AUTOMATED MEASUREMENT SOLUTIONS

Coating thickness measurement, material analysis and material testing

> Automated measurement technology from FISCHER means experts in the field, advice and support from A to Z, simple integration into the existing system, and reliable measurement performance.

Stefan Wunderlich, Proxy, KF Industrieanlagen GmbH, DE

Trusting number 1.
The world's best in measuring technology and service performance.

Your success is in your hands – and we make a measurable contribution to it. High-precision and efficient quality control is required, especially when coating systems are becoming increasingly complex, structures are shrinking and the demands placed on materials are growing. Whether for coating thickness measurement, material analysis or material testing, the HELMUT FISCHER GROUP is your partner for reliable automated measurement technology. Together with you we develop customized measurement solutions for your application and manufacturing environment. Our diverse product portfolio offers you modular and standardized measurement systems in fully or semi-automated versions or as stand-alone variants. We realize measurement solutions that make your work on site measurably easier and actively support you in improving the quality of your products, using resources more sparingly and thus saving costs.

According to our motto "Measuring Made Easy" a measuring challenge is easy to use if you, as a customer, use the right measurement technology. As part of our all-round, worry-free package we are there for you from the first joint consultation meeting to your first self-measurement – and well beyond. In order to offer you the highest quality, the majority of our devices – from single parts to software – are developed and produced in Germany.

Focus on what really matters – your work. We take care of the rest.

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FISCHER TRUSTED BRANDS

FISCHERSCOPE®
FISIQ®
MMS®
NICKELSCOPE®
PERMASCOPE®
PHASCOPE®
SIGMASCOPE®
SR-SCOPE®
WinFTM®
XAN®
XDV®

Company headquarters in Sindelfingen, Germany

HELMUT FISCHER – Measuring Made Easy

The knowledge and willpower of our founder, Helmut Fischer – his inventive genius and irrepressible desire to implement – are the driving force behind an exemplary company development. In 1953, this success story began with the founding of a two-man company in Stuttgart, Germany. Today, the HELMUT FISCHER GROUP is a global player at the forefront of industrial measurement technology.

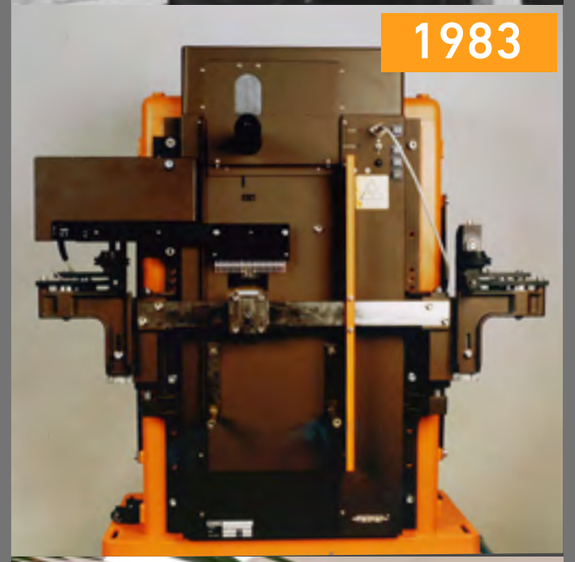
Innovation and expertise
When it comes to surface measurements, we are state-of-the-art worldwide. Our vow is to continuously develop and produce technology-leading products that make our customers measurably more efficient. Our high-tech devices measure coating thicknesses down to the nanometer range and are used wherever precision, reliability and ease of use are required.

Customized product solutions
Our portfolio is diverse, with each solution perfectly tailored to your requirements and wishes. Your big advantage: FISCHER offers everything you need from one single source, whether simple handheld devices for quick measurements on the go, to XRF analysis, or fully integrated high-end systems for automated production monitoring.

Excellent customer service
With 21 subsidiaries worldwide and an extensive network of authorized distributors, we are there for our customers in almost every country. From the first joint consultation to your first self-measurement, our experts from sales, application laboratory, and service will ensure individual, fast, and uncomplicated onsite support.

Quality and safety
If you assure quality in your products, you should work with quality measuring devices. For many decades, the HELMUT FISCHER GROUP has stood for outstanding products at the highest standard. Absolutely reliable measured values – this is our commitment to our customers. That is why we develop our measuring devices in-house and produce most of them at our company headquarter in Germany. In addition, we are certified according to ISO 9001.

Environment and sustainability
We stand for responsible and resource-saving actions while developing sustainable measurement solutions. With optimized processes and technologies, we reduce environmental impact to a minimum. Whether recycling or upcycling – corresponding material and energy savings benefit not only the environment, but also our customers.



How it all began ...

The ambitious start
The HELMUT FISCHER GROUP proudly looks back on a long and successful company history that began in 1953. At the age of only 22, Helmut Fischer founded the company "Schuhmann and Fischer" in a small workshop in Stuttgart, Germany, together with his mentor and former physics teacher Schuhmann.

The expansion
A few years later, Helmut Fischer founded the company of the same name with headquarters in Sindelfingen. Bolstered by the German economic miracle of the 1950s and 1960s, the Swabian one-man business became an international company.

