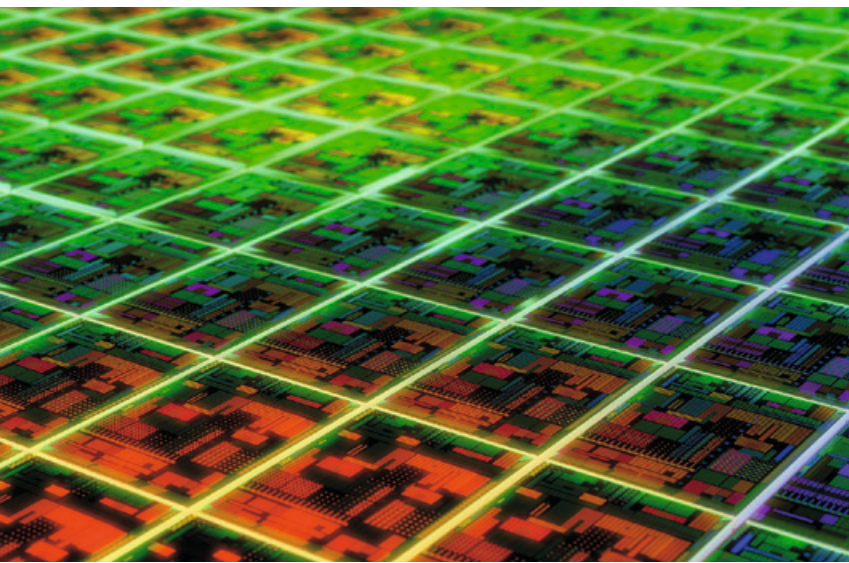


FISCHERSCOPE® X-RAY XDV®-μ SEMI

Excellence in EDXRF microstructure metrology





A winning team

The world's leading EDXRF instrument for non-destructive microstructure wafer metrology is now integrated with a fully automated handling unit. Ensuring perfect, consistent quality control, the XDV-μ SEMI is a key element to successful advanced-packaging production.

Thanks to its highly precise and reliable measurement results, the XDV-μ SEMI's typical tasks are found in :

- composition analysis of solder bumps and smaller, lead-free solder caps on copper pillars, e.g. SnAg
- layer thickness measurement of under-bump metallization (UBM), e.g. Ni/Cu/Ti/Wafer
- layer thickness measurement of landing pad, e.g. Au/(Pd/)Ni/Cu
- analysis of other advanced 2.5D/3D packaging solutions

Features

Reliable

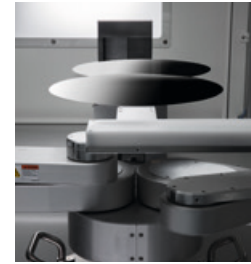
- Hands-free operation
- Fully automated measurement process
- Well-defined constant metrology conditions

Precise

- Industry-leading poly-capillary optics for micro-spot measurement
- Very high detector sensitivity and resolution
- Automatic recognition of measurement structures

User friendly

- Easy and intuitive system software
- Service and maintenance-friendly design
- Automated and manual measurements possible with the same instrument



1 Safe automation

A fully enclosed design of the system as well as careful handling of wafers through specially engineered robot and alignment stations allow and special warpage adjusting device for a worry-free operation of the fully automatic tool.





2 Customer-tailored versions

One or more load ports for SEMI standard transportation containers, E84 interfacing, RFID or barcode readers as well as many more optional features to choose from.

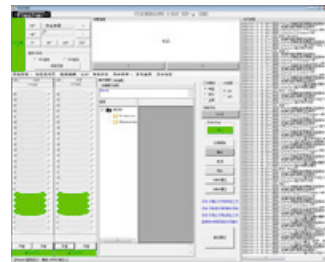
3 Finest test instruments, precision and high resolution

The X-RAY XDV-μ SEMI uses X-ray fluorescence radiation to measure and analyze materials precisely and non-destructively. Thanks to this powerful and flexible technology a wide variety of measurement tasks can be realized. Application specific configurations will offer tailor-made solutions around wafer metrology.



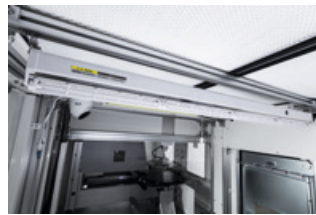
4 Smart details support usability and maintenance

Integrated CCTV supervision for handling compartment and measurement enclosure and the ergonomic design of the instrument are just a few details that make work with X-RAY XDV-μ SEMI comfortable and enjoyable. Service and maintenance are made simple and fast by large service hatches and easy access to individual components.



5 Easy handling

Separate terminals for handling control and X-RAY control.



6 Designed for clean environment

The fully encapsulated design of the metrology station ensures stable conditions. Air flow is controllable thanks to the optional filter fan units (FFU) and ionizing air blower.

