

**ALD Vacuum Technologies**

High Tech is our Business



# **ModulTherm<sup>®</sup> 2.0**

Vacuum heat treatment system  
with high pressure gas quenching





## High tech is our business

ALD is a brand name associated world-wide with innovative vacuum technology at the highest level. As one of the leading manufacturers of vacuum plants and vacuum process technology we supply all areas of vacuum metallurgy and vacuum heat treatment with high-tech products and services.

### Tradition with obligation

The company's success story begins with two great entrepreneurs in vacuum technology: Ernst Leybold (1824 – 1907), founder of the Leybold company and Wilhelm Carl Heraeus (1827 – 1904), founder of the Heraeus company.



Wilhelm Carl Heraeus



Ernst Leybold

The companies Leybold, Heraeus and Degussa, which was founded by Friedrich Ernst Roessler in 1837, are the roots of ALD. Today, ALD is a member of the international AMG Advanced Metallurgical Group N.V. and is ranked at the top in vacuum metallurgy. ALD is the leader in vacuum heat treatment technology.

### Technology, setting examples

Thanks to our advanced and highly sophisticated concepts ALD offers individual solutions which are geared to their respective tasks. The technological advancements in vacuum metallurgy, vacuum heat treatment and vacuum sintering technology make us a strong partner for important and growing future-oriented branches such as energy production, aviation, material production and processing and the automotive industry. Our ambition to provide the highest level of quality and technical perfection is strengthened by our determination to supply our customers with optimum service. Therefore, we are continuously developing new ecological processes, which are further improved in specialized operating companies, thus conserving resources and protecting the environment.

### Service, creating additional benefits

Through consistent project management and quality management ALD has acquired a top position in the international marketplace. In addition to our high level of expertise in process and plant technology we offer a wide range of extensive services together with our representatives and partners worldwide. Our full service comprises the excellent supply of spare parts, periodic maintenance as well as servicing, modernization and integration of newly developed processes into existing plants. You can be assured, ALD is your reliable partner, today, tomorrow and in the future.

## New technologies for future branches

ALD Vacuum Technologies is the technology leader in the area of vacuum case hardening. Low pressure carburizing and dry gas quenching combined with the named heat treatment system ModulTherm® represent the preferred technology in the heat treatment of new transmissions and injection systems in the automotive industry.



Photo: Buderus Edelstahl GmbH

### Vacuum heat treatment

The heating of parts in vacuum prevents damaging oxidation which occurs in normal atmosphere. The atmosphere is easily and safely removed by evacuating the treatment chamber at the beginning of the heat treatment process. This technology is especially suited for hardening, tempering, case hardening, brazing, sintering and annealing at temperatures up to 1250 °C.

### Linked single chamber system

The ALD ModulTherm® heat treatment system consists of several individual treatment chambers which are positioned in one row and handled by a shuttle module which moves on rails. The shuttle module consists of a transport chamber as well as a high pressure gas quench chamber where loads are hardened in gas flow, at high pressure and high velocity, after e.g. a carburizing cycle.

### Heat treatment systems, integrated into production

The ALD ModulTherm® heat treatment system can be integrated directly into the mechanical production line. Surrounding components are not affected by heat or exhaust gases or any other negative effects, due to the cold wall furnace technology. The integration of heat treatment into the production line verifiably increases productivity. Many well-known manufacturers are already using the new heat treatment technology successfully.

New technology successfully in use:

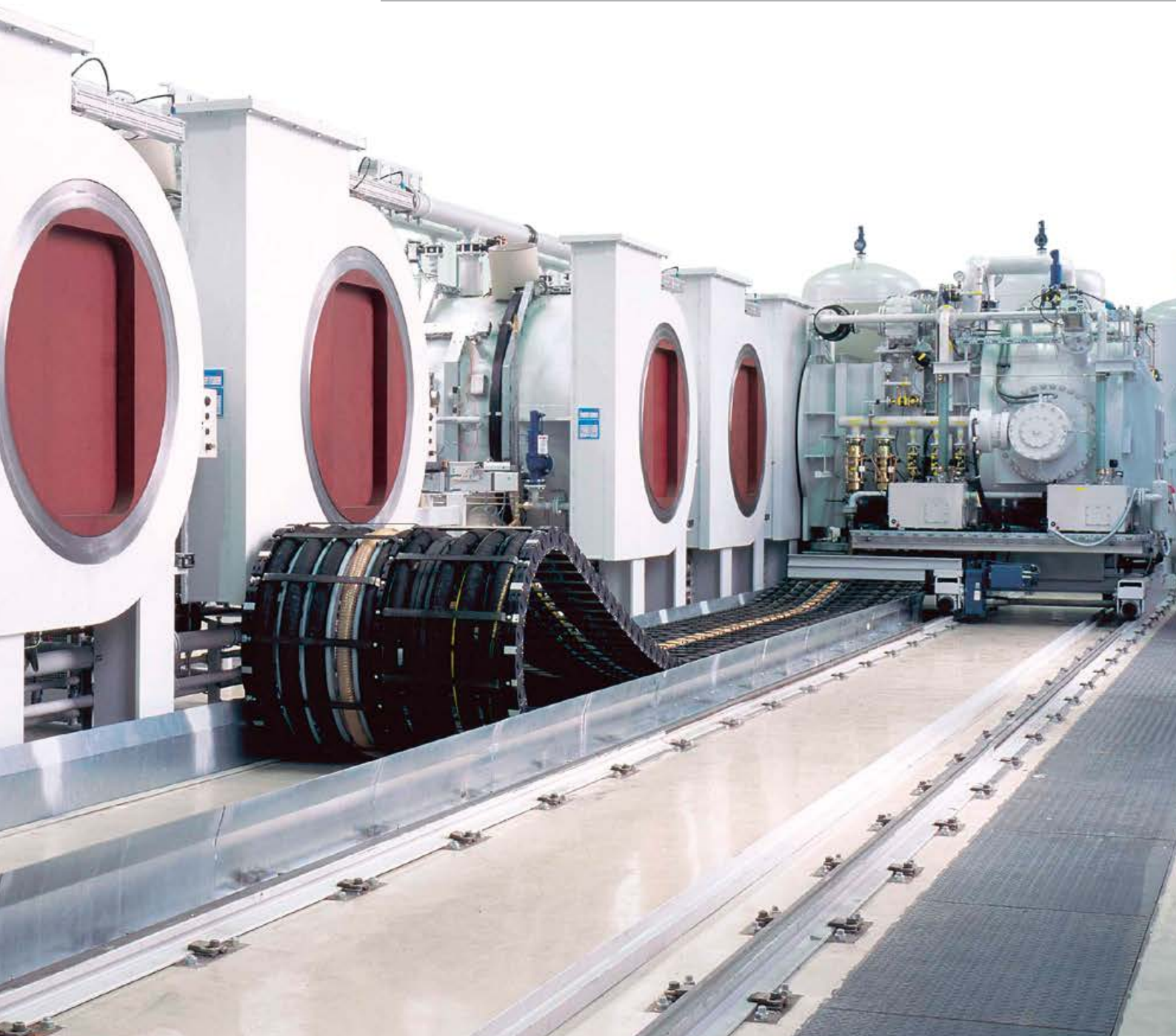






## Hardness which pays off

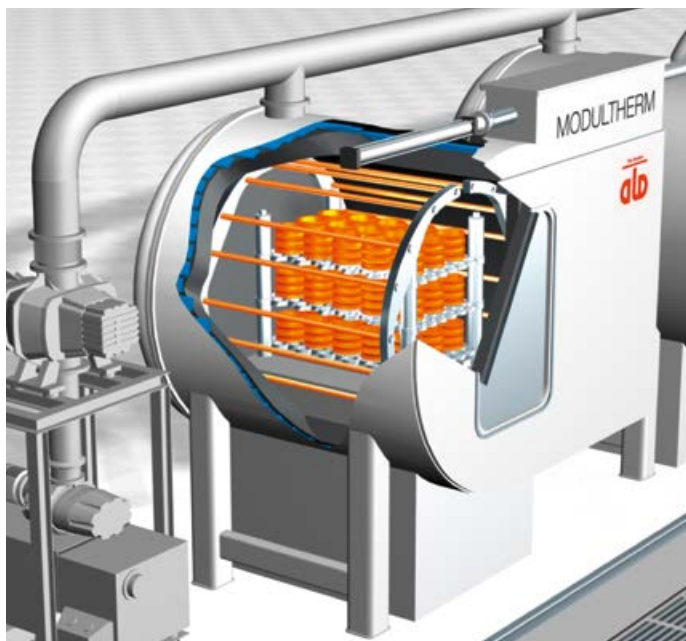
ALD ModulTherm® heat treatment technology has been used successfully worldwide for many years. The new version ALD ModulTherm®2.0 comprises new technical developments and improvements which offer a multitude of advantages.



