For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).

AE-TL-N 切削条件基准表 Cutting Condition

3D刃长 3 × D cutting length

平头型 / 尖角型 / 带断屑槽刃型通用 Applies to square/sharp corner edge /chipbreaker type

插铣 Plunging

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	70		70		50	
外径×刃长 DC×APMX	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
3 × 9	7,500	350	7,500	350	5,300	100
4 × 12	5,600	350	5,600	350	3,980	100
5 × 15	4,460	350	4,460	350	3,180	100
6 × 18	3,680	400	3,680	400	2,650	110
8 × 24	2,800	450	2,800	450	1,990	120
10 × 30	2,230	450	2,230	450	1,590	120
12 × 36	1,840	450	1,840	450	1,330	120
16 × 48	1,400	500	1,400	500	1,000	130
20 × 60	1,100	500	1,100	500	800	130
25 × 75	890	500	890	500	640	130
切削深度 Depth of Cut	ap 1D				ap 0.5D	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC尼龙 · ABS树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	90		70		90		90	
外径×刃长 DC×APMX	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
3 × 9	8,500	290	6,400	190	8,500	130	8,500	130
4 × 12	6,400	270	4,800	190	6,400	120	6,400	120
5 × 15	5,100	270	3,800	190	5,100	110	5,100	110
6 × 18	4,200	250	3,200	190	4,200	110	4,200	110
8 × 24	3,200	250	2,600	190	3,200	110	3,200	110
10 × 30	2,900	250	2,200	180	2,900	110	2,900	110
12 × 36	2,400	250	2,000	180	2,400	110	2,400	110
16 × 48	2,000	240	1,600	180	2,000	110	2,000	110
20 × 60	1,600	210	1,300	160	1,600	110	1,600	110
25 × 75	1,300	200	1,000	150	1,300	100	1,300	100
切削深度 Depth of Cut								
	ap							
	1D							

上表适用于使用气冷的情况。

The table above is for when using air-blow.

1. 请使用高刚性、高精度的机械、刀柄。
2. 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
3. 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
4. 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
5. 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
6. 对于更高质量的树脂加工，推荐使用水溶性切削油剂(尼龙系和酚醛塑料除外)。
7. 插铣加工树脂时，请进行阶梯进给。

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
3. Reduce speed and feed as well as depth of cut when high precision is required.
4. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
5. When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
6. For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).
7. Please step feed when processing resin by plunging.



5D刃长 $5 \times D$ cutting length

平头型 / 尖角型 / 带断屑槽刃型通用 Applies to square/sharp corner edge /chipbreaker type

侧铣 Side Milling

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	100		100		50	
外径×刃长 DC×APMX	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
3 × 15	10,600	640	10,600	640	5,300	200
4 × 20	8,000	690	8,000	690	4,000	210
5 × 25	6,400	730	6,400	730	3,200	230
6 × 30	5,300	780	5,300	780	2,600	240
8 × 40	4,000	870	4,000	870	2,000	260
10 × 50	3,200	960	3,200	960	1,600	290
12 × 60	2,700	1,050	2,700	1,050	1,300	320
16 × 80	2,000	1,140	2,000	1,140	1,000	350
20 × 100	1,600	1,230	1,600	1,230	800	380
25 × 125	1,300	1,320	1,300	1,320	640	400
切削深度 Depth of Cut						
	a_p		a_e			
	5D		0.1D			

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC尼龙 · ABS树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	85		70		85		85	
外径×刃长 DC×APMX	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
3 × 15	8,500	1,150	6,800	820	8,500	510	8,500	510
4 × 20	6,400	960	5,100	770	6,400	480	6,400	480
5 × 25	5,100	900	4,100	740	5,100	460	5,100	460
6 × 30	4,200	880	3,400	710	4,200	440	4,200	440
8 × 40	3,200	770	2,700	650	3,200	380	3,200	380
10 × 50	2,800	740	2,300	620	2,550	380	2,550	380
12 × 60	2,300	660	2,000	600	2,300	350	2,300	350
16 × 80	1,900	570	1,600	480	1,900	340	1,900	340
20 × 100	1,500	450	1,300	390	1,500	270	1,500	270
25 × 125	1,200	360	1,000	300	1,200	220	1,200	220
切削深度 Depth of Cut								
	a_p		a_e					
	5D		0.1D					

上表适用于使用气冷的情况。

The table above is for when using air-blow.

1. 请使用高刚性，高精度的机械、刀柄。
2. 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
3. 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
4. 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
5. 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
6. 对于更高质量的树脂加工，推荐使用水溶性切削油剂（尼龙系和酚醛塑料除外）。

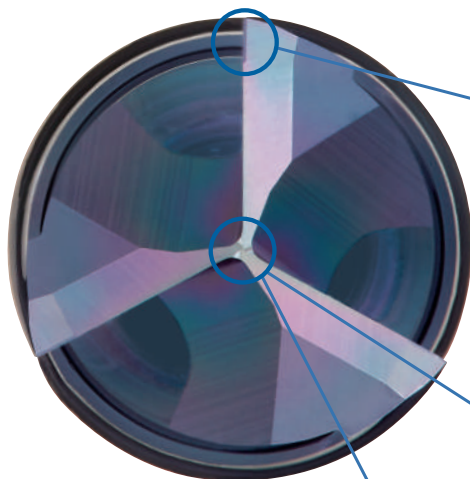
1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
3. Reduce speed and feed as well as depth of cut when high precision is required.
4. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
5. When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
6. For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).

非铁金属加工用DLC硬质合金铣刀 高性能型
DLC Coated Carbide End Mill for Non-Ferrous Materials High Performance Type

AE-VTS-N

对应多种加工! 高效率, 实现高品质加工

Suitable for a wide range of applications! High efficiency and high quality processing



修光刃式样[※]

Flat cutting edge specification

实现更高精度的加工面品质

Achieves higher precision machined surface quality

※除圆弧角型的部分尺寸外

*Does not apply to some sizes of radius type

带中心刃

Center cutting edge

可插铣加工

Can be used for plunging

不等导程、不等分割

Variable lead and unequal spacing teeth

抑制振动, 实现稳定·高效率加工

Stable and high efficiency milling is made possible by the suppression of chatter

连接中心的3枚切削刃

3 cutting edges that connect at the center

切削负荷在中心附近的切削刃之间是均等的, 可稳定且高转速加工[※]

The cutting load is equalized among the cutting edges with greater stability to enable high speed milling*

※插铣、斜线加工时有效

*Effective for plunging and ramping

Durability

耐久性

DLC-IGUSS 涂层

DLC-IGUSS Coating

通过涂层表面的平滑度, 对需求耐溶着性和润滑性的铝合金等的非铁金属发挥出众的威力。此外, 提高工具的寿命。

Due to the smoothness of the coating surface, it is extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity. Moreover, tool durability is also improved.



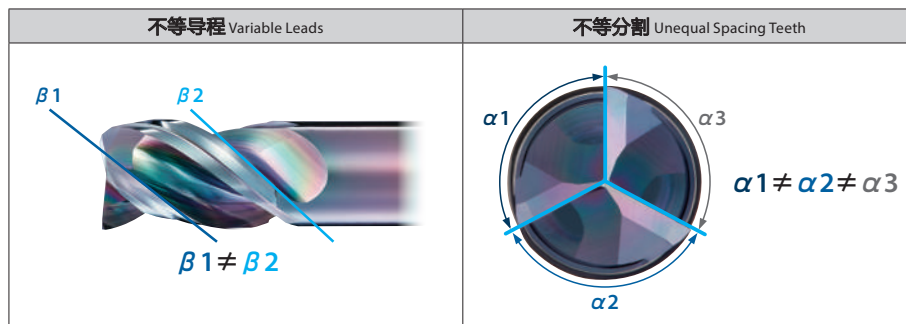


抑制振动

Suppression of Vibration

采用不等导程、不等分割，实现稳定·高效率加工

Variable lead and unequal spacing teeth geometry enable stable and high efficiency milling



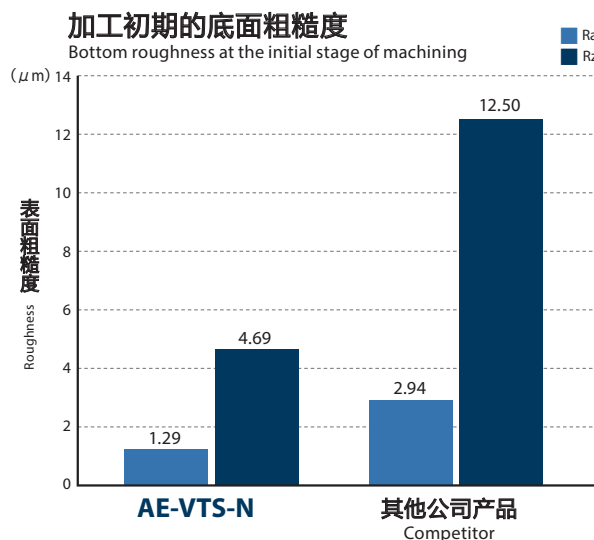
即使在高速切削条件下，也具有好的加工面品质

Good machined surface quality even under high speed cutting condition

DLC涂层的耐溶着效果、不等导程·不等分割的抗振效果以及修光刃的效果，实现即使在高效率加工条件下也能有良好的加工表面

Due to the anti-welding effect of the DLC coating, the anti-vibration effect of the variable lead and unequal spacing teeth geometry, and the effect of the flat cutting edge specification, good machined surface can be achieved even under aggressive cutting condition.

使用工具 Tool	AE-VTS-N φ10×30	其他公司无涂层产品 Non-coated Competitor φ10 3刃 Flutes
加工材料 Work Material	A7075	
加工方法 Processing Method	槽铣 Slot Milling	
切削速度 Cutting Speed	408m/min (13,000min ⁻¹)	300m/min (9,550min ⁻¹)
进给速度 Feed	4,780mm/min (0.123mm/t)	1,432mm/min (0.05mm/t)
切削深度 Depth of Cut	ap = 10mm	
切削油剂 Coolant	水溶性切削油剂 Water-soluble	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	



标准
Standard

高性能
High Performance

短刃型
Short
AE-TS-N

长刃型
Long
AE-TL-N

长刃带断屑槽刃型
Long With Chipbreaker
AE-TL-N(-N)

