



高效率多刃、铸铁加工用刀盘

MFK型

High Efficiency Multi-edge Cutter for Cast Iron

- **有效抑制振刀、良好的完成面**
Excellent surface finish by controlling chattering
- 兼具稳定加工与高性价比的**双面10刀刃规格刀片**
10-cornered pentagonal inserts for stable and economical machining
- 2种特殊刀片构造**以低阻力保证强劲切刃**
Two special insert structures reduce cutting force and improve edge strength
- 密齿规格可**对应铸铁加工的高效率、高进给加工**
Applicable to high efficiency and high feed cast iron machining with multi-edge design

负角刀片也
具有优良的锋利度、抗振强!

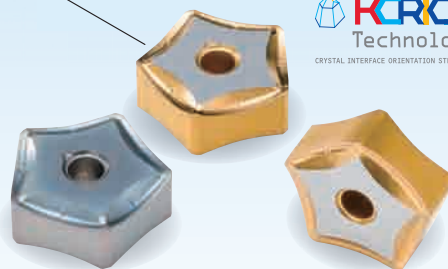
Resistant to chattering with sharpness even with negative type insert



实现长寿命加工的

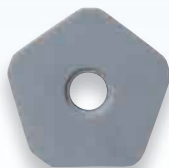
新CVD材质CA420M登场

New CVD grade CA420M for longer tool life



NEW

实现高速度、
高效率加工的
陶瓷材质
KS6050/CS7050
Ceramic grades for high
speed and high efficiency
machining



精加工用带修
光刃刀片实现
系列化
Wiper insert for
finishing is available



ADVANCING PRODUCTIVITY

致力于生产效率提高的京瓷

MFK型

密齿刀盘实现铸铁的高效率加工
采用兼具稳定加工与高性价比的
双面10刀刃规格刀片

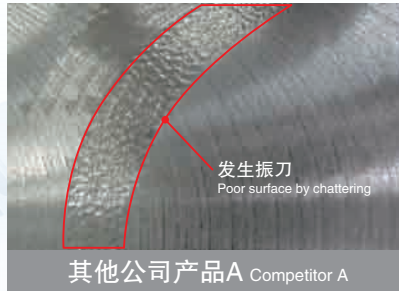
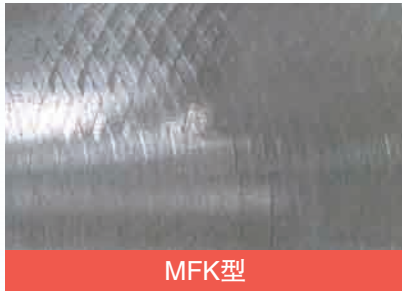
Multi-edge cutter realizes the high efficiency cast iron machining
10-cornered pentagonal inserts for stable and economical machining



MFK型良好的平衡设计可实现低阻力加工
抗振强可获得良好的加工面

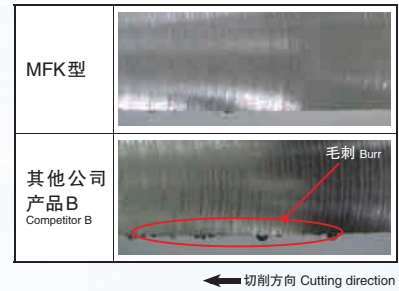
MFK reduces cutting force by good balanced design
Excellent surface finish by controlling chattering

加工面比较 Surface finish comparison



< 切削条件 > Cutting Conditions
被切削材 Workpiece: FCD600, 干式 Dry, $V_c=180\text{m/min}$, $f_z=0.3\text{mm/t}$, $a_p \times a_e=3 \times 78\text{mm}$

