

电解铜箔生产线

SHANGHAI TIMONIC PRECISION MACHINERY CO., LTD
上海钛默妮精密机械有限责任公司

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COMPANY BRIEF

INTRODUCTION 企业简介

上海钛默妮精密机械有限责任公司，隶属于中国特种金属集团有限公司（CSM），是一家专业从事电解铜箔生产线及其配件的制造公司。

Shanghai Titanium Precision Machinery Co., Ltd., a subsidiary of China Special Metals Group Co., Ltd. (CSM), is a manufacturing company specializing in electrolytic copper foil production lines and accessories.

主要产品

- | | |
|---------------|---------------|
| 1、电解铜箔用钛阴极辊， | 2、钛及不锈钢结构阳极槽， |
| 3、钛阴极辊用抛磨生产线， | 4、铜箔钝化机， |
| 5、铜箔烘干机， | 6、铜箔收卷机， |
| 7、生产锂电铜箔用一体机， | 8、生产标准铜箔用标箔机。 |

Main products

- | |
|--|
| 1. Titanium cathode drum for electrolytic copper foil , |
| 2. Anode tank of titanium and stainless steel structure, |
| 3. Grinding and Polishing production line for titanium cathode drum, |
| 4. Copper foil passivation machine, |
| 5. Copper foil dryer machine, |
| 6. Copper foil winder machine, |
| 7. The machine for Production of lithium battery copper foil |
| 8. The machine for the Standard copper foil production. |

上海钛默妮精密机械有限责任公司利用上海的人力资源优势，在上海南张江高科技园区设立设计装配调试车间4000平米。同时拥有20000平方米的厂房用于安装3.8米旋压机。

Shanghai Titanium Precision Machinery Co., Ltd., making use of Shanghai's human resources and technological advantages, set up a design and assembly workshop of 4,000 square meters in Shanghai South Zhangjiang Hi-Tech Park. At the same time, it has a workshop of 20,000 square meters for the 3.8-meter spinning machine.



