

FURNACES AND EQUIPMENT FOR ALUMINIUM BILLET PRODUCTION



PRODUCTS and SERVICES of CEOTHERM

- **CeoTherm** produces industrial furnaces, machinery and auxiliary equipment for aluminum, iron & steel foundries. Also serves industrial automation and machine revision works.
- **CeoTherm** produces melting and holding furnaces, heat treatment furnaces and machineries for aluminum extrusion, aluminum melting & recycling and aluminum forming industries.
- **CeoTherm** also has products for ferrous and non-ferrous industries. Tailor-made design, manufacturing and application with modern Technologies and knowledge are performed by **CeoTherm** experience, engineering and technical capability.



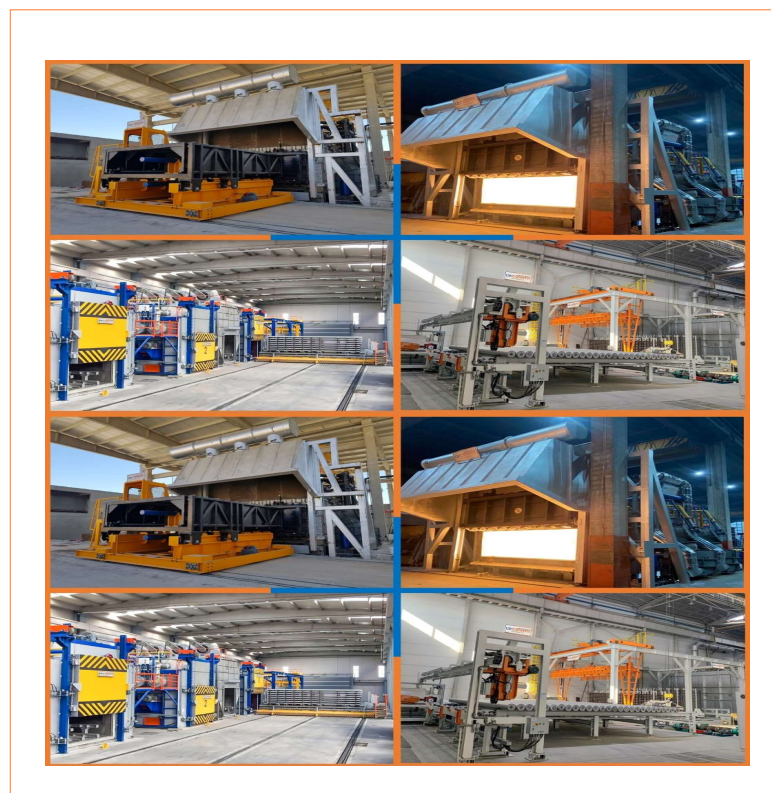
About

Foundation Year	September 2009
Products and Services	Industrial Furnaces, design, manufacturing include electric, mechanic, burning system with related auxiliary equipment and control system
Number of Employees	>55 30-Blue collars for manufacturing, 12 technicians and supervisors 8 Engineers 5 finance and management
Production Area	3000 m ²
Storage Area	500 m ² + contacted logistic warehouses
Certificates	▪ISO 9001:2014 Quality Management, ▪CE Quality Certificate ▪Certificate of Conformity - Individual products



