

Led by experience. Driven by curiosity.

Cheetah EVO

Efficient inspections with crystal clear images
for SMT, semiconductors and labs.



comet
yxlon



Comet Yxlon – this is who we are.

Comet Yxlon designs and manufactures high-end X-ray and CT system solutions for industrial environments – based on customer-centric product development. We're proud to be part of Comet, the globally leading Swiss technology company with a focus on plasma control and X-ray technology.

**Led by experience.
Driven by curiosity.**

Deeper insights.

Looking beyond the surface is our core competency at Comet Yxlon – not only in a technical way.

Zooming in on your industry, applications and business challenges allows us to develop innovative and relevant solutions that help you shape future markets. Faster time to market? Avoiding production downtimes? The perfect image with the highest resolution, as fast and easy as possible? Whatever your goal – let's talk about it!



Automated 3D laminography inspection for maximum productivity.

Your benefits with the Cheetah EVO:

- Fast and intuitive scan set-up
- High detail resolution at submicron level for 2D, 2.5 D and 3D imaging
- Best-in-class laminography
- Automated inspection programs and software-assisted image review
- Dose monitoring for sensitive parts
- Optional high load capacity (≤ 20 kg)
- Seamless review with integrated 3D visualization and optional AI-powered image analysis

The smart choice for the smart factory.

Connectivity, self-optimizing processes, automation – Industry 4.0 demands new solutions. Challenge accepted: The Cheetah EVO helps increase speed, image quality, and efficiency in the SMT and semiconductor industry as well as in laboratories.

Increase yield

Deeper insights from repeatable scan results keep your production on target.

Improve your efficiency

Faster results due to dedicated inspection workflows boost your productivity.

Enhance your quality

Precise image details reveal root causes for failure, for example tricky defects.

Already Aristotle realized: "The whole is greater than the sum of its parts". With the Cheetah EVO, it's the combination of state-of-the-art hardware like the new water-cooled tube, innovative visualization software and smart workflows like VoidInspect, that makes this system stand out.

Smart workflows and visualization

The Cheetah EVO responds to the need for improved, automated operation with integrated workflows in the FGUI operating software. 3D volumes once acquired and reconstructed are brilliantly visualized using Dragonfly 3D View. They can be analyzed with Dragonfly 3D World, which takes advantage of an AI-powered image processing algorithm. Both software solutions offer the ability to render 3D cinematic images with a preset selection using application-specific look-up tables resulting in the most realistic, vivid visualization.

Water-cooled FXT 160.51 X-ray tube

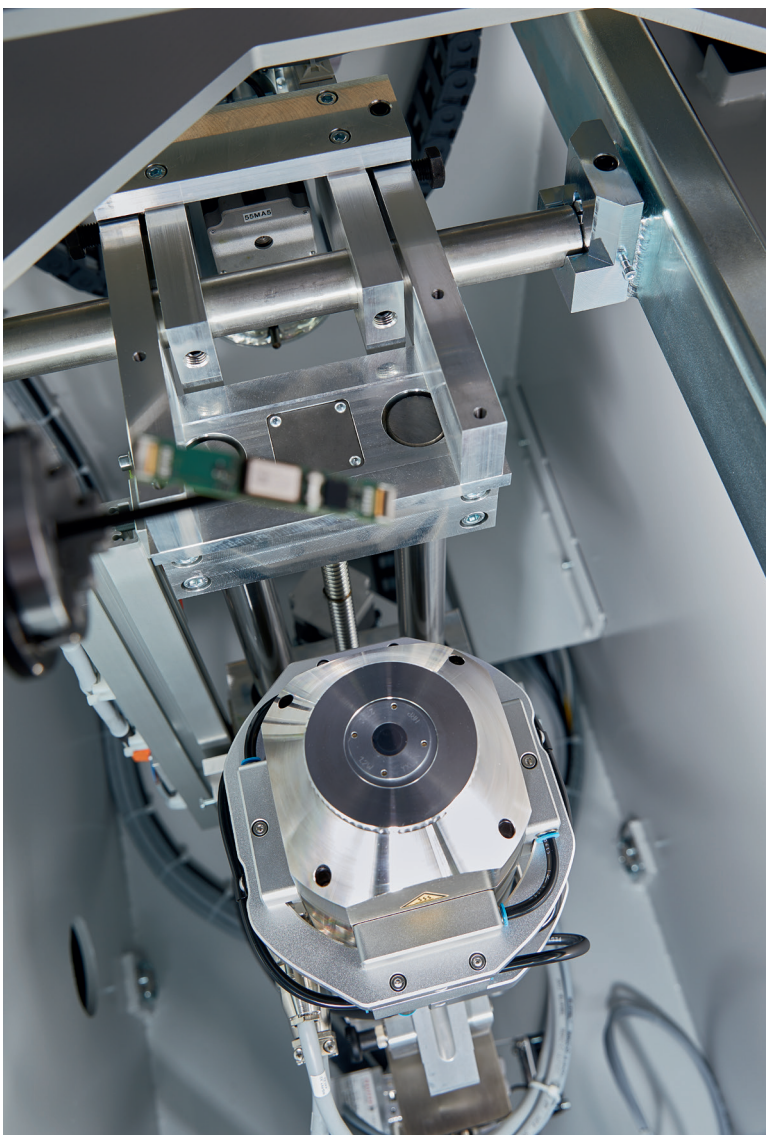
When the temperature of the tube housing and the target inside increases during the inspection process, focus drift may occur. Thanks to improved heat dissipation at the tube optics, Comet Yxlon's new water-cooled tube stabilizes the focal spot and significantly improves CT results – expect crystal clear CT images with higher resolution and less image distortion. This is also the basis for a significantly improved repeatability of results of 2D and laminography scans during, e.g., batch inspections – a vital quality for using the data in production process control.

