Beijing BoHao Industry and Trade Co., Ltd

——Expert in the electric melting of glass furnaces

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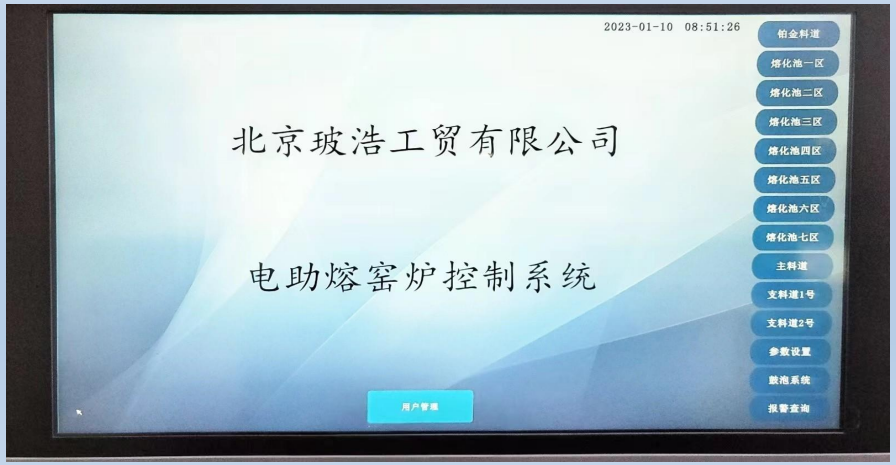
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• Company Introduction

Beijing Bohao Industry and Trade Co., LTD., founded in September 2000 with a registered capital of 5 million RMB, is a company specializing in the design, production, installation and commissioning of thermal materials and electrical equipments for glass electric furnaces.

We design intelligent and safe electric heating systems,installed in a suitable position in the furnace,that can help increase furnace production, improve glass quality,reduce emissions, and promote energy substitution.For services to glass industry development.







一、Glass furnace electrical heating system

Our unique and intelligent electric heating systems, installed in the right place in the furnace, can help increase furnace production, improve glass quality, reduce emissions and promote energy substitution. We provide complete technical solutions for furnaces.

The latest technology electric heating system we supplied is a system consisting of multiple sections. This is now often used in the production of refractor y glass, such as alkali-free glass、glass fiber and similar varieties, as well as high borosilicate glass, LCD/PDP and high aluminum glass.

We also supply custom transformers and control cabinets

A、Mathematical model: Ensure the design of electric heating system which is perfectly customized according to the customer's situation

B、Software package: A program written specifically for electric heating systems

C、Auxiliary hardware： Advanced and industry-recognized

Our complete service covers every link from design, production, supply, on-site installation and commissioning to continuous after-sales service

Pictures of some electric heating equipment

The insulation level of the transformer can be selected according to the actual needs of customers:

Class A: 105℃

Class E: 120℃

Class B: 130℃

Class F: 155℃

Class H: 180℃

Meet the special requirements of the use environment, support customization







Pictures of some electric heating equipment

The electric heating system is controlled by multiple independently units

A： ontrol mode: constant current or constant power

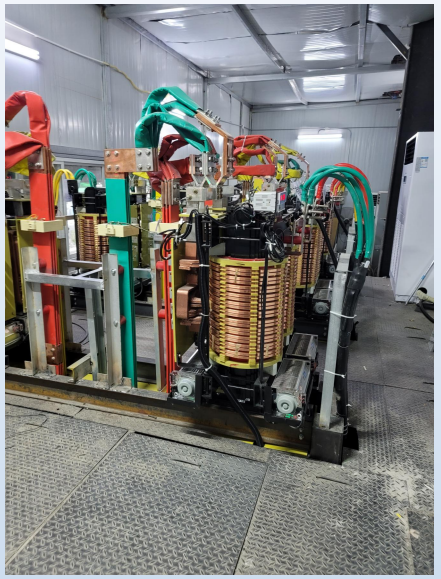
B： It can be equipped with PLC centralized control or host computer integrated control

C： SCR unit is a highly integrated module developed for the company

The main electrical components are made of Changshu Switch Factory, Shanghai Electric Ceramics, Siemens and other famous brand products (except customer designated brand parts), which effectively ensures the safety and stability of the system









Pictures of some electric heating equipment

PLC control cabinet and touch screen control interface

A： Control system: Siemens series

B： Touch screen 10 "~17", can be customized

C： Can surveillance, calculate and record various operating parameters: voltage, current, power, temperature, flow, etc

D： With data abnormal alarm, and communication function



二、Molybdenum electrode and water jacket support system

According to the glass material, charging method and furnace design, we will provide users with:

