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追求极致 / 持续专注 / 精益求精

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集金属焊接材料及金刚石刀具的研发、生产、服务于一体
助力客户创造价值，推动科技发展

Combining metal sintering materials & diamond tool R&D, production and service into a single entity.

Help customers create value and promote science and technology.

COMMITTED TO PROVIDING CUSTOMERS WITH
BETTER PRODUCTS AND SERVICES

01

COMPANY PROFILE

公司简介

在科技引领智造的今天，需要一个全新的工业材料变革体系，而复合材料日新月异的发展，正是支撑这个体系的核心。

惠州捷姆复合材料有限公司正是一家专注于粉末冶金复合材料，金刚石复合刀具的开发和研究的国家级高新技术企业。

公司技术源于日本，于东京、上海、深圳、惠州均设有研发机构和实验室，与国内外多所高校与研发机构建立长期合作开发平台，已研发出具有国际先进水平的多种产品。

惠州捷姆复合材料有限公司，充分利用自己的国际技术优势，大胆创新，对传统粉末冶金材料，金刚石刀具焊接，从配方到制程都实现颠覆性突破。

在陶瓷、碳（氮）化硅、石英、蓝宝石、玻璃、钨钢等脆硬复合材料加工领域，为客户提供了超高性价比的一体化解决方案。不断攻克复合材料加工难点，推进复合材料在航空、航天、3C电子、汽车、智能穿戴等领域的普及应用，为中国制造业的跨越式发展做出贡献。

公司的经营理念是：

1.有一颗匠心…努力探索，为客户提供最优解决方案。

2.做一个匠人…持之以恒，潜心研究最高端制造技术。

3.造一个匠品…砥砺前行，只为制造世界级产品而生。

技无止境，发展无疆。惠州捷姆复合材料有限公司有信心，有实力做坚守复合材料加工领域的第一方阵，引领行业发展，勇攀行业巅峰。

Huizhou GEM Composite Material Co., Ltd. is a national high-tech enterprise specializing in the development and research of powder metallurgy composite materials and diamond composite tools.

Our technology originates from Japan, and has established R&D organizations and laboratories in Tokyo, Shanghai, Shenzhen and Huizhou, we also maintained long-term cooperation with universities and R&D institutions both domestic and international, and have developed a variety of products that have reached the international advanced level.

Huizhou GEM Composite Material Co., Ltd. making full use of its international technical advantages, boldly innovates. We have achieved disruptive breakthrough in the field of traditional powder metallurgy materials and diamond tool welding, from formulation to process.

We can provide customers with high cost-effective integrated solutions in Zirconia/Alumina Ceramic, Silicon Carbide/Nitride, quartz, Sapphire, Glass, Tungsten Steel and other brittle and hard composite materials processing field.We insist on overcoming the difficulties of Brittle-Hard materials processing, promoting the popularity and application of composite materials in the fields of Aviation, Aerospace, 3C Electronics, Automotive, Smart Wearable, etc., and contributing to the leapfrog development of China's manufacturing industry.

Company business philosophy:

Commitment to excellence: Providing optimal solutions to our customers.

Be serious and responsible: Dedicated to the highest level of technology.

Making great products: Insist on making the world's best products.

02

ENTERPRISE QUALIFICATION

企业资质

03

COMPANY ENVIRONMENT

企业环境

目录
Catalogue

氧化铝、氧化锆陶瓷加工
Alumina and zirconia ceramics processing

1.材料介绍 Material Introduction

氧化铝陶瓷广泛用于机械、电子等行业，特别在工业耐磨部件中广泛应用，氧化锆陶瓷广泛应用于3C电子，生物医疗、航空航天领域，为高端精密制造和生物医学领域提供关键材料。

Alumina ceramics are widely used in machinery, electronics and other industries, especially in industrial wear-resistant parts; zirconia ceramics are widely used in 3C electronics, biomedical, aerospace, providing key materials for high-end precision manufacturing and biomedical fields.