Large flat-panel detectors

The Cheetah's large flat-panel detectors offer an up to 50 % larger field of view for a better overview. Manufacturers benefit from faster working processes due to the reduced number of steps in automated processes.

Optional high load capacity (≤20 kg)

The reinforced mechanics and sample table are suitable for components up to 20 kg, so several parts and electronic interconnects in fixed packages can be inspected at once – a real time saver.



The water-cooled FXT 160.51 tube delivers repeatable and precise scan results.



The high load option of Cheetah EVO is suitable for parts with a weight of up to 20 kg.

Different applications. Same great quality.

SMT inspections: grand performance for small devices

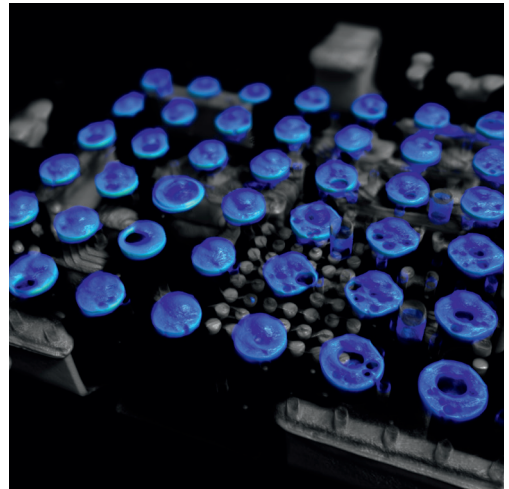
Due to the miniaturization and performance increase of more and more features must fit in an ever-smaller area. Cheetah enables accurate, repeatable inspection routines with void compilations, including multi-area voiding. It does not only provide high performance and resolution, but is also equipped with enhancement filters and powerful automation tools.

SMT applications

PCB (BTC, BGA, LGA, QFN / QFP, THT)

IGBT

LED



LDA solder connection plane on a PCB with distinctive voiding, visualized using Dragonfly 3D View.

Semiconductor inspections: maximum resolution at minimum voltage

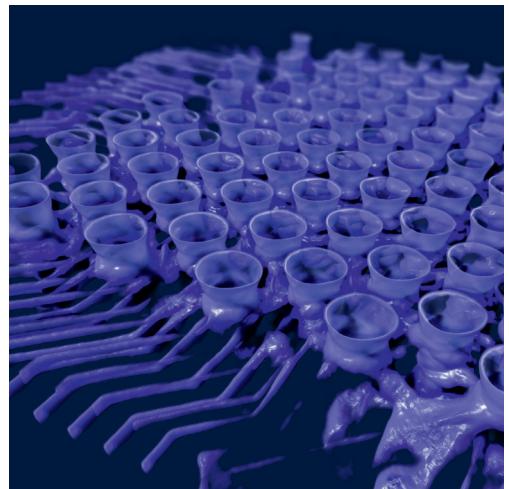
Cheetah enables accurate, repeatable inspection routines with void compilations, including multi-area voiding. Its high detail resolution laminography is key for inspecting the internal connections of state-of-the-art advanced packaging IC devices.

