



Induction heat treatment equipment

Melling Performance Springs, Lytham St Annes, Lancashire adds specialist Induction heat treatment equipment to aid technical advancements for the most demanding applications.

Melling Performance Springs has recently invested in specialist induction heat treatment equipment giving increased design and manufacturing capabilities for the most demanding compression spring applications.

Induction heat treatment is a highly efficient and precise method of hardening springs made from strategically selected materials. This technology is key for very demanding spring applications. The MPS machine operates with a 50 Kilowatt solid state insulated gate bi-polar transistorised power supply.

The induction heat treatment process improves the mechanical and physical properties of the spring

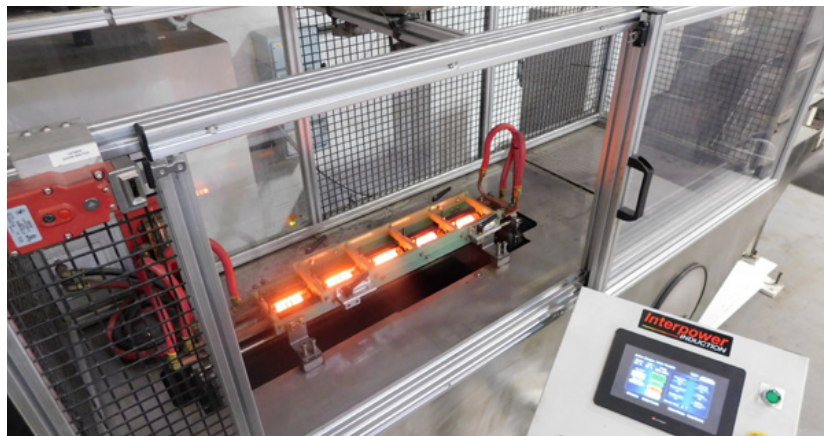
material. During induction heat treatment, an alternating current is passed through a set of parallel copper coils, creating a rapidly alternating magnetic field. When a spring is placed within these induction coils, the magnetic field induces eddy currents within the spring material, generating heat due to resistance. This localised heating allows for precise control over the heating process, resulting in uniform and consistent heating. Once heated to an exact temperature, and held for a specific time, parts are then rapidly cooled using an exact concentration of a specialised polymer-based coolant at a controlled temperature. These quench parameters are critical to avoid steam pockets, material



cracking and decarburisation. The machine is equipped with precise equipment to control the heating, holding time and quenching parameters that allows for a consistent and repeatable method of achieving specific metallurgical properties - giving improved and optimised performance.



Degrees Fahrenheit	HEAT COLORS	Degrees Centigrade
2500	Yellow	1371
2400	Yellow-Orange	1316
2300	Orange	1260
2200	Orange-Red	1204
2100	Red	1149
2000	Red-Orange	1093
1900	Red	1038
1800	Red-Orange	982
1700	Orange	927
1600	Orange-Red	871
1500	Red	816
1400	Red-Orange	760
1300	Orange	704
1200	Orange-Red	649
1100	Red	593
1000	Red-Orange	538



Induction heat treatment offers several advantages over traditional heating methods. The rapid heating, and cooling cycles, allow for a highly efficient process that is more economical and environmentally friendly, resulting in reduced cycle times, lower energy consumption, and increased productivity, leading to overall cost savings. The rapid heating from the induction coils coupled with the machine's electronic and mechanical control technology allows the springs to heat uniformly in a matter of seconds which dramatically reduces decarburisation levels, maintaining the material's surface quality and wear resistance. This eliminates the need for an atmospheric heat treatment process that would require open flames or hazardous chemicals and gasses.



Microstructure and compressive residual stress

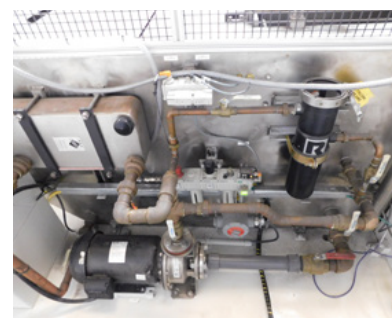
Induction heat treatment plays a pivotal role in tailoring the microstructure of materials, leading to enhanced mechanical properties and performance. During induction heat treatment, the raw material undergoes various phase transformations, such as austenitization, followed by precisely controlled quenching to achieve the desired microstructure. These changes in microstructure directly impact the mechanical properties of the material, including hardness, tensile strength, toughness, and wear resistance. The increased hardness coupled with optimised methods of shot peening, allows Melling Performance Springs to increase the levels of compressive residual stress induced into the material. These improved levels of compressive residual stress enhance the material and provides a beneficial counterbalance to the tensile residual stress, therefore exhibiting superior performance and reliability, enabling Melling Performance Springs to manufacture higher

stressed parts that allow for reduced weight/active mass, improved natural frequency giving superior harmonics, improve fatigue performance, wear and relaxation resistance and reducing the chance of premature failure.

About Us

Melling Performance Springs, is based in Lytham St Annes, Lancashire and manufactures, high performance, precision compression springs for its global customers. We aim to provide solutions to our customers problems. MPS holds IATF 16949:2016, ISO 9001:2015 & ISO 14001:2015 accreditations.

The company was originally founded in 1996 and purchased by Melling in 2020. Our parent company, Melling Engine Parts is headquartered in Jackson, Michigan, USA.



Further information can be found at mellingperformancesprings.com or contact springsales@melling.com