Scope List of the Refernce Project

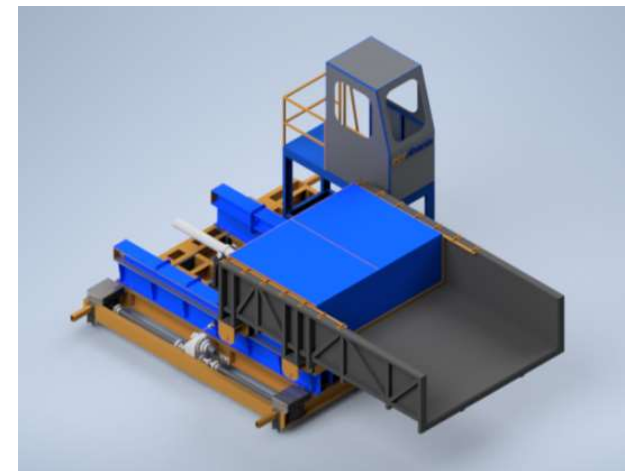
No	Description of the goods	Qty.
1	15 Tons/charge Scrap Charging Machine ASCM-15	1 set
2	Automatic Dross Skimming Machine ALDSM	1 set
3	100 Tons/charge Capacity, melt rate 12Ton/h, Natural Gas Heated, Side Well (Molten aluminum vortex) Mounted, Stationary Type, Aluminum Melting Furnace with Regenerative Burners AMFS-100-RGN	1 set
4	50 Tons/charge Capacity, melt rate 10Ton/h, Natural Gas Heated, Tilting Type Aluminum Melting Furnace with Regenerative Burners AMFT-50-RGN	1 set
5	50 Tons/charge Capacity, Natural Gas Heated, Tilting Type Aluminum Holding/Casting Furnace with Cold Burners ACFT-50	1 set
6	ABB Electromagnetic Stirrer (ORZ-320) and Trolley	1 set
7	14 Tons/hour Capacity Continuous Type Aluminum Billet Homogenization Furnace from 6'' to 16'' Billets, include an Automatic Billet Saw	1 set
8	50 Tons/charge Capacity Billet Homogenizing Furnace	1 set
9	50 Tons/charge Capacity Cooling Cabinet	1 set
10	50 Tons/charge Capacity Billet Transfer Car	1 set
11	Automatic Billet Saw for Billet Heat Cut up to 16''	1 set
12	Automatic Billet Stacking and Destacking System	1 set
13	Billet Weighing System With Load Cells	1 set
14	Pneumatic Billet Marking System	1 set
15	Automatic Billet Destacking System	1 set
16	Automatic Billet Stripping System	1 set



15 Tons/Charge Scrap Charging Car

Fast & Easy Scrap Charging

- Scrap container : W: 8.000 x L: 3.500 x H: 1.000 mm.
- Charge box volume : 28 m³
- Load capacity (max.) : 15 tons (depends on scrap/ingot volume)
- Furnace charging time : 6-8 minute
- Wheels : 4
- Wheel drive system : hydro-motor
- Locking at station : 1 ea. hydraulic cylinder
- Power connection : Spring driven cable reel
- Travels one direction, parallel to furnace front door.
- Travel on 2 rails fixed on the floor.
- Charging movements with hydraulic cylinders
- There is a driver cabinet on top of the charging machine for good view while charging materials into the furnace
- Audio and Visual alarms while the charging machine is in operation.
- All functions of the controlled by SIEMENS S7 1200 PLC



Automatic Dross Skimming Machine

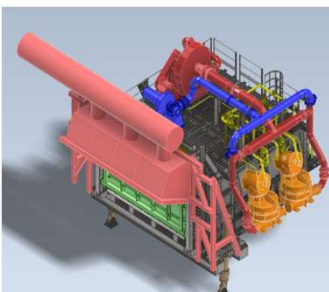
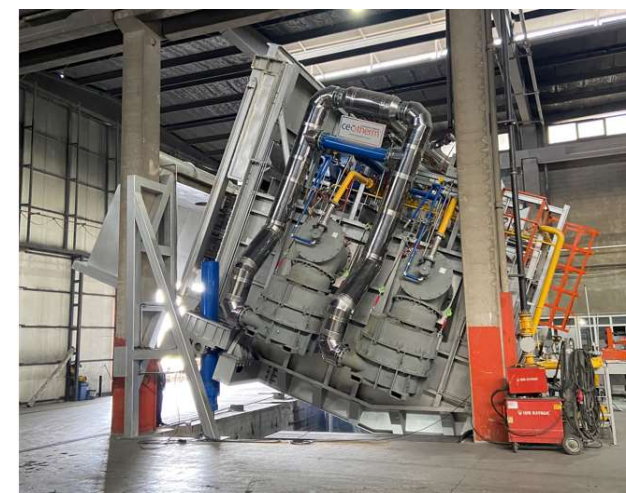
Fast, easy and safe molten metal skimming

- The On-rail Skimming machine operates and travels over 4 wheels on the same rails as the furnace charging car.
- Driven by hydro-motor reducer.
- Helps to de-drossing and stirring.
- Furnace bottom and side wall cleaning.
- Quick execution against energy losses as well as metal losses with oxidation.
- Reduction of waves and splashes during furnace skimming
- Reduction of hydrogen absorption
- Refractory protection and extends refractory life
- Protected operator cabin for staff safety
- Automatic skimming with camera system (Intelligent AI)
- Adjustable sensitive joystick-controlled operation
- The internally cooled telescopic boom design



