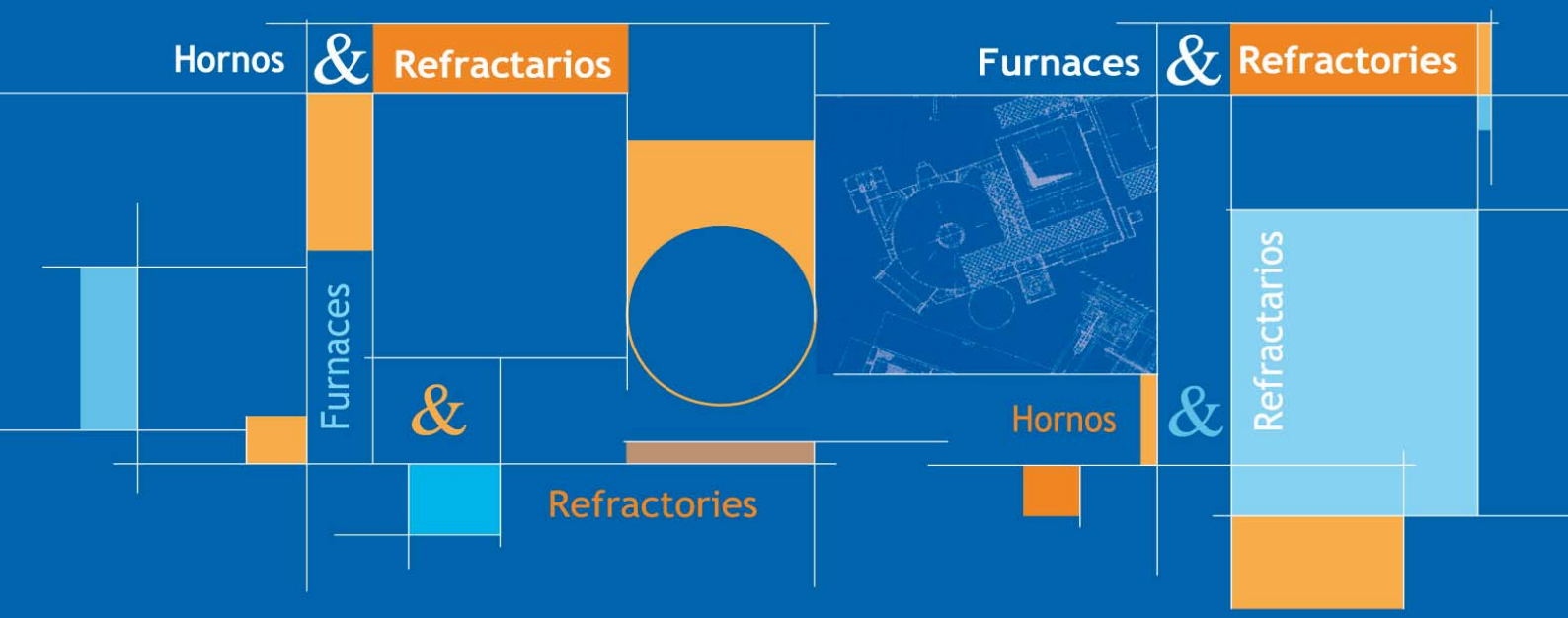
insertec

Furnaces & Refractories



Company Profile

www.insertec.biz

INSERTEC - Ingeniería y Servicios Técnicos, S.A. is a company founded in 1980, devoted to the supply of **Industrial Furnaces** and **Refractory Products**.
Our production facilities in Spain, resides the subsidiaries in Italy, Mexico, Brazil, China, ... with a worlwide staff of more than 100 people.

The Headquarters and the Industrial Furnaces' Production Plant is located closed to Bilbao (Vizcaya), in the North of Spain, the most important metallurgic area in the Iberian Peninsula. The facilities are strategically connected through road and railways networks with Europe, and quick connections with Bilbao Port and International Airport.

Headquaters
Industrial Furnaces Production

Refractory Products Division's Offices and the main Warehouse are located in Galdacano (Vizcaya). Products are supplied to more than 25 countries around the world from these facilities. The main Plant for the production and packaging of refractory products is in Arrigorriaga (Vizcaya). Other facilities are in Guadalajara (Spain), Piracicaba (Brazil) and Zhenjiang (China).

Offices, Plant and Warehouse
Refractory Products Division

International structure formed by the following subsidiaries:

- **INSERTEC INDUSTRIAL,** in Tultitlan, Edo. Mexico
- **INSERTEC MEXICO,** in Monterrey (Mexico)
- **INSERTEC ITALIA,** in Turin (Italia)
- **INSERTEC DEDINI,** in Sao Paulo (Brazil)
- **ZHENJIANG INSERTEC,** in Zhenjiang (China)
- **SANKEN INSERTEC EUROPE (SIE),** with agents in whole Europe, Eastern Europe and Scandinavia,

and our agents and representatives in countries around the five continents.

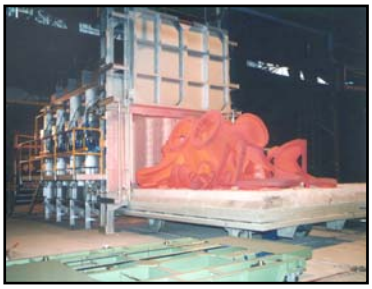
Main Production Plant
Refractory Products Division

INSERTEC has worked for many years with a clear commitment of expanding to international markets and continuous improvement process thanks to our investment in R+D. This philosophy has leaded to agreements with recognized Firms, leaders in their respective markets, such as:

- **SANKEN SANGYO** (Hiroshima, Japan).
  Aluminium Foundry Products.
- **WAHL REFRACTORIES** (Ohio, USA)
  Refractory Products.

Besides, **INSERTEC** is member of several National and International Associations such as: FEAF, TEDFUN, CECOF or ANFRE.

INSERTEC design and manufacture a wide range of Furnaces for Heating, Forging and Heat Treatment, on turn-key installations.



Car Boggie Furnace

Chamber Furnace

Pit Furnace

Vacuum Furnace

Continuous Hardening and Tempering Line

Process

- Continuous and Batch type
- Under Inert or controlled atmosphere
- Temperatures from 100 up to 1250ºC

Industrial Sectors

- Automotive parts
- Siderometallurgic
- Aerospace
- Wind Energy and Petrochemical
- Tools and Fasteners
- Bearings and Gears
- Heat - Treatment in general

Treatment

- Normalising
- Austenising
- Hardening
- Tempering
- Stress relieving
- Relieving
- T4, T5, T6 Aluminium
- Carburising
- Nitriding
- Carbonitriding
- Nitrocarburising
- Brazing
- Vacuum

Ancilliary Equipments

- Quenching Tank
- Cooling Chamber
- Charging Machines
- Loading/Unloading Tables
- Atmosphere Generators
- Washing Machine
- Dosing and Weighing devices
- Storage parts

REFRACTORY Lining

INSERTEC, manufacture and sell a wide range of monolithic refractory masses, precast shapes and other consumables for Heat Treatment.

Transfer Furnace

Bell Furnace

Recirculation Furnace

T6 Continuous Line

Revamping of Furnaces

INSERTEC design and manufacture a wide range of Furnaces and Refractories for Aluminium Foundry Industry, on a turn-key basis.

Tilting MELTOWER®

Combination MELTOWER®

IMAE Ladle Holding

Continuous T6 Heat Treat

FOUNDRY APPLICATIONS

- Melting and Holding
- Heat Treatment

INDUSTRAL SECTOR

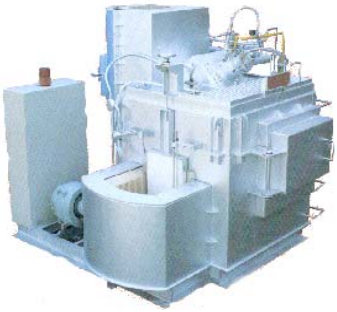
- High Pressure Die Casting
- Low Pressure Die Casting
- Gravity in Permanent Mold & Sand

Stationary MELTOWER®

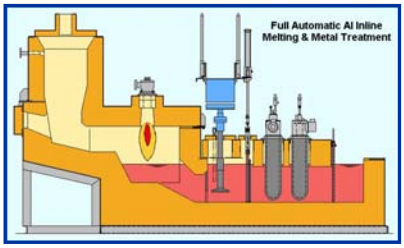
FURNACES Type & Process

TOWER Type Furnaces

- **MELTOWER®** Central melting unit
- **MELHOLDER®** for each DC cell
- **IN-LINE Process** for melting & molten treatment in continuous
- **ALUSWIRLER®** Sink Vortex
- **Combination MELTOWER®** for Ingots, returns & In-house Chips
- **ALUMAP®** Heated Launder systems



MELHOLDER®



IN-LINE Process

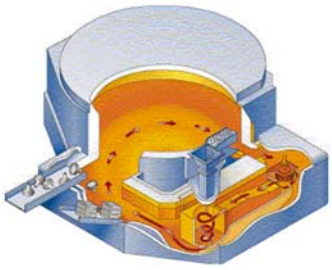
HOLDING & DOSING Furnaces

RMAE & IMAE Ladle Holding unit

- Immersion heater tubes
- Radiant roof electrical resistances

Ancilliary

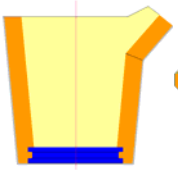
- Charging equipments
- Transport Ladles
- Gas & Electrical Preheaters



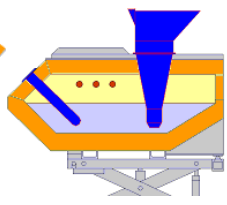
ALUSWIRLER® Process

REFRACTORY Lining

- Tower Melters
- Holders & Dosing
- Ladles
- Launders



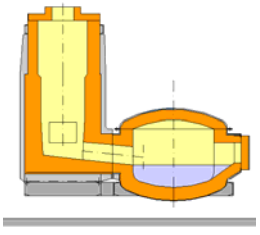
Ladles



Dosing Fc.

Precast Shapes

- **SIFCA®** Impact plates
- **SIFCA®** Door frames
- Special Pieces



Meltower Linings

INSERTEC design and manufacture a wide range of Furnaces and Refractories for Aluminium Recycling sector, on a turn-key basis.

Rotary Furnace FARB

ALUMINIUM RECYCLING

- Scrap, Baled, Profiles
- UBC, Chips, Turnnings, …
- White & Black Dross

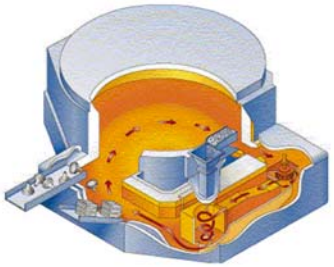
- **INDUSTRAL SECTOR**
- Secondary Recycling
- In-house Foundry Recycling

Rotary FARB Installation

FURNACES Type & Process

- **ALUSWIRLER®** sink Vortex process
- **HIRARO®**, Side open well Reverb
- **FARB**, Tilting Rotary Furnace, for scrap and dross processing
- Multi-Chamber, Dry-hearth Reverbs, up to 100 ton
  - Melting & Holding furnaces
  - Stationary & Tilting type

Tilting Reverb Furnace



ALUSWIRLER® process

Dry-Hearth Reverb Furnace

Ancilliary Equipments

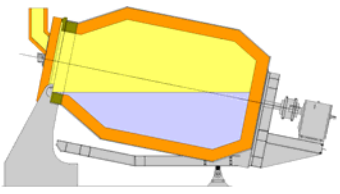
- Charging machines
- The Press, for hot dross processing
- Chips Drier & Delaquer Systems
- Pre-treatment systems for Scrap
- Oxy/Gas & Regenerative combustion systems
- Stirring systems with mechanical or electromagnetic pumps
- Molten metal Transport ladles
- Ingot casting machines
- SCADA Monitoring systems

IDEX® System Dryer/Decoater

SIFCA® Precast Frames

REFRACTORY Lining

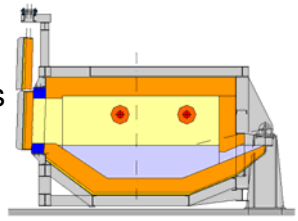
- Reverb Furnaces
- Rotary Furnaces
- Launders
- Transport ladles



Rotary Furnace

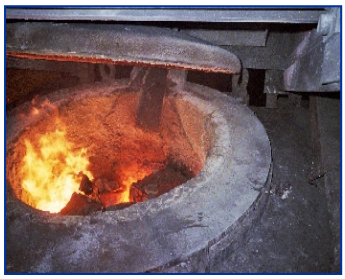
Precast Shapes

- **SIFCA®** Impact plates
- **SIFCA®** Door frames
- Skimming tools



Reverb Furnace

IDEX® + ALUSWIRLER®


Coreless Furnace


Ladles


Monolithics masses


Door Frame sils

IRON & STEEL Foundry

INSERTEC, manufacture and sell a wide range of monolithic refractory masses, precast shapes and other consumables for foundries.

Applications

- Coreless Induction furnaces.
- Channel furnaces.
- Cuppolas
- Rotary furnaces
- Treatment & Transfer Ladles.
- Automatic dosing & pouring units.

Monolithic refractory masses

- Silica based products : **CUARSIL**
- Dry ramming masses : **INSETAG**
- Castables:**INSECAST / INSELOC**
- Gumming mixes
- Patching materials

Precast Shapes

- Structural rings
- Pouring spouts
- Backslaggers
- Top Blocks
- Pushout plugs

ALUMINIUM Foundry

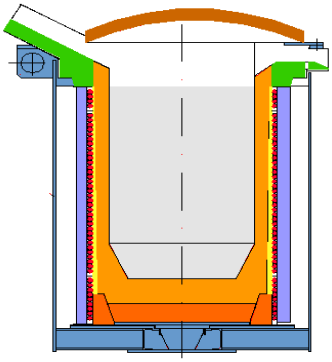
Applications

- Coreless Induction furnaces.
- Reverberatory
- Rotary
- Rotary furnaces
- Tower Melting
- Dosing furnace
- Crucible furnace
- Transport ladles

Precast Shapes

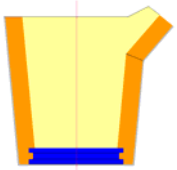
- Door frames
- Lintels
- Impact plates
- Sumerged Cones
- Dosing Tubes
- Loading Hoppers
- Dosing Cups
- Launders
- Skimming tools
- Thermocuple

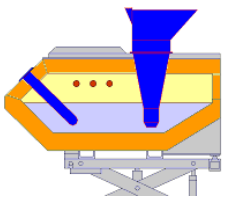

Channel Furnace

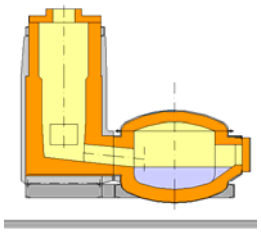

CUARSIL or INSETAG Dry Mass

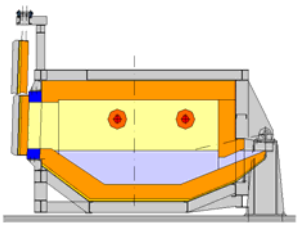

Complete Lining of the Furnace

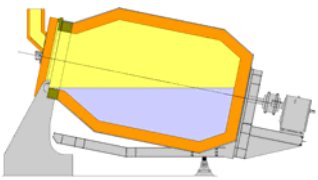

Ramp of Furnaces


Ladles


Dosing Fc.


Melting Tower Fc.


Reverberatory Fc.


Rotative Fc.

Arc furnace and Ladle

Botalite

Blaster Nozzels

STEEL WORKS

Applications

- Electric Arc Furnaces
- Launders
- Tundish

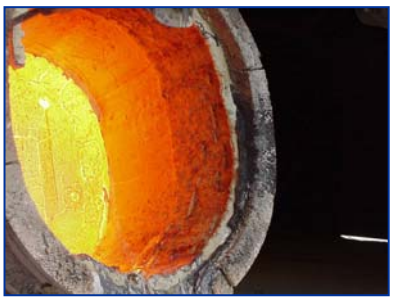
Monolithic refractory masses

- Olivine
- Magnesia based products

Precast Shapes

- Ladles
- Nozzels

Arc furnace Delta



Ladle Lip

CEMENTS

Precast Shapes

- Nose rings
- Blaster Nozzels
- Dampers
- Retainig rings
- Impact pads
- Planetary coolers
- Static grate plates
- Vortex finders
- Thermocouple tubes
- Cooler Bullnoses

Nose Ring

Enamel furnace

Heat Treatment

ENAMEL & FRITS

CERAMIC & GLASS

Complete solution for lining furnaces melting plants

Precast Shapes

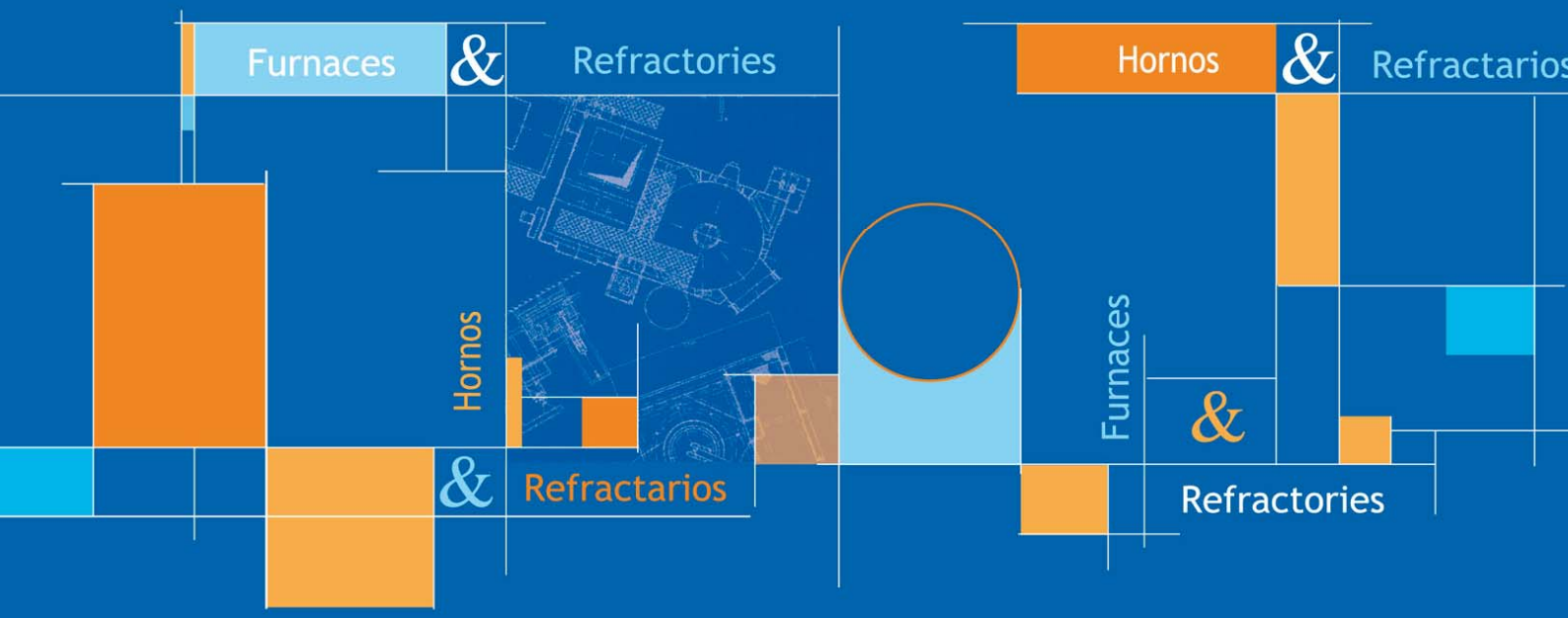
- Castables
- AZS briks
- Precast Spouts
- Burner blocks
- Feeder blocks

HEAT TRATMENT

Complete solution for lining furnaces heat treatment plants

Spout precast shapes

Enamel, Glass Furnace



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ALUMINIUM Recycling
Furnaces & Refractories

insertec
Furnaces & Refractories

Aluminium Recycling - En

INSERTEC design and manufacture a wide range of Furnaces and Refractories for Aluminium Recycling sector, on a turn-key basis.

