

# Master Thesis - “Validation and Continuous Improvement of Machine Learning Models for Industrial Image Processing”

## (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 with increasing focus on sustainable aviation.

This thesis work will be conducted at GKN Aerospace Engine Systems Sweden, Trollhättan, with start in January or February 2023.

### Project Background

Several inspection processes output image data which is analyzed manually, i.e. by the human eye. At GKN Aerospace, research has been conducted to implement systems assisting and/or automating such analysis processes, resulting in multiple demonstrators. In order to improve the underlying industrial inspection processes, the developed solutions need to be industrialized. The automation of image analysis tasks involves classic Computer Vision methods as well as Machine Learning. Regarding industrialization, this offers interconnected chances and challenges: Once industrialized, the permanently acquired data can be used to continuously improve the system. But to get such systems involving ML-based computer vision industrialized, a validation process needs to be in place proving the reliability of the method and creating trust in it.

The proposed Master Thesis is placed in the described area of conflict between validation, industrialization and continuous improvement. A process needs to be determined and implemented how to validate machine learning-based image analysis solutions, as well as a process for continuous improvement of existing models. With this in place, experimentation regarding the necessary amount and composition of datasets for validation and continuous improvement should be conducted. Furthermore, timing aspects of continuous improvement and also the validation of improved models are subjects of interest. Influences of data drift on both processes can be investigated as well. At GKN, different use cases with existing solutions are available. Each offers different challenges and can have a different focus. They have in common that extensive amounts of data are available to conduct the required experiments.

### Assignment Description

- Familiarize with the topic and the existing use cases
- Choose a use case on which the thesis work will be based
- Prepare the necessary image data
- Investigate and implement a validation setup for the existing ML models
- Implement a continuous improvement cycle for the chosen use case
- Apply the implemented validation setup to optimize the improvement cycle
- Analyze, document and present results

### Qualifications

Student in the final year of their M.Sc. studies in the field of Production Technology, Computer Science or similar. An interest in computer vision and machine learning for industrial applications is required. Python programming skills are of great advantage.

### Contact

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