Melting Furnaces

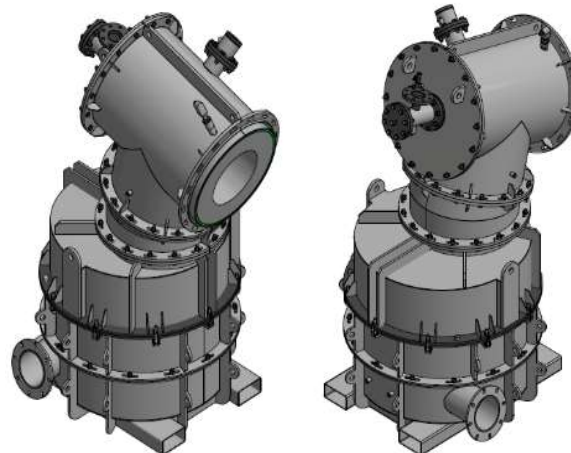
- 5 to 100 Tons capacity
- New technology regenerative or cold burner heating system for low energy consumption.
- Robust steel body provides structural rigidity.
- 85 %Al₂O₃ non-wetting type refractory castable.
- No corundum built up.
- Hydraulic cylinder driven main door.
- Hydraulic tilting system.
- Pneumatic cylinder driven door clamping system.
- Air cooled exhaust damper system.
- Magnetic or porous plug aluminum stirrer system.
- Control with PLC and HMI



Melting Furnaces

Regenerative Combustion System

- Heating system will be in compliance with European Standard Industrial Thermo-processing Equipment Part 2: Safety requirements for combustion and fuel handling systems EN 746/2
- Indoor installation protection class IP-54
- Emission will fit TA Luft emission standard.
- Motorized combustion air and gas valves
- Pneumatic actuated damper at exhaust gate of the Furnace and pressure transmitter
- Control with PLC and HMI



Melting Furnaces

Manufacturing of Steel Construction

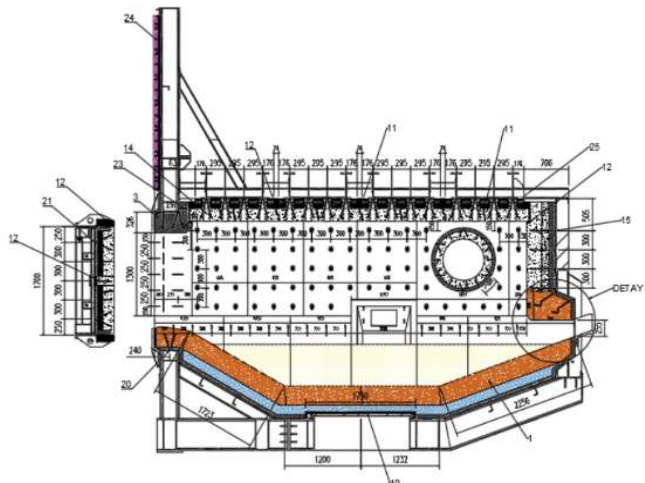
- Furnace steel body is made from 10 mm thick St-37 Carbon steel plates and reinforced by profiles to provide a rigid structure
- Roof profiles : IPE 120 and IPE 400
- Side walls : NPU 140, 200 and IPE 200
- Back wall : NPU 400, 220, 140 and IPE 220
- Front wall : IPB 300
- Base : IPE 400, 500 and NPU 140