Enterprise tenet

企业宗旨

客户满意才是我们最终目标

Customer satisfaction is our ultimate goal of



Quality policy

质量方针

高质量赢市场

High quality win the market



Corporate values

企业价值观

实现自身价值，创造社会利益，和谐发展

Realize their own value, create social benefits, harmonious development



Enterprise goals

企业目标

争当同行业的领航者

To be the leader in the same industry



Corporate philosophy

企业理念

诚实、守信、团结、拼搏

Honest Trustworthy Unity Struggle

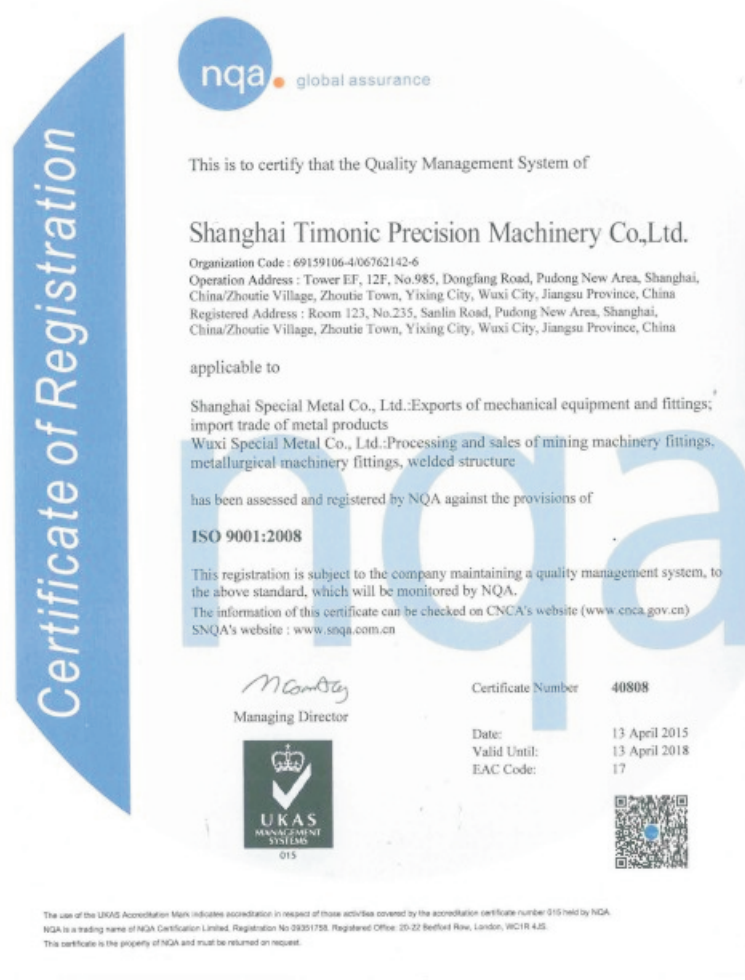
自尊 自信 自强

做企业信任

开拓 进取 创新

创企业辉煌

中国特种金属集团有限公司
China Special Metal Group Limited



生产工厂 Production plant



加工车间 Mechanical Processing workshop

Quality Assurance

- ◆Offer Quality Control Plan at the beginning of the project
- ◆On site quality control
- ◆Weekly Production Procedure Report
- ◆Time-temperature chart including temperature pattern
- ◆Chemical analysis and mechanical properties in cast-on test bar
- ◆Non Destructive Testing(NDT)such as UT,MT,RT
- ◆Dimensional test of marked(circled)measurements acc to production drawing
- ◆Visual inspection of surface

Site Quality Control Team

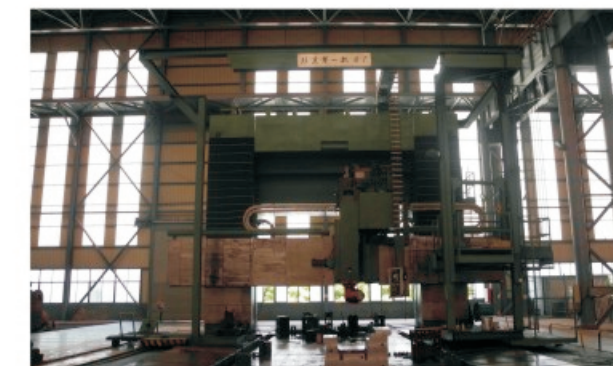
For each project, we have one Site Quality Control Manager who works at the working site to follow up all the process and check every quality control points totally according to the Quality Control Plan to assure to offer qualified products to our honorable customer.

机加工设备
Machining Equipment

生产设备
Production equipment



名称类别	Name	型号	Spec	加工范围	Description
数控龙门铣	CNC Gantry Milling	GMC40120	GMC40120	宽4.5米*长12米*高2.4米	12m*4.5m*2.4m



名称类别	Name	型号	Spec	加工范围	Description
数控龙门铣	CNC Gantry Milling	XKA2850	XKA2850	宽5米*长28米*高3.8米	28m*5m*3.8m



真空自耗电弧炉
Vacuum consumable electro-arc furnace



抛丸机
Shot blast cleaning chamber



名称类别	Name	型号	Spec	加工范围	Description
数控立车	CNC Vertical Lathe	CKJ5263	CKJ5263	6.3米立车, 承重90吨, 回转直径6.3米, 高限4米	6.3m Vertical Lathe, bearing 90t, tactical diameter 6.3m, Maximum height 4m



名称类别	Name	型号	Spec	加工范围	Description
数控立车	CNC Vertical Lathe	CKJ5240	CKJ5240	4米立车, 转台承重25吨, 回转直径4米, 高限3米	4m Vertical Lathe, boring bar bearing 25t, tactical diameter 4m, Maximum height 3m



真空脱气炉
VOD furnace



井式热处理炉
Heat treating furnace



名称类别	Name	型号	Spec	加工范围	Description
数控落地镗	CNC Boring and Milling Machine	Tk6920	Tk6920	长10米*高5米*方滑枕1.2米*镗杆1.2米	length 10m, height 5m, the square ram 1.2, boring bar 1.2m



名称类别	Name	型号	Spec	加工范围	Description
数控落地镗	CNC Boring and Milling Machine	Tk6920	Tk6920	长14米*高5米*方滑枕1.2米*镗杆1.2米, 转台3*3.5米承重60吨	length 14m, height 5m, the square ram 1.2, boring bar 1.2m, rotary table 3*3.5m, bearing 60t