毛刺比较 Burr comparison



良好的切削锋利度、抑制毛刺
Sharp cutting prevents burr formation

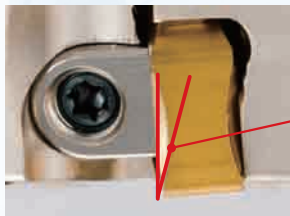
2大
重点
Two points

2个特殊刀片构造以低阻力实现强劲切刃

Two special insert structures reduce cutting force and improve edge strength

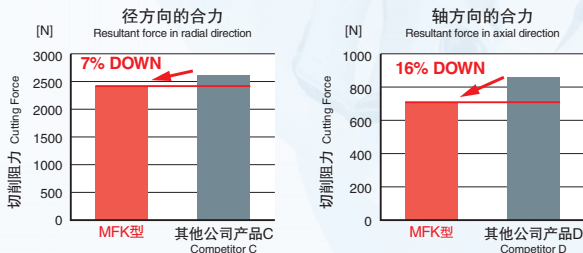
POINT.1 螺旋切刃结构保证低阻力

Low cutting force with helical cutting edge design



最大 A.R.+15°
A.R. Max. +15°

切削阻力比较 Cutting Force Comparison



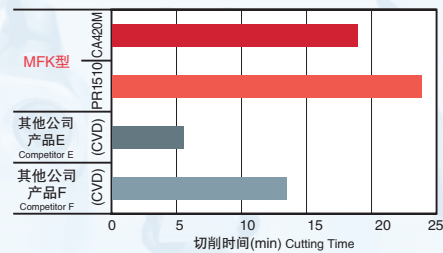
< 切削条件 > Cutting Conditions
被切削材 Workpiece: FCD600, 干式 Dry, $\phi 125$
 $V_c=180\text{m/min}$, $f_z=0.3\text{mm/t}$, $a_p \times a_e=3.0 \times 62\text{mm}$

POINT.2 双重刀尖结构抑制崩损

Fractures suppressed with double edge position



抗崩损性比较 Fracture Resistance Comparison



< 切削条件 > Cutting Conditions
被切削材 Workpiece: FCD450(4个孔) with 4 bores
 $V_c=300\text{m/min}$
 $f_z=0.5\text{mm/t}$
 $a_p=2.0\text{mm}$
湿式 Wet

降低咬刀时的冲击负荷
Reducing impact load when approaching workpiece

■ 可根据加工场景选择的刀杆系列化 Holder lineup to meet various applications

密齿(多刃规格)与超密齿(超多刃规格)系列化
可根据加工选择最适合的刀盘

Fine pitch type and extra fine pitch type are available
Choose most suitable cutter for your application



密齿型 (例: φ125 12枚刃)
Fine Pitch (Example : φ125 12 inserts)

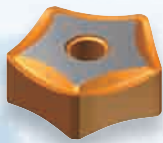
- 推荐用于工件刚性低时
Recommended for low rigid workpiece
- 可对应广泛的加工范围
For wide application range



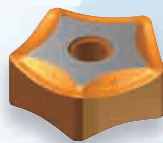
超密齿型 (例: φ125 18枚刃)
Extra Fine Pitch (Example : φ125 18 inserts)

- 推荐工件刚性高时
Recommended for high rigid workpiece
- 可高效率加工
For high efficiency machining

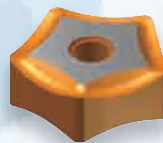
■ 丰富的断屑槽阵容可对应多样加工 Applicable to various applications with wide range lineup of chipbreakers



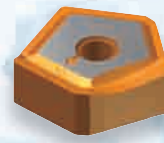
通用型:
GM断屑槽
General use:
GM Chipbreaker



刀尖强化型:
GH断屑槽
Strong edge:
GH Chipbreaker



精加工用:
GL断屑槽
(研磨级)
Finishing:
GL Chipbreaker
Ground



带修光刃:
W断屑槽
(研磨级)
Wiper edge:
W Chipbreaker
Ground

■ 新铣削加工用CVD材质“CA420M”实现长寿命、稳定加工

New milling CVD grade CA420M realizes long tool life and stable machining



先进CVD涂层 KCIOS Technology 改变常识

Advanced CVD coating KCIOS Technology revolutionizes common sense

京瓷独特的结晶控制技术与被膜密着强度的提高, 让CVD涂层发展至新阶段

Kyocera's unique crystal control technology and advanced film adhesion lead CVD coating to the next stage

寿命增长

Longer tool life

α-Al₂O₃(氧化铝)的结晶成长,
朝向高耐磨损性与高抗崩损性方向控制
Control α-Al₂O₃ crystal growth for improving
wear resistance and fracture resistance