The innovations
At the beginning of the 1980s, FISCHER greatly expanded its product range. In 1982, the first X-ray fluorescence measuring instrument was launched. The first automated inline measuring device was delivered in 1983. Further measuring and testing devices in the fields of nanoindentation and scratch testing, as well as Terahertz measuring technology followed. Thanks to many patented innovations, which still exist today, the devices quickly established themselves in the industry.

The technical progress
We continue to succeed in developing new measuring instruments by significantly improving the components used in order to support and encourage the technical progress of our customers. The extensive range of components ensures a high degree of customization.

The life's work
Building measurement devices that will last for many years has always been very important to Helmut Fischer. The company itself, then, should be just as durable. Our declared goal is to develop measurement solutions that offer our customers added value and support them efficiently in the performance of their work. This focus shapes our work day after day.

The foundation
After five decades at its helm, in 2003, Helmut Fischer transferred his company shares to the Helmut Fischer Foundation. The Foundation was established to support artists and young scientists, and helps to ensure the continuity of the company.

One partner for all your needs

Measurement technology and automation from a single source. From retrofitting your existing plant to complete turnkey solutions

ACCREDITED DAKKS CALIBRATION LABORATORY IN GERMANY

Market-leading software solutions. Carry out measurements and control processes in a highly efficient, reliable and smart manner

MADE IN GERMANY. HIGHEST QUALITY STANDARDS IN FISCHER PRODUCTION GUARANTEED

Wide-ranging expertise. Comprehensive know-how and personal advice from our team of experts – from application consulting and commissioning to trainings and after-sales support

PRECISE CALIBRATION WITH CERTIFIED STANDARDS

Industry 4.0. Reliably monitor and control processes for consistently high quality

True endurance runners. Designed for uninterrupted 24/7 use, even in harsh environments

Many applications, a solution for everyone

Fuel cells: Precious metal-loaded catalyst layers – made of platinum, for example – on the proton exchange membrane are at the heart of a fuel cell. Our automated measuring devices FISCHERSCOPE® X-RAY 4200, 4300 and 5000 are used inline to continuously monitor the precious metal content and thus ensure consistent quality with minimal use of materials.

Connectors: Plug contacts are often made of electroplated strip material. By measuring during production with the FISCHERSCOPE® X-RAY 4100 you can reliably ensure, without contact, that even structured tapes are correctly coated. Reduce the use of precious metals such as gold and save money.

Tinned non-ferrous metal strips: In the production of tinned non-ferrous metal strips, continuous inline layer thickness measurement is essential for consistent product quality. Our X-ray double-head measuring systems simultaneously measure the coating thicknesses of the front and back side of the strip and thus offer you the possibility to intervene in the coating process in a regulating manner.

Steel strips: The coating thickness of steel coils is essential from an economic and functional point of view. Our inline measuring devices support the challenging measurements in the running process, while the steel strips run from roll to roll at high speeds. Even under harsh conditions, we are at your side as a reliable process controller.

Aluminum profiles: The success of the heat treatment of aluminum is indispensable for safety-relevant applications and can be proofed in the conductivity. Using the phase-sensitive eddy current method, the FISCHERSCOPE® MMS® Automation measures conductivity automatically, quickly and non destructively.

Solar cells: Thin-film solar cells consist of highly complex multi-layer systems with layer thicknesses of just a few micrometers. Inline measurement technology from FISCHER enables the precise determination of the material composition of CIS/CIGS, CdTe or perovskite solar cells. Even minor deviations from the tolerance range are detected immediately, which ensures the optimum functionality of the high-tech surfaces.

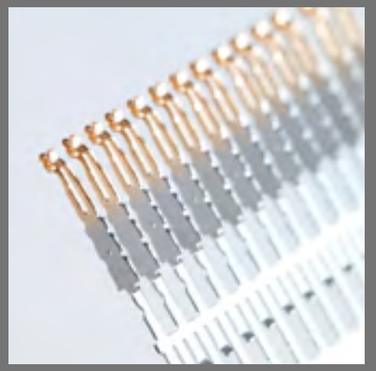
Packaging films: Food packaging requires complex manufacturing processes due to various specifications. At FISCHER you will find proven measuring solutions to ensure the correct coating thickness. The FISCHERSCOPE® X-RAY 5400 can be mounted on vacuum systems, detecting the smallest changes in the ongoing coating process, for example silicon oxide on films, and reports these to your control loop.

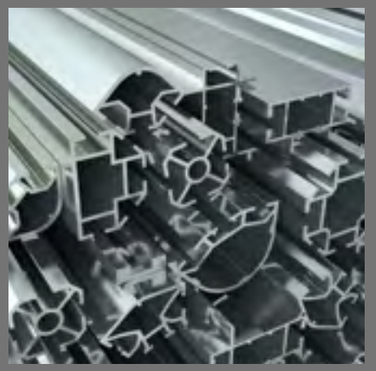
Wafers: The miniaturization of microchips, which is pushed to the physical limit, forms the basis for state-of-the-art electronics, but requires increasing demands on the process technology. The fully automatic, clean room compatible FISCHERSCOPE® X-RAY XDV®-µ SEMI series inspects your wafers automatically by your factory control with absolutely reliable measuring values.

