MATERIALS CENTER LEOBEN
FORSCHUNG GMBH

Heat Treatment Laboratory

EXPERTISE & RELIABILITY

Heat Treatment Laboratory

Our expertise is your benefit

The Materials Center Leoben offers a sound mix of theoretical and practical expertise and state-of-the-art facilities, making it a flexible and experienced partner for demanding research, development and application tasks in the areas of materials engineering, process engineering, quality assurance and component design.

The heat treatment laboratory specialises in the defined and instrumented heat treatment of metallic materials with special focus on:

- Vacuum and inert gas heat treatment
- Thermochemical surface treatment (carburisation, plasma nitriding, ...)
- Cryogenic treatment - combination of deep freezing and tempering
- FE simulation of heat treatment processes

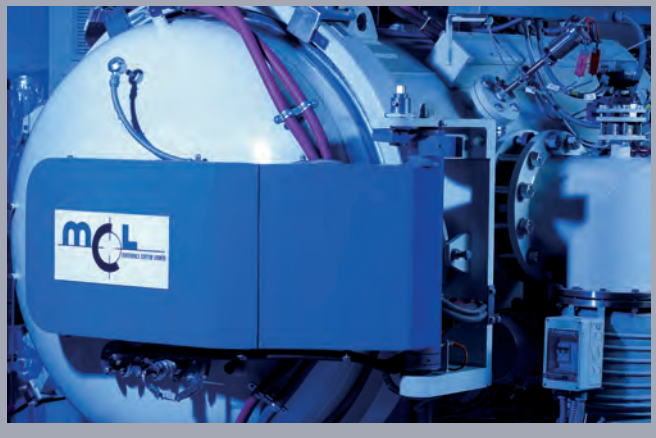
The services of the heat treatment laboratory range from heat treatment of small batches and samples to optimisation of heat treatment processes and further on to professional consulting. The range of services also includes FE simulation of heat treatment processes (calculation of microstructure, hardness and internal stress distribution and distortion).

EXPERTISE AND HIGH-TECH EQUIPMENT

FOR YOUR SUCCESS

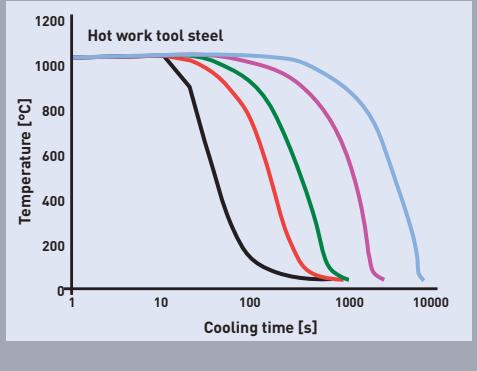
Vacuum heat treatment

Standard and special vacuum heat treatments (hardening, annealing, tempering, ...) of specimens and components (sampling, process optimisation, ...).



Our fields of expertise

- Instrumented heat treatment processes
- Temperature controlled heat treatment of specimens (e.g. quenching at defined cooling rates)
- Combined hot and cold treatment processes, including process development



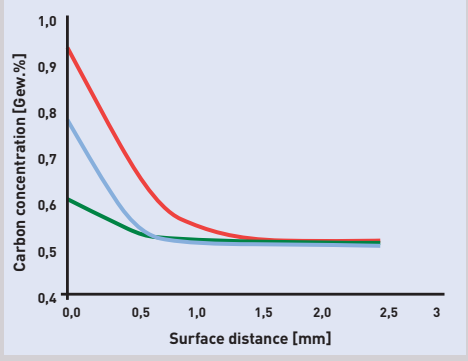
Targeted variation of cooling rate on experimental specimens

Surface treatment

Thermochemical treatment (carburisation, plasma nitriding / oxiding).

Our fields of expertise

- Plasma nitriding of high alloy steels (e.g. hot-work and high-speed tool steels)
- Nitriding of temperature sensitive steels
- Component sampling and process development for low-pressure carburising



Targeted adjustment of different carbon profiles in a heat-treated steel

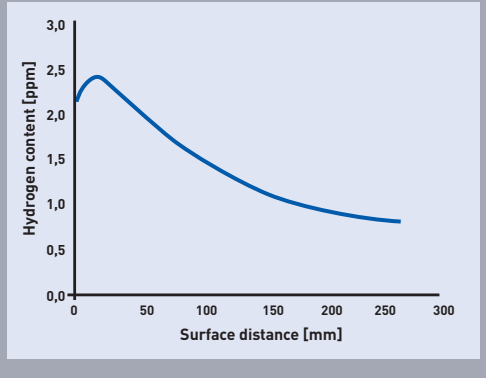
Consulting and damage analysis

Consulting in the heat treatment of steels and damage analysis of heat-treated components.

