

Y.Multplex

Modular inspection system for universal material testing



To ensure constant product quality, it is imperative that unequivocal information is rapidly gained about the inner structure of products and materials, and that distinct quality attributes are defined. As the leading supplier of industrial X-ray inspection systems for non-destructive material testing, YXLON International offers an innovative solution to support you in achieving this task: Y.Multplex, its new product line of universal inspection systems.

Y.Multplex systems can be deployed equally well for spot-check sampling and inline testing, and offer the customary high-grade YXLON inspection quality for materials as diverse as steel, aluminum, ceramics, plastics or rubber.

YXLON. The reason why.

- rapid and unequivocal inspection results
- easy to use, safe operation
- flexibly deployable
- expandable on a modular basis
- small footprint due to compact structural design

Y.Multplex inspection systems

Alongside the most recent trends occurring in technology, the experiences accumulated and the feedback obtained worldwide from over 400 universal X-ray inspection systems sold were taken into consideration in developing the Y.Multplex line.



The result is a range of technologically and qualitatively high-grade X-ray inspection systems that adapt themselves flexibly to customers' needs. Intelligent manipulation concepts, state-of-the-art system technology, as well as high-performance X-ray image processing, and an ergonomically simplified operation concept that substantially alleviates the burden on inspection personnel and places the inspection task itself in the foreground, all contribute toward enabling reliable inspection decisions.

Parts to be inspected

Y.Multplex systems are designed for the X-ray inspection of different parts composed of the widest variety of materials. Details concerning the inspection envelope to be attained can be viewed from the focal spot. Depending on the choice of X-ray detector, the effective inspection envelope can turn out to be appropriately larger:

Y.Multplex 3000 S			
Inspection envelope size (Ø x Height)	300 mm x 450 mm		
Max. weight	15 kg		
Y.Multplex 5500 M			
Inspection envelope size (Ø x Height)	600 mm x 900 mm		
Max. weight	60 kg		
Y.Multplex 5500 XL			
Inspection envelope size (Ø x Height)	900 mm x 1.5 m		
Max. weight	60 kg		
Y.Multplex 5500 XXL			
According to actual application the inspection envelope size can vary			
Typical size (Ø x Height)	1.2 m x 1.8 m		
Typical max. weight	200 kg		

The X-ray systems can be designed for different maximum X-ray voltage outputs. The following typical materials can be inspected using the corresponding X-ray voltage output:

X-ray voltage output	160 kV	225 kV	320 kV
Typical wall thickness, Al.	140 mm	180 mm	
Typical wall thickness, Fe.	34 mm	40 mm	55 mm

Inspection workflow

Y.Multplex systems have been conceived for spot-check sampling and small-series inline inspections. The parts to be inspected are affixed to the parts turntable by an operator before the actual inspection begins. After closing the product door, the inspector can safely test all of the positions necessary for the part to be inspected with the help of the highly dynamic, 5-axis manipulator system. The X-ray image is depicted thereby in real time on a monitor on the operating console. The manipulator's high dynamics and ergonomic operation provide for short inspection times and reliable operation.

Radiation-shielded cabinet

YXLON inspection systems comply with the specifications required by the German "Röntgenverordnung" ('X-Ray Emission Regulation') for a fully shielded X-ray-emitting device.

For service and maintenance work, all components within the cabinet can be reached conveniently through the spacious product-loading opening. An ergonomically arranged leaded-glass window for observing the inspection process is located on the front of the radiation cabinet. Both the radiation-shielded cabinet and switch controls stand on a basic frame with integrated inserts for lifting via forklift. This space-saving construction design minimizes the floor space required and reduces transport and start-up times significantly.

Relative to the maximum size of the parts to be inspected, the dimensions of the radiation-shielded cabinet vary accordingly in 4 sizes:

Y.Multplex 3000 S	2.5 x 2.3 x 1.6 m ³ (WxHxD)
Y.Multplex 5500 M	2.6 x 2.6 x 1.9 m ³ (WxHxD)
Y.Multplex 5500 XL	3.2 x 3.0 x 2.5 m ³ (WxHxD)
Y.Multplex 5500 XXL	2.8 x 3.2 x 3.0 m ³ (WxHxD)

The floor space required for the entire system lies between 8 and 12 m², and is equivalent to the following dimensions:

Y.Multplex 3000 S	5.0 x 2.7 m ² (WxD)
Y.Multplex 5500 M	5.2 x 3.5 m ² (WxD)
Y.Multplex 5500 XL	5.5 x 3.8 m ² (WxD)
Y.Multplex 5500 XXL	6.5 x 4.1 m ² (WxD)

Manipulator systems

Depending on the size of the inspection envelope, Y.Multplex manipulators differ into 2 categories.

■ U-arm Manipulator

The Y.Multplex systems S, M and XL are equipped with a high-quality, multi-axis manipulator system in which the X-ray source and X-ray detector are securely mounted on a U-arm.