Rotary Furnace FARB

ALUMINIUM RECYCLING

- Scrap, Baled, Profiles
- UBC, Chips, Turnnings, …
- White & Black Dross

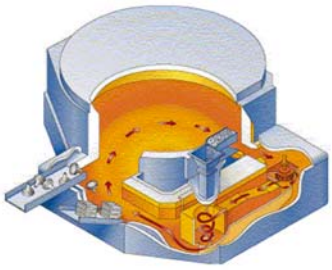
- **INDUSTRAL SECTOR**
- Secondary Recycling
- In-house Foundry Recycling

Rotary FARB Installation

FURNACES Type & Process

- **ALUSWIRLER®** sink Vortex process
- **HIRARO®**, Side open well Reverb
- **FARB**, Tilting Rotary Furnace, for scrap and dross processing
- Multi-Chamber, Dry-hearth Reverbs, up to 100 ton
  - Melting & Holding furnaces
  - Stationary & Tilting type

Tilting Reverb Furnace



ALUSWIRLER® process

Dry-Hearth Reverb Furnace

Ancilliary Equipments

- Charging machines
- The Press, for hot dross processing
- Chips Drier & Delaquer Systems
- Pre-treatment systems for Scrap
- Oxy/Gas & Regenerative combustion systems
- Stirring systems with mechanical or electromagnetic pumps
- Molten metal Transport ladles
- Ingot casting machines
- SCADA Monitoring systems

IDEX® System Dryer/Decoater

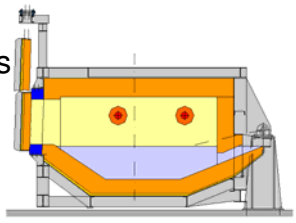
SIFCA® Precast Frames

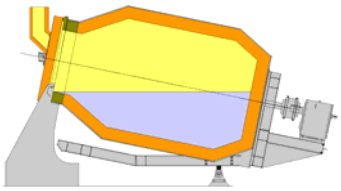
REFRACTORY Lining

- Reverb Furnaces
- Rotary Furnaces
- Launders
- Transport ladles

Precast Shapes

- **SIFCA®** Impact plates
- **SIFCA®** Door frames
- Skimming tools





Rotary Furnace

IDEX® + ALUSWIRLER®

Ingeniería y Servicios Técnicos, S.A.

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Rotary FARB
Aluminium Recycling

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Furnaces & Refractories

Rotary FARB - En

INSERTEC manufactures the Rotary and Tilting Furnaces model ***FARB,*** with an oxy-fuel combustion system, and with state of the art technology for the competitive Aluminium Recycling Industry.

Their main features are:

- Increase in the productivity
- Lower operation costs
- Increase in metal yield
- Reduction of emissions
- Reduction of final disposal to land-fill or secondary recyclers.

This kind of furnace can increase productivity as a result of shorter melting cycles by increasing the melting rate on the furnace.

Compared with usual fixed axis rotary furnaces, also reduce the amount of salts and fluxes required for the process, and therefore the amount of final disposal salt cake.

Has a better thermal efficiency, using oxygen instead of air, and so reducing amount of emissions and content in NO_x

Improve the chemical analysis because shorter cycle times.

FARB with door, rake and saltcake train

Tilting Rotary Furnace FARB-16

The ***FARB Rotary Furnace*** counts with a very advanced design for recycling all kind of aluminium and other non-ferrous dross and scraps, with a minimum consumption of salts.

Today, it is considered as the most advanced and competitive type of furnace, due to their short cycle times, small amount of salts required and high yield in metal recovery.

In general the ***FARB*** is supplied with an oxy-fuel combustion system, and uses a kind of process called “dry salts”.

These two features, combined with the tilt type design of the furnace, allow the ***FARB*** melt more rapidly and efficiently, with tap-to-tap cycle times between 2 and 3 hours, with a thermal efficiency among 75-80%, and productivity time over 98%.

Another important issue to be considered is the support offered by INSERTEC regarding experience in processing different type and kinds of materials, experience gained along a good number of important projects all around the world.

FARB Furnace
Aluminium Recycling

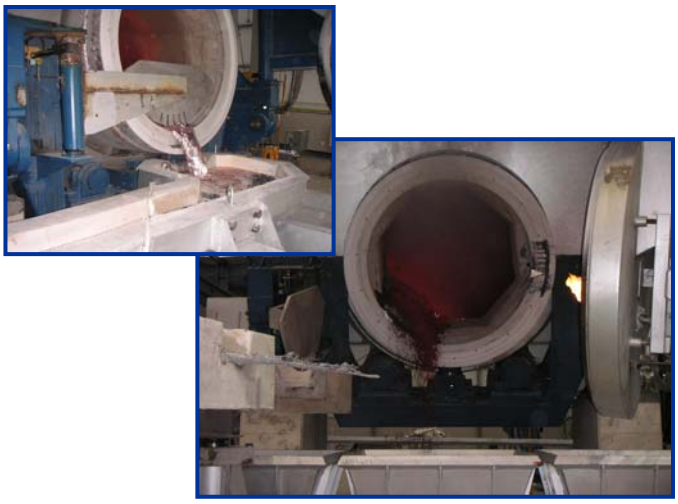
insertec
Furnaces & Refractories

The ***FARB*** Furnace is a universal solution for processing all kind of materials, such as:

- Dirty scraps, with dust, paint, plastics
- Foundry returns
- Automotive parts with ferrous inserts
- Aluminium cans, UBC
- Chips, turnings
- White and black drosses

Some features of its design are:

- Tap-to-tap cycle times, from 2.5 to 3 hrs
- Ratio of salts required, 0.4 to 0.5 of NMP
- Energy consumption, 400 kWh/MT
- Rotary speed, up to 8-12 rpm
- Robust steel structure, with a proven drum
- Long life refractory lining
- Oversized driving system and bearings
- Hydraulically Rotation and Tilting systems
- Supervision and control from PLC

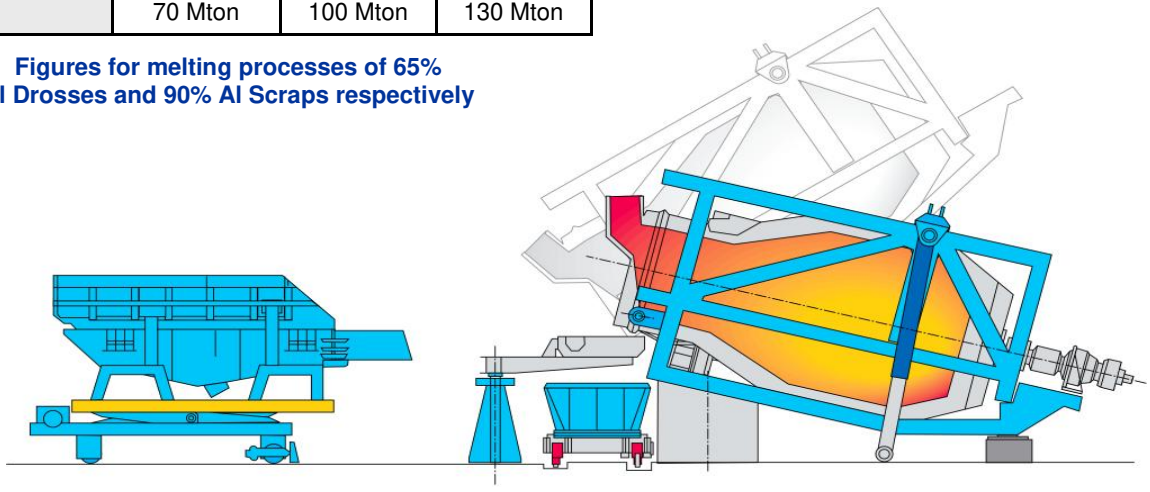


FARB with door opened, drain off molten metal with dross rake and saltcake into bins of Salt car

View of one FARB-24 and its charge feeder

Technical Specifications Rotary Furnaces Tilting type FARB			
Model	**FARB-12**	**FARB-16**	**FARB-24**
Capacity (MT)	12 Mton 8 m3	16 Mton 10 m3	24 Mton 15 m3
Input (Mton) - Dross / Scraps - Salt required	 10.5 / 11.5 1.50 / 0.5	 13.5 / 15.0 2.5 / 1.0	 20.0 / 22.5 4.0 / 1.5
Output (Mton): - Molten Metal - Salt cake	 7 / 10.5 5.0 / 1.5	 9.5 / 14.0 6.5 / 2.0	 14.0 / 20 10.0/ 4.0
Output Production - Dross	 45 Mton	 70 Mton	 85 Mton
- Scrap	70 Mton	100 Mton	130 Mton

Figures for melting processes of 65% Al Drosses and 90% Al Scraps respectively



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REVERBERATORY FRLB
Aluminium melting & holding

insertec
Furnaces & Refractories

Reverberatory FRLB - En

Tilting Reverberatory Furnace, type FRLB, for melting and holding of aluminium, with capacities from 15 to 100 Mton.

The furnace is designed to customers requirements on melting/holding capacity and the application.

The furnace is in general a **rectangular design** and with one main large lifting door providing clear and unobstructed access to the heating chamber for material charging alloying and drossing etc.

The furnace is **hydraulically tilted** with two hydraulic cylinders positioned on opposite sides of the furnace. The Main door is also hydraulically operated.

The **burners** are positioned opposite to both the pouring spout and the exhaust gas duct. This increases the residence time and optimises path for the hot gases inside the heating chamber.

Burners size is according to furnace purpose (melting, holding or alloying), and are controlled automatically according to bath and roof temperatures.

Monolithic refractory hearth and wall construction are lined with castables processing non wetting properties.

Flat roof fabricated from steel sections for added strength and the composite refractory lining is chosen for its thermal properties and durability .

Dry precast **door frame** material with the high mechanical strength resistance to temperature fluctuations and abrasion.

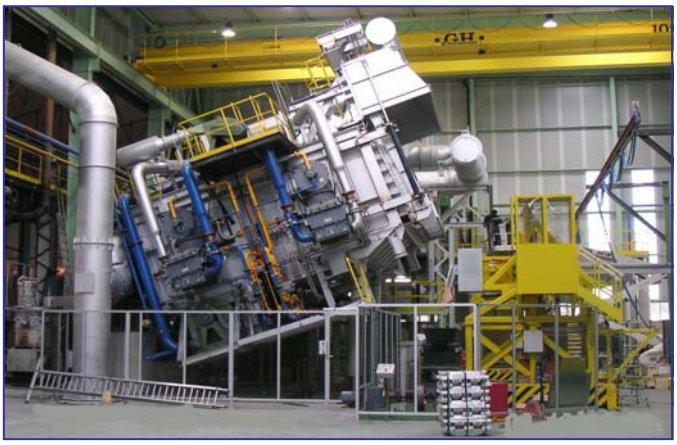
Charging well and Poring spout axis can be lined with the tilting axis. This innovate design allows the charging well and pouring spout rotate about tilting axis, and so designed for simultaneous and continuous receiving and pouring of the molten metal on demand.

Detail of main doors with dry pre-cast shape frames

REVERBERATORY FRLB
Aluminium Melting & Holding

insertec
Furnaces & Refractories

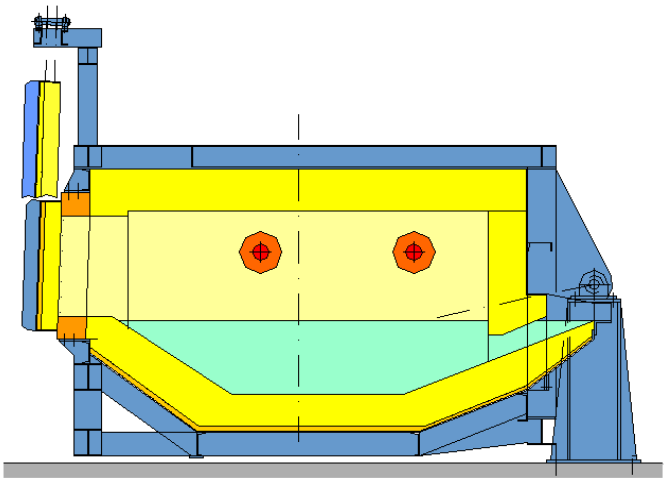
View of a tilted furnace with the door opened



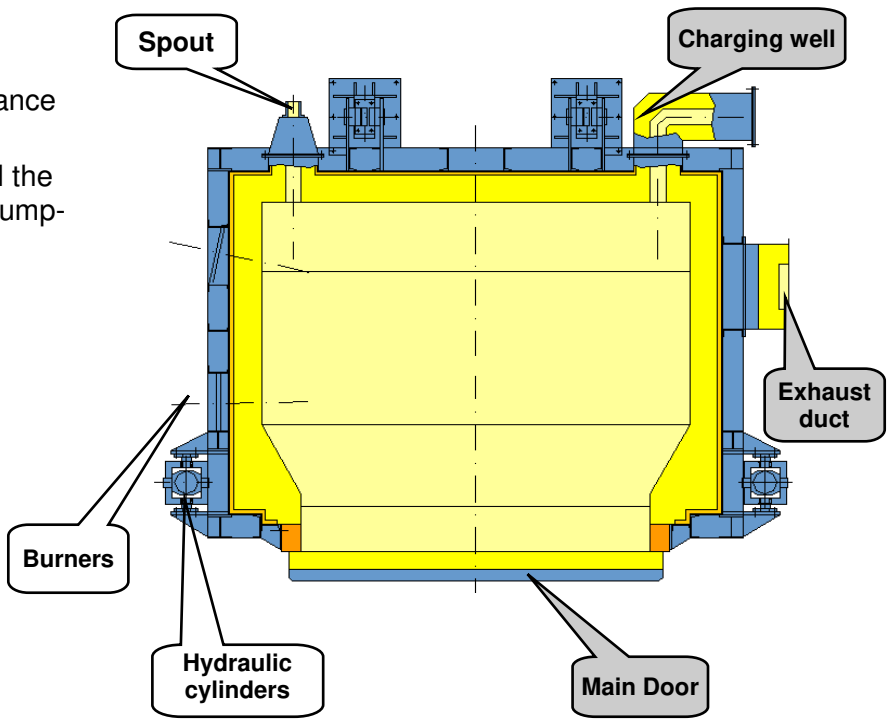
Tilting reverberatory furnace with regenerative burners

Options:

- **Stationary reverberatory furnaces** are also available
- **Combustion System** with high velocity nozzle-mix burners, regenerative or oxi-gas burners
- **Furnaces pressure control system**, through and actuated valve on fumes exhaust
- **Dry-hearth** for melting big solid materials without molten bath contact
- **Electromagnetic stirring system** of molten metal by a flat coil, for metal homogenization or alloy
- **Degassing system** of molten metal by means of porous plugs or lances
- **Auxiliary ports** for additives or maintenance doors
- **SCADA monitoring systems** for control the Furnace and register and managing consumptions and production data



Detail of the pouring spout aligned with the tilting axis and rotary exhaust exit



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ALUSWIRLER®
Melting Chips Process

insertec
Furnaces & Refractories

ALUSWIRLER Chips – En

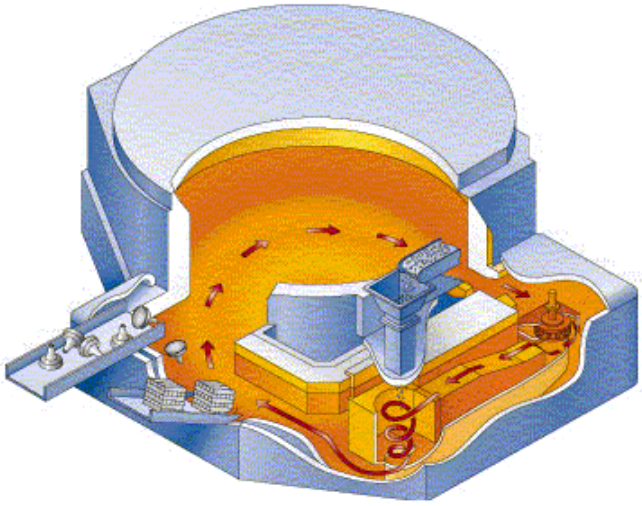
The **ALUSWIRLER®** system is designed for continuous melting of aluminium chips, by submersion in a hot molten metal vortex.

The **ALUSWIRLER®** is the hearth of the system. The aluminium chips are melted because their submersion into the liquid metal and the quick heat transfer from the hot molten metal. The vortex is generated by a mechanical pump electrically driven.

The **ALUSWIRLER®** chamber is a side well attached to the main furnace chamber, linked by communication channels, which direct the flow of molten metal generated by the mechanical pump.