短刃型
Short
AE-VTS-N

深壁加工型
For Deep Side Milling
AE-VTFE-N

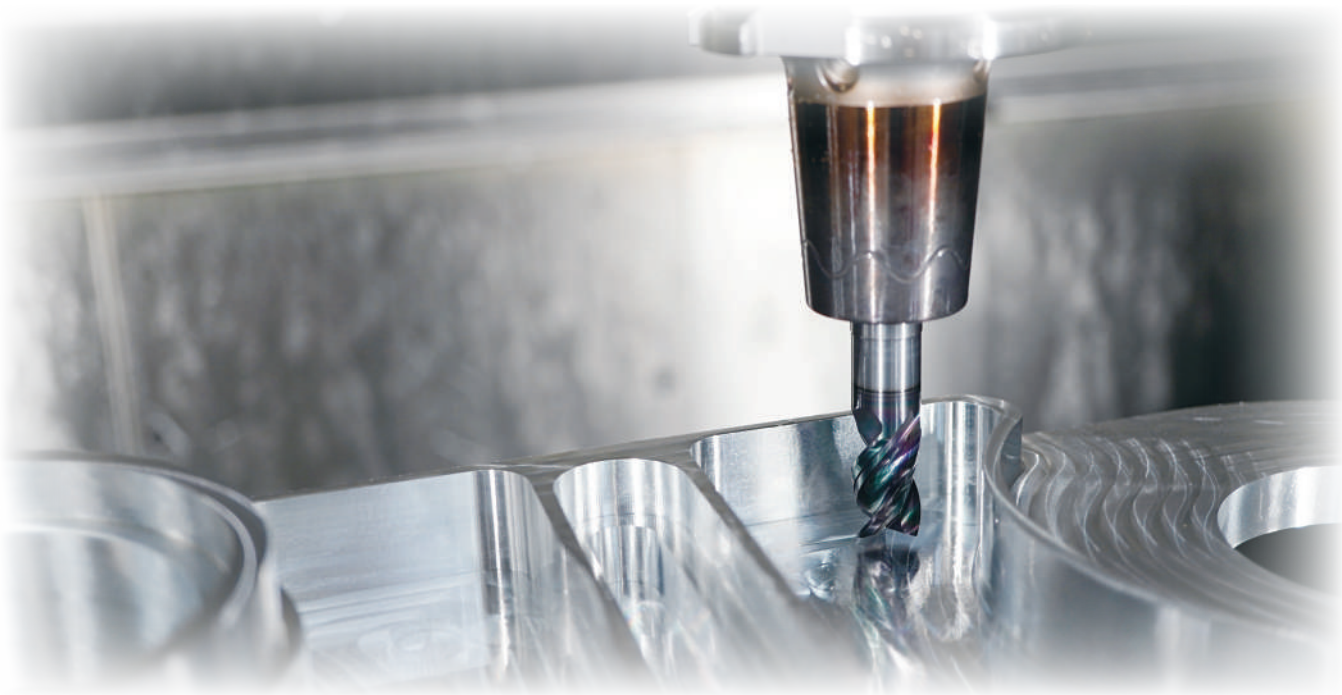
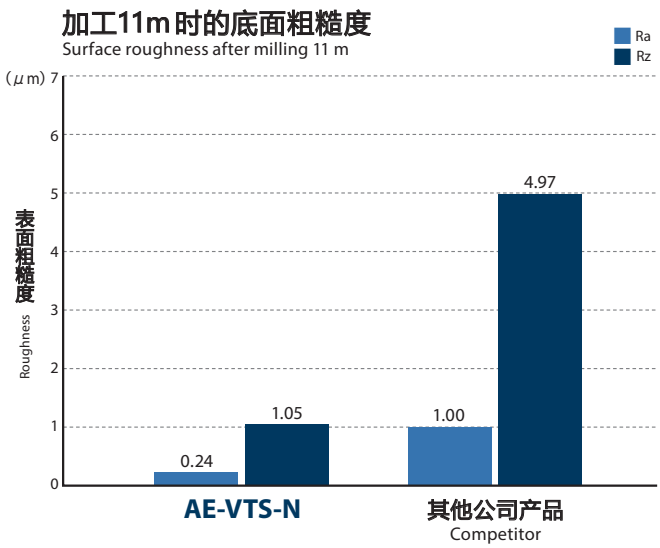
可换头式
Exchangeable Head
PXAL

高品质
High Quality

优异的加工面品质 Excellent surface finish

DLC 涂层和修光刃的效果, 实现底面优异的加工面品质。
Due to the effect of the DLC coating and the flat cutting edge specification, excellent machined surface quality is achieved.

使用工具 Tool	AE-VTS-N φ10×30	其他公司无涂层产品 Non-coated Competitor φ10 3刃 Flutes
加工材料 Work Material	A7075	
加工方法 Processing Method	槽铣 Slot Milling	
切削速度 Cutting Speed	300m/min (9,550min ⁻¹)	
进给速度 Feed	1,432mm/min (0.05mm/t)	
切削深度 Depth of Cut	ap = 10mm	
切削油剂 Coolant	水溶性切削油剂 Water-soluble	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	



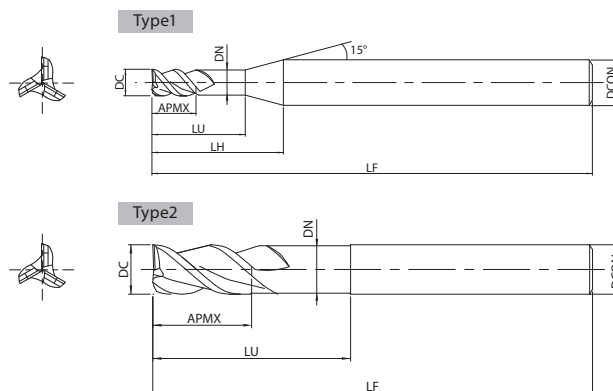
AE-VTS-N 平头型 Square



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.



0~-0.02



1.5D刃长(颈长3D) 1.5 × D cutting length (Neck length 3 × D)

单位:mm Unit:mm

商品号 EDP No.	外径×颈长 DC×LU	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	形状 Type	库存 Stock
8557243	1 × 3	45	1.5	8.6	4	0.95	1	●
8557244	1.5 × 4.5	45	2.3	9.3	4	1.45	1	●
8557245	2 × 6	45	3	10.1	4	1.95	1	●
8557246	2.5 × 7.5	45	3.8	10.6	4	2.4	1	●
8557360	3 × 9	55	4.5	14.8	6	2.85	1	●
8557361	4 × 12	55	6	15.9	6	3.8	1	●
8557362	5 × 15	55	7.5	17	6	4.8	1	●
8557363	6 × 18	60	9	—	6	5.8	2	●
8557364	8 × 24	70	12	—	8	7.7	2	●
8557365	10 × 30	75	15	—	10	9.7	2	●
8557366	12 × 36	80	18	—	12	11.7	2	●

· 标识说明请参考 p.12.

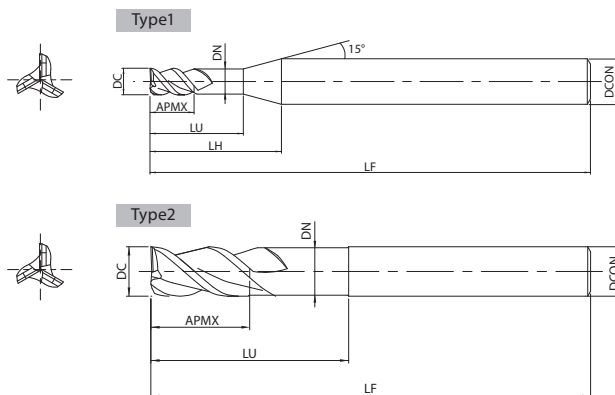
· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item

AE-VTS-N 尖角型 Sharp Corner Edge



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.



1.5D刃长(颈长3D) 1.5 × D cutting length (Neck length 3 × D)

单位:mm Unit:mm

商品号 EDP No.	外径×颈长 DC×LU	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	形状 Type	库存 Stock
8557247	1 × 3 -SP	45	1.5	8.6	4	0.95	1	●
8557248	1.5 × 4.5 -SP	45	2.3	9.3	4	1.45	1	●
8557249	2 × 6 -SP	45	3	10.1	4	1.95	1	●
8557250	2.5 × 7.5 -SP	45	3.8	10.6	4	2.4	1	●
8557460	3 × 9 -SP	55	4.5	14.8	6	2.85	1	●
8557461	4 × 12 -SP	55	6	15.9	6	3.8	1	●
8557462	5 × 15 -SP	55	7.5	17	6	4.8	1	●
8557463	6 × 18 -SP	60	9	—	6	5.8	2	●
8557464	8 × 24 -SP	70	12	—	8	7.7	2	●
8557465	10 × 30 -SP	75	15	—	10	9.7	2	●
8557466	12 × 36 -SP	80	18	—	12	11.7	2	●

· 标识说明请参考 p.12。

· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item

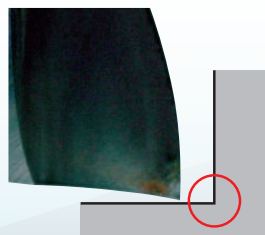
可以切削出完全垂直壁面的 尖角型 铣刀

Sharp corner edge type for milling straight corners

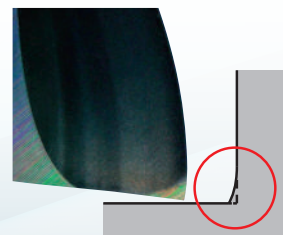
所谓尖角型是没有尖角保护的刃尖式样。可以加工出直角。

The sharp corner edge type is designed without a gash land cutting edge specification, enabling it to mill straight corners.

适用于不可有切削残余的圆弧角形状的加工。
Effective corner milling with no uncut residue left behind.



尖角型(-SP)
Sharp Corner Edge

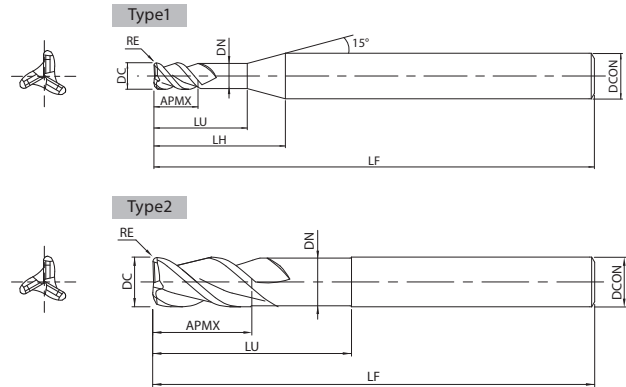


平头型
Square Type

AE-VTS-N 圆弧角型 Radius



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.



1.5D 刃长(颈长3D)

1.5 × D cutting length (Neck length 3 × D)

单位:mm Unit:mm

商品号 EDP No.	外径×颈长×圆弧半径 DC×LU×RE	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	形状 Type	库存 Stock
8557400	3 × 9 × R0.2	55	4.5	14.8	6	2.85	1	●
8557401	3 × 9 × R0.5							●
8557402	4 × 12 × R0.2							●
8557403	4 × 12 × R0.5	55	6	15.9	6	3.8	1	●
8557404	4 × 12 × R1							●
8557405	5 × 15 × R0.2							●
8557406	5 × 15 × R0.5	55	7.5	17	6	4.8	1	●
8557407	5 × 15 × R1							●
8557408	6 × 18 × R0.3							●
8557409	6 × 18 × R0.5	60	9	—	6	5.8	2	●
8557410	6 × 18 × R1							●
8557411	8 × 24 × R0.3	70	12	—	8	7.7	2	●
8557412	8 × 24 × R0.5							●
8557413	8 × 24 × R1							●
8557414	8 × 24 × R1.5							●
8557415	8 × 24 × R2							●
8557416	10 × 30 × R0.3	75	15	—	10	9.7	2	●
8557417	10 × 30 × R0.5							●
8557418	10 × 30 × R1							●
8557419	10 × 30 × R1.5							●
8557420	10 × 30 × R2							●
8557421	10 × 30 × R3							●
8557422	12 × 36 × R0.3	80	18	—	12	11.7	2	●
8557423	12 × 36 × R0.5							●
8557424	12 × 36 × R1							●
8557425	12 × 36 × R1.5							●
8557426	12 × 36 × R2							●
8557427	12 × 36 × R3							●

· 标识说明请参考 p.12。

· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item



AE-VTS-N 切削条件基准表 Cutting Condition

平头型/尖角型/圆弧角型通用 Applies to square/sharp corner edge/radius type

槽铣 Slot Milling

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	400		400		200	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	32,000	1,430	32,000	1,430	16,000	660
1.5 × 4.5	32,000	1,630	32,000	1,630	16,000	720
2 × 6	32,000	1,920	32,000	1,920	16,000	800
2.5 × 7.5	32,000	2,880	32,000	2,880	16,000	1,080
3 × 9	32,000	3,820	32,000	3,820	16,000	1,430
4 × 12	24,000	3,960	24,000	3,960	12,000	1,530
5 × 15	19,200	4,090	19,200	4,090	9,600	1,640
6 × 18	18,500	4,230	18,500	4,230	9,300	1,740
8 × 24	16,000	4,510	16,000	4,510	8,000	1,940
10 × 30	13,000	4,780	13,000	4,780	6,400	2,150
12 × 36	11,000	5,050	11,000	5,050	5,300	2,360
切削深度 Depth of Cut	$\frac{a_p}{1D}$		$\frac{a_p}{1D}$		$\frac{a_p}{0.5D}$	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC尼龙 · ABS树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	95		75		95		95	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	28,600	2,150	22,300	1,340	28,600	1,290	28,600	1,290
1.5 × 4.5	19,100	1,720	14,900	1,120	19,100	860	19,100	860
2 × 6	14,300	1,500	11,100	1,000	14,300	860	14,300	860
2.5 × 7.5	11,500	1,380	8,900	930	11,500	690	11,500	690
3 × 9	9,500	1,280	7,400	890	9,500	570	9,500	570
4 × 12	7,200	1,230	5,600	870	7,200	540	7,200	540
5 × 15	5,700	1,200	4,500	880	5,700	510	5,700	510
6 × 18	4,800	1,150	3,700	830	4,800	500	4,800	500
8 × 24	3,600	1,080	3,000	830	3,600	430	3,600	430
10 × 30	3,200	960	2,500	710	3,200	430	3,200	430
12 × 36	2,700	890	2,100	660	2,700	410	2,700	410
切削深度 Depth of Cut	$\frac{a_p}{1D}$		$\frac{a_p}{1D}$		$\frac{a_p}{1D}$		$\frac{a_p}{1D}$	

上表适用于使用气冷的情况。

The table above is for when using air-blow.

