

WE INCLUDE PROGRESS



» MELTING TECHNOLOGY

» LADLE TECHNOLOGY

» EXTRUSION TECHNOLOGY

» NEW PLANTS

» MODERNISATION & CONVERSION

» SERVICE & MAINTENANCE

PERSUASIVE TECHNOLOGY

MELTING AND HEATING TECHNOLOGY



COMPETENCE THROUGH EXPERIENCE

**Your partner for melting and heating
equipment since 1962**

In **1962**, the company's history began in Iserlohn. The current **MARX GmbH & Co. KG** was thereby founded by Erich Marx. The scope of tasks at that time pertained to the repairs of engines, refurbished transformers and inductors.

In **1967**, Wolfgang Eckenbach who had with the company from the beginning became the company's authorized signatory.

In **1972**, he took over as manager following the exit of Erich Marx. Under his leadership, the company developed from the repair company into a supplier of complete plants for the industry of induction melting and heating technology.

In **1981**, the first branch was founded in Germany, the **MARX Ofenbau GmbH** in Donauwörth.

In **1995**, the third location followed with the **MARX Elektrowärme GmbH** in Hennigsdorf.

2006 and **2007** the production areas in Iserlohn and

Donauwörth were each increased by approximately 11,000 square feet and the manufacturing technology upgraded in terms of machine technology.

In **2007** Wolfgang Eckenbach transferred the overall responsibility to his sons, Guido and Christian, the current managing directors of the Marx group.

In **2008**, the fourth location of the company group, the **MARX LLC** was established in Youngstown, Ohio, USA.

In **2010**, the production area of Marx GmbH & Co. KG in Iserlohn was enlarged again to by approximately 11,000 square feet.

In **2011** an investment was also made in the United States that pertained to a new production building with 11,000 square feet of land.

A total of approximately 100 people now operate in all four companies. The recent developments have always been made with the purpose of improving our services and have contributed to an optimal proximity to the customer; fast and competent solutions in our areas of activity, as well as the ability to offer an ever-increasing level of know-how. This is where we see our task and responsibility for the future.

**We are here for you - three times in Germany
and once in the USA!**

MARX TECHNOLOGY

» MELTING TECHNOLOGY

Channel furnace plants
Crucible furnace plants
Compact furnace plants
Inductors
IGBT converters
MARX coil insulation
Modernisation & conversion
Service & maintenance



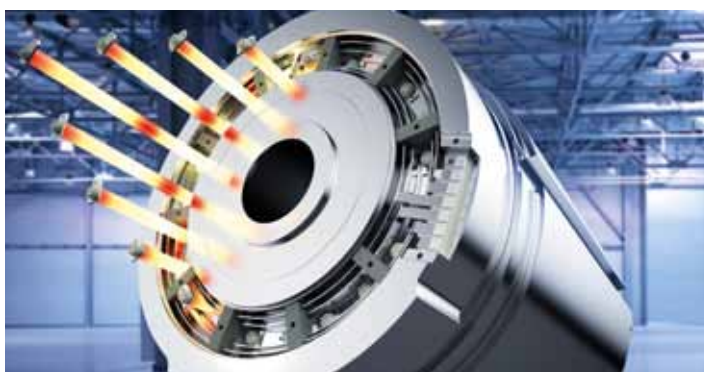
» LADLE TECHNOLOGY

Casting, transport and treatment ladles
MARX gearbox technology
Mobile gearbox test rigs
Wire-treatment plants
Conversion & maintenance
APR inspections according to DIN EN 1247
Certified welding company (DIN EN 3834-2)



» EXTRUSION TECHNOLOGY

MARX Smart Container
HPC High-Power Cartridges
Control & Software
Inductive billet heating
Tool stations and Pre-heating stations
Service & maintenance
Maintenance & training



Professional plants engineering, retrofitting or servicing, **MARX** offers optimal solutions for all requirements.

More than 50 years of experience in the repair and installation service have definitely left their mark on us. Almost every furnace brand has been serviced, repaired, technically upgraded or newly built in our company.

