XTC

更多材质，更高品质！

九江金鹭硬质合金有限公司

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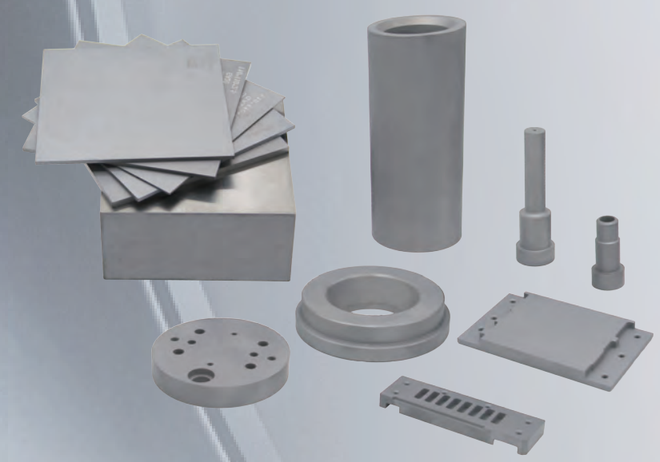
2023

GEHM®

硬质合金
精密冲压模具材料

CEMENTED CARBIDE FOR PRECISION STAMPING

更多材质，更高品质！
MORE GRADES, HIGHER QUALITY.



九江金鹭硬质合金有限公司
JIUJIANG GOLDEN EGRET HARD MATERIAL CO.,LTD.

公司简介
Company Profile

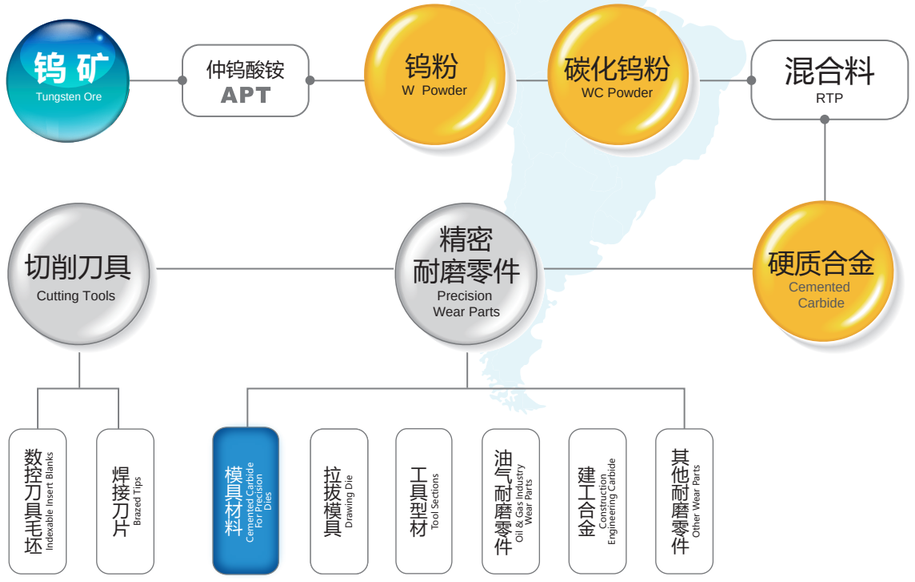
九江金鹭硬质合金有限公司是由厦门钨业股份有限公司与五矿有色金属股份有限公司共同出资组建的国有控股企业，成立于2011年。公司拥有一支高素质的员工队伍，依托厦门钨业，运用先进的管理理念，专注开发和生产应用于工业、工程等领域的硬质合金耐磨零件，为广大用户提供高效、耐磨、稳定的产品，创造更大价值。

厦门钨业（股票代码：600549）拥有从钨矿山、冶炼、深加工到钨二次资源回收的完整钨产业链，钨冶炼和粉末产品、超细晶硬质合金处于国际领先水平，是国家级重点高新技术企业、国家首批发展循环经济示范企业，拥有我国唯一的国家级钨材料工程技术研究中心，在世界钨、钼、稀土、能源新材料领域具有重要影响力。

Jiujiang Golden Egret Hard Material Co., Ltd. (GEHM) was founded in 2011 as a joint venture by Xiamen Tungsten Co., Ltd. (XTC) and China Minerals Non-ferrous Co., Ltd. With the creative staff and the advanced management concept, backed by XTC, GEHM specializes in developing & producing the cemented carbide wear parts that apply to the fields of industry, engineering, construction, etc., dedicating itself to creating more values for the worldwide customers by providing efficient, durable and reliable products.

