Qualification process development for metal additive manufacturing - A study for Alfa Laval

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Additive manufacturing in metal is a relatively new commercial manufacturing method. Competence sharing within industry to improve process understanding of the method is needed. There is also a demand for development of sustainable and standardised qualification processes.

Qualification processes aim to ensure that the additive manufacturing procedures operate and perform as expected as well as ensuring the quality of the processes' input and output. Few general qualification processes for additive manufacturing in industry application were found in this study. Instead, the result showed complex qualification needs for both part and process. Therefore, a qualification framework was developed. The framework, viewed in Figure 1, includes the four steps of qualification required: raw material, equipment, part & process and performance. To adapt and optimize the framework for the focus company Alfa Laval's interest, it was developed into a strategy concerning qualification based on part criticality. The utilization of the qualification steps of part & process and performance depends on the criticality level of built parts. It is a balance between reducing cost and ensuring that commercial parts' requirements are fulfilled.

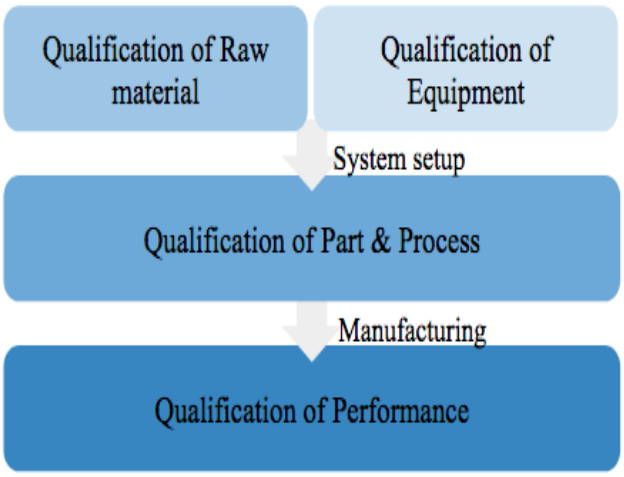

Figure 1.The framework of the four qualification steps.

Additive manufacturing in metal is a relatively new industrial manufacturing method. Therefore, qualification processes are not fully developed and standardised at companies today. Increased understanding of additive manufacturing and the qualification processes connected to the method, would help industrial companies stay competitive and develop high-quality products. A shared competence and expertise around additive manufacturing would support the development of a successful manufacturing method.

Alfa Laval is introducing additive manufacturing as a new technology which generates difficulties with process understanding and the coverage of qualification processes. The aim of this thesis is to develop a sustainable qualification procedure for their introduction of additive manufacturing. The presented concept and strategy are aimed to be used as the foundation for development of qualification procedures, with the objective to reduce the cost of qualification without reducing the guarantee of quality.

The research consisted of a literature study, to explore the qualification possibilities for additive manufacturing, and a case study to investigate which procedures are useful and viable for the industry. The case study included interviews within the industry and data collection at Alfa Laval.