Our supply standard consists of integral, manually or process controlled **melting and heating plants** for ferrous and non-ferrous metals, designed as channel or crucible induction furnaces as well as components and modules for retrofitting or modernization of plants of other manufacturers than Marx.

New manufacture, repair and maintenance of all types of **ladles**, including an own **gearbox series** as well as **wire**

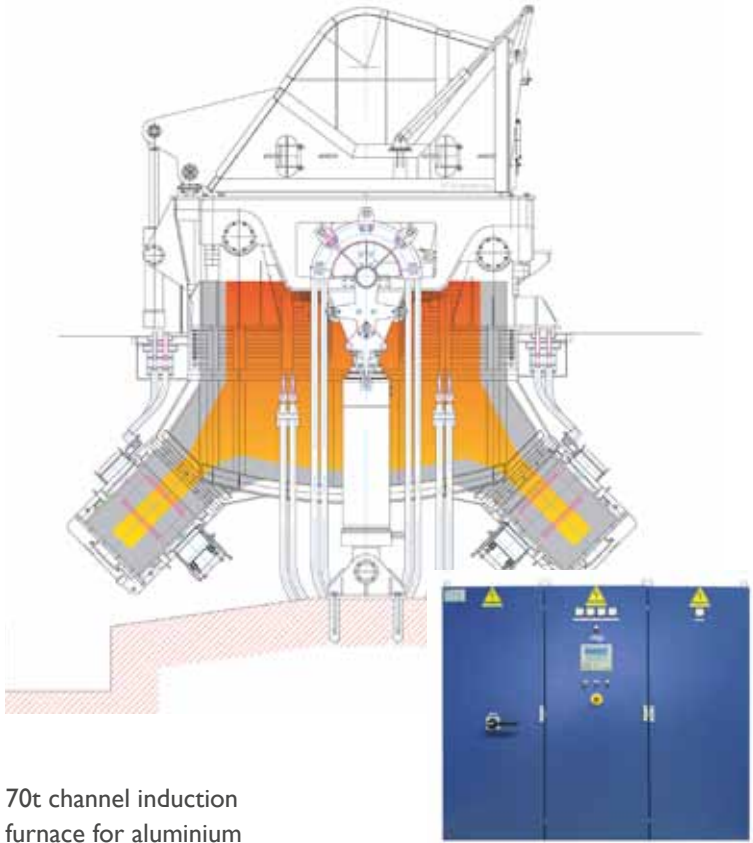
treatment plants for GG / GGG are also part of our product range.

We are also one of the leading suppliers of **heating systems for containers**, and along with new installations we also offer our customers individual components, repairs and modifications for extrusion press heating equipment.

The most modern equipment at our manufacturing facilities and an extensive know-how, offer us by the planning, development and production, the ability to work in a manner that our customers worldwide have been used to for more than 50 years:

Reliable - Fast - Competent.