## Treatment Chamber

Thermal and thermochemical heat treatment processes take place in individual treatment chambers which operate separately. Therefore, various processes can be performed simultaneously. Depending on the production situation, each single treatment chamber can be shut down at any time, thus ensuring the highest process flexibility, increasing the utilization level, conserving energy and reducing cost.

The separation of the transport and quench functions allows loading of treatment chambers while the quench cycle is in process. This increases the degree of utilization and improves overall efficiency. The expansion of the system with additional treatment chambers can be performed within one or two days while the plant is operating without disturbing production.



Treatment chamber

## Shuttle Module

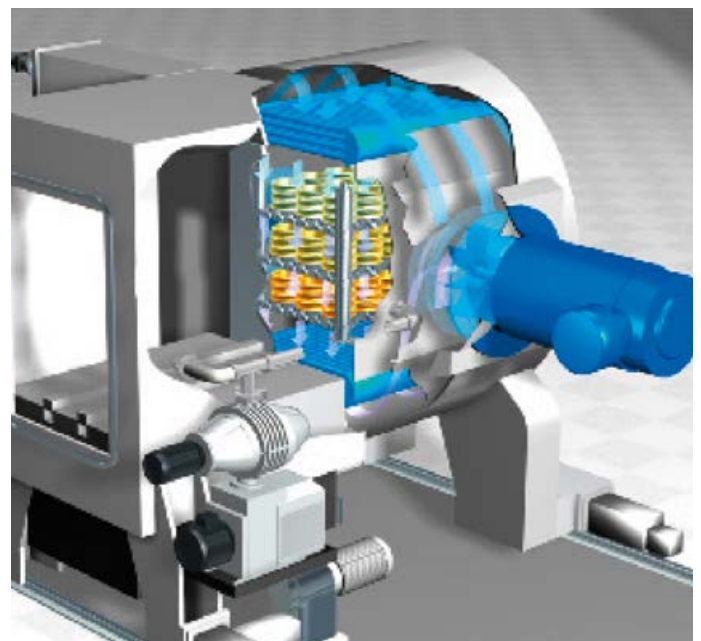
The shuttle module transports the load within the ModulTherm<sup>®</sup> 2.0 plant. It combines the functions transport and quench perfectly and ensures the best possible plant utilization.

## Transport Chamber

The transport chamber is firmly attached to the shuttle module. A fork lift system transports cold and hot loads within the ALD ModulTherm<sup>®</sup> 2.0 heat treatment system. All drive systems are mounted outside of the transport chamber for easy maintenance access and limited heat exposure.

## Quench Chamber

ALD uses the environmentally friendly dry gas quenching process to harden low-alloyed case hardening and heat-treatable steels. The parts are hardened homogeneously and safely in a specially developed quench chamber, using quench gases such as nitrogen or helium under high pressure, of up to 20 bar, and a high velocity. The advantages of ALD Vacuum Technologies patented gas quench technology include minimum dispersion of hardness values and minimum distortion. For bigger parts this is obtained by quench gas reversal, i.e. by alternating the quench gas flow through the load from top to bottom and vice versa. Dynamic quenching allows to treat especially thin-walled parts with minimum distortion, often making expensive subsequent treatment unnecessary.



Shuttle module consisting of transport chamber and quench chamber



## Everything under control – The ModulTherm® Control concept

The ALD ModulTherm® heat treatment system is equipped with an easy to operate control system. In addition to the control of the heat treatment system it manages documentation, service and maintenance.

### ModulTherm® Control

The ALD ModulTherm®2.0 entire heat treatment system is controlled by the ModulTherm® Control (MDC). The data-base hosted by a standard industrial PC supports the following functions:

- plant operation
- operating modes of the plant
- logistic management
- recipe creation and management
- data back-up
- load record generation
- alarm management
- machine parameter management
- data transfer to external server

