

Inspection of Printed Circuit Boards (PCBs)

X-ray inspection by computed tomography (CT) allows for the quality evaluation of printed circuit boards (PCBs). This is a routine method to inspect and quantify the presence of voids, cracks, broken connections, bridges, and typical PCB flaws. In this application note, we showcase the electronics inspection capabilities of CT using Dragonfly 3D World software.

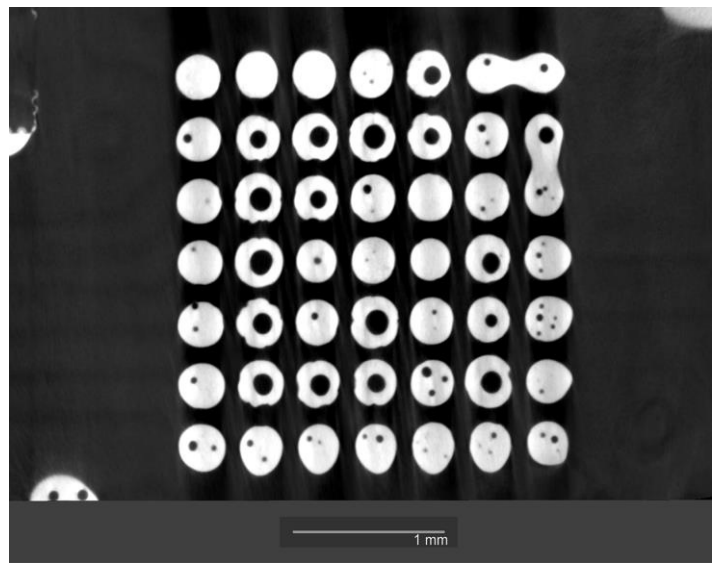
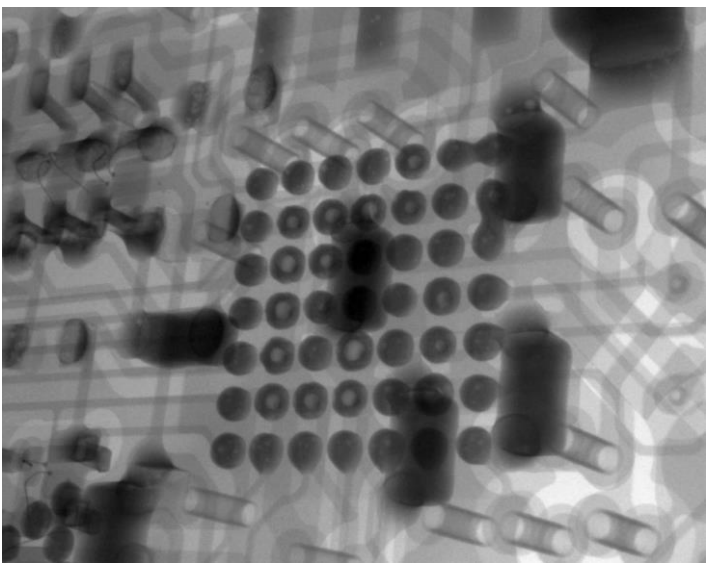
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Requirements

