

## STRESS RELIEVING

Stress relieving is exactly how it sounds. This process is performed to minimize residual stresses in parts and components. This process involves heating parts and components to a temperature where the internal stresses can relieve themselves and then cool at a slow enough rate to prevent these stresses from redeveloping.

### BENEFITS

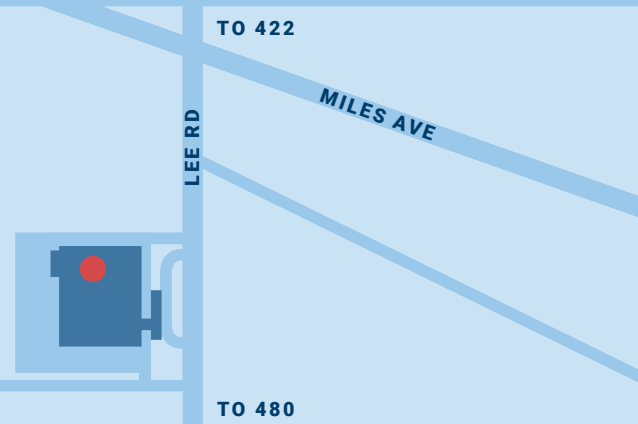
The risk for unwanted dimensional changes and stresses after machining parts and components are minimized. This provides advantages for parts and components with tight dimensional tolerances. Stress relieving reduces the difficulty to perform secondary operations such as grinding and thread rolling. Stress relieving can also be used to lower the hardness of a part or component for a multitude of different applications.

### CONTACT

**Lindsey Rice**  
Director of Sales  
lindsey.rice@ymail.com

**Jim Berry**  
General Manager  
jberry@usaheattreating.com

**Douglas W. DeLaney**  
Quality Assurance Manager/IT  
dwdelaney@usaheattreating.com



⊕ CONTINUOUS AUSTEMPER

⊖ NEUTRAL-HARDENING

⊙ STRESS RELIEVING

# USA HEAT TREATING, INC.

Established in 2002, to service and modernize the heat-treating needs of the manufacturing industry. USA is a service provider of commercial heat treatment for a variety of industries. Our commitment to our customers is quality and turnaround. That commitment begins with our employees and a successful application of the ISO 9001 standard.

USA is certified to ISO 9001 IAF MLA to meet the IATF's automotive supplier requirements.

## PROCESSES

- ★ High volume continuous heat treating
- ★ Mesh Belt Austemper
- ★ Cast link oil quench lines
- ★ Rotary retort oil quench lines
- ★ Mesh Belt stress line

## INSPECTION EQUIPMENT

- ★ Instron/Wilson 500 Series Digital Testers
- ★ Instron/Wilson MO Tukon
- ★ Unitron MEC-2 Microscope
- ★ SSI DP2000 Analyzer

USAHEATTREATING.COM

AN ISO 9001 REGISTERED COMPANY

## CONTINUOUS AUSTEMPER

The Austempering process provides steel with a tough, high-strength structure that resists embrittlement. This process is particularly appropriate for medium and high carbon stampings that require dimensional repeatability. Austempering is typically cost competitive with conventional quench and temper processes.

Austempering creates a Bainite microstructure which provides superior toughness at high hardnesses over typical Martensitic Neutral Hardened (quenched and tempered) steel. Austempering produces minimal distortion, no cracking during quenching and is resistant to hydrogen embrittlement. Austempered steel is superior to conventionally processed steels.

### THE PROCESS

The Austempering process begins by heating the parts to approximately 1550°F to 1750°F in a carbon controlled atmosphere for protection against oxidization and scale. The parts are then immediately quenched in molten salt at approximately 450°F to 750°F. The molten salt quench temperature is above the Martensitic start temperature and a preferred structure of Bainite forms in the steel.

Austempering is a heat treatment that pertains to ferrous metals. What makes Austempering unique is that transformation takes place over many minutes or hours. This equates to a uniform transformation to its Bainite microstructure. The end results are products that are dimensionally more repeatable and predictable.

### BENEFITS

- ★ Less Distortion
- ★ Higher Strength and Toughness
- ★ Lighter Parts and Components
- ★ Lower Overall Component Cost

## NEUTRAL-HARDENING

Commonly known as Quench and Temper, this heat treating process is used to produce parts and components with high hardness and high strength. This process consists of austenitizing, quenching and tempering to produce a tempered martensitic structure.

### BENEFITS

Neutral Hardening is a heat treatment where transformation to Martensite takes place within seconds. This Martensitic microstructure produces an optimal combination of high strength and toughness. Additionally, Neutral Hardening allows for the hardness of the metal to be adapted for distinct purposes. This process will produce Tempered Martensite that is harder and tougher than ordinary carbon steel.

The Neutral Hardening process is used for parts and components where greater abrasion resistance and higher yield strength are a necessity in a wide range of industries.

**USA**  
HEAT TREATING INC.