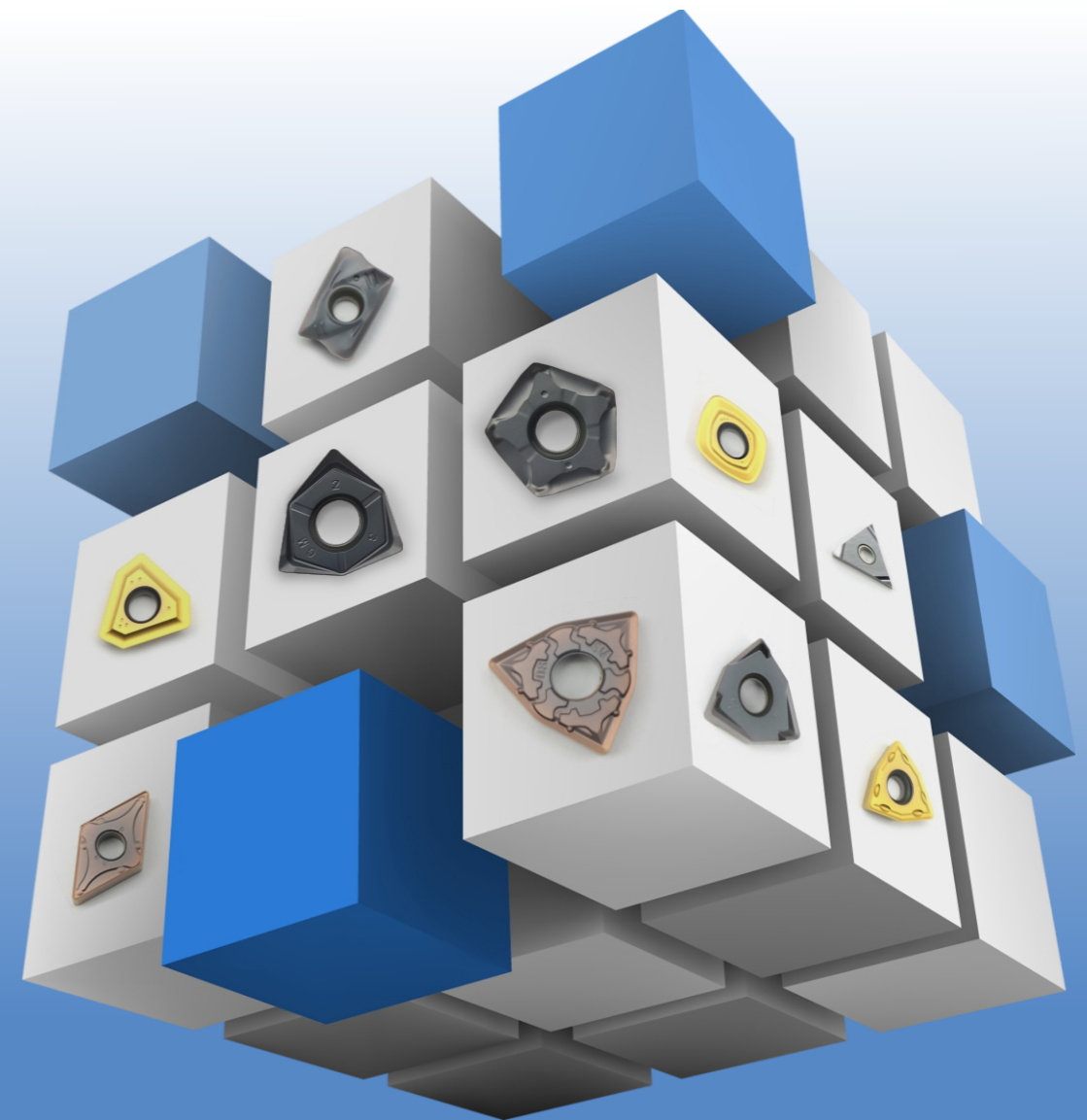


株洲山特科技有限公司

Zhuzhou Shante Technology Co., Ltd

数控刀片

CUTTING TOOLS





株洲山特科技有限公司

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ABOUT US
公司介绍

ABOUT US

株洲山特科技有限公司位于株洲国家高新技术开发区，公司是一家集硬质合金产品的研发、生产、销售为一体的企业。主要产品有硬质合金切削刀片、锯片、矿山工具、模具材料、硬质合金棒及非标硬质合金制品。广泛应用于模具工业、汽车工业、轨道交通、工程机械、3C工业、航空航天、能源设备、通用机械、石油化工等行业。高精度车削、铣削、镗销、钻削、切断切槽和螺纹绞削加工的数控刀片及配套刀具、硬质合金整体刀具及工具系统，并能根据客户的不同需求生产各类切削工具，为机械加工制造提供整体配套解决方案。

公司在硬质合金行业中享有较高的声誉。各种产品可以满足客户的不同需求。公司拥有一批经验丰富的技术人员，先进的硬质合金生产设备，一流的检测中心，配套精密模具生产线和深加工生产线。

Zhuzhou Shante Technology Co., Ltd. is located in Zhuzhou National High tech Development Zone. The company is an enterprise that integrates the research and development, production, and sales of hard alloy products. The main products include hard alloy cutting blades, saw blades, mining tools, mold materials, hard alloy rods, and non-standard hard alloy products. Widely used in the mold industry, automotive industry, rail transit, engineering machinery, 3C industry, aerospace, energy equipment, general machinery, petrochemical and other industries. CNC blades and supporting tools for high-precision turning, milling, boring, drilling, cutting grooves, and thread twisting, as well as hard alloy integrated tools and tool systems. We can produce various cutting tools according to different customer needs, providing overall supporting solutions for mechanical processing and manufacturing. The company enjoys a high reputation in the hard alloy industry. Various products can meet the different needs of customers.

The company has a group of experienced technical personnel, advanced hard alloy production equipment, first-class testing centers, supporting precision mold production lines and deep processing production lines.

EQUIPMENT
装备水平



EQUIPMENT

公司拥有从粉料、成型、烧结、研磨的完整刀片制造工艺装备生产线。压制成型采用国际上最先进的电动直驱自动压力机，其高精度满足了产品的高稳定性、高精度连续生产的要求。烧结方面，应用最能满足刀片质溢和外观质量要求的先进压力烧结设备。先进的研磨加工设备保证产品高精度的外观尺寸。涂层与巴尔查斯合作采用世界上最先进的物理涂层技术，保证产品性能进一步提高。全套世界一流生产设备保证每一片刀片在使用过程中达到始终如一。

The company has a complete blade manufacturing process and equipment production line from powder, forming, sintering, and grinding. The compression molding adopts the most advanced international electric direct drive automatic press, which meets the requirements of high stability and high-precision continuous production of the product with high precision. In terms of sintering, advanced pressure sintering equipment that can best meet the requirements of blade quality overflow and appearance quality is applied. Advanced grinding and processing equipment ensures the high-precision appearance and size of the product. The cooperation between coating and Balchals adopts the world's most advanced physical coating technology to ensure further improvement of product performance. The complete set of world-class production equipment ensures that each blade is consistently used.

»» 生产设备
PRODUCTION EQUIPMENT



»» 检测仪器
TESTING INSTRUMENT



硬质合金、涂层硬质合金和金属陶瓷牌号

Grade of Cemented Carbide, Coated Cemented Carbide and Cermet

牌号 Grade	性能及应用 Performance & Application
JGA05A	<p>高硬度的超微粒硬质合金基材与韧性和耐磨性都很好的特殊纳米涂层相结合，可提供具有锋利的切削刃和机械冲击性，是不锈钢的要求小公差和高表面质量的精加工牌号。</p> <p>High hardness superfine grain cemented carbide substrate, combined with special nano-coating with excellent toughness and wear resistance, It can provide sharp cutting edge and mechanical impact. Fine finishing grade for stainless steel cutting which requires small tolerance and high surface quality.</p>
JGA05F	<p>高硬度的超微粒硬质合金基材与韧性和耐磨性都极好的特殊纳米NEO PLUS涂层技术相结合，积层的间隔更薄，积层数的增加可抑制崩损等异常损伤，可同时实现长寿加工和优异的精加工面。适用不锈钢、耐热合金超精加工。</p> <p>High hardness superfine grain cemented carbide substrate, combined with nano NEO PLUS coating with excellent toughness and wear resistance. It can make the interval of lamination thinner, and the increase of lamination can inhibit the abnormal damage such as breakage, so as to achieve long life machining and excellent finishing surface at the same time. Superfine finishing grade for cutting stainless steel and heat-resisting alloy.</p>
JGA10A	<p>微细颗粒硬质合金基材上覆盖耐磨损性、抗氧化性能优良特殊纳米复合涂层，应用于硬料、不锈钢加工，高速加工有着优秀的寿命表现和稳定性。</p> <p>Fine grain cemented carbide substrate, covered with special nano-composite coating with excellent wear resistance and oxidation resistance. Used for cutting hard material and stainless steel. It has excellent stable performance in high speed processing.</p>
JGA20F	<p>NEO涂层系列JGA20F牌号，微细颗粒硬质合金基材上覆盖耐磨损性、抗氧化性能优良的Neo涂层技术，应用于硬料，不锈钢加工，多种钢材料，铸铁材料，高速加工有着优秀的寿命表现和稳定性。</p> <p>NEO coating series JGA20F grade, the fine grain cemented carbide substrate, covered with special nano-composite coating with excellent wear resistance and oxidation resistance. It is used for cutting hard material, stainless steel, various steel material and cast iron material. It has excellent stable performance in high speed processing.</p>
JGA20H	<p>微细颗粒硬质合金基材上覆盖耐磨损性、抗氧化性能优良特殊复合涂层，应用于硬料，不锈钢加工，多种钢材类，铸铁材料，高速加工有着优秀的寿命表现和稳定性。钻削类产品首选牌号。</p> <p>Fine grain cemented carbide substrate, covered with special composite coating with excellent wear resistance and oxidation resistance. Used for cutting hard material, stainless steel, various steel material, cast iron material. It has excellent stable performance in high speed processing. Preferred grade for drilling products.</p>

牌号 Grade	性能及应用 Performance & Application
JGM20S	<p>这种CVD涂层材质专门用于对奥氏体不锈钢材料进行中速、高速切削的精加工至一般加工。与特有槽型的结合可以避免切深处的破损，并且减少毛口的形成，减少微崩刃和积屑瘤的形成，并提高工作的精加工质量。</p> <p>CVD coating material, specially used for medium speed and high speed cutting of austenitic stainless steel from fine finishing to rough processing. The combination with the special groove type can avoid the breakage of the cutting depth, reduce the formation of the burrs, the micro avalanche edge and built-up edges, and improve the finishing quality of the work.</p>
JGM30S	<p>这种CVD复合涂层，基体为一种韧性极强的材料，用于加工条件极为苛刻的铸造不锈钢材料加工。基体可用于重型断续切削，涂层具有耐磨性，可以延长刀具寿命。经过抛光处理的表面可以避免积屑瘤的形成，可以进行大进给大切削的加工。</p> <p>CVD composite coating, the substrate is a very tough material, used in the processing of cast stainless steel materials under very harsh processing conditions. The substrate can be used for heavy-duty intermittent cutting, and the coating has good wear resistance and can prolong tool life. The polished surface can avoid the formation of built-up edges and can be machined with roughing feed and hard cutting.</p>
JGK10R	<p>硬的基体有很高的高温硬度，因此有良好的抗塑性变形性，用于灰铸铁和球墨铸铁材料的高速切削加工，具有一致的切削性能。这种基体允许刀片进行长时间的高速切削，刀片变形量很小，CVD厚涂层以及涂层去应力处理工艺使刀片具有卓越的耐磨性，确保刀具具有超长的使用寿命，是铸铁类高速切削的理想选择。</p> <p>The hard matrix has very good high temperature hardness, so it has good plastic deformation resistance. It is used for high speed cutting of gray cast iron and nodular iron materials, and has consistent cutting performance. CVD thick coating stress removal process can make the blades with excellent wear resistance and ensure the tool has long service life. It is an ideal choice for high speed cutting of cast iron.</p>
JGK20R	<p>一种经过特别增加韧性处理的MT-CVD, TiCN-Al₂O₃涂层，基体具有很好的耐磨性，增加了涂层的粘着性以及刀刃的强度，对灰铸铁和球墨铸铁材料进行湿式断续切削的理想材质。这种材质的应用范围广泛，从精加工到粗加工，在对高强度和加工可靠性有较高要求的加工中具有非常出色的加工效率。</p> <p>MT-CVD, TiCN-Al₂O₃ coating treated with special increased toughness. The substrate has good wear resistance, increases the adhesion of the coating and the strength of the blade, and is an ideal material for wet intermittent cutting of gray cast iron and nodular iron materials. This material has a wide range of applications from fine finishing to rough processing and has an excellent processing efficiency in the process which requires high strength and processing reliability.</p>

硬质合金、涂层硬质合金和金属陶瓷牌号

Grade of Cemented Carbide, Coated Cemented Carbide and Cermet

牌号 Grade	性能及应用 Performance & Application
JGP25T	<p>一种新型，具有很强的抗变形能力的富钴含量基材，专门设计的CVD复合涂层，用于对多种钢材料，铁素体，马氏体，PH不锈钢以及铸铁进行精加工至半精加工的应用范围。具有卓越的抗变形性能以及出色的刀片刃口强度，采用先进的涂层去应力处理工艺的新型涂层，具有出色的加工效率，超长并可以预测的刀具寿命，以及卓越的工作表面加工质量。</p> <p>A new type of cobalt-rich substrate with strong resistance to deformation and a specially designed CVD composite coating for finishing to semi-finishing applications of various steel materials, including ferrite, martensite, PH stainless steel and cast iron. With excellent deformation resistance and blade edge strength. A new coating with advanced coating stress removal process has excellent processing efficiency, predictable long tool life and excellent working surface processing quality.</p>
JGP25S	<p>一种特别设计的高钴硬质合金材质，以及具有出色的抗磨损性能的复合CVD厚涂层，用于多种工件材料，包括钢材料，铁素体、马氏体以及铸铁材料，钴基材料基体在抗变形性能和刀刃韧性之前有着良好的平衡性，厚涂层在高速切削中具有出色的耐磨性和抗月牙洼磨损性。光滑的涂层表面可以避免积屑和微崩刃现象，在苛刻的断续切削也具有很高的金属去除率。</p> <p>A specially designed high cobalt cemented carbide material. A composite CVD thick coating with excellent wear resistance, used in a variety of workpiece materials, including steel, ferrite, martensite and cast iron materials. Cobalt-based material matrix has a good balance before deformation resistance and blade toughness. Thick coating has excellent wear resistance and crescent wear resistance in high speed cutting. Smooth coating surface can avoid chip accumulation and micro avalanche edge. It has high metal removal rates in harsh intermittent cutting.</p>
JGP40T	<p>一种具有更高强度的基体，提供极好的切削刃安全性。用于恶劣工况下对钢件、铸钢件和铁素体/马氏体不锈钢件进行重型粗加工的CVD涂层硬质合金材质。基体与涂层的配合使刀片具有非常出色的韧性，并具有很高的安全操作性，刃线安全性使这种材质能够以高金属去除率进行断续切削。</p> <p>Cemented carbide substrate with higher strength and excellent cutting edge safety. CVD coated cemented carbide material, used for heavy-duty roughing of steel, cast steel and ferrite/martensitic stainless steel under adverse conditions. The combination of substrate and coating gives the blades excellent toughness and high safety operability. Edge line safety enables intermittent cutting with high metal removal rates.</p>

