

Y.MU 2000

Precise inspection results for sampling and 100% inspection



To ensure uniform product quality, it is mandatory to rapidly and consistently acquire information about the inner structures of products and materials and to define distinct quality attributes.

YXLON International, the leading provider of industrial X-ray inspection systems for non-destructive material testing, offers the MU 2000 as a market-proven solution to assist you with this task.

The MU 2000 is equally suited for sampling and 100% inspection. It offers high inspection quality for materials as diverse as steel, aluminum, ceramic, composite materials or rubber.

YXLON. The reason why.

- consistent, precise inspection results
- low inspection cost per part
- prompt equipment availability
- easy to upgrade through modular design

The MU 2000 is based on the concept of de-coupled manipulation: X-ray source and detector move independently from the part manipulator. This concept was originally developed for the world NDT market by YXLON International and sold many times since. It maximizes the inspection envelope in a given X-ray shielded area and minimizes the necessary footprint.

Excellent image quality allows the operator to quickly and efficiently identify fine details and contrasts. High throughput is the result. The ergonomic design and simple, intuitive operation of the entire system also contributes to a reduced inspection time.



*MU 2000
160 kV PCNC version
with 600 mm turntable*

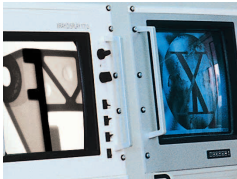
- **Consistent, precise inspection results**
 - high image quality
 - simple, intuitive operation
- **Low inspection cost per part**
 - high throughput, low testing time
 - simple, fast handling
 - small footprint
- **Prompt equipment availability**
 - easy transport and fast start-up
 - immediate use
 - worldwide, qualified service
 - tough, low maintenance mechanics
- **Easy to upgrade through modular design**



Simple, intuitive operation

All necessary controls are centrally located at the ergonomically designed control console. Several μ -controllers supervise X-ray, positioning, velocity and acceleration para-

meters. System conditions are clearly indicated using LCD and other displays.



Superior image quality

With a focus on image quality and using its wealth of applications experience, YXLON International develops and constantly optimizes its high quality X-ray and imaging

equipment. High image quality is the basis for fast, precise inspection results.



Constant potential radioscopic X-ray systems

YXLON's constant potential X-ray systems are the new generation of X-ray systems that employ the latest 40 kHz technology. This new technology offers very high system output stability, precise energy selection and extremely

fast reaction time to changes in energy demands.



High image quality and long life

YXLON International's industrial grade image intensifier systems are designed specifically for the high demands of the non-

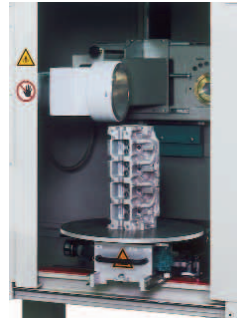
destructive testing environment. They are used universally in a vast number of different applications even above 350 kV.



Easy transport and fast start-up

For easy handling during transportation, the supporting legs of the lead cabinet can be removed. Plugs on the connection lines

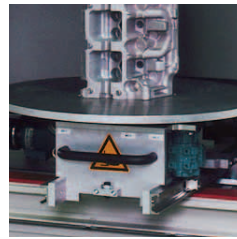
between the lead cabinet and control console eliminate any wiring problems and speed the initial start-up of the system.



Flexible inspection views, decoupled manipulation

The system provides all necessary degrees of freedom to adequately inspect a part. The concept of decoupled movements of detector / X-ray tube and the part is a unique characteristic of this system. The part is simply placed on a flat turntable which rotates and moves the part in two directions.

X-ray source and detector are mounted on a C-arm which tilts and moves up and down. This ensures safe, versatile inspection of large, heavy parts as well as small parts without the need for complex part fixtures.



Optimized manipulator concept

Tough, low maintenance mechanics as well as a high number of non-variable parts used for the 6-axis manipulator ensure high flexibility and high uptime. Elimination of fault prone components like limit switches characterizes the

simple, though efficient manipulation concept. Speed and acceleration of individual axes are defined and optimized according to the travel distance available. Manual as well as PCNC supported X-ray inspections are done in the most efficient manner in the shortest possible time without complex part fixtures.



Short inspection time

The large product door of the lead shielded cabinet supports a short part changeover time. The bi-parting doors save space and provide fast, safe loading and unloading. Positioning of the part and C-arm manipulators

within the cabinet can be conveniently monitored through the integrated lead glass window.



