GE
Sensing & Inspection Technologies

phoenix v|tome|x L 300

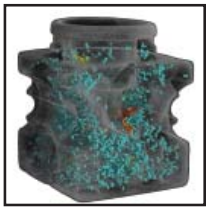
300 kV µCT system for analysis and 3D metrology

The phoenix v|tome|x L 300 is equipped with the first unipolar 300 kV / 500 W microfocus source. Due to its unipolar tube design, the system can be used for high magnification applications as well as scans of strongly absorbing samples, e.g. injection nozzles or turbine blades. Major hard- and software components of the system are proprietary GE technology. The phoenix v|tome|x L 300 comes with a granite based manipulation and an air conditioned X-ray safety cabinet allowing samples of up to 50 kg and up to 600 mm length / 500 mm diameter to be scanned.

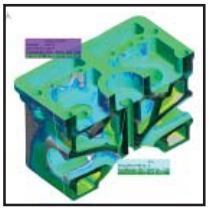
Unique features

- Details up to 1 µm in 2D inspection and 3D CT
- Highest magnification due to unipolar design (5 mm distance between focal spot and sample)
- Metrology package for dimensional measuring with greatest possible precision and user-friendliness
- Failure detection and precise 3D metrology of steel parts and large aluminum castings.

3D metrology and pore analysis of an automotive control arm



Automatic pore analysis in an aluminum casting



3D metrology of an aluminum casting

Customer benefits:

- Wide application spectrum of very different samples without change of X-ray tubes
- Best in world magnification allows quantitative NDE for high absorbing samples at 300 kV
- Accelerated 3D reconstruction results within a few minutes by velo|CT
- High precision 3D metrology with CT – automatic generation of first article inspection reports in < 1h possible.

imagination at work

Technical Specifications & Configurations

Standard Configuration

- **Granite-based 6-axes manipulation unit**
- **Unipolar 300 kV / 500 W microfocus X-ray tube**
- **1024 x 1024 pixel area detector (16-bit)**
- **Separate reconstruction PC with velo|CT reconstruction acceleration**
- **datos|x CT-software**
- **quality|assurance 2D image processing software**
- **Radiation protection cabinet up to 300 kV**

System

Walk-in cabinet (W x H x D):	ca. 4.100 mm x 2.600 mm x 2.960 mm (162 in x 103 in x 116.5 in)
Weight manipulator:	ca. 8,500 kg (18,750 lb)
Weight cabinet:	ca. 13,500 kg (29,770 lb)
Total weight:	ca. 22,000 kg (48,510 lb)

Radiation Protection

The radiation safety cabinet is a full protective installation without type approval according to the German RöV and the US Performance Standard 21 CFR 1020.40. For operation, other official licenses may be necessary.

X-ray Tube

Type:	Open unipolar microfocus X-ray tube with unlimited lifetime, directional type, closed cooling water circuit, oil-free pre-vacuum pump
Maximal tube voltage/output:	300 kV / 500 W
Target:	Tungsten, rotatable for multiple use
Filament:	Tungsten hairpin, pre-adjusted in plug-in cartridges for fast and easy exchange
Detail detectability:	Up to 1 micrometer
Min. focus-object-distance:	For CT > 5 mm, depending on the sample size

Detector

high-contrast|set:	16-bit area detector
Pixels:	1024 x 1024 pixels
Resolution (pixel size):	400 x 400 micrometer
Frame grabbing rate:	Up to 15 fps
Gray-value scale:	65,536 gray scales

Granite based manipulation

Max. travel X-axis sample:	500 mm (19.6 in)
Max. travel Y-axis tube + detector:	600 mm (23.6 in)
Magnification axis Z:	Up to 1,200 mm (47 in)
Rotation axis:	n x 360°
Min. focus-detector-distance:	400 mm (15.7 in)
Max. focus-detector-distance:	1,500 mm (59 in)
Max. sample diameter:	320 mm (12.6 in); (optional 500 mm (19.6 in)
Max. sample height:	600 mm (23.6 in)
Max. sample weight:	50 kg (110 lb)
Control:	Joystick and CNC

Software

- **datos|x**—CT acquisition and reconstruction software, phoenix|x-rays proprietary software package for fast and accurate CT
- **quality|assurance**—2D image processing (16 bit), comprehensive X-ray inspection software comprising image enhancement functions, measuring functions and CNC programming for automated X-ray inspection
- **velo|CT**—GPU based reconstruction acceleration for CT results within just a few minutes

Computed Tomography

Type:	Cone beam-CT (3D)
Max. voxel resolution:	< 2 µm / 300 kV tube, 1 µm / 180 kV tube (depending on sample size)
Max. geometric magnification (2D):	333x
Max. geometric magnification (3D):	200x

Hardware Configuration (Option)

Additional X-ray tube:	180 kV / 15 W high power nanofocus-tube
200 µm high-contrast|set	Temperature stabilized 2k x 2k area detector with 200 micrometer pixel size
Virtual Detector:	Two-times enlarged measurement range for objects up to 500 mm (19.6 in) in diameter
Multiline detector:	For high resolution 2D CT with reduced scattering artifacts
Additional 2D CT:	High-resolution line detector (610 mm wide [24 in], 1,525 pixels), other configurations also available
Tilt/Rotate Unit:	Two additional axes for flexible 2D X-ray inspection of samples up to 10 kg (22 lb)
Faster reconstruction of the volumetric data:	Additional reconstruction PC cluster (4 or 8 units)
Air conditioning unit:	For stabilizing the temperature inside of the cabinet
Surveillance:	Video camera in radiation protection cabinet
Anti-vibration system:	Either active or passive
Anti-collision system:	For either tube and/or detector

Software Configuration (Option)

Basic package

agc|module:	Automatic Geometry Calibration
bhc|module:	Beam Hardening Correction
rar|module:	Automatic Ring Artefact Reduction

Metrology package

bhc+|module:	Automatic beam hardening correction of one-material samples.
surface|extraction:	Automatic detection and extraction of the surface data (STL) of a 3D-volume
easy|calib:	Adjustment of system geometry with high precision
calibration|object:	Calibrated test specimen for adjusting the system geometry with easy|calib
pw|control:	Executing PolyWorks-based automatic measurement procedures from datos|x

Additional Modules

scan|optimiser:	Automatic optimization of high-resolution scans by compensating of drift-effects
ROI|scan:	Scanning "regions of interest" with <360° rotation for maximized magnification
fast|scan:	Quick CT acquisition with continuous sample rotation

Additional Software

Visualization and analysis software:	Volume Graphics VGStudio MAX 2.0
Optional modules:	
Defect analysis:	Automatic evaluation of voids, pores, etc. in volume data
Wall thickness:	Automatic measurement of wall thicknesses in cast parts
Dimensional measuring:	Fitting of basic primitives into volume data, alignment of volume data with CAD data, wide-ranging 3D measurement possibilities
Nom./actual comparison:	3D comparison of CT with CAD data
Coordinate measurement software:	IMInspect: PolyWorks/Inspector from InnovMetric Software Inc. Includes all data analysis functions that are required in coordinate measurement technology.

www.phoenix-xray.com

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