INDUCTIVE FIXTURE HARDENING

For dimensionally accurate parts
EMA Indutech developed a new inductive hardening and tempering process which combines the benefits of induction heating and hardening with the benefits of a press hardening process. Especially automobile manufacturers increasingly require components with higher accuracy for use in sophisticated applications. To meet these increased requirements, **inductive fixture hardening in one machine** was developed and successfully introduced into the market.

In comparison to conventional fixture hardening, the new machine is distinguished by five important and exceptional criteria:

1. In the state-of-the-art process, workpieces are heated or carburized in a rotary or ring hearth furnace and, while still hot, transported to the press. During transfer period the parts cool down with varying intensity. Also it is known, that the time span from end of heating to first quench is extremely relevant for the quality. This **time is minimized** in the new process. If necessary, or to compensate temperature losses during the transfer, the inductor in the new machine is capable to compensate these losses.

2. If **almost scale-free** heat treatment is required, the workpieces are transferred into the cold state, as a rule. The new machine can be equipped with a sealed **protective gas chamber**, in which the entire heat treatment including reheating, can be performed.

3. Four quenching circuits with mutually independent controls are used. There are quenching holes in the lower fixture, the upper fixture and the calibration mandrel as well as additional exterior quenches. These four quenching options offer **maximum flexibility** and different starting times allow initial **shape corrections**. Of course the flow rates and quenching times can be adjusted and monitored separately.

4. After quenching, the workpiece is shrunk onto the mandrel. In this position the workpiece is heated up inductively to tempering temperature. This increase in temperature causes the workpiece to expand slightly. With increasing temperature, the workpiece expands marginally, creating a minimal gap that enables removal from the plug without affecting the precise, accurate surface of the calibration mandrel.
No appreciable traces of abrasion are left on the mandrel. Therefore the life time increases significantly.

5. Since water soluble polymers are used as quench medium, the washing machine required for oil quenching in the state-of-the-art process, can usually be eliminated.

The Process in principle:

Hardening
Step 1: The workpiece is placed on non-conductive supports and moved to the heating position.
Step 2: Inductive heating or reheating to hardening temperature follows.
Step 3: When the workpiece is heated, the upper fixture moves down and the mandrel is inserted.
Step 4: Quenching starts in the pressed state and the workpiece shrinks onto the mandrel.

Tempering
Step 5: The fixtures move back apart to give space for the inductor.
Step 6: The Inductor heats the workpiece up to tempering temperature.
Step 7: The workpiece is removed from the mandrel.
Step 8: If necessary, additional inductive tempering can follow. After all an active or passive cooling completes the process.

Note: Production machines need to be customized according to workpieces, dimensions and cycle times.
Ideal Solutions for Heat Treatment

Inductive Fixture Hardening E-09.2017

- 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
- Extremely 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

IGBT converters with digital power inverter control

- Heating
- Melting
- Forging and forming
- Hardening and annealing
- Replacement of old and external devices

After Sales Service

- Global 24/7 Service and Hotline
- Qualified and knowledgeable Service Centre
- Preventive maintenance
- Smart remote control solutions
- In stock spare parts
- Customized plant-retrofit
- Inductor development- construction and repair service
- Training for operators, maintenance personnel and induction experts

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/ISO and VDA certified
- Efficient project and quality management from the first question to subsequent service

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