KCIOS
Technology

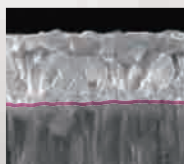


以往产品 Conventional

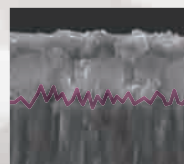
抑制被膜剥离

Prevent film peeling

通过最适宜的界面将
被膜密着强度比以往提高40%
40% improved film adhesion
by optimized interface



KCIOS
Technology



以往产品
Conventional

防止崩刀

Control chipping

高纵横比TiCN层提高
被膜强度、抗崩损性
Higher film strength and fracture resistance
with high aspect ratio TiCN

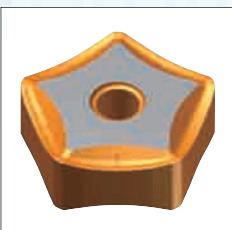


TiCN层
TiCN layer

硬质合金母材
Carbide substrate

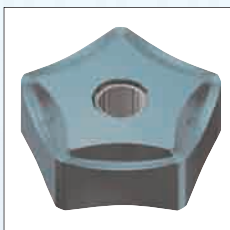
“KCIOS Technology”是京瓷独特的CVD涂层技术名称 KCIOS Technology is Kyocera's original CVD coating technology

■ 刀片材质的使用分类 Insert grade lineup



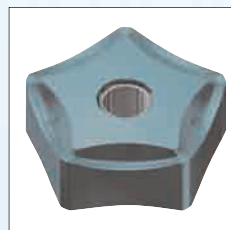
长寿命、第一推荐
CA420M

Long tool life (1st recommendation)



重视稳定加工
PR1510

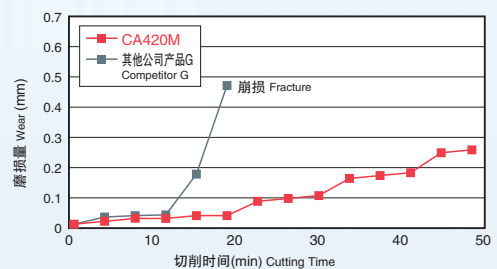
Stable machining



重视抗崩损性
PR1525

Fracture resistance

■ 耐磨损比较 Wear resistance comparison



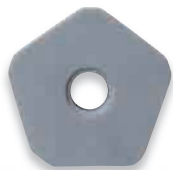
< 切削条件 > Cutting Conditions
被切削材 Workpiece: FCD450, 干式 Dry
Vc=200m/min, fz=0.3mm/t, ap × ae=2.0 × 80

铸铁加工用氮化硅陶瓷 KS6050/CS7050

Si₃N₄ ceramic insert grades for cutting cast iron

铸铁加工的第一推荐 KS6050

First recommendation for cast iron

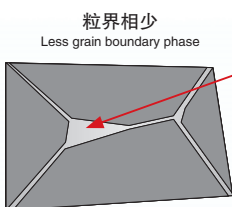


POINT.1 优越的耐磨损性 实现稳定加工

High wear resistance enables stable machining

受到切削性能的不良影响使得粒界相减少

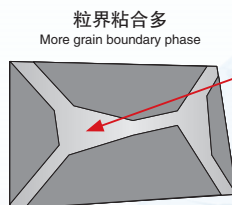
Reduces grain boundary phase that generates negative impact on the cutting performance



KS6050

抑制粒界相、
提高设备的性能与热的性能
Mechanical and thermal property will be improved by controlling grain boundary phase

抑制崩刀可实现稳定切削
Stable machining by controlling chipping

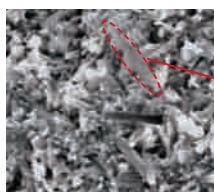


以往材质 Conventional Grade
粒界相多(glass)多、受到切削热量的影响发生强度降低
The grain boundary phase contained a high proportion of glass, therefore its toughness will be weakened by cutting heat