Efficient X-ray inspection

Small floor space requirements and short part transport distances make possible a quick, efficient inspection. X-ray components like the X-ray generator and power supply are placed under the compact, lead

shielded cabinet. The combination of operator panel and control enclosure, optimized manipulator concept as well as the bi-parting product doors keeps the floor space requirements to approx. 7m² total.

Technical Data

	MU 2000 Standard			MU 2000 XL		MU 2000 XXL
	160 kV	225 kV	320 kV	160 kV	225 kV	160 kV
Inspection envelope (diameter x height, measured for the center of the beam)	600 mm x 900 mm			800 mm x 1500 mm		1000 mm x 1800 mm
Part weight	60 kg			60 kg		60 kg
Radiation cabinet						
Width x height x depth (incl. legs)	2200 x 2700 x 1800 mm	2300 x 2750 x 1850 mm	2400 x 2750 x 1950 mm	2650 x 3300 x 2050 mm	2700 x 3350 x 2100 mm	2700 x 3750 x 2800 mm
Weight	4 t	6,5 t	10 t	6 t	10 t	7,5 t
Control cabinet						
Max. floor space	1500 x 1100 mm			1500 x 1100 mm		1500 x 1100 mm
Supply	1 x 230V, 50/60 Hz			1 x 230V, 50/60 Hz		1 x 230V, 50/60 Hz
Consumption	max. 5 kW			max. 5 kW		max. 5 kW
Weight	250 kg			250 kg		250 kg
Product door						
Width x height	760 x 1150 mm			1100 x 1700 mm		1100 x 2300 mm
Open, close (motorized)	≤ 2 s	≤ 3 s	≤ 4 s	≤ 2 s	≤ 3 s	≤ 4 s
Travel						
Magnification	640 mm			850 mm		850 mm
- Max. speed	15 m/min			15 m/min		15 m/min
Transverse axis	650 mm			900 mm		1100 mm
- Max. speed	15 m/min			15 m/min		15 m/min
Turntable	n x 360°			n x 360°		n x 360°
- Diameter	400 mm			400 mm		400 mm
- Max. speed	8 U/min			8 U/min		8 U/min
Scan axis	900 mm			1450 mm		1850 mm
- Max. speed	15 m/min			15 m/min		915 m/min
Tilt	± 30°			± 30°		± 30°
- (vertical limits of scan axis)	(380 mm - 840 mm above turntable)			(450 mm - 1400 mm above turntable)		(500 mm - 1700 mm above turntable)
- Max. speed	7°/sec			7°/sec		7°/sec
FFD (variable)	650-950 mm			900-1200 mm		1000-1300 mm
X-ray tube (see also separate datasheet)	MG 165	MG 226	MG 325	MG 165	MG 226	MG 165
X-ray-tube	Y.TU/160-D04	Y.TU/225-D03	Y.TU/320-D01	Y.TU/160-D04	Y.TU/225-D03	Y.TU/160-D04
Focal spot according EN12543	1.0 mm / 1.0 mm	1.0 mm / 3.0 mm	1.9 mm / 3.6 mm	1.0 mm / 1.0 mm	1.0 mm / 3.0 mm	1.0 mm / 1.0 mm
Focal spot according IEC336	0.4 / 0.4	0.4 / 1.5	0.8 / 1.8	0.4 / 0.4	0.4 / 1.5	0.4 / 0.4
Power	640 W	640 W / 1.6 kW	640 W / 1.6 kW	640 W	640 W / 1.6 kW	640 W
Cooler	water flow monitor	water flow monitor	OL4502	water flow monitor		water flow monitor
Image system (see also separate datasheet)	Y.XRS 232			Y.XRS 232		Y.XRS 232
Input window (switchable)	9" (7", 5")			9" (7", 5")		9" (7", 5")
Video monitor (switchable)	Display.1712 (17" & 12")			Display.1712 (17" & 12")		Display.1712 (17" & 12")
Options						
External manipulator travel	0	0	0	0	0	0
X-ray tube	Y.TU/160-D01 bis D06	Y.TU/225-D01 bis D03	Y.TU320-D01 bis D03	Y.TU/160-D01 bis D05	Y.TU/225-D01 bis D03	Y.TU/160-D01 bis D05
WL3002 water cooler	0	0	X	0	0	0
Digital flat panel	0	0	0	0	0	0
X-ray diaphragm	0	0	0	0	0	0
Image intensifier diaphragm	0	0	0	0	0	0
VS 10 image enhancement module	0	0	0	0	0	0
Three jaw chuck	0	0	0	0	0	0
PXM2500 PCNC control	0	0	0	0	0	0
IMAGE.2500i image enhancement system	0	0	0	0	0	0
IMAGE.2500i-R image reference system	0	0	0	0	0	0
IMAGE.3500DD image analysis system	0	0	0	0	0	0
ADR Automatic Defect Recognition	0	0	0	0	0	0
Video printer	0	0	0	0	0	0
Heavy part weight manipulator	200 kg	200 kg	200 kg	200 kg	200 kg	200 kg
Large diameter turntable	600 mm	600 mm	600 mm	600 mm	600 mm	600 mm
Safety carpet	0	0	0	0	0	0
Special manipulator for wheel or tire-on-wheel inspection	0	0	0	0	0	0