牌号 Grade	性能及应用 Performance & Application
JTN20	<p>金属陶瓷牌号，对金属陶瓷粘合剂（镍、钴）与特殊高熔点粘合剂进行特殊的强化混合技术，兼具优秀的抗崩损性与耐磨损性能，广泛覆盖钢的精加工到粗加工领域。</p> <p>Cermet grade, with the special mixing enhancement technology for cermet adhesive (nickel, cobalt) and special high melting point adhesive, it has excellent edge wear resistance, widely used in the field of steel cutting from fine finishing to rough processing.</p>
JTN35	<p>INNOVA系列金属陶瓷牌号，对金属陶瓷粘合剂（镍、钴）与特殊高熔点粘合剂进行特殊的强化混合技术，有效抑制切削时粘合剂的软化，具有良好的抗塑性变形性，此牌号没有涂层，保证了在整个刀具寿命期间都有锋利的切削刃，这意味着良好的表面质量和低切削力，这是在高速和低速条件下能保证高表面质量的精加工牌号。</p> <p>INNOVA series of cermet grades. with the special mixing enhancement technology of cermet adhesive (nickel, cobalt) and special high melting point adhesive, it is used to effectively inhibit the softening of adhesive during cutting, and has good plastic deformation resistance. This grade has no coating and ensures sharp cutting edges throughout the tool life, which means good surface quality and low cutting force. This is the fine finishing grade which can guarantee high surface quality under high speed and low speed conditions.</p>
JGU30A	<p>微细颗粒硬质合金材质，在切削铸铁，稀有合金和有色金属工件时，具有出色的抗刃口磨损性能，以及很高的强度，具有出色的热变形和抗破损的性能，晶粒结构的控制非常出色，从而具有更长的使用寿命，以及更可靠的性能。</p> <p>The fine grain cemented carbide material. It has excellent edge wear resistance as well as very high strength, excellent thermal deformation and anti-cutting damage performance in cutting cast iron, rare alloy and non-ferrous metal workpiece. The control of grain structure is excellent, thus having longer service life and more reliable performance.</p>

普通铣削刀片命名规则

Naming Rules of Milling Inserts

A 85°	B 82°	C 80°	D 55°	E 75°
H 120°	K 55°	L 90°	M 86°	O 135°
P 108°	R 360°	S 90°	T 60°	V 35°
W 80°	Z 其他			

形状代号

代号	有无孔	有无断屑槽	刀片剖面	代号	有无孔	有无断屑槽	刀片剖面
B	有	无		N	无	无	
H	有	单面		R	无	单面	
C	有	无		F	无	双面	
J	有	双面		A	有	无	
W	有	无		M	有	单面	
T	有	单面		G	有	双面	
Q	有	无		X	—	—	特殊
U	有	双面					

断屑槽及夹固形式

内切圆直径 (mm)	C	D	R	S	T	V	W
3.97					06		
5.0							
5.56			05		09		
6.0							
6.35	06	07			11	11	
8.0			08				
9.525	09	11	09	09	16	16	06
10.0							
12.0							
12.7	12	15	12	12	22	22	08
15.875	16		15	15	27		
16.0			16				
19.05	19		19	19	33		
20.0			20				
25.0	25	25	25				
25.4			25	25			
31.75			31				
32			32				

切削刃长度

代号	刀片厚度 (mm)
00	0.79
T0	0.99
01	1.59
T1	1.98
02	2.38
T2	2.58
03	3.18
T3	3.97
04	4.76
T4	4.96
05	5.56
T5	5.95
06	6.35
T6	6.75
07	7.94
09	9.52
T9	9.72
11	11.11
12	12.70

刀片厚度

S **P** **K** **N**

12 **04** **ED** **T21** **R** - **NR8**

代号	后角(度)	代号	后角(度)
A	3°	B	5°
C	7°	D	15°
E	20°	F	25°
G	30°	N	0°
P	11°	O	其他后角

代号	刀尖高度m公差 (mm)	内切圆 ϕ 1.C公差 (mm)	厚度S ₁ 公差 (mm)	(参考)M级精度详细情况 (按形状、大小分)
A	±0.005	±0.025	±0.025	● 刀尖高度公差 (mm)
F	±0.005	±0.013	±0.025	内切圆 正三角形 正方形 80°菱形 55°菱形 35°菱形 圆形
C	±0.013	±0.025	±0.025	6.35 ±0.08 ±0.08 ±0.08 ±0.11 ±0.16 —
H	±0.013	±0.013	±0.025	9.525 ±0.08 ±0.08 ±0.08 ±0.11 ±0.16 —
E	±0.025	±0.025	±0.025	12.7 ±0.13 ±0.13 ±0.13 ±0.15 — —
G	±0.025	±0.025	±0.13	15.875 ±0.15 ±0.15 ±0.15 ±0.18 — —
J	±0.005	±0.05-±0.13	±0.025	19.05 ±0.15 ±0.15 ±0.15 ±0.18 — —
K	±0.013	±0.05-±0.13	±0.025	25.4 — ±0.18 — — — —
L	±0.025	±0.05-±0.13	±0.025	● 内切圆 ϕ 1.C公差 (mm)
M	±0.08-±0.18	±0.05-±0.13	±0.13	内切圆 正三角形 正方形 80°菱形 55°菱形 35°菱形 圆形
N	±0.08-±0.18	±0.05-±0.13	±0.025	6.35 ±0.05 ±0.05 ±0.05 ±0.05 ±0.05 —
U	±0.08-±0.18	±0.08-±0.25	±0.13	9.525 ±0.05 ±0.05 ±0.05 ±0.05 ±0.05 ±0.05
				12.7 ±0.08 ±0.08 ±0.08 ±0.08 — ±0.08
				15.875 ±0.10 ±0.10 ±0.10 ±0.10 — ±0.10
				19.05 ±0.10 ±0.10 ±0.10 ±0.10 — ±0.10
				25.4 — ±0.13 — — — ±0.13

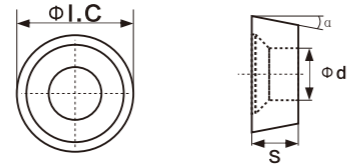
代号	后角(度)	代号	后角(度)
A	45°	A	3°
D	60°	B	5°
E	75°	C	7°
F	85°	D	15°
P	90°	E	20°
Z	其他	F	25°
		G	30°
		N	0°
		P	11°
		Z	其他

代号	后角(度)	代号	后角(度)
F	0-5°	K	0-0.10
E	1-10°	P	1-0.15
T	2-15°	W	2-0.20
S	3-20°		3-0.25
	4-25°		4-0.30
	5-30°		5-0.35
	6-40°		6-0.40
	7-45°		7-0.45

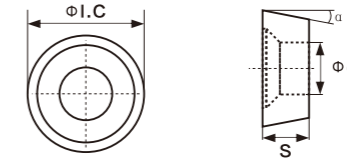
代号	断屑槽型
R	右
L	左
N	双向

代号	切削方向
R	右
L	左
N	双向

RCKT/RCMX



RPMW/ RPMT



A

铣削刀片
Milling Inserts

刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)			牌号 Grade						
		φI.C	S	φd	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	RCKT 10T3MO-DS3	10	3.97	4.4							●
	RCKT 1204MO-DS3	12	4.76	4.0							●
	RCMX 1204MO	12	4.76	4.2		●	●	○			
	RCMX 1606MO	16	6.35	5.2		●	●	○			
	RCKT 1606MO	16	6.35	5.2		●	●	○			
	RCKT 1606MO-ER	16	6.35	5.2			●			●	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

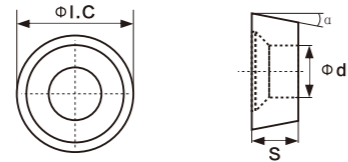
A

铣削刀片
Milling Inserts

刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)			牌号 Grade						
		φI.C	S	φd	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	RPMW 08T2MOT	8	2.38	3.5		●	●	○			
	RPMW 1003MO	10	3.18	4.6		●	●	○			
	RPMW 10T3MO	10	3.97	4.6		●	●	○			
	RPMW 1204MO	12	4.76	4.4		●	●	○			
	RPMT 08T2MO-JS	8	2.58	3.3					●	●	
	RPMT 10T3MO-JS	10	3.97	4.4					●	●	
	RPMT 1204MO-JS	12	4.76	4.4					●	●	
	RPMT 1204MO-DL	12	4.76	4.4		●		●			

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

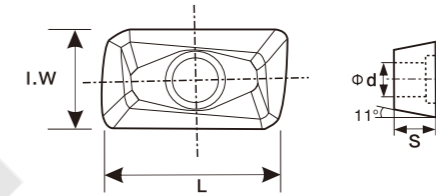
RDMW/RDMT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)			牌号 Grade						
		φI.C	S	φd	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	RDMW 1204MO-NR8	12	4.76	4.4		●	●				
	RDMW 1605MO-NR8	16	5.56	5.5		●	●				
	RDMW 1204MO	12	4.76	4.4		●	○				
	RDMW 1604MO	16	4.76	5.0		●	○				
	RDMW 1605MO	16	5.56	5.5		●	○				
	RDMT 0802MO-TN	8	2.38	3.5		●	○				
	RDMT 10T3MO-TN	10	3.97	4.5		●	○				
	RDMT 1204MO-TN	12	4.76	4.7		●	○				

● 主推牌号 ○ 一般牌号 ○ 可生产牌号

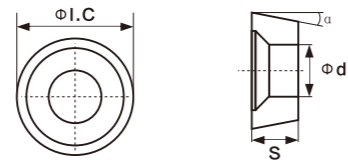
APMT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		L	I.W	S	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	APMT 1135PDER-M2	11.32	6.20	3.5	2.8	0.8		●	●		○		
	APMT 1604PDER-M2	17.21	9.26	4.76	4.4	0.8		●	●		○		
	APMT 1135PDER-H2	11.22	6.20	3.5	2.8	0.8		●	●		○		
	APMT 1604PDER-H2	17.25	9.23	4.76	4.4	0.8		●	●		○		
	APMT 1135PDER-DL	11.22	6.20	3.5	2.8	0.8		●		●	○		
	APMT 1604PDER-DL	17.27	9.30	4.76	4.4	0.8		●		●	○		

● 主推牌号 ○ 一般牌号 ○ 可生产牌号

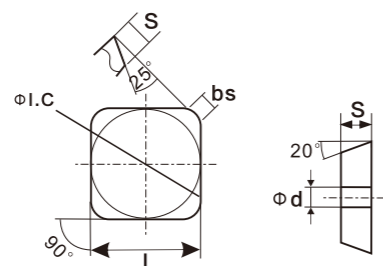
RXXM



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)			牌号 Grade						
		φI.C	S	φd	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	RXXM 1003MO-M	10	3.18	4.0		●	○				
	RXXM 12T3MO-M	12	3.97	4.0		●	○				

● 主推牌号 ○ 一般牌号 ○ 可生产牌号

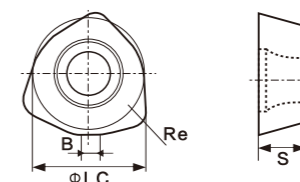
SEEN/SEET/SPKN



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)			牌号 Grade						
		L	φI.C	S	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	SEEN 1203AFTN	12.7	12.7	3.18							●
	SEEN 1504AFTN	15.875	15.875	4.76							●
	SEET 120308PER	13.308	13.308	4.04							●
	SPKN 1203ERER	12.7	12.7	3.18			●		●		●
	SPKN 1203EDEL	12.7	12.7	3.18			●		●		

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

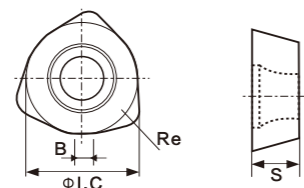
WDMW



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)				牌号 Grade						
		φI.C	S	B	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	WDMW 06T320ZTR	10.00	3.97	1.20	2.00			●			○	
	WDMW 080520ZTR	13.00	5.56	1.50	2.00			●			○	
	WDMW 10X620ZTR	13.00	6.00	1.20	2.00			●			○	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

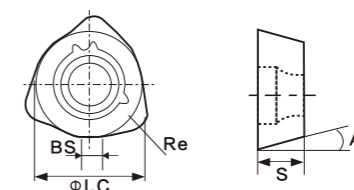
WPMT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)				牌号 Grade						
		φI.C	S	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	WPMT 060415	9.525	4.20	4.4	1.5			●			●	
	WPMT 080615	12.85	6.35	5.5	1.5			●			●	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

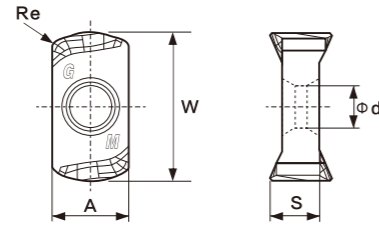
JDMW



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)				牌号 Grade						
		φI.C	S	BS	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	JDMW 09T320SR	9.53	3.97	1.80	2.00			●			○	
	JDMW 120420SR	13.00	5.56	1.50	2.00			●			○	
	JDMW 140520SR	13.00	6.00	1.20	2.00			●			○	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

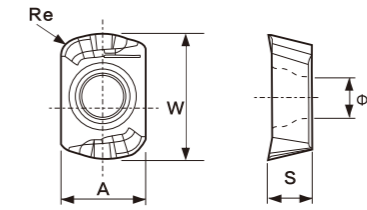
LNMU/LOGU



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		A	S	φd	W	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	LNMU 0303ZER-MJ	6.0	3.75	2.85	6.0	1.2		●	●			○	
	LNMU 0303ZER-ML	6.0	3.75	2.85	6.0	1.2		●	●			○	
	LOGU 030310ER-GM	6.0	3.96	3.45	6.0	1.0		●	●			○	

● 主推牌号 ● 一般牌号 ○ 可生产牌号

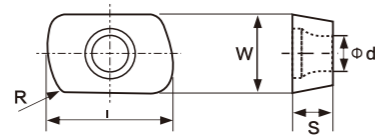
LPGT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		A	S	φd	W	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	LPGT 010210ER-GM	4.19	2.19	2.10	6.26	1.0	●	●					

● 主推牌号 ● 一般牌号 ○ 可生产牌号

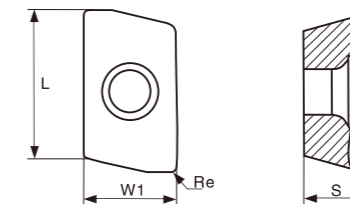
EPMT/EPNW



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		R	I	S	W	φd	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	EPMT 0603TN-8	8.0	10.00	3.18	6.35	2.8	○	●	●				
	EPNW 0603TN-8	8.0	10.00	3.18	6.35	2.8	○	●	●				

● 主推牌号 ● 一般牌号 ○ 可生产牌号

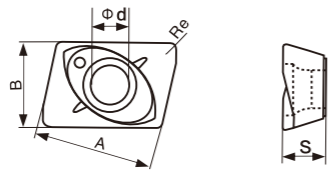
XOMX



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		W1	L	S	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	XOMX 10T308TR-M09	6.9	9.3	3.83	3.50	0.8	○	●	●				
	XOMX 120408TR-M12	8.20	11.60	5.07	3.85	0.8	○	●	●				
	XOMX 120412TR-M08	8.20	11.60	5.07	3.85	2.0	○	●	●				

● 主推牌号 ● 一般牌号 ○ 可生产牌号

JDMT



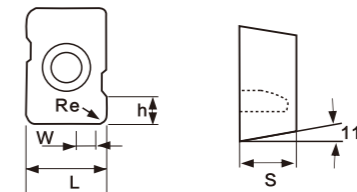
A

铣削刀片
Milling Inserts

刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		W1	L	S	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	JDMT 070204R	6.40	4.30	2.45	2.15	0.40	●	●	○				
	JDMT 070208R	6.40	4.30	2.45	2.15	0.80	●	●	○				

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

MPHW



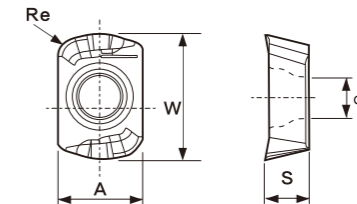
A

铣削刀片
Milling Inserts

刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		L	W	S	h	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	MPHW 060304ZEL	6.35		3.18	3	0.4	●	●	○				
	MPHW 060308ZEL	6.35		3.18	3	0.8	●	●	○				
	MPHW 060304ZEL-0.5	6.35	0.5	3.18	3	0.4	●	●	○				
	MPHW 060308ZEL-1.5	6.35	1.5	3.18	3	0.8	●	●	○				

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

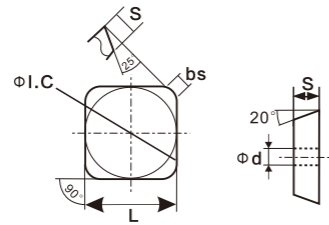
BLMP



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		A	S	φd	W	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	BLMP 0603R-M	6.39	3.73	4.4	9.0	1.0	●	●					
	BLMP 0904R-M	9.2	4.79	5.6	11.9	1.5	●	●					