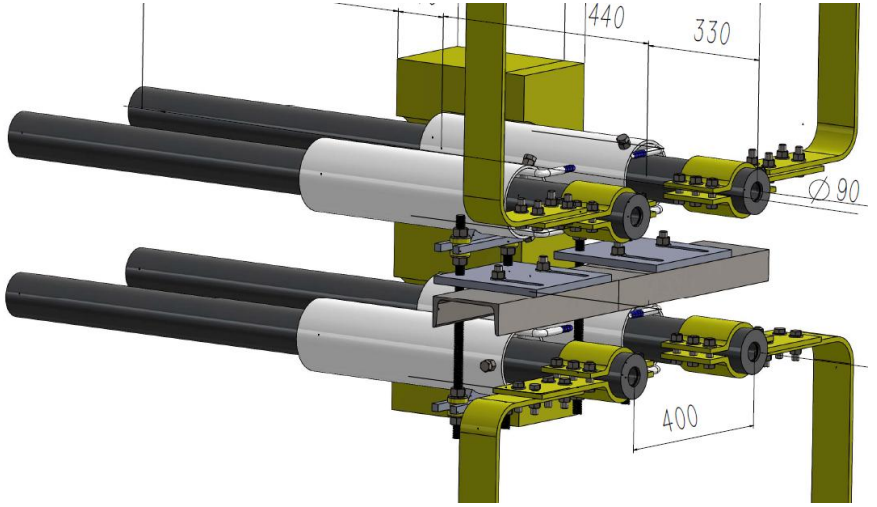
•Preparation of high purity molybdenum electrode Mo by powder metallurgy;

•Refined intergranular molybdenum electrodes TZM and La-Mo were prepared by powder metallurgy;

•High overload molybdenum electrode Mo was prepared by vacuum melting cas;

•Single metal molybdenum electrode without water cooling;

•Oxidation resistant coating molybdenum electrode and molybdenum protection plate



二、Molybdenum electrode and water jacket support system

2.1Technical specifications and properties of molybdenum electrode

The high purity molybdenum electrode is made of 180-mesh Mo-1 powder, the forging ratio is ≥ 70%, and the finished molybdenum density is above 10.16-10.18g/cm^3。

GDMS full element test analysis of finished product。

测试结果：

样品编号	样品原编号	Al(w/%)	Bi(w/%)	Ca(w/%)	Cd(w/%)	Cr(w/%)
001	/	<0.0001	<0.0001	<0.001	<0.001	0.0044
		Fe(w/%)	Mg(w/%)	Ni(w/%)	P(w/%)	Pb(w/%)
		0.0092	<0.0001	0.0058	<0.001	<0.0001
		Sb(w/%)	Si(w/%)	Sn(w/%)	C(w/%)	N(w/%)
		<0.0001	<0.001	<0.0001	0.0016	0.0022
		O(w/%)	Mo(w/%)	/	/	/
		0.0023	≤99.96	/	/	/

Surface roughness less than 6.3, end roughness: 3.2, bending: 1.0mm/m. The content of other ingredients meets the national standard GB/T17782 standard.

Continuation rod (Conductor bar) material: brass H59/ or stainless steel

二、Molybdenum electrode and water jacket support system

High purity molybdenum electrode size specifications:

Production process	diameter	length
	mm	mm
powder method	Φ0.5-85	0-2000
melting-casting	Φ0.5-102.4	0-2000

Note: Special dimensions can be customized.

Mo electrode by powder metallurgy method





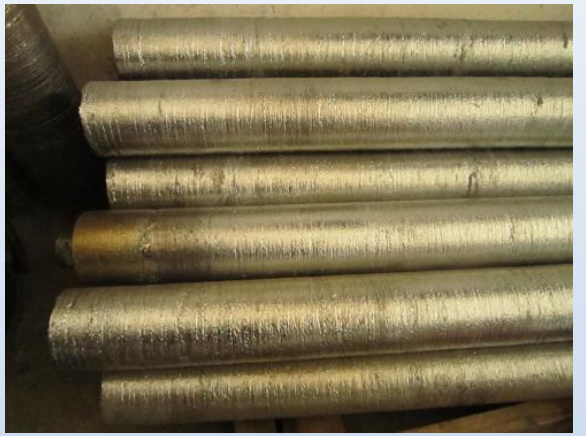


2.2 Vacuum fused cast molybdenum electrode

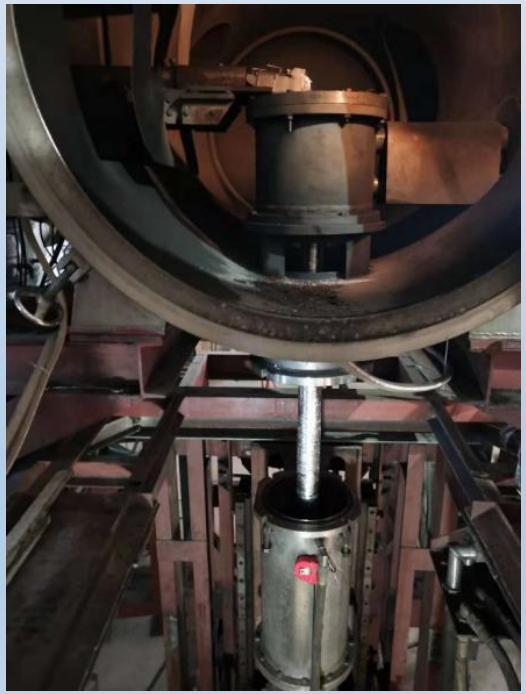
Molybdenum was melted to 3600℃ or above in a vacuum electron beam furnace and prepared at a high vacuum of

