CASTHOUSE EQUIPMENT

OTTOJUNKER
WE UNDERSTAND METALS

... FOR ALUMINIUM

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METALS

Introduction

OTTO JUNKER and the THERMCON brand have long been synonymous with advanced industrial furnace technology and plant engineering. A world leader in its markets, our company has specialized in the supply of aluminium foundry and casthouse equipment.

A powerful partner in furnace engineering and process automation.
Installations for melting and casting aluminium, drying processes, heat recovery, burner installations, furnace modernization projects and process automation systems form the backbone of OTTO JUNKER´s product range.

Our extensive know-how and experience in furnace and plant design, supported by OTTO JUNKER's stringent quality assurance and high dedication and commitment, are key to our ability to supply equipment of a consistently high quality.

Optimum solutions and installations – based on sound know-how and experience.
Our highly qualified, experienced staff ensures that OTTO JUNKER systems will provide the most advanced technology while meeting ongoing innovation and optimization targets, in conjunction with individual customer specifications, at all times.

Quality assurance

In line with OTTO JUNKER's quality assurance principles, our equipment is built to provide the following:

- Safe and efficient operation (operator friendly)
- Low total cost of ownership
- Low maintenance costs
- Rugged and reliable design

OTTO JUNKER products are designed and manufactured in accordance with the stringent quality standards for which our company is renowned and which we take care to improve and refine continuously in dialogue with operators of OTTO JUNKER equipment around the world.

OTTO JUNKER´s mission statement:

Determine all problems impartially, identify a solution through joint academic and industrial enterprise, and deliver the result to the customer in the form of quality products.

Process competence:

Supplying complex processing lines from a "one-stop" source is our business. OTTO JUNKER's product range covers the full process chain from melting equipment (sophisticated foundry systems, both induction-type and fuel-fired) to heat treatment systems (pre-heating, annealing, homogenizing, quenching and tempering, artificial ageing, handling and finishing technology).

Technological competence:

Based on our long-standing experience and ongoing product refinement, OTTO JUNKER equipment features extensive capabilities and advanced standards of technology. Our company's close cooperation with the Technical University of Aachen (RTWH) has continued to drive and inspire this innovation, especially in the fields of metallurgy and materials science, electrical engineering and IT.

Product range:

- Scrap and ingot pre-heating system
- Charging machine
- Melting furnace
- Pouring furnace
- Recycling system
- Porous bubbling plug system
- Molten metal launder
- Launder preheating system
- Laser-based launder level control equipment
- Billet handling equipment
- Homogenizing furnace for extrusion billet and rolling slabs
- Cooling chamber for extrusion billet and rolling slabs
- Burner systems
- Switchgear and control systems
- SCADA system
- Economic feasibility analyses
- Furnace optimisation
- Furnace upgrades

Charging machines for feedstock

OTTO JUNKER offers a wide range of ingot and scrap charging machines of THERMCON design. These systems contribute in a major way to the productivity and safety of any aluminium melting operation.

The charging time per batch is less than three minutes. Feedstock can be moved deep into the furnace so as to maximize the charging volume right from the start of the melting cycle.

Our charging machines are custom designed for use with existing or new furnaces and can be provided with very wide (7 meters+) and long containers to match virtually any furnace configuration.

Wide containers provide the advantage of allowing extrusion scrap to be charged directly without any prior cutting. The containers may be permanently attached to the machine or can be made exchange-able as part of the plant's scrap collection system, thus minimizing scrap handling operations.

Each machine is powered and operated fully hydraulically via its own hydraulic power pack.

Load cells and communication with a casthouse SCADA system can be included in the machine control system.

Skimming machines

OTTO JUNKER skimming machines of THERMCON design prove highly effective tools in every casthouse operation. Replacing the primitive method of skimming by forklift with long rake attached to it, the THERMCON skimming machine performs this job much more efficiently and quickly.