"Fish eye" resulting from hydrogen embrittlement in a carburised component

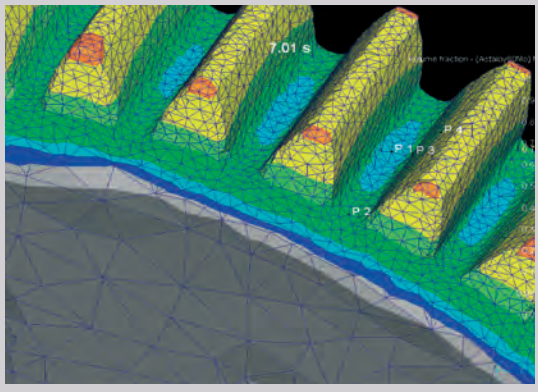
Our fields of expertise

- Heat treatment of tool steels (hot-work and cold-work tool steels, high-speed steels)
- Thermochemical treatment and coating of low to high-alloy steels
- Analysis of damage caused by inappropriate heat treatment and development of improvement measures



Heat treatment simulation

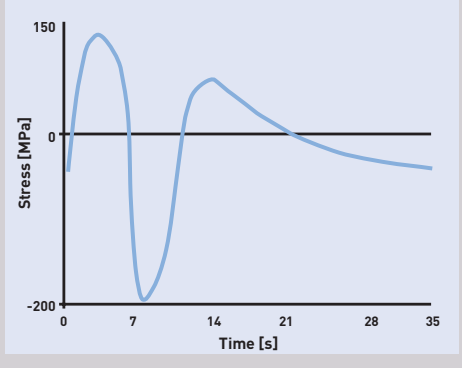
FE simulation of heat treatment of components.



Simulated internal stress distribution in a toothed wheel after heat treatment

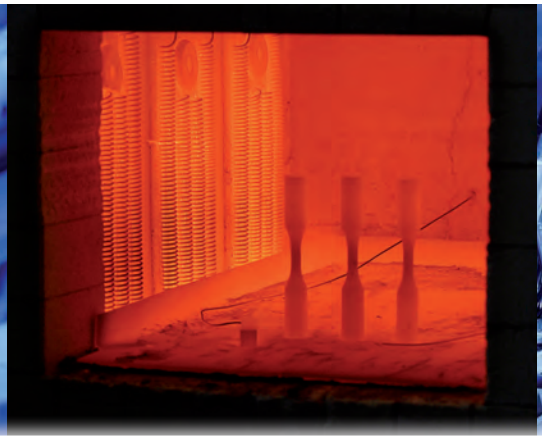
Our fields of expertise

- Simulation of carburising and nitriding processes
- Simulation of microstructure, hardness and internal stress distribution and distortion of heat-treated components
- Determination of data for the FE simulation of heat treatment processes



Simulated internal stress development during hardening process

RANGE OF SERVICES
AND EQUIPMENT


Our range of services

- **Standard and special vacuum hardening** (e.g. with temperature controlled gas quenching)
- **Tempering and annealing** under vacuum, inert gas or atmospheric conditions
- **Deep freezing to -180°C** (incl. combination of deep freezing and tempering up to 600°C in one facility and one process)
- **Low-pressure carburising of components and specimens** under strictly defined conditions (incl. optimisation of carburising processes for new materials, components etc.)
- **Plasma nitriding and plasma oxiding of steel materials** (especially high-alloy steels, both specimens and small to medium-size components and tools)
- **Technical heat treatment** and thermochemical surface layer modification of ferrous materials
- **Simulation of heat treatment processes** (microstructure, hardness and internal stress distributions)
- **Consulting** in technical heat treatment of ferrous materials, thermochemical treatment
- **Damage analysis** of components and tools

Our equipment

- Single chamber vacuum furnace from Systherms with integrated high-pressure gas quenching (max. 15 bar) including integrated vacuum carburising and carbonitriding system (batch size up to 200 kg), furnace chamber: 400 x 400 x 600 mm (W x H x L)
- Plasma nitriding system from Rübig
- Combined freezing and tempering unit (-180°C to 600°C)
- Inert gas furnace (nitrogen and argon) up to 1200°C (furnace chamber: 400 x 300 x 600 mm)
- Various air circulation furnaces (tempering furnaces) up to 700°C (furnace chamber: 300 x 300 x 300 mm)
- Oil and water quenching systems for specimens and small parts
- Temperature measurement instruments for installation on heat treatment systems and components

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