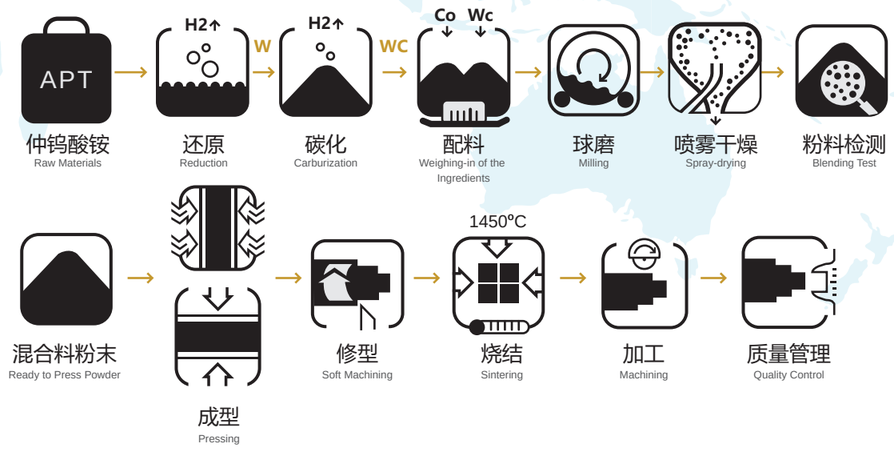
XTC (stock symbol: 600549) owns a complete tungsten industrial chain which is from tungsten ore, smelting, deep processing to tungsten recycling, and its tungsten smelting, tungsten powder and ultra-fine cemented carbide products are in the international advanced level. XTC is a state-level key high-tech enterprise which is one of the first batch of the national demonstrational enterprises for developing circular economy, having the only National Tungsten Material Engineering Technology Research Center in China, occupying an extremely important position in the industries of tungsten, molybdenum, rare earth and new energy materials worldwide.

产业链
Industrial Chain



主要设备
Advanced Equipment

制造流程
Manufacturing Process



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- 作业常识 Common Sense
- 放电加工 Electrical discharge machining
- 焊接加工 Welding processing
- 废弃处理时的注意事项 Attentions to disposing carbide waste

牌号总览
Grade List

牌号 Grade	钴含量 Cobalt content Co%	晶粒度 Grain Size (μm)	密度 Density (g/cm³)	洛氏硬度 Hardness (HRA)	断裂韧性 K_{1C} (MPa·m$^{1/2}$)	抗弯强度 TRS (MPa)	抗压强度 Compression Strength (MPa)	杨氏模量 Young's modulus (GPa)
GF40H	12.5	1.0-2.0	14.20	89.4	13.0	3700	4700	570
GF50H	14.0	1.5-3.0	14.05	88.5	14.5	3800	4600	550
GF55HH	16.5	1.0-4.0	13.80	87.3	15.5	3500	4200	540
CY106	6.5	1.0-5.5	14.83	90.4	13.0	2950	5200	620
CY366	12.0	0.4-0.8	14.15	91.2	10.0	3600	5500	610
CY466	12.0	0.8-2.5	14.15	89.8	13.0	3700	5100	580
CY887	12.7	0.8-1.3	14.15	90.3	11.5	4050	5400	570
GU20	10.3	0.8	14.40	91.7	10.0	3800	5600	600
GU10UT	6.0	0.2-0.5	14.75	94.0	7.0	3200	5200	650
GU092	9.0	0.2-0.5	14.40	93.6	7.5	4100	5300	620
GU25UF	12.0	0.4	14.10	92.6	8.5	4200	6000	570
GA20	13.5	0.5-1.5	14.05	90.0	12.0	3700	5300	560
GA70	20.0	2.0-6.0	13.40	85.0	23.0	2800	3400	480
GA25N	13.5(Ni)	0.8-2.0	13.92	88.8	12.0	3000	4500	550

冲压应用牌号推荐

Grade Application Recommendation for Stamping Material

用途 Application	牌号 Grade	GF40H	GF50H	GF55HH	CY106	CY366	CY466	CY887	GA20	GA70	GA25N
电机铁芯冲压 Stamping Motor Core	轻度冲击 Light Stamping						■				
	一般冲击 General Stamping	■	■								
	中度冲击 Medium Stamping			■							
引线框架冲压 Stamping Lead Frame	轻度冲击 Light Stamping					■					
	一般冲击 General Stamping							■	■		
电子连接器冲压 Stamping Electronic Connector	轻度冲击 Light Stamping					■					
	一般冲击 General Stamping							■	■		
	中度冲击 Medium Stamping						■				
纯铜、纯铁冲压 Stamping Pure Copper and Pure Iron	轻度冲击 Light Stamping				■						
	一般冲击 General Stamping				■						
	中度冲击 Medium Stamping						■				
厚板冲压、冷镦 Stamping thick Plate, Cold Heading	重度冲击 Heavy Stamping									■	
无磁 Non-magnetic	一般冲击 General Stamping										■

锂电池壳体拉伸牌号推荐

Grade Recommendation for Lithium Battery Casing Stretching Mold

用途 Application	牌号 Grade	GU20	GU10	GU10UT	GF50H
锂电池圆壳拉伸-冲杆 Lithium Battery Round Casing Stretching Mold– punch		■			
锂电池圆壳拉伸-凹模 Lithium Battery Round Casing Stretching Die–die			■	■	
锂电池方壳拉伸-凹模 Lithium Battery Square Casing Stretching Die –die					■

第四代⁺硬质合金——抗腐蚀、高韧性、高耐磨、低应力

The 4th Plus Generation Tungsten Carbide — anti-corrosion, High toughness, High wear resistance, Low stres

九江金鹭在继承厦门钨业在模具材料方面研究成果的基础上，一直坚持以使用效果为导向，与客户进行深度互动，研发出了第四代⁺硬质合金模具材料，其抗腐蚀性、耐磨性和韧性大幅度提升，同时具有较低的应力，良好的综合性能，使材料具有极高加工稳定性，大幅提升模具使用寿命。

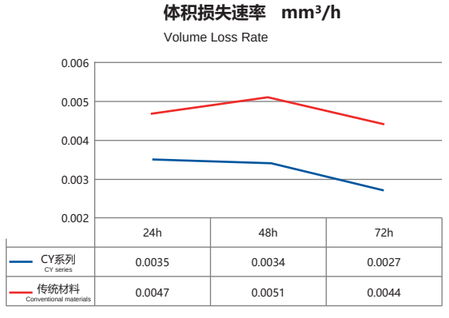
Inheriting the researching achievement of XTC Group, GEHM has successfully developed the 4th Plus generation carbide which has higher performance in corrosion resistance, wear resistance and toughness, while having relatively low stress, good comprehensive performance, making the material extremely stable during processing and greatly increasing service life of mold.