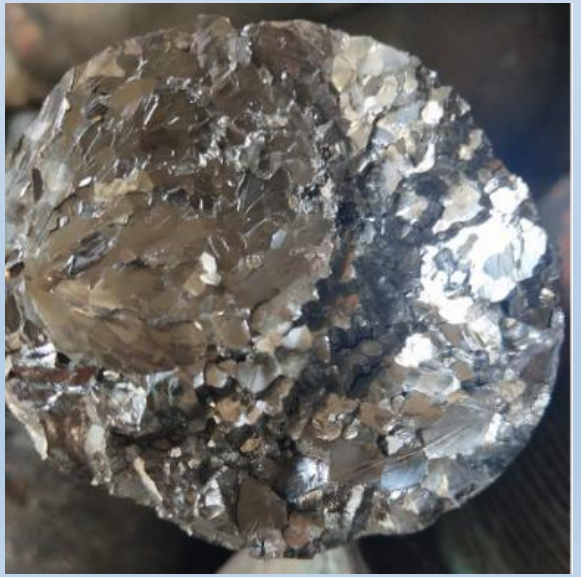
10^{-2}Pa in the furnace.

The current carrying capacity is twice that of powder metallurgy molybdenum electrode









2.3water jacket support system

Our high temperature alloy electrode water jacket is water cooled, with a specially designed water cooling loop, the great cooling effect reduces the possibility of water jacket clogging. Industry-leading cooling effect

Water jacket material is mainly as follows:

1、Nickel-based superalloy (00Cr28Ni69CuRe) water jacket, can be used for a long time below 1050℃ without water; can also be used for a short time at 1250℃.

2、Heat resistant stainless steel low magnetic austenitic 247# alloy water jacket, thermal shock resistance and welding performance is much better than 310S

