



MCT225 HA Metrology CT

Absolute accuracy for
inside metrology



Today, manufacturers are seeking to reduce time-to-market, despite a greater variety of products and shorter product lifecycles. At the same time, the demand for better product quality and lower costs is increasing. METROLOGY CT is the ultimate technology that helps manufacturers across industries to achieve these goals.

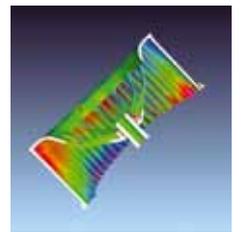
Reduce total inspection cycle time

Metrology CT enables you to non-destructively measure inside and outside dimensions of complex parts. This not only saves valuable time and money in the inspection process, but also prevents incorrect measurements due to a part being dimensionally affected during sectioning.

Users can also re-analyse the reconstructed data anywhere and anytime, as the sample preparation, CT scan and data reconstruction only need to be done once. And repetitive inspection of multiple samples or families of components is only a matter of positioning the part in the enclosure and running the inspection program. Smaller parts can be measured together in one scan.



CT scan of plastic fan



Section showing CAD comparison

Faster optimisation of mold and production parameters

One of the most important challenges during first article inspection is to fine-tune mold design and production parameters as quickly as possible with a minimum of costly iterations. The full 3D image obtained by Metrology CT provides a better insight into dimensional deviations using powerful analysis tools such as Part-to-CAD comparison, 3D sectioning and GD&T analysis. Users can take better informed decisions, thereby accelerating the design, prototyping and manufacturing processes, drastically reducing the cost for iterative prototyping and speeding up the time to market for new products.



Wall thickness inspection of bottles and cans

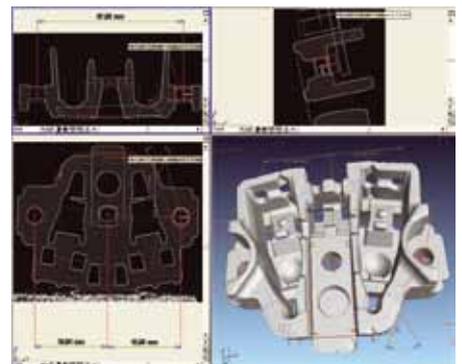


Diesel injector nozzle

Metrology meets NDT to save costs

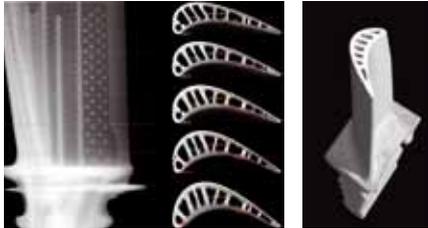
With Metrology CT, dimensional inspection can be combined with structural non-destructive testing (NDT) within a single system, activities that today are often performed by two different departments and systems. By revealing defects such as voids, inclusions or cracks during dimensional inspection, the overall inspection cycle time can be drastically reduced. It is even possible to adjust dimensional tolerances so that parts are accepted or rejected, depending on their structural quality. This "smart" dimensional inspection enables further reductions in scrappage of expensive components by relaxing tolerances when CT scans show that few voids are present.

Furthermore, for complex assembly troubleshooting, the CT data can be used without disassembling the part, which is beneficial for overall throughput.

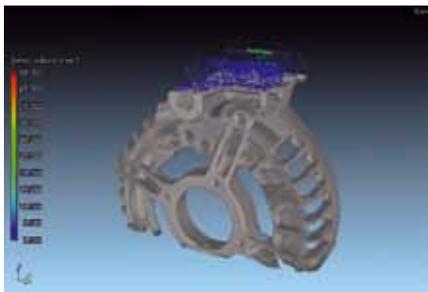


Dimensioning of plug

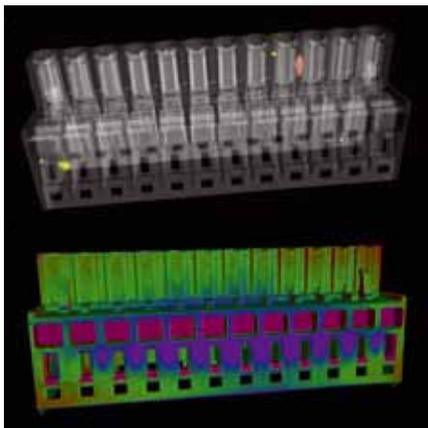
The future of Metrology



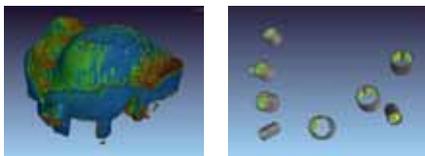
Turbine blade sectioning



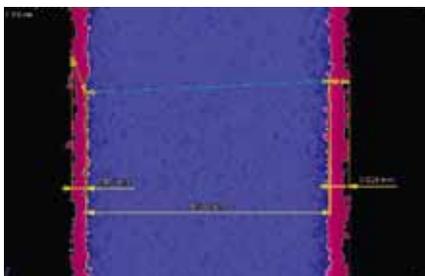
NDT void detection of aluminium casing



CAD comparison and void analysis of connector



Dimensional positioning of tooth prostheses



Thickness of paint layer

CT Metrology accurately measures

- Complex plastic parts
- Precision molded and micro-machined parts
- Precision aluminum castings
- Powder moldings (sintered parts)
- Additive manufactured parts
- Ceramics
- Fiber composites

