



精密耐磨零件

PRECISION WEAR PARTS



厦门金鹭特种合金有限公司
Xiamen Golden Egret Special Alloy Co., Ltd.

公司简介 About GESAC

厦门金鹭特种合金有限公司，成立于1989年，是一家中外合资的国家高新技术企业，隶属于中国六大稀土集团之一的厦门钨业股份有限公司。公司致力于高品质钨粉末材料、硬质合金、精密切削工具等钨系列产品的研发、生产，以及行业专业解决方案的提供，是世界知名的钨粉末、硬质合金及切削工具供应商。

凭借完整钨产业链的产品集成技术研发，以及务实、创新的管理理念，厦门金鹭始终保持着强劲的发展势头，为全球用户提供最高性价比的钨粉末产品和服务，为现代工业领域解决高硬度、耐高温、耐磨损问题，提供了优良的产品和完善的解决方案，客户遍布全球四十多个工业发达国家和地区，享誉海内外。

公司拥有3个生产基地，3个海外销售公司和1个企业技术中心，独立承担并完成多项“国家科技支撑计划项目”，“国家科技重大专项”，“国家火炬计划项目”，“国家重点新产品”开发项目及省市重点研究课题，被评为“战略性新兴产业骨干企业”、“创新型企业”、“先进技术企业”。

Xiamen Golden Egret Special Alloy Co., Ltd. (GESAC), founded in 1989, is a Sino-foreign joint venture with national high-tech, affiliated with XTC, which is one of six major rare earth groups in China. GESAC is committed to research & development, production and professional solutions providing of high-quality tungsten powder materials, cemented carbide, precision cutting tools and other tungsten products. Up to now, GESAC has become world-famous manufacturer and supplier of tungsten powder, cemented carbide and precision cutting tools products.

With the Integrated Product Development of complete tungsten industry chain, as well as a pragmatic and innovative management concept, GESAC has always maintained a strong momentum of development, providing the cost effective tungsten powder products and services for global users, offering the excellent products and perfect solutions for solving high hardness, high temperature resistance and wear resistance topics. Our brand "Golden Egret" has become one of the leading brand in the market, enjoying famous reputation in more than 40 countries and regions.

GESAC owns three production bases, three overseas sales branches and one R&D center. We undertook and completed several development programs independently, including the "National Science and Technology Support Programs", the "National Torch Program Projects", and the "National Key Projects" and so on. GESAC was awarded as "Key Enterprise for Strategic Emerging Industry", "Innovative Enterprise" and "Enterprise with Advanced Technology".



精密耐磨零件

PRECISION WEAR PARTS

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精密轴套 / 圆环

Precision Carbide Bushing and Sleeve

精密轴套、圆环抗冲击、抗磨损和抗腐蚀能力强，广泛应用于采油设备的电动潜油泵、潜油电机、离心泵、各种旋转轴类耐磨套、保护套，以及水泵和密封行业中。

Precision tungsten carbide Bushings/Sleeves with high impact resistance, abrasion resistance and corrosion resistance. Widely used in oil extraction equipment such as Electric Submersible Pump (ESP), Motor, Centrifugal pump, wear sleeve protector of all kinds of rotating shaft, also used in water pump & sealing industry.



产品规格 Product Specifications

| 尺寸Dimensions(mm) | | |
|------------------|--------|----------|
| 外径OD | 内径ID | 高度Height |
| OD≤300 | ID≥0.5 | H≤300 |

技术参数 Technical Parameters

| 尺寸公差 Dimension Tolerance (mm) | 圆柱度 Cylindricity (mm) | 平面度 Flatness (mm) | 平行度 Parallelism (mm) | 垂直度 Perpendicularity (mm) | 同芯度 Concentricity (mm) | 粗糙度 Roughness (μm) |
|----------------------------------------|-----------------------------|-------------------------|----------------------------|---------------------------------|------------------------------|--------------------------|
| ≤0.025 | ≤0.01 | ≤0.005 | ≤0.01 | ≤0.025 | ≤0.025 | Ra 0.1~1.6 |

