Waygate Technologies
a Baker Hughes business

# Easy-to-use

## Your entry level high quality Electronics X-ray inspection solution

Phoenix X|aminer

# Phoenix X|aminer

## High quality 160kV microfocus X-ray inspection system with optional 3D CT

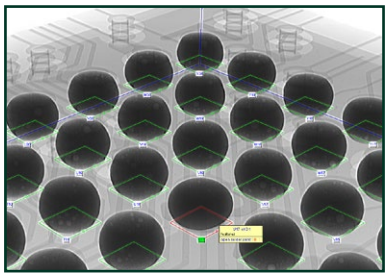
The Phoenix X|aminer X-ray inspection system, combines high-resolution 2D X-ray technology and 3D CT in one, is designed for the special needs of the high-resolution inspection of electronic assemblies, components and PCBAs.

The Phoenix X|aminer is equipped with an unlimited lifetime 160kV/20 W microfocus X-ray tube. Due to the high energy and power of the X-ray tube the system is an effective and reliable solution for electronic applications including power electronics.

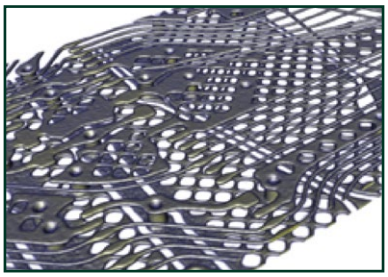
The Phoenix X|act technology offers ease use and allows manual as well as automatic inspection. Waygate Technologies new DXR flat panel detector with CsI scintillator and 85 µm superior resolution is bringing with 2D image quality and live imaging performance to next level.

## Key features & benefits

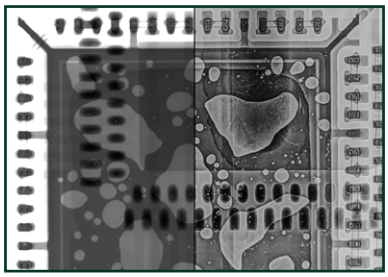
- New detector with improved scintillator technology for higher quality electronics inspection
- Unlimited lifetime 160kV/20 W X-ray tube to penetrate even high absorbing components
- Easy and fast computed tomography (CT) due to comprehensive software package
- Intuitive operation and easy to use software
- Flash!™ Electronics optimized dedicatedly for electronics inspection maximizes productivity with fastest and most accurate image processing
- Live CAD data overlay
- Automated real X-ray sample map for easy orientation on top, bottom and even inside samples
- Anti-collision feature to protect samples
- Small footprint
- 27″ 2K monitor
- OPC-UA interface to export process and machine data for statistical analysis



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



3D Computed Tomography of an USD stick

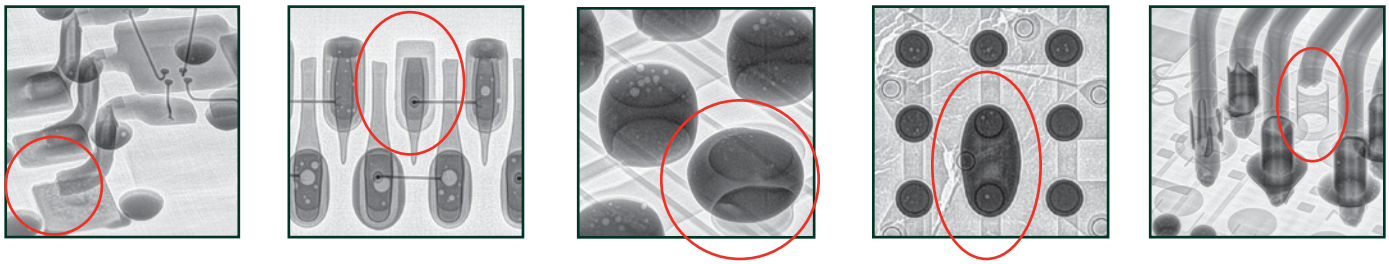


Flash!™ Electronic specially optimized for electronics application

# High quality X-ray inspection to ensure product reliability

The reliability of electronic assemblies strongly depends on solder joint quality. All dimensions and features of the solder joint are imaged: diameter, thickness (grey value), lands and contact areas (darker and brighter circles), voids (bright spots).

