

Project Profile

Valid3D

Data-driven quality assurance for additive manufacturing

To unlock the potential of metal additive manufacturing (AM) in the medical and aviation industries, the ITEA project Valid3D (Valid generative design for 3D printing) will develop a framework for data-driven quality assurance across the entire production process.

Addressing the challenge

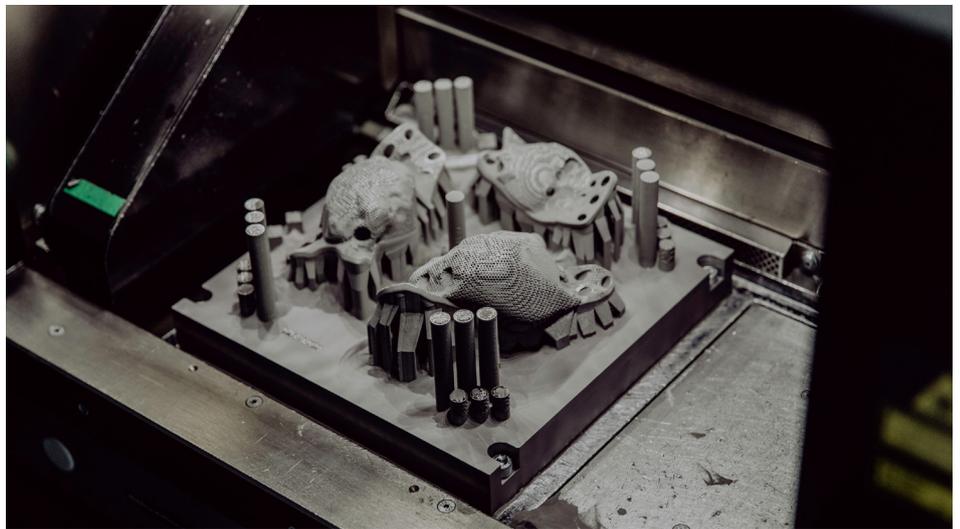
Additive manufacturing offers the possibility of complex components with lightweight internal structures that combine entire modules in one 3D-printed component, which significantly reduces maintenance requirements. However, today's expensive non-destructive and destructive testing procedures and subsequent strict fixed production windows make the use of 3D-printed parts inflexible and uneconomical. The various tasks to build and integrate 3D-printed metal components are also distributed among different stakeholders, leading to knowledge gaps. These factors render it difficult for 3D-printed components to meet the quality assurance demands of the medical and aviation industries.

Proposed solutions

Valid3D's solution lies in a generic, central and collaborative AM quality system (AMQS) in which all AM-related data sources can be stored, analysed and correlated for continuous process improvements, scrap reduction and preventive maintenance. By gathering data from six data source categories, this will be capable of cross-correlating all relevant AM inputs and outputs. The best format and storage solutions will also be investigated so that data from different sources can be linked and stored in a standardised, structured and therefore interpretable format. The AMQS will be used to capture a comprehensive dataset, from the initial design file to the quality tests of the final product, integrating both newly developed and traditional

data sources. This broad database will be used to develop artificial intelligence (AI) models to provide feedback to the individual process steps, resulting in a holistic approach in which data becomes information and information becomes knowledge about the AM production process. This will make it

making quality compliance conclusions easier. This will help tap the unique potential of additive manufacturing for aerospace and medical parts, including an expected 30% reduction in part rejection or re-design across each. In turn, this will lead to both cost savings and a stronger competitive position through a quicker time to market. For medical devices, additive manufacturing can also offer better quality of life in patient-specific cases such as facial reconstruction, cancer-affected bone restoration, or situations where off-the-



^ Finished metal build after powder removal and still inside the machine build chamber, the platform contains test specimens and medical implants.

possible, for the first time, to compare the freedom of component design in the construction process with the results of quality assurance and thus ensure the applicability of the designed components.

Projected results and impact

With Valid3D, the partners envision enhanced data integration, storage and management to link data from different process steps, thereby increasing the efficiency of daily operations and

shelf devices are not a match. For aircraft, meanwhile, lightweight components have a significant impact on CO2 emissions as fuel consumption depends largely on weight. This is part of a wider environmental impact of Valid3D, which can drastically reduce material and energy requirements while helping to finally bring additive manufacturing to the targeted markets on a scale not possible today.

Project partners



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Project end
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<https://itea4.org/project/valid3d.html>



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