

YXLON FF35 CT MULTI-APPLICATION, HIGH- RESOLUTION COMPUTED TOMOGRAPHY (CT) INSPECTION SYSTEM FOR FINE AND MIDDLE-SIZED PARTS



YXLON

EXPERIENCE A STRUCTURED CT INSPECTION WORKFLOW

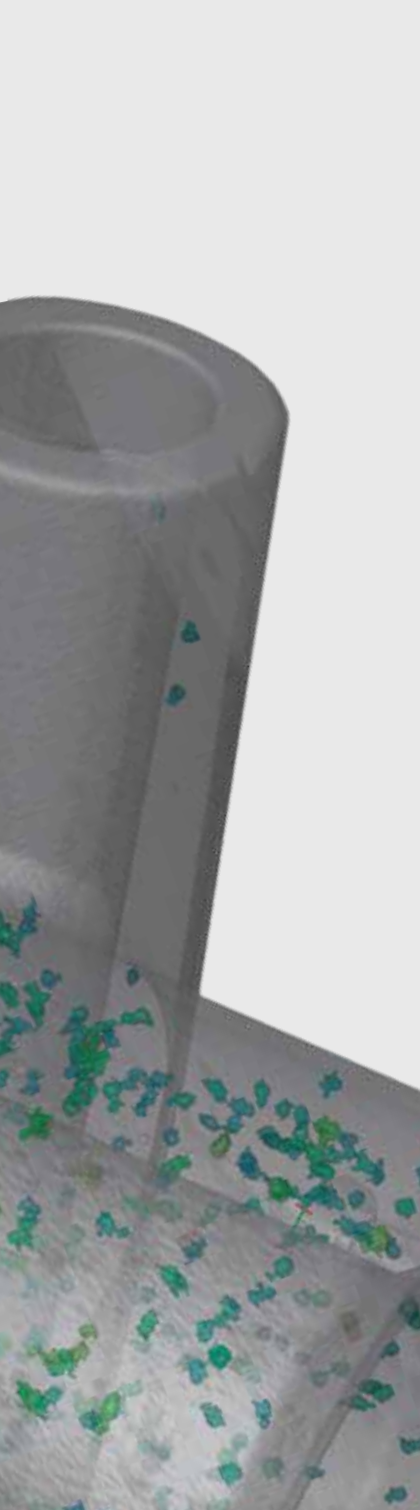


*Al casting with porosity analysis
and dimensional measurement*

It is the great advantage of industrial computed tomography systems that they non-destructively provide detailed and imaging insights into inner structures of components. On that note, it is the ideal instrument for quality assurance and material analysis in research and development.

Due to the accuracy of cutting-edge CT systems, even metrological applications are meanwhile standard. Inner structures and even elastic materials can precisely be measured. And CT is comparatively fast where numerous features need to be determined.

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**Typical applications for
computed tomography are**

- Research and Development
- Failure analysis
- Process control
- Inspection of small serial productions
- Quality assurance and material analysis
- Assembly checking
- Combined DR (digital radiography) and CT inspection

