

## Master Thesis in Additive Manufacturing

# Qualification of freeform fabrication systems for application in aerospace and automotive industries

Freeform fabrication systems like selective laser melting (SLM) and electron beam melting (EBM) offer a new dimension of functional and property design freedom. Material palettes for such processes have been expanding ever since. Physics of the new processes impose distinctive characteristics with respect to conventionally manufactured materials of the same designation. For full qualification in modern industry, an iterative process development and characterization strategy is necessary to be implemented.

In the framework of this master thesis, the selected candidate should show basic knowledge of the process attributes and induced properties. This knowledge, she/he will use to correlate process and post process parameters to physical properties like relative density, porosity and above all to process induced microstructure. Subsequently, the student should be able to design a study of the mechanical properties under quasi-static and cyclic loading. Finally, the gathered knowledge should enable an innovative predictive statistical-numerical modelling of the mechanical properties.

### Required knowledge and skills:

- Microstructural and mechanical characterization
- Programming languages: (Python, Matlab)
- CAD and FEM software (Inventor, Abaqus)
- Statistics and modelling