推荐牌号 Recommended Grades

GF05N / GF06N / GF08N / GU10 / GK05 / GK05A



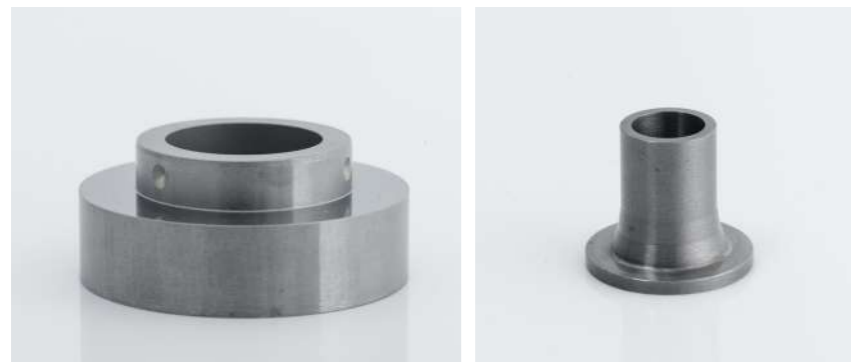
台阶环和异形合金环

Precision Flange Sleeve and Shaped Sleeve

我们提供各种规格的台阶环和异形合金环；
产品精度高、耐磨性好，耐腐蚀性及抗冲击性强，使用寿命长；
广泛应用于油气勘探、钻采、化工、泵阀、密封等加工行业。

Different series of flange sleeve and shaped sleeve with high precision, wear resistance, corrosion resistance, good impact resistance and long life can be customized.

Widely used in oil and gas exploration, drilling, chemical, pump valve, seals and other fields.



推荐牌号 Recommended Grades

GU10 / GU20 / GK05 / GK05A

常用硬质合金牌号及物理机械性能

Mechanical Properties of Common Cemented Carbide Grades

| 牌号 Grade | 粘结相 Binder (%) | 硬度 HRA | | 密度 Density (g/cm ³) | | TRS (N/mm ²) | 材料特点及应用领域 Application |
|-------------|----------------------|-----------|------|---------------------------------------|-------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GF05N | 5.0(Ni) | 93.6 | 91.6 | 15.10 | 14.90 | 2070 | 耐磨性好，耐腐蚀性强，适用于加工耐腐蚀潜油泵零件、耐酸泵零件、耐腐蚀密封和球阀。 Superior wear and corrosion resistance, suitable for Electrical submerged oil Pump, acid-proof pump, seal-ring and valve balls. |
| GF06N | 6.0(Ni) | 92.5 | 90.5 | 15.05 | 14.80 | 1725 | 耐磨性好，耐腐蚀性强，适用于潜油泵零件，泥浆泵和耐酸泵零件。 Superior wear and corrosion resistance, suitable for submerged oil pump, acid-proof pump and slush pump. |
| GF08N | 8.0(Ni) | 90.5 | 89.5 | 14.70 | 14.50 | 2000 | 耐磨性好，耐腐蚀性强，适用于潜油泵零件，泥浆泵和耐酸泵零件。 Superior wear and corrosion resistance property, suitable for submerged oil pump, acid-proof pump and slush pump. |
| GK05 | 6 | 90.5 | 92.3 | 15.05 | 14.85 | 2720 | 耐磨性好，适用于应力不大的条件下，用做锯齿、喷嘴、异形产品结构件、机械附件。 Suitable for saw tips, nozzles, non-standard structure products or mechanical components under conditions of low mechanical stress. |
| GU10 | 6.1 | 93.5 | 92.5 | 14.93 | 14.73 | 2700 | 耐磨性好，适用于应力不大的条件下，用做样板刀、阀芯、衬套、密封环、量具、夹具、异形产品结构件、机械附件。 Excellent wear resistance, applicable to low mechanic stress conditions as prototype blades, valve cores, bushings, seal-ring, measuring implement, fixture and mechanic components. |
| GU20 | 10.3 | 92.2 | 91.4 | 14.50 | 14.30 | 3500 | 耐磨性好，强度优异，适用于合金球，切削工具、异形产品结构件、机械附件。 Good wear resistance and high intensity, applicable to carbide balls, cutting tools, non-standard structure parts and mechanical accessory. |