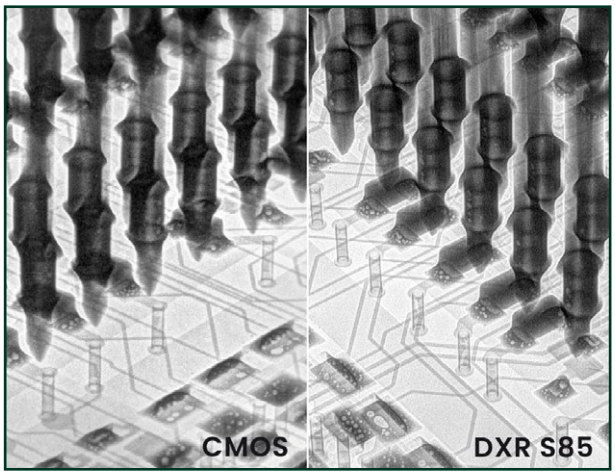
All defects that have any influence on the solder joints shape are detectable. In addition to the visible surface the X-ray image reveals hidden features of the interconnection, which are most important for the reliability of solder joints.



# Waygate Technologies new brilliant detector

## Newest superior resolution DXR S85 detector with improved scintillator technology leads to more efficient and accurate electronics inspection

- Superior 85 µm pixel resolution and detail detectability down to 0.5 µm for high performance failure analysis
- Improved CsI scintillator technology for higher inspection efficiency and better image quality
- 130 mm x 130 mm large active area for significant productivity improvement
- Higher pixel depth for more image data
- 27'' 2K monitor



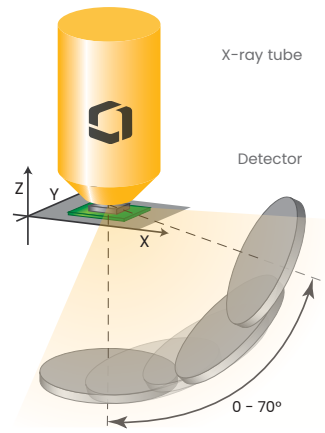

CMOS DXR S85

DXR S85 offers better Signal noise ratio, leading to better failure detectability

# OVHM-Technology
# - oblique views at highest magnification

Conventional tilt techniques generate oblique views by simply tilting the sample, which involves moving the region of interest away from the X-ray tube resulting in a decrease in magnification.
The OVHM|module was specifically designed to enable oblique views of up to 70 degrees and 0 to 360 degree rotations at highest magnification.

Unlike with conventional systems, the X-ray tube is located above the sample tray allowing the user to move the sample as close to the tube head as needed. Only this guarantees highest magnification in combination with easiest sample handling.




Schema of OVHM-Technology: Oblique views give excellent information on features that can not be revealed in top-down view at highest magnification.

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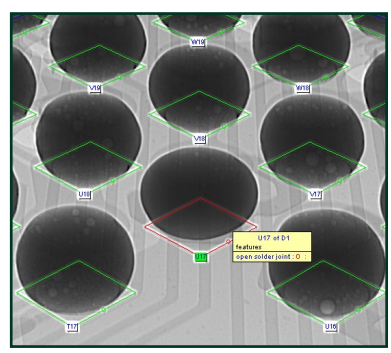
# Phoenix X|act - CAD based inspection

Phoenix X|act is a powerful image processing software to program automatic test cycles. Manual as well as fully automated X-ray inspection can be done easily and self-explanatory. It is available in two versions: base and operator offers multiple new features like:

- Easy macro recording for intuitive programming of inspection tasks:
  - Easy teach in of positioning and image processing parameters
  - All display settings can be saved with one click
- Enhanced sample map functions – once created, the sample map can be used for all boards of the same type
- Clear live image quality – the X-ray image enhancement ensures higher defect detection
- Live CAD data overlay
- Automated savings of results, images and X-ray sample maps
- CAD based programming