CT Metrology is used for

- First article dimensional inspection and mold sign-off
- Production line monitoring – Spot deviations before they become a problem
- NDT void analysis to see the buried causes of surface deviations
- Troubleshooting assembly issues

CT Metrology is used in a wide range of industries

- Automotive
- Aerospace
- Consumer goods
- Medical devices
- Electronics

Best accuracy for wide range of material densities

MCT225 HA



MCT225 HA provides Metrology CT for a wide range of sample sizes and material densities in accordance with the latest industry standards. With more than 95 years of Nikon experience in optical metrology, fifty years' CMM expertise and twenty five years' X-ray know-how, our pedigree for reliable high quality Metrology CT is second to none.

The 225kV microfocus source – one of the most powerful in its class – is actively cooled for thermal stability. The X-ray “CoolGun” in combination with the high resolution panel detector produces incredibly sharp images with low noise levels, enabling magnification levels up to 200x.

Absolute accuracy for inside metrology

MCT225 HA is pre-calibrated using accuracy standards traceable to the UK's national measurement institute (NPL) and verified using VDI/VDE 2630 guidelines for Computed Tomography in Dimensional Measurement. Absolute Accuracy guarantees measurement accuracy without time consuming comparative scans or reference measurements, samples are simply placed on a rotary table inside the enclosure and measured. Several key metrology features provide long term stability and enable the MCT225 HA to achieve an impressive accuracy specification of $3.8 +L/50 \mu\text{m}$.

