Master Thesis - “Predicting laser powder bed fusion defects through in-process monitoring data” (30 credits/20 weeks)

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. 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
- Design benchmark samples with challenging design features for LPBF
- Develop evaluation procedures
- Manufacture component-like structures using in-process monitoring
- Process and evaluate monitoring data
- Evaluate process data from processing of component-like structures including typical features produced by EOS and Renishaw laser powder-bed fusion machines of Inconel 718 and Ti-6Al-4V
- 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, GKN UK and Chalmers.

Qualifications
- Master in mechanical engineering, material engineering or similar
- Experience with data analysis, in particular image analysis, is a merit
- 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 sites and at Chalmers University of Technology, Göteborg.

Apply by
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Last date for application: 2022-12-12. Interviews will be held continuously and the position could be filled prior to the last application date.