

Applications (Cont.)

- Materials:
- Ferrous:
 - Alloy Steels
 - Cast Iron
 - Nickel Alloys
 - Silicon Steels
 - Stainless Steel

- Nonferrous:
 - Aluminum
 - Beryllium Copper
 - Brass
 - Copper
 - Titanium

- Functional Materials for energy
 - Engineered Ceramics
 - Refractory

- Markets Served:
- Aerospace
 - Automotive
 - Bearings
 - Forgings

- Defense
 - Electric Motors
 - Energy
 - Oil & Gas

- Off-Road Vehicle
 - Steel Mills
 - Wire
 - Ceramics
 - Battery Materials



Get started with Surface!

Call Surface with the following information to get your furnace solution underway.

Work Description and your Process needed:

- cycle
- operation
- hours per year
- available space
- operating temperature range
- heat source

We will work with you to develop the best processing solution for your heat treating requirements. This starts with developing a complete process solution and continues through shipment, installation and equipment commissioning.

Once your system is in place we continue working with you for the life of the equipment through our industry leading aftermarket services including customer service, Aftermarket Parts, Rebuild and Upgrade Service. We look forward to working with you.



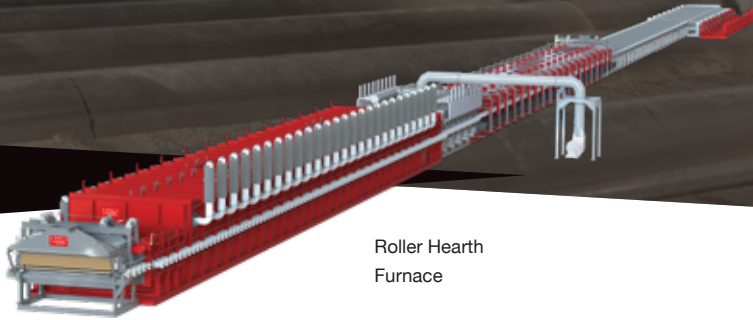
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Roller Hearth Furnaces



Surface Combustion has an Installed Base of Over 350 Roller Hearth Furnaces Worldwide

The roller hearth furnace is a continuous or batch furnace concept that allows processing of small product in trays and baskets, or larger product directly on the furnace hearth. The hearth consists of a series of rolls which are supported and driven externally to the furnace chamber. Furnaces can be provided in electric, direct fired, and indirect gas fired configurations to meet specific processing requirements. The furnace design can be configured with lengths and layouts to meet the customer's needs.

- Unique Design Features:
- Atmosphere flow balance
 - Automation and tracking
 - Charge / Discharge vestibules with fast in/out functions for atmosphere control
 - Charge / Discharge throats to minimize atmosphere and heat loss
 - Experience – over 350 roller hearth furnaces installed
 - Oscillation of heavy loads
 - Roll to roll drive systems
 - Roll bearing air cooling
 - Static Cool sections for bright work
 - Trident® radiant tube heating system

- New Developments:
- Silicon Carbide Rollers
 - Indirect Air-Cooling Sections



Surface Combustion has references over 300 feet long and with widths up to 10 feet wide.

Roller Hearth Furnaces

Furnaces Features

A continuous or batch concept, the roller hearth furnace handles a range of loads and is built to the lengths and layouts a process demands.

Types:

- Roller Hearth Lamination Annealing Furnaces
- Roller Hearth Tube and Bar Annealing Furnaces
- Roller Hearth Tray Furnaces – Coils & Fixtured Loads / Components
 - Straight through or U-shape layout options

Rating / Sizing:

- 4,000 lbs/hr – 33,000 lbs/hr (Tube Annealing & Bright Normalizing)
- Typical widths are 3 to 6 feet; with customs designs up to 10 feet
- Provided at any Overall Length Required
- Up to 2,200F designs

Features & Benefits:

- Self-emptying
- Flexibility of variable speed for varying production and process requirements
- Variety of heating options: Electric – Indirect Gas – Direct Fired Gas
- Controlled atmospheres: RX®, DX®, Nitrogen, Nitrogen-Methanol
- Variety of cooling options: Static and Jet cooling options
- Flexible design for processing many types of workloads
- Furnaces designed to meet required production demands
- Bayonet quench tank for munitions

Companion Equipment:

- DX® exothermic gas atmosphere generator
- RX® endothermic gas atmosphere generator
- Afterburners / Incinerators
- Water Cooling Systems
- Load / Unload Systems
- Conveyors



Applications

Variable speed drives and controlled atmosphere capability let a single roller hearth line cover many thermal processing requirements.

Processes:

- | | | |
|---|----------------------------|---------------------------|
| • Austenitize, Quench and Temper | • Carburize | • Reheat |
| • Annealing <ul style="list-style-type: none">• Isothermal Anneal• In Process Anneal | • Demilitarization | • Solution Heat Treatment |
| • Austemper | • Hardening | • Spheroidizing |
| • Burn-Off | • Incineration | • Stress Relief |
| • Bluing | • Malleabilizing | • Steam Treating |
| • Carbon Restoration | • Martemper | • Tempering |
| • Carbonitriding | • Normalize | • Waste Remediation |
| | • Precious Metals Recovery | |
| | • Pyrolysis | |

Part Types

The roller hearth design handles both long products and discrete components, processed in trays and baskets or directly on the hearth.

Long Products:

- Bars
- Pipe
- Plate
- Rod Coil
- Slabs
- Stampings
- Tube

Components:

- | | |
|------------------------|----------------------|
| • Aerospace structures | • Forgings |
| • Armaments | • Pinions |
| • Bearings | • Powder Metal Parts |
| • Castings | • Munitions |
| • Gears | |
| • Engine Blocks | |

Roller Hearth Furnaces