Protective enclosure

No risk of radiation exposure

Temperature controlled enclosure

Thermally stable to $20^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$

Dual monitors

Full screen image and software controls

Nikon Metrology source

Actively cooled 225kV microfocus reflection source

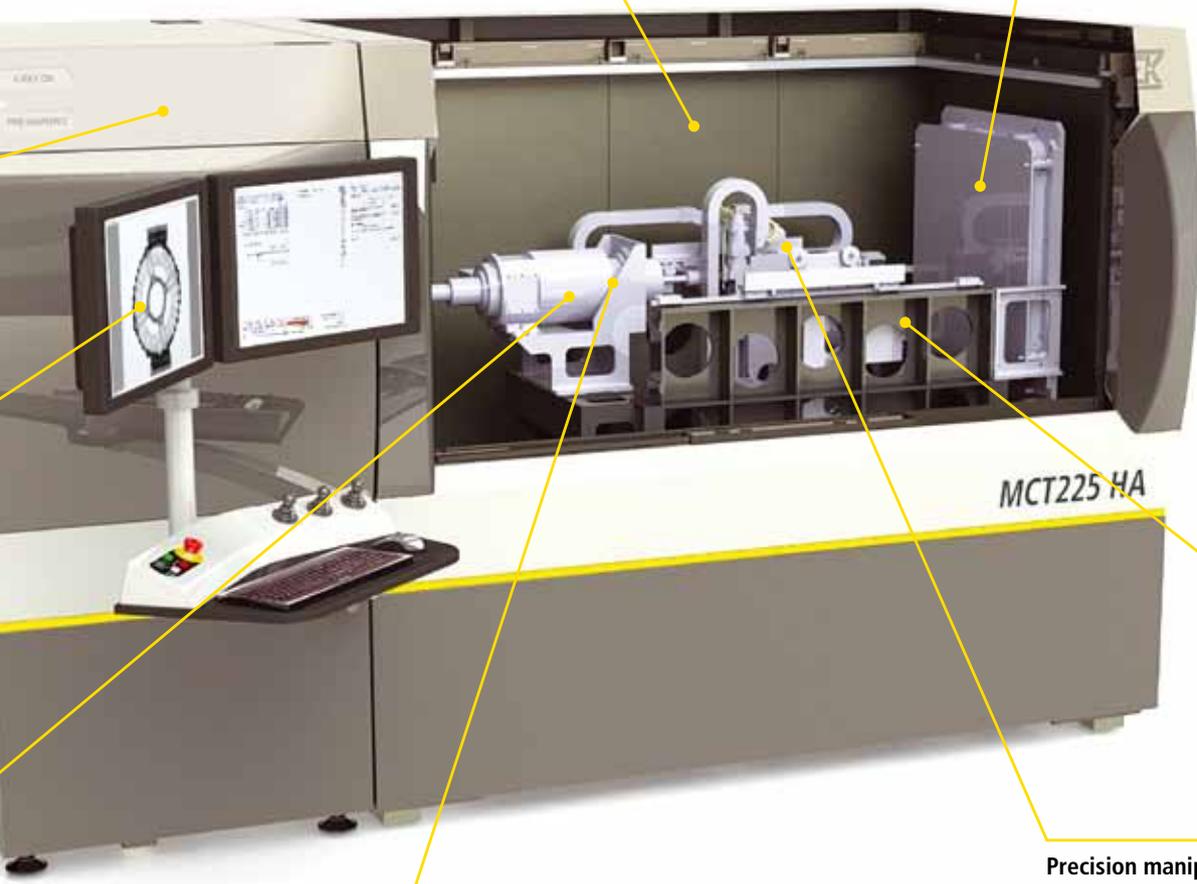


Operation panel with precision joysticks



Accuracy 3.8 +L/50 μ m
Pre-calibrated and certified accuracy to VDI/VDE 2630

High resolution
7.3 Megapixel detector 200x magnification



Finite Element optimized support frame for maximum stiffness

Precision manipulator
Laser corrected linear and rotary guideways

Low cost of ownership
Serviceable open-tube source



Source and manipulator

Precision rotary table

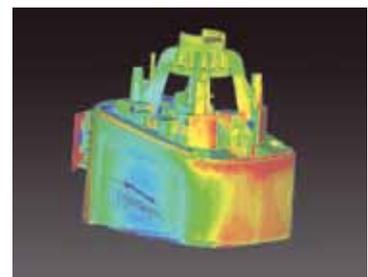
High resolution panel detector

Flexible efficiency

MCT225 HA is invaluable for manufacturers seeking to benefit from reduced lead times and inspection cycles. The powerful microfocus X-ray source with a focal spot size down to 1 μm combined with high magnification and small feature detection capabilities creates a solution suited to a wide variety of applications. All internal and external geometry of complex parts and assemblies can be measured and tested in a single, non-destructive process.

The ultimate tool for mold tool development

Plastic injection moldmakers and metal die cast mold toolmakers can reduce correction cycles during tool development by 50%. All shrinkage, deformation and dimensional errors are clearly identified, with easy to understand inspection reports. Optimization of mold parameters can be shortened from weeks to days, accelerating the time to market for new products and designs.



■ Measurement

Dimensional analysis

With the MCT225 HA, measurement of regular geometries and free-form surfaces as well as the corresponding volumes is accurate, non-contact and non-destructive. The CT inspection technique can replace the conventional coordinate measuring machine – without the limitations of accessibility, programming, fixturing and the need for a large set of probing tools.

Part-to-CAD comparisons

The MCT225 HA compares actual measured data on real parts against CAD nominal data or a 'reference' part. Components subject to extended use can be verified to inspect the degree of wear. Deviations can be displayed and evaluated by color rendering, statistical evaluations or single point deviations.

Wall thickness analysis

Wall thickness of components must be kept within tolerance to guarantee stiffness, operation and material consumption. MCT225 HA provides quick, precise measurements which can be displayed by color rendering.

Development, rapid prototyping and reverse engineering

MCT225 HA can also be used for development, design or for reconstruction based on existing components to e.g. generate CAD-compatible data.

■ NDT inspection

Material defect analyses

The MCT225 HA examines workpieces non-destructively for material defects such as cracks, pores, pinholes, voids, or variations in density. The defects are displayed and evaluated as 2D sectional representations or 3D representations.

Structural analyses

Flaws, delaminations (especially in composites) or material defects that are attributed to incorrect or deficient material composition or structure are revealed with the MCT225 HA and analyzed using 2D or 3D visualizations.

Assembly tests

MCT225 HA inspects assemblies to check proper operation. The position of individual components, correct assembly of parts, or defective seals are visualized using CT. This is an important advantage over traditional testing where cutting or slicing inherently damages the part and operation.