高耐腐蚀性

High Corrosion Resistance

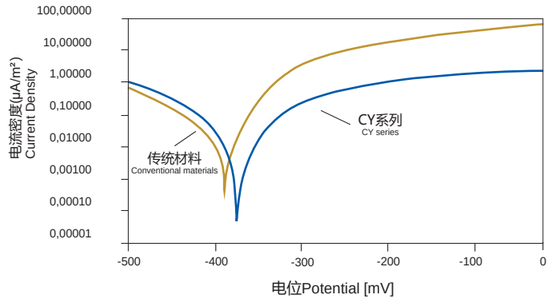
失重法腐蚀试验（pH值为2的稀盐酸溶液）

Result of Corrosion Resistance test with weight-loss method in 10%HCl Solution



电化学腐蚀试验

Result of Electrochemical Corrosion Test



两者腐蚀结果表明，第四代⁺合金抗腐蚀能力有明显的提高。在粘结剂钴被分解前，抗腐蚀材质会自我持续产生保护层，从而使腐蚀速率大大降低。

The two test results show that the corrosion resistance of the 4th plus generation carbide has been significantly improved. Before the binder cobalt is decomposed, the corrosion-resistant material will continuously self-produce a protective layer, thereby greatly reducing corrosion rate.

HIP处理提高合金强度

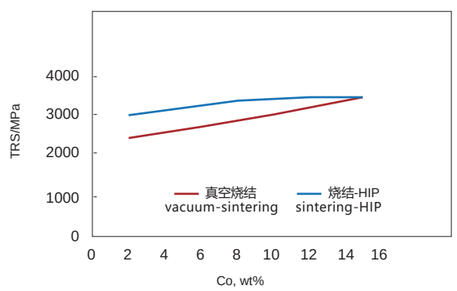
Advantages of HIP

常规烧结硬质合金内部往往存在微孔隙，成为导致工件破坏的裂纹源。在烧结温度下充入惰性气体，进行HIP处理能有效消除微孔隙，使合金机械性能得到显著提高，九江金鹭所有模具材料都经过HIP处理。

Conventional sintered cemented carbide often has micro-pores inside, which become the source of cracks that cause damage to the workpiece. Filling with inert gas at the sintering temperature and performing HIP treatment can effectively eliminate micro-pores and significantly improve the mechanical properties of the carbide, all GEHM EDM blocks are HIP processed.

HIP工艺处理对不同钴含量合金抗弯强度的影响

Effect of HIP Process on TRS of Different Cobalt Contents

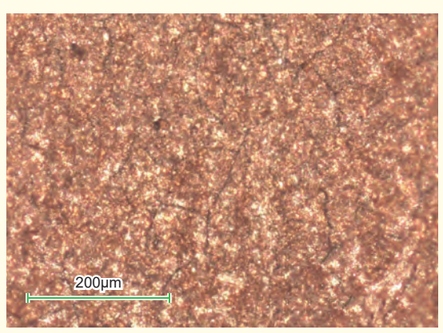


优良的电加工性能

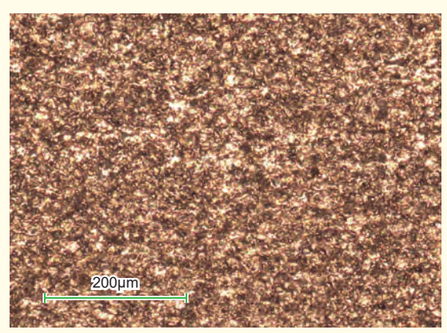
Excellent Electro-machining Performance

线割机台： Sodick慢丝水割机
线割工艺： 割一修三

Wire cutting Machine: Sodick EDM Wire-Cutting Machine
Process: Cut one and modify three



传统材料线割有龟裂
Cracks appear on conventional carbide after EDM



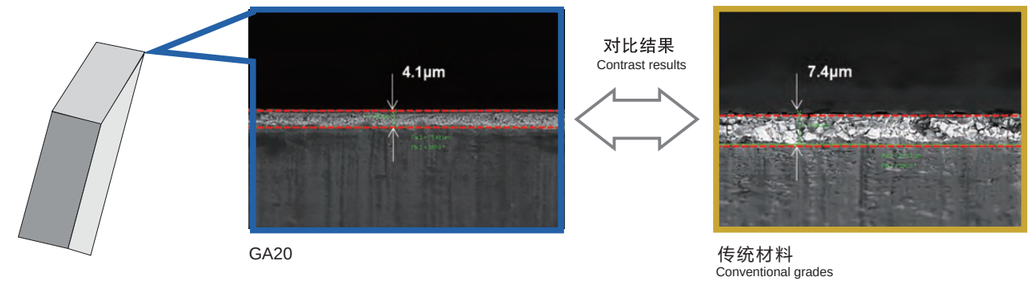
CY466线割没有龟裂
No cracks on CY466 after EDM

