

## Investigation of control strategies in laser processing General Information

Project type:	Master Thesis, internship or combined
Lab/Group:	Intelligent manufacturing group (LAMP, <u>www.empa.ch/web/s204</u> )
Supervisor:	Dr. Elia Iseli
Location:	Empa, Feuerwerkerstrasse 39, 3602 Thun
Starting date:	ASAP
Duration:	6 month
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## **Project Description**

The Laboratory for advanced materials processing (LAMP) specializes in advanced 2D and 3D manufacturing processes, with research focused on innovative material designs and detection systems. Our work involves developing and applying cutting-edge process simulation tools, in-situ monitoring techniques, as well as machine learning-based modeling and process control.

This Master's thesis focuses on developing improved control strategies for laser processes through numerical predictions and experimental validation. Laser-material interactions often result in local heating and high temperature gradients, affecting material properties and overall part performance. This work explores advanced processing techniques to enhance material quality and consistency. The research will be conducted within an interdisciplinary team, covering topics across the fields of control, laser-material interactions, and material characterization.

We invite motivated students from Materials Science, Mechanical Engineering, Computational Science, Physics, or related fields to apply. If you are interested in gaining hands-on experience in numerical simulations and high-performance computing, while contributing to cutting-edge research, please contact us for further details.

## Tasks:

- Literature research/get familiar with existing approaches
- Find promising processing parameters by means of numerical computations
- Develop control algorithm, conduct experiments, validate numerical predictions
- Write report

## Skills:

- Python, MATLAB, Multi-physics simulation
- Material characterization (optional)