

Bachelor's Thesis, Term Project, Master's Thesis

Advanced Thermal Management for Large Format Additive Manufacturing

A thesis opportunity is available in collaboration with a spin-off of TUM's Chair of Carbon Composites. This project focuses on the development of innovative thermal management techniques to enable large format additive manufacturing (LFAM) for industrial applications. LFAM has the potential to revolutionize the manufacturing industry, and this thesis aims at contributing to its successful implementation.

The main objective of this thesis is to investigate and develop advanced thermal management strategies to enhance the performance and reliability of LFAM systems. By effectively controlling the layer interface temperature during the printing process, superior material properties can be achieved, distortion can be reduced, and overall print quality can be improved. This research project offers the opportunity to work with an innovative start-up at the forefront of LFAM technology.

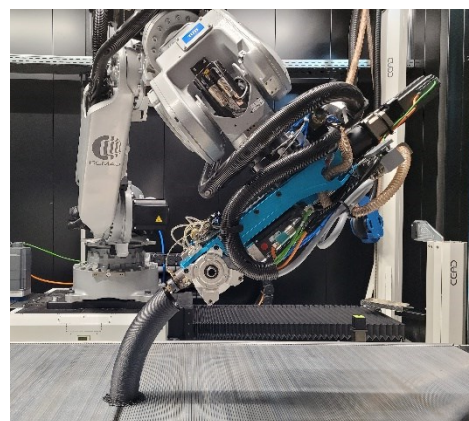


Figure: LFAM system

Research focus of the thesis can be chosen from the following thematic areas:

1. Material Characterization:
 - Investigate the temperature influence on mechanical behavior of different materials used in LFAM.
 - Analyze material properties and their correlation with temperature variations.
 - Develop characterization techniques for optimizing material selection and process parameters.
2. Automation & Robotics:
 - Design and implement automation solutions for LFAM systems.
 - Develop distributed sensors and edge devices for robotic systems to optimize the printing process.
 - Integrate automated quality control mechanisms for real-time monitoring.
3. Computer Vision & AI:
 - Develop computer vision algorithms for real-time temperature monitoring.
 - Implement machine learning techniques to predict and control temperature fluctuations.
 - Optimize LFAM process parameters using AI-driven optimization algorithms.
4. Business & Operations Planning:
 - Conduct market analysis and identify potential industrial applications for LFAM.
 - Develop business models and strategies for the commercialization of LFAM technology.
 - Create operational plans and evaluate scalability for large-scale production.
5. Hardware Prototyping for Thermal Management Systems:
 - Design and prototype hardware systems for advanced thermal management in LFAM.
 - Evaluate the performance and effectiveness of different thermal management solutions.
 - Optimize hardware designs for efficient heat transfer and temperature control.

The thesis can be written in either German or English.

Requirements:

- Bachelor, term project, or master's thesis level students.
- Strong interest in additive manufacturing, robotics, computer vision, business planning, or hardware prototyping.
- Proficiency in relevant programming languages and software tools.
- Ability to work independently, conduct experiments, and analyze data.
- Good communication and reporting skills.

Benefits:

- Opportunity to work with a dynamic start-up and gain exposure to cutting-edge LFAM technology.
- Collaboration with industry experts and researchers in the field.
- Access to state-of-the-art equipment and facilities.
- Guidance and support from experienced supervisors.
- Potential opportunities for publication or future employment.

Starting date: Now

For more details please contact:
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