Semiconductor applications

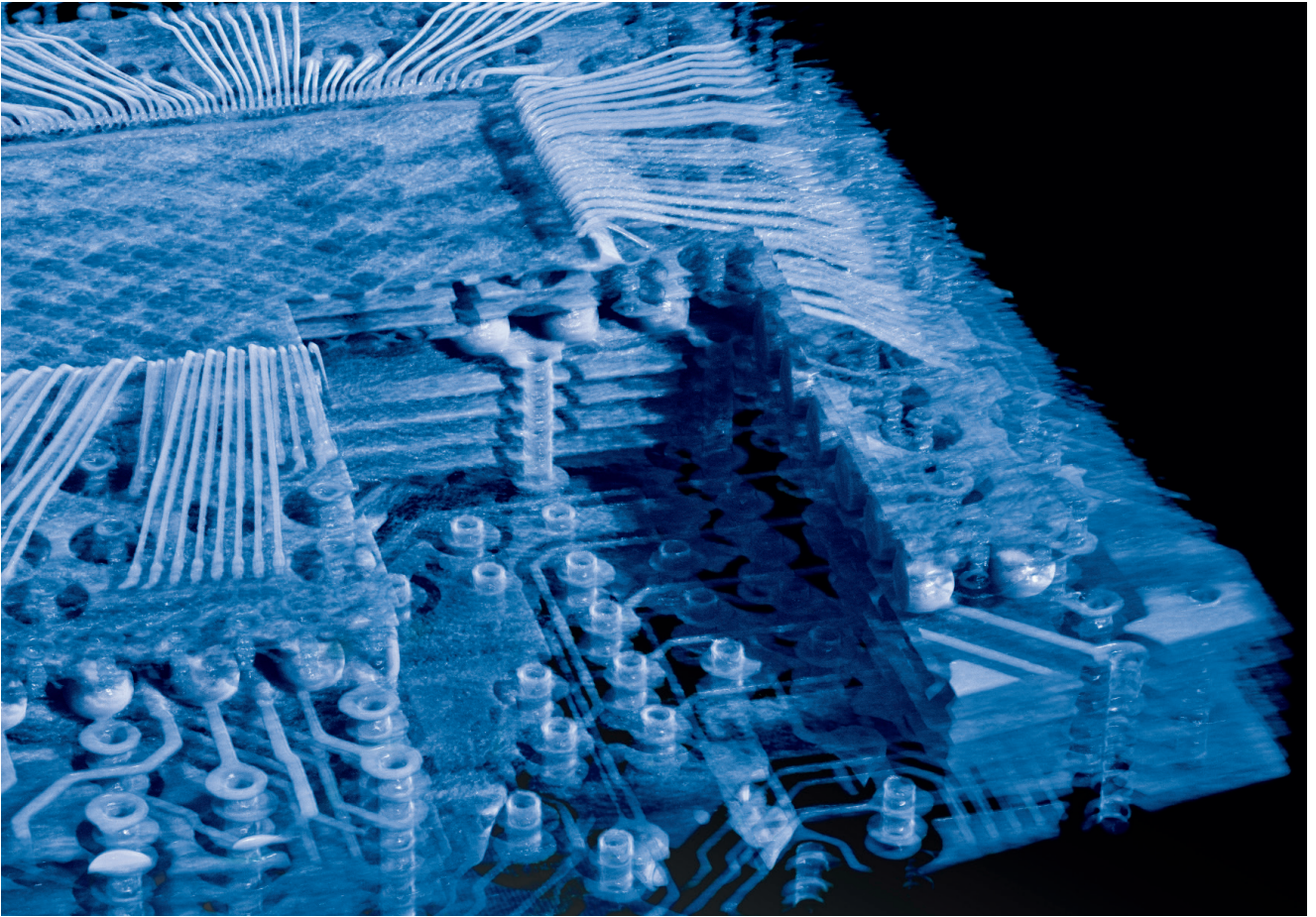
Wafers and integrated circuits
(die attach connections, 3D IC joints, TSV)

Sensors

MEMS and MOEMS



C4 bumps in a flipflip package visualized using 3D View/World's Edge Contrast for transparency.