Our electrode jackets type includes

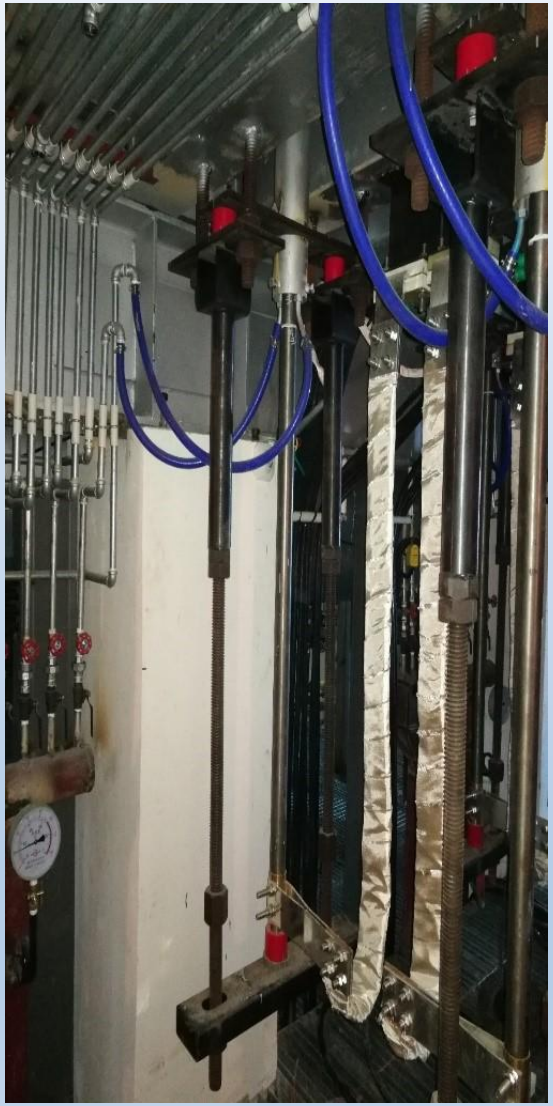
A： Recessed type　　B： "V" channel type

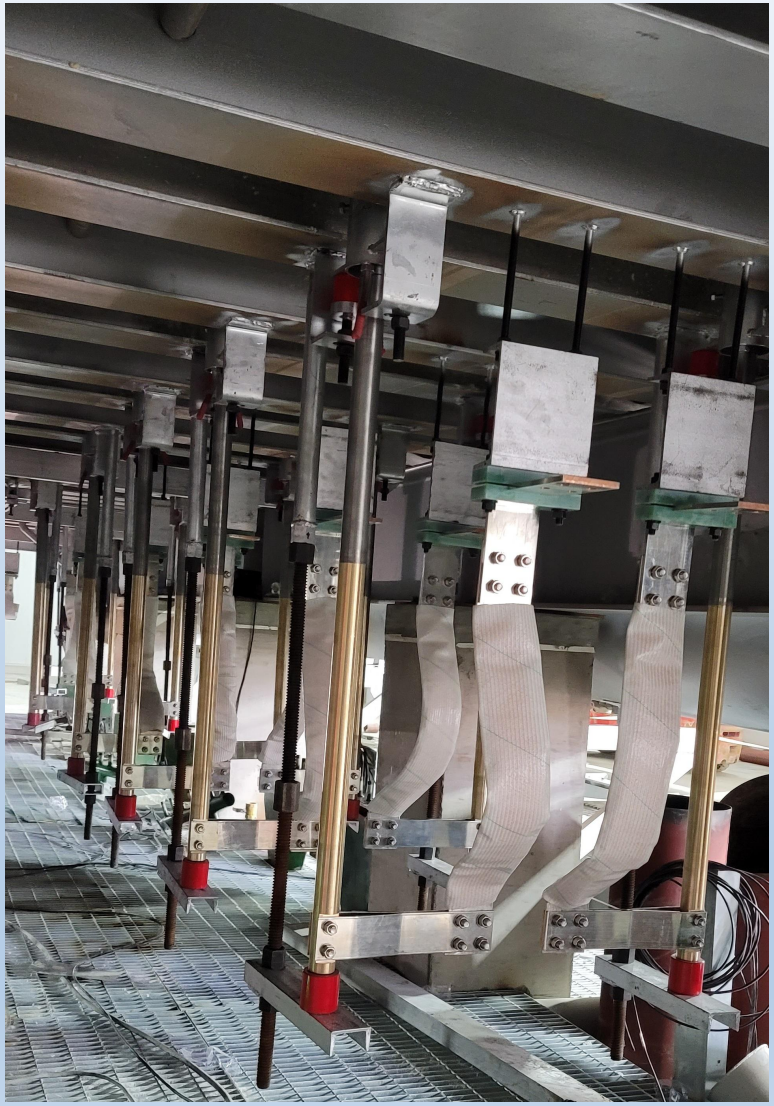
C： Air protected type　D： Dry type (air-cooled)

Our experts will provide the best options for your application



water jacket support











water jacket support



Some product pictures

Water jacket for electrode in bottom of a glass-ceramics furnace(with nitrogen protection device)

