

eldec MIND, MIND-M, MIND-S Modular Induction Hardening Systems

eldec
Member of the EMAG Group



Your part – our task

Starting with your workpiece, we look at the specific part quality you want to achieve. Our focus is on the perfect solution!

Calling upon our wide range of know-how in applications, technology, metallurgical and process-chain experience, we

formulate a concept and recommend a solution to your hardening challenge.

With a long lasting record for outstanding service and high quality products, we have earned an excellent reputation from leading enterprises worldwide.





Complete modularity for optimum solutions

MIND stands for Modular Induction. In the development of the MIND Series of hardening machines, top priority was given to create maximum flexibility for maximum productivity. Depending on workpiece, desired hardening pattern, lot sizes and additional quality concerns, the eldec MIND System is configured using proven common components. Module selections include base machine, energy source, cooling / quench systems

and part specific tooling, such as work-holding, automation and inductor coils.

Thanks to this well thought-out modular design, individual solutions are easily created by using time-proven components: Customization without the hassle of a piecemeal, one-of-a-kind design. The result leads to increased system availability and state-of-the-art technology for the best price possible, guaranteeing lowest life cycle cost.



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1 Base Machine: eldec MIND, the machine tool among inductive hardening machines

The MIND product line was developed with the latest 3D CAD software and FEA design tools.

The base frame is built on solid, highly accurate stress-relieved welded components. The drive technology, slides and motion control system are state-of-the-art and comply with the latest DIN and CE requirements.

Our control and measuring technology is customized to the requirements of today's heat treatment tasks and the necessities of our customers: Process energy sensor control, deviation fault monitors, data recorders, quench volume and temperature control, for example.

eldec MIND Hardening machines are available as a manually controlled stand-alone solution, as a heat treatment system with individualized levels of automation or also as in-line, single-piece flow hardening cell, totally integrated in the process chain of machining before and after heat treating.



The following pictures show a range of different MIND-devices, modules and options

- 1. Manual load station
- 2. Laser measuring system
- 3. 8-position rotary index table with part ID
- 4. C-axis
- 5. NC Tailstock
- 6. Energysource, Quench tank



- 1. Work area for camshafts
- 2. Work area for drive shafts
- 3. Work area for sprockets made of powder metal



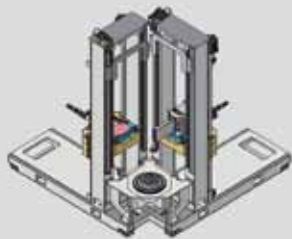
Maximum workpiece diameter:
600 / 1200 mm

Maximum workpiece length:
750 / 1500 mm

Maximum workpiece weight:
500 kg

Controls, either:
CNC - Siemens 8400
SPS - Mitsubishi System Q

L-design



Detailed technical information and a complete overview of the MIND modules and specifications, can be found on the current eldec MIND data sheet.

eldec MIND modular system:
a selection of modules and options



Larger work table Ø 1200 mm



Manual load station



PLC-control



Actuator for NC-controlled rotary table



Z x Z slides with 4 coax



CNC-control



Main spindle drive



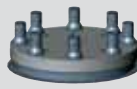
C-axis NC-control



Electromechanical rotary table drive



4-position rotary index table



8-position rotary index table



Twin station 4-position rotary index table



Tailstock



NC-controlled tailstock



Tailstock column for rotary index table



Tempering station Z



Z slide with 2 coax

2 Energy Source: eldec generators, powerful and precise



eldec offers a wide variety of micro-processor controlled single and dual frequency generators, available from 1.5 kW to 3000 kW (3 MW). Generators up to 150 kW are integrated directly on the machine base, while Generators larger then 150 kW will be positioned separately.

eldec energy sources are well known for their precise energy metering capabilities and their outstanding process capability.

The convertor’s auto-tuning feature guaranties constant generator power output and maintains resonant frequency during workpiece transition through the Curie point.

High efficiency levels and precise heat input results in low energy consumption and best life cycle costs. The generators feature the latest IGBT technology and are protected against short circuits and running without a part present. Accidental coil contact with the part will not harm the system.



MF and HF Generators (Medium frequency and High frequency)

MF Generators feature automatic adaptation due to their pulse width modulation covering the entire frequency range. They are particularly suitable for deeper case (approx 1.5 to 5.5 mm).

HF Generators are designed in IGBT transistor technology with pulse package control. They are particularly suitable for surface-layer hardening at lower depths (approx. 0.2 to 2.5 mm).