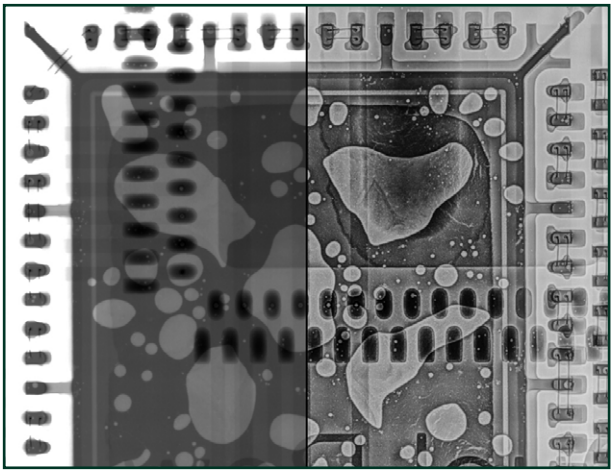


Live CAD overlay and inspection results in the X-ray live image - at any time and at any viewing angle

# Flash!™ Electronics
# – Intelligent image processing for electronics

Combining 25+ years of experience and patents with next-generation technology, Flash!™ Electronics automatically optimizes digital radiography of electronics quickly and consistently. It delivers exceptional image quality and comfortable reading with a faster, smoother workflow enhancing productivity.

- Excellent, consistent image quality optmized for electronics applications
- Rendering of all relevant image data, optimized for the human eye
- Robust image processing and operator independent
- Easy to learn and use, One-Click-Solution at the operator and reviewer/verification levels
- Full visibility in all densities, viewing all the layers without manual adjustment

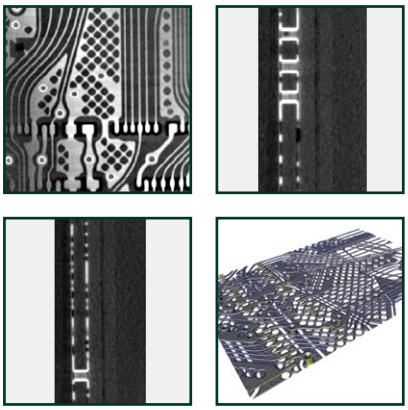


Flash!™ Electronics has better gray scale spreading and shows more details in both high- and low- density areas

# Phoenix Datos|x
# - High Quality Computed Tomography

For advanced inspection and 3D analysis of smaller electronics, Phoenix's proprietary 3D CT solution is optionally available.

Datos|x is a comprehensive software package for computed tomography applications, controlling and monitoring all components of the CT system.
This all-in-one software enables fast and easy 3D-CT inspection by combining all relevant procedures of CT imaging such as the creation of projection data sets, reconstruction of volumes as well as visualization of volumes and projections.



# Technical specifications and configurations

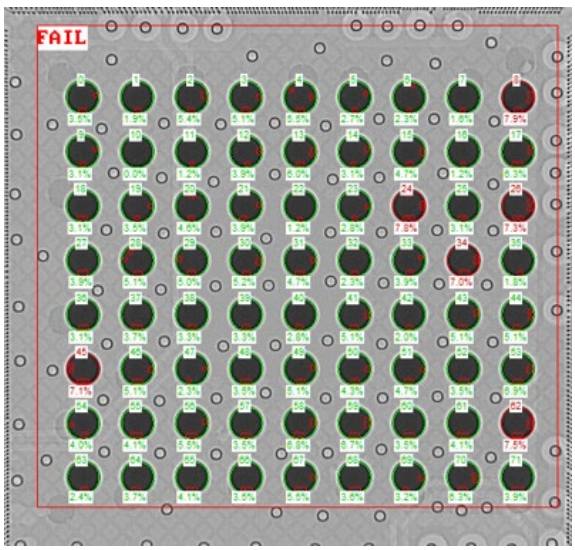
| | Phoenix X\|aminer |
|---|---|
| X-ray detector | 1536 x 1536 pixel CsI detector DXR S85,<br>Superior 85 µm pixel resolution |
| Geometric magnification | >2000 x |
| Total magnification | >91000 x |
| Detail detectability | down to 0.5 µm |
| X-ray tube type | Low maintenance open microfocus tube, transmission head,<br>170° cone angle, collimated. Target tungsten on non-toxic s<br>upport, rotatable for multiple use.<br>Turbo-molecular and oil-free roughing vacuum pump |
| Max. tube voltage / power at target | 160 kV/20 W |
| Filament | tungsten hairpin, pre-adjusted in plug-in cartridges for fast and easy ex-<br>change in < 20 minutes |
| General construction | high precision vibration-free synchronized CNC manipulation |
| Manipulator | high precision vibration-free synchronized 5 axes manipulation |
| Max. inspection area | 410 mm x 410 mm (16" x 16") |
| Max. sample size / weight | 510 mm x 510 mm (20" x 20") / 5 kg (11 lbs.) |
| OVHM – oblique view rotation | adjustable view angle up to 70° n x 360° |
| Control | joystick control or mouse (manual mode)<br>and CNC (automatic mode) |
| Manipulation aids | sample X-ray mapping, click'n-move-to function, click'n-zoom-to func-<br>tion, automatic isocentric manipulator movement,<br>active anti-collision system |
| Min. system dimensions (WxHxD) | 1800 mm x 1900 mm x 1430 mm (70.9" x 74.8" x 56.3")<br>(D without console and demountable back side extension) |
| Height adjustable control panel | 400 mm (15.75") adjustable range |
| Max. weight | approx. 2050 kg / 4520 lbs. |
| Radiation Safety | Radiation safety cabinet for full protective installation without type ap-<br>proval according to German StrSchG/StrSchV. It complies with French<br>NFC 74 100 and the US Performance<br>Standard 21 CFR Subchapter J. For operation, other official licenses may<br>be necessary. |
| Leakage radiation | radiation leakage rate: < 1.0 µSv/h measured 10 cm from cabinet wall |