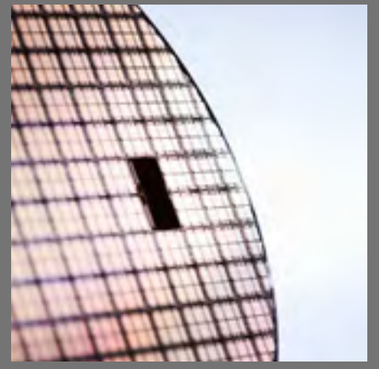
Galvanic baths: Put an end to wet chemistry, laborious and time-consuming measurements to analyze your electroplating baths. Analyze the metal content of your bath composition fully automated by the FISCHERSCOPE® XAN® LIQUID ANALYZER in seconds using X-ray fluorescence analysis. This makes solution analysis more precise, faster and more economical.

Printed circuit boards: Copper layers on printed circuit boards have a minimum layer thickness to ensure functionality. The effort is to produce as close as possible to this limit. Our measuring device FISCHERSCOPE® MMS® Automation enables automated inspection and both reliable and accurate measurement to ensure your quality requirements. In addition, we provide your with our FISCHERSCOPE® XDV®-µ PCB XL for measuring coating thicknesses and small structures on large-scale PCBs. Discover your measuring solution for PCB formats standard systems cannot handle!

Batteries: In electromobility, high-performance batteries with ever-increasing capacity are required. The individual cells are separated from each other by insulating varnishes. The coating thickness measurements of the lacquers with the FISCHERSCOPE® MMS® Automation and the PERMASCOPE® module is safety relevant to avoid short circuits and to ensure functionality.







Discover variety, quality and innovation

Automated solution	View	Product	Measuring method	Short characteristics	Page
Modular solutions		**FISCHERSCOPE® X-RAY 5000 series** Inline measurement with highest precision for thin layers.		■ Measuring device as a modular component for flexible integration into existing production systems	**14 – 15**
Pre-engineered solutions		**FISCHERSCOPE® XDV®-µ PCB XL** From large-scale PCBs to the finest structures.		■ Standardized measuring system with existing hardware and software design ■ As stand-alone variant or modularly integrated into existing or new production lines ■ Modifiable and adaptable according to your requirements ■ Partially or fully automated	**16 – 17**
		FISCHERSCOPE® X-RAY 4000 series Inline measurement with maximum endurance.			**18 – 19**
		FISCHERSCOPE® X-RAY XDV®-µ SEMI First choice for automated wafer measurement.			**20 – 21**
		FISCHERSCOPE® XAN® LIQUID ANALYZER Efficient inline solution analysis for electroplating baths.			**22 – 23**
		FISCHERSCOPE® MMS® AUTOMATION The inline all-rounder: Multi-measuring-system.			**24 – 27**
Customized solutions		**SPECIAL SOLUTIONS** Customized measurement technology.		■ Customized special system construction on request, tailored to your application ■ Precise integration of proven FISCHER measurement technology into your production environment	**28 – 29**

Get advice from our experts! sales@helmut-fischer.com

FISCHERSCOPE®
X-RAY 5000 SERIES

Tailor-made. Easy integration, individually adaptable to your application

Does not break a sweat. Sample temperatures up to 250 °C (482 °F) thanks to water cooling

Compact design. Measuring head with all necessary components in one unit

Robust and reliable. No moving parts

Vacuum compatible. Can be mounted on vacuum chambers

Digital pulse processor DPP+. Even shorter measuring times with the same standard deviation*

* Compared to the DPP.

Practical installation via a ISO-F DN 250 flange

Quality control of solar panels

Inline measurement with highest precision for thin layers.

The FISCHERSCOPE® X-RAY 5000 series is the perfect choice for non-destructive material analysis and thickness measurement of particularly thin coatings on large-area products. As a compact, modular measuring unit, the measurement technology can be easily and flexibly integrated into a wide variety of production systems. The FISCHERSCOPE® X-RAY 5000 can be used as a single module or grouped together, for example in the photovoltaic sector for quality testing of fuel cells, glass panels and thin-film solar cells, or for films and hot surfaces. Specially developed for automation, the measuring heads can be easily installed on vacuum chambers using an ISO-F DN 250 flange, for example.

FISCHERSCOPE® X-RAY 5100 scanner

Simultaneous measurement by several FISCHERSCOPE® X-RAY 5100

The device has proven itself to be robust and low-maintenance in continuous industrial operation. Calibration is quick and easy during the production process. Thanks to large apertures, state-of-the-art detectors and ultra-fast pulse processing, you benefit from outstanding repeatability. The measuring heads can be integrated into existing systems or supplied as a complete, customer-specific turnkey solution.