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

SEMR/SEKR

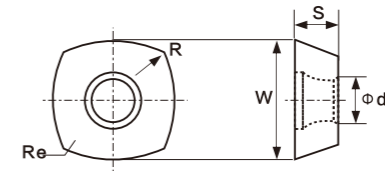


刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		L	φI.C	S	φd	BS	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	SEMR 1203AFTN	12.7	12.7	3.18	2.3	2.0			●		●	○	
	SEMR 1504AFTN	15.875	15.875	4.76	3.2	2.2			●		●	○	
	SEKR 1203AFTN	12.7	12.7	3.18	2.3	2.0			●		●	○	

● 主推牌号 ● 一般牌号 ○ 可生产牌号

快进给系列

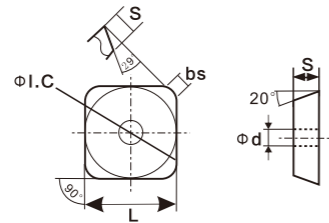
SDMT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		R	S	W	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	SDMT 120512-GM	15.0	5.56	12.7	4.4	1.2		●	●			○	
	SDMT 150512-GM	15.0	5.56	15.587	4.4	1.2		●	●			○	
	SDMT 1205ZDTN-R15	15.0	5.56	12.7	4.4	1.2		●	●			○	
	SDMT 1505ZDTN-R15	15.0	5.56	15.587	4.4	1.2		●	●			○	

● 主推牌号 ● 一般牌号 ○ 可生产牌号

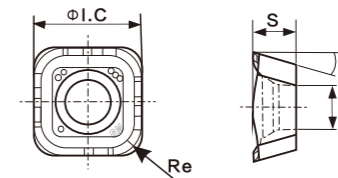
SEMT/SEKT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		φI.C	S	φd	BS	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	SEMT 13T3AGSN-GM	13.4	3.97	4.3	1.9	1.5		●	●			○	
	SEKT 1204AFTN-DR7	12.7	4.76	5.2	2.0	2.5		●	●			○	

● 主推牌号 ● 一般牌号 ○ 可生产牌号

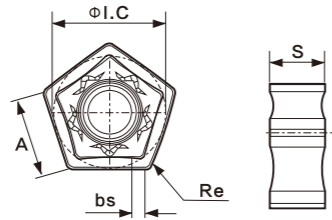
SOMT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		φI.C	S	φd	Re	α	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	SOMT 100420ER-GM	10.30	4.58	4.6	2.0	16		●	●			○	
	SOMT 140520ER-GM	14.14	5.56	5.8	2.0	16		●	●			○	

● 主推牌号 ● 一般牌号 ○ 可生产牌号

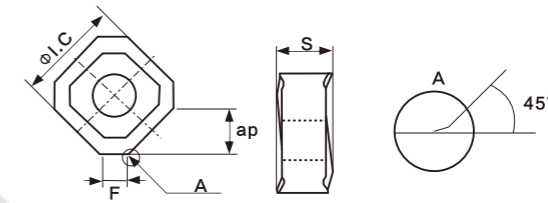
PNMU



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		phi I.C	A	S	BS	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	PNMU 0905XNER-GM	12.20	8.90	6.0	1.40	0.8		●	●			○	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

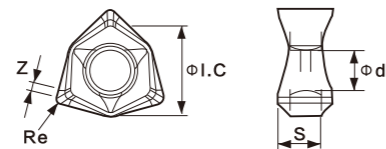
SNMX/SNGX



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		phi I.C	S	ap	BS	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	SNMX 1306ENTN-M	13.5	6.8	9.5	2.2	0.4			●			●	
	SNGX 1306ANTN-M	13.5	7.0	9.5	2.2	0.4			●		○		
	SNMX 1205ANN-F5	12.7	6.4	-	1.5	-			●			●	
	SNMX 120512-F2	12.7	6.4	-	-	1.2			●		○		

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

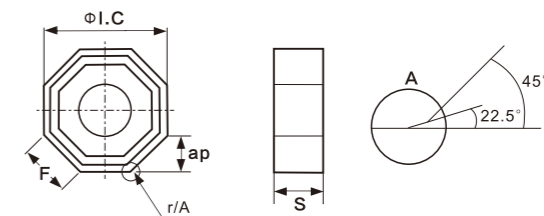
WNMU



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		phi I.C	S	phi d	BS	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	WNMU 040304EN-GM	6.75	3.18	3.18	0.60	0.4			●		○		
	WNMU 080608EN-GM	14.02	6.65	6.20	1.30	0.8			●		○		
	WNMU 040304EN-GH	6.75	3.18	3.18	0.60	0.4			●		○		
	WNMU 080608EN-GH	14.02	6.65	3.20	1.30	0.8			●		○		

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

ONMU

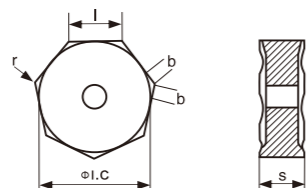



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		phi I.C	S	ap	BS	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	ONMU 050505-TN	13.0	5.5	3.5	5.0	0.5			●			●	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

负型七边形铣刀片

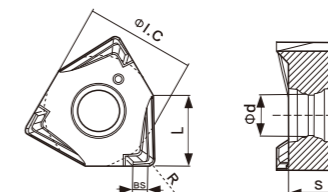
XNMU




刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		φI.C	S	ap	BS	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	XNMU 060508-MT	13.7	6.0	3.0	-	0.8			●				
	XNHU 0906ANTN-MM	18.5	6.35	5.0	1.0	1.0			●				

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

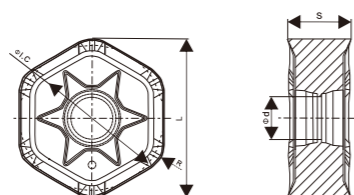
XNEX

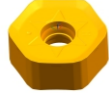


刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		φI.C	S	L	BS	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	XNEX 040304TR-EM8	6.75	3.29	4.0	0.8	0.4			●			●	
	XNEX 080608TR-NR3	14.02	6.45	7.5	1.3	0.8			●			●	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

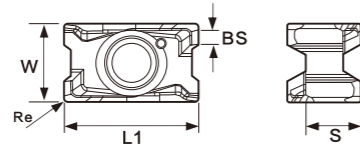
HNGX



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		φI.C	S	φd	ap	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	HNGX 0604ANSN-M	10.5	4.76	3.7	3.0	0.8			●			●	
	HNGX 0906ANSN-M	16.5	6.35	4.9	5.0	0.8			●			●	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

LNPU/LNGU

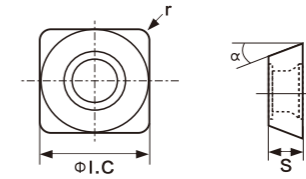


刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		L1	S	W	BS	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	LNPU 110408SR-NR8	12.10	4.83	6.60	0.90	0.8		○	●			●	
	LNPU 15T608SR-NR8	16.90	6.96	10.00	1.80	0.8		○	●			●	
	LNGU 110408ER-DR7	12.16	4.83	6.60	1.00	0.8		○	●			●	
	LNGU 15T608ER-DR7	17.01	6.96	10.00	1.80	0.8		○	●			●	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

玉米铣刀系列

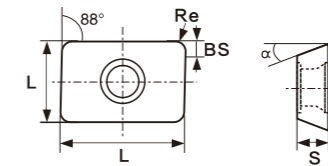
SPMT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)				牌号 Grade						
		ΦI.C	S	Φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	SPMT 120408	12.70	4.76	5.5	0.8			●	●		○	
	SPMT 120608	12.70	6.35	5.5	0.6			●	●		○	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

LPMT

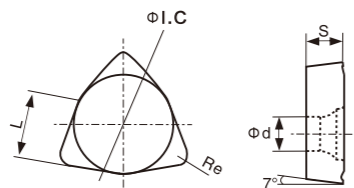


刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		ΦI.C	L	S	BS	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	LPMT 150412	12.7	15.88	4.76	1.6	1.2		●	●				
	LPMT 150612	12.7	15.88	6.35	-	1.2		●	●				

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

浅孔钻系列

WCMX/WCMT

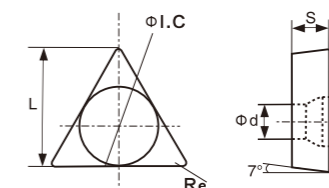


刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)				牌号 Grade						
		φI.C	S	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	WCMX 030208-FN	5.56	2.38	2.80	0.8		●		●			
	WCMX 040208-FN	6.35	2.38	2.80	0.8		●		●			
	WCMT 050308-FN	7.94	3.18	3.40	0.8		●		●			
	WCMT 06T308-FN	9.53	3.97	3.80	0.8		●		●			
	WCMT 080412-FN	12.70	4.76	4.40	1.2		●		●			

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

深孔钻系列

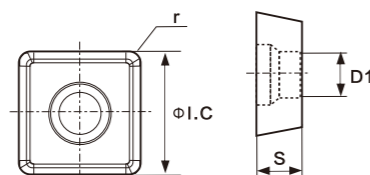
TPMT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		φI.C	L	S	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	TPMT 16T312R-22	9.53	16.50	3.97	3.4	1.2				●		○	
	TPMT 220612R-22	12.70	22.00	6.35	4.4	1.2				●		○	
	TPMT 16T312R-23	9.53	16.50	3.97	3.4	1.2				●		○	
	TPMT 220612R-23	12.70	22.00	6.35	4.4	1.2				●		○	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

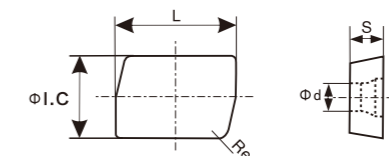
SPMG



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)				牌号 Grade						
		φI.C	S	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	SPMG 050204-DG	5.00	2.38	2.25	0.4		○	●				
	SPMG 060204-DG	6.00	2.38	2.61	0.4		○	●				
	SPMG 07T308-DG	7.94	3.97	2.85	0.8		○	●				
	SPMG 090408-DG	9.80	4.30	4.05	0.8		○	●				
	SPMG 110408-DG	11.50	4.80	4.45	0.8		○	●				
	SPMG 140512-DG	14.30	5.20	5.75	1.2		○	●				

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

R424.9

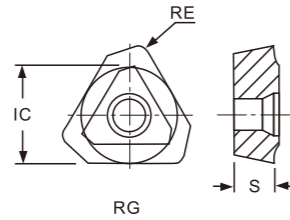


刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		φI.C	L	S	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	R424.9-13T308-22	10.00	14.70	3.97	3.4	0.8				●		○	
	R424.9-180608-22	11.50	20.60	6.35	4.4	0.8				●		○	
	R424.9-13T308-23	10.00	14.70	3.97	3.4	0.8				●		○	
	R424.9-180608-23	11.50	20.60	6.35	4.4	0.8				●		○	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

深孔钻系列

TPMX

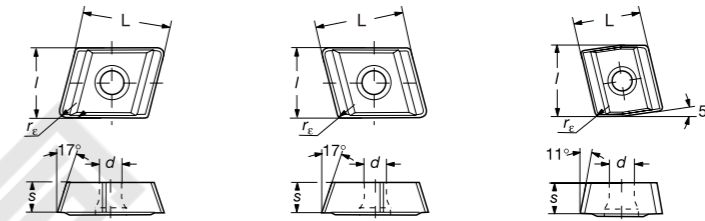


刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		φI.C	L	S	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	TPMX 140308R-G	8.45	3.50	0.80					●				
	TPMX 170408R-G	10.30	4.00	0.80					●				
	TPMX 240512R-G	14.20	5.50	1.20					●				
	TPMX 280716R-G	17.00	7.50	1.60					●				

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

深孔钻系列

R800.24



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade						
		φI.C	L	S	φd	Re	JGA05A	JGA10A	JGA20F	JGA20H	JGM20S	JGM30S	JTN35
	R800.24-06T308M-CG	9.87	6.35	3.97	2.80	0.80				●			
	R800.24-08T308M-CG	9.87	7.94	3.97	2.80	0.80				●			
	R800.24-10T308M-CG	9.87	9.53	3.97	2.80	0.80				●			
	R800.24-12T308M-CG	9.87	12.70	3.97	2.80	0.80				●			
	R800.24-06T308M-IG	9.87	6.35	3.97	2.80	0.80				●			
	R800.24-08T308M-IG	9.87	7.94	3.97	2.80	0.80				●			
	R800.24-12T308M-IG	9.87	12.70	3.97	2.80	0.80				●			
	R800.24-08T308M-PG	8.50	9.00	3.97	2.80	0.80				●			
	R800.24-09T308M-PG	9.68	9.00	3.97	2.80	0.80				●			
	R800.24-11T308M-PG	12.75	9.00	3.97	2.80	0.80				●			

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

铣削加工常见问题及解决方案

Common Problems and Solutions In Milling

A

铣削刀片
Milling Inserts

常见问题 Main problem	选择条件 Selection condition	刀具材料选择 Selection of Tool material		切削条件 Cutting Condition			
		硬度更高的材料 Material with higher hardness	韧性好的材料 material with good toughness	切削速度 cutting speed	进给 feeding	切深 cutting depth	改变铣刀直径与宽度 Change diameter and width of milling tools
刀尖的损伤 Knife-point Damage	后刀面磨损 Flank wear	切削条件不合适 Cutting condition is not suitable		↓			
		切削刃几何形状不合适 Cutting edge geometry is not appropriate	✓				
	前刀面磨损大 Front edge wear	切削条件不合适 Cutting condition is not suitable		↓	↓	↓	
		切削刃几何形状不合适 Cutting edge geometry is not appropriate	✓				
	切削刃破损 Cutting edge wear	切削条件不合适 Cutting condition is not suitable			↓	↓	
		切削刃几何形状不合适 Cutting edge geometry is not appropriate	✓				
热冲击破损 Thermal shock damage	切削条件不合适 Cutting condition is not suitable			↓	↓	↓	
	切削刃几何形状不合适 Cutting edge geometry is not appropriate						
积屑瘤粘结 Built-up Edge Bonding	切削条件不合适 Cutting condition is not suitable			↑	↑		
	切削刃几何形状不合适 Cutting edge geometry is not appropriate						
表面粗糙度大 Surface roughness	刀具磨损铣刀振动大 Tool wear, milling vibration	✓		↑	↓	↓	
产生毛刺 Burrs	切削条件不合适 Cutting condition is not suitable			↓	↓	↓	✓
	切削刃几何形状不合适 Cutting edge geometry is not appropriate						
产生塌边 Collapse	切削条件不合适 Cutting condition is not suitable				↓	↓	
	切削刃几何形状不合适 Cutting edge geometry is not appropriate						
平面度平行度恶化 Flatness and parallelism deterioration	切削刃几何形状不合适 Cutting edge geometry is not appropriate				↓	↓	
振动大 Vibration	切削条件工艺不合适 Cutting condition is not suitable			↓	↓	↓	✓
其他 Others	切屑缠绕堵塞 Cutting Wound Blocking	切削条件不合适 Cutting condition is not suitable		↑	↑↓		✓
		切削刃几何形状不合适 Cutting condition is not suitable					

