

The Solution

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HOLCROFT

DualTherm®
Vacuum Furnace Systems
offer exceptional processing performance





DualTherm offers exceptional processing flexibility using proven technologies.

DualTherm vacuum furnace systems are designed for small to medium batch workloads for applications in the aerospace, wind generation, automotive, bearing, tooling and industrial markets. Intricate part geometry of specialized alloy materials or greater cross sections of lower alloyed materials can be processed confidently. Its exceptional processing flexibility supports vacuum annealing, normalizing, hardening, aging, sintering, low pressure carburizing and carbonitriding, along with High Pressure Gas Quenching (HPGQ) applications.

Design Concept

Based on proven technologies of the ModulTherm® system, the DualTherm design has two distinct chambers that separate the heating and cooling processes for faster heat-up times, less energy consumption, greater quenching intensity and less maintenance. By separating the processes of heating, cooling and load movement, as illustrated in Figure 1, process execution is far more effective, enabling a broader range of process capabilities.

Entry/Exit Chamber Step 1

The furnace is loaded through the quench chamber; the chamber is evacuated and the load is moved into the treatment chamber.

Transfer Zone Step 2

Loads are transferred from chamber to chamber by an internal transfer mechanism. This mechanism is well-proven as part of the automated ModulTherm systems installed around the world.

Treatment Chamber Step 3

The Treatment Chamber remains under vacuum (except during convection heating) and is always at operating temperature. At the end of the treatment cycle, the load is transferred to the cold chamber, which now acts as a quenching chamber.

HPGQ Chamber Step 4

Helium or nitrogen is used to quench the workload at pressures up to 20 bar. At the end of the quench cycle, the cold chamber is returned to atmospheric pressure, and the workload is removed by a fork loader.

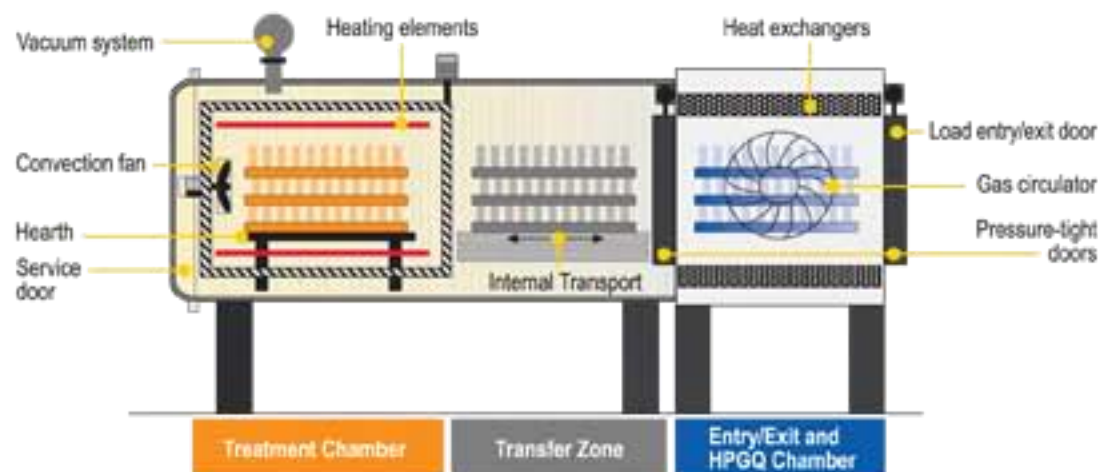


Figure 1: DualTherm chamber design

User Benefits:

- Multiple heat treatment capabilities
- Easily expanded processing capacity
- Interplanar oxidation elimination
- Precise case depth control
- Multiple part geometry processing
- Repeatable load-to-load results
- Easily automated process parameters
- Rugged, low maintenance operation
- Clean, safe work environment
- Single or linked furnace configurations

Features and Options:

- Up to 2200 lbs. hearth capacity
- 24" W x 30" H x 40" L treatment chamber
- Convection-heated treatment chamber
- Up to 2280°F processing temperature
- 180 kW heating power
- Nitrogen or helium gas quenching
- Selectable gas quenching pressure up to 20 bar
- Quench gas recovery systems
- Single or dual gas circulating fans
- Single or dual heat exchangers
- Efficient input charge load/unload

Design Benefits

- Treatment Chamber hot zone is not thermally stressed by high-pressure/high-speed gas flow during quenching process, resulting in significantly longer hot zone life.
- Maintaining a steady temperature precludes the need to heat and cool the hot zone assembly with each workload, thereby saving energy.
- Simplified baffling system enables alternating gas flow paths, providing quench distortion control.
- Separated chambers prevent load handling equipment interference or compromise with heating or quenching processes.
- Ultimate control of gas distribution provides a homogenous, uniform quench flow.

Processes

The DualTherm system can be used for annealing at temperatures up to 2280°F/1250°C, as well as for low pressure carburizing up to 1925°F/1050°C. When equipped with multiple quench gases (i.e. nitrogen, helium, argon) it is also possible to treat tool steels, rapid machining steels or Powdered Metals (PM) in addition to low alloyed tempering steels and case hardening materials.

- Annealing under convection up to 1750°F/950°C

- Annealing with partial pressure up to 2280°F/1250°C
- Hardening at temperatures to 2280°F/1250°C with different gases and with a maximum quenching pressure of up to 20 bar
- Low pressure carburizing with high pressure gas quenching
- Low pressure carbonitriding
- Vacuum brazing with subsequent fast cooling

Control System

A swing-arm-mounted, panel PC is conveniently positioned near the workload entry door. All furnace movements and functions are authorized using a programmable logic controller (PLC). At the PC, all treatment recipes are entered, stored and executed integrating user-specific data, such as load number, part numbers and quantities. The PC also is the storage facility for all historical data, including process parameters and fault messages. Process information can be viewed in real time and historically via the graphical user interface.

The PC can be networked to most factory systems and backed up to a CD/DVD drive. This makes remote recipe development and download possible.

Exceptional Processing *Flexibility*



Obtain superior metallurgical results for applications in aerospace, wind generation, automotive, bearing, tooling, and industrial markets, using the **DualTherm system**.



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ALD-Holcroft Vacuum Technologies Co., Inc.
49630 Pontiac Trail
Wilson, MI 48393-2009
Ph: 248.668.4130
F: 248.624.3710
E-mail: sales@ald-holcroft.com
www.ald-holcroft.com

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