- 请使用高刚性，高精度的机械、刀柄。
- 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
- 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
- 悬伸较长的情况下，请参考「根据悬伸量变化的切削条件调整参考值」来调整转速及进给速度(参考 p.38)。
- 切屑缠绕时，请下调转速和进给速度。
- 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
- 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
- 对于更高质量的树脂加工，推荐使用水溶性切削油剂(尼龙系和酚醛塑料除外)。

- Use a rigid and precise machine and holder.
- Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
- Reduce speed and feed as well as depth of cut when high precision is required.
- Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.38).
- When the chips wind around the end mill, reduce the speed and feed.
- Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
- When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
- For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).



平头型 / 尖角型 / 圆弧角型通用 Applies to square/sharp corner edge/radius type

侧铣 Side Milling

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	400		400		200	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	32,000	1,430	32,000	1,430	16,000	720
1.5 × 4.5	32,000	1,630	32,000	1,630	16,000	800
2 × 6	32,000	1,920	32,000	1,920	16,000	1,080
2.5 × 7.5	32,000	2,880	32,000	2,880	16,000	1,200
3 × 9	32,000	3,820	32,000	3,820	16,000	1,600
4 × 12	24,000	3,960	24,000	3,960	12,000	1,700
5 × 15	19,200	4,090	19,200	4,090	9,600	1,830
6 × 18	18,500	4,230	18,500	4,230	9,300	1,950
8 × 24	16,000	4,510	16,000	4,510	8,000	2,180
10 × 30	13,000	4,780	13,000	4,780	6,400	2,400
12 × 36	11,000	5,050	11,000	5,050	5,300	2,650
切削深度 Depth of Cut	ap		ae		ap	
	1.5D		0.2D		1.5D	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC 尼龙 · ABS 树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	105		85		105		105	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	31,800	2,390	25,500	1,530	31,800	1,430	31,800	1,430
1.5 × 4.5	21,200	1,910	17,000	1,280	21,200	950	21,200	950
2 × 6	15,900	1,670	12,700	1,140	15,900	950	15,900	950
2.5 × 7.5	12,700	1,520	10,200	1,070	12,700	760	12,700	760
3 × 9	10,600	1,430	8,500	1,020	10,600	640	10,600	640
4 × 12	8,000	1,370	6,400	1,000	8,000	600	8,000	600
5 × 15	6,400	1,340	5,100	990	6,400	580	6,400	580
6 × 18	5,300	1,270	4,200	950	5,300	560	5,300	560
8 × 24	4,000	1,200	3,400	870	4,000	480	4,000	480
10 × 30	3,500	1,050	2,900	830	3,500	470	3,500	470
12 × 36	2,900	960	2,500	790	2,900	440	2,900	440
切削深度 Depth of Cut			ap		ae			
			1.5D		0.5D			

上表适用于使用气冷的情况。

The table above is for when using air-blow.

1. 请使用高刚性、高精度的机械、刀柄。
2. 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
3. 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
4. 悬伸较长的情况下，请参考「根据悬伸量变化的切削条件调整参考值」来调整转速及进给速度(参考 p.38)。
5. 切屑缠绕时，请下调转速和进给速度。
6. 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
7. 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
8. 对于更高质量的树脂加工，推荐使用水溶性切削油剂(尼龙系和酚醛塑料除外)。

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
3. Reduce speed and feed as well as depth of cut when high precision is required.
4. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.38).
5. When the chips wind around the end mill, reduce the speed and feed.
6. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
7. When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
8. For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).

AE-VTS-N 切削条件基准表 Cutting Condition

平头型 / 尖角型 / 圆弧角型通用 Applies to square/sharp corner edge/radius type

插铣 Plunging

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	150		150		75	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	20,000	400	20,000	400	10,000	120
1.5 × 4.5	20,000	400	20,000	400	10,000	120
2 × 6	20,000	400	20,000	400	10,000	120
2.5 × 7.5	20,000	400	20,000	400	10,000	120
3 × 9	15,900	500	15,900	500	8,000	150
4 × 12	12,000	500	12,000	500	6,000	150
5 × 15	9,600	500	9,600	500	4,800	150
6 × 18	8,000	600	8,000	600	4,000	180
8 × 24	6,000	700	6,000	700	3,000	210
10 × 30	4,800	700	4,800	700	2,400	210
12 × 36	4,000	700	4,000	700	2,000	210
切削深度 Depth of Cut	a_p 1D		a_p 1D		a_p 0.5D	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC尼龙 · ABS树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	95		70		90		90	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
1 × 3	28,600	540	22,300	330	28,600	320	28,600	320
1.5 × 4.5	19,100	430	14,900	280	19,100	210	19,100	210
2 × 6	14,300	380	11,100	250	14,300	210	14,300	210
2.5 × 7.5	11,500	350	8,900	230	11,500	170	11,500	170
3 × 9	9,500	320	7,400	220	9,500	140	9,500	140
4 × 12	7,200	310	5,600	220	7,200	140	7,200	140
5 × 15	5,700	300	4,500	220	5,700	130	5,700	130
6 × 18	4,800	290	3,700	210	4,800	130	4,800	130
8 × 24	3,600	280	2,800	210	3,600	110	3,600	110
10 × 30	3,200	280	2,200	180	2,900	110	2,900	110
12 × 36	2,700	280	1,850	180	2,400	110	2,400	110
切削深度 Depth of Cut	a_p 1D							

上表适用于使用气冷的情况。

The table above is for when using air-blow.

1. 请使用高刚性，高精度的机械、刀柄。
2. 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
3. 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
4. 悬伸较长的情况下，请参考「根据悬伸量变化的切削条件调整参考值」来调整转速及进给速度(参考 p.38)。
5. 切屑缠绕时，请下调转速和进给速度。
6. 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
7. 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
8. 对于更高质量的树脂加工，推荐使用水溶性切削油剂(尼龙系和酚醛塑料除外)。
9. 插铣加工树脂时，请进行阶梯进给。

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
3. Reduce speed and feed as well as depth of cut when high precision is required.
4. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.38).
5. When the chips wind around the end mill, reduce the speed and feed.
6. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
7. When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
8. For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).
9. Please step feed when processing resin by plunging.



平头型 / 尖角型 / 圆弧角型通用 Applies to square/sharp corner edge/radius type

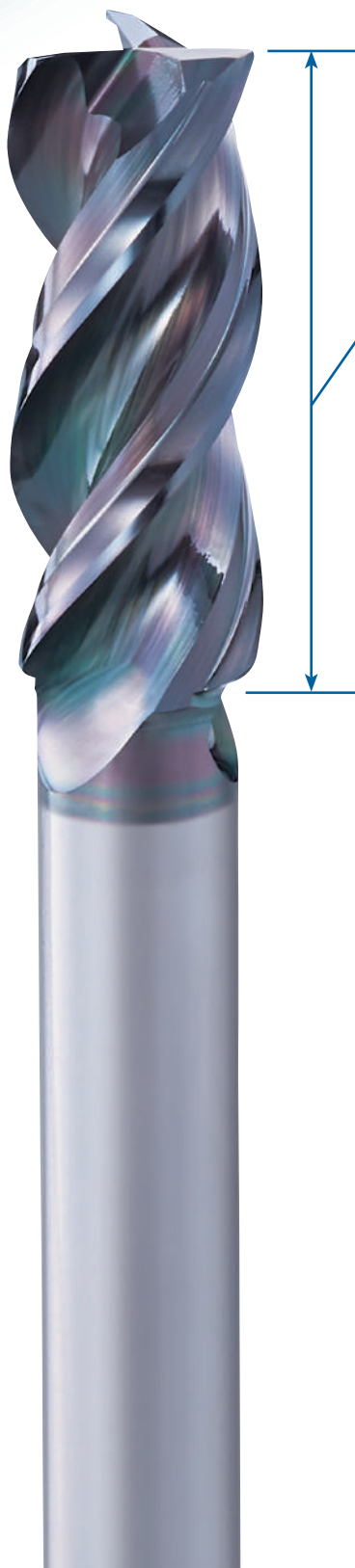
根据悬伸量变化的切削条件调整参考值(DC = $\phi 6$ 、 $\phi 8$) Cutting Condition Guide for Changes in Overhang Length

	加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
	悬长 L/D	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
槽铣 Slot Milling	5	70%		70%		70%	
	6	70%	20%	70%	20%	70%	20%
侧铣 Side Milling	5	70%		70%		70%	
	6	50%		50%		50%	
插铣 Plunging	5	80%		80%		80%	
	6	60%		60%		60%	

AE-VTFE-N

高效率·高精度加工L/D=5以上的深壁

Highly efficient and highly accurate deep side milling at L/D of 5 or more



2.5D刃长

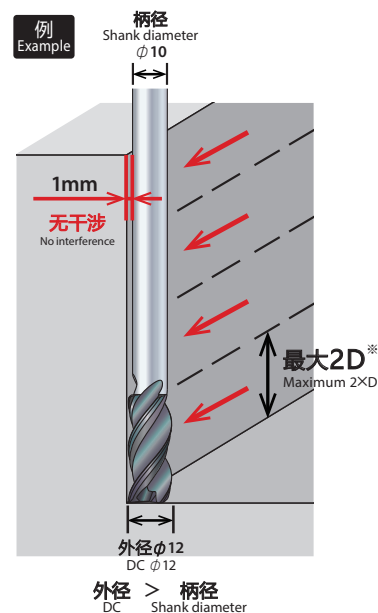
2.5 × D cutting length

- 最大2D*的大阶梯铣削可进行高效率深壁加工

Highly efficient deep side milling is possible with large step milling of up to 2 × D*

※推荐切削深度取决于悬长。
详情请见 p.46。

*The recommended depth of cut varies depending on the overhang length. See p.46 for details.



粗刃长柄型

Long length reduced shank type

粗刃型是刀具外径大于柄径的形状

Reduced shank types are tools with an outer diameter that is larger than the shank diameter

- 可对应非铁金属零件的深壁加工、型腔加工
Suitable for deep side milling and pocket milling of non-ferrous metal parts
- 通过改变悬长可对应各种各样的加工深度
Supports various machining depths by changing the overhang length

修光刃式样

Flat cutting edge specification

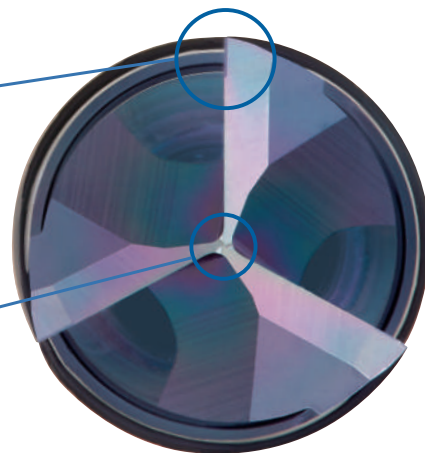
- 长悬长加工中实现高品质的底面加工
Achieves high quality bottom surface milling with long overhang length

连接中心的3枚切削刃

3 cutting edges that connect at the center

- 切削负荷在中心附近的切削刃之间是均等的，可稳定加工

The cutting load is equalized among the cutting edges with greater stability



High Milling Quality

加工
品质

抑制接刀痕

Suppresses streak generation

柄侧端面的R形状可以抑制因侧面分段铣削而产生的接刀痕

The R shape on the shank side edge suppresses the generation of streaks due to step milling

柄侧端面的R形状

R shape on the shank side edge



Stable Performance

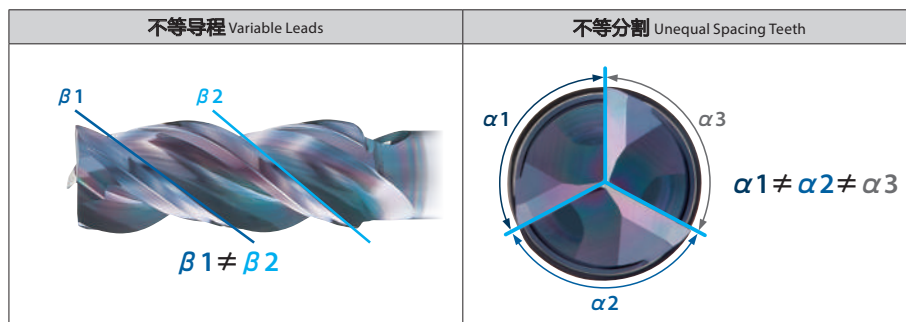
稳定
加工

抑制振动

Suppression of Vibration

采用不等导程、不等分割，实现稳定·高效率加工

Variable lead and unequal spacing teeth geometry enable stable and high efficiency milling



Durability

耐久性

DLC-IGUSS 涂层

DLC-IGUSS Coating

通过涂层表面的平滑度，对需求耐溶着性和润滑性的铝合金等的非铁金属发挥出众的威力。此外，提高工具的寿命。

Due to the smoothness of the coating surface, it is extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity. Moreover, tool durability is also improved.