The impeller, its housing and the vortex chamber are ceramic pre-cast shapes, easily replaceable. They are located into the refractory living of the side well, becoming so the **ALUSWIRLER®** chamber.

The impeller rotation produces a high flow of molten metal, that downwards becomes a vortex of hot liquid metal, point where the pretreated and dried aluminium chips are charged for its melting, being submerged nearly instantaneously. The melting process is so quick that all the chips are melted before they can reach the main chamber of the furnace.



Schematic drawing of recirculating effect through the sink vortex and open well

Features of the **ALUSWIRLER®** system:

- High metal recovery
- Low specific energy consumption
- Continuous melting in molten metal
- Applied sink vortex technology
- Low residence time
- Indirect heating
- Molten metal temperature uniformity
- Not salts required

Chips dosing to the ALUSWIRLER

ALUSWIRLER®
Melting Chips Process

insertec
Furnaces & Refractories

Chips pretreatment:

The treatment in continuous of the chips previous to the melting process requires:

1. Skip elevator of chips baskets
2. Rotary Shredder, to obtain uniform chips size between 10-30 mm
3. Centrifugal Separator, to minimize lubricants and water content, up to 3-5%,
4. Magnetic Separator, to eliminate the ferrous parts accompanying the chips
5. Buffer Hopper of treated chips, previous the drying and melting process
6. Related belt and screw conveyors, between the different components, with variable adjusted speed
7. Rotary Drier, for complete evaporation of lubricants and water, supplying hot chips ready to be melted.

Rotary Drying Furnace 1000 kg/hr

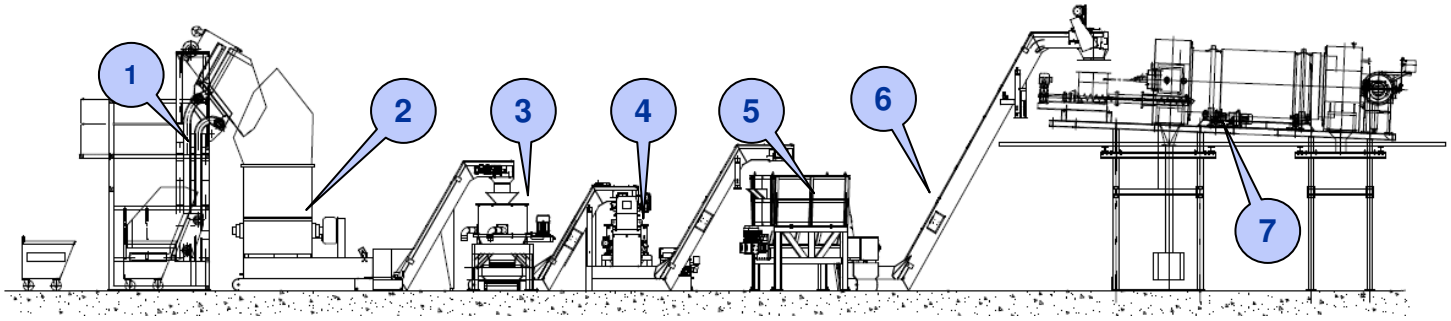
In-house Chips Recycling in the Foundry, mean to the processing plants

- Avoid the storage of chips for resale
- Additional melting capacity
- Improvement of the Environmental issues
- Compact installation and quick pay-back

Shredder and centrifuge

Magnetic Separator, Buffer Hoper and Drier

Typical Chips pre-treatment and drying Line



Basket / Elevator / Shredder / Centrifuge / Separator / Buffer Hopper Rotary Drier

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HIRARO® Furnace
Sidewell with stirring

insertec Furnaces & Refractories

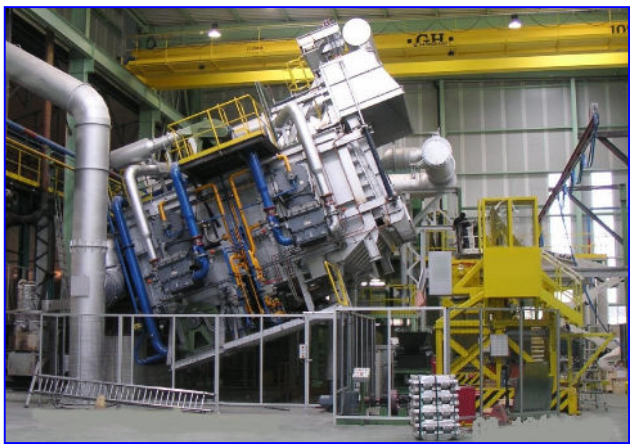
Hiraro Furnace - En

HIRARO® Furnaces are the most advanced melting & alloying reverb melting facilities for aluminium recycling, compared to the conventional Stationary and Round Top-load Melt Furnace.

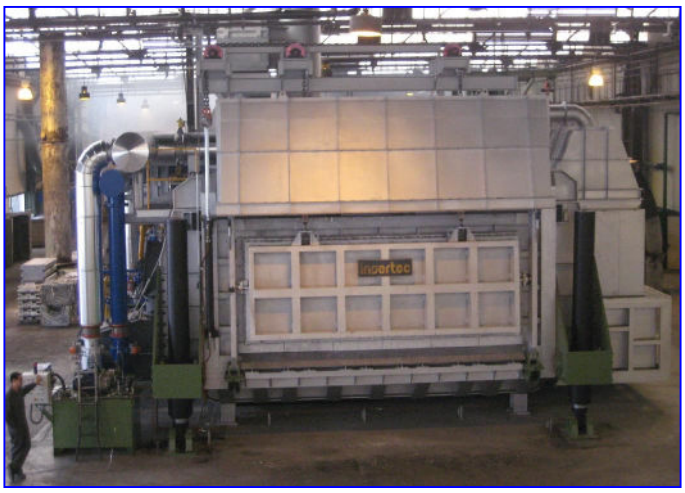
They count with an open sidewell chamber and the ALUSWIRLER® mechanical pump and stirring system, which:

- creates a sink-vortex of hot molten aluminium for melting light scraps
- creates a flow of molten metal through the open well for melting heavy scraps
- stirrs all the molten metal bath, improving the alloying effect, metal homogenity and temperature uniformity

35 Mton Stationary Sidewell melter



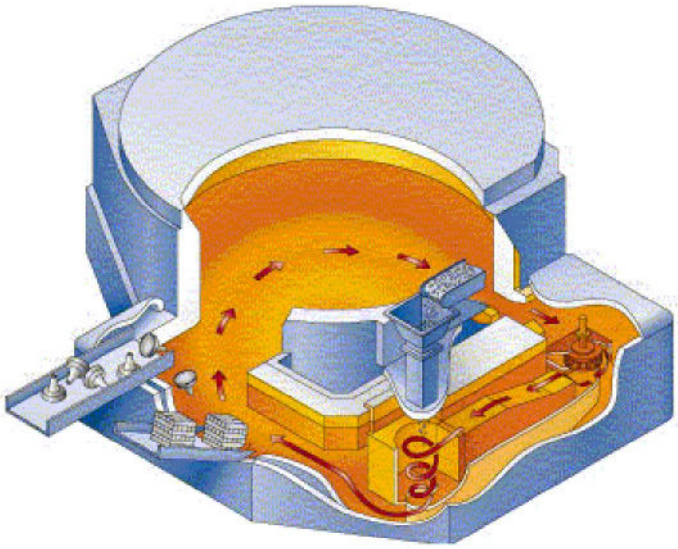
25 Mton Tilting Sidewell melter



60 Mton HIRARO Furnace general front view

According to Customer requests and process needs they can be equipped with:

- Stationary or Tilting designs
- Conventional, Regenerative or Oxy/Fuel burners
- Dry-hearths for sows or ingot bundles melting
- Wide range of holding capacities and combined melting rates



Schematic drawing of recirculating effect through the sink vortex and open well

HIRARO® Furnace
Sidewell with stirring

insertec
Furnaces & Refractories

Stirring effects:

The pumping of hot molten metal by the ALUSWIRLER® system not only creates a sink vortex able to melt lights scraps, like turnings, chips or UBC, or heavy scraps in the open well, like profiles, fragmented parts, etc, but also stirs all the furnace molten metal bath, and so:

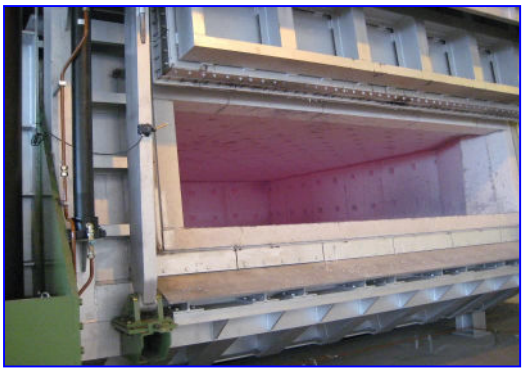
- Uniform composition of the melt
- Uniform temperature distribution
- Enhance alloying effect of Si, Mg, Sr, Ti, ...
- Reduce fuel consumption
- Reduce dross generation

Stationary HIRARO Furnace
70 ton capacity & 8 ton/hr melting rate

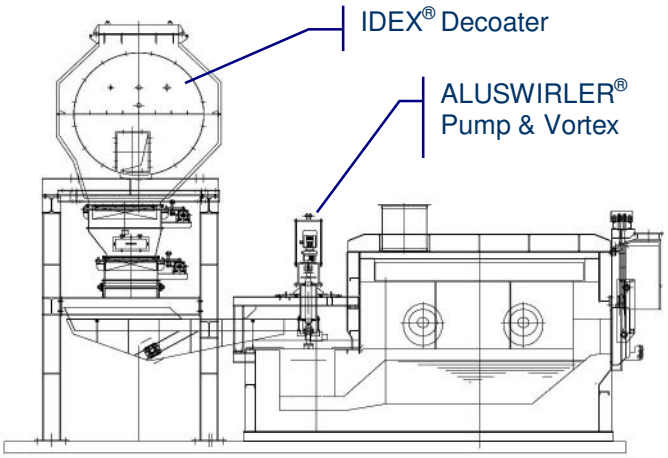
Sink vortex of
hot molten metal

Ingot bundles or sows
melting in the dry hearth

Overall view of the sidewell chamber &
ALUSWIRLER® stirrimg system



Main Door with SIFCA precast frame



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IDEX® System
Chips Dryer & Afterburner

insertec
Furnaces & Refractories

IDEX Chips Dryer – En

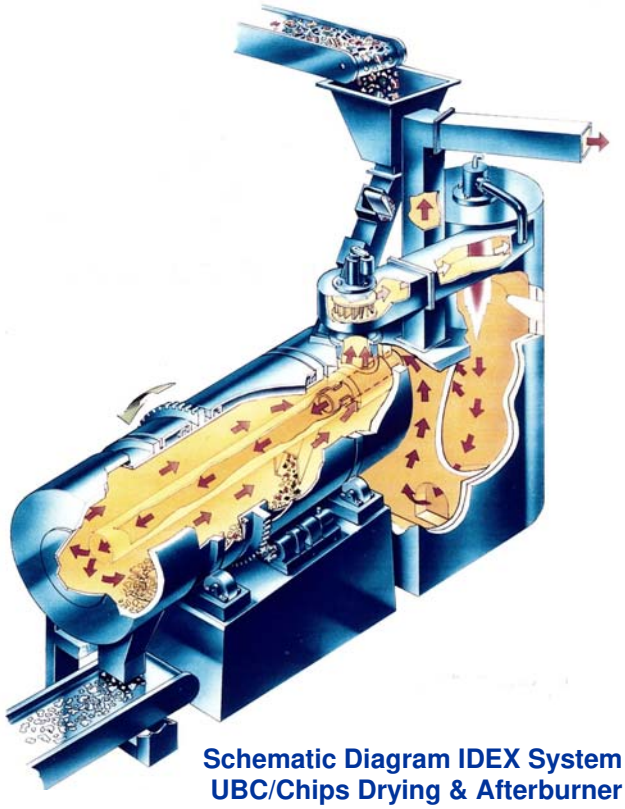
IDEX® System Improved Metal Recovery

Continuous process from 500 kg/hr to 15 ton/hr rates, which complies with emission standards.

The **IDEX®** system is an indirectly fired rotary kiln thermal delacquering/drying system that removes organic materials such as water coolants, paints, oils from the surface of aluminium.
There are two main process elements:

- The first is the rotary drum where the scrap material is heated to remove the organic coatings by a process of volatilization.
- The second is the afterburner chamber in which the liberated organics release their potential energy by controlled incineration. This offsets the energy supplied by the burner and makes the system efficient.

IDEX® system includes a Rotary Kiln and an Afterburner, completed with cyclones, exhaust fans, safety and control systems



Schematic Diagram IDEX System UBC/Chips Drying & Afterburner

Benefits of IDEX® System

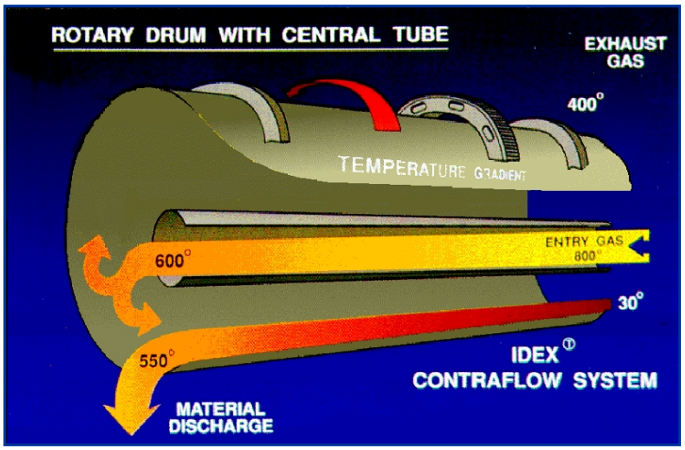
- High efficiency and metal yield
- Increase plant safety, no water
- Reduces dross formation in melting furnace
- Reduce emissions, waste gas controls
- Reduce salt/flux usage on melting
- Increase melting rate

IDEX-3000 for UBC/Chips Drying process

Advantages IDEX® System

- *Indirect fired heat* —
  - No fires in the Kiln, No water spray.
- *Low temperatures* —
  - Low metal losses.
- *No refractory in Rotary Kiln* —
  - Low maintenance.
- *Recirculation & Counter flow* —
  - High efficiency Operation.
- *Central Inner Tube* —
  - Convection & Radiation effect.
- *Compact design* —
  - entry & exit ductwork at charge end.
- *Stable control temperature* —
  - Best Quality drying.
- *Widest range of materials* —
  - Proven ability to process.
- *Vertical Afterburner* —
  - Long residence time, low emissions.
- *Dust/dirt removed in cyclone* —
  - not dust carried into furnace.

IDEX® System — Main Features
Rotary Kiln & Afterburner



IDEX® System with Rotary Drum & Central Tube for recirculation of hot gases

IDEX-1000 with Vertical Afterburner Chamber

Kiln Discharge End Temperature
The temperature at the kiln discharge is controlled to ensure a well cleaned final product. The IDEX® tube, acts as a heat exchanger giving up heat to the chips and kiln exit gases by radiation. The Gases enter the IDEX® tube at afterburner temperature and by the time they reach the end have cooled, used to control the temperature at the discharge end of the kiln.

Kiln Speed
The kiln rotational speed is adjusted by the kiln drive motor. Each material has an ideal residence time within the kiln barrel.

Kiln Pressure Control
The IDEX® Dryer kiln is pressure controlled to ensure that process gases remain within the system and that the infiltration of air into the drum is kept to a minimum. This pressure control gives excellent results and you can adjust the process parameters to the level of VOC.

Afterburner Temperature
It is required to ensure that emissions are minimized. The temperature in the afterburner is controlled via the gas fired burner system. As the VOC's are liberated within the kiln they pass through to the afterburner where they are incinerated. This will cause the burner system to turn down as the VOC's are used to provide additional heat for the combustion process.
The residence time inside the afterburner chamber at temperature will effect the destruction efficiency of VOC's and Dioxins.

Cyclone, Recirculation Fan and Vent Valve
A high efficiency cyclone unit is employed to remove any particulate from the kiln prior to the recirculation fan and afterburner. A double air lock discharge particulate into the discharge bin on automatic operation. The recirculation fan provides the required gas flow from the Afterburner. The fan is fitted with a variable speed drive unit, and the speed of the fan is modulated automatically to maintain the kiln gas exit temperature at the selected control set point.

Aluminium Chips — Input Technical Specification

- *Type of material to process* —
  Aluminium machining chips
- *Production rate* —
  Several models from 500 to 5000 kg/hr
- *Quality of Aluminium Chips* —
  Fresh and pretreated chips as well as:
  - Shredded, size between 10 to 30 mm
  - Centrifuged, <3,5% coolants
  - Tramp (sand/dust,…) <1%
  - Magnetic separated.

ALUMINIUM Foundry
Furnaces & Refractories

insertec
Furnaces & Refractories

Aluminium Foundry - En

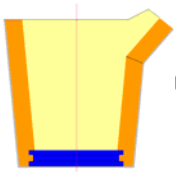
INSERTEC design and manufacture a wide range of Furnaces and Refractories for Aluminium Foundry Industry, on a turn-key basis.

Tilting MELTOWER®

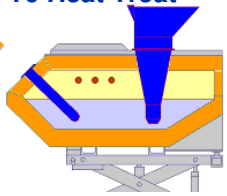
Combination MELTOWER®

IMAE Ladle Holding

Continuous T6 Heat Treat



Ladles



Dosing Fc.