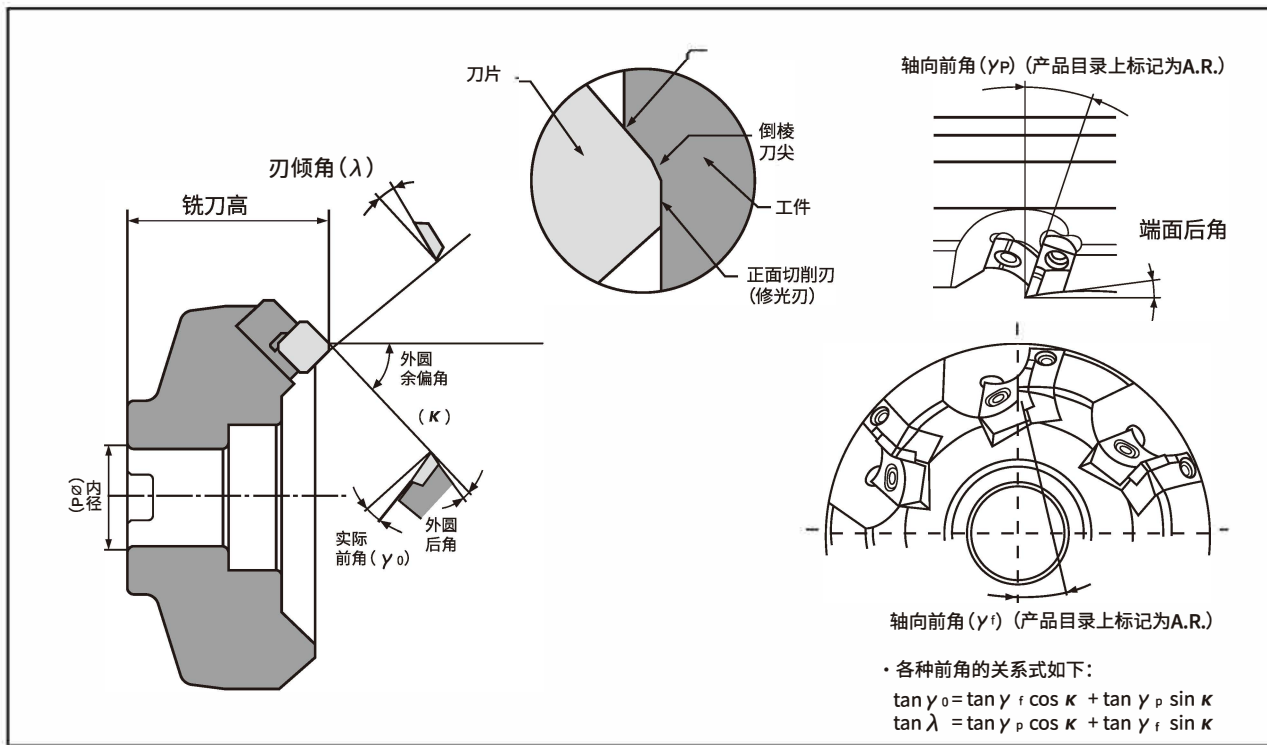
A

铣削刀片
Milling Inserts

切削液 Cutting fluid	前角 front angle	主偏角 cutting edge angle	切削刃强度 cutting edge strength	齿数 number of teeth	增大容屑空间 increase chip-void space	检查副切削刃几何形状 increase cutting edge geometry	检查端面跳动 checking end-face runout	提高刀具刚性 improve blade rigidity	机床装夹 Machine tool clamping			
									工件刀柄装夹 Workpiece holder clamping	刀柄悬伸 Tool holder overhanging	动力、机床间隙 Power machine clearance	
✓												
	↑		↓									
✓												
	↑	↓	↓									
			↓	↑		✓	✓	✓	✓	✓	✓	✓
✓												
	↑		↓									
✓						✓	✓					
	↑	↑	↓			✓						
	↑	↑	↓					✓	✓	✓	✓	✓
✓				↓								
	↑			↓	✓							

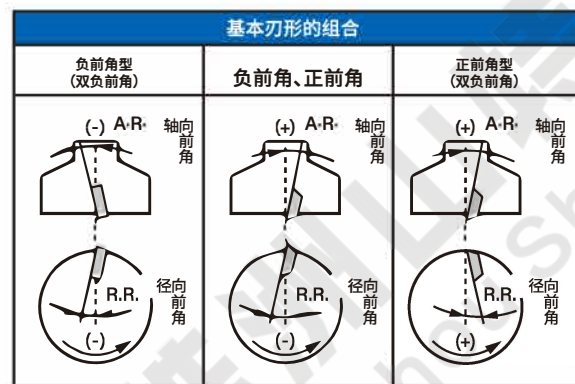
铣削刀具

■ 面铣刀各部分名称



■ 刀尖角度和工件材料的适应性

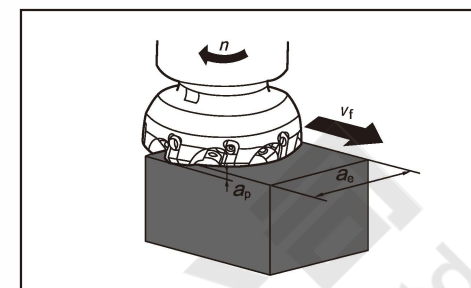
条件		刀尖角度的适应性		
		双负前角	负前角、正前角	双正前角
切削刃形状	γ_p (A.R.)	-	+	+
	γ_f (R.R.)	-	-	+
	γ_o	-	+	+
工件材料	碳钢、合金钢 (<300HB)	△	◎	◎
	不锈钢 (<300HB)	×	◎	○
	模具钢 (<300HB)	△	◎	○
	铸铁、球墨铸铁	◎	○	○
	铝合金	×	○	◎
	铜、铜合金	×	○	◎
	钛、钛合金	×	○	○
高硬度材料 (40~55HRC)	○	○	×	
特征		· 刀尖强度高 · 刀片使用的刀尖数多	· 断屑性能良好 · 刀尖强度、切削性能的平衡性优良	· 切削性能最好



铣削刀具

■ 铣削加工的计算式

● 切削速度



● 由转数求切削速度

$$v_c = \frac{\pi \times \phi D_c \times n}{1000} \quad (\text{m/min})$$

v_c : 切削速度 (m/min)
 ϕD_c : 刀尖直径 (mm)
 n : 转数 (min^{-1})
 $\pi \approx 3.14$

● 由切削速度求转数

$$n = \frac{1000 \times v_c}{\pi \times \phi D_c} \quad (\text{min}^{-1})$$

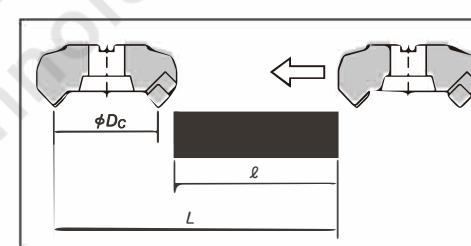
● 进给速度 (工作台进给量) 和每齿进给量的求解方法

$$v_f = f_z \times z \times n \quad (\text{mm/min})$$

v_f : 进给速度 (mm/min)
 f_z : 每齿进给量 (mm/t)
 z : 铣刀齿数
 n : 转数 (min^{-1})

铣刀和工件的相对速度, 在一般铣床上是工作台的移动速度。在铣削中, 每齿进给量很重要。标准切削条件也是由切削速度和每齿进给量来体现的。

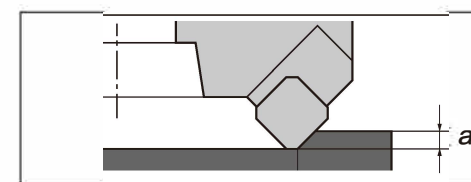
● 切削时间的计算



$$T = \frac{L}{V_f} \quad (\text{min})$$

T : 切削时间 (min)
 L : 工作台总进给长度。
 (L : 被切削部分的长度 (mm) + ϕD_c : 刀具直径 (mm))
 V_f : 进给速度 (mm/min)

■ 切深和切宽



● 切深

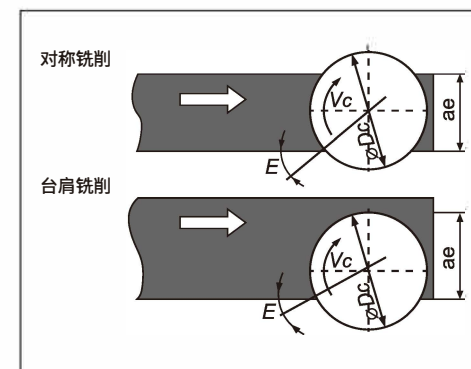
由必要的切削余量、机床的能力来决定。使用 ZJG 刀片是由刀片形状、尺寸确定极限切深量。请参照产品目录中的数值。

a_p : 切深 (mm)

● 切削宽度和压力角

根据铣刀直径、铣刀的切削位置、工件材料等有一个适当的压力角, 在一般条件下将下表的数值作为目标值。

ϕD_c : 铣刀刀尖直径 (mm)
 E : 压力角
 a_e : 切削宽度 (mm)



对称铣削

工件材料	适当的 E 值	铣刀直径和 a_e
钢	~42°	$a_e \approx \frac{2}{3} \phi D_c$
铸铁	~53°	$a_e \approx \frac{4}{5} \phi D_c$

台肩铣削

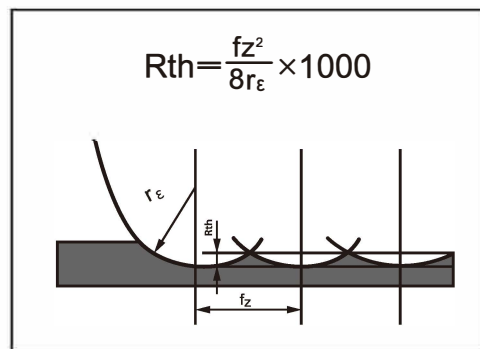
工件材料	适当的 E 值	铣刀直径和 a_e
钢	~30°	$a_e \approx \frac{3}{5} \phi D_c$
铸铁	~40°	$a_e \approx \frac{3}{4} \phi D_c$

铣削刀具

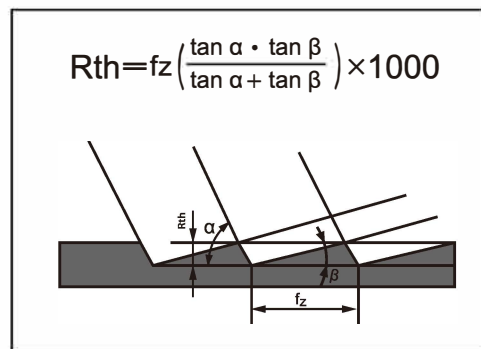
■ 铣削表面粗糙度

(1) 理论表面粗糙度
理论粗糙度如下图所示，与单刀车削相同。

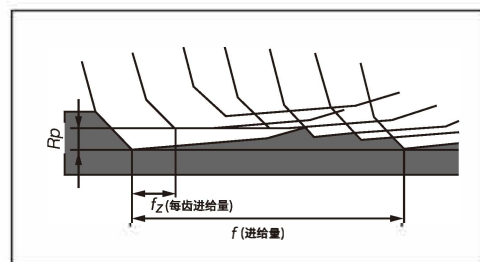
● 有刀尖圆弧半径 r_{ϵ} 时



● 无刀尖圆弧半径 r_{ϵ} 时

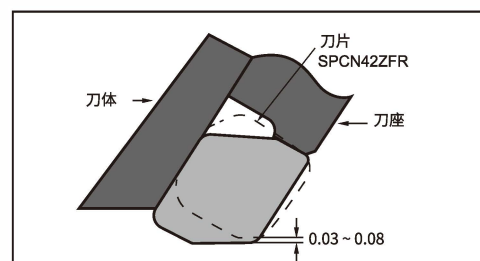


R_{th} : 理论粗糙度 (um)
 f_z : 每齿进给量 (mm/t)
 r_{ϵ} : 刀尖圆弧半径 (mm)
 α : 余偏角
 β : 副偏角



(2) 实际表面粗糙度
实际的铣刀刀齿多，各齿之间有高低差别。把其中最大的差叫做“偏摆”或“跳动” (Rp)。多刀齿的粗糙度如左图所示，比单齿切削的大。只有一个刀齿突出时，与单齿切削相似，把 f_z (mm/t) 换算成 f (mm/rev) 后的数值变大，并由那个刀齿来承受所有的负荷。

改善加工面粗糙度



要提高表面粗糙度，必须把端面偏摆(端跳)控制在极小的范围，把 f (mm/rev) 设定在端面切削刃(修光刃)宽度的90%以内。要得到效率更高、粗糙度更好的表面，有以下的方法。

- (1) 使用普通铣刀时
安装一片如左图所示的有修光刃刀片使用。
- (2) 使用精铣用铣刀

铣削刀具

■ 所需功率的计算

$$P_C = \frac{k_c \times a_p \times a_e \times V_f}{60 \times 1000 \times 1000}$$

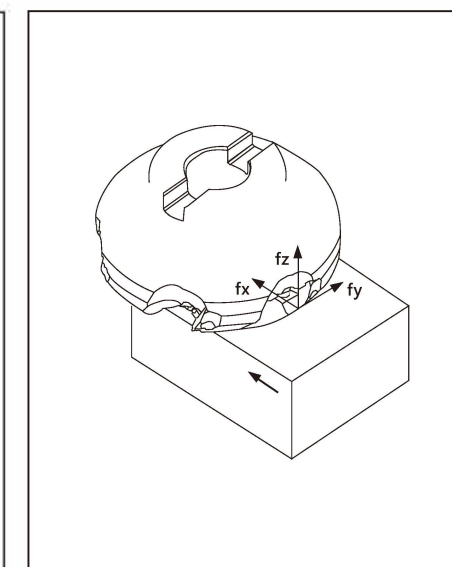
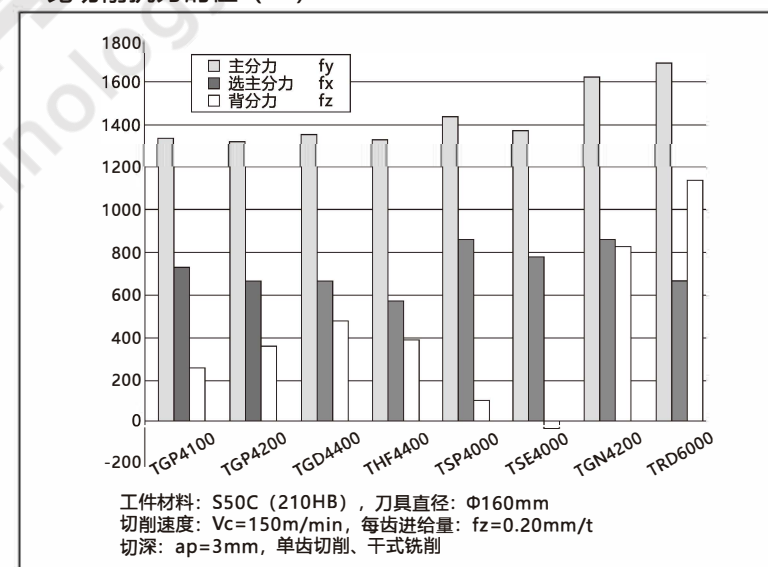
P_C : 所需功率 (KW)
 k_c : 比切削抗力 (N/mm²)
 [参见下表]
 a_p : 切深 (mm)
 a_e : 切宽 (mm)
 V_f : 进给速度 (mm/min)

实际功率随ZJIG铣刀种类(实际前角成正比)、使用机床的电机效率而异。请把前述结果作为目标值。

● 比切削抗力的值 (k_c)

工件材料 (JIS)	抗拉强度 Mpa	对应各单齿进给量值的比切削抗力值 k_c (N/mm ²)				
		0.1 (mm/t)	0.15 (mm/t)	0.2 (mm/t)	0.3 (mm/t)	0.4 (mm/t)
SS400	520	2150	2000	1900	1750	1650
S55C	770	1970	1860	1800	1760	1620
SCM435	730	2450	2350	2200	1980	1710
SKT4	(Hb352)	2030	2010	1810	1680	1590
SC450	520	2710	2530	2410	2240	2120
FC250	(Hb200)	1660	1450	1320	1150	1030
Al(Si)	200	660	580	522	460	410
黄铜	500	1090	960	877	760	680

● 比切削抗力的值 (k_c)



● 转速速查表

铣刀直径 ΦD_c (mm)	切削速度 (V_c) m/min												
	10	30	50	100	125	150	200	300	500	800	1000	2000	4000
10	318	955	1592	3184	3980	4777	6369	9554	15923	25477	31847	63694	127388
12	265	796	1326	2653	3317	3980	5307	7961	13269	21231	26539	53078	106157
16	199	597	995	1990	2488	2985	3980	5971	9952	15923	19904	39808	79617
20	159	477	796	1592	1990	2388	3184	4777	7961	12738	15922	31847	63694
25	127	382	636	1273	1592	1910	2547	3821	6369	10191	12738	25477	50955
30	106	318	530	1061	1326	1592	2123	3184	5307	8492	10615	21231	42462
32	99	298	497	995	1244	1492	1990	2985	4976	7961	9952	19904	39808
35	90	272	454	909	1137	1364	1819	2729	4549	7279	9099	18198	36396
40	79	238	398	796	995	1194	1592	2388	3980	6369	7961	15923	31847
50	63	191	318	636	796	955	1273	1910	3184	5095	6369	12738	25477
63	50	151	252	505	631	758	1011	1516	2527	4044	5055	10110	20220
80	39	119	199	398	497	597	796	1194	1990	3184	3980	7961	15923
100	31	95	159	318	398	477	636	955	1592	2547	3184	6369	12738
125	25	76	127	254	318	382	509	764	1273	2038	2547	5095	10191
160	19	59	99	199	248	298	398	597	995	1592	1990	3980	7961
200	15	47	79	159	199	238	318	477	796	1273	1592	3184	6369
250	12	38	63	127	159	191	254	382	636	1019	1273	2547	5095
315	10	30	50	101	126	151	202	303	505	808	1011	2022	4044

