

THE NEW VALUE FRONTIER



高效率加工 Axel系列

# 3ZFK型

AXEL MILL

## 新一代 3维多功能立铣刀诞生

Multi-function endmill 3ZFK

**三重处理**

Triple functions

**插铣加工, 凹槽加工, 精加工**

Plunge milling, Slotting, Finishing

**三重性能**

Triple Performances

**高效率, 长寿命, 良好表面粗糙度**

High efficiency machining, Longer tool life, Better surface finish

**3刃设计**

3-flute design



**AXEL MILL**

**三重性能**

Triple Performances

**三重处理**

Triple functions

ADVANCING PRODUCTIVITY

致力于生产效率提高的京瓷

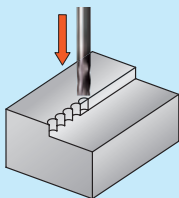
# 三重加工 · 三大性能

Triple functions/Triple Performances

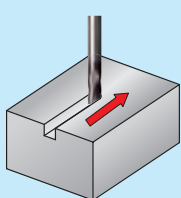
## 三重加工 Triple functions

一根即可完成插铣、凹槽、精加工的三重加工操作。  
Applicable for plunge milling, slotting and finishing with one endmill

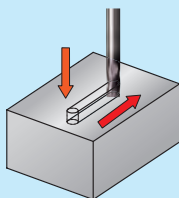
### 加工用途 Application



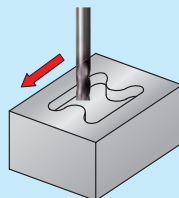
插铣加工  
Plunge milling



凹槽加工  
Slotting



插铣+凹槽加工  
Plunge milling + Slotting



型腔铣削加工  
Pocketing

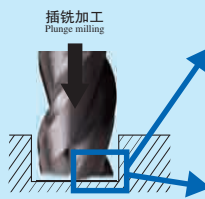
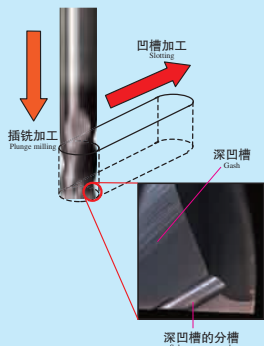


## 三重性能 Triple Performances

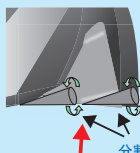
### 1. 全新设计提高性能 High efficiency machining due to new design

- 良好的排屑性能！深凹槽的分槽可将插铣加工时产生的切屑进行分割。  
Smooth chip evacuation because sub-groove on gash breaks chips at plunge milling

### 深凹槽的分槽效果 Effect of sub-groove on gash



#### 3ZFK型

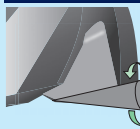


分割后的切屑 Small chips



由于排出的切屑较小，因此排屑性能良好  
Smooth chip evacuation due to small size chip

#### 普通立铣刀 Conventional Endmill



切屑较大 Large chips



排屑性差，加大工具负担，造成切刃破损  
Poor chip evacuation increases load on endmill body and causes cutting edge breakage

- 抗“堵塞”能力强！深凹槽有效防止切削“堵塞”  
Prevents chip clogging by deep flute and gash design.



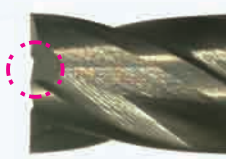
深凹槽  
Deep flute



3ZFK型的切槽  
Bottom surface of 3ZFK cutting edge



3ZFK型



传统产品  
Conventional Endmill

### 2. 通过MEGACOAT实现长寿命 3. 高品质的锋利刃尖打造完美表面加工

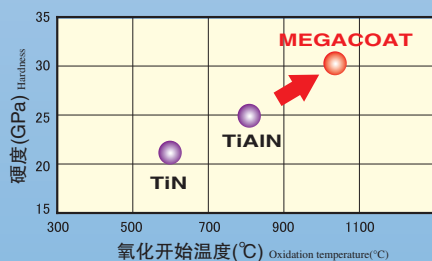
Longer tool life by MEGACOAT

Better surface finish by sharp cutting edge quality

- 优良的耐磨损性/耐热性  
Excellent wear resistance and heat resistance

- 整个切槽平滑锋利 Smooth and sharp to the tip of the cutting edge
- 抑制毛刺，提高表面粗糙度 Controls burr formation. Better surface roughness

#### 采用MEGACOAT(新PVD涂层) MEGACOAT (New PVD coat)



KYOCERA MEGACOAT  
整个切槽平滑锋利延长寿命，提高表面加工品质  
Smooth and sharp to the tip of the cutting edge  
Longer tool life improved surface finish



其他公司产品A Competitor Coating A  
表面粗糙切槽部位附有圆形凹凸  
Rough coating surface and round blunt cutting edge