精密硬质合金球

Precision Tungsten Carbide Balls

精密硬质合金球因其具有较高的抗冲击、抗磨损、抗腐蚀能力，并具有圆度、表面粗糙度高等优点，广泛应用于轴承、球阀、高压泵、球磨等行业中。产品质量处于国内领先水平，长期为国际油气服务商供货。

Precision tungsten carbide balls with high impact resistance, abrasive resistance, corrosion resistance, also particularly strict Sphericity and surface roughness, are widely used in bearing, ball valve, cartridge of high pressure pumps, ball-milling, etc. The quality of our products is in a leading position at domestic market. We are the long-term suppliers for international oil & gas Service Company.

产品规格 Product Specifications

| |
|-----------------------|
| 直径Sphere Diameter(mm) |
| 2≤D≤65 |

技术参数 Technical Parameters

| 等级 Grade | 球直径变动量 Ball diameter Variable Momentum | 球形偏差 Spherical Deviation | 粗糙度 Roughness | 基本直径公差 Basic Diameter Tolerance |
|-------------|-------------------------------------------------|--------------------------------|------------------|---------------------------------------|
| | Vdws | △Sph | Ra | Dt. |
| G20 | 0.5μm | 0.5μm | 0.032μm | ±4μm |
| G40 | 1μm | 1μm | 0.06μm | ±4μm |

推荐牌号 Recommended Grades

GU10 / GK05 / GK10B / GU20



硬质合金组合件

Precision Carbide Assembly Parts



硬质合金组合件产品采用硬质合金与钢件进行镶嵌、焊接、堆焊和环氧树脂冷镶工艺，具有残余应力小、结合强度高、生产成本低等优点。广泛应用于石油、化工、能源、环保、模具、机械制造等行业。

The assembly parts consist of tungsten carbide and steel parts adopting the process of Shrink fit/Inlay, Welding/Brazing, Overlaying/Build up welding, Epoxy fit. And have the advantages of low residual stress, high assembled strength and low production cost. The price & performance are very competitive and widely applied to Oil/Gas, Chemical, Energy, Environmental protection, Die, Machinery manufacturing and so on.



注：可按需定制 Customized According to Requirement

精密非标硬质合金件

Precision Non-Standard Carbide Parts

采用先进的成型、烧结和机加工技术，获得形状复杂、尺寸精度高的各种硬质合金精密非标订制产品，产品具有高耐磨、高耐腐蚀和高冲击的特性，被广泛用于钛合金精锻、食品机械、石油勘探及开采等行业，填补了国内外各领域的空白。

Adopting advanced pressing, sintering and machining technology to obtain the shape of a variety of hard alloy precision Non-standard products, the products are with high wear resistance, high corrosion resistance and good impact resistance properties, widely applied to industry of Titanium alloy forging, food machinery, oil exploration and exploitation, filling in the application blank of some fields at home and abroad.



钨合金屏蔽类零件

Tungsten Heavy Alloy / Shielding Parts

钨合金由于其密度高、熔点高、吸收射线能力强、具有良好的机械加工性能、可加工成各种形状的精密制零件，广泛应用于生产放射线屏蔽件、准直器、多叶光栅、防辐射罐、代轴材料、集装箱检测系统屏蔽件、地质勘探γ射线屏蔽件、探伤仪γ射线屏蔽件等。

钨合金精密零件优良的材料性能及精确地加工精度被广泛应用于石油勘探开采、电子、航天、医疗等行业。

Tungsten alloy with high density, high melting point, strong Ray absorption ability, good mechanical processing performance, can be machined into various shapes of the precision parts, widely used in the production of radiation shield, collimator, radiation proof tank, uranium material replacement, container detection system shield, geological prospecting Gamma Ray shielding ,flaw detector gamma ray shielding device.

Tungsten alloy precision parts due to excellent material properties and accurate machining accuracy is widely used in oil exploration and mining, electronics, aerospace, medical and other industries.

