



Y.Cougar Series Compact and versatile X-ray solutions for 2D and 3D 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.Cougar is the product line of compact and ergonomic Feinfocus X-ray solutions especially designed for maximum versatility. YXLON. The reason why.

- highly flexible and universal in application
- rapid, high resolution inspection results
- small footprint and easy access
- 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

YXLON.Products





Y.Cougar X-ray solutions

Designed to meet a wide range of rigorous needs of the electronics, automotive, military and aerospace, telecom and medical device markets, the compact Y.Cougar platform provides the most versatile X-ray solution for 2D and 3D inspection in the market. The extensive expertise acquired by the pioneer of microfocus X-ray inspection technology with more than 2500 system installations worldwide steered the development of a user-friendly, compact and versatile microfocus inspection solution, the Y.Cougar platform.

The result is a range of high quality X-ray solutions that adapt themselves flexibly to changing customer needs. Advanced technological solutions enable ergonomic and reliable operation across the outstandingly economic system range.

Y.Cougar systems are the ideal solution for real-time microfocus X-ray inspections ranging from manual single device to fully automated high volume applications.

Applications

The Y.Cougar platform addresses constantly changing market and application requirements through maximum operator flexibility. Ranging from failure analysis and R&D to production volume X-ray inspection, an array of configurations is offered. These are ideally suited for a wide range of twodimensional and three-dimensional microfocus computed tomography (μ CT) applications:

- Printed circuit boards (PCB)
- · Semiconductor packages and interconnects
- Electronics assemblies
- · Sensors, micro-systems and encapsulated components
- Medical devices
- Wafer-level chip scale packages (WLCSP)
- Micro-Electro-Mechanical Systems (MEMS, MOEMS)
- · Photonics assemblies
- · Cables, harnesses, plastics and many more

Compact design

The Y.Cougar features a small footprint (1.1 m x 1.1 m), low system weight (\sim 1450 kg) and convenient front and side door service access. Three basis configurations are supported by a wide range of modular options:

- Y.Cougar F/A Most cost effective Failure Analysis (F/A) configuration
- Y.Cougar SMT Advanced Surface Mount Technology (SMT) configuration
- Y.Cougar PRO
 Production configuration with autor

Production configuration with automated loading



Ball bond, micro motor gear box, aluminum casting, and ball grid array (BGA) in oblique view



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



Configuration and specifications

- Geometric magnification up to 2,000 x, total magnification up to 10,000 x
- Inspection area of 310 mm x 310 mm (12" x 12"), maximum sample size of 550 mm x 440 mm (21" x 17")
- Optional multifocus X-ray tube (MFT) offering microfocus (μf), nanofocus (nf), and High Power (HP) modes
- Detail detectability down to < 500 nm
- 16 bit real-time image processing as standard
- CNC capabilities for X-ray, manipulation and image processing (optional for Y.Cougar F/A)
- Optional automatic BGA analysis, voiding calculation, universal Automatic Defect Recognition (ADR), and AVI recording

Y.Cougar F/A

- Optional 90 kV sealed tube
- 6" standard image intensifier (II 150) with 9" image intensifier (II 230) or high definition 6" image intensifier (II 150 HD) option

■ Y.Cougar SMT and Y.Cougar PRO

- High definition digital flat panel detector (Panel 0505 HD) as standard with larger high definition (Panel 1212 HD) or high speed (Panel 1313 HS) option
- Oblique viewing (140°) at high magnification
- Optional 360° sample rotation table
- Microfocus computed tomography (Y.µCT) option
- Optional Y.QuickScan the ultra fast µCT solution
- Automatic loading interface with optional twin-magazine loader (Y.Cougar PRO only)

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.