FOUNDRY APPLICATIONS

- Melting and Holding
- Heat Treatment

INDUSTRAL SECTOR

- High Pressure Die Casting
- Low Pressure Die Casting
- Gravity in Permanent Mold & Sand

FURNACES Type & Process

TOWER Type Furnaces

- **MELTOWER®** Central melting unit
- **MELHOLDER®** for each DC cell
- **IN-LINE Process** for melting & molten treatment in continuous
- **ALUSWIRLER®** Sink Vortex
- **Combination MELTOWER®** for Ingots, returns & In-house Chips
- **ALUMAP®** Heated Launder systems

HOLDING & DOSING Furnaces

RMAE & IMAE Ladle Holding unit

- Immersion heater tubes
- Radiant roof electrical resistances

Ancilliary

- Charging equipments
- Transport Ladles
- Gas & Electrical Preheaters

REFRACTORY Lining

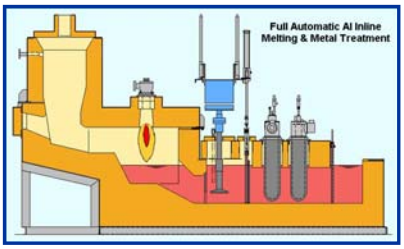
- Tower Melters
- Holders & Dosing
- Ladles
- Launders

Precast Shapes

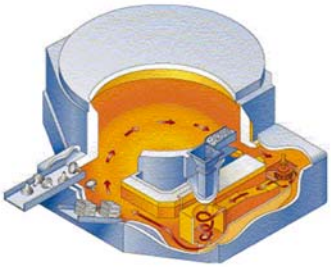
- **SIFCA®** Impact plates
- **SIFCA®** Door frames
- Special Pieces

Stationary MELTOWER®

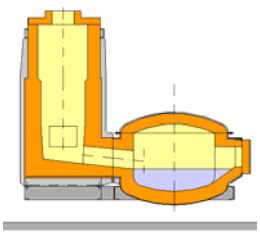
MELHOLDER®



IN-LINE Process



ALUSWIRLER® Process



Meltower Linings

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MELTOWER®
Tilting Tower FADB

insertec
Furnaces & Refractories

Meltower FADB - En

MELTOWER® Melting Furnace designed for ingots and in house foundry returns, used as central bulk melting furnace where a continuous production of liquid aluminium is required.

Process Description

Charge Preheating. A skip charge elevator lifts the materials up to the point of entry at the top of the tower. The materials are then preheated by transfer of energy from the exhaust gas. After preheating the materials, descend in the tower for melting on an inclined dry hearth.

Melting Burners are positioned adjacent to the dry hearth and melt by direct flame impingement philosophy Then, the metal drains by gravity from the inclined dry-hearth into the holding chamber. An additional proprietary dry hearth Burner avoids unmelted metal remaining on the hearth whilst enhancing molten metal fluidity during transfer to the holding chamber

Metal Losses. Our proven combustion combined with direct flame impingement philosophy will melt metal on demand and with the very minimum of oxidation. The short exposure of the materials to high temperatures, results in a high

Tilting MELTOWER

2 ton/hr Tilting Meltower General view

A single burner maintains temperature uniformity at all times in the **holding chamber** during melting and holding

All the products of combustion are exhausted through the tower to maximize the thermal efficiency.

A **molten metal level sensor** in the holding chamber provides security for the operator

There is a **charge level sensor** is provided in the preheating tower, to ensure full preheating capability and initiating the automatic charging. The temperature of the waste gas is monitored and used to control the melting burners

Material **charging equipment** is designed to suit the physical nature of the charge materials, access and ease for charging and the foundry layout of the melting furnace.

A visual display of measured temperatures and control parameters is provided including the temperatures of the molten metal, exhaust gas and holding chamber atmosphere.

MELTOWER®
Tilting Tower FADB

insertec
Furnaces & Refractories

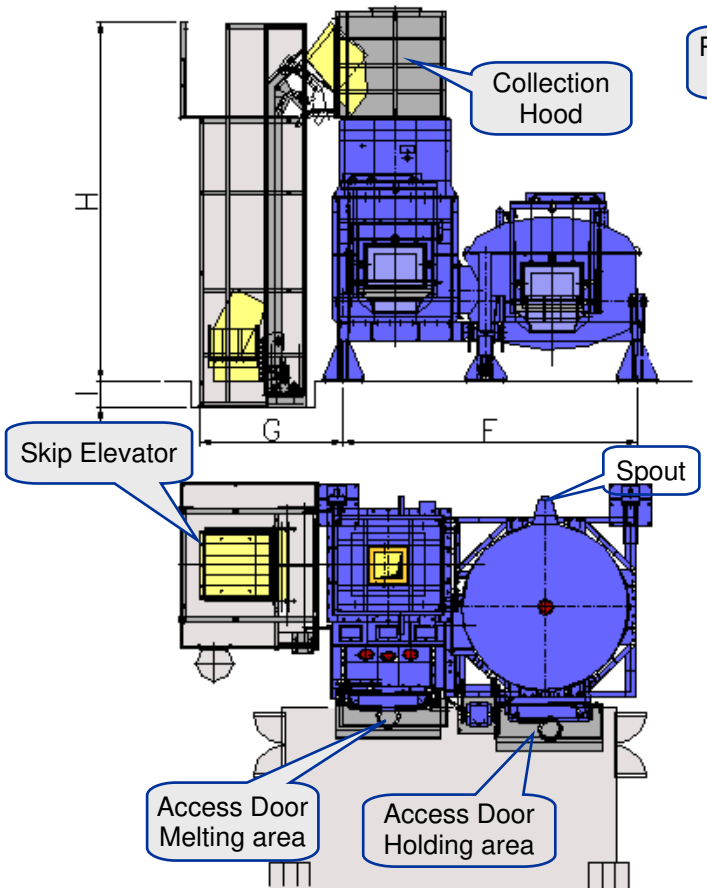
Features:

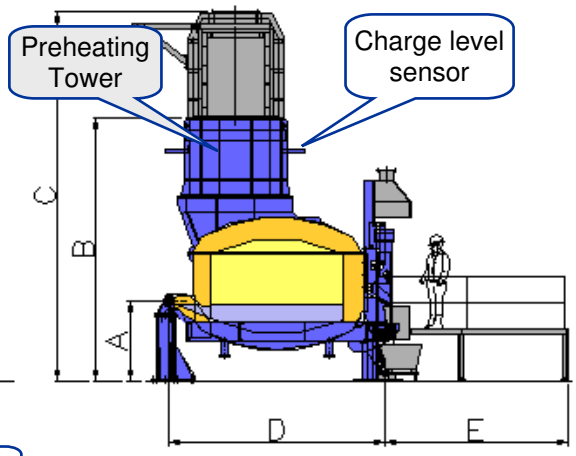
- Excellent thermal efficiency.
- High metal recovery.
- Clear and unobstructed access to chambers, for maintenance and ease of cleaning and inspection.
- Independent temperature regulation for the melting and holding chambers.
- Automatic bath level monitoring.
- Material charge level detection by photocell sensor.
- Automatic skip elevator charging system
- Lip axis pour.

MELTOWER furnace is distinguished from other designs available in the market in:

- its holding chamber of circular section,
- excellent mechanical rigidity with independent frame support,
- durability of refractory lining, easy access for cleaning and minimum space.

That joined to the long experience achieved by **INSERTEC** in the use of non-wetting castables allow to design and build with guarantee this kind of holding chambers.





Tilting MELTOWER® Furnace		
Standard Models	**Melting Rate**	**Holding Capacity**
FADB - 1 - 1600	1000 kg/hr	1600 kg
FADB - 1,5 - 2400	1500 kg/hr	2400 kg
FADB - 2 - 3500	2000 kg/hr	3500 kg
FADB - 2,5 - 4000	2500 kg/hr	4000 kg
FADB - 3 - 5000	3000 kg/hr	5000 kg
FADB - 4 - 6000	4000 kg/hr	6000 kg

Tilting MELTOWER® Furnace							
Standard Models	**Dimensions (mm)**						
	A	**B**	**D**	**E**	**F**	**H**	**I**
FADB - 1 - 1600	1200	3600	3000	3000	5400	5600	500
FADB - 1,5 - 2400	1200	4600	3200	3000	5600	6600	500
FADB - 2 - 3500	1350	4700	3400	3500	5900	6700	500
FADB - 2,5 - 4000	1350	4800	3500	3500	6100	6800	500
FADB - 3 - 5000	1500	5500	3800	4000	6900	7500	500
FADB - 4 - 6000	1500	6000	4100	4000	7300	8000	500

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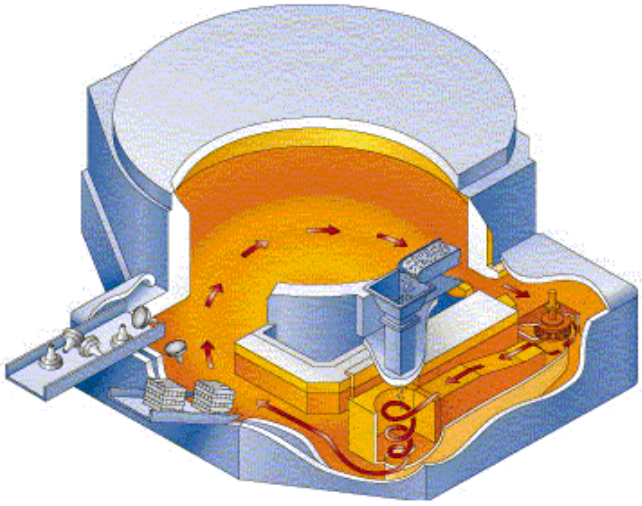

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ALUSWIRLER®
Melting Chips Process

insertec
Furnaces & Refractories

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6. Related belt and screw conveyors, between the different components, with variable adjusted speed
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Rotary Drying Furnace 1000 kg/hr

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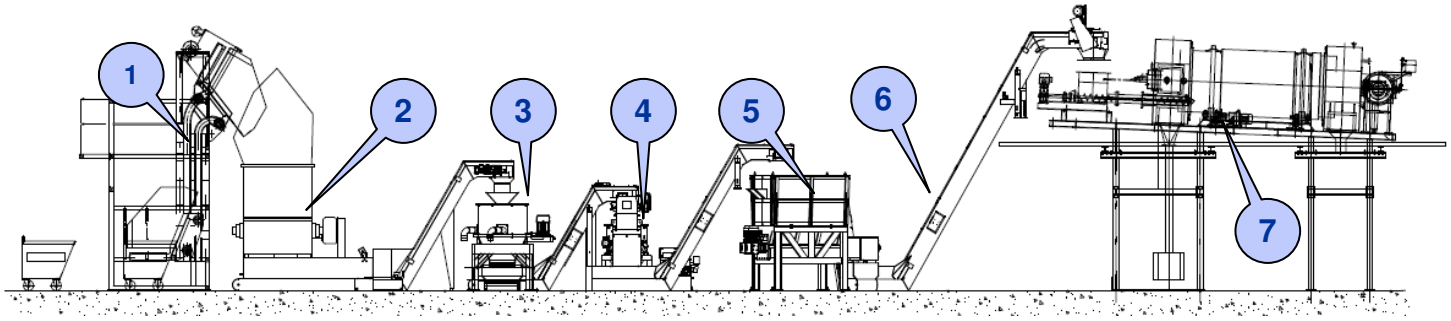
Shredder and centrifuge

Magnetic Separator, Buffer Hoper and Drier

Typical Chips pre-treatment and drying Line



Basket / Elevator / Shredder / Centrifuge / Separator / Buffer Hopper Rotary Drier

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Combination MELTOWER®
Melting Ingots & Chips

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Combination Meltower – En

The **COMBINATION MELTOWER® Furnace** has the capability to melt prealloyed ingots and foundry returns and additional continuous melting and blending with machining chips.

Both forced convection and submergence systems are employed to optimize melting efficiency and to facilitate the efficient and high metal recovery on recycling of the machining chips.

Combination MELTOWER® process will provide clean quality molten metal on demand from the casting cells and with the correct temperature uniformity and alloy composition at all times.

Includes fully automated loading systems for the charge materials.

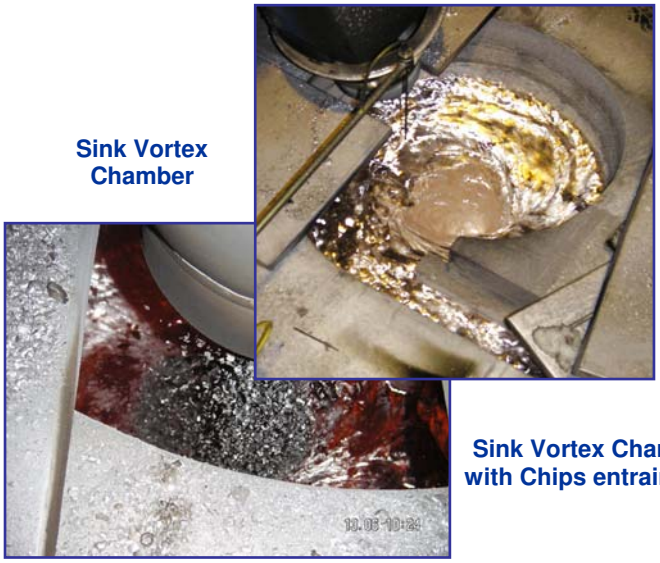
Using the proven economy of the **MELTOWER** design combines an Electro-Mechanical **ALUSWIRLER®** to provide the forced convection for improving the heat flux, accelerating melting rates and optimizing fuel efficiency.

The Molten metal recirculation also serves to provide the necessary sink vortex submergence system for processing the pre-treated machining chips.

ALUSWIRLER chamber and feed of chips

Combination MELTOWER Furnace with Skip elevator

Sink Vortex Chamber



Sink Vortex Chamber with Chips entrainment

Factors considered and justification:

- Improvements in metal quality and productivity
- Additional melting capacity
- Opportunities to reduce fixed operating costs
- In-house recycling of machining chips
- Rapid return on the investment
- Impact on foundry environment
- Compact layout High metal recovery
- Low specific energy consumption
- Continuous melting in molten metal
- Instantaneous Entrainment
- Molten metal temperature uniformity
- Flux less melting

Combination MELTOWER®
Melting Ingots & Chips

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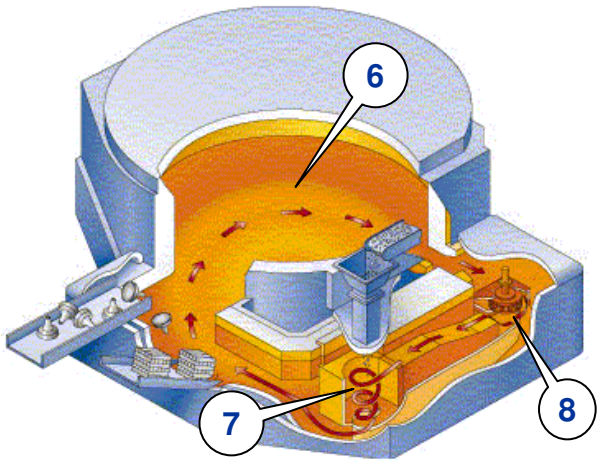
The molten metal recirculation rate is closely controlled and is synchronized with the Chips feed rate and condition of the pre-treated chips.

Alternative for recycling sprues and irony parts, like liners, metallic filters, … are available to submerge on baskets into open well downstream sink vortex.



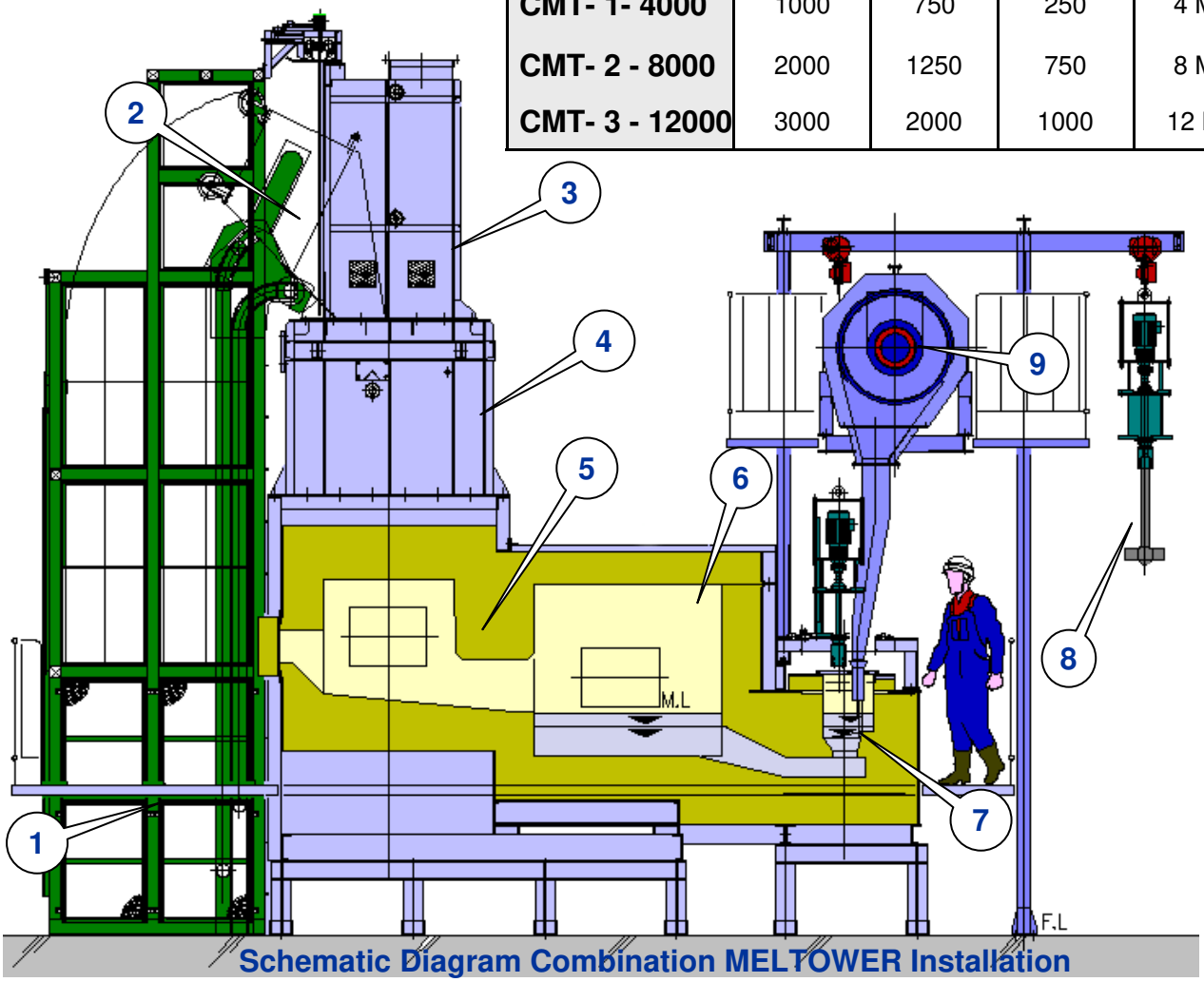
ALUSWIRLER recirculating system

Combination MELTOWER

Continuous aluminium Ingots and chips pretreated melted with the following main components:

1. Skip elevator for Ingots, returns and rejected parts on baskets
2. Basket charging on tower section
3. Collected hood for waste gases
4. Preheated Ingots tower chamber
5. Tower melting chamber
6. Holding chamber
7. Chips sink vortex chamber
8. Aluswirler pumping system
9. Chips dryer rotary kiln

Combination MELTOWER Furnace				
Standard Model	Max. Melting Rate (kg/hr)			Molten metal Capacity
	Combined	In Tower	Chips	
CMT- 1- 4000	1000	750	250	4 Mton
CMT- 2 - 8000	2000	1250	750	8 Mton
CMT- 3 - 12000	3000	2000	1000	12 Mton



Schematic Diagram Combination MELTOWER Installation

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ECO-KILN®
Chips Pretreatment

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Furnaces & Refractories

Chips ECO-Kiln – En

ECO-KILN®
Improved Metal Recovery

The success of any melting system depends on the physical characteristics and nature of the feed-stock, therefore, the integration of durable, efficient pre-treatment equipment is crucial in achieving full processing efficiency and hence, a high metal re-covery and payback in small sizes up to 300 kg/hr.

