

NDT ELECTRONICS TESTING

ELIMINATE COSTLY AND TIME-CONSUMING DESTRUCTIVE INSPECTION

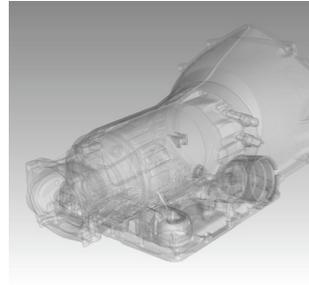
X-ray computed tomography scanning, or CT scanning, has proven to be a very powerful tool in the field of non-destructive testing and industrial imaging. This advanced technology provides highly-detailed 3D images of the internal structures and components of various materials and products, thus eliminating the need for costly and time-consuming destructive inspection.

WHAT IS INDUSTRIAL CT SCANNING?

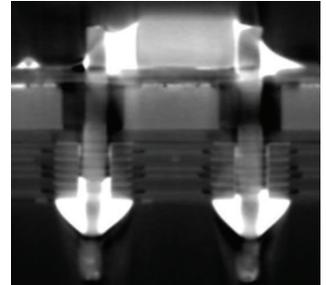
Industrial CT scanning, much like medical CAT scanning, begins with acquiring multiple x-ray projection images a full, or partial, 360 degrees around an object. These projection images are then reconstructed into a three-dimensional data set.

Unlike medical CAT scanning, however, there is no human patient being exposed in the industrial X-ray CT scanner. Therefore higher levels of radiation can be used (still benign to most test objects), that allow for increased penetration through dense materials to obtain high resolution image data.

NTS maintains one of the most powerful, high-resolution industrial x-ray CT systems commercially available. A large walk-in 450kV micro-focus system enables large objects (up to 37 inches in diameter) to be imaged with extreme



Obtain high resolution CAD data from hidden internal surfaces and features



An image slice from a CT scan of a PCB, showing inconsistency in solder fill

WHAT IS INDUSTRIAL CT SCANNING? CONTINUED

high resolution. This system, combined with other NTS capabilities and state-of-the-art processing and visualization tools, allows this technology to solve numerous problems spanning many different industries.

HOW CAN X-RAY IMAGING AND CT SCANNING BENEFIT MY PROJECT?

CT scanning has multiple applications for every part of the design and manufacturing process, from research and development to quality assurance and failure analysis. Results are not limited to qualitative image data. Advanced processing techniques and algorithms are available to produce many different types of quantitative data.

Some examples include:

- Material Properties
 - » Porosity/Inclusion Analysis
 - » Fiber Composite Material Analysis (Fiber Orientation)
 - » Foam Structure Analysis
 - » Density Mapping (Polymers/Ceramics)
- Geometric/Surface Data
 - » Part-to-part/Part-to-CAD Comparisons
 - » Export Polygon Mesh/CAD Surfaces
 - » Wall Thickness Measurements
 - » Advanced Coordinate Measurement (GD&T)



Learn how our 3D imaging capabilities at NTS can help with quality assurance or failure analysis projects

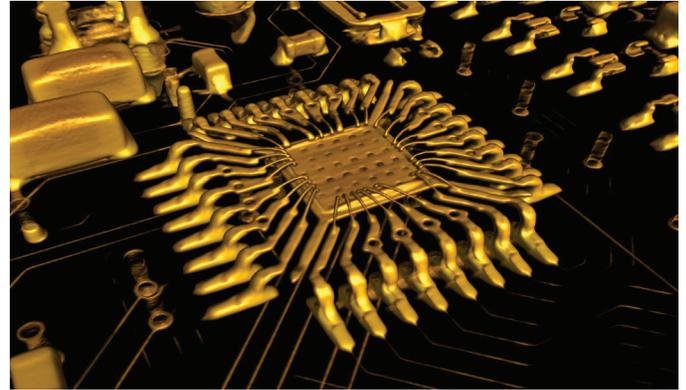
ELECTRONIC COMPONENT & PRINTED CIRCUIT ASSEMBLY INSPECTION

X-ray CT scanning is used extensively in the development, quality control, and failure analysis of many types of electronic devices, from extremely small integrated circuit (IC) components to full-size devices and large wire harnesses.

CT scanning offers the ability to perform 100% non-destructive inspection of solder joint quality of BGA and micro-BGA devices as well as the data to quickly find open or short circuits in complex enclosed wiring and connectors.

Applications include:

- Failure analysis
- Solder joint failures
- Solder fill content
- Void content
- Interface layer bonding
- BGA solder ball analysis
- PCB delamination (multi-layered board)
- Reverse engineering
- Bond wire integrity
- Interconnect quality (short/open)
- Microwave waveguide shape analysis
- Fiber optic component alignment
- Counterfeit component ID
- Tamper analysis



See inside of components using non-destructive 3D x-ray imaging to assess quality or identify flaws

LITHIUM-ION BATTERIES & ENERGY STORAGE DEVICES

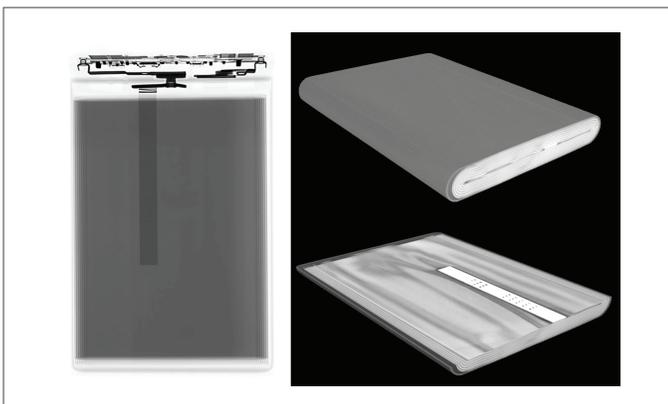
Understanding the results of battery testing and failure analysis is key to improving design and ensuring the proper functioning of all internal safety features now required by most industries.

X-ray CT scanning is an excellent way to obtain internal three-dimensional data in a non-destructive manner for a variety of quality assurance and analysis applications. Chesapeake Testing has performed X-ray CT scanning of battery cells for clients in numerous industries including the National Transportation Safety Board (NTSB).

ABOUT NTS

Every hour of every day, NTS is fully invested in helping you build better, stronger, safer, more reliable products, and bring those products to market quickly and efficiently. Since conducting our first rounds of tests in 1961, NTS has become one of the largest commercial test laboratory networks in North America.

Our test, inspection and certification services cover environmental, dynamics, EMC, wireless, product safety, materials, ballistics and much more. NTS engineers and technicians have exceptional knowledge of all test and conformity requirements in both domestic and international arenas. Our client partners in Aerospace, Defense, Telecom and Energy rely on NTS to make sure they're putting their best products forward, and so can you.



X-ray and CT scan images from a consumer grade lithium-ion battery. Detect internal defects for use in quality control and failure analysis

