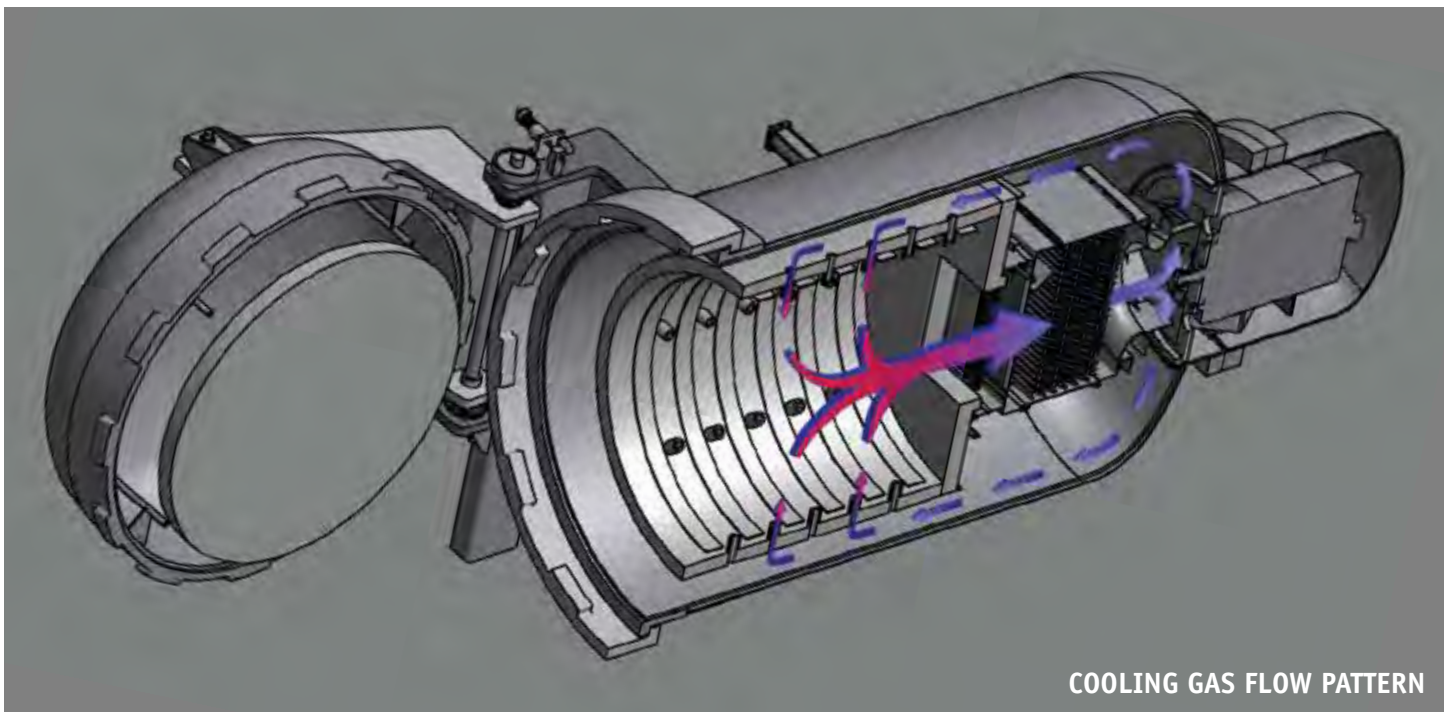




# Introducing The Solar Super Quench Vacuum Furnace

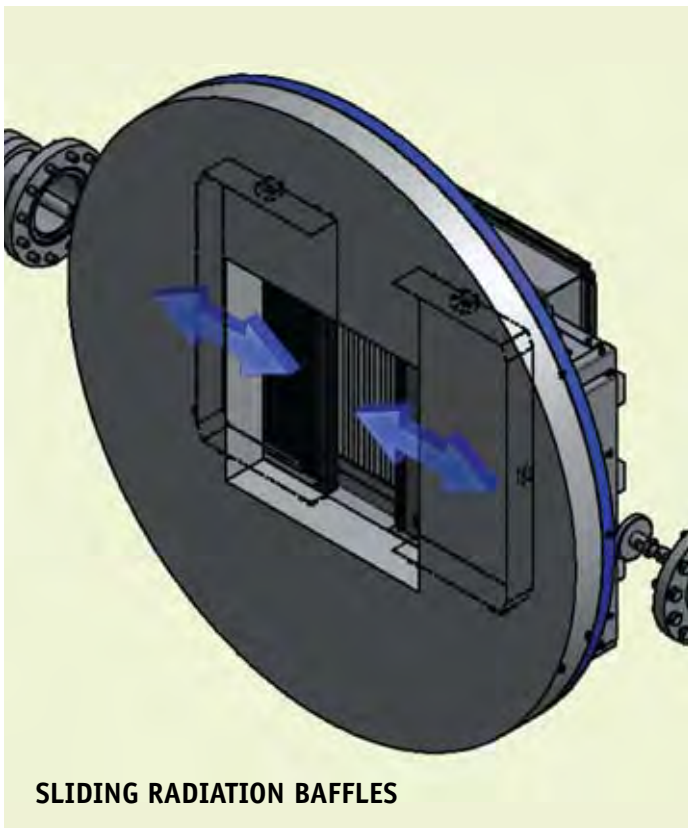
For many years, vacuum furnace engineers and designers have been challenged to continue to improve gas quenching capabilities of these furnaces. The prime objective has always been to replace oil quench atmosphere furnaces with the very real advantages of high pressure gas quenching vacuum furnaces. This would result in the elimination of possible cracking and reduce residual stress on

processed materials. Although some oil quench steel grades of reasonable cross section have been successfully processed in newer 10-bar vacuum furnaces, there continues to be a desire to advance the art for processing lower alloy materials. This has led to the manufacture of a limited number of 20-bar gas quenching furnaces within the heat treating industry with some qualified success.



COOLING GAS FLOW PATTERN

Introducing the new Solar Manufacturing SSQ-IQ Series 20-bar vacuum furnace featuring a unique, minimally restricted gas flow design that greatly improves cooling speeds on any materials being processed. We are confident that this new 20-bar gas cooling system with its much improved gas flow patterns will significantly advance the curve in high pressure gas quenching technology.



As stated, key to the design\* is the minimally restricted flow of the cooling gas resulting in very low pressure drops, where net effect of available energy is used to cool the work and not to just circulate the gas. This is primarily accomplished by the elimination of the standard fixed thermal exit baffles and the incorporation of rear-opening, sliding radiation baffles that are actuated when the cooling gas is introduced. This allows for the direct exit of the cooling gas from the hot zone through a chevron-type diffuser and into the gas-to-water heat exchanger. The gas then returns through graphite tapered nozzles positioned at the front and main circular body section of the hot zone.

