OSG PHOENIX® Vol.4

PAS / PAO / PSE / PRC / PHC / PDR / PFB / PXM / PHP

New appearance!

面铣刀登场!!

Phoenix 45° Face Milling

— OSG Phoenix “诞生”一周年 —

产品线扩大进行中
追加两种新型面铣刀PAS、PAO系列

— A year since the introduction of OSG PHOENIX —

Continuous expansion of product lineups
Introducing two new face milling cutter series – PAS & PAO

PAS

Phoenix 45° face milling
Square insert type

[See page 7]

PAO

Phoenix 45° face milling
Octagon insert type

[See page 11]

OSG PHOENIX®

OSG PHOENIX Series

加工方法 Machining Method	形状 Appearance	商品记号 Abbreviation	式样 Specification	页码 Page
铣刀加工 Milling		NEW PAS	面铣刀(方形刀片) Phoenix 45° Face Milling Square Insert Type	⇒P.7 ~
		NEW PAO	面铣刀(八角刀片) Phoenix 45° Face Milling Octagon Insert Type	⇒P.11 ~
		PSE	台阶加工铣刀 Phoenix Shoulder Cutter	⇒P.15 ~
		PRC	圆弧角铣刀 Phoenix Radius Cutter	⇒P.23 ~
		PHC	高进给铣刀 Phoenix High Feed Cutter	⇒P.31 ~
		PDR	高进给圆弧角铣刀 Phoenix High Feed Radius Cutter	⇒P.39 ~
		NEW SIZES PFB	精加工用球头铣刀 Phoenix Finishing Ball	⇒P.45 ~
		PSE PRC PHC NEW SIZES OP-SFA	刀盘交换式系列 Phoenix Screw-In Type	⇒P.51 ~
		PXM PXMZ	可交换式刀头式铣刀 Phoenix Replaceable Head End Mill	⇒P.55 ~
孔加工 Drilling		PHP	可转位式直柄型钻头 Phoenix Indexable Drill	⇒P.65 ~

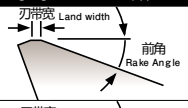
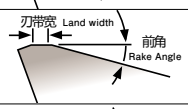
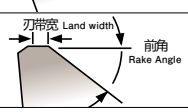
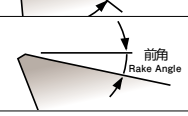
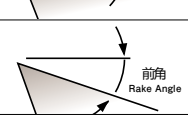
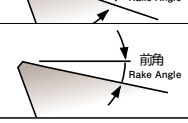
Table of Inserts

刀片材质一览

分类 Classification	材质 Grades	涂层方法 Coating Method	母材硬质 (HRA) Hardness	表面处理 Surface Treament		特长 Features
				主成分 Main Component	厚度 Coating Thickness	
P	NEW XC3025	CVD涂层	90.8	TiCN +TiN+Al_2O_3	4μm	**钢用·不锈钢用·铸铁加工用** For machining steels, stainless steels and cast irons 强韧的硬质母材和耐磨耗性很好的涂层 A strong carbide base material and excellent wear-resistant coating
	XP3035	PVD涂层	90.7	TiAlN+TiN	4μm	**钢用·不锈钢用·铸铁加工用** For machining steels, stainless steels and cast irons 高硬度、高韧性的超硬母材，耐崩刃及耐磨损性高的通用型涂层及材质 A material for general-purpose milling, it is made of a tough, high-strength carbide material coated with chipping-resistant and wear-resistant coating.
	XP3225	PVD涂层	91.5	Cr系	3μm	**钢用·不锈钢用·铸铁加工用** For machining steels, stainless steels and cast irons 强韧的超硬母材及优质的通用型涂层 A tough carbide base material and excellent general purpose coating
	XP3320	PVD涂层	91.5	SiC含有耐热强化涂层 Silicon-based heat-resistant coating	3μm	**钢用·不锈钢用·铸铁加工用** For machining steels, stainless steels and cast irons 强韧的超硬母材，耐热及耐磨损性高的涂层 It is made of a tough carbide material with a heat-resistant and wear-resistant coating
	XP3930	PVD涂层	90.8	TiAlN	3μm	**钢用·铸铁用·不锈钢加工用** For machining steels, cast irons and stainless steels 平衡性能优异，加工材料范围广泛 Excellent balance, can accommodate a range of workpiece materials
	XP9040	PVD涂层	91.9	TiAlN	3μm	**钢用·不锈钢加工用** For machining steels and stainless steels 强韧的超硬母材，耐崩刃及耐磨损性高的涂层及孔加工专用材质 A material for hole drilling, it is made of a tough carbide material with an anti-chipping and wear-resistant coating
M	XP2040	PVD涂层	89.6	TiAlN	4μm	**不锈钢用·钢加工用** For machining stainless steels and steels 强韧的超硬母材，耐崩刃及耐磨损性高的涂层及材质 A material for general-purpose milling, it is made of a tough, high-strength carbide material with an anti-chipping and wear-resistant coating
K	XC1015	CVD涂层	92.0	TiCN+Al_2O_3	5μm	**铸铁加工用材质** For machining cast irons 高硬度、高韧性的超硬母材，耐崩刃及耐磨损性高的通用型涂层及铸铁专用材质 A material for milling cast-iron, it is made of a tough, high-strength carbide material with an anti-chipping and wear-resistant coating
	NEW XP1020	PVD涂层	91.5	TiN+TiAlSiN	2μm	**铸铁加工用材质** For machining cast irons 高硬度、高韧性的超硬母材，耐崩刃及耐磨损性高的通用型涂层及铸铁专用材质 A material for milling cast-iron, it is made of a tough, high-strength carbide material with an anti-chipping and wear-resistant coating
	XC9025	CVD涂层	90.8	TiCN+Al_2O_3	6μm	**铸铁加工用材质** For machining cast irons 高硬度、高韧性的超硬母材，耐崩刃及耐磨损性高的通用型涂层及铸铁孔加工专用材质 A material for hole drilling in cast-iron, it is made of a tough, high-strength carbide material with an anti-chipping and wear-resistant coating
N	CK010	—	92.0	—	—	**非铁金属加工用材质** For machining non-ferrous materials 耐崩刃性及耐磨损性高的超硬、无涂层材质 A non-coated carbide material with both anti-chipping and wear resistant properties
	XC4505	CVD涂层	92.0	DIA	12μm	**非铁金属加工用材质** For machining non-ferrous materials 超微结晶金刚石涂层，涂层强度高 The minute diamond crystals provide for a coating layer with excellent strength
H	XP6305	PVD涂层	93.0	SiC含有耐热强化涂层 Silicon-based heat-resistant coating	3μm	**高硬度加工用材质** For machining high hardness materials 高温硬度及热传导率好的高硬度材加工用专用材质 High temperature hardness levels and excellent thermal conductivity for machining high hardness materials
S	XC5035	CVD涂层	89.3	TiN+Ti(CN)+ Al_2O_3+Ti(BN)	6μm	**耐热钢·不锈钢加工用材质** For machining heat-resistant alloy and stainless steels 强韧的超硬母材，耐氧化性好，润滑度高的涂层及耐热钢加工用材质 A material for machining heat-resistant steel, it is made of a tough carbide material with an oxidation-resistant and high-lubricity coating
	XC5040	CVD涂层	89.3	TiN+TiB_2	4μm	**耐热钢·不锈钢加工用材质** For machining heat-resistant alloy and stainless steels 强韧的超硬母材，耐氧化性好，润滑度高的涂层、可湿式加工及耐热钢加工用材质 A material for machining heat-resistant steel, it can be used for wet machining. It is made of a tough carbide material with an oxidation-resistant and high-lubricity coating

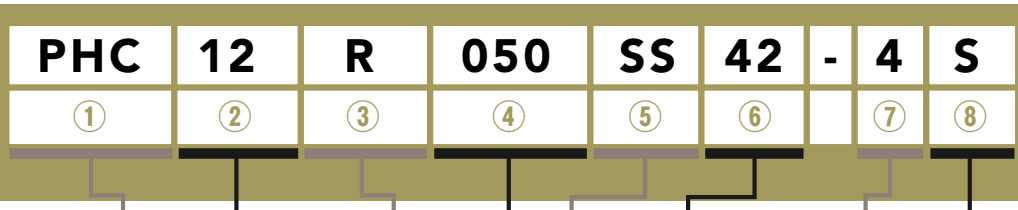
Type of chip former and the application

断屑槽种类和用途

	断屑槽名称 Chib Former	切削刃横截面形状 Cutting edge cross-section (approximate)	前角 Rake Angle	用途 Application
铣削用 For Milling	GL		25°	大前角，窄刃带，能够减小切削抵抗的低抵抗型断屑槽。 For milling stainless-steel: a breaker with a large rake angle and a small flat land to reduce cutting force
	GM		15° 35° (PAS)	前角与刃带的平衡性设计，可加工钢～铸铁的通用型断屑槽。 For drilling various materials from steel to cast iron: a breaker with a superior balance of rake angle and flat land
	NEW GR		35° (PAS)	由于前刀角和平底刃刃带，刃尖强度很高，适合铸铁及高硬度材料加工用的高刚性断屑槽。 For machining various materials from steel to cast iron: a highly rigid breaker with large rake angle and flat land to provide a sharp cutting edge and enable efficient milling.
	SM		15°	锋利的切削刃，可减少切削抵抗，使切屑流畅排出的难加工材料专用断屑槽 For machining difficult materials: a breaker with a sharp cutting edge to reduce cutting force and provide smooth chip evacuation
	NM		30°	锋利的切削刃与大前角相结合，抑制溶着，提高被加工面的光洁度，防止毛刺产生的非铁金属加工专用断屑槽。 For machining nonferrous materials: a breaker with a sharp cutting edge and a large rake angle to suppress welding, improve the milling surface and prevent burrs
钻孔用 For Drilling	DM		10°	最适合于钢～铸铁加工的前角设计，孔加工专用断屑槽。 For machining various materials from steel to cast iron: a general-purpose breaker with an ideal rake angle

Designation (Body)

刀体表示方法



①缩写 Abbririation

例:
PHC=
高进给刀具
High Feed Cutter

③方向 Cutting Direction

R=右手 Right hand
L=左手 Left hand

⑥装夹直径 Mounting Diameter

例:
42=42mm

⑦刃数 Number of Flute

例:
4=4刃 Flute

②刀片尺寸 Insert Size

例:
12=12mm

④刀盘直径 Cutter Diameter

例:
050=50mm

⑤装夹方式 Mounting Type

A	刀座型（英寸） Bore Type (Inch)
M	刀座型（毫米） Bore Type (Metric)
SS	直柄型（毫米） Straight Shank (Metric)
SA	直柄型（英寸） Straight Shank (Inch)
MT	莫氏锥柄 Morse Taper Shank
SF	刀头交换式铣刀 Screw Fit Type
FS	侧固式 Flat Shank

⑧柄型 Shank Type

S	短柄型 Short
L	长柄型 Long
LL	超长柄型 Extra Long

Designation (Insert)

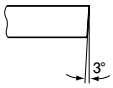
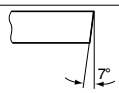
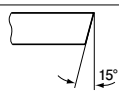
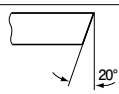
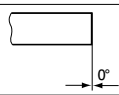
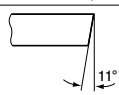
刀体表示方法

Z	D	K	T
①	②	③	④

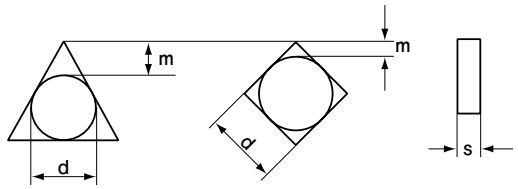
① 形状 Shape of insert

C	菱形80° Diamond apex 80°	
D	菱形55° Diamond apex 55°	
O	正八角形 octagon	
R	圆形 round	
S	正方形 square	
T	正三角形 triangle	
V	菱形35° diamond apex 35°	
W	不等角六角型 axonometric hexagon	
Z	其他形状 other shapes	–

② 后角 Clearance Angle

A	3°	
C	7°	
D	15°	
E	20°	
N	0°	
P	11°	
X	特殊形状 Special Dimension	

③ 公差 Tolerance

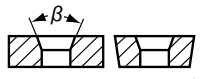
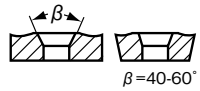
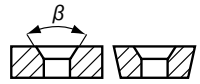
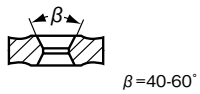
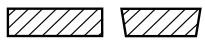


记号 Symbol	内接圆 公差φd(mm) Inscribed circle tolerance	圆弧 公差m(mm) Corner height tolerance	厚度 公差s(mm) Thickness tolerance
A	±0.025	±0.005	±0.025
C	±0.025	±0.013	±0.025
E	±0.025	±0.025	±0.025
H	±0.013	±0.013	±0.025
K※	±0.05～±0.15	±0.013	±0.025
M※	±0.05～±0.15	±0.08～±0.18	±0.13
N※	±0.05～±0.15	±0.08～±0.18	±0.025

※为刀片侧面烧结处理 Sintered insert shown on the side

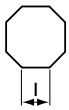
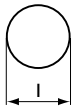
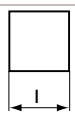
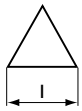
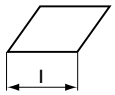
注 :根据产品别，有不同的情况。Note: Above values may vary based on product

④ 断屑槽形状 Special Cutting and Fastening Features

记号 Symbol	孔形状 Shape of Hole	有无断屑槽 With or without Breaker	刀片横截面 Insert cross section
W	上部倒角，下部圆筒（40°～60°） Partial cylindrical hole	无 No breaker	 β=40-60°
T		单面 One side	 β=40-60°
B	上部倒角，下部圆筒（70°～90°） Partial cylindrical hole	无 No breaker	 β=70-90°
U	部分圆筒(柱)孔片面取（40°～60°） Partial cylindrical hole, both sides	两面 Both side	 β=40-60°
N	–	无 No breaker	
R	–	单面 One side	

15	05	08	S	R	-	GM
⑤	⑥	⑦	⑧	⑨	-	⑩

⑤ 切削刃长度(l) Length of the cutting edge

O	
R	
S	
T	
Z	

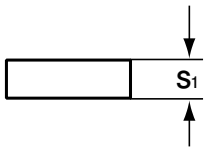
⑦圆弧记号 Corner Radius

记号 Symbol	圆弧半径 r
02	R0.2
04	R0.4
08	R0.8
12	R1.2
16	R1.6
24	R2.4

⑨刀片方向 Cutting Direction

记号 Symbol	刀片方向 Cutting Direction
R	右手 Right hand
L	左手 Left hand
N	左右共用 Both ways

⑥厚度 (l) Thickness of insert



记号 Symbol	厚度S_1 (mm) Thickness
02	2.38
03	3.18
T3	3.97
04	4.76
05	5.56
06	6.35

⑧主切削刃记号 Type of cutting edge

记号 Symbol	形状 Appearance
F	 尖刃 Sharpe edge
E	 圆刃 Round honing
T	 倒角刃 Chamfer honing
S	 复合刃 Combination honing

⑩断屑槽记号 Type of chip breaker

记号 Symbol	名称 Name
GL	GL断屑槽 breaker
GM	GM断屑槽 breaker
GR	GR断屑槽 breaker
NM	NM断屑槽 breaker
SM	SM断屑槽 breaker
DM	DM断屑槽 breaker

Phoenix PAS

Phoenix 45度角面铣刀(方形刀片)
Phoenix 45° Face Milling Square Insert Type

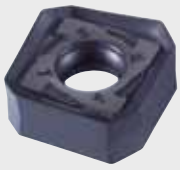
Phoenix 45° Square

■刀片形状
Insert form

正前角断屑槽实现高刚性，并且减轻加工时的切削抵抗。
Positive breaker enables high rigidity and reduces cutting force resistance

○ 规格为表里4角(共**8**角)。最大切深量**6.5**mm。
4 cutting edges per side (a total of 8 corners) specifications, 6.5 mm maximum depth of cut

○ 从粗加工到精加工，适用范围广泛。
Applicable in a wide range of work stages, from rough milling to finishing

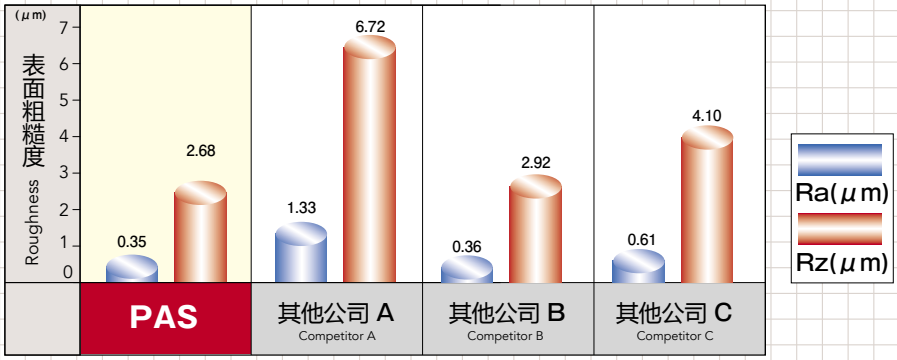


由于正前角刃形，减轻切削抵抗
The positive edge reduces cutting resistance

■高精度精加工面
High precision surface finishing

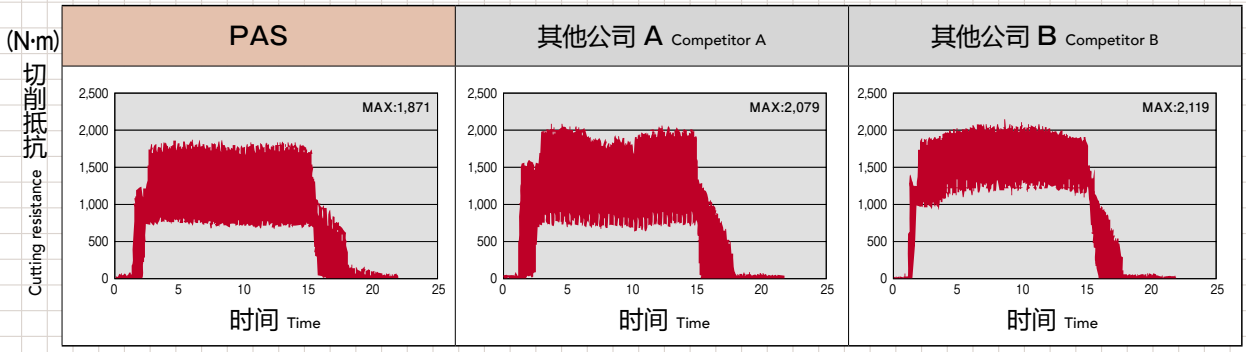
工具 Tool：PAS15R080M25.4-6 (SNKU1505AZER-GR XC1015)
使用机械 Machine：立式加工中心 (BT50)　　加工材料 Work Material：FCD500
切削条件 Cutting Conditions：Vc=250m/min (n=995min^{-1}) Vf=597mm/min (fz=0.1mm/t) ap=0.2mm ae=50mm Dry

底面粗糙度 Bottom roughness



■低抵抗加工
Low resistance machining

工具 Tool：PAS15R080M25.4-6 (SNKU1505AZER-GR XC1015)
使用机械 Machine：立式加工中心(BT50)　　加工材料 Work Material：FCD500
切削条件 Cutting Conditions：Vc=180m/min (n=716min^{-1}) Vf=860mm/min (fz=0.2mm/t) ap=3mm ae=50mm Dry



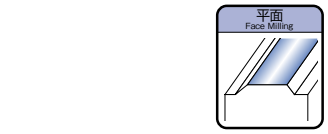
Phoenix

45度角面铣刀(方形刀片)
Phoenix 45° Face Milling Square Insert Type with Bore Type

NEW

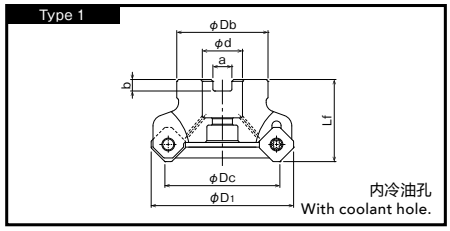
PAS BORE

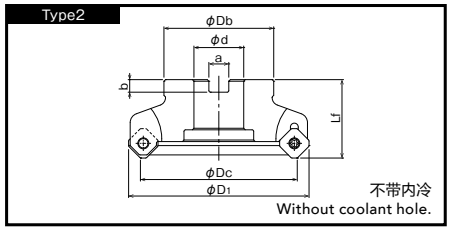
平面 Face Milling



Specification Chart

■形状尺寸表 Specification Chart



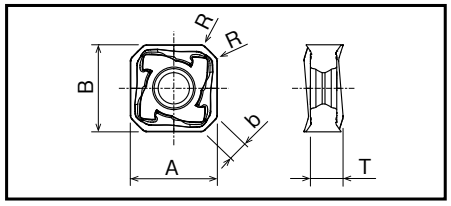


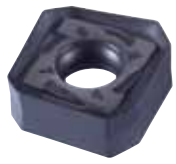
单位:mm Unit:mm

形状 EDP No.	名称 Designation	外径 Dc	直径 D1	刃数 z	颈长 Lf	台座径 Db	内孔径 d	端面槽宽 a	端面槽深 b	形状类型 Type	库存 Stock
7802000	PAS15R050M22-4	50	65	4	45	45	22	10.4	6.3	1	C
7802001	PAS15R063M22-5	63	78	5	45	50	22	10.4	6.3	1	C
7802002	PAS15R080M25.4-6	80	95	6	50	60	25.4	9.5	6	1	C
7802003	PAS15R100M31.7-7	100	115	7	50	70	31.75	12.7	8	2	C
7802004	PAS15R125M38.1-8	125	140	8	63	90	38.1	15.9	10	2	C

C=标准在库存品 C=Standard stock item.

Applicable Insert





■适用刀片 Applicable Insert

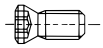
单位:mm Unit:mm

名称 Designation	切削刃数 Number of Cutting Edges	刀片尺寸 Insert Size				涂层种类 Grade of Coated Materials			
		A×B	厚度 T	R	副切削刃 b	XP3035	XP3025	XP2040	XC1015
SNKU1505AZER-GM	8	15.88×15.88	7.18	1.0	3.65	7814061	7819061	7813061	
SNKU1505AZER-GR	8	15.88×15.88	7.18	1.0	3.65				7812060

库存种类为C(标准库存品)。
Stocks are categolized in section C (Standard stock item).

Accessories

■零件 Accessories

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀具 Applicable Cutters
 固定螺丝 Clamping Screw	7808131	C	FS45513P (Torx 20IP)	PAS BORE ϕ50~125

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀具 Applicable Cutters
 T型扳手 T-Handle Wrench	7808000	C	20IP-T (Torx 20IP)	PAS BORE ϕ50~125

C=标准库存品 C=Standard stock item.
扳手请另购。 Please purchase the wrench separately from the cutter.

Phoenix

45度角面铣刀(方形刀片)

Phoenix 45° Face Milling

PAS

■加工材料推荐

Recommended Materials by Application

◎第一推荐材料 First recommended material
○第二推荐材料 Second recommended material

刀片型号 Inserts Grades	断屑槽 Chip Breaker	切削油剂 Coolant	P	M	K	N	S	H
XP3035	GM	–	◎	○	○			
XC3025	GM	–	◎		○			
XP2040	GM	–	○					○
		有		◎				
XP1015	GR	–			◎			

GM:中切削用 GR:重切削用
GM:Middle Cutting GR:Heavy Cutting

Recommended Conditions

■切削条件基准表 Recommended Conditions

单位:mm Unit:mm

	加工材料 Work Material	抗损强度·硬度 Tensil Strength· Hardness	切削速度 Vc (m/min) Milling Speed	每刃进给量 fz (mm/t) Feed Per Tooth	切削深度 ap (mm) Depth of Cut
P	软钢、低炭素钢 Mild Steels、Carbon Steels (SS400、S10C)	~180HB	180 (100 ~ 250)	0.18 (0.15 ~ 0.35)	3
	炭素钢、合金钢 Carbon Steels、Alloy Steels (S50C、SCM440)	~280HB	180 (100 ~ 250)	0.18 (0.15 ~ 0.35)	3
	模具钢 Die Steels (SKD11、SKD61)	~280HB	150 (80 ~ 200)	0.15 (0.1 ~ 0.3)	3
M	不锈钢(湿式) Stainless Steels (SUS304、SUS420)	~250HB	120 (80 ~ 180)	0.12 (0.08 ~ 0.25)	3
K	铸铁 Cast Iron (FC250)	~300N/mm²	180 (100 ~ 350)	0.2 (0.15 ~ 0.35)	4
	球墨铸铁 Ductile Cast Iron (FCD400)	~600N/mm²	180 (100 ~ 270)	0.2 (0.1 ~ 0.3)	3
H	预硬钢 Pre-hardened Steel (NAK80)	40~43HRC	100 (60 ~ 150)	0.12 (0.08 ~ 0.2)	1.5
	铸件用钢 Steel for Die Casting (DAC55、DH31)	43~48HRC	80 (40 ~ 120)	0.1 (0.05 ~ 0.15)	0.5
	调质钢 Hardened Steels (SKD11)	50~60HRC	60 (40 ~ 90)	0.08 (0.05 ~ 0.15)	0.5

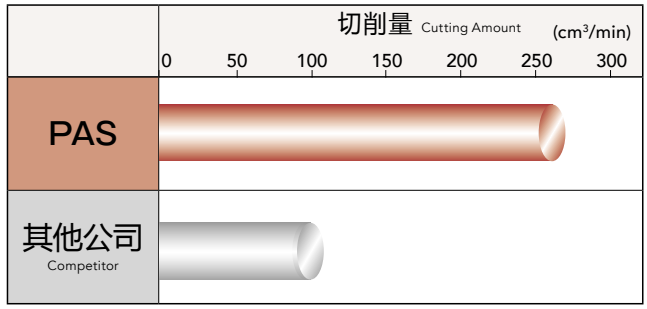
・上述数据为根据实际的切削速度的标准数据。请根据加工环境适当地调整。
Above figure is general numbers from actual millings. Please adjust according to machining environments.

Processing Data

■加工数据 Processing Data

冲压模具基准面 粗加工 Die mold surface, rough milling

使用工具 Tool	PAS15R100M31.7-7	其他公司 φ63 Competitor
使用刀片(材质) Insert (grade)	SNKU1505AZER-GR(XC1015)	硬质合金涂层刀片 Coated Carbide chip
加工材料 Work Material	FCD500	
切削速度 Cutting Speed	200m/min(637min^{-1})	120m/min(600min^{-1})
进给量 Feed	1,500mm/min (0.37mm/t)	2,700mm/min (0.9mm/t)
切削深度 Depth of Cut	3mm	1mm
切削宽度 Width of Cut	MAX 60mm	MAX 40mm
切削油剂 Coolant	气冷式 Air Blow	
使用机械 Machine	立式加工中心(BT50) Gantry Machining Center	

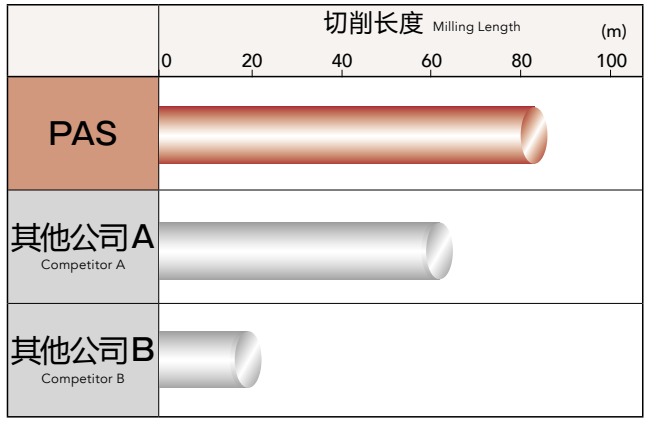


以往使用其他公司的高速进给工具时，由于其切深量不大，所以对余量不均匀的工件大多早成空切，但使用PAS后由于其切深量大，可以减少空切的次数，且销量也增多2.5倍，加工时间可以减少60%

In the past, due to the limited depth of cut, competitor high feed cutters often leave a large amount of work material uncut, creating a need for aircut. This challenge has been overcome with the introduction of the PAS, which is capable of milling difficult-to-reach areas, thus eliminating 2.5 times more work materials than conventional high feed cutters and decreasing machining time by 60 percent.

零部件的粗加工 Rough milling of parts

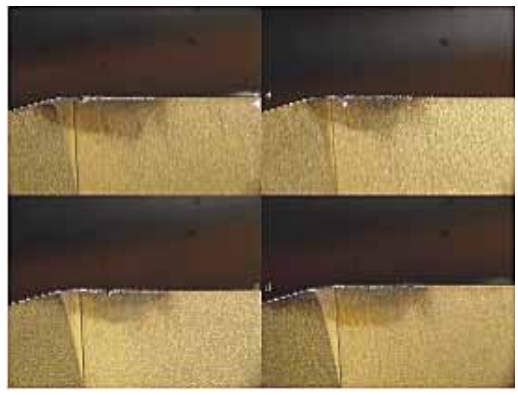
使用工具 Tool	PAS15R080M25.4-6	其他公司A·B Competitor A·B
使用刀片(材质) Insert (grade)	SNKU1505AZER-GM(XP3035)	硬质合金涂层刀片 Coated Carbide chip
加工材料 Work Material	S50C	
切削速度 Cutting Speed	200m/min (796min^{-1})	
进给量 Feed	955mm/min (0.2mm/t)	
切削深度 Depth of Cut	ap=2mm ae=50mm	
切削油剂 Coolant	气冷式 Air Blow	
使用机械 Machine	立式加工中心(BT50) Vertical Machining Center	



使用各家厂家的产品对零部件进行粗加工并做比较，其他公司的产品较早开始磨损和崩刃，但是PAS的磨损是正常磨损，耐久是1.4倍以上。

Competitor products and the PAS were compared in the rough milling stage under identical conditions. The competitor tools had large chippings and were worn out at early stages. The PAS, in contrast, showed normal cutting wear and attained more than 1.4 times the durability.

照片为加工80m之后的刀片 Photo of after milling 80m



» Phoenix PAO

Phoenix 45度角面铣刀(八角刀片)
Phoenix 45° Face Milling Octagon Insert Type

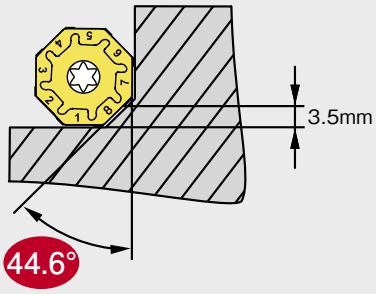
Phoenix 45° Octagon

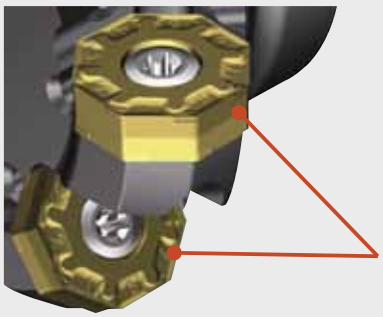
■刀片形状
Insert form

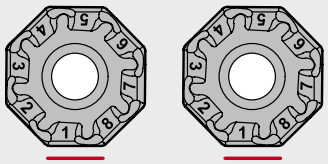
负前角刃型及正后角兼备，刚性更高，切削锋利性更好。
Achieves high rigidity and ultra sharp cutting edge with the negative cutter form and positive relief angle

○ 规格为经济性很好的里外8角(共**16**角)。最大的切深量为**3.5**mm。
An economical 8 corners per side (16 corners in total) specification, 3.5 mm maximum depth of cut.

○ 由于副切削刃形状，提供了表面精度。副切削刃为 2mm。
The new cutting edge geometry of the secondary blade further improves surface roughness.
Secondary cutting blade 2 mm.





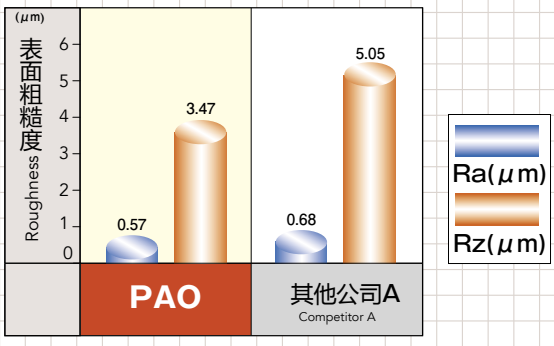


○ 每个刀片的数字可合起来后安装，所以能抑制不均匀的情况。
The slot of each insert is individually numbered.
By matching the correct insert during setup, confusion can be minimized.

