YXLON.Products

Y.Fox
High precision 2D & 3D µCT X-ray solution for high quality microfocus inspection

Continuous miniaturization and increasing quality and reliability demands drive the need for high resolution inspection tools. As a leading supplier of industrial X-ray inspection systems for microfocus and non-destructive testing, YXLON International is taking up this challenge. Across various domains, including electronics, micro-systems, assemblies and materials, product integrity can be ensured through deployment of the Feinfocus product family – high performance X-ray solutions optimized for the use in research and development, prototyping, failure analysis, process monitoring and higher volume production testing.

Y.Fox is a series of versatile Feinfocus X-ray solutions especially designed for high accuracy inspection tasks.

YXLON. The reason why.

- **high geometric magnification and resolution**
- **high precision sample manipulation**
- **large digital flat panel detector**
- **16 bit real-time imaging chain**
- **Y.QuickScan® – the ultra fast µCT solution**
- **easy to use, safe operation**

YXLON. The reason why

Y.Fox X-ray solution

Technological trends, such as the continuing miniaturization and increasing quality and reliability demands motivated the development of a high performance universal inspection system. The comprehensive expertise acquired by the pioneer of microfocus X-ray inspection technology with more than 2500 system installations worldwide steered the development of a high resolution microfocus inspection solution, the Y.Fox.

The result is a configurable high accuracy inspection solution combining flexibility, functionality and ergonomics of standard microfocus X-ray systems.

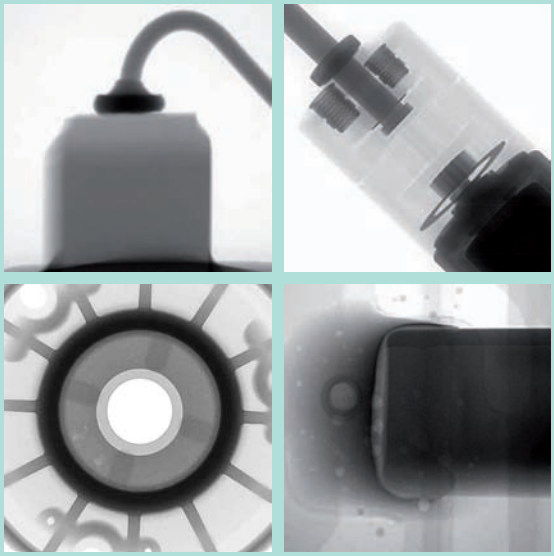
The award winning Y.Fox series is the ideal solution for real-time X-ray inspections where exceptionally high magnification and accuracy are required.

Applications

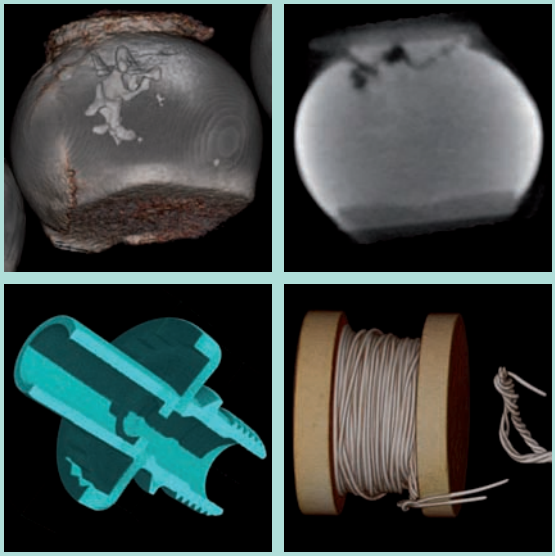
Shrinking device geometries in electronic and electro-mechanical components and micro-systems enables continuous growth in complexity. Especially in semiconductor packaging and micro-system composition, decreasing feature sizes and three-dimensional technologies drive the need for high magnification X-ray inspection including three-dimensional microfocus computed tomography (µCT). Quality control, research and development, and process monitoring of these production lines increasingly demand high accuracy inspection solutions.

The Y.Fox series particularly addresses these inspection needs from failure analysis to volume production inspection of miniature devices. Supported by a variety of options the Y.Fox series is positioned at the forefront of high accuracy and high quality X-ray inspection technology across a wide range of applications:

- Semiconductor packages
- High-Density Interconnects (HDI)
- Electronics assemblies and printed circuit boards (PCB)
- Sensors, actuators and other micro-systems
- Medical devices
- Wafer-level chip scale packages (WLCSP)
- Micro-Electro-Mechanical Systems (MEMS, MOEMS)
- Electro-mechanical and mechanical components
- Material sciences



Ball bond, micro motor gear box, aluminum casting, and surface mount passive component