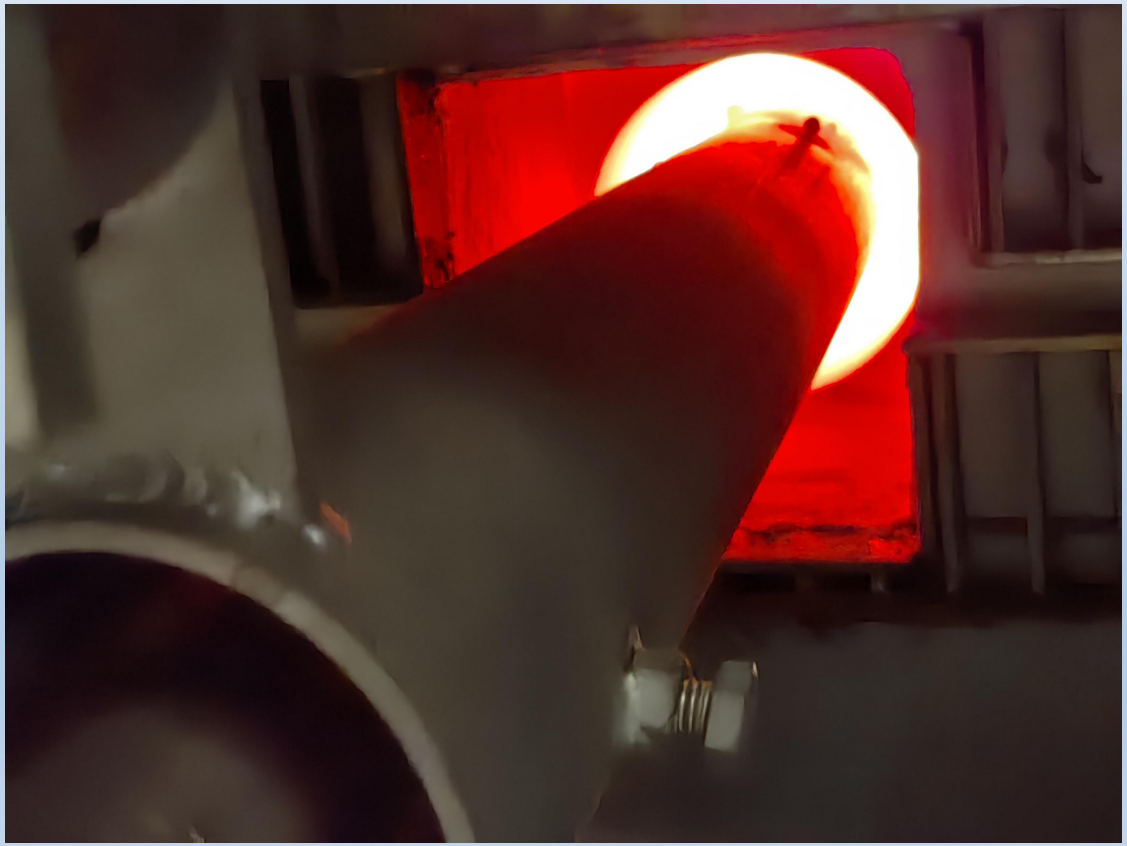






Some product pictures

The company has a bottom insert electrode water jacket
The electrode water jacket can still be used normally after 72 hours of power supply and water interruption







三、Controlled furnace bottom electric draining system

Due to the high viscosity characteristics of aluminum and zirconium materials, zirconium-rich glass will be deposited at the bottom of the furnace or the bottom of the feed path, forming metamorphic glass.These metamorphic glasses can appear in the form of small stones, nodules or streaks in the glass, affecting the quality of the glass. Especially for thin-walled glass products more obvious.

In the appropriate part of the furnace, the installation of controlled electric discharge device is an effective means to solve the deterioration of glass at the bottom of the furnace and the bottom of the feed, especially for the phase separation, crystallization, striation and other special glass production has a special effect.

The device can discharge materials continuously or intermittently according to needs, about 20-50kg/hr. Safe and reliable, can also be replaced in hot state, does not affect normal production.



三、Controlled furnace bottom electric draining system

•Electric draining system basic technical parameters and requirements:

1、Types of glass: special glass;

2、Maximum electric heating capacity : 20KW

3、Type of heating: Directly heated glass

4、Run mode: Continuous or intermittent

5、type of cooling: water-cooling

6、Draining rate: controlled, 20 - 60kg/hr

7、Electric control mode: Constant current control

•Cooling water parameters and requirements:

Water pressure: 0.2-0.3Mpa; Flow: 0.03m^3/min;

return water temp.: <45℃; hardness: <10;

P H : 6-8; Solid filter: 40-mesh filter;

Water loss power: <5KW。



四、Furnace bottom high precision bubbling system

High-precision furnace bottom bubbling, often installed in the hot spot of the furnace, and the glass liquid upflow coincide, the naked eye is about one meter outside the bubble line mirror area, transverse installation of one to two rows of bubblers。Improve the convection of glass liquid in the furnace, enhance the heat exchange and physicochemical reaction speed between the materials in the furnace, and improve the efficiency of melting, clarifying and homogenizing in the process of melting glass liquid.

•Methods are divided into: dry/water-cooled bubbling; Pulse/continuous bubbling; Bubbling in the bottom/furnace.





四、Furnace bottom high precision bubbling system

Bubble control system with high precision - mass flow controller：

High control precision，flow≤1.67L/min，control precision：≤0.3%；flow：1.67-10L/min， control precision≤1%。

Flow control ensures constant volume control regardless of the actual condition at the bubbling nozzle. If the diameter of the bubbling nozzle is reduced due to crystallization, the controller automatically increases the prepressure of the bubbling nozzle.

Flow control requires the flow, pressure and temperature to communicate with the existing SCADA system through the interface for monitoring and control. The flow rate of each bubble tube can be set, and once the limit is exceeded or there is an error, it will alarm.





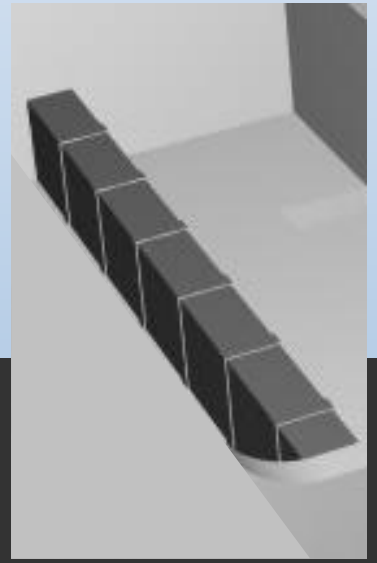
五、Antioxidant coating molybdenum protection plate (molybdenum electrode)

Principle of use:

In the parts where the glass liquid erosion of refractory materials is the most serious - such as the surface of the flow hole, kiln hole, bubbling hole brick, etc., molybdenum (plate) is used to protect the resistant material, so that it can run steadily for a long time and extend its life。The metal molybdenum immersed in the glass liquid has very stable physical and chemical properties, and will not undergo displacement reaction with most glasses at high temperature. It can effectively prevent the erosion of glass liquid on resistant materials and improve the service life of resistant materials.











