

3M BUCKLEY INNOVATION CENTRE

NON-DESTRUCTIVE TESTING USING X-RAY COMPUTERISED TOMOGRAPHY (XCT)

A guide to using X-Ray Computerised Tomography (XCT) at the 3M BIC to investigate the internal features of your device.



X-RAY COMPUTERISED TOMOGRAPHY (XCT)

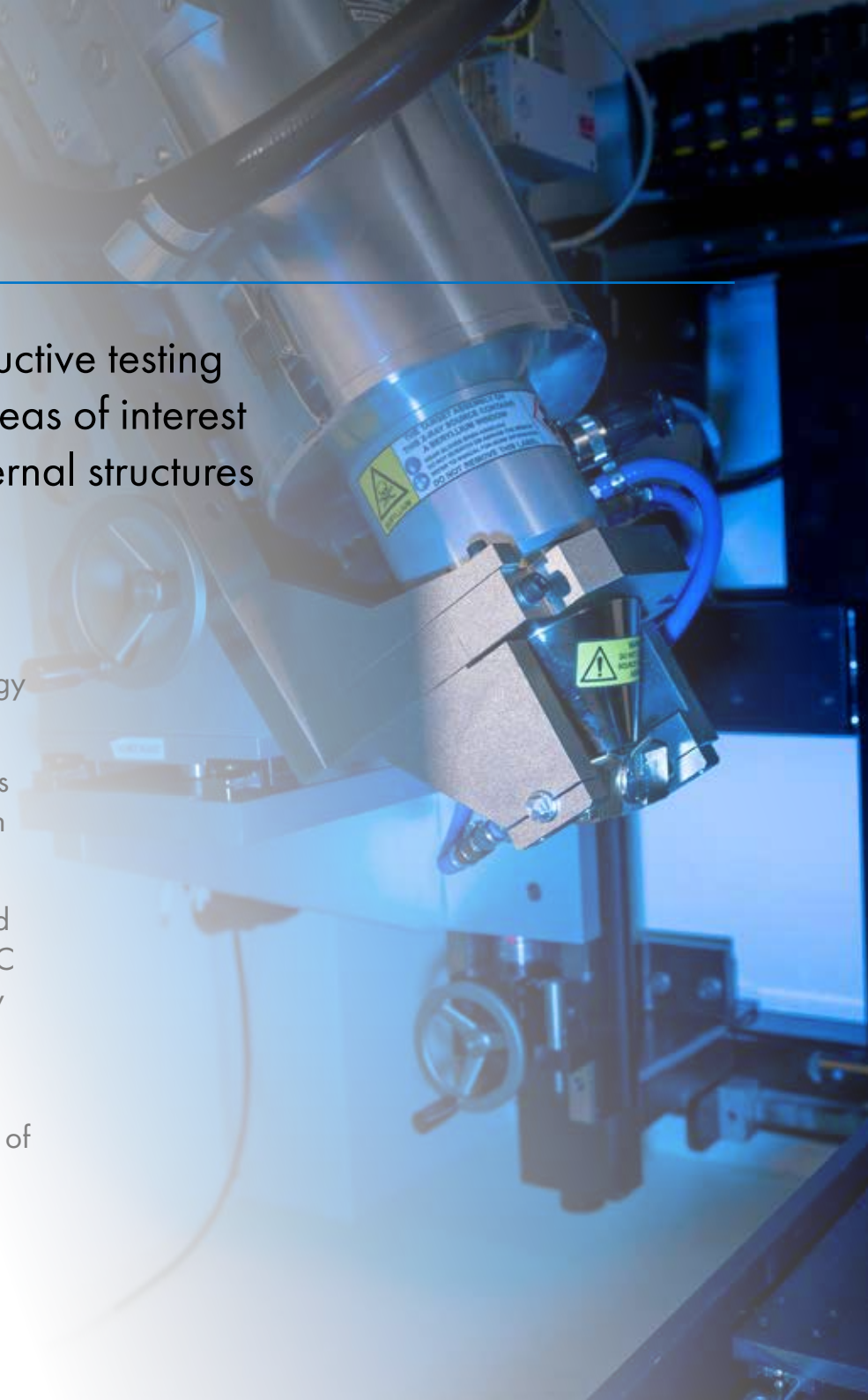
X-ray Computerised Tomography (XCT) is a non-destructive testing tool that facilitates the internal inspection of specific areas of interest of a product or component, with the ability to map internal structures to high accuracy for verification and analysis.

The Nikon 225k XCT at the 3M BIC is one of only a small number in the UK, capable of meeting the needs of the most demanding inspection and metrology applications.

The metrology grade MCT-225kV XCT is configured for precision applications enabling precise alignment and direct comparison of Computer Aided Design (CAD) specification with the observed image.

Used for quantifying and qualifying dimensions with high accuracy, combined with the software package – Volume Graphics, the design team at the 3M BIC has the capabilities to construct both 2D and 3D images of objects from X-ray image data.