GA20-良好的刃口锋利性硬质合金

GA20 - Good Edge Sharpness Cemented Carbide

试验证明采用细晶粒牌号GA20与传统材料对比，可以将刃尖厚度缩小46%，刃口锋利性大幅提高。GA20产品利用强化技术，对WC粒度分布进行特殊控制，相比传统材料，即可维持硬度，又能保证韧性，在耐腐蚀性和抗崩性能方面有所提高。

The tests prove that comparing with conventional grades, the GA20 with fine grain size WC can make the knife-edge 46% thinner which make the knife blade much sharper and keener.Strengthening the cobalt phase in GA20 to spread the WC grain specially, this technology make the carbide contains good hardness and toughness. More than that, the carbide will have stronger corrosion resistance and chipping resistance.



双重去应力处理

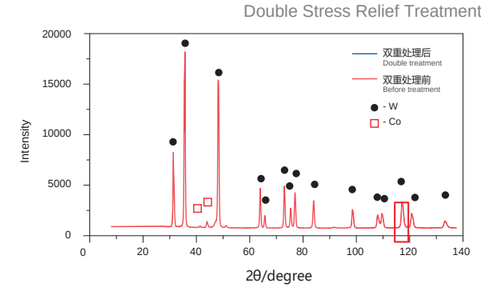
Double Stress Relief Treatment

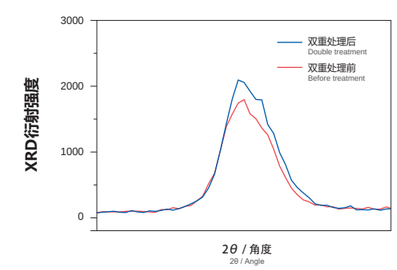
独特的双重去应力处理工艺技术，大幅降低内应力和提高合金的强度，有效保证合金机械加工中的稳定性，提高模具使用寿命。

Unique double stress relief treatment technology greatly reduces internal stress and improves the strength of cemented carbide, effectively ensuring the stability of cemented carbide during machining and extending service life of mold.

双重去应力处理降低内应力

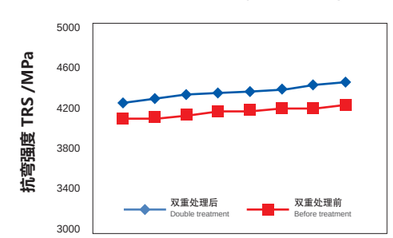
Double Stress Relief Treatment to Reduce Internal Stress





双重去应力处理提高合金强度

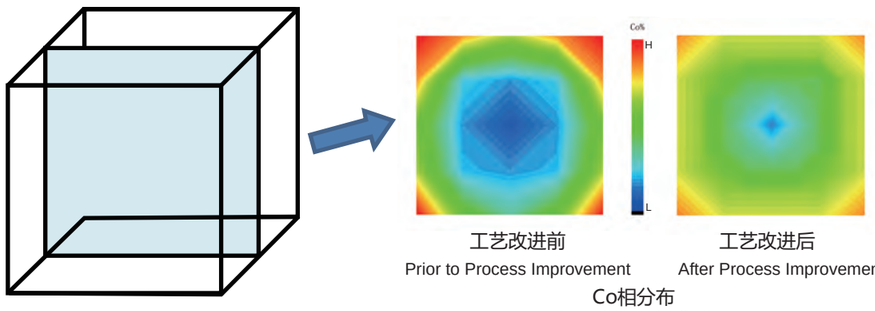
Double Stress Relief Treatment to Improve Strength of Carbide



优化烧结工艺提升材料均匀性
Optimize Sintering Process to Improve Material Uniformity

硬质合金在烧结过程中因碳气氛、重力影响，导致钴相迁移使得合金各部位成分不均。九江金鹭通过特殊烧结工艺有效减小了钴相迁移，保证硬质合金材料成分及性能的均一。

During the sintering process of cemented carbide, the migration of cobalt phase caused by carbon atmosphere and gravity leads to compositional non-uniformity in different parts of cemented carbide. GEHM effectively mitigates cobalt phase migration through a specialized sintering process, ensuring uniform composition and properties of cemented carbide materials.



工艺改进前
Prior to Process Improvement

工艺改进后
After Process Improvement

Co相分布
Cobalt Phase Distribution

通用牌号
Common Grades

CY466

● 中钴中晶组织结构，多组元合金元素增强钴相强度，耐磨性与韧性良好平衡，耐高温、化学腐蚀，具有良好的电加工性能。
● 适用于0.5mm厚不锈钢带、0.5mm厚以下硅钢带、1.0mm厚以下纯铜纯铁带冲压。
● With medium-cobalt & medium coarse grain size, and enhanced strength of cobalt phase by multi-component carbide elements, CY466 has the advantages of perfect balance between wear resistance and toughness, good resistance against high temperature resistance & chemical corrosion, as well as exceptional EDM performance .
● Suitable for stamping 0.5mm thick stainless steel strip, silicon steel strip with a thickness of less than 0.5mm, pure copper or iron strip with a thickness of less than1.0mm.

GA20

● 高钴细晶组织结构，强度高、断裂韧性以及刃边锋利性好。
● 适用于薄不锈钢带、铜带高速冲压。
● High-cobalt and fine grain size, high strength, excellent fracture toughness and edge sharpness.
● Suitable for high-speed stamping of thin stainless steel strip and copper strip.

