
Master Thesis Opportunity

Simulation Framework for Hybrid Metal-Plastic Joints Based on Microscale Mechanical Interlocking

Join hyjoin and develop the next generation of predictive engineering tools for intelligent joining technology.

In this thesis, you will develop a simulation framework to model and predict the performance of hybrid metal-plastic joints created through laser-structured surface technologies and thermal direct joining. By combining different modeling approaches and data-driven evaluation, you will create methods to evaluate joint stiffness, strength, durability, sealing performance, and environmental robustness.

Your Tasks

- Develop a simulation framework for hybrid metal-plastic joining technologies
- Model mechanical interlocking between laser-structured metal surfaces and polymers
- Validate and implement numerical approaches to predict joint strength, thermal behavior and failure behavior of thermally direct joined components
- Analyze the influence of surface structure geometry on mechanical performance
- Evaluate the effects of temperature, humidity, and environmental influences on joint properties
- Correlate simulation results with experimental manufacturing and testing data
- Develop software tools and workflows for automated simulation and design evaluation
- Validate and optimize the models using real industrial applications

Your Profile

- M.Sc. student in Mechanical Engineering, Manufacturing Engineering, Computational Engineering, Materials Science, Mechatronics, Physics, or a related field
- Interest in simulation, material modeling, and advanced manufacturing technologies
- Experience with numerical methods such as FEM, multi-physics simulation, or computational modeling
- Familiarity with material behavior and structural mechanics
- Programming skills (Python preferred)
- Experience with simulation software is a plus
- Analytical mindset and enthusiasm for solving complex engineering problems
- Motivated, independent, and eager to learn
- Excited by the pace and responsibility of a startup environment

What We Offer

- A highly relevant industrial research topic
- Direct impact on innovative manufacturing technology
- Close collaboration with experts in laser processing and joining
- Startup culture with flat hierarchies and fast decision-making
- Flexible start date and room for your own ideas

Location: Munich / Dresden

Company: hyjoin GmbH **Start:**

Flexible

Interested? Let's build the future of intelligent joining technology together. Send your application to careers@hy-join.com.