

**Unicase Master[®]
4D Quench[®]**



A MODERN ALTERNATIVE TO PRESS QUENCHING

UNICASE MASTER[®] 4D QUENCH[®]

Vacuum System for Individual Quenching With Distortion Control

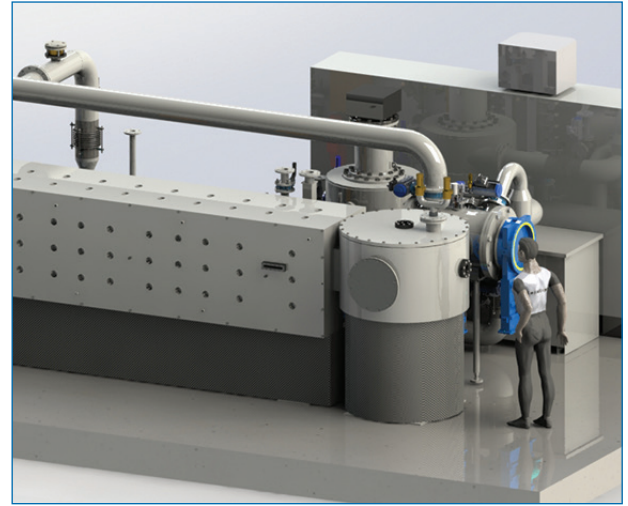
- Total process integration and automation
- Distortion control, reduction and prediction
- High quality, high precision
- Noiseless transmission
- eCar, eDrive
- Industry 4.0

Unicase Master® 4D Quench®

A vacuum system for single-piece nitrogen quenching with distortion control is an attractive alternative to press hardening.

UCM 4D Quench® - is a vacuum heat treatment solution for individual quenching of component parts such as gears, shafts, bearing races, rings, sleeves, etc. made of standard or custom case and through hardening steels. It provides excellent distortion control and notably increases precision and repeatability of heat treatment while reducing unit and production costs. The system is fully automated and easily integrated with in-line production. It's a smart, modern alternative to press hardening that eliminates all of the disadvantages.

UCM 40 Quench® is ideal for heat treaters who want to significantly increase production quality and economy of mechanical transmission components compared to batch or continuous heat treatment systems, or



quench presses. It consists of a vacuum heating chamber and a high pressure nitrogen quench chamber equipped with transportation mechanisms.

Industries:

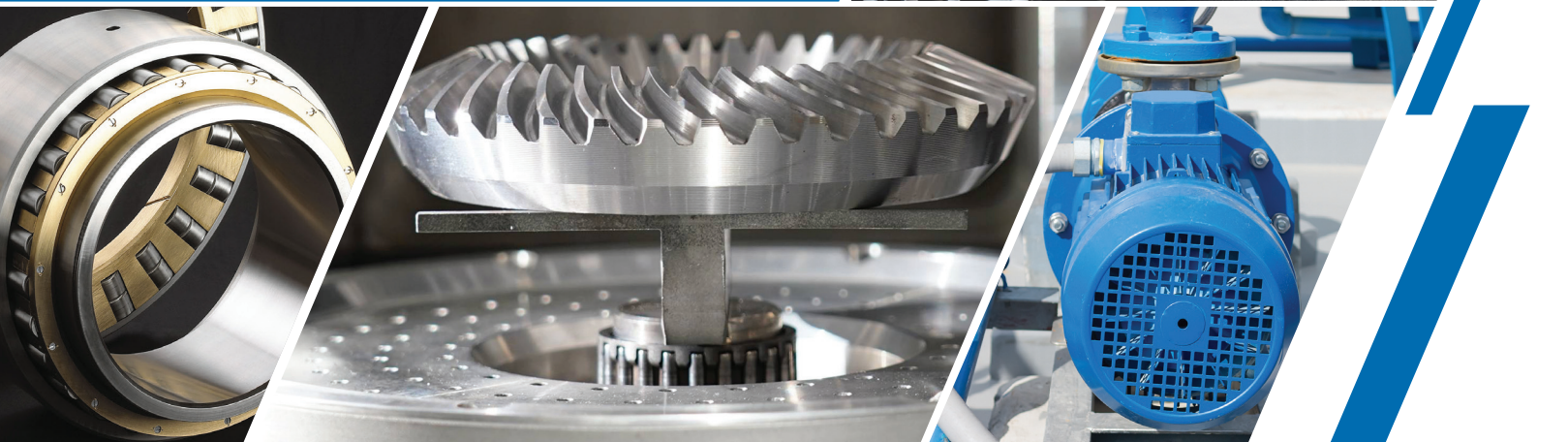
- Aerospace
- Automotive
- Transmission
- Bearing
- Machinery

