3. Overview of Abstracts

3.1 Design and process strategies for metal additive manufacturing

Wessel W. Wits (University of Twente, The Netherlands)

Additive Manufacturing (AM) is a relatively new type of production technology, where parts are typically build using a layered approach. AM enables the production of (near) net-shape parts with complex geometries, optimized structures and internal cavities. Compared to conventional processes, for AM the design and process strategies are not that well known yet; more so, for metal AM.

As AM technologies have the capability of producing parts impossible to produce otherwise, this poses new demands on the part design, process design and also on the quality control strategies. Freeform options, optimized geometries, porous structures and gradient properties, as shown in Figure 1, are functional part features that should now be on the repertoire of design engineers.

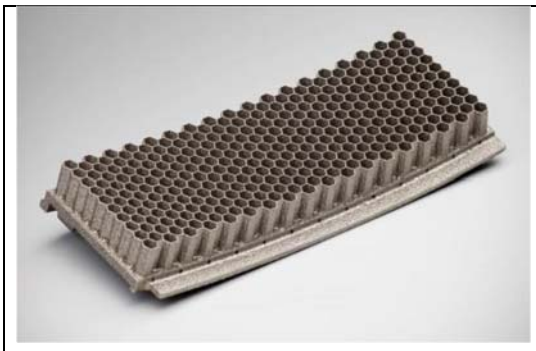

Figure 1: freeform optimized geometry with porous features.

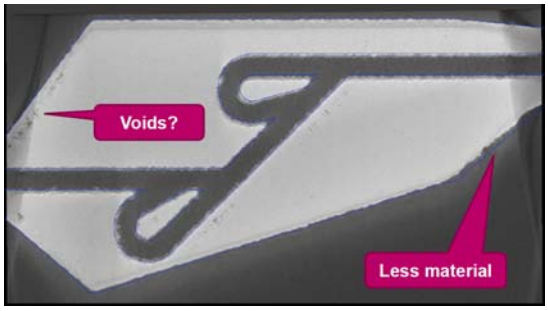

Figure 2: AM part and automatic CAD comparison (original CAD contour is blue).

This presentation focusses on the quality control of both outer (i.e. on the surface) and internal shapes. 2D x-ray imaging and 3D Computer Tomography (3D-CT) are addressed. The former being rather "quick and dirty". The latter allows us to examine the part in any plane or direction. Quality control algorithms can automatically determine part quality based on the original CAD file, as shown in Figure 2. Also, production defects, such as unwanted voids due to the additive process can be traced automatically. Finally, current research advances regarding design tooling and (closed loop) quality assurance is highlighted.