3D visualization of a wire-bonded BGA on a PCB.

Laboratory inspections: leading technology for precise analysis

The inspection of electronic components during research and development is highly complex and requires a broad range of features. Computed tomography with the Comet Yxlon Cheetah EVO is the technology of choice for detailed analyses of micro components such as those used in batteries, connectors, and medical devices.

Lab applications

Batteries

Connectors and other electronics components

Medical material

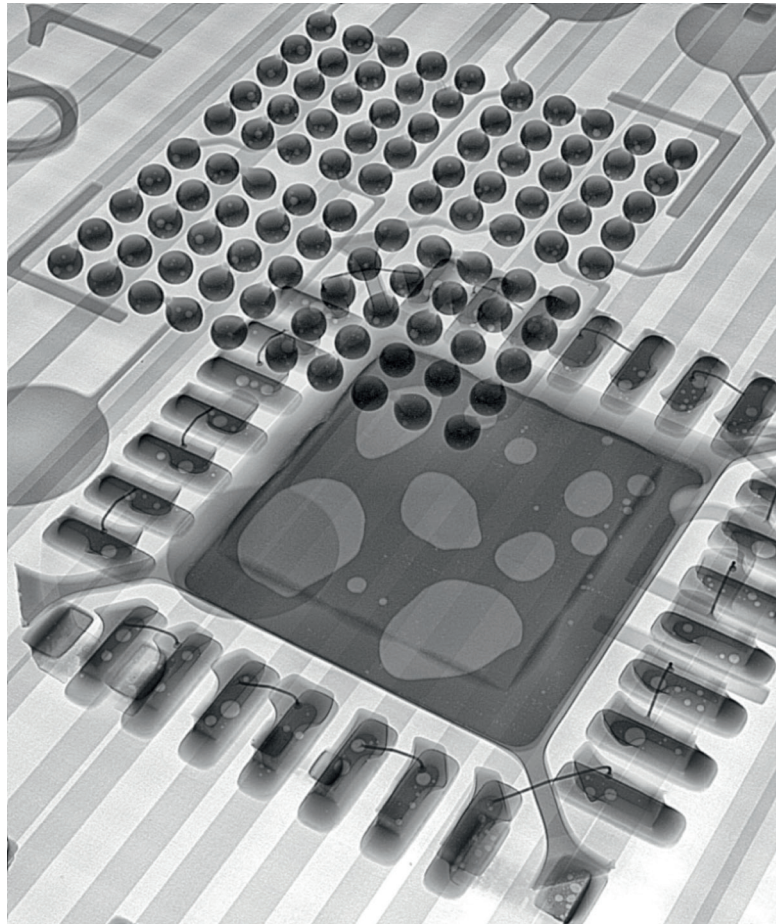
Military and space electronics

Software solutions for accurate, repeatable, fast results.

From image acquisition with the FGUI user interface to visualization of the volume with Dragonfly 3D View or analysis with Dragonfly 3D World: the Cheetah EVO offers a wide range of integrated software features.

More clarity, efficiency and insights

Our software solutions serve three specific areas of interest. "Clarity" focuses on detail-rich image acquisition. "Efficiency" revolves around connectivity to boost your productivity, while "Insights" features powerful analysis solutions.



High contrast image of QFN and BGA soldering on a double-sided PCB with applied eHDR filtering.

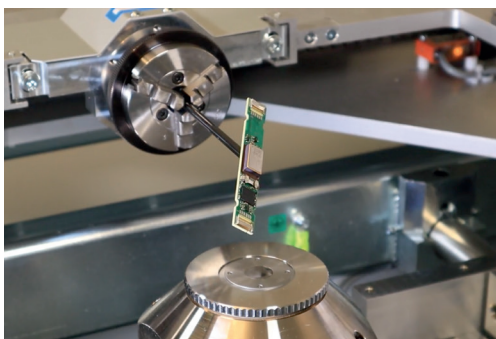
Clarity: acquire highest-resolution 2D, 2.5D and 3D images and volumes.

2D and 2.5D imaging: create compelling images fast with eHDR

To ensure highest product quality, the eHDR filter highlights complex structures with just one click. Thanks to our advanced software and enhanced 16-bit gray scale values, it detects even the slightest variances in gray scale, so that no defect will be missed. This allows operators to easily see faults that were invisible before.