电机铁芯冲压材料
Materials for Stamping Motor Core

GF系列是为了具有重载冲击条件下冲压模所研究设计的，与传统材料相比GF系列配以中钴、混晶配方，有着优越的冲击韧性、抗震性和抗腐蚀性，有效改善加工过程材质表面腐蚀问题，同时降低加工和使用过程产生裂纹的概率。

Designed for stamping molds under heavy-duty, GF series are featured in medium-cobalt content and mixed tungsten carbide powder grain sizes, which make them gain superior anti-impaction ability, anti-shock resistance and corrosion resistance, effectively improving corrosion problem on the surface of finished carbide products during processing, while reducing the probability of cracks during processing and using.

GF40H

● 硬度高，耐磨性和韧性方面都表现优越。主要用于传统Y系列电机铁芯制作。

● With High hardness, excellent resistance and toughness. Mainly used for conventional Y-series motor core production.

GF50H

● 有着良好的韧性，抗震性能好。可用于结构复杂的无刷电机、伺服电机铁芯的制造。

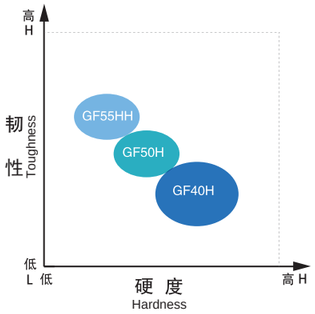
● With excellent toughness and anti-shock resistance, suitable for producing complex-structured cores of brushless and servo motors.

GF55HH

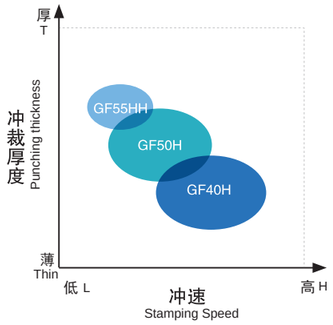
● 具有极好的抗震性，能应对厚度较大的材料冲压及低速模具冲压。

● Has excellent anti-shock resistance, suitable for stamping thicker mold at low speed.

GF系列牌号关系图
Comparison of GF series Grades



GF系列牌号适用范围
Application of GF series Grades



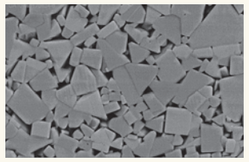
引线框架、电子连接件冲压材料

Materials for Stamping Lead Frame and Electronic Connector

针对SPCC、铁带、铜带、不锈钢带的高速冲压，提供优质方案，在引线框架、电子连接器等领域备受好评。

GA series offers the optimal solution for high-speed stamping of SPCC, steel strip, beryllium copper strip and stainless electronic components, etc. The series is highly acclaimed in the fields of lead frame and connector industry.

CY106

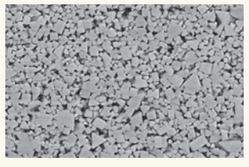


- 更低的粘结剂，更高的抑制剂，抑制模具与纯铜、纯铁等软质金属的亲和性，配合粗WC晶粒，成就合金超强的抗冲击能力。
- 适用于0.5mm厚以下纯铜、纯铁等软质材料冲压加工。
- By less binder and more inhibitor, to inhibit the affinity between mold and soft metals like pure copper and pure iron. Additionally, incorporating coarse grain size WC, the cemented carbide achieves superior impact resistance.
- Suitable for stamping of soft metals such as pure copper and iron (thickness<0.5mm) .

CY366

- 中钴超细晶硬质合金，具有高耐磨性与良好的抗崩刃性，以及良好的电加工技能。
- 适用于＜0.4mm高硬不锈钢带、合金铜带高速冲压。
- Middle-cobalt and ultra-fine grain size cemented carbide, exhibits high wear resistance and excellent chipping resistance, as well as good electrical machining performance.
- Suitable for high-speed stamping of stainless steel strip and copper-carbide strip (thickness<0.4mm).

CY887



- 以细晶WC为基体的中钴硬质合金材料，是优良的耐剥落性和耐磨性的综合体，通用性强。
- 适用于0.5mm厚以下合金铜带高速冲压，0.15mm厚以下不锈钢带高速冲压。
- Due to its fine grain size and medium-cobalt content. CY887 is a combination of excellent spalling resistance and wear resistance. Moreover, it possesses remarkable versatility in various applications.
- Suitable for high-speed stamping of beryllium copper strip and stainless steel strip (thickness<0.15mm).

高耐磨材料

Materials for High Wear Resistance

GU系列配以中低钴、细晶配方，有着良好的刃口锋利性、耐磨性能，有效改善加工过程中刃口磨损问题，延长产品使用寿命。

With low and medium cobalt content as well as a fine grain size formula, GU series has good cutting edge sharpness and wear resistance, which effectively address the issue of cutting edge wear during processing, thereby prolonging product's service life.

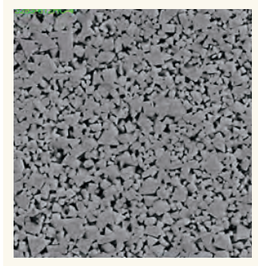
GU10UT

- 低钴超细晶组织结构，高耐磨性。
- Low-cobalt and ultra-fine grain size structure, with high wear resistance.