检验设备
Inspection equipment

产品展示
Products Show



涂层测厚仪
Coating thickness instrument



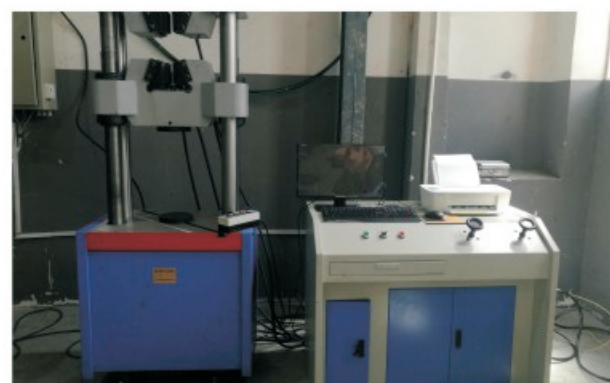
超声波探伤仪
Ultrasonic tester



摆锤式冲击试验机
Pendulum impact testing machine



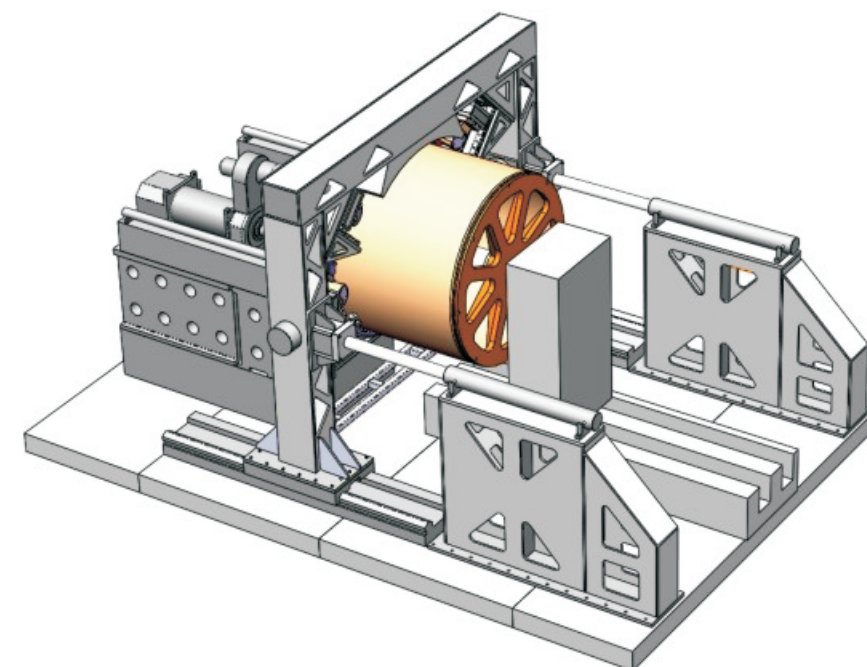
MP-2金相试样磨抛机
MP-2 Metallographic sample grinding and polishing machine



液压万能试验机
Hydraulic universal testing machine



光谱分析仪
Spectrum analyzer



四辊旋压机：
最大旋压直径3.8米，长度1.7米（目前同行业内唯一的四辊旋压机）
Four-roller spinning rolling machine:
The maximum spinning diameter is 3.8 meters and the length is 1.7 meters.
(Currently the only four-roller spinning rolling machine in the industry)