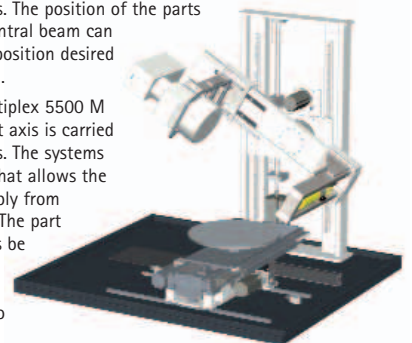
In the case of all three system variations, a spindle drive motorizes the U-arm and enables it to travel vertically up and down.

Rotation within the X-ray beam as well as movement parallel and perpendicular to the central beam is effected by a traveling parts turntable.

YXLON was the first to standardize this manipulation concept of decoupled axes for the industry. In practice, that concept has proven itself over and over again. The central beam travels vertically along the part to be inspected. As a result of this decoupling, the height of the area necessarily shielded against radiation is substantially reduced.

In the Y.Multplex 3000 S model, the movements of the hub axis, rotation and the horizontal movement of the parts holder are carried out on a motorized basis. The position of the parts holder parallel to the central beam can be set manually to any position desired prior to X-ray inspection.

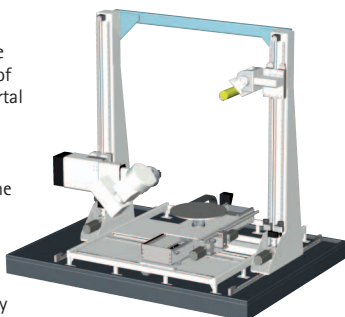
In the case of the Y.Multplex 5500 M and XL, this enlargement axis is carried out on a motorized basis. The systems have a central tilt axis that allows the U-arm to be tilted variably from -45° to +45° via motor. The part to be inspected can thus be tested with the greatest flexibility and at various angles without having to respan the part.





Portal Manipulator

Y.Multiplex XXL systems are equipped with a new type of portal manipulator. This portal manipulator distinguishes itself by having the X-ray source and X-ray detector respectively mounted on one column. These components can travel in terms of the height and depth of the radiation cabinet.



Similar to the case posed by smaller cabinet systems, besides the height saved construction-design space is additionally saved in terms of depth. A minimized need for floor space is the result. Also the case with these systems is that the part to be inspected can travel on a turntable during enlargement, in other words parallel to the central beam. An intelligent control unit makes sure that the X-ray tube's central beam is always targeted perpendicular to the midpoint of the detector, even in a tilted inspection position. In the case of various inspection angles, adaptation of the distance between focal point and detector (FDD) is effected by 2 additional motorized axes on the portal.

Overview:

Y.Multiplex System	S	M	XL	XXL
Vertical axis				
- Travel (mm)	450	900	1500	1800
- Speed	6 m/min	25 m/min	25 m/min	25 m/min
Tilt axis				
- Angle	-	± 45 °	± 45 °	± 45 °
- Speed	-	50 °/s	50 °/s	50 °/s
Rotation				
- Angle	nx 360 °	nx 360 °	nx 360 °	nx 360 °
- Speed	8 U/min	20 U/min	20 U/min	20 U/min
Enlargement				
- Travel (mm)	350	600	600	600
- Speed	-	25 m/min	25 m/min	25 m/min
Horizontal movement				
- Travel (mm)	300	600	900	1200
- Speed	6 m/min	25 m/min	25 m/min	25 m/min
FDD (Focal point/Detector Distance)				
- Travel (mm)	700	650-950	950-1250	1150-1450
- Speed	fixed	manual	12 m/min	12 m/min

Constant potential X-ray system MG165

All Y.Multiplex units are equipped with YXLON's highly stable constant potential X-ray systems: This modern, 40-kHz technology is marked by extremely short change-over times between different kV settings, and provides for the best results during image generation. Depending on the application involved, metal-ceramic tube heads with tube voltages ranging from 6-320 kV and tube power of up to 1000 W are utilized in the Y.Multiplex systems. YXLON's X-ray tubes, typically equipped with a dual focal point of 0.4 mm / 0.4 mm in compliance with IEC 336, provide for a high degree of detail identifiability in the X-ray image.

Imaging system

YXLON continuously conceives, develops and improves all components for the generation, analysis and depiction of X-ray images.

Whether image-enhancing and analysis systems or monitors and detectors, the components utilized in YXLON X-ray inspection systems are specially optimized for the respective application. A brilliant X-ray image is the basis for a reliable and precise inspection decision. The nature and quality of the X-ray image chain, including the X-ray detector, also have a defining role in terms of the speed of full-scale testing.

YXLON deploys an industrial-grade X-ray image intensifier with a digital camera on a standard basis in order to generate high-contrast and high-resolution X-ray images in real time.