五、Antioxidant coating molybdenum protection plate (molybdenum electrode)





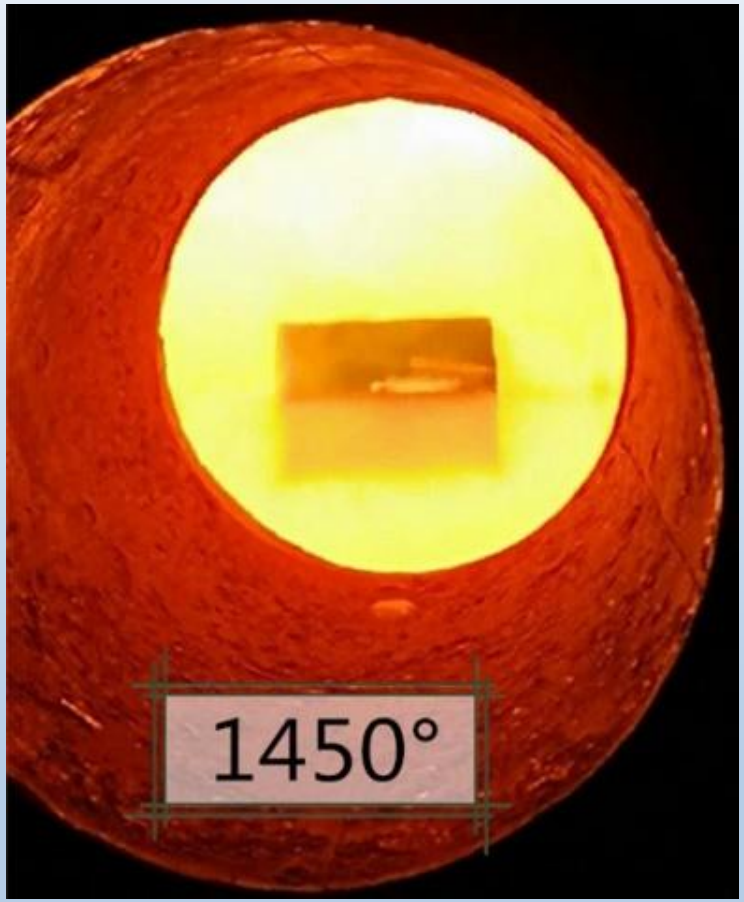
Actual use case of a high aluminum glass kiln flow hole (before use and after 4 years of use)

五、Antioxidant coating molybdenum protection plate (molybdenum electrode)

Anti-oxidation additive molybdenum protection board technology core::

1、In the heating furnace, the antioxidant additive molybdenum is directly exposed to the air, without any protection, and after normal feeding from room temperature to 1500° according to the temperature curve requirements within 15 days, the molybdenum is completely retained in the furnace, playing the role of oxidation resistance.。

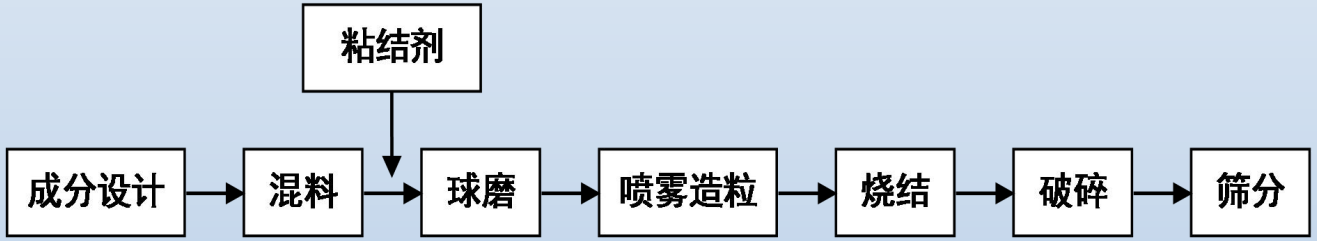
2、The anti-oxidation molybdenum material is sintered by the anti-oxidation additive compound, and the additive layer reversely penetrates to the molybdenum substrate 400μm, while the thermal expansion coefficient of the additive layer and the molybdenum substrate is always consistent.



