

# High performance X-ray inspection solution

with non-destructive planarCT board inspection



microme|x neo 160  
microme|x neo 180  
nanome|x neo 180



# phoenix micromel|x neo and nanomel|x neo

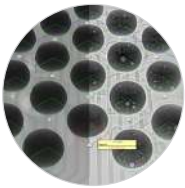
## High resolution 160/180 kV micro- / nanofocus X-ray inspection systems with 3D CT option

The phoenix micromel|x neo and nanomel|x neo series combines high-resolution 2D X-ray technology and 3D CT in one system. Innovative and unique features and an extreme high positioning accuracy make both systems the effective and reliable solution for a wide spectrum of 2D and 3D offline inspection tasks: R&D, failure analysis, process and quality control.

The phoenix|x-ray x|act technology offers easy to program CAD based  $\mu$ AXI ensuring automated inspection in the micrometer range. Another unique benefit is Waygate Technologies highly dynamic DXR flat panel detector with active cooling. Offering up to 30 frames per second, it provides outstanding brilliant live imaging and fast data acquisition for 3D CT.

### Unique features

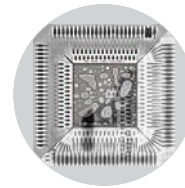
- Superior pixel resolution (85/100 $\mu$ m) new detectors more competent to semiconductors and tiny electronics components inspection
- Ease of use: inspection report to be automatically generated after inspection
- x|act package for CAD based  $\mu$ AXI programming and automatic inspection
- diamond|window for up to 2 times faster data acquisition at the same high image quality level
- Optionally 3D computed tomography scans within 10 seconds



Open BGA ball with live CAD data overlay and FLASH!™ image optimization

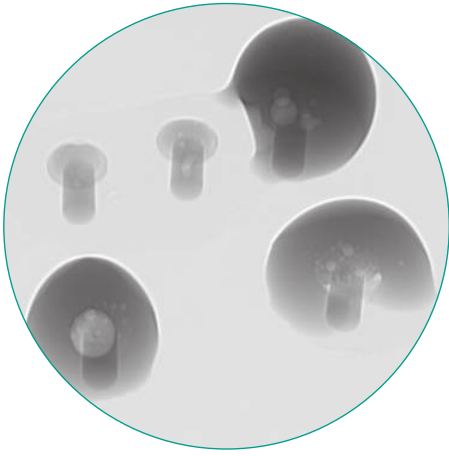


3D Computed Tomography of an USB flash drive



Advanced planarCT evaluation (left) without overlaying features in the X-ray image



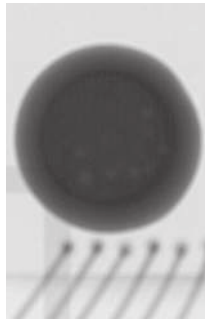


FLASH!™ filtered voids in an open  $\mu$ BGA ball: 1,970x geometric zoom for extreme high magnification

## Brilliant DXR-HD live imaging

Waygate Technologies proprietary high dynamic DXR detector with enhanced scintillator technology phoenix|x-ray introduces a new industry standard for efficient live inspection:

- Full frame rate of 30 frames per second at 1000x1000 pixels offers low noise coupled with brilliant image quality ensuring fast and detailed live inspection
- Active temperature stabilization for precise and reliable inspection results
- Extremely fast data acquisition in 3D CT mode
- Detail detectability down to  $0.5 \mu\text{m}$  /  $0.2 \mu\text{m}$  for high performance failure analysis



diamond|window

beryllium window

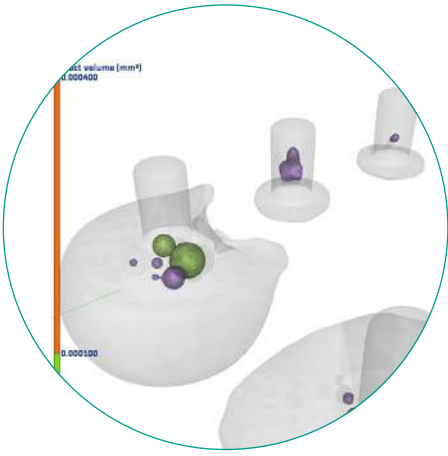
(same X-ray tube parameter: 130 kV, 11.4 W)

## High output with high-resolution: diamond|window

Compared to conventional beryllium targets, the diamond|window allows higher power at a smaller focal spot. This ensures high-resolution even at a high output.