高精度加工 High Precision Milling

高精度深壁加工 High precision deep side milling

在L/D=8的情况下, 实现良好精度的深壁加工

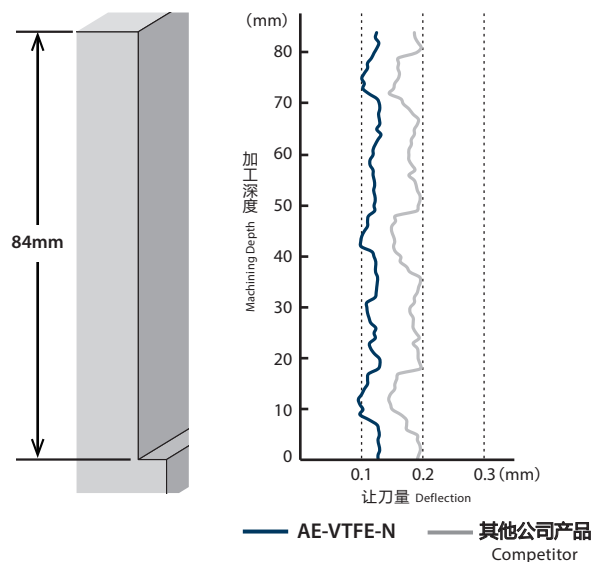
Achieves good accuracy deep side milling at L/D = 8

使用工具 Tool	AE-VTFE-N $\phi 12$	其他公司产品 $\phi 12$ Competitor
加工材料 Work Material	A7075	
加工方法 Processing Method	侧面分段铣削 Side Step Milling	
切削速度 Cutting Speed	100m/min (2,650min ⁻¹)	
进给速度 Feed	955mm/min (0.12mm/t)	
切削深度 Depth of Cut	$a_p = 12\text{mm} \times 7\text{次}$ $a_e = 0.6\text{mm}$ 7 times	
刀具悬伸量 Overhang Length	96mm L/D=8	
切削油剂 Coolant	水溶性切削油剂 Water-soluble	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	

加工面的让刀量比较

Comparison of the amount of deflection of the machined surface

加工初期时 The initial stage of machining



与以往长刃型相比, 实现良好的加工精度

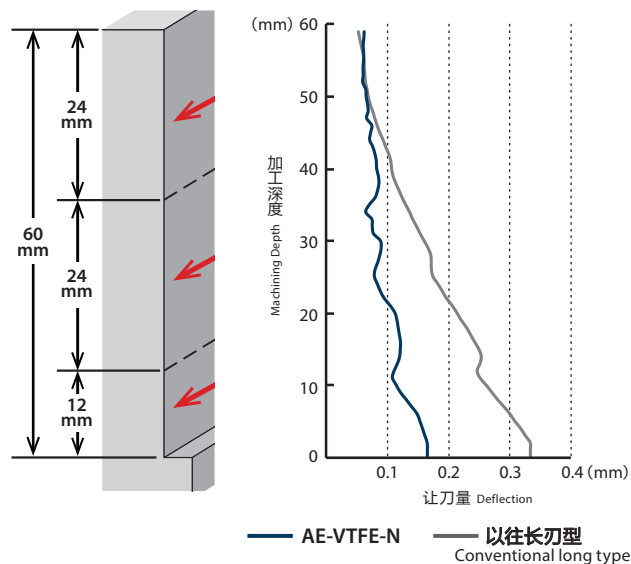
Achieves better machining accuracy compared to conventional long type

使用工具 Tool	AE-VTFE-N $\phi 12$	以往长刃型 $\phi 12$ Conventional long type
加工材料 Work Material	A7075	
加工方法 Processing Method	侧面分段铣削 Side Step Milling	侧铣 Side Milling
切削速度 Cutting Speed	200m/min (5,305min ⁻¹)	100m/min (2,700min ⁻¹)
进给速度 Feed	1,910mm/min (0.12mm/t)	1,050mm/min (0.13mm/t)
切削深度 Depth of Cut	$a_p = 24\text{mm} \times 2\text{次} + 12\text{mm}$ $a_e = 1.2\text{mm}$ 2 times	$a_p = 60\text{mm}$ $a_e = 1\text{mm}$
刀具悬伸量 Overhang Length	72mm L/D=6	
切削油剂 Coolant	水溶性切削油剂 Water-soluble	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	

加工面的让刀量比较

Comparison of the amount of deflection of the machined surface

加工初期时 The initial stage of machining



高品质
High Quality

L/D=5的槽铣, 加工面品质优良 Stable slot milling at L/D=5

标准
Standard

高性能
High Performance

短刃型
Short
AE-TS-N
长刃型
Long
AE-TL-N

长刃带断屑槽刃型
Long With Chipbreaker
AE-TL-N(N)

短刃型
Short
AE-VTS-N

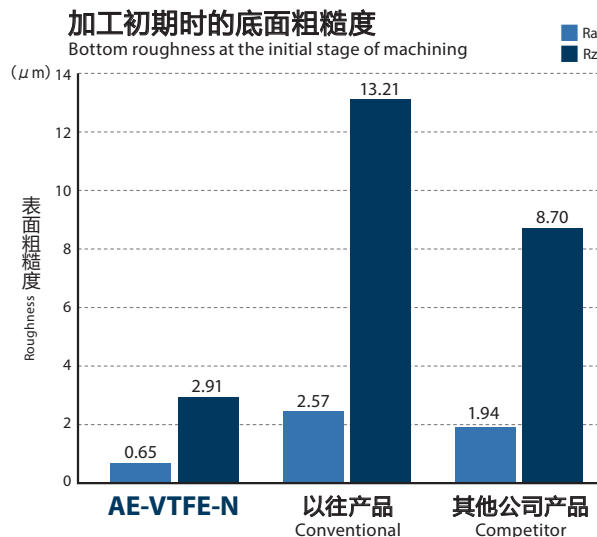
深壁加工型
For Deep Side Milling
AE-VTFE-N

可换头式
Exchangeable Head
PXAL

修光刃实现底面优良的加工面品质。

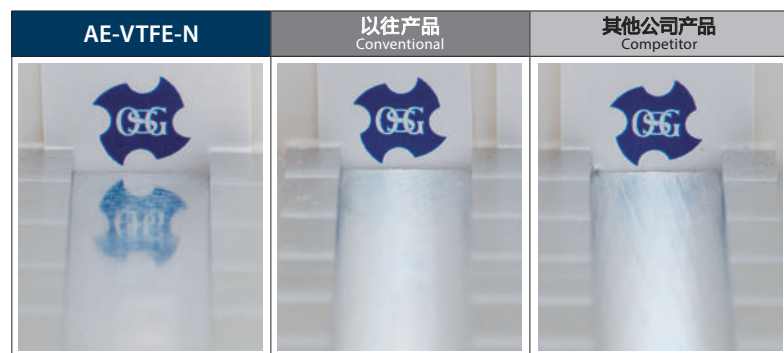
Due to the effect of the flat cutting edge specification, excellent machined surface quality is achieved.

使用工具 Tool	AE-VTFE-N $\phi 12$	以往产品 $\phi 12$ Conventional	其他公司产品 $\phi 12$ Competitor
加工材料 Work Material	A5052		
加工方法 Processing Method	槽铣 Slot Milling		
切削速度 Cutting Speed	200m/min (5,305min ⁻¹)		
进给速度 Feed	1,910mm/min (0.12mm/t)		
切削深度 Depth of Cut	$a_p = 2.4\text{mm}$ (0.2D)		
刀具悬伸量 Overhang Length	60mm L/D=5		
切削油剂 Coolant	水溶性切削油剂 Water-soluble		
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center		



良好的加工面

Good machined surface



AE-VTFE-N 平头型 Square



涂层可能会有颜色不均的情况，但这并不影响刀具的性能。
End mills may have some discoloration, but it does not cause any performance problems.

※柄侧端面的 R 是为了防止分段加工时产生接刀痕，并不是完全 R。
The radius chamfering is not a full radius since it is for preventing streaks during milling.

CARBIDE

DLC+GUSS

0~-0.02

SHRINK
FIT

40~43°

SPEED
FEED
P45~P46

2.5D刃长 2.5 × D cutting length

单位:mm Unit:mm

商品号 EDP No.	外径 DC	全长 LF	刃长 APMX	柄径 DCON	库存 Stock
8550126	6	100	15	4	●
8550128	8	110	20	6	●
8550130	10	130	25	8	●
8550132	12	150	30	10	●
8550134	14	160	35	12	●
8550138	18	180	45	16	●
8550142	22	200	55	20	●

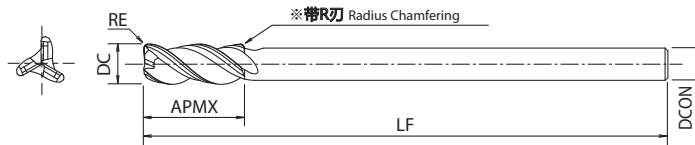
· 标识说明请参考 p.12。

· See p.12 for explanation of icons.

● = 标准库存品 ● =Standard stock item



AE-VTFE-N 圆弧角型 Radius



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。

End mills may have some discoloration, but it does not cause any performance problems.

※柄侧端面的 R 是为了防止分段加工时产生接刀痕, 并不是完全 R。

The radius chamfering is not a full radius since it is for preventing streaks during milling.



2.5D刃长 2.5 × D cutting length

单位:mm Unit:mm

商品号 EDP No.	外径×圆弧半径 DC×RE	全长 LF	刃长 APMX	柄径 DCON	库存 Stock
8550156	6 × R0.2	100	15	4	●
8550158	8 × R0.5	110	20	6	●
8550160	10 × R0.5	130	25	8	●
8550161	10 × R1	130	25	8	○
8550168	12 × R0.5	150	30	10	●
8550169	12 × R1	150	30	10	○
8550174	14 × R0.5	160	35	12	●
8550175	14 × R1	160	35	12	○
8550180	18 × R1	180	45	16	●
8550184	22 × R1	200	55	20	●

· 标识说明请参考 p.12。

· See p.12 for explanation of icons.

● = 标准库存品

● = Standard stock item

○ = 准标准库存品(请确认库存。)

○ = Limited standard stock item

AE-VTFE-N 切削条件基准表 Cutting Condition

平头型 / 圆弧角型通用 Applies to square/radius type

槽铣 Slot Milling

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	200		200		100	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
6	8,490	1,530	8,490	1,530	4,250	640
8	6,370	1,150	6,370	1,150	3,180	480
10	6,370	1,910	6,370	1,910	3,180	760
12	5,310	1,910	5,310	1,910	2,650	640
14	4,550	1,640	4,550	1,640	2,270	540
18	3,540	1,270	3,540	1,270	1,770	420
22	2,900	1,040	2,900	1,040	1,450	350
切削深度 Depth of Cut						
			ap			
			DC ≤ 10		0.1D	
			10 < DC		0.2D	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using **water-soluble coolant**.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC 尼龙 · ABS 树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	100		80		100		100	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
6	4,800	1,150	3,700	830	4,800	500	4,800	500
8	3,600	1,080	3,000	830	3,600	430	3,600	430
10	3,200	960	2,500	710	3,200	430	3,200	430
12	2,700	890	2,100	660	2,700	410	2,700	410
14	2,300	760	2,000	630	2,300	350	2,300	350
18	1,900	680	1,600	550	1,900	340	1,900	340
22	1,600	620	1,300	490	1,600	340	1,600	340
切削深度 Depth of Cut								
	ap							
	0.5D							

上表适用于使用气冷的情况。

The table above is for when using **air-blow**.

