

Master Thesis - “Capability determination of in-process monitoring laser powder bed fusion” (30 credits/20 weeks – 2 students)

Project Background

Additive manufacturing (AM) offers design freedom enabling the development of functionality-orientated new designs. Metal AM has significant potential for the development of products with high added value and with high level of customization, such as lightweight aerospace components. Additive manufacturing demands strict in-process quality control procedures and high product quality. Currently the quality control and validation of metal AM parts relies heavily on time-consuming and expensive ex-situ tests.

The main factor that affects repeatability and compromises the performance of the materials is the presence of defects. Based on 3D models rebuilt from in-situ optical tomography monitoring images and post-build X-ray CT images, demonstrate local porosity prediction through in-process monitoring images and machine learning. demonstrated our preliminary work on the laser powder-bed fusion feedback loop: predict local porosity

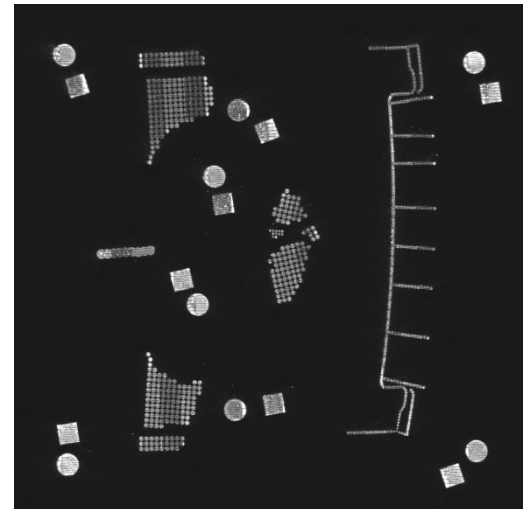
Hence, to assess the quality of a product and to predict its performance, it is crucial to recognize which defects are present and ensure their detectability.

Assignment Description

The thesis work will focus on:

- Literature review
- Develop evaluation procedures
- Evaluate monitoring data
- Evaluate process data from processing of component-like structure including typical features produced by EOS laser powder-bed fusion machine of Inconel 718
- Preparation of XCT samples
- Validate defect predictions with ex-situ XCT measurements
- Make suggestions of how evaluation and analyzing can be improved

The thesis work will be supported by both GKN Sweden and Chalmers.



Qualifications

- Master in mechanical engineering, material engineering, computer science or similar
- Interest in Material Science/Process Technology/Numerical analysis
- The students should be capable of taking initiatives on their own, especially while gathering data from departments
- The work will take place both at GKN Trollhättan and at Chalmers University of Technology, Göteborg.

Supervisor

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