■高精度精加工面
High precision surface finishing

工具：PAO06R080M25.4-8 (OZKU060508SR-GM XC1015)
Tool
使用机械：立式加工中心 (BT50)　　加工材料：FCD500
Machine　　Work Material
切削条件：Vc=250m/min (n=1,194min^{-1}) Vf=796mm/min (fz=0.1mm/t) ap=0.2mm ae=50mm Dry
Cutting Conditions

底面粗糙度 Bottom roughness



Phoenix

45度角面铣刀(八角刀片)
Phoenix 45° Face Milling Octagon Insert Type with Bore Type

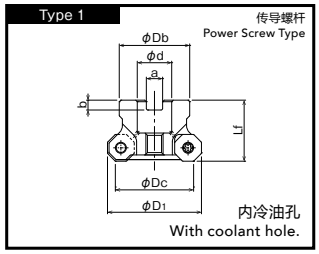
NEW

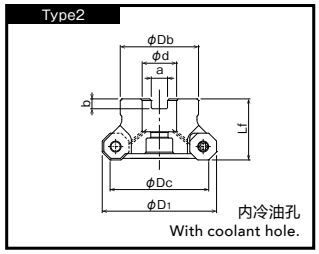
PAO BORE

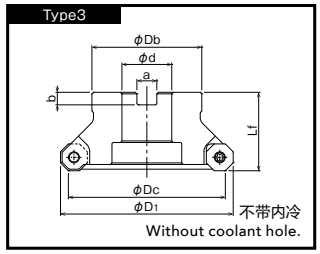
平面 Face Milling

Specification Chart

■形状尺寸表 Specification Chart





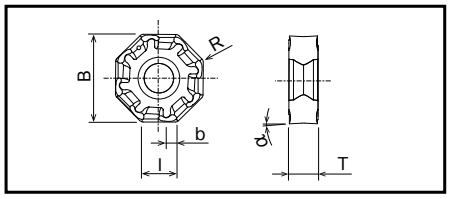


单位:mm Unit:mm

形状 EDP No.	名称 Designation	外径 Dc	直径 D1	刃数 z	颈长 Lf	台座径 Db	内孔径 d	端面槽宽 a	端面槽深 b	形状类型 Type	库存 Stock
7802020	PAO06R050M22-5	50	60.2	5	40	45	22	10.4	6.3	1	C
7802021	PAO06R063M22-7	63	73.2	7	40	50	22	10.4	6.3	2	C
7802022	PAO06R080M25.4-8	80	90.2	8	50	60	25.4	9.5	6	2	C
7802023	PAO06R100M31.7-10	100	110.2	10	50	70	31.75	12.7	8	3	C
7802024	PAO06R125M38.1-12	125	135.2	12	63	90	38.1	15.9	10	3	C

C=标准库存品 C=Standard stock item.

Applicable Insert



■适用刀片 Applicable Insert

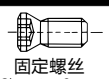
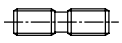
单位:mm Unit:mm

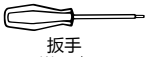
名称 Designation	切削刃数 Number of Cutting Edges	刀片尺寸 Insert Size						涂层种类 Grade of Coated Materials			
		内接圆径 B	厚度 T	切削刃长度 l	前角 α	R	副切削刃 b	XP3035	XP2040	XC1015	XP1020
OZKU060508SR-GM	16	17.1	5.66	6.0	3°	0.8	2.0	7814062	7813062	7812062	7821062

库存种类为C(标准库存品)。
Stocks are categolized in section C (Standard stock item).

Accessories

■零件 Accessories

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀具 Applicable Cutters
 固定螺丝 Clamping Screw	7808130	C	FS50614 (Torx 20)	PAO BORE ϕ50~125
 动力螺杆 Power Screw	7808151	C	PS1031 (M10×31)	PAO BORE ϕ50

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀具 Applicable Cutters
 扳手 Wrench	7808209	C	T20-D (Torx 20)	PAO BORE ϕ50~125

C=标准库存品 C=Standard stock item.
扳手请另购。 Please purchase the wrench separately from the cutter.

Phoenix

45度角面铣刀
Phoenix 45° Face Milling

PAO

■加工材料推荐
Recommended Materials by Application

◎第一推荐材料 First recommended material
○第二推荐材料 Second recommended material

刀片型号 Inserts Grades	断屑槽 Chip Breaker	切削油剂 Coolant	P	M	K	N	S	H
XP3035	GM	–	◎	○	○			
XP2040	GM	–	○					○
		有		◎				
XC1015	GM	–			◎			
XP1020	GM	–			◎			

GM:中切削用
GM:Middle Cutting

Recommended Conditions

■切削条件基准表 Recommended Conditions

	加工材料 Work Material	抗损强度·硬度 Tensil Strength· Hardness	切削速度 Vc (m/min) Milling Speed	每刃进给量 fz (mm/t) Feed Per Tooth	切削深度 ap (mm) Depth of Cut
P	软钢、低炭素钢 Mild Steels、Carbon Steels (SS400、S10C)	~180HB	180 (100 ~ 250)	0.25 (0.2 ~ 0.5)	2
	炭素钢、合金钢 Carbon Steels、Alloy Steels (S50C、SCM440)	~280HB	180 (100 ~ 250)	0.25 (0.2 ~ 0.5)	2
	模具钢 Die Steels (SKD11、SKD61)	~280HB	150 (80 ~ 200)	0.25 (0.15 ~ 0.4)	2
M	不锈钢(湿式) Stainless Steels (SUS304、SUS420)	~250HB	120 (80 ~ 180)	0.2 (0.15 ~ 0.4)	2
K	铸铁 Cast Iron (FC250)	~300N/mm²	200 (100 ~ 350)	0.3 (0.2 ~ 0.5)	2
	球墨铸铁 Ductile Cast Iron (FCD400)	~600N/mm²	180 (100 ~ 270)	0.28 (0.15 ~ 0.4)	2
H	预硬钢 Pre-hardened Steel (NAK80)	40~43HRC	100 (60 ~ 150)	0.15 (0.1 ~ 0.25)	1.5
	铸件用钢 Steel for Die Casting (DAC55、DH31)	43~48HRC	80 (40 ~ 120)	0.12 (0.05 ~ 0.2)	0.5
	调质钢 Hardened Steels (SKD11)	50~60HRC	60 (40 ~ 90)	0.1 (0.05 ~ 0.2)	0.5

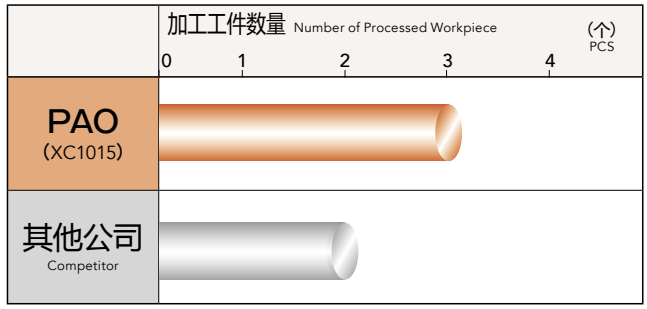
・上述数据为根据实际的切削速度的标准数据。请根据加工环境适当地调整。
Above figure is general numbers from actual millings. Please adjust according to machining environments.

Processing Data

■加工数据 Processing Data

机床零部件的粗加工 Roughing of machinery parts

使用工具 Tool	PAO06R125M38.1-12	其他公司 Competitor
使用刀片(材质) Insert (grade)	OZKU060508SR-GM(XC1015)	硬质合金涂层刀片 Coated Carbide chip
加工材料 Work Material	FC250	
切削速度 Cutting Speed	200m/min(500min^{-1})	157m/min(400min^{-1})
进给量 Feed	1,800mm/min (0.3mm/t)	1,000mm/min (0.3mm/t)
切削深度 Depth of Cut	ap=2mm ae=90mm	
切削油剂 Coolant	气冷式 Air Blow	
使用机械 Machine	龙门铣床(BT50) Gantry Machining Center	

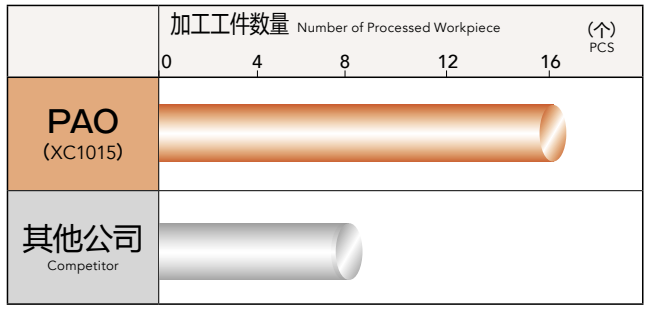


由于能抑制切削抵抗，所以即使切削条件增加1.8倍也能进行稳定加工，并且寿命达到其他公司的1.5倍。

By reducing cutting resistance, efficiency can be increased by 1.8 times and tool life can be prolonged 1.5 times.

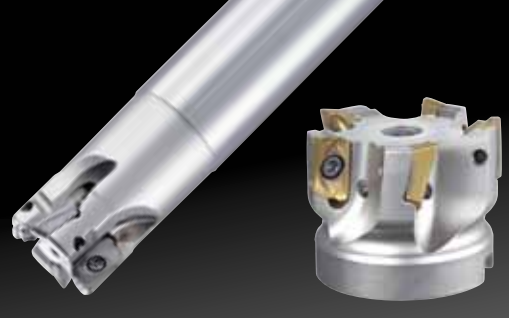
液压阀的粗加工 Roughing of oil pressure valve

使用工具 Tool	PAO06R125M38.1-12	其他公司 Competitor
使用刀片(材质) Insert (grade)	OZKU060508SR-GM(XC1015)	硬质合金涂层刀片 Coated Carbide chip
加工材料 Work Material	FCD500	
切削速度 Cutting Speed	150m/min(380min^{-1})	150m/min(300min^{-1})
进给量 Feed	900mm/min (0.2mm/t)	720mm/min (0.27mm/t)
切削深度 Depth of Cut	ap=3mm ae=50~80mm	
切削油剂 Coolant	气冷式 Air Blow	
使用机械 Machine	龙门铣床(BT50) Gantry Machining Center	



以往使用的刀具为单面8角规格，但是PAO能使用的角数增多了2倍，减少了每个角的单价。并且切削量也增加了25%，寿命提高了2倍。

The 8-corner type has been used previously, but with the PAO, the amount of milled materials can be increased by 25 percent, with twice as much tool life. In addition, the number of corners has also doubled, leading to a decrease in tooling cost.



■底部槽口的效果
Bottom notch

○ 由于底部槽口，能将切屑细小的分断。
The bottom notch breaks chips into small pieces.

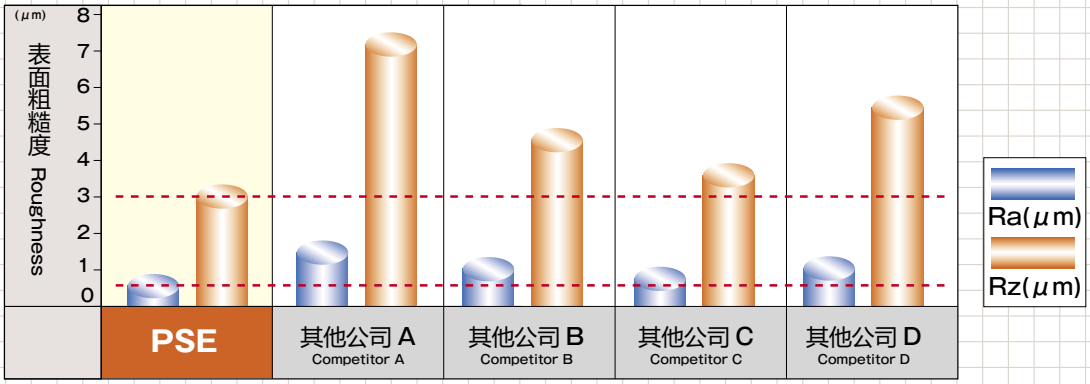
○ 能抑制切屑的卡住，能顺利地进行斜面加工和螺旋线加工。
This prevents the jamming or wrapping of chips, enabling the tool to perform ramping and helical milling in a smooth manner.

■高精度刀片
High precision insert

—底面粗糙— Bottom roughness

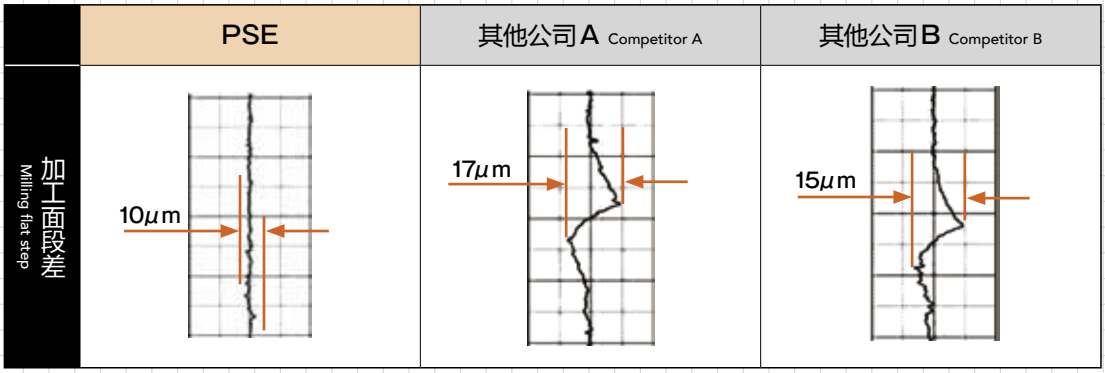
工具：PSE11R032SS32-5S (ZDKT11T304SR-GM XP3035) 加工材料：S50C
Tool
切削条件：Vf=180m/min fz=0.1mm/t ap=0.1mm ae=25.6mm
Cutting Conditions
结果：Ra：0.5μm以下 Rz：4μm以下，PSE的底面粗糙度上面能得到良好的效果。
Result PSE showed an improvement at the bottom flat surface finish Rz 4μm and under.

底面粗糙度 Bottom roughness



—侧面加工高低差异— Side Milling Offset

工具：PSE15R032SS32-3S (ZDKT150508SR-GM XP3035) 加工材料：S50C
Tool
切削条件：Vc=180m/min fz=0.1mm/t ap=5mm ae=0.2mm
Cutting Conditions
结果：高低差距10μm（实际值）及侧面加工高低差异上可发挥其性能。
Result Showed improvement at side step machining as (measured) step as 10 μm

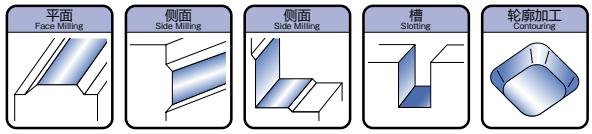


Phoenix

台阶加工用立铣刀直柄型
Shoulder Cutter with Straight Shank

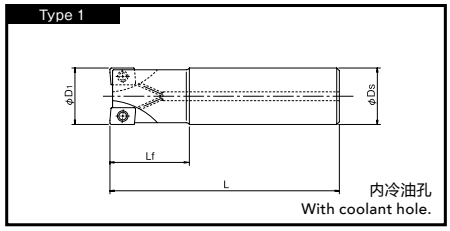
PSE SS

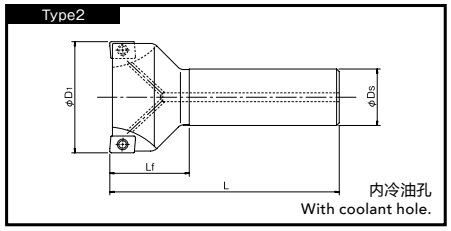
使用圆弧角R2以上的刀片时，必须对刀体的圆弧角进行修正
刀体侧的圆弧角＝刀片圆弧角-1（例：刀片为R3时，刀体为R2）
When using an insert with a corner radius of R2 or greater, the corner of the cutter body must be corrected. The body corner radius should equal insert radius minus 1 (example: if insert radius is R3, body radius should be R2).



Specification Chart

■形状尺寸表 Specification Chart





单位:mm Unit:mm

形状 Type	商品号 EDP No.	名称 Designation	直径 D1	刃数 z	柄径 Ds	全长 L	颈长 Lf	使用刀片 Applicable Inserts	形状类型 Type	库存 Stock
普通型 短刃 Coarse Pitch Short	7801101	PSE11R020SS20-2S	20	2	20	100	30		1	C
	7801102	PSE11R025SS25-3S	25	3	25	120	35		1	C
	7801103	PSE11R032SS32-3S	32	3	32	130	45		1	C
多刃型 短刃 Close Pitch Short	7801100	PSE11R016SS16-2S	16	2	16	90	25		1	C
	7801116	PSE11R018SS16-2S	18	2	16	90	25		2	C
	7801115	PSE11R020SS20-3S	20	3	20	100	30		1	C
	7801117	PSE11R022SS20-3S	22	3	20	110	30		2	C
	7801104	PSE11R025SS25-4S	25	4	25	120	35		1	C
	7801118	PSE11R028SS25-4S	28	4	25	120	35		2	C
	7801119	PSE11R030SS32-4S	30	4	32	130	45		1	C
	7801105	PSE11R032SS32-5S	32	5	32	125	40	①	1	C
	7801120	PSE11R035SS32-5S	35	5	32	130	35		2	C
长刃型 Long	7801121	PSE11R016SS16-2L	16	2	16	150	50		1	C
	7801122	PSE11R018SS16-2L	18	2	16	150	25		2	C
	7801123	PSE11R020SS20-3L	20	3	20	160	60		1	C
	7801124	PSE11R022SS20-3L	22	3	20	160	30		2	C
	7801125	PSE11R025SS25-3L	25	3	25	170	70		1	C
	7801126	PSE11R028SS25-3L	28	3	25	170	35		2	C
	7801127	PSE11R030SS32-3L	30	3	32	190	90		1	C
	7801128	PSE11R032SS32-3L	32	3	32	190	90		1	C
	7801129	PSE11R035SS32-3L	35	3	32	190	35		2	C
普通型 短刃 Coarse Pitch Short	7801107	PSE15R032SS32-2S	32	2	32	130	45		1	C
	7801108	PSE15R040SS32-3S	40	3	32	140	50		2	C
	7801109	PSE15R050SS32-3S	50	3	32	130	45		2	C
	7801110	PSE15R063SS32-4S	63	4	32	130	45		2	C
多刃型 短刃 Close Pitch Short	7801106	PSE15R025SS25-2S	25	2	25	120	35		1	C
	7801130	PSE15R028SS25-2S	28	2	25	120	35		2	C
	7801131	PSE15R030SS32-3S	30	3	32	130	45		1	C
	7801111	PSE15R032SS32-3S	32	3	32	130	45		1	C
	7801132	PSE15R035SS32-3S	35	3	32	130	35		2	C
	7801112	PSE15R040SS32-4S	40	4	32	140	50	②	2	C
	7801113	PSE15R050SS32-5S	50	5	32	130	45		2	C
	7801114	PSE15R063SS32-6S	63	6	32	130	45		2	C
长刃型 Long	7801133	PSE15R025SS25-2L	25	2	25	170	70		1	C
	7801134	PSE15R028SS25-2L	28	2	25	170	35		2	C
	7801135	PSE15R030SS32-3L	30	3	32	190	90		1	C
	7801136	PSE15R032SS32-3L	32	3	32	190	90		1	C
	7801137	PSE15R035SS32-3L	35	3	32	190	45		2	C
	7801138	PSE15R040SS32-3L	40	3	32	190	45		2	C

C＝标准在库存品 C=Standard stock item.

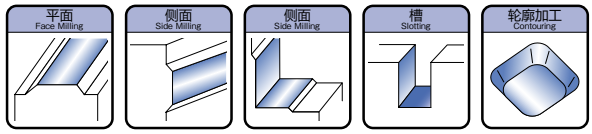
Phoenix

台阶加工用面铣刀
Shoulder Cutter with Bore Type

PSE BORE

使用圆弧角R2以上的刀片时，必须对刀体的圆弧角进行修正
刀体侧的圆弧角=刀片圆弧角-1（例：刀片为R3时，刀体为R2）

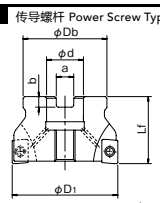
When using an insert with a corner radius of R2 or greater, the corner of the cutter body must be corrected. The body corner radius should equal insert radius minus 1 (example: if insert radius is R3, body radius should be R2).



Specification Chart

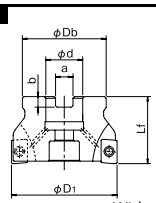
■形状尺寸表 Specification Chart

Type1 传导螺杆 Power Screw Type



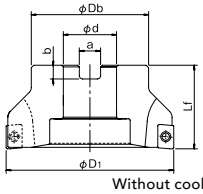
内冷油孔
With coolant hole.

Type2



内冷油孔
With coolant hole.

Type3

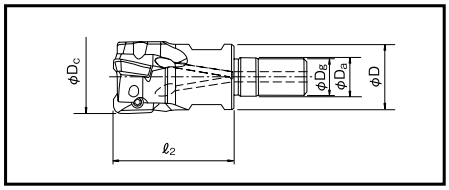


不带内冷
Without coolant hole.

单位:mm Unit:mm

形状 Type	商品号 EDP No.	名称 Designation	直径 D_1	刃数 z	全长 到身高 Lf	台座径 Db	内孔径 d	端面 槽宽 a	端面 槽深 b	适用刀片 Applicable Inserts	形状类型 Type	库存 Stock
普通型 Coarse Pitch	7801000	PSE11R040M16-4	40	4	40	38	16	8.4	5.6	①	1	C
	7801001	PSE11R050M22-5	50	5	40	45	22	10.4	6.3		1	C
	7801002	PSE11R063M22-6	63	6	40	50	22	10.4	6.3		2	C
	7801003	PSE11R080M27-7	80	7	50	60	27	12.4	7		2	C
	7801020	PSE11R080M25.4-7	80	7	50	60	25.4	9.5	6		2	C
多刃型 Close Pitch	7801004	PSE11R040M16-6	40	6	40	38	16	8.4	5.6		1	C
	7801005	PSE11R050M22-7	50	7	40	45	22	10.4	6.3		1	C
	7801006	PSE11R063M22-8	63	8	40	50	22	10.4	6.3		2	C
	7801007	PSE11R080M27-10	80	10	50	60	27	12.4	7		2	C
	7801021	PSE11R080M25.4-10	80	10	50	60	25.4	9.5	6		2	C
普通型 Coarse Pitch	7801008	PSE15R040M16-3	40	3	40	38	16	8.4	5.6	②	1	C
	7801009	PSE15R050M22-3	50	3	40	45	22	10.4	6.3		1	C
	7801010	PSE15R063M22-4	63	4	40	50	22	10.4	6.3		2	C
	7801011	PSE15R080M27-5	80	5	50	60	27	12.4	7		2	C
	7801022	PSE15R080M25.4-5	80	5	50	60	25.4	9.5	6		2	C
	7801012	PSE15R100M32-7	100	7	50	70	32	14.4	8		3	C
	7801023	PSE15R100M31.7-7	100	7	50	70	31.75	12.7	8		3	C
	7801024	PSE15R125M38.1-8	125	8	63	90	38.1	15.9	10		3	C
多刃型 Close Pitch	7801014	PSE15R040M16-4	40	4	40	38	16	8.4	5.6		1	C
	7801015	PSE15R050M22-5	50	5	40	45	22	10.4	6.3		1	C
	7801016	PSE15R063M22-6	63	6	40	50	22	10.4	6.3		2	C
	7801017	PSE15R080M27-8	80	8	50	60	27	12.4	7		2	C
	7801025	PSE15R080M25.4-8	80	8	50	60	25.4	9.5	6		2	C
	7801018	PSE15R100M32-10	100	10	50	70	32	14.4	8		3	C
	7801026	PSE15R100M31.7-10	100	10	50	70	31.75	12.7	8		3	C
	7801027	PSE15R125M38.1-11	125	11	63	90	38.1	15.9	10		3	C

C=标准库存品 C=Standard stock item.



PSE 刀头交换式铣刀 Screw Fit Type

单位:mm Unit:mm

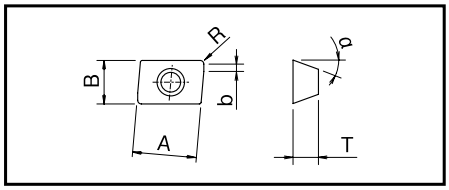
商品号 EDP No.	名称 Designation	外径 Dc	刃数 Z	装夹直径 Da	螺纹尺寸 Dg	扳手尺寸 Wrench Size	全长 ℓ2	端面直径 D	适用刀片 Applicable Inserts	库存 Stock
7801600	PSE11R016SF8-2	16	2	8.5	8	10	27	14.5	ZD*11T3··	C
7801601	PSE11R020SF10-3	20	3	10.5	10	14	33	18		C
7801602	PSE11R025SF12-4	25	4	12.5	12	17	35	23		C
7801603	PSE11R028SF12-4	28	4	12.5	12	17	35	23		C
7801604	PSE11R032SF16-5	32	5	17	16	22	40	28		C
7801605	PSE11R035SF16-5	35	5	17	16	22	40	28		C
7801606	PSE11R040SF16-6	40	6	17	16	22	40	28		C
7801607	PSE15R025SF12-2	25	2	12.5	12	17	35	23	ZDKT1505··	C
7801608	PSE15R028SF12-2	28	2	12.5	12	17	35	23		C
7801609	PSE15R032SF16-3	32	3	17	16	22	40	28		C
7801610	PSE15R035SF16-3	35	3	17	16	22	40	28		C
7801611	PSE15R040SF16-4	40	4	17	16	22	40	28		C

C=标准在库存品 C=Standard stock item.

Applicable Insert

台阶加工刀具
Shoulder Cutter

PSE 刀片



■适用刀片 Applicable Insert

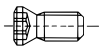
单位:mm Unit:mm

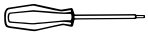
	名称 Designation	切削刃数 Number of Cutting Edges	刀片尺寸 Insert Size A×B	厚度 T	前角 α	R	副切削刃 b	超硬 Uncoated CK010	涂层种类 Grade of Coated Materials XP3035	XP2040	XC1015	XC5035	XC5040
①	ZDKT11T308SR-GL	2	10×6.8	3.8	15°	0.8	1.4		7814026	7813026			
	ZDKT11T304SR-GM	2	10×6.8	3.8	15°	0.4	1.8		7814025	7813025	7812025		
	ZDKT11T308SR-GM	2	10×6.8	3.8	15°	0.8	1.4		7814032	7813032			
	ZDKT11T312SR-GM	2	10×6.8	3.8	15°	1.2	1.0		7814053				
	ZDKT11T320SR-GM	2	10×6.8	3.8	15°	2.0	2.1		7814038				
	ZDKT11T330SR-GM	2	10×6.8	3.8	15°	3.0	1.5		7814054				
	ZDKT11T340SR-GM	2	10×6.8	3.8	15°	4.0	-		7814055				
	ZDKT11T308ER-SM	2	10×6.8	3.8	15°	0.8	1.4					7815031	7816031
	ZDKT11T316ER-SM	2	10×6.8	3.8	15°	1.6	0.8					7815027	7816027
	ZDKT11T302FR-NM	2	10×6.8	3.8	15°	0.2	2.0	7811048					
	ZDKT11T304FR-NM	2	10×6.8	3.8	15°	0.4	1.8	7811049					
	ZDHT11T304FR-NM	2	10×6.8	3.5	15°	0.4	1.8	7811024					
②	ZDKT150508SR-GL	2	14×9.3	5.56	15°	0.8	1.6		7814057	7813057			
	ZDKT150508SR-GM	2	14×9.3	5.56	15°	0.8	1.6		7814029	7813028	7812029		
	ZDKT150508ER-SM	2	14×9.3	5.56	15°	0.8	1.6					7815056	7816056
	ZDKT150508FR-NM	2	14×9.3	5.56	15°	0.8	1.6	7811046					

库存种类为C(标准库存品)。
Stocks are categolized in section C (Standard stock item).

Accessories

■零件 Accessories

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀片 Applicable Inserts		适用刀具 Applicable Cutters
 固定螺丝 Clamping Screw	7808107	C	FS25656P (Torx 8IP)	①	ZD*T11···	PSE SS/SF φ16~35
	7808109	C	FS25673P (Torx 8IP)			PSE BORE φ40~80
	7808115	C	FS35686P (Torx 15IP)	②	ZDKT15···	PSE SS/SF φ25~63 PSE BORE φ40~125
 动力螺杆 Power Screw	7808150	C	PS0830 (M8×30)	① ②	ZD*T11··· ZDKT15···	PSE BORE φ40
	7808151	C	PS1031 (M10×31)	① ②	ZD*T11··· ZDKT15···	PSE BORE φ50

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀片 Applicable Inserts		适用刀具 Applicable Cutters
 扳手 Wrench	7808225	C	8IP-D (Torx 8IP)	①	ZD*T11···	PSE SS/SF φ16~35 PSE BORE φ40~80
	7808228	C	15IP-D (Torx 15IP)	②	ZDKT15···	PSE SS/SF φ25~63 PSE BORE φ40~125

C=标准库存品 C=Standard stock item.
扳手请另购。 Please purchase the wrench separately from the cutter.

Phoenix

台阶加工刀具
Shoulder Cutter

PSE

■加工材料推荐
Recommended Materials by Application

◎第一推荐材料 First recommended material
○第二推荐材料 Second recommended material

刀片型号 Inserts Grades	断屑槽 Chip Breaker	切削油剂 Coolant	P	M	K	N	S	H
CK010	NM	–			○	◎		
XP3035	GL GM	–	◎	○	○			
XP2040	GL GM	–	○					◎
		有		◎			○	
XC1015	GM	–			◎			
XC5035	SM	–		◎				○
		有		○			○	
XC5040	SM	有		○			◎	○

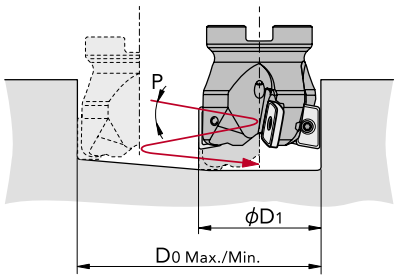
GL:轻切削用 GM:中切削用 NM:铝合金用 SM:耐热合金用
GL:Light Cutting GM:Middle Cutting NM:Aluminum SM:Heat Resistance Alloy

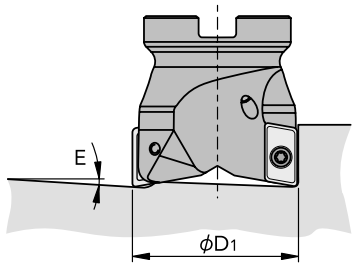
Recommended Conditions

■切削条件基准表 Recommended Conditions

	加工材料 Work Material	抗损强度·硬度 Tensil Strength · Hardness	刀片尺寸 Insert Size							
			ZD·T11…				ZDKT15…			
			切削深度 ap:10mm 切削宽度 ae:0.2D		切削深度 ap:3mm 切削宽度 ae:1.0D		切削深度 ap:14mm 切削宽度 ae:0.2D		切削深度 ap:5mm 切削宽度 ae:1.0D	
			切削速度 Vc (m/min) Milling Speed	每刃进给量 fz(mm/t) Feed Per Tooth	切削速度 Vc (m/min) Milling Speed	每刃进给量 fz(mm/t) Feed Per Tooth	切削速度 Vc (m/min) Milling Speed	每刃进给量 fz(mm/t) Feed Per Tooth	切削速度 Vc (m/min) Milling Speed	每刃进给量 fz(mm/t) Feed Per Tooth
P	软钢、低炭素钢 Mild Steels、Carbon Steels (SS400、S10C)	~180HB	180 (100 ~ 250)	0.25 (0.2 ~ 0.5)	180 (100 ~ 250)	0.12 (0.05 ~ 0.2)	180 (100 ~ 250)	0.3 (0.2 ~ 0.6)	180 (100 ~ 250)	0.15 (0.05 ~ 0.25)
P	炭素钢、合金钢 Carbon Steels、Alloy Steels (S50C、SCM440)	~280HB	180 (100 ~ 250)	0.2 (0.15 ~ 0.4)	180 (100 ~ 250)	0.11 (0.05 ~ 0.2)	180 (100 ~ 250)	0.25 (0.15 ~ 0.5)	180 (100 ~ 250)	0.12 (0.05 ~ 0.2)
P	模具钢 Die Steels (SKD11、SKD61)	~280HB	150 (80 ~ 200)	0.2 (0.15 ~ 0.4)	150 (80 ~ 200)	0.1 (0.05 ~ 0.18)	150 (80 ~ 200)	0.25 (0.15 ~ 0.5)	150 (80 ~ 200)	0.12 (0.05 ~ 0.2)
M	不锈钢(干式) Stainless Steels(Dry) (SUS304、SUS420)	~250HB	150 (80 ~ 200)	0.18 (0.15 ~ 0.4)	150 (80 ~ 200)	0.1 (0.05 ~ 0.18)	150 (80 ~ 200)	0.2 (0.15 ~ 0.45)	150 (80 ~ 200)	0.12 (0.05 ~ 0.2)
M	不锈钢(湿式) Stainless Steels(Wet) (SUS304、SUS420)	~250HB	80 (60 ~ 120)	0.18 (0.15 ~ 0.4)	80 (60 ~ 120)	0.1 (0.05 ~ 0.18)	80 (60 ~ 120)	0.2 (0.15 ~ 0.45)	80 (60 ~ 120)	0.12 (0.05 ~ 0.2)
K	铸铁 Cast Iron (FC250)	~350N/mm²	180 (100 ~ 300)	0.25 (0.15 ~ 0.5)	180 (100 ~ 300)	0.12 (0.05 ~ 0.2)	180 (100 ~ 300)	0.3 (0.2 ~ 0.6)	180 (100 ~ 300)	0.15 (0.05 ~ 0.25)
K	球墨铸铁 Ductile Cast Iron (FCD400)	~800N/mm²	180 (100 ~ 250)	0.15 (0.1 ~ 0.4)	180 (100 ~ 250)	0.12 (0.05 ~ 0.2)	180 (100 ~ 250)	0.2 (0.15 ~ 0.5)	180 (100 ~ 250)	0.15 (0.05 ~ 0.25)
N	铝合金 Aluminum Alloys	~13%Si	300 (200 ~ 1,500)	0.3 (0.2 ~ 0.5)	300 (200 ~ 1,500)	0.15 (0.1 ~ 0.25)	300 (200 ~ 1,500)	0.35 (0.2 ~ 0.6)	300 (200 ~ 1,500)	0.18 (0.1 ~ 0.3)
S	耐热合金 Heat Resistant Alloys (Inconel 718)	–	35 (25 ~ 60)	0.15 (0.1 ~ 0.3)	35 (25 ~ 60)	0.1 (0.05 ~ 0.15)	35 (25 ~ 60)	0.2 (0.1 ~ 0.3)	35 (25 ~ 60)	0.12 (0.05 ~ 0.15)
S	钛合金 Titanium Alloy (Ti-6Al-4V)	–	40 (30 ~ 120)	0.18 (0.1 ~ 0.35)	40 (30 ~ 120)	0.1 (0.08 ~ 0.25)	40 (30 ~ 120)	0.22 (0.1 ~ 0.35)	40 (30 ~ 120)	0.12 (0.08 ~ 0.25)
H	预硬钢 Pre-hardened Steel (NAK80)	40~43HRC	100 (40 ~ 150)	0.18 (0.1 ~ 0.3)	90 (40 ~ 150)	0.1 (0.08 ~ 0.2)	100 (40 ~ 150)	0.22 (0.1 ~ 0.35)	90 (40 ~ 150)	0.12 (0.08 ~ 0.25)
H	铸件用钢 Steel for Die Casting (DAC55、DH31)	43~48HRC	80 (40 ~ 120)	0.12 (0.08 ~ 0.2)	70 (40 ~ 120)	0.08 (0.06 ~ 0.15)	80 (40 ~ 120)	0.15 (0.08 ~ 0.25)	70 (40 ~ 120)	0.1 (0.06 ~ 0.2)
H	调质钢 Hardened Steels (SKD11)	50~55HRC	60 (40 ~ 90)	0.1 (0.05 ~ 0.2)	50 (40 ~ 90)	0.06 (0.05 ~ 0.1)	60 (40 ~ 90)	0.12 (0.05 ~ 0.2)	50 (40 ~ 90)	0.08 (0.05 ~ 0.12)

槽加工时推荐使用短刃型。 Course pitch is recommended for Slotting.