µCT of BGA ball (3D view and virtual slice), plastic component, and sensor coil

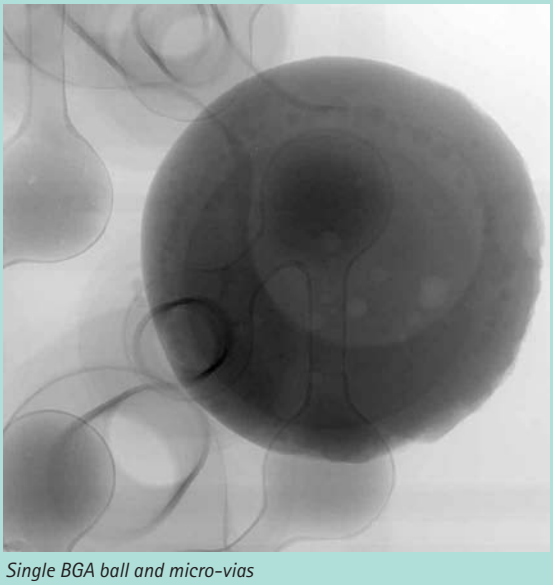
Configuration and specifications

- Highest geometric magnification up to 2,720 x, total magnification up to 7,200 x
- High precision manipulation offering true spatial 2D measurements and oblique viewing up to ±45°
- Optional 160 kV or 225 kV multifocus X-ray tube (MFT) offering three operating modes:
  - Microfocus (µf) for microfocus applications
  - Nanofocus (nf) for sub-micron applications
  - High Power (HP) for inspection of denser materials
- Detail detectability down to < 500 nm
- Inspection area of 300 mm x 400 mm (12" x 16")
- Optional microfocus computed tomography (Y.µCT):
  – Change from 2D to 3D configuration within seconds
  – Y.QuickScan® – the ultra fast µCT solution
  – Optimized hardware for fast reconstruction
  – 3D spatial measurements of inner structures
- 16 bit real-time image processing with more than 65,000 gray-scales as standard
- Optional extra large high speed digital flat panel detector (Panel 2520 HS) or high definition image intensifier (II 230 HD)
- Optional automatic BGA analysis, voiding calculation, universal Automatic Defect Recognition (ADR), and AVI recording
- Full CNC capabilities for X-ray, manipulation, and image processing (semi automation) as standard
- Customized solutions, such as Y.Fox WBI for automated Wafer Bump Inspection, available upon request

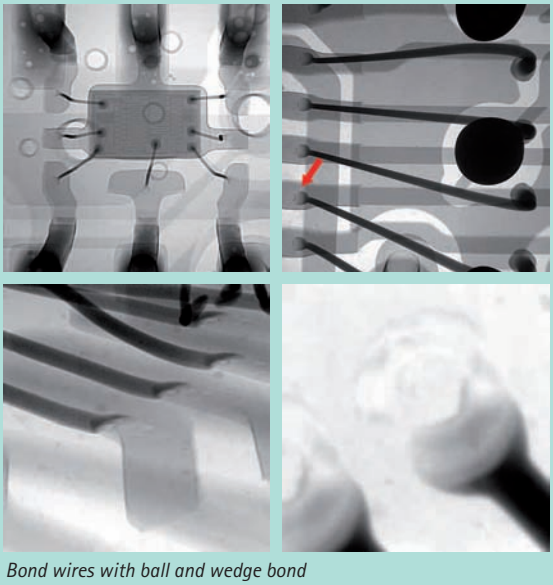
Ergonomics, easy usage and safety

Easy usage and ideal ergonomics are achieved through the deployment of advanced technological solutions. These reduce the strain of operating a high-tech X-ray inspection system yet still provide highest quality inspection results.

- Precise and variable speed manipulation and navigation via joystick
- True X-ray Intensity (TXI) technology: achieving sharp, consistent image quality through continuous feedback of X-ray source status
- Virtually unlimited X-Ray tube life due to open tube design
- Y.FGUI: intuitive-to-use Feinfocus Graphical User Interface for image analysis and system control
- Easy Teach-In: enabling code-free programming of customer inspection routines yet maintaining additional customization through Visual Basic
- Easy-View: a dedicated, flexibly configurable operator workspace supporting single-click execution of numerous customer inspection routines
- Operator console adjustable in height and position
- Easy access automatic door with automatic X-ray off for safe sample loading
- Radiation safety < 1 µSV/h



Single BGA ball and micro-vias

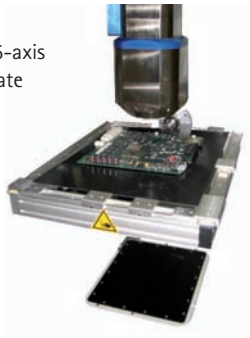


Bond wires with ball and wedge bond

Manipulation

Y.Fox systems offer high precision 5-axis manipulation as standard for ultimate real-time viewing and navigation capabilities:

- Sample frame X/Y/Z manipulation
- Sample frame tilt (oblique view)
- Sample rotation and µCT axis
- Detector Z-axis (optional)



Y.µCT Module including Y.QuickScan®

The Y.µCT Module allows performing high resolution microfocus computed tomography (µCT) in order to obtain a real insight into the innermost three-dimensional composition of a sample. The Y.µCT Module extends the base system by the following functions and components:

- Easy-to-use scanning and reconstruction software
- Y.QuickScan® offering µCT scans in a few seconds and reconstruction within a couple of minutes
- High performance reconstruction and visualization workstation

2D inspection workflow

Single or trays of devices can be loaded comfortably via the automatic sliding door without usage of any special fixtures. X-ray can only be activated when the door has been closed. Immediate visual feedback is given on the flat screen display through the use of the real-time imaging chain.

For manual inspection, the operator can easily adjust magnification and manipulate the sample by the use of joysticks on the operator console. A rich library of software operators allows image manipulation and analysis supported by convenient wizard functions.

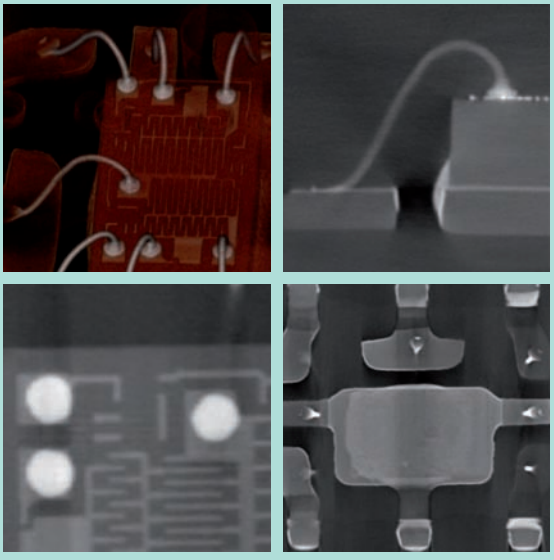
For automated inspection workflows, Y.Fox systems are supported by a code-free Easy Teach-In function which allows fast definition of X-ray workflows (inspection routines) by a few mouse clicks. The corresponding Visual Basic script is ideally suited for further customization where desired. Libraries of taught inspection routines are comfortably available in the Easy-View operator mode.

3D inspection workflow

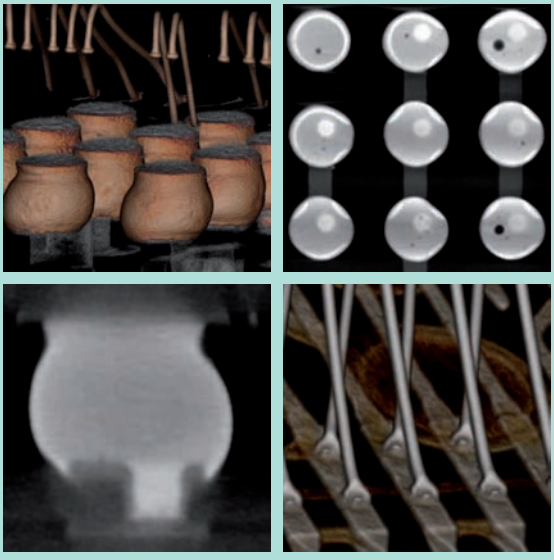
Systems with Y.µCT Module can easily be deployed for high accuracy and high resolution volume scanning and analysis. The solution supports fast to setup manual µCT scans and execution of predefined µCT scan routines.

Supported by the real-time imaging chain, tube parameters and positioning can be adjusted in a matter of seconds for viewing of the sample's region of interest. Upon scan execution, the sample is rotated by 360° and a sequence of projections is acquired. Dedicated hardware solutions offer on- and offline reconstruction.

The dataset of reconstructed slices is visualized in a CAD-like environment which can be controlled intuitively for viewing of the sample in volume. Comprehensive yet easy-to-deploy viewing modes and functions allow an in-depth inspection of virtual cross-sections and slices, sample dyeing according the local material densities, spatial measurements, and saving of visualization and inspection templates and views.



Integrated micro-system - 3D view and virtual cross-sections of bonding wire and die attach



Y.QuickScan® - 3D view and virtual slices of micro-BGA with micro-vias, bond-wires with wedge bond

Y.FGUI

The Y.FGUI (Feinfocus Graphical User Interface) offers an ideal solution regarding easy operation and advanced system control while placing an emphasis on the real-time X-ray image. Easily associated icons and controls, supported by clutter-free workspaces enable intuitive usage and fast operator training.