# Technical specifications and configurations (cont.)

| | Phoenix X\|aminer |
|---|---|
| **Image processing software** | • Phoenix X\|act: comprehensive CAD based X-ray inspection software comprising image enhancement functions and measuring functions<br>• BGA\|module (standard): Intuitive automatic view based BGA solder-joint evaluation incl. automatic wetting analysis<br>• VC\|module (standard): Intuitive automatic view based voiding calculation software package incl. capability of multiple die attach voiding evaluation<br>• C4\|module: view based evaluation of round solder joints with background structure, such as C4 bumps<br>• ML\|module: view based registration of multilayer printed circuit boards |
| **Software Configuration (Option)** | X\|act BGA check strategy: automated CAD based analysis of BGA solder joints<br>X\|act PTH check strategy: automated CAD based analysis of PTH solder joints<br>Xe2 package – Automated solder joint evaluation package:<br>• QFP\|module: automated QFP solder joint evaluation<br>• QFN\|module: automated inspection of QFN / MLF solder joints<br>• PTH\|module: automated pin-through-hole solder joint evaluation<br>X\|act review: visual interface for rework and failure indication<br>Flash!™: Waygate Technologies' exclusive image optimization technology |
| **Computed Tomography (Option)** | • Volume acquisition / reconstruction software: Phoenix Datos\|x<br>• Upgrade package for combined 2D / 3D (computed tomography) operation CT-unit: precision rotation axis,<br>• Max. geom. magnification: 100 x (CT)<br>• Max. voxel resolution: down to 2 µm, resolution depending on the sample size. |
| **Phoenix X\|act operator software (Option)** | Advanced image processing software incl. view based inspection programming |
| **basic CT axis (Option)** | high mechanical precision rotation unit for optimized high-resolution CT applications |
| **easyfix CT axis (Option)** | rotation unit including a counter bearing to fix even extended spatial samples |
| **Barcode scanner** | Manual bar code reader: for product identification |
| **Tilt / rotate unit (Option)** | tilt ± 45° and rotation n x 360° for samples up to 2 kg |
| **Positioning aid (Option)** | laser crosshair |
| **PCB holder for rotation table (Option)** | max. board size 310 mm x 310 mm (12'' x 12'') |
| **XY table (Option)** | increased inspection area 510 mm x 510 mm (20'' x 20'') without rotation and OVHM |

# Phoenix X|aminer - Your Advantages

- Extremely high defect coverage to assure highest quality requirements at easiest usage
- Fast and easy sample handling
- Automation capabilities
- No tube exchange necessary because of unlimited lifetime of the X-ray tube
- Best detail detectability down to 0.5 µm
- Optional Flash!™ Electronics image optimization technology for best electronics inspection
- Large 27'' monitor for better defect identification
- OPC-UA interface for improved efficiency and minimized downtime




Proprietary BGA ADR for fast voiding detecting
Waygate Technologies exclusive FLASH!™ technology option
enables faster, more reliable failure detection.

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