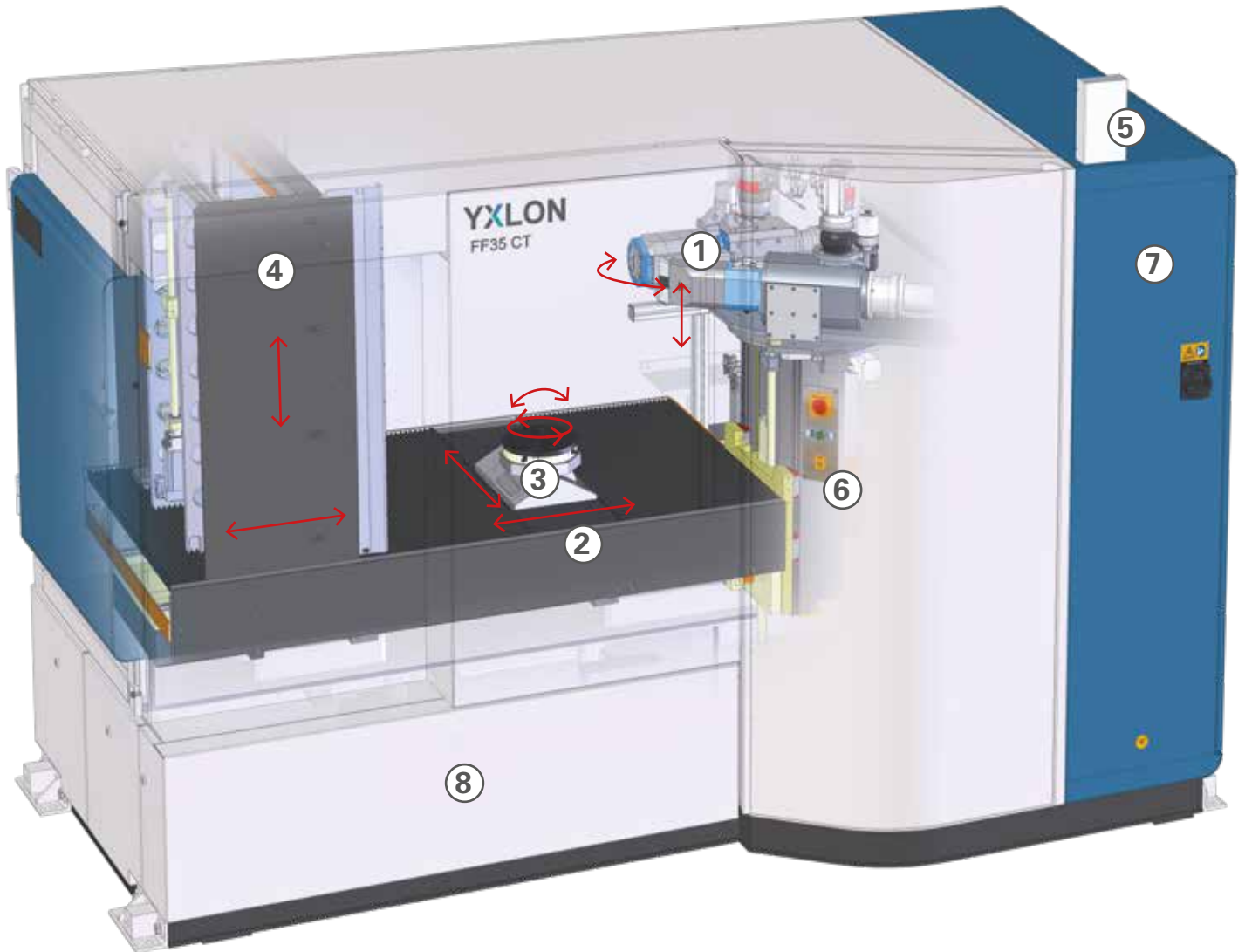


The extremely versatile high-resolution systems YXLON FF35 CT and FF35 CT Metrology are designed for a huge variety of parts like

- Electronic components incl. SMD
- Products made from new materials or new manufacturing methods, e.g. additively manufactured components, fiber-reinforced plastics
- Medical objects, e.g. cannulas
- Metal parts
- Organic and geological samples

Due to the dual x-ray tube configuration, FF35 CT covers an extraordinarily wide bandwidth of parts and applications. The transmission tube provides a resolution in the submicron range and is recommended for part sizes up to 10 mm, whereas the directional beam tube having much higher power allows quick scans in less than a minute. The FF35 CT is a dual-tube system with two HV-cables and two generators without the need for reconfigurations.

IT'S THE INSIDE THAT MATTERS



Based on the Yxlon system software Geminy which offers easy, intuitive operation with touch screens and graphical user interface, the FF35 CT / FF35 CT Metrology provide numerous special features. The users benefit from unrivaled image quality, utmost flexibility regarding the bandwidth of applications, and compact cabinet design.

Various automated functions help to save time. Different user levels support unskilled operators as well as experienced experts to achieve optimum results in their inspection tasks. Health monitor and push messages keep the user informed about system status and inspection progress.

A detailed description of the software platform Geminy is available in a separate brochure.

SPECIAL SYSTEM CHARACTERISTICS

1. YXLON 225 kV microfocus directional beam tube

- 320 W power and water-cooled target for short scan times
- 2 modes for optimal adjustment of focal spot size with respect to power
- 4 μm spatial resolution (2D image)
- TXI – „True X-ray Intensity“ for a long-term stable dose

Optional: YXLON 190 kV nano-focus transmission tube

- Water-cooled target and coils for quick temperature balance and highest focal spot stability
- Diamond target for high power
- 4 modes for optimal adjustment of focal spot size with respect to power
- 150 nm detail detectability (2D image)
- TXI – „True X-ray Intensity“ for long-term stability

2. Granit-based manipulator

- Smallest thermal expansion and high stability of temperature
- Vibration isolation from the system by active dampers
- High-precision Heidenhain encoder on all axes
- 6 axes for utmost versatility of applications
- Swivel mechanism for tube selection

3. Extremely precise turntable

- Joint development of Yxlon and Heidenhain
- Highly precise angle encoder
- Heavy load possible
- Low-maintenance, no need for compressed air supply
- Optional: tilting function