3D X-ray inspection with computed tomography (CT)

X-ray CT offers a full 3D reconstruction, making it the preferred choice for inspecting dense, multi-layered SMT assemblies such as complex PCB stacks, connectors, and fully assembled modules. This technology enables complete internal analysis, including precise defect localization in hidden solder joints and intricate interconnections.



Cheetah EVO is quickly set up as a full CT.

High-precision 3D laminography with Micro3Dslices

Laminography is the ideal solution for the analysis of large flat electronic components like PCBs, BGAs, and QFNs with unmatched precision. It combines the advantages of 2D X-ray and 3D CT: Computed laminography delivers high-resolution slice images that reveal hidden defects and avoids interference from overlapping components.

Comet Yxlon's Micro3Dslices enhances this process by enabling fast, automated slice-by-slice analysis in under 40 seconds per part. This ensures consistent, high-quality inspection results while allowing targeted evaluation of solder joints, voids, misalignments, and short circuits.

Artifact reduction and image enhancement for best 3D results

Powerful image quality optimizations help improve the quality of the scan data, e.g. through Beam Hardening / Correction, Ring Artifact Reduction or Noise Reduction. In addition, the Dragonfly 3D World software helps reduce noise, correct distortions, and improve feature visibility – with a comprehensive toolchain from traditional image filtering and post-processing algorithms to cutting-edge AI models.



Insights: smart automation meets stunning visualization.

From software-assisted inspections and automated review processes to impressive 3D visualizations – the Cheetah EVO software enables you to extract valuable insights from your image data fast and share them in spectacular representations.

Easy meets advanced: visualization with Dragonfly 3D View.

Dragonfly 3D View is our all-in-one software tool that helps you create stunning 3D image visualizations. Thanks to its user-friendly design and blazing-fast startup times, operators can create professional-grade animations fast and with ease.

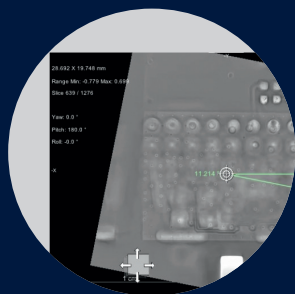
Effortless data import

Dragonfly 3D View streamlines workflows by automatically opening volumes after reconstruction, eliminating manual steps and saving time.

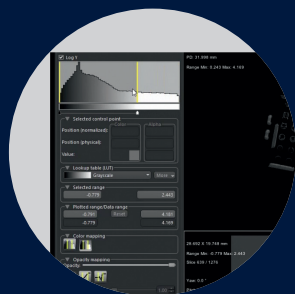
Interactive 2D and 3D Views

3D View makes complex imaging more accessible than ever before, e.g. by simplifying navigation through image stacks, and offering seamless zoom, pan, and rotation for optimal viewing. Users can easily align and register volumes with intuitive manipulate functions, allowing seamless X/Y/Z reorientation.

Electronics failure analysis workflow



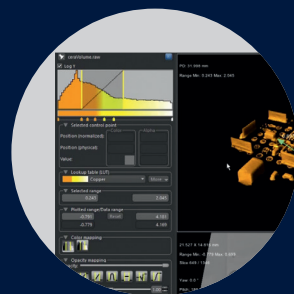
Align volumes easily using intuitive image tools.



Use the histogram to enhance visibility of important details.



Annotate, measure, and highlight critical issues in 2D and 3D views.



Apply pre-configured color maps to emphasize structural differences.

Precise annotations and measurements

Easily add points, rulers, angles, and regions to 2D/3D views to measure distances, angles, areas, and perimeters. Plot histograms and intensity profiles for detailed, data-driven insights, or add annotations with multiple options, automatically visible across all views.

Intuitive visualization, editing and rendering

3D View enables users to optimize 3D renderings with material presets, to fine-tune visuals using lighting, shadows, and focus, and to apply clipping and edge contrast for clearer detail. Selective visualization effects, such as LUT, allow for enhanced clarity and analysis.