普通车削刀片命名规则

Naming Rules of Turning Inserts

A 85°	B 82°	C 80°	D 55°	E 75°
H 120°	K 55°	L 90°	M 86°	O 135°
P 108°	R 360°	S 90°	T 60°	V 35°
W 80°	Z 其他			

形状代号

代号	有无孔	有无断屑槽	刀片剖面	代号	有无孔	有无断屑槽	刀片剖面
B	有	无		N	无	无	
H	有	单面		R	无	单面	
C	有	无		F	无	双面	
J	有	双面		A	有	无	
W	有	无		M	有	单面	
T	有	单面		G	有	双面	
Q	有	无		X	—	—	特殊
U	有	双面					

断屑槽及夹固形式

内切圆直径 (mm)	C	D	R	S	T	V	W
3.97					06		
5.0			05		09		
5.56							
6.0			06		11	11	
6.35	06	07					
8.0			08				
9.525	09	11	09	09	16	16	06
10.0			10				
12.0			12				
12.7	12	15	12	12	22	22	08
15.875	16	15	15	15	27		
16.0		19	16				
19.05	19	19	19	19	33		
20.0			20				
25.0	25	25	25	25			
25.4			25	25			
31.75			31				
32			32				

切削刃长度

代号	刀片厚度 (mm)
00	0.79
T0	0.99
01	1.59
T1	1.98
02	2.38
T2	2.58
03	3.18
T3	3.97
04	4.76
T4	4.96
05	5.56
T5	5.95
06	6.35
T6	6.75
07	7.94
09	9.52
T9	9.72
11	11.11
12	12.70



代号	后角(度)	代号	后角(度)
A	3°	B	5°
C	7°	D	15°
E	20°	F	25°
G	30°	N	0°
P	11°	O	其他后角

代号	刀尖高度m公差 (mm)	内切圆 ϕ 1.C公差 (MM)	厚度S ₁ 公差 (mm)	(参考M级精度详细情况 (按形状、大小分))										
				● 刀尖高度公差 (mm)										
A	±0.005	±0.025	±0.025	内切圆	正三角形	正方形	80°菱形	55°菱形	35°菱形	圆形				
F	±0.005	±0.013	±0.025	6.35	±0.08	±0.08	±0.08	±0.11	±0.16	—				
C	±0.013	±0.025	±0.025	9.525	±0.08	±0.08	±0.08	±0.11	±0.16	—				
H	±0.013	±0.013	±0.025	12.7	±0.13	±0.13	±0.13	±0.15	—	—				
E	±0.025	±0.025	±0.025	15.875	±0.15	±0.15	±0.15	±0.18	—	—				
G	±0.025	±0.025	±0.13	19.05	±0.15	±0.15	±0.15	±0.18	—	—				
J	±0.005	±0.05-±0.13	±0.025	25.4	—	±0.18	—	—	—	—				
K	±0.013	±0.05-±0.13	±0.025	● 内切圆 ϕ 1.C公差 (mm)										
L	±0.025	±0.05-±0.13	±0.025	内切圆	正三角形	正方形	80°菱形	55°菱形	35°菱形	圆形				
M	±0.08-±0.18	±0.05-±0.13	±0.13	6.35	±0.05	±0.05	±0.05	±0.05	±0.05	—				
N	±0.08-±0.18	±0.05-±0.13	±0.025	9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05				
U	±0.08-±0.18	±0.08-±0.25	±0.13	12.7	±0.08	±0.08	±0.08	±0.08	—	±0.08				
				15.875	±0.10	±0.10	±0.10	±0.10	—	±0.10				
				19.05	±0.10	±0.10	±0.10	±0.10	—	±0.10				
				25.4	—	±0.13	—	—	—	±0.13				

代号	内切圆直径 (mm)
2	6.35
3	9.525
4	12.7
5	15.875
6	19.05
6	25.4

代号	内切圆直径 (mm)
2	3.18
3	4.76
4	6.35
5	7.94
6	9.52

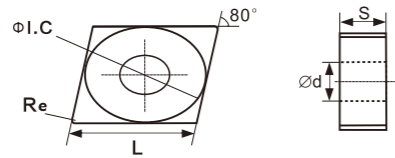
代号	内切圆直径 (mm)
0	0.2
1	0.4
2	0.8
3	1.2
4	1.6
5	2.0
6	2.4

代号	内切圆直径 (mm)
00	无圆角
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
32	3.2
X	其他

刀片直径尺寸Mo (公制) 圆形刀片

SM3	不锈钢加工
PM4	钢件加工
PF3	硬料加工
HS2	金属陶瓷
KN5	铸铁加工

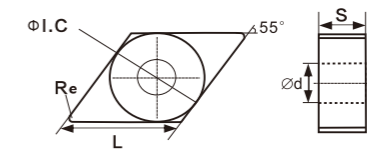
CNMA/CNMG



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade								
		L	φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35
	CNMA 120404	12.70	12.90	4.76	5.16	0.4				●	○				
	CNMA 120408	12.70	12.90	4.76	5.16	0.8				●	○				
	CNMA 120412	12.70	12.90	4.76	5.16	1.2				●	○				
	CNMA 160608	16.10	15.875	6.35	6.35	0.8				●	○				
	CNMG 120404-KN5	12.70	12.90	4.76	5.16	0.4				●	○				
	CNMG 120408-KN5	12.70	12.90	4.76	5.16	0.8				●	○				
	CNMG 120412-KN5	12.70	12.90	4.76	5.16	1.2				●	○				
	CNMG 160608-KN5	16.10	15.875	6.35	6.35	0.8				●	○				
	CNMG 120404-PM4	12.70	12.90	4.76	5.16	0.4						●	●	○	
	CNMG 120408-PM4	12.70	12.90	4.76	5.16	0.8						●	●	○	
	CNMG 120412-PM4	12.70	12.90	4.76	5.16	1.2						●	●	○	
	CNMG 120404-SM3	12.70	12.90	4.76	5.16	0.4		○	●						
	CNMG 120408-SM3	12.70	12.90	4.76	5.16	0.8		○	●						
	CNMG 120412-SM3	12.70	12.90	4.76	5.16	1.2		○	●						
	CNMG 120404-HS2	12.70	12.90	4.76	5.16	0.4									●
	CNMG 120408-HS2	12.70	12.90	4.76	5.16	0.8									●
	CNMG 120412-HS2	12.70	12.90	4.76	5.16	1.2									●
	CNMG 120404-MA	12.70	12.90	4.76	5.16	0.4		●	○						
	CNMG 120408-MA	12.70	12.90	4.76	5.16	0.8		●	○						
	CNMG 120412-MA	12.70	12.90	4.76	5.16	1.2		●	○						

● 主推荐牌号 ○ 一般牌号 ○ 可生产牌号

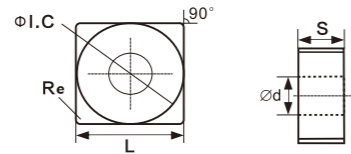
DNMA/DNMG



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade								
		L	φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35
	DNMA 150404	15.50	12.70	4.76	5.16	0.4				●	○				
	DNMA 150408	15.50	12.70	4.76	5.16	0.8				●	○				
	DNMA 150604	15.50	12.70	6.35	5.16	0.4				●	○				
	DNMA 150608	15.50	12.70	6.35	5.16	0.8				●	○				
	DNMG 150404-KN5	15.50	12.70	4.76	5.16	0.4				●	○				
	DNMG 150408-KN5	15.50	12.70	4.76	5.16	0.8				●	○				
	DNMG 150604-KN5	15.50	12.70	6.35	5.16	0.4				●	○				
	DNMG 150608-KN5	15.50	12.70	6.35	5.16	0.8				●	○				
	DNMG 150608-PM4	15.50	12.70	4.76	5.16	0.4						●	●	○	
	DNMG 150604-PM4	15.50	12.70	4.76	5.16	0.8						●	●	○	
	DNMG 150408-PM4	15.50	12.70	6.35	5.16	0.4						●	●	○	
	DNMG 150608-PM4	15.50	12.70	6.35	5.16	0.8						●	●	○	
	DNMG 150404-SM3	15.50	12.70	4.76	5.16	0.4		○	●						
	DNMG 150408-SM3	15.50	12.70	4.76	5.16	0.8		○	●						
	DNMG 150604-SM3	15.50	12.70	6.35	5.16	0.4		○	●						
	DNMG 150608-SM3	15.50	12.70	6.35	5.16	0.8		○	●						
	DNMG 150404-HS2	15.50	12.70	4.76	5.16	0.4									●
	DNMG 150408-HS2	15.50	12.70	4.76	5.16	0.8									●
	DNMG 150604-HS2	15.50	12.70	6.35	5.16	0.4									●
	DNMG 150608-HS2	15.50	12.70	6.35	5.16	0.8									●
	DNMG 150404-MA	15.50	12.70	4.76	5.16	0.4		●	○						
	DNMG 150408-MA	15.50	12.70	4.76	5.16	0.8		●	○						
	DNMG 150604-MA	15.50	12.70	6.35	5.16	0.4		●	○						
	DNMG 150608-MA	15.50	12.70	6.35	5.16	0.8		●	○						

● 主推荐牌号 ○ 一般牌号 ○ 可生产牌号

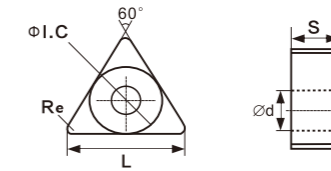
SNMA/SNMG



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade									
		L	φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35	
	SNMA 120404	12.70	12.70	4.76	5.16	0.4				●	○					
	SNMA 120408	12.70	12.70	4.76	5.16	0.8				●	○					
	SNMA 150608	15.875	15.875	6.35	5.16	0.8				●	○					
	SNMA 150612	15.875	15.875	6.35	5.16	1.2				●	○					
	SNMG 120404-KN5	12.70	12.70	4.76	5.16	0.4				●	○					
	SNMG 120408-KN5	12.70	12.70	4.76	5.16	0.8				●	○					
	SNMG 150608-KN5	15.875	15.875	6.35	5.16	0.8				●	○					
	SNMG 150612-KN5	15.875	15.875	6.35	5.16	1.2				●	○					
	SNMG 120404-PM4	12.70	12.70	4.76	5.16	0.4					●	●	○			
	SNMG 120408-PM4	12.70	12.70	4.76	5.16	0.8					●	●	○			
	SNMG 150608-PM4	15.875	15.875	6.35	5.16	0.8					●	●	○			
	SNMG 150612-PM4	15.875	15.875	6.35	6.35	1.2					●	●	○			
	SNMG 120404-SM3	12.70	12.70	4.76	5.16	0.4		○	●							
	SNMG 120408-SM3	12.70	12.70	4.76	5.16	0.8		○	●							
	SNMG 150608-SM3	15.875	15.875	6.35	5.16	0.8		○	●							
	SNMG 150612-SM3	15.875	15.875	6.35	6.35	1.2		○	●							
	SNMG 120404-HS2	12.70	12.70	4.76	5.16	0.4										●
	SNMG 120408-HS2	12.70	12.70	4.76	5.16	0.8										●
	SNMG 150608-HS2	15.875	15.875	6.35	5.16	0.8										●
	SNMG 150612-HS2	15.875	15.875	6.35	6.35	1.2										●
	SNMG 120404-MA	12.70	12.70	4.76	5.16	0.4	●	○								
	SNMG 120408-MA	12.70	12.70	4.76	5.16	0.8	●	○								
	SNMG 120412-MA	12.70	12.70	4.76	5.16	1.2	●	○								

● 主推牌号 ○ 一般牌号 ○ 可生产牌号

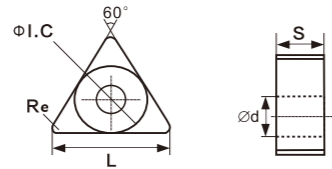
TNMA/TNMG



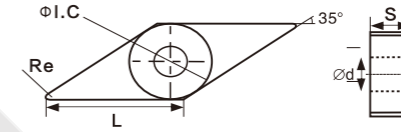
刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade									
		L	φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35	
	TNMA 160404	16.50	9.525	4.76	3.81	0.4				●	○					
	TNMA 160408	16.50	9.525	4.76	3.81	0.8				●	○					
	TNMA 220408	22.00	12.70	4.76	5.16	0.8				●	○					
	TNMA 220412	22.00	12.70	4.76	5.16	1.2				●	○					
	TNMG 160404-KN5	16.50	9.525	4.76	3.81	0.4				●	○					
	TNMG 160408-KN5	16.50	9.525	4.76	3.81	0.8				●	○					
	TNMG 220408-KN5	22.00	12.70	4.76	5.16	0.8				●	○					
	TNMG 220412-KN5	22.00	12.70	4.76	5.16	1.2				●	○					
	TNMG 160404-PM4	16.50	9.525	4.76	3.81	0.4					●	●	○			
	TNMG 160408-PM4	16.50	9.525	4.76	3.81	0.8					●	●	○			
	TNMG 220408-PM4	22.00	12.70	4.76	5.16	0.8					●	●	○			
	TNMG 220412-PM4	22.00	12.70	4.76	5.16	1.2					●	●	○			
	TNMG 160404-SM3	16.50	9.525	4.76	3.81	0.4		○	●							
	TNMG 160408-SM3	16.50	9.525	4.76	3.81	0.8		○	●							
	TNMG 220408-SM3	22.00	12.70	4.76	5.16	0.8		○	●							
	TNMG 220412-SM3	22.00	12.70	4.76	5.16	1.2		○	●							
	TNMG 160404-HS2	16.50	9.525	4.76	3.81	0.4										●
	TNMG 160408-HS2	16.50	9.525	4.76	3.81	0.8										●
	TNMG160412-HS2	16.50	9.525	4.76	3.81	1.2										●
	TNMG 160404-MA	16.50	9.525	4.76	3.81	0.4		●	○							
	TNMG 160408-MA	16.50	9.525	4.76	3.81	0.8		●	○							
	TNMG160412-MA	16.50	9.525	4.76	3.81	1.2		●	○							

● 主推牌号 ○ 一般牌号 ○ 可生产牌号

TNMG/TNGG



VNMG/VNGG



B
车削刀片
Turning Inserts

刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade									
		L	φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35	
	TNMG 160404R-VF	16.50	9.525	4.76	3.81	0.4										●
	TNMG 160404L-VF	16.50	9.525	4.76	3.81	0.4										●
	TNGG 160402R-S	16.50	9.525	4.76	3.81	0.2	●									●
	TNGG 160402L-S	16.50	9.525	4.76	3.81	0.2	●									●
	TNGG 160404R-S	16.50	9.525	4.76	3.81	0.4	●									●
	TNGG 160404L-S	16.50	9.525	4.76	3.81	0.4	●									●
	TNGG 160402R-C	16.50	9.525	4.76	3.81	0.2	●									●
	TNGG 160402L-C	16.50	9.525	4.76	3.81	0.2	●									●
	TNGG 160404R-C	16.50	9.525	4.76	3.81	0.4	●									●
	TNGG 160404L-C	16.50	9.525	4.76	3.81	0.4	●									●

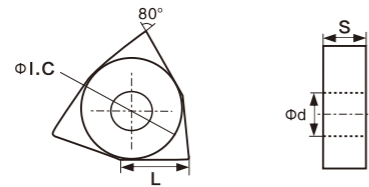
● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