Overall structure

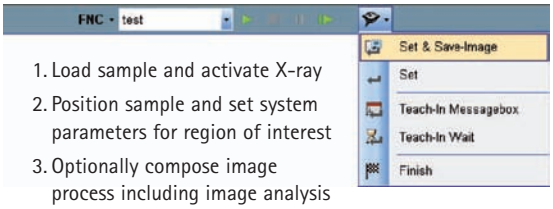
The large X-ray image is accompanied by ergonomically separated workspaces for the Easy-View operator mode, advanced image processing and CNC teaching, display of manipulation details and advanced tube and system control. Main tube parameters are controlled at the common upper workspace region. Overview and parameter panels are positioned at the lower right.

Easy-View Workspace

- Control of main tube settings
- Automatic contrast on/off
- Sharpening on/off
- Display settings in X-ray image
- Add freely editable text
- Save image
- Access to a library of CNC inspection workflows
- Enables quick and easy operator training

Easy Teach-In

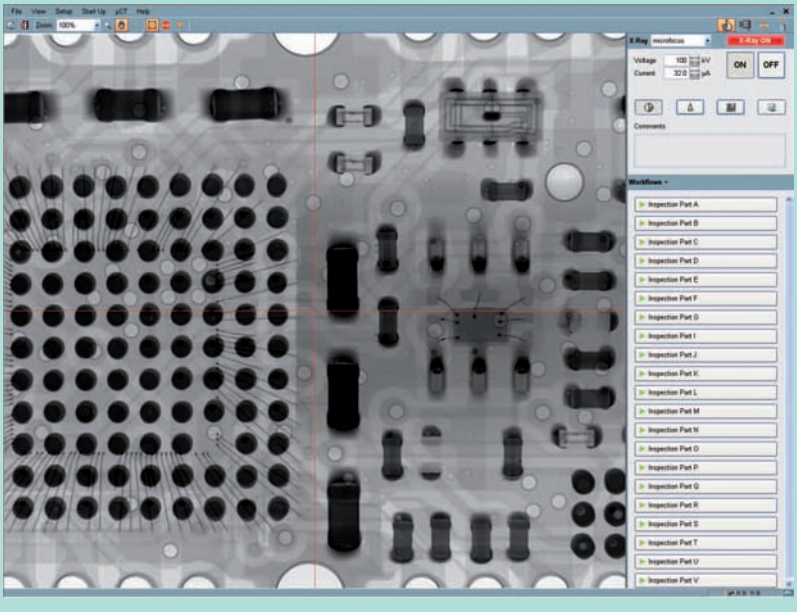
Code-free Teach-In by a few mouse clicks is accomplished following a straightforward recipe:



1. Load sample and activate X-ray
2. Position sample and set system parameters for region of interest
3. Optionally compose image process including image analysis
4. Select "Set & Save Image"
5. Go back to step 2 for further inspection points
6. Select "Finish" in Teach-In menu

Image Process (IP) Workspace

- Straightforward drag & drop composition of image chain and adjustment operator parameters
- Easy-to-use operators and analysis tools as standard including contrast, sharpening, average, OSD with spatial, wire sweep and THT measurements, etc.
- Additional optional operators for image analysis (BGA, voiding calculation) supported by configuration wizards
- Control of detector settings
- Ergonomic arrangement for all typical inspection workflows



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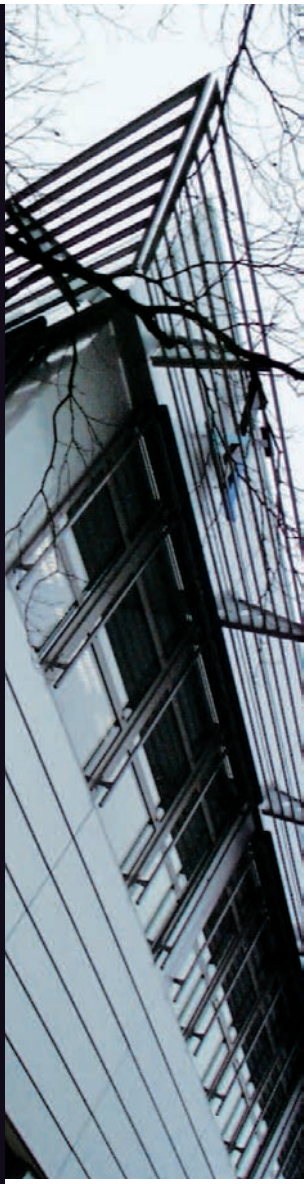

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