All machine movements (e.g., floor travel, movements of the telescopic boom) are hydraulically powered. However, no part of the hydraulic system projects into the furnace.
The telescopic boom effectively minimizes the skimming machine's space requirements.

Further advantages:

- Safety - the operator stands well protected in an operator cabin.
- More sensitive control – the operator develops a perfect "feel" for each movement (up, down, forward, reverse, sideways swivelling movement) of the telescopic boom.
- More efficient recovery - thanks to the enhanced control sensitivity, less free metal will be removed from the furnace along with the dross.
- Force limiting devices limit the maximum forces acting on the furnace lining, thus minimizing damage to the lining (which may be substantial with forklift-based stirring).

Hearth-type melting furnaces

OTTO JUNKER supplies a broad range of custom-designed melting furnaces for any production processes employed in the aluminium industry – from DC casting of rolling slabs, T-bars and extrusion billets, sheet or plate through to wire/rod making, conventional ingot casting lines, etc.

Dry-hearth furnace systems are a reliable solution for melting down ingots, sows and heavy scrap containing a free ferrous portion (e.g., automotive castings).
The iron content is reclaimed from the dry hearth once the aluminium scrap has molten down.

- Melting rates: 1 – 30 tonnes/h
- Capacities: 2 – 150 tonnes
- Available burner systems:
    - ambient air burners
    - recuperative burners
    - regenerative burners
    - O2 burners

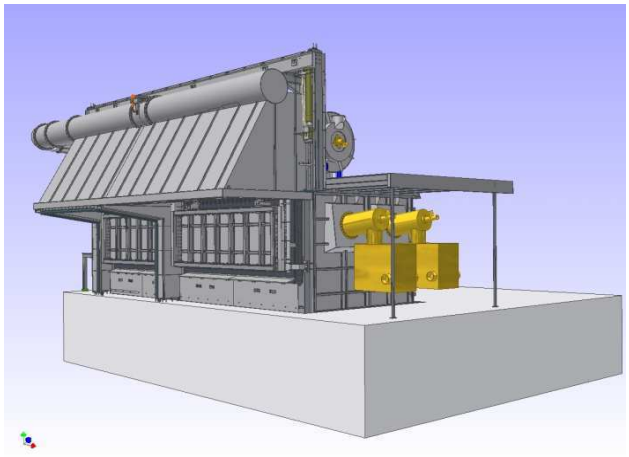
Design features:

- Minimum energy consumption thanks to specific furnace design
- Proven furnace pressure control system
- Unique module doors
- Door clamping system ensuring a perfect seal
- Prefabricated door lintel refractory systems for low maintenance

Accessories:

- Charging machines
- Skimming machines
- Electromagnetic stirrers
- Porous plug systems
- Siphon systems for charging liquid metal
- Semi-automatic tapping systems for stationary furnaces
- Laser-based launder level control system for automatic tilting furnaces

Multichamber melting furnaces



Multichamber furnaces with integrated fume treatment facilities and heat recovery for preheating the charge material are supplied to the secondary aluminium industry.

The systems are suitable to recycle contaminated aluminium in an environmentally sound manner, meeting or exceeding the strictest clean air legislation even with respect to dioxin emissions.

Feedstock can be charged into this particular furnace type at three different points: Ingot material intended to form the molten heel at start-up, for correction of alloys or to enhance the melting rate can be charged on the dry ramp in the heating chamber where the burners are installed. Baled or loose light-gauge scrap can be charged to the enclosed side well chamber. Small scrap pieces such as edge trimming or punch scrap, chips, etc. can be placed into the charge well.

Metal circulation between the chambers is achieved either by an electromagnetic pump or by a mechanical pump, depending on the given application and budget. Charging to the side well chamber can be effected by means of a special charging machine that seals entirely against the furnace so that no fumes can escape into the building whilst charging and all fumes are processed in the integrated offgas incinerator and then vented into open air via the fume filtration plant.

Furnace melt rates can be up to 10 tons per hour, depending on charge mix and bath contents (typically between 50 and 130 tons of liquid metal).

