DIGITAL TARGET/ACTUAL COMPARISON USING CT SCAN FOR 3D PRINTING

Application for the manufacturing industry - Using CT scanning to digitally compare CAD design specifications with the physical world

SUMMARY

With additively manufactured components, in particular, designers often have to cope with defects such as poor dimensional accuracy or component distortion during the manufacturing process. This can be addressed by the smart combination of individual technologies. A computed tomography (CT) scanner is used to generate 3D scans of components which are then compared with the CAD data. As a result, deviations from the digital CAD design can be accurately identified and not only can the quality of the manufactured part be assessed, its manufacturing processes can also be optimized.

CURRENT SITUATION

Additive manufacturing offers great design freedom. In the case of functional components, it is important that the design is reproduced exactly. An additively manufactured component should not be used without undergoing CT quality inspection. This is recommended for prototype components, as component distortion is unavoidable in the manufacturing process. Repeatability is critical for quality (geometric fidelity). In order to be able to perform optimizations, the process and method must be fully understood.

PROJECT DESCRIPTION

Non-destructive analysis of additively manufactured components, in particular functional components, using industrial CT, enables deviations of the actual component from the “digital target geometry”, i.e. the CAD design, to be identified. When the component is reprinted and subjected to another CT scan, this provides precise information on how the component has changed compared with the previous component printing process.

SOLUTION

Industrial computed tomography delivers quality transparency and enables very fast, efficient assessment of components for geometric fidelity and geometric properties. Hachtel’s solution for additive manufacturing enables the whole range of materials and processes used, each with their quite specific properties, to be compared directly with the CAD data using the CT scan. Deviation from the “digital target” is critical to quality. With multiple component printing, changes to process parameters can be continuously optimized and stored. The complex engineering in additive manufacturing (the support structures, for example) and the optimization loops needed today can be accelerated through precise calculation with simulation tools.

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• Non-destructive testing based on industrial CT scanning and on new closed-loop control solutions ensures short time-to-market.
• Data and information for simulation technologies throughout the entire production process enable the development process to be optimized and shortened.

STANDORIZATION APPROACHES

In order to obtain information from engineering tools (CAD) cost-effectively, simulation technologies require standardized semantic information models, which can then be used to optimize simulation models. Standardization of a description language (administration shell) enables simulation process costs to be reduced.