Melting technology



70t channel induction furnace for aluminium

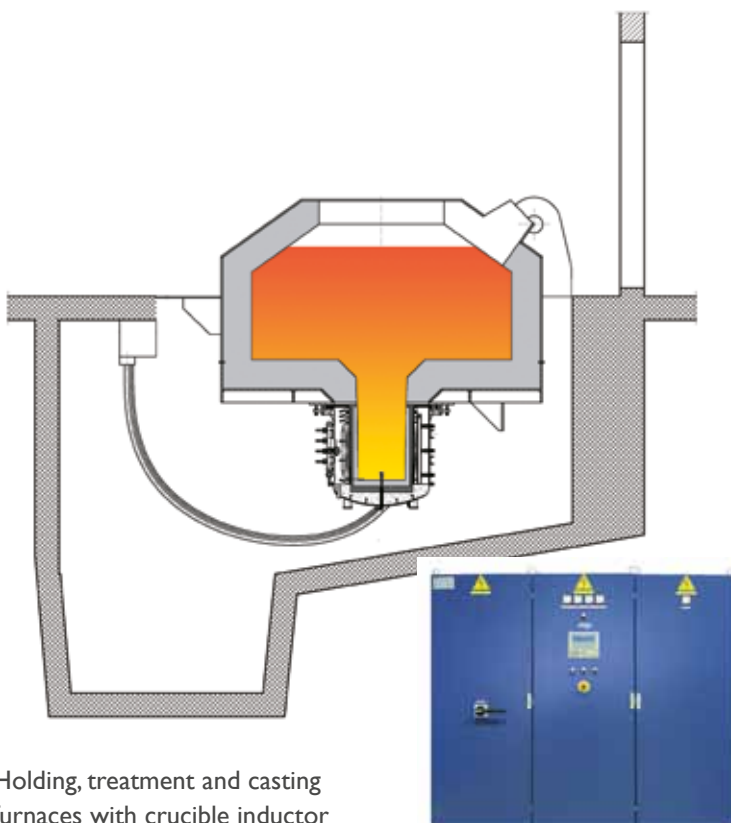
Channel furnace plants

The channel furnace technology developed by MARX over the last 50 years aims to make the very most of the advantages offered by state-of-the-art channel furnace plants, their particular **energy efficiency** and their varied application and usage possibilities.

The flow-oriented MARX channel inductors have been specially developed to meet the high requirements in terms of energy savings, maximum **melting performances** and service lives.

This type of technology makes it possible to significantly increase **service lives** while simultaneously reducing energy consumption.

For example, channel inductors with a power of 2,400kW were developed and trialled for copper and copper alloys, and with a power of 1,500kW for aluminium.



Holding, treatment and casting furnaces with crucible inductor

Crucible furnace plants

Our crucible furnaces are designed, constructed and installed in close collaboration with customers to develop optimum solutions for their applications.

The use of the very latest **IGBT converter technology** ensures practically **maintenance-free operation** of the power unit.

Power is regulated continually and adjusted to the melting process. Depending on their intended purpose, the IGBT converters are designed for mains and medium frequency applications as well as the low frequency range (<50Hz).

Supplying power in the low frequency range offers particular advantages when melting swarf. The chips are immediately stirred into the melt by intensive agitation of the bath, thus significantly reducing melting time, energy consumption and losses due to burn-off.

Channel inductors for aluminium and zinc

Inductor power: 60 to 1,500kW

- » Melting furnaces
- » Holding/Storage furnaces
- » Casting furnaces
- » Piece-galvanising furnaces
- » Strip-galvanising furnaces
- » Furnaces for alloying and homogenising
- » Zinc-cathode melting furnaces



Channel inductors for copper and copper alloys

Inductor power: 50 to 2,500kW

- » Melting furnaces
- » Melting furnaces for brass turnings
- » Holding furnaces
- » Combined melting and casting furnaces
- » Forehearth casting furnaces for vertical continuous casting
- » Holding furnaces for horizontal continuous casting
- » Dosing furnaces for sand moulding lines with stopper rod device



Channel inductors for iron and iron alloys

Inductor power: 125 to 2,000kW

- » Holding furnaces
- » Dosing furnaces with forehearth and stopper rod device



Crucible furnace plants

Capacity: up to 30t

- » Alloy: Iron and non-ferrous metals
- » Power unit: NF / MF (transistor technology)
- » Power can be distributed to one or more furnaces



Compact furnace plants

Capacity: up to 3t

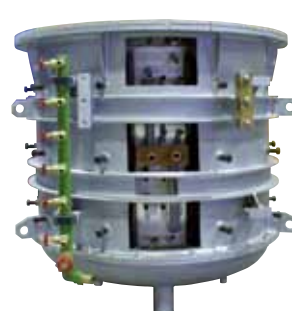
- » Alloy: Iron and non-ferrous metals
- » Power unit: MF (transistor technology)
- » Power can be distributed to one or more furnaces



Crucible inductors

Rated power: 100 to 1,000 kW

- » Alloy: Non-ferrous metals (Al / Cu)
- » Power unit: NF / MF (transistor technology)



Coil production and repair

- » Manufacturing of new coils
- » Coil repair for all brands
- » Restoral of nominal diameter
- » Volume increase
- » Power increase
- » Coil optimisation
- » TIG welding method