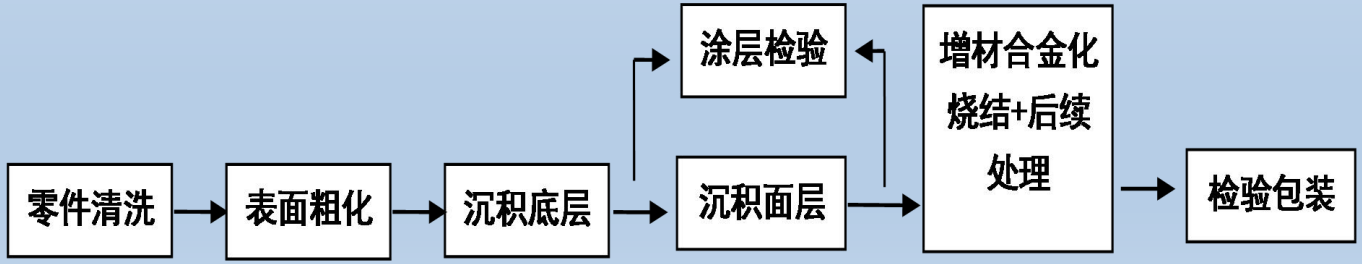
五、Antioxidant coating molybdenum protection plate (molybdenum electrode)

- The process of antioxidant additive is introduced：

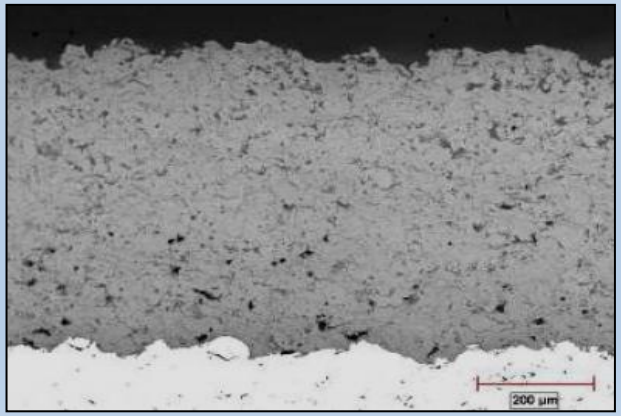
1、**Preparation of additive powder**



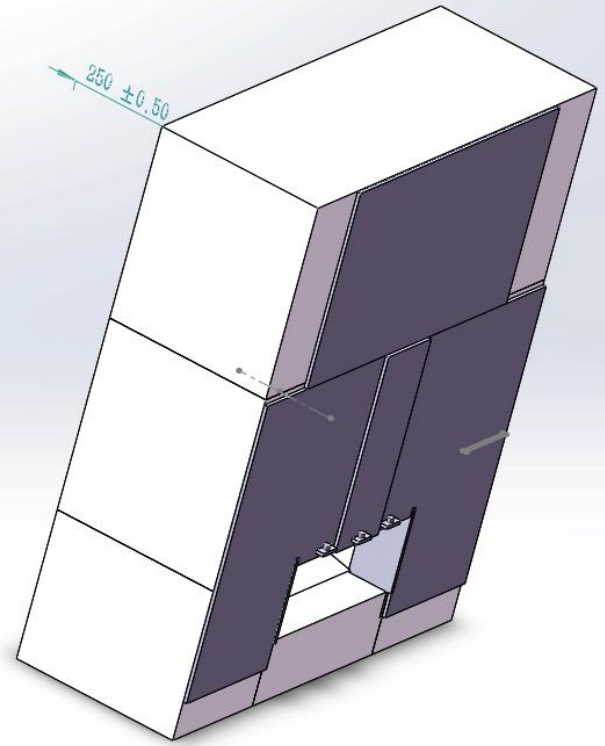
2、Molybdenum plate surface high temperature oxidation resistance coating preparation process







Dynamic display of oxidizing additive molybdenum plate (independently designed according to the characteristics of each furnace)

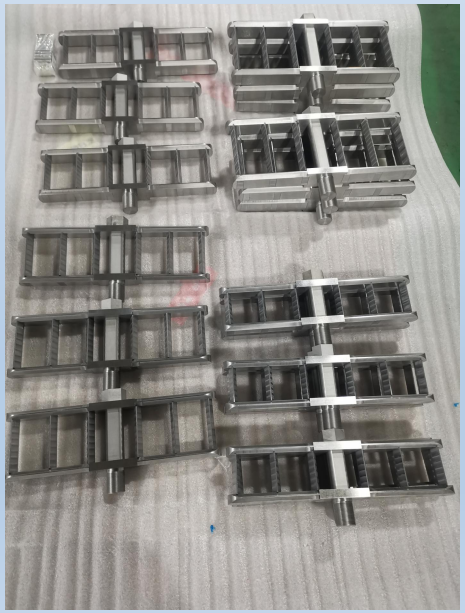


六、Molybdenum stirring mechanism

Feed channel molybdenum stirring paddle device

Glass in the flow hole, riser, feed channel, the situation is very different from the kiln, in the following aspects: first, the temperature is low, the second is that the glass flow is mainly downstream, easy to form laminar flow.