B
车削刀片
Turning Inserts

刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade									
		L	φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35	
	VNMG 160404-PM4	16.60	9.525	4.76	3.81	0.4							●	●	○	
	VNMG 160408-PM4	16.60	9.525	4.76	3.81	0.8							●	●	○	
	VNMG 160412-PM4	16.60	9.525	4.76	3.81	1.2							●	●	○	
	VNMG 160404-SM3	16.60	9.525	4.76	3.81	0.4	○	●								
	VNMG 160408-SM3	16.60	9.525	4.76	3.81	0.8	○	●								
	VNMG 160404-HS2	16.60	9.525	4.76	3.81	0.4										●
	VNMG 160408-HS2	16.60	9.525	4.76	3.81	0.8										●
	VNMG 160412-HS2	16.60	9.525	4.76	3.81	1.2										●
	VNGG 160402R-S	16.60	9.525	4.76	3.81	0.2	●									●
	VNGG 160402L-S	16.60	9.525	4.76	3.81	0.2	●									●
	VNGG 160404R-S	16.60	9.525	4.76	3.81	0.4	●									●
	VNGG 160404L-S	16.60	9.525	4.76	3.81	0.4	●									●
	VNGG160404R-H	16.60	9.525	4.76	3.81	0.4	●									●
	VNGG160404L-H	16.60	9.525	4.76	3.81	0.4	●									●

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

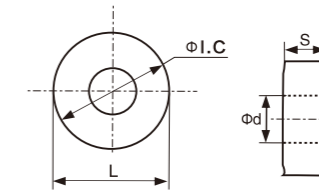
WNMA/WNMG



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade								
		L	ϕI.C	S	ϕd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35
	WNMA 080404	8.70	12.70	4.76	5.16	0.4				●	○				
	WNMA 080408	8.70	12.70	4.76	5.16	0.8				●	○				
	WNMA 080412	8.70	12.70	4.76	5.16	1.2				●	○				
	WNMG 080404-KN5	8.70	12.70	4.76	5.16	0.4				●	○				
	WNMG 080408-KN5	8.70	12.70	4.76	5.16	0.8				●	○				
	WNMG 080412-KN5	8.70	12.70	4.76	5.16	1.2				●	○				
	WNMG 080404-PM4	8.70	12.70	4.76	5.16	0.4					●	●	○		
	WNMG 080408-PM4	8.70	12.70	4.76	5.16	0.8					●	●	○		
	WNMG 080412-PM4	8.70	12.70	4.76	5.16	1.2					●	●	○		
	WNMG 080404-SM3	8.70	12.70	4.76	5.16	0.4		○	●						
	WNMG 080408-SM3	8.70	12.70	4.76	5.16	0.8		○	●						
	WNMG 080412-SM3	8.70	12.70	4.76	5.16	1.2		○	●						
	WNMG 080404-HS2	8.70	12.70	4.76	5.16	0.4									●
	WNMG 080408-HS2	8.70	12.70	4.76	5.16	0.8									●
	WNMG 080412-HS2	8.70	12.70	4.76	5.16	1.2									●
	WNMG 080404-MA	8.70	12.70	4.76	5.16	0.4		●	○						
	WNMG 080408-MA	8.70	12.70	4.76	5.16	0.8		●	○						
	WNMG 080412-MA	8.70	12.70	4.76	5.16	1.2		●	○						

● 主推荐牌号 ○ 一般牌号 ○ 可生产牌号

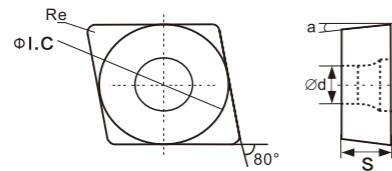
RNMG/RCMX



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade								
		L	ϕI.C	S	ϕd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35
	RNMG 120400	12.70	12.70	4.76	5.16								○	○	●
	RCMX 160600-PR8	16.00	16.00	6.35	5.50								○	○	●
	RCMX 200600-PR8	20.00	20.00	6.35	6.50								○	○	●
	RCMX 250700-PR8	25.00	25.00	7.94	7.20								○	○	●
	RCMX 320900-PR8	32.00	32.00	9.52	9.50								○	○	●

● 主推荐牌号 ○ 一般牌号 ○ 可生产牌号

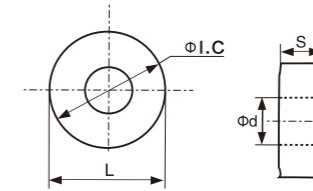
CCMT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)				牌号 Grade									
		φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35	
	CCMT 060204-HS2	6.40	6.35	2.38	0.4										●
	CCMT 060208-HS2	6.40	6.35	2.38	0.8										●
	CCMT 09T304-HS2	9.70	9.525	3.97	0.4										●
	CCMT 09T308-HS2	9.70	9.525	3.97	0.8										●
	CCMT 120404-HS2	12.90	12.70	4.76	0.4										●
	CCMT 120408-HS2	12.90	12.70	4.76	0.8										●
	CCMT 060204-PF3	6.40	6.35	2.38	0.4	●			○			●			
	CCMT 060208-PF3	6.40	6.35	2.38	0.8	●			○			●			
	CCMT 09T304-PF3	9.70	9.525	3.97	0.4	●			○			●			
	CCMT 09T308-PF3	9.70	9.525	3.97	0.8	●			○			●			
	CCMT 120404-PF3	12.90	12.70	4.76	0.4	●			○			●			
	CCMT 120408-PF3	12.90	12.70	4.76	0.8	●			○			●			
	CCMT 060204-SM3	6.35	2.38	2.8	0.4		●	●							
	CCMT 060208-SM3	6.35	2.38	2.8	0.8		●	●							
	CCMT 09T304-SM3	9.525	3.97	4.4	0.4		●	●							
	CCMT 09T308-SM3	9.525	3.97	4.4	0.8		●	●							
	CCMT 120404-SM3	12.70	4.76	5.56	0.4		●	●							
	CCMT 120408-SM3	12.70	4.76	5.56	0.8		●	●							

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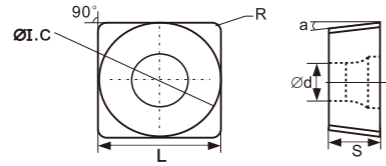
DCMT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade									
		L	φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35	
	DCMT 070204-HS2	7.80	6.35	2.38	2.8	0.4										●
	DCMT 070208-HS2	7.80	6.35	2.38	2.8	0.8										●
	DCMT 11T304-HS2	11.60	9.525	3.97	4.4	0.4										●
	DCMT 11T308-HS2	11.60	9.525	3.97	4.4	0.8										●
	DCMT 070204-PF3	7.80	6.35	2.38	2.8	0.4	●			○			●			
	DCMT 070208-PF3	7.80	6.35	2.38	2.8	0.8	●			○			●			
	DCMT 11T304-PF3	11.60	9.525	3.97	4.4	0.4	●			○			●			
	DCMT 11T308-PF3	11.60	9.525	3.97	4.4	0.8	●			○			●			
	DCMT 070204-SM3	7.80	6.35	2.38	2.8	0.4		●	●							
	DCMT 070208-SM3	7.80	6.35	2.38	2.8	0.8		●	●							
	DCMT 11T304-SM3	11.60	9.525	3.97	4.4	0.4		●	●							
	DCMT 11T308-SM3	11.60	9.525	3.97	4.4	0.8		●	●							

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

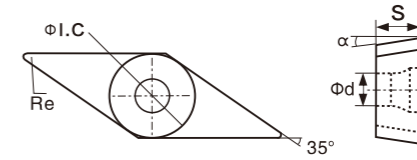
SCMT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade								
		L	φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35
	SCMT 09T304-HS2	9.525	9.525	3.97	4.4	0.4									●
	SCMT 09T308-HS2	9.525	9.525	3.97	4.4	0.8									●
	SCMT 120404-HS2	12.70	12.70	4.76	5.56	0.4									●
	SCMT 120408-HS2	12.70	12.70	4.76	5.56	0.8									●
	SCMT 09T304-PF3	9.525	9.525	3.97	4.4	0.4	●			○		●			
	SCMT 09T308-PF3	9.525	9.525	3.97	4.4	0.8	●			○		●			
	SCMT 120404-PF3	12.70	12.70	4.76	5.56	0.4	●			○		●			
	SCMT 120408-PF3	12.70	12.70	4.76	5.56	0.8	●			○		●			
	SCMT 09T304-SM3	9.525	9.525	3.97	4.4	0.4		●	●						
	SCMT 09T308-SM3	9.525	9.525	3.97	4.4	0.8		●	●						
	SCMT 120404-SM3	12.70	12.70	4.76	5.56	0.4		●	●						
	SCMT 120408-SM3	12.70	12.70	4.76	5.56	0.8		●	●						

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

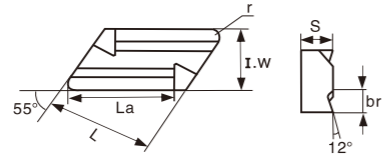
V*MT/V*ET



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade								
		L	φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35
	VBMT 110304-HS2	11.00	6.35	3.18	2.8	0.4									●
	VBMT 110308-HS2	11.00	6.35	3.18	2.8	0.8									●
	VBMT 160404-HS2	16.50	9.525	4.76	4.4	0.4									●
	VBMT 160408-HS2	16.50	9.525	4.76	4.4	0.8									●
	VBMT 110304-PF3	11.00	6.35	3.18	2.8	0.4	●			○		●			
	VBMT 110308-PF3	11.00	6.35	3.18	2.8	0.8	●			○		●			
	VBMT 160404-PF3	16.50	9.525	4.76	4.4	0.4	●			○		●			
	VBMT 160408-PF3	16.50	9.525	4.76	4.4	0.8	●			○		●			
	VBMT 160404-MF3	16.50	9.525	4.76	4.4	0.4		●	●						
	VBMT 160408-MF3	16.50	9.525	4.76	4.4	0.8		●	●						
	VBMT 110304-SM3	16.50	9.525	4.76	4.4	0.4		●	●						
	VBMT 110308-SM3	16.50	9.525	4.76	4.4	0.8		●	●						
	VBMT 160404-SM3	16.50	9.525	4.76	4.4	0.4		●	●						
	VBMT 160408-SM3	16.50	9.525	4.76	4.4	0.8		●	●						
	VCMT 160404-SM3	16.50	9.525	4.76	4.4	0.4		●	●						
	VCMT 160408-SM3	16.50	9.525	4.76	4.4	0.8		●	●						
	VBGT 110302R-F	11.00	6.35	3.18	2.8	0.2	●								●
	VBGT 110302L-F	11.00	6.35	3.18	2.8	0.2	●								●
	VPET 110302R-FSF	11.00	6.35	3.18	2.8	0.2	●								●
	VPET 110302L-FSF	11.00	6.35	3.18	2.8	0.2	●								●

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

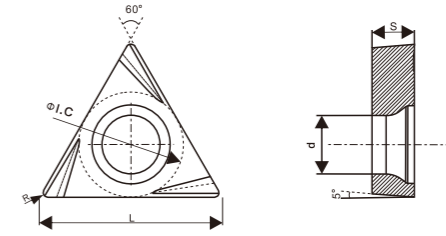
KNMUX



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade								
		La	L	I.W	S	r	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35
	KNMUX 160405-L11	16.00	16.15	9.525	4.76	0.5						●	●	○	
	KNMUX 160410-L11	16.00	16.15	9.525	4.76	1.0						●	●	○	
	KNMUX 160405-R11	16.00	16.15	9.525	4.76	0.5						●	●	○	
	KNMUX 160410-R11	16.00	16.15	9.525	4.76	1.0						●	●	○	

● 主推荐牌号 ● 一般牌号 ○ 可生产牌号

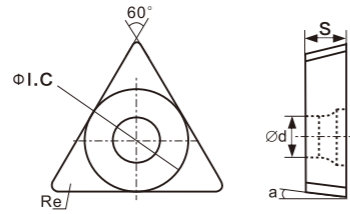
TBGT/TPGT/TCGT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade									
		L	φI.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35	
	TBGT 060102L-W	3.97	1.59			0.2	●									●
	TBGT 060104L-W	3.97	1.59			0.4	●									●
	TPGT 080202L-W	4.76	2.38			0.2	●									●
	TPGT 080204L-W	4.76	2.38			0.4	●									●
	TPGT 090202L-W	5.56	2.38			0.2	●									●
	TPGT 090204L-W	5.56	2.38			0.4	●									●
	TPGT 110302L-W	6.35	3.18			0.2	●									●
	TPGT 110304L-W	6.35	3.18			0.4	●									●
	TCGT 110202L-W	6.35	2.38			0.2	●									●
	TCGT 110204L-W	6.35	2.38			0.4	●									●

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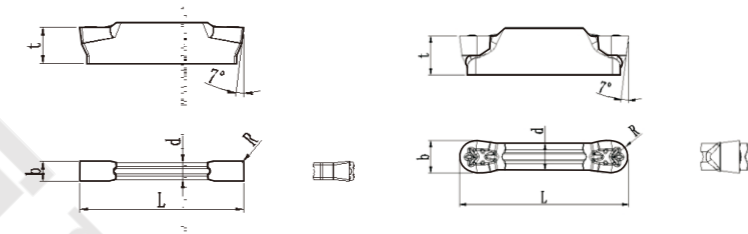
TCMT/TCGT



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade								
		L	φ1.C	S	φd	Re	JGA05F	JGA10A	JGA20F	JGK10R	JGK20R	JGP25T	JGP25S	JGP40T	JTN35
	TCMT 090204-HS2	9.60	5.56	2.38	2.5	0.4									●
	TCMT 090208-HS2	9.60	5.56	2.38	2.5	0.8									●
	TCMT 110204-HS2	11.00	6.35	2.38	2.8	0.4									●
	TCMT 110208-HS2	11.00	6.35	2.38	2.8	0.8									●
	TCMT 16T304-HS2	16.50	9.525	3.97	4.4	0.4									●
	TCMT 16T308-HS2	16.50	9.525	3.97	4.4	0.8									●
	TCMT 090204-PF3	9.60	5.56	2.38	2.5	0.4	●			○			●		
	TCMT 090208-PF3	9.60	5.56	2.38	2.5	0.8	●			○			●		
	TCMT 110204-PF3	11.00	6.35	2.38	2.8	0.4	●			○			●		
	TCMT 110208-PF3	11.00	6.35	2.38	2.8	0.8	●			○			●		
	TCMT 16T304-PF3	16.50	9.525	3.97	4.4	0.4	●			○			●		
	TCMT 16T308-PF3	16.50	9.525	3.97	4.4	0.8	●			○			●		
	TCMT 090204-SM3	9.60	5.56	2.38	2.5	0.4		●	●						
	TCMT 090208-SM3	9.60	5.56	2.38	2.5	0.8		●	●						
	TCMT 110204-SM3	11.00	6.35	2.38	2.8	0.4		●	●						
	TCMT 110208-SM3	11.00	6.35	2.38	2.8	0.8		●	●						
	TCMT 16T304-SM3	16.50	9.525	3.97	4.4	0.4		●	●						
	TCMT 16T308-SM3	16.50	9.525	3.97	4.4	0.8		●	●						
	TCGT 080202R-F		4.76	2.38	2.3	0.2	●								●
	TCGT 080202L-F		4.76	2.38	2.3	0.2	●								●
	TCGT 110302R-F		6.35	3.18	2.8	0.2	●								●
	TCGT 110302L-F		6.35	3.18	2.8	0.2	●								●

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切槽切断系列 MGMN/MRMN



刀片外形 Inserts Shape	型号 Type	基本尺寸 Dimensions(mm)					牌号 Grade								
		b	r	L	d	t	JGA10A	JGA20F	JGM20S	JGM30S	JGK10R	JGK20R	JGP15T	JGP30T	JTN20
	MGMN 150-G	1.50	0.15	16.0	1.2	3.5		●	●				○		
	MGMN 200-G	2.00	0.20	16.0	1.6	3.5		●	●				○		
	MGMN 250-G	2.50	0.20	18.5	2.0	3.85		●	●				○		
	MGMN 300-M	3.00	0.40	21.0	2.35	4.8		●	●				○		
	MGMN 400-M	4.00	0.40	21.0	3.3	4.8		●	●				○		
	MGMN 500-M	5.00	0.80	26.0	4.1	5.8		●	●				○		
	MRMN 600-M	6.00	0.80	26.0	4.1	5.8		●	●				○		
	MRMN 200-M	2.00	1.00	16.0	1.50	3.5		●	●				○		
	MRMN 300-M	3.00	1.50	21.0	2.35	4.8		●	●				○		
	MRMN 400-M	4.00	2.00	21.0	3.3	4.8		●	●				○		
	MRMN 500-M	5.00	2.50	26.0	4.1	5.8		●	●				○		
	MRMN 600-M	6.00	3.00	26.0	4.1	5.8		●	●				○		
	MRMN 800-M	8.00	4.00	31.0	4.1	6.5		●	●				○		