1. 上表是在悬伸量为刀具径5倍情况下的参考值。
2. 请使用高刚性、高精度的机械、刀柄。
3. 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
4. 对加工精度有要求的情况下，请适当下调转速，进给速度及切削深度。
5. 悬伸较长的情况下，请参考「根据悬伸量变化的切削条件调整参考值」来调整转速及进给速度（参考 p.46）。
6. 切屑缠绕时，请下调转速和进给速度。
7. 加工镁合金时，请务必使用切削油剂厂家推荐的切削油剂。另外，请注意切屑的处理与管理，以免造成火灾。
8. 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
9. 对于更高质量的树脂加工，推荐使用水溶性切削油剂（尼龙系和酚醛塑料除外）。

1. The above milling condition is a guideline for the overhang length is 5×D.
2. Use a rigid and precise machine and holder.
3. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
4. Reduce speed and feed as well as depth of cut when high precision is required.
5. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.46).
6. When the chips wind around the end mill, reduce the speed and feed.
7. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
8. When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
9. For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).



平头型 / 圆弧角型通用 Applies to square/radius type

侧铣 Side Milling

加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material · Magnesium Alloy A5052 · A7075 · AZ91 · AZ80A		铝合金铸件 Aluminum Alloy Casting AC4C · ADC		铜合金 Copper Alloy C1100	
切削速度 Cutting Speed (m/min)	300		300		150	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
6	15,920	2,870	15,920	2,870	7,960	1,190
8	11,940	2,150	11,940	2,150	5,970	1,070
10	9,550	2,870	9,550	2,870	4,780	1,000
12	7,960	2,870	7,960	2,870	3,980	960
14	6,820	2,460	6,820	2,460	3,410	820
18	5,310	1,910	5,310	1,910	2,650	640
22	4,340	1,560	4,340	1,560	2,170	520
切削深度 Depth of Cut			ap			
			2D		ae	
					0.1D	

上表适用于使用水溶性切削油剂的情况。

The table above is for when using water-soluble coolant.

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP · UPE · PTFE		POM · PVC · MC尼龙 · ABS树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	110		90		110		110	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
6	5,300	1,270	4,200	950	5,300	560	5,300	560
8	4,000	1,200	3,400	870	4,000	480	4,000	480
10	3,500	1,050	2,900	830	3,500	470	3,500	470
12	2,900	960	2,500	790	2,900	440	2,900	440
14	2,500	830	2,300	720	2,500	380	2,500	380
18	2,100	760	1,800	620	2,100	380	2,100	380
22	1,700	660	1,400	530	1,700	360	1,700	360
切削深度 Depth of Cut			ap		ae			
			2.5D		0.4D			

上表适用于使用气冷的情况。
使用上的注意事项请参考 p.45。The table above is for when using air-blow.
See p.45 for precaution for use.

根据悬伸量变化的切削条件调整参考值 Cutting Condition Guide for Changes in Overhang Length

	加工材料 Work Material	铝合金延伸材·镁合金 Aluminum Alloy Expanding Material· Magnesium Alloy A5052· A7075· AZ91· AZ80A				铝合金铸件 Aluminum Alloy Casting AC4C· ADC				铜合金 Copper Alloy C1100			
		悬长 L/D	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	切削深度 Depth of Cut		转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	切削深度 Depth of Cut		转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	切削深度 Depth of Cut
	ap				ae	ap			ae	ap			ae
槽铣 Slot Milling	6	50%	50%	0.015D	—	50%	50%	0.015D	—	50%	50%	0.015D	—
	7	30%	20%	0.01D	—	30%	20%	0.01D	—	30%	20%	0.01D	—
侧铣 Side Milling	6	65%	60%	2D	0.05D	65%	60%	2D	0.05D	90%	90%	2D	0.05D
	7	55%	50%	2D	0.03D	55%	50%	2D	0.03D	70%	70%	2D	0.03D
	8	45%	45%	2D	0.025D	45%	45%	2D	0.025D	65%	65%	2D	0.01D

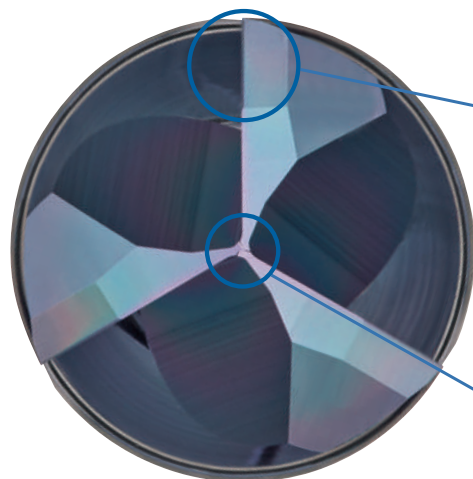
· 外径φ22的AE-VTFE-N请在L/D = 7以下使用。
· Please use the φ22 AE-VTFE-N at L/D = 7 or less.

非铁金属加工用 DLC 可换头式铣刀 PXM
DLC Coated Exchangeable Head End Mill PXM for Non-Ferrous Materials

PXAL

对应大径加工，实现高品质加工面

Suitable for large-diameter milling with high surface quality



修光刃式样[※]

Flat cutting edge specification

实现更高精度的加工面品质

Achieves higher precision machined surface quality

※除圆弧角型的部分尺寸外

*Does not apply to some sizes of radius type

带中心刃

Center cutting edge

可插铣加工

Can be used for plunging

采用适用于非铁金属的材料种类XP4625

Utilizes XP4625 grade suitable for non-ferrous metal applications

采用适合铝合金等非铁金属的材料种类，具有出色的耐磨损性和耐溶着性，实现了工具的长寿命化。

By adopting a grade optimal for non-ferrous materials such as aluminum alloy, excellent wear resistance, welding resistance, and long tool life can be achieved.

Durability

耐久性

DLC-IGUSS 涂层

DLC-IGUSS Coating

通过涂层表面的平滑度，对需求耐溶着性和润滑性的铝合金等的非铁金属发挥出众的威力。此外，提高工具的寿命。

Due to the smoothness of the coating surface, it is extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity. Moreover, tool durability is also improved.

Lineup

种类
款式

丰富的形状款式

Abundant lineup in various shapes and styles

备有平头型、圆弧角型、粗刃型等丰富的种类，可对应各式各样的加工。

An abundant lineup including square type, radius type, and reduced shank type are available to accommodate a wide range of applications.

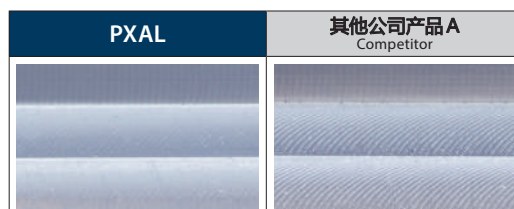
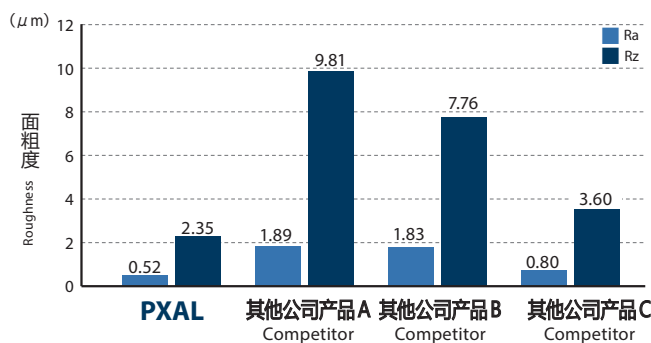


通过修光刃效果，提高加工面粗糙度

Improved surface roughness by the effect of the flat cutting edge specification

使用工具 Tool	刀头 Head : PXAL160C16-03R000 刀杆 Holder : PXMZ-C16SS16-S100	其他公司无涂层产品 A, B, C Non-coated Competitor
尺寸 Size	φ 16	φ 16 3刃 Flutes
加工材料 Work Material	A7075	
加工方法 Processing Method	侧铣 Side Milling	
切削速度 Cutting Speed	600m/min (12,000min ⁻¹)	
进给速度 Feed	5,400mm/min (0.15mm/t)	
切削深度 Depth of Cut	ap=8mm (0.5D) ae=4.8mm (0.3D)	
悬长 Overhang Length	50mm (L/D = 3.1)	
切削油剂 Coolant	水溶性切削油剂 Water-soluble	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	

加工465m时的底面粗糙度 Bottom surface roughness after milling 465 m

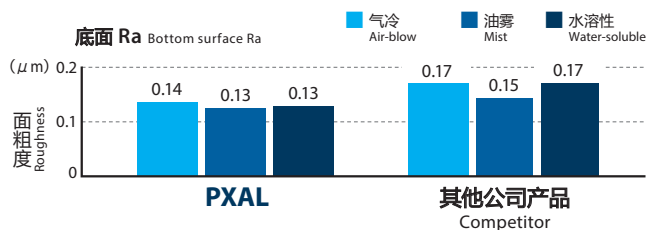
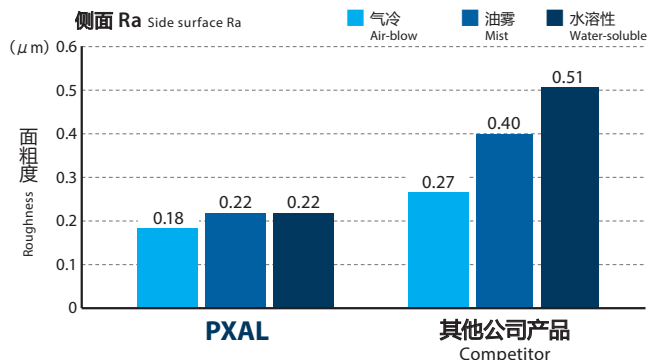


不论冷却种类都能实现良好的加工面粗糙度

Achieves good surface finish regardless of coolant type

使用工具 Tool	刀头 Head : PXAL160C16-03R000 刀杆 Holder : PXMZ-C16SS16-S100	其他公司无涂层产品 Non-coated Competitor
尺寸 Size	φ 16	φ 16 3刃 Flutes
加工材料 Work Material	A7075	
加工方法 Processing Method	侧铣 Side Milling	
切削速度 Cutting Speed	600m/min (12,000min ⁻¹)	
进给速度 Feed	2,700mm/min (0.075mm/t)	
切削深度 Depth of Cut	ap=8mm (0.5D) ae=4.8mm (0.3D)	
悬长 Overhang Length	50mm (L/D = 3.1)	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	

加工462m时的加工面粗糙度 Surface roughness after milling 462 m



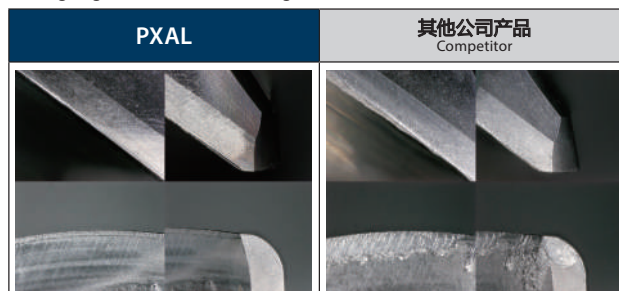
DLC 涂层抑制溶着

Welding suppression by DLC coating

使用工具 Tool	刀头 Head : PXAL160C16-03R010 刀杆 Holder : PXMZ-C16SS16-S100	其他公司无涂层产品 Non-coated Competitor
尺寸 Size	φ 16 × R1	φ 16 × R1 3刃 Flutes
加工材料 Work Material	A7075	
切削速度 Cutting Speed	600m/min (12,000min ⁻¹)	
进给速度 Feed	2,700mm/min (0.075mm/t)	
加工方法 Processing Method	侧铣 Side Milling	
切削深度 Depth of Cut	ap=8mm (0.5D) ae=4.8mm (0.3D)	
悬长 Overhang Length	50mm (L/D = 3.1)	
切削油剂 Coolant	无(气冷式) None Air-blow	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	

加工300m时的刀尖状态

Cutting edge condition after milling 300 m



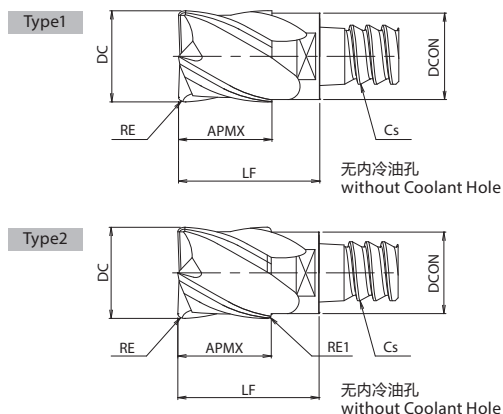
PXAL



涂层可能会有颜色不均的情况, 但这并不影响刀具的性能。

End mills may have some discoloration, but it does not cause any performance problems.

