

## Semesterarbeit/ Forschungspraktikum

# Parameter Study for Laser-Directed Energy Deposition - Development of an Optimized Process Window

### Background:

Laser-Directed Energy Deposition (DED-LB/M) is an Additive Manufacturing (AM) process in which metal powder is melted by a laser and deposited layer by layer to create complex geometries. This technology enables the efficient and material-saving production of various components. However, optimal process parameters are crucial to ensure a high-quality and defect-free deposition.

### Aim:

This work aims to determine a process window for DED-LB/M based on a Design of Experiments (DoE) study. The study will focus on a nickel-based alloy with a similar composition to Inconel 625. By systematically varying critical process parameters, including laser power, feed rate, and powder flow rate optimized parameters will be determined.

### Tasks:

- Research on the state of the art in DED-LB/M and DoE-based parameter studies
- Design of an experimental plan
- Experimental execution of the parameter study
- Evaluation according to determined quality criteria
- Derivation of a process window



### Your profile:

- Interest in laser-based AM, experimental work and structured data analysis
- Initiative and independent working style
- Good German or English skills
- Basic knowledge of DoE and metallographic analysis is an advantage

### Contact

Julius Arnhold  
julius.arnhold@tum.de  
+49 89 289 55328