Maximum ramping angle(E)

■斜线下刀加工时最大倾斜角(E) Maximum ramping angle(E)

刀片尺寸 Insert Size	ZD·T11···				ZDKT15···			
刀片直径(mm) D1	倾斜角 Ramping Angle E	螺旋线开孔 Helical Milling(mm)		螺旋角度 Helical Angle P	倾斜角 Ramping Angle E	螺旋线开孔 Helical Milling(mm)		螺旋角度 Helical Angle P
		最小径 D0 Min.	最大径 D0 Max.			最小径 D0 Min.	最大径 D0 Max.	
16	10.8°	20	29	9.5°	–	–	–	–
18	9.1°	24	33	7°	–	–	–	–
20	9.8°	30	37	7°	–	–	–	–
22	6.3°	34	41	4.3°	–	–	–	–
25	7.5°	40	47	4.5°	9.5°	37	48	7.5°
28	6.3°	46	53	3.9°	8.3°	39	54	5.6°
30	5.5°	50	57	3.4°	7.4°	43	58	5.3°
32	4.8°	53	61	3.2°	6.8°	47	62	5°
35	3.2°	60	67	2.5°	5.9°	53	68	3.8°
40	2.9°	72	77	2.2°	5.1°	63	78	3.2°
50	2.2°	93	98	1.7°	2.5°	86	98	2.5°
63	1.8°	118	123	1.5°	2.5°	111	124	1.5°
80	1.4°	152	157	1°	2°	147	158	1.3°
100	–	–	–	–	1.5°	190	198	1.1°
125	–	–	–	–	0.9°	240	248	0.9°

OSG Phoenix

Information

Phoenix 刀具系列使用的都是不会对环境造成负担的再生塑料制造的包装盒。

The Phoenix packaging is environmentally friendly as it uses a case made of recycled plastic.

Processing Data

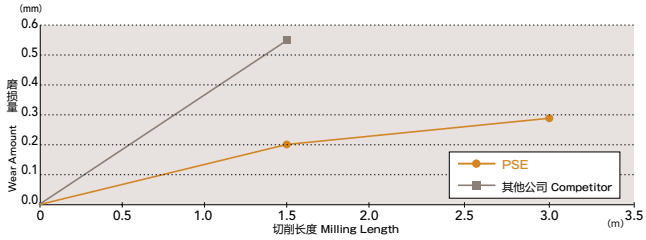
■加工数据 Processing Data

Inconel718 (45HRC)的长寿命加工 Long tool life on Inconel 718

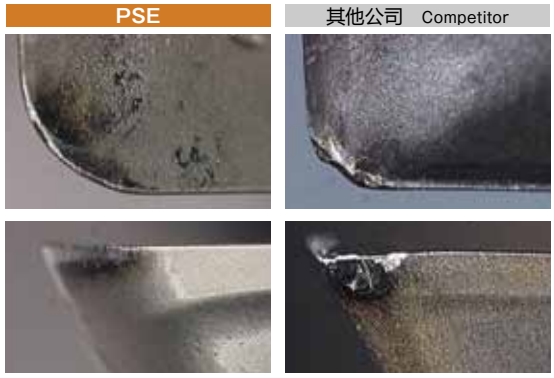
使用工具 Tool	PSE11R032SS32-5S	其他公司 Competitor
使用刀片(材质) Insert (grade)	ZDKT11T308ER-SM(XC5040)	硬质合金涂层刀片 Coated Carbide chip
加工材料 Work Material	Inconel 718 (45HRC)	
切削速度 Cutting Speed	30m/min(298min^{-1})	25m/min(248min^{-1})
进给量 Feed	120mm/min(0.08mm/t)	80mm/min(0.08mm/t)
切削深度 Depth of Cut	ap=1mm ae=20mm	ap=1mm ae=20mm
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	

与传统工具相比,切削参数提高50%以后仍可加工,耐久性为传统工具的2倍,并且是正常磨损,仍可继续加工。

Our product was able to mill at conditions that were 50% higher than those for conventional tools. It provided double the durability, wore normally, and was able to continue milling.

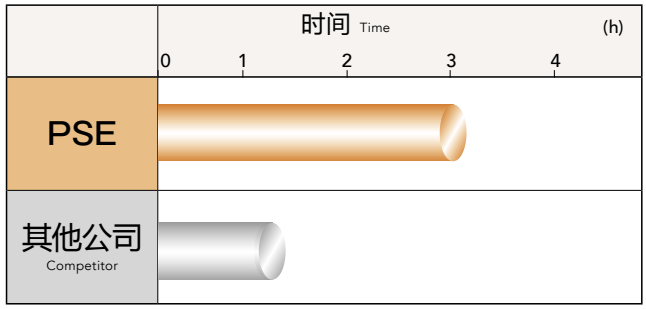


加工1.5m 后照片 Photo of after milling 1.5m



NAK80 (40HRC)的长寿命加工 Long tool life on NAK80 (40HRC)

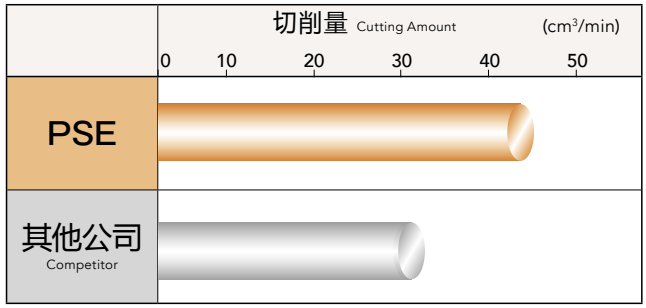
使用工具 Tool	PSE11R020SS20-3S	其他公司 Competitor
使用刀片(材质) Insert (grade)	ZDKT11T308SR-GL (XP2040)	硬质合金涂层刀片 Coated Carbide chip
加工材料 Work Material	NAK80 (40HRC)	
切削速度 Cutting Speed	130m/min(2,070min^{-1})	
进给量 Feed	1,400mm/min(0.23mm/t)	
切削深度 Depth of Cut	ap=0.3mm ae=10mm	
切削油剂 Coolant	气冷式 Air Blow	
使用机械 Machine	立式加工中心(BT50) Vertical Machining Center	



在相同的切削条件下,其他公司的产品已经发生崩刃,但是PSE没有发生任何的崩损,仍可稳定加工,耐久性也约为2倍。The conventional tool chipped, but under the same conditions, the PSE did not exhibit any chipping, performed stably, and provided approximately double the durability.

机械零部件的正面加工 Face milling of machine parts

使用工具 Tool	PSE15R100M31.7-10	其他公司 Competitor
使用刀片(材质) Insert (grade)	ZDKT150508SR-GM(XP2040)	硬质合金涂层刀片 Coated Carbide chip
加工材料 Work Material	SUS304	
切削速度 Cutting Speed	150m/min(478min^{-1})	
进给量 Feed	720mm/min(0.15mm/t)	500mm/min(0.15mm/t)
切削深度 Depth of Cut	ap=1mm ae=60mm	
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(BT40) Horizontal Machining Center	
切削量 Cutting Volume	43.2cm^3/min	30cm^3/min

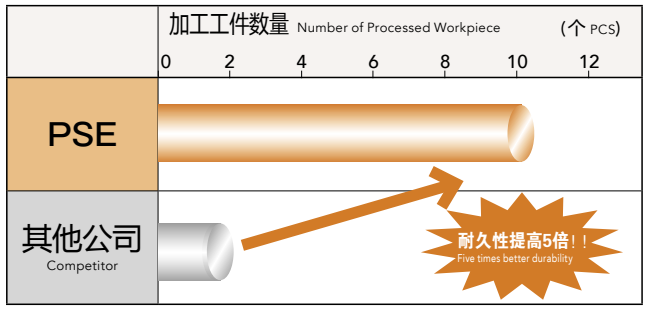


断续加工等孔较多的正面加工情况下,可以得到比其他公司产品1.4倍的效率。而且能进一步抑制发热,与其他公司产品相比,可抑制工件变形,改善对后续工序的影响。

This process consisted of intermittent face milling a surface with multiple holes, and our product was able to mill with 1.4 times the efficiency of the conventional tool. Moreover, it inhibited the generation of heat, reducing the distortion of the workpiece as well as the effects passed on to the subsequent process.

喷嘴的槽加工 Groove milling of a nozzle piece

使用工具 Tool	PSE11R020SS20-3S	其他公司 Competitor
使用刀片(材质) Insert (grade)	ZDKT11T308ER-SM(XC5040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	SUS630	
切削速度 Cutting Speed	160m/min(2,548min^{-1})	
进给量 Feed	510mm/min(0.07mm/t)	
切削深度 Depth of Cut	ap=2mm ae=20mm	
切削油剂 Coolant	水溶性切削油剂 Water Soluble	
使用机械 Machine	多用途加工机 Compound Machine	

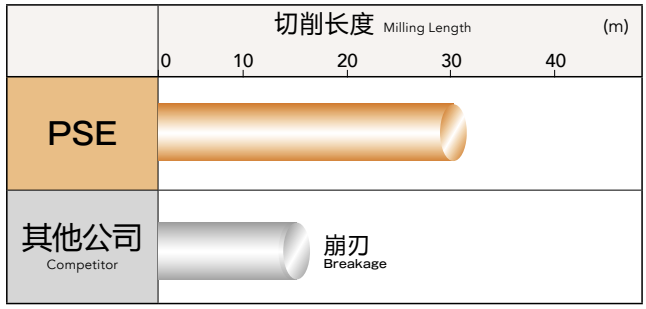


不锈钢的槽加工案例。其他公司的产品由于切屑堵塞，过早发生崩刃而无法加工。而PSE切屑由于排出稳定，可加工10个工件，性能非常好。

This process consists of groove milling in stainless steel. The conventional tool caused the chips to jam, resulting in premature breakage of the tool. The PSE, in contrast, evacuated chips in a stable manner and could mill 10 workpieces, a significant improvement.

容器长寿命加工 Long life milling of a chamber

使用工具 Tool	PSE15R080M25.4-8	其他公司 Competitor
使用刀片(材质) Insert (grade)	ZDKT150508SR-GM(XP2040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	SUS304	
切削速度 Cutting Speed	180m/min(717min^{-1})	
进给量 Feed	700mm/min(0.12mm/t)	
切削深度 Depth of Cut	ap=1mm ae=60mm	
切削油剂 Coolant	气冷式 Air Blow	
使用机械 Machine	卧式加工中心(BT50) Horizontal Machining Center	

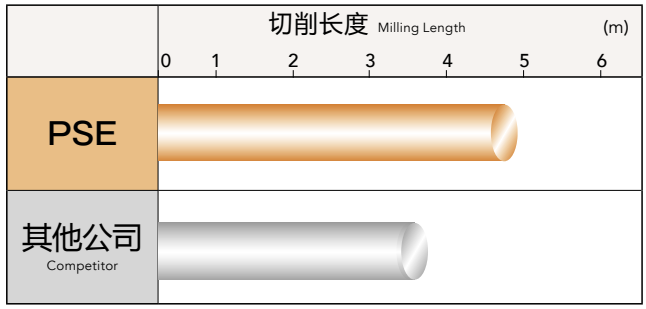


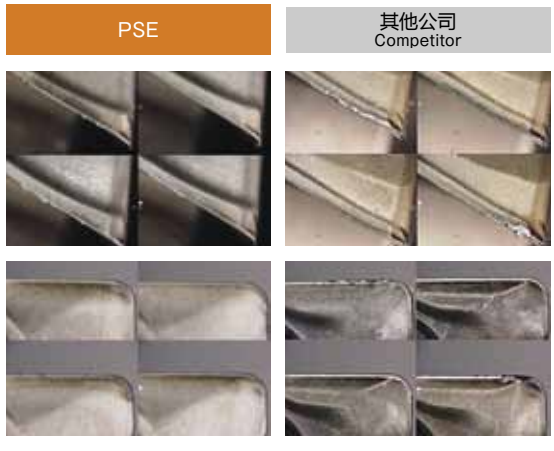
不锈钢干式加工案例。型腔开口部的正面加工，在相同条件下，传统的工具过早崩刃，不可继续加工，而PSE可得到2倍以上的耐久性。

This process consisted of dry milling in stainless steel. A conventional tool and the PSE were compared in face milling the surface of a chamber opening under identical conditions. The conventional tool broke prematurely, and was not able to continue. However, the PSE was able to attain more than double the durability.

飞机零部件粗加工 Rough milling of aircraft parts

使用工具 Tool	PSE11R025SS25-4S	其他公司 Competitor
使用刀片(材质) Insert (grade)	ZDKT11T308ER-SM(XC5040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	Titanium- β alloy	
切削速度 Cutting Speed	40m/min(510min^{-1})	
进给量 Feed	160mm/min(0.08mm/t)	
切削深度 Depth of Cut	ap=5mm ae=10mm	
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(BT40) Horizontal Machining Center	





航空零部件的粗加工案例，在同等条件下的加工比较。其它公司产品发生崩刃，但是PSE在正常磨损状态，为其他公司产品耐久性的1.5倍。

A competitor's product and the PSE were compared in the rough milling of aircraft parts under identical conditions. The competitor's product chipped, but the PSE wore normally and attained 1.5 times the durability.

» Phoenix PRC

直柄圆弧角铣刀系列
Phoenix Radius Cutter Series

Phoenix Radius Cutter

PRC 的特产
Features of PRC

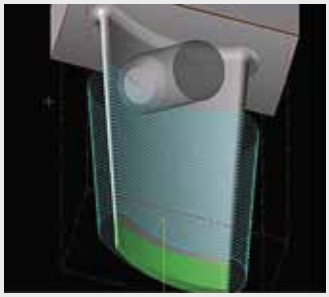
因为不需要压块，能顺利地排出切屑
Because it does away with a pressure bar, it can evacuate chips smoothly

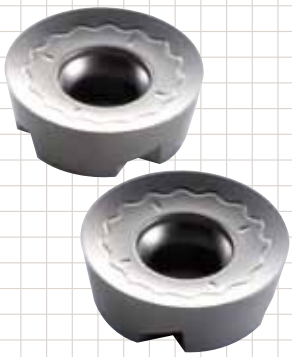
容屑槽很宽，提高切屑排屑性
Improved chip ejection with wide chip pocket

刀片回转螺纹固定
Insert rotation stop

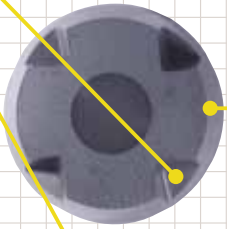
根据刀片的切槽设计
Setting to accommodate cutout

对应三维加工的刀体后刀形状
Body relief shape support 3dimensional machining





[里侧 Back side]



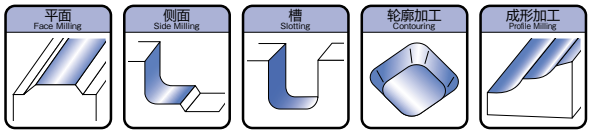
4圆弧角型
4 Corner type

8圆弧角型
8 Corner type

由于切深量设定，可以选择圆弧角的数量(4或8)
The user can select the number of corners to be used by changing the depth of cut setting (4 or 8 corners).

直柄圆弧角铣刀
Radius Cutter with Straight Shank

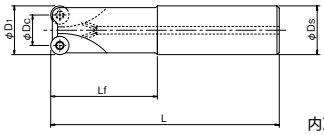
PRC SS



Specification Chart

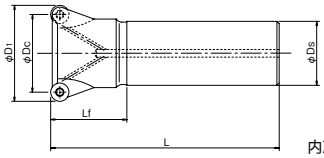
■形状尺寸表 Specification Chart

Type 1



内冷油孔
With coolant hole.

Type2



内冷油孔
With coolant hole.

单位:mm Unit:mm

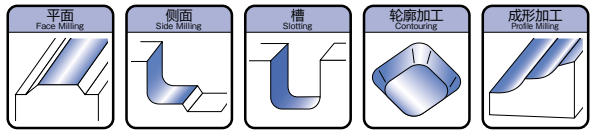
形状 Type	商品号 EDP No.	名称 Designation	外径 Dc	直径 D1	刃数 z	柄径 Ds	全长 L	颈长 Lf	适用刀片 Applicable Inserts	形状类型 Type	库存 Stock
短刃型 Short	7800300	PRC10R020SS20-2S	10	20	2	20	130	50	①	1	C
	7800301	PRC10R025SS25-3S	15	25	3	25	140	60		1	C
	7800302	PRC10R032SS32-4S	22	32	4	32	150	70		1	C
长刃型 Long	7800303	PRC10R020SS20-2L	10	20	2	20	180	80		1	C
	7800304	PRC10R025SS25-3L	15	25	3	25	200	120		1	C
	7800305	PRC10R032SS32-4L	22	32	4	32	200	120		1	C
短刃型 Short	7800318	PRC12R030SS32-2S	18	30	2	32	150	70	②	1	C
	7800306	PRC12R032SS32-2S	20	32	2	32	150	70		1	C
	7800320	PRC12R032SS32-3S	20	32	3	32	150	70		1	C
	7800307	PRC12R040SS32-3S	28	40	3	32	150	50		2	C
	7800308	PRC12R050SS42-4S	38	50	4	42	150	50		2	C
长刃型 Long	7800319	PRC12R030SS32-2L	18	30	2	32	200	120		1	C
	7800309	PRC12R032SS32-2L	20	32	2	32	200	120		1	C
	7800321	PRC12R032SS32-3L	20	32	3	32	200	120		1	C
	7800310	PRC12R040SS32-3L	28	40	3	32	250	50		2	C
	7800311	PRC12R050SS42-4L	38	50	4	42	250	50		2	C
短刃型 Short	7800312	PRC16R040SS32-2S	24	40	2	32	150	50	③	2	C
	7800313	PRC16R050SS42-3S	34	50	3	42	150	50		2	C
	7800314	PRC16R063SS42-4S	47	63	4	42	150	50		2	C
长刃型 Long	7800315	PRC16R040SS32-2L	24	40	2	32	250	50		2	C
	7800316	PRC16R050SS42-3L	34	50	3	42	250	50		2	C
	7800317	PRC16R063SS42-4L	47	63	4	42	250	50		2	C

C=标准库存品 C=Standard stock item.

Phoenix

圆弧角面铣刀
Radius Cutter with Bore Type

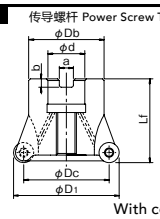
PRC BORE



Specification Chart

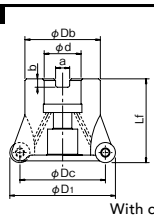
■形状尺寸表 Specification Chart

Type1 传导螺杆 Power Screw Type



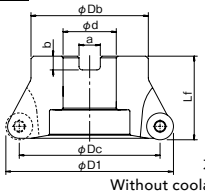
内冷油孔
With coolant hole.

Type2



内冷油孔
With coolant hole.

Type3

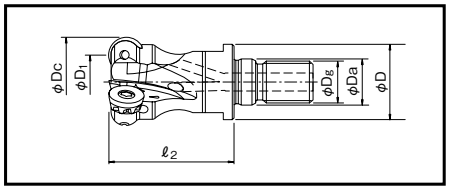


不带内冷
Without coolant hole.

单位:mm Unit:mm

形状 Type	商品号 EDP No.	名称 Designation	外径 Dc	刀具直径 D1	刃数 z	全长(刀身高) Lf	台座径 Db	内孔径 d	端面槽宽 a	端面槽深 b	适用刀片 Applicable Inserts	形状类型 Type	库存 Stock
普通型 Coarse Pitch	7800200	PRC12R050M22-4	38	50	4	40	45	22	10.4	6.3	②	2	C
	7800201	PRC12R063M22-4	51	63	4	40	50	22	10.4	6.3		2	C
	7800202	PRC12R080M27-5	68	80	5	50	60	27	12.4	7		2	C
	7800209	PRC12R080M25.4-5	68	80	5	50	60	25.4	9.5	6		2	C
	7800203	PRC12R100M32-6	88	100	6	50	70	32	14.4	8		2	C
	7800210	PRC12R100M31.7-6	88	100	6	50	70	31.75	12.7	8		3	C
多刃型 Close Pitch	7800204	PRC12R050M22-5	38	50	5	40	45	22	10.4	6.3		2	C
	7800206	PRC12R063M22-6	51	63	6	40	50	22	10.4	6.3		2	C
	7800207	PRC12R080M27-8	68	80	8	50	60	27	12.4	7		2	C
	7800211	PRC12R080M25.4-8	68	80	8	50	60	25.4	9.5	6		2	C
	7800208	PRC12R100M32-10	88	100	10	50	70	32	14.4	8		2	C
	7800212	PRC12R100M31.7-10	88	100	10	50	70	31.75	12.7	8		3	C
多刃型 Close Pitch	7800213	PRC16R050M22-3	34	50	3	40	45	22	10.4	6.3	③	1	C
	7800214	PRC16R063M22-5	47	63	5	40	50	22	10.4	6.3		2	C
	7800216	PRC16R080M27-6	64	80	6	50	60	27	12.4	7		2	C
	7800218	PRC16R080M25.4-6	64	80	6	50	60	25.4	9.5	6		2	C
	7800217	PRC16R100M32-7	84	100	7	50	70	32	14.4	8		2	C
	7800219	PRC16R100M31.7-7	84	100	7	50	70	31.75	12.7	8		3	C

C=标准在库存品 C=Standard stock item.



PRC 刀盘交换式型 Screw Fit Type

单位:mm Unit:mm

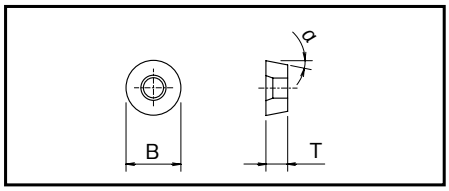
商品号 EDP No.	名称 Designation	外径 D1	直径 Dc	刃数 Z	装夹直径 Da	螺纹尺寸 Dg	扳手尺寸 Wrench Size	全长 ℓ2	端面径 D	适用刀片 Applicable Inserts	库存 Stock
7801700	PRC10R020SF10-2	10	20	2	10.5	10	14	33	18	RPH*10T3··	C
7801701	PRC10R025SF12-3	15	25	3	12.5	12	17	35	23		C
7801702	PRC10R030SF16-3	20	30	3	17	16	22	40	28		C
7801703	PRC10R032SF16-4	22	32	4	17	16	22	40	28		C
7801704	PRC10R040SF16-4	30	40	4	17	16	22	40	28		C
7801705	PRC12R030SF16-2	18	30	2	17	16	22	40	28	RPH*1204··	C
7801706	PRC12R032SF16-3	20	32	3	17	16	22	40	28		C
7801707	PRC12R040SF16-3	28	40	3	17	16	22	40	28		C

C=标准在库存品 C=Standard stock item.

Applicable Insert

圆弧角铣刀
Radius Cutter

PRC 刀片



■适用刀片 Applicable Insert

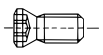
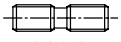
单位:mm Unit:mm

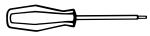
	名称 Designation	刃数	刀片尺寸 Insert Size			超硬 Uncoated	涂层种类 Grade of Coated Materials				
			内径 B	厚度 T	前角 α	CK010	XP3035	XP2040	XC1015	XC5035	XC5040
①	RPHW10T3MOSN	8	10	3.97	11°		7814030				
	RPHW10T3MOEN	8	10	3.97	11°				7812017		
	RPHT10T3MOEN-GL	8	10	3.97	11°			7813008			
	RPHT10T3MOEN-SM	4	10	3.97	11°					7815010	
	RPHT10T3M8EN-SM	8	10	3.97	11°					7815050	7816050
	RPHT10T3MOFN-NM	8	10	3.97	11°	7811009					
②	RPHW1204MOSN	8	12	4.76	11°				7812018		
	RPHW1204MOSN	8	12	4.76	11°		7814018				
	RPHT1204MOEN-GL	8	12	4.76	11°			7813011			
	RPHT1204MOEN-SM	4	12	4.76	11°					7815012	
	RPHT1204M8EN-SM	8	12	4.76	11°					7815051	7816051
	RPHT1204MOFN-NM	8	12	4.76	11°	7811013					
③	RPHW1605MOSN	8	16	5.56	11°				7812019		
	RPHW1605MOSN	8	16	5.56	11°		7814019				
	RPHT1605MOEN-GL	8	16	5.56	11°			7813014			
	RPHT1605MOEN-SM	4	16	5.56	11°					7815015	
	RPHT1605M8EN-SM	8	16	5.56	11°					7815052	7816052
	RPHT1605MOFN-NM	8	16	5.56	11°	7811016					

库存种类为C(标准库存品)。
Stocks are categolized in section C (Standard stock item).

Accessories

■零件 Accessories

	商品号 EDP No.	库存 Stock	名称 Designation		适用刀片 Applicable Inserts	适用刀具 Applicable Cutters
 固定螺丝 Clamping Screw	7808116	C	FS30573A (Torx 10)	①	RPH*10···	PRC SS/SF φ20～32
	7808112	C	FS35586 (Torx 15)	②	RPH*12···	PRC SS/SF φ32～50 PRC BORE φ32～63
	7808113	C	FS45510 (Torx 20)	③	RPH*16···	PRC SS/SF φ40～63 PRC BORE φ50～100
 动力螺杆 Power Screw	7808151	C	PS1031 (M10×31)	③	RPH*16···	PRC BORE φ50

	商品号 EDP No.	库存 Stock	名称 Designation		适用刀片 Applicable Inserts	适用刀具 Applicable Cutters
 扳手 Wrench	7808207	C	T10-D (Torx 10)	①	RPH*10···	PRC SS/SF φ20～32
	7808208	C	T15-D (Torx 15)	②	RPH*12···	PRC SS/SF φ32～50 PRC BORE φ32～63
	7808209	C	T20-D (Torx 20)	③	RPH*16···	PRC SS/SF φ40～63 PRC BORE φ50～100

C=标准库存品 C=Standard stock item.
扳手请另购。 Please purchase the wrench separately from the cutter.

Phoenix

圆弧角铣刀
Radius Cutter

PRC

■加工材料推荐
Recommended Materials by Application

◎第一推荐材料 First recommended material
○第二推荐材料 Second recommended material

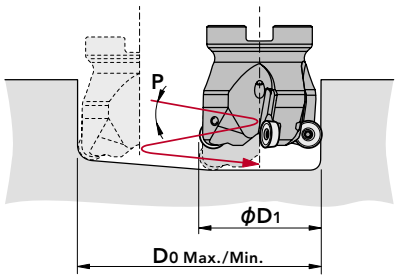
刀片型号 Inserts Grades	断屑槽 Chip Breaker	切削油剂 Coolant	P	M	K	N	S	H
CK010	NM	–			○	◎		
XP3035	–	–	◎	○	○			
XP2040	GL	–	○					◎
		有		◎			○	
XC1015	–	–			◎			
XC5035	SM	–		◎				○
		有		○			○	
XC5040	SM	有		○			◎	○

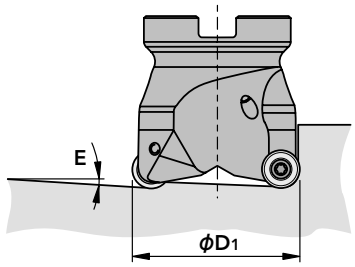
GL:轻切削用 GM:中切削用 NM:铝合金用 SM:耐热合金用
GL:Light Cutting GM:Middle Cutting NM:Aluminum SM:Heat Resistance Alloy

Recommended Conditions

■切削条件基准表 Recommended Conditions

	加工材料 Work Material	抗损强度·硬度 Tensil Strength· Hardness	切削速度 Vc (m/min) Milling Speed	刀片尺寸 Insert Size					
				RPH.10..		RPH.12..		RPH.16..	
				每刃进给量 fz (mm/t) Feed Per Tooth	切削深度 ap (mm) Depth of Cut	每刃进给量 fz (mm/t) Feed Per Tooth	切削深度 ap (mm) Depth of Cut	每刃进给量 fz (mm/t) Feed Per Tooth	切削深度 ap (mm) Depth of Cut
P	软钢、低炭素钢 Mild Steels,Carbon Steels (SS400、S10C)	~180HB	200 (100 ~ 300)	0.25 (0.1 ~ 0.35)	2	0.3 (0.1 ~ 0.4)	2.4	0.35 (0.1 ~ 0.5)	3.2
P	炭素钢、合金钢 Carbon Steels,Alloy Steels (S50C、SCM440)	~280HB	180 (100 ~ 250)	0.2 (0.1 ~ 0.3)	2	0.25 (0.1 ~ 0.35)	2.4	0.3 (0.1 ~ 0.45)	3.2
P	模具钢 Die Steels (SKD11、SKD61)	~280HB	150 (80 ~ 200)	0.2 (0.1 ~ 0.3)	2	0.25 (0.1 ~ 0.35)	2.4	0.3 (0.1 ~ 0.45)	3.2
M	不锈钢 Stainless Steels (SUS304、SUS420)	~250HB	200 (100 ~ 280)	0.25 (0.1 ~ 0.35)	2	0.3 (0.1 ~ 0.4)	2.4	0.35 (0.1 ~ 0.5)	3.2
K	铸铁 Cast Iron (FC250)	~350N/mm²	220 (100 ~ 350)	0.25 (0.05 ~ 0.4)	2	0.3 (0.1 ~ 0.5)	2.4	0.35 (0.1 ~ 0.6)	3.2
K	球墨铸铁 Ductile Cast Iron (FCD400)	~800N/mm²	150 (100 ~ 220)	0.2 (0.1 ~ 0.3)	2	0.25 (0.1 ~ 0.35)	2.4	0.3 (0.1 ~ 0.45)	3.2
N	铝合金 Aluminum Alloys	~13%Si	600 (300 ~ 1,500)	0.4 (0.2 ~ 0.8)	2	0.6 (0.2 ~ 1)	2.4	0.8 (0.3 ~ 1.5)	3.2
S	耐热合金 Heat Resistant Alloys (Inconel 718)	–	40 (25 ~ 60)	0.15 (0.05 ~ 0.25)	2	0.2 (0.05 ~ 0.3)	2.4	0.25 (0.05 ~ 0.4)	3.2
S	钛合金 Titanium Alloy (Ti-6Al-4V)	–	80 (50 ~ 120)	0.2 (0.1 ~ 0.3)	2	0.25 (0.1 ~ 0.35)	2.4	0.3 (0.1 ~ 0.45)	3.2
H	预硬钢 Pre-hardened Steel (NAK80)	40~43HRC	120 (40 ~ 150)	0.15 (0.05 ~ 0.25)	1.5	0.2 (0.05 ~ 0.3)	1.5	0.25 (0.05 ~ 0.4)	1.5
H	铸件用钢 Steel for Die Casting (DAC55、DH31)	43~48HRC	80 (40 ~ 120)	0.15 (0.05 ~ 0.25)	1	0.2 (0.05 ~ 0.3)	1	0.25 (0.05 ~ 0.4)	1
H	调质钢 Hardened Steels (SKD11)	50~55HRC	60 (30 ~ 90)	0.15 (0.05 ~ 0.25)	0.5	0.2 (0.05 ~ 0.3)	0.5	0.25 (0.05 ~ 0.4)	0.5





Maximum ramping angle(E)

■斜线下刀加工时最大斜角(E) Maximum ramping angle(E)

刀片尺寸 Insert Size	RPH·10···			RPH·12···			RPH·16···		
刀片直径(mm) D1	倾斜角 Ramping Angle E	螺旋线开孔 Helical Milling(mm)		倾斜角 Ramping Angle E	螺旋线开孔 Helical Milling(mm)		倾斜角 Ramping Angle E	螺旋线开孔 Helical Milling(mm)	
		最小径 D0 Min.	最大径 D0 Max.		最小径 D0 Min.	最大径 D0 Max.		最小径 D0 Min.	最大径 D0 Max.
20	36.5°	24	40	–	–	–	–	–	–
25	17°	32	50	–	–	–	–	–	–
30	10°	42	60	10.3°	38	60	–	–	–
32	9.8°	46	64	10.1°	42	64	–	–	–
40	–	–	–	7.5°	58	80	12.5°	50	80
50	–	–	–	5.2°	78	100	8.4°	70	100
63	–	–	–	3.8°	104	126	5.7°	96	126
80	–	–	–	2.7°	138	160	4°	130	160
100	–	–	–	2°	178	200	3°	170	200

OSG Phoenix

Information

Phoenix 刀具系列使用的都是不会对环境造成负担的再生塑料制造的包装盒。

The Phoenix packaging is environmentally friendly as it uses a case made of recycled plastic.