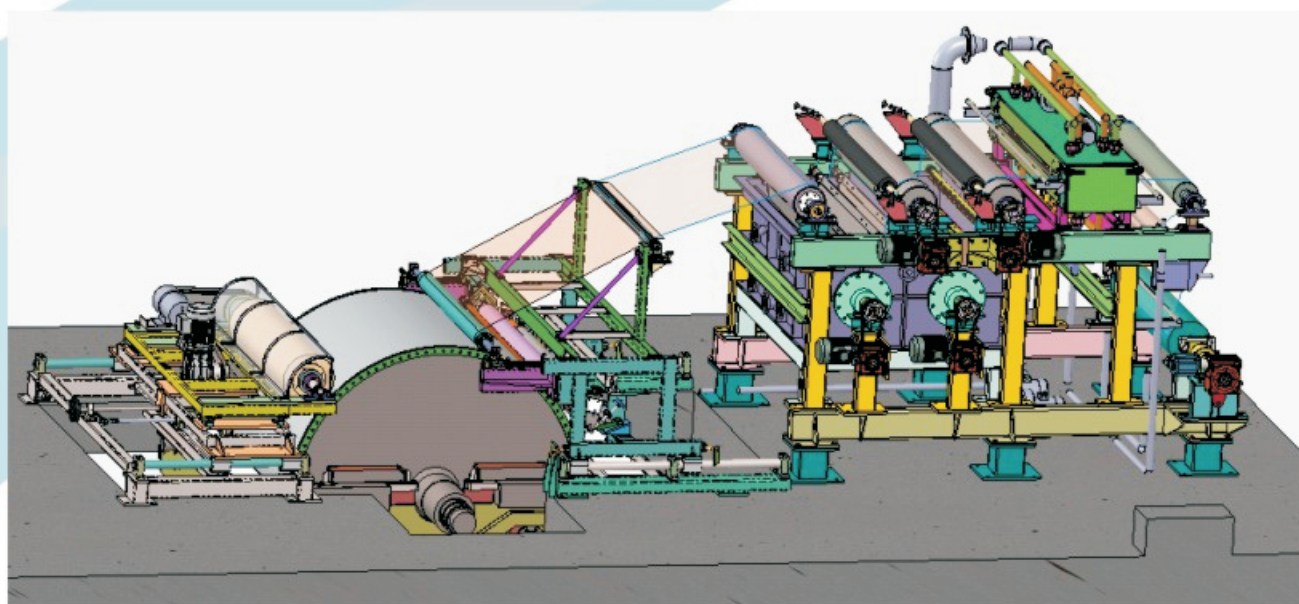


钛阴极辊
Titanium cathode drum

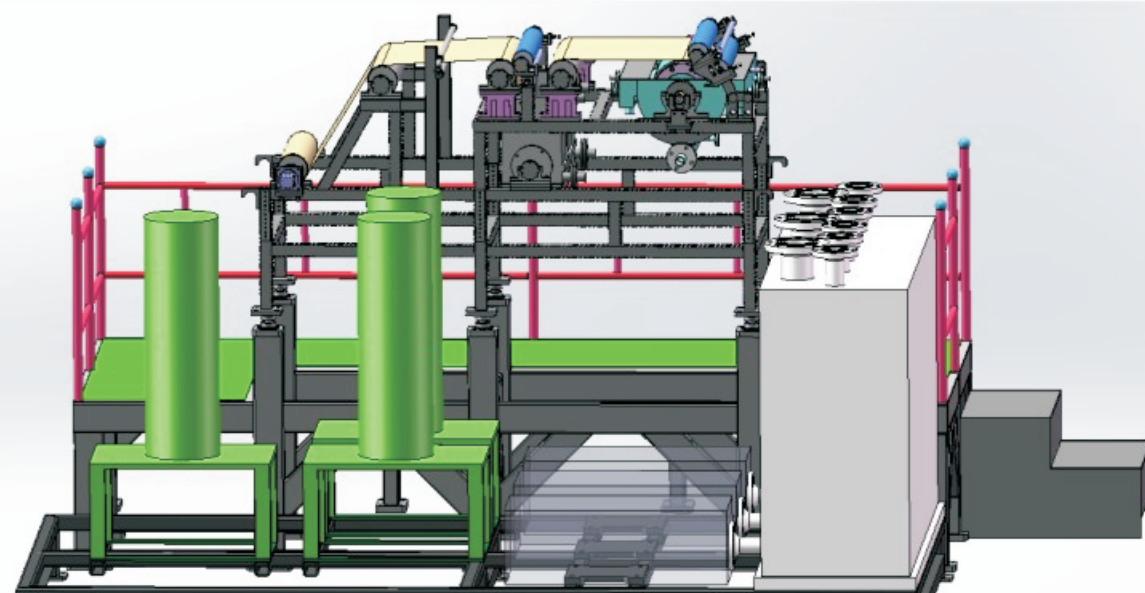


现场钛阴极辊使用
Used titanium cathode drum at the scene

铜箔生产设备 Copper foil production equipment



铜箔一体机
Copper foil integrated machine assembly line



铜箔生产线
Copper foil production line

► 我们的优势

1、同行业内唯一的四辊旋压机：

最大旋压直径3.8米，长度1.7米，通过四辊旋压可以使阴极辊的形状，表面，精度得到进一步的优化细化精确化。

2、铸锭杂质含量控制技术：

通过对杂质元素的严格精确控制，在真空熔炼工艺下实现对铸锭成分的精准控制，通过对原材料海绵钛的优选和熔炼实施过程的严格参数控制来获得成分均匀性最佳的低杂质含量优质钛铸锭。