# 高效率加工Axel系列诞生

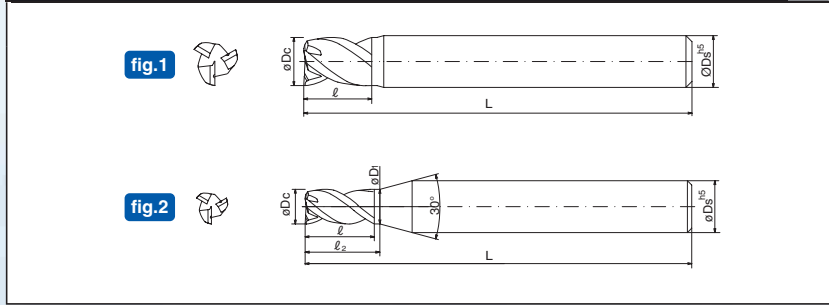
AXEL MILL



## 3ZFK型

超微粒子超硬母材  
Super micro grain carbide

采用 MEGACOAT  
MEGACOAT is applied



推荐的被切削材料  
Recommended Material

P Steel, M Stainless steel, K Cast Iron, N Aluminum & Non Ferrous Material, S Titanium Alloy

形状  
Shape

MEGACOAT, Land, h5 Shank Dia., 40°

## 库存机型 Stock Items

### 短柄型号 Short

型号 Description	库存 Stock	外径 Outside Dia.		刃长 Effective Cutting Length	颈部长度 Neck Dia.	颈部以下长度 Under Neck Length	刀柄直径 Shank Dia.	全长 Overall length	刃数 Number of flutes
		øDc	外径公差 Outside Dia Tolerance						
3ZFKS060-090-06	●	6.0	0 -0.020	9.0	-	-	6	50	3
3ZFKS070-105-08	●	7.0	0 -0.020	10.5	7.2	11.3	8	60	3
3ZFKS080-120-08	●	8.0	-0.005 -0.025	12.0	-	-	8	60	3
3ZFKS100-150-10	●	10.0	-0.005 -0.025	15.0	-	-	10	70	3
3ZFKS120-180-12	●	12.0	-0.010 -0.030	18.0	-	-	12	75	3

### 中柄型号 Medium

型号 Description	库存 Stock	外径 Outside Dia.		刃长 Effective Cutting Length	颈部长度 Neck Dia.	颈部以下长度 Under Neck Length	刀柄直径 Shank Dia.	全长 Overall length	刃数 Number of flutes
		øDc	外径公差 Outside Dia Tolerance						
3ZFKM030-060-06	●	3.0	0 -0.015	6.0	3.2	6.5	6	50	3
3ZFKM040-080-06	●	4.0	0 -0.015	8.0	4.2	8.6	6	50	3
3ZFKM050-100-06	●	5.0	0 -0.015	10.0	5.2	10.8	6	50	3
3ZFKM060-130-06	●	6.0	0 -0.020	13.0	-	-	6	50	3
3ZFKM070-160-08	●	7.0	0 -0.020	16.0	7.2	17.3	8	60	3
3ZFKM080-190-08	●	8.0	-0.005 -0.025	19.0	-	-	8	60	3
3ZFKM100-220-10	●	10.0	-0.005 -0.025	22.0	-	-	10	70	3
3ZFKM120-260-12	●	12.0	-0.010 -0.030	26.0	-	-	12	75	3

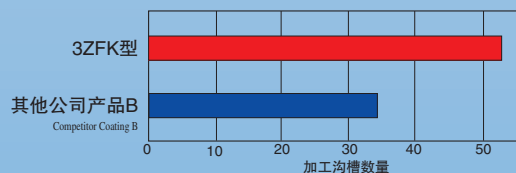
●: 标准库存 Standard Stock

## 加工案例 Case studies

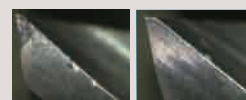
### 钛合金材料的凹槽加工 Slotting of Titanium Alloy

外径 Outside Dia.	ø10	
被切削材料 Material	Ti-6Al-4V	
转速 Spindle Revolution	3ZFK型: n=1700min <sup>-1</sup> 其他公司产品B Competitor Coating B: n=1300min <sup>-1</sup>	
进给 Feed Rate	Vf = 460mm/min	
切入量 Depth of Cut	ap × ae = 2 × 10mm	

- 3ZFK型产品加工表面良好, 寿命长。
- 与其他公司产品B相比, 寿命延长1.4倍以上。
- 切口光滑, 不易产生毛刺
- Better surface finish and longer tool life with 3ZFK.
- Compared to competitor's coated products, the 3ZFK has a 1.4 times as much tool life.
- 3ZFK prevents burr formation due to sharp cutting edge.

