Our range of services

- Preparation of metallographic specimens (metallic materials, metal / ceramic composites, electronic components, ...)
- Light microscopic analysis (microstructure documentation, microstructure assessment)
- Stereo microscopic analysis (photography)
- Micro, small load and macro hardness testing
- Automated hardness profile testing (20 mN to 2500 N)
- Coating adhesion testing using hardness indentation method
- Coating hardness testing using instrumented micro-hardness method
- Roughness measurement (R\(\text{a}, R\text{t}, R\text{z}\)) of centrifugal microscopes
- Preparation of topographic images with qualitative and quantitative evaluation in 2D and 3D, including small to medium-sized components, cutting edges, friction traces, wear surfaces and similar
- Tribological ball-on-disc tests at room temperature, dry or lubricated, including subsequent 3D evaluation of friction traces
- Mobile metallography (on-site testing)
- One or more days of on-site training in metallographic preparation and microstructure assessment

Standard methods

- Cleanliness testing in accordance with DIN 50602, ASTM E45, DIN EN 10247, ISO 4967
- Assessment of carbide banding and carbide network in accordance with SEP 1520
- Grain size in accordance with DIN EN ISO 643 and ASTM E112
- Decarburisation in accordance with DIN EN ISO 3887
- Hardness testing in accordance with Brinell (DIN EN ISO 6506-1), Rockwell (DIN EN ISO 6508-1), Vickers (DIN EN ISO 6507-1)
- Nanoindentation testing (DIN EN ISO 14577-1)
- Determination of case hardening depth (DIN EN ISO 1307-1) and hardening depth after nitriding (DIN 50190-3)

Our equipment

- C swore and fine cutting machines for sample preparation
- Devices for hot and cold mounting of specimens
- Automated sandwich grinding and polishing devices
- Electrochemical polishing and etching equipment
- Light microscope incl. digital image capture and automatic xy-table for the analysis of large specimens
- Stereomicroscope incl. 3D image capture
- Quantitative image analysis system
- Scanning electron microscope incl. analysis of case hardenings, micro-hardness testers in the load range from 20 mN to 2500 N
- Room temperature tribometer in the load range from 1 – 10 N

* partly in cooperation with our scientific partners.
Non-metallic inclusion as the cause of fracture

3D characterisation of surfaces using confocal microscopy and scanning electron microscopy.

Fractographic analysis – damage analysis

Fractographic analysis: (microscopic, microscopic), including determinations of crack initiation, crack growth and assessment of the cause of damage.

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 metallography laboratory specializes in the analysis of various metallic materials, metal / ceramic composites, cemented carbides and special materials with focus on:

- Metallographic preparation and characterisation of components
- Classical and instrumented hardness testing including hardness mapping
- Analysis of surface structures and topographies
- Fracture surface analysis
- Damage analysis

The services offered by the metallography laboratory include fast preparation and characterisation of different materials and components including presentation and interpretation of the results.

Our fields of expertise

- Preparation of metallographic specimens of components in the size range from <= 0.1 mm to > 1 dm
- Characterisation of micrographs of surface layers (e.g. microstructure characterization of carbonised or nitrided surfaces)
- Material characterisation in accordance with different standards (e.g. characterisation testing)
- Preparation and characterisation of special materials

Performance of instrumented micro, nano- and macro hardness testing for the characterisation of bulk materials and surfaces.

3D characterisation of surfaces using optical microscopy and scanning electron microscopy.

Our fields of expertise

- Measurement of hardness profiles of component cross-sections
- Measurement of hardness profiles of surface layers of metallic and ceramic components
- Determination of macrohardness of metal and ceramic materials

Our fields of expertise

- Preparation of metallographic specimens of components in the size range from <= 0.1 mm to > 1 dm
- Characterisation of microstructure of metallic materials
- Metallographic preparation and characterisation of macro components
- Analysis of surface structures and topographies

Record of topographic images of components

Fractographic analysis of crack initiation and crack growth.

Our fields of expertise

- Fractographic analysis of crack initiation and crack growth.
- Determination of fracture mechanisms
- Damage analysis

Macroetching of cross-section of a toothed wheel

Metallographic characterisation of components

Analysis of surface structures & topographies

Characterisation of the structure and microstructure of structural and functional components of different metallic materials, metal / ceramic material composites, electronic components and similar.

Performance of instrumented micro, nano- and macro hardness testing for the characterisation of bulk materials and surfaces.

3D characterisation of surfaces using optical microscopy and scanning electron microscopy.

Performance of instrumented micro, nano- and macro hardness testing for the characterisation of bulk materials and surfaces.

3D characterisation of surfaces using optical microscopy and scanning electron microscopy.

Performance of instrumented micro, nano- and macro hardness testing for the characterisation of bulk materials and surfaces.

3D characterisation of surfaces using optical microscopy and scanning electron microscopy.

Performance of instrumented micro, nano- and macro hardness testing for the characterisation of bulk materials and surfaces.

3D characterisation of surfaces using optical microscopy and scanning electron microscopy.

Performance of instrumented micro, nano- and macro hardness testing for the characterisation of bulk materials and surfaces.

3D characterisation of surfaces using optical microscopy and scanning electron microscopy.
Metallography 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 metallography laboratory specializes in the analysis of various metallic materials, metal/ceramic composites, ceramic carbides and special materials with focus on:

- Metallographic preparation and characterization of components
- Classical and instrumented hardness testing including hardness mapping
- Analysis of surface structures and topographies
- Fracture surface analysis
- Damage analysis

The services offered by the metallography laboratory include fast preparation and characterization of different materials and components including presentation and interpretation of the results.

- Preparation of metallographic specimens of components in the size range from <0.1 mm to >1 dm
- Characterization of microscopic surface layers (e.g. microstructure, characterisation of carbided or nitried surfaces)
- Material characterization in accordance with different standards (e.g. characterisation testing)
- Preparation and characterization of special materials

Instrumented hardness testing

Characterisation of the structure and microstructure of metallic and functional components of different metallic materials, metal/ceramic composite materials, electronic components and similar.

Performance of instrumented micro, nanolocalised and micro hardness testing for the characterisation of bulk materials and surfaces.

Analysis of surface structures & topographies

Performance of instrumented micro, nanolocalised and micro hardness testing for the characterisation of bulk materials and surfaces.

3D-characterisation of surfaces using confocal microscopy and scanning electron microscopy.

Fracture surface analysis – damage analysis

Fractographic analysis (macroscopic, microscopic), including determinations of crack initiation, crack growth and assessment of the cause of damage.

- Fractographic analysis
- Instrumented hardness testing
- Macroetching of cross-section of a toothed wheel
- SEM images of a powder compressed component
- Surface topography of an electronic component
- Microscopic documentation of a microdrill
- Metallographic characterisation of components
- Analysis of surface structures & topographies

EXPERTISE AND HIGH-TECH EQUIPMENT FOR YOUR SUCCESS

MATERIALS CENTER LEOBEN
METALLOGRAPHY 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 metallography laboratory specializes in the analysis of various metallic materials, metal / ceramic composites, cemented carbides and special materials with focus on:

- Metallographic preparation and characterization of components
- Classical and instrumented hardness testing including hardness mapping
- Analysis of surface structures and topographies
- Fracture surface analysis
- Damage analysis

The services offered by the metallography laboratory include fast preparation and characterization of different materials and components including presentation and interpretation of the results.

EXPERTISE AND HIGH-TECH EQUIPMENT
FOR YOUR SUCCESS

Metallography Laboratory

Metallographic characterisation of components

Characterization of the structure and microstructure of structural and functional components of different metallic materials, metal / ceramic composite materials, electronic components and similar.

Instrumented hardness testing

Performance of instrumented micro, nanosized and macro hardness testing for the characterization of bulk materials and surfaces.

Analysis of surface structures & topographies

10X-characterization of surfaces using optical microscopy and scanning electron microscopy.

Fracture surface analysis – damage analysis

Fractographic analysis (macroscopic, microscopic), including determination of crack initiation, crack growth and assessment of the cause of damage.

Our fields of expertise
- Measurement of hardness profiles of component cross-sections
- Measurement of hardness mapping and surface hardness profiles
- Determination of mechanical properties of metallic and ceramic coatings
- Determination of microhardness of cemented carbides
- Hardness mapping of ceramic and metallic materials

Hardness profile of a case hardened case hardened surface layer

Hardness map of a welding seam

Surface topography of a powder compressed component

Surface topography of an electronic component

Metallographic characterisation of components

Analysis of surface structures & topographies

EXPERTISE AND HIGH-TECH EQUIPMENT
FOR YOUR SUCCESS
Our range of services
• Preparation of metallographic specimens (metallic materials, metal / ceramic composites, electronic components,...)
• Light microscopic analysis (microstructure documentation, microstructure assessment)
• Stereomicroscopic analysis (histology)
• Micro, small load and micro hardness testing
• Automated hardness profile testing (50 mN to 2500 N)
• Coating adhesion testing using hardness indentation method
• Coating hardness testing using instrumented microhardness method
• Roughness measurement (R_a, R_t, R_z) by means of confocal microscopy
• Preparation of topographic images with qualitative and quantitative evaluation in 2D and 3D, including small to medium-sized components, cutting edges, friction traces, wear surfaces and similar
• Tribological ball-on-disc tests at room temperature, dry or lubricated, including subsequent 3D evaluation of friction traces
• Mobile metallography (on-site testing)
• One or more days of on-site training in metallographic preparation and microstructure assessment

Standard methods
• Cleanliness testing in accordance with DIN 50602, ASTM E45, DIN EN 10247, ISO 4967
• Assessment of carbide banding and carbide network in accordance with SEP 1520
• Grain size in accordance with DIN EN ISO 643 and ASTM E112
• Decarburisation in accordance with DIN EN ISO 3887
• Hardness testing in accordance with Brinell (DIN EN ISO 6506-1), Rockwell (DIN EN ISO 6508-1), Vickers (DIN EN ISO 6507-1), Rockwell (DIN EN ISO 6508-1), Instrumental hardness testing (DIN EN ISO 14577-1)
• Determination of case hardening depth (DIN EN ISO 6506-1) and hardening depth after nitriding (DIN 50190-1)

Our equipment
• Scissors and fine cutting machines for sample preparation
• Devices for hot and cold mounting of specimens
• Automated mechanical grinding and polishing equipment
• Electrochemical polishing and etching equipment
• Light microscope incl. digital image capture and automatic xy-table for the analysis of large specimens
• Stereomicroscope incl. 3D image capture
• Quantitative image analysis system
• Scanning electron microscope incl. analysis (EDX, WDX, EBSD)*
• Nanofocus μsurf confocal microscope (profilometer) with automatic xy-table (analysis of large surfaces)
• Instrumented microhardness, small load and microhardness testers in the load range from 20 mN to 2500 N (HV, HRC, HB, HMK) with automatic xy-testing tables
• Room temperature tribometer in the load range from 1 – 10 N

* partly in cooperation with our scientific partners
**Our range of services**

- Preparation of metallographic specimens (metalllic materials, metal / ceramic composites, electronic components, ...)
- Light microscopic analysis (microstructure documentation, microstructure evaluation)
- Stereomicroscopic analysis (tomography)
- Micro, small load and macro hardness testing
- Automated hardness profile testing (20 mN to 2500 N)
- Coating adhesion testing using hardness indentation method
- Coating hardness testing using instrumented microhardness method
- Roughness measurement (R_t, R_z, R_t) by means of confocal microscopy
- Preparation of topographic images with qualitative and quantitative evaluation in 2D and 3D, including small to medium-sized components, cutting edges, friction faces, wear surfaces and similar
- Tribological ball-on-disc tests at room temperature, dry or lubricated, including subsequent 3D evaluation of friction traces
- Mobile metallography (on-site testing)
- One or more days of on-site training in metallographic preparation and microstructure assessment

**Standard methods**

- Chlorine testing in accordance with DIN 584, ISO 5601, ISO 2667
- Assessment of carbide banding and carbide network in accordance with GSP 1500
- Grain size test in accordance with DIN EN ISO 4959 and ASTM E-112
- Decarburisation in accordance with DIN EN ISO 3087
- Hardness testing in accordance with Brinell [DIN EN ISO 6506-1], Rockwell [DIN EN ISO 6508-1]
- Rockwell [DIN EN ISO 6508-1]
- Instrumented hardness testing [DIN EN ISO 14577-1]
- Determination of case hardening depth [DIN EN ISO 3113] and hardening depth after nitriding [DIN 50190-3]

- Light microscopy incl. digital image capture and automatic 3D evaluation of large specimens
- Stereomicroscope incl. 3D image capture
- Quantitative image analysis system
- Scanning electron microscope incl. analysis EDS, WDS, EBSD
- Nanofocus μsurf confocal microscope (profilometer) with automatic xy-table (analysis of large surfaces)
- Instrumented microhardness, small load and macrohardness testers in the load range from 20 mN to 2500 N (HV, HRC, HB, HDE) with automatic xy-testing tables
- Room temperature tribometer in the load range from 1 – 10 N

* partly in cooperation with our scientific partners

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**Metallography Laboratory**

- Preparation of metallographic specimens
- Microscope and lab cutting machines for sample preparation
- Devices for hot and cold mounting of specimens
- Automated and manual grinding and polishing devices
- Electrical and chemical polishing and etching equipment

**Our equipment**

- Coarse and fine cutting machines for sample preparation
- Devices for hot and cold mounting of specimens
- Automated and manual grinding and polishing devices
- Electrical and chemical polishing and etching equipment

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**Materials Center Leoben Forschung GmbH**

ISO 9001 CERTIFIED

EXPERTISE & RELIABILITY

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