Features

- Robust inline instrument for analysis and measurement of thinnest layers and layer systems in the running process with connection to the production control system
- Microfocus tube with tungsten anode; molybdenum anode optional
- Fixed aperture (configurable up to Ø 11 mm)
- Fixed filter (configurable)
- Silicon drift detector 50 mm^2 for highest precision on thin layers as well as Peltier cooling
- Digital pulse processor DPP+ for higher count rates and significantly reduced measurement times
- For measurements in vacuum or air
- Available option: Water cooling for sample temperatures up to 250 °C (482 °F)
- Any mounting position possible
- Remote control and data export via TCP/IP interface

FISCHERSCOPE® XDV®-µ PCB XL

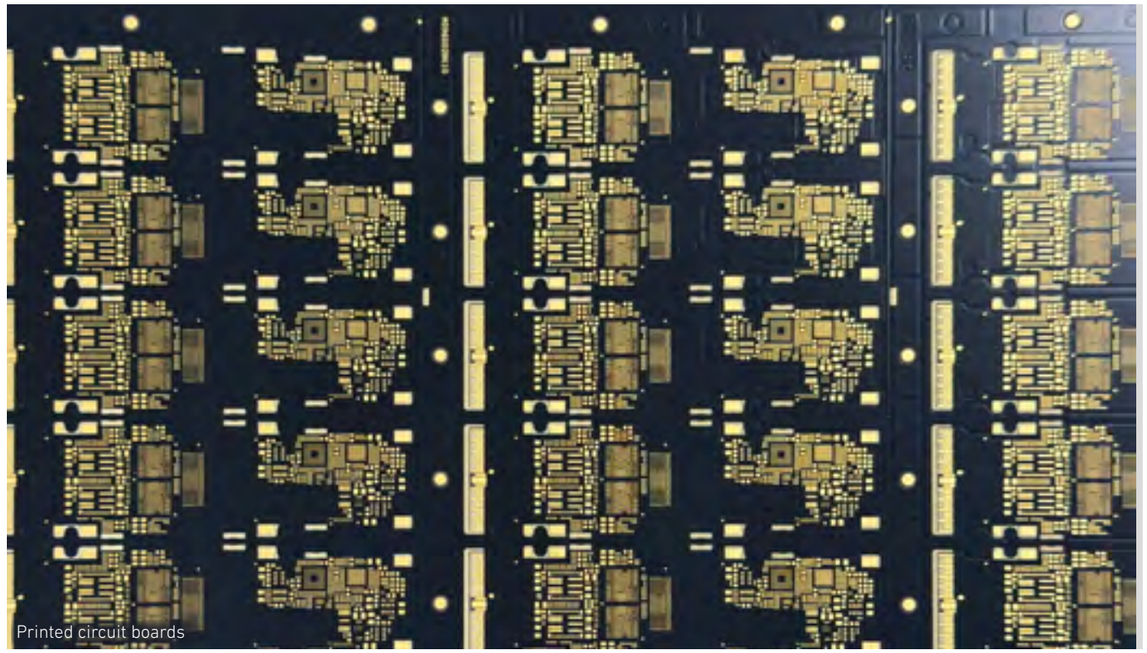
Measure large-scale PCBs with a single system. Largest measurement area in its class, 610 × 610 mm (24 × 24 in) enables one-time positioning

Vacuum chuck for perfect sample handling. Even thinnest PCBs are securely held in place without repositioning (optional)

Hands-free table retraction – more than convenience. Efficient and secure handling of large-scale PCBs during XRF measurements thanks to the foot switch

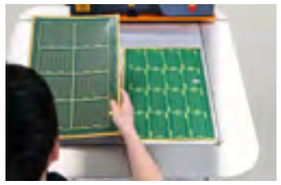
Right measurement position – automatically. Intelligent pattern recognition speeds up measurement routines and minimizes manual operator intervention

Ready for the Smart Factory. Seamlessly integrates into automated production lines – or as a standalone device


Printed circuit boards

From large-scale PCBs to the finest structures.

Robust, efficient, and highly precise – the FISCHERSCOPE® XDV®-µ PCB XL is designed for maximum throughput and reliable quality control of large-scale PCB panels. As the larger version of our trusted FISCHERSCOPE® X-RAY XDV®-µ PCB, it offers the largest measurement area in its class. The entire panel can be captured and measured in a single run – without repositioning! The powerful combination of our in-house manufactured polycapillary optics for extremely small measurement spots, a large silicon drift detector, and the microfocus tube Ultra enables precise measurement of the finest structures and thinnest coatings, including ENIG, ENEPIG, immersion silver, and immersion tin. The vacuum chuck securely holds even particularly thin and flexible PCBs flat and firmly in place.


Largest measurement area in its class with 610 x 610 mm

Foot switch for hands-free table retraction

WinFTM® software's intelligent pattern recognition ensures highly repeatable positioning. Predefined measurement positions are automatically identified, approached, and measured at the push of a button.

Whether used as a manual stand-alone system, in semi-automatic operation, or fully integrated into your production line – the level of automation can be flexibly scaled to suit your requirements. Rely on outstanding measurement stability, IPC-compliant measurement results, and maximum process reliability for your quality control!

Features

- Highly precise benchtop instrument to measure coating thickness and small structures on large-scale PCBs with maximum throughput
- Microfocus tube Ultra with tungsten anode; molybdenumanode optional
- Measuring direction with measuring top down
- Polycapillary optics for particularly small measurement spots with approx. Ø 10 µm or Ø 17 µm (FWHM)
- 4-fold changeable filter
- Silicon drift detector 20 mm^2 or 50 mm^2 for highest precision on thin layers
- Digital pulse processor DPP+ for higher count rates and significantly reduced measurement times
- Highly precise, programmable measuring table for PCBs with up to 610 × 610 mm, optionally with vacuum chuck

FISCHERSCOPE®
X-RAY 4000 SERIES

Tailor-made. Individually adaptable to your application

Automatable. Approach measuring points precisely and change measuring task at the same time

Inline measurement in real time. Precise and fast measurement in your shift operation

Easy to operate. Strip for adjustment and operating panel easily accessible

Compact design. Positioning axis and measuring head in one unit

Intelligent self-monitoring. Automatable regular calibration and measuring equipment monitoring

Digital pulse processor DPP+. Even shorter measuring times with the same standard deviation*

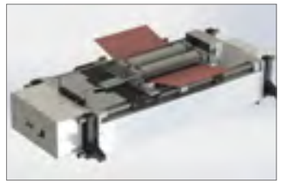
* Compared to the DPP.