This is particularly important when recycling the machining chips, which have a high surface area per unit volume. Even small residues of water-soluble fluid will have a significant impact on metal recovery. Our many proven case references dem-onstrate that materials suitably dried, graded and without finds or ageing produce an extremely high metal recovery.

Assumed that the Aluminium chips are collected from the machining operation and centrifuged to reduce the content of the soluble water and organic residues to <5%.

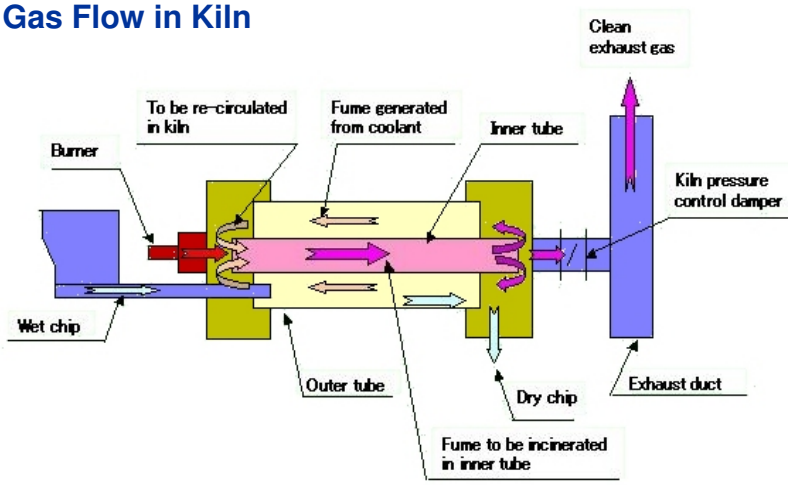
ECO-KILN® system is an option to more conven-tional pretreatment lines where the dryer incorpo-rates two (2) main components a rotary kiln and af-terburner. One burner is employed and serves both as chips dryer and fume incinerator and hence im-proves thermal efficiency. This dual function com-bined with the heat source of the combustible cool-ant results in extremely low specific energy con-sumption.

An additional safety benefit of the **ECO-KILN®** is the avoidance of the hermit reaction on drying from short run of ductwork. The short routing of the duct-work work from the kiln to the stack also reduces improves radiation losses.

Fume is reduced and it is not necessary collect fumes in the sink vortex melting area.

All waste gases are discharged directly via a vertical stack chimney.

ECO-KILN® Chip Rotary Dryer
Gas Flow in Kiln



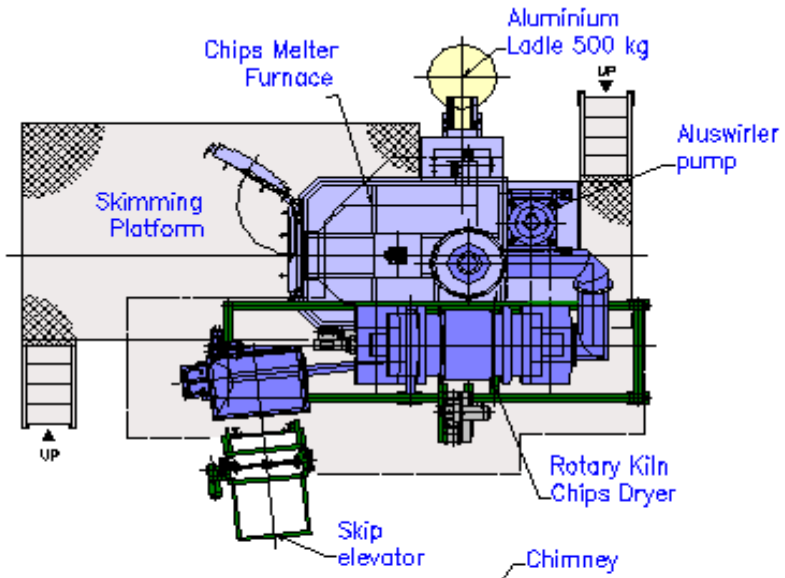
ECO-KILN® Chip Dryer
Concept and Controls

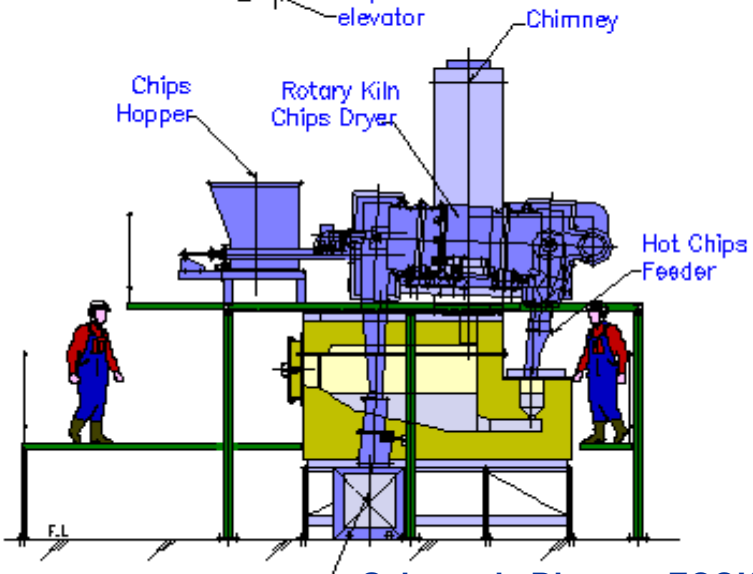
Gas fired Rotary Kiln assembly incorporates a central tube inlet chamber which houses the gas burner and uses indirect heating to dry the centrifuged chips. The chips enter the kiln in the annulus between the inner tube and outer tubes and are dried by radiation as they pass through the kiln. If the temperature rises abnormally high, cooling air from the combustion air fan will automatically cool the inside of the kiln.

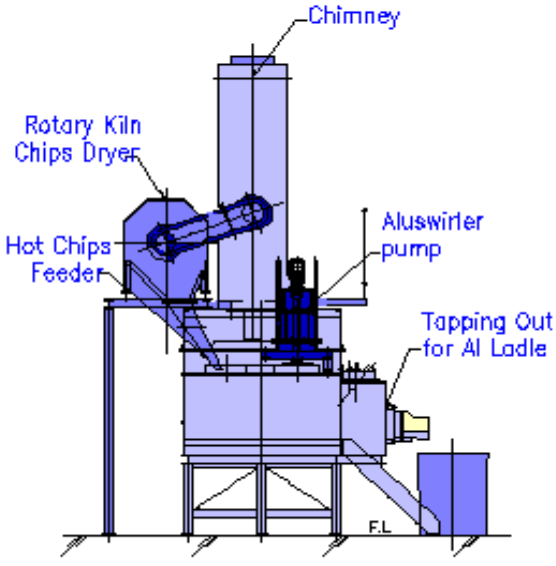
Any fume developed is sucked into the inner tube by the momentum of the burner flame and is fully incinerated as it recirculates between the inner and outer tubes. To accomplish this incineration the inside of the kiln is maintained at a slight negative pressure. To control the CO emissions the inner tube houses an advanced stabilizer device.

The Temperature control is will be High/Low with the operating temperature parameter fixed during commissioning and to suit the optimum condition and the nature of the chip material.

Temperature control is High/Low controlled and the following combustion device is provided. Low pressure nozzle mix gas fired burner, with Air butterfly valve, Air/fuel ratio regulating and fuel needle valves.







Schematic Diagram ECOKILN & ALUSWIRLER
Chips Pretreatment & Melting Installation

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IDEX® System
Chips Dryer & Afterburner

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IDEX Chips Dryer – En

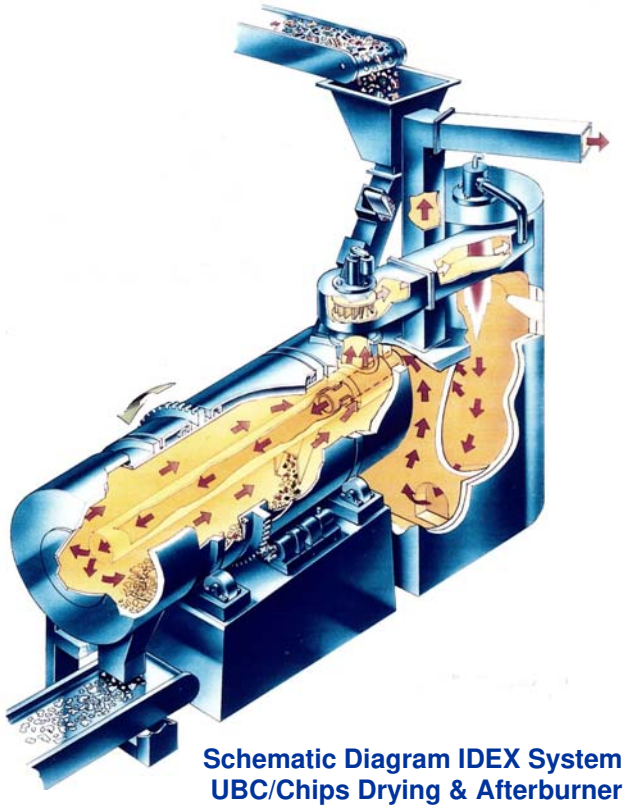
IDEX® System Improved Metal Recovery

Continuous process from 500 kg/hr to 15 ton/hr rates, which complies with emission standards.

The **IDEX®** system is an indirectly fired rotary kiln thermal delacquering/drying system that removes organic materials such as water coolants, paints, oils from the surface of aluminium.
There are two main process elements:

- The first is the rotary drum where the scrap material is heated to remove the organic coatings by a process of volatilization.
- The second is the afterburner chamber in which the liberated organics release their potential energy by controlled incineration. This offsets the energy supplied by the burner and makes the system efficient.

IDEX® system includes a Rotary Kiln and an Afterburner, completed with cyclones, exhaust fans, safety and control systems



Schematic Diagram IDEX System UBC/Chips Drying & Afterburner

Benefits of IDEX® System

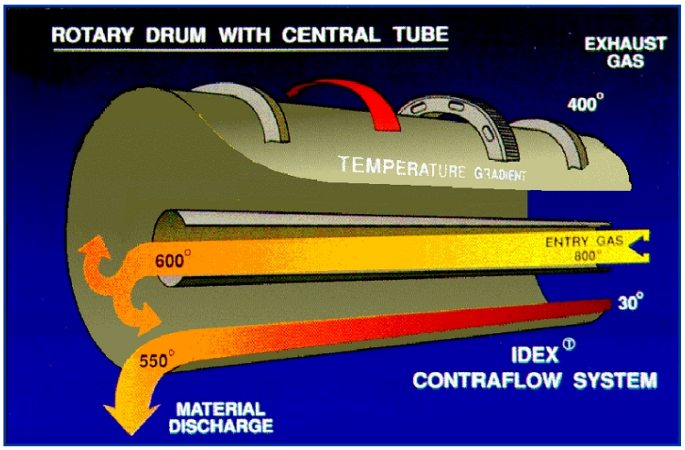
- High efficiency and metal yield
- Increase plant safety, no water
- Reduces dross formation in melting furnace
- Reduce emissions, waste gas controls
- Reduce salt/flux usage on melting
- Increase melting rate

IDEX-3000 for UBC/Chips Drying process

Advantages IDEX® System

- *Indirect fired heat* —
  - No fires in the Kiln, No water spray.
- *Low temperatures* —
  - Low metal losses.
- *No refractory in Rotary Kiln* —
  - Low maintenance.
- *Recirculation & Counter flow* —
  - High efficiency Operation.
- *Central Inner Tube* —
  - Convection & Radiation effect.
- *Compact design* —
  - entry & exit ductwork at charge end.
- *Stable control temperature* —
  - Best Quality drying.
- *Widest range of materials* —
  - Proven ability to process.
- *Vertical Afterburner* —
  - Long residence time, low emissions.
- *Dust/dirt removed in cyclone* —
  - not dust carried into furnace.

IDEX® System — Main Features
Rotary Kiln & Afterburner



IDEX® System with Rotary Drum & Central Tube for recirculation of hot gases

IDEX-1000 with Vertical Afterburner Chamber

Kiln Discharge End Temperature
The temperature at the kiln discharge is controlled to ensure a well cleaned final product. The IDEX® tube, acts as a heat exchanger giving up heat to the chips and kiln exit gases by radiation. The Gases enter the IDEX® tube at afterburner temperature and by the time they reach the end have cooled, used to control the temperature at the discharge end of the kiln.

Kiln Speed
The kiln rotational speed is adjusted by the kiln drive motor. Each material has an ideal residence time within the kiln barrel.

Kiln Pressure Control
The IDEX® Dryer kiln is pressure controlled to ensure that process gases remain within the system and that the infiltration of air into the drum is kept to a minimum. This pressure control gives excellent results and you can adjust the process parameters to the level of VOC.

Afterburner Temperature
It is required to ensure that emissions are minimized. The temperature in the afterburner is controlled via the gas fired burner system. As the VOC's are liberated within the kiln they pass through to the afterburner where they are incinerated. This will cause the burner system to turn down as the VOC's are used to provide additional heat for the combustion process.
The residence time inside the afterburner chamber at temperature will effect the destruction efficiency of VOC's and Dioxins.

Cyclone, Recirculation Fan and Vent Valve
A high efficiency cyclone unit is employed to remove any particulate from the kiln prior to the recirculation fan and afterburner. A double air lock discharge particulate into the discharge bin on automatic operation. The recirculation fan provides the required gas flow from the Afterburner. The fan is fitted with a variable speed drive unit, and the speed of the fan is modulated automatically to maintain the kiln gas exit temperature at the selected control set point.

Aluminium Chips — Input Technical Specification

- *Type of material to process* —
  Aluminium machining chips
- *Production rate* —
  Several models from 500 to 5000 kg/hr
- *Quality of Aluminium Chips* —
  Fresh and pretreated chips as well as:
  - Shredded, size between 10 to 30 mm
  - Centrifuged, <3,5% coolants
  - Tramp (sand/dust,…) <1%
  - Magnetic separated.

MELHOLDER® InLine MELTING & TREATMENT

insertec Furnaces & Refractories

MELHOLDER InLine - En

MELHOLDER® InLine Furnace is based on the proven Meltower technology for continuous aluminium melting & holding process, designed for gravity and low pressure die casting application, which requires:

- High Metal quality
- Save Energy with lower cost process
- High Productivity
- Environmental installation
- Safety for operators

MELHOLDER® InLine Process

Specially applied for gravity and low pressure die casting, including molten metal treatment:

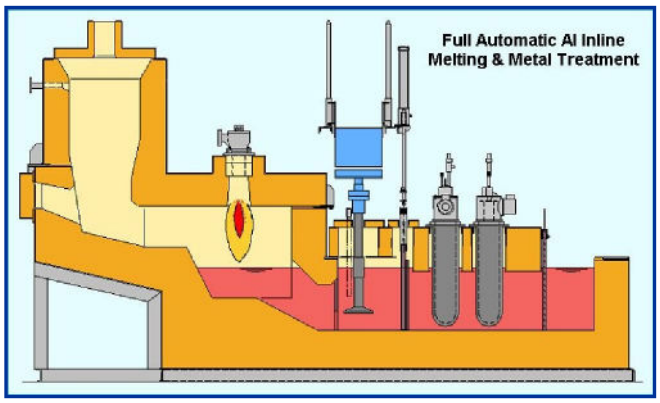
- Purifying system can be fitted for degassing, filtering removing non metallic inclusions
- Temperature accurancy by reheating with immersion submerges tubes.
- Open-Well type configurations are available for ladling sizes.
- Alternative fuels such as Ligth oil, LPG or natural gas can be Used.
- Alternatives up to 5 ton/hr rates

MELHOLDER® InLine 2000 kg/hr
on gravity sand mould casting line

MELHOLDER® InLine 3000 kg/hr
on gravity sand mould casting line

Advantages

- Continuous melting with molten alloy available on demand at the correct temperature and composition.
- High Thermal efficency melting on Tower technology
- Low oxidation Losses.
- Ease of maintenance with clear unobstructed acess to the melting and Holding chambers.
- Independent temperature control on melting, holding and open well area.
- Automatic molten metal level sensor.
- Automatic and ergonomic charger with Skip Elevator



Full automatic MELHOLDER® InLine process
Melting, Holding & Molten metal treatment

MELHOLDER® InLine MELTING & TREATMENT

insertec Furnaces & Refractories

Comparison with Traditional process

On traditional process, normally metal is tapped out from melter unit and transport into ladles or crucibles, where it is degassed before its delivery to Casting Cells.
This procedure generate:

- Uneven quality and temperature of metal
- Unsafe and hot working environment

Urgent needs for improve:

- Manpower reduction involvement in degassing and metal delivery
- Ensure quality and metal uniformity

Analysis of Traditional situation

This intermittent and non-regular way of working causes a number of problems, summarized in:

- Drop of metal temperature when poured to transport ladles (from 30º to 50ºC), which makes necessary
- Higher tapping temperatures, and so Higher energy consumption and increase of the oxides and drosses generation
- Air absorption during pouring
- Increase of the Hydrogen content
- Additional cost for transport ladle linings
- Increase of non metallic inclusions
- Degassing in done individually
- Uneven treatment depending operators
- Fork Lift transportation with unsafe environment

MELHOLDER® InLine 1000 kg/hr,
General view, melting chamber

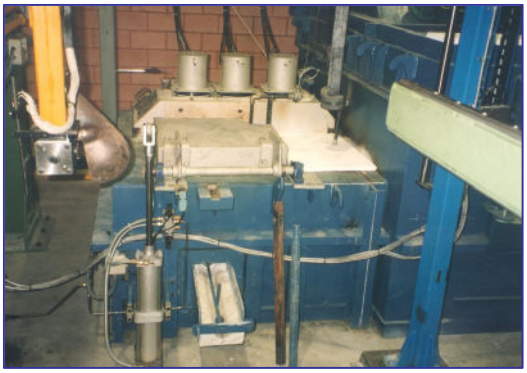
The alternative presented by INSERTEC is:

The MELHOLDER® InLine Melting and Treatment automated System

Based in furnaces for melting and metal treatment for the most exigent quality requirements, including one settlement heated chamber for metal treatment with:

- In line rotor degassing system
- Reheating by submerged tubes
- Metal filtration
- Open well for ladle dosing

The technology is made possible with a constant level control throughout all stages and chamber of the furnaces, from melting up to treatment and metal dosing.



