

# Materials and Failure Analysis

## Structure and materials investigation

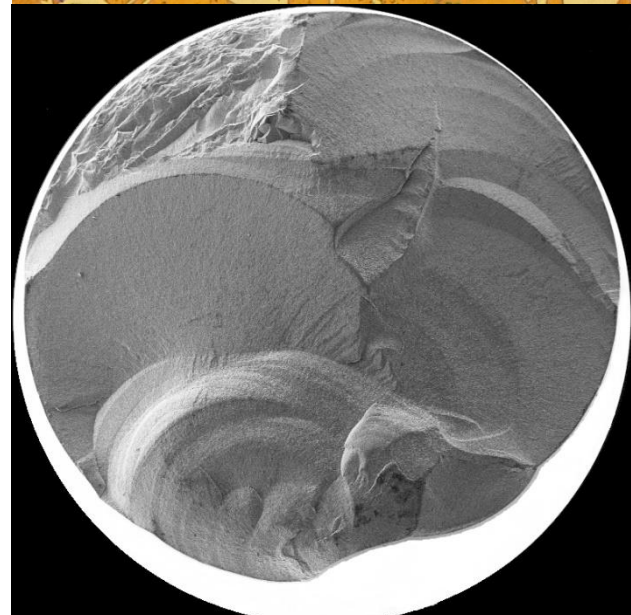
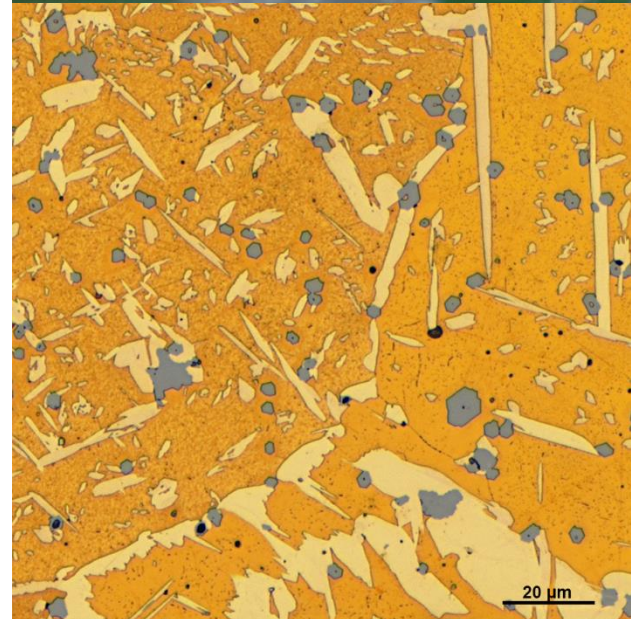
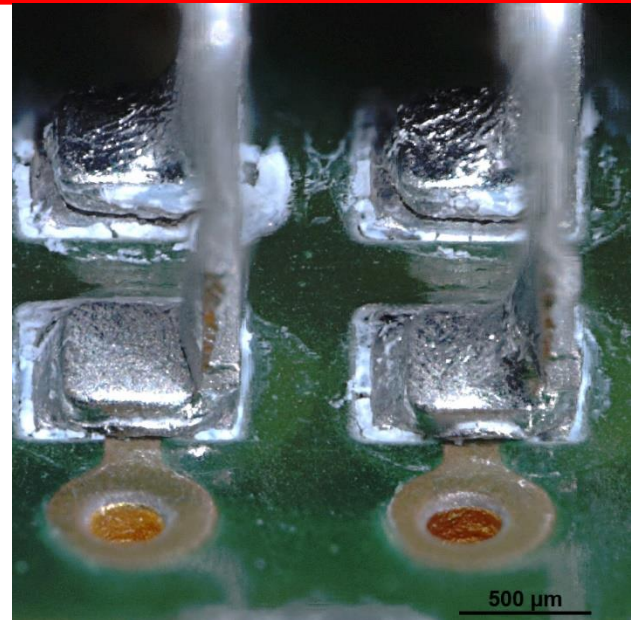
- 3D X-ray computed tomography
- Light- and scanning electron microscopy for microstructure and property correlations
- X-ray diffraction (XRD)
- Chemical and thermal analysis
- Destructive materials testing
- Abrasion and corrosion tests

## Image analysis for evaluation

- Steel cleanliness analysis according to Standards EN 10 247, ASTM E45, ..
- Grain size determination according to DIN EN ISO 643, ASTM E112 or other specifications
- Volume deficits of castings made from Aluminum, Magnesium, and Zinc Casting Alloys according to VDG test sheet P202
- Quantitative porosity determination and pore size distribution for sintered components
- Dimensional metrology of components

## Failure analysis

- Root cause failure analysis of parts and components - also on site
- Fracture- and surface analysis of metals, ceramics and composite materials
- Abrasion and corrosion root cause analysis and recommendations



# Technical Equipment

## Materialography / Materials testing

### Materialographic laboratory

- Grinding and polishing machines
- Ion polishing machine
- High-End light optical microscopy
- High-resolution scanning electron microscopy with energy dispersive X-ray analysis and Electron Backscatter Diffraction (EBSD)

### Materials testing

- Micro- and macro hardness testing
- Cold, warm and dynamic tensile testing
- Notched-bar impact testing
- Abrasion test bench

## X-ray analysis

- 3D X-ray computer tomography with micro- and nano focus tube
- X-ray diffractometer including internal stress measurement with high-temperature furnace
- X-ray fluorescence

## Chemical and thermal analysis

- Optical spark emission spectrometry
- AES, AAS, ICP-MS
- Carrier gas hot extraction
- Dilatometry
- Differential thermal analysis
- Dynamic difference calorimetry

## Further methods

- Powder technology and synthesis of ceramics, composite materials, sintered magnets
- Battery test bench
- Magnetic test benches, Permagraph, magnetometer with microscope units

In collaboration with Aalen University, Materials Research Institute

