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Steelmaking Electric Arc Furnace
Ladle Refining Furnace (LF Furnace)
VD/VOD Vacuum Refining Furnace
Continuous Casting Machine
Rolling Machine
Electrical Automation Control System

FERRO-ALLOY PRODUCTION LINE
Submerged Arc Furnace for Ferro-Alloy

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Submerged Arc Furnace Dust Collection System
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INTRODUCTION

Xi’an Tengye Metallurgical Engineering Co., Ltd. is a general contracting company specialized in EPC metallurgical engineering project which involved in metallurgical equipment designing, technical researching, manufacturing, erection and commissioning.

Our main service is supplying complete equipment of steelmaking line, ferroalloy production line and other metallurgical engineering projects. And main products are EAF, LF, VD/VOD, CCM, Rolling Mill, Submerged Arc Furnaces for Ferroalloy, Induction furnaces, Raw material pre-processing system and product processing system.

Based on the research station we set in Xi’an Metallurgy University, we have co-operation with famous metallurgical doctors who give metallurgical processing technic supports and researching abilities to us. We also have the mature and professional technic team. We have designing performance and independent researching achievements of EAF from 0.5t-100t, LF from 8t-160t, Submerged Arc Furnaces for Ferroalloy from 3200KVA-36000KVA. We keep the policy “Conscientious, Strict, Innovation”. Quality is the strongest insurance of a company, so we have the QC department to supervise the complete production line and guarantee the quality.

Complying with the global integration trend, we have built good relationship with customers in Iran, Indonesia, Japan, Tajikistan and Vietnam markets and signed cooperation agreements with the experienced metallurgical designing institutions in Mid-east. Make our exquisite projects and push them to the international market, supply the integrated scheme to the steel companies all over the world.
MANAGEMENT MODE

Closely cooperating with you means our engineering team translates your wishes into concrete form. We will extensively plan your plant layout, analyze the interfaces and battery limits as well as the various production stages, equipment, and disciplines. Optimize the complex interaction between all investment and process-related factors. This not only reduces interfaces, but also ensures smooth plant integration and short project times.

Our proven procedure will coordinate all activities, guarantees quality, and monitors on-time, on-budget performance. So you always know the exact status of your project because we continually inform you about its progress. Our project management is designed to ensure you are involved in all major decisions. These included in one package are: Project development, Project planning, Project implementation, Project leadership.

TECHNOLOGY CENTER PRODUCT MANAGEMENT

QUALITY MANAGEMENT
Material Quality Control
Material Support
Material Quality Management
Support to Solve the Quality Issue

In-process Quality Control
In-process Quality Management
Improve the Quality Level of Product
Support to Solve the Quality Issue
Detail Raising Check System
SIIS Data Collection & IPC
Abnormal Control

Quality Reliability Control
Equipment Calibration Center
Environment Substance Laboratory
Soldering Failure Analysis Laboratory
Quality Reliability Engineering Laboratory

Outgoing Quality Control
Support to Solve the Quality Issue
Outgoing Level Check Planning
Outgoing Quality Management
Customer Inspection

QUALITY MONITORING TEAM
SECURITY LEADERSHIP TEAM
ISO PROMOTING TEAM
6S MONITORING TEAM
HUMAN RESOURCE SYSTEM
MARKETING PRODUCT SYSTEM
RESEARCH AND DEVELOPMENT AND SUPPLY CHAIN SYSTEM

AFTER SALE SERVICES
Installation
Planning
Management
Implementation
Supervision

Commissioning
Supervision
Handover
Raising Projecting

Training
On-site
Offline
Operators
Engineers

Operation
Supervision
Contact
Operation
System Support
Contracted
AD-Root
Online
Spare Parts

ENGINEERING SYSTEM

For each new project, we design the part drawing to complete general layout with 2D first, then transfer it to 3D to check the motion simulation to protect engineering against the mistake on manufacturing and assembly. The view of assembly, product complete model and piping net in the factory can be down on the computer by 3D. It is very convenience and accuracy of operation on site.

2D ELECTRODE SYSTEM DRAWING

3D HYDRAULIC • BRAKE SYSTEM

3D ELECTRODE SYSTEM MODEL

3D PRESSURE RING
MANUFACTURE CAPABILITY

Gantry Boring and Milling Machine

16m Floor Type Boring and Milling Machine
CNC Coordinate Type Cutting Machine

28m CNC Vertical Lathe
28m CNC Floor Type Boring and Milling Machine

Reheating Furnace
64m CNC Double-gantry Moving Boring and Milling Machine
ELECTRIC ARC FURNACE FOR STEELMAKING

APPLICATION
For smelting carbon steel, high quality carbon steel and various alloy steel. It applies to all steel scrap, hot metal crust, pelletizing and preheating steel scrap, hot briquetted iron and sponge iron, etc.

