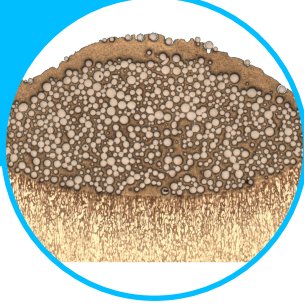


## Testing heterogeneous materials with indentation tests



This student research project is part of a project funded by the Ministry of Economics and Technology that deals with the simulation and experimental validation of eigenstresses in laser-generated composite materials. Laser dispersion is the primary process used in this project, where working surfaces of already manufactured parts are coated by adding tungsten carbide powder into the melt pool of a base material. The coating extends the part's lifetime due to the outstanding material characteristics of the locally produced metal matrix composite. Understanding and predicting the formation of eigenstresses within the phases is a key ingredient in optimizing such coatings.

### Tasks

The challenging thermo-mechanical simulations needed for the predictions will be realized in LS-DYNA. Main tasks include:

- Modeling and simulation of an indentation test on homogeneous material.
- Investigation of the coating material using fully resolved heterogeneous medium and using its homogenized counterpart.
- Building a parametric model and using it in an optimization scheme to match provided experimental data.

### Technical requirements

- Basic Python knowledge
- Motivation to learn new scripting languages
- Interest in simulations and efficient numerical schemes
- Tutorials and access to LS-DYNA will be provided