3、组织均匀性控制技术：

通过锻造、轧环和热加工工序，对坯料组织的充分细化，组织均匀性控制奠定坚实的细晶组织基础，避免阴极辊使用过程表面“花斑”的形成。

4、轧制组织均匀性控制技术：

即选用大吨位双向数控环轧机进行环件成品的碾压成型加工，通过轧制过程工艺参数的优化（轧制温度、道次变形量）和加工量的合理分配来实现对组织细化的效果和环件各部位的组织一致性。最终的控制目标是成品环件平均晶粒度达到GB/T6394-2002标准5~6级，超声波探伤满足GB/T5193-2007 AA级。

5、旋压成型组织一致性控制技术：

通过固化旋压加工工艺，采用大口径薄壁等温旋压技术，通过对模具和坯料保温专有技术和道次变形量优化控制实现加工过程的金属动态再结晶，阴极辊组织均匀性和一致性是稳定制备高品质铜箔的关键因素。

OUR ADVANTAGE

1、The only four-roller spinning rolling machine in the industry :

The maximum spinning diameter is 3.8 meters and the length is 1.7 meters. This type of rolling machine can further optimize the shape, surface and precision of the cathode drum.

2、The control technology of impurity content of ingots:

Through the strict and precise control of impurity elements, the precise control of ingots composition can be realized by the vacuum melting process, and the high-quality titanium ingot with low impurity elements can be obtained through the strict parameter control of the raw material of sponge titanium and the smelting implementation process.

3、The control technology of the tissue uniformity:

Through the forging, rolling and hot treatment process, the billet achieves a full refinement, and establish the fine-grained tissue foundation. Cathode drum avoids the formation of "spotted spots" on the surface.

4、The control technology of rolling tissue uniformity:

Through the large-tonnage, two-way Computerized Numerical Control rolling mill to form ring parts, and through the parameter optimization (rolling temperature and deformation) and the reasonable distribution of processing volume to ensure the effect of tissue refinement and the consistency of various parts. The final control objective is that the average grain size of the finished ring parts reaches GB/T6394-2002 grade5~6, and the ultrasonic test meets the GB/T5193-2007 AA level.

5、The control technology of Spin-formed tissue consistency:

Through the stable standardized spin-formed process, and using large-diameter thin-wall isothermal spin-formed technology, the metal tissue dynamic recrystallization during machining process can be realized through the mould and billet insulation technology and the optimization of the control rolling frequency deformation. The tissue uniformity and consistency of the cathode roller are the key factors for the stable preparation of high quality copper foil.

► 缺陷分析

客户在生产铜箔过程中出现的问题：

- 1.铜箔的厚度一致性不好：国际一流铜箔生产厂家铜箔厚度误差 $\leq 1\%$ ，国内绝大多数铜箔生产厂家铜箔难以达到；
- 2.铜箔力学性能较低：国际一流锂离子电池用铜箔，抗拉强度 $\geq 500\text{N/mm}^2$ ，国内锂离子电池用铜箔抗拉强度难以达到 400N/mm^2 ；
- 3.超薄铜箔“成斑纹”严重，影响锂离子电池使用寿命；
- 4.超薄铜箔“撕边”严重，6微米铜箔难以达到生产。

原因分析：

- 1.阴极辊表面钛材料晶粒度较低；
- 2.磨辊方法不科学，导致辊面粗糙度不均匀；
- 3.上液分配不均且上液量不稳定；
- 4.阳极板结构不合理；
- 5.槽体及阳极弧板同心度精度不够；
- 6.侧封漏液难以管控，槽体内液体分流严重等。

我们针对以上的问题和原因分析，我公司已经突破了技术瓶颈，解决了生产过程中遇到的各类型问题，技术人员会长期跟踪用户，利用我们的技术优势，给予用户稳定及时的技术支持。

DEFECTS ANALYSIS

Problems in the process of producing copper foil for customers:

1. The thickness consistency of copper foil is not good: The copper foil thickness error of the international first-class copper foil manufacturers is controlled at $\leq 1\%$. However, most copper foil manufacturers in China are difficult to meet such standards;
2. The mechanical properties of copper foil are low: the copper foil tensile strength $\geq 500\text{N/mm}^2$ is produced from the international first-class manufacturers used for lithium batteries, but the copper foil tensile strength of domestic manufacturers is difficult to reach 400N/mm^2 ;
3. Ultra-thin copper foil "spots" is serious, affecting the service life of lithium batteries;
4. Ultra-thin copper foil "tearing edge" is serious, 6 micron copper foil is difficult to produce.

