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 noding 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 material, 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 carbo-nitriding 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 for hydrogen and argon up to 1300°C (furnace chamber: 200 x 200 x 400 mm)
• Various air circulation furnaces (tempering furnace up to 700°C, furnace chamber: 160 x 200 x 300 mm)
• Oil and water quenching systems for specimens and small parts
• Temperature measurement instruments for installation on heat treatment systems and components
Consulting in the heat treatment of steels and damage analysis of heat-treated components.

Heat treatment simulation

Our expertise and 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 specializes in the defined and instrumented heat treatment of metallic materials with special focus on:

- Vacuum and inert gas heat treatment
- Thermochemical surface treatment (carburization, plasma nitriding, ...)
- Cryogenic treatment - combination of deep freeze 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 optimization of heat treatment processes and further on to professional consulting. The range of services also includes FE simulations of heat treatment processes (calculation of microstructure, hardness and internal stress distribution and distortion).

Heat Treatment Laboratory

Vacuum heat treatment

Surface treatment

Consulting and damage analysis

Heat treatment simulation

Our fields of expertise

- Instrumented heat treatment processes
- Temperature controlled heat treatment of specimens (e.g. quenching at defined cooling rates)
- Combined heat and cold treatment processes, including process development
- Standard and special vacuum heat treatments (hardening, annealing, tempering, ... of specimens and components (sampling, process optimization, ...)
- Thermochemical treatment (carburization, plasma nitriding, ...)
- Consulting in the heat treatment of steels and damage analysis of heat-treated components.

Simulated internal stress development during hardening process

Targeted variation of cooling rate on experimental specimens

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

Simulated internal stress distribution in a toothed wheel after heat treatment

Vacuum heat treatment

Thermochemical treatment (carburisation, plasma nitriding / oxidising).

Targeted variation of cooling rate on experimental specimens

Simulated internal stress development during hardening process

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

Simulated internal stress distribution in a toothed wheel after heat treatment

Material scientific analysis and simulation of heat treatment processes

Materials Center Leoben

Heat Treatment Laboratory

EXPERTISE AND HIGH-TECH EQUIPMENT FOR YOUR SUCCESS

Heat Treatment Laboratory

Vacuum heat treatment

Surface treatment

Consulting and damage analysis

Heat treatment simulation

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

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

Hydrogen content [ppm]
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- Vacuum and inert gas heat treatment
- Thermochemical surface treatment (carburization, 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 optimization of heat treatment processes and further on to professional consulting. The range of services also includes FE simulations of heat treatment processes (calculation of microstructure, hardness and internal stress distribution and distortion).

Heat Treatment Laboratory

Vacuum heat treatment

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

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

Surface treatment

Thermochemical treatment (carburization, plasma nitriding, plasma oxidizing).

Our fields of expertise
- Planar hardening of high-alloy turning tool steel and high-speed tool steels
- Thermochemical treatment and coating of low-alloy steels
- Analysis of damage caused by inappropriate heat treatment and development of improvement measures

Consulting and damage analysis

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

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-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.

Our fields of expertise
- Simulation of carburizing and nitriding process
- Determination of microstructure, hardness and internal stress distribution and distortion of heat treated components
- Determination of data for the FE simulation of heat treatment processes

Our expertise is your benefit

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- Vacuum and inert gas heat treatment
- Thermomechanical 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 optimization of heat treatment processes and further on to professional consulting. The range of services also includes FE simulations of heat treatment processes (simulation of microstructural hardness and internal stress distribution and distortion).
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 (-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 sputtering 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 (technical heat treatment of ferrous materials, thermochemical treatment)
- Damage analysis of components and tools

Our equipment

- Single-chamber vacuum furnace from Sytthers with integrated high-pressure gas quenching (max. 15 bar)
- Plasma nitriding system from Rübig
- Combined freezing and tempering unit (-180°C to 600°C)
- Inert-gas furnace 3 (hydrogen and argon) up to 1300°C
- Vacuum air circulation furnace 4 (furnace chamber: 400 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
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 at -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 nailing of steel materials (especially high-alloy steels, both specimens and small to medium-size components and tools)
- Technical heat treatment and thermochemical surface hardening 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 carbo-nitriding systems (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 (hydrogen and argon up to 1300°C) (furnace chamber: 600 x 400 x 400 mm)
- Various air circulation furnaces (tempering furnace up to 700°C (furnace chamber: 100 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