*Note: \*A patent application has been filed on key elements of this design.*

The selected heat exchanger is a more compact design, incorporating high surface area per unit volume. The re-circulating gas flow is driven by a 300 HP, high performance, easily accessible, rear mounted, 230 volt motor.

In addition, the SSQ-IQ will advance present vacuum carburizing capabilities on lower alloy steels like AISI 8620, with its capacity to increase core hardness on larger cross-section components. We expect that this will be particularly of interest to the gear producing industry. Also, with the added quenching capability, the furnace will be able to process larger loads and heavier cross-sections of other materials such as AISI 4140, 4130, 4340, and 52100.



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## SSQ-IQ SERIES

### Vacuum Heat Treating Furnaces

Solar Manufacturing designs and manufactures vacuum heat treating and brazing furnaces with a focus on energy efficiency and durability. As a team of specialists with many collective years of experience in vacuum furnace and hot zone design, we are committed to our objectives of providing vacuum furnaces with the lowest cost of ownership achieved through state-of-the-art materials, high performance operation and new and innovative designs. This SSQ-IQ furnace series will advance the industry in high pressure gas quenching capabilities.

Solar Manufacturing is part of Solar Atmospheres, Inc., a progressive company and one of the largest independent commercial heat treaters in the USA. Being part of this organization affords us a distinct industry advantage to assist you in choosing the right vacuum furnace for your application based on extensive process and equipment experience.