SPEED
FEED
P53-P57



无内冷油孔 without Coolant Hole

PXAL 平头型·圆弧角型 Square · Corner Radius Type

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 DC	圆弧半径 RE	刃数 ZEFP	刃长 APMX	全长 LF	颈径 DCON	螺旋角 FHA	安装规格 Cs	材质 Grades	形状 Type
7834930	PXAL100C10-03R000	10	0	3	10	16	9.8	45°	C10	XP4625	1
7834931	PXAL100C10-03R100		1								1
7834932	PXAL100C10-03R250		2.5								1
7834933	PXAL120C10-03R000	★12	0	3	12	18	9.8	45°		XP4625	2
7834934	PXAL120C12-03R000	12	0	3	12	18	11.7	45°	C12	XP4625	1
7834935	PXAL120C12-03R100		1								1
7834936	PXAL120C12-03R300		3								1
7834937	PXAL140C12-03R000	★14	0	3	14	20	11.7	45°		XP4625	2
7834938	PXAL160C16-03R000	16	0	3	16	23.5	15.7	45°	C16	XP4625	1
7834939	PXAL160C16-03R100		1								1
7834940	PXAL160C16-03R200		2								1
7834941	PXAL160C16-03R300		3								1
7834942	PXAL160C16-03R400		4								1
7834943	PXAL180C16-03R000	★18	0	3	18	25.5	15.7	45°		XP4625	2

库存种类都为C(即标准库存品)。 Stock are categorized as C (Standard stock item).

· 标识说明请参考 p.12。

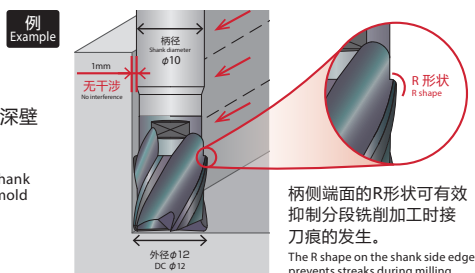
· See p.12 for explanation of icons.



★ PXAL 粗刃型 Reduced Shank Type

· 粗刃型的刀具外径大于柄径，使其在模具零件等的深壁加工、型腔加工中最为适合。

· The outer diameter of the reduced shank type is larger than the shank diameter, making it highly effective in the processing of die and mold applications that require vertical wall milling or pocketing.



单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 DC	圆弧半径 RE	刃数 ZEFP	刃长 APMX	全长 LF	颈径 DCON	螺旋角 FHA	安装规格 Cs	材质 Grades	形状 Type
7834944	PXAL200C20-03R000	20	0	3	20	27.5	19.6	45°	C20	XP4625	1
7834945	PXAL200C20-03R100		1								1
7834946	PXAL200C20-03R200		2								1
7834947	PXAL200C20-03R300		3								1
7834948	PXAL200C20-03R400		4								1
7834949	PXAL220C20-03R000	★22	0	3	22	29.5	19.6	45°		XP4625	2
7834950	PXAL250C25-03R000	25	0	3	25	35	24	45°	C25	XP4625	1
7834951	PXAL250C25-03R100		1								1
7834952	PXAL250C25-03R300		3								1
7834953	PXAL250C25-03R500		5								1

库存种类都为C(即标准库存品)。 Stock are categorized as C (Standard stock item).

丰富的刀头种类! 可换头式铣刀PXM

Abundant exchangeable milling heads! Exchangeable head end mill PXM

通过发挥与整体型相同加工性能的刀头部和刀头部的更换，实现刀体部的通用性，从而降低加工成本。
丰富的刀头种类对应多种多样的加工场景。

The PXM is an exchangeable head end mill series with the same high performance of a solid tool and the cost efficiency of an indexable tool. A single exchangeable head body is able to accommodate a wide range of exchangeable heads to meet various application needs.

形状类型 Available shapes

- 平头型
Square Type
- 粗加工型
Roughing Type
- 圆弧角型
Corner Radius Type
- 球头型
Ball Type

详情请参考 OSG PHOENIX 样本。

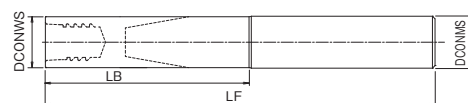
Please see OSG PHOENIX Catalog for details.



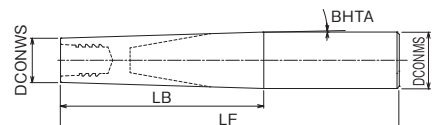
PXMZ



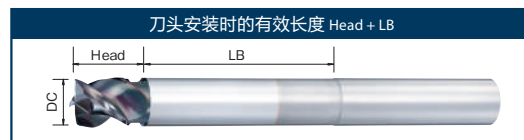
Type1 无内冷油孔 without Coolant Hole



Type2 无内冷油孔 without Coolant Hole



无内冷油孔 without Coolant Hole
硬质合金刀杆 Carbide Shank



单位:mm Unit:mm

商品号 EDP No.	名称 Designation	颈径 DCONWS	柄径 DCONMS	角度 BHTA	全长 LF	颈长 LB	刀头安装时的有效长度 Head + LB		安装 规格 Cs	形状 Type
							PXAL 外径 DC			
							φ 10、12、16、 20、25	φ 12、14、18、 22 (粗刃型) Reduced Shank Type		
7801830	PXMZ-C10SS10-S075CS	9.8	10	0°	75	17.3	33.3	35.3	C10	1
7801810	PXMZ-C10SS10-L100CS		10	0°	100	37.3	53.3	55.3		1
7801840	PXMZ-C10TP12-LL130CS		12	0.9°	130	67	83	85		2
7801831	PXMZ-C12SS12-S075CS	11.7	12	0°	75	24	42	44	C12	1
7801811	PXMZ-C12SS12-L100CS		12	0°	100	45.9	63.9	65.9		1
7801832	PXMZ-C12SS12-L115CS		12	0°	115	64.2	82.2	84.2		1
7801841	PXMZ-C12TP16-LL135CS		16	1.3°	135	83.8	101.8	103.8		2
7801833	PXMZ-C16SS16-S090CS	15.7	16	0°	90	39.2	62.7	64.7	C16	1
7801812	PXMZ-C16SS16-L130CS		16	0°	130	61.2	84.7	86.7		1
7801834	PXMZ-C16SS16-L135CS		16	0°	135	84.2	107.7	109.7		1
7801842	PXMZ-C16TP20-LL165CS		20	1.1°	165	115	138.5	140.5		2
7801835	PXMZ-C20SS20-S090CS	19.6	20	0°	90	39.1	66.6	68.6	C20	1
7801813	PXMZ-C20SS20-L150CS		20	0°	150	78.4	105.9	107.9		1
7801836	PXMZ-C20SS20-L180CS		20	0°	180	109.1	136.6	138.6		1
7801843	PXMZ-C20TP25-LL200CS		25	1.1°	200	140	167.5	169.5		2
7801814	PXMZ-C25SS25-L200CS	24	25	0°	200	96.6	131.6	—	C25	1

库存种类都为C(即标准库存品)。 Stock are categorized as C (Standard stock item).

1. 请适当调整冷却喷嘴的位置，以免切屑卷曲缠绕。
2. 即使安装于PXMZ 带内冷油孔刀杆上也可加工。

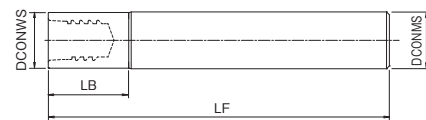
1. Adjust the position of the coolant nozzles accordingly so that the chips do not get tangled.
2. Also compatible with PXMZ shank holder with coolant hole.



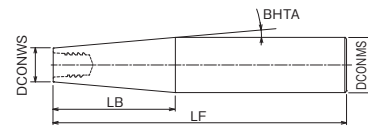
PXMZ



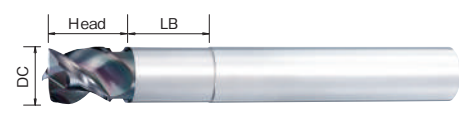
Type1 无内冷油孔 without Coolant Hole



Type2 无内冷油孔 without Coolant Hole

无内冷油孔 without Coolant Hole
钢制刀杆 Steel Shank

刀头安装时的有效长度 Head + LB



单位:mm Unit:mm

商品号 EDP No.	名称 Designation	颈径 DCONWS	柄径 DCONMS	角度 BH _T A	全长 L _F	颈长 L _B	刀头安装时的有效长度 Head + L _B		安装 规格 C _s	形状 Type
							PXAL 外径 DC			
							φ10、12、16、 20、25	φ12、14、18、 22 (粗刃型) Reduced Shank Type		
7801800	PXMZ-C10SS10-S075	9.8	10	0°	75	12	28	30	C10	1
7801801	PXMZ-C12SS12-S100	11.7	12	0°	100	18	36	38	C12	1
7801821	PXMZ-C12TP20-S145		20	5°	145	47.4	65.4	67.4		2
7801802	PXMZ-C16SS16-S100	15.7	16	0°	100	23	46.5	48.5	C16	1
7801822	PXMZ-C16TP25-S155		25	5°	155	53.1	76.6	78.6		2
7801803	PXMZ-C20SS20-S120	19.6	20	0°	120	28	55.5	57.5	C20	1
7801823	PXMZ-C20TP32-S170		32	5°	170	70.8	98.3	100.3		2
7801804	PXMZ-C25SS25-S140	24	25	0°	140	34.5	69.5	—	C25	1

库存种类都为C(即标准库存品)。 Stock are categorized as C (Standard stock item).

- 请适当调整冷却喷嘴的位置，以免切屑卷曲缠绕。
- 即使安装于PXMZ 带内冷油孔刀杆上也可加工。

- Adjust the position of the coolant nozzles accordingly so that the chips do not get tangled.
- Also compatible with PXMZ shank holder with coolant hole.

零件 Accessories

	商品号 EDP No.	名称 Designation	适用刀头外径 Applicable Head Dia.	安装规格 Cs	推荐安装扭矩 Recommended Tightening Torque
扳手 Spanner	7801890	PXMP8-10	φ10, φ12 (粗刃型)	C10	10N·m
			φ12, φ14	C12	12N·m
	7801891	PXMP13-16	φ16, φ18	C16	30N·m
			φ20, φ22	C20	50N·m
	7801892	PXMP21	φ25	C25	60N·m

PXM 专用扳手请另购。

There spanner are specifically for PXM, and sold separately from the cutters.

- 使用注意事项请参考 p.59。
- 安装扭矩请参考上表。
- 专用扭矩扳手请咨询本公司营业人员。

- Please refer to p.59 for cautions during use.
- Please refer to the table above for tightening torque.
- Contact your nearest OSG sales representative for details of our dedicated adjustable torque wrench for tightening inserts.