0 = optional; X = not available. Other options on request.

(certain options may influence the performance parameter; e.g., available inspection envelope or part weight.)

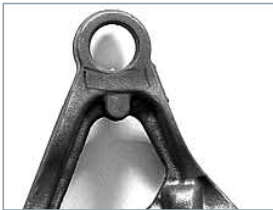
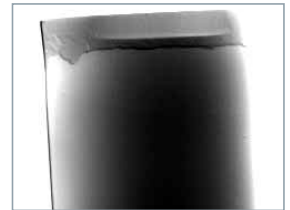
Typical applications



Oil pump housing: 50kV; 7 mA



Turbine blade: 60kV; 0,5 mA



Lower control arm: 160kV; 6,1 mA



Injection pump housing: 225kV; 3 mA



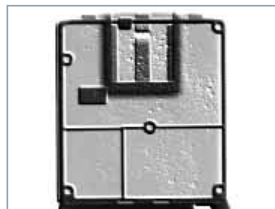
Al bracket: 30kV; 6 mA



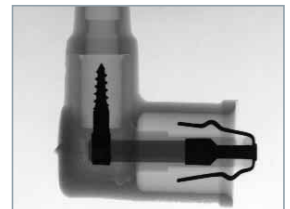
Iron: 60kV; 8 mA



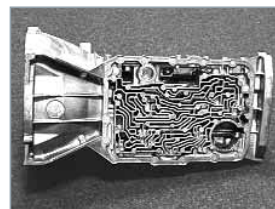
Al housing: 80kV; 0,5 mA



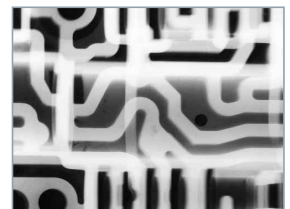
Spark plug connector: 60kV; 0,5 mA



Fe hinge: 225kV; 3 mA



Al slideplate: 60kV; 0,5 mA





Options

■ Automated, recurring inspection sequences for a distinct inspection result

Supported by the Windows™-based PCNC control, inspection tasks and sequences are automated quickly and reliably. This decreases inspection time even further. Settings for manipulator position and speed are as much a part of the stored recipe as the X-ray, detector and image enhancement settings. With the PCNC and in combination with one of YXLON's digital imaging systems, the operator is able to link pre-programmed image macros to a corresponding inspection view. As a result, the operator's inspection results are based on automated, consistent inspection parameters. For a better comparison with established standards and for a dependable, fast inspection, a reference image can be displayed automatically next to each inspection view. Inspection results and supporting information are saved within an Access™ database for further process analysis.

■ Ergonomic inspection of heavy and bulky parts

The part manipulator is motor driven and can be moved outside the lead cabinet to assist the operator especially while loading and unloading heavy or bulky parts. Outside the lead cabinet, parts can be handled much easier by using overhead cranes or forklift trucks.

■ TFT – High contrast display 1000 : 1

For non-destructive testing, the best possible X-ray image is essential. The DISPLAY/T-20 is ideal for presentation of black and white X-ray images. It features excellent sharpness and high luminance as well as high contrast. Due to the very high brightness level, the X-ray image on the display is clearly visible even in a brightly illuminated environment. Because the X-ray images are displayed absolutely flicker and distortion free, the DISPLAY/T-20 is best suited for measuring tasks.

■ High throughput with batch inspection

By using customized part fixtures, multiple parts can be inspected utilizing the available inspection envelope. As a result, handling time decreases, throughput increases and the cost per inspection is reduced.

Compliance

YXLON International products are manufactured according to strict safety and quality standards and in compliance with the following standards:

- UJV
- DIN 54113
- EURATOM 96/29
- IEC 529 Protection
- German Röntgenverordnung from 2003
- VDE-0100 and -0113
- CE-conformity
- 21 CFR § 1020.40 (on request)
- 47 CFR § 15 (FCC)

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