发生崩刀不稳定
Unstable machining due to chipping

POINT.2 抑制突发崩损

Prevention of sudden fracture



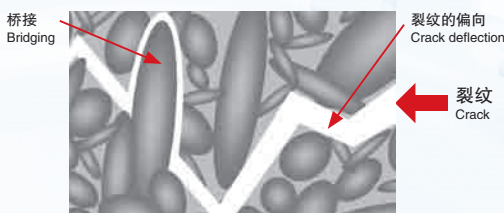
KS6050与以往产品
相比纵横比大
KS6050 has high aspect ratio compared with conventional grade

L

d

※纵横比 = L/d
aspect ratio

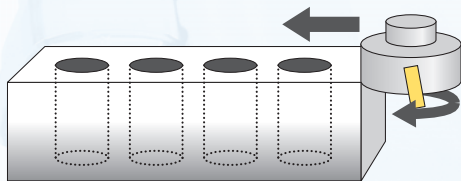
裂纹的进展举动 Crack propagation



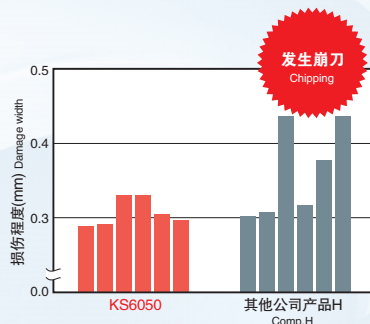
纵横比: 大 \Rightarrow 抑制裂纹的进展
Large aspect ratio \Rightarrow Controls crack propagation

抗崩损性提高
Fracture resistance improvement

抗崩损性比较 Fracture Resistance Comparison



< 切削条件 > Cutting Conditions
Vc=500m/min, ap=2mm, fz=0.5mm/t, 干式 Dry
被切削材 Workpiece Material: FCD450 (4孔座 4-hole block)
刀片 Insert: SNGN120412T02025

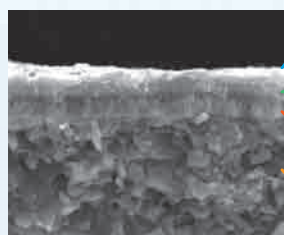


即便断续加工 损伤程度小 \Rightarrow 良好的抗崩损性
Less damage at interrupted cutting High fracture resistance

球墨铸铁加工的第一推荐

CS7050

First recommendation for ductile cast iron



耐磨损性强化层(TiC层)
High wear resistant phase (TiC base)

特殊Al₂O₃层
Special Al₂O₃ phase

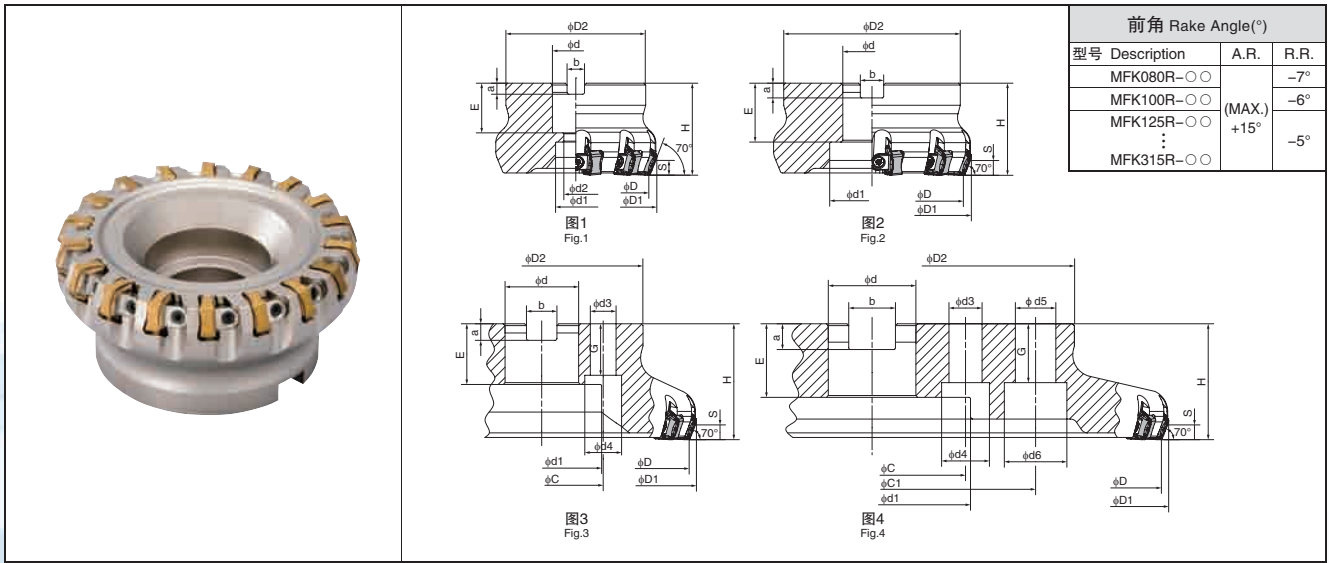
附着力强化层(TiN层)
High adhesion phase (TiN base)