推荐牌号 Recommended Grades

GH221 / GH232 / GH243 / GH273 / GH132 / GH164



钨合金配重类零件

Tungsten Alloy Weight / Balance Parts

钨合金由于其较高的密度和可加工性，广泛应用于配重。如：陀螺仪转子、各种仪表及飞机的平衡配重件、手机上的偏心块、高尔夫球头的配重块及航母上的配重块等。

配重钨合金主要有：配重块、配重棒、配重球、配重环、渔坠等。

Tungsten alloy because of its high density and process ability, widely used in weight/balance, such as, rotor gyroscope, a variety of instruments, balance weight for the aircraft, phone eccentric block, golf club head weight block, aircraft carrier and so on.

Tungsten alloy weight mainly including: weight block, weight rod, a counterweight ball.

产品规格 Product Specifications

| 配重球类Ball Type | |
|-------------------|--|
| 直径Diameter (mm) | |
| 2.38≤S≤63 | |

| 配重环类Ring Type | | |
|---------------------------|-------|----------|
| 基本尺寸Basic Diameter (mm) | | |
| 外径OD | 内径ID | 长度Length |
| D≤200 | D≥0.5 | L≤300 |

| 配重棒类Bar Type | |
|---------------------------|----------|
| 基本尺寸Basic Diameter (mm) | |
| 外径OD | 长度Length |
| 4≤D≤120 | L≤800 |

| 配重块类Block Type | | |
|---------------------------|---------|-------------|
| 基本尺寸Basic Diameter (mm) | | |
| 长度Length | 宽度Width | 厚度Thickness |
| L≤600 | W≤120 | H≤120 |

推荐牌号 Recommended Grades

GH221 / GH232 / GH243 / GH273 / GH132 / GH164



常用钨合金牌号及物理机械性能

Mechanical Properties of Common Tungsten Alloy

W-Ni-Fe

| 牌号 Grade | 密度 Density (g/cm ³) | 硬度 HRA | 抗拉强度 Tensile Strength MPa | 屈服强度 Yield Strength MPa | 延伸率 Elongation (%) | 材料特点及应用领域 Material Features and Recommended Applications |
|----------|---------------------------------|--------|---------------------------|-------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GH221 | 18.35-18.65 | 28-35 | > 800 | > 600 | > 5 | 有磁性、密度大且具有良好的耐腐蚀性，可用作各种大型设备的配重件。Magnetic, high density, excellent corrosion resistance, mainly used as counterweight parts of various kinds of large equipment. |
| GH232 | 17.95-18.25 | 27-34 | > 850 | > 550 | > 6 | 有磁性、良好的射线吸收能力及机械加工性能，常用作屏蔽和防御各种射线的材料。Magnetic, superior ray absorption ability and the machining performance, commonly used for shielding and defense material of various kinds of rays. |
| GH243 | 17.45-17.75 | 26-33 | > 850 | > 550 | > 10 | 有磁性、具有良好的导热性和较低的热膨胀系数，常用作金属切削机床用镗刀杆高密度精密零件等。Magnetic, with good thermal conductivity and low hot line expansion coefficient, commonly used for metal cutting tools as the boring cutter bars or high precision parts, etc. |
| GH273 | 16.95-17.25 | 24-32 | > 850 | > 550 | > 10 | 有磁性，具有较高的抗拉强度和弹性模量，常用作各类高密度精密零件。Magnetic, with good tensile strength and modulus of elasticity, commonly used for all kinds of high precision parts. |

W-Ni-Cu

| 牌号 Grade | 密度 Density (g/cm ³) | 硬度 HRA | 抗拉强度 Tensile Strength MPa | 屈服强度 Yield Strength MPa | 延伸率 Elongation (%) | 材料特点及应用领域 Material Features and Recommended Applications |
|----------|---------------------------------|--------|---------------------------|-------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GH132 | 17.95-18.25 | 27-34 | > 650 | > 520 | > 1 | 高密度、无磁性，力学性能良好，可用作石油探钻机杆上的平衡锤、油井射孔弹头、测井仪拖锤等。With high density, nonmagnetic, good mechanical performance, can be used as balance weight on the bar for oil drilling, the well perforation warhead, tool drag hammers, etc. |
| GH164 | 16.95-17.25 | 24-32 | > 650 | > 520 | > 2 | 无磁性、良好的射线吸收能力及机械加工性能，常用作屏蔽和防御各种射线的材料。non-magnetic, superior rays absorption ability and the machining performance, commonly used as shielding material of various kinds of rays. |