2.材料加工特性 Material Processing Characteristics

材料加工特性 Material Processing Characteristics	氧化铝 Alumina Ceramics	氧化锆 Zirconia Ceramics
硬度 Hardness	★★★	★★☆
崩边 Rupture	★★	★★
刀痕 Grinding Line	★	★
粘刀 Tool Sticking	★	★
发热 Heat	★★	★★
滑刀 Sliding	★	★
材料研磨性 Abrasive	★★★	★★★

3.设备和磨棒匹配条件 CNC and grinding tool matching conditions

磨棒技术参数 Grinding Tool Matching Conditions	
金刚石粒度 Diamond size	80#-120#粗加工 150#-300#中加工 350#-800#精加工 80#-120# Roughing 150#-300# Medium machining 350#-800# Finishing
金刚石浓度 Diamond concentration	高 High
结合剂 Binding agent	适当冲击韧性增强；耐磨性增强 Appropriate impact toughness enhancement; Increased abrasion resistance
砂轮硬度 Grinding tool hardness	加硬 Harder
砂轮结构 Grinding tool structure	常规 Routine
砂轮修整 Tools dressing	无需 Unnecessary

设备条件：主轴最佳运行转速24000rpm，可应对绝大部分尺寸的加工，同时根据产品尺寸的不同，具体转速可参考后文的转速推荐表；并需要多条出水喷嘴。

Equipment conditions: the best running speed of the spindle 24000rpm, which can cope with most of the size of the processing. Furthermore, according to the different sizes of the grinding tools, the specific speed can be referred to the speed recommended table following. Also it needs multiple water nozzles.

碳（氮）化硅陶瓷加工

Carbon (Nitrogen) Silicon Ceramics Processing

1.材料介绍 Material Introduction

碳化硅硬度高、导热性好，常用于磨料、高温结构件及半导体领域；氮化硅强度高、耐高温和抗热震性佳，常被用于制造刀具、高温陶瓷部件等。

Silicon carbide ceramics with high hardness and good thermal conductivity are commonly used in abrasives, high-temperature structural parts and semiconductor fields; silicon nitride ceramics with high strength, high-temperature resistance and good thermal shock resistance are often used in the manufacture of grinding tools and high-temperature ceramic parts.

2.材料加工特性 Material Processing Characteristics

材料加工特性 Material Processing Characteristics	碳化硅陶瓷 Carbon Silicon Ceramics	氮化硅陶瓷 Nitrogen Silicon ceramics
硬度 Hardness	★★★★★	★★★★
崩边 Rupture	★★★★★	★★★★
刀痕 Grinding Line	★★	★★
粘刀 Tool Sticking	★★	★★☆
发热 Heat	★☆	★★
滑刀 Sliding	★★	★★☆
材料研磨性 Abrasive	★★★	★★★

3.设备和磨棒匹配条件 CNC and grinding tool matching conditions

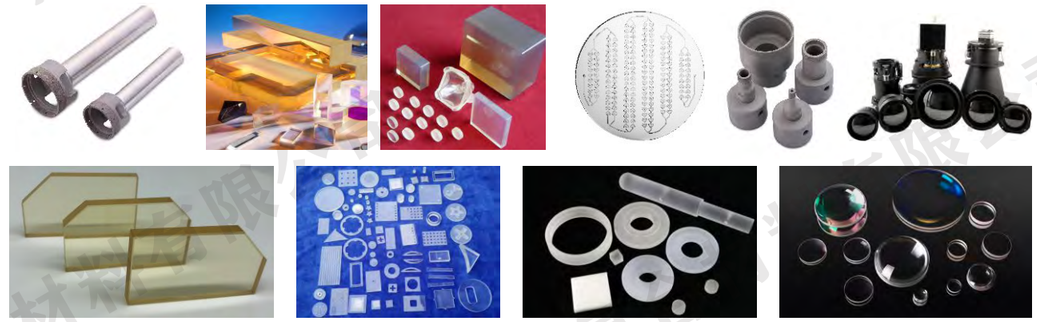
设备条件：主轴最佳运行转速24000rpm，可应对绝大部分尺寸的加工，同时根据产品尺寸的不同，具体转速可参考后文的转速推荐表；并需要多条出水喷嘴。

Equipment conditions: the best running speed of the spindle 24000rpm, which can cope with most of the size of the processing. Furthermore, according to the different sizes of the grinding tools, the specific speed can be referred to the speed recommended table following. Also it needs multiple water nozzles.