Si₃N₄母材
Si₃N₄ substrate

高涂层附着力使其耐磨损性提高、
可对应高速加工

Wear resistance improvement due to high coating adhesion.
Suitable for high speed cutting.

MFK型面铣刀 MFK Face Mill



刀杆尺寸 Toolholder Dimensions





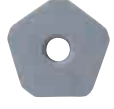
刀盘安装部 Bore Dia.	型号 Description	库存 Stock	刃数 No. of inserts	尺寸(mm) Dimension																形状 Drawing	重量(kg) Weight				
				φD	φD1	φD2	φd	φd1	φd2	H	E	a	b	s	φd3	φd4	φd5	φd6	φC			φC1	G		
英制规格 Inch Spec	密齿型 Fine pitch	MFK 080R-11-8T	●	8	80	89	76	31.75	26	17	63	32	8	12.7	6.0	18	26	101.6	177.8	32	图1 fig.1	1.76			
		100R-11-10T	●	10	100	109	96	38.1	55	70		38	10	15.9							图2 fig.2	2.98			
		125R-11-12T	●	12	125	134	100					50.8	70	11							19.1	图3 fig.3	3.65		
		160R-11-16T	●	16	160	169	142	47.625	110	40		14	25.4	22							32	图4 fig.4	4.62		
		200R-11-20T	●	20	200	209	40																14	25.4	18
		250R-11-24T	●	24	250	259	315	324	220	40		14	25.4	18							26	101.6	177.8	32	10.73
	315R-11-28T	非标	28	315	324	220	40	14	25.4	18	26	22	32	177.8	32	19.71									
	超密齿型 Extra Fine pitch	MFK 080R-11-10T	●	10	80	89	76	31.75	26	17	63	32	8	12.7	6.0	18	26	101.6	177.8	32	图1 fig.1	1.70			
		100R-11-14T	●	14	100	109	96	38.1	55	70		38	10	15.9							图2 fig.2	2.85			
		125R-11-18T	●	18	125	134	100					50.8	70	11							19.1	图3 fig.3	3.44		
		160R-11-22T	●	22	160	169	142	47.625	110	40		14	25.4	22							32	图4 fig.4	4.44		
		200R-11-28T	●	28	200	209	40																14	25.4	18
250R-11-36T		●	36	250	259	315	324	220	40	14		25.4	18	26							101.6	177.8	32	10.36	
315R-11-44T	非标	44	315	324	220	40	14	25.4	18	26	22	32	177.8	32	19.21										
公制规格 Metric Spec	密齿型 Fine pitch	MFK 080R-11-8T-M	●	8	80	89	76	27	20	13	63	24	7	12.4	6.0	14	20	66.7	28	32	图1 fig.1	1.87			
		100R-11-10T-M	●	10	100	109	96	32	26	17		28	8	14.4							图2 fig.2	2.99			
		125R-11-12T-M	●	12	125	134	100	40	55	70		33	9	16.4							图3 fig.3	3.56			
		160R-11-16T-M	●	16	160	169	142	60	110	40		14	25.7	18							26	101.6	177.8	32	4.51
		200R-11-20T-M	●	20	200	209	40																		14
		250R-11-24T-M	●	24	250	259	315	324	220	40		14	25.7	18							26	101.6	177.8	32	10.43
	315R-11-28T-M	非标	28	315	324	220	40	14	25.7	18	26	22	32	177.8	32	19.41									
	超密齿型 Extra Fine pitch	MFK 080R-11-10T-M	●	10	80	89	76	27	20	13	63	24	7	12.4	6.0	14	20	66.7	28	32	图1 fig.1	1.81			
		100R-11-14T-M	●	14	100	109	96	32	26	17		28	8	14.4							图2 fig.2	2.86			
		125R-11-18T-M	●	18	125	134	100	40	55	70		33	9	16.4							图3 fig.3	3.38			
		160R-11-22T-M	●	22	160	169	142	60	110	40		14	25.7	18							26	101.6	177.8	32	4.32
		200R-11-28T-M	●	28	200	209	40																		14
250R-11-36T-M		●	36	250	259	315	324	220	40	14		25.7	18	26							101.6	177.8	32	10.07	
315R-11-44T-M	非标	44	315	324	220	40	14	25.7	18	26	22	32	177.8	32	18.92										