Materials:

Traditionally oil quenched steels for post carburizing or through hardening applications

Technologies:

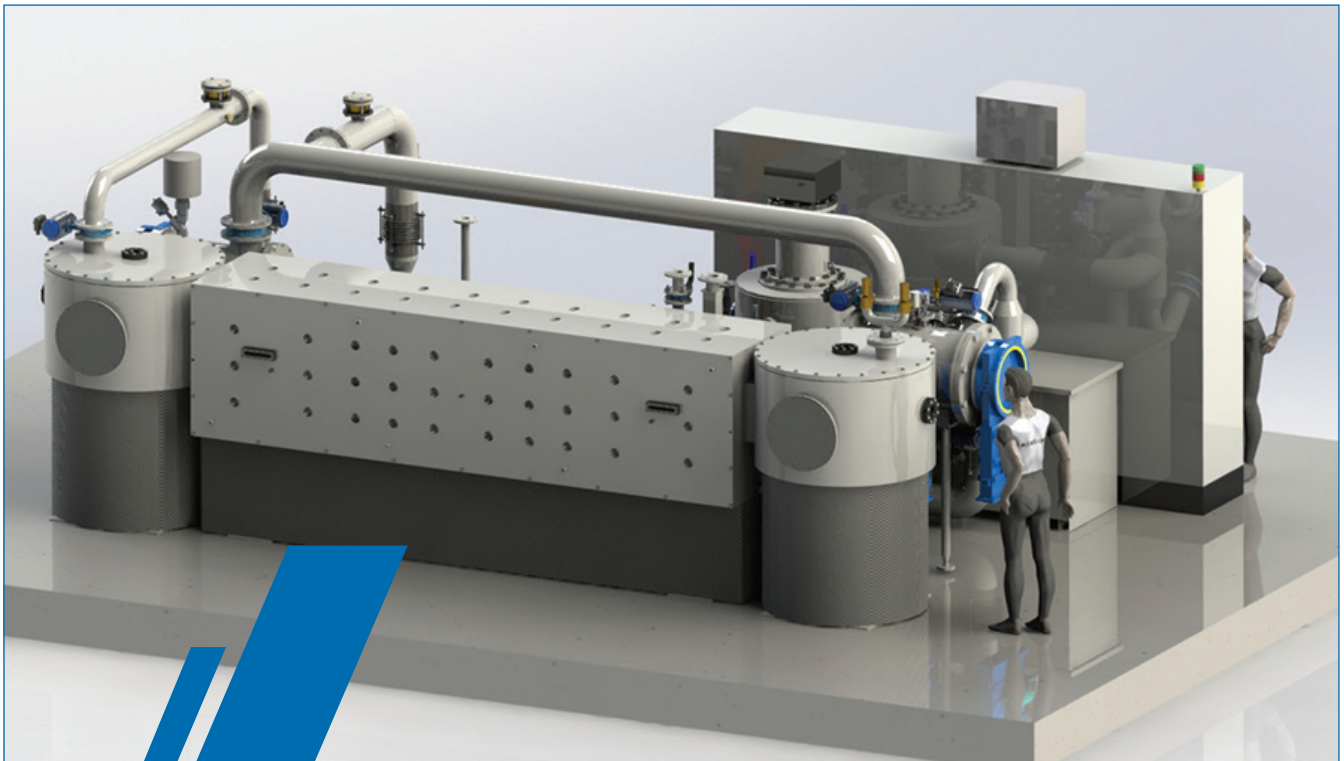
Bright hardening (High Pressure Gas Quench) with distortion reduction and control

