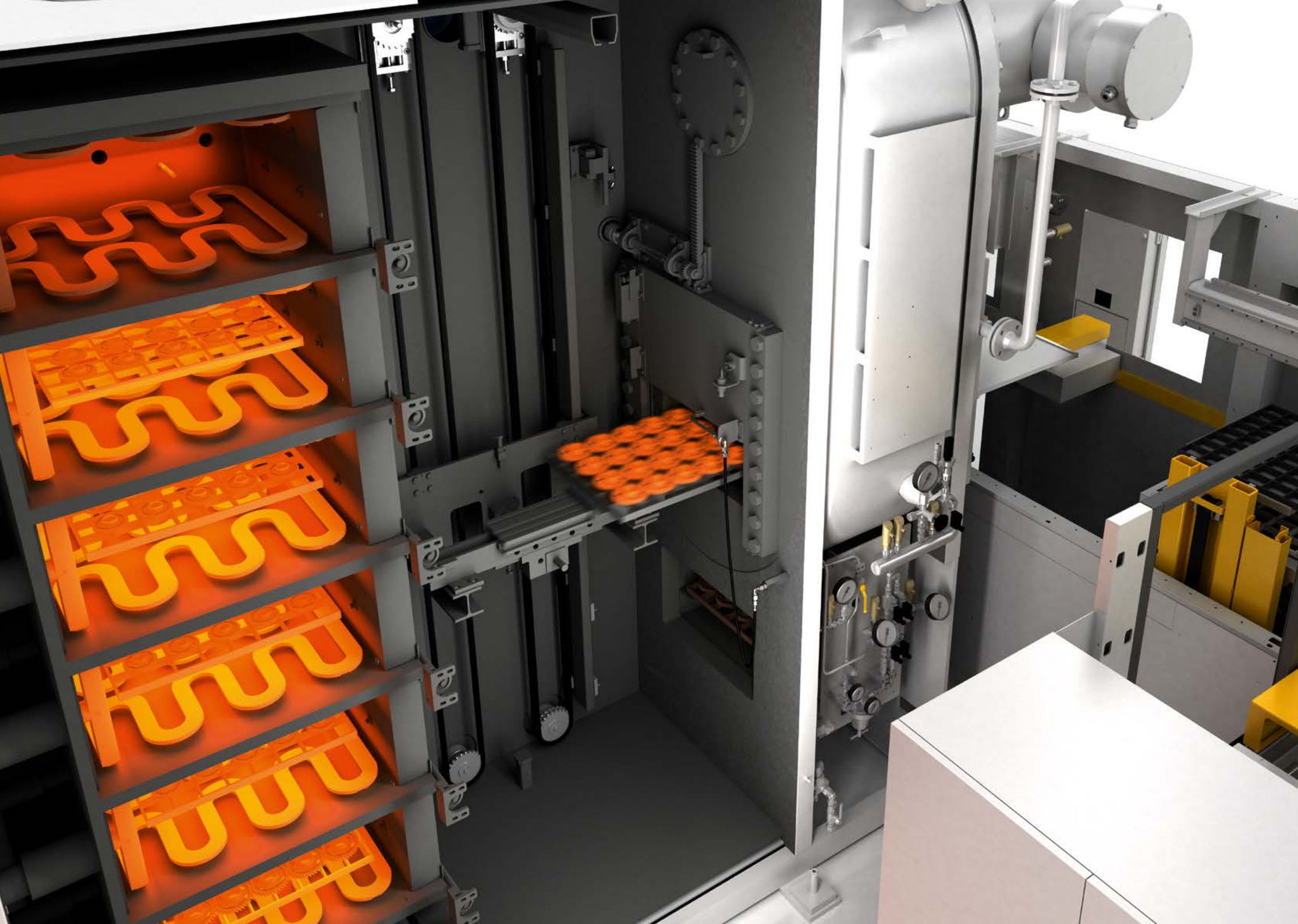


# PROCESS INTEGRATED HEAT TREATMENT

The Solution  
**ald** SyncroTherm®



**FELSOMAT**®



## Process Integrated Heat Treatment SyncroTherm

To keep up with current production requirements, we partnered with ALD Vacuum Technologies GmbH, to adapt the heat treatment of large batches to the treatment of single components.