Electroplated stamped strip

Inline measurement with maximum endurance.

The FISCHERSCOPE® X-RAY 4000 series is developed for the continuous and non-destructive material analysis and coating thickness measurement of layers and layer systems in ongoing manufacturing processes. Optimized for industrial requirements, the inline measuring system is used in production lines for the precise measurement of electroplated solid and stamped strips, even with shaped and stamped contact surfaces. It is also suitable for measuring electrical contacts on strip material and platinum and other precious metals on membranes for fuel cells.

Fuel cells


FISCHERSCOPE® X-RAY 4200 (horizontal alignment)

Thanks to simple handling, automated calibration and minimum set-up times, converting from one product to another is simple due to the easily adjustable conveyor guides. The programmable axis of the measuring head allows reliable measurements at different positions of the product to be measured.

Features

- Robust inline instrument for measurement on solid strips up to one meter wide, stamped grids with measuring structures of a few millimeters, up to coated membranes
- Microfocus tube with tungsten anode; molybdenum anode optional
- 2-fold or 4-fold changeable apertures
- 6-fold changeable filter
- Silicon drift detector 50 mm^2 for highest precision on thin layers
- Digital pulse processor DPP+ for higher count rates and significantly reduced measurement times
- Hardware and software aligned to measuring tasks related to inline measurement
- Horizontal or vertical installation position
- Remote control and data export via TCP/IP interface

FISCHERSCOPE® X-RAY XDV®-µ SEMI

Fully automated. Perfectly fitted for 24/7 use and smooth measuring processes

Programmable. Automated measurements on predefined structures thanks to advanced pattern recognition technology

Smart details for usability. Integrated CCTV monitoring of the complete handling process

Easy maintenance. Large service hatches for access to individual components

Clean room compatible. No contamination of the wafers as well as constant measuring conditions

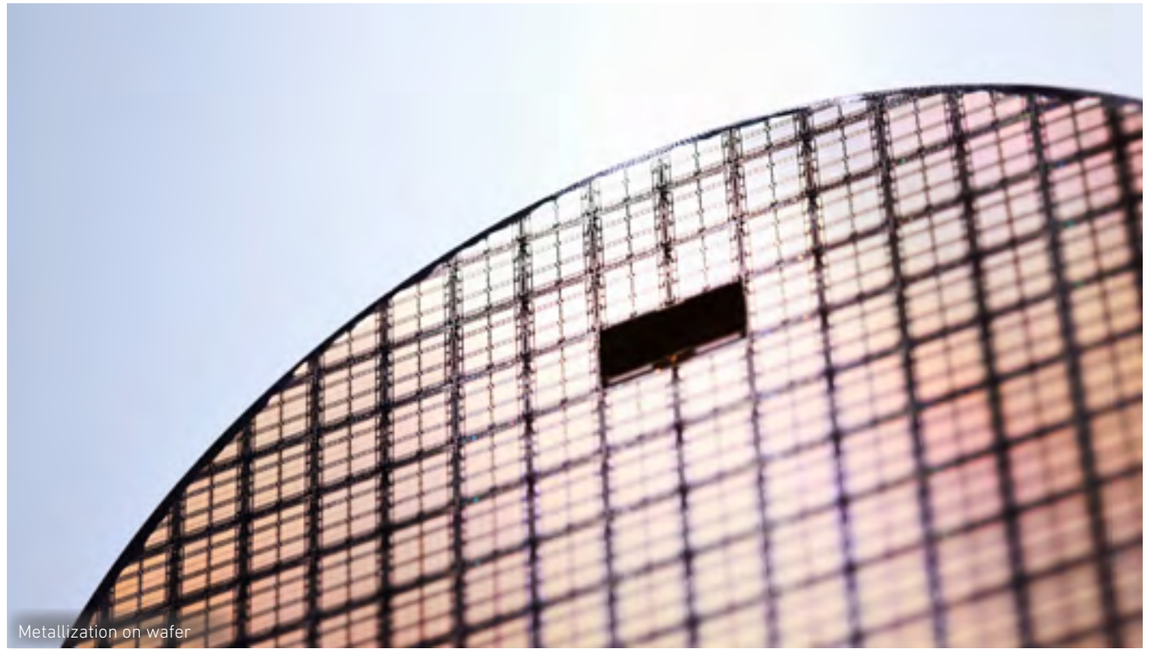
Most advanced polycapillary optics on the market. Our in-house manufactured polycapillary optics deliver outstanding measurement results with short measurement times

Digital pulse processor DPP+. Even shorter measuring times with the same standard deviation*

* Compared to the DPP.