GU092

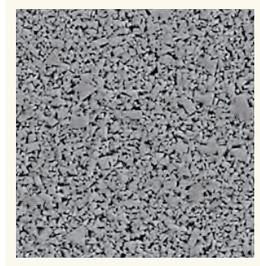
- 中钴超细晶组织结构，高耐磨性和良好的刃口锋利性。
- Medium-cobalt and ultra-fine grain size structure, with high wear resistance and good cutting edge sharpness.

GU20



- 中钴亚细晶组织结构，良好的耐磨性、韧性、刃口锋利性。
- Medium-cobalt and sub-fine grain size structure, with good wear resistance, toughness, cutting edge sharpness.

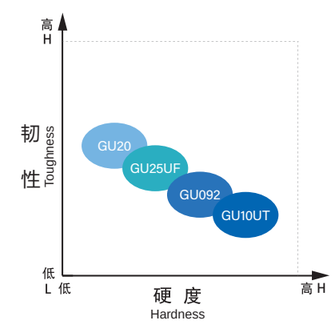
GU25UF

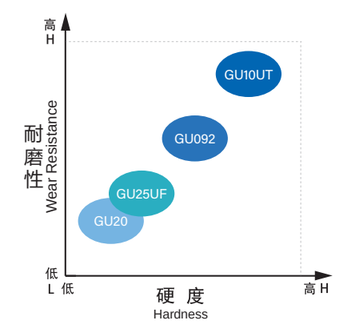


- 中高钴超细晶组织结构，能够通过精磨加工出锋利的刃边，具有高耐磨、高刃边强度、优异的抗刃口崩碎能力。
- With 11% to 14% cobalt and ultra-fine grain size structure, the sharp edge could be finished through fine grinding, with high wear resistance, high edge strength, excellent resistance to edge breakage.

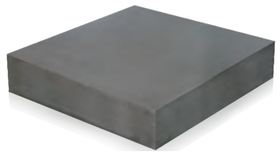
GU系列牌号关系图

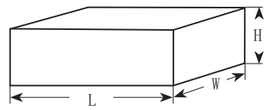
Comparison of GU series Grades





板块规格表
EDM Blocks





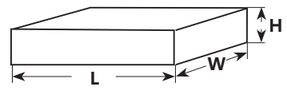
规格 Specifications	尺寸Dimension(mm) 公差Tolerance(mm)			牌号 Grade	
	长度L (0 ~ +5)	宽度W (0 ~+5)	高度H (+0.5~+0.6)	GF40H	GF50H
MF16520	165	165	20	O	O
MF16525	165	165	25	O	O
MF16530	165	165	30	O	O
MF16535	165	165	35	O	O
MF16540	165	165	40	O	O
MF16545	165	165	45	O	O
MF16550	165	165	50	△	△
MF16555	165	165	55	△	△
MF16560	165	165	60	△	△
MF16565	165	165	65	△	△
MF16570	165	165	70	O	O
MF205150	205	205	15	O	O
MF205200	205	205	20	△	△
MF205250	205	205	25	△	△
MF205270	205	205	27	O	O
MF205280	205	205	28	O	O
MF205300	205	205	30	O	O
MF205350	205	205	35	O	O
MF205400	205	205	40	O	O

(△：常备库存；O：可制作)
(△： Inventory ； O：Availlable)

规格 Specifications	尺寸Dimension(mm) 公差Tolerance(mm)			牌号 Grade	
	长度L (0 ~ +5)	宽度W (0 ~+5)	高度H (+0.5~+0.6)	GF40H	GF50H
MF255150	255	255	15	O	O
MF255200	255	255	20	△	△
MF255250	255	255	25	△	△
MF255270	255	255	27	O	O
MF255280	255	255	28	O	O
MF255300	255	255	30	O	O
MF255350	255	255	35	O	O
MF305100	305	305	10	O	O
MF305150	305	305	15	O	O
MF305200	305	305	20	△	△
MF305250	305	305	25	△	△
MF305300	305	305	30	O	O

供货态 Condition
上下平磨，HIP及去应力处理 Top and bottom grinding, HIP and Stress Relief Treatment
库存量可能因出货情况而产生不足，订购前请先咨询 Inventory may be insufficient due to shipment, Please consult us before ordering

板块规格表
EDM Blocks



规格 Specifications	尺寸Dimension(mm) 公差Tolerance(mm)			牌号 Grade
	长度L (+0.6~+2)	宽度W (+0.6~+2)	高度H (+0.2~+0.4)	GA20
MA125015	125	112.5	1.5	△
MA125020	125	112.5	2.0	△
MA125025	125	112.5	2.5	△
MA125030	125	112.5	3.0	△
MA125035	125	112.5	3.5	△
MA125040	125	112.5	4.0	△
MA125045	125	112.5	4.5	△
MA125050	125	112.5	5.0	△
MA125055	125	112.5	5.5	△
MA125060	125	112.5	6.0	△
MA125065	125	112.5	6.5	△
MA125070	125	112.5	7.0	△
MA125075	125	112.5	7.5	△
MA125080	125	112.5	8.0	△
MA125085	125	112.5	8.5	△
MA125090	125	112.5	9.0	△
MA125095	125	112.5	9.5	△
MA125100	125	112.5	10.0	△
MA125105	125	112.5	10.5	△
MA125110	125	112.5	11.0	△
MA125115	125	112.5	11.5	△
MA125120	125	112.5	12.0	△
MA125125	125	112.5	12.5	△
MA125130	125	112.5	13.0	△
MA125135	125	112.5	13.5	△
MA125140	125	112.5	14.0	△
MA125145	125	112.5	14.5	△
MA125150	125	112.5	15.0	△
MA125155	125	112.5	15.5	△
MA125160	125	112.5	16.0	△