Melting Furnaces

Refractory / Lining Application

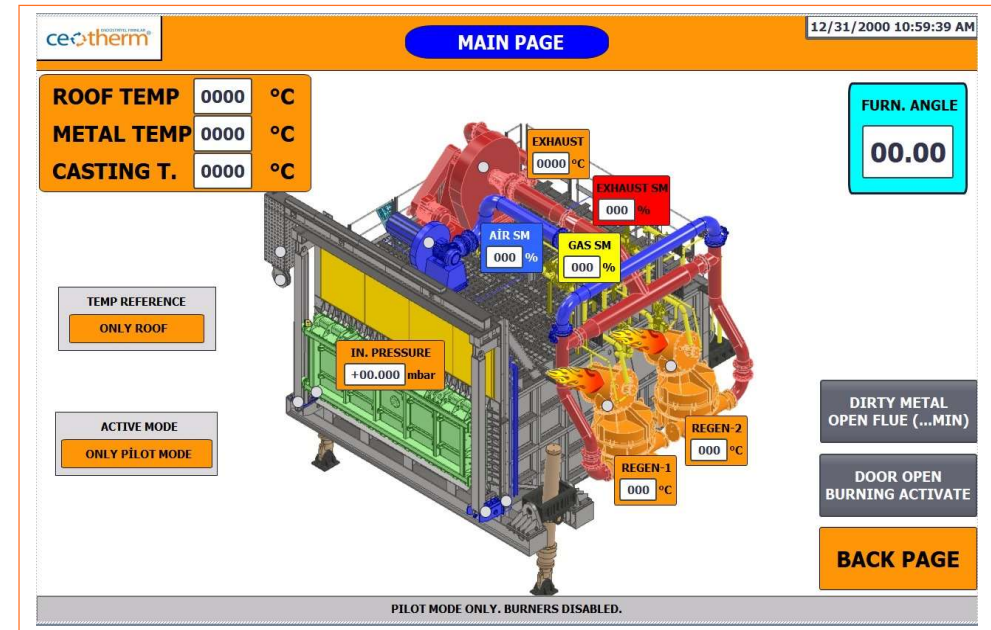
- Lining will be suitable for metal temperature max. 760 °C and roof temperature max. 1050°C. The refractory material will be supplied from
- Calderys-Haznedar or EKW and can be change after finishing of detailed engineering with approval of customer



Melting Furnaces

Automation and Control System

- All the motions, temperature, pressure, flows, levels and positions will be controlled and monitored by SIEMENS S7 1500 PLC and HMI. The system will have 10% available I/O modules as spare.
- The operator panel will be placed nearby of the furnace. MCC and other panels will be in a room.
- Control panel, dust-tight construction IP-54, Purge timers, limit circuitry
- High Temperature Limit controller,
- 2 x Flame relays with digital display.
- Limits and annunciation logic
- Furnace door logic
- Burners cycle control loop
- Fuel gas flow control loop
- Combustion air flow control loop
- Roof temperature control loop
- Bath temperature control loop
- Furnace pressure control loop
- Fuel/Air ratio control loop
- Exhaust temperature control loop

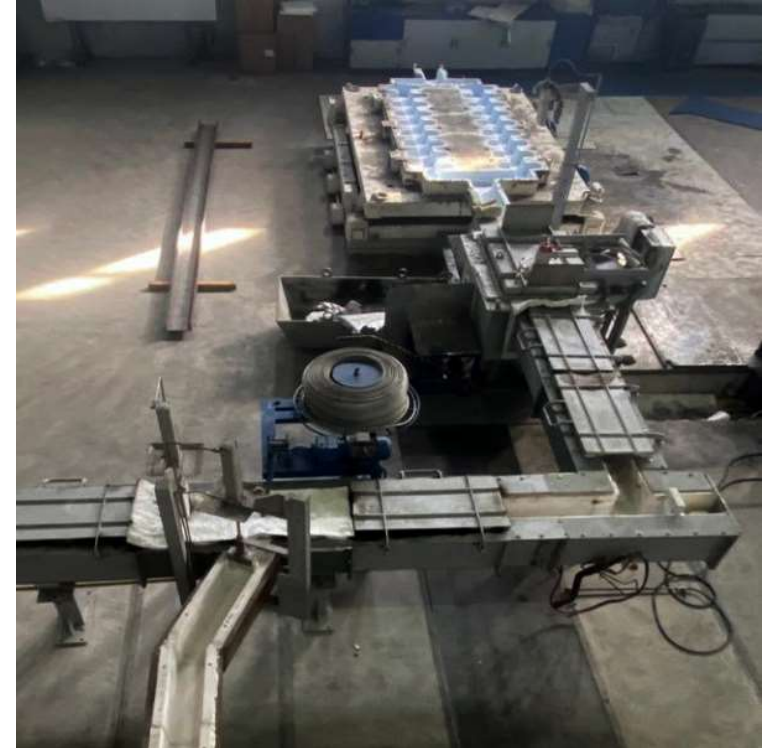


Summary of the operator panel pages;