Joint technology testing

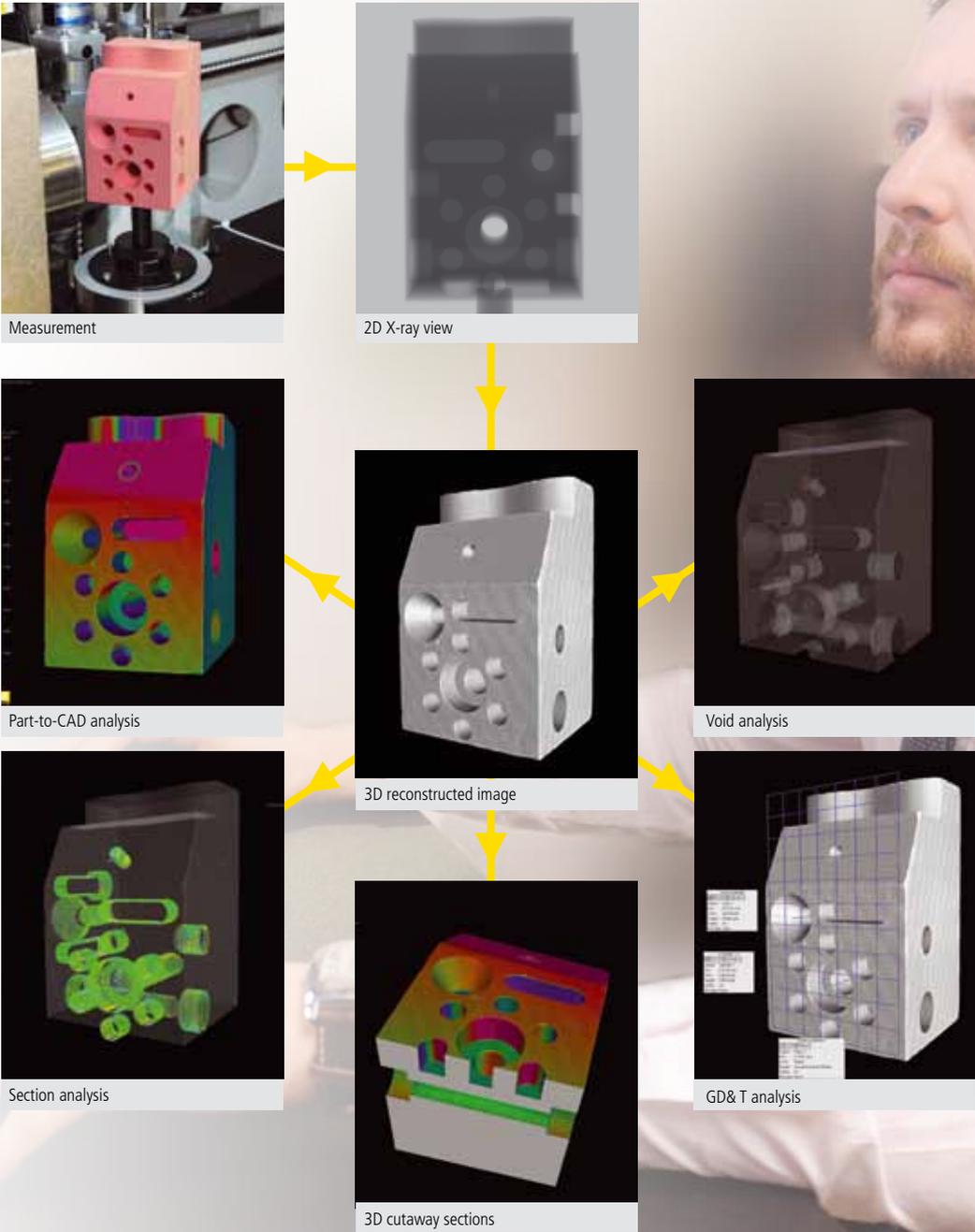
Defective joints are identified non-destructively after welding, soldering, riveting or gluing.

Powerful analysis tools provide insight

Everything to hand

The unique CT Wizards guides the operator through every step of the measurement set up process. Settings are automatically optimized for accuracy and image quality without compromising on productivity. Accelerated reconstruction of the sample volume, using optimized graphics cards, reduces the total process time from hours to minutes.

Powerful analysis tools facilitate the visual inspection of 3D data, automated defect analysis and detailed dimensional inspection reports. The whole inspection process can be automated by running predefined analysis routines.



Specifications

MPE _L (length error)	3.8+L/50 μm (L in mm)
P _S (size error)	3 μm
P _F (form error)	4 μm
Sample size diameter (maximum)	150mm (5.91")
Sample weight (maximum)	5kg (11lbs)
Manipulator travel	X 100mm (3.94") Y 300mm (11.81") Z 500mm (19.69") R 360deg
Source to detector distance	800mm (nominal) (31.50")
Detector	14 bit 7.3Mpixels (3,200x2,300 pixel)
Magnification	2.6x to 200x
X-ray source	Transmission target 225kV/20W open tube
X-ray spot	1μm microfocus
Radiation protection (DIN 54113-2, IRR99)	< 1μSv/hr
Enclosure dimensions	W3,211mm (126.4") x D1,587mm (62.5") x H1,968mm (77.5")
System weight	4,200Kg (9,259 lbs)

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