钨铜合金

Tungsten Copper Alloy

钨铜合金综合了金属钨熔点高、铜导电性能强的优点，其微观组织均匀、耐高温、强度高、耐电弧烧蚀，广泛用作耐高温材料、高压开关用电气合金、电加工电极、微电子材料，加工成的零部件和元器件被广泛应用于航天、航空、电子、电力、冶金、机械、体育器材等行业。

钨铜合金采用先进的生产工艺技术，产品致密性好、内部组织均匀、塑性好、易加工成型，被广泛应用于电极材料。

Tungsten copper alloy combines the advantages of high melting point metal tungsten and good conductive performance metal copper, with uniform microstructure, high temperature resistance, high strength resistance to arc erosion. Widely used in military, electrical alloy of high-voltage switch, EDM electrode, microelectronic materials. It also can be machined into components to be applied in aerospace, aviation, electronics, electric power, metallurgy, machinery, sports equipment and other industries.

Tungsten copper alloy is made of advanced production technology, the product is compact, the inner structure is uniform, the plasticity is good and easy to process. Widely used as electrode material.



常用钨铜合金牌号及物理机械性能 Mechanical Properties of Common Tungsten Copper Alloy

W-Cu

| 牌号 Grade | 化学成分 Chemical Composition (%) | | | 物理性能 Physical Properties | | | 材料特点及应用领域 Material Features and Recommended Applications |
|-------------|----------------------------------|--------|-----|------------------------------------|-----------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Cu | Others | W | 密度 Density (g/cm ³) | 硬度 HRA | 导电度 (IACS) (%) | |
| GC30 | 30±2 | ≤0.5 | ≈70 | 13.8~14.4 | ≥170 | ≥40 | 具有良好的导电性能，耐电腐蚀，强度高，常用作电触头接点材料、电火花加工电极、电阻焊电极等。 With good conductivity, electric corrosion resistance, high strength, commonly used for electrical contact material, EDM electrode etc. |
| GC25 | 25±2 | ≤0.5 | ≈75 | 14.6~15.4 | ≥190 | ≥36 | |
| GC20 | 20±2 | ≤0.5 | ≈80 | 15.0~15.6 | ≥215 | ≥32 | |
| GC15 | 15±2 | ≤0.5 | ≈85 | 15.7~16.3 | ≥230 | ≥28 | |
| GC10 | 10±2 | ≤0.5 | ≈90 | 16.7~17.3 | ≥260 | ≥24 | |

异形切削工具

Shaped Cutting Tools

异形切削工具是指根据不同行业客户的需要而开发的特殊形状的专用切削工具。我司异形切削工具主要有切割轮、锥齿轮切削工具、圣诞树铣刀等。因产品质量稳定、性能优越，在汽车齿轮加工、玻璃切割等领域受到国内外客户高度认可。

Shaped cutting tools are the special shape tools which developed for the customers in different industries. Our shaped cutting tools mainly include cutting wheel, bevel gear cutting tools, blade root milling cutters, etc.. Our products own not only stable quality, but also the superior performance in the automobile gear machining and the glass cutting area, which getting highly recognition from domestic and foreign customers.



