Master Thesis - “Simulation of additive manufacturing deposition for aerospace applications” (30 credits/20 weeks – 1-2 students)

Project Background

GKN Aerospace is committed to the green transition in aviation. A key enabler for this journey is additive manufacturing, which reduces waste material and energy consumption while increasing design freedom, enabling more efficient products. At GKN Aerospace in Trollhättan we are currently focusing on Directed Energy Deposition (DED) to vastly improve the manufacturing concepts for certain components.

To be able to introduce DED on flying components it is important to have control over the manufacturing process and to ensure that the deposited geometries meets the strict requirements of the aerospace industry.

Student 1: One way to increase the understanding of the DED process is by performing simulations of geometries with local features deposited on them and analyse the impact these features have on the final distortions of the components.

Student 2: This analysis will focus on different fixture and substrate concepts and how they affect the final part distortions.

These distortion results would then be further analysed to see if there is a way to pre-compensate the original geometry to get a final shape closer to the nominal geometry. This final goal of this pre compensation is to deposit near net shape and thereby drastically reduce the material required for the manufacturing process compared to traditional manufacturing.

This master thesis project will focus on simulating the deposition of local features for single and multi-bead deposition and fixturing concepts for large scale free form DED deposition.

Assignment Description

The thesis work will focus on:

- Literature review focused on DED deposition, as well as the different modelling of these geometries.
- Use and improve internal and external GKN tools to predict the deformation behaviour caused by deposition on final geometry.
- Evaluate different designs for deposition and fixture concepts and evaluate their impact on the final part deformation.
- Implement logic for deposition and fixture design on larger models.
- The thesis work will be supported by appropriate simulation and process engineers.

Qualifications

- Master in mechanical engineering, engineering physics, computer science or similar.
- Previous FEM modelling experience is recommended.
  The student will work mainly with Simufact Welding.
- Basic knowledge of Additive Manufacturing is appreciated.
- The student should be capable of taking initiatives on their own.

Application

Send your resume and cover letter to simon.andersson3@gknaerospace.com &

sakari.tolvanen@gknaerospace.com.

Last date for application: 2024-12-15. Interviews will be held continuously and the position could be filled prior to the last application date.