#### optional:

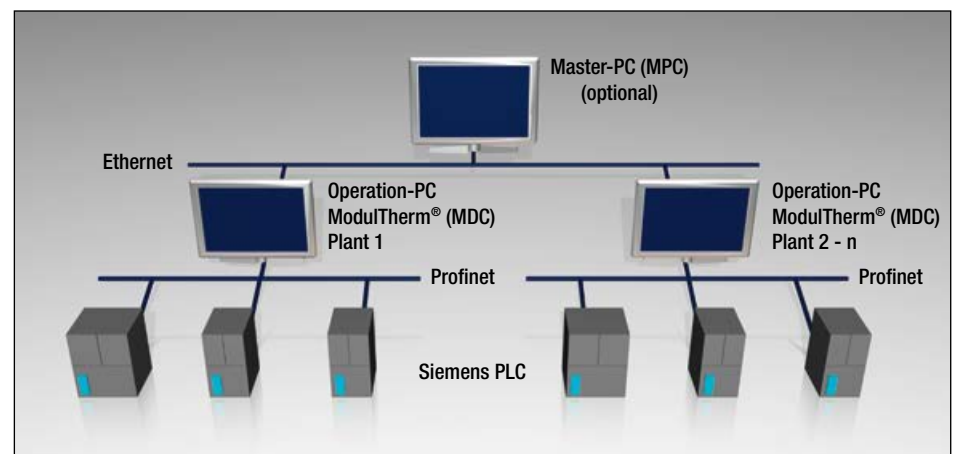
- second furnace PC (multi-user function)
- data input via scanner
- automated plant launch
- maintenance management
- automatic leak rate determination
- buffer management

### Plant Control

The Siemens PLC controls all movements and process parameters within the ALD ModulTherm®2.0 heat treatment system, i.e. temperature, pressure and gas flow control in each treatment chamber. In addition to the master control, each of the system's modules and peripheral systems are equipped with their own PLC control.

### Control System

Several ALD ModulTherm®2.0 heat treatment systems can operate simultaneously in the production line. As an option, these systems can be linked to the network of the superior control system. The central master PC (MPC) visualizes all connected systems. Recipe creation and management as well as batch management in the loading and unloading stations of each connected plant can be carried out easily.





## Service for twenty-four-seven operation

The customer's satisfaction is our highest priority. Therefore, we have set high quality standards for ourselves. In addition to technical expertise, reliability, flexibility and highest quality, ALD is offering high service availability, creating a real added value.



### Your reliable partner

The ALD ModulTherm®2.0 heat treatment system is designed for a 24/7 operation. In order to guarantee smooth continuous operation, ALD has set up a world-wide network of experienced specialists who offer universal service for the entire process chain. Thus, in addition to repairs, installations, preventive maintenance, hotline assistance and remote services are performed in a highly professional manner. We have established warehouses at strategically favorable locations, which store original spare parts to reach each ALD ModulTherm®2.0 heat treatment system fast and reliably.

### Our service overview

- supply of spare parts and consumables
- repair service
- service and inspection
- modernization of plants (factory installations)
- operator training
- preventive maintenance
- professional support in emergencies

### Own & Operate

In the past decades, ALD has established long-term know-how in vacuum heat treatment which is applied in company-owned operating corporations. The ALD Own & Operate GmbH, located in Germany, USA and Mexico, for example, offers heat treatment services to the automotive and aviation industry as well as to other industries.



## Advantages at a glance

The high production and process flexibility is creating new ways to individually adapt production to the respective demands. The results are reduced production costs, improved efficiency, increased productivity and environmental compatibility.



### Environment

- low environmental contamination
- no CO<sub>2</sub> emission
- high energy efficiency due to low thermal loss
- on-demand plant operation
- easy-control electrical heating
- cold wall technology, allowing immediate integration into production
- low noise emission (< 75 dB)
- dry quenching without disposal of waste washing water
- clean working environment without oil, vapors or flames

### Quality

- high reproducibility by easy process control
- high carburizing uniformity on the part and within the load
- clean and shiny part surfaces
- minimal part distortion
- little to none subsequent processing
- complete quality documentation for each load