- Mimic diagrams
- Furnace tilting positions
- On/Off equipment
- Manuel control
- Burner reset
- The operation of the fan, pressure, vibration of the bearings, the temperature
- Roof and molten aluminum and bottom outer shell temperatures
- I/O and Program page
- Natural gas and electrical consumption
- Trend page (temperature-time curve)
- Hydraulic and Pneumatic system pages
- Parameters , Maintenance and Alarm history pages

Liquid Metal Transfer Runners

- Flow rate : 2 - 100 Tons/hour
- Heating system during casting period.
- Pre heating system before casting process.
- Covered by manual/automatic open/close insulated covers during heating.
- Launderers are manufactured by 6 mm thickness St-37 metal sheets.
- Launderers will have enough degree of incline available for proper casting process.
- Launderers are isolated with non-wetting, low thermal mass precast refractory and ceramic wool.



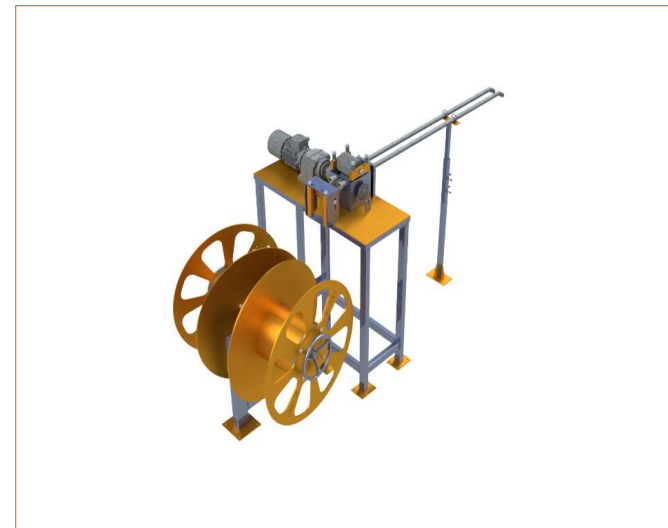
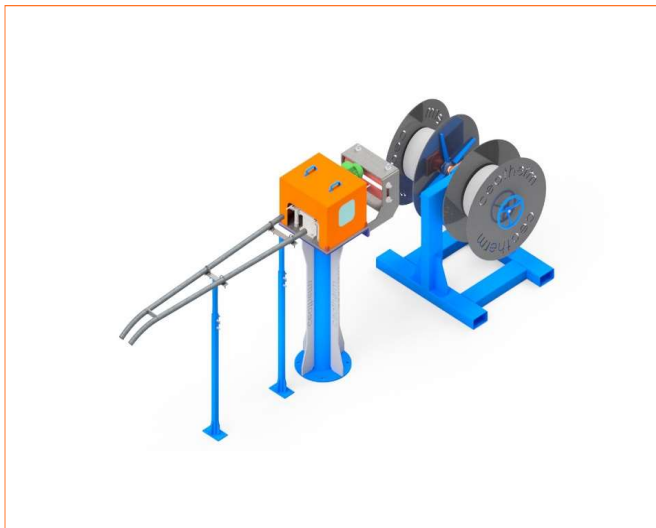
Degassing Unit

- Degassing unit flow rate up to 30 Tons/hour and matches 0.15 cc/100g Al. maximum outlet purity.
 - Hydrogen values before degasser 0.35-0.40 cc/100 gr
 - Hydrogen values after degasser 0.15-0.20 cc/100 gr
 - The rotating-type treatment process is based on the gas flotation principle.
 - Rotors inject and disperse an ascending flow of tiny bubbles of process gas into the molten metal.
 - Hydrogen is removed by desorption into the gas bubble which bring it up to the surface and out with the fumes,
 - The inclusions are captured by the bubbles, either by collision when big, or radial interception if small. They then rise to the surface of the melt forming dross which is removed by skimming.
- 2-6 pcs. gas injection nozzles.
 - Pre heating burner
 - Hydraulic lift up/down top cover.
 - Nitrogen or argon gas supply equipment.
 - Gas mixtures and control panel.
 - Molten aluminum flow capacity 2 Tons/hour to 60 Tons/hour