Using the XCT as part of your production toolkit alongside the rapid reconstruction facility at the 3M BIC, provides an alternative visual inspection of your product.



THE PROCESS OF XCT



X-Ray analysis can provide a detailed investigation of internal features as well as external, surface examination of products in plastics, metals and biological materials.



Features can be used to verify manufacturing processes through precise measuring and dimensional accuracy, as well as coordinate measurement against CAD Files.



Internal structures can be seen and revealed in 3D reconstructions showing pathways and anomalies, as well as occlusions or abnormal porosity.



Identify manufacturing aspects or processes that may have contributed to a fault, including structural flaws, poor welds, missing electrical contacts or internal defects.



Non-destructive testing has no impact on the integrity of the product being studied so 'passes' can be returned intact.

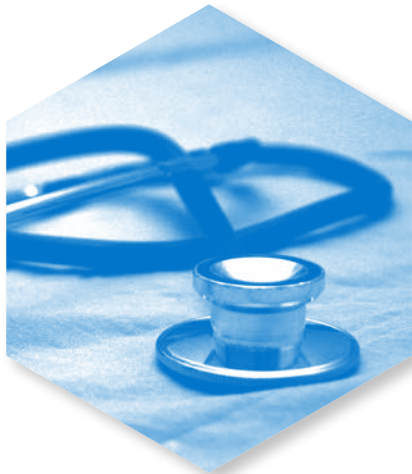
BENEFITS OF XCT

- Technical improvements
- Reliability
- Traceability
- Quality control
- Failure analysis improvement
- Design evaluation
- Integrity and Safety of High Value Products/Parts/Components

X-Ray investigations can be combined with optical and electron microscopy to provide a range of object analysis.

HOW XCT IS USED IN YOUR INDUSTRY

XCT can be used across a wide variety of industries, including the following:



Medical

- Pharmaceutical devices
- Medicine dispensers
- Small medical instruments, stents and pacemakers
- Composite parts
- Dental implants
- Medical joint and cranial implants

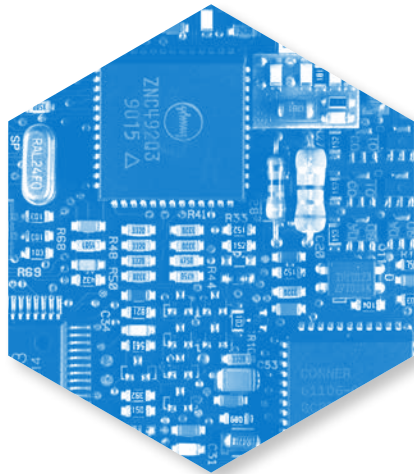


Engineering

- Turbine blades (wax and cast metal)
- Weld analysis in components
- Particulate filters (diesel)
- Die cast (small) pressure parts
- Injection nozzles
- Composite fibre material structures

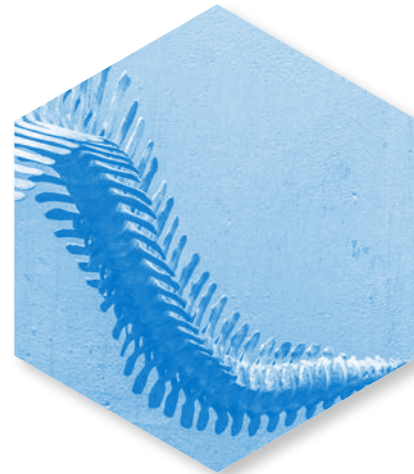
HOW XCT IS USED IN YOUR INDUSTRY

XCT can be used across a wide variety of industries, including the following:



Electrical

- ◆ LED light pipes
- ◆ Electrical connections
- ◆ Sensors
- ◆ ECBs – electronic circuit boards
- ◆ Solenoid connections
- ◆ Soldering and arcing faults



Heritage

- ◆ Paleontology – fossils and bone structures
- ◆ Geology and soil science
- ◆ Verification of ancient artefacts
- ◆ Museum artefacts preservation through digitisation

XCT AT THE 3M BIC

Engineering inc. Aerospace & automotive pitot tube / aerospace sector



Brief To investigate the cause of faulty readings within a flow measurement tool, enabling accurate data readings vital for the air flow of an aircraft.



Challenge Faulty and unreliable readings on the pressure tube attached to the underside of aircraft were causing malfunctioning airspeed indication within the cockpit instrumentation panel leading to several diagnostics reviews once on the ground.



Outcome After several fault-finding sessions costing time and money, the original part was sent for an xct that showed small details of debris obstructing the tube area. Using xct, the company was able to solve the issue without destroying a valid component. machining process.

XCT AT THE 3M BIC

Electronic Circuit board / smartphone



Brief Today's consumable goods are packed with microelectronics components which are sophisticated and complex systems, usually consisting of thin layers, narrow conducting wires and tiny solder joints.