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车削加工常见问题及解决方案

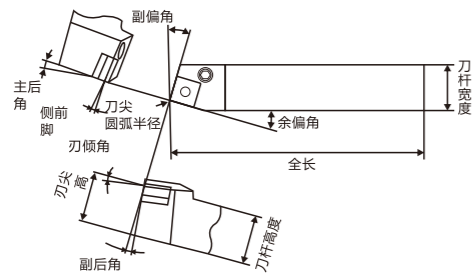
Common Problems and Solutions in Turning

常见问题 Main problem	选择条件 Selection condition	刀具材料选择 Selection of Tool material		切削条件 Cutting Condition		
		硬度更高的材料 Material with higher hardness	韧性好的材料 material with good toughness	切削速度 cutting speed	进给 feeding	
刀尖磨损过大 Too much wear for the knife point	加工中精度超标 Machining accuracy beyond standard	后刀面磨损增大 Flank wear increases	✓			
表面精度恶化 Surface accuracy deterioration	表面质量差 Poor surface quality	切削条件不适合 Cutting condition is not suitable		↓	↑	
		刀具磨损增大、刀刃不够锋利 Tool wear increases and the blade is not sharp enough	✓	↓		
		切削刃缺损 Cutting edge defect		✓	↓	
		切削刃几何形状不合适 Cutting edge geometry is not appropriate			↑	↓
		切削条件不合适 Cutting condition is not suitable			↑	↓
发热 Fever	切削热的影响 Cutting heat effect	振动、发颤 Vibration and tremble		✓	↓	
		积屑瘤 built-up edge		↑	↑	
尺寸精度差 Poor dimensional accuracy	加工中尺寸波动 Dimension fluctuation in machining	切削条件不合适 Cutting condition is not suitable		↓		
		切削刃几何形状不合适 Cutting edge geometry is not appropriate	✓			
刀具切削刃损伤 Cutting edge damage	后刀面、前刀面磨损增大 Wear increases on the back and front knife surfaces	刀片精度不合适 The blade accuracy is not suitable			↑	
		工件、刀具位置偏移 Work tool offset		↑		
	微崩 Minor Tipping	后刀面磨损 The front edge wears	✓	↓	↓	
	积屑瘤 Built-up edge	前刀面磨损 The back edge wears	✓	↓	↓	
		工件硬度与刀具切削条件不适合 The hardness of the tool material is not suitable for cutting condition			↑	
	热龟裂 Thermal cracking	振动、冲击 Vibration and impact		✓	↓	
	切削刃刀尖部分变形 Cutting edge deformation	在断续切削大进给时发生 Occurs when intermittent cutting in large feeding		✓	↓	
刀具寿命 Life time of tools	材料、切削条件不合适 Tool material is not suitable for cutting condition	✓	✓	↓		
切屑控制 Cutting control	长切屑缠绕 long cutting chips, winding	切削条件不合适 Cutting condition is not suitable		↓	↑	
		刀刃几何形状不合适 Cutting edge geometry is not appropriate			↓	
	切屑太短，导致飞溅 Short cutting chips, causing splash	切削条件不合适 Cutting condition is not suitable			↓	
毛刺、塌边 Burr, Collapse	钢、铝，产生毛刺 Steel and aluminum, burrs	刀刃几何形状不合适 Cutting edge geometry is not appropriate		↑	↓	
		切削条件不合适 Cutting condition is not suitable	✓			
	铸铁，塌边 Cast iron, collapse	刀具磨损、几何形状不合适 Cutting tool wears and Cutting edge geometry is not appropriate	✓		↓	↑
		切削条件不合适 Cutting condition is not suitable		↓	↑	
软钢，毛边 Mild steel, burrs	切削条件不合适 Cutting condition is not suitable	刀具磨损、几何形状不合适 Cutting tool wears and Cutting edge geometry is not appropriate	✓		↓	
		切削条件不合适 Cutting condition is not suitable			↓	

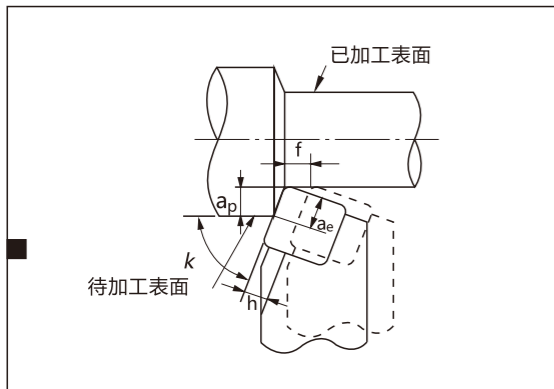
切削条件 Cutting Condition		刀具形状 Shape of tool						机床装夹 Machine tool clamping			
切深 cutting depth	切削液 Cutting fluid	改变刀片槽型 change the groove of the blade	前角 front angle	刀尖圆弧半径 corner radius	主偏角 cutting edge angle	切削刃强度 cutting edge strength	提高刀片精度 Improve blade accuracy	提高刀具刚性 improve blade rigidity	工件刀柄装夹 Workpiece holder clamping	刀柄悬伸 Tool holder overhanging	动力、机床间隙 Power machine clearance
				↑							
	✓		↑	↑		↓	✓		✓	✓	✓
↓		✓		↑		↑					
↓	✓			↑		↓	✓				
↓	✓	✓	↑	↓	↑	↓			✓	✓	✓
↓	✓	✓	↑			↓	✓				
↓		✓	↑	↓	↑	↓		✓	✓	✓	✓
↑	✓										
↓	✓			↓	↑						
	✓			↑	↓	↓					
↓		✓		↑		↑		✓	✓	✓	✓
	✓										
↓		✓	↑	↑		↑		✓	✓	✓	✓

车削刀具

车刀各部分的名称

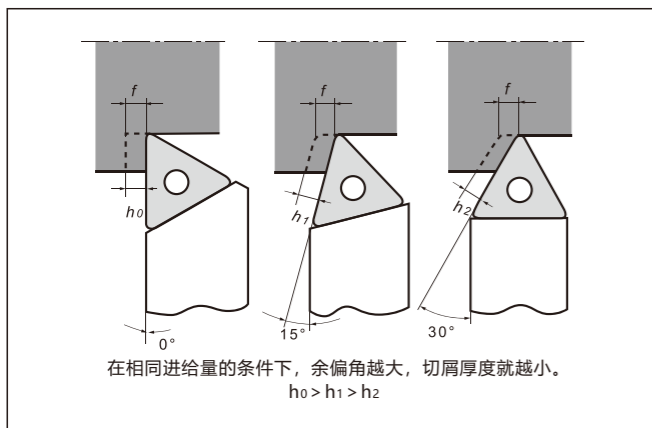


车刀工件的相对角



a_p ... 切深 (深度) (待加工表面和已加工表面之间的距离)
 a_e ... 切削宽度 (被切削部分的长度)
 κ ... 主偏角 (主切削刃和待加工表面构成的角度)
 f ... 进给量 (工件每转的刀具移动量)
 h ... 切削厚度 (被切削部分的厚度)
 已加工表面 (已被加工后的工件表面)
 待加工表面 (加工前的工件表面)

余偏角的效果



钝化处理

ZZJG刀片结合使用目的选择下表所列一种切削刃钝化处理。钝化是用来保持切削刃强度的一种切削刃处理方式。

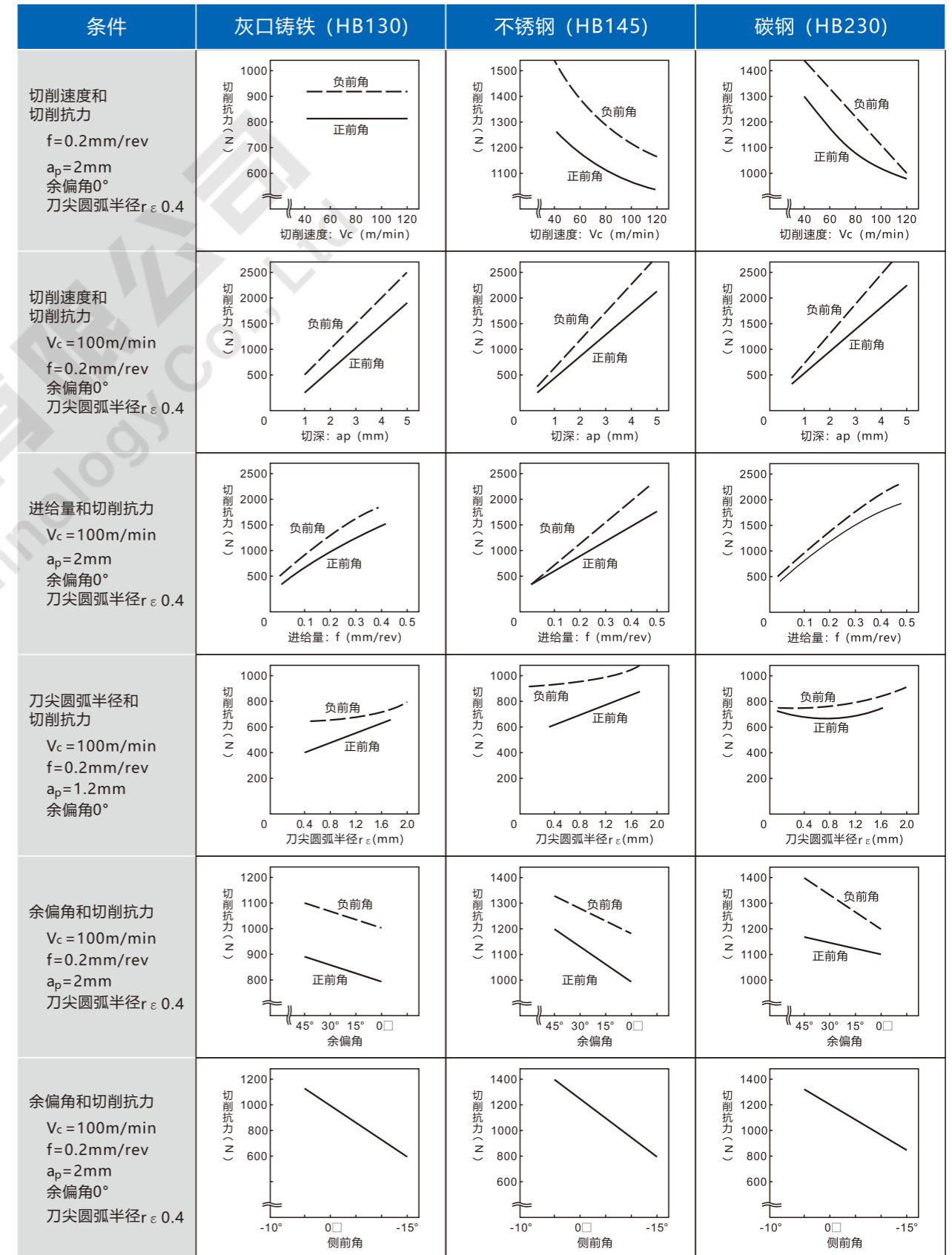
主切削刃的形态	形状
锋利刃	
倒原切削刃	
倒菱切削刃	

刀尖形状的效果

刀尖形状	现象	后面磨损	月牙洼磨损	刀尖强度	切削抗力	已加工表面	震动	刀尖温度	切屑形状和排屑方向
刀倾角变大	-	减少	减少	下降	背分力减少	-	难以产生	下降	排屑方向变化
倾前角变大	-	减少	减少	下降	减少	-	-	下降	形态、形状出现变化
后角变大	减少	-	下降	减少	-	容易产生	下降	-	-
副偏角变大	减少	-	下降	背分力减少	变粗	难以产生	下降	-	-
余偏角变大	减少	减少	提高	背分力减少	-	容易产生	提高	切屑厚度变薄	-
刀尖圆弧半径变大	某种程度减少	-	提高	提高	变粗	容易产生	提高	排屑方向变化	-
倒棱变大	提高	-	提高	提高	-	容易产生	提高	-	-

车削刀具

切削抗力和切削条件·刀具形状的关系

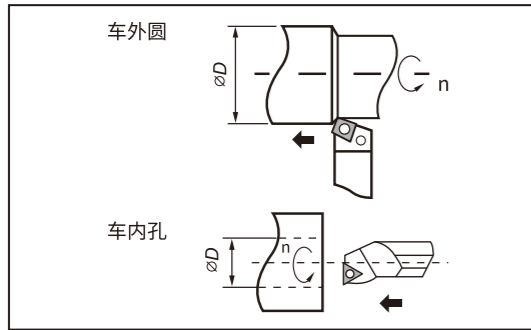


*9.8N=1kgf

车削刀具

车削加工的计算式

车削速度



由转数求切削速度

$$V_c = \frac{\pi \times \varnothing D_c \times n}{1000}$$

V_c : 切削速度 (m/min)
 $\varnothing D_c$: 刀尖直径 (mm)
 n : 转数 (min^{-1})
 $\pi \approx 3.14$

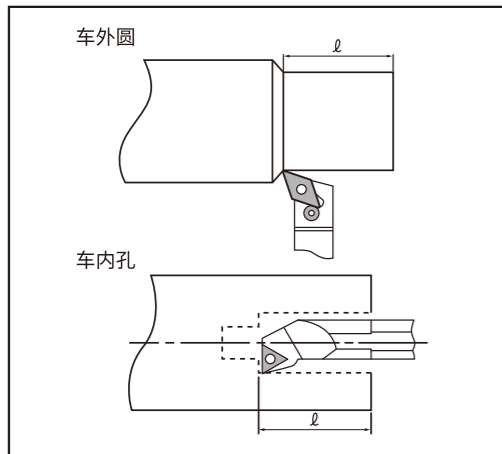
由切削速度求转数时

$$n = \frac{V_c \times 1000}{\pi \times \varnothing D}$$

示例: 计算以250转/分钟的转速切削直径为150mm的工件时的切削速度

$$V_c = \frac{3.14 \times 150 \times 250}{1000} = 117 \text{ m/min}$$

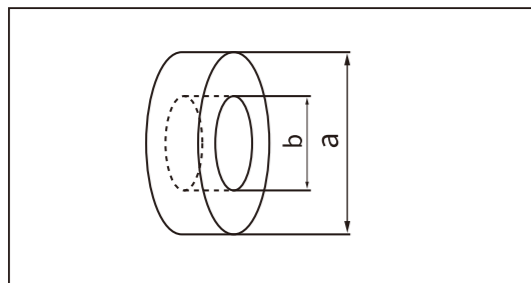
车外圆和车内孔的切削时间的计算



$$T = \frac{l}{f \times n} \text{ (min)}$$

T : 切削时间 (min)
 l : 切削长度 (mm)
 f : 进给量 (mm/rev)
 n : 转速 (min^{-1})

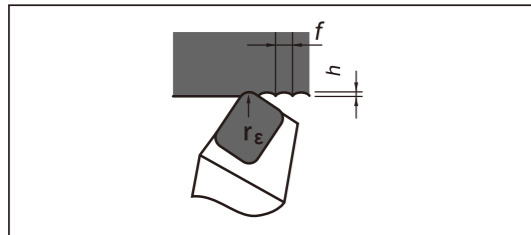
端面切削时间 (速度一定) 的计算



$$T = \frac{\pi \times (a^2 - b^2)}{4000 \times V_c \times f} \text{ (min)}$$

V_c : 切削速度 (m/min)
 f : 进给量 (mm/rev)
 T : 切削时间 (min)

理论表面粗糙度



$$h = \frac{f^2}{8r_\epsilon} \times 1000 \text{ (}\mu\text{m)}$$

h : 理论已加工表面粗糙度 (μm)
 f : 进给量 (mm/rev)
 r_ϵ : 刀尖圆弧半径 (mm)

功耗的计算 (kW)

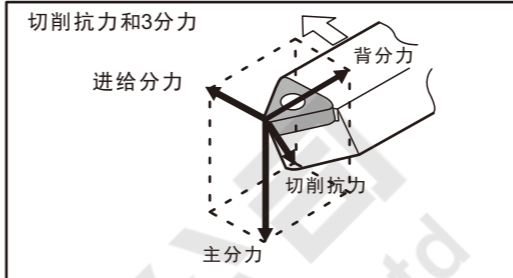
$$P_c = \frac{F \times V_c}{60000} \text{ (kW)}$$

