TUBAF
Die Ressourcenuniversität.
Seit 1765.

imkf INSTITUT FÜR MASCHINENELEMENTE
KONSTRUKTION UND FERTIGUNG
PROFESSUR ADDITIVE FERTIGUNG

Topic Definition for a MASTER THESIS

for

Topic: **Experimental Investigation of Directed Energy Deposition - Arc Process Parameters for a New Steel Alloy**

Additive Manufacturing (AM) has progressed from a rapid prototyping technique to a viable manufacturing route for structural, end-use metallic components, offering enhanced design freedom, material efficiency, and reduced lead times. Among metal AM processes, Directed Energy Deposition -Arc (DED-Arc) is particularly suited for high deposition rates and large build volumes, making it attractive for fabricating and repairing large-scale components, albeit with comparatively lower geometric precision than Laser Powder Bed Fusion. Recent research interest has shifted toward expanding DED capabilities by introducing new materials and multi-material systems to overcome the limitations of monolithic materials. In this context, the present work aims to investigate the feasibility of processing a novel material combination using DED-Arc, with emphasis on establishing suitable process parameters and achieving a stable metallurgical interface. The study aims to evaluate the manufacturability and resulting properties of the deposited material system, providing insights into its mechanical performance, interfacial integrity, and potential applicability for industrial and structural applications.

The following tasks should be completed:

- Conduct single and multi-bead experiments to achieve uniform bead geometry.
- Evaluate the bead morphology with appropriate bonding to the substrate and the previously deposited layer.
- Assess mechanical properties, including tensile, hardness, etc.
- Optimize the process parameters for the selected output properties
- Demonstrate application of the material and process combination for appropriate industrial usage

For the defense of the thesis, a poster and a video must be submitted according to the specifications of the professorship.

Issue: Klicken oder tippen Sie, um ein Datum einzugeben.
Submission: Klicken oder tippen Sie, um ein Datum einzugeben.
Mentor: Dr. Neel Kamal Gupta

Prof. Dr.-Ing. H. Zeidler
Academic supervisor