

# YXLON FF20 CT HIGH-RESOLUTION COMPUTED TOMOGRAPHY (CT) INSPECTION SYSTEM FOR FINE PARTS



YXLON

# EXPERIENCE A STRUCTURED CT INSPECTION WORKFLOW



*3D volume of a BGA*

**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.

[www.yxlon.com](http://www.yxlon.com)



**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

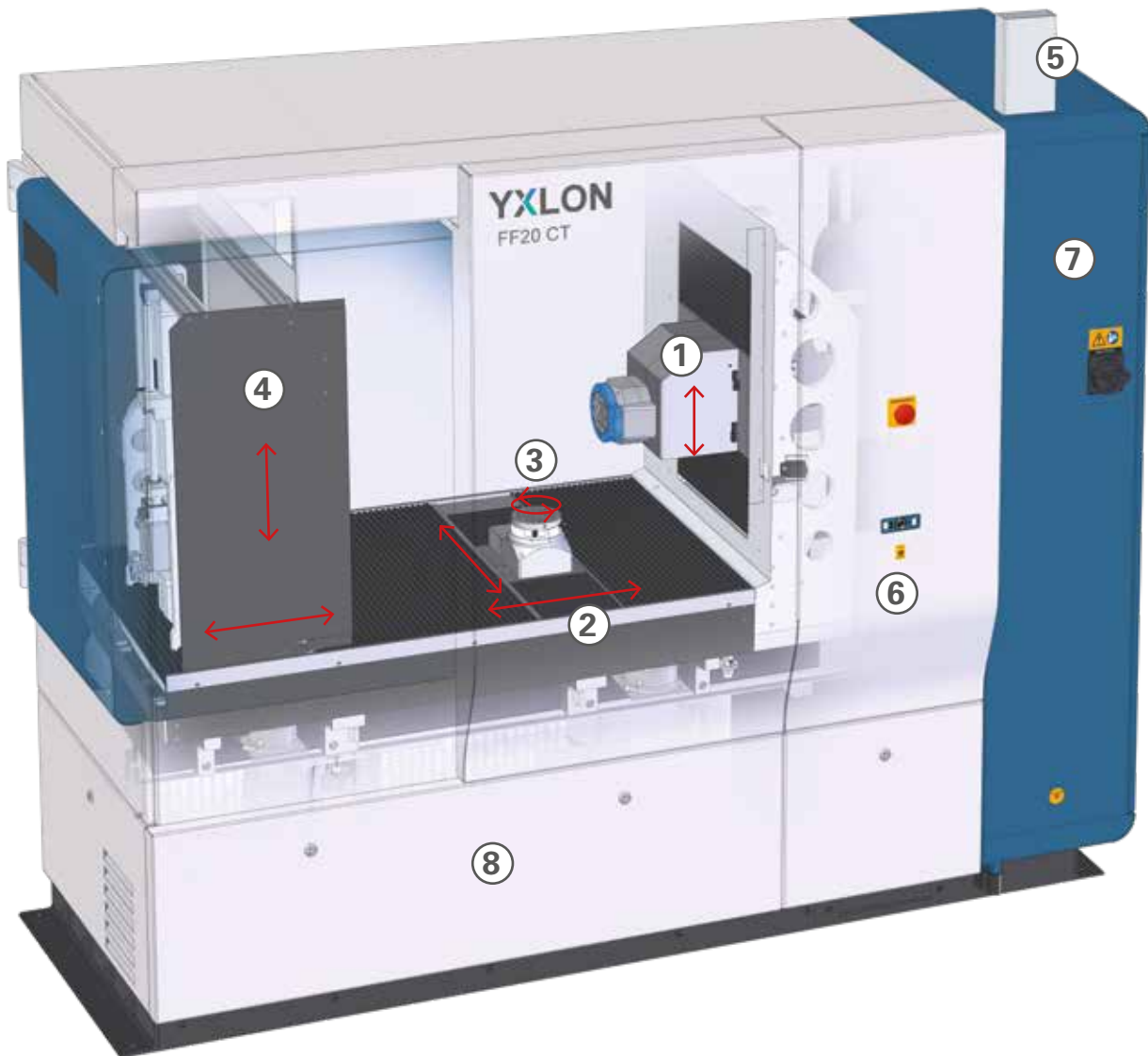


**The extremely compact high-resolution systems YXLON FF20 CT and FF20 CT Metrology are designed for fine to very fine parts like**

- Electronic components incl. SMD
- Semiconductor packages
- Products made from new materials or new manufacturing methods, e.g. additively manufactured components, fiber-reinforced plastics
- Microsystems (MEMS, MOEMS)
- Medical objects, e.g. cannulas

With comparatively high energy of 190 keV, even larger or denser parts can be inspected to the finest detail.

# 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 FF20 CT / FF20 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 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

### 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

### 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

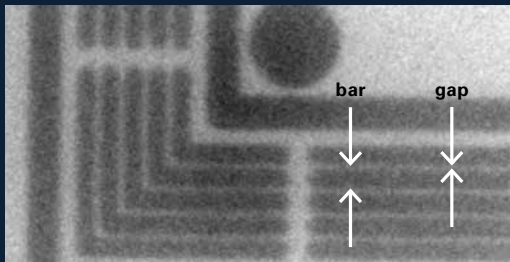
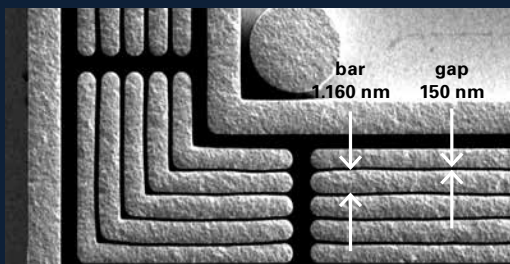
- Outstanding accessibility for service
- Integrated high-power generator for fast installation and smallest footprint