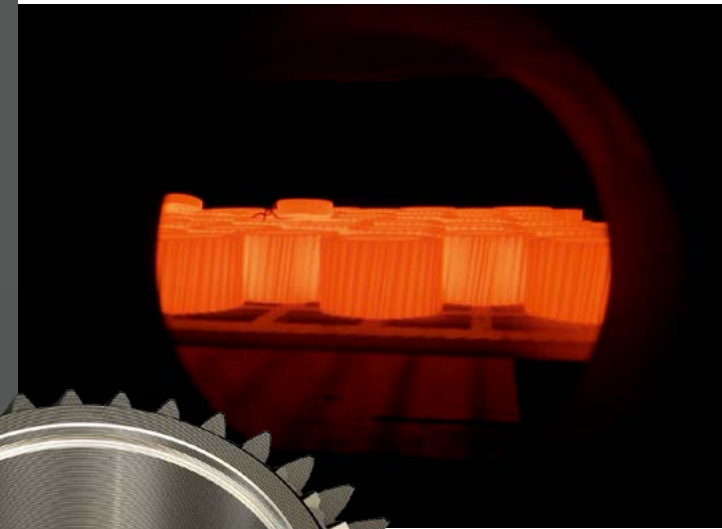
This new and unique concept improves both productivity and quality, in an environmentally friendly way.

The SyncroTherm consists of a welded machine base with up to six hot zones, which are arranged one above the other, a cold loading area with telescopic loader, and a pressure-tight chamber which is used for both quenching and loading. The strong direct radiation coming from the flat-panel radiators (installed above and below each hot zone) rapidly and uniformly heats up the single parts arranged in a 2D-carrier.

Parts made of micro-alloyed steels are carburized at temperatures well above 1000 °C, without undesired grain growth. Temperature and gas supply are controlled independently in each hot zone.

After carburization, the telescopic loader returns the CDC-workpiece carrier with the carburized parts to the quenching chamber. The chamber is flooded with nitrogen gas at a maximum pressure of 6 bar. The installed gas circulator directs the gas flow over the parts for rapid and uniform quenching.

The SyncroTherm is equipped with an easy-to-operate Siemens controller, to control, monitor and document all processes.



Put tomorrow's technology to work today.

With this newly developed heat treatment technology, the controller takes care of the heating, carburization at low pressure (with Ethyne as a carbon carrier) and high pressure quenching with nitrogen to achieve minimum dimensional and form deviations on the parts.

#### Environmentally friendly

- ▶ Dry quenching without disposal of waste water
- ▶ Low energy and process gas consumption
- ▶ High energy efficiency due to low thermal losses
- ▶ Clean work area, without thermal impact or CO<sub>2</sub>-emissions

#### Quality

- ▶ Individual processes, customized for various parts
- ▶ Reduction of heat treatment distortion
- ▶ High temperature uniformity
- ▶ High carburization uniformity on the part and in the batch without surface oxidation
- ▶ Low distortion quenching due to part specific gas diffusers
- ▶ Complete quality documentation for each batch

#### Operating efficiency

- ▶ A smaller footprint means: smaller foundation and transformers, as well as reduced nitrogen and cooling water needs
- ▶ Low operating costs due to high energy efficiency and small gas consumption
- ▶ More effective and efficient production
- ▶ Reduced throughput time and simplified logistics
- ▶ Elimination of buffers, logistic areas and part transportation
- ▶ Only a few heat treat jigs are required with minimal wear expected

A compact heat treat module, which can be adapted exactly to the requirements of the process.