BRAND NEW MICROFOCUS TUBE ULTRA

Availability depending on region and country.



Metallization on wafer

First choice for automated wafer measurement.

The FISCHERSCOPE® X-RAY XDV®-µ SEMI is the optimal measurement solution for fully automated inspection of microstructures on wafers. The device is suitable for coating thickness measurement and element analysis of base metallizations in the nanometer range, C4 solder balls, lead-free solder caps on copper pillars, small contact areas and 2.5D/3D packaging applications. Compliant with relevant SEMI standards, the measurement solution is ideal for process monitoring in manufacturing.

Handling robot loads measuring device with wafers

Automatic docking and loading of wafers in standardized FOUPS and cassettes

The XDV®-µ SEMI enables consistent test conditions through an encapsulated test environment. This ensures error-free handling and measurement of the high-quality wafers. FOUP, SMIF or cassette boxes can be automatically docked to the measurement system. Measurement results are forwarded to the higher-level system in the factory via the standardized SECS/GEM interface, so that corrective action can be taken immediately in the event of deviations.

Features

- Special device for automated measurements and analyses of smallest structures, very thin coatings and multi-layer systems on wafers with diameters up to 12 inches
- Microfocus tube Ultra with tungsten anode for even higher performance with smallest spots with µ-XRF; molybdenum anode optional
- 4-fold changeable filter
- Polycapillary optics for particularly small measuring spots of approx. 10 or 17 µm half-width with high intensity
- Silicon drift detector 20 mm^2 or 50 mm^2 for highest precision with thin films as well as Peltier cooling
- Precise, programmable measuring table with vacuum wafer chuck for automated measurements on small structures
- Standardized SECS/GEM communication
- Compatible with Overhead Hoist Transport (OHT) and Automated Guided Vehicle (AGV) deliveries

Discover more!
Scan the QR code and find out more about the **FISCHERSCOPE® X-RAY XDV®-µ SEMI.**

FISCHERSCOPE® XAN® LIQUID ANALYZER

Market-leading precision. Combination of measuring cell and software ensures best measuring performance and safety

Absolutely unique. No need to change* the measuring cell

Maximum lifetime. Innovative design and durable materials enable a lifetime of the measuring cell up to 1 year*

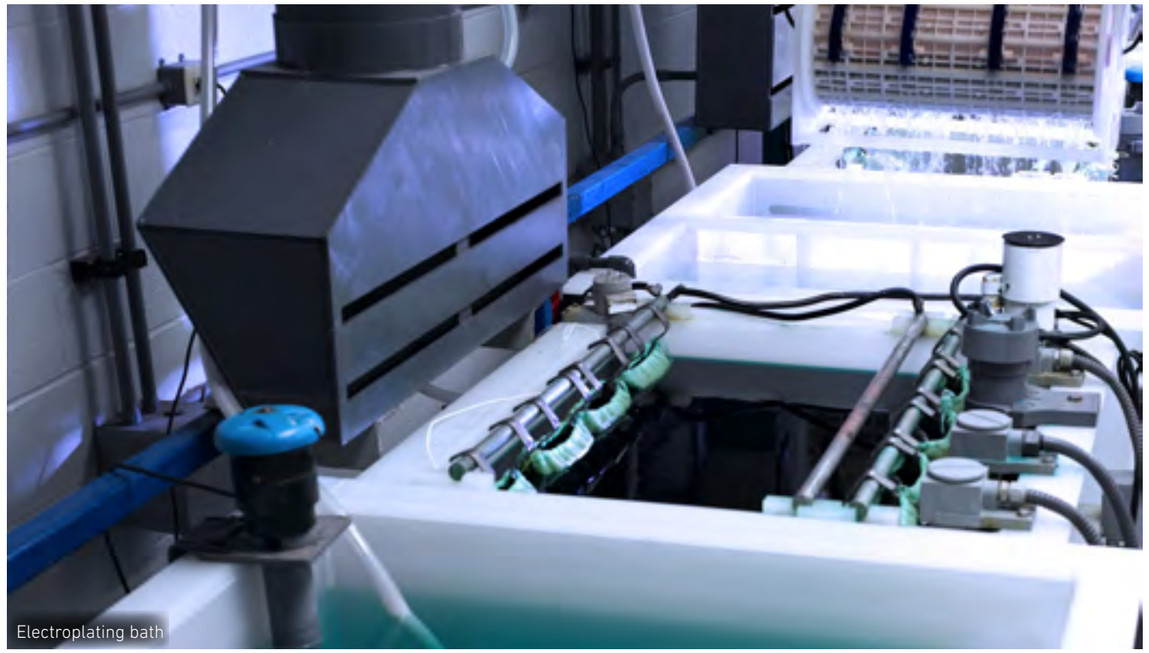
Intelligent self-monitoring. Fully automatic, preventive purging, monitoring and calibration processes ensure maximum uptime

No time-consuming spot checks and information gaps. Stay continuously in the picture about your electroplating process

Extremely low maintenance. Robust construction, service-friendly design

Safety in real time. Live measurement results as well as simple and fast documentation of these

*In a test setup under controlled laboratory conditions with a typical zinc-nickel solution, a lifetime of the measuring cell of over one year was achieved. The lifetime can vary and is individually dependent on the frequency of the rinsing and cleaning cycles, the composition of the coating baths and their temperatures, and the ambient conditions.