●: 标准库存 Std. Item 非标: 非标生产 Made To Order

零部件与适合刀片 Spare Parts and Applicable Inserts

型号 Description	零部件 Spare Parts				适合刀片 Applicable Inserts	型号 Description	零部件 Spare Parts				适合刀片 Applicable Inserts				
	按压模具 Wedge	紧固螺栓 Wedge screw	扳手 Wrench	锥形安装用螺栓 Mounting Bolt			按压模具 Wedge	紧固螺栓 Wedge screw	扳手 Wrench	锥形安装用螺栓 Mounting Bolt					
MFK 080R-11-8T 100R-11-10T 125R-11-12T 160R-11-16T 200R-11-20T 250R-11-24T 315R-11-28T	C09N	W6X18N	TT-15	HH16X40	PNMG1106XNEN-GM PNMG1106XNEN-GH PNEG1106XNEN-GL PNEG1106XNER-W PNEA1106XNTN-T01020	MFK 080R-11-8T-M 100R-11-10T-M 125R-11-12T-M 160R-11-16T-M 200R-11-20T-M 250R-11-24T-M 315R-11-28T-M	C09N	W6X18N	TT-15	HH12X35 HH16X40	PNMG1106XNEN-GM PNMG1106XNEN-GH PNEG1106XNEN-GL PNEG1106XNER-W PNEA1106XNTN-T01020				
MFK 080R-11-10T 100R-11-14T 125R-11-18T 160R-11-22T 200R-11-28T 250R-11-36T 315R-11-44T						C09N						W6X18N	TT-15	HH12X35 HH16X40	PNMG1106XNEN-GM PNMG1106XNEN-GH PNEG1106XNEN-GL PNEG1106XNER-W PNEA1106XNTN-T01020

■ 适用刀片 Applicable Inserts

形状 Insert	型号 Description	尺寸(mm) Dimension				CVD涂层 CVD Coated Carbide	MEGACOAT NANO		陶瓷 Ceramic	
		A	T	X	Z		CA420M	PR1510	PR1525	KS6050
 通用型 General	PNMG1106XNEN-GM	17.23	6.35	2.0	2.0	●	●	●	-	-
 刀尖强化型 Tough edge	PNMG1106XNEN-GH					●	●	●	-	-
 重视面精度 Surface-finish Oriented	PNEG1106XNEN-GL	17.18	6.35	2.6	2.6	●	●	●	-	-
 带修光刃刀片 (2刀尖规格) Wiper insert (2-edge)	PNEG1106XNER-W	18.02				2.0	10.0	●	●	●
 高速加工用 High Speed	PNEA1106XNTN-T01020	16.94	6.5	1.5	1.5	-	-	-	●	●