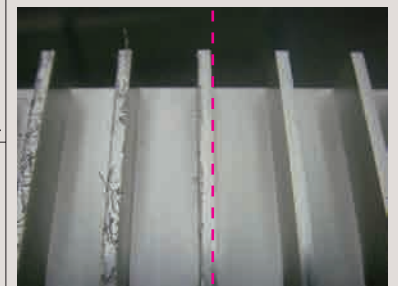


### 进行35次切槽后的切刃比较 Cutting edge after 35 passes



其他公司产品B  
Competitor Coating B

3ZFK型



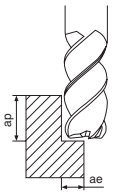
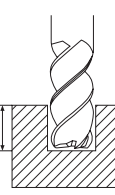
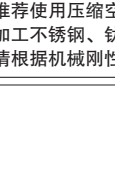
其他公司产品B  
Competitor Coating B

3ZFK型



# 标准切削条件 Recommended Milling Conditions

● 肩部加工 Shouldering 插槽加工 Plunge milling 凹槽加工 Slotting

加工类型 Application	被切削材料 Material	切入量(ap × ae)(mm) Depth of Cut	外径Dc(mm) Outside Dia.	ø3	ø4	ø5	ø6	ø7	ø8	ø10	ø12	
肩部加工 Shouldering 	碳钢 S45C Carbon steel	肩部加工 Shouldering 短柄型号 Short 1.2Dc × 0.3Dc 中柄型号 Medium 1.5Dc × 0.3Dc 插槽加工 Plunge milling 凹槽加工 Slotting 1Dc	转速(min <sup>-1</sup> ) Spindle Revolution	13,800	10,700	8,800	7,500	6,600	6,000	4,800	4,000	
			进给 (mm/min) Feed Rate	肩部加工 Shouldering	850	950	1,100	1,200	1,100	1,000	910	850
				插槽加工 Plunge milling	180	170	170	170	160	150	120	100
				凹槽加工 Slotting	570	650	700	730	750	780	800	750
合金钢 SCM, SNCM Alloy steel 	合金钢 SCM, SNCM Alloy steel	肩部加工 Shouldering 短柄型号 Short 1.2Dc × 0.3Dc 长柄型号 Medium 1.5Dc × 0.3Dc 插槽加工 Plunge milling 凹槽加工 Slotting 0.5Dc	转速(min <sup>-1</sup> ) Spindle Revolution	10,600	9,300	8,300	7,400	6,500	6,000	4,700	3,500	
			进给 (mm/min) Feed Rate	肩部加工 Shouldering	700	780	900	980	900	850	750	700
				插槽加工 Plunge milling	120	120	130	140	130	130	120	100
				凹槽加工 Slotting	500	540	570	590	610	600	580	500
淬硬钢 NAK, 30 - 45HRC Pre-hardened steel	淬硬钢 NAK, 30 - 45HRC Pre-hardened steel	肩部加工 Shouldering 短柄型号 Short 1.2Dc × 0.3Dc 中柄型号 Medium 1.5Dc × 0.3Dc 插槽加工 Plunge milling 凹槽加工 Slotting 0.5Dc	转速(min <sup>-1</sup> ) Spindle Revolution	5,200	4,000	3,200	2,600	2,300	2,000	1,600	1,400	
			进给 (mm/min) Feed Rate	肩部加工 Shouldering	440	440	490	490	490	440	400	370
				插槽加工 Plunge milling	90	110	110	130	110	100	80	70
				凹槽加工 Slotting	220	270	270	320	330	330	230	200
插槽加工 Plunge milling 凹槽加工 Slotting 不锈钢 SUS304 Stainless steel 	不锈钢 SUS304 Stainless steel	肩部加工 Shouldering 短柄型号 Short 1.2Dc × 0.2Dc 中柄型号 Medium 1.5Dc × 0.2Dc 插槽加工 Plunge milling 凹槽加工 Slotting 0.5Dc	转速(min <sup>-1</sup> ) Spindle Revolution	3,300	2,500	2,000	1,700	1,400	1,300	1,100	900	
			进给 (mm/min) Feed Rate	肩部加工 Shouldering	280	270	330	340	330	330	350	320
				插槽加工 Plunge milling	20	30	40	40	40	30	20	20
				凹槽加工 Slotting	110	110	130	140	130	130	120	120
肩部加工 Shouldering 钛合金 Titanium Alloy	钛合金 Titanium Alloy	肩部加工 Shouldering 短柄型号 Short 1.2Dc × 0.2Dc 中柄型号 Medium 1.5Dc × 0.2Dc 插槽加工 Plunge milling 凹槽加工 Slotting 0.5Dc	转速(min <sup>-1</sup> ) Spindle Revolution	3,300	2,500	2,000	1,700	1,400	1,300	1,100	900	
			进给 (mm/min) Feed Rate	肩部加工 Shouldering	280	270	330	340	330	330	350	320
				插槽加工 Plunge milling	20	30	40	40	40	30	20	20
				凹槽加工 Slotting	110	110	130	140	130	130	120	120

- 推荐使用压缩空气进行钢材加工。 Compressed air is recommended for machining steel.
- 加工不锈钢、钛合金时推荐使用水溶性切削油。 Water soluble coolant is recommended for machining stainless steel and titanium alloy.
- 请根据机械刚性调整切入量。 Adjust depth of cut (ap) to suit machine rigidity

## 切削工具相关咨询

400-650-6400-5

● 受理时间 8:45-11:45 · 12:45-17:30  
● 周六、日以及法定节假日期间不受理业务。

※ 个人信息的使用: 回答用户咨询问题, 提高服务品质, 提供产品信息。  
※ 咨询时, 请确认电话号码的正确性。

**KYOCERA**

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http://www.kyocera.com.cn/prdct/cuttingtool/index.html