FEATURES OF THE EQUIPMENT
Series reactor in main loop improves the system impedance and achieves secondary high-voltage, long-arc and low-current operation with stable arc and high arc power. On-load tap changer is adopted during the operation of the EAF, which comprises left or right operation, rotating lid, top charging and eccentric bottom tapping. The furnace body is of frame-type full water-cooling structure, with detachable upper and lower furnace shells, concentric circular tubular furnace cover in the water-cooling structure, oxygen lance at the furnace door and burner on the furnace wall. The proportional valve controls electrode lifting, rotation of furnace cover and furnace tilting. There are a whole set of PLC, and computer control system and computer screen monitoring system.

AUTOMATION OPERATION
The operation of electric arc furnace is completely automation. The batching and weighing of raw material will be controlled and supervised by industry computer. On the main operation desk, there is online interface to raw material batching, charging, temperature inspection, spectrum, quick composition inspection, ladle weighing, furnace front display and company ERP system. On the furnace front display, the operator can view the information on melting processing to adjust the quality of molten steel. It will achieve the computerizing management on raw material batching and steel melting processing online. It will make powerful guarantee on steel quality and advanced management.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>FURNACE SHELL DIAMETER(㎜)</th>
<th>CAPACITY(Ⅳ)</th>
<th>TRANSFORMER RATED CAPACITY(Ⅳ)</th>
<th>ELECTRIC RESISTANCE(Ω)</th>
<th>ELECTRIC RESISTANCE(Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HX-0.5</td>
<td>1600</td>
<td>0.5/1.5</td>
<td>0.63</td>
<td>150</td>
<td>150</td>
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<td>HX-1.0</td>
<td>2100</td>
<td>1.0/2.0</td>
<td>1.25</td>
<td>200</td>
<td>200</td>
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<td>HX-5</td>
<td>5200</td>
<td>5.5</td>
<td>5.2</td>
<td>500</td>
<td>500</td>
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<td>HX-10</td>
<td>1500</td>
<td>10/15</td>
<td>15.0</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>HX-20</td>
<td>4000/4000</td>
<td>20/25</td>
<td>20.25</td>
<td>400</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL</th>
<th>FURNACE SHELL DIAMETER(㎝)</th>
<th>CAPACITY(Ⅳ)</th>
<th>TRANSFORMER RATED CAPACITY(Ⅳ)</th>
<th>ELECTRIC RESISTANCE(Ω)</th>
<th>ELECTRIC RESISTANCE(Ω)</th>
</tr>
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<tbody>
<tr>
<td>HX-50</td>
<td>6000/4800</td>
<td>30/45</td>
<td>30.45</td>
<td>7000</td>
<td>7000</td>
</tr>
<tr>
<td>HX-60</td>
<td>5400</td>
<td>60/70</td>
<td>60.70</td>
<td>9000-11000</td>
<td>9000-11000</td>
</tr>
<tr>
<td>HX-70</td>
<td>5800</td>
<td>70/80</td>
<td>70.80</td>
<td>11000-13000</td>
<td>11000-13000</td>
</tr>
<tr>
<td>HX-80</td>
<td>5800</td>
<td>70/80</td>
<td>70.80</td>
<td>12000-14000</td>
<td>12000-14000</td>
</tr>
<tr>
<td>HX-100</td>
<td>6200</td>
<td>100/120</td>
<td>100.120</td>
<td>15000-17000</td>
<td>15000-17000</td>
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<tr>
<td>HX-120</td>
<td>6400</td>
<td>120/140</td>
<td>120.140</td>
<td>18000-22000</td>
<td>18000-22000</td>
</tr>
<tr>
<td>HX-150</td>
<td>6800</td>
<td>150/170</td>
<td>150.170</td>
<td>24000-25000</td>
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</tbody>
</table>

The Trapping Process of EAF
LADLE REFINING FURNACE (LF FURNACE)

APPLICATION

Ladle refining furnace is used for refining molten steel from primary melting furnace (EAF or Converter), can create a slightly positive pressure reducing atmosphere, apply such means as submerged arc heating, argon stirring, white slag refining, alloy composition trimming, wire feeding under the atmosphere to conduct degassing, desulfurization, decontamination for hot metal, and accurately control the ingredients and temperature of molten steel. The equipment also has an effect of buffering and adjusting continuous casting links.

