

## Master Thesis - “Effect of Nozzle Powder Flow in DED-Powder Deposition” (30 credits/20 weeks – 1 student)

### About us

GKN Aerospace is the world’s leading multi-technology tier 1 aerospace supplier. With 38 locations in 12 countries, we serve over 90% of the world’s aircraft and engine manufacturers. We design and manufacture innovative smart aerospace systems and components. Our technologies are used in aircraft ranging from the most used civil aircraft to the world’s advanced 5th generation fighter aircraft and the Ariane orbital rockets used by ESA.

### Project Background

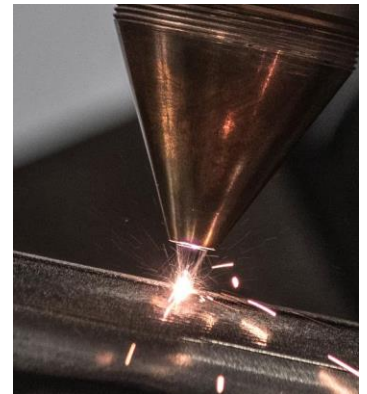
At GKN Aerospace in Trollhättan there is a large focus on Directed Energy Deposition (DED) to improve products but also come up with new ground breaking innovations. DED is one of many Additive Manufacturing methods that is showing promising results to reduce waste material but also enable designs of more net shape products. To be able to introduce DED on flying components it is important to have control of the deposition process and make sure that the deposited material meets the tight requirements in the industry.

This master thesis will therefore be focused on DED using powder as feedstock and the equipment that is necessary for this process. For DED-powder to function properly a great deal of parameters and equipment needs to be understood and be fine-tuned with each other to produce a result that fit these tight requirements.

Therefore, this master thesis project will focus on studying and mapping the effect of the nozzle quality and subsequent powder stream to understand its effect on bead geometry and defects.

### Assignment Description

- Literature review focused on DED, nozzle designs, wear and damage of nozzles and its effect on bead geometry
- Establish basic knowledge about the process, its equipment and the effect all different components have on the final result
- Design and evaluate DoE to investigate the nozzle effect on final deposition
- Use of different sensors to characterize nozzles in the workshop
- Propose and implement a nozzle characterization procedure into the development workflow



The thesis work will be supported by appropriate process and materials engineers.

### Qualifications

- Student in final year of M.Sc. studies in mechanical-, material-, automation engineering or similar
- Interest in programming and material science
- Previous programming experience is recommended. The student will work with python
- Workshop experience is recommended
- Basic knowledge of Additive Manufacturing recommended
- The student should be capable of taking initiatives on their own
- GKN would prefer if the student can perform most of the work on site at the Global Technology Centre organization in Trollhättan, Sweden

### Apply by

Send your resume and cover letter to:

David Lindell, [david.lindell@gknaerospace.com](mailto:david.lindell@gknaerospace.com)

Interviews will be held continuously