

Professorship for Laser-based Additive Manufacturing

Modular Integration of an Optical System for Enhanced Material Processing in PBF-LB/M

Project Seminar

Overview

Are you interested in solving hands-on engineering problems in system design for laser-based powder bed fusion of metals (PBF-LB/M)? Do you want to turn an engineering concept into a working solution, not just on screen, but in the real world?

Then this is your project. We are looking for motivated students to join an interdisciplinary team project focused on the **design and implementation of a modular laser optical system for integration into a laser-based powder bed fusion machine** – one of the most advanced technologies in modern manufacturing.

Aim of the Project

In PBF-LB/M, laser wavelength plays a key role in determining material processability. This project aims to design a modular optical mount for integrating a 445 nm diode laser into a PBF machine, enabling improved processing of materials such as copper. The modular design will allow quick reconfiguration of the system, supporting flexible use of the PBF machine with different optical setups. You will be working on the following tasks:

- Analyze system requirements and interface conditions of the existing PBF machine.
- Develop a modular design for quick installation and removal of the optical unit.
- Manage the procurement and manufacturing of components and integrate the system into the machine.
- Design and implement an effective cooling system.

- Perform characterization of the optical setup, including calibration, power measurement, and caustic measurement.

Requirements and Application

- Ability to think analytically with an understanding of engineering concepts
- Confident in using CAD software, preferably SolidWorks
- No prior knowledge of additive manufacturing required – motivation is key

Please send your CV, current transcript of records, and a brief motivation letter to:

Contact Person

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All applications will be reviewed, and places will then be offered. These must be bindingly confirmed by the students by 20.08.2025.