4. Selection of detectors

- Up to 430 mm x 430 mm active area for large field of view
- CsI scintillator for high local resolution and high efficiency
- Qualified acc. to ASTM E2597
- Optimized for microfocus CT applications

5. X-ray warning lamp

6. ESD connections

- Safe static discharge for the work with semiconductor components
- ESD-proved construction by use of appropriate materials

7. Integrated, ventilated control cabinet

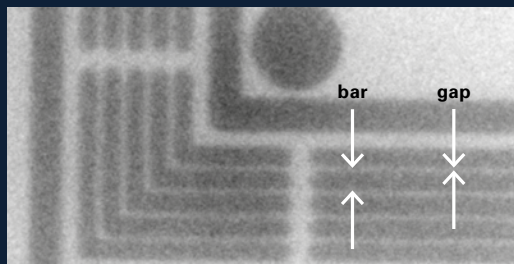
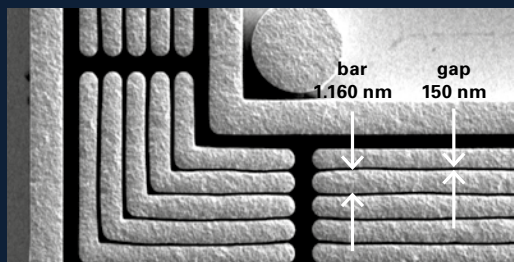
- Outstanding accessibility for service
- Integrated high-power generator for fast installation and smallest footprint

8. Vacuum and tube cooling components

- Easy service access
- Vibration isolation from the manipulator

Software platform Gemin

The novel software platform Gemin is the heart of the computed tomography system FF35 CT. Its great number of various trajectories provides enormous flexibility regarding part sizes and inspection tasks. Details on Gemin are described in a separate brochure.



SEM (Scanning Electron Microscope) image shows the exact dimensions of the test pattern 150 nm gap clearly visible in the X-ray image



Optional: Additional 190 kV nanofocus transmission tube

FF35 CT METROLOGY

The FF35 CT Metrology additionally offers the following features:

Stabilization of interior temperature

- Smart fan control depending on door and detector position
- Separate heat exchanger which can be placed outside the measuring room
- Temperature range acc. to measuring quality class 3 defined by VDI 2627
- Display of readiness for measurement and fulfillment of temperature requirements in the health monitor



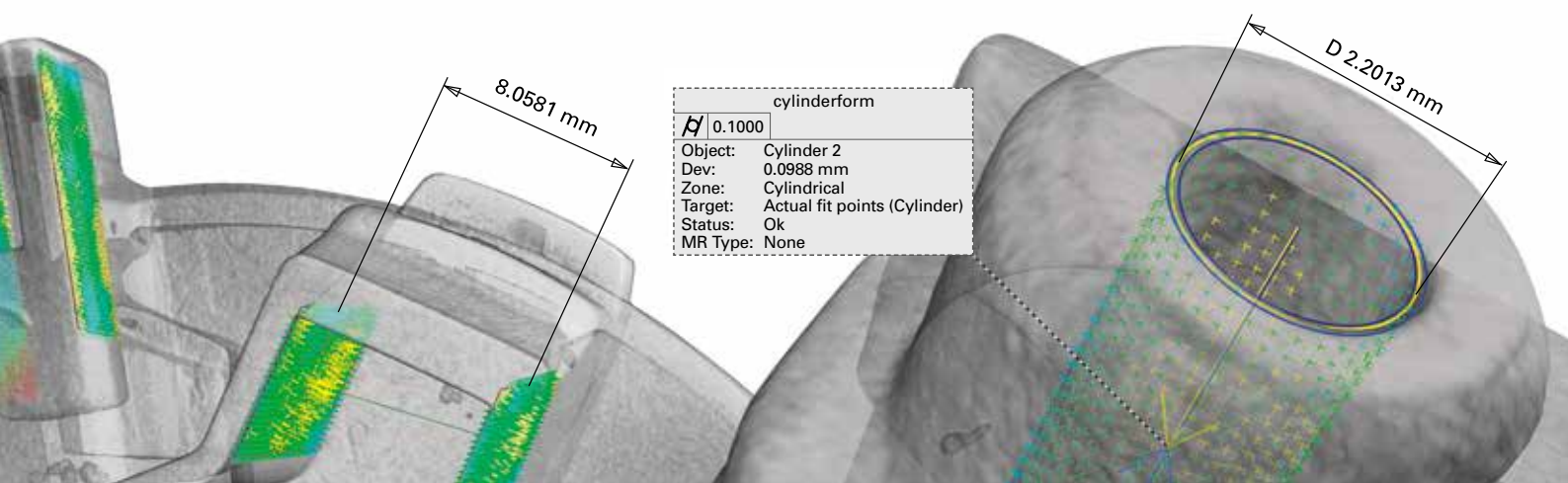
*YXLON FF35 CT Metrology
for accurate measurements of
inner structures*