Saving time, reducing cost, eliminating scrap



Hands-free Means Safe

The automated wafer handler eliminates the biggest source of errors and dangers in semiconductor-production quality control: direct human interaction with the wafer material. The wafer handler manipulates the silicon or glass wafers with special, steady care, preventing damage to the costly almost finished products.

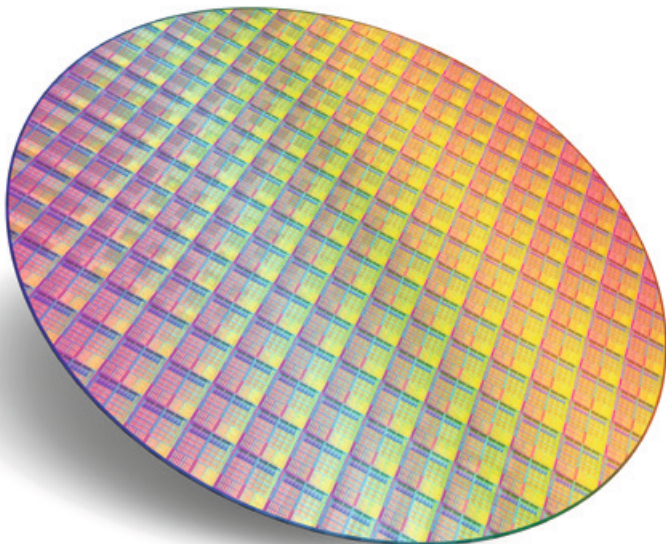
Increased Productivity

Available with one or more load ports to dock FOUPs and other SEMI standardized transportation pods, the wafer handling solution provides a long unsupervised operation time. Once the FOUP is placed on the load port, feeding, handling and metrology of the wafers are performed fully automatically. Your valuable employees are free to work on other tasks.

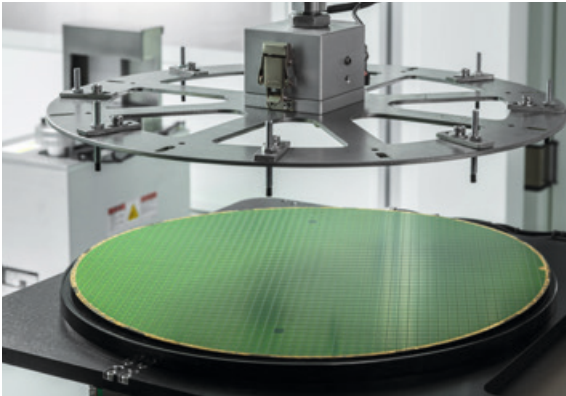


Lowest TCO in Microstructure Metrology

Smartly combining leading-edge technologies, both, in wafer handling and microstructure metrology, the new FISCHER metrology solution XRAY XDV- μ SEMI for advanced packaging and other semiconductor-manufacturing applications enables an entirely new dimension in cost-effective quality control on the factory floor. The combination of reliable, long-life components and intelligent design yields the lowest total cost-of-ownership (TCO) for fully-automated metrology tools in this field.



- Safe handling of wafers prevents damage and loss
- Repeatable test conditions
- Hands-free, independent measurements; no supervision needed
- Lowest total cost of ownership for finished wafer metrology



High-warpage compatible

For compatibility with high-warpage sample, X-RAY XDV- μ SEMI is equipped with special handler and warpage adjusting device to protect the sample during transportation and decrease the impact on measurement.

Automatic Docking and Loading

By default, the wafer handling system is equipped with state-of-the-art load ports. Multiple wafer sizes can be handled through adapters. If manual docking is no longer an option in a highly optimized production environments, you may switch to SEMI E84-compliant pod transfer. In any case, pods are simply placed on the docking table. The load port automatically performs all steps to safely dock the pod and open the front opening door.

A Clean System

All moving parts are installed below or far behind the wafer surface, thus ensuring a high-level particle-free environment. In order to further reduce any remaining particles, both, the handling work cell as well as the measurement enclosure may be equipped with Fan Filter Units (FFUs).

Proven Design

Both, the handling as well as the metrology part of the XDV- μ SEMI solution are well-proven designs that are smartly linked together and hence deliver trouble-free operation over a long period of time.

Perfect alignment

The wafers are handled by an advanced 4-axis servo-driven robot. No matter in which position the wafers are stored in the pod or cassette, the alignment station detects the wafer orientation and pre-arranges the wafers to measurement position. The pre-alignment is



done while a second wafer is in the X-RAY XDV- μ Wafer measurement unit, thus saving time by operating with two wafers simultaneously.

