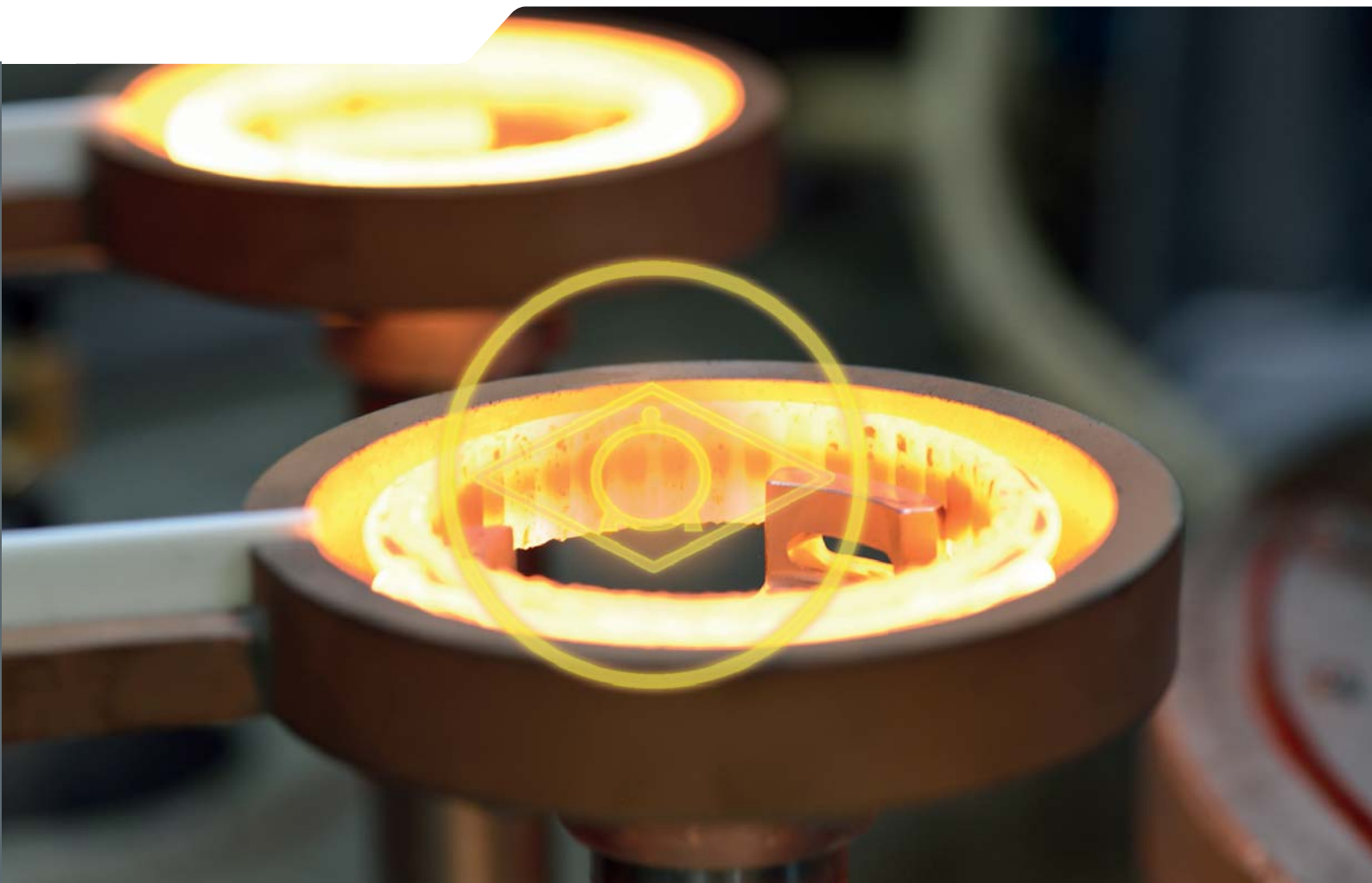


# Inductive Calibration Hardening of sliding sleeves and coupling sleeves



## Machines of the *VELA* series

The gripper star system *VELA* is a high performance machine in unique quality worldwide for heat treatment of drive components preferably sliding sleeves. In addition to inductive hardening of carburized sliding sleeves with quenching on a calibration mandrel, the machine process also includes inductive tempering in conjunction with wear-free removal of the workpiece from the calibration mandrel.

Due to the close tolerance of the completely heat-treated workpieces, reworking can be significantly reduced. One of the expensive hard machining steps, the regrinding of hardened surfaces, is drastically minimized.

The inductive heat treatment of components,

with dimensions very close to the final dimension, also makes it possible to significantly reduce the carburizing depth and thus also the duration of the process. The holding tolerances of the carburizing depth can be reduced by 40 %, thus being almost halved.

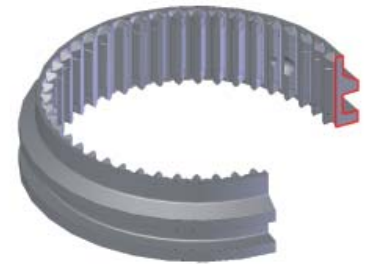
A further unique selling point of the machine is that the calibration mandrel is also suitable for the increasingly required high-performance sliding sleeves with wider backings and protruding snap-in teeth.