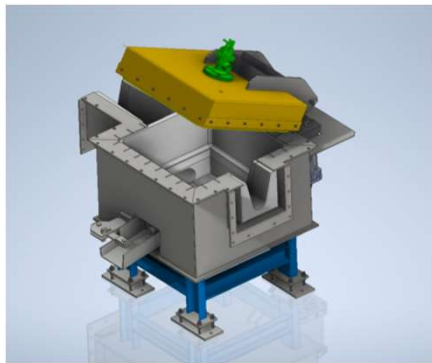
ALTiB Rod Feeder

- The rod feeder placed before degasser unit and immerse ALTiB rod grain refiner into molten aluminum in the launder.
- 2 Rod un-coilers (one is installed as spare)
- Feeding speed adjustable 100-500 cm/minute
- Coil handling capacity m: 200 kg per coil
- Dimensions OD-800mm W-350 mm
- Rod diameter : app. 10 mm



Ceramic Filter Box

- Ceramic foam filters are used to filtering of molten aluminum.
- Preheating burner installed on top cover.
- It is available in a range of size from in 7"-26" and grades 10 to 80 ppm.
- Refractory lined vessel is made from precast refractory.
- There is a drain for pouring remain aluminum after casting.
- Molten aluminum flow capacity 2 Tons/hour to 60 Tons/hour



HOT-TOP BILLET CASTING SYSTEM

Hydraulic cylinder

Cylinder is mounted vertically in to the casting pit
Mounting flange at cylinder head

Lifting platform

On the upper part of the lifting platform there are the connection holes for installation the dumpy billet seat.

Tilting device of casting platform

It is composed of tipping frame, pedestal, turnover cylinder, position limitation device, water distribution device.

Support at well mouth

Adjust height and support casting platform

Cooling water system

This system is provided with water cooling tower and 6 water pumps and the pipeline, manual butterfly valve and automatic cleaning filter. Air butterfly valve is controlled by control switch of the emergency water line, air regulating ball valve, pressure sensor, electromagnetic flow meter, temperature sensor, anti-vibration resilient joint, rotating joint.

Drainage system; A strong water drainage system is composed of one submerged pumps and liquid level transducer.

The displacement capacity for one pump: >350t/hr

Hydraulic pipeline

1Cr18Ni9Ti stainless steel pipes, hydraulic fittings with flat seals, hoses are high pressure rubber pipes with two layer steel wires



Steam discharging device at well mouth

It is composed of stainless steel pipeline, fan, gas collection cover etc. Remove water vapor in the well so as that operator can see clearly the circs of casting rod and it can help to improve surface and internal quality of casting rod.

Mold repairing platform

Hydraulic lifting device is in tipping pit. When in backward position, it is in the same level as floor and the lifting stroke is 2500mm, can stand on it to repair mold.

Electrical control system

Composed of the motor control cabinet (MCC), basic automation system (PLC), communication system, remote diagnosis system, and production stat. system, control menu system, process parameter setup system and storage system, pulpit and operation display terminal (human-machine interface HMI), etc.

ALUMINIUM BILLET HOMOGENIZATION PLANTS

- 5-60 Tons/charge capacity.
- Operating temperature 580°C
- Temperature homogeneity ± 5 °C
- Self recuperative or cold burner gas heating system.
- Gas consumption $< 30 \text{ Nm}^3 \text{ NG/Ton Al.}$
- Reversible or single direction air circulation system.
- Heating time: 8-11 hours according to billet diameter.
- Driven by e-reducer main door.
- Pneumatic actuated door clamping system.
- Pneumatic actuated door locking system.



HOMOGENIZATION FURNACES & COOLING CABINET

- 5-60 ton/charge capacity
- Working temperature: 580°C
- Homogeneity: $\pm 5^{\circ}\text{C}$
- High efficiency Self Recuperative or cold air burner
- Gas consumption $< 27 \text{ Nm}^3 \text{ NG/Ton Al.}$
- Reversible or one direction air circulation
- Heating time: 8-11 hour depends on billet diameter
- E-motor reducer driven door
- Pneumatic actuated door clamping system
- Pneumatic actuated door locking system
- Explosion protection windows
- Cooling cabinet
- Reversible air flow cooling system
- Cooling rate up to 400°C/h.