Degassing rotor, vertical heaters
and pneumatic open well lid

Comparison Table			
Equipment	Unit	Fully Automated System	Tradicional System
Meeting, Fuel consumption	%	40	100
Metal level accurancy	mm	± 5	- -
Dosing temp. accurancy	ºC	± 3	± 15
Productivity	%	200	100
Rejects by inclusions	%	3	100

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RMAE
Electrical Holding Furnace

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Furnaces & Refractories

RMAE Holding Furnace - En

RMAE Furnaces are chamber-holding furnaces, reverberatory type, without crucible, for holding molten aluminium at required temperature and location close to the die-casting machine, heated by electrical resistances and with very low energy consumption.

The furnace incorporates a central heating chamber and two wells, one for charging molten metal and other for ladling. The heated cover houses overhead Resistance Heating element which ensure efficient transfer of heat to the molten metal and are easily replaced in the event of element failure. This cover is hinged in one side and a hydraulically but manual operated actuator enables maintenance and cleaning of the molten metal surface.

The furnace configuration and holding capacity is designed to suit both the orientation of the die-casting machine, the molten metal casting yield and the size of the dosing ladle.

The furnace also includes a drain off spout, complete with a manually driven tapping system, to facilitate emptying the furnace, for cleaning, alloy changes or emergencies.

Ladling well with T/C and level sensor

Charging hopper with pneumatic lid

RMAE Holding Furnace next to High Pressure Die casting Machine.

As molten aluminium is chemically active to refractory, non-wetting and lower porosity monolithic cast able is used in areas in contact with the molten metal .The wall between the central chamber and the molten metal charging well is a precast shape and manufactured with high strength refractory material, exhibiting excellent properties against temperature shock and with efficient heat transfer. This ensures improved temperature uniformity in the dosing well.

Heating system is provided by 6 spiral resistances, which are located in the heating chamber, cover and manufactured from Kanthal AF material wound over ceramic tubes. A module of thyristors regulates the power control.

The installed power is chosen, so it can recover temperature quickly following routine maintenance and also provides sufficient power to melt and metal solidification in the event of power failure. Insulated covers are provided to both the measurement and dosing wells to reduce thermal losses during operation and non-productive periods.

RMAE
Holding Furnace

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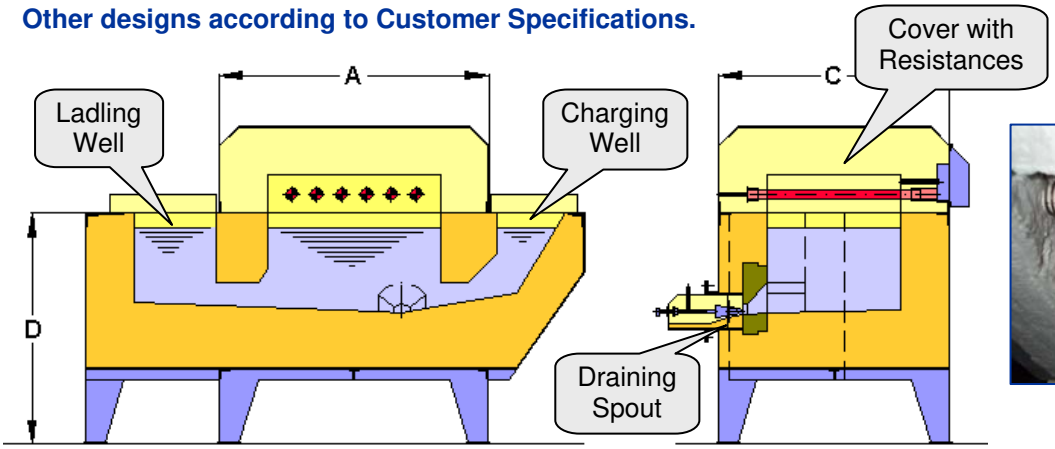
Furnaces & Refractories

Features

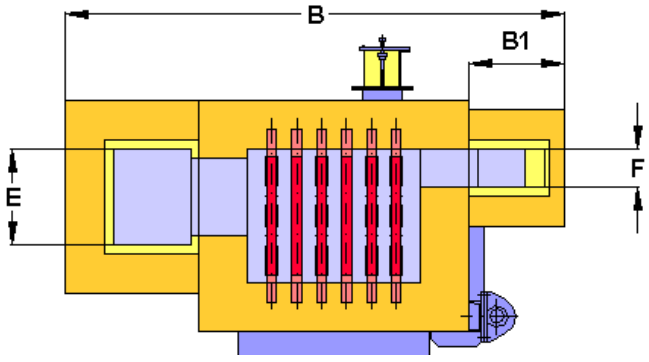
- Excellent energy efficiency, by a good selection of refractory materials and chambers design.
- Draining spout for empty the furnace for cleaning, change of alloy or emergencies.
- Heated cover pneumatically or hydraulically actuated.
- Special precast refractory plate between central chamber and dipping well, with excellent heat transfer.
- Installed power, for superheating or remelting molten aluminium in the event of a power failure.
- Accurate temperature control of molten metal, with an immersed thermocouple
- Air over temperature control in heating chamber.
- Continuous charging and dosing
- Orientation according to the requirements of the Customer Plant layout.
- Optionally the furnace can incorporate plate filtration between the heating chamber and the dosing well.
- Compact design, with small footprint.

RMAE Holding Furnaces				
Standard Models	Molten metal Capacity (kg)		Electrical Power (KW)	
	Overall	Aprox. Ladling Cap.	Installed	When Ladling
RMAE - 22 - 550	550	300	22	8,5
RMAE - 30 - 850	850	500	30	10
RMAE - 36 - 1350	1350	800	36	12

Other designs according to Customer Specifications.



Detail of Hot resistances



RMAE Holding Furnaces							
Standard Models	Basic Dimensions						
	A	B	B1	C	D	E	F
RMAE - 22 - 550	1200	2400	500	1100	900	400x 450	200x 300
RMAE - 30 - 850	1350	2600	500	1200	1100	400x 450	200x 300
RMAE - 36 - 1350	1500	2750	500	1200	1100	450x 500	200x 300

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UNDER HEATED HOLDING Furnace IMAE

insertec Furnaces & Refractories

IMAE Furnace - En

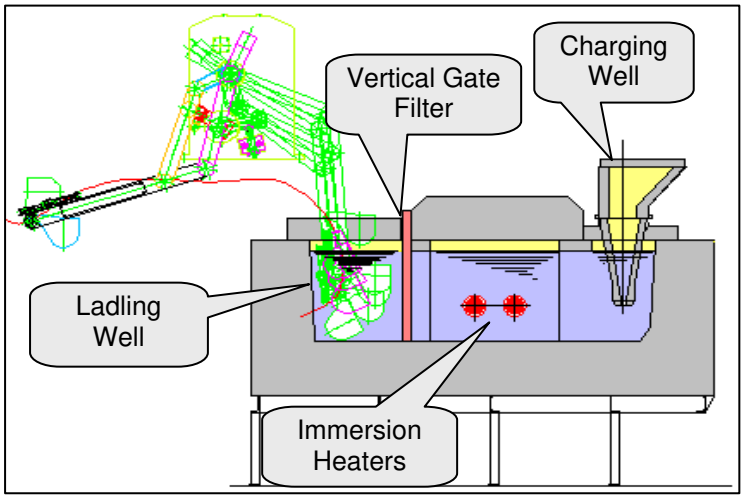
UNDER HEATED Holding Furnaces are chamber-holding furnaces, complete with electric immersion type heaters, for the application of holding and ladle dosing molten aluminium, designed for the installation at the die-casting cell. This furnace ensures the molten aluminium is at the correct temperature uniformity for the casting process and with very low energy consumption.

The furnace concept incorporates a central heating chamber positioned between the molten metal charging well, and a combined level and temperature measurement and ladle dosing well.

Heating System

Horizontally mounted electric resistance type immersion heaters are mounted in the sidewall of the heating chamber for direct and efficient transfer of heat to the molten metal. These heaters protected by fine ceramic tubes, which are extremely durable, and with a long service life. The heaters also incorporate a fail safe protection in the event of a premature failure refectory protection tube.

Well insulated cover complete optimises efficiency and whilst allowing clear and unobstructed access for maintenance and cleaning of the molten metal surface. The furnace is individually designed and based on the holding capacity orientation of the die-casting machine, production demands and the capacity of the dosing ladle.



Arrangement with ladling robot

IMAE Holding Furnace next to High Pressure casting machine.

Refractory Selection

Non-wetting monolithic castable with lower porosity materials are selected for metal contact surfaces. Special partition wall between chambers, exhibiting excellent properties against temperature shock and with efficient heat transfer to reinforces the improved temperature uniformity in the lading well.

Vertical gate Filter

Effective filtration is considered, in order to separate oxides particles from molten aluminium by one vertical gate filter located previously to ladling open well, supported vertically by manual hanging device

Tap-Out drain

Tap-out hole for drain off is considering like an option, pending customer requirements.

Ladle Open Well

UNDER HEATED HOLDING
Furnace IMAE

insertec
Furnaces & Refractories

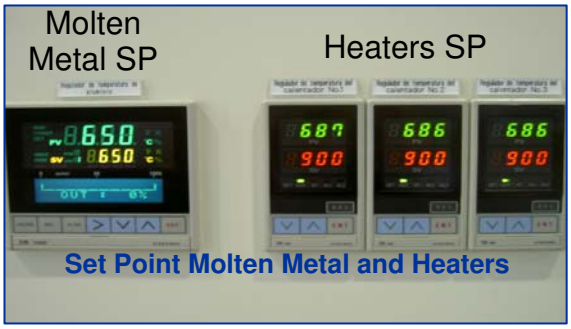
Features & Advantages

- Excellent energy efficiency, by under heating horizontal immersion tubes
- Low thermal losses by good selection of refractory materials and chamber design
- Vertical gate filter
- Tap-out drain to empty furnace for cleaning, alloy change or emergencies.
- Light isolating cover.
- Accurate temperature, uniform and homogeneity on the molten metal
- Reduce stratifications of molten metal and reduce over heating on the roof
- Minimized maintenance and skimming on the furnace
- Long life of heaters and immersion tubes
- Layout according to the requirements of the Customer Plant layout.

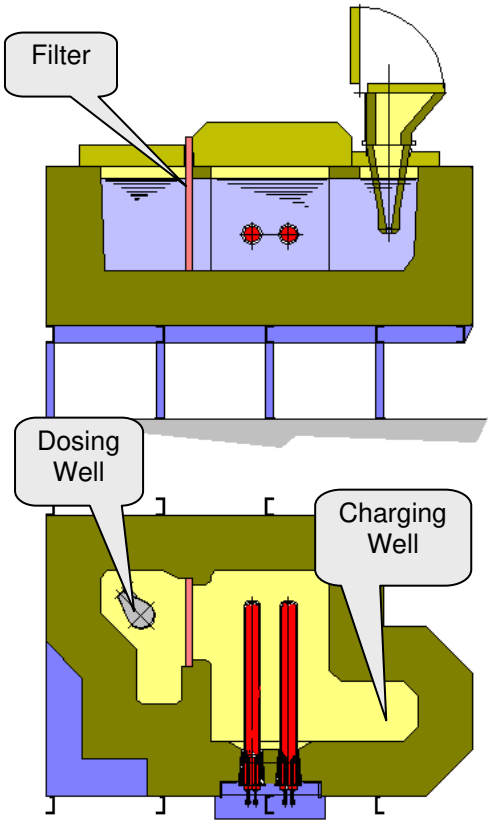
Fine ceramic Immersion Tubes

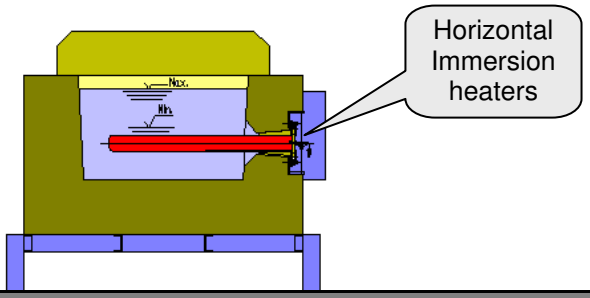
Temperature Control

Molten metal is controlled by immersion thermocouple and resistances temperatures.



Set Point Molten Metal and Heaters





IMAE Holding Furnaces

Standard Models	Basic Technical Specifications			
	Overall Holding Capacity (kg)	Useful ladling Capacity (kg)	Resistances & Power (KW)	Overall Dimensions LxWxH (m)
IMAE - 20 -1000	1000	400	2x10	2,5x1,2x1,1
IMAE - 30- 1600	1600	750	2x15	2,6x1,2x1,2
IMAE - 36 -2350	2350	1000	2x18	2,8x1,5x1,2
IMAE - 45- 3000	3000	1400	3x15	2,8x1,8x1,2

Other designs according to Customers' specifications can be studied

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T4 Aluminium Batch Heat Treatment

insertec Furnaces & Refractories

T4 Aluminium - En

Industrial Applications

T4 Aluminium Heat Treatment (Solution treatment).
Ageing is also available on request.

T4 Installation Description

Designed for batch operation this Furnace incorporates a charge loading system and combined with a horizontally sliding gate. This device is positoned at the base of the Furnace for loading and unloading operations. The charge basket support and quenching tank are mounted on a transfer bogie.
This furnace is fully automated to ensure consistancy of the components.

Rear view illustrating electric control panel and electric heating system.

Front view of Furnace illustrating the upper heating chamber and transfer bogie with load support and quench tank.

Transfer Bogie

This steel structure suitably reinforced by steel memberes and designed to support the loadings imposed by the charge and basket and quench tank This transfer bogie is electromechanically driven via a geared motor .

Main Technical Features

- Furnace type: Drop-Bottom chamber.
- Maximum working temperature: 600ºC.
- Temperature uniformity: ± 3ºC.
- Heating system: Electrical resistances.
- Electric power regulation: Phase angle tyristor.

Quench Tank

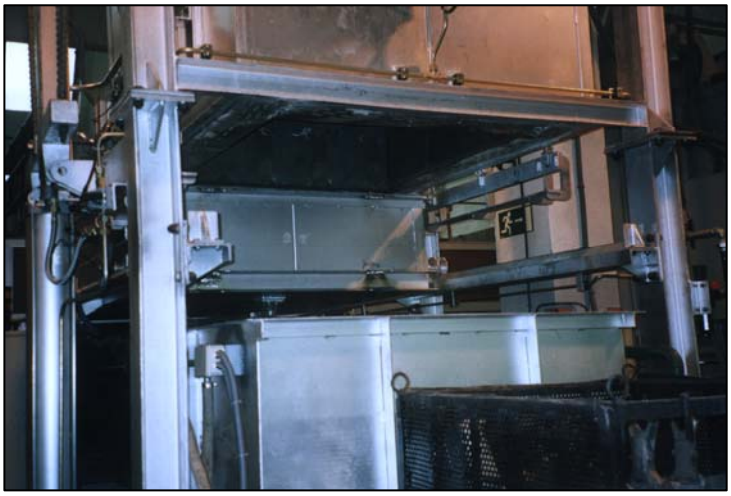
- Quench tank location:
  - Steel support structure.
  - Civil work and foundation.

- Quench fluid:
  - Water.
  - Polymer.

- Variable transfer time from heating chamber to quench tank: 6-15 seconds.

- Cooling media temperature < 38ºC.

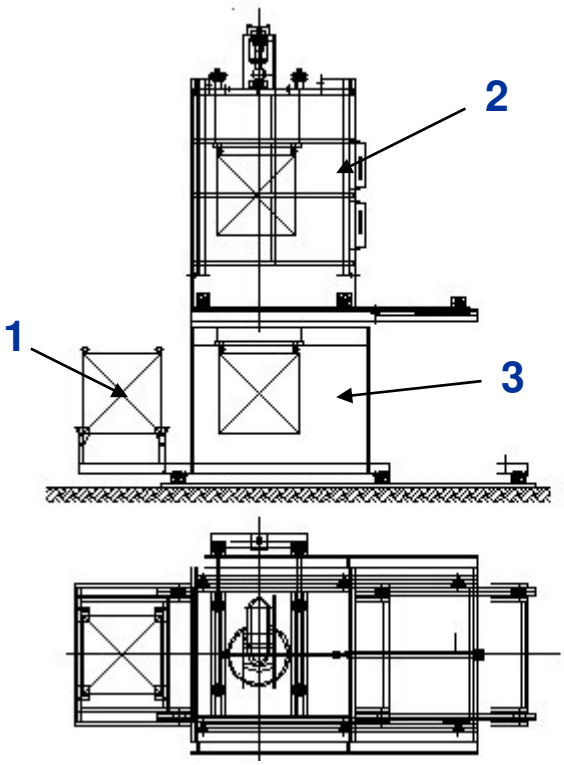
- Cooling system: recirculating pump and air-cooled heat exchanger.



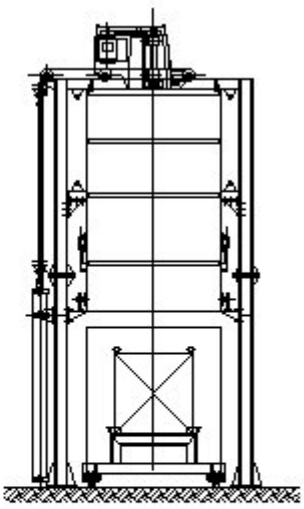
Detailed view of Furnace heating chamber with open sliding gate and quench tank .

