

Quality control of an additively manufactured artifact

Additive manufacturing (AM) is transforming the way supply components for various industries, including aerospace and medical, are manufactured. With new technologies come new inspection challenges, and CT is often used for this application due to its high sensitivity to detect typical AM defects and flaws. In this application note we demonstrate a metal AM test part containing some of the typical defects of interest for such inspections: cracks, trapped powders, and porosities. With the unique insight of CT you can easily identify flawed parts and gain confidence in the quality of your parts, when these are not present.

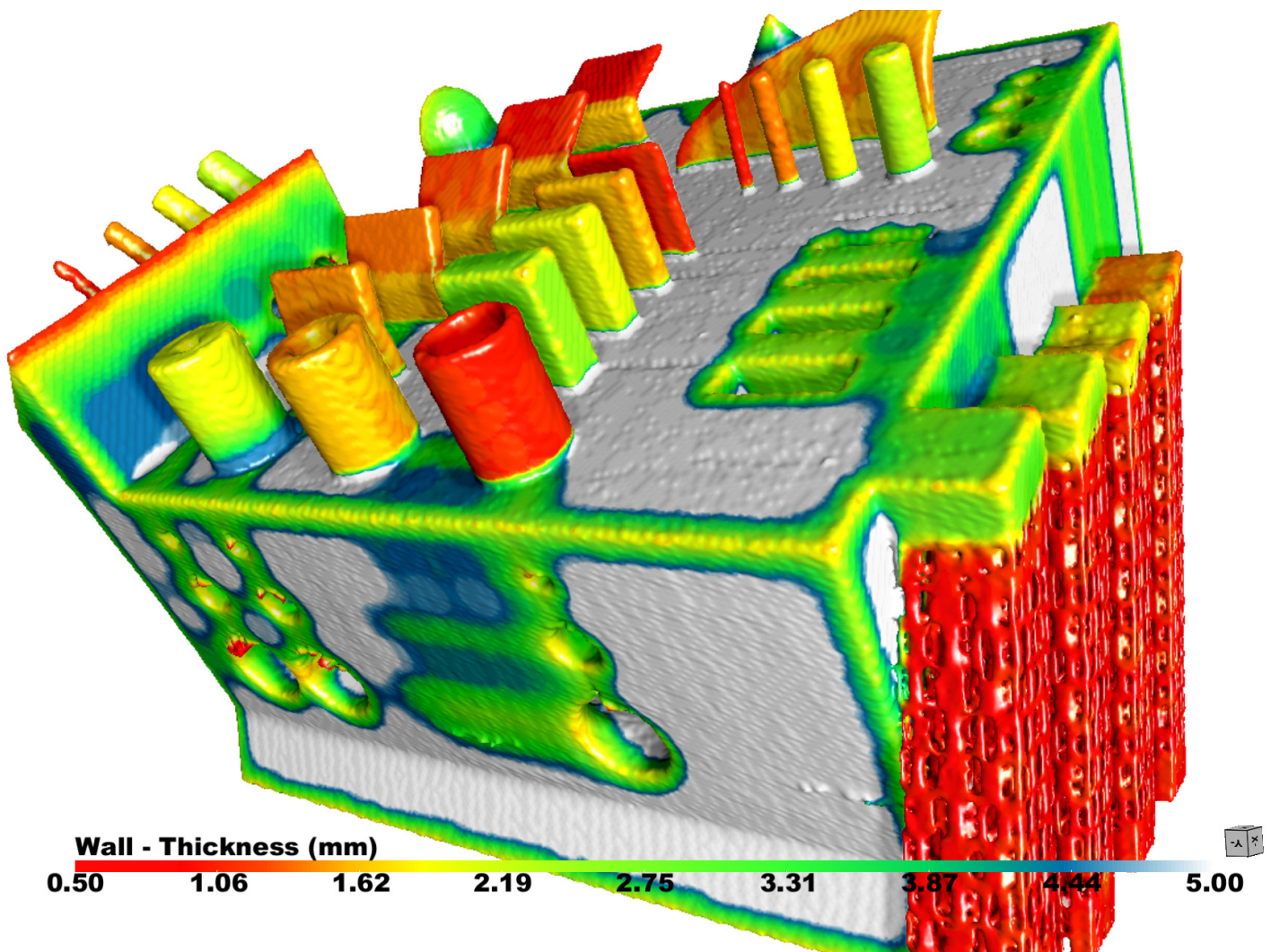
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Requirements