Electroplating bath

Efficient inline solution analysis for electroplating baths.

Now you can control your coating system even more efficiently - with the FISCHERSCOPE® XAN® LIQUID ANALYZER you can keep a constant eye on your electroplating baths. The high-precision inline measuring device allows you to measure a wide range of metallic bath solutions, such as zinc, nickel, zinc-nickel, gold, palladium, chrome and rhodium. Each electroplating bath has its own supply line to the respective measuring cell in order to avoid contamination.

Closed Loop System

Sophisticated flow cell

The robust multi-channel inline measuring system can be used flexibly, even in harsh industrial production environments: as a stand-alone version or fully integrated into a local production control system (MES). The device continuously delivers precise measurement results 24/7. The measurement data is provided quickly, easily and in real time via a fieldbus interface. The data can be visualized centrally on the device or decentrally on other external monitors, for example directly at the electroplating bath. The large touch display is easy and intuitive to operate. The measuring device is controlled via an integrated Siemens PLC.

Features

- Robust inline instrument for fully automated analysis of metal concentration in electroplating baths
- Automatic sequential measurement of up to 4 electroplating bath solutions (channels)
- 1-channel to 4-channel solution
- Microfocus tube with tungsten anode
- Silicon drift detector 50 mm^2 for highest precision
- Digital Pulse Processor DPP+ for minimizing measurement time and optimizing repeatability
- Fieldbus interface enables connection to higher-level control systems as well as equipment for equipment communication
- WAN connectivity

Discover more!
Scan the QR code and find out more about the **FISCHERSCOPE® XAN® LIQUID ANALYZER.**

FISCHERSCOPE® MMS® AUTOMATION

Easy integration. Proven FISCHER measurement technology as automated solution

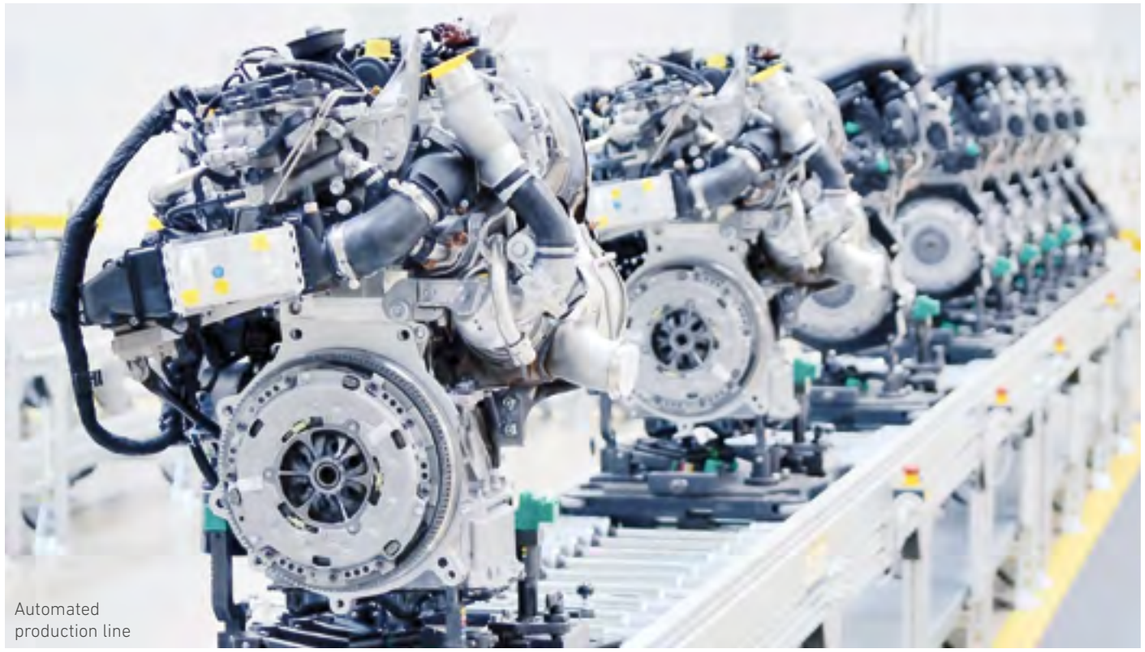
Multi-channel measurement. Simultaneous measurement with up to four probes of the same type in one application

Well connected. Standardized PROFINET connection to your PLC

Measurement over long distances. Drag chain capable cables up to 30 m length

Quickly ready for use. Thanks to simple top-hat rail mounting

Tailor-made. Flexible and modularly scalable, a suitable solution for every application



Automated production line

The inline all-rounder: Multi-measuring system.

The FISCHERSCOPE® MMS® Automation is developed for automated coating thickness measurement and material testing. The measured values are recorded using probes that are mounted on a robot arm, for example. The signals reach the base unit via a digitizing unit - the respective MMS® module. The base unit is typically mounted in the control cabinet and is responsible for data processing. It communicates with higher-level units via an RS232 interface or PROFINET.