### Commercial efficiency

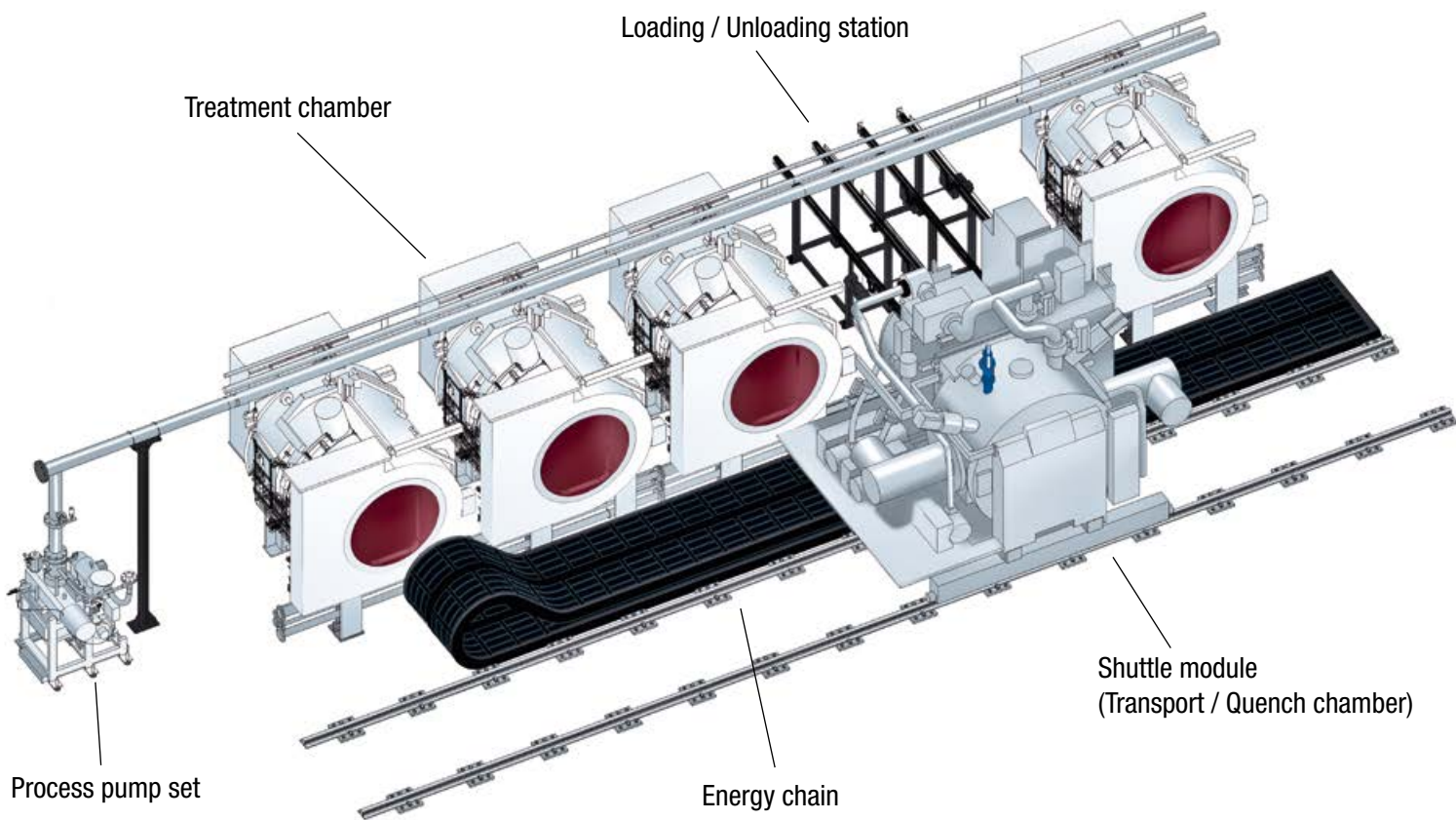
- investment into a plant which meets the customer's requirements exactly
- flexible and simple plant expansion without production interruption
- efficient component utilization
- high throughput due to short treatment cycles
- high production flexibility through simultaneous processes
- less hard machining due to minimal part distortion
- easy maintenance without production interruption
- low consumption cost due to small gas volumes and efficient quench gas recovery
- high energy efficiency through on-demand technology, less thermal losses, energy-efficient drives, intelligent energy management
- maximum availability
- 24/7 service
- economical treatment of small, medium and large scale production





## Technology at a glance

The modular design of the ALD ModulTherm<sup>®</sup>2.0 heat treatment system allows tailoring the plants individually to meet the customer's specific requirements exactly.



### Charge dimensions

Width	600 mm
Height	750 mm
Length	1000 mm

### Gross charge weight

Standard	500 kg
Optional	1000 kg

Quenching pressure max. 20 bar



## Interested in more information?

We would be glad to provide details about efficiencies and various advantages of the ALD ModulTherm®2.0 heat treatment system and integration of this system into your production process. Please contact us!

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