PXAL 切削条件基准表

Cutting Condition

侧铣 Side Milling

$L/D \leq 3$

加工材料 Work Material	铝合金延伸材 Aluminum Alloy Expanding Material A5052·A7075	
切削速度 Cutting Speed (m/min)	500	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
10	16,000	4,800
12	13,300	3,990
14	11,400	3,420
16	10,000	3,600
18	8,900	3,210
20	8,000	3,840
22	7,300	3,510
25	6,400	3,840
切削深度 Depth of Cut	ap	ae
	0.7D	0.2D

上表适用于使用水溶性切削油剂的情况。

$3 < L/D \leq 5$

加工材料 Work Material	铝合金延伸材 Aluminum Alloy Expanding Material A5052·A7075	
切削速度 Cutting Speed (m/min)	300	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
10	9,600	2,310
12	8,000	1,920
14	6,900	1,660
16	6,000	1,730
18	5,400	1,560
20	4,800	1,850
22	4,400	1,690
25	3,900	1,880
切削深度 Depth of Cut	ap	ae
	0.7D	0.08D

The table above is for when using water-soluble coolant.

$5 < L/D \leq 7$

加工材料 Work Material	铝合金延伸材 Aluminum Alloy Expanding Material A5052·A7075	
切削速度 Cutting Speed (m/min)	200	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
10	6,400	1,390
12	5,400	1,170
14	4,600	1,000
16	4,000	1,040
18	3,600	940
20	3,200	1,110
22	2,900	1,010
25	2,600	1,130
切削深度 Depth of Cut	ap	ae
	0.7D	0.04D

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin	
	PP · UPE · PTFE		POM · PVC · MC尼龙 · ABS树脂 · PEEK MC Nylon ABS Resin		亚克力 Acrylic		酚醛塑料 Bakelite	
切削速度 Cutting Speed (m/min)	115		95		115		115	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
10	3,500	1,050	2,900	830	3,500	470	3,500	470
12	2,900	960	2,500	790	2,900	440	2,900	440
14	2,500	830	2,300	720	2,500	380	2,500	380
16	2,400	790	2,000	630	2,400	380	2,400	380
18	2,100	760	1,800	620	2,100	380	2,100	380
20	1,900	740	1,600	600	1,900	370	1,900	370
22	1,700	660	1,400	530	1,700	360	1,700	360
25	1,500	660	1,250	530	1,500	360	1,500	360
切削深度 Depth of Cut								
					⌀p	⌀e		
					1D	0.5D		

槽铣 Slot Milling

 $L/D \leq 3$

加工材料 Work Material	铝合金延伸材 Aluminum Alloy Expanding Material A5052·A7075	
切削速度 Cutting Speed (m/min)	500	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
10	16,000	4,800
12	13,300	3,990
14	11,400	3,420
16	10,000	3,000
18	8,900	2,670
20	8,000	2,400
22	7,300	2,190
25	6,400	1,920
切削深度 Depth of Cut	$\frac{ap}{0.5D}$	

上表适用于使用水溶性切削油剂的情况。

 $3 < L/D \leq 5$

加工材料 Work Material	铝合金延伸材 Aluminum Alloy Expanding Material A5052·A7075	
切削速度 Cutting Speed (m/min)	300	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
10	9,600	2,160
12	8,000	1,800
14	6,900	1,560
16	6,000	1,350
18	5,400	1,220
20	4,800	1,080
22	4,400	990
25	3,900	880
切削深度 Depth of Cut	$\frac{ap}{0.35D}$	

The table above is for when using water-soluble coolant.

 $5 < L/D \leq 7$

加工材料 Work Material	铝合金延伸材 Aluminum Alloy Expanding Material A5052·A7075	
切削速度 Cutting Speed (m/min)	200	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
10	6,400	960
12	5,400	810
14	4,600	690
16	4,000	600
18	3,600	540
20	3,200	480
22	2,900	440
25	2,600	390
切削深度 Depth of Cut	$\frac{ap}{0.2D}$	

加工材料 Work Material	热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
	PP·UPE·PTFE		POM·PVC·MC尼龙·ABS树脂·PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	105		85		105		105	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
10	3,200	960	2,500	710	3,200	430	3,200	430
12	2,700	890	2,400	660	2,700	410	2,700	410
14	2,300	760	2,000	630	2,300	350	2,300	350
16	2,200	730	1,800	570	2,200	350	2,200	350
18	1,900	680	1,600	550	1,900	340	1,900	340
20	1,750	650	1,400	530	1,750	340	1,750	340
22	1,600	620	1,300	490	1,600	340	1,600	340
25	1,400	620	1,100	480	1,400	340	1,400	340
切削深度 Depth of Cut					$\frac{ap}{1D}$			
			$DC \leq 12$					
			$12 < DC$		$\frac{ap}{0.5D}$			

上表适用于使用气冷的情况。

The table above is for when using air-blow.

1. 请使用高刚性、高精度的机械、刀柄。
2. 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
3. 悬长过长时，易发生振动，请适当调整转速、进给速度和切削深度。
4. 请考虑被夹具夹持的柄部(PXMZ)的悬长与刀头全长(LF)相加的悬长来选定切削条件。
5. 加工铜·铜合金时，请下调上表转速的20~40%，进给速度50~80%，切削深度(ap) 50 ~ 80%左右。
6. 加工镁合金时，请使用与铝合金延伸材相同的切削条件。
使用切削油剂的情况下，请务必使用切削油剂厂家推荐的切削油剂。
另外，请注意切屑的处理与管理，以免造成火灾。
7. 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
8. 对于更高质量的树脂加工，推荐使用水溶性切削油剂(尼龙系和酚醛塑料除外)。

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the depth of cut is large or when machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
3. Please adjust the cutting condition when the overhang length is longer.
4. Please consider the overhang length as the total length of replaceable head and overhang length of shank holder.
5. When milling copper and copper alloys, lower the rotational speed by 20 to 40%, feed rate by 50 to 80%, and cutting depth by ap 50 to 80% in accordance with the table above.
6. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
7. When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
8. For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).

PXMC

PXMC 夹具特点

PXMC Collet Features

- 即使小型 M/C 也能取得惊人的排屑性

Powerful chip evacuation even on small machining center

- 实现短悬长，刚性提高与理想的回转平衡性

The reduction of overhang length improves rigidity and rotational balance

- 丰富的刀头品种

- 适用于钢、不锈钢、铝
- 从粗加工至精加工的广泛加工范围

A wide variety of exchangeable heads

- Suitable for steel, stainless steel and aluminum
- Wide processing range from roughing to finishing

- 与一体式刀柄相比，即便发生问题也仅需要更换筒夹配件即可，具有超高性价比

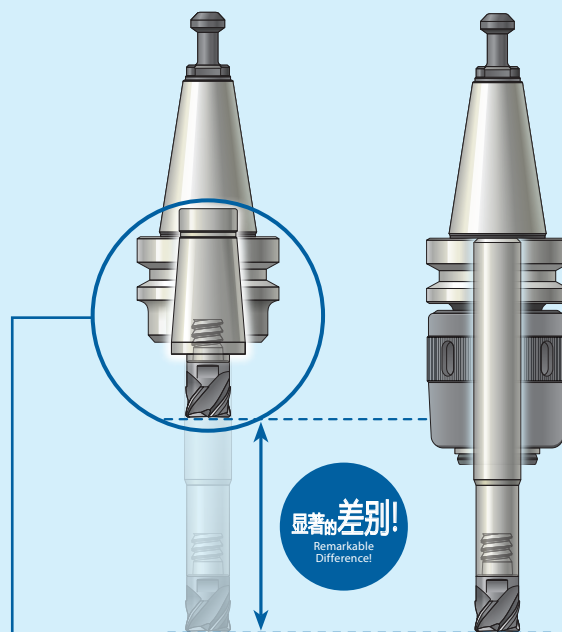
Greater cost performance compared to monoblock type holders, only need to change the collet in case of trouble.

PXMC 超短型

PXMC Collet Extra Short Type

以往组合

Conventional Combination



显著的差别!
Remarkable Difference!

PXM 刀头特点

PXM Exchangeable Head Features

活用整体铣刀的设计·实绩·专业技术的刃形

- 可对应各式各样的加工

All the knowledge and know-how acquired by designing solid carbide end mills are found in these exchangeable heads.

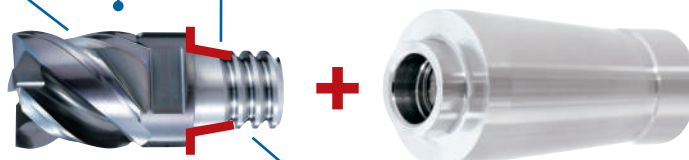
- Various types are available to meet various machining methods.

端面 + 锥形 = 双面拘束

- 确保高刚性与精度
- 外周刃的跳动精度：0.015mm 以下
- 更换刀头精度(轴向) $\pm 0.03\text{mm}$

End Face + Taper = Double Face Clamping

- High rigidity and accuracy of tightening
- High precision of run out $\leq 0.015\text{mm}$
- High head replacing accuracy = $\pm 0.03\text{mm}$



采用锯齿螺纹

- 刀头的装卸更方便
- 更换刀具时间的短缩

Applying buttress screw makes easy and reduces time to desorb heads

可换头式铣刀 PXM 专用夹具

Collet for PXM Exchangeable Head End Mill

标准
Standard

高性能
High Performance

短刃型
Short
AE-TS-N

长刃型
Long
AE-TL-N

长刃带断屑槽刃型
Long With Chipbreaker
AE-TL-N(-N)

短刃型
Short
AE-VTS-N

深壁加工型
For Deep Side Milling
AE-VTFE-N

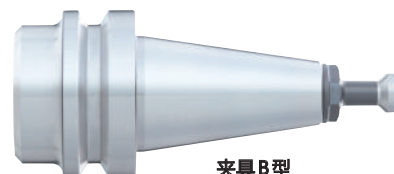
可换头式
Exchangeable Head
PXM



短型
Short

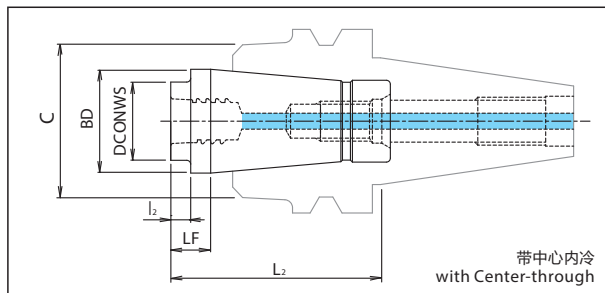


超短型
Extra Short



夹具B型
Holder Type B

形状尺寸表 Specification



单位:mm Unit:mm

类型 Type	商品号 EDP No.	名称 Designation	颈径 DCONWS	BD	LF	颈长 l2	刀头安装时的有效长度 Head +l2		安装 规格 Cs
							PXAL 外径 DC		
							φ 12、16、20、 25	φ 14、18、22 (粗刃型) Reduced Shank Type	
超短型 Extra Short	7834001	PXMC-C1205	11.7	26	10.5	5	23	25	C12
	7834002	PXMC-C1605	15.7	26	10.5	5	28.5	30.5	C16
	7834003	PXMC-C2005	19.6	26	10.5	5	32.5	34.5	C20
	7834004	PXMC-C2505	24	26	10.5	5	40	—	C25
短型 Short	7834011	PXMC-C1230	11.7	26	35.5	30	48	50	C12
	7834012	PXMC-C1630	15.7	26	35.5	30	53.5	55.5	C16
	7834013	PXMC-C2030	19.6	26	35.5	30	57.5	59.5	C20
	7834014	PXMC-C2530	24	26	35.5	30	65	—	C25

库存种类都为C(即标准库存品)。 Stock are categorized as C (Standard stock item).