The homogenization effect of diffusion and convection, which plays a major role in the high temperature section, is not ideal at this stage, and the use of mechanical agitation is an effective way to homogenize glass liquid。







The mixing mechanism is designed according to the glass material and furnace structure：

1、Good mixing effect and high efficiency；

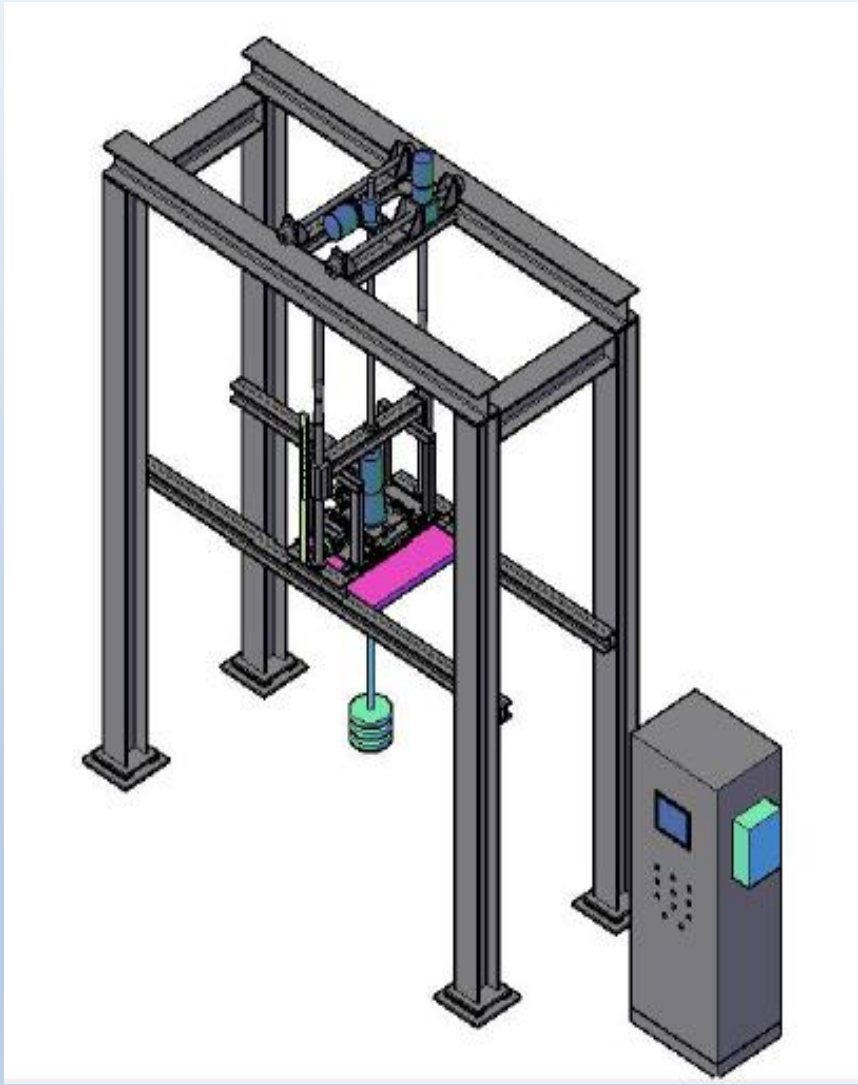
2、Strong adaptability - wide range of mixing speed adjustment；

3、Small pollution - molybdenum has almost no pollution to liquid glass；

4、No attenuation - the stirring effect is consistent throughout the operation cycle; There is no phenomenon that the mixing effect becomes worse after the corrosion of the resistant material in the later stage of mixing；

5、Easy to operate - no need to bake, can be directly put into the glass liquid。

6、ndependent automated control system. The DCS central control system can be connected through its own PLC。



七、SCADA/DCS supervision system

Hardware system generally includes data acquisition equipment and control equipment and data communication equipment, SCADA system is generally through the digital or analog quantity to achieve. The computer is placed in the monitoring center, and the data transmitted by the system is analyzed and sorted out, and the command control system is issued.

Data acquisition and monitoring control software system has the following characteristics:

1.Graphical monitoring interface;

2.Dynamic simulation of system state;

3.Real-time data and historical trends;

4.Alarm handling system;

5.Data acquisition and recording;

6.Data analysis;

7.Report output.



七、SCADA/DCS supervision system

DCS control system, also known as distributed control system or distributed control system, is a new generation of microprocessor based instrument control system. It adopts the design principle of decentralized control function and centralized display operation, and realizes the basic design idea of centralized management and decentralized control through the structure of multi-layer and hierarchical cooperation and autonomy.

DCS system plays an important role in industrial production, it can not only monitor and control various parameters in the production process, such as flow, pressure, temperature, etc., but also improve production efficiency and quality by optimizing control strategies to ensure the safety and reliability of the production process. In general, the DCS control system is an indispensable part of the modern industrial automation field, which is of great significance for improving production efficiency and optimizing resource allocation.



八、Some customers



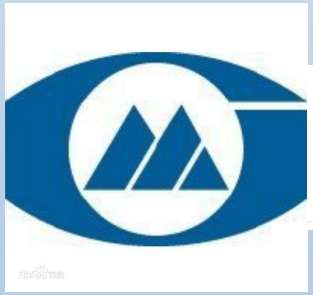






















THANK



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