Reason analysis:

1. The surface of the cathode drum has a low grain size of titanium material;
2. The method of grinding rollers is unscientific, resulting in the uneven roughness of roller surface;
3. The supplied liquid is unevenly distributed and unstable;
4. The structure of the anode plate is unreasonable;
5. The accuracy of the concentricity of the tank body and the anode arc plate is inaccurate;
6. Side seal leakage is difficult to control, liquid shunt in the tank is serious.

Based on the above problems and reasons analysis, our company has broken through the technical bottleneck and solved all kinds of problems encountered in the production process. The technicians will contact with the users

► 设计特点

在特种材料制造和焊接加工方面的优势，借鉴日本及国内知名铜箔公司的成功经验，设计了 $\Phi 2700$ 生箔机、一体机，其具有以下主要特点：

- 1、合理的密封结构，确保阳极槽体无渗漏；
- 2、阳极母板内弧面精度高，圆度、直线度 $\leq 0.2\text{MM}$ ；
- 3、母板背部导电接触面大、发热小、电流分布均匀合理；
- 4、侧板绝缘屏蔽，避免阳极槽侧板铜结晶、析出；
- 5、收卷、主传动及水洗喷淋独立安装，避免共振；
- 6、独有的进液系统，精确调节槽体内的局部浓度。



DESIGN FEATURES

Based on the advantages in the manufacture of special materials and welding processing and learning from the successful experience of well-known copper foil companies in Japan and China, We designed the $\Phi 2700$ copper foil machine and the integrated machine, which has the following main features:

1. The reasonable sealing structure ensures no leakage of the anode storage tank;
2. The precision of the arc surface in the anode mother board is high, and the roundness and straightness are $\leq 0.2\text{MM}$;
3. The conductive contact surface on the back of the mother board is large, the calorific power is small, and the electric current distribution is well distributed and reasonable;
4. The side plate is insulated and shielded to avoid the crystallization in copper liquor on the side plate of the anode storage tank;
5. Winder device, transmission shaft and washing spray are installed independently to avoid resonance;
6. The unique liquid inlet system precisely adjusts the partial concentration in the storage tank.

精密加工中心
SUPER PRECISION MACHINING CENTER



全球领先五轴联动加工中心
Global leading Grob 5-axe machining center



精密数控车床
Precision CNC lathe

加工精密件适用范围

材质: 钛合金, 合金

形状: 复杂的形状零件, 例如: 球面

应用: 太空飞行器, 航空工业, 汽车行业、医疗器械

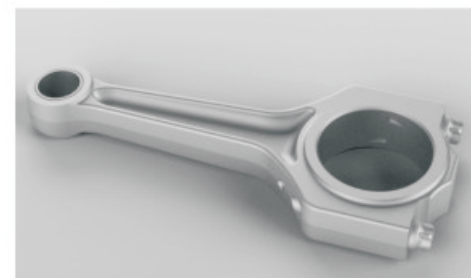
The range of processing precision parts

Material: titanium alloy, alloy

Shape: a complex shape part, such as a spherical surface.

Application: Spacecraft, aviation industry, automotive industry, medical equipment.

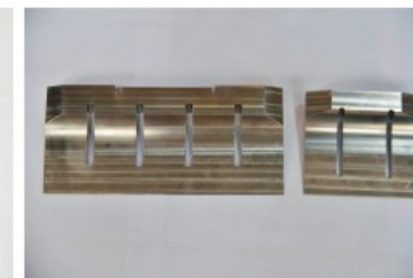
高精度复杂零件加工
HIGH-PRECISION COMPLEX PARTS MACHINING PARTS



钛合金连杆
Titanium alloy connecting rod



涡轮叶片
Turbines blade



钛刀 (切橡胶用)
Titanium knife (for cutting rubber)

加工材料
Machinable Materials

钛合金Titanium -Alloy:

TA1 TA2 TA5 TA11 TC4 TC9 TC11 TC15 TC17 TC23

哈氏合金Hastelloy -Alloy:

Hastelloy B Hastelloy B-2 Hastelloy B-3
Hastelloy C Hastelloy C-4 Hastelloy C22
Hastelloy C-276 Hastelloy C-2000
Hastelloy G-30 Hastelloy G-35 Hastelloy S Hastelloy X Hastelloy N HAYNES 230
HAYNES 556 HAYNES 188

因科乃尔Inconel-Alloy:

No6600 No6601 No6617 No6625
No7718 No7750
No8020 No8800 No8810 No8811 No8825 No8926 NO9925

在这个追求合作与共赢的时代

我们期望不断密切同新老客户的友好合作关系

与朋友们一起创造价值, 共享成功!