Holding and Pouring furnaces

OTTO JUNKER supplies a broad range of custom-designed holding and pouring furnaces for any production process employed in the aluminium industry – from DC casting of rolling slabs, T-bars, extrusion billets, sheet or plate through to wire/rod making, conventional ingot casting lines etc. These furnaces can be either stationary or tilting and are suitable for alloying, holding and pouring operations.

- Capacities: 2 – 150 tons
- Available heating systems:
    - ambient air burners for gas, light or heavy fuel oil
    - electric heating elements

Design features:

- Cascade-free pouring of liquid metal through pouring spout systems arranged in the furnace tilting axis
- Minimum energy consumption thanks to specific furnace design
- Proven furnace pressure control systems
- Modular door design
- Door clamping system ensuring a perfect seal
- Prefabricated door lintel refractory systems for low maintenance

Accessories:

- Skimming machines
- Electromagnetic stirrers
- Porous bubbling plugs and siphon systems for charging liquid metal
- Semi-automatic tapping systems for stationary furnaces
- Laser-based launder level control for automatic tilting furnaces

Molten metal launder systems

Launder systems are an essential part of any casthouse. Well designed launders contribute to a smooth and efficient casthouse operation where fast transfers between furnaces are of key importance. Clean, low-turbulence casting launders play a significant role in producing high quality products.

OTTO JUNKER has outstanding experience in designing and installing launder systems. This expertise is supported by the company's own proprietary software program for the design of open and closed launder systems, the use of the most advanced launder lining materials, and launder (pre-) heating technologies ranging from gas firing for transfer launders to electric heating for casting launders.

Launders are sized and rated to meet the required transfer and/or casting capacities. Features and accessories may include laser launder level control systems for (semi) automatic melt transfer and automatic casting operations, high-level metal probes for anti-spill safety, launder thermocouples for fine-tuning the molten metal temperature during casting, etc.

Billet handling systems

Available billet handling solutions range from manually operated billet grabbers to fully automated systems which provide automatic billet stacking from the moment the billets are put on the table (the entry of an automatic billet handling system) for processing through the homogenizing furnace, the cooling chamber and the billet saw.

The whole process is controlled by a dedicated PLC system that moves the billets from the entry point to the exit of the billet saw, based on menus in which the heat treatment curve in the homogenizing furnace, the cooling cycle in the cooling chamber and the required sawing operations are programmed.

The billets are grouped in the exact number depending on diameter for each layer. The layer is then moved over spacers that separate the layers and allow for air to pass between the layers in the homogenizing furnace and the cooling chamber.

The crane then will lift the layer by grabbing all spacers on each side and will stack the required number of layers to form the batch for the homogenizing furnace. The number of layers depends on the diameter of the billets.

Once the stacks are homogenized, the billet charging machine will automatically start the cycle to remove the previous batch from the cooling chamber and to advance the batch that has just completed the heat treatment cycle from the homogenizing furnace into the cooling chamber. In addition, a newly assembled batch is placed in the homogenizing furnace.

No operator intervention whatsoever is required between the depositing table and the exit of the saw.

Homogenizing furnaces & cooling chambers

OTTO JUNKER batch-type homogenizing furnaces for extrusion billets can homogenize a wide range of billet sizes to very close temperature tolerances. Batch-type homogenizing furnaces provide the necessary flexibility wherever billets are produced in many different diameters and alloys.

The furnaces together with the charging machine operate semi-automatically. Control is effected by PLC systems with HMI interfaces that allow control of the process via menus for each size and alloy plus additional custom-designed menus. Thus, each batch can be treated in accordance with the special requirements of individual customers or for specific end-products.

In-furnace cooling can be integrated in the homogenizing furnace to allow initial cooling down of the billets in line with the metallurgical requirements for optimum characteristics of the homogenized end product.

Heating can be by gas, light fuel oil or electrical energy. Gas and oil heating systems may be based on direct firing or radiant tube burners.

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