TYPE OF LF FURNACE

Bridge type or the type with independent rack mount and furnace cover; single arm or three-arm; ladle revolving platform or furnace lid rotary type, etc.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Ladle Shell Inner Diameter (mm)</th>
<th>Capacity (t)</th>
<th>Transformer Capacity (KVA)</th>
<th>Heating Rate of Metal (K/min)</th>
<th>Electrode Diameter (mm)</th>
<th>Crude Copper (mm)</th>
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</thead>
<tbody>
<tr>
<td>LF-15</td>
<td>2000</td>
<td>15-18</td>
<td>3</td>
<td>≥3</td>
<td>250</td>
<td>460</td>
</tr>
<tr>
<td>LF-20</td>
<td>2500</td>
<td>20-30</td>
<td>4</td>
<td>≥3</td>
<td>250</td>
<td>460</td>
</tr>
<tr>
<td>LF-30</td>
<td>2700</td>
<td>30-40</td>
<td>6</td>
<td>≥4</td>
<td>300</td>
<td>550</td>
</tr>
<tr>
<td>LF-40</td>
<td>2900</td>
<td>40-50</td>
<td>8</td>
<td>≥4</td>
<td>500</td>
<td>550</td>
</tr>
<tr>
<td>LF-50</td>
<td>3000</td>
<td>50-60</td>
<td>10</td>
<td>≥4</td>
<td>350</td>
<td>620</td>
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<tr>
<td>LF-60</td>
<td>3150</td>
<td>60-70</td>
<td>12.5</td>
<td>≥4</td>
<td>350</td>
<td>620</td>
</tr>
<tr>
<td>LF-70</td>
<td>3200</td>
<td>70-80</td>
<td>15.5</td>
<td>≥4</td>
<td>400</td>
<td>680</td>
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<tr>
<td>LF-80</td>
<td>3300</td>
<td>80-90</td>
<td>14</td>
<td>≥4</td>
<td>400</td>
<td>680</td>
</tr>
<tr>
<td>LF-90</td>
<td>3400</td>
<td>90-100</td>
<td>16</td>
<td>≥4</td>
<td>400</td>
<td>680</td>
</tr>
<tr>
<td>LF-100</td>
<td>3600</td>
<td>100-115</td>
<td>18</td>
<td>≥4</td>
<td>450</td>
<td>740</td>
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<tr>
<td>LF-130</td>
<td>3700</td>
<td>130-145</td>
<td>20</td>
<td>≥4</td>
<td>450</td>
<td>740</td>
</tr>
<tr>
<td>LF-150</td>
<td>3900</td>
<td>150-170</td>
<td>25</td>
<td>≥4</td>
<td>450</td>
<td>740</td>
</tr>
<tr>
<td>LF-200</td>
<td>4200</td>
<td>200-220</td>
<td>30</td>
<td>≥4</td>
<td>450</td>
<td>740</td>
</tr>
<tr>
<td>LF-250</td>
<td>4400</td>
<td>250-270</td>
<td>55</td>
<td>≥4</td>
<td>500</td>
<td>810</td>
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</table>
VD/VOD VACUUM REFINING FURNACE

APPLICATION
VD vacuum refining furnace can conduct vacuum degassing for molten steel, alloy composition trimming and argon stirring in vacuum. VOD vacuum refining furnace carries out oxygen blowing and decarburization, vacuum degassing and alloy composition trimming in vacuum, mainly used for refining ultra-low carbon stainless steel, electric pure iron, etc.

MAIN TYPES
VD / VOD vacuum refining furnace can adopt either single or dual station. Overhead, pit or vehicle-mounted arrangement can be selected for vacuum tank. Unscrewing and vehicle-mounted movement are optional ways for movement of the vacuum tank.

IT CONSISTS OF
Vacuum tank, vacuum tank cover and lifting mechanism of the cover, steel ladle, oxygen lance mechanism, vacuum charging device, temperature measurement and sampling and observation system, oxygen system, argon system, cooling water system, vacuum pump system, etc.

