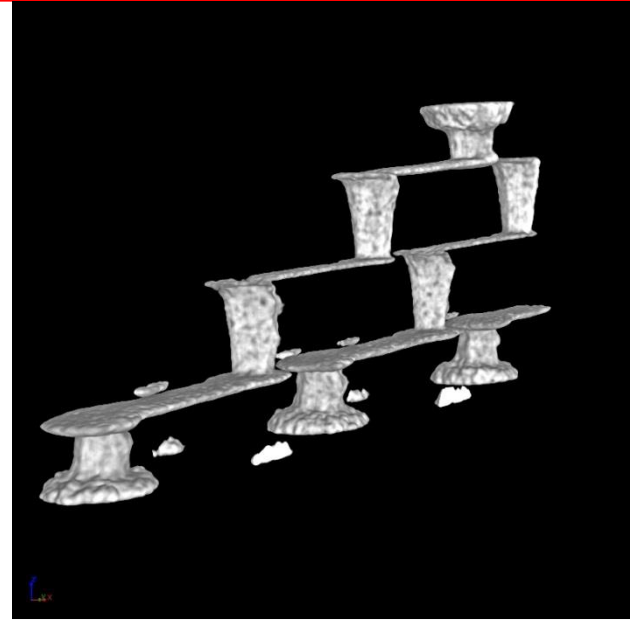


# X-ray and Structural Analysis

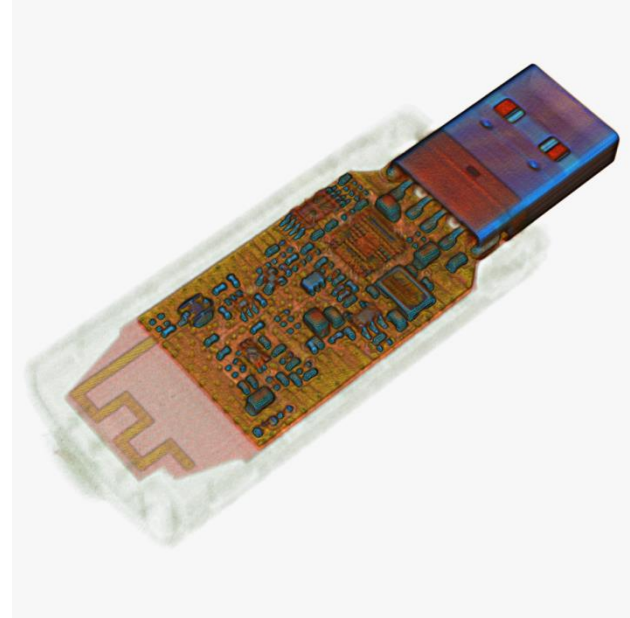
## Industrial computed tomography

- Non-destructive defect analysis
- 3D-Quantification (porosity, particle size distributions)
- Dimensional metrology / reverse engineering
- Rapid prototyping
- Benchmark analysis



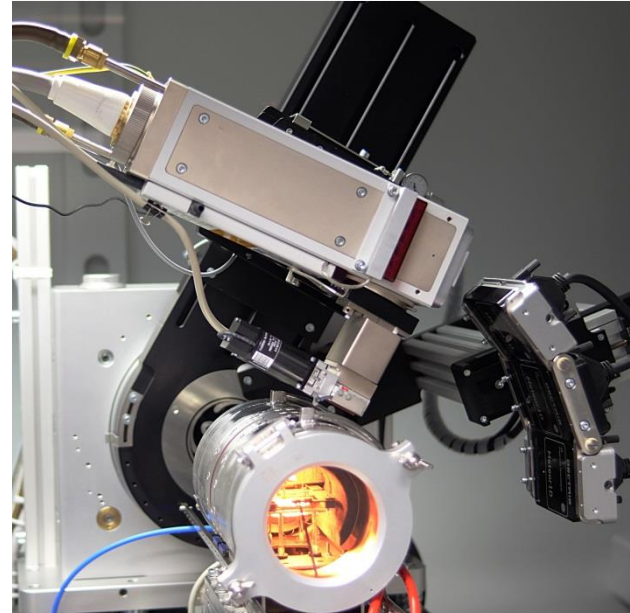
## Structural analysis – fast and in-situ

- X-ray diffractometry (XRD) for qualitative and quantitative determination of phases
- Time- and temperature dependent in-situ XRD-analysis up to 1500°C with time frame 1 second
- X-ray-measurement of internal stresses
- In-situ characterization of heat-treatments for metal alloys and ceramics



## Combination with other methods

- Target-preparation and microscopy of tomographic analyzed components
- Comparison of in situ XRD-data with dilatometry and resulting microstructure
- Integrated materials and defect-analysis combining different methods



# Technical Equipment

## X-ray-computed tomography

v|tome|x s (GE phoenix|x-ray systems)

- Micro-focus-tube 240 kV / max. resolution 2  $\mu\text{m}$
- Nano-focus-tube 180 kV / max. resolution 1  $\mu\text{m}$
- Detector resolution 1920 x 1536 pixel with lateral extended effective range
- Sample properties: max. weight: 10 kg, max. volume: 300 x 250 x 250 mm
- Volume reconstruction and software analysis

Large volume CT on request for components up to 50 kg and 600 x 600 x 1500 mm

## XRD 3003 fast in-situ System

Seifert Sun XRD 3003 fast in-situ (GE Seifert)

- 3 Meteor1D Detector (2- $\theta$  range: 48°)  
0.3 ms readout time, resolution (0.01°)
- minimal scan time 0.5 - 1 s
- Internal stress via  $\sin^2\Psi$ -method

Furnace XRTP-6000 (DSeTec)

- 20°C to 1500°C
- Heating-rates up to 30 K/s, cooldown rates to 70 K/s
- Pressure range  $4 \cdot 10^{-3}$  to 1.100 mbar
- Inert-atmosphere and further gases on request
- Full synchronization with in-situ XRD

## Further methods

- Materialographic laboratory with high end microscopy and quantitative image analysis
- Destructive materials testing
- Battery testing bench
- Magnetic characterization (soft- / hard-magnets)
- Thermal and chemical analysis
- Processing technologies for sintered materials

In collaboration with Aalen University, Materials Research Institute

