

Popular science summary of the PhD thesis

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Title of the PhD thesis	Digital Fingerprints for Linking Product and Process Perspective in Advanced Manufacturing
PhD school/Department	Department of Civil and Mechanical Engineering

Science summary

* Please give a short popular summary in Danish or English (approximately half a page) suited for the publication of the title, main content, results and innovations of the PhD thesis also including prospective utilizations hereof. The summary should be written for the general public interested in science and technology:

Main content

The PhD thesis applies Digital Fingerprint concept to the in-process generated data from additive manufacturing technologies, aims at better using the data to improve the performance of the process and quality of the product.

Results

The thesis provided three different approaches for obtaining the Digital Fingerprint: finite element method, regression analysis and neural networks. In the meantime, case studies are conducted with different additive manufacturing techniques, including Selective Thermoplastic Electrophotography Process (STEP), Selective Laser Sintering (SLS), Vat Photopolymerization (VPP) and soft-tooling injection molding. By applying the most suitable Digital Fingerprint extraction methods to corresponding technologies, this study offers a comprehensive understanding for utilizing data more effectively to achieve advanced in-process quality inspection, which sets the stage for sustainable upscaling and digitalization for the field.

Innovations

One of the major innovations in this thesis is the development of systematic approaches to generate, utilize and evaluate the concept of Digital Fingerprint that can improve the efficiency of data generated during the additive manufacturing process. The approaches developed in this project are not only beneficial for additive manufacturing industry but also for digitalization and other related research.