常用钨合金牌号及物理机械性能 Mechanical Properties of Common Tungsten Alloy

| 牌号 Grade | 粘结相 Binder (%) | 硬度 HRA | | 密度 Density (g/cm ³) | | TRS (N/mm ²) | 材料特点及应用领域 Material Features and Recommended Applications |
|-------------|-------------------|-----------|------|------------------------------------|-------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GU10F | 6 | 94 | 93 | 14.90 | 14.70 | 3300 | 适用于高硬材料、复合材料加工，玻璃刀等。 Suitable for processing high hard materials, composite materials, glass cutters etc. |
| GU20 | 10.3 | 92.2 | 91.4 | 14.50 | 14.30 | 3500 | 通用型铣刀、钻头材质，适用于合金钢、不锈钢等材料的切削加工。 For general use of milling and drilling, suitable for cutting alloy steel, stainless steel, non-ferrous metal and so on |
| GU20F | 10.3 | 92.7 | 91.7 | 14.47 | 14.27 | 3800 | 适用于合金钢、不锈钢、有色金属、高温合金等材料的切削加工。 Suitable for cutting alloy steel, stainless steel, non-ferrous metal, high temperature alloy and so on |
| GU25UF | 12 | 93.0 | 92.2 | 14.20 | 14.00 | 4200 | 适用于不锈钢、有色金属、钛合金、高温合金、高硬材料的铣削加工。 Suitable for milling of stainless steel, non-ferrous metal, titanium alloy, high temperature alloy and high hard material |

切割轮毛坯

Carbide Disc Cutter Blank

硬质合金切割轮毛坯选用超细碳化钨粉末为原料，具有硬度高、抗磨损能力强，使用寿命长等优点。被广泛应用于切割PCB板、PVC板、塑料、化纤、钢、铸铁、不锈钢、铝、玻璃、瓷砖等。

Tungsten carbide cutter blanks are made of ultra-fine tungsten carbide powder as raw material, with high hardness, strong wear resistance, long service life and so on. They are widely used in cutting PCB board, PVC board, plastic, chemical fiber, steel, cast iron, stainless steel, aluminum, glass, ceramic tile, etc.

产品规格 Product Specifications

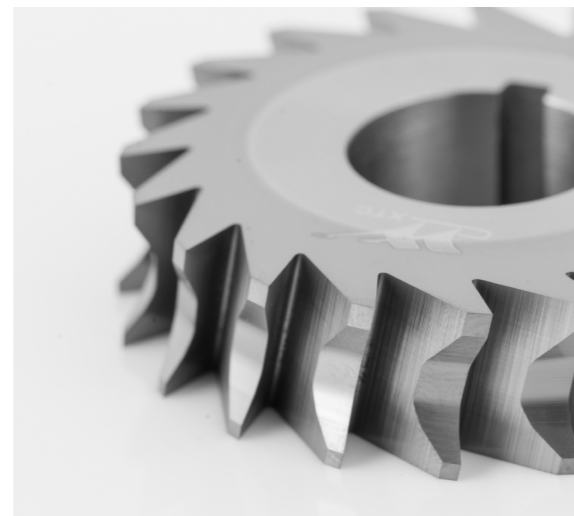
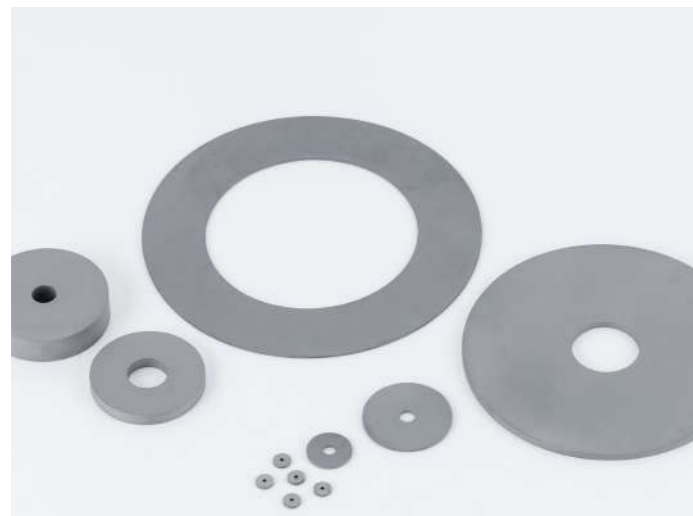
| 基本尺寸 Basic Dimensions (mm) | | |
|------------------------------|-------|-------------|
| 外径OD | 内径ID | 厚度Thickness |
| D≤200 | D≥0.8 | H≥0.6 |

技术参数 Technical Parameters

| 尺寸公差 Dimension Tolerance (mm) | 平行度 Parallelism (mm) | 垂直度 Perpendicularity (mm) | 同芯度 Concentricity (mm) | 粗糙度 Roughness (μm) |
|---------------------------------|------------------------|-----------------------------|--------------------------|----------------------|
| ≤0.020 | ≤0.005 | ≤0.03 | ≤0.02 | Ra0.2 |