- Easy-to-use mouse manipulation and navigation by "Click & Center" in image or via joysticks
- Anti-collision design for damage free inspection
- Auto Isocentric Motion (AIM): a Feinfocus exclusive smart manipulation technology automatically keeping the region of interest in the center of view – regardless of magnification, viewing angle and tilt/rotate
- 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
- 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
- Change between 2D, μCT and fully automated sample manipulation within seconds
- Operator console adjustable in height and position
- Easy access sliding door with automatic X-ray off for safe sample loading
- Radiation safety < 1 μSV/h



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



Single BGA ball and micro-vias

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Y.Cougar F/A

The most cost effective Y.Cougar F/A system is ideally suited for manual two-dimensional X-ray inspection. With 16 bit image processing as standard and optional CNC for automated inspection workflows, Y.Cougar F/A manipulation includes:

- Image intensifier Z axis (motorization optional)
- Sample tray X/Y manipulation
- Optional sample rotate & tilt device (360°/60°)
- Tube Z-axis



Inspection workflow

Y.Cougar F/A systems are conceived for failure analysis, spot-check and small-series manual inspection. Samples can be loaded via the sliding door without usage of any special fixtures. X-ray can only be activated when the sliding door has been closed. Magnification and X/Y sample manipulation is conducted by joystick operations. Immediate visual feedback is given through the use of the real-time image chain. Images can be analyzed, annotated and saved via the Easy-View operator mode.

Y.Cougar SMT

The more advanced Y.Cougar SMT system offers larger versatility for low to higher volume, manual and semiautomated, 2D and 3D µCT X-ray inspection. With digital flat panel detectors, CNC and oblique viewing as standard, Y.Cougar SMT manipulation includes:

- Flat panel detector Z axis and 140° tilt
- Sample tray X/Y manipulation
- Sample rotation table 360° (option)
- High accuracy μ CT sample rotation (with Y. μ CT module)
- Tube Z-axis



Inspection workflow

Y.Cougar SMT systems are ideally suited for advanced applications offering oblique viewing and CNC as standard. The system is controlled manually via joysticks or "Click & Center" manipulation in the X-ray or overview image. Fast code-free training of inspection routines is achieved by a few mouse clicks. The corresponding Visual Basic script is ideally suited for further customization where desired. Libraries of taught inspection workflows are comfortably available in the Easy-View operator mode.



Smart sensor, stent, fault-affected wire connection, and relais



Y.Cougar PRO

The Y.Cougar PRO offers maximum flexibility in application. With its automatic loading unit it is ideally suited for medium and larger volume automated X-ray inspection while also supporting manual and automated, 2D and 3D μ CT inspection. Y.Cougar PRO manipulation includes:

- Full Y.Cougar SMT functionality and options
- Additional fully automated loading interface
- Optional twin magazine loader



Inspection workflow

Y.Cougar PRO systems are designed for the widest range of X-ray inspection needs. Single samples or sample trays can be loaded manually or automatically via the side shutter and automatic loading interface. Fully automated batch inspections can be performed without any operator interaction according to predefined inspection workflows. For manual inspection, the Y.Cougar PRO offers the same easy-to-operate and comfortable working environment as the Y.Cougar SMT.

Y.µCT module with Y.QuickScan option

The Y. μ CT module gives a real insight into the threedimensional composition of a sample including virtual crosssections and slices and measurements. Available for Y.Cougar SMT and Y.Cougar PRO systems, the Y. μ CT module includes:

- µCT manipulator with high accuracy sample rotation
- Easy-to-use scanning and reconstruction software
- Reconstruction and visualization workstation
- Y.QuickScan offering µCT scans in a few seconds and reconstruction within a couple of minutes (optional)



Inspection workflow

Systems with Y. μ CT module can easily be deployed for high quality volume scanning and analysis. Tube parameters and positioning can adjusted in a matter of seconds or predefined μ CT scan routines can be deployed. Upon 360° sample rotation a sequence of projections is acquired. Fast reconstruction is achieved through dedicated hardware solutions with visualization in a CAD-like environment offering in-depth inspection of virtual cross-sections and slices and much more.



Y.QuickScan - 3D view and virtual cross-sections of micro-BGA with micro-vias, wedge bonding

Surface mount technology: chip passive, MLF, PLCC, and SOIC

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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. Parameter and overview panel for Y.Cougar SMT and PRO 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:

FNC + test 📑 💌 🔳 🕖 🍅	% -
	📮 Set & Save-Image
 Load sample and activate X-ray 	🚚 Set
2. Position sample and set system	📮 leach-In Messagebox
parameters for region of interest	😹 Teach-In Wail
3 Ontionally compose image	88 Einink

- 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



Measurements for wire sweep, barrel fill (THT), and BGA voiding in single ball



Automatic analyses: voiding calculation, and BGA analysis









Ball grid array (BGA) in oblique views