Compelling storytelling

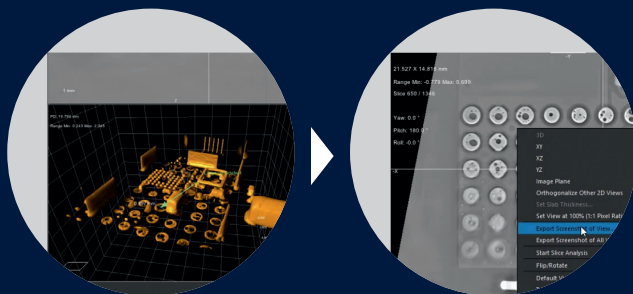
3D View empowers users to create stunning, professional-grade animations with ease. With intuitive keyframes, smooth transitions, and flexible rotations, the built-in Movie Maker transforms static 3D images into engaging visual stories.

Boost productivity: seamless collaboration

3D View streamlines collaboration with a powerful all-in-one project organizer, enabling users to efficiently organize and share data across locations and departments. Create structured projects, add tags for easy categorization, and find relevant information fast.

Workspace customization

3D View adapts to your unique workflow with a fully customizable workspace. Tailor every aspect of the interface to suit your needs, store personalized configurations, and switch between setups based on your current task easily.



Remove irrelevant areas and focus on defects.

Export images for professional reporting.

Dragonfly 3D World.

Dragonfly 3D World is our powerful, comprehensive solution for image visualization and analysis. It contains all features of Dragonfly 3D View plus powerful AI-based tools for next-level segmentation and quantification.



Insights: improve image analysis and process control.

ProInsight THTInspect DR

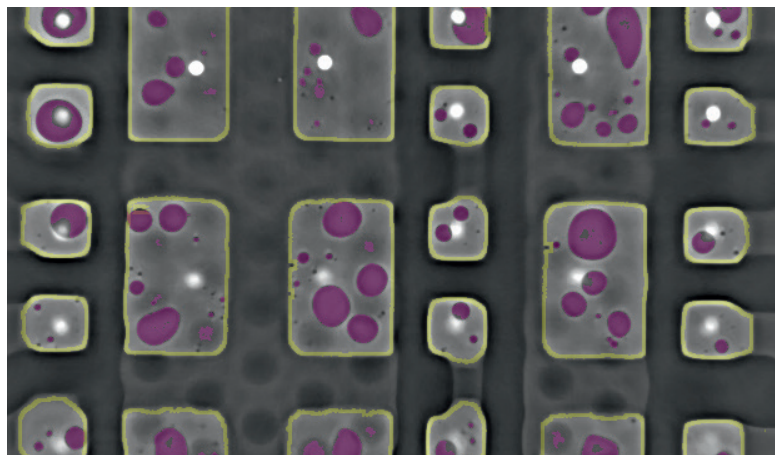
THTInspect DR is the assisted defect analysis for fill level inspections on THT-based components in 2D. It enables an assisted inspection routine based on Dragonfly for quantitative analysis.

ProInsight VoidInspect CL and DR

VoidInspect is the software-guided analysis tool of voids in solder joints. It works with both laminography (CL) as well as digital radiography (DR) data sets. VoidInspect has been developed based on our powerful Dragonfly image processing technology. It is an inspection routine for quantitative analysis, with very high accuracy and repeatability, that helps save time and minimize error. It is qualified for the inspection of electronic components like BGA, LGA, BTC and QFN Central Pads, LED, IGBT and DPAK.

2D multi area void calculation (MAVC)

QFNs and other bottom-terminated devices without overlapping can also be inspected with 2D digital radiography. Faulty or missing solder joints and large areas of voiding are reliably detected, and MAVC helps analyze voids in complex soldering designs. With just four parameters to adjust, setup is quick, simple, and costefficient. Precise void analysis of multi-layer components needs computed laminography and VoidInspect.



Results of guided void analysis of solder pads using VoidInspect CL.

Automated BGA inspection

Cheetah allows to quickly select and index individual BGA balls, either manually or using automatic grid detection. A wizard guides the operator through the inspection process step-by-step and ensures perfectly accurate and repeatable results.

Efficiency: automate tasks and protect sensitive electronics.

Dose Monitoring

For dose-sensitive components, such as silicon-based electronics, minimizing radiation exposure is crucial to prevent damage while ensuring high-quality imaging. The Cheetah's Dose Monitoring technology prevents damaging X-ray sensitive electronics during the inspection process. The absorbed X-ray dose is automatically monitored – when a critical threshold is reached, the operator is informed, and the scan is aborted.