Preparation for new coil insulation

- » Removal of old insulation in pyrolysis furnace
- » Cleaning the coil using a special sand blasting method (metallically pure)
- » Leak-tightness test via water-pressure check or helium leakage rate check
- » Flushing of the cooling channel and water-flow check



MARX full-insulation technology

- » Goteplast insulation (grey-green-grey)
 - » Intermediate insulation of Cogemikanit or GHG
 - » Intermediate insulation technologies are doubly applied, overlapping, and consolidated with saturation
- Crucible furnace coils, can be impregnated both in the dipping process, as well as under vacuum conditions with impregnating varnish.



Drying furnace for drying coils and crucible furnace inserts

- » Drying and hardening the impregnation varnishes to solidify the entire coil unit
- » Removal of residual moisture in permanent concrete and coil grout
- » Pre-drying of magnet yokes for treating with 2-component resin



Crucible furnace coil completely coated with silicate glass fibre

- » Offers protection from metal splashes
- » Breathable to allow residual moisture to escape



Quality assurance and testing methods

- » Helium leakage rate check
- » Water-flow check
- » Water-pressure check
- » Endoscopy examination
- » Insulation measurement
- » Electrical tests as per VDE



Ladle technology



Casting, transport and treatment ladles

Our product portfolio includes casting, transport and treatment ladles with dimensions to suit the particular requirements of our customers. Gearboxes MX-1 up to MX-5 from our MARX gearbox series are available in different dimensions which match the respective ladle sizes.

The current regulations of **DIN EN 1247** and the DGUV (Deutsche Gesetzliche Unfallversicherung - German Social Accident Insurance) are an integral part of the design, manufacture and inspection of casting, transport and treatment ladles.

As your partner in security issues, we conduct **annual inspections** in your premises. The **main inspections** are carried out according to the customer's wish, either at our factory or on site by one of our specialists.

MX Gearbox series

Our gearboxes of the MX series are characterised by their particularly **sturdy design**. **Certified by Germanischer Lloyd**, they offer maximum safety.

All gearboxes are fitted with a brake that operates automatically in both tilting directions and that holds the ladle at any desired tilt angle, thereby ensuring the necessary **self-locking effect**.

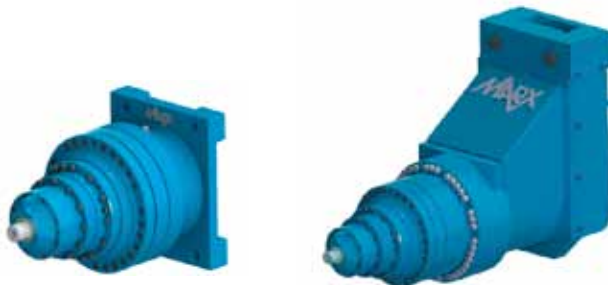
During the development of the specially fitted gearboxes, particular importance was given to components and services from **regional suppliers**, such as the cast parts of the gearboxes or the machining operations.



MX-1 60V

MX-2 80V

MX-3 110V



MX-4 140V

MX-5 180V

Crane casting ladles

Available in all sizes and designs.

Our scope of supply includes both standard ladles and foundry ladles, which can be individually produced based on customer requirements.



Treatment ladles

- » Tundish-cover ladles
- » Ladles for the overpour or sandwich processes
- » Ladles for wire-treatment processes



Special foundry ladles

- » C-suspensions
- » Bottom-pouring ladles
- » Drum ladles
- » Siphon ladles
- » Steel foundry ladles
- » Foundry ladles with changeable suspension
- » Manual foundry ladles



MX gearbox series

The gearbox series includes models MX-1 to MX-5.

Our MX-1 to MX-4 gearbox models are used for the most standard foundry ladle sizes with a capacity of up to 25 tons.

The MX-5 is suitable for the operation of foundry ladles with a capacity of up to 50 tons without the need for an offset gearbox.