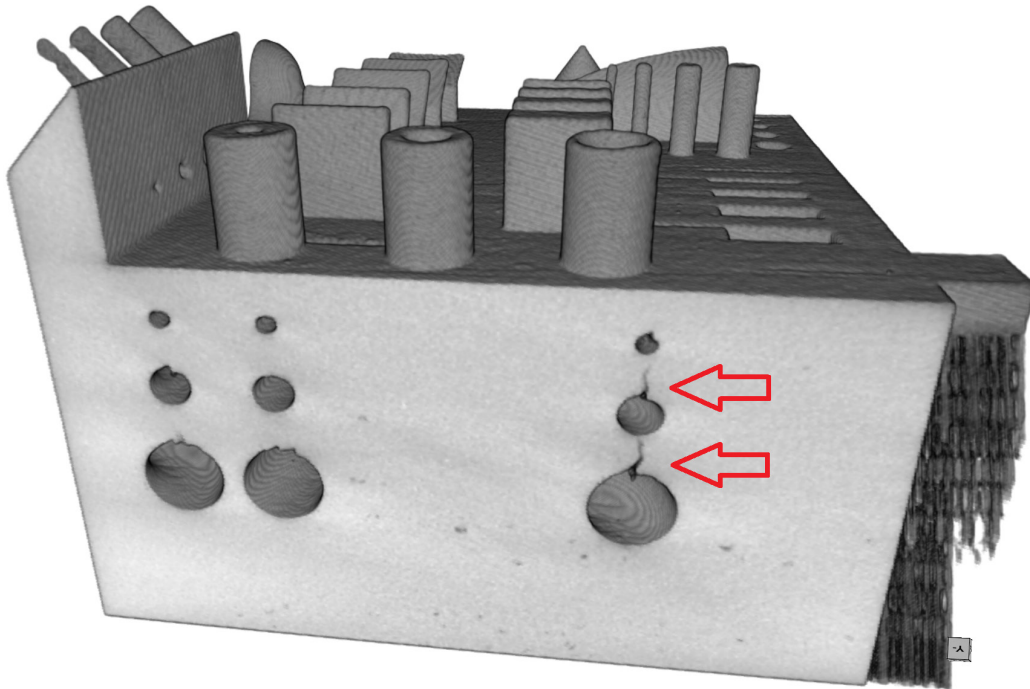
A high-quality CT scan of the part, typically using a laboratory X-ray micro-CT instrument. Image analysis is fully digital and the actual part is not needed. A computer with Dragonfly 3D World is needed, the data can be in any format, provided the voxel size is known (typical is a stack of 16-bit tiff images representing the full volume). The part in this example was scanned using the YXLON FF35 microCT system.

Typical outputs

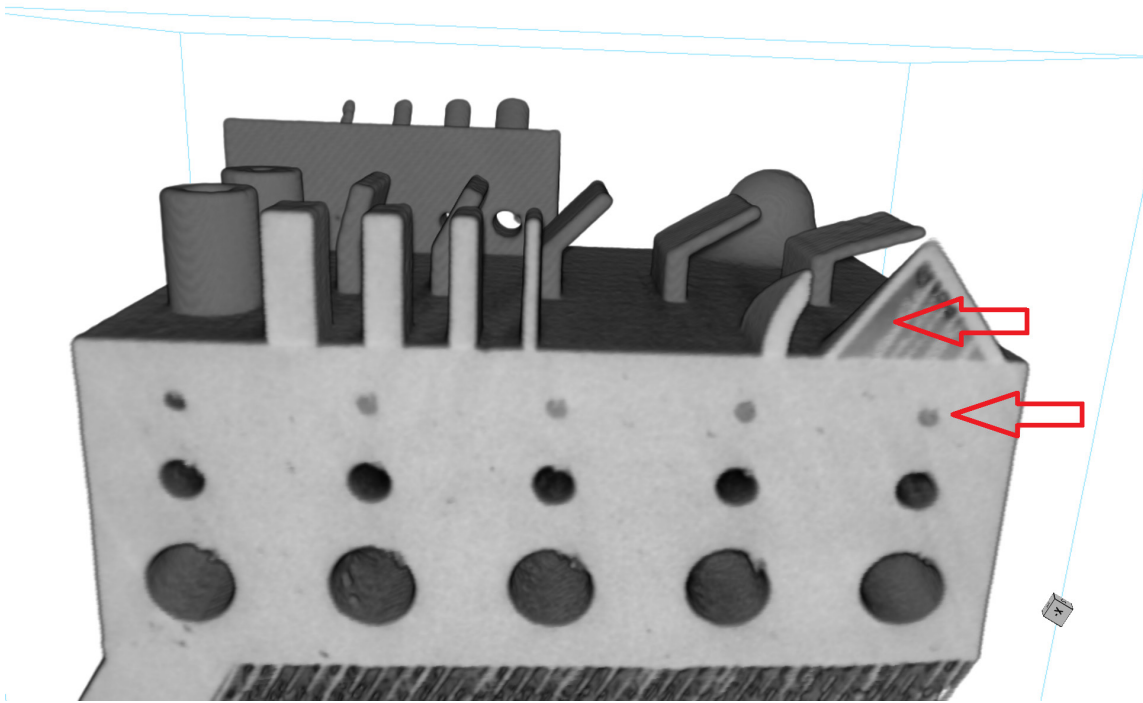
- Cross sectional images of defects/cracks & highlighting flaws/indications
- Wall thickness analysis highlighting thinnest features and local changes in thickness in 3D.



