

## Master Thesis - “Machine Learning to Explore Process Data to Support Additive Manufacturing” (30 credits/20 weeks –1 student)

### About us

GKN Aerospace is the world’s leading multi-technology tier 1 aerospace supplier. With 55 manufacturing locations in 15 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.

This thesis work will be conducted at GKN Aerospace Engine Systems, Sweden, Trollhättan.

### Project Background

Additive Manufacturing (AM) is becoming more popular nowadays for producing light-weight customized products and for decreasing the cost and time of manufacturing. One of the crucial aspects of AM is the monitoring of the welding process for a better quality of products. A way to analyze the deviations in the welding process is through visual inspection of melt-pool images which are captured by cameras. However, this is a very time-consuming verification procedure if done manually since there is a large number of images generated from every built component, and it is also prone to human-inaccuracy due to the time consuming and tedious task. Another problem is that material and time are wasted because defect analysis is done after the component is manufactured (post-production). For instance, if larger defects are detected in the manufactured component, the product may be entirely discarded. Hence, process engineers need a support to automate the defects analysis of process data (images and robot parameters data).

The aim of the master thesis is to explore machine learning/deep learning based solutions using process data to automate defect analysis and to support process engineers in finding more efficient ways to speed-up in-situ quality control of AM products.

### Assignment Description

- Familiarize with topics, additive manufacturing and aerospace engineering.
- Understanding process/manufacturing data
- Identifying the challenges with process data and to explore ways to model process data.
- Proposing a suitable approach or a method based on machine learning/deep learning using process data on how it can be modelled with a better accuracy to be able to use in practice.
- Implementing and validating the developed models
- Documenting results in thesis and presenting thesis work at GKN

### Qualifications and Skills

- Be a final year master thesis student in Machine learning or data science or similar fields.
- Great interest in data analytics and deep learning.
- Knowledge in probability theory, statistics and mathematics.
- Knowledge in sequence, time series and prediction.
- Practical experience in Python programming.

### Apply by

Send your resume and cover letter to [Jonatan.Palmquist@gknaerospace.com](mailto:Jonatan.Palmquist@gknaerospace.com)

Last date for application: 2020-12-17

