



## 3D LAB: FINE STRUCTURE ANALYSIS

The University of Miskolc serves especially the members of the vehicle and automotive industry and the metal processing sector with the competencies of its researchers and its world class infrastructure in the examination and solution of production problems, procurer complaints and failure cases. Our competencies include solutions for cases associated with the microstructure of components or products on the level of base material or during operation.

### COMPETENCIES

- Chemical analytic examinations, thermal analysis examinations (TG DSC)
- Microstructural light and electron microscope (P FIB, SEM) examinations with EDX analysis in 2 and 3 dimensions
- X-ray diffraction phase analysis
- Mechanical material examinations
- Computer tomography (CT) examinations
- X-ray diffraction examinations both at room temperature and elevated temperatures
- X-ray diffraction residual stress measurements (laboratory and industrial on-site measurements)
- Crystallographic anisotropy examinations (TEM -ASTAR, EBSD, XRD, ODF)
- Virtual element method (VEM) and cellular automaton simulations for metal forming and heat treatment processes
- Semi-industrial alloy production, continuous casting, rolling, heat treatments
- Computed image analysis in both 2 and 3 dimensions



### SERVICES

- Comparative examinations, revealing root causes in production for products assessed as “go” and “no go”
- Early degradation of products, revealing causes of procurer complaints
- Revealing causes of production problems originating from supplier requirements
- Numerical qualification of residual stress, revealing causes of degradation, failures connected to the actual state
- Revealing problems associated with the technologies of heat treatment, surface modification, plastic forming, technology optimisation, development
- Physical and computed simulation of different technological processes
- On-site expertise in case of production problems, malfunctions
- Specialist engineer trainings



### TOOLS

- STRESSTECH XSTRESS ROBOT DIFFRACTOMETER
- YXLON FF35 COMPUTER TOMOGRAPH
- THERMO SCIENTIFIC HELIOS G4 PFIB SEM
- BRUKER D8 DISCOVER XRD SAXS XRR



### REFERENCES

- Robert Bosch Electronics
- Joyson Safety Systems Hungary
- Electrolux Lehel
- HILTI Hungary
- Magyar Suzuki Corporation
- Thyssenkrupp
- Starter E-Components Automotive