Operation sequence :

- Loading/Unloading position.
- Transfer bogie transfers and positions the charge underneath the Furnace chamber. The charge and its basket are then winched into postion in the Furnace heating chamber.



Typical T4 Aluminium Heat Treatment layout .



On completion of the heating cycle the transfer bogie travels to position the quench tank inmediately undernearth the Furnace heating chamber, in readiness to recive the charge basket.

After the queching cycle the transfer bogie then travels to its home position.

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T6 Heat Treatment
Continuous Installation

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Furnaces & Refractories

T6 Heat Treatment - En

INSERTEC manufactures and supplies Continuous Installations for Aluminium T6 Heat Treatment, specially aimed at industrial sectors, such as:

- Automotive parts.
- Railway.
- Electric and energy.
- Marine.

Basically heat treatment installations consists of:

- Loading Table.
- Solution Furnace.
- Quenching Tank (water, etc.).
- Aging Furnace.
- Unloading Table.
- Transfer Car (Optional).
- Baskets return system (Optional).
- Cooling Chamber (Optional).

Applications:

Heat treatments of aluminium die-casting process.

Additional Options:

- Lineal or "U" type arrangement on site, provided with transfer car located between both Furnaces.
- Automatic basket positioning systems.
- Automatic load feeding devices.
- Foundry sand collecting hoppers for being recovered.
- Direct gas fired heating system by means of burners or electrical heating system by means of resistances.

General view of T6 Heat Treatment Installation based on "U" type arrangement.

General view of T6 Heat Treatment Installation based on lineal arrangement.

Process Description:

Baskets with parts to be heat treated are positioned on the loading table just in front of the Solution Furnace.

When discharge operation starts, the Solution Furnace rear door is opened and the last basket is driven out towards quenching position.

Solution Furnace rear door is closed and lifting mechanism takes the mentioned basket down to the quenching bath. After that, Solution Furnace front door is opened and a new basket is driven into the Furnace being moved all the existing baskets inside the Furnace at the same time.

Once quenching process is finished, basket is lifted up to initial position and driven just in front of Aging Furnace, waiting for permission to be loaded.

On completion of aging process, Ageing Furnace rear door is opened and the last basket is driven out towards unloading table.

Then Ageing Furnace rear door is closed, and afterwards front door is opened so as to let basket be loaded into the Furnace being moved all the existing baskets inside the Furnace at the same time.

The system is completely automatic with limit switches and position detectors for controlling basket movements along the whole process.

T6 Heat Treatment
Continuous Installations

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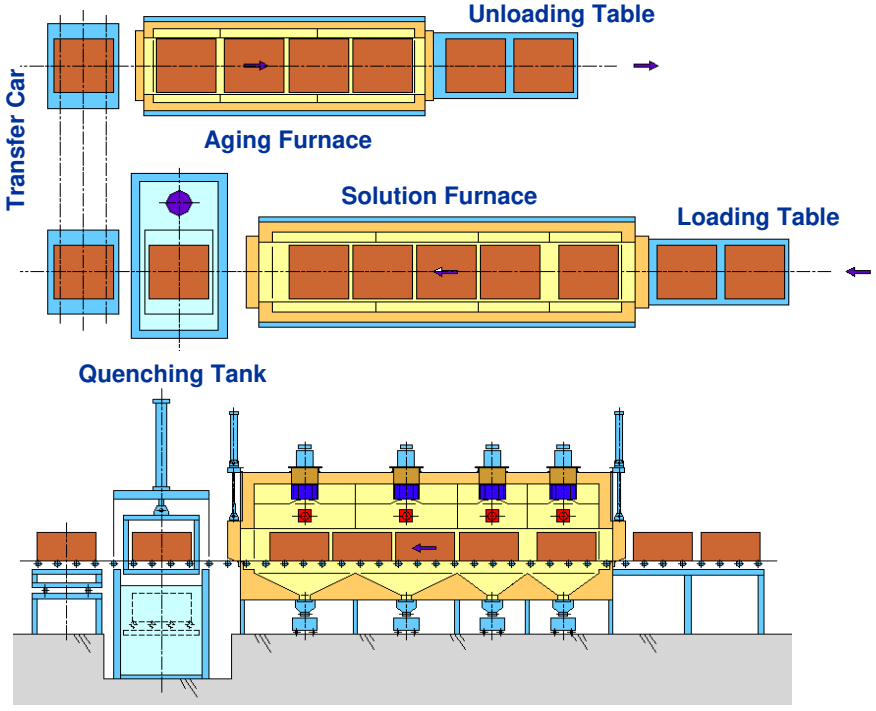
T6 Heat Treatment Installation provided with loading and unloading tables.

Solution Furnace with open front door.

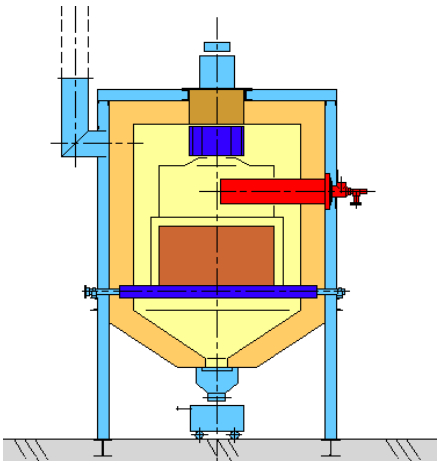
Fully automated and programmable installations depending on the required temperature-time cycle for each type of load, provided with:

- Limit switches.
- Position detectors.
- Safety alarms and interlocked operation system.

Load baskets placed on loading table.



T6 Installation lay-out based on "U" type arrangement.



Cross section view
of inner Furnace chamber
provided with sand collecting hopper.

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Heat Treatment
Industrial Furnace Division

insertec
Furnaces & Refractories

Heat Treatment - En

INSERTEC designs and manufactures a wide range of Furnaces for Heat Treatment, Forging and Heating under "Turn-key" supply conditions.

Bogie-hearth Furnace

Chamber Furnace

Pit Furnace

Vacuum Furnace

Hardening and Tempering Continuous Line

PROCESSES

- Continuous or Batch
- Open, protective or controlled atmosphere
- Temperatura range of 100ºC up to 1250ºC

INDUSTRIES

- Automotive
- Metalworking
- Aeronautics
- Energy (Wind, Hydraulic, etc.)
- Petrochemical
- Toolmaking and Fasteners
- Bearings and Gears
- Heat Treating

TREATMENTS

- Normalising
- Austenitising
- Hardening
- Tempering
- Annealing
- Stress Relieving
- Aluminium T4, T5, T6
- Carburising
- Nitriding
- Carbonitriding
- Nitrocarburising
- Welding
- Brazing
- Vacuum

AUXILIARY EQUIPMENT

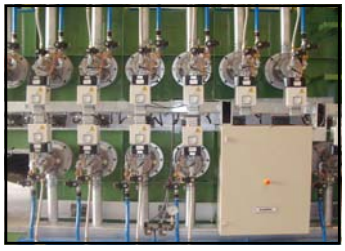
- Quenching Tanks (water, oil and polymer)
- Forced Cooling Chambers
- Charging Machine
- Load / Unload Tables
- Atmosphere Generator
- Washing Machine
- Dosing and Weighing devices
- Pieces feeding systems

Transfer Furnace

Bell Furnace

Recirculation Furnace

T6 Continuous Furnace



Upgrading of Furnaces

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Bogie-hearth Furnaces
Batch Heat Treatments

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Furnaces & Refractories

Bogie-hearth Furnaces - En

INSERTEC manufactures and supplies Bogie-hearth Furnaces for batch heat treatment, specially aimed at industrial sectors, such as:

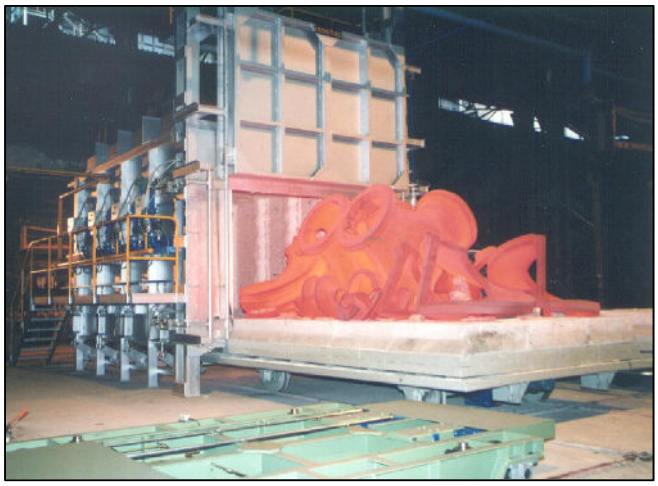
- Metalworking.
- Energy (Wind, Hydraulic, etc.).
- Petrochemical.
- Mechanical.
- Heat Treating.

and combined with our own professional Technical Assistance on site.

Bogie-hearth Furnaces can be mainly divided into the following series:

- TSCG Series are directly gas fired Furnaces.
- TSCE Series are electrically heated Furnaces.

being technically designed depending on the type of load to be heat-treated.



Bogie-hearth outside the Furnace after heating cycle.

Available Heat Treatments:

- Hardening.
- Tempering at low and high temperature.
- Annealing.
- Normalising.
- Austenitising.
- Stress relieving.
- Preheating prior to Hot Forging.

Front view of Bogie-hearth Furnace
with bogie transfer car for handling on site.

General Description:

Bogie-hearth Furnaces are usually provided with one only sliding type front door for batch loading and unloading. Door support structure is also provided with electromechanical or hydraulic driving system, being supplied by request the door tightening system in order to improve the sealing against the heating chamber frame.

Pieces to be heat-treated are charged into the Furnace by means of an electromechanically driven Bogie-hearth, which is used as self-moving Furnace floor.

These ones can be placed on the working surface of Bogie-hearth or upon the existing load supports, made of refractory concrete preshaped pieces, or heat-resistant alloy steel, in accordance with process technical requirements.

Sealing between Bogie-hearth and Furnace chamber sidewalls is achieved by means of an adjustable perimetric joint, driven by a hydraulic or pneumatic tightening system.

Heat insulation of Furnace is usually made of pressed ceramic fiber for roof, sidewalls and front door, and refractory concrete and insulating bricks on floor.

The heating system of Furnace consists of:

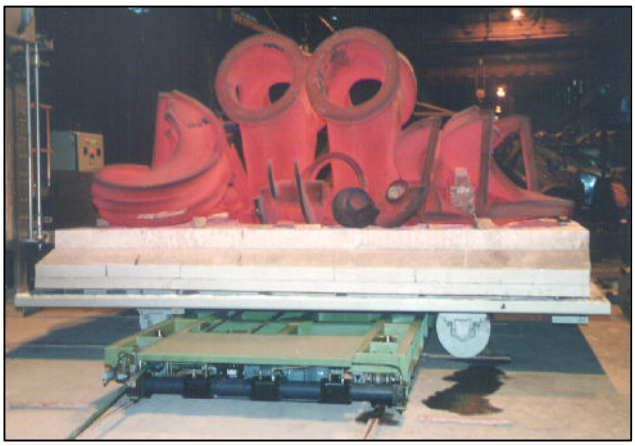
- Gas fired open burners operating under different combustion control modes depending on process temperature range, such as, sequential pulsating or combustion air fixed gas regulating modes.
- Heating elements by means of wire or strip type electric resistances, depending on the total electric power required for process.

In general, this kind of installations are fully automated and capable of being programmed according to the required temperature-time cycle, including limit switches, safety alarms and interlocked operation systems.

Bogie Transfer Car

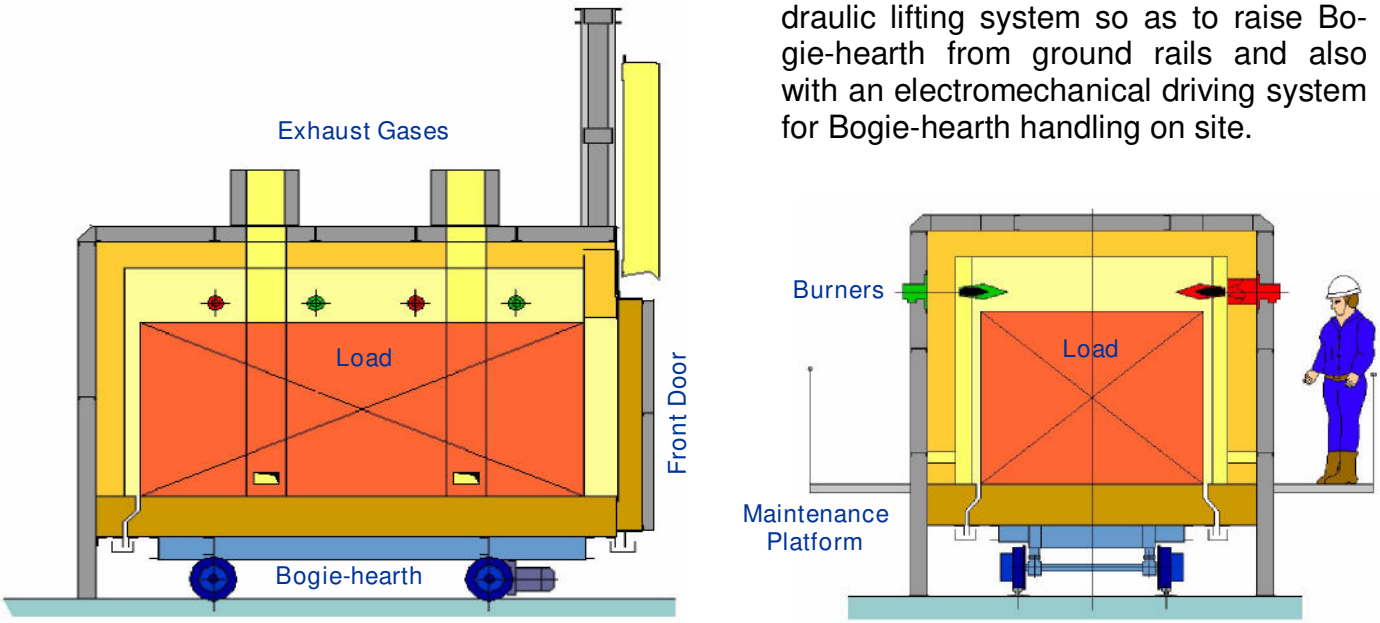
Bogie Transfer Car can be provided for Bogie-hearth handling on site.

Once Bogie-hearth is outside the Furnace, Bogie Transfer Car starts moving as far as it is located under it. Then Bogie-hearth is raised and carried over Bogie Transfer Car for required handling movements, being finally positioned in front of any of the available working positions on site (Furnace, cooling chamber, load-unload tables, etc.).



Bogie Transfer Car in handling operation.

Bogie Transfer Car is provided with a hydraulic lifting system so as to raise Bogie-hearth from ground rails and also with an electromechanical driving system for Bogie-hearth handling on site.



Bogie-hearth Furnace longitudinal and cross sections.

Chamber Furnaces
Batch Heat Treatments

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Furnaces & Refractories

Chamber Furnaces - En

INSERTEC manufactures and supplies Chamber Furnaces for batch heat treatment, specially aimed at industrial sectors, such as:

- Metalworking.
- Energy (Wind, Hydraulic, etc.).
- Petrochemical.
- Mechanical.
- Heat Treating.

and combined with our own professional Technical Assistance on site.

Chamber Furnaces can be mainly divided into the following series:

- TMCG Series are directly gas fired Furnaces.
- TMCE Series are electrically heated Furnaces.

being technically designed depending on the type of load to be heat-treated.

General view of Heat Treatment Installation.

Available Heat Treatments:

- Hardening.
- Tempering at low and high temperature.
- Annealing.
- Normalising.
- Austenitising.
- Stress relieving.
- Preheating prior to Hot Forging.

Chamber Furnaces provided with sliding front door.

General Description:

Chamber Furnaces are provided with one only sliding type front door for batch loading and unloading. Door support structure is also provided with electromechanical or hydraulic driving system, being supplied by request the door tightening system in order to improve the sealing against the heating chamber frame.

Pieces to be heat-treated, placed over metallic trays or inside of baskets, are charged into the Furnace by means of a Charging Machine which leaves them upon the existing load supports, made of refractory concrete pre-shaped pieces, or heat-resistant alloy steel, in accordance with process technical requirements.

Construction detail of Furnace heating chamber.

Chamber Furnaces
Batch Heat Treatments

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Furnaces & Refractories

Heat insulation of Furnace is usually made of pressed ceramic fiber for roof, sidewalls and front door, and refractory concrete and insulating bricks on floor.

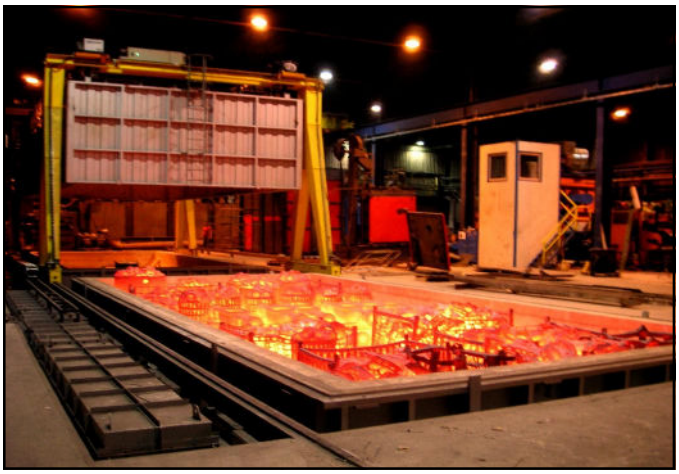
The heating system of Furnace consists of:

- Gas fired open burners operating under different combustion control modes depending on process temperature range, such as, sequential pulsating or combustion air fixed gas regulating modes.
- Heating elements by means of wire or strip type electric resistances, depending on the total electric power required for process.

