

# X-RAY COMPUTED TOMOGRAPHY (XCT) AT THE 3M BIC

The 3M BIC boasts the Nikon 225 MCT X-Ray Computed Tomography (XCT) that can perform precise internal and external measurements and 3D imaging of objects made from a range of materials including: aluminium, steel, titanium, and Inconel, plus polymers, composites, and plastics.

XCT can be used to identify and reduce errors in design and builds before full-scale manufacturing is undertaken.

More information about our XCT capabilities and how we can help your business, can be found below:



## ELECTRONICS INSPECTION

With electronic circuit boards, we can add insight into the printed circuit board assemblies, electrical devices and/or components with our inspection process. This can also include batch Bond Wire Analysis set up where there is automatic detection and identification of broken wires – usually with a go/no go status to move this scan quickly forward for your production needs.

### Advantages of Electronics inspection:

- ✓ Can be fast so good quick go/no go inspection
- ✓ Wide range of materials can be scanned
- ✓ Cost-effective way of reducing inspection process
- ✓ Relatively low cost compared to in-house capability investment
- ✓ Easy to project manage

## REAL-TIME X-RAY INSPECTION

Real-time X-Ray inspection can be relevant to one-off projects to multiple batch projects, samples can be accurately scanned to identify part specifics including manufacturing or design defects, faults or failures.

Detailed accurate comparisons of internal of internal and external geometry differences between similarly identical parts can be viewed. Related results can be reported with colour coding to distinguish deviations identified within the part.

### Advantages of Real-time X-Ray Inspection:

- ✓ High quality results
- ✓ Good for fine features and visual quality
- ✓ Very high dimensional accuracy
- ✓ Inspection of internals, including voids and cooling channels within AM parts
- ✓ Identification of excessive materials or blockages investigation
- ✓ Evaluation of complex internal geometry
- ✓ Identification of surface wear and removal
- ✓ Design to manufacturing accuracy confirmation/investigation

## **FAILURE ANALYSIS**

Failure analysis consists of investigating root causes of failure across the part or assembly. Sections can be inspected and measured to ensure features are correct and accurate. Any faults, fractures or abnormalities can also be identified.

We can detect differences between actual parts and intended CAD design to verify, stipulate and testify parts accuracy. Coupled with part-to-part comparison, this can enable design or manufacturing corrections or new CAD file creations and/or editing.

Alternatively, a report can be generated back to the originator to state the differences or identified faults within the component.

### **Advantages of Failure Analysis:**

- ✓ Non destruction of parts to seek the cause
- ✓ Cross sectional views of every part/slice can be inspected
- ✓ Shorter turnaround time for fault finding
- ✓ Identification of missing parts

## **POROSITY/INCLUSION DEFECTS**

Porosity in additive manufactured parts can cause fractures, inclusions and voids within a product. These defects could cause catastrophic failure in high end components involved in the aerospace, nuclear and oil industry. For this reason, internal inspection is carried out to ensure conformity and standardisation before production onto the wider market.

### **Advantages of Porosity/Inclusion checks:**

- ✓ Safety of critical components
- ✓ Sign off verification
- ✓ Fit for function

## HELICAL CT SCANNING

With taller part structures, scanning can often be a problem, however with our X-CT 225 kV machine this can be done vertically through the X-ray beam. With typical CT scanning, a circular scan is where the source and the detector are stationary, and the scan trajectory is achieved by rotating the object.

A drawback with a circular scan is only the central plane of the object can be reconstructed exactly. With the rest of the object, it will only be an approximate reconstruction. This can be good, provided the object does not vary much along the direction of the rotating axis.

A helical CT scan follows a helical trajectory in the frame of reference of the object. The result is a reduced processing time and an overall enhancement of imaging quality.

### Advantages of Helical CT Scanning:

- ✓ Accuracy
- ✓ Faster result for long tall parts
- ✓ Image quality
- ✓ Increased resolution
- ✓ No cone beam/ring artefacts

## REVERSE ENGINEERING

Scan data can be taken from physical objects or parts. The cloud data or point data can be modelled to all.

A CAD file to be produced from the different data sources such as STL, WRL, TXT, PLY or OBJ file. A reverse engineered part can then be produced by traditional manufacturing methods or imported into an AM process as suitable.

### Advantages of Reverse Engineering:

- ✓ Files ready to use
- ✓ Allows data collection if no current digital data available
- ✓ Utilise data to replace incorrect or incomplete documentation for legacy equipment
- ✓ CAD files can be manipulated allowing reconstruction of 3D modelling
- ✓ Redesign or optimisation of parts and components
- ✓ Obsolete part recreation

For a free consultation to discuss XCT with our Innovation and Technology team, [get in touch](#).