Special drives

- » Pneumatic drives for ladle gearbox
- » Electric drives for ladle gearbox
- » Electric gear motors
- » Offset gearboxes

Gearbox test rigs

With our specially developed gearbox test rigs, we are able to measure and document the exact output and braking torques in accordance with DIN EN 1247.

The mobile design of the test rigs allows us to perform these measurements both at the MARX premises or on-site at your location.



Ladle technology



Modernisation, conversion and service

When you need **quick and reliable repairs** or servicing of your foundry ladles and gearboxes, then MARX is the right partner for you.

Thanks to the in-house manufacturing capabilities at all of our German sites, we are able to provide quick and **flexible solutions** to make your range of ladles available for production again as quickly as possible.



Steel construction and welded constructions as per DIN EN 3834-2

In our Iserlohn and Hennigsdorf sites, we have the option of manufacturing the steel-construction components for our projects ourselves in accordance with DIN EN 3834-2, and our machinery pool allows us to perform an extremely wide range of manufacturing tasks. We are therefore able to respond to your requirements in an **independent and flexible** manner.

In addition to a range of small and medium-sized machine tools, the existing **machinery pool** also allows for tasks including, in particular, the following:

- » Point turning (max. length 5,000mm, max. diameter 1,400mm)
- » Boring work
- » Horizontal and vertical milling
- » Round milling of sheet metal up to 20mm thickness and a width of up to 2,100mm
- » CNC flame-cutting work (also plasma cutting of high-alloy steels)

Gearbox conversion

- » Worm gear transmission to planetary oil bath gearbox
- » Conversion to pneumatic drive
- » Conversion to electric drive
- » Conversion from keyway connection to splined shaft

Ladle modifications

- » Volume increase
- » Plug lifting devices
- » Modification of the crane adapter
- » Sealed ladle gate technology

Visual inspections and main tests as per accident prevention regulations

We will test and maintain your foundry ladles in accordance with the current regulations of DIN EN 1247 and the DGUV (Deutsche Gesetzliche Unfallversicherung - German Social Accident Insurance). Depending on customer requirements, the main tests are carried out at our production plant or directly on-site by one of our specialists.



Special-design steel constructions

- » Crucible-push-out stations
- » Furnace platforms
- » Inductor housings
- » Tilting frames
- » Crucible furnace frames
- » Capacitor frames
- » Transportation systems for foundry ladles
- » Accommodation frames for special foundry ladles
- » Welded constructions based on customer requirements

Certified welding company according to DIN EN 3834-2

- » Certified welders
- » Certified welding equipment
- » Welding supervisors
- » dye penetrant testing
- » Ultrasound tests
- » X-ray tests

Wire-treatment plants (DIM)

The Marx DIM plants are specially designed for the treatment and inoculation of grey cast iron. The treatment process is precisely attuned to the individual melting treatments, and can be initiated fully automatically. The treatment cabins can be fitted with special, designated treatment ladles and can also be adapted to the customer's existing ladles.



Extrusion technology



Smart Container

The current state of development of the process-controlled “**Smart Containers**” means that they can be heated up and regulated at weights of between 500kg and over 100 tons in segmented heating zones.

The **high-power heating cartridges** can be produced with up to three heating zones and achieve a proven service life of up to 5 years and above depending on their intended purpose.

The zone arrangement is designed individually depending on the particular application, which include special solutions such as containers with oval inner liner, large external diameters or long containers.

The process is controlled based on the specific requirements, and is supported by segmented cooling zones as required.

Tool stations and Pre-heating stations

In order to meet today's modern demands, **special tool stations** have been developed at MARX, to heat up the extrusion press tools to an **optimal process temperature**.

The **container pre-heating stations** are either fitted with independent heating systems, or can be operated via the resistance heating system integrated in the container. In this case, the power is supplied automatically via a pneumatic contact unit. The heating process is precisely controlled via integrated controllers.