Processing Data

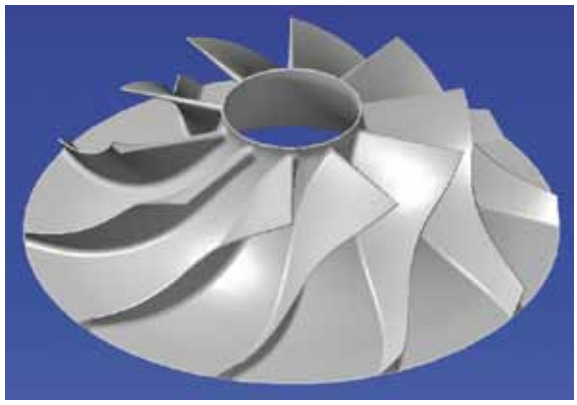
■加工数据 Processing Data

Inconel718 (45HRC)的长寿命加工 Long-life milling of Inconel 718 (45HRC)

使用工具 Tool	PRC12R050M22-5	其他公司 Competitor
使用刀片(材质) Insert (grade)	RPHT1204MOEN-SM(XC5035)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	Inconel 718 (45HRC)	
切削速度 Cutting Speed	40m/min(255min^{-1})	60m/min(382min^{-1})
进给量 Feed	270mm/min(0.21mm/t)	270mm/min(0.14mm/t)
切削深度 Depth of Cut	ap=0.5mm ae=30mm	
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	
耐久度 Durability	10m	2m

其他公司产品加工2m 后磨损大，并且刀片的其他刃角也无法使用，与此相对，PRC 可以加工10m，大大地提高了寿命。

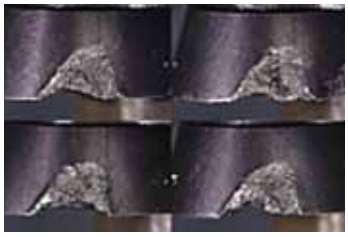
The conventional tool broke extensively after milling 2 meters, and the damage extended to other corners, rendering the tool unusable. In contrast, the PRC was able to mill 10 meters, resulting in a considerably longer tool life.

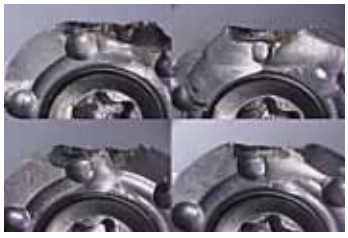


加工2m后的照片 Photo of after milling 2m

PRC

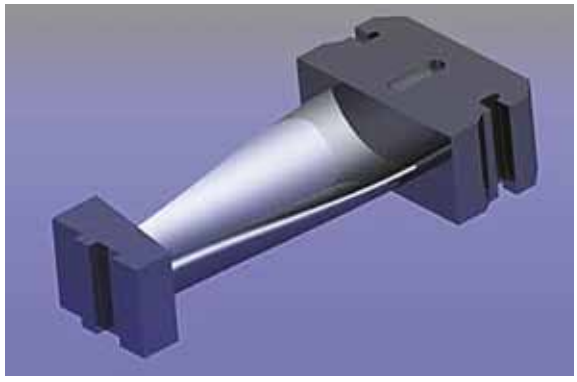
其他公司 Competitor





叶片粗加工 Rough - mill a blade

使用工具 Tool	PRC10R032SS32-4S	其他公司 Competitor
使用刀片(材质) Insert (grade)	RPHT10T3MOEN-SM(XC5035)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	13Cr相当品 Equivalent	
切削速度 Cutting Speed	90m/min(896min^{-1})	
进给量 Feed	1,100mm/min(0.3mm/t)	
切削深度 Depth of Cut	ap=0.5mm ae=22mm	
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(BT40) Horizontal Machining Center	



叶片粗加工，可以实现耐久性1.5倍的稳定加工。

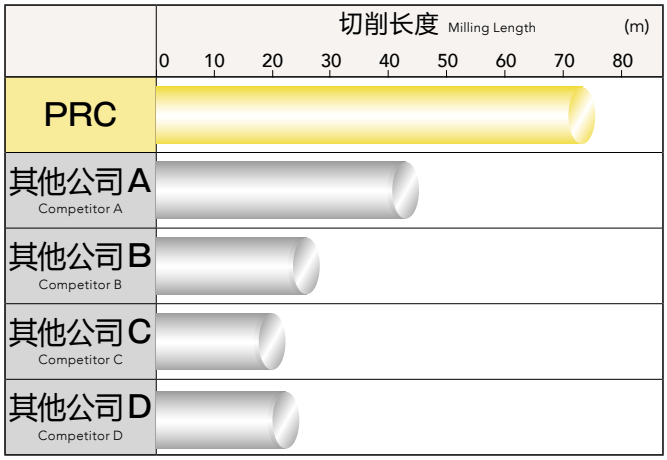
The PRC was able to rough-mill a blade in a stable manner, resulting in 1.5 times the durability.

零部件的粗加工(工具奥运会) Rough milling of parts (Tool Olympics)

使用工具 Tool	PRC12R050M22-5	其他公司A、B、C、D Competitor A, B, C, D
使用刀片 (材质) Insert (grade)	RPHT1204MOEN-GL(XP2040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	SUS304	
切削速度 Cutting Speed	100m/min(637min^{-1})	
进给量 Feed	800mm/min(0.25mm/t)	
切削深度 Depth of Cut	ap=1mm ae=25mm	
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	

各个公司针对零部件粗加工的比较结果。其他公司的刀具过早的崩刃及折损了，但是PRC 仍然是正常磨损状态，与其他公司 A 相比，耐久性为他们产品的1.7倍以上。

Each company's products were compared in the rough milling of parts. A competitor's tool resulted in premature chipping and breakage, but the PRC wore normally, resulting in 1.7 times the durability.



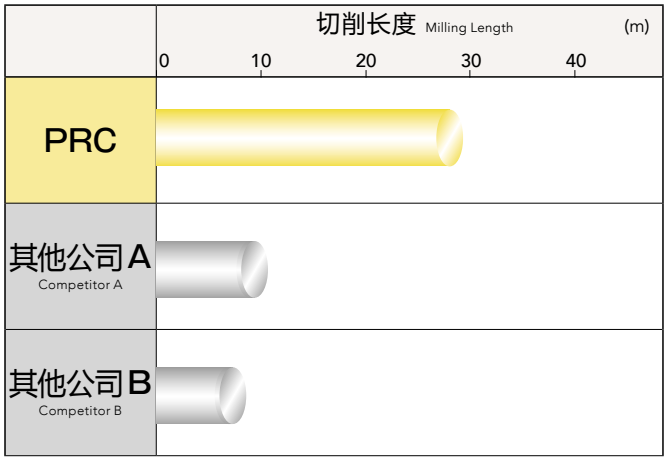
加工67.2m后的照片 photo of after milling 67.2m

零部件的粗加工(工具奥运会) Rough milling of parts (Tool Olympics)

使用工具 Tool	PRC12R040SS32-3S	其他公司A、B Competitor A, B
使用刀片 (材质) Insert (grade)	RPHW1204MOSN(XC1015)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	FC250	
切削速度 Cutting Speed	180m/min(1,433min^{-1})	
进给量 Feed	2,300mm/min(0.5mm/t)	
切削深度 Depth of Cut	ap=3mm ae=25mm	
切削油剂 Coolant	气冷式 Air Blow	
使用机械 Machine	卧式加工中心(BT50) Horizontal Machining Center	

各个公司针对零部件粗加工的比较结果。由于刚性高，耐磨损性好，我们的刀片是其他公司耐久性的3倍。

Each company's products were compared in the rough milling of parts. Having higher rigidity and wear resistance, our inserts provided three times the durability of a competitor's product.



照片为加工29m之后的刀片 Photo of after milling 29m

» Phoenix PHC

Phoenix 高进给圆弧角铣刀
Phoenix High Feed Radius Cutter Series

Phoenix High feed Cutter

■适用于粗加工
Ideal configuration for rough milling

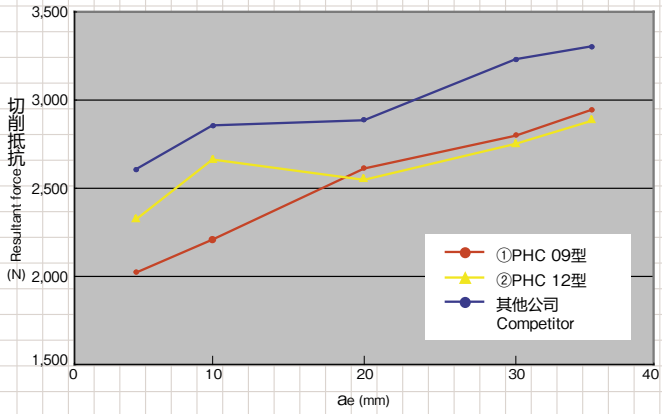
○ 经济的4圆弧角规格。
Economical four-corner type

○ 既保持刃尖的刚性，又重视锋利性的断屑槽形状。
A breaker shape that enhances cutting performance while ensuring the rigidity of the cutter

■PHC φ50 切削数据
Processing data of PHC φ50

根据切深量(ae)的切削抵抗(φ50) —低抵抗刃形—
Cutting force is reduced by changing the depth of cut (ae)

使用工具 Tool	PHC09R050M22-5 (5刃)	PHC12R050M22-4 (4刃)
使用刀片(材质) Insert (grade)	SDMT09T308SR-GM (XP3035)	SXMT120410SR-GM (XP3035)
加工材料 Work Material	S50C	
切削速度 Cutting Speed	180m/min (1,150min^{-1})	
进给量 Feed	5,000mm/min	
切削深度 Depth of Cut	ap=1mm ae=5,10,20,30,35mm	
切削幅 Width of Cut	200mm	
切削油剂 Coolant	气冷式 Dry	
使用机械 Machine	立式加工中心 (BT50) Vertical Machining Center	



根据切深量变化的同时接触刃数
Number of flutes making simultaneous contact through changes in the depth of cut (ae)

	5mm	10mm	20mm	30mm	35mm
PHC 09型	1刃	2刃	3刃	3刃	4刃
PHC 12型	1刃	2刃	2刃	3刃	3刃

与其他公司产品相比低抵抗!
The PHC exhibited a lower cutting force compared to the competitor's product!

【分别使用】 Proper tool selection

- PHC 09型　由于多刃规格，能进行高效率加工 Multiple cutters for highly efficient milling
- PHC 12型　适合进行断续加工或长悬长加工 For milling intermittently or with a long tool projection

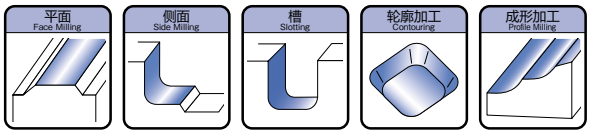
由于多刃规格的PHC09型的刃尖设计为低抵抗，所以即使切深量(ae)提高，也能抑制切削抵抗。因此也能抑制机械负荷、振动，从而实现高效率加工。

Even if the depth of cut (ae) is increased for the PHC09 with cross pitch, the design of the cutting edge suppresses the cutting force. This suppresses the load and vibrations imparted on the machine, enabling high efficiency machining.

Phoenix

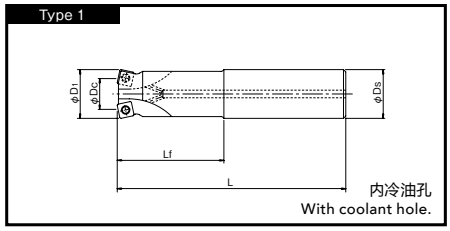
高进给圆弧角铣刀直柄型
High Feed Radius Cutter with Straight Shank

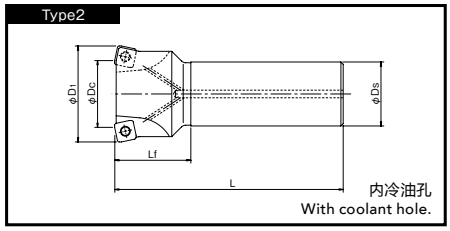
PHC SS



Specification Chart

■形状尺寸表 Specification Chart





单位:mm Unit:mm

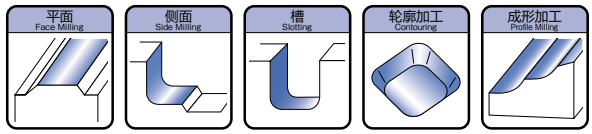
形状 Type	商品号 EDP No.	名称 Designation	外径 Dc	直径 D1	刃数 z	柄径 Ds	全长 L	颈长 Lf	适用刀片 Applicable Inserts	形状类型 Type	库存 Stock
短刃型 Short	7800700	PHC09R025SS25-2S	13.2	25	2	25	140	60	①	1	C
	7800701	PHC09R025SS25-3S	13.2	25	3	25	140	60		1	C
	7800716	PHC09R028SS25-3S	16.2	28	3	25	140	40		2	C
	7800717	PHC09R030SS32-3S	18.2	30	3	32	150	70		1	C
	7800702	PHC09R032SS32-3S	20.2	32	3	32	150	70		1	C
	7800718	PHC09R035SS32-3S	23.2	35	3	32	150	50		2	C
	7800703	PHC09R040SS32-4S	28.2	40	4	32	150	50		2	C
	7800719	PHC09R040SS42-4S	28.2	40	4	42	150	50		1	C
长刃型 Long	7800704	PHC09R025SS25-2L	13.2	25	2	25	200	120		1	C
	7800705	PHC09R025SS25-3L	13.2	25	3	25	200	120		1	C
	7800720	PHC09R028SS25-3L	16.2	28	3	25	200	40		2	C
	7800721	PHC09R030SS32-3L	18.2	30	3	32	200	120		1	C
	7800706	PHC09R032SS32-3L	20.2	32	3	32	200	120		1	C
	7800722	PHC09R035SS32-3L	23.2	35	3	32	200	50		2	C
	7800707	PHC09R040SS32-4L	28.2	40	4	32	250	50		2	C
	7800723	PHC09R040SS42-3L	28.2	40	3	42	250	70		1	C
超长刃型 Extra Long	7800724	PHC09R025SS25-2LL	13.2	25	2	25	300	180		1	C
	7800725	PHC09R028SS25-2LL	16.2	28	2	25	300	40		2	C
	7800726	PHC09R030SS32-2LL	18.2	30	2	32	300	180		1	C
	7800727	PHC09R032SS32-2LL	20.2	32	2	32	300	180		1	C
	7800728	PHC09R035SS32-2LL	23.2	35	2	32	300	50		2	C
	7800729	PHC09R040SS42-2LL	28.2	40	2	42	300	70		1	C
短刃型 Short	7800730	PHC12R030SS32-2S	13.4	30	2	32	150	70	②	1	C
	7800708	PHC12R032SS32-2S	15.4	32	2	32	150	70		1	C
	7800731	PHC12R035SS32-3S	18.4	35	3	32	150	50		2	C
	7800709	PHC12R040SS32-3S	23.4	40	3	32	150	50		2	C
	7800732	PHC12R040SS42-3S	23.4	40	3	42	150	50		1	C
	7800710	PHC12R050SS42-4S	33.4	50	4	42	150	50		2	C
	7800711	PHC12R063SS42-5S	46.4	63	5	42	150	50		2	C
长刃型 Long	7800733	PHC12R030SS32-2L	13.4	30	2	32	200	120		1	C
	7800712	PHC12R032SS32-2L	15.4	32	2	32	200	120		1	C
	7800734	PHC12R035SS32-3L	18.4	35	3	32	200	50		2	C
	7800713	PHC12R040SS32-3L	23.4	40	3	32	250	50		2	C
	7800735	PHC12R040SS42-3L	23.4	40	3	42	250	70		1	C
	7800714	PHC12R050SS42-4L	33.4	50	4	42	250	50		2	C
	7800715	PHC12R063SS42-5L	46.4	63	5	42	250	50		2	C
超长刃型 Extra Long	7800736	PHC12R030SS32-2LL	13.4	30	2	32	300	180		1	C
	7800737	PHC12R032SS32-2LL	15.4	32	2	32	300	180		1	C
	7800738	PHC12R035SS32-2LL	18.4	35	2	32	300	50		2	C
	7800739	PHC12R040SS42-2LL	23.4	40	2	42	300	70		1	C

C=标准库存品 C=Standard stock item.

Phoenix

高进给圆弧角面铣刀
High Feed Radius Cutter with Bore Type

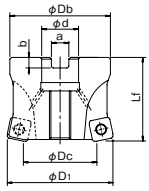
PHC BORE



Specification Chart

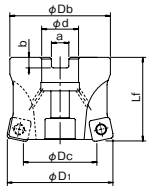
■形状尺寸表 Specification Chart

Type1 传导螺杆 Power Screw Type



内冷油孔
With coolant hole.

Type2

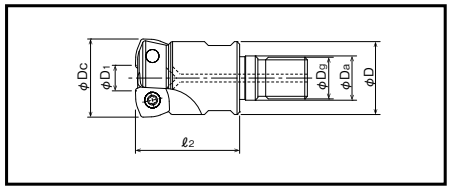


内冷油孔
With coolant hole.

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 Dc	刀具直径 D1	刃数 z	全长 (刀身高) Lf	台座径 Db	内孔径 d	端面槽宽 a	端面槽深 b	形状类型 Type	适用刀片 Applicable Inserts	库存 Stock
7800600	PHC09R040M16-4	28.2	40	4	40	38	16	8.4	5.6	1	①	C
7800601	PHC09R050M22-5	38.2	50	5	50	47	22	10.4	6.3	2		C
7800605	PHC09R050M22.2-5	38.2	50	5	50	47	22.225	8.4	5	2		C
7800603	PHC09R063M22-6	51.2	63	6	50	60	22	10.4	6.3	2		C
7800606	PHC09R063M22.2-6	51.2	63	6	50	60	22.225	8.4	5	2		C
7800607	PHC12R040M16-3	23.4	40	3	40	38	16	8.4	5.6	1	②	C
7800608	PHC12R050M22-4	33.4	50	4	50	47	22	10.4	6.3	2		C
7800614	PHC12R050M22.2-4	33.4	50	4	50	47	22.225	8.4	5	2		C
7800610	PHC12R063M22-5	46.4	63	5	50	60	22	10.4	6.3	2		C
7800615	PHC12R063M22.2-5	46.4	63	5	50	60	22.225	8.4	5	2		C
7800612	PHC12R080M27-7	63.4	80	7	50	76	27	12.4	7	2		C
7800616	PHC12R080M31.7-7	63.4	80	7	63	76	31.75	12.7	8	2		C
7800613	PHC12R100M32-8	83.4	100	8	63	96	32	14.4	8	2		C
7800617	PHC12R100M31.7-8	83.4	100	8	63	96	31.75	12.7	8	2		C

C=标准库存品 C=Standard stock item.



PHC 刀盘交换式型 Screw Fit Type

单位:mm Unit:mm

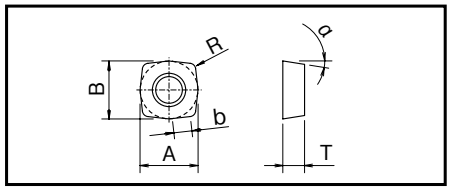
商品号 EDP No.	名称 Designation	刀具直径 D1	外径 Dc	刃数 Z	装夹直径 Da	螺纹尺寸 Dg	扳手尺寸 Wrench Size	全长 ℓ2	端面直径 D	适用刀片 Applicable Inserts	库存 Stock
7801500	PHC09R025SF12-3	13.2	25	3	12.5	12	17	35	23	SDMT09T3··	C
7801501	PHC09R028SF12-3	16.2	28	3	12.5	12	17	35	23		C
7801502	PHC09R030SF16-3	18.2	30	3	17	16	22	40	28		C
7801503	PHC09R032SF16-3	20.2	32	3	17	16	22	40	28		C
7801504	PHC09R035SF16-3	23.2	35	3	17	16	22	40	28		C
7801505	PHC09R040SF16-4	28.2	40	4	17	16	22	40	28		C
7801506	PHC12R030SF16-2	13.4	30	2	17	16	22	40	28	SXMT1204··	C
7801507	PHC12R032SF16-2	15.4	32	2	17	16	22	40	28		C
7801508	PHC12R035SF16-3	18.4	35	3	17	16	22	40	28		C
7801509	PHC12R040SF16-4	23.4	40	3	17	16	22	40	28		C

C=标准库存品品 C=Standard stock item.

Applicable Insert

高进给圆弧角面铣刀
High Feed Radius Cutter

PHC 刀片



■适用刀片 Applicable Insert

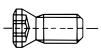
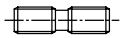
单位:mm Unit:mm

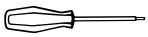
	名称 Designation	切削刃数 Number of Cutting Edges	刀片尺寸 Insert Size					涂层种类 Grade of Coated Materials				
			A×B	厚度 T	前角 α	R	副切削刃 b	XP3035	XP2040	XC1015	XC5035	XC5040
①	SDMT09T308SR-GM	4	9.52×9.52	3.97	15°	0.8	1.9	7814020	7813020	7812020		
	SDMT09T308ER-SM	4	9.52×9.52	3.97	15°	0.8	1.9				7815021	7816021
②	SXMT120410SR-GM	4	12.7×12.7	4.76	9°	1	1.3	7814022	7813022	7812022		
	SXMT120410ER-SM	4	12.7×12.7	4.76	9°	1	1.3				7815023	7816023

库存种类为C(标准库存品)
Stocks are categolized in section C (Standard stock item).

Accessories

■零件 Accessories

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀片 Applicable Inserts		适用刀具 Applicable Cutters
 固定螺丝 Clamping Screw	7808111	C	FS35572 (Torx 15)	①	SDMT09···	PHC SS/SF φ25~35
	7808112	C	FS35586 (Torx 15)			PHC SS/SF φ40 PHC BORE φ40~63
	7808113	C	FS45510 (Torx 20)	②	SXMT12···	PHC SS/SF φ32~63 PHC BORE φ40~100
 动力螺杆 Power Screw	7808150	C	PS0830 (M8×30)	①	SDMT09···	PHC BORE φ40
				②	SXMT12···	

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀片 Applicable Inserts		适用刀具 Applicable Cutters
 扳手 Wrench	7808208	C	T15-D (Torx 15)	①	SDMT09···	PHC SS/SF φ25~40 PHC BORE φ40~63
	7808209	C	T20-D (Torx 20)	②	SXMT12···	PHC SS/SF φ32~63 PHC BORE φ40~100

C=标准库存品 C=Standard stock item.
扳手请另购。 Please purchase the wrench separately from the cutter.

Phoenix

高进给圆弧角铣刀
High Feed Radius Cutter

PHC

■加工材料推荐
Recommended Materials by Application

◎第一推荐材料 First recommended material
○第二推荐材料 Second recommended material

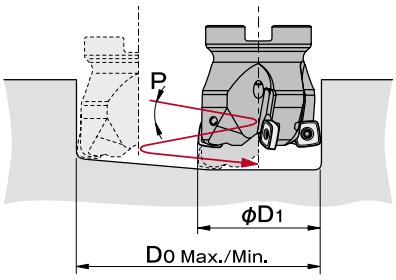
刀片型号 Inserts Grades	断屑槽 Chip Breaker	切削油剂 Coolant	P	M	K	S	H
XP3035	GM	–	◎	○	○		
XP2040	GM	–	○				◎
		有		◎		○	
XC1015	GM	–			◎		
XC5035	SM	–		◎			○
		有		○		○	
XC5040	SM	有		○		◎	○

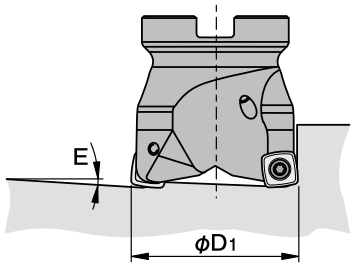
GM:中切削用　SM:耐熱合金用
GM:Middle Cutting　SM:Heat Resistance Alloy

Recommended Conditions

■切削条件基准表 Recommended Conditions

	加工材料 Work Material	抗损强度·硬度 Tensil Strength· Hardness	切削速度 Vc (m/min) Milling Speed	刀片尺寸 Insert Size							
				SDMT09…				SXMT12…			
				每刃进给量 fz (mm/t) Feed Per Tooth	切削深度 ap (mm) Depth of Cut			每刃进给量 fz (mm/t) Feed Per Tooth	切削深度 ap (mm) Depth of Cut		
					L/D=2	L/D=3	L/D=4		L/D=2	L/D=3	L/D=4
P	软钢、低炭素钢 Mild Steels、Low Carbon Steels (SS400、S10C)	~180HB	180 (60 ~ 250)	0.8 (0.3 ~ 1.8)	1	0.8	0.5	1.25 (0.5 ~ 3.2)	1.2	1.2	1
P	炭素钢、合金钢 Carbon Steels、Alloy Steels (S50C、SCM440)	~280HB	180 (60 ~ 250)	0.8 (0.3 ~ 1.5)	1	0.8	0.5	1.25 (0.5 ~ 3)	1.2	1.2	1
P	模具钢 Die Steels (SKD11、SKD61)	~280HB	180 (60 ~ 250)	0.8 (0.3 ~ 1.5)	0.8	0.6	0.4	1.25 (0.5 ~ 3)	1.2	1.2	1
M	不锈钢 Stainless Steels (SUS304、SUS420)	~250HB	120 (90 ~ 180)	0.5 (0.3 ~ 1.5)	0.8	0.6	0.4	1 (0.5 ~ 2.5)	1.2	1	1
K	铸铁 Cast Iron (FC250)	~350N/mm²	200 (100 ~ 300)	1 (0.5 ~ 1.8)	1	0.8	0.5	1.5 (0.5 ~ 3.5)	1.5	1.5	1
K	球墨铸铁 Ductile Cast Iron (FCD400)	~800N/mm²	180 (100 ~ 250)	0.9 (0.5 ~ 1.5)	1	0.8	0.5	1.35 (0.5 ~ 3)	1.2	1.2	0.9
S	耐热合金 Heat Resistant Alloys (Inconel 718)	–	30 (25 ~ 60)	0.4 (0.2 ~ 0.8)	0.5	0.5	0.4	0.5 (0.2 ~ 1)	1	1	0.8
S	钛合金 Titanium Alloy (Ti-6Al-4V)	–	80 (50 ~ 120)	0.5 (0.3 ~ 1)	0.5	0.5	0.3	0.7 (0.3 ~ 1.2)	0.8	0.8	0.4
H	预硬钢 Pre-hardened Steel (NAK80)	40~43HRC	120 (40 ~ 150)	0.5 (0.2 ~ 1)	0.5	0.5	0.3	0.8 (0.3 ~ 1.5)	1	1	0.5
H	铸件用钢 Steel for Die Casting (DAC55、DH31)	43~48HRC	90 (40 ~ 120)	0.4 (0.2 ~ 0.8)	0.5	0.5	0.3	0.7 (0.3 ~ 1.2)	0.7	0.7	0.5
H	调质钢 Hardened Steels (SKD11)	50~55HRC	60 (40 ~ 90)	0.3 (0.2 ~ 0.7)	0.3	0.3	0.2	0.5 (0.3 ~ 0.8)	0.5	0.5	0.4





Maximum ramping angle(E)

■斜线下刀加工时最大倾斜角(E) Maximum ramping angle(E)

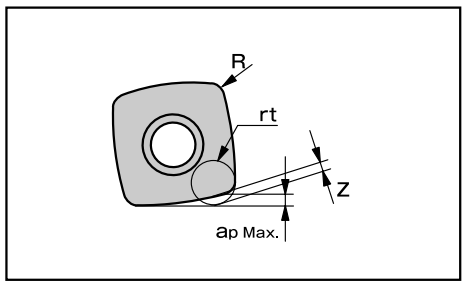
刀片尺寸 Insert Size	SDMT09···				SXMT12···			
刀片直径 (mm) D1	倾斜角 Ramping Angle E	螺旋线开孔 Helical Milling(mm)		螺旋角度 Helical Angle P	倾斜角 Ramping Angle E	螺旋线开孔 Helical Milling(mm)		螺旋角度 Helical Angle P
		最小径 Do Min.	最大径 Do Max.			最小径 Do Min.	最大径 Do Max.	
25	3.6°	35	48	3.1°	–	–	–	–
28	2.6°	41	54	2.1°	–	–	–	–
30	2.2°	45	58	1.9°	7.9°	40	58	6.5°
32	2°	49	62	1.7°	7.2°	44	62	6.1°
35	1.6°	55	68	1.1°	4.6°	50	68	3.9°
40	1.2°	65	78	1°	2.9°	69	78	2.5°
50	0.9°	85	98	0.8°	1.5°	80	98	1.3°
63	0.8°	111	124	0.7°	1.1°	106	124	0.9°
80	–	–	–	–	1.3°	140	158	1.1°
100	–	–	–	–	0.7°	180	198	0.6°

■程序编写时的刃尖形状设定
Flute shape definitions for the purpose of creating a program

单位:mm Unit:mm

刀片尺寸 Insert Size	R	最大切深 ap Max.	类似圆弧角 rt	切削余量 Z
SDMT09···	0.8	1	2	0.7
SXMT12···	1	2	3	1.15

加工时请将程序依照类似圆弧角铣刀的条件编写。
For machining purposes, create machining programs for the respective simulated R radius cutters.