1. PXM是「OSG PHOENIX PXM系列」刀头专用夹具。

1. The PXM exchangeable head is designed specifically for the "OSG PHOENIX PXM" series.

PXMC对应HYPRO热缩刀柄 产品一览

Product Listing of PXMC corresponding to the HYPRO Shrink System

单位:mm Unit:mm

类型 Type	商品号 EDP No.	名称 Designation	C	L2	
				超短型 Extra Short	短型 Short
夹具B型 Holder Type B	8910000	BT30-SLK12-35 P30T-1(MAS1) *1	38	45.5	70.5
	8910001	BT30-SLK12-35 P30T-2(MAS2) *1	38	45.5	70.5
	8910002	BT40-SLK12-45	38	55.5	80.5
	8910003	BT40-SLK12-75	38	85.5	110.5
	8910005	A63-SLK12-75	38	85.5	110.5
	8910006	A63-SLK12-135	38	145.5	170.5

1. 价格请咨询我司营业。

2. PXMC夹具可与HYPRO热缩刀柄互换。

1. Contact your local OSG sales representative for information regarding pricing.

2. The PXMC collet is compatible with the HYPRO Shrink Collet System.

*1: 仅BT30用刀柄附带拉钉。

*1: Only BT30 holders come with a pull stud bolt.



PXAL+PXMC 切削条件基准表 Cutting Condition

PXAL+PXMC 超短型 PXAL + PXMC Extra Short Type

侧铣 Side Milling

加工材料 Work Material	铝合金延伸材 Aluminum Alloy Expanding Material A5052·A7075		热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
			PP·UPE·PTFE		POM·PVC·MC尼龙·ABS树脂·PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	450		115		95		115		115	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
12	10,000	3,000	2,900	960	2,500	790	2,900	440	2,900	440
14	10,000	3,000	2,500	830	2,300	720	2,500	380	2,500	380
16	10,000	3,000	2,400	790	2,000	630	2,400	380	2,400	380
18	8,900	3,210	2,100	760	1,800	620	2,100	380	2,100	380
20	8,000	2,880	1,900	740	1,600	600	1,900	370	1,900	370
22	7,300	3,510	1,700	660	1,400	530	1,700	360	1,700	360
25	6,400	3,080	1,500	660	1,250	530	1,500	360	1,500	360
切削深度 Depth of Cut	ap									
	0.7D								1D	

铝合金的切削条件是使用[水溶性切削油剂](#)的情况。
树脂的切削条件是使用[气冷式](#)的情况。

The cutting conditions for aluminum alloys are for when using [water-soluble cutting fluids](#).
The cutting conditions for resin are for when using [air-blow](#).

槽铣 Slot Milling

加工材料 Work Material	铝合金延伸材 Aluminum Alloy Expanding Material A5052·A7075		热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
			PP·UPE·PTFE		POM·PVC·MC尼龙·ABS树脂·PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	450		105		85		105		105	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
12	10,000	3,000	2,700	890	2,400	660	2,700	410	2,700	410
14	10,000	3,000	2,300	760	2,000	630	2,300	350	2,300	350
16	10,000	3,000	2,200	730	1,800	570	2,200	350	2,200	350
18	8,900	2,670	1,900	680	1,600	550	1,900	340	1,900	340
20	8,000	2,400	1,750	650	1,400	530	1,750	340	1,750	340
22	7,300	2,190	1,600	620	1,300	490	1,600	340	1,600	340
25	6,400	1,920	1,400	620	1,100	480	1,400	340	1,400	340
切削深度 Depth of Cut	ap 0.5D									
			DC≤12 12<DC				ap 1D 0.5D			

铝合金的切削条件是使用[水溶性切削油剂](#)的情况。
树脂的切削条件是使用[气冷式](#)的情况。

The cutting conditions for aluminum alloys are for when using [water-soluble cutting fluids](#).
The cutting conditions for resin are for when using [air-blow](#).

- 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
- 加工铜·铜合金时，请下调上表转速的20~40%，进给速度50~80%，切削深度(ap) 50 ~ 80%左右。
- 加工镁合金时，请使用与铝合金延伸材相同的切削条件。
使用切削油剂的情况下，请务必使用切削油剂厂家推荐的切削油剂。
另外，请注意切屑的处理与管理，以免造成火灾。
- 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
- 对于更高质量的树脂加工，推荐使用水溶性切削油剂（尼龙系和酚醛塑料除外）。

- Please adjust speed and feed when the depth of cut is large or machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
- When milling copper and copper alloys, lower the rotational speed by 20 to 40%, feed rate by 50 to 80%, and cutting depth by ap 50 to 80% in accordance with the table above.
- Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
- When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
- For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).



PXAL+PXMC 短型 PXAL + PXMC Short Type

侧铣 Side Milling

加工材料 Work Material	铝合金延伸材 Aluminum Alloy Expanding Material A5052·A7075		热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
			PP·UPE·PTFE		POM·PVC·MC尼龙·ABS树脂·PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	450		115		95		115		115	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
12	10,000	2,700	2,900	960	2,500	790	2,900	440	2,900	440
14	10,000	2,700	2,500	830	2,300	720	2,500	380	2,500	380
16	10,000	2,700	2,400	790	2,000	630	2,400	380	2,400	380
18	8,900	2,890	2,100	760	1,800	620	2,100	380	2,100	380
20	8,000	2,600	1,900	740	1,600	600	1,900	370	1,900	370
22	7,300	3,160	1,700	660	1,400	530	1,700	360	1,700	360
25	6,400	2,770	1,500	660	1,250	530	1,500	360	1,500	360
切削深度 Depth of Cut	ap								ap	
	0.7D								1D	

铝合金的切削条件是使用水溶性切削油剂的情况。
树脂的切削条件是使用气冷式的情况。

The cutting conditions for aluminum alloys are for when using water-soluble cutting fluids.
The cutting conditions for resin are for when using air-blow.

槽铣 Slot Milling

加工材料 Work Material	铝合金延伸材 Aluminum Alloy Expanding Material A5052·A7075		热可塑性树脂 Thermoplastic Resin						热硬化性树脂 Thermosetting Resin 酚醛塑料 Bakelite	
			PP·UPE·PTFE		POM·PVC·MC尼龙·ABS树脂·PEEK MC Nylon ABS Resin		亚克力 Acrylic			
切削速度 Cutting Speed (m/min)	450		105		85		105		105	
外径 DC	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
12	10,000	2,700	2,700	890	2,400	660	2,700	410	2,700	410
14	10,000	2,700	2,300	760	2,000	630	2,300	350	2,300	350
16	10,000	2,700	2,200	730	1,800	570	2,200	350	2,200	350
18	8,900	2,410	1,900	680	1,600	550	1,900	340	1,900	340
20	8,000	2,160	1,750	650	1,400	530	1,750	340	1,750	340
22	7,300	1,980	1,600	620	1,300	490	1,600	340	1,600	340
25	6,400	1,730	1,400	620	1,100	480	1,400	340	1,400	340
切削深度 Depth of Cut										
	ap								ap	
	0.5D								1D	
									0.5D	

铝合金的切削条件是使用水溶性切削油剂的情况。
树脂的切削条件是使用气冷式的情况。

The cutting conditions for aluminum alloys are for when using water-soluble cutting fluids.
The cutting conditions for resin are for when using air-blow.

- 请根据切削深度、机械刚性等使用状况，调整转速和进给速度。
在树脂加工中，采用坚固的工件形状和固定方法时，则可以提高进给速度。
- 加工铜·铜合金时，请下调上表转速的20~40%，进给速度50~80%，切削深度(ap) 50~80%左右。
- 加工镁合金时，请使用与铝合金延伸材相同的切削条件。
使用切削油剂的情况下，请务必使用切削油剂厂家推荐的切削油剂。
另外，请注意切屑的处理与管理，以免造成火灾。
- 加工树脂时，为了防止切屑卷入、缠绕，请清除切屑。
- 对于更高质量的树脂加工，推荐使用水溶性切削油剂（尼龙系和酚醛塑料除外）。

- Please adjust speed and feed when the depth of cut is large or machines with low rigidity are used. In resin processing, the feed rate can be increased if the shape of the workpiece and method of fixation are rigid.
- When milling copper and copper alloys, lower the rotational speed by 20 to 40%, feed rate by 50 to 80%, and cutting depth by ap 50 to 80% in accordance with the table above.
- Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.
- When processing resin, please remove cutting chips to prevent them from getting caught or entangled.
- For higher quality processing of resin, the use of a water-soluble cutting fluid is recommended (excluding nylon and Bakelite).

PXMZ 锁紧顺序 Tightening procedure



① 清洗

Cleaning

将刀头和柄部之间的垃圾以及污垢擦干净
Remove dirt and chips from the connecting thread and shank



有空隙
With gap



无空隙◎
Without gap

② 暂锁

Initial Tightening

手动锁紧
Tighten by hand

③ 最终拧紧

Final Tightening

使用专用扳手拧紧
Tighten with a spanner wrench

④ 确认

Confirmation

确认是否有空隙
Confirm that there is no gap

使用上的
注意
Cautions
during use

- 安装刀头时请使用 PXM 专用扳手。
(非专用扳手不能使用)。
- 推荐安装扭矩请参考 p.52。
- 刀头与夹具端面安装时，请确认无间隙。
- 安装部脱油会使得安装更加困难，有可能达不到端面。所以请勿脱油。
- 请将扳手插入刀头凹槽处，慢慢回转。

- Only use the spanner wrenches that are designed specifically for the PXM (p.52) for attaching PXM heads.
- Please do not use alternative spanner wrenches sold on the market as a replacement.
- Please refer to p.52 for tightening torque.
- Please tighten until the head and the shank holder faces meet. Confirm that there is no gap.
- Degreasing the connecting thread may result in over tightening or a possible separation of the faces. Please do not degrease.
- Please make sure that the spanner wrench is inserted properly and turn it slowly during use.

PXMC 安装顺序 Mounting Procedure



① 临时拧紧(BT30) Initial Tightening

清扫刀柄的安装部分，并插入。

转动拉钉，使其临时拧紧。

※ BT30以外的请参考下面。

Make sure the fastening portion of the collet is clean then insert it into the holder. Turn the pull stud to tighten.
*For models other than BT30 please refer to the instructions below.



② 最终拧紧 Final Tightening

用扳手拧紧。

Tighten with a spanner wrench



③ 清扫 Cleaning

清除刀头、夹具之间的垃圾及污垢。

Remove dirt and chips from the connecting thread and collet



④ 安装刀头 Mounting the Head

用手拧紧后，再用 PXM 专用扳手拧紧。

After screwing the head in by hand, use the PXM spanner wrench to tighten.



※ BT30以外的安装顺序 Mounting procedure for holders other than BT30

① 在螺纹六角部插入六角扳手。

※ 有孔的拉钉 (φ6以上) 时，
可将拉钉安装着进行操作。

Insert the hexagon socket wrench into the pull screw hexagonal section.

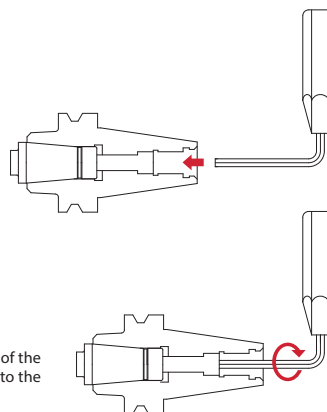
*For pull studs with holes (φ6 or above), it is operational with the stud being attached.

② 不转动夹具，在夹具的先端处握住 扳手进行转动（右转）。按指定扭 矩进行安装。

※ 推荐安装扭矩: 18N·m

To prevent the collet from rotating, support the tip of the collet by hand, tighten with the wrench by turning to the right, then fastening to the required torque.

*Recommended tightening torque: 18N·m



使用上的
注意
Cautions
during use

- 安装刀头时请使用 PXM 专用扳手。
(非专用扳手不能使用)。
- 推荐安装扭矩请参考 p.52。
- 刀头与夹具端面安装时，请确认无间隙。
- 安装部脱油会使得安装更加困难，有可能达不到端面。所以请勿脱油。
- 请将扳手插入刀头凹槽处，慢慢回转。

- Only use the spanner wrenches that are designed specifically for the PXM (p.52) for attaching PXM heads.
- Please do not use alternative spanner wrenches sold on the market as a replacement.
- Please refer to p.52 for tightening torque.
- Please tighten until the head and the collet faces meet. Confirm that there is no gap.
- Degreasing the connecting thread may result in over tightening or a possible separation of the faces. Please do not degrease.
- Please make sure that the spanner wrench is inserted properly and turn it slowly during use.

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AE-LNBD-N

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Lineup

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Lineup

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Lineup

3 × D cutting length / 5 × D cutting length

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