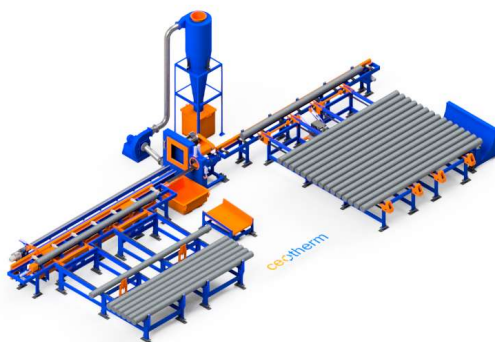
TRANSFER CAR

- Max. capacity 60 tons.
- Charging time <3 minutes
- Driven by electric motor gear box or hydro-motor gear box.
- Hydraulic lifting system to leave and get the billets from the stations.
- Car fixing with hydraulic locking system of the car.
- Control panel on the transfer car for the operator.
- Contactless power transfer for long distance travels (optional)



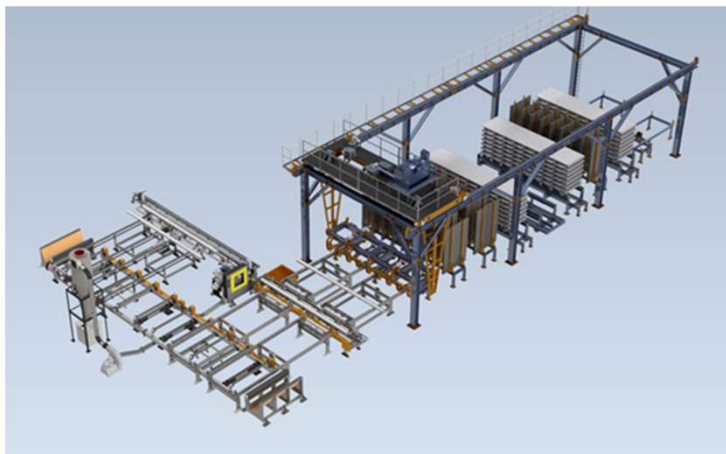
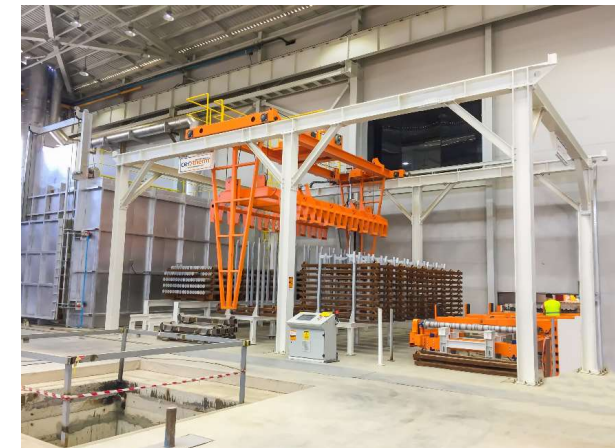
BILLET CUTTING SAW

- Billet loading table with hydraulic driven automatic shooter system.
- Billet saw machine entrance roller conveyor.
- Blade drive motor with rotation speed control.
- Blade thickness 6 mm.
- Automatic spraying lubrication system.
- Cutting tolerance 5mm.
- Automatic chip collecting unit.
- Billet exit roller conveyor driven by e-motor reducer.



AUTOMATIC BILLET STACKER & DESTACKER

- Billets automatically de-stacked by gripper system after finishing of homogenizing process.
- De-stacking time 2 hours.
- Billets are automatically transferred to the unloading platform one by one
- One common unloading system can serve up to 4 furnaces.
- Driven by a electric reducer rope lifting system.
- Driven by a electric reducer movement system.
- Pneumatic actuated clamping system.
- PLC and HMI control



CONTROL & AUTOMATION SYSTEMS



- All temperature consumption, movements and functions controlled by PLC and monitored on the HMI operator control panel
- All message receipt, alarm display and large log history
- Maintenance time and solution displays are given in detail
- System has ethernet, profibus, profinet communication
- The system and can be controlled and all the reports can be taken from the Supervisory control and data Acquisition (SCADA) system
- All electrical panel are made of DKP steel painted by electrostatic RAL 7035 beige color paint
- Control panels have protection such as IP 55 inside the room