Dose Reduction Kit

Our optional Dose Reduction Kit significantly lowers the dose rate on delicate parts, combining specialized collimators and filters to precisely limit radiation to the necessary level for imaging. In addition, the Low Dose Detector Mode further optimizes exposure settings, allowing safe and accurate inspection without compromising component integrity.



The Dose Reduction Kit combines collimator and filters that limit the potential risk of damage on active silicon components.

Automated sequences

Increase the productivity of working on recurring SMT test tasks – by automating and customizing test sequences with the Cheetah EVO's scripting interface. With FNC scripting, users can create tailored inspection routines that standardize and streamline repetitive tasks, reducing operator dependency and minimizing human error. This enables (semi-) automated analysis of solder joints, void detection, and component alignment checks, ensuring consistent and repeatable inspection results.

Additionally, scripting allows seamless integration with external systems, adaptive decision-making based on real-time data, and optimized test workflows, ultimately improving efficiency and throughput in SMT quality control.

Our supportive Life Cycle Service.

At Comet Yxlon, service is not an add-on, but an integral part of every product. We support you through the entire life cycle of your system – for easy operation and extended product life.

Comet Yxlon supplies tailored service solutions for a wide range of production environments and applications. Whether you are an X-ray beginner or a CT expert, whether you need introductory training or a performance upgrade: Our service team is here to support you.

1. Getting you started

Our professional Comet Yxlon field service technicians or certified service providers will ease your way into working with your new inspection system.

- Bringing the system to life: installation & commissioning
- Power on: introductory training by Comet Yxlon Academy
- Correct measurements from the start: SmartCalibration
- Cost transparency from the beginning: flat fee service rates

2. Running things smoothly

Is there an issue? No problem. Our skilled service technician team helps with troubleshooting, maintenance, and part exchange for easy operation.

- High efficiency thanks to remote control and VisualAssist
- Professional phone support and on-site visits
- Preventive maintenance and SmartExchange
- High-end system monitoring with SmartCalibration

3. Enhancing performance

With our upgrades and conversion kits, your Comet Yxlon system remains in top-notch condition and keeps its value as market demands change.

- System release upgrades, feature & performance upgrades
- Component upgrades
- System software upgrades
- Advanced Academy training

Tailor-made Service Level Agreements

Our Service Level Agreements are based on different performance factors, e.g.

ServicePass – for fast reaction times and seamless maintenance

SmartPass – focusing on the highest possible system availability

LifeCyclePass – the all-inclusive premium contract for guaranteed life-cycle-costs

Please contact us to learn more about the specifics of our different service contracts!

Cheetah EVO in numbers.

Inspection parts

Max. part size	800 mm x 500 mm (31" x 19")
Max. inspection envelope 2D	460 mm x 410 mm (18" x 16")
Max. part weight	5 kg
Max. part weight rotation	2 kg
Max. part weight heavy load	20 kg

X-ray source

	FXT-160.50	FXT-160.51
Tube type	microfocus, open	
Energy range	20 - 160 kV	
Max. power	64 W	
Max. target power	15 W	
Spatial resolution ¹⁾	2.0 μm	0.8 μm
Features	TXI ²⁾	TXI ²⁾ , multifocus, optional water-cooling

Detector

	1313	1515	1616
Active area	128 mm x 128 mm	152 mm x 152 mm	162 mm x 162 mm
Pixel matrix	1,004 x 1,004	1,256 x 1,256	1,276 x 1,276
Pixel pitch	127 μm	119 μm	127 μm
Max. frame rate	48 Hz	60 Hz	48 Hz

Manipulation

Focus-detector distance (FDD)	124 - 526 mm
Oblique viewing	+/- 70° (140°)
Turntable ($\varnothing$)	440 mm

Cabinet / System

Dimensions (W x D x H)	1,650 mm x 1,400 mm x 2,050 mm
Weight	~ 2,200 kg
Loading door clearance (W x H)	650 mm x 687 mm
Mains connection	230 V $\pm$ 10 % AC, 50 / 60 Hz, 1 phase, neutral and ground conductor
Max. power consumption	2.5 kVA

¹⁾ Measured with JIMA RT RC-02B or HiCo micro-chart test specimen. Acceptance criteria CNR*MTF > 5 %; MTF > 5 %; CNR > 0.5.

²⁾ TXI = true X-ray intensity – controls real output dose for constant intensity.

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