### 8. Vacuum and tube cooling components

- Easy service access
- Vibration isolation from the manipulator

### Software platform Geminy

The novel software platform Geminy is the heart of the computed tomography system YXLON FF20 CT. Its great number of various trajectories provides enormous flexibility regarding part sizes and inspection tasks. Details on Geminy 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



YXLON 190 kV nanofocus transmission tube

# FF20 CT METROLOGY

The FF20 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



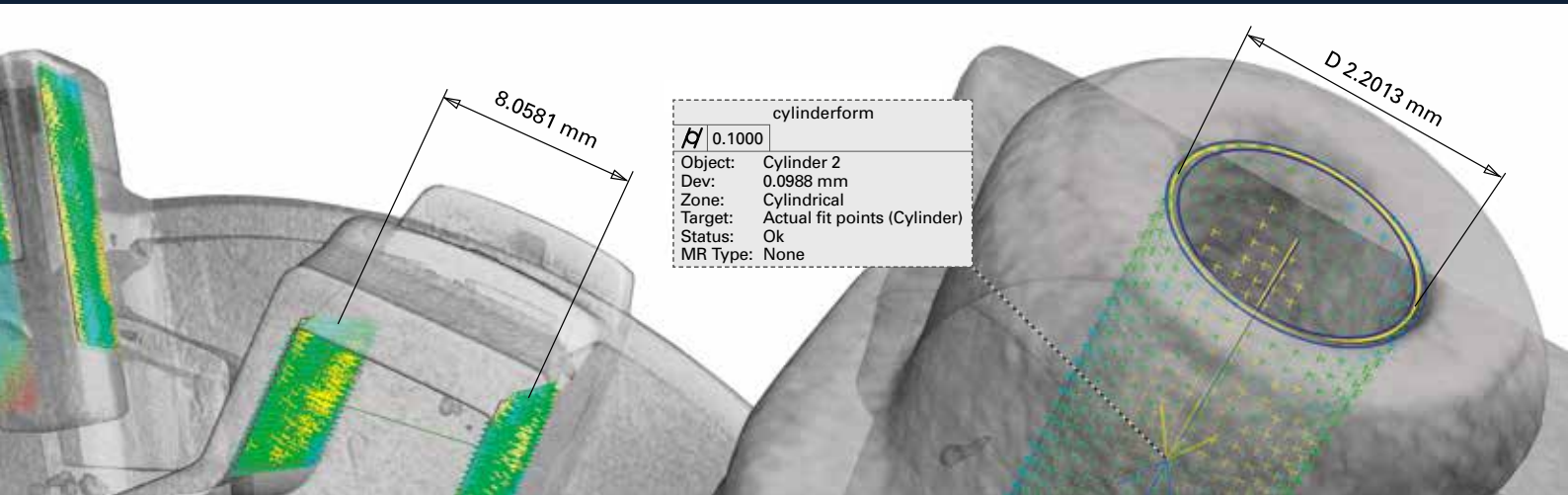
*YXLON FF20 CT Metrology  
for accurate measurements of  
inner structures*

## 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 FF20 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 FF20 CT

Tube	Y.FXT 190.61 transmission tube
Maximum energy	190 kV
Maximum power	80 W
Detail visibility	≥ 150 nm <sup>1)</sup>
TXI	yes <sup>2)</sup>
Water cooling (Target and coils)	yes

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

2) TXI = True X-ray Intensity – regulation of output dose for constant intensity

Manipulation/Inspection Part	
FDD (Focus Detector Distance) <sup>4)</sup>	~ 190 mm – 790 mm
FOD (Focus Object Distance) <sup>4)</sup>	~ 0 – 575 mm
Loading door	motorized
Maximum part weight <sup>5)</sup>	17 kg
Maximum part size <sup>6)</sup>	~ 280 mm Ø x 700 mm height

4) Values are average. Exact values depend on detector configuration.

5) Inspection item placed centrally on turntable, otherwise 5 kg.

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

Cabinet/System	
Width	~ 2,380 mm
Height (w/o levelling wedges)	~ 2,180 mm
Depth	~ 945 mm
Weight	~ 3,400 kg
Manipulator design	granite-base, vibration isolation with active level control, all axes equipped with Heidenhain length and angle encoders

Detector (recommended)	YXLON Panel 4343 CT <sup>3)</sup>
Active area	432 mm x 432 mm
Pixel pitch	150 µm
Pixel matrix	2,880 x 2,880
Frame rate	up to 15 Hz

Detector (alternative)	YXLON Panel 2530 <sup>3)</sup>
Active area	249 mm x 302 mm
Pixel pitch	139 µm
Pixel matrix	1,792 x 2,176
Frame rate	up to 30 Hz

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

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 of above
Further trajectories	virtual rotation axis „FlexCenter“
CT field of view, std. circular scan <sup>7)</sup>	~ 280 mm Ø x 220 mm height
CT field of view, maximum <sup>7,8)</sup>	~ 280 mm Ø x 430 mm height

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

8) Standard cone beam scan with vertical field-of-view extension

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 30" monitor

## YXLON FF20 CT Metrology

Conditions	
Features, Options	see above, but without virtual rotation axis "FlexCenter"
Air conditioning inside cabinet	yes, temperature range referring to VDI 2627 measuring room quality class 3
Systems ambient conditions	Measuring room quality class 4

Measuring accuracy	
MPE <sub>SD</sub> <sup>9)</sup>	3.9 µm + L/75 [L=mm]

9) 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 FF20 CT Metrology under compliance with conditions described beside.

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