In addition, the entire machine room is encapsulated and the complete heat treatment process can be carried out under inert gas. In this way, extremely low scale workpiece surfaces can be produced.



## Disadvantages of previous hardening processes

- Thermal expansion causes changes in dimension and shape
- Distortions due to asymmetric shapes
- Distortions due to asymmetric hardness patterns
- Volume expansion due to martensite structure (approx. 1 %)
- Tensions inside the work piece due to machining and fabrication steps prior to hardening
- And mostly combinations of the above

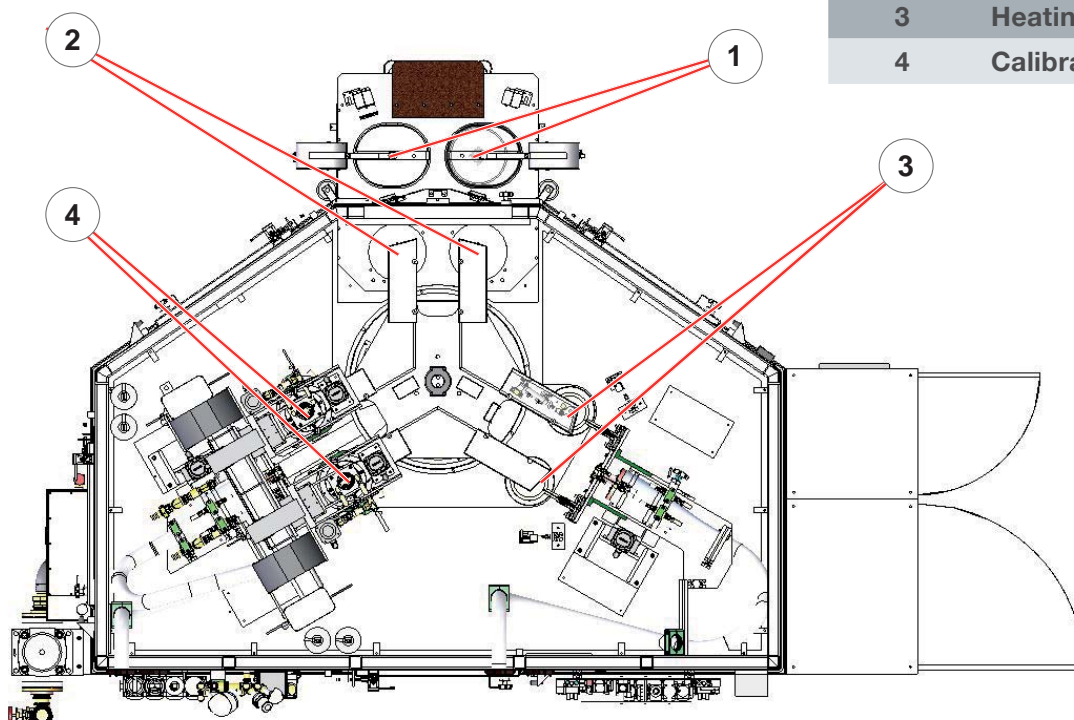


Cross section of sliding sleeve

## Benefits of inductive calibration hardening with VELA

- Workpiece dimensions close to the final dimension
- Minimization of rejects and reworking
- The system can be integrated in line directly
- One-Piece flow
- Energy savings due to short term heating
- Excellent reproducibility
- Optimum accessibility for set-up and service work
- Minimal scale on surfaces due to the use of inert gas
- Remote service via security provider

## Stations of the VELA



Position	Description
1	Loading and unloading
2	Transfer area
3	Heating area
4	Calibrating area

## Ideal Solutions for Heat Treatment

### Induction heating and hardening systems

- Economical and highly reliable systems
- Low energy consumption per workpiece
- Accurately reproducible hardening results
- High throughputs
- Heating zones and times can be determined precisely
- Heat treatment processes with low distortion
- Scale-free hardness zones due to heat treatment with protective gas
- Simple to integrate into production lines
- Lower expenses for production parts
- Tailor-made induction systems from a single source
- User-friendly adjustment, retrofitting and maintenance
- Modern engineering supported by FEM simulation
- Areas of application: surface hardening, annealing and tempering, heat shrinking, fixture hardening

### IGBT converters

- Digital converter control
- Power range from 10 kW up to several Megawatt
- Frequencies from 5 Hz to 400 kHz
- Heating and melting
- Hardening, annealing and tempering
- Forging and forming
- High energy efficiency
- Easy integration into production lines
- Customized solutions and special systems
- Replacement of old and external devices

### After Sales Service

- Qualified and knowledgeable Service Centre
- Service hotline for troubleshooting
- Preventive maintenance
- Smart remote control solutions
- Efficient spare part concepts
- Customized plant-retrofit
- Inductor development, construction and repair service
- Training for operators, maintenance personnel and induction experts (also on site)

### Top quality from one source

- More than 70 years of experience in heat treatment
- Over 10,000 induction systems in long-term operation worldwide
- Development and manufacture from a single source
- DIN EN ISO 9001:2015 certified
- Efficient project and quality management from the first question to subsequent service



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