P_c : 切削功率 (kW)
 F : 切削抗力 (N)
 V_c : 切削速度 (m/min)

车削刀具

切消抗力的计算

- 从实验数据曲线图读取
- 用简化公式求切消抗力



$$F = k_c \times a_p \times f \text{ (N)}$$

F : 切消抗力 (N)
 k_c : 比切消抗力 (N/mm^2)
 [参见下表]
 a_p : 切深 (mm)
 f : 进给量 (mm/rev)

示例:
 计算以0.2mm/rev的进给量和3mm的切深切削高碳钢 (10SC55) 的切消抗力
 $F = 3430 \times 3 \times 0.2 = 2058 \text{ N}$

所需功率的计算

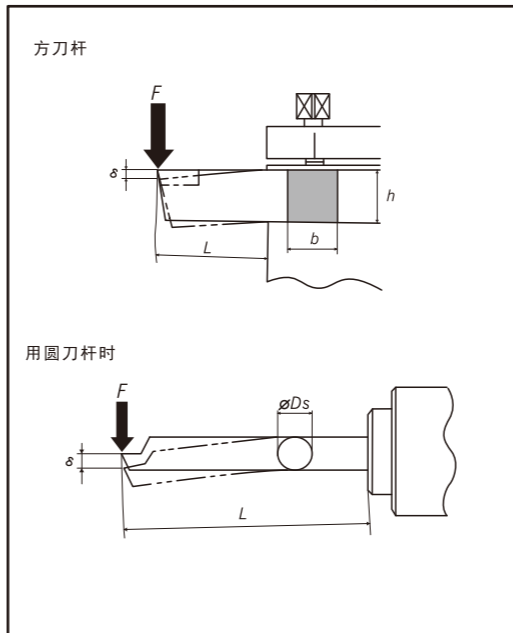
$$P_c = \frac{k_c \times a_p \times v_c \times f}{60 \times 1000} \text{ (kW)}$$

P_c : 所需功率 (kW)
 k_c : 比切消抗力 (N/mm^2)
 [参见下表]
 v_c : 切削速度 (m/min)
 a_p : 切深 (mm)
 f : 进给量 (mm/rev)

比切消抗力的值 (k_c)

工件材料 (JIS)	抗拉强度 (MPa)	硬度 (H8)	对应各进给量值的比切消抗力值 k_c (N/mm^2)				
			0.04 (mm/rev)	0.1 (mm/rev)	0.2 (mm/rev)	0.4 (mm/rev)	1.0 (mm/rev)
SS400\S15C	390	100	3430	2840	2450	2080	1700
S35C\S40C	590	170	4220	3490	2940	2500	2080
SS0C\SCr430	785	230	4900	4020	3430	2940	2400
SCM440\SNCM439	980	300	5390	4410	3780	3240	2650
SDK	1765(56HRC)	56HRC	8390	6870	5880	5000	4120
FC200	(160HB)	160	2550	1960	1630	1340	1000
FCD600	(200HB)	200	3330	2550	2110	1750	1340
铝合金	(89HB)	89	1350	1130	950	810	670
铝			1050	870	740	640	520
钛合金			390	390	390	390	390
黄铜			1080	1080	1080	1080	1080

车刀刀杆弯曲应力及刀尖挠度的计算



弯曲应力

- 用方刀杆时

$$S = \frac{6 \times F \times L}{b \times h^2} \text{ (Mpa)}$$

S : 在刀杆上产生的弯曲应力 (MPa)
 F : 切削抗力 (N)
 L : 车到悬伸量 (mm)
 b : 刀杆宽度 (mm)
 h : 刀杆高度 (mm)
 $\varnothing D_s$: 刀杆直径 (mm)
 E : 刀杆材料的弹性系数 (MPa)

- 用圆刀杆时

$$S = \frac{32 \times F \times L}{\pi \times \varnothing D_s^3} \text{ (Mpa)}$$

刀尖挠度 (mm)

- 用方刀杆时

$$\delta = \frac{4 \times F \times L^3}{E \times b \times h^3} \text{ (mm)}$$

- 用圆刀杆时

$$\delta = \frac{64 \times F \times L^3}{3 \times \pi \times b \times E \times \varnothing D_s^3} \text{ (mm)}$$

(参考) E值

材质	MPa (N/mm^2)	[kgf/mm^2]
钢材	210,000	21,000
硬质合金	560,000-620,000	56,000-62,000

硬度对照表 (黑色金属硬度及强度近似换算值)

Hardness Control Table (Approximate Conversion on Hardness & Strength of Ferrous Metals)

硬度 Hardness				硬度 Hardness				抗弯强度	
洛氏		维氏	布氏	洛氏		维氏	布氏	TRS	
HRC	HRA	HV	HB	HRC	HRA	HV	HB	(N/mm ²)	
70.0	86.6	1037		43.0	72.1	411	401	1360	
69.5	86.3	1017		42.5	71.8	405	396	1340	
69.0	86.1	997		42.0	71.6	399	391	1320	
68.5	85.8	978		41.5	71.3	393	385	1300	
68.0	85.5	959		41.0	71.1	388	380	1280	
67.5	85.2	941		40.5	70.8	382	375	1260	
67.0	85.0	923		40.0	70.5	377	370	1245	
66.5	84.7	906		39.5	70.3	372	365	1225	
66.0	84.4	889		39.0	70.0	367	360	1210	
65.5	84.1	872		38.5		362	355	1190	
65.0	83.9	856		38.0		357	350	1175	
64.5	83.6	840		37.5		352	345	1160	
64.0	83.3	825		37.0		347	341	1140	
63.5	83.1	810		36.5		342	336	1125	
63.0	82.8	795		36.0		338	332	1110	
62.5	82.5	780		35.5		333	327	1095	
62.0	82.2	766		35.0		329	323	1080	
61.5	82.0	752		34.5		324	318	1065	
61.0	81.7	739		34.0		320	314	1050	
60.5	81.4	726		33.5		316	310	1035	
60.0	81.2	713		33.0		312	306	1020	
59.5	80.9	700		32.5		308	302	1010	
59.0	80.6	688		32.0		304	298	298	
58.5	80.3	676		31.5		300	294	294	
58.0	80.1	664		31.0		296	291	291	
57.5	79.8	653		30.5		292	287	287	
57.0	79.5	642		30.0		289	283	283	
56.5	79.3	631		29.5		285	280	280	
56.0	79.0	620		29.0		281	276	276	
55.5	78.7	609		28.5		278	273	273	
55.0	78.5	599		28.0		274	269	269	
54.5	78.2	589		27.5		271	266	266	
54.0	77.9	579		27.0		268	263	263	
53.5	77.7	570		26.5		264	260	260	
53.0	77.4	561		26.0		261	257	257	
52.5	77.1	551		25.5		258	254	254	
52.0	76.9	543		25.0		255	251	251	
51.5	76.9	534		24.5		252	248	248	
51.0	76.3	525	501	24.0		249	245	820	
50.5	76.1	517	494	23.5		246	242	810	
50.0	75.8	509	488	23.0		243	240	800	
49.5	75.5	501	481	22.5		240	237	790	
49.0	75.3	493	474	22.0		237	234	785	
48.5	75.0	485	468	21.5		234	232	775	
48.0	74.7	478	461	21.0		231	229	765	
47.5	74.5	470	455	20.5		229	227	760	
47.0	74.2	463	449	20.0		226	225	750	
46.5	73.9	456	442	19.5		223	222	745	
46.0	73.7	449	436	19.0		221	220	735	
45.5	73.4	443	430	18.5		218	218	730	
45.0	73.2	436	424	18.0		216	216	725	
44.5	72.9	429	418	17.5		214	214	715	
44.0	72.6	423	413	17.0		211	211	710	
43.5	72.4	417	407					1385	

此表所列各个钢系的换算值, 对含碳量由低到高的钢种基本适用。The conversion values for all steels listed in this table are basically applicable to steels with low to high carbon content. 此表所列的抗拉强度值, 适用于换算精度要求不高的一般钢种, 1N/mm²=1Mpa。The tensile strength values listed in this table are suitable for general steels with low conversion accuracy. 此表摘自GB1172-74。This table is taken from GB1172-74

安全使用切削工具的注意事项

Precautions for safe use of Cutting Tools

危险性 Hazard	防护措施 Protective Measures
直接接触切削刀具锋利的刀刃可能对人体造成伤害。 Direct contact with the sharp edge of the cutting tool may cause injury to human body.	当您在机床上安装或拆卸切削刀具时, 请使用手套等防护劳保用品。 When you install or remove cutting tools on the machine tool, please use protective labor protection appliances such as gloves
不恰当使用刀具可能导致其破损, 附件飞出, 引起损害。 Improper use of the tool may cause its breakage and accessories flying out, resulting in the damage	使用前阅读样本和安全标准。 Read samples and safety standards before use, 请使用防护眼镜和防护服。 Please use safety glasses and protective clothing
过度磨损和剧烈冲击使切削抵抗能力剧增, 可能导致刀具破裂而飞溅, 对操作者造成伤害。 Excessive wear and severe impact increase the cutting resistance, which may lead to tool fracture and splashing, causing injury to the operator.	及时更换过度磨损的刀具。 Replace excessively worn tools in time. 请使用防护眼镜和防护服。 Please use safety glasses and protective clothing
切削过程中的切屑可能对人造成烫伤和划伤。 Chips during cutting may cause burns and scratches to people	及时使用钳子等工具清除切屑。 Timely use pliers and other tools to remove chips 请使用防护眼镜和防护服以及防护手套。 Please use safety glasses, protective clothing and protective gloves
切削过程中产生的火花和高温切屑有引发火灾和爆炸的危险。 The sparks and high temperature chips produced in the cutting process are dangerous and may cause fire and explosion	清除在切削区域的易燃易爆物品。 Remove flammable and explosive materials in the cutting area 请做好灭火器准备。 Please prepare fire-fighting equipment
高速运行的机床由于夹具等的平衡性差而引起剧烈振动, 导致刀具破损。 The high-speed running machine tools vibrate violently because of the poor balance of the fixture and so on, resulting in the tool damage	在切削前, 检查设备是否有松动或者异常声音。 Before cutting, check whether the equipment is loose or abnormal. 请使用防护眼镜和防护服。 Please use safety glasses and protective clothing
被加工件上的毛刺等缺陷非常锋利, 很容易划伤人体。 The defects such as burrs on the machined parts are very sharp and easy to scratch the human body.	请不要触摸被加工件上的毛刺。 Please do not touch the burrs on the machined part 请使用防护眼镜和防护服。 Please use safety glasses and protective clothing
没有夹紧被加工件就直接进行加工会造成刀具破损和被加工件的飞溅。 If the workpiece is machined directly without clamping, the tool will be damaged and the workpiece will splash	必须把被加工件牢牢夹住。 The machined part must be firmly clamped. 请使用防护眼镜和防护服。 Please use safety glasses and protective clothing
在刀片或刀片附件没有夹紧固定适当的情况下进行切削, 有刀具脱落飞出造成危险的。 When the blade or its accessories are not clamped properly, there is a risk of injury caused by the falling off of the tool	加工前确认刀片以及其他附件已经使用恰当的工具紧固妥当。 Before machining, please make sure that the blades and other accessories have been fastened properly with appropriate tools
用螺帽或压板等辅助工具过分紧固时, 刀片或者刀具有破碎飞溅的危险。 When the auxiliary tools such as screw pins or pressing plates are used for over-tightening, the blade or knife may be in the risk of breaking and flying	请不要使用套管等辅助工具过分紧固 Do not overtighten with auxiliary tools such as sleeves
刀片或附件在高速切削时, 有可能因惯性离心力的作用下脱落飞出。 In high speed cutting, the blade or accessories may fall off and fly out under the action of inertial centrifugal force	请在推荐范围内使用刀具。 Please use the tool within the recommended range 请使用防护眼镜和防护服。 Please use safety glasses and protective clothing
由于铣削刀具的边锋利, 直接用手触摸有被划伤的。 Because the edge of milling tool is sharp, it is dangerous to be scratched by touching directly with hands	为了您的安全, 在必须接触刀片的情况下带好防护手套。 For your safety, please wear protective gloves when you have to touch the blade
旋转切削中, 衣服、手套等很容易被绞到高速运行的设备中, 造成人员伤亡。 In rotary cutting process, clothes, gloves and so on are easily twisted into high-speed running equipment, resulting in casualties.	当您在进行旋转切削中, 请不要带手套加工。 When you are doing rotary cutting, please do not wear gloves. 时刻注意不要让衣服等接触运行中的机床部件。 Always be careful not to let clothes and other running machine parts in contact each other
偏心旋转或平衡不良的工具在旋转加工时会产生晃动振动而引起破损飞溅导致伤害。 The tool with eccentric rotation or poor balance will have shaking vibration in rotation processing, which will cause damage and flying, resulting in injury	请在容许转速范围内使用刀具。 Please use the tool within the allowable speed range 定期检查机械的平衡性能。 Check the mechanical balance performance of the machine regularly
在高速切削时, 高速飞出的切屑有可能造成伤害。 In high speed cutting, chips flying out at high speed may cause injury.	使用安全罩、保护屏、外罩等。 Use safety cover, protective screen, outer cover, etc. 请使用防护眼镜和防护服 Please use safety glasses and protective clothing
用极小的刀具进行钻削时, 容易造成刀具折断飞溅和无法取出的可能。 When drilling with a very small tool, it is easy to cause the tool to break and fly and cannot be removed	减小刀具振动和在合适的运行速度下加工。 Reduce the vibration of the tool and machine at a suitable operating speed 请使用防护眼镜和防护服。 Please use safety glasses and protective clothing
在规定用途外使用, 会导致机床和刀具的加速损坏, 并引起其他危险。 If it is used outside for the specified purpose, it will cause accelerated damage to the machine tools and cutting tools, and cause other hazards	请按照说明规定使用。 Please follow the instructions.

硬质合金产品安全标准

Safety standard for cemented carbide products

1、安全责任

在使用株洲精工硬质合金有限公司生产的产品前，请对操作者进行必要的安全培训，并请您仔细阅读产品包装上的“注意”和“警告”内容，对于没有按要求使用所造成的不良后果，本公司不负任何法律责任。

2、硬质合金切削刀具材料基本特征

硬质合金刀具是由W、C、Co、Ti、Ta、Nb等元素及其化合物经过烧结成型，并且进行一系列的后续加工而形成的加工工具。硬质合金有着很好的化学稳定性和很高的强度，是加工大部分金属和大量高强度非金属的理想工具。

3、使用硬质合金刀具的注意事项

- 硬质合金是硬而脆的材料，在过大的作用力或者某些特定的局部应力作用下脆裂破损，并带有锋利的刃口。
- 大部分硬质合金以钨、钴为主要成分，密度很大，在运送和储存应作重物处理，小心轻放。
- 硬质合金产品应存放在干燥，无腐蚀性气氛的环境中。
- 硬质合金产品在使用过程中，如产生切屑，脆片等，请在加工前准备必要的劳保用品。

1. Security Responsibility

Before the use of the cemented carbide products manufactured by Zhuzhou Jingong Cemented Carbide Co., Ltd., please make the necessary training for the operator, and read carefully the "caution" and "warning" contents on the product packaging. For the adverse consequences caused by failure to use the products. The company does not bear any legal responsibility.

2. Basic Characteristics of cemented carbide materials

Cemented carbide is made up of the elements such as W, C, Co, Ti, Ta, Nb and etc, and other compounds, and was formed through the process of sintering and a series of subsequent processing. Cemented carbide has good chemical stability and high strength, and is an ideal tool for the processing of most metals and a large number of high strength non-metals.

3. Precautions for using cemented carbide

- Cemented carbide is a kind of hard and brittle material, which can be cracked and damaged under the action of a large force and some particular local stress, and with a sharp edge.
- Most of cemented carbide has tungsten and cobalt as the main components, and the density is very large. In transportation and storage, please be careful and regard the product as heavy cargo.
- Cemented carbide products should be stored in a dry, non-corrosive atmosphere environment.
- In the use of the cemented carbide products, if some cuttings and chips were produced, please prepare some necessary PPE before processing.