(△：常备库存；O：可制作)
(△： Inventory ； O：Availlable)

规格 Specifications	尺寸Dimension(mm) 公差Tolerance(mm)			牌号 Grade
	长度L (+0.6~+2)	宽度W (+0.6~+2)	高度H (+0.2~+0.4)	GA20
MA105205	105	105	20.5	△
MA105225	105	105	22.5	△
MA105255	105	105	25.5	△
MA105305	105	105	30.5	△
MA105355	105	105	35.5	△
MA105405	105	105	40.5	△
MA105455	105	105	45.5	△
MA105505	105	105	50.5	△
MA105555	105	105	55.5	△
MA105605	105	105	60.5	△
MA105655	105	105	65.5	△
MA105705	105	105	70.5	△
MA105755	105	105	75.5	O
MA105805	105	105	80.5	O

供货态 Condition
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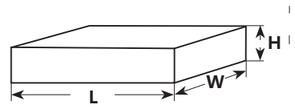
板块规格表
EDM Blocks



规格 Specifications	尺寸Dimension(mm) 公差Tolerance(mm)			牌号 Grade
	长度L (0~+5)	宽度W (0~+5)	高度H (+0.5~+0.6)	GA20
MA150060	150	150	6.0	O
MA150065	150	150	6.5	O
MA150070	150	150	7.0	O
MA150075	150	150	7.5	O
MA150080	150	150	8.0	O
MA150085	150	150	8.5	O
MA150090	150	150	9.0	O
MA150095	150	150	9.5	O
MA150100	150	150	10.0	△
MA150105	150	150	10.5	O
MA150110	150	150	11.0	O
MA150115	150	150	11.5	O
MA150120	150	150	12.0	△
MA150125	150	150	12.5	O
MA150130	150	150	13.0	O
MA150135	150	150	13.5	O
MA150140	150	150	14.0	O
MA150145	150	150	14.5	O
MA150150	150	150	15.0	O
MA150160	150	150	16.0	O
MA150180	150	150	18.0	O
MA150200	150	150	20.0	O
MA150220	150	150	22.0	O
MA150250	150	150	25.0	O
MA150300	150	150	30.0	O
MA150350	150	150	35.0	O

规格 Specifications	尺寸Dimension(mm) 公差Tolerance(mm)			牌号 Grade
	长度L (0~+5)	宽度W (0~+5)	高度H (+0.5~+0.6)	GA20
MA150400	150	150	40.0	O
MA150450	150	150	45.0	O
MA150500	150	150	50.0	O
MA150550	150	150	55.0	O
MA150600	150	150	60.0	O
MA150650	150	150	65.0	O
MA150700	150	150	70.0	O

供货态 Condition
上下平磨，HIP及去应力处理 Top and bottom grinding, HIP and Stress Relief Treatment
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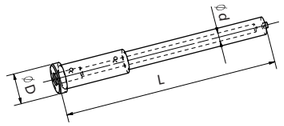
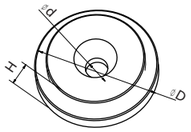
（△：常备库存；O：可制作）
（△： Inventory ； O：Available ）

新能源电池壳体规格表
New Energy Battery Casing Stretching Mold



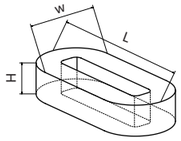


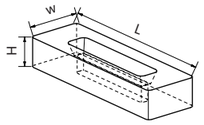
圆壳拉伸冲杆
Round Casing Stretching – Punch

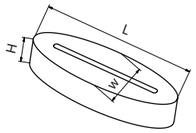
系列 Series	尺寸 Dimensions（mm）		
	D(mm)	d(mm)	L(mm)
18650 系列	23~80	3~18	200~600
21700 系列			
46系列			

圆壳拉伸凹模
Round Casing Stretching –Die

系列 Series	尺寸 Dimensions（mm）		
	D(mm)	d(mm)	L(mm)
18650 系列	40~170	20~50	20~40
21700 系列			
46系列			







方壳拉伸凹模系列
Square Casing Stretching –Die

尺寸 Dimensions（mm）		
L(mm) 最大规格	W(mm) 最大规格	H(mm) 最大规格
530	200	80

注：可根据客户的具体需求定制。
PS: Customized Dimension are available.

预型件规格
Preforms

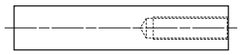
可为客户提供冲压模具配套的异形预型件，减少加工量及加工难度，为用户降低加工成本，可提供通孔、盲孔、螺纹孔及各类台阶和槽型定制。

We provide customers with customized preforms matching stamping mold. It can reduce grinding stock and processing difficulty and save costs for users. We also have ability to manufacture through hole, blind hole, step hole, threaded hole, various steps and groove types.