MF:
10 kHz to 25 kHz
5 kW to 1500 kW
(2 kHz to 5 kHz on request)

HF:
150 kHz to 350 kHz
1.5 kW to 1500 kW

SDF® Generators (Simultaneous Dual Frequency)

SDF® Generators allow heating with Medium and High frequency at the same time on a common inductor coil. Our patented circuit architecture allows the high-frequency energy oscillation to be superimposed on the medium-frequency basic oscillation during induction heating up to 3000 kW high density power output.

SDF® Generators are well suited to true case hardening of gears and complex geometric components. Through the use of pulse width modulation and pulse package control, complex heating tasks can be solved efficiently using Simultaneous Dual Frequency. Shortest heat times minimize part distortion which also reduces workpiece rework and finish stock allowance.

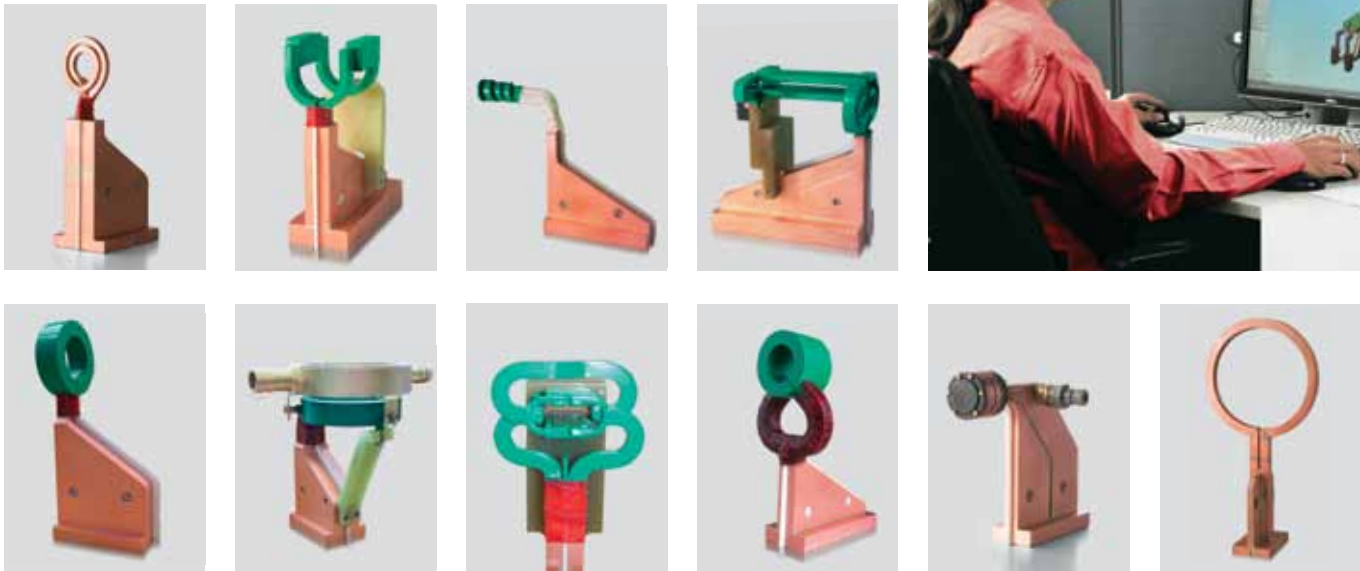
Fast cycle times allow full in-line integration of the hardening process into the manufacturing single-piece part flow process chain. **SDF®** Generators are well suited for highly flexible solutions for small-to-medium lot sizes because the MF and HF power is controllable independent of each other. The energy consumption compared to conventional carburizing or common single-frequency induction is much more economical and environmentally friendly.

SDF®:
10 kHz to 25 kHz and 150 kHz to 350 kHz
50 kW to 3000 kW (Available power and frequency upon request)

3 Tool / Inductor: decades of experience in construction and manufacturing

The key to every induction heating system is the inductor. Therefore, the inductor coil's shape is determined by the geometry of the workpiece section to be heated. The appropriate frequency, material and power density are incorporated into the design.

eldec was established as Schwenk Induktorbau GmbH in 1982 as an advanced coil design and manufacturing firm. Still today, the inductor design and build is one of our primary areas of expertise. eldec inductors are designed with the latest 3D CAD software, manufactured on CNC machines and built by well-qualified specialists.



eldec MIND: Cooling System

4 Cooling System: accurately sized

Cooling systems will be customized according to the dimensions and requirements of the overall system and the actual on-site conditions. Generators, inductors and quenching medium are chilled by either passive or active means (heat exchangers or refrigeration) and, if required, equipped with an adequate filtration system.