磨棒技术参数 Grinding Tool Matching Conditions	
金刚石粒度 Diamond size	80#-120#粗中加工 250#-600#精加工 80#-120# Rough & Medium Machining 250#-600# finishing
金刚石浓度 Diamond concentration	高 High
结合剂 Binding agent	耐热；适当自锐性增强 Heat-resistant Appropriate self- sharpening; enhancement
砂轮硬度 Grinding tool hardness	硬 Hard
砂轮结构 Grinding tool structure	适当排屑冷却增强；工作面减小 Enhanced cooling with proper chip removal; Reduced working surface
砂轮修整 Tools dressing	无需 Unnecessary

微晶玻璃、石英加工

Microcrystalline Glass and Quartz Processing



1.材料介绍 Material Introduction

微晶玻璃和石英都广泛应用于电子产品结构件和光学镜片领域。

Both microcrystalline glass and quartz are widely used in the field of electronic product structure parts and optical lenses.

2.材料加工特性 Material Processing Characteristics

材料加工特性 Material Processing Characteristics	微晶玻璃、石英 Microcrystalline Glass and Quartz
硬度 Hardness	★
崩边 Rupture	★★★
刀痕 Grinding Line	★★
粘刀 Tool Sticking	★★☆
发热 Heat	★★
滑刀 Sliding	★
材料研磨性 Abrasive	★

3.设备和磨棒匹配条件 CNC and grinding tool matching conditions

磨棒技术参数 Grinding Tool Matching Conditions	
金刚石粒度 Diamond size	80#-150#粗中加工 250#-600#精加工 80#-150# Rough & Medium Machining 250#-600# finishing
金刚石浓度 Diamond concentration	低 Low
结合剂 Binding agent	自锐性增强 Enhancement of self-acuity
砂轮硬度 Grinding tool hardness	中软 Medium-soft
砂轮结构 Grinding tool structure	排屑冷却增强；工作面减小 Enhanced chip removal cooling; Reduced working surface
砂轮修整 Tools dressing	需要 Desirable

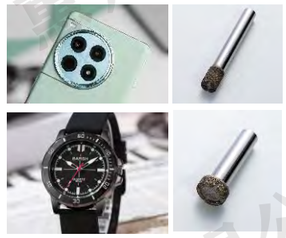
设备条件：主轴最佳运行转速20000rpm，可应对绝大部分尺寸的加工，同时根据产品尺寸的不同，具体转速可参考后文的转速推荐表；并需要多条出水喷嘴。

Equipment conditions: the best running speed of the spindle 20000rpm, which can cope with most of the size of the processing. Furthermore, according to the different sizes of the grinding tools, the specific speed can be referred to the speed recommended table following. Also it needs multiple water nozzles.

蓝宝石加工

Sapphire Processing





1.材料介绍 Material Introduction

蓝宝石材料具有高硬度、良好的光学性能和耐高温等特性，常用于电子、光学等领域。

Sapphire materials are characterized by high hardness, good optical properties and high temperature resistance, and are commonly used in electronics, optics and other fields.

2.材料加工特性 Material Processing Characteristics

材料加工特性 Material Processing Characteristics	蓝宝石 Sapphire
硬度 Hardness	★★★★
崩边 Rupture	★★★
刀痕 Grinding Line	★★☆
粘刀 Tool Sticking	★★☆
发热 Heat	★★★
滑刀 Sliding	★★☆
材料研磨性 Abrasive	★

3.设备和磨棒匹配条件 CNC and grinding tool matching conditions

设备条件：主轴最佳运行转速24000rpm，可应对绝大部分尺寸的加工，同时根据产品尺寸的不同，具体转速可参考后文的转速推荐表；并需要多条出水喷嘴。

Equipment conditions: the best running speed of the spindle 24000rpm, which can cope with most of the size of the processing. Furthermore, according to the different sizes of the grinding tools, the specific speed can be referred to the speed recommended table following. Also it needs multiple water nozzles.