- Up to 2 times faster CT data acquisition at the same high image quality level
- High output with high-resolution
- Non-toxic target
- Improved focal spot position stability within long term measurements
- Increased target lifetime due to less degradation with higher power density



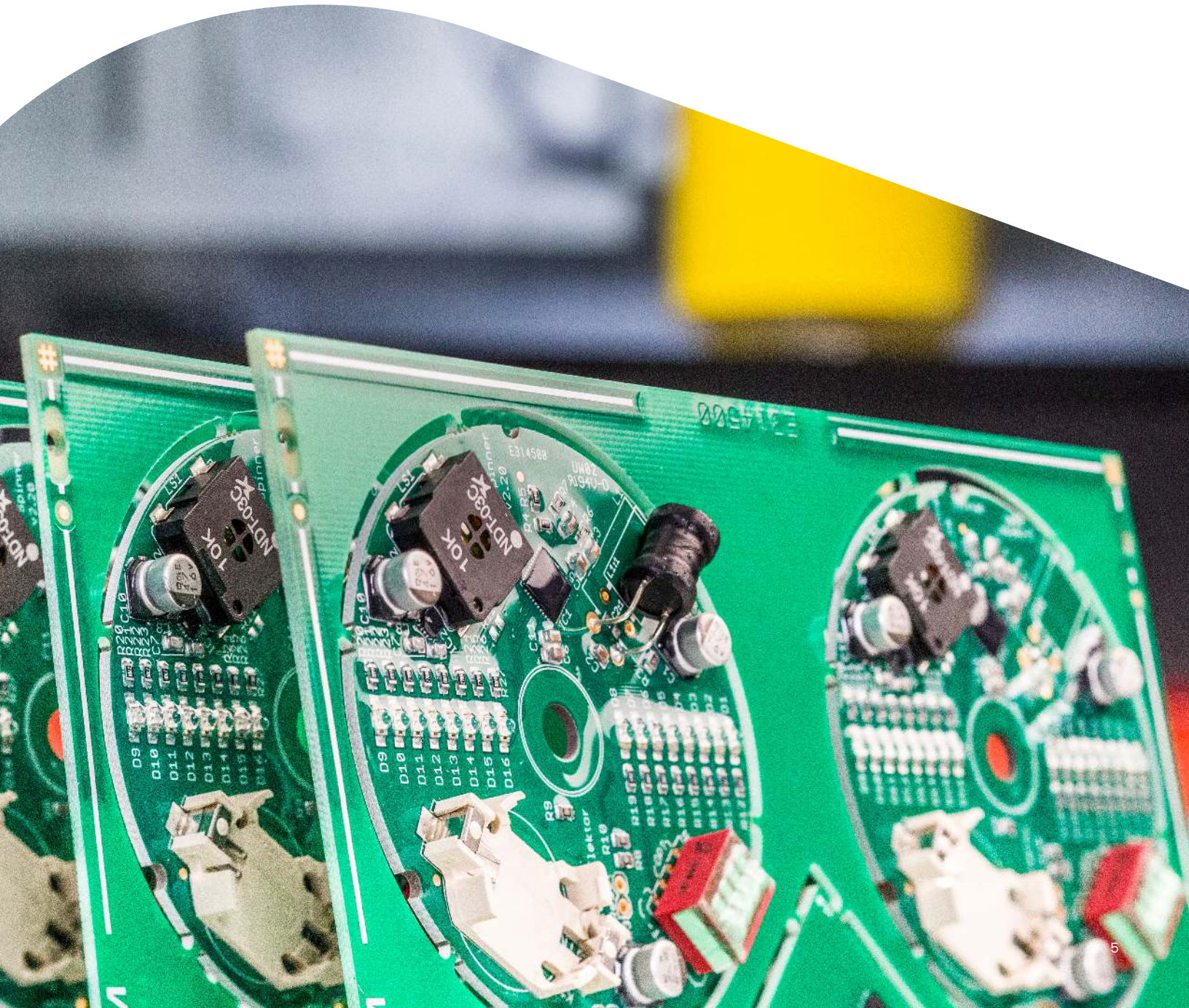


## High-resolution 3D computed tomography

For advanced inspection and 3D analysis of smaller samples, phoenix|x-ray's proprietary 3D CT technology is optionally available.