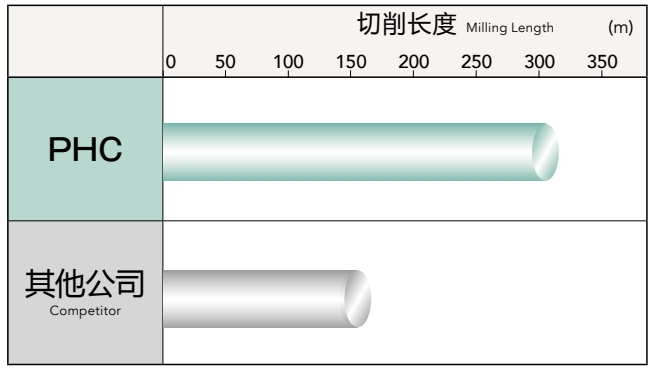


Processing Data

■加工数据 Processing Data

压铸模具粗加工 Rough milling of die-casting dies

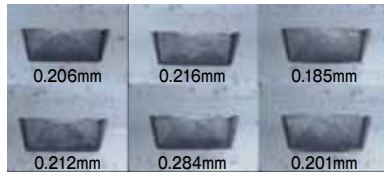
使用工具 Tool	PHC09R063M22-6	其他公司 Competitor
使用刀片(材质) Insert (grade)	SDMT09T308SR-GM(XP2040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	DAC55(48HRC)	
切削速度 Cutting Speed	75m/min(379min^{-1})	118m/min(596min^{-1})
进给量 Feed	1,250mm/min(0.55mm/t)	600mm/min(0.25mm/t)
切削深度 Depth of Cut	ap=0.7mm ae=25.5mm	
切削油剂 Coolant	气冷式 Air Blow	
工具悬长 Length of Tool Extension	145mm	
使用机械 Machine	立式加工中心(BT50) Vertical Machining Center	



压铸模具粗加工。与其他公司产品相比，能以2倍的效率进行加工，而且能得到2倍的耐久寿命。另外，由于低抵抗规格能抑制发热量，所以切屑的颜色为棕色，很稳定。

This product was able to mill at double the efficiency of a competitor's product while doubling the durability. Due to its low-resistance construction, it minimizes heat generation, resulting in a stable discharge of brownish chips.

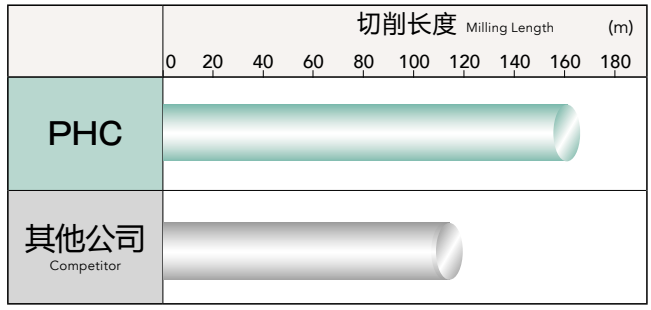
刀片磨损量照片
a picture of wear width of the chip



稳定的切屑
consistent chips

压铸模具粗加工 Rough milling of die-casting dies

使用工具 Tool	PHC09R050M22-5	其他公司 Competitor
使用刀片(材质) Insert (grade)	SDMT09T308SR-GM(XP2040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	SKD61(48HRC)	
切削速度 Cutting Speed	80m/min(510min^{-1})	110m/min(700min^{-1})
进给量度 Feed	1,360mm/min(0.53mm/t)	800mm/min(0.28mm/t)
切削深度 Depth of Cut	ap=0.5mm ae=25mm	
切削油剂 Coolant	气冷式 Air Blow	
使用机械 Machine	卧式加工中心(BT50) Horizontal Machining Center	

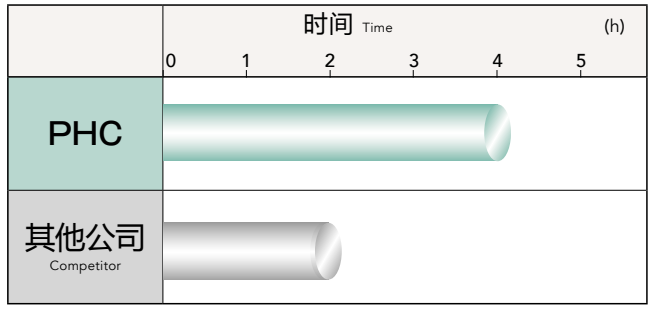


由于低抵抗刃形，与其他公司产品相比，能以1.7倍的效率进行加工，而且能得到1.4倍的耐久寿命。另外，使用其他公司产品时，由于加工发热导致加工件的变形，使用PHC的加工能抑制发热量，能改善加工件的变形。

Due to its low-resistance edge form, this product was able to mill at 1.7 times the efficiency of the conventional tool, and achieved 1.4 times the durability. Additionally, the heat generated by the conventional tool created a distortion in the workpiece, while the PHC was able to improve the process by suppressing the generation of heat.

注塑模具粗加工 Rough milling of plastic dies

使用工具 Tool	PHC12R050M22-4	其他公司 Competitor
使用刀片(材质) Insert (grade)	SXMT120410SR-GM(XP2040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	PX5(30HRC)	
切削速度 Cutting Speed	157m/min(1,000min^{-1})	
进给量度 Feed	3,000mm/min(0.75mm/t)	
切削深度 Depth of Cut	ap=0.75mm ae=25mm	
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(HSK-A100) Vertical Machining Center	

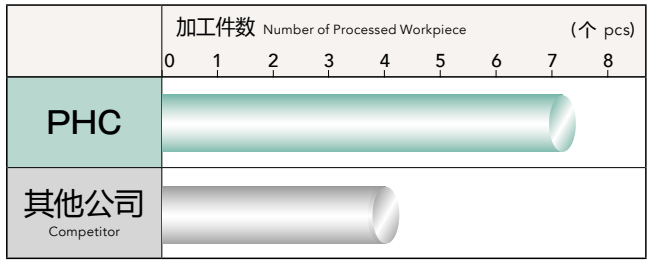


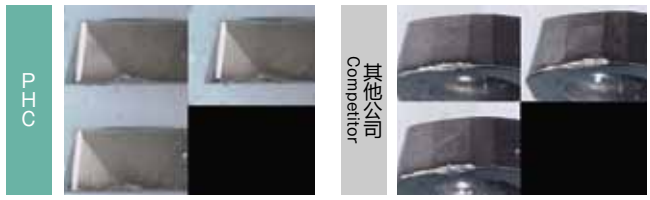
与其他公司产品一样参数进行模具外形粗加工时,能得到2倍的耐久寿命。

While rough milling a die using the same conditions as the conventional tools, this product has doubled the durability.

叶片粗加工 Rough milling of blades

使用工具 Tool	PHC09R032SS32-3S	其他公司 Competitor
使用刀片(材质) Insert (grade)	SDMT09T308ER-SM(XC5040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	SUS630	
切削速度 Cutting Speed	80m/min(796min^{-1})	
进给量 Feed	800mm/min(0.33mm/t)	
切削深度 Depth of Cut	ap=0.5mm ae= ~ 32mm	
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	



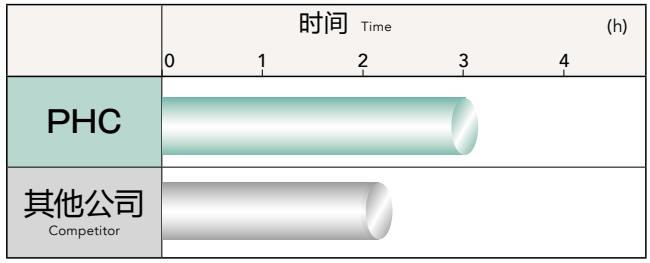


根据同样参数进行叶片粗加工时，能得到1.75 倍的寿命。刀片的磨损是正常磨损，能进行稳定的加工，也能继续加工。

A blade was rough-milled under the same conditions for comparison. This tool provided 1.75 times the durability, and milled in a stable manner with inserts exhibiting normal wear. Moreover, it was capable of continued milling.

冲压模具 Rough milling of press dies

使用工具 Tool	PHC12R050M22-4	其他公司A Competitor A
使用刀片(材质) Insert (grade)	SXMT120410SR-GM(XP2040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	SKD11相当品 Equivalent	
切削速度 Cutting Speed	112m/min(713min^{-1})	
进给量 Feed	2,400mm/min(0.84mm/t)	2,000mm/min(0.7mm/t)
切削深度 Depth of Cut	ap=1.25mm ae=32.2mm	
切削油剂 Coolant	气冷式 Air Blow	
使用机械 Machine	龙门铣床(BT50) Planer Machining Center	

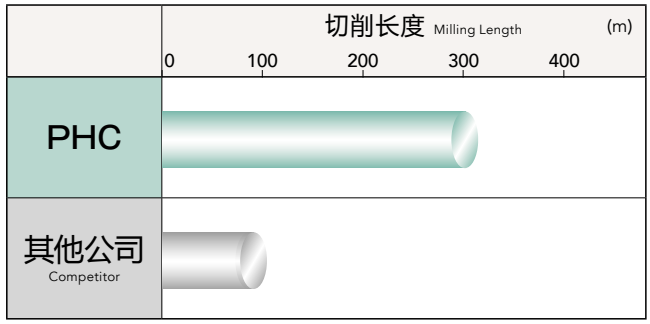


对冲压模具的钢材进行粗加工。使用其他公司产品时因为发生崩刃，所以不能提高进给量，但是使用PHC 是在把参数提高20% 的状态也能进行稳定加工，而且能得到1.5倍的寿命。

This process consisted of rough-milling of steel for a press die. A competitor's product could not increase the feed rate due to chipping. The PHC was able to mill with stability while increasing the conditions by 20%, and also provided 1.5 times the durability.

注塑模具粗加工 Rough milling of plastic dies

使用工具 Tool	PHC12R063M22-5	其他公司 Competitor
使用刀片(材质) Insert (grade)	SXMT120410SR-GM(XP2040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	HPM7(33HRC)	
切削速度 Cutting Speed	100m/min(505min^{-1})	
进给量 Feed	2,500mm/min(1mm/t)	
切削深度 Depth of Cut	ap=1.5mm ae=40mm	
切削油剂 Coolant	气冷式 Air Blow	
使用机械 Machine	立式加工中心(BT50) Vertical Machining Center	



使用其他公司产品时很早就发生崩刃，但是使用PHC 的话能进行稳定加工，在同样参数使用的情况下，切削长度为其他公司产品的3倍。

A competitor's product chipped prematurely, but the PHC exhibited minimum resistance, inhibiting chipping and allowing it to mill three times the distance under the same conditions.

» Phoenix PDR

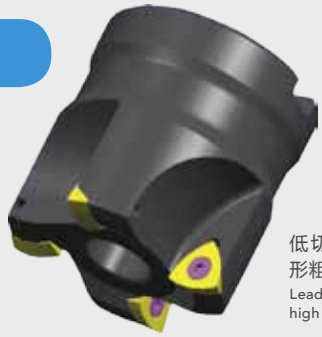
Phoenix 高进给圆弧角铣刀系列
Phoenix High Feed Radius Cutter Series

Phoenix Deep feed Radius

■解决以往的加工问题
Solves traditional machining problems

以往的高效率工具的问题点
Issues with traditional high-efficiency cutting tools

- ○ 没有能够大切深加工的圆弧角铣刀。
  There is no radius tool that can perform large depths of cut.
- ○ 外皮的切削量大，因此导致工具的破损。
  Large variances in removal damage the tool.
- ○ 黑皮部分的切深量很少，因此导致空切的情况增加。
  The depth of cut is so small for black surface areas that air cutting becomes common.



需要切深量…
但是不想降低效率。
Depth of cut is needed...
but we don't want to reduce efficiency.

低切深量高进给刀圆弧角形粗加工工具
Leading low depth of cut, high feed radius roughing tools

考虑到刃尖刚性的可变动负角形状
Variable negative form for edge rigidity

➡防止崩刃
→prevention of breakage

螺旋刃形
Spiral tool form

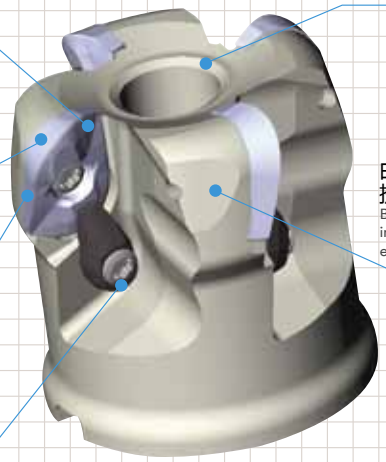
➡降低切削抵抗
→reduction in cutting force

可用于精加工的修光刃
A cutting tool capable of finish milling thanks to the wiping edge

切深量2-5mm 时为最适合的刀片形状（圆弧角R10）
Ideal chip formation when depth of cut is between 2-5mm (corner radius 10)

对应侧面加工的刃形
A cutting tool capable of side machining

采用双重装夹
Uses double clamping



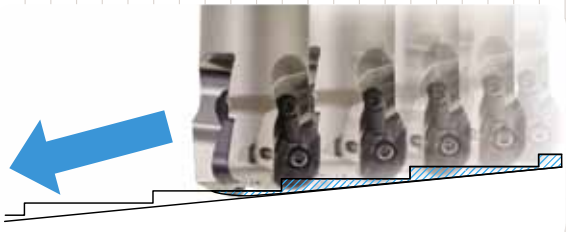
底部内凹形状（3.5mm）针对粗糙的铸件表面
Bottom relief (3.5mm) prevents rough surfaces

由于刀架的增大，提高了刀体的刚性
Body rigidity has been increased because of the enlarged back metal

■用圆弧角铣刀来替代球头铣刀加工!
The work of a ball, cut by a radius!

一直被认为只能使用球头型铣刀的加工，PDR 的话也能进行。
The PDR can cut what was until now considered the work of ball end mills.

进行等高线加工时，随着切深量的增大，加工出的高低差异随之变大。一般来说，对于后工序工具的影响较大，最终加工工程间的总加工时间会增多。但是PDR 采用球头铣刀相同作用的刃型设计，仍然保持着圆弧角的有效工具刚性，能进行走差线加工。等高线粗加工时限于ap3mm 以下。建议使用直径π50以下。

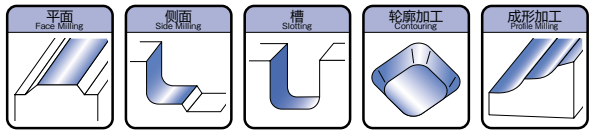


In heavy roughing (contoured machining), machining steps become larger based on the depth of cut. Usually, the effect on the next cutting tool is great, and as machining processes are added, the overall production time increases. However, the tool form of the PDR is designed to increase the removal and leave stepovers similar to ball end mills while still maintaining the rigidity of a radius end mill. Roughing of contoured lines is restricted to ap3mm. Also, a diameter of ϕ50mm or less is recommended.

Phoenix

高进给圆弧角立铣刀 附柄型
Deep Feed Radius Cutter with Shank Type

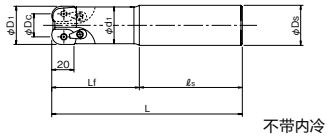
PDR SS/MT/CN



Specification Chart

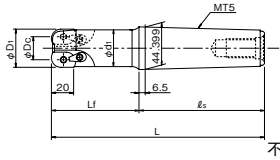
■形状尺寸表 Specification Chart

Type 1



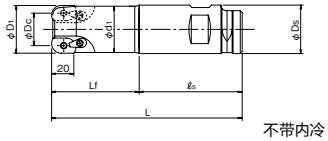
不带内冷
Without coolant hole.

Type2



不带内冷
Without coolant hole.

Type3



不带内冷
Without coolant hole.

单位:mm Unit:mm

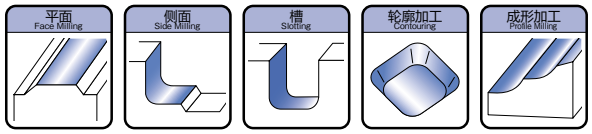
形状 Type	商品号 EDP No.	名称 Designation	外径 Dc	直径 D1	刃数 z	柄径 Ds	全长 L	颈长 Lf	颈径 d1	柄长 ℓs	形状类型 Type	库存 Stock
普通型 Regular	7800000	PDR20R040SS42-2S	20	40	2	42	150	50	38.9	100	1	C
	7800001	PDR20R040MT5M16-2S	20	40	2	MT5-M16	256	120	38.9	136	2	C
	7800003	PDR20R040MT5M24-2S	20	40	2	MT5-M24	256	120	38.9	136	2	C
	7800004	PDR20R050SS42-3S	30	50	3	42	150	50	48.5	100	1	C
	7800005	PDR20R050MT5M16-3S	30	50	3	MT5-M16	256	120	48.5	136	2	C
	7800007	PDR20R050MT5M24-3S	30	50	3	MT5-M24	256	120	48.5	136	2	C
	7800008	PDR20R050CN50.8-3S	30	50	3	CN50.8	150	65	48.5	85	3	C
长柄型 Long	7800009	PDR20R040SS42-2L	20	40	2	42	250	150	38.9	100	1	C
	7800010	PDR20R040MT5M16-2L	20	40	2	MT5-M16	306	170	38.9	136	2	C
	7800012	PDR20R040MT5M24-2L	20	40	2	MT5-M24	306	170	38.9	136	2	C
	7800013	PDR20R050SS42-3L	30	50	3	42	250	150	48.5	100	1	C
	7800014	PDR20R050MT5M16-3L	30	50	3	MT5-M16	306	170	48.5	136	2	C
	7800016	PDR20R050MT5M24-3L	30	50	3	MT5-M24	306	170	48.5	136	2	C
	7800017	PDR20R050CN50.8-3L	30	50	3	CN50.8	250	165	48.5	85	3	C

C=标准库存品 C=Standard stock item.

Phoenix

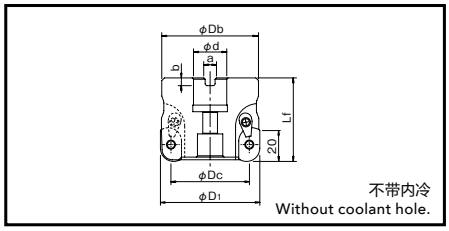
高进给圆弧角铣刀头
Deep Feed Radius Cutter with Bore Type

PDR BORE



Specification Chart

■形状尺寸表 Specification Chart



单位:mm　Unit:mm

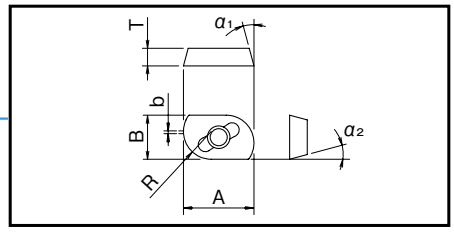
形状 Type	商品号 EDP No.	名称 Designation	外径 Dc	直径 D1	刃数 z	全长（刀身高） Lf	台座径 Db	内孔径 d	端面槽宽 a	端面槽深 b	库存 Stock
英制 for inch holes	7800050	PDR20R063M22.2-3	43	63	3	63	60	22.225	8	5	C
	7800051	PDR20R063M22.2-4	43	63	4	63	60	22.225	8	5	C
	7800052	PDR20R080M31.7-4	60	80	4	63	76	31.75	12.7	8	C
	7800053	PDR20R080M31.7-5	60	80	5	63	76	31.75	12.7	8	C
	7800054	PDR20R100M31.7-5	80	100	5	63	96	31.75	12.7	8	C
	7800055	PDR20R100M31.7-6	80	100	6	63	96	31.75	12.7	8	C
	7800056	PDR20R125M31.7-6	105	125	6	63	100	31.75	12.7	8	C
公制 for metric holes	7800057	PDR20R063M22-3	43	63	3	63	60	22	10.4	6.3	C
	7800058	PDR20R063M22-4	43	63	4	63	60	22	10.4	6.3	C
	7800059	PDR20R080M27-4	60	80	4	63	76	27	12.4	7	C
	7800060	PDR20R080M27-5	60	80	5	63	76	27	12.4	7	C
	7800061	PDR20R100M32-5	80	100	5	63	96	32	14.4	8	C
	7800062	PDR20R100M32-6	80	100	6	63	96	32	14.4	8	C
	7800063	PDR20R125M40-6	105	125	6	63	100	40	16.4	9	C

C=标准库存品　C=Standard stock item.

Phoenix

高进给圆弧角立铣刀
Deep Feed Radius Cutter

PDR 刀片



Applicable Insert

■适用刀片 Applicable Insert

单位:mm Unit:mm

名称 Designation	切削刃数 Number of Cutting Edges	刀片尺寸 Insert Size						涂层种类 Grade of Coated Materials
		A×B	厚度 T	前角 α1	后角 α2	R	副切削刃 b	XP3930
ADMT2006100PDR-GM	2	24.18×16	6.35	15°	15°	10	1	7810000

库存种类为C(标准库存品)
Stocks are categolized in section C (Standard stock item).

Accessories

■零件 Accessories

	商品号 EDP No.	库存 Stock	名称 Designation
固定螺丝 Clamping Screw	7808001	C	CSPB-5 (Torx 20IP)
T型扳手 T-Handle Wrench	7808000	C	20IP-T
压板(压板、刀垫、螺丝) Metal weight set (washer)	7808002	C	CSY-20

C=标准库存品
C=Standard stock item.

Recommended Conditions

■加工材料推荐 Recommended Materials by Application

◎第一推荐材料 First recommended material
○第二推荐材料 Second recommended material

刀片型号 Inserts Grades	断屑槽 Chip Breaker	切削油剂 Coolant	P	K
XP3930	GM	–	◎	◎

GM:通用 GM:General use

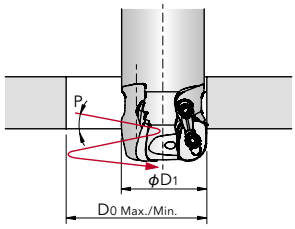
■切削条件基准表 Recommended Conditions

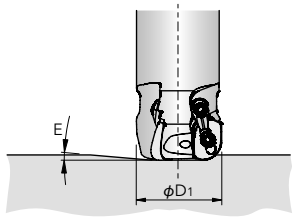
	加工材料 Work Material	抗损强度·硬度 Tensil Strength· Hardness	切削速度 Vc (m/min) Milling Speed	PDR SS/MT/CN			PDR BORE				
				每刃进给量 fz (mm/t) Feed Per Tooth	切削深度 ap (mm) Depth of Cut		每刃进给量 fz (mm/t) Feed Per Tooth	切削深度 ap (mm) Depth of Cut			
					120	170		100	200	300	400
P	软钢、低炭素钢 Mild Steels, Low Carbon Steels (SS400、S10C)	~180HB	180(90 ~ 220)	0.7(0.3 ~ 1)	3	2	0.6(0.3 ~ 1)	3	3	2	2
P	炭素钢、合金钢 Carbon Steels, Alloy Steels (S50C、SCM440)	~280HB	180(90 ~ 220)	0.7(0.3 ~ 1)	3	2	0.6(0.3 ~ 1)	3	3	2	2
P	模具钢 Die Steels (SKD11、SKD61)	~280HB	150(90 ~ 180)	0.6(0.3 ~ 1)	3	2	0.5(0.3 ~ 1)	3	2	2	2
K	铸铁 Cast Iron (FC250)	~350N/mm²	180(100 ~ 250)	0.8(0.3 ~ 1.5)	3	3	0.7(0.3 ~ 1.5)	3	3	2	2
K	球墨铸铁 Ductile Cast Iron (FCD400)	~800N/mm²	150(100 ~ 250)	0.7(0.3 ~ 1.2)	3	3	0.6(0.3 ~ 1.2)	3	3	2	2

Maximum ramping angle(E)

■斜线下刀加工时最大倾斜角(E) Maximum ramping angle(E)

刀片直径 (mm) D1	倾斜角 Ramping Angle E	螺旋线开孔 Helical Milling(mm)		Z轴进刀量 Plunging (mm)
		最小径 Do Min.	最大径 Do Max.	
40	5°	50	78	3
50	3°	70	98	3
63	2°	96	124	3
80	1°	130	158	3
100	0.5°	170	198	3
125	0.5°	220	248	3





1. 切削初始会产生较长的铁屑，请注意。
2. 进给速度设定为基准条件表的40~70。
3. 角度1以下时可不用降低进给速度进行加工。
4. 推荐使用空气冷却。

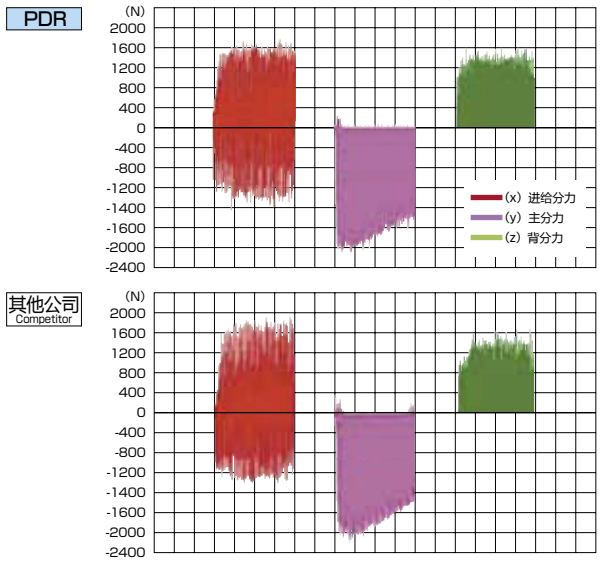
1. Long chips may occur in the beginning of the milling process.
2. The amount of feed should be within 40-70% of the recommended milling conditions.
3. To advance without dropping the feed rate, set an angle of less than 1° .
4. We recommended using air blow.

Processing Data

■加工数据 Processing Data

刃尖刚性及锋利性并存的刃型设计 Cutting edge is designed for both rigidity and sharpness

使用工具 Tool	PDR20R050MT5M16-3L
使用刀片(材质) Insert (grade)	ADMT2006100PDR-GM (XP3930)
加工材料 Work Material	FC250
切削速度 Cutting Speed	150m/min(955min^{-1})
进给量 Feed	1,500mm/min (0.52mm/t)
切削深度 Depth of Cut	ap=3mm ae=25mm
切削油剂 Coolant	气冷式 Air Blow
使用机械 Machine	立式加工中心 (8.5/11kw) Vertical Machining Center



(单位：N)

	x进给分力 Feed force	y主分力 Principal cutting force	z背分力 Thrust force	合力 Resultant force
PDR	1651	2082	1433	3019
其他公司(有断屑槽) Competitor (with breaker)	1725	2095	1455	3079

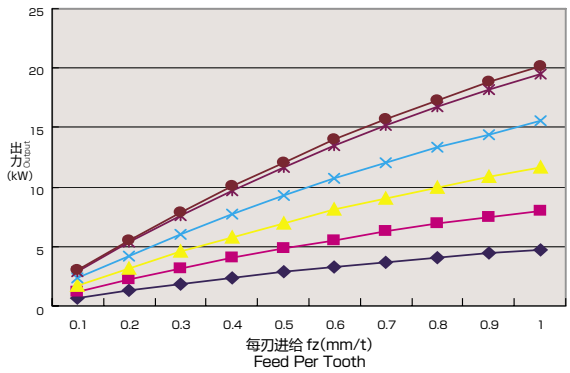
采用强化刃形，合力与断屑槽(效果)相同！
With the strengthened cutting edge, resultant force is as with a breaker!

为了有效利用机器主轴用电机(输出)… To effectively use the spindle load meter...

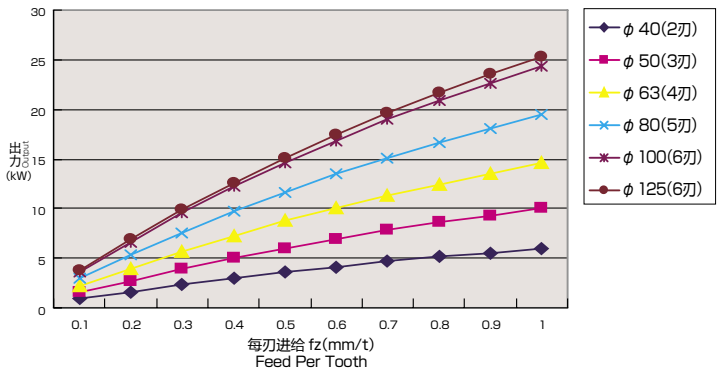
切削速度 Cutting Speed	150m/min
每刃进给量 Feed Per Tooth	**mm/t
切削深度 Depth of Cut	ap=3mm ae=(Dc-20)+5 (切深量3mm工具直径) Tool diameter for 3mm cut depth

PDR 推荐使用 2～5mm 的切深量。
这跟机械主轴用电机(输出)有很大关系。
所以请根据电机的马力来决定刀具直径和加工条件。
For PDR, a depth of cut of 2-5mm is recommended. This is largely related to the spindle load meter. Please select the tool diameter and cutting conditions that are suited to your spindle load meter.

■ FC250 机械主轴用电机(输出)表
Spindle load meter reference table

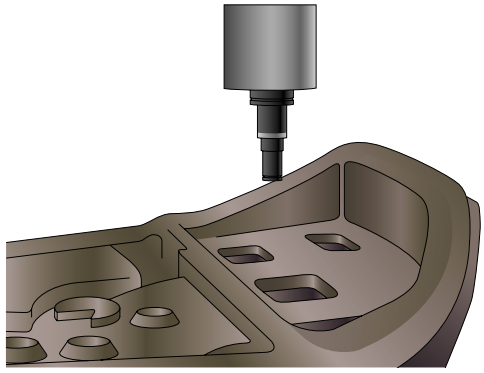


■ S50C 机械主轴用电机(输出)表
Spindle load meter reference table



提高加工效率+长寿命的达成 Achieving efficient machining and longer tool life

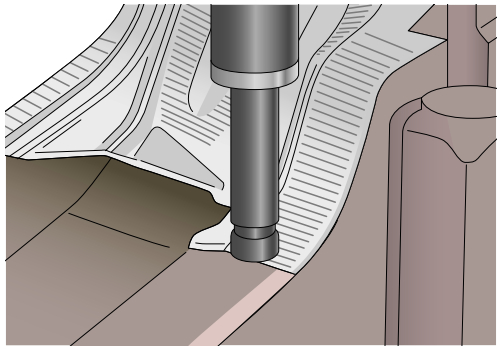
使用工具 Tool	PDR20R050MT5M24-3S
使用刀片(材质) Insert (grade)	ADMT2006100PDR-GM (XP3930)
加工材料 Work Material	FC250
加工工件 Work	冲压模具 Press Dies
切削速度 Cutting Speed	150m/min(955min^{-1})
进给量 Feed	2,000mm/min(0.7mm/t)
切削深度 Depth of Cut	ap=3mm ae=30mm
切削油剂 Coolant	气冷式 Air Blow
使用机械 Machine	龙门铣床 (18.5/22kw) Planer Machining Center
耐久时间 Durability	4小时 Hours



效率是球头铣刀的2倍，主轴负荷值降低。主轴最大负荷55%。
While efficiency is twice as great as ball end mills, spindle loads are also reduced! The maximum spindle load is 55%.

高效率加工的实现 Highly efficient machining

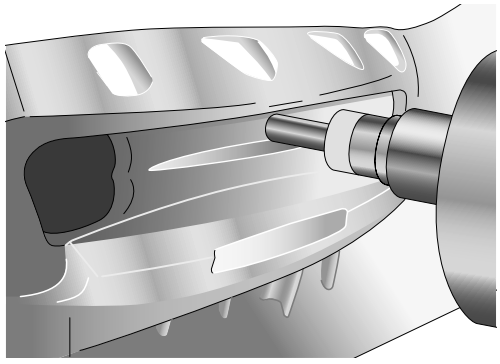
使用工具 Tool	PDR20R040MT5M24-2S
使用刀片(材质) Insert (grade)	ADMT2006100PDR-GM (XP3930)
加工材料 Work Material	高强度铸铁 Meehanite Cast Iron
加工工件 Work	冲压模具 Press Dies
切削速度 Cutting Speed	170m/min (1,350min^{-1})
进给量 Feed	2,430mm/min (0.9mm/t)
切削深度 Depth of Cut	ap=3mm ae=20mm
切削油剂 Coolant	气冷式 Air Blow
使用机械 Machine	龙门铣床 (18.5/22kw) Planer Machining Center
加工时间 Milling Time	4小时 Hours



其他公司刀具的进给速度为1,500mm/min。PDR加工4小时后，工具没有损伤，仍可继续稳定加工。
The feed rate was 1,500mm/min for the competitor's tool. The machining time with the PDR was 4 hours, and with no tool damage, stable machining was possible.