磨棒技术参数 Grinding Tool Matching Conditions	
金刚石粒度 Diamond size	80#-200#粗中加工 400#-600#精加工 80#-200# Rough & Medium Machining 400#-600# finishing
金刚石浓度 Diamond concentration	中低 Mid-to-low
结合剂 Binding agent	自锐性增强 Enhancement of self-acuity
砂轮硬度 Grinding tool hardness	中 Medium
砂轮结构 Grinding tool structure	适当排屑冷却增强 Enhanced cooling with proper chip removal
砂轮修整 Tools dressing	需要 Desirable

碳陶复合材料加工

Carbon Ceramic Composite Material Processing





1.材料介绍 Material Introduction

碳陶复合材料兼具碳材料和陶瓷材料的优点，具有高强度、耐高温、耐磨等性能，广泛应用于航空航天、汽车制动等领域。

Carbon ceramic composites combine the advantages of carbon and ceramic materials, with high strength, high temperature resistance, wear resistance and other properties, widely used in aerospace, automotive braking and other fields.

2.材料加工特性 Material Processing Characteristics

材料加工特性 Material Processing Characteristics	碳陶复合材料 Carbon Ceramic Composite Material
硬度 Hardness	★★
崩边 Rupture	★
刀痕 Grinding Line	☆
粘刀 Tool Sticking	★★☆
发热 Heat	★★★
滑刀 Sliding	★
材料研磨性 Abrasive	★

3.设备和磨棒匹配条件 CNC and grinding tool matching conditions

磨棒技术参数 Grinding Tool Matching Conditions	
金刚石粒度 Diamond size	80#-120#粗中加工 250#-600#精加工 80#-120# Rough & Medium Machining 250#-600# finishing
金刚石浓度 Diamond concentration	高 High
结合剂 Binding agent	耐热；适当自锐性增强 Heat-resistant; Appropriate self- sharpening enhancement
砂轮硬度 Grinding tool hardness	硬 Hard
砂轮结构 Grinding tool structure	适当排屑冷却增强 Enhanced cooling with proper chip removal
砂轮修整 Tools dressing	无需 Unnecessary

设备条件：主轴最佳运行转速20000rpm，可应对绝大部分尺寸的加工，同时根据产品尺寸的不同，具体转速可参考后文的转速推荐表；并需要多条出水喷嘴。

Equipment conditions: the best running speed of the spindle 20000rpm, which can cope with most of the size of the processing. Furthermore, according to the different sizes of the grinding tools, the specific speed can be referred to the speed recommended table following. Also it needs multiple water nozzles.

氮化铝陶瓷加工

Aluminum Nitride Ceramic Processing

1.材料介绍 Material Introduction

氮化铝陶瓷在现代工业中发挥着重要作用，尤其是在对散热和电性能有较高要求的领域。

Aluminum nitride ceramics play an important role in modern industry, especially in areas with high requirements for heat dissipation and electrical properties.

2.材料加工特性 Material Processing Characteristics

材料加工特性 Material Processing Characteristics	氮化铝陶瓷 Aluminum Nitride Ceramic
硬度 Hardness	★★★
崩边 Rupture	★★★★★★
刀痕 Grinding Line	★★
粘刀 Tool Sticking	★★☆
发热 Heat	☆
滑刀 Sliding	☆
材料研磨性 Abrasive	★★★

3.设备和磨棒匹配条件 CNC and grinding tool matching conditions

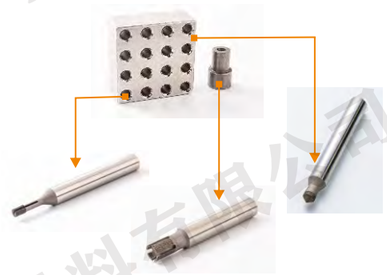
设备条件：主轴最佳运行转速25000rpm，可应对绝大部分尺寸的加工，同时根据产品尺寸的不同，具体转速可参考后文的转速推荐表；并需要多条出水喷嘴。

Equipment conditions: the best running speed of the spindle 25000rpm, which can cope with most of the size of the processing. Furthermore, according to the different sizes of the grinding tools, the specific speed can be referred to the speed recommended table following. Also it needs multiple water nozzles.

