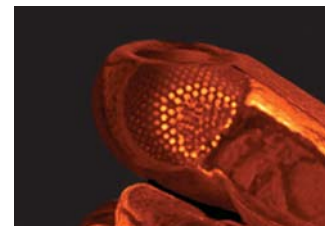


nanotom® – high resolution 3D nanofocus CT

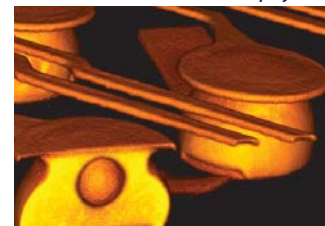
High-resolution computed tomography (CT) has become a powerful inspection tool for a wide range of industrial and scientific inspection and metrology applications such as non-destructive structure and failure analysis as well as for quality assurance or production control. With its 180 kV / 15 W ultra high performance nanofocus X-ray tube, precision mechanics and advanced software modules, the nanotom® is the inspection solution for a wide range of 3D CT applications. Once scanned, the fully three dimensional CT information allows many possibilities for analysis, e.g. non-destructive visualization of slices, arbitrary sectional views, or automatic pore analysis. Since the whole geometry of the object is scanned, precise 3D measurements of complex objects or even the automatic generation of first article inspection reports within an hour are possible.



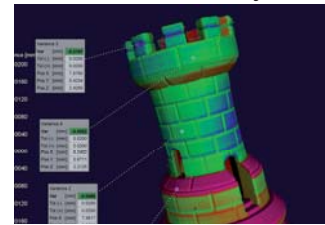
- ▶ First 180 kV / 15 W nanoCT® system
- ▶ 5-Megapixel fully digital image chain
- ▶ Low maintenance, longlife open high-power nanofocus X-ray tube
- ▶ 4 operation modes from submicron to high-intensity applications
- ▶ Ultra high-resolution images with voxel resolutions of less than 0.5 µm
- ▶ Granite-based precision manipulation and optional thermal stabilization
- ▶ High precision rotation-unit with air bearing
- ▶ Variable focus-detector-distance
- ▶ Accommodates samples of up to 120 mm (4.7") in diameter, 150 mm (5.9") in height and 2 kg (4.4 lb) in weight
- ▶ Easy target exchange in less than 30 minutes
- ▶ Excellent software modules for artefact reduction
- ▶ velo|CT: high speed CT reconstruction
- ▶ Automated generation of first article inspection reports in < 1 hour possible
- ▶ Compact size (164 x 143 x 75 cm) | (64.6" x 56.3" x 29.5"), larger cabinets on request



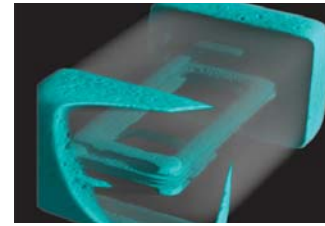
Shrimp eye



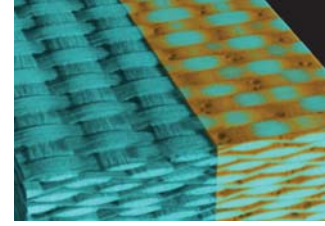
CSP solder joints



Micropart CAD variance analysis



SMD inductor



Fibreglass



Crimp

## Why nanofocus CT?

Smaller focal spots ensure very little geometric fuzziness and therefore improved image resolution. With its special design, the nanotom<sup>®</sup> provides focal spot sizes in the submicron range, allowing it to resolve image features as small as 200 nm. Due to its high power nanofocus X-ray tube, the nanotom<sup>®</sup> is the right choice for a large range of applications from nanoCT<sup>®</sup> of low absorbing samples up to high power scans of high absorbing metal objects.

### Advanced CT software

To optimize the quality of high resolution 3D volumes, the nanotom<sup>®</sup> includes a variety of effective software tools to minimize unavoidable physical effects like ring-artefacts and to correct beam hardenings or minimal drift effects. Innovative tools e.g. for automatic geometry calibration, or region-of-interest-CT ensure the ease of use and flexibility of phoenix|x-rays proprietary reconstruction software datos|x.

### Extreme high accuracy for 3D metrology

Especially if complex parts with hidden or difficult accessible surfaces have to be measured, CT offers big advantages in comparison with conventional tactile or optical coordinate measuring machines (CMMs): high density of measurement points and fast capturing of the complete geometry of the sample. The nanotom<sup>®</sup> includes all essential features for CT with highest accuracy: Minimized focal spot and voxel size, granite based setup for high mechanical and thermal stability as well as advanced software for optimized CT reconstruction quality and geometrically correct surface extraction.

### Precision & Compliance

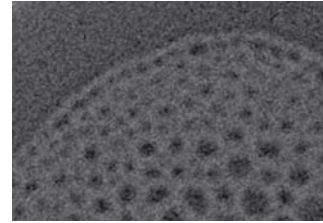
phoenix|x-ray specifications are in accordance with the upcoming standard VDI 2630. E.g. for a 30 mm object (position tolerance  $\pm 1.5 \mu\text{m}$ ) and at a voxel size of  $40 \mu\text{m}$ , the nanotom<sup>®</sup> shows a sphere distance error SD of  $< \pm 0,5 \mu\text{m}$  at a diameter measurement error PS of  $< 2 \mu\text{m}$ . Both parameters were determined by using a special sphere plate designed and calibrated by the German Metrology Institute PTB.

### 3D micro analysis with submicrometer resolution

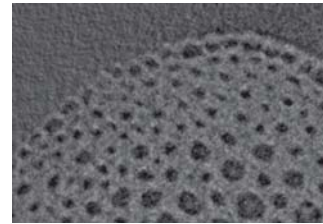
High-resolution nanoCT<sup>®</sup> widely expands the spectrum of detectable micro-structures. The tomographic images acquired with the nanotom<sup>®</sup> contain information on the position and density of absorbing object features within the sample. They are used for the reconstruction of the volumetric data. Any internal difference in material, density or porosity can be visualized and data like distances or pore volumes can be measured. Hence, nanoCT<sup>®</sup> is the perfect tool for the non-destructive examination of samples for internal cracks, delaminations, inclusions, mechanical fit or porosity.

### nanoCT<sup>®</sup> – closest to synchrotron CT

In pursuit of high resolution images, the potential, convenience and economy of nanoCT<sup>®</sup> can compete in many application fields with high cost and rare available synchrotron facilities. The nanotom<sup>®</sup> is the first 180 kV nanoCT<sup>®</sup> system and due to its small footprint suitable even for smallest laboratories. It is first choice for companies and research institutes all over the world in a wide range of application fields such as materials science, micro-engineering, electronics, biology, geosciences, to name only a few.



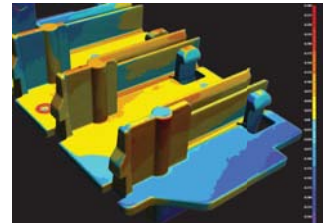
microfocus CT of a fern stem



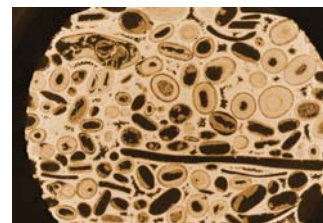
nanoCT<sup>®</sup> of a fern stem



Sintered micro turbine ( $\varnothing 3 \text{ mm}$ )



CAD variance analysis



Carbonate with oil-filled porosity