切深量增大，效率提高 Increased efficiency by the depth of cut increases

使用工具 Tool	PDR20R050SS42-3S
使用刀片(材质) Insert (grade)	ADMT2006100PDR-GM (XP3930)
加工材料 Work Material	S50C
加工工件 Work	树脂模具 Plastic Dies
切削速度 Milling Speed	150m/min (955min^{-1})
进给量 Feed	3,000mm/min (1mm/t)
切削深度 Depth of Cut	ap=3mm ae=30mm
悬长 Projection Length	100mm
切削油剂 Coolant	气冷式 Air Blow
使用机械 Machine	卧式加工中心 (37/45kw) Horizontal Machining Center
加工时间 Milling Time	2小时 Hours

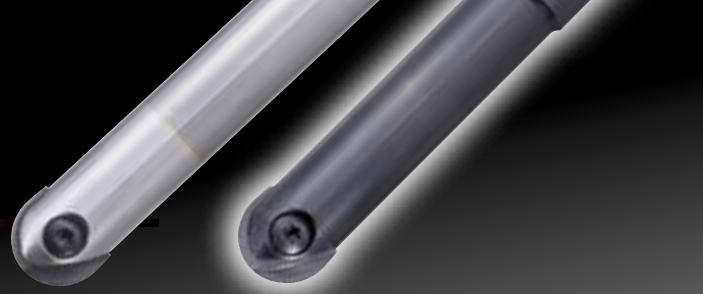


与现有工具相比，效率为1.5倍。
Efficiency was improved 1.5 times compared to current tools.

» Phoenix PFB

精加工球头铣刀
Phoenix Finishing Ball End Mill

Phoenix Finishing Ball



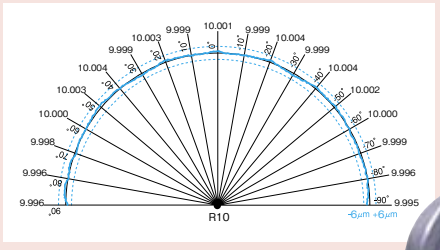
可转位式的精加工用球头型铣刀。
安装精度很高，所以能实现良好的加工面和长寿命。

The high precision mounting of the insert into the body enables a superior milling surface and long tool life.

PFB-SP

- ○ 螺旋形刃型，加工材料广泛
- ○ 精加工的精度与整体式球头型铣刀一样好。
- ○ 刀片R精度非常好(±6μm)(±6μm)

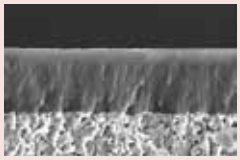
○The spiral edge form hands a wide range of work materials.
○Can perform the same finishing cuts as a solid ball end mill.
○High insert radius precision.



XP3320材质 Grade

・既有耐磨损性又有耐崩刃性的硬质材质
・开始氧化温度为1300度，被膜硬度3500HV，在高速、高效率切削时，能实现长寿命

・A carbide material with a superior balance of wear resistance and anti-chipping properties
・Oxidation temperature 1,300°C, coating hardness 3,500HV, long tool life achieved during high-speed, high-efficiency machining.



➡耐热性涂层
→Heat resistant coating
➡耐磨损性涂层
→Wear resistant coating

XP3225材质 Grade NEW

・很少受到冷却的影响，在很广泛的切削领域能进行稳定的加工。
・尤其是加工软钢、碳素钢时发挥了很高的效率。

・Performance is not affected by the quality of coolant oil. Hence stable machining can be achieved in a wide range of cutting conditions.
・Especially effective in cutting soft and carbon steel.

PFB-D

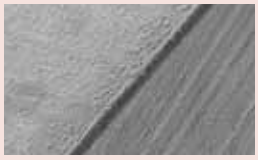
- ○ 采用锋利性很好的螺旋形刃型
- ○ 在石墨、铜、铝、MMC、碳素纤维复合材料等的加工上，实现惊人的耐久性的金刚石涂层

○Employs a spiral edge form for outstanding sharpness.
○Amazing durability when machining graphite, copper, aluminum, MMC, and carbon fiber composite material!

XC4505材质 Grade

・金刚石涂层专用的硬质材料
・高超的研磨技术与最先进技术的金刚石涂层相结合，制成锋利的切削刀。

・Utilizes a special carbide material for diamond coating
・A sharp edge is attained through the combination of our high-level grinding techniques and leading diamond coating technology.



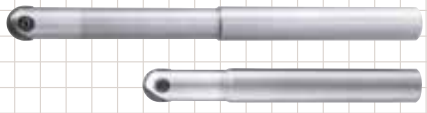
■刀体的特点及使用

Body features and applications

・硬质合金刀体

抑制振动，悬长较长的加工时也能得到良好的加工面。另外，在高速加工时也能实现高精度、长寿命的加工。

It inhibits chattering and produces a favorable milling surface even when machining with a long projection length. High precision and long tool life are possible even when milling at high speeds.



・钢制刀体

在较短的悬长加工时，能发挥很高的性价比。

It achieves superior cost performance when working with relatively short projection lengths.

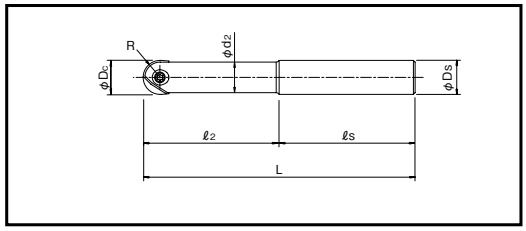
精加工球头铣刀
Finishing Ball End Mill

PFB

成形加工 Profile Milling

Specification Chart

■形状尺寸表 Specification Chart



钢制刀体 Steel Shank

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 Dc	球半径 R	全长 L	有效长		刃数 z	柄径 Ds	柄长 ℓs	颈径 d2	库存 Stock
					颈长 ℓ2	L/D					
7801400	PFB-R080SS08-S120	8	4	120	36	4.5	2	8	84	7	C
7801401	PFB-R100SS10-S130	10	5	130	45	4.5	2	10	85	9	C
7801402	PFB-R120SS12-S130	12	6	130	54	4.5	2	12	76	11	C
7801403	PFB-R160SS16-S140	16	8	140	64	4	2	16	76	14	C
7801404	PFB-R200SS20-S160	20	10	160	80	4	2	20	80	18	C
7801405	PFB-R250SS25-S160	25	12.5	160	75	3	2	25	85	22	C
7801406	PFB-R300SS32-S170	30	15	170	90	3	2	32	80	27	C

C=标准库存品 C=Standard stock item.

硬质合金刀体 Carbide Shank 短刃型 Short Type

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 Dc	球半径 R	全长 L	有效长		刃数 z	柄径 Ds	柄长 ℓs	颈径 d2	库存 Stock
					颈长 ℓ2	L/D					
7801430	PFB-R080SS08-S100CS	8	4	100	20	2.5	2	8	80	7	C
7801431	PFB-R100SS10-S100CS	10	5	100	25	2.5	2	10	75	9	C
7801432	PFB-R120SS12-S110CS	12	6	110	30	2.5	2	12	80	11	C
7801433	PFB-R160SS16-S140CS	16	8	140	40	2.5	2	16	100	14	C
7801434	PFB-R200SS20-S160CS	20	10	160	50	2.5	2	20	110	18	C
7801435	PFB-R250SS25-S160CS	25	12.5	160	62.5	2.5	2	25	97.5	22	C
7801436	PFB-R300SS32-S170CS	30	15	170	75	2.5	2	32	95	27	C

C=标准库存品 C=Standard stock item.

硬质合金刀体 Carbide Shank 长刃型 Long Type

单位:mm Unit:mm

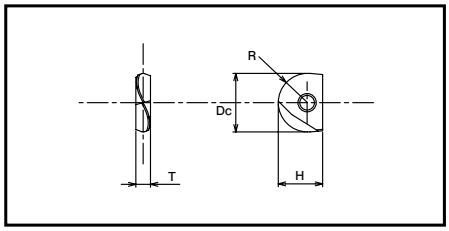
商品号 EDP No.	名称 Designation	外径 Dc	球半径 R	全长 L	有效长		刃数 z	柄径 Ds	柄长 ℓs	颈径 d2	库存 Stock
					颈长 ℓ2	L/D					
7801420	PFB-R080SS08-LL140CS	8	4	140	56	7	2	8	84	7	C
7801421	PFB-R100SS10-LL150CS	10	5	150	70	7	2	10	80	9	C
7801422	PFB-R120SS12-LL160CS	12	6	160	84	7	2	12	76	11	C
7801423	PFB-R160SS16-LL200CS	16	8	200	96	6	2	16	104	14	C
7801424	PFB-R200SS20-LL240CS	20	10	240	120	6	2	20	120	18	C
7801425	PFB-R250SS25-LL260CS	25	12.5	260	137.5	5.5	2	25	122.5	22	C
7801426	PFB-R300SS32-LL290CS	30	15	290	165	5.5	2	32	125	27	C

C=标准库存品 C=Standard stock item.

Phoenix

精加工球头铣刀
Finishing Ball End Mill

PFB刀片



Applicable Insert

■适用刀片 Applicable Insert

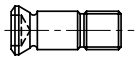
单位:mm Unit:mm

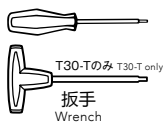
形状 Appearance	名称 Designation	产品规格 Specifications	切削刃数 Number of Cutting Edges	刀片尺寸 Insert Size 外径 Dc	球半径 R	厚度 T	高度 H	库存 Stock	涂层种类 Grade of Coated Materials XP3320	XP3225	涂层种类 Grade of Coated Materials XC4505
	PFB080-SP	螺旋槽型 Spiral Type	2	8	4	2.4	7	C	7820010	NEW 7820030	
	PFB100-SP		2	10	5	2.6	8.5	C	7820011	NEW 7820031	
	PFB120-SP		2	12	6	3	10	C	7820012	NEW 7820032	
	PFB160-SP		2	16	8	4	12	C	7820013	NEW 7820033	
	PFB200-SP		2	20	10	5	15	C	7820014	NEW 7820034	
	PFB250-SP		2	25	12.5	6	18.5	C	7820015	NEW 7820035	
	PFB300-SP		2	30	15	7	22.5	C	7820016	NEW 7820036	
	PFB080-D	螺旋槽型（金刚石涂层） Spiral Type (Diamond Coated)	2	8	4	2.4	7	C			7820020
	PFB100-D		2	10	5	2.6	8.5	C			7820021
	PFB120-D		2	12	6	3	10	C			7820022
	PFB160-D		2	16	8	4	12	C			7820023
	PFB200-D		2	20	10	5	15	C			7820024
	PFB250-D		2	25	12.5	6	18.5	C			7820025
	PFB300-D		2	30	15	7	22.5	C			7820026

C=标准库存品 C=Standard stock item.
※=更多信息请咨询我司营业人员。 ※=Please contact our sales staff for more information.

Accessories

■零件 Accessories

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀片 Applicable Inserts	连接扭矩 Recommended tightening torque
 固定螺丝 Clamping Screw	7808123	C	FS25669RB	φ8	1Nm
	7808117	C	FS30686RB	φ10	1.2Nm
	7808118	C	FS35610RB	φ12	2Nm
	7808119	C	FS40613RB	φ16	3Nm
	7808120	C	FS50615RB	φ20	5Nm
	7808121	C	FS60620RB	φ25	5Nm
	7808122	C	FS80624RB	φ30	6Nm

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀片 Applicable Inserts
 T30-Tのみ T30-T only 扳手 Wrench	7808204	C	T7-D	φ8
	7808205	C	T8-D	φ10
	7808207	C	T10-D	φ12
	7808208	C	T15-D	φ16
	7808209	C	T20-D	φ20, φ25
	7808212	C	T30-T	φ30

C=标准库存品 C=Standard stock item.
扳手请另购。 Please purchase the wrench separately from the cutter.

OSG Phoenix

Information

Phoenix 刀具系列使用的都是不会对环境造成负担的再生塑料制造的包装盒。
The Phoenix packaging is environmentally friendly as it uses a case made of recycled plastic.

精加工球头铣刀
Finishing Ball End Mill

PFB

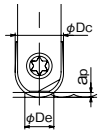
Recommended Conditions

■切削深度及实际加工直径(φDe)基准表 Chart of cutting depth and actual cutting diameter

单位:mm Unit:mm

ap(切削深度) cutting depth		实际加工直径 (φDe) Actual cutting diameter														
外径 Dc	圆弧角 R	0.1	0.2	0.3	0.4	0.5	0.8	1	1.5	2	2.5	3	3.5	4	4.5	5
8	4	1.8	2.5	3	3.5	3.9	4.8									
10	5	2	2.8	3.4	3.9	4.4	5.4	6	7.1							
12	6	2.2	3.1	3.7	4.3	4.8	6	6.6	7.9	8.9						
16	8	2.5	3.6	4.3	5	5.6	7	7.7	9.3	10.6	11.6					
20	10	2.8	4	4.9	5.6	6.2	7.8	8.7	10.5	12	13.2	14.3	15.2			
25	12.5	3.2	4.5	5.4	6.3	7	8.8	9.8	11.9	13.6	15	16.2	17.3	18.3		
30	15	3.5	4.9	6	6.9	7.7	9.7	10.8	13.1	15	16.6	18	19.3	20.4	21.4	22.4

●实际加工直径(φDe) How to determine actual cutting diameter



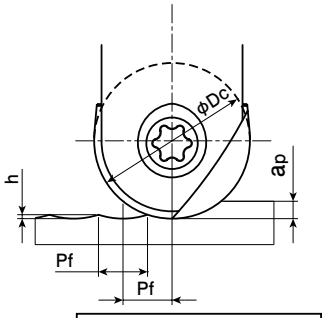
$$De=2\sqrt{ap\times(Dc-ap)}$$

■推荐的进给量及表面加工粗糙度 Recommended pick feed and milling surface roughness

单位:mm Unit:mm

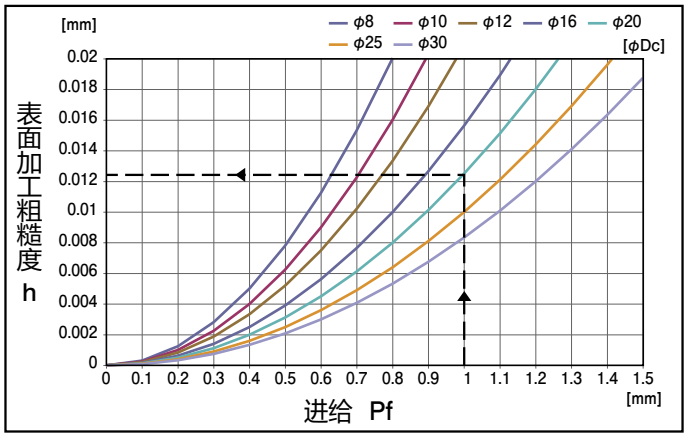
外径 Dc	进给 Pf	表面加工粗糙度 h
8	0.5	0.008
10	0.6	0.009
12	0.7	0.01
16	0.8	0.01
20	1	0.012
25	1.2	0.014
30	1.3	0.014

■理论上的表面加工粗糙度 Recommended pick feed and milling surface roughness



$$h=0.5\times(Dc-\sqrt{Dc^2-Pf^2})$$

例) Dc=20mm
Pf= 1mm
→h=0.0125mm



Phoenix

精加工球头铣刀
Finishing Ball End Mill

PFB

Recommended Conditions

■加工材料推荐
Recommended Materials by Application

◎第一推荐材料 First recommended material
○第二推荐材料 Second recommended material

刀片型号 Inserts Grades	P	M	K	N	S	H
XP3320	○	○	◎		◎	◎
XP3225	◎	◎	○	◎*1	○	○
XC4505				◎*2		

*1 铜铝合金加工的第一推荐 Best recommended for aluminum and copper alloy applications
*2 石墨及CFRP加工的第一推荐 Best recommended for graphite and CFRP applications

■切削条件基准表 Recommended Conditions

PFB-SP

单位:mm Unit:mm

	加工材料 Work Material		抗损强度·硬度 Tensil Strength· Hardness	切削速度 Vc (m/min) Milling Speed	切削量 ap (mm) Rule of thumb of cutting amount	每刃进给量 fz (mm/t) 直径 Dc			
						φ8	φ10,12	φ16,20	φ25,30
P	软钢、低炭素钢 Mild Steels·Carbon Steels	(SS400、S10C)	~ 180HB	300 (200~400)	0.02Dc	0.1	0.12	0.14	0.18
	炭素钢、合金钢 Carbon Steels·Alloy Steels	(S50C、SCM440)	~ 280HB	300 (200~400)	0.02Dc	0.07	0.1	0.12	0.14
	模具钢 Die Steels	(SKD61、SKD11)	~ 280HB	250 (150~350)	0.02Dc	0.07	0.1	0.12	0.14
M	不锈钢 Stainless Steels	(SUS304、SUS420)	~ 250HB	250 (150~350)	0.02Dc	0.07	0.12	0.14	0.17
K	铸铁 Cast Iron	(FC250)	~ 300N/mm²	400 (300~500)	0.02Dc	0.12	0.14	0.18	0.22
	球墨铸铁 Ductile Cast Iron	(FCD400)	~ 600N/mm²	300 (200~400)	0.02Dc	0.1	0.12	0.14	0.18
N	铝合金 Aluminum Alloys	(A7075)	~ 13%Si	500 (400~600)	0.03Dc	0.12	0.14	0.18	0.22
	铜合金 Copper Alloys	(C1100)	—	300 (200~400)	0.03Dc	0.11	0.13	0.17	0.2
S	耐热合金 Heat Resistant Alloys	(Inconel 718)	—	50 (20~ 80)	0.015Dc	0.04	0.05	0.06	0.06
	钛合金 Titanium Alloy	(Ti-6Al-4V)	—	90 (40~120)	0.02Dc	0.06	0.08	0.11	0.13
H	预硬钢 Prehardened Steels	(NAK80、STAVAX)	40 ~ 43HRC	200 (100~300)	0.015Dc	0.06	0.07	0.08	0.1
	铸件用钢 Die Cast Steels	(DAC55、DH31)	43 ~ 48HRC	180 (90~200)	0.015Dc	0.05	0.06	0.07	0.07
	调质钢 Hardened Steels	(SKD11)	50 ~ 60HRC	150 (100~250)	0.01Dc	0.05	0.06	0.07	0.07

・上表的数值为实际加工中的一般值，请根据实际加工环境进行适当调整。
Above figure is general numbers from actual millings. Please adjust according to machining environments.

PFB-D

单位:mm Unit:mm

	加工材料 Work Material	抗损强度·硬度 Tensil Strength· Hardness	切削速度 Vc (m/min) Milling Speed	切削量 ap (mm) Rule of thumb of cutting amount	每刃进给量 fz (mm/t) 直径 Dc			
					φ8	φ10,12	φ16,20	φ25,30
N	石墨 Graphite	—	500 (400~600)	0.03Dc	0.14	0.17	0.21	0.25
	CFRP Carbon Fiber Reinforced Plastics	—	400 (300~500)	0.03Dc	0.11	0.13	0.17	0.2

・上表的数值为实际加工中的一般值，请根据实际加工环境进行适当调整。
Above figure is general numbers from actual millings. Please adjust according to machining environments.

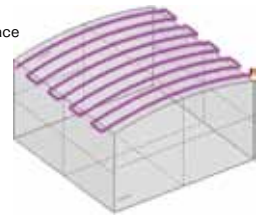
Processing Data

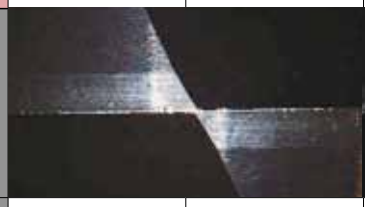
■加工数据 Processing Data

SUH600 叶片加工(磨损量的比较) Milling of a SUH600 blade (Comparison of tool wear)

使用工具 Tool	PFB-R200SS20-S160
使用刀片(材质) Insert (grade)	PFB200-SP (XP3320)
零件名 Work	叶片样品模式 Blade Sample Model
加工材料 Work Material	SUH600相当品 Equivalent
工具悬长 Overall Length	110mm
回转速度 Milling Speed	94m/min(1,500min^{-1})
进给量 Feed	2,000mm/min(0.67mm/t)
切削深度 Depth of Cut	ap=0.2mm Pf=1mm
加工方法 Milling Method	仿型加工 Profiling Milling
切削油剂 Machine	水溶性切削油剂 Water Soluble
使用机械 Machine	立式加工中心(BT40) Vertical Machining Center

工件表面 R300
Workpiece top surface



加工时间 Time	70分 minute		140分 minute	
切削长度 Milling Length	100m		200m	
PFB				
磨损量(mm) Wear amount	0.033	0.030	0.041	0.043
其他公司 Competitor				
磨损量(mm) Wear amount	0.032	0.033	0.070	0.071

200m加工结束时,PFB的磨损量比其他公司产品少1/2

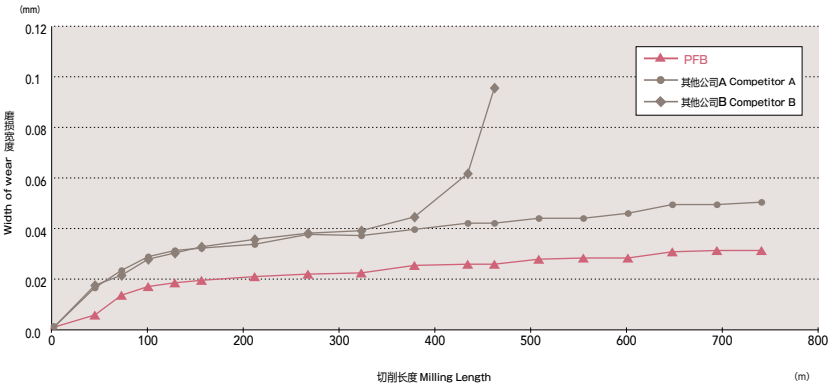
In comparison to competitor products, the PFB has half the amount of tooling wear after machining 200 m.

S50Cの30° 傾斜面加工 S50C at 30°inclined surface machining

使用工具 Tool	PFB-R200SS20-S160
使用刀片(材质) Insert (grade)	PFB200-SP (XP3225)
加工材料 Work Material	S50C
工具悬长 Overall Length	80mm (4D)
切削速度 Cutting Speed	300m/min(4,800min^{-1})
进给量 Feed	1,344mm/min(0.14mm/t)
切削深度 Depth of Cut	ap=0.1mm Pf=0.5mm
加工方法 Milling Method	直线加工 倾斜度30° Straight line pick 30-degree inclination
切削油剂 Coolant	气冷式 Air Blow
使用机械 Machine	卧式加工中心(BT40) Horizontal Machining Center

XP3225刚开始加工时的磨损量比其他公司产品小,也没有突发性的崩刃,加工很稳定。

The XP3225 is capable of achieving stable machining without abrupt interruptions and tool chipping. In comparison to competitor products, tooling wear on the XP3225 in the initial machining stage was minimal.



其他公司A 462m Competitor A	其他公司B 836m Competitor B	PFB 836m
		
		

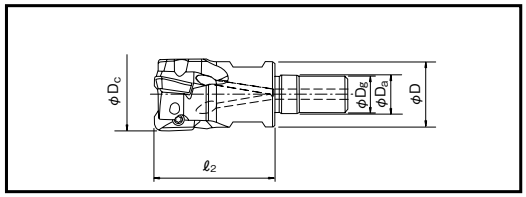
» Phoenix SF

刀盘交换式系列
Phoenix Screw Fit Type

Screw Fit

Specification Chart

■形状尺寸表 Specification Chart

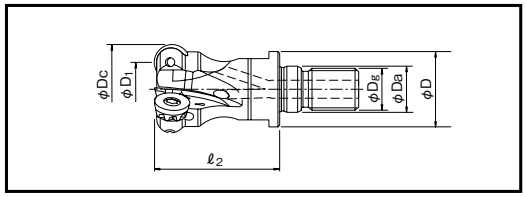


PSE 刀盘交换式 Screw Fit Type

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 Dc	刃数 Z	装取直径 Da	螺纹尺寸 Dg	扳手尺寸 Wrench Size	全长 ℓ2	端面径 D	适用刀片 Applicable Inserts	库存 Stock
7801600	PSE11R016SF8-2	16	2	8.5	8	10	27	14.5	ZD*11T3··	C
7801601	PSE11R020SF10-3	20	3	10.5	10	14	33	18		C
7801602	PSE11R025SF12-4	25	4	12.5	12	17	35	23		C
7801603	PSE11R028SF12-4	28	4	12.5	12	17	35	23		C
7801604	PSE11R032SF16-5	32	5	17	16	22	40	28		C
7801605	PSE11R035SF16-5	35	5	17	16	22	40	28		C
7801606	PSE11R040SF16-6	40	6	17	16	22	40	28		C
7801607	PSE15R025SF12-2	25	2	12.5	12	17	35	23	ZDKT1505··	C
7801608	PSE15R028SF12-2	28	2	12.5	12	17	35	23		C
7801609	PSE15R032SF16-3	32	3	17	16	22	40	28		C
7801610	PSE15R035SF16-3	35	3	17	16	22	40	28		C
7801611	PSE15R040SF16-4	40	4	17	16	22	40	28		C

C=标准库存品 C=Standard stock item.
请参阅P.18。 See page 18 for the accessories.

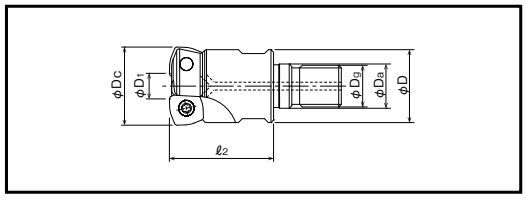


PRC 刀盘交换式 Screw Fit Type

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	刀具直径 D1	外径 Dc	刃数 Z	装取直径 Da	螺纹尺寸 Dg	扳手尺寸 Wrench Size	全长 ℓ2	端面径 D	适用刀片 Applicable Inserts	库存 Stock
7801700	PRC10R020SF10-2	10	20	2	10.5	10	14	33	18	RPH*10T3··	C
7801701	PRC10R025SF12-3	15	25	3	12.5	12	17	35	23		C
7801702	PRC10R030SF16-3	20	30	3	17	16	22	40	28		C
7801703	PRC10R032SF16-4	22	32	4	17	16	22	40	28		C
7801704	PRC10R040SF16-4	30	40	4	17	16	22	40	28		C
7801705	PRC12R030SF16-2	18	30	2	17	16	22	40	28	RPH*1204··	C
7801706	PRC12R032SF16-3	20	32	3	17	16	22	40	28		C
7801707	PRC12R040SF16-3	28	40	3	17	16	22	40	28		C

C=标准库存品 C=Standard stock item.
请参阅P.26。 See page 26 for the accessories.



PHC 刀盘交换式 Screw Fit Type

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	刀具直径 D1	外径 Dc	刃数 Z	装取直径 Da	螺纹尺寸 Dg	扳手尺寸 Wrench Size	全长 ℓ2	端面直径 D	适用刀片 Applicable Inserts	库存 Stock
7801500	PHC09R025SF12-3	13.2	25	3	12.5	12	17	35	23	SDMT09T3··	C
7801501	PHC09R028SF12-3	16.2	28	3	12.5	12	17	35	23		C
7801502	PHC09R030SF16-3	18.2	30	3	17	16	22	40	28		C
7801503	PHC09R032SF16-3	20.2	32	3	17	16	22	40	28		C
7801504	PHC09R035SF16-3	23.2	35	3	17	16	22	40	28		C
7801505	PHC09R040SF16-4	28.2	40	4	17	16	22	40	28		C
7801506	PHC12R030SF16-2	13.4	30	2	17	16	22	40	28	SXMT1204··	C
7801507	PHC12R032SF16-2	15.4	32	2	17	16	22	40	28		C
7801508	PHC12R035SF16-3	18.4	35	3	17	16	22	40	28		C
7801509	PHC12R040SF16-3	23.4	40	3	17	16	22	40	28		C

C=标准库存品 C=Standard stock item.
请参阅P.34。 See page 34 for the accessories.

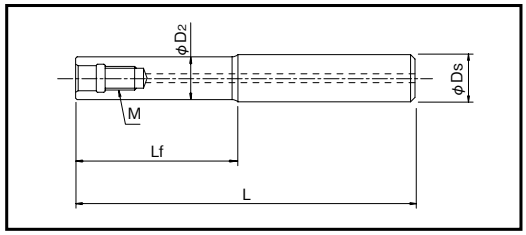
Phoenix

刀盘交换式直柄型
Straight arbor for screw-fit tools

OP-SFA

Specification Chart

■**形状尺寸表** Specification Chart



刀盘交换式直柄型 Straight arbor for screw-fit tools

钢制刀体直柄型 Straight arbor with steel shank

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	柄径 Ds	颈径 D2	螺纹尺寸 M	装取直径 Da	全长 L	颈长 Lf	库存 Stock
7801900	SF-M08SS16-15	16	14.5	8	8.5	95	15	C
7801901	SF-M10SS20-20	20	18	10	10.5	120	20	C
7801902	SF-M12SS25-35	25	23	12	12.5	135	35	C
7801903	SF-M16SS32-35	32	28	16	17	155	35	C

C=标准库存品 C=Standard stock item.

硬质合金刀体直柄型 Straight arbor with carbide shank

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	柄径 Ds	颈径 D2	螺纹尺寸 M	装取直径 Da	全长 L	颈长 Lf	库存 Stock
7801910	SF-M08SS16-55CS	16	14.5	8	8.5	115	55	C
7801911	SF-M08SS16-85CS	16	14.5	8	8.5	145	85	C
7801912	SF-M10SS20-70CS	20	18	10	10.5	140	70	C
7801913	SF-M10SS20-110CS	20	18	10	10.5	180	110	C
7801914	SF-M12SS25-90CS	25	23	12	12.5	170	90	C
7801915	SF-M12SS25-140CS	25	23	12	12.5	220	140	C
7801916	SF-M16SS32-120CS	32	28	16	17	220	120	C
7801917	SF-M16SS32-190CS	32	28	16	17	290	190	C

C=标准库存品 C=Standard stock item.

OSG Phoenix

Information

Phoenix 刀具系列使用的都是不会对环境造成负担的再生塑料制造的包装盒。

The Phoenix packaging is environmentally friendly as it uses a case made of recycled plastic.

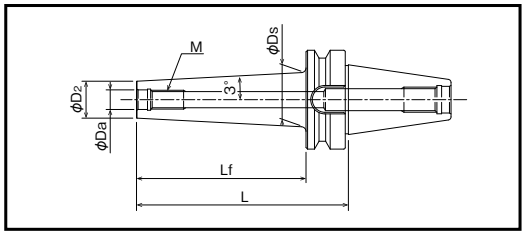
Phoenix

刀盘交换式直柄型
Straight arbor for screw-fit tools

OP-SFA

Specification Chart

■形状尺寸表 Specification Chart



BT NEW

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	颈径 D2	螺纹尺寸 M	装取直径 Da	全长 L	颈长 Lf	柄径 Ds	库存 Stock
7802500	BT30-SFA 8-45	14.5	8	8.5	45	23	16	※
7802501	BT30-SFA 8-85	14.5	8	8.5	85	63	21.1	※
7802502	BT30-SFA10-45	18.5	10	10.5	45	23	20	※
7802503	BT30-SFA10-85	18.5	10	10.5	85	63	25.1	※
7802504	BT30-SFA12-45	23.5	12	12.5	45	23	25	※
7802505	BT30-SFA12-85	23.5	12	12.5	85	63	30.1	※
7802506	BT30-SFA16-45	29	16	17	45	23	32	※
7802507	BT30-SFA16-85	29	16	17	85	63	32	※
7802508	BT40-SFA 8-45	14.5	8	8.5	45	18	16	※
7802509	BT40-SFA 8-85	14.5	8	8.5	85	58	20.5	※
7802510	BT40-SFA10-45	18.5	10	10.5	45	18	20	※
7802511	BT40-SFA10-85	18.5	10	10.5	85	58	24.5	※
7802512	BT40-SFA12-45	23.5	12	12.5	45	18	25	※
7802513	BT40-SFA12-85	23.5	12	12.5	85	58	29.5	※
7802514	BT40-SFA12-135	23.5	12	12.5	135	108	34.8	※
7802515	BT40-SFA16-45	29	16	17	45	18	32	※
7802516	BT40-SFA16-85	29	16	17	85	58	35	※
7802517	BT40-SFA16-135	29	16	17	135	108	40.3	※
7802518	BT50-SFA 8- 85	14.5	8	8.5	85	50	19.4	※
7802519	BT50-SFA 8-135	14.5	8	8.5	135	100	24.6	※
7802520	BT50-SFA10- 85	18.5	10	10.5	85	50	20	※
7802521	BT50-SFA10-135	18.5	10	10.5	135	100	28.6	※
7802522	BT50-SFA12- 85	23.5	12	12.5	85	50	25	※
7802523	BT50-SFA12-135	23.5	12	12.5	135	100	33.6	※
7802524	BT50-SFA12-185	23.5	12	12.5	185	150	38.9	※
7802525	BT50-SFA12-250	23.5	12	12.5	250	221	45.7	※
7802526	BT50-SFA12-300	23.5	12	12.5	300	271	50.9	※
7802527	BT50-SFA16- 85	29	16	17	85	50	32	※
7802528	BT50-SFA16-135	29	16	17	135	106	39.1	※
7802529	BT50-SFA16-185	29	16	17	185	156	44.4	※
7802530	BT50-SFA16-250	29	16	17	250	221	51.2	※
7802531	BT50-SFA16-300	29	16	17	300	271	56.4	※

※＝更多信息请咨询我司营业人员。 ※=Please contact our sales department for lead time.