Measuring module and probe are mounted directly on a inline measuring station (left illustration) or a robot (right illustration)

Due to its modular design, the MMS® Automation provides maximum flexibility: You can equip the device not only with up to four different modules and probes at the same time for solving a wide range of different measuring tasks. Alternatively, up to four of the same probes can be used simultaneously in one application to cover a particularly large number of measuring points. With long cables suitable for drag chains, the device can be placed far away from the measuring station.

Features

- Universal measuring system for automated coating thickness measurement and material testing
- Test method: Magnetic induction, amplitude- and phase-sensitive eddy current method, microresistivity
- Modules: PERMASCOPE®, PHASCOPE® DUPLEX, SIGMASCOPE®, SR-SCOPE®, NICKELSCOPE®
- Measured value memory: A total of 1.000.000 measured values in a maximum of 1.000 applications
- Multi-channel measurement of up to four identical probes in one application
- Measurement range: Depending on the combination of coating and base material and the used probe
- Remote control by your PLC, fast data transfer via PROFINET and RS232
- Probes for various applications available

Discover more!
Scan the QR code and find out more about the **FISCHERSCOPE® MMS® AUTOMATION**.

FISCHERSCOPE® MMS® AUTOMATION Modules

Whether you want to measure the lacquer film thickness on car bodies, the copper coating on printed circuit boards or need to sort different aluminum parts according to their alloys, the FISCHERSCOPE® MMS® Automation is the right measuring system for every industry and every application. The required flexibility is ensured by the inline all-rounder's modular design with five different measuring modules.

PERMASCOPE®
The PERMASCOPE® is a versatile module for coating thickness measurement. It combines two measuring methods: the magnetic induction method and the eddy current method.

Typical applications:

- Electrically insulating coatings on various metals, e.g. paint on steel or aluminum
- Electrically conductive, non-magnetizable coatings on ferrous metals, e.g. zinc, copper or chromium on steel
- Weakly electrically conductive coatings on well conducting metals, e.g. chromium and electroless nickel on copper or aluminum

PHASCOPE® DUPLEX
The PHASCOPE® DUPLEX was specially developed for the automotive industry to measure duplex coatings (paint and zinc on steel) in one step. It uses three measuring methods: the magnetic induction method as well as the amplitude-sensitive and the phase-sensitive eddy current method.

Typical applications:

- Paint on steel and aluminum
- Paint and zinc coatings (thin EPD coatings) on steel; both layers are measured in one step
- Brake line hoses
- Wire (net and mesh), e.g. for shopping carts

SIGMASCOPE®
The SIGMASCOPE® determines the electrical conductivity of metals and can be used either for coating thickness measurement or for identifying non-ferrous metals.

Typical applications:

- Measurement of copper layers on printed circuit boards
- Testing of aluminum alloys in incoming goods

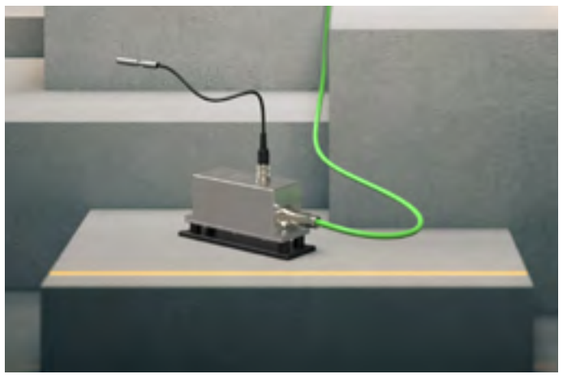
SR-SCOPE®
The SR-SCOPE® is a special module for the electronics industry. It uses the microresistivity method and is suitable for measuring the thickness of single copper layers on multi-layer PCB – without the influence of deeper layers.

NICKELSCOPE®
The NICKELSCOPE® is based on the Hall effect and uses the different magnetizability of coating and base material for coating thickness measurement.

Typical applications:

- Electroplated nickel coatings on non-ferrous metals and insulating base materials
- Non-magnetic coatings such as copper, aluminum or lead on steel or iron

Learn more about our **measurement methods** on page 34.



FISCHERSCOPE® MMS® Automation Module with drag chain compatible cabling and connected probe

Extensive probe portfolio

FISCHERSCOPE® MMS® AUTOMATION Probes

The heart of any electromagnetic measuring system is the probe. It generates the actual signal that is subsequently evaluated. For this reason, it must meet certain requirements depending on the area of application and must not damage soft coatings, for example.

With over 100 standard probes and numerous customized probes, we offer you a comprehensive product portfolio from which you can select the right probe for your measuring task together with us. All FISCHER probes are extremely robust, wear-resistant and developed, produced and tested in-house to the highest quality standards. Simply connect the pre-calibrated probe to your measuring instrument and get started: Our devices recognize the probes automatically.

Due to a spring-loaded system, our probes are placed on the surface with an optimal pressure. This reduces measuring errors and leads to high repeatability, which guarantees your measurement results. Probes with integrated curvature compensation allow reliable measurement on curved surfaces. Probes with conductivity compensation, on the other hand, can compensate for different electrical conductivities of the base material and thus avoid time-consuming calibration procedures.

Get in touch with us! We would be happy to advise you on the selection of the right probes for your application. If required, we also develop individual special designs for you!
sales@helmut-fischer.com

Features and criteria for probe selection

Depending on the application, our probes have specