MATERIALS CENTER LEOBEN
FORSCHUNG GMBH

Metallography Laboratory

EXPERTISE & RELIABILITY

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 specialises 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.

EXPERTISE AND HIGH-TECH EQUIPMENT

FOR YOUR SUCCESS

Metallographic characterisation of components

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

Microscopic documentation of a microdrill

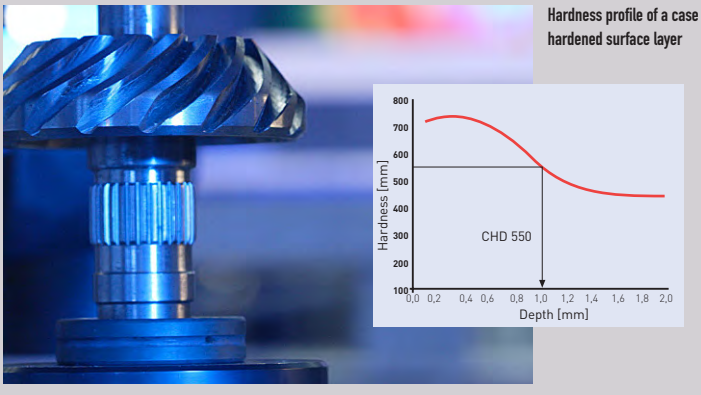
Macroetching of cross-section of a toothed wheel

Our fields of expertise

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

Instrumented hardness testing

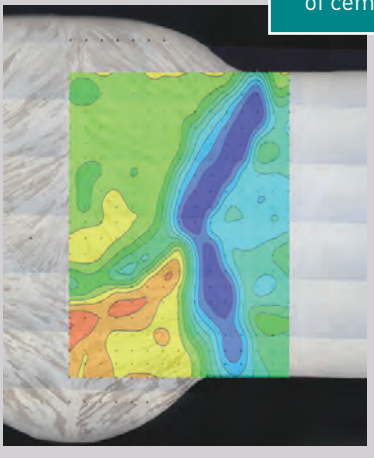
Performance of instrumented micro, small load and macro hardness testing for the characterisation of bulk materials and surfaces.



Hardness profile of a case hardened surface layer

Our fields of expertise

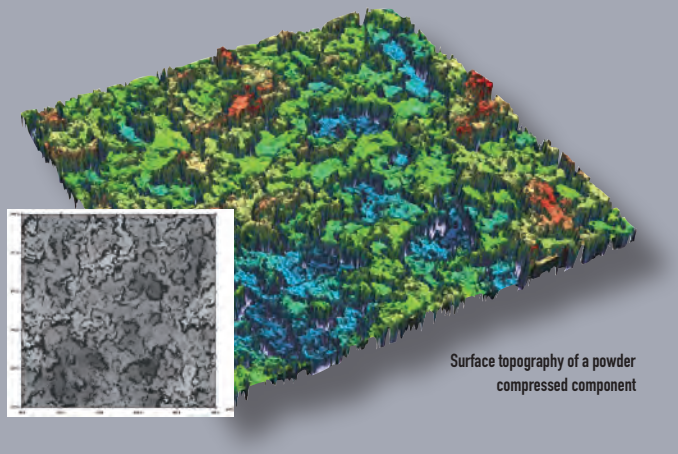
- Measurement of hardness profiles of component cross-sections
- Measurement of high-resolution surface hardness profiles
- Hardness measurement of metallic and ceramic coatings
- Determination of Palmqvist toughness of cemented carbides



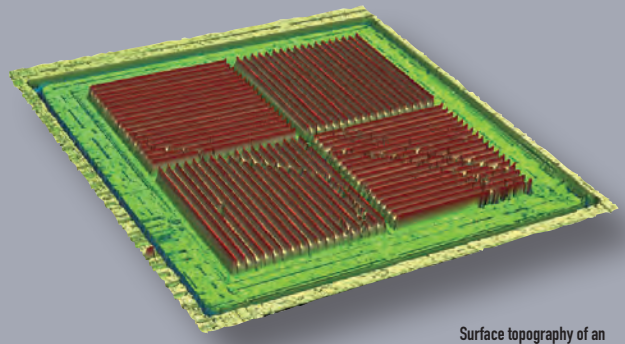
Hardness map of a welding seam

Analysis of surface structures & topographies

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



Surface topography of a powder compressed component



Surface topography of an electronic component

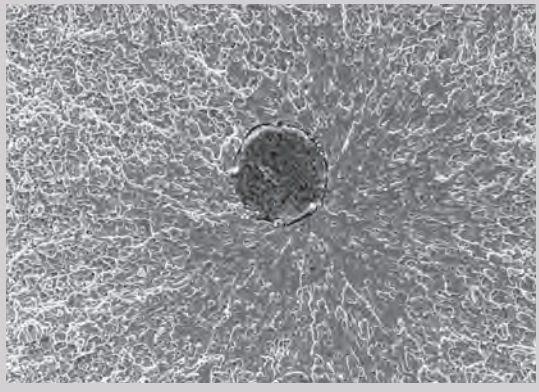
Our fields of expertise

- Roughness measurements (R_a, R_t, R_z)
- Wear characterisation of wear specimens, components and tools
- Recording of topographic images of components

Fracture surface analysis – damage analysis

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

FIB section of coating defect



Non-metallic inclusion as the cause of fracture

Our fields of expertise

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

RANGE OF SERVICES
AND EQUIPMENT



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** (fractography)
- **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_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), Vickers (DIN EN ISO 6507-1), Rockwell (DIN EN ISO 6508-1)
- Instrumented hardness testing (DIN EN ISO 14577-1)
- Determination of case hardening depth (DIN EN ISO 2639) and hardening depth after nitriding (DIN 50190-3)

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
- 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 macrohardness testers in the load range from 20 mN to 2500 N (HV, HRC, HB, HM) with automatic xy-testing tables
- Room temperature tribometer in the load range from 1 – 10 N

*** partly in cooperation with our scientific partners**

MATERIALS CENTER LEOBEN
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Materials Center Leoben Forschung GmbH
Roseggerstraße 12 | A-8700 Leoben
T +43-3842-45922 | F +43-3842-45922-500
metlab@mcl.at | **www.mcl.at**