磨棒技术参数 Grinding Tool Matching Conditions	
金刚石粒度 Diamond size	250#-400#粗中加工 600#以上精加工 250#-400# Rough & Medium Machining Above 600# finishing
金刚石浓度 Diamond concentration	中高 Mid-high
结合剂 Binding agent	适当冲击韧性增强；耐磨性增强 Appropriate impact toughness enhancement; Increased abrasion resistance
砂轮硬度 Grinding tool hardness	中硬 Mid-hard
砂轮结构 Grinding tool structure	排屑冷却增强；工作面减小 Enhanced chip removal cooling; Reduced working surface
砂轮修整 Tools dressing	无需 Unnecessary

硬质合金（钨钢）加工

Tungsten Steel Machining



1.材料介绍 Material Introduction

钨钢是一种具有高硬度、高强度、耐高温和耐磨性等优异性能的材料，常用于制造刀具、模具、耐磨零件等。

Tungsten steel is a material with excellent properties such as high hardness, high strength, high temperature resistance and wear resistance, and is commonly used in the manufacture of grinding tools, molds and wear-resistant parts.

2.材料加工特性 Material Processing Characteristics

材料加工特性 Material Processing Characteristics	硬质合金（钨钢） Tungsten steel
硬度 Hardness	★★★☆
崩边 Rupture	★
刀痕 Grinding Line	★★☆
粘刀 Tool Sticking	★★★☆
发热 Heat	★★☆
滑刀 Sliding	★★
材料研磨性 Abrasive	★★

3.设备和磨棒匹配条件 CNC and grinding tool matching conditions

磨棒技术参数 Grinding Tool Matching Conditions	
金刚石粒度 Diamond size	80#-120#粗加工 150#-300#中加工 350#-800#精加工 80#-120# Roughing 150#-300# Medium machining 350#-800# Finishing
金刚石浓度 Diamond concentration	高 High
结合剂 Binding agent	耐热；适当自锐性增强；适当冲击韧性增强 Heat-resistant; Appropriate self- sharpening enhancement; Appropriate impact toughness enhancement
砂轮硬度 Grinding tool hardness	硬 Hard
砂轮结构 Grinding tool structure	适当排屑冷却增强 Enhanced cooling with proper chip removal
砂轮修整 Tools dressing	无需 Unnecessary

设备条件：主轴最佳运行转速20000rpm，可应对绝大部分尺寸的加工，同时根据产品尺寸的不同，具体转速可参考后文的转速推荐表；并需要多条出水喷嘴。

Equipment conditions: the best running speed of the spindle 20000rpm, which can cope with most of the size of the processing. Furthermore, according to the different sizes of the grinding tools, the specific speed can be referred to the speed recommended table following. Also it needs multiple water nozzles.

微钻系列

Micro-drill series





随着科技的发展，各行业对微小零件和设备的需求不断增加。航空航天、医疗设备、电子信息等领域对具有更高制造精度的微加工有较大需求，同时还有提供便利生活方式的个人消费产品需要更小更轻的尺寸。传统的机械微钻因其具有优秀的加工质量、稳定的工作、高通用性和高去材率的优势而被广泛应用。金属材料、非金属材料和复合材料都需要通过机械微钻进行加工处理。

With the development of technology, the demand for small parts and equipment in various industries is constantly increasing. There is a great demand for microfabrication with higher manufacturing accuracy in fields such as aerospace, medical equipment, and electronic information. At the same time, personal consumer products that provide convenient lifestyles also require smaller and lighter sizes. Traditional mechanical micro drills are widely used due to their advantages of excellent machining quality, stable operation, high versatility, and high material removal rate. Metal materials, non-metal materials, and composite materials all need to be processed through mechanical micro drills.

深孔钻系列

Deep hole drill series

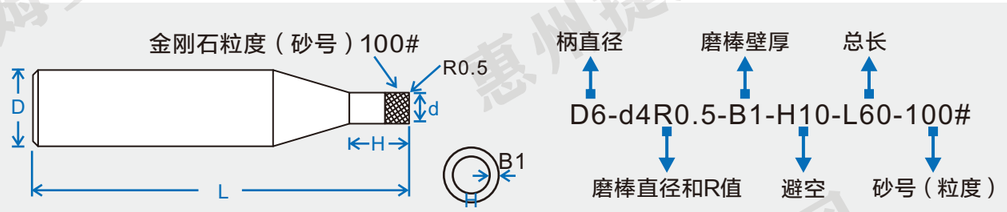


深孔钻是一种专门用于钻深、钻孔精度高、光洁度要求高的加工需求而定制的精密机床。相较于普通钻床，深孔钻可以做到更高的钻深、更高的钻孔精度和更好的表面质量。因此，深孔钻广泛应用于汽车、航空航天、造船、医疗器械等行业。

Deep hole drill is a precision machine tool specially designed for processing needs such as deep drilling, high drilling accuracy, and high smoothness requirements. Compared to ordinary drilling machines, deep hole drilling can achieve higher drilling depth, higher drilling accuracy, and better surface quality. Therefore, deep hole drills are widely used in industries such as automobiles, aerospace, shipbuilding, and medical equipment.

