

## Master Thesis

# Development of an Auxiliary Powder Feeding Device for Hybrid DED-Arc Process.

### Background

In Directed Energy Deposition (DED-Arc) processes, producing Metal Matrix Composites (MMCs) can be carried out on ex-situ or in-situ mixing of the matrix and reinforcements. In-situ mixing can be realized in the form of a Conventional Powder Approach -powder metal matrix and powder reinforcement- or in the form of a Hybrid Wire-Powder Approach where the matrix material is fed in wire form, while the reinforcement particles are fed in powder form.

### Aim

The aim of the work is to develop a powder feeding mechanism and investigate different approaches to feed the reinforcement particles simultaneously during the alloy wire deposition. Structural and mechanical testing will be conducted to determine the quality of the produced specimens as well as the efficiency of each powder feeding technique to overcome the challenges associated with the hybrid assembly.

### Your Responsibilities

- Conducting a literature analysis on the possible powder feeding mechanism, the weld pool-reinforcement particles interaction.
- Designing a suitable feeding mechanism for the reinforcement particles.
- Investigating different feeding mechanisms (trailing feed, leading feed, and coaxial feed).
- Structural and mechanical testing of the produced specimens.

### Your profile

- Mechanical Engineering, Material Science or a similar study.
- Basic knowledge in materials science, metallography, and mechanical testing.
- Proven experience in CAD/CAM software.
- Interest in additive manufacturing and practical work.
- Very good English spoken and written.

### Contact

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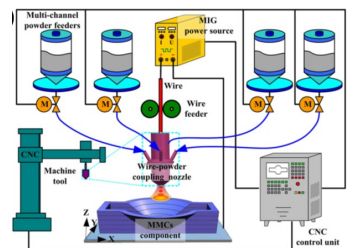


Figure. Hybrid DED-Arc approach for composite manufacturing. (Sun et al., 2022)