GASBARRE
THERMAL PROCESSING SYSTEMS

*BATCH AND CONTINUOUS*
# STEAM TREATING

***RELIABILITY, EXPERTISE, SERVICE, AND SELECTION***

## WHAT IS STEAM TREATING?

Steam Treating is a time-temperature-atmosphere dependent process employing a steam atmosphere introduced at the appropriate time to create a tightly adherent oxide layer.

Other common names include: bluing and blackening.

## *WHY STEAM TREAT?*

- Increase Density
- Increase Wear Resistance
- Improve Corrosion Resistance
- Increase Apparent Hardness
- Improve Magnetic Response
- Porosity Sealing
- Cosmetic Appearance

### *BATCH KEY POINTS*

- Lower Initial Capital Investment
- Less Floor Space
- Intermittent Labor
- Easy to Idle
- Low Maintenance
- Flexible cycle and part processing

### *BATCH CYCLE*

- Load Baskets
- Start Auto Cycle
- Ramp to Burn Off Temperature and Soak
- Ramp to 1000°F +/- and Soak
- Activate Steam and Soak
- Eliminate Steam
- Nitrogen Purge
- Cool
- Approximate 3 to 3.5 Hour Cycle

### *CONTINUOUS KEY POINTS*

- Higher Capital Investment
- More Floor Space
- Fixed Labor
- Difficult to Idle
- Slightly Higher Maintenance
  *(Belt, Muffle, Water, Continuous Moving Components)*
- Better for higher volume applications

### *CONTINUOUS CYCLE*

- Continuous Belt Load
- Continuous Flow
- Cycle Very Similar to Batch
- Lighter Loads Requiring Lower Soak Times
- Approximate 3 Hour Cycle Time

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## BATCH STEAM TREAT FURNACE

The batch furnace is an electrically heated, top-loading, pit-type furnace. The furnace can be installed in a pit to lower the loading height or installed at ground level with a mezzanine. The typical maximum temperature is 760°C (1400°F). The work envelope is typically cylindrical and surrounded on all sides by high-temperature resistance heating elements. The work chamber includes an alloy retort to protect the surrounding high-performance insulation package from the process steam. The workload is maintained in mesh alloy baskets that are lowered into the heat chamber from the top.

A counterbalanced cover lid is utilized to seal the work chamber. A shielded high-temperature circulation fan is located in the floor of the unit. The circulation fan is utilized to provide the best temperature and steam uniformity to the workload. An ambient air blower can be included to accelerate the cooling cycle.

## CONTINUOUS BELT STEAM TREAT FURNACE

High-volume production requirements may lend themselves to a continuous-belt steam-treat furnace.

The humpback belt furnace is designed for product to be loaded directly onto a continuous mesh belt. These furnaces are electrically heated with a maximum temperature of 760°C (1400°F).

The humpback design utilizes an elevated hearth and alloy muffle chamber that takes advantage of the fact that steam wants to rise. The design aids in reducing the ability of air entering and mixing with the steam.

The heating is done by wire-wound heating elements above and below the alloy muffle for good temperature uniformity. The cycle times are controlled by the belt drive speed and the length of the heating chamber. Continuous designs typically have multiple heating zones individually controllable via universal digital control instruments or via HMI. Continuous furnaces can be customized to specific production load/volume requirements.

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