Available types of Furnaces:

Depending on both available space on site and operating requirements of Installation, other possible solutions for Furnace lay-out could be proposed:

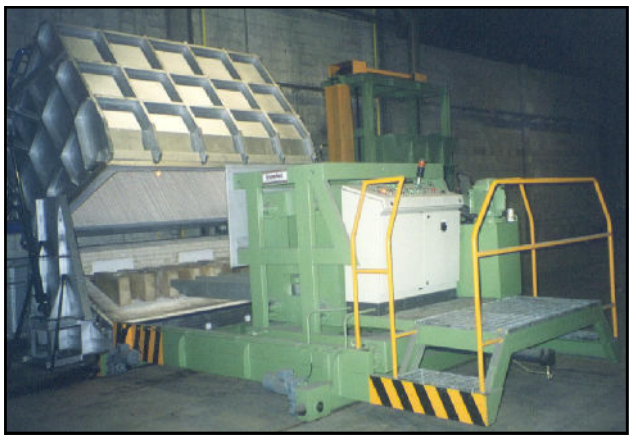
- Tilting Bell type Chamber Furnace capable of revolving around one fixed pivoting axis.
- Vertical Bell type Chamber Furnace provided with bell lifting system or specially designed bell for being handled by existing bridge crane on site.
- Travelling Bell type Chamber Furnace provided with a double driven-head bridge crane.



Travelling Bell type Chamber Furnace provided with two load-unload bases.

Auxiliary Equipments of Installation:

The following ones can be mainly showed:



Charging Machine (3 or 4 Movements).

Forced Air Cooling Chamber.

Quenching Tank (water, oil or polymer).

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Recirculation Furnaces
Batch Heat Treatments

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Furnaces & Refractories

Recirculation Furnaces - En

INSERTEC manufactures and supplies high quality Recirculation Furnaces in various fields of applications for batch heat treatment that require tight temperature uniformity, specially aimed at industrial sectors, such as:

- Aeronautics.
- Automotive.
- Metalworking.
- Energy (Wind, Hydraulic, etc.).

and combined with our own professional Technical Assistance on site.

Recirculation Furnaces can be mainly divided into the following series:

- TCRG Series, Chamber type, or TSCRG, Bogie Hearth type, are directly or indirectly gas fired convection Furnaces.
- TCRE Series, Chamber type, or TSCRE, Bogie Hearth type, are electrically heated convection Furnaces.

Chamber type Recirculation Furnaces.

Available Heat Treatments:

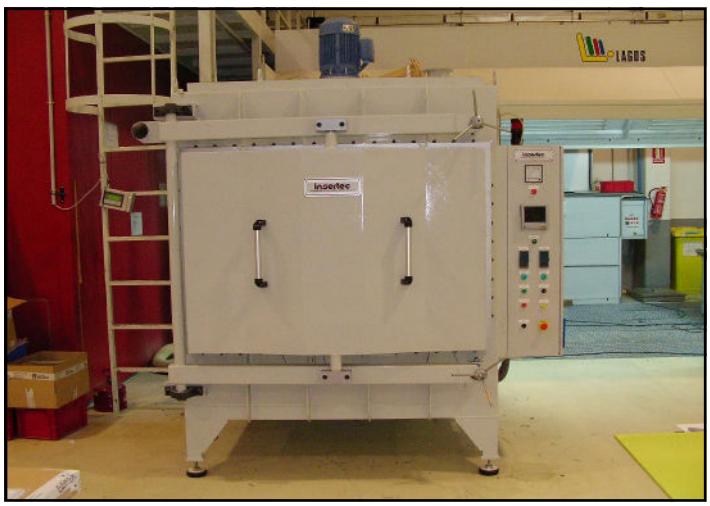
- Stress relieving (Aluminium, Titanium...).
- Tempering.
- Dehydrogening.
- Annealing and artificial ageing (Aluminium).
- Curing (Ceramic composites and paints).

Bogie Hearth type Recirculation Furnace provided with sliding front door.

General Description:

Recirculation Furnaces are often provided with one only front door, hinged or sliding type, for batch loading and unloading, being manual or automatically operated.

In general, these Furnaces are also provided with door tightening system in order to improve not only the sealing against the heating chamber frame, but also against the perimeter joint of the transfer car-bottom if used.



Chamber type Recirculation Furnace provided with hinged front door.

Recirculation Furnaces
Batch Heat Treatments

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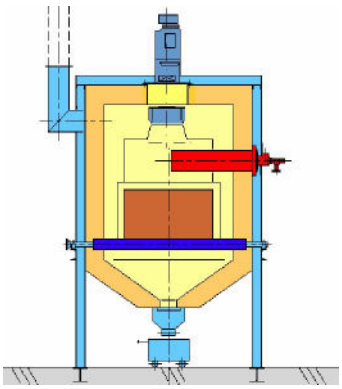
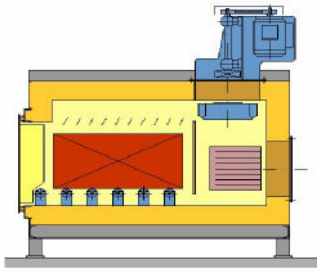
Chamber type Recirculation Furnace.

Main Features:

- Furnace dimensional and constructive design based on load physical characteristics, such as; dimensions, shape, weight, construction material,...in strict compliance with process technical requirements defined by Customer.
- Excellent temperature uniformity during the heating process, by means of accurate temperature control system and forced internal recirculation.
- Heating elements located at centrifugal fan suction side, so as to get a flow across the load under low overpressure.
- After-sales and skilled site services related to all Furnace matters throughout its service life.



Gas fired Furnace cross section.



Electrically heated Furnace cross section.

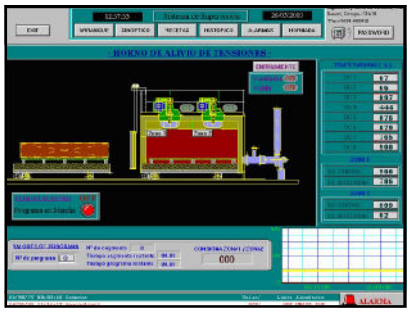
Supply Options:

- Furnace constructive design according to maximum working temperature (≤750ºC).
- Manual or automatic door driving mechanisms.
- Directly or indirectly gas fired heating system by means of open burners (provided with load protection against direct flame radiation if required), or electrical heating by means of armoured resistances, or pre-shaped ones when appropriate.
- Forced internal recirculation in vertical, longitudinal or cross flow by means of centrifugal fans.

Heating elements assembly detail for easy access from the outside of Furnace .

Furnace heating chamber inside view.

- Load cooling process by means of forced ambient air recirculation system can be optionally supplied.
- Electric control panel equipped with process temperature program, safety and record devices in accordance with current Standards.



Bogie hearth type Recirculation Furnace diagram.

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Vacuum Furnaces
Batch Heat Treatments

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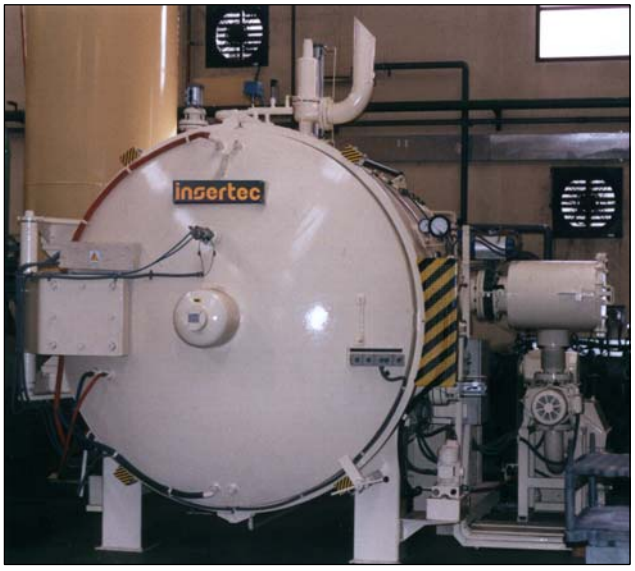
Furnaces & Refractories

Vacuum Furnaces - En

INSERTEC manufactures and supplies Vacuum Furnaces for batch heat treatment, specially aimed at industrial sectors which usually require highly value-added products, being combined with our professional Technical Assistance on site.

Vacuum Furnaces can be mainly divided into the following series:

- **TVCT** Series for Hardening and other heat treatments over 800ºC.
- **TVCR** Series for Tempering and other



Horizontal-loaded Vacuum Furnace for Annealing and Tempering.

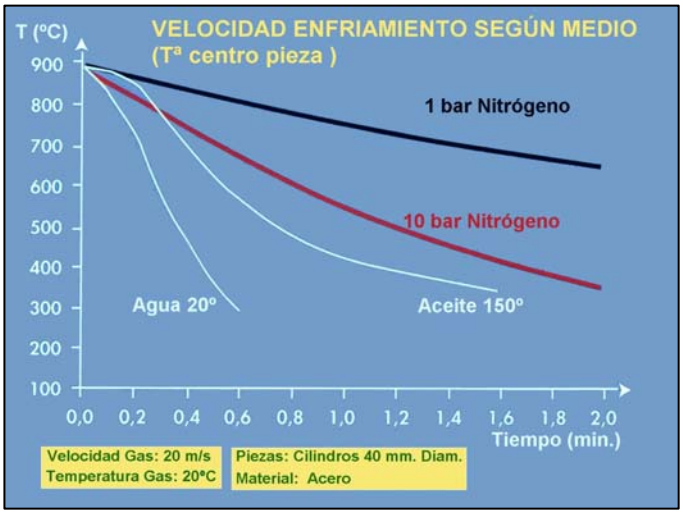
Available Heat Treatments:

- Hardening.
- Tempering at low and high temperature.
- Annealing.
- Quick nitriding.
- Nitrocarburising.
- Bright annealing.
- Stress relieving.
- Degasification and recrystallization.
- Welding at high temperature.
- Sintering of Cr-Ni alloys.
- Brazing.

Horizontal-loaded Vacuum Furnace for Hardening under N_2 atmosphere up to 10 bar.

Advantages of Convective Heat Transfer:

- Shortening of heat treatment cycle time.
- Possibility of accomplishing tempering at low temperature.
- Isothermal simulation.
- Higher cooling velocity.
- Optimal heat transfer efficiency during heating and quenching processes, due to a well thought out design of Furnace hot zone.



Technical comparison of quenching velocities depending on used different medias during process (Pressurized N_2 gas vs. Oil / Water).

Vacuum Furnaces
Batch Heat Treatments

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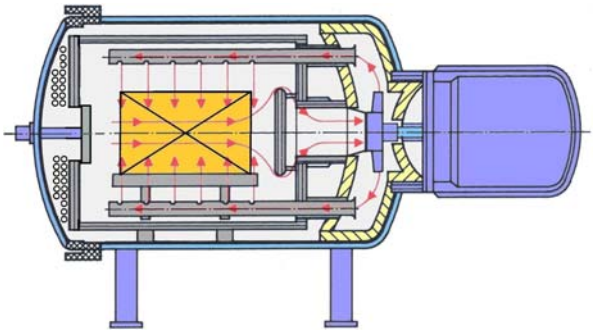
Furnaces & Refractories

1. VACUUM FURNACES FOR HARDENING:

Main tecnnical features:

- Operating temperature: 1350ºC Max.
- Heating elements: Graphite resistances
- Vacuum level: 5 x 10^{-2} mbar abs. (10^{-4} mbar *as an optional extra by request*)
- Quenching gas pressure: 10 bar abs. Max.
- Protective gas: Nitrogen (N_2)
- Water cooled double wall construction Furnace chamber.
- Internal heat insulation and graphite cooling pipes.

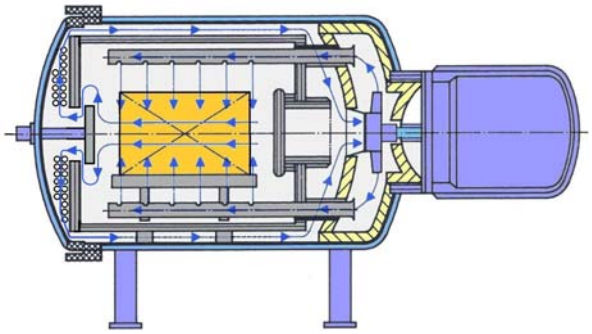
Horizontal-loaded Vacuum Furnace being preassembled at INSERTEC workshop.



TVCT Serie Vacuum Furnace cross section.

HEATING BY FORCED INTERNAL RECIRCULATION.

- Gas is heated up to approx. 750ºC by convective heat transfer process.
- Forced recirculation gas flow is achieved by means of a motor-driven centrifugal impeller mounted on rear side.



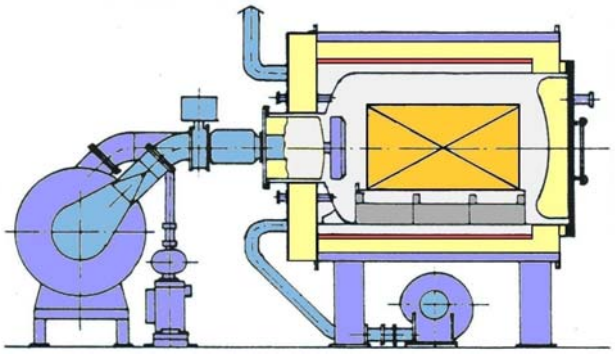
COOLING UNDER PRESSURIZED GAS (<10 bar abs.).

- Gas is cooled by convective heat transfer process while passing through the water-cooled tubular type heat exchanger mounted inside the Furnace front door.
- Forced recirculation gas flow is achieved by means of a motor-driven centrifugal impeller mounted on rear side, under operating pressure of 10 bar abs. as maximum, so cooling process time can be shortened.

2. VACUUM FURNACES FOR ANNEALING AND TEMPERING:

Main technical features:

- Operating temperature: 150÷850ºC
- Heating elements: Wire resistances
- Vacuum level: 5 x 10^{-2} mbar abs.
- Protective gas: Nitrogen (N_2), Argon (Ar) or N_2-H_2 mixture.
- Internal muffle ambient air cooling system.
- Load forced gas cooling system (*as an optional extra by request*).



TVCR Serie Vacuum Furnace cross section.

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ALUMINIUM Industry
Refractory Product Solutions

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Furnaces & Refractories

Refractory for Aluminium – En

Ladle for Aluminium

INSERTEC produces a wide range of refractory masses and precast shapes specially designed for the Aluminium Industry.

Complete Lining

Refractory Masses

INSERTEC has a wide range of product to be in contact with the aluminium with the following characteristics:

- High Mechanical Strength
- Resistance to the abrasion
- Resistance to the erosion
- Resistance to the chemical attack

Furnace Ramp

- ALULOC
- ALUCAST
- CARBOLOC
- EROLOC
- INSELOC
- EROCRETE
- FOSINCAST
- INSECOR

Reverberatory Door Frame

Melt Tower Door Frame

APPLICATIONS - Refractory Masses

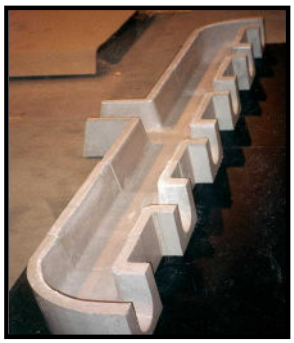
- Rotary Furnaces
- Reverbaratory Furnaces
- Induction Furnaces
- Melting Tower
- Dossing Furnaces
- Ladles
- Runner, Filter Box, etc.

Precast Spout

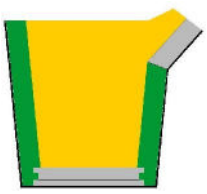
In addition to these products, we produce materials for insulation and for repair Works.

Furnace Frame

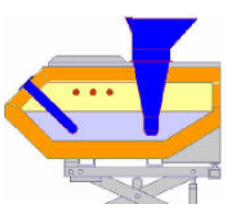
- FOSGUN
- INSEGUN
- INSEPLAST
- CERAMIC FIBRE
- INSULATING SHEETS
- PAINTS
- BRICKS
- ALUCOR



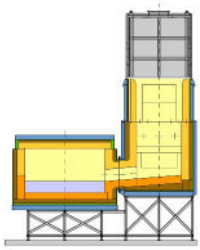
Runner



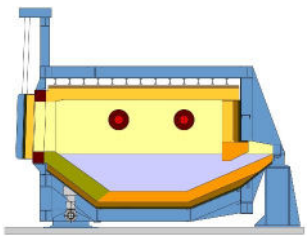
Ladles



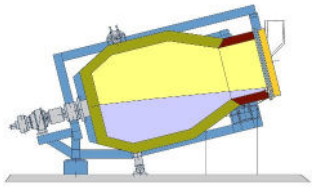
Dossing Furnaces



MeltingTower



Reverberatory



Rotary

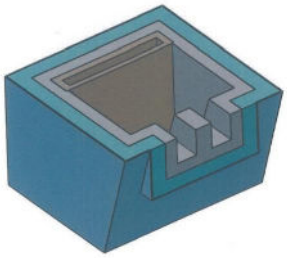
Precast Shapes

INSERTEC counts with own :

- Technical office designing individual solutions adapted for each customer.
- Laboratory for Quality control and new products development.

Skimming Tool


Ladle Bottom


Filter Box

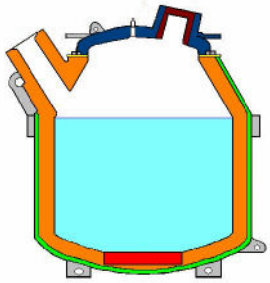

Cones


Cups


Ladle Lining

APPLICATIONS - Precast Shapes

- Door Frames
- Impact Plates
- Ladles and Bottoms
- Submerged Cones
- Complete Furnaces
- Furnace Ramps
- Skimming Tools
- Floor Tiles
- Runners
- Dossing Cups


Road Transport Ladle

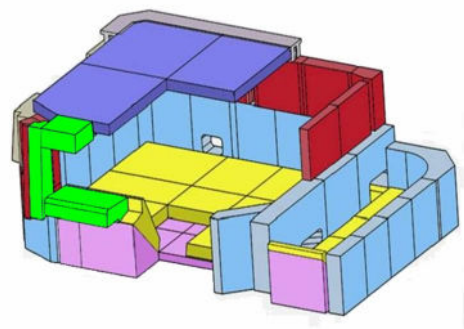
Furnace Lining in Precast Shapes:

INSERTEC designs, produces and install industrial furnaces by large Precast Shapes.


Floor Tiles

Mecanized Pieces

- Pouring Spout
- Floaters
- Regulation Rod
- Lid
- Dossing Cup
- Hallmarks
- Wheel
- Insulating
- Frame
- Graphite Pieces


Furnace Lining made by Precast-Shapes