金刚石烧结磨棒命名方式

Product Nomenclature



选刀条件需求表

Table of Requirements for Knife Selection Conditions

加工设备情况					
设备类型		设备转速		设备精度	
冷却排屑情况					
加工参数					
加工材质					
用刀部位	☐ 底刃	☐ 侧刃	☐ 其他：		
加工方式	☐ 螺旋铣	☐ 平面铣	☐ 侧铣	☐ 啄钻	
	☐ 其他：				
加工尺寸					
转速（S）		进给（F）		吃刀量（Q）	
Z轴下刀深度		步 距		抬刀（仅啄钻）	

砂轮直径与粒度关系表

Table of the Relationship between Grinding Wheel Diameter and Particle Size

磨棒直径	颗粒度	磨棒直径	颗粒度
d0.5	400#~1000#	d2.5	100#~1000#
d0.8	250#~1000#	d3	100#~1000#
d1	200#~1000#	d3以上	80#~1000#
d1.5	150#~1000#	|	|
d2	120#~1000#	d50	80#~1000#

不同产品直径推荐的线速度/转速表

Recommended line speed/tachometer for different product diameters

砂轮的线速度（m/s）=砂轮外径d（m）* π * 砂轮转速（rpm）÷60

砂轮直径（mm）	线速度（m/s）	轴转速（rpm）
d1	1.25~1.65	24000~32000
d3	3.14~3.76	20000~24000
d6	5~6.9	16000~22000
d10	7.85~10.46	15000~20000
d20	12.56~18.84	12000~18000
d40	16.75~31.4	8000~15000

金刚石粒度与表面粗糙度的关系

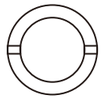
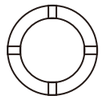
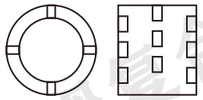
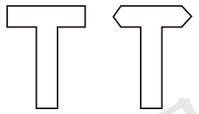
Relationship between diamond particle size and surface roughness

工件材质	粒度	表面粗糙度(Ra/μm)	工件材质	粒度	表面粗糙度(Ra/μm)
氧化锆	100#	0.8	硬质合金（钨钢）	100#	0.4
	150#	0.6		150#	0.25
	200#	0.5		200#	0.2
	250#	0.4		250#	0.15
	300#	0.35		300#	0.1
	400#	0.3		400#	0.06
	600#	0.2		600#	0.04

产品选型及加工参数建议
PRODUCT SELECTION AND PROCESSING PARAMETER SUGGESTIONS

砂轮头部结构的选择

Selection of Grinding Wheel Head Structure

头部形状	直径	头部描述	应用工位
	d2.5以内	无槽无孔	用于钻孔，铣槽加工
	d3以上~d6	一个侧槽 不过中心	直钻孔，铣槽铣台阶
	d3~d6	一个侧槽 过中心	钻孔，铣槽，扩孔
	d4~d50	一个槽 有中心孔	铣槽，铣面，扩孔，铣球
	d4~d50	一字槽 有中心孔	铣槽，铣台阶，铣面
	d10~d50	十字槽 有中心孔	铣面，铣台阶
	d8~d50	十字错位槽 有中心孔	铣面，铣球
	d20~d50	米字槽	铣面，铣球
	d4~d50	T型	螺纹，倒扣