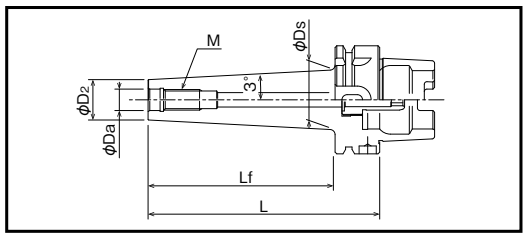
Phoenix

刀盘交换式直柄型
Straight arbor for screw-fit tools

OP-SFA

Specification Chart

■形状尺寸表 Specification Chart



HSK NEW

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	颈径 D2	螺纹尺寸 M	装取直径 Da	全长 L	颈长 Lf	柄径 Ds	库存 Stock
7802550	A 63-SFA 8-45	14.5	8	8.5	45	19	16	※
7802551	A 63-SFA 8-85	14.5	8	8.5	85	59	20.6	※
7802552	A 63-SFA10-60	18.5	10	10.5	60	34	20	※
7802553	A 63-SFA10-85	18.5	10	10.5	85	59	24.6	※
7802554	A 63-SFA12-60	23.5	12	12.5	60	34	25	※
7802555	A 63-SFA12-85	23.5	12	12.5	85	59	29.6	※
7802556	A 63-SFA12-135	23.5	12	12.5	135	109	34.9	※
7802557	A 63-SFA16-60	29	16	17	60	34	32	※
7802558	A 63-SFA16-85	29	16	17	85	59	32	※
7802559	A 63-SFA16-135	29	16	17	135	109	40.4	※
7802560	A100-SFA 8- 85	14.5	8	8.5	85	50	19.7	※
7802561	A100-SFA 8-135	14.5	8	8.5	135	100	24.9	※
7802562	A100-SFA10-85	18.5	10	10.5	85	50	23.7	※
7802563	A100-SFA10-135	18.5	10	10.5	135	100	28.9	※
7802564	A100-SFA12- 85	23.5	12	12.5	85	50	28.7	※
7802565	A100-SFA12-135	23.5	12	12.5	135	100	33.9	※
7802566	A100-SFA12-185	23.5	12	12.5	185	150	39.2	※
7802567	A100-SFA12-250	23.5	12	12.5	250	221	46.6	※
7802568	A100-SFA12-300	23.5	12	12.5	300	271	51.9	※
7802569	A100-SFA16- 85	29	16	17	85	50	34.2	※
7802570	A100-SFA16-135	29	16	17	135	106	40.1	※
7802571	A100-SFA16-185	29	16	17	185	156	45.3	※
7802572	A100-SFA16-250	29	16	17	250	221	52.1	※
7802573	A100-SFA16-300	29	16	17	300	271	57.4	※

※=更多信息请咨询我司营业人员。 ※=Please contact our sales department for lead time.

Phoenix PXM

可交换刀头式铣刀
Phoenix Replaceable Head End Mill

Phoenix Exchangeable Milling

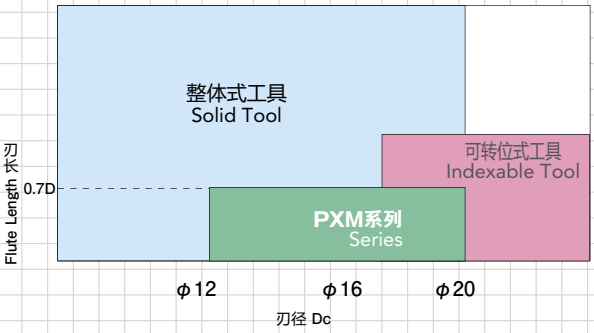
(PAT.P.)

- 采用双面束缚，确保振动精度和连结强度
- 采用锯齿螺纹，装卸都很容易
- 缩短交换工具的时间（可以在机床上交换）
- 刀头与柄部的组合，可以产生多种刀形变化
- 运用OSG整体式硬质合金铣刀的设计经验，能对应多种加工形态的各种刃型

・Held at two surfaces to ensure runout precision and strength.
・Provided with buttless screws to facilitate coupling.
・Shortened tool replacement time. (Replaceable on machine)
・Numerous variations are possible by combining different heads and bodies.
・The lineup of cutter forms, which is backed by OSG's experience with carbide solid end mills, supports various types of milling.

端面采用双面束缚，确保高刚性及高精度。
Held at two surfaces, the end face and the taper, to ensure a high level of rigidity and precision.

精度：振动0.015mm以下、　轴方向±0.03mm
Precision Runout Under　Axial



与整体式刀具的对比
Compared to solid tools

在大径方面很具性价比。只需交换头部即可，可缩短换刀时间。
The large diameter offers cost advantages. To reduce the tool changing time, only the cutter tip needs to be replaced.

与可转位式刀具的对比
Compared to indexable tools

由于刃数优势，提高了生产性。刃尖的自由度。初期成本、运转成本上有很大优势。
It provides flute quantity advantages to improve productivity, as well as a selection of cutter tips. It offers additional advantages in terms of initial costs and running costs.

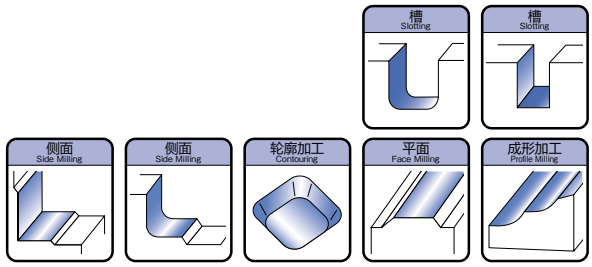
PXSE	不等分割 4刃 平头型，圆弧角形 Unequal Spancing Four flutes Square Type・Corner Radius Type	作为通用工具使用，从槽加工到侧面加工，可以进行重切削。 As a general-purpose tool, it can be used for heavy cutting from grooves to side faces.
PXSM	不等分割 多刃 平头型，圆弧角形 Unequal Spancing Multiple flutes Square Type・Corner Radius Type	作为通用工具使用，能利用多刃优势进行加工。 As a general-purpose tool, it can bring the advantages of multiple cutters into full play.
PXRE	直刃 圆弧角形 Straight flute Corner Radius Type	可针对高硬度材料加工。 It can mill high hardness materials.
PXBE	3刃 球头型 Three flutes Ball Type	可进行高效率粗加工。 It can perform highly efficient roughing.
PXBM	多刃 球头型 Multiple flutes Ball Type	可进行中粗加工及精加工。 It can be used for intermediate-finish and finish milling.

Phoenix

可交换刀头式铣刀 平头· 圆弧角形

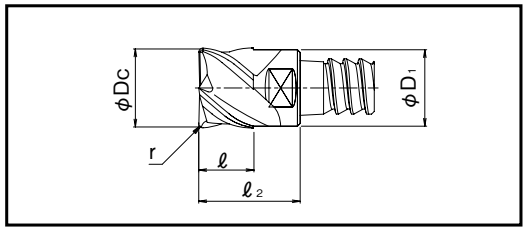
Replaceable Head End Mill Square Type・Corner Radius Type

PXM PXSE



Specification Chart

■形状尺寸表 Specification Chart



PXSE 不等分割 4刃 平头·圆弧角形 Unequal Spancing Four flutes Square Type・Corner Radius Type

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 Dc	圆弧半径 r	刃数 Z	刃长 ℓ	全长 ℓ2	颈径 D1	螺旋角 Helix Angle	材质 Grades	库存 Stock
7830004	PXSE120C12-04R000	12	0	4	8.4	14.4	11.7	38	XP3225	C
※	PXSE120C12-04R005	12	0.5	4	8.4	14.4	11.7	38	XP3225	※
7830006	PXSE120C12-04R010	12	1	4	8.4	14.4	11.7	38	XP3225	C
※	PXSE120C12-04R020	12	2	4	8.4	14.4	11.7	38	XP3225	※
※	PXSE120C12-04R030	12	3	4	8.4	14.4	11.7	38	XP3225	※
7830009	PXSE160C16-04R000	16	0	4	11.2	18.7	15.7	38	XP3225	C
7830010	PXSE160C16-04R005	16	0.5	4	11.2	18.7	15.7	38	XP3225	C
7830011	PXSE160C16-04R010	16	1	4	11.2	18.7	15.7	38	XP3225	C
※	PXSE160C16-04R015	16	1.5	4	11.2	18.7	15.7	38	XP3225	※
※	PXSE160C16-04R020	16	2	4	11.2	18.7	15.7	38	XP3225	※
※	PXSE160C16-04R030	16	3	4	11.2	18.7	15.7	38	XP3225	※
7830015	PXSE200C20-04R000	20	0	4	14	21.5	19.6	38	XP3225	C
※	PXSE200C20-04R005	20	0.5	4	14	21.5	19.6	38	XP3225	※
7830017	PXSE200C20-04R010	20	1	4	14	21.5	19.6	38	XP3225	C
※	PXSE200C20-04R020	20	2	4	14	21.5	19.6	38	XP3225	※
※	PXSE200C20-04R030	20	3	4	14	21.5	19.6	38	XP3225	※

C=标准在库存品 C=Standard stock item.

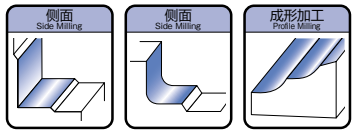
※=更多信息请咨询我司营业人员。 ※=Please contact our sales staff for more information.

Phoenix

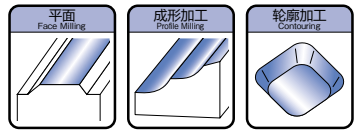
可交换刀头式铣刀
平头·圆弧角形/圆弧角型
Replaceable Head End Mill Square Type・Corner Radius Type / Corner Radius Type

PXM PXSM/PXRE

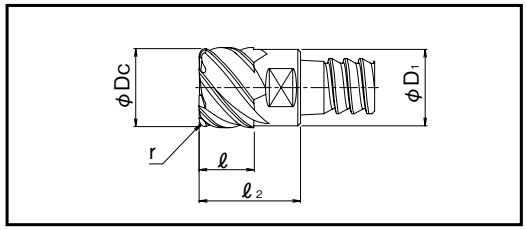
PXSM



PXRE



Specification Chart



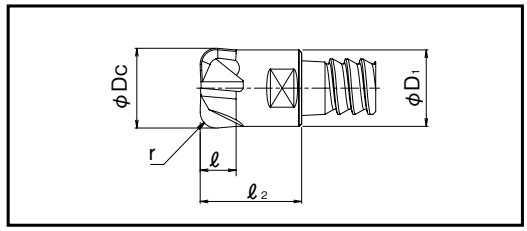
■形状尺寸表 Specification Chart

PXSM 不等分割 多刃 平头·圆弧角形 Unequal Spancing Multiple flutes Square Type・Corner Radius Type

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 Dc	圆弧半径 r	刃数 Z	刃长 ℓ	全长 ℓ2	颈径 D1	螺旋角 Helix Angle	材质 Inserts Grades	库存 Stock
※	PXSM120C12-06R000	12	0	6	8.4	14.4	11.7	38	XP3225	※
※	PXSM120C12-06R005	12	0.5	6	8.4	14.4	11.7	38	XP3225	※
※	PXSM120C12-06R010	12	1	6	8.4	14.4	11.7	38	XP3225	※
※	PXSM120C12-06R020	12	2	6	8.4	14.4	11.7	38	XP3225	※
※	PXSM120C12-06R030	12	3	6	8.4	14.4	11.7	38	XP3225	※
7830109	PXSM160C16-06R000	16	0	6	11.2	18.7	15.7	38	XP3225	C
7830110	PXSM160C16-06R005	16	0.5	6	11.2	18.7	15.7	38	XP3225	C
7830111	PXSM160C16-06R010	16	1	6	11.2	18.7	15.7	38	XP3225	C
※	PXSM160C16-06R015	16	1.5	6	11.2	18.7	15.7	38	XP3225	※
※	PXSM160C16-06R020	16	2	6	11.2	18.7	15.7	38	XP3225	※
※	PXSM160C16-06R030	16	3	6	11.2	18.7	15.7	38	XP3225	※
7830115	PXSM160C16-08R000	16	0	8	11.2	18.7	15.7	42	XP3225	C
※	PXSM160C16-08R005	16	0.5	8	11.2	18.7	15.7	42	XP3225	※
7830117	PXSM160C16-08R010	16	1	8	11.2	18.7	15.7	42	XP3225	C
※	PXSM160C16-08R015	16	1.5	8	11.2	18.7	15.7	42	XP3225	※
※	PXSM160C16-08R020	16	2	8	11.2	18.7	15.7	42	XP3225	※
※	PXSM160C16-08R030	16	3	8	11.2	18.7	15.7	42	XP3225	※
7830121	PXSM200C20-10R000	20	0	10	14	21.5	19.6	42	XP3225	C
※	PXSM200C20-10R005	20	0.5	10	14	21.5	19.6	42	XP3225	※
7830123	PXSM200C20-10R010	20	1	10	14	21.5	19.6	42	XP3225	C
※	PXSM200C20-10R020	20	2	10	14	21.5	19.6	42	XP3225	※
※	PXSM200C20-10R030	20	3	10	14	21.5	19.6	42	XP3225	※

C=标准库存品 C=Standard stock item.
※=更多信息请咨询我司营业人员。 ※=Please contact our sales staff for more information.



PXRE 直刃 螺旋角形 Straight flute Corner Radius Type

单位:mm Unit:mm

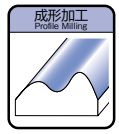
商品号 EDP No.	名称 Designation	外径 Dc	圆弧半径 r	刃数 Z	刃长 ℓ	全长 ℓ2	颈径 D1	螺旋角 Helix Angle	材质 Inserts Grades	库存 Stock
7830201	PXRE120C12-04R020	12	2	4	5	14.4	11.7	—	XP6305	C
7830202	PXRE160C16-06R030	16	3	6	7	18.7	15.7	—	XP6305	C
7830203	PXRE200C20-06R030	20	3	6	10	21.5	19.6	—	XP6305	C

C=标准库存品 C=Standard stock item.

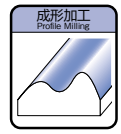
可交换刀头式铣刀 球头型
Replaceable Head End Mill Ball Type

PXM PXBE/PXBM

PXBE

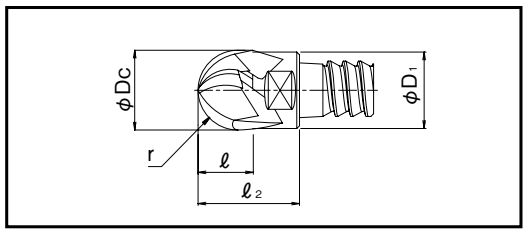


PXBM



Specification Chart

■形状尺寸表 Specification Chart

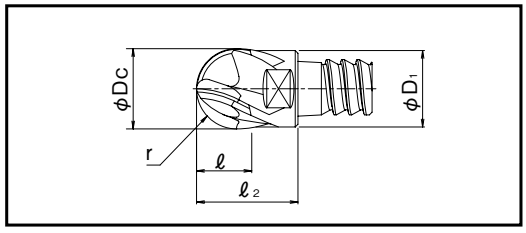


PXBE 3刃 球头形 Three flutes Ball Type

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 Dc	球半径 r	刃数 Z	刃长 ℓ	全长 ℓ2	颈径 D1	螺旋角 Helix Angle	材质 Inserts Grades	库存 Stock
7830251	PXBE120C12-03R060	12	6	3	8.4	14.4	11.7	45	XP3320	C
7830252	PXBE160C16-03R080	16	8	3	11.2	18.7	15.7	45	XP3320	C
7830253	PXBE200C20-03R100	20	10	3	14	21.5	19.6	45	XP3320	C

C=标准库存品 C=Standard stock item.



PXBM 多刃 球头形 Multiple flutes Ball Type

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 Dc	球半径 r	刃数 Z	刃长 ℓ	全长 ℓ2	颈径 D1	螺旋角 Helix Angle	材质 Inserts Grades	库存 Stock
7830301	PXBM120C12-04R060	12	6	4	8.4	14.4	11.7	45	XP3320	C
7830302	PXBM160C16-06R080	16	8	6	11.2	18.7	15.7	45	XP3320	C
7830303	PXBM200C20-06R100	20	10	6	14	21.5	19.6	45	XP3320	C

C=标准库存品 C=Standard stock item.

Phoenix

刀头交换式铣刀用刀柄
Arbor for Replaceable Head End Mill

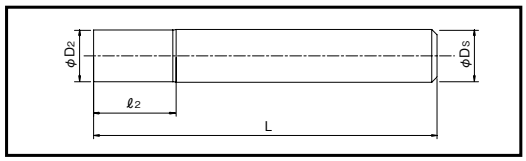
PXMZ

Specification Chart

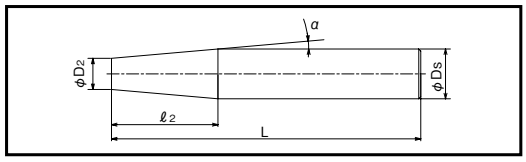
■形状尺寸表 Specification Chart

钢制刀体 Arbor with steel shank

Type 1



Type 2

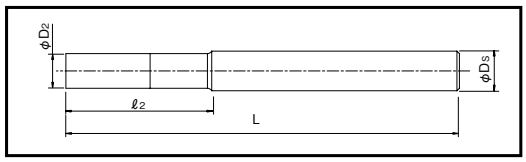


单位:mm Unit:mm

商品号 EDP No.	名称 Designation	适用刀头外径 Proper head diameter	颈径 D2	柄径 Ds	角度 α°	全长 L	颈长 ℓ2	形状 Type	库存 Stock
7801801	PXMZ-C12SS12-S100	12	11.7	12	0°	100	19	1	C
7801821	PXMZ-C12TP20-S145	12	11.7	20	5°	145	47.4	2	C
7801802	PXMZ-C16SS16-S100	16	15.7	16	0°	100	23.4	1	C
7801822	PXMZ-C16TP25-S155	16	15.7	25	5°	155	53.1	2	C
7801803	PXMZ-C20SS20-S120	20	19.6	20	0°	120	28.8	1	C
7801823	PXMZ-C20TP32-S170	20	19.6	32	5°	170	70.8	2	C

C=标准库存品 C=Standard stock item.

Type 1



硬质合金刀体 Arbor with carbide shank

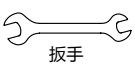
单位:mm Unit:mm

商品号 EDP No.	名称 Designation	适用刀头外径 Proper head diameter	颈径 D2	柄径 Ds	角度 α°	全长 L	颈长 ℓ2	形状 Type	库存 Stock
7801811	PXMZ-C12SS12-L100CS	12	11.7	12	0°	100	46.3	1	C
7801812	PXMZ-C16SS16-L130CS	16	15.7	16	0°	130	62	1	C
7801813	PXMZ-C20SS20-L150CS	20	19.6	20	0°	150	79.3	1	C

C=标准库存品 C=Standard stock item.

Accessories

■零件 Accessories

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀头外径 Proper head diameter	连接扭矩 Recommended tightening torque
 扳手 Spanner	7801890	C	PXMP8-10	φ12	12Nm
	7801891	C	PXMP13-16	φ16	30Nm
				φ20	50Nm

C=标准库存品 C=Standard stock item.

PXM专用扳手请另购。
A spanner dedicated for PXM. Please purchase the spanner separately from the cutter.

1.装夹刀头时，请锁紧至端面完全接触为止。
2.锁紧扭力请参看左表。
1.Please refer to Page 64 for cautions during use.
2.Refer to the table above for tightening torque.

Recommended Conditions

■切削条件基准表 Recommended Conditions

PXSE 侧面切削 SIDE MILLING

单位:mm Unit:mm

加工材料 WORK MATERIAL	一般构造用钢·炭素钢·铸铁 MILD STEELS· CARBON STEELS· CAST IRON SS400、S55C、FC250 (～750N/mm²)		合金钢·工具钢 ALLOY STEELS TOOL STEELS SCM、SKT、SKS、SKD (～30HRC)		不锈钢·调质钢 STAINLESS STEELS HARDENED STEELS SUS304、SKD (～45HRC)		调质钢·钛合金 HARDENED STEELS TITANIUM ALLOY STEELS (45～55HRC)		超耐热合金钢 镍合金® HEAT STEELS INCONEL®	
名称 MILL DIA. (mm)	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	3,180	760	2,650	640	1,700	400	1,700	350	650	100
16	2,390	570	1,950	470	1,250	300	1,250	250	500	80
20	1,910	460	1,550	370	1,000	250	1,000	200	400	65
切削速度 DEPTH OF CUT		ap 0.5Dc		ae 0.15Dc		ap 0.5Dc / ae 0.1Dc		ap 0.5Dc / ae 0.05Dc		ap 0.5Dc / ae 0.05Dc

PXSE 槽切削 SLOTTING

单位:mm Unit:mm

加工材料 WORK MATERIAL	一般构造用钢·炭素钢·铸铁 MILD STEELS· CARBON STEELS· CAST IRON SS400、S55C、FC250 (～750N/mm²)		合金钢·工具钢 ALLOY STEELS TOOL STEELS SCM、SKT、SKS、SKD (～30HRC)		不锈钢·调质钢 STAINLESS STEELS HARDENED STEELS SUS304、SKD (～45HRC)		调质钢·钛合金 HARDENED STEELS TITANIUM ALLOY STEELS (45～55HRC)		超耐热合金钢 镍合金® HEAT STEELS INCONEL®	
名称 MILL DIA. (mm)	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	2,500	500	1,550	300	1,300	250	1,300	250	650	100
16	1,850	350	1,150	250	1,000	200	1,000	200	500	80
20	1,500	300	950	200	750	160	750	160	400	65
切削速度 DEPTH OF CUT	ap ≦0.35Dc				ap ≦0.3Dc		ap ≦0.2Dc		ap ≦0.1Dc	

PXSM 侧面切削 SIDE MILLING

单位:mm Unit:mm

加工材料 WORK MATERIAL	一般构造用钢·炭素钢·铸铁 MILD STEELS· CARBON STEELS· CAST IRON SS400、S55C、FC250 (～750N/mm²)		合金钢·工具钢 ALLOY STEELS TOOL STEELS SCM、SKT、SKS、SKD (～30HRC)		不锈钢·调质钢 STAINLESS STEELS· HARDENED STEELS SUS304、SKD (～45HRC)		调质钢·钛合金 HARDENED STEELS· TITANIUM ALLOY STEELS (45～55HRC)		超耐热合金钢 镍合金® HEAT STEELS· INCONEL®	
名称 MILL DIA. (mm)	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	4,750	1,750	3,950	1,150	3,150	950	2,650	800	1,550	350
16-6F	3,550	1,310	2,950	860	2,350	710	1,950	600	1,150	260
16-8F	3,550	1,750	2,950	1,150	2,350	950	1,950	800	1,150	350
20	2,850	1,750	2,350	1,150	1,900	950	1,550	800	950	350
切削速度 DEPTH OF CUT		ap ≦0.5Dc		ae ≦0.05Dc		ap ≦0.5Dc / ae ≦0.02Dc		ap ≦0.3Dc		ae ≦0.02Dc

1. 请使用刚性好、精度高的设备和家具。
2. 请根据切深量、机械钢性等使用状况调整转速及进给速度。
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.

Phoenix

刀头交换式铣刀
Replaceable Head End Mill

PXM PXRE/PXBE/PXBM

Recommended Conditions

■切削条件基准表 Recommended Conditions

PXRE

单位:mm Unit:mm

加工材料 WORK MATERIAL	一般构造用钢·炭素钢·铸铁 MILD STEELS· CARBON STEELS· CAST IRON SS400、S55C、FC250 (～750N/mm²)		合金钢·工具钢 ALLOY STEELS TOOL STEELS SCM、SKT、SKS、SKD (～30HRC)		调质钢(38～45HRC) 不锈钢·预硬钢 HARDENED STEELS PREHARDENED STEELS SKD、NAK80、HPM50		调质钢 HARDENED STEELS (45～55HRC)		调质钢 HARDENED STEELS (55～60HRC)	
名称 MILL DIA. (mm)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)
12	5,800	10,600	4,000	6,500	3,200	4,900	2,700	3,300	2,300	2,200
16	4,000	11,900	3,000	7,700	2,400	5,900	2,000	3,900	1,700	2,700
20	3,200	9,550	2,400	6,500	1,900	4,900	1,600	3,300	1,400	2,200
切削深度 DEPTH OF CUT				ap: 0.1×圆弧半径(r) Corner R size		ae: 0.3Dc				ap: 0.1×圆弧半径(r) Corner R size / ae: 0.3Dc

PXBE

加工路径以等高线加工为前提。 The work path sets the basic premise for the contouring process.

单位:mm Unit:mm

加工材料 WORK MATERIAL	一般构造用钢·炭素钢·铸铁 MILD STEELS· CARBON STEELS· CAST IRON SS400、S55C、FC250 (～750N/mm²)		合金钢·工具钢 ALLOY STEELS TOOL STEELS SCM、SKT、SKS、SKD (～30HRC)		不锈钢·调质钢 STAINLESS STEELS HARDENED STEELS SUS304、SKD (～45HRC)		调质钢·钛合金 HARDENED STEELS TITANIUM ALLOY STEELS (45～55HRC)		调质钢 HARDENED STEELS (55～60HRC)	
名称 MILL DIA. (mm)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)
12	6,600	2,950	6,600	2,950	5,300	1,900	3,950	1,150	2,600	400
16	4,950	2,250	4,950	2,250	3,950	1,450	2,950	900	1,900	300
20	3,950	1,750	3,950	1,750	3,150	1,150	2,350	750	1,600	250
切削深度 DEPTH OF CUT			Dc: ø12 / ø16, ø20; ap: 0.07Dc / 0.05Dc; Pf: 0.15Dc; apMax=1mm以下				Dc: ø12 / ø16, ø20; ap: 0.05Dc / 0.03Dc; Pf: 0.1Dc; apMax=0.8mm以下		ap: 0.03Dc; Pf: 0.05Dc; apMax=0.5mm以下	

PXBM

加工路径以等高线加工为前提。 The work path sets the basic premise for the contouring process.

单位:mm Unit:mm

加工材料 WORK MATERIAL	一般构造用钢·炭素钢·铸铁 MILD STEELS· CARBON STEELS· CAST IRON SS400、S55C、FC250 (～750N/mm²)		合金钢·工具钢 ALLOY STEELS TOOL STEELS SCM、SKT、SKS、SKD (～30HRC)		不锈钢·调质钢 STAINLESS STEELS HARDENED STEELS SUS304、SKD (～45HRC)		调质钢·钛合金 HARDENED STEELS TITANIUM ALLOY STEELS (45～55HRC)		调质钢 HARDENED STEELS (55～60HRC)	
名称 MILL DIA. (mm)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)	回转转速 SPEED (min^{-1})	进给速度 FEED (mm/min)
12	6,600	3,900	6,600	3,900	5,300	2,500	3,950	1,500	2,600	550
16	4,950	4,500	4,950	4,500	3,950	2,900	2,950	1,800	1,900	600
20	3,950	3,500	3,950	3,500	3,150	2,300	2,350	1,500	1,600	500
切削深度 DEPTH OF CUT					ap: 0.02Dc	Pf: 0.05Dc				

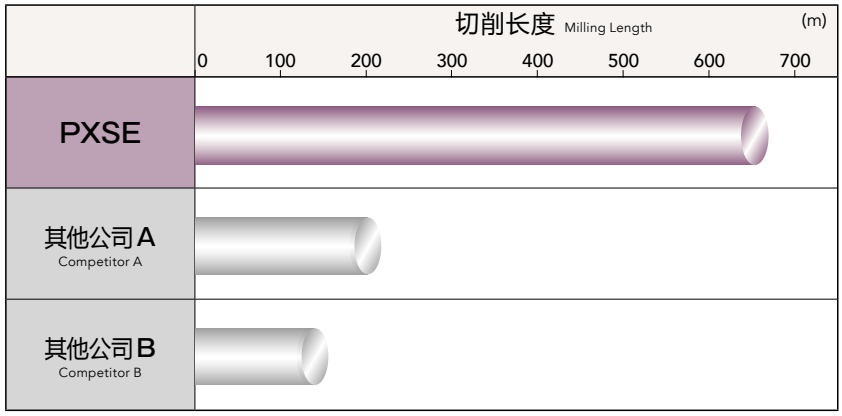
1. 请使用刚性好、精度高的设备和家具。
2. 请根据切深量、机械钢性等使用状况调整转速及进给速度。
1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.

Processing Data

■加工数据 Processing Data

SCM440侧面加工 Side milling in SCM440

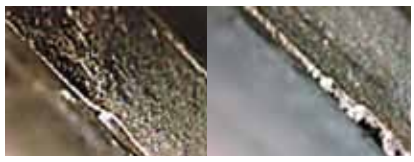
使用工具 Tool	刀头：PXSE120C12-04R000 Head 刀夹：PXMZ-C12SS12-S100 Holder
尺寸 Size	φ12
加工材料 Work Material	SCM440（180HB）
切削速度 Cutting Speed	100m/min(2,650min^{-1})
进给量 Feed	1,060mm/min(0.1mm/t)
切削方法 Milling Method	侧面切削 Side Milling
切削深度 Depth of Cut	ap=5mm ae=3mm
切削油剂 Coolant	气冷式 Air Blow
使用机械 Machine	立式加工中心(BT40) Vertical Machining Center



与其他公司产品相比，无可比拟的刀具寿命。可以进行重切削加工。

Durability that overwhelms the competitor's product. Heavy machining is possible.

PXSE (619m)

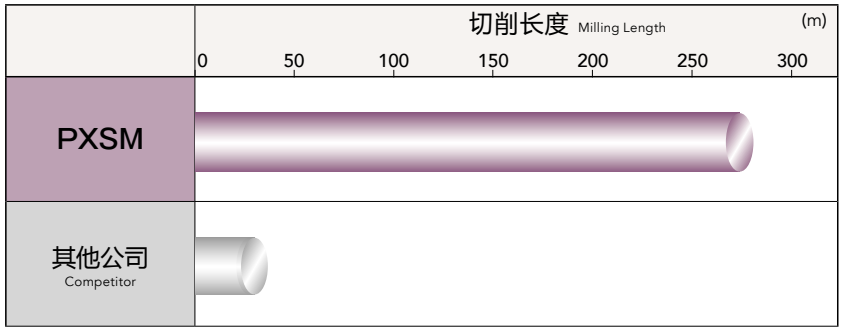


其他公司A(178m) Competitor A

其他公司B(117m) Competitor B

S50C侧面加工 Side milling in S50C

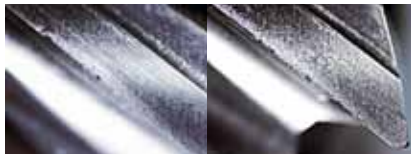
使用工具 Tool	刀头：PXSM160C16-06R000 Head 刀夹：PXMZ-C16SS-S100 Holder
尺寸 Size	φ16
加工材料 Work Material	S50C
切削速度 Cutting Speed	100m/min(1,990min^{-1})
进给速度 Feed	1,195mm/min(0.1mm/t)
切削方法 Milling Method	侧面切削 Side Milling
切削深度 Depth of Cut	ap=8mm ae=1.6mm
切削油剂 Coolant	气冷式 Air Blow
使用设备 Machine	卧式加工中心(BT40) Horizontal Machining Center



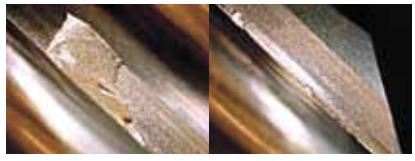
PXSM的独特形状，可以实现稳定的加工。

Unique design of PXSM gives stable machining.