推荐牌号 Recommended Grades

GU10F / GU20 / GU20F / GU25UF



锥齿轮切削刀具

Cutting Tools for Bevel Gears

锥齿轮是机械上的关键零件，因其重合度高、传动平稳、噪声低，广泛应用于汽车、拖拉机、工程机械、工业缝纫机、电动工具、机床等机械设备中。

以超细WC为原料，采用先进的合金制备及机械加工技术，生产出具有高强度、高耐磨性、高精度等优点的系列锥齿轮切削刀具毛坯及精磨产品。

Bevel gears are the key part in the mechanical, because of its high contact ratio, stable transmission, low noise, wide usages in automobiles, tractors, construction machinery, industrial sewing machines, electric tools, machine tools and other machinery and equipment.

Our company bases on our own superfine WC as raw material, with advanced alloy technology and machining technology to produce parts with the advantages of high strength, high wear resistance, high precision series bevel gear cutting tool blank and fine products.

产品规格 Product Specifications

| 基本尺寸 Basic Dimensions (mm) | | | 基本尺寸 Basic Dimensions (mm) | | |
|------------------------------|-----------------|------------------|------------------------------|-----------------|------------------|
| 长度 Length (mm) | 宽度 Width (mm) | 高度 Height (mm) | 长度 Length (mm) | 宽度 Width (mm) | 高度 Height (mm) |
| 90 | 9.000 | 7.500 | 114 | 19.685 | 15.240 |
| 102 | 11.430 | 10.668 | 114 | 19.050 | 14.732 |
| 102 | 12.700 | 10.160 | 114 | 21.590 | 14.732 |
| 114 | 15.240 | 12.700 | 114 | 22.860 | 14.732 |
| 114 | 15.240 | 15.240 | 114 | 22.860 | 19.050 |

技术参数 Technical Parameters

| 尺寸公差 Dimension Tolerance (mm) | 平面度 Flatness (mm) | 平行度 Parallelism (mm) | 垂直度 Perpendicularity | 粗糙度 Roughness (μm) |
|---------------------------------|---------------------|------------------------|----------------------|----------------------|
| ≤0.006 | ≤0.003 | ≤0.003 | ≤0.005 | Ra0.2-0.8 |

推荐牌号 Recommended Grades

GU20 / GU25UF / GU10F



圣诞树铣刀毛坯

Blade Root Milling Cutters

圣诞树铣刀，也被称为汽轮机叶根铣刀或波形刃槽铣刀。主要运用于汽轮机叶根槽加工的高效刀具。采用先进的预成型工艺和合金制造技术，所生产的铣刀毛坯具有尺寸精度高，磨削余量少，材质均匀，加工寿命长等优点。

Blade root milling cutters are specially designed for turbine rotor groove machining. We use advanced technology of preformed and machining, to produce good quality products with high precision, low grinding stock, homogeneous material, long service life, etc.

产品规格 Product Specifications

| 基本尺寸 Basic Dimensions (mm) | |
|------------------------------|----------------------|
| 外径OD D≤200 | 厚度Thickness H≤250 |

技术参数 Technical Parameters

| 轮廓型线跳动 Contour Lines Jump (mm) | 型线余量 Profile Allowance (mm) | 刀柄尺寸公差 Shank Tolerance (mm) | 柄部圆柱度 Stem Cylindricity (mm) |
|----------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|
| ≤0.10 | 0.30~0.50 | ≤0.013 | ≤0.005 |

推荐牌号 Recommended Grades

GU20 / GU20F



硬度换算表

Hardness Comparison

| 标准球 Standard Ball | 布氏硬度10mm球 荷重3000kg | | | 洛氏硬度(3R) | | | 维氏硬度 HV 荷重 30kg |
|----------------------|-----------------------|----------------------|----------------------|-------------------------|-----------------------|-----------------------|--------------------------|
| | Hult Green 球 | 碳化钨球 Carbide Ball | 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 |



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