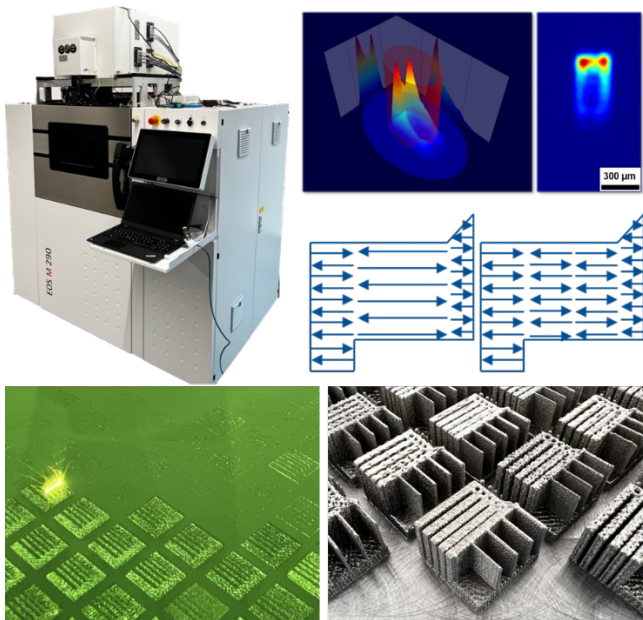


Simulation-Based Vector Dwell Times to Avoid Melt Accumulation in Powder Bed Fusion of Metals (PBF-LB/M)

Initial Situation

At the Professorship of Laser-based Additive Manufacturing, we conduct research on innovative process strategies, methods, and systems in the field of metal additive manufacturing. Our focus lies on the process Laser-based Powder Bed Fusion of Metals (PBF-LB/M), in which thin layers of metal powder are selectively melted by a laser, building up parts layer by layer. Different laser beam shapes and their influence on key process characteristics are investigated. Besides the order of the scan vectors, introducing targeted dwell times between individual vectors is a promising lever, e.g. to avoid melt accumulation at part tips.



Objective and Scope of the Thesis

The objective of this thesis is to calculate a vector-specific dwell time based on a thermal simulation that specifically avoids melt accumulation. For this purpose, different calculation rules are developed and tested in iterative experiments.

The thesis comprises the following work packages:

1. Literature review on path planning, thermal budget and melt accumulation
2. Improvement of the evaluation methodology for detecting melt accumulation
3. Configuration of the simulation and development of calculation rules for dwell times
4. Iterative experiments to verify the calculated dwell times
5. Comparison and refinement of the calculation rules
6. Documentation of the results

Candidate Profile

- Initiative and creativity
- Analytical thinking and structured work
- Strong interest in additive manufacturing
- Programming skills (e.g. Python) beneficial
- Enthusiasm for teamwork

Application and Contact

Please send a short motivation letter and your current transcript to the contact below.

- Bachelor's Thesis, Semester Thesis or Master's Thesis (6 months), in English or German
- Part of a student team of 3-4 members – independent thesis with regular exchange within the team
- Application by October 21, 2026
- Feedback by October 26, 2026
- Interviews October 26–30, 2026
- Start from November 1, 2026

Richard Off, M.Sc. | richard.off@tum.de