常用螺纹规格
Common Thread

穿丝孔直径 Wire Hole Diameter D(mm)	最大长度 Maximum Length L(mm)
1.0	64
1.25	64
1.5	96
2	96
3	127

盲孔直径 Blind Hole Diameter D(mm)	最大长度 Maximum Length L(mm)
1.0	32
1.25	32
1.5	48
2	48
3	64



常用螺纹规格 Common Thread Specification	最大深度 Maximum Depth L(mm)
M3	24
M4	24
M5	24
M6	32
M8	32
M10	40
M12	40
M16	40

注：接受各类非标螺纹定制。
PS: Accept all kinds of non-standard thread customization

硬度换算表
Hardness Conversion

布氏硬度10mm球 荷重3000kg			洛氏硬度				维氏硬度 HV 荷重 30kg
标准球	Hult Green 球	碳化钨球	HRA 荷重60kg 金刚石	HRB 荷重100kg 1/6"球	HRC 荷重150kg 金刚石	HRD 荷重100kg 金刚石	
–	–	–	92.5	–	80.5	–	1700
–	–	–	92.0	–	80.0	–	1600
–	–	–	91.5	–	79.0	–	1550
–	–	–	91.0	–	78.0	–	1500
–	–	–	90.5	–	77.0	–	1450
–	–	–	90.0	–	76.0	–	1400
–	–	–	89.5	–	75.0	–	1350
–	–	–	89.0	–	74.0	–	1300
–	–	–	88.5	–	73.0	–	1250
–	–	–	88.0	–	72.0	–	1200
–	–	–	87.5	–	71.5	–	1150
–	–	–	87.0	–	71.0	–	1140
–	–	–	86.5	–	70.0	–	1076
–	–	–	86.0	–	69.0	–	1004
–	–	–	85.6	–	68.0	76.9	940
–	–	–	85.3	–	67.5	76.5	920
–	–	–	85.0	–	67.0	76.1	900
–	–	767	84.7	–	66.4	75.7	880
–	–	757	84.4	–	65.9	75.3	860
–	–	745	84.1	–	65.3	74.8	840
–	–	733	83.8	–	64.7	74.3	820
–	–	722	83.4	–	64.0	73.8	800
–	–	710	83.0	–	63.3	73.3	780
–	–	698	82.6	–	62.5	72.6	760
–	–	684	82.2	–	61.8	72.1	740
–	–	670	81.8	–	61.0	71.5	720
–	615	656	81.3	–	60.1	70.8	700
–	610	647	81.1	–	59.7	70.5	690
–	603	638	80.8	–	59.2	70.1	680
–	597	630	80.6	–	58.8	69.8	670
–	590	620	80.3	–	58.3	69.4	660
–	585	611	80.0	–	57.8	69.0	650
–	578	601	79.8	–	57.3	68.7	640
–	571	591	79.5	–	56.8	68.3	630

注意事项
Attention

作业常识
Common Sense

1. 因硬质合金的硬度极高且具有脆性，受外力冲击容易断裂，在安装使用各种硬质合金材料时禁止敲打、抛掷硬质合金材料；操作时请充分注意安全，以免砸伤手脚。

Because of the high hardness and brittleness, the tungsten carbide is easily broken by the external force. Please do not beat or throw the tungsten carbide products while using and please pay full attention to avoid injuring byfalling carbides.

2. 硬质合金在加工中可能会发生破损，因此，请务必在使用机械设备上加装安全装置及安全防护罩，操作人员务必戴好防护眼镜及安全靴。

The carbide might be broken during your procession, therefore please do add protection device and security equipment to your machines when working. And please do wear protective glasses and boots.

3. 作业时请戴手套操作，以防有与硬质合金接触后而引起过敏的人；粉尘也会对人体造成影响，请戴用防尘口罩。

Please wear gloves to avoid allergy caused by touching tungsten carbide during your work; please wear anti-dust mask because the dust caused during your operation might be harmful to human body.

4. 硬质合金中包含铁系的金属(钴和镍)，在酸性环境中会发生腐蚀(生锈)，因此，在辅助加工液的使用上请选择弱碱性。

Please choose alkalescent lubricating liquid for your processing because the carbides which contain cobalt and nickel are easily to be corroded.

放电加工
Electrical discharge machining

1. 硬质合金在线切割放电加工时可能产生开裂，因此，请在线切割加工后确认有无裂纹，再进行后续加工。

The carbide might be broken down during the electrical discharge machining. Before you go on the next processing step, please make sure there is no crack on the carbide.

2. 硬质合金的强度在放电加工后会降低，容易产生开裂等的破损，请根据具体用途设定加工条件和加工方法。

The carbides' hardness going down after EDM, please choose reasonable processing methods based on your application to avoid cracks.

焊接加工
Welding processing

1.硬质合金在焊接加工时，可能会发生开裂，请在焊接加工后确认有无开裂情况，并对产品进行保温处理。

The carbide might be broken down during the welding processing. Please carefully check out whether there are cracks on the carbide and do heat preservation for the products.

2. 在大气中加热后，硬质合金表面会发生氧化，请在焊接加工后去除氧化部分。

Heating in the air, the surface of the carbide will be oxidized. Please remove the oxidized part of the products after the wielding process.

废弃处理时的注意事项
Attentions to disposing carbide waste

1. 虽不含有Rosh对应物质等的有害物，但废弃的硬质合金会对自然界造成影响，因此，请与专业处理部门协商处理。

Though our carbide products are free of harmful substances listed in ROSH standards, but the waste carbide will affect the environment, too. If you need dispose carbide waste, please contact the professional persons.

Notes