The detector is equipped with a 9" input window and has a CCD camera specially attuned to the demands posed by industrial material testing. The camera's output signal is presented to the viewer on a high-resolution monitor.

Other X-ray detectors such as a 12" image intensifier or digital flat-screen detectors can also be integrated when desired. In addition, all Y.Multiplex systems can be

upgraded to include YXLON's Y.IMAGE 2500i, Y.IMAGE 2500i-R, Y.IMAGE 3500 or Y.IMAGE 4500 image-enhancement systems. These image-processing programs offer the inspector a wide variety of options for digital image enhancement, analysis and archiving.



Operating console

Operation of the X-ray inspection system is performed from a centralized, separately located control console. The operating console for Y.Multiplex systems forms the interface between the inspector and the X-ray inspection system. During the development phase, a particularly great emphasis was placed on the ergonomic array of the input and output units in these manual inspection systems.

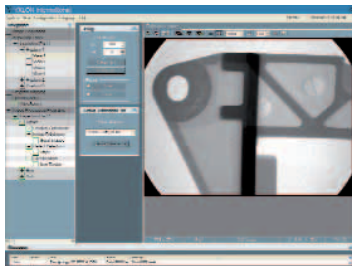
All the necessary steps for system operation and maintenance are supported graphically via control elements at the operating console or via a monitor. Reliable operation of the system is thus simple and intuitive.



Operation

The X-ray testing of parts to be inspected is becoming even simpler and more efficient through a new, centralized interface. Intuitive operator guidance and graphic operator support make the X-ray inspection reliable and supply precise, unequivocal inspection results. While the operator of the Y.Multiplex 3000 S sets all inspection positions manually via appropriate control elements such as joysticks and illuminated buttons, the inspector operating a Multiplex M, XL or XXL is supported by graphic operator guidance and an NC mode. Different system status conditions, notifications and malfunction reports are displayed on a color monitor thereby. This NC control enables the simple, and thus user-friendly, programming of various inspection workflows. Similar to Windows®, the user interface is designed in such a way that even unexperienced operators master the system after a short time.

Passwords safeguard the individual operating modes for NC control against unauthorized use. When installing system users, access rights can be freely assigned or modified.



Operating mode Y.Multiplex 3000 S

Manual Operation

- Manual control of all system parameters such as inspection positions and X-ray parameters correspondent to inspection specifications
- Visual inspection

Maintenance/Service Operation

- Graphically assisted parameterization and extensive function control of individual component groups such as drive mechanisms, feeds, switches and lamps

Operating modes Y.Multiplex 5500 M, XL, XXL

Manual Operation

- Manual control of all system parameters such as inspection positions and X-ray parameters correspondent to inspection specifications
- X-ray parameters correspondent to inspection specifications.
- Visual inspection

Setup Operation

- Installation & storage of system parameters such as inspection positions and X-ray parameters dependent on the part to be inspected

Semi-automated Operation

- Automated setting of all system parameters such as inspection positions and X-ray parameters dependent on the part to be inspected. The inspector then submits an inspection decision for each inspection position on the basis of the X-ray image generated

Maintenance/Service Operation

- Graphically assisted parameterization and extensive function control of individual component groups such as drive mechanisms, feeds, switches and lamps

Y.Multiplex power supply

3 x 240 V / 400 V +10 %, -15 %

(3 phases, neutral conductor, ground), 50/60 Hz, 35 A

Power input approx 5 kW

Water cooling for X-ray tube: min. flow 4 m³/h

Y.Multiplex options

- Digital image analysis and enhancement programs Y.IMAGE 2500i, Y.IMAGE 3500 or Y.IMAGE 4500
- Reference-image system, including Y.IMAGE 2500i-R
- Remote-controlled maintenance
- 12" image intensifier instead of 9" image intensifier
- Marking facility, various models available
- Motorized shunt-out of parts turntable for external loading of parts to be inspected
- Roller support pod for tire and wheel testing
- Maintenance contract

The type and outfitting of operating consoles can vary greatly as a result of the wide variety of options. YXLON offers consoles with seating, standing consoles and operating consoles with one to three integrated monitors for its universal inspection systems.

Let us know your specifications and wishes.

We'll find the solution for you.

Regulatory compliance

The products of YXLON International X-Ray GmbH are manufactured in accordance with strict safety and quality standards, and are inspected in compliance with the following norms:

- UUV
- DIN 54113 (German industrial standard)
- EURATOM 96/29
- IEC 529 types of protection
- German X-ray Emission Regulation from 2002
- DIN VDE 0100 and DIN EN 60204
- CE conformity
- 21 CFR Section 1020.40 (on request)
- 47 CFR Section 15 (FCC)

The quality-assurance system of YXLON International X-Ray GmbH is certified pursuant to ISO 9001.