Manufacturing Metrology Team – Instrument Data Sheet

Nikon MCT225 computed tomography system

Purpose

- X-Ray 3D measurement of external and internal form

Working principle

- The Nikon MCT 225 is an X-ray computed tomography system for metrology of the external and internal features of samples. The instrument takes a number of 2D X-ray images at varying angles around the sample to capture the internal and external geometries of the sample. These 2D images are then reconstructed to form a 3D model, which can then be used to perform dimensional measurements of the sample.

Advantages

- The most accurate method of measuring internal geometry non-destructively
- Measurement of pore morphology and distribution is possible
- .STL output for reverse engineering via additive manufacturing
- Specific metrology focussed system with quoted maximum permissible error of 9 µm + L/50 and 2 µm feature detectability

Limitations

- X-ray penetration of part materials limits part size
- Increased X-ray power required for higher attenuation samples reduces accuracy

Related research focus

- Development of procedures for internal surface texture measurement
- Development of methods to accurately determine the surface and edges of parts
- The application of “information-rich metrology” to XCT
- Development and production of XCT calibration artefacts by additive manufacture
- XCT measurement for additive manufacturing

Instrument specification	
Accuracy (µm) MPE	9 + L/50 (L in mm)
Sample size (maximum)	Diameter 250 mm, height 450mm
Sample weight (maximum)	5 kg
Manipulator travel	X 480 mm, Y 450 mm, Z 730 mm, R 360°
Source to detector	1165 mm (nominal)
Detector	16-bit 4 Mpx (2000 px × 2000 px)
Magnification	1.6× to 150×
Feature detection (minimum)	2D radiography 2 µm
X-Ray source	225 kV/225 W open tube
X-Ray spot	3 µm micro-focus
Enclosure temperature	19 to 21 °C
Ambient temperature	17 to 25 °C
Radiation protection (DIN 54113-2, IRR 99)	<1 µSv/hr
Enclosure dimensions	W 2214 mm, S 1275 mm, H 2205 mm
System weight	4200 kg

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