Container heating for light metal (resistance heating)

- » New production and repair for all press sizes
- » Container weights of up to 100 tons and above
- » Individual heating zone arrangement
- » Conversion of existing presses to modern, multi-zone heating systems



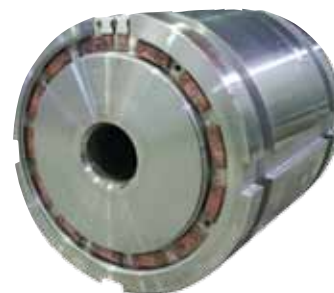
Container heating for heavy metal (resistance heating)

- » New production and repair for all press sizes
- » Container weights of up to 100 tons and above
- » Individual heating zone arrangement
- » Individually controlled cooling
- » Conversion of existing presses to modern, multi-zone heating systems



Induction heating systems and accessories for containers

- » New production and repair for all press sizes
- » Connection components and special high-current cables for supplying power to the induction heating systems
- » Transformers for the heating supply



Integrated heating systems for bolsters, tools and die slides

- » to compensate heat losses at:
 - die slides
 - bolsters and
 - extrusion press tools
- » Up to 2 heating zones with individual temperature measurement
- » Automatic contacting with die slides (depending on plant concept)
- » Connection components



MARX HPC High-power heating cartridges, control components and accessories

- » Heating cartridges with up to 3 heating zones; service life based on intended purpose up to 5 years and above
- » Special components for connection
- » Control units for heating systems
- » Control units for regulated cooling systems
- » Special thermocouples with simultaneous detection at up to 3 different measurement points
- » Insulation components



Inductive billet heaters

- » The converter, induction coil, power unit, recooling system, control and operator cabinet with operator panel are combined within a frame to form a single unit
 - » Compact dimensions
- Example:
- approx. 900x700x2,100mm (WxDxH)
 - With billet data:
 - Length 200mm, Ø up to 60mm
 - Temperatures up to 560°C



Service, maintenance and training sessions



Service and maintenance

Customer service is of top priority for us. In the casting sector in particular, fast response times and flexibility are of crucial importance. That's why we make it possible for you to contact us at any time on our **24h emergency number**.

With a total of **three production and service sites** in Germany, we are able to reach and support our customers all over Europe as quickly as possible.

Our assembly personnel also have **years of experience**, enabling them to provide solutions competently, reliably and quickly.



Training sessions

The provision of training for our customers is part of our daily business activities. Our service and sales employees are available to provide you with **on-site support** at any time.

We also provide regular training sessions on the safe **handling, servicing and maintenance** about our product range.

On customer request, we can also create **individual training plans** that are specially tailored to the customer's specific situation and requirements. The training sessions can be held either at your premises or in our training rooms.

Just get in touch with us!

Assembly personnel

- » Commissioning
- » Modernisations
- » Assembly work
- » Maintenance
- » Inspections

24h availability

We are available by phone to our customers 24 hours a day in the event of emergencies.

24h emergency call:
+49 172 279 95 64

24h emergency call Donauwörth:
+49 171 235 66 91

Training sessions

- » Maintenance workshops for furnace plants
- » Foundry ladle workshops
- » Safety workshops for
 - Induction furnaces
 - Foundry ladles
 - Heating systems for Extrusion presses
- » On-site consultancy



Induction furnace technology

- » Furnace inspection and maintenance
- » Spare parts service
- » Coil repairs for all brands
- » Helium leakage check
- » NDT testing for welded seams
- » Coil storage
- » On-site coil change for all brands

Foundry ladle technology

- » Visual inspections and main tests as per accident prevention regulations
- » Gearbox test rigs (mobile)
- » Groove miller (mobile)
- » Training sessions (ladle workshops under the command of TÜV Rheinland)
- » Strength verification and FEM calculation of foundry ladles

Extrusion technology

- Modernisation of heating systems**
 - » Conversions from induction heating to resistance heating
 - » Conversions from external heating (holder) to internal resistance heating
 - » Conversions to „SMART CONTAINER“ SYSTEM
- Repair service**
 - » Container heating systems (resistance heating, induction heating)
 - » Billet heating systems
 - » Tool stations and Pre-heating stations
- Spare parts service**





Donauwörth / Germany



Hennigsdorf / Germany



Youngstown / Ohio / USA



Iserlohn / Germany

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