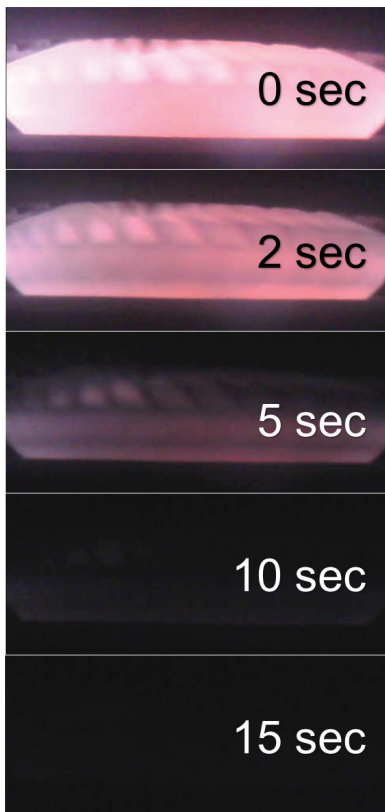
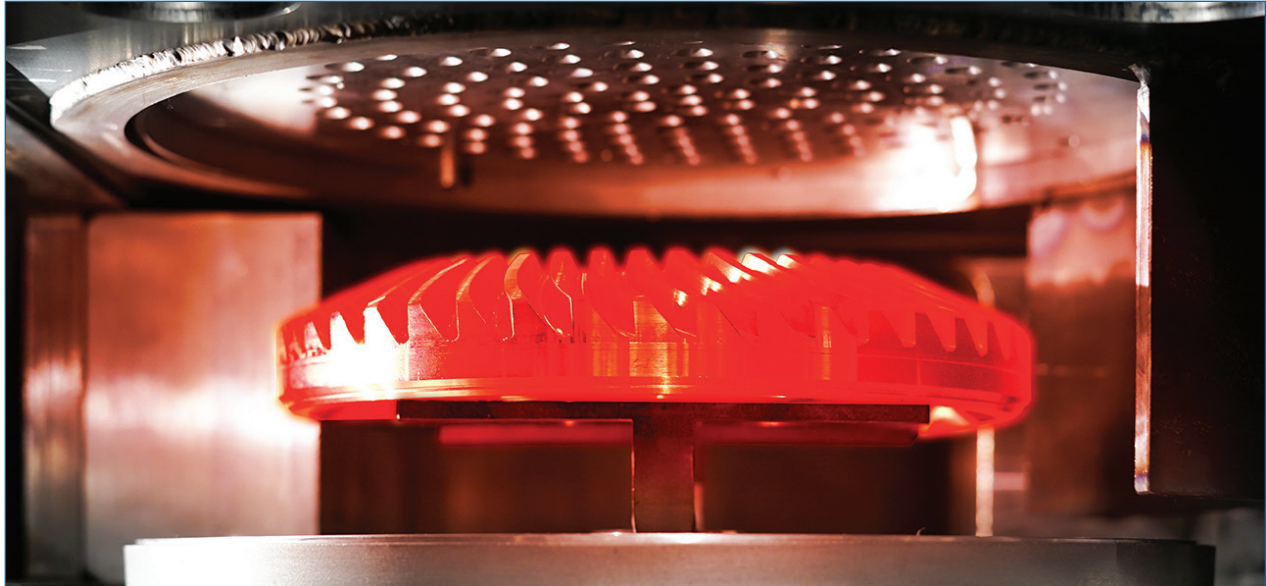


Find out more about our Unicase Master 4D Quench!

Technical Specifications

Parameter/Model	UCM-1-200/50-4DQ	UCM-1-300/100-4DQ	UCM-1-500/150-4DQ
Working zone OD/H	200/50 mm, 8/2"	300/100 mm, 12/4"	500/150 mm, 20/6"
Part mass	5 kg, 11 lb	10 kg, 22 lb	20 kg, 44 lb
Temperature	1260°C , 2300°F		
Heating positions	15	10	6
Cycle time	40 s	60 s	90 s
Vacuum	10 ⁻² mbar/torr		
Heating power	75 kW	120 kW	180 kW
Quenching type	10 bar N ₂		
Quenching rate	2000 W/m ² K (oil range)		
Footprint	7 X 4 m, 23 X 13 ft		