●: 标准库存 Std. Item

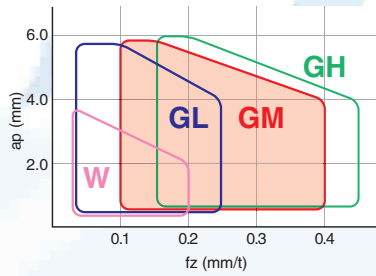
■ 切削条件 Recommended Conditions

被切削材 Workpiece Material	刀片材质 Insert Grade	切削速度 Cutting Speed (m/min)	断屑槽规格 Chipbreakers	每刃进给量(mm/t) fz(mm/t) Feed per tooth				
				0.06	0.1	0.2	0.3	0.4
铸铁 Gray Cast Iron FC	CA420M	170 ~ 230 ~ 300	GM★	● 0.25				
	PR1510	120 ~ 180 ~ 250	GH☆	● 0.3				
	PR1525		GL	● 0.12				
球墨铸铁 Nodular Cast Iron FCD	CA420M	150 ~ 200 ~ 250	GM★	● 0.2				
	PR1510	100 ~ 150 ~ 200	GH☆	● 0.25				
	PR1525		GL	● 0.1				

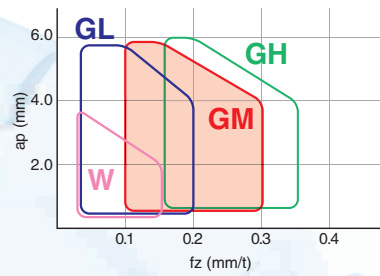
★: 第1推荐 1st recommendation ☆: 第2推荐 2nd recommendation

■ 推荐范围 Recommended application range

被切削材 Workpiece : FC



被切削材 Workpiece : FCD



※注意

- 1.使用W型时、请使用“GM+W”“GH+W”组合。
- 2.在 $fz=0.2$ 以上条件下使用时，刀尖部的损伤增大。W型的主切削刃寿命低于GM，GH。为此，W型的接下去进行加工时的刀具设定为2倍的进给加工。

Notes

When using W type, please use together with GM or GH.
If machining over $fz=0.2$, insert corner will be damaged. The main cutting edge of W type insert is receding from that of GM and GH. Therefore, the feed rate for the insert next to W type is double of the other inserts.

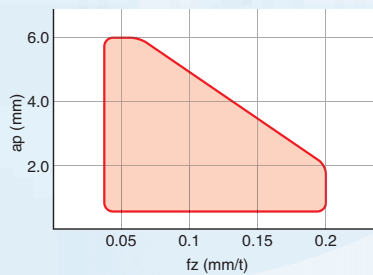
■ 切削条件(陶瓷材质) Recommended Conditions(Ceramic)

被切削材 Workpiece Material	刀片材质 Insert Grade	切削速度 Cutting Speed (m/min)	刀尖规格 Edge Preparation	每刃进给量(mm/t) fz(mm/t) Feed per tooth				
				0.05	0.1	0.2	0.3	0.4
铸铁 Gray Cast Iron FC	KS6050 ★ CS7050 ☆	600 ~ 900 ~ 1200	0.10 × 20°					
球墨铸铁 Nodular Cast Iron FCD	KS6050 ☆ CS7050 ★	400 ~ 600 ~ 900						

★：第1推荐 1st recommendation ☆：第2推荐 2nd recommendation

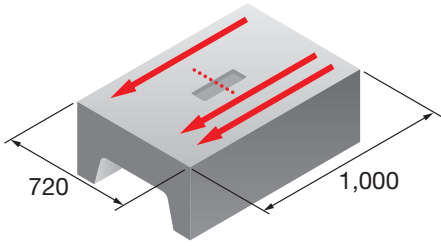
■ 推荐范围(陶瓷材质) Recommended application range(Ceramic)

被切削材 Workpiece : FC/FCD



加工案例 Case Studies

FC250

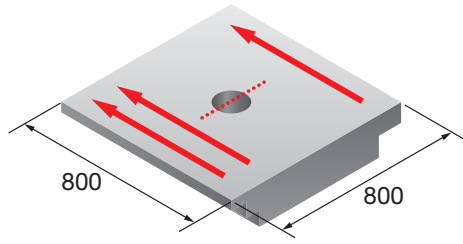


- 机械用底座 Machine base
- Vc=160m/min
- fz=0.16mm/t(Vf=782mm/min)
- ap x ae=3 x 100mm
- 干式 Dry
- MFK125R-11-12T(12枚刃) 12 inserts
- PNMG1106XNEN-GM(PR1510)