#### Features and Benefits

- Horizontal, front loading design with hinged front door for easy, convenient unobstructed loading/unloading of work loads and fixtures
- Autoclave locking ring closure eliminates door seal problems
- Work zone sizes:

18" W x 14" H x 24" D	500 pound capacity
24" W x 24" H x 36" D	1500 pound capacity
36" W x 36" H x 48" D	3500 pound capacity

Other sizes available as required.
- Energy efficient graphite insulation for high temperature applications up to 2650°F

- Thin, curved graphite resistance heating elements for uniform radiant heat up
- High performance internal gas quenching system incorporating minimally restricted gas paths for rapid cooling at gas pressures up to 285 PSIG (20-bar)
- Fully automated and programmable industrial controls package
- Designed for easy maintenance and minimal downtime.
- Full one (1) year Warranty

#### Specification/Details

The SSQ-IQ model is a horizontal front loading, internal quench, vacuum heat treating furnace generally designed for high production commercial and captive heat treating shops requiring high speed cooling capabilities. It is a high temperature, high vacuum, batch type furnace with electric resistance heating elements.

#### Hot Zone

- Operating temperature: 2400°F
- Maximum temperature: 2650°F
- Temperature uniformity:  $\pm 10^{\circ}\text{F}$  (1000°F to 2400°F)
- Hearth: graphite support pins and graphite rails
- Heating elements: curved graphite bands
- Insulation: 1.0" graphite board backed by three (3) layers of 0.5" high purity graphite felt
- Insulation and heating elements are mounted on a heavy duty stainless steel support structure

# SSQ-IQ SERIES

## Vacuum Heat Treating Furnace

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### Vacuum Chamber

Double wall, water cooled, horizontal front loading vacuum chamber. Hinged front door with pneumatically operated, autoclave-type locking ring to permit the furnace to safely quench at positive pressures up to 285 PSIG (20-bar). Oversized water inlets and outlets assure maximum water flow.

### Gas Quenching System

The internal gas quench system provides the lowest resistance, highest efficiency gas flow in the industry. This is primarily accomplished by the elimination of fixed position hot zone gas exit baffles and the introduction of moveable, sliding radiation baffles at the rear of the hot zone. An appropriately sized, reduced voltage motor drives a high-speed radial fan to recirculate the quench gas straight through the water-to-gas heat exchanger and then into the hot zone at high velocity. The tapered graphite gas nozzles are specifically directed at the work load for optimum cooling.

### Vacuum Pumping System

- Mechanical Pump: Edwards Stokes
- Vacuum Booster Blower: Edwards Stokes
- Diffusion Pump: Varian
- Holding Pump: Alcatel
- High Vacuum Valve: Right angle poppet valve

### Power Supply

Hunterdon VRT or Magnetic Specialities angle fired SCR power supply; 460 volt/3 phase/60 Hertz

### Control Cabinet and Instrumentation

All industrial controls and instrumentation are housed in a suitable NEMA 12 control cabinet. The SolarVac interactive control system enables the operator to monitor, control, record and display information graphically to quickly understand the status of the furnace.

- Programmable Logic Controller: Allen-Bradley
- Programmable Controller: Honeywell Model DCP551
- Overtemperature Controller: Honeywell Model UDC2500
- Graphic Video Recorder: Eurotherm Model 6180 utilizing a 12" color touch-screen monitor
- Operator Interface: Allen-Bradley PanelView Plus 1500 utilizing a 15" color touch-screen monitor
- Vacuum Gauge Controller: Televac MC300
- Control Thermocouples: Type "S"
- Work Thermocouples: Type "K"

### Optional Equipment and Energy Savings Options

- ConserVac energy saving pump control system
  - Variable frequency drive for quench motor
  - Dedicated rail guided load truck; manual or powered
  - Gas backfill reservoir
  - A330 and molybdenum work grids
- Additional options are available upon request.

**For more information or to request a proposal, contact the vacuum furnace specialists at Solar Manufacturing.**