Pattern recognition

The X-RAY XDV- μ SEMI automatically locates the exact measurement position. The system software stores a wafer pattern during setup and searches for it during the measurement cycle. You can be sure that the wafers are reliably and precisely tested, always at the right positions.

Power and Sensitivity

Advanced Halo-free X-ray poly-capillary optics combined with a large-area silicon drift detector set the basis for highly precise and repeatable measurement results. The proprietary, industry-leading Halo-free poly-capillary optics concentrate the X-rays on an extremely small and well-defined measurement spot. Microstructures such as solder bumps can be measured precisely without interfering signals from the surrounding elements. The large silicon drift detector provides a high-resolution spectrum of the measurement signal.

- Automatic, safe and clean operation of Wafer pods
- No contamination of wafers
- Robust and proven design
- High-warpage compatible
- Parallel work stations save time through simultaneous alignment and measurement
- Automatic pattern recognition ensures reliable measurement positions
- Smallest measurement spots provide perfect microstructure metrology
- High-resolution test results by large and sensitive detectors

Overview

FISCHERSCOPE X-RAY XDV- μ SEMI		
Handling	Wafer feeding	One or more load ports, suitable for various SEMI-standard 200/300mm wafer pods. Adapters for smaller containers and cassettes are available on request
	Robot	Reliable 4-axis, servo-driven precision robot
	End effector	Standard vacuum end-effector; option: edge-grip end-effectors; end-effectors for warped and thin wafers
	Alignment	Alignment station with rotary and linear axis, holding wafers with vacuum
	Warpage adjusting device	Adjust the warpage of the sample to meet the precondition of the measurement
X-Ray Instrument	Model	FISCHERSCOPE X-RAY XDV- μ Wafer instrument
	General features	Outstanding accuracy, repeatability and long-term stability ensures reliable operation. Recalibration intervals can be considerably reduced. Fundamental parameter analysis, based on real physical models, allow precise measurements without calibration samples or prior knowledge of the sample composition
	X-Ray optics	Proprietary, industry-leading poly-capillary system
	Measurement spot size (fwhm @ Mo-K α)	$\varnothing = 20\mu\text{m}$, $20\mu\text{m}$ halo-free or $10\mu\text{m}$
	Detector System	Peltier cooled, large-area silicon drift detector (SDD)
	Sample Positioning	Automated wafer chuck with vacuum lift pins; holds wafers up to 12"/300mm diameter
	Sample alignment	High-precision XY stage with absolute accuracy in the μm range. Laser pointer for manual pre-alignment of measurement spot
System Software	Handling unit	FISCHER SEMI master software
	X-Ray instrument	WinFTM [®] operating software, integrated communication with FISCHER SEMI master software
	Interface	SECS/GEM interface to MES (Manufacturing Execution System)
Others	Status	Operating status of handling unit displayed by status lights
	Options	Wide range of initial and retrofitting optional features available

Tailor made to your needs

Features				
Wafer size	12"	or	8"	or Other
Number of Wafer Pods	1	or	n	
Wafer Pods and Special Adapters	300mm FOUNDRY OPEN POD (FOUP)	or	200mm Cassette	or 200mm Open Cassette Adapter (with cover)
Pod Loading	Automatic SEMI E84-compliant loading interface		or	Manual loading of pods
Pod Identification	RFID reader		or	Barcode reader
End effector	Regular vacuum end effector		or	Edge-grip end effector
Wafer flipping	No wafer flipping		or	Wafer-flipping station
CCTV Supervision	CCTV supervision for handling compartment		or	CCTV supervision for measurement enclosure
ESD Control	ESD control for handling compartment		or	ESD control for measurement enclosure
Clean room extension	FFU for handling compartment		or	FFU for measurement enclosure



FISCHER worldwide

Knowing what their customers need and want is a must for anyone trying to succeed in today's globalized markets. Because we at FISCHER think of ourselves as partners to our customers, we attach great importance to providing them excellent advice and working in close cooperation with them. This is why the Helmut Fischer Group maintains its worldwide presence through local subsidiaries and qualified distribution partners; there is always one near you.

Application Laboratories

Especially in a strongly demanding industry like the semiconductor industry, a highly qualified application support is required. FISCHER addresses this need through its strategically located Application Laboratories around the world (Germany, Switzerland, China, USA, India, Japan and Singapore). Our competent and experienced staff help you to select the appropriate instrument configuration for your individual application.

Service

Good service and efficient customer support are just as important to FISCHER as technically advanced and innovative products. For this reason, FISCHER has established a dense and tightly-linked global network of service partners staffed with highly qualified personnel. Offering extensive services such as setup, maintenance, training, calibration and so forth, FISCHER supports you in every aspect of your instruments and their use. This is how FISCHER guarantees the reliability and precision of its products. Worldwide.



Global Sales Global Application Global Service



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