Ruby Gauge

- Execution of five different SD measurements in seven directions following VDI/VDE 2630 – sheet 1.3
- Automatic measuring process of the maximal SD deviation incl. test report
- Convenient access to the history of SD measurements for further analysis

Strengths of YXLON FF35 CT Metrology

- Non-destructive measurement of finest inner structures
- Capture of nearly unlimited measuring points in one CT scan decoupled from the measurement evaluation
- Considerable time savings due to seamless defect analysis and nominal-actual comparison
- Reduced correction loops and correction costs for product samplings
- Conformity with standard VDI/ VDE 2630



CHECK OUT THESE FACTS

YXLON FF35 CT

Tube	Y.FXT 225.48 reflection tube	Detector (recommended)	YXLON Panel 4343 CT ⁴⁾
Maximum energy	225 kV	Active area	432 mm x 432 mm
Maximum power	320 W	Pixel pitch	150 µm
Detail visibility	≥ 4 µm ¹⁾	Pixel matrix	2,880 x 2,880
TXI	yes ²⁾	Frame rate	up to 15 Hz
Tube (optional / retrofittable)	Y.FXT 190.61 transmission tube	Detector (alternative)	YXLON Panel 2530 ⁴⁾
Maximum energy	190 kV	Active area	249 mm x 302 mm
Maximum power	80 W	Pixel pitch	139 µm
Detail visibility	up to 150 nm ³⁾	Pixel matrix	1,792 x 2,176
TXI	yes ²⁾	Frame rate	up to 30 Hz

1) With JIMA IQI RT RC-02B.

2) TXI = True X-Ray intensity – controls real output dose for constant intensity.

3) With YXLON IQI for 2D at minimum focal spot size and HRP Target.

4) Qualified acc. ASTM E-2597. Specification for more detectors on request.

Manipulator/Inspection Part

FDD (Focus Detector Distance) ⁵⁾	~ 520 mm – 1170 mm
FOD (Focus Object Distance) ⁵⁾	~ 0 – 930 mm
Tilting axis (optional)	+/- 30°
Tube pivot axis	motorized
Loading door	motorized
Maximum part weight ⁶⁾	27 kg
Maximum part size ⁷⁾	~ 530 mm Ø x 800 mm height

5) Values are average. Exact values are dependent on tube and detector configuration.

6) Inspection item placed centrally on turntable, no tilting axis. More values on request.

7) Max. size which can be set by manual collision protection envelope.

CT - Trajectories and Scan Fields

Circular scan trajectories	continuous rotation "QuickScan" start/stop scan "QualityScan"
Helical scan trajectories	standard "HeliExtend" dual "HeliExtend Dual"
Scan extension	1.8 times horizontal extension, vertical extension, combination
Further trajectories	virtual rotation axis "FlexCenter"
CT field of view, std. circular scan ⁸⁾	~ 325 mm Ø x 270 mm height
CT field of view, hor. extended ⁸⁾	~ 510 mm Ø x 190 mm height
CT field of view, maximum ^{8,9)}	~ 510 mm Ø x 600 mm height

8) Values valid for detector YXLON Panel 4343, collision protected, optimized for diameter.

9) Standard cone beam scan with horizontal and vertical field-of-view extension.

Cabinet/System

Width	~ 2,960 mm
Height (w/o levelling wedges)	~ 2,120 mm
Depth	~ 1,590 mm
Weight	~ 6,800 kg – ~ 6,900 kg (single tube – dual tube)
Manipulator design	Granite-base, vibration isolation with active level control, all axes equipped with Heidenhain length and angle encoders

Operator Desk

Width	~ 1,800 mm
Height	~ 700 mm – ~ 1,200 mm, motorized
Depth	~ 800 mm
Weight	~ 175 kg
Monitor	2 pcs, capacitive touchscreen, 1920 x 1080 pixel, 21", as well as separate reconstruction and evaluation station with 27" or 30" monitor

YXLON FF35 CT Metrology

Conditions	Measuring accuracy
Features, Options	MPE _{SD} ¹⁰⁾ 8,0 µm + L/75 [L=mm]
Air conditioning inside cabinet	yes, temperature range referring to VDI 2627 measuring room quality class 3
Systems ambient conditions	Measuring room quality class 4

10) Referring to VDI/VDE 2630 part 1.3. Measured as deviation of sphere distance in tomographic static mode (TS) with std. circular scan. More details on request. Values valid only for YXLON FF35 CT Metrology under compliance with conditions described beside.

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