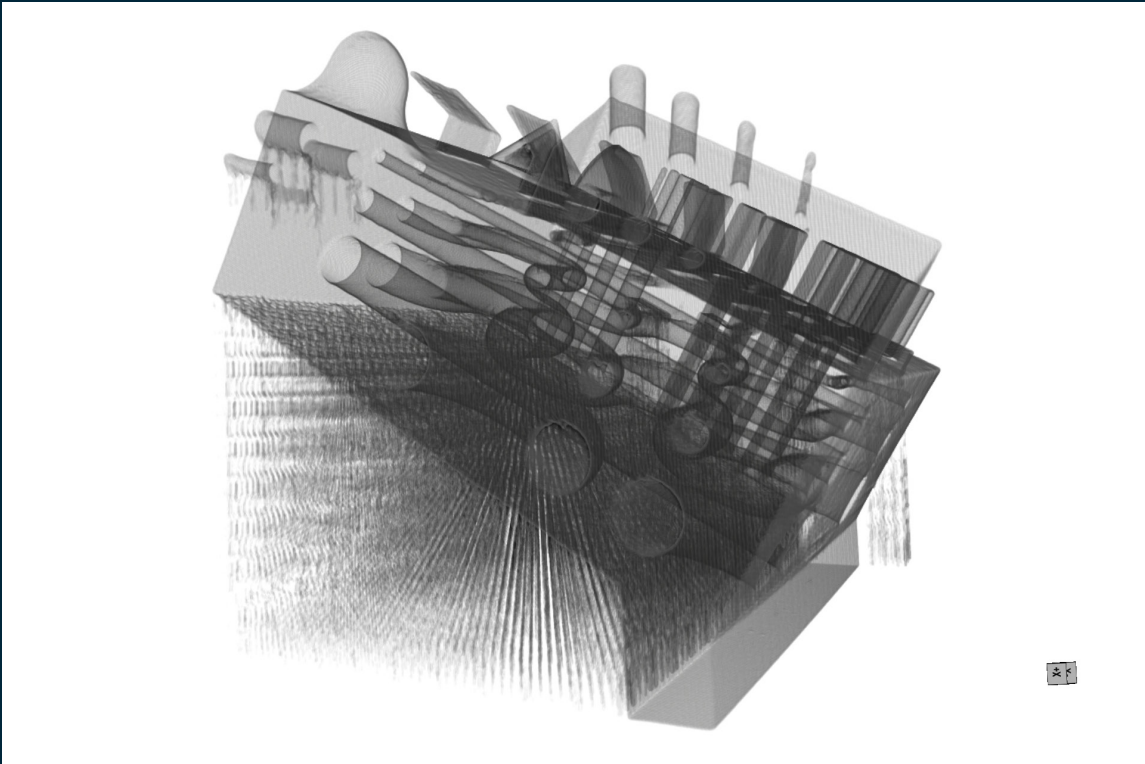
This color-coded local wall thickness mapping highlights the thin regions and easily identifies features with different thickness values.



A cropped 3D view here identifies two internal crack locations above channel regions, possibly caused by local thermal stresses during the manufacturing process.



A cropped 3D view shows some internal cavities and channels filled with powder as indicated.



Advanced

This application note demonstrates the inspection of some typical flaw types in metal additive manufactured parts, using Dragonfly 3D World software tools for visualization and segmentation. The thickness colormap was calculated using the thickness mesh method. Dragonfly 3D World has a wide range of visualization, segmentation and analysis capabilities not shown here with almost any 2D or 3D measures possible. These are not limited to additive manufacturing parts but can be applied to any parts.

The benefits

The benefits of this for your process is knowledge of the quality of your parts, using a reliable software for data analysis. The workflows in Dragonfly 3D World are fully customizable and open to the user, there are no hidden algorithms or question marks surrounding data analysis. Customization and reporting tools allow faster and better decisions to be made for improving manufacturing processes and in quality control and qualification efforts. Unlock a new world of quality control in your additive manufacturing processes using Dragonfly 3D World!

For a video workflow demonstration of the above case:
<https://www.youtube.com/watch?v=BI1wl-20VSc>



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