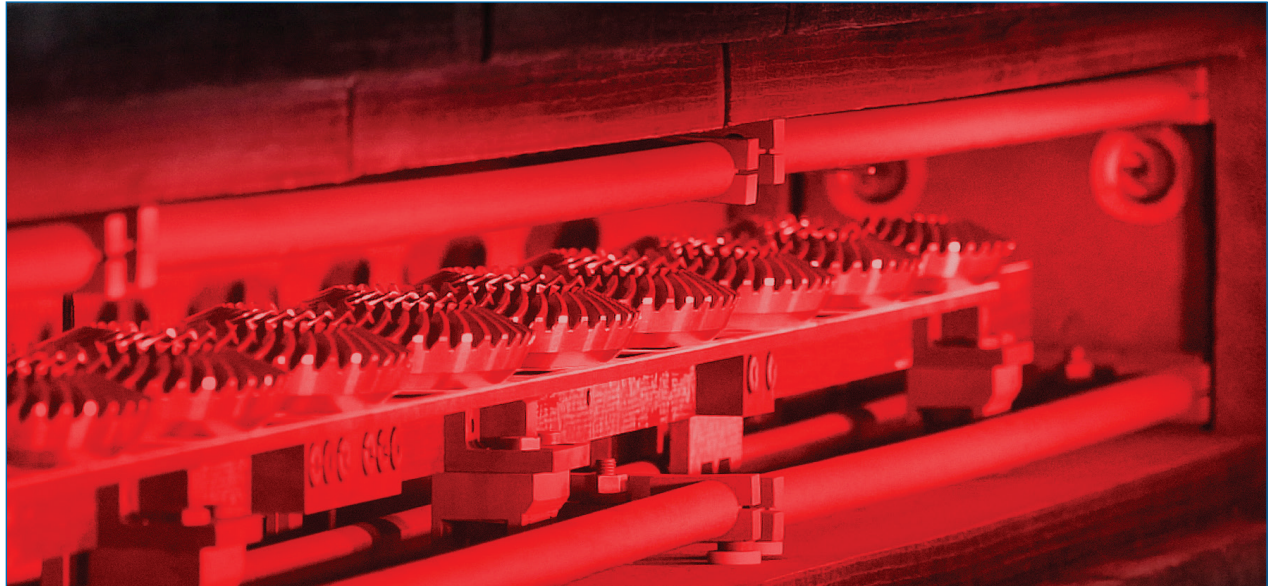


Parts are heated up to hardening temperature in the heating chamber under vacuum, which protects the part's surface against contamination and unexpected composition changes. The quenching process provides significant improvements related to the reduction of distortion. This is done primarily using a high-pressure gas quenching system installed in the quenching/unloading chamber.

The system utilizes a proprietary arrangement of cooling nozzles that surround the part to ensure a uniform flow of cooling gas on all sides, as well as the top and bottom. This is referred to as 3D quenching. In addition, a table spins the part, enhancing quench uniformity. The fourth dimension in the process occurs when the part is rotated during quench, allowing us to 4D quench parts for the best possible uniformity.

The cooling nozzle pattern can be adjusted to fit the particular part. The entire nitrogen cooling system provides the equivalent of an oil quench with more uniform cooling, which reduces distortion and results in highly repeatable results. Oil or specialized gases such as helium are not required.

The single-piece flow method, where parts are passing through heat treatment one at a time, enables integration into in-line manufacturing, alongside CNC machines. It eliminates heat treatment fixtures, material logistic costs and time, and shortens the production cycle. Moreover, repeatability of quenching results and distortion control can potentially reduce machining costs. In addition, every single part is monitored during heat treatment, which provides 100% traceability and quality control. Both the system and the technology are safe, clean and environmentally friendly.



4D Quench System Benefits:

- Distortion control, reduction and prediction
- Absolute precision and repeatability of results
- Improved safety and no fire risk
- Total process integration and automation
- Single part traceability and reporting
- Compact footprint
- Flexible, on-demand operation
- No human involvement and impact
- Elimination of press tooling
- Eliminates the need for furnace fixtures
- No decarburization and oxidation

- Clean part surface (vacuum)
- Nitrogen quench (no need for oil or helium)
- Elimination of copper masking or stop off paints
- Elimination of high-temperature radiation
- Elimination of oil and oil vapor contamination
- Elimination of washers and cleaning chemicals
- Safe and environmentally friendly process

Unique Features:

- Single-piece flow
- Vacuum heat treatment
- 4 dimensional, forced nitrogen quenching



SECO/VACUUM is a member of the SECO/WARWICK Group, a leading global manufacturer of heat treatment furnaces and equipment.

SECO/WARWICK is a technological leader in innovative heat treatment furnaces. Expertise includes end-to-end solutions in 5 categories: vacuum heat treatment, atmosphere, and aluminum thermal processing, controlled atmosphere brazing of aluminum heat exchangers and vacuum metallurgy. SECO/WARWICK Group has 9 companies located on three continents with customers in nearly 70 countries, and with production facilities in Poland and China. In addition, the Group includes a number of service and sales offices in such countries as USA, Germany and Russia. The company provides standard or customized state-of-the-art heat processing equipment and technologies to leading companies in the following industries: automotive, aerospace, electronics, tooling, medical, recycling, energy including nuclear, wind, oil, gas, and solar and production of steel, titanium, and aluminum.

SECO/VACUUM
The North American Vacuum Furnace Company

SECO/VACUUM Technologies LLC
180 Mercer Street, Suite 101
Meadville, PA 16335 USA
T: +1 814 332 8520
E: info@SecoVacUSA.com
www.SecoVacUSA.com