PXSM (294m)



其他公司(42m) Competitor



Processing Data

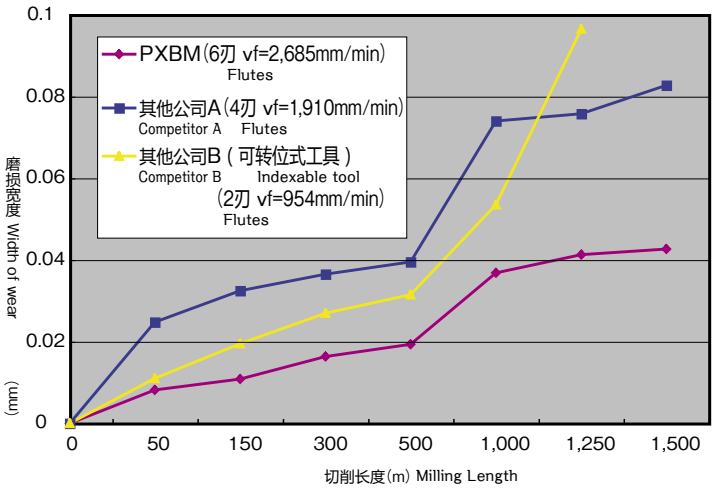
■加工数据 Processing Data

NAK80的斜面加工(进给率相同下的比较) NAK80 machining at slop face (comparison with the same feed rate)

使用工具 Tool	刀头：PXBM160C16-06R080 Head 刀夹：PXMZ-C16SS16-S100 Holder
尺寸 Size	φ16
加工材料 Work Material	NAK80(40HRC)
切削速度 Cutting Speed	200m/min(3,980min^{-1})
每刃进给量 Feed Per Tooth	0.12mm/t
切削方法 Milling Method	底面加工 Pick Milling
切削深度 Depth of Cut	ap=0.32mm Pf=0.8mm
切削油剂 Coolant	气冷式 Air Blow
使用设备 Machine	卧式加工中心(BT50) Horizontal Machining Center

刃数多，提高加工效率。并可实现优异的刀具寿命。

Materialized by more cutting edges for better productivity, longer tool life with superb durability.



PXBM(1,500m)

其他公司产品A(1,500m) Competitor A

其他公司产品B 可转位式工具 (1,250m) Competitor B Indexable tool

由于多刃化，加工效率提高1.8倍 ～模具中精加工～ The multiple edge design helps increase efficiency by 1.8 times in die mold roughing processes.

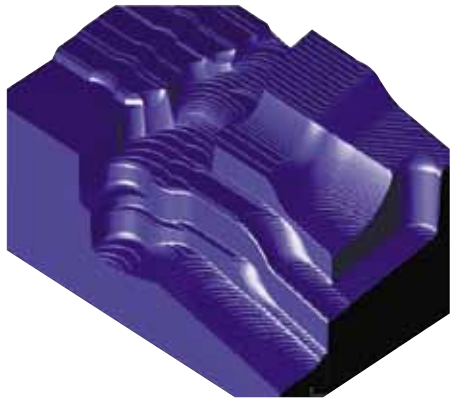
使用工具 Tool	刀头：PXRE200C20-06R030 Head 刀夹：PXMZ-C20SS20-S120 Holder	其他公司高进给圆弧角刀具 Competitor High Feed Radius Cutter
尺寸 Size	φ20×R3 6刃 Flutes	φ20×R3 2刃 Flutes
材质 Grades	XP6305	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	SKD61（43HRC）	
切削速度 Cutting Speed	230m/min(3,700min^{-1})	120m/min(1,900min^{-1})
进给速度 Feed	6,700mm/min(0.3mm/t)	3,100mm/min(0.8mm/t)
切削深度 Depth of Cut	0.4mm	0.5mm
切削宽度 Width of Cut	10mm	
切削油剂 Coolant	气冷式 Air Blow	
使用设备 Machine	卧式加工中心(BT50) Horizontal Machining Center	

在使用高进给圆弧角刀具粗加工时，在编写程序时会输入R值，这导致加工时产生很大残余量。而PXRE的圆弧角R是高精度，其残余量很少，在进行后续加工时，加工负荷稳定，工具寿命以及加工精度都提高了。

With high feed radius cutters, a simulated R value is inputted in the program during rough milling, resulting in large amounts of uncut areas. In contrast, with the high precision Corner R form PXRE, there are fewer uncut areas, which reduce the load of the next process, thereby increasing tool life and the precision of cut.

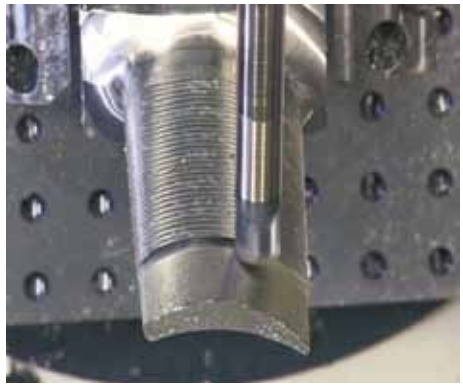
替代粗加工用的高进给刀具使用PXRE，可以提高加工效率1.8倍

By replacing the high feed radius cutter with the PXRE, milling efficiency can be increased by 1.8 times



由于多刃化，加工效率提高2倍　～涡轮叶片加工～ The multiple edge design helps double efficiency in the milling of blades.

使用工具 Tool	刀头：PXSM160C16-06R005 Head 刀夹：PXMZ-C16SS16-L130CS Holder	其它公司的圆弧角铣刀 Competitor Radius Cutter
尺寸 Size	φ16×R0.5　6刃 Flutes	φ16×R2.5　2刃 Flutes
材质 Grades	XP3225	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	13Cr相当品 Equivalent	
切削速度 Cutting Speed	125m/min(2,500min^{-1})	
进给速度 Feed	690mm/min(0.046mm/t)	350mm/min(0.07mm/t)
切削深度 Depth of Cut	ap=1mm　ae=0.25mm	
切削油剂 Coolant	气冷式 Air Blow	
使用设备 Machine	立式5轴加工中心 5-Axis Vertical Machining Center	



进行很难提高参数的精加工时，替代圆弧角铣刀使用PXSM，效率能提高2倍

In finishing operations with settings that are difficult to modify, switching to the Phoenix Radius Cutter can double milling efficiency

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.

②暂锁 Initial Tightening

手动锁紧

Tighten by hand

③最终锁紧

Final Tightening

使用专用扳手锁紧

Tighten with a spanner wrench

④确认

Confirmation

确认有否空隙

Confirm that there is no gap

注意事项 Cautions during use

·请使用专用扳手(P.59)，不能使用普通扳手。
·请锁紧到刀头和刀柄的端面紧贴为止。请确认有否空隙。
·脱脂连接部分的话锁得太紧，有可能导致端面不能紧贴。
·根据刀头的切槽的形状插入扳手，往回转方向慢慢锁紧。

· Only use the spanner wrenches that are designed specifically for the PXM (P. 59). Please do not use alternative spanner wrenches sold on the market as a replacement.
· 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.

» Phoenix PHP

钻头系列
Phoenix Drill Series

Phoenix High Performance drill

■PHP 独特的形状，能应对各种加工形态。

Unique PHP design supports many types of machining

■刀片的排列 Insert arrangement

·可减少吃入抵抗的先端角形状
Point angle shape reduces bite resistance

·可实现高效率加工的平衡排列
Balanced arrangement to achieve high efficiency machining

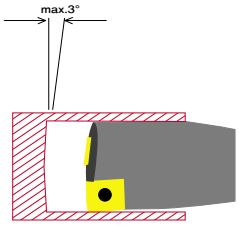
·中心、外周刃上可以使用相同刀片，易于管理
The center and the peripheral edge of the same insert can be used, simplifying insert management.

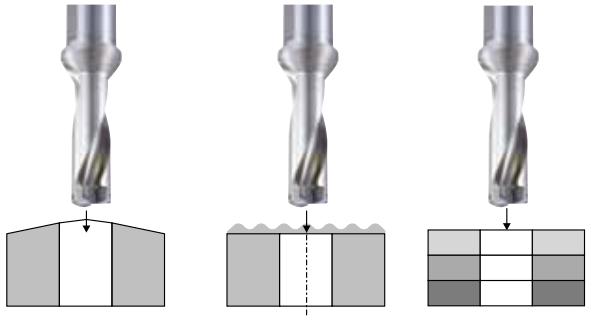
■最适合槽形 Ideal flute form

控制切屑的排出方向 Controls the flow of chips

■先端角形状，可扩大加工范围

Point angle shape increases the machining range





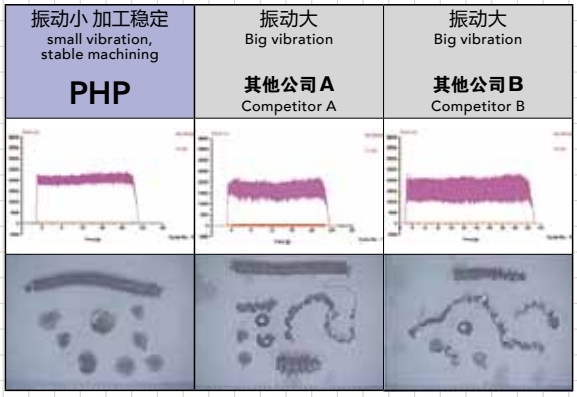
■高刚性刀体 High rigidity of body

高刚性刀体，改善刀具寿命 High rigidity improves tool durability

■稳定的扭矩

The stable torque

使用工具 Tool	PHP210FS25M07-3D
使用刀片 材质) Insert(grade)	SCMT073206-DM(XP9040)
加工材料 Work Material	S50C
切削速度 Cutting Speed	150m/min (2,275min^{-1})
进给量 Feed	341mm/min (0.15mm/rev)
切深量 Depth of Hole	50mm
切削油剂 Coolant	水溶性切削油剂（内部给油） Water Soluble(Internal)
使用机械 Machine	立式加工中心(BT50) (26kW/30kW) Horizontal Machining Center

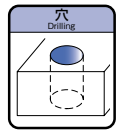


稳定的扭矩，减少对机械的负荷。
The stable torque minimizes the load imparted on the machine.

钻头
Drill

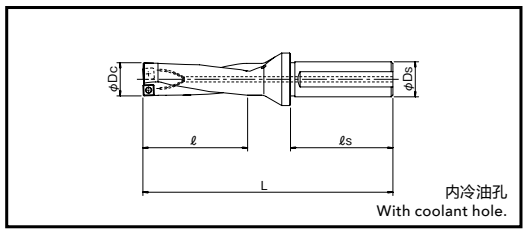
PHP

穴
Drilling



Specification Chart

■形状尺寸表 Specification Chart



单位:mm Unit:mm

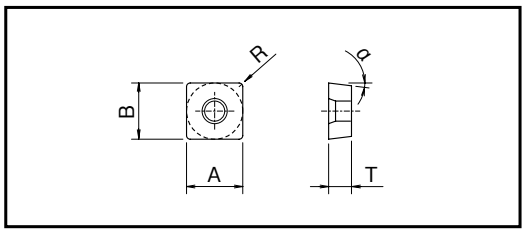
商品号 EDP No.	名称 Designation	外径 Dc	全长 L	槽长 ℓ	柄径 Ds	柄长 ℓs	适用刀片 Applicable Inserts	库存 Stock
7800100	PHP140FS20M04-3D	14	116	42	20	50	①	C
7800101	PHP145FS20M04-3D	14.5	119	45	20	50		C
7800102	PHP150FS20M04-3D	15	119	45	20	50		C
7800103	PHP155FS20M04-3D	15.5	122	48	20	50		C
7800104	PHP160FS20M04-3D	16	122	48	20	50		C
7800105	PHP165FS20M05-3D	16.5	125	51	20	50	②	C
7800106	PHP170FS20M05-3D	17	125	51	20	50		C
7800107	PHP175FS25M05-3D	17.5	134	54	25	56		C
7800108	PHP180FS25M05-3D	18	134	54	25	56		C
7800109	PHP185FS25M06-3D	18.5	137	57	25	56	③	C
7800110	PHP190FS25M06-3D	19	137	57	25	56		C
7800111	PHP195FS25M06-3D	19.5	140	60	25	56		C
7800112	PHP200FS25M06-3D	20	140	60	25	56		C
7800113	PHP205FS25M06-3D	20.5	143	63	25	56		C
7800114	PHP210FS25M07-3D	21	143	63	25	56	④	C
7800115	PHP215FS25M07-3D	21.5	146	66	25	56		C
7800116	PHP220FS25M07-3D	22	146	66	25	56		C
7800117	PHP225FS25M07-3D	22.5	149	69	25	56		C
7800118	PHP230FS25M07-3D	23	149	69	25	56		C
7800119	PHP235FS32M07-3D	23.5	156	72	32	60		C
7800120	PHP240FS32M07-3D	24	156	72	32	60		C
7800121	PHP245FS32M08-3D	24.5	159	75	32	60	⑤	C
7800122	PHP250FS32M08-3D	25	159	75	32	60		C
7800123	PHP255FS32M08-3D	25.5	162	78	32	60		C
7800124	PHP260FS32M08-3D	26	162	78	32	60		C
7800125	PHP265FS32M08-3D	26.5	165	81	32	60		C
7800126	PHP270FS32M08-3D	27	165	81	32	60		C
7800127	PHP280FS32M08-3D	28	168	84	32	60		C
7800128	PHP290FS32M10-3D	29	171	87	32	60	⑥	C
7800130	PHP300FS32M10-3D	30	179	90	32	60		C
7800131	PHP310FS32M10-3D	31	182	93	32	60		C
7800132	PHP320FS32M10-3D	32	185	96	32	60		C
7800133	PHP330FS40M10-3D	33	196	99	40	68		C
7800134	PHP340FS40M10-3D	34	199	102	40	68		C
7800135	PHP350FS40M12-3D	35	202	105	40	68	⑦	C
7800136	PHP360FS40M12-3D	36	205	108	40	68		C
7800137	PHP370FS40M12-3D	37	218	111	40	68		C
7800138	PHP380FS40M12-3D	38	221	114	40	68		C
7800139	PHP390FS40M12-3D	39	224	117	40	68		C
7800140	PHP400FS40M12-3D	40	227	120	40	68		C

C=标准库存品 C=Standard stock item.

Phoenix

钻头
Drill

PHP 刀片



Applicable Insert

■适用刀片 Applicable Insert

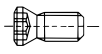
单位:mm Unit:mm

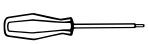
	名称 Designation	切削刃数 Number of Cutting Edges	切削直径 Applicable Cutters	刀片尺寸 Insert Size				涂层种类 Grade of Coated Materials	
				A×B	厚度 T	前角 α	R	XP9040	XC9025
①	SCMT042204-DM	4	ϕ14~16	4.8×4.8	2.2	7°	0.4	7818001	7817001
②	SCMT052404-DM	4	ϕ16.5~18	5.4×5.4	2.4	7°	0.4	7818002	7817002
③	SCMT062806-DM	4	ϕ18.5~20.5	6.2×6.2	2.8	7°	0.6	7818003	7817003
④	SCMT073206-DM	4	ϕ21~24	7.2×7.2	3.2	7°	0.6	7818004	7817004
⑤	SCMT083608-DM	4	ϕ24.5~28	8.6×8.6	3.6	7°	0.8	7818005	7817005
⑥	SCMT104208-DM	4	ϕ29~34	10×10	4.2	7°	0.8	7818006	7817006
⑦	SCMT125008-DM	4	ϕ35~40	12.3×12.3	5	7°	0.8	7818007	7817007

库存种类为C(标准库存品)
Stock are categolized in section C (Standard stock item).

Accessories

■零件 Accessories

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀片 Applicable Inserts	
 固定螺丝 Clamping Screw	7808100	C	FS18538 (Torx 6)	①	SCMT042204-DM
	7808102	C	FS20540 (Torx 6)	②	SCMT052404-DM
	7808104	C	FS22550 (Torx 7)	③	SCMT062806-DM
	7808108	C	FS25560 (Torx 8)	④	SCMT073206-DM
	7808110	C	FS30573 (Torx 8)	⑤	SCMT083608-DM
	7808111	C	FS35572 (Torx 15)	⑥	SCMT104208-DM
	7808113	C	FS45510 (Torx 20)	⑦	SCMT125008-DM

	商品号 EDP No.	库存 Stock	名称 Designation	适用刀片 Applicable Inserts			
 扳手 Wrench	7808203	C	T6-D (Torx 6)	①	SCMT042204-DM	②	SCMT052404-DM
	7808204	C	T7-D (Torx 7)	③	SCMT062806-DM		–
	7808205	C	T8-D (Torx 8)	④	SCMT073206-DM	⑤	SCMT083608-DM
	7808208	C	T15-D (Torx 15)	⑥	SCMT104208-DM		–
	7808209	C	T20-D (Torx 20)	⑦	SCMT125008-DM		–

C=标准库存品 C=Standard stock item.
扳手请另购。 Please purchase the wrench separately from the cutter.

Phoenix

钻头
Drill

PHP

■加工材料推荐
Recommended Materials by Application

◎第一推荐材料 First recommended material
○第二推荐材料 Second recommended material

刀片型号 Inserts Grades	断屑槽 Chip Breaker	切削油剂 Coolant	P	M	K	N	S
XP9040	DM	有	◎	◎		◎	○
XC9025	DM	有	○	○	◎	○	

DM:钻头中切削用
DM:Center Cutting Type Drill

Recommended Conditions

■切削条件基准表 Recommended Conditions

	加工材料 Work Material	抗损强度·硬度 Tensil Strength· Hardness	切削速度 Vc (m/min) Drilling Speed	进给量 f (mm/rev) Feed Rate			
				ø14~ø20.5	ø21~ø28	ø29~ø34	ø35~ø40
P	软钢、低炭素钢 Mild Steels、Carbon Steels (SS400、S10C)	~180HB	200 (150 ~ 250)	0.09 (0.06 ~ 0.13)	0.13 (0.1 ~ 0.18)	0.18 (0.13 ~ 0.21)	0.25 (0.2 ~ 0.27)
	炭素钢、合金钢 Carbon Steels、Alloy Steels (S50C、SCM440)	~280HB	160 (100 ~ 220)	0.09 (0.06 ~ 0.13)	0.13 (0.1 ~ 0.18)	0.18 (0.13 ~ 0.21)	0.25 (0.2 ~ 0.27)
	模具钢 Die Steels (SKD11、SKD61)	~280HB	140 (80 ~ 180)	0.08 (0.05 ~ 0.12)	0.12 (0.06 ~ 0.15)	0.14 (0.09 ~ 0.18)	0.15 (0.1 ~ 0.2)
M	不锈钢 Stainless Steels (SUS304、SUS420)	~250HB	150 (100 ~ 180)	0.08 (0.05 ~ 0.12)	0.1 (0.06 ~ 0.12)	0.15 (0.1 ~ 0.17)	0.18 (0.15 ~ 0.2)
K	铸铁 Cast Iron (FC250)	~350N/mm²	150 (100 ~ 180)	0.09 (0.06 ~ 0.13)	0.13 (0.1 ~ 0.18)	0.18 (0.13 ~ 0.21)	0.25 (0.2 ~ 0.27)
	球墨铸铁 Ductile Cast Iron (FCD400)	~800N/mm²	130 (80 ~ 150)	0.09 (0.06 ~ 0.13)	0.12 (0.08 ~ 0.16)	0.16 (0.1 ~ 0.2)	0.2 (0.15 ~ 0.25)
N	铝合金 Aluminum Alloys	~13%Si	220 (100 ~ 800)	0.09 (0.06 ~ 0.2)	0.13 (0.1 ~ 0.25)	0.18 (0.13 ~ 0.3)	0.25 (0.2 ~ 0.35)
S	耐热合金(湿式) Heat Resistant Alloys(Wet) (Inconel 718)	–	30 (15 ~ 50)	0.04 (0.02 ~ 0.06)	0.06 (0.03 ~ 0.1)	0.08 (0.04 ~ 0.12)	0.1 (0.06 ~ 0.14)
	钛热合金(湿式) Titanium Alloy(Wet) (Ti-6Al-4V)	–	60 (30 ~ 100)	0.06 (0.04 ~ 0.08)	0.08 (0.06 ~ 0.12)	0.1 (0.08 ~ 0.15)	0.12 (0.1 ~ 0.15)

1. 此切削条件基准表是基于使用水溶性切削油的加工。
2. 使使用稀释20倍以下的优质水溶性切削油。
3. 不推荐使用非水溶性切削液。
4. 此切削条件基准表适用于孔深3D以下的加工。
5. 请在装夹刀时去除刀片上的杂物或油污，装夹时请小心操作。
6. 请保持被加工材料稳定夹持，使之不会变形，弯曲及产生振动。
7. 油孔堵塞可能导致钻头折损，请务必在供油装置上使用过滤设备。

1. The indicated speeds and feeds are for water soluble oil.
2. Suitable cutting fluid is water soluble high density oil (less than 20 times dilution).
3. Using non-water soluble oil is not recommended.
4. These conditions are for drilling depth less than 3 times the drill diameter.
5. Inserts should be attached to the holder tightly in a very neat condition.
6. Fasten the work material to reduce the possibility of work deformation, deflection of machined surface, or vibration.
7. A clogged oil hole can lead to a breakage. Make sure that a filter is attached to the oil feeder.

Processing Data

■加工数据 Processing Data

Inconel718 (28HRC)的高效率加工 High efficiency machining of Inconel 718 (28HRC)

使用工具 Tool	PHP200FS25M06-3D
使用刀片(材质) Insert (grade)	SCMT062806-DM(XP9040)
加工材料 Work Material	Inconel718(28HRC)
切削速度 Cutting Speed	60m/min(955min^{-1})
进给速度 Feed	57mm/min(0.06mm/rev)
切深量 Depth of Hole	50mm (2.5D通孔) (Through)
切削油剂 Coolant	水溶性切削油剂 (内部给油) Water Soluble(Internal)
使用设备 Machine	多用途加工机 (工件旋转) Multifunction milling machine (rotating workpiece)

使用车床Inconel718(28HRC)孔加工案例。加工10孔后，PHP可将切屑细小的分断，实现稳定的加工。

While drilling holes in Inconel 718 (28HRC) on a lathe, 10 holes were completed, breaking up chips into small pieces and resulting in stable milling.

刀片磨损量照片 (加工5孔后) Photo of insert wear width (after 5 holes)

0.147mm

0.113mm

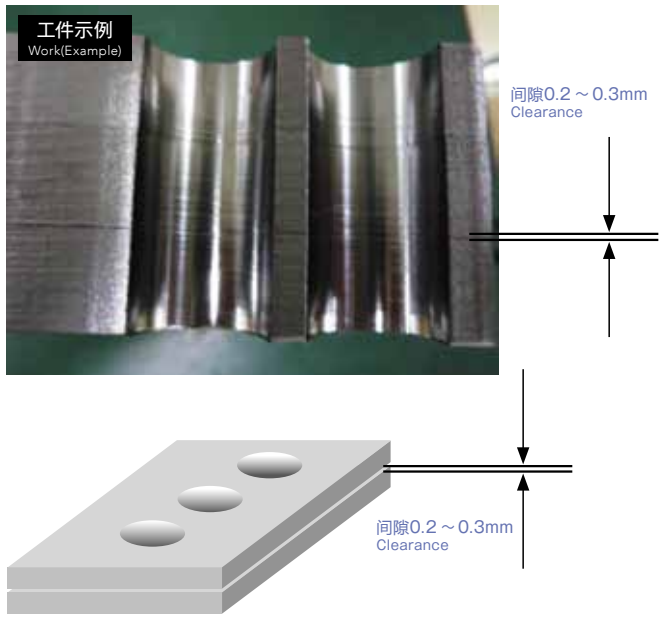
切屑 Chip

SS400的多层板加工 Stacked milling of SS400

使用工具 Tool	PHP260FS32M08-3D	其他公司(高速钢) Competitor (HSS Drill)
使用刀片(材质) Insert (grade)	SCMT083608-DM(XP9040)	—
加工材料 Work Material	SS400	
切削速度 Cutting Speed	80m/min(980min^{-1})	20m/min(245min^{-1})
进给速度 Feed	118mm/min(0.12mm/rev)	25mm/min(0.1mm/rev)
切深量 Depth of Hole	30mm (厚度20mm×10mm 通孔) (Thickness Through)	
切削油剂 Coolant	水溶性切削油剂 (外部给油) Water Soluble (External)	
使用设备 Machine	立式加工中心(BT50) Vertical Machining Center	

厚度为20mm×10mm的多层板加工案例。过去，其他公司可转位式钻头在加工多层板时经常发生刀片刀体崩刃折损。因此放弃使用可转位式钻头，而使用高速钢钻头以低速加工替代。然而PHP采用不易在过孔时发生盘状切屑的前角形状，无论有无外部供油均可稳定加工。

Stacked milling consisted of 20mm × 10mm sheets. In the past, tests using a competitor's indexable drills resulted in the frequent breakage of inserts and bodies, so we abandoned the use of indexable drills, using high-speed drills at low speeds instead. Because the tip of the PHP is shaped with an angle, it suppresses the creation of discs, allowing it to mill in a stable manner even when coolant was fed externally.

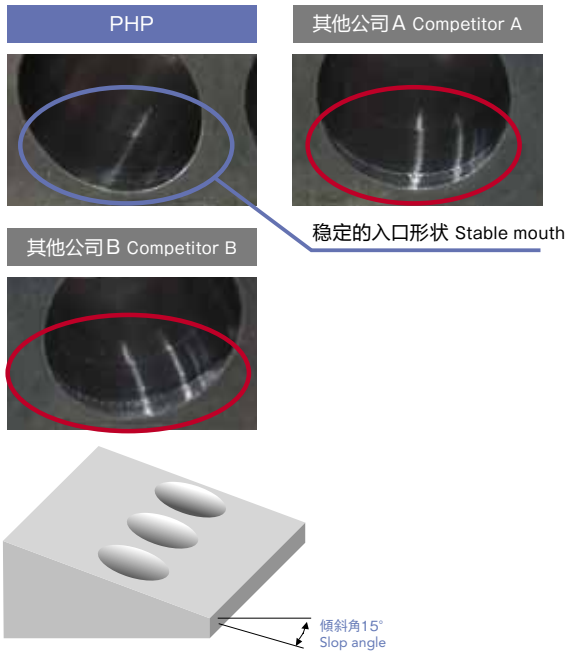


15°倾斜面的加工 Milling of a 15° inclined plane

使用工具 Tool	PHP210FS25M07-3D	其他公司A、B Competitor A.B
使用刀片(材质) Insert (grade)	SCMT073206-DM(XP9040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	S50C	
切削速度 Cutting Speed	200m/min(3,033min^{-1})	
进给速度 Feed	364mm/min(0.12mm/rev) [入口 : 152mm/min(0.05mm/rev)]	
切深量 Depth of Hole	45mm	
切削油剂 Coolant	水溶性切削油剂 Water Soluble	
使用设备 Machine	卧式加工中心(BT50) Horizontal Machining Center	

15度斜面加工案例，其他公司产品在入口处会晃动造成扩孔(红圈部分)。PHP 可以承受断续加工的高刚性，可以抑制入口处的扩孔(蓝圈部分)

When milling a 15° inclined plane, a competitor's product wobbled at entry and enlarged the entry point (as indicated by the red circle). Because the PHP has the rigidity to withstand intermittent milling, it inhibits the enlargement of the entry point (as indicated by the blue circle).



风力发电(回转支承) 的孔加工 Drilling holes in a wind power generator (rotating wheel)

使用工具 Tool	PHP210FS25M07-3D	其他公司 Competitor
使用刀片(材质) Insert (grade)	SCMT073206-DM(XP9040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	S45C相当品 Equivalent	
切削速度 Cutting Speed	165m/min(2,502min^{-1})	
进给量 Feed	300mm/min(0.12mm/rev)	
切深量 Depth of Hole	57mm	
切削油剂 Coolant	水溶性切削油剂 Water Soluble	
使用机械 Machine	卧式专机 Horizontal Dedicated Machine	

是其他公司产品寿命的1.3倍，PHP 在加工128孔后仍可以稳定的加工。

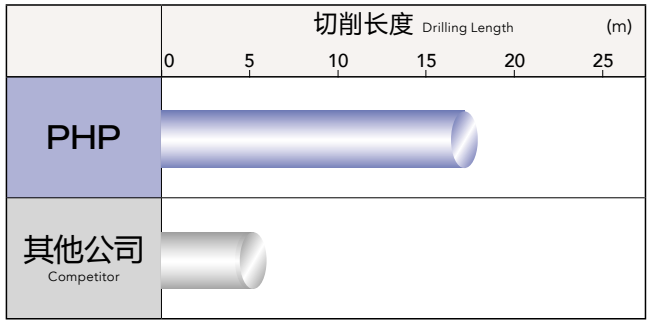
The PHP drilled 128 holes and exhibited stable milling performance. Its durability was 1.3 times that of a competitor's product.

零部件的孔加工 Drilling holes in parts

使用工具 Tool	PHP210FS25M07-3D	其他公司 Competitor
使用刀片(材质) Insert (grade)	SCMT073206-DM(XP9040)	硬质合金涂层刀片 Coated Carbide Chip
加工材料 Work Material	SUS304	
切削速度 Cutting Speed	150m/min(2,275min^{-1})	
进给量 Feed	272mm/min(0.12mm/rev)	
切深量 Depth of Hole	50mm	
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	

其他公司的产品由于切屑问题而致使不能稳定耐久的加工。PHP 在加工时排屑性好，并能将切屑细小的分断，可以达到其他公司产品2倍的寿命。

A competitor's product could not provide stable durability due to chipping. Our product, however, breaks up chips into small pieces and evacuates them properly, which inhibits durability variances and provides double the durability.



安全须知

- 工具使用时有破损的危险，请务必使用保护罩、保护镜、安全靴等。
- 手不要直接碰刀刃。
- 请不要用手接触碎屑。
- 刀具的刀刃不良时请停止使用。
- 如发生异常声音及振动时请立刻停止使用。
- 请不要擅自修改工具。
- 加工前请确认工具尺寸。

Safe use of cutting tools

- Use safety cover, safety glasses and safety shoes during operation.
- Do not touch cutting edges with bare hands.
- Do not touch cutting chips with bare hands. Chips will be hot after cutting.
- Stop cutting when the tool becomes dull.
- Stop cutting operation immediately if you hear any strange cutting sounds.
- Do not modify tools.
- Please use correct tools for the operation.Check dimensions to ensure proper selection.

TOOL COMMUNICATION
OSG CORPORATION
欧士机（上海）精密工具有限公司

OSG免费技术热线
400 888 2086

欧士机（上海）营业本部
地址：上海市浦东新区浦东南路360号新上海国际大厦17楼D座
电话：021-58886600　传真：021-58883300　邮编：200120

欧士机（上海）物流中心
地址：上海市外高桥保税区希雅路69号15号厂房楼5楼E部
电话：021-50464855　传真：021-50464755　邮编：200131

欧士机（上海）北京分公司
地址：北京市朝阳区建国门外大街19号国际大厦A座23层A室
电话：010-85261018　传真：010-85261016　邮编：100004

欧士机（上海）广州分公司
地址：广州市东风路767号东宝大厦1808-1809室
电话：020-38210423　传真：020-38210425　邮编：510600

欧士机（上海）大连分公司
地址：大连开发区五彩城1栋1号凯伦国际大厦B2006
电话：0411-87655185　传真：0411-87655186　邮编：116600

欧士机（上海）天津分公司
地址：天津市和平区解放北路188号信达广场18层1807室
电话：022-23037566　传真：022-23037577　邮编：300042

欧士机（上海）重庆分公司
地址：重庆市沙坪坝区华宇广场2号楼时代星空20F16号
电话：023-65408030　传真：023-65402088　邮编：400030

欧士机（上海）青岛分公司
地址：青岛市市北区龙城路50号万达CBD广场3号楼1单元2803室
电话：0532-66775787　传真：0532-66775797　邮编：266034

欧士机（上海）深圳事务所
地址：深圳市福田区福民路福民佳园1127B　邮编：518048
电话：0755-83566532/83568729　传真：0755-83558854

欧士机（上海）无锡事务所
地址：无锡新区龙山路旺庄科技创业中心大楼C栋1708室
电话：0510-82739271　传真：0510-82739220　邮编：214028

欧士机（上海）芜湖办事处
地址：安徽芜湖市香格里拉花园98幢1单元204室
电话：0553-5868160　传真：0553-5868190　邮编：241000

欧士机（上海）武汉事务所
地址：武汉市江汉区中山广场16层23号　邮编：116600
电话：027-85557370/85557360　传真：85557350

欧士机（上海）哈尔滨事务所
地址：哈尔滨市南岗区延兴路98号一单元2601室
电话：0451-55551861　传真：0451-55551862　邮编：150080

欧士机（上海）杭州萧山事务所
地址：杭州市萧山区建设一路66号华瑞中心2幢805室
电话：0571-82757757　传真：0571-82757767　邮编：311200

欧士机（上海）苏州事务所
地址：苏州工业园区翠园路181号商旅大厦1511室
电话：0512-62388327　传真：0512-62388320　邮编：215028

欧士机（上海）柳州事务所
地址：广西柳州市桂中大道南端阳光壹佰城市广场第2幢第23层第4号房
电话：0772-8250338　传真：0772-8250328　邮编：545006

Http://www.chinaosg.com
E-mail:business@shanghaiosg.com

样本印刷使用
环保植物性大豆油墨

PRINTED WITH SOY INK

样本印刷使用
环保植物性大豆油墨