<table>
<thead>
<tr>
<th>RATED CAPACITY (T)</th>
<th>LADLE SHELL INNER DIAMETER (mm)</th>
<th>VACUUM PUMP SUCTION CAPACITY (m³/min)</th>
<th>WORKING VACUUM (kPa)</th>
<th>SIZE OF VACUUM TANK (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>2200</td>
<td>150</td>
<td>3600*4100</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>2600</td>
<td>180</td>
<td>4000*4600</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>2700</td>
<td>200</td>
<td>4200*5175</td>
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<tr>
<td>40</td>
<td>2900</td>
<td>250</td>
<td>4500*5900</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>3000</td>
<td>280</td>
<td>5000*6400</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>3150</td>
<td>350</td>
<td>5500*6800</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>3200</td>
<td>380</td>
<td>5600*6800</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>3300</td>
<td>380</td>
<td>6000*7200</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>3400</td>
<td>380</td>
<td>6400*7500</td>
<td></td>
</tr>
<tr>
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<td>3500</td>
<td>400</td>
<td>6500*7800</td>
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<td>120</td>
<td>3600</td>
<td>420</td>
<td>6800*8000</td>
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<tr>
<td>150</td>
<td>3900</td>
<td>450</td>
<td>6500*8600</td>
<td></td>
</tr>
</tbody>
</table>
CONTINUOUS CASTING MACHINE

We can design and manufacture the up-to-date billet continuous casting machine in accordance with the user’s steelmaking capacity, billet size, steel grades and the user’s field conditions. The detailed design mainly includes:

- Equipment foundation and civil works
- Steel structure platform
- Casting radius, Strand number
- Ladle support, Turret, Ladle transfer car, Fixed support, Tundish, Tundish car, Tundish roaster, Mould, Oscillation device, Secondary cooling system, Dummy bar, Dummy bar storage device, Withdrawal straightening machine, Approach roller table, Automatic cutting machine, Transmit roller table, Cooling bed, Pusher, Hydraulic system, Computer and PLC system

This type of CCM can be designed as curved and vertical-bend according to the users requirements. It can cast carbon steel, alloy steel and special steel, such as stainless steel. Automatic hydraulic control, automatic secondary cooling water distribution, compressed air-water cooling system.
ROLLING MILL

We design and manufacture a complete line of precision rolling mills. It is used for metal rolling process and refers to complete the whole process of rolling production equipment, including the main equipment, auxiliary equipment, lifting transport equipment and accessory equipment, etc. The rolling mill mainly consists of roller, rolling mill house, bearing package, bearing, workbench, rolling guide, rail chair, roller adjustment device, top roll balance device and roller change device, driving device, cooling bed, finishing facilities with cold shear, bundling system with bar counter and wire tying machines etc.
LOW-VOLTAGE ELECTRICAL AUTOMATION CONTROL SYSTEM

THE ELECTRODE AUTOMATIC PRESSURE RELEASE FUNCTION
Based processes requirements, precisely press and release the electrode can greatly improve the stability, reliability of electric furnace production, reduce electrode fracture rate and ensure the operation of electric furnace safe, high efficiency and stable.

ELECTRODE LIFTING FUNCTION
Based process requirements accurately control electrode operation.

THE FUNCTION OF AUTOMATIC CONTROL FEEDING
Based process requirement, feed the material to furnace timely and quantitatively, the feeding uniformity and stability can ensure continuous and stable operation of electric furnace, to improve the level of automation.

DETECTION AND DISPLAY OF OPERATING PARAMETERS
Electric furnace operating parameters such as: current, voltage, power factor, temperature, pressure and other parameters in real-time detection and control, and a sound alarm, all parameters, status can be displayed on the color display.

AUTOMATIC AND MANUAL SWITCHING FUNCTION
To ensure system reliability, it is equipped with a set of manual control buttons, manual control can be used under any circumstances.

THE OPERATION PARAMETERS OF STORAGE AND PRINTING FUNCTION
Instant printing and timing print arbitrary choice, operating parameters can be prolonged storage, retrieve, and manage easily.

THE NETWORK FUNCTION
Connected with the LAN network, the parameter of the furnace can be remote monitored, improve the enterprise automation management level.
SUBMERGED ARC FURNACE FOR FERRO-ALLOY

APPLICATION
Submerged arc furnace will be mainly applied for reduction of metallurgical ore to produce the FeSi, FeMn, FeCr, Ferrotungsten, SiMn and Titanium slag alloy, which will be the important material for metallurgical and chemical industries.

WORKING CHARACTERISTICS
For submerged arc furnaces, the lining will be made of carbon or magnesia refractory material. The electrode is self-baking. The electrode will be inserted into the charging material.