- 180 kV high power X-ray technology, fast image acquisition with DXR detector and diamond window combined with phoenix|x-ray's fast reconstruction software deliver high quality inspection results
- Maximum voxel resolution down to 2 microns; the nanoCT® capability of the nanomelx allows even a higher image sharpness

nanoCT® of TSVs in an electronic package. The voids in the copper filling are clearly visible.



# x|act – CAD based inspection:

## high resolution $\mu$ AXI for extremely high defect coverage

As a solution for  $\mu$ AXI with extremely high defect coverage, phoenix|x-ray provides its high precision systems micromelx neo and nanomelx neo including the unique x|act software package for fast and easy offline CAD programming.

Its intuitive new GUI with improved\* outstanding precision and repeatability, small views with resolutions of only a

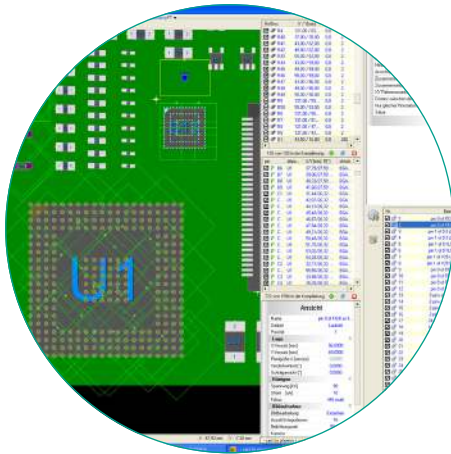
few micrometers, 360° rotation and oblique viewing up to 70° ensures meeting highest quality standards – even for inspection of components with a pitch of just 100 microns.

Besides automated inspection, x|act ensures an easy pad identification by its live CAD data overlay function even in manual inspection while FLASH!™ image optimization ensures high defect coverage.

\*AXI capabilities provide the outstanding precision

## Efficient CAD programming

x|act provides not only a minimal setup time compared with conventional view based AXI – once programmed, the inspection program is portable to all x|act compatible systems.



- Easy pad-based offline programming
- Specific inspection strategies for different pad types
- Fully automated inspection program generation
- Extremely high positioning accuracy even at oblique viewing and rotation
- Easy pad identification in manual X-ray inspection
- High reproducibility on large PCBs

Fast and easy programming: just assign the inspection strategies and let x|act generate the automated inspection program

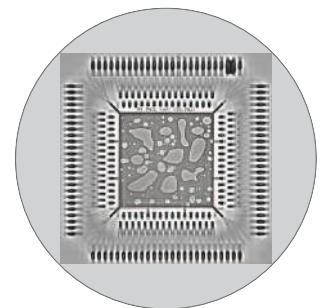
## Virtual board slicing with planarCT



- Easy 2D slice or 3D volume evaluation of large complex boards
- No board cutting, no overlaying structures as in X-ray images



planarCT slice or multislice views allow exact inspection results of a single plane or a whole package

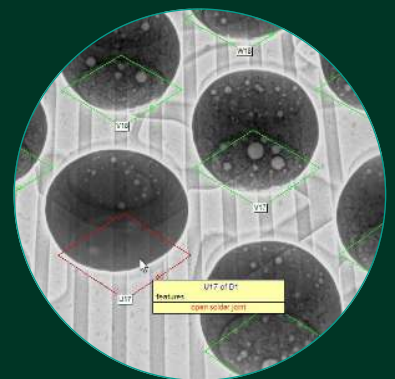


Advanced planarCT evaluation without overlaying features in the X-ray image



## Your advantages phoenix microme|x and nanome|x neo

- Brilliant live inspection images due to high dynamic Waygate DXR digital detector array
- Unique high power 180 kV / 20 W micro- or nanofocus tube for even high absorbing electronic samples
- Minimized setup time due to highly efficient automated CAD programming
- Live overlay of CAD and inspection results even in rotated oblique inspection views
- Extremely high defect coverage and repeatability
- Best detail detectability 0.5  $\mu\text{m}$  or even 0.2  $\mu\text{m}$  with nanofocus
- Optional FLASH!™ image optimization technology
- Large 27" monitor for better defect identification
- Optional advanced failure analysis with high resolution 3D micro- or nanoCT® or large board planarCT
- Optional 3D CT scans up to 10 seconds



x|act provides **live CAD overlay** and inspection results in the X-ray live image – at **any time**, at **any viewing angle**.