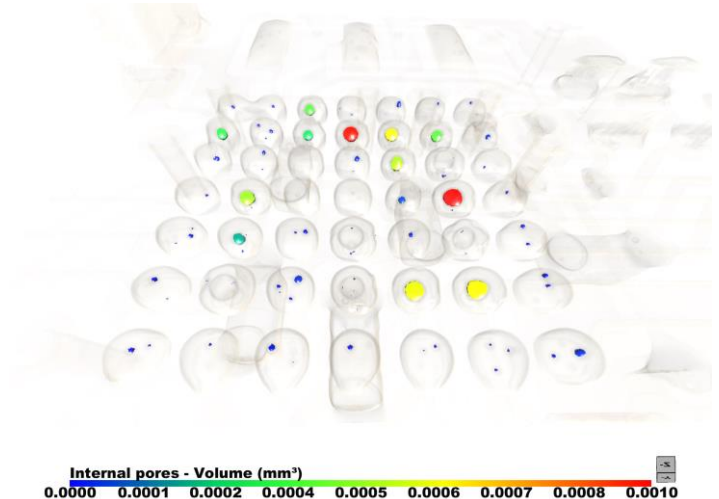
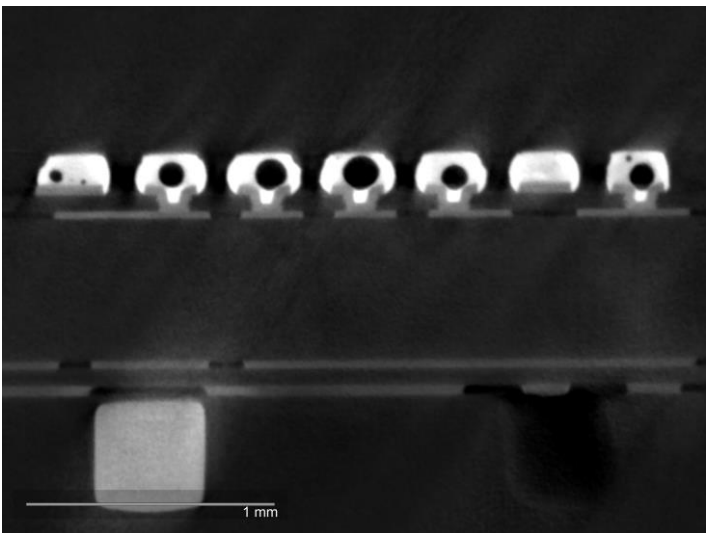
A high-quality CT scan of the electronic component, typically using a laboratory X-ray micro-CT instrument. Image analysis is fully digital and a computer with Dragonfly 3D World software is needed. The data can be any format as long as the voxel size is known (typical is a stack of 16-bit TIFF images representing the full volume). The part in this example was scanned using the YXLON Cheetah EVO at 120 kV and 35 μ A.

Typical outputs

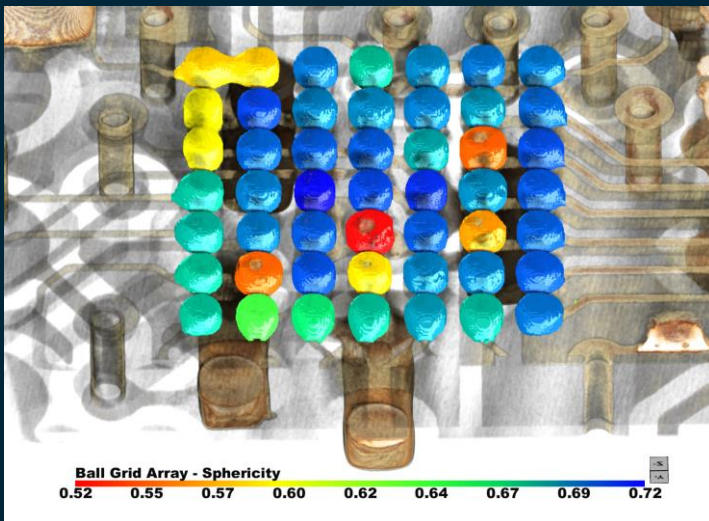
- Cross sectional images and videos of voids & highlighting flaws.
- Volume and sphericity analysis of BGA balls, highlighting bridges and balls with excessive voiding.



On the left the 2D X-ray image shows some voids but is made challenging due to the complexity of the dual-layer circuit board. To the right is shown the CT cross section with much higher signal to noise ratio and clarity of voids and bridges of the ball grid array.



Voids inside the BGA are important to quantify, here the volumes of enclosed voids are calculated and visualized.



Here the individual balls are compared in terms of sphericity – a measure of roundness – which highlights the balls with open pores and those with bridges.

Advanced

This application note demonstrates the inspection of some typical flaw types in electronic components, using Dragonfly 3D World software tools for visualization and segmentation. The feature colormaps were calculated using the multi-ROI scalar analysis after segmentation of the BGA using thresholding tools. Dragonfly has a wide range of visualization, segmentation, and analysis capabilities not shown here with almost any 2D or 3D measures possible.

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 inspection of electronics with Dragonfly 3D World!

For a video workflow demonstration of the above case:
<https://youtu.be/QNZy6Sg3fv0>



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