PR1510	切屑排出量=235cc/分 Chip Removal Rate = 235cc/min	加工效率约2倍 Efficiency 2 times
其他公司产品H(12枚刃) Competitor H (12 inserts)	切屑排出量=125cc/分 Chip Removal Rate = 125cc/min	

即使提高切削速度与进给,也能发出轻快的切削音,振动少、稳定加工。
Light noise and small vibration even increasing cutting speed and feed rate
(来自用户评价) User Evaluation

FC250

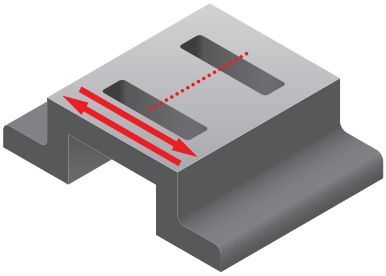


- 底座 Base
- Vc=160m/min
- fz=0.18mm/t(Vf=917mm/min)
- ap x ae=3 x 140mm
- 干式 Dry
- MFK200R-11-20T(20枚刃) 20 inserts
- PNMG1106XNEN-GM(CA420M)

CA420M	切屑排出量=385cc/分 Chip Removal Rate = 385cc/min	加工效率2.3倍 Efficiency 2.3 times
其他公司产品I(12枚刃) Competitor I (12 inserts)	切屑排出量=167cc/分 Chip Removal Rate = 167cc/min	

相比其他公司产品I,即使加工效率提高了2.3倍时切削音依然小,可实现稳定加工。
CA420M improved the efficiency by 2.3 times. Small noise and stable machining.
(来自用户评价) User Evaluation

FCD600

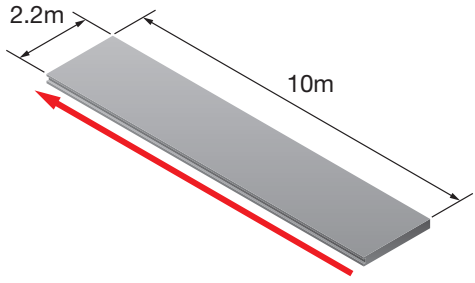


- 模具零部件 Mold part
- Vc=90m/min
- fz=0.34mm/t(Vf=974mm/min)
- ap x ae=2 x ~60mm
- 干式 Dry
- MFK080R-11-8T(8枚刃) 8 inserts
- PNMG1106XNEN-GM(PR1525)

PR1525	加工个数3个/刀尖 Machining efficiency: 3 pcs/edge	寿命3倍 Tool life 3 times
其他公司产品J(8枚刃) Competitor J (8 inserts)	加工个数1个/刀尖 Machining efficiency: 1 pcs/edge	

相比其他公司产品J在加工一个产品后发生了崩刀,PR1525在加工3个以后还能保持刀尖状态良好,实现稳定加工。
Competitor J had chipping after machining 1pc. PR1525 kept good edge condition and stable machining after machining 3 pcs.
(来自用户评价) User Evaluation

FC300



- 基底 Bed
- Vc=150m/min
- fz=0.26mm/t(Vf=1,242mm/min)
- ap x ae=3 x 100mm
- 干式 Dry
- MFK160R-11-16T(16枚刃) 16 inserts
- PNMG1106XNEN-GM(CA420M)

CA420M	切屑排出量=372cc/分 Chip Removal Rate = 372cc/min	加工效率4倍 Efficiency 4 times
以往产品K(8枚刃) Conventional K (8 inserts)	切屑排出量=93cc/分 Chip Removal Rate = 93cc/min	

CA420M与以往产品K相比,加工效率提高了4倍。
CA420M improved the efficiency by 4 times compared with Conventional K
(来自用户评价) User Evaluation

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KYOCERA

京瓷(中国)商贸有限公司

机械工具事业部

上海市闸北区万荣路700号大宁中心广场A3幢140室(200072)

TEL:021-3660-7711 FAX:021-5638-6200

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

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