Waygate Technologies exclusive **FLASH!™** technology option enables **faster, more reliable** failure detection.

# Technical specifications and configurations

	nanome x neo 180	microme x neo 180	microme x neo 160
X-ray detector	Option 1: Waygate Technologies high dynamic 200 µm pixel resolution detector Option 2: Superior 100 µm pixel resolution detector		Option 1: Superior 85 µm pixel resolution αSi detector Option 2: Superior 75 µm pixel resolution CMOS detector
Geometric magnification	max. 1,970x		
Total magnification 27" Monitor	max. 2,700x		max. 7,200 x
Total magnific. 27" 2K Monitor	max. 2,300x		max. 6,000x
Detail detectability	up to 0.2 µm	up to 0.5 µm	
X-ray tube type	Low maintenance open nanofocus tube with unlimited lifetime, transmission type, 170° cone angle, collimated	Low maintenance open microfocus tube with unlimited lifetime, transmission type, 170° cone angle, collimated	
Max. tube voltage/power on target	180 kV / 15 W	180 kV / 20 W	160 kV / 20 W
	Diamond window for up to 2 times faster data acquisition as the same high image quality level		
Filament	Tungsten hairpin, pre-adjusted in plug-in cartridges for fast and easy exchange		
Manipulator	high-precision vibration-free synchronized 5-axes manipulation		
Max. inspection area	460 mm x 360 mm (18" x 14"), 610 mm x 510 mm (24" x 20") without rotation table		
Max. sample size / weight	680 mm x 635 mm (27" x 25") / 10 kg (22 lbs.)		
ovhm – oblique view rotation	continuously adjustable view angle up to 70°, rotation 0° – 360°		
Control	Joystick or mouse control (manual mode) and CNC (automatic mode)		
Manipulation aids	sample X-ray mapping, click'n-move-to function, click'n-zoom-to function, automatic isocentric manipulator movement		
Positioning aid	laser crosshair	laser crosshair optional	
Anti-Collision System	may be deactivated for maximum magnification (tube touching the sample)		
System dimensions (W x H x D)	2,160 mm x 1,920 mm x 1,590 mm (85" x 75.6" x 62.6"), (without control console)		
Min. transportation width:	1,590 mm (62.6") (without control console)		
Max. weight	appr. 3,100 kg / 6,835 lbs.		
Radiation safety	The radiation safety cabinet is a full protective installation without type approval according to the German RöV and the US Performance Standard 21 CFR, Subchapter J. For operation, other official licenses may be necessary		
Image processing software	<p>phoenix x act: comprehensive CAD based X-ray inspection software comprising image enhancement functions, measuring functions and fast and easy automated CAD based programming for automatic inspection</p> <p>bg module (standard): Intuitive automatic view based BGA solder-joint evaluation incl. automatic wetting analysis</p> <p>vc module (standard): Intuitive automatic view based voiding calculation software package incl. capability of multiple die attach voiding evaluation</p>		
Software Configuration (Option)	<p>x act BGA check strategy: automated CAD based analysis of BGA solder joints</p> <p>x act PTH check strategy: automated CAD based analysis of PTH solder joints</p> <p>qfp module: automated QFP solder joint evaluation</p> <p>qfn module: automated inspection of QFN / MLF solder joints</p> <p>pth module: automated pin-through-hole solder joint evaluation</p> <p>c4 module: view based evaluation of round solder joints with background structure, such as C4 bumps</p> <p>mll module: view based registration of multilayer printed circuit boards</p> <p>quality review: visual interface for rework and failure indication</p> <p>FLASH!™: Waygate's exclusive image optimization technology</p> <p>planarCT module: Non destructive 2D slice and 3D volume board evaluation incl. 3D viewer software</p>		
Hardware Configuration (Option)	<p>Tilt / rotate unit: tilt ± 45° and rotation n x 360° for samples up to 2 kg</p> <p>Manual bar code reader: for product identification</p>		
Computed Tomography (Option)	<p>Volume acquisition / reconstruction software: phoenix datos x</p> <p>Upgrade package for combined 2D / 3D (computed tomography) operation CT-unit: precision rotation axis</p> <p>Max. geom. magnification: 100 x (CT)</p> <p>Max. voxel resolution: down to 2 µm, resolution depending on the sample size.</p> <p>The nanoCT® function of the nanome x allows a higher image sharpness.</p>		