## Automatically better

with system partnership

**ALD and Felsomat – the power of productivity, quality and flexibility: all from a single source**

#### Our know how:

- ▶ ALD Vacuum Technologies is a worldwide manufacturer, with world class rapid prototype part and process development
- ▶ Felsomat knows how to integrate turn-key systems to produce high quality parts
- ▶ The SyncroTherm system advantage: highest quality machine design and construction in a compact footprint – installation time and effort are thus minimized
- ▶ Our customers can reduce part costs, while improving quality, through the use of a completely automated process flow: from green manufacturing, to heat treating, to hard finishing operations

 FELSOMAT®

 The Solution  
ald

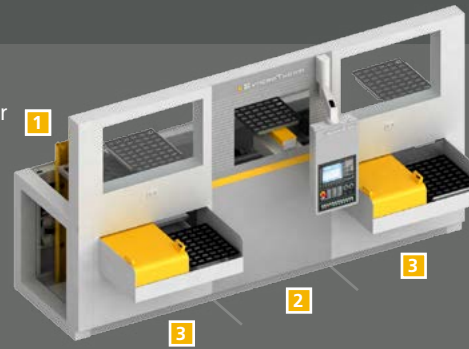


**Felsomat standard automation: tailored to each SyncroTherm heat treating application with CFC parts carriers**

Using the fully integrated Felsomat automation platform, it is now possible to create lean and efficient solutions for the loading of heat treat jigs. The degree of automation implemented can range from Chaku-Chaku (partially automated) to a fully automated line, with few operators.

- ▶ Pallet stacker in combination with a pallet drawer module for decoupled manual loading and unloading of heat treat jigs
- ▶ Magazine rack to increase work cell part storage capacity
- ▶ Basket stacking cell FSC600 with Robot-module for automatic loading and unloading of heat treat jigs
- ▶ Annealing furnace integrated in the basket stacking cell consisting of a fast heating radiator, reticulating furnace (170 - 190 °C) with cooling area for approx. 25 baskets

Basic automation module with 2 drawer modules



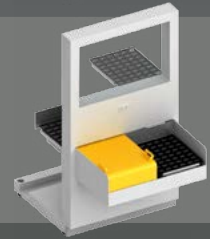
1 Jig handling module



2 Telescopic arm (NC-handling unit)



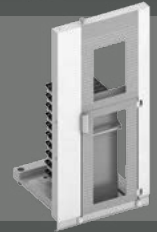
3 Drawer module



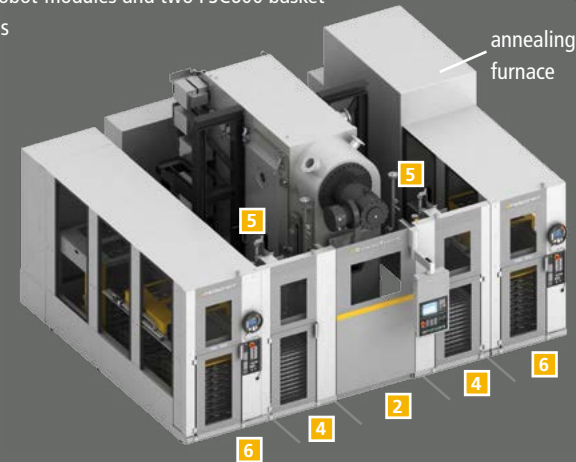
Basic automation module with 2 basket staker modules



4 Heat treat jig staker module



Heat treatment installation with annealing furnace, fully automated with two heat treat jig staker modules, two 4-axis-robot-modules and two FSC600 basket stacking cells



5 4-axis-robot-module



6 FSC600 basket stacking cell



## Flexline: highest efficiency, cost-effectiveness and quality

The Future of Gear Manufacturing

Machines, tooling and automation, including integrated quality assurance for every individual process: REISHAUER and FELSOMAT are redefining the integration of gear manufacturing technologies.

### The task

Combining all process technologies into one complete system. Every process step is integrated into the seamless, continuous-flow production process, thereby streamlining the production line and drastically reducing throughput time and work in process.

### The result

A highly efficient integrated production system, consisting of interchangeable technology modules and automation components. This results in lowest cost per part and maximum return on investment, without compromising process reliability or quality.



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