eldec MIND-M: compact hardening systems

The MIND-M offers a high degree of precision and reliability at comparably low investment costs. Simple heat treatment tasks with a maximum power requirement of 30 kW at high frequency (HF) or 100 kW at medium frequency (MF) applications can be processed with the MIND-M. Energy source, cooling system and process cell are combined on a single

machine base to save space. The MIND-M is fitted with an X, Y and Z axis for positioning the inductor versus the workpiece, a main spindle drive for workpiece rotation, as well as a temperature and thus flow-controlled spray for the quenching medium. A tailstock module with centring pin enables secure clamping of workpieces between the centring

points. Loading of the unit can be performed either manually or automatically within the process chain with the aid of a loading module. In combination with a 180° adapter plate this can also be carried out in parallel with heat treatment.



MIND-M 1000

MIND-M 250



MIND-M 250 is suitable for chucked parts up to a diameter of 350 mm as well as shafts with a maximum workpiece length of 250 mm.

MIND-M 1000 is suitable for shaft-shaped components with a length of up to 1000 mm.

eldec MIND-S: minimal floor space induction heating and hardening systems

The eldec MIND-S is the compact, “smaller sibling” of our full-featured MIND hardening machine series. A complete, integrated system for your induction hardening application or any other induction heat treating of small parts.

The energy source with active coolant and quench system (if needed) is

integrated into the machine base. The spacious working area allows for different modules and work holding devices to be freely positioned.

This creates flexibility for different parts and applications. Effective for low, medium and high volume production for hardening, tempering, brazing, fitting or melting in the smallest possible space.

The MIND-S can be transported “as is”, featuring the smallest foot print of any complete system. This makes MIND-S a complete space-saving and crane-ready system with a maximum power requirement of 15 kW at high frequency (HF) or 30 kW at medium frequency (MF) applications.



eldec MIND-S is suitable for various workpieces and heating tasks.
All-in-one and easily accessible: energy source, coolant system, quench system and electrical controls.
Spacious working area.



MIND-S



Process development

Innovative products require innovative processes. We are here to advise you on this. Our broad, technical and application know-how, our deep understanding of complete manufacturing process chains and our well established knowledge of metallurgy, together with comprehensive test and analytical capacities, form the foundations of our solutions-oriented work.



Technological consultancy

We seek out the right solution for your tasks. To do this we provide support from the very start with sound technological consultancy. Our employees pride themselves on their networked thinking, they are always in demand as speakers at technology conferences and specialist forums and are constantly exchanging ideas and information with their colleagues in the sciences.



After-sales service

From the eldec locations or in conjunction with our global sales and service partners, we ensure that everything runs smoothly for you and that the complete scope of services of your system is always available to you, now and for many years to come. Full spare part availability and a competent service team ensure a reliable service and a swift response.



Equipment rental service

You have just received a large order and you have to start production quickly? Your system is malfunctioning or you need a test device immediately? We would be delighted to help by providing a plant hire service.

Commissioning / acceptance

System solutions (with specification sheet and process technology) will be set up at one of the eldec locations, Dornstetten (D) or Auburn Hills (USA), for preacceptance, if required.

eldec Services: all-round service

A product is only as good as the service that follows it. That's why with us a perfect solution comes hand in hand with an excellent all-round service that we can offer worldwide thanks to our service network.

Our services include technological consultancy, a comprehensive range of training programs and reliable after-sales service.



User training

Our sophisticated training concept gives you the opportunity to have your eldec system operators comprehensively trained. Individually or in small groups, the participants learn how to get the best productivity levels from your system.

Basic training in induction technology

This training will teach you everything you need to know about induction heating. We will provide brief, concise and memorable answers to your questions about induction.

Inductor design and inductor manufacturing training

The inductor forms the core of every eldec system. We therefore also dedicate special trainings to inductor manufacturing, which are subdivided into theoretical and practical parts. Here, the participants are first taught the theoretical principles before the practical exercises, where they learn how to build a suitable coil based on frequency, material and power density.

Technological and metallurgical training

Our engineers will provide you with the knowledge you need to competently make any decisions that arise. In our metallurgy training courses, we teach both the basics and also more detailed topics for specialists. Because regardless of whether hardening or brazing – the material to be heated determines the process.



Maintenance training

The service life of every machine is increased significantly through maintenance and care. To maintain your production levels, we offer maintenance training courses, during which your maintenance operatives will learn about all the opportunities for preventive maintenance. So that your manufacturing system always runs smoothly.

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