Challenge As the dimensions of these structures become increasingly complex and smaller to view with the naked eye, companies want to ensure each element has the highest rate of reliability to survive extreme conditions in the marketplace and ensure validity of working parts.



Outcome The internal structures can be checked for faults or broken connections without invalidating the warranty or breaking the smartphone to ensure they are fit for function. operator to set up a complex precision location and alignment for a contact point prior to the fabrication procedure. This resulted in increased productivity, reduced costs and improved lead times.



XCT AT THE 3M BIC

Heritage Legacy winder part / textiles sector



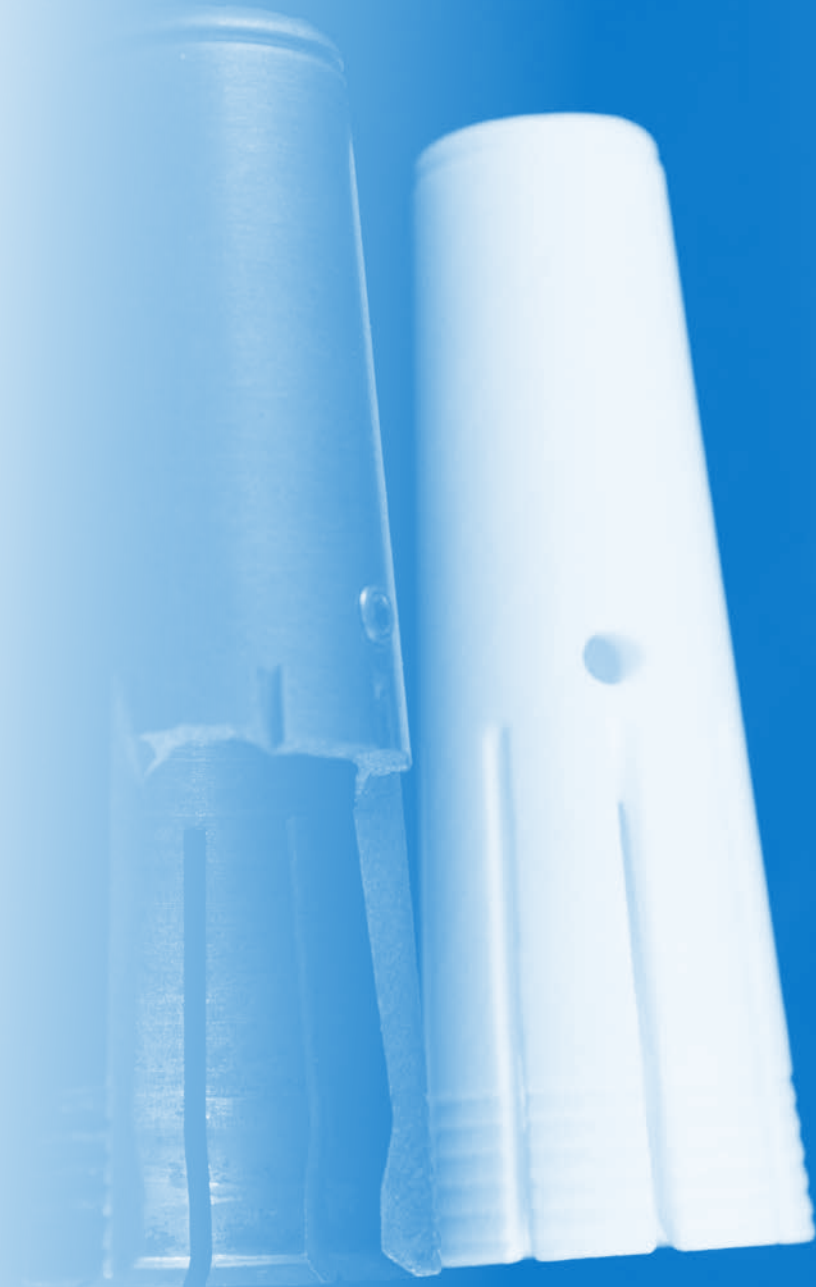
Brief To create an XCT scan of a fractured winder from a textiles manufacturing machine.



Challenge Made from cast iron, spares were impossible to source, and the winder needed to be identical to fit the seventy-year-old machinery. Although a small part, without it the machine would not work and production would come to a halt.



Outcome XCT data was captured to allow a reversed engineered component part to be accurately reproduced in a modern material. The reproduction of this legacy part enabled the business to continue manufacturing their military ceremonial braiding in today's competitive market and enable a historic textile technology to continue sustainably into the future.



3M BUCKLEY INNOVATION CENTRE

At the 3M BIC, we understand that every business has bespoke challenges, constraints and requirements related to the specifics of their industry. Our aim is to enable, support and provide individual solutions to meet these challenges.

Contact us today for a FREE consultation to find out more about how we can support your design and development of jigs and fixtures at the 3M BIC and how our team can help.



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