粒度与直径对照表

Comparison table of grit mesh and diameter

中国			日本		欧洲	
粒度	旧标号	尺寸μm	粒度	尺寸μm	粒度	尺寸μm
16/18	20	1000/1180	16/18	1000/1180	D1180	1000/1180
18/20	22	850/1000	18/20	850/1000	D1001	850/1000
20/25	24	710/850	20/30	600/850	D851	710/850
25/30	30	600/710			D711	600/710
30/35	36	500/600	30/40	425/600	D601	500/600
35/40	40	425/500			D501	425/500
40/45	46	355/425	40/50	300/425	D426	355/425
45/50	54	300/355			D356	300/355
50/60	60	250/300	50/60	250/300	D301	250/300
60/70	70	212/250	60/80	180/250	D251	212/250
70/80	80	180/212			D213	180/212
80/100	90	150/180	80/100	150/180	D181	150/180
100/120	100	125/150	100/120	125/150	D151	125/150
120/140	120	106/125	120/140	106/125	D126	106/125
140/170	150	90/106	140/170	90/106	D107	90/106
170/200	180	75/90	170/200	75/90	D91	75/90
200/230	200	63/75	200/230	63/75	D76	63/75
230/270	240	53/63	230/273	53/63	D64	53/63
270/325	280	45/53	273/325	45/53	D54	43/53
325/400	320	38/45	325/400	38/45	D46	38/45
M36/54	W40	36/54	400	34/38	D45	40/50
M22/36		22/36	500	28/34	D35	32/40
M20/30	W28	20/30	600	24/28	D25	25/32
M12/22		12/22	700	20/24	D20	25/40
M10/20	W50	10/20	800	16/20	D20A	25/30
M8/16		8/16	1000	13/16	D20B	30/40
M8/12		8/12				
M6/12	W14	6/12	1200	10/13	D15	15/25
M5/10	W10	5/10	1500	8/10	D15A	10/15
M4/8	W7	4/8	2000	6/8	D15B	15/20
M3/6		3/6	2500	5/6	D15C	20/25
M2.5/5	W5	2.5/5	3000	4/5	D7	5/10
M2/4		2/4	4000	3/4	D3	2/5
M1.5/3	W3	1.5/3	5000	2/3	D1	1/2
M1/2	W1.5	1/2	8000	1/2	D0.7	0.5/1
M0/2		0/2				
M0.5/1.5	W1	0.5/1.5	15000	0/1	D0.25	0.5
M0.5/1		0.5/1				
M0/1		0/1				
M0/0.5		0/0.5				

产品选型及加工参数建议
PRODUCT SELECTION AND PROCESSING PARAMETER SUGGESTIONS

金刚石烧结刀具的故障原因和对策

Reasons and Countermeasures for Malfunctions of Diamond Sintering Grinding Tools

现象 Phenomenon	原因 Reason	对策 Solution
磨棒钝化 Tool blunting	金刚石粒度过小 Small particle size of diamond	增大金刚石粒度 Enlarge particle size of diamond
	结合剂过硬 Hard binder	调软结合剂 Adjust the binder to be softer
	弱研磨材料反磨砂轮能力差 Weak abrasive material has poor ability to grind the grinding wheel in reverse.	增加修刀工艺 Add the tool sharpening process
磨棒烧刀 Tool burning	排屑和冷却不足 Insufficient chip removal and cooling	1.增大冲水压力 2.增加冲水喷头 3.冲水位置对准加工位置 1.Increase the water flushing pressure. 2.Add more water flushing nozzles. 3.Align the water flushing position with the machining position.
	堵塞 Clogged	增强磨棒的排屑结构 Enhance the chip removal structure of the grinding tool
	加工参数过快 The processing parameters are too fast	1.减小吃刀量和进给参数 2.提高转速 1. Reduce the depth of cut and feed parameters 2. Raise the rotational speed
加工崩边 Edge chipping	加工参数不合适 Inappropriate processing parameters	1.减小吃刀量和进给参数 2.在加工特征的进口和出口使用较慢速度，中间位置可适当加快速度 1. Reduce the depth of cut and feed parameters 2. Use a slower speed at the inlet and outlet ofthe processing feature, and the speed can be appropriately increased at the middle position
	金刚石粒度过大 Excessive diamond particle size	减小金刚石粒度 Reduce the diamond particle size
	磨棒工作面过大 Excessive working surface of the grinding tool	改用较小工作面的磨棒结构 Switch to a grinding rod structure with a smaller working surface
	材料本身极易崩边 The material itself is extremely prone to edge chipping	增设超声波刀柄 Add ultrasonic tool holders
粗糙度/刀纹不良 poor roughness / bad tool marks	加工参数不合适 Inappropriate processing parameters	1.减小吃刀量和进给参数 2.提高转速 1. Reduce the depth of cut and feed parameters 2. Raise the rotational speed
	磨棒刚性不足 The deficiency of the rigidity of the grinding tool	1.更换高刚性基体 2.更改刀头结构设计以改善刚性 1. Replace with a high-rigidity base 2. Change the structure design of the tool head to improve rigidity
	金刚石粒型不匹配 Mismatched diamond particle shape	改变粒型和粒度，例如增加锋利度，增加刃角，增加尖角 Change the particle shape and size, for example, increase the sharpness, increase the cutting edge angle, and increase the sharp corner
	磨棒不够锋利 Grinding tool is not sharp enough	增强自锐性 Enhance self-sharpening property
	实在难以达到要求 Really difficult to meet the requirements	增加精修工艺和对应磨棒 Add the fine-finishing process and corresponding grinding rods