The material will be molten by arc and current. The charging material will be continuously adding. The tapping will be batch type. It is a continuous operation industry furnace.

DEVELOPMENT DIRECTION
Submerged arc furnace is toward to larger, automatically, sealed, environmental protection and energy saving. As to core components of submerged arc furnace, the structure of the electrode holding system, our technical team also has carried on the technological innovation. With copper tile type top tight hydraulic oil cylinder, copper tile type bellows expansion tank, taper ring, big bolt clamping type, modular control device structure etc. According to the requirements of the various ferroalloy products and metallurgical process, we will select the most appropriate furnace type structure for you.
DUST COLLECTION SYSTEM

FOR STEEL PLANT
In steel making enterprises, the flue gas from arc furnace is one of the main source of pollution, as the exhausting volume is large, the temperature of flue gas is high and it is fine ash powder with hydrophilic property. It is difficult to collect and filter. Along with the development of process in steel and iron industry with ultra high power, strengthening melting and molten iron, and the environment protection, the flue gas filtering is the key section in steelmaking workshop. According to your workshop layout and local gas exhausting code, you can select our different type of dust collection system, such as 'sealed cover/ roof cover' + the fourth flue gas outlet hole + cooler + separately chamber back blowing bag type filter or pulse bag type filter.

FOR SUBMERGED ARC FURNACE
During the alloy melting process in submerged arc furnaces, there is large volume of flue gas with high temperature. Also, the composition of flue gas is very complex. Considering the chemical and physical properties of flue gas, you can select the best one for your project. In recent years, the LCM long bag type pulse filter has been widely applied for submerged arc furnaces. It can be also used for calcium carbide furnace, boiler, limestone kiln, metal mixer and asphalt mixing station to meet the requirement of national emission standard.

FOR RAW MATERIAL AND CRASHING WORKSHOPS
The raw material for melting should be crashed, screened and transported to the furnace. During these productions, certain dust will be caused. In the products workshop, there is same problem of dust from crashing and screening. For example, the particles of titanium ore and slag are very fine, it is easy to make the pollution in the workshop and harm to workers, so should install dust collection system.
SPARE PARTS FOR SUBMERGED ARC FURNACE

- Expansion Pad Type Clapper Pressure Ring
- Oil Cylinder for Electrode
- Electric Network
- Copper Brasses
- The Copper Double-deck Pressure Ring
- The Holding System After Assemble
- Hydraulic Brake for SAF
- The Water Cooled Protection Sleeve
- The Rotating System
- Transformer
- The Ladle Car
- The Charging System
SPARE PARTS FOR STEELMAKING EQUIPMENT

ELECTRIC HORIZONTAL ARM
The complete water cooling copper-steel compound electric horizontal arm has good property, reasonable structure, low failure rate and easy maintenance to reduce the power compensation and increase the productivity.

TIP HOLDER
It is made of chromium-bronze with good property. It will be forged and machined with water cooling to increase the conductivity and working life against arcing.

ELECTRODE CLAMP
There are two kinds of electrode clamps, such as water cooling or non-water cooling types. It will be made of non-magnetic stainless steel. The isolation area will be coated with ceramic powder under the advanced international processing. It has the reliable performance and long working life to be applied for LF and Arc furnaces.

WATER COOLING CABLE
It is made of high quality oxygen-free copper wire and extruded to connector with good electric conductivity and mechanical strength. As the bending ratio will be small, the arrangement will be compact. As its out lay will be made of flame retardant rubber, it has a long working life.

SOFT COMPENSATOR
It will be made of high quality copper by reliable processing to get excellent performance.

FORGED COPPER SHOE
The shoe will be made of forged cooper T2, machined and heat treated. It will be without any air holes, or slag. It has good electricity and cooling to increase the working life more than 2 times of normally shoe.
TYPICAL CASES

TENGYE METALLURGICAL ENGINEERING

Reheating Furnace

27000KVA FeSi SAF

The 80t-Ultra -High Power EAF
TYPICAL CASES

22500KVA Fe-Si SAF

100t Double Station Ladle Furnace

80t-VD Vacuum Refining Furnace

33000KVA Silicon Furnace

25t-Tilting Ladle Furnace

Cooling Bed for Rolling Mill
TYPICAL CASES

3000kVA FeMn Plant Layout

Product Crushing Workshop of 75%FeSi

Finishing Round Bar Transfer and Integrated System

The Belt Conveyor Corridor of Feeding System

The Cooling Water Pipe Row of SAF