产品选型及加工参数建议
PRODUCT SELECTION AND PROCESSING PARAMETER SUGGESTIONS

参数表
Parameter table

注意 表中数据是样品测试的特性值，特性值会随产品的制造过程和形态有所差异。

特性项目 / 材料 / 产品编号			氧化铝 / AL_2O_3				氧化锆 / ZrO_2	氮化铝/ AIN	碳化硅/ SiC	氮化硅 / Si_3N_4	可加工陶瓷
			95氧化铝	99氧化铝	998氧化铝	999氧化铝					
颜色			白	象牙色	象牙色	白色	白色	灰色	黑色	黑色	白色
主要成分含量			95%氧化铝 95%AL_2O_3	99%氧化铝 99%AL_2O_3	99.8%氧化铝 99.8%AL_2O_3	99.9%氧化铝 99.9%AL_2O_3	>94.4%氧化锆 >94.4%ZrO_2	96%氮化铝 96%AIN	–	–	–
主要特征			良好的金属化特性、耐磨。	优秀的耐等离子腐蚀、高耐磨损。			高机械强度、耐磨、耐热。	–	较高的高温强度、耐腐蚀、好的热导率。	轻质、耐磨、耐高温。	易加工、优秀的电绝缘性、优秀的热绝缘性。
主要用途			IC封装、电子部件、机械部件。	半导体设备部件、耐磨损、耐腐蚀件。			耐磨、耐热部件、如砂磨机配件。	–	耐腐蚀件、密封件、耐高温件。	耐热件、耐磨损件、耐腐蚀件。	电绝缘性、热绝缘性。
密度		g/cc	≥3.7	≥3.88	≥3.92	–	≥6.01	≥3.3	≥3.14	≥3.2	≥2.52
显气孔率		%	0	0	0	–	0	0	0	0	0
维氏硬度		Gpa	13.8	18	18	–	13	9.5	24	13.9	–
抗弯硬度		Mpa	380	350	350	–	900	350	400	500-700	94
抗压硬度		Mpa	2500	2450	2600	–	2400	2500	2200	3500	345
杨氏模具		GPA	300	350	360	–	200	320	400	300	66.9
泊松比		–	0.2	0.22	0.22	–	0.31	0.24	0.14	0.25	0.29
断裂韧性		MPA · $m^{1/2}$	3	4-5	4-5	–	6-7	–	4	5-7	–
线性膨胀系数	40-400℃	x10^{-6}/℃	7.5	8.2	8.1	–	10	4	4	2.6	9
热传导率	20°	W/(m k)	20	25-30	32	–	2-3	170	120-150	15-20	1.46
比热		J/(kg .k)x10^3	0.78	0.8	0.8	–	0.46	0.74	–	–	0.79
体积电阻率	20°	Ω cm	>10^{14}	>10^{14}	>10^{14}	–	–	>10^{14}	>10^6	>10^{14}	>10^{17}
介电强度		KV/mm	50	20	17	–	–	>15	–	13	45
介电常数		–	9	9.2	9.7	–	–	–	–	–	6
介电损耗系数		x10^{-4}	2.6	2	1	–	–	8.8	–	–	4
硝酸	90℃		<0.12	–	<0.05	–	0	–	–	<1.0	–
硫酸	95℃	重量损失	<0.3	–	<0.23	–	<0.04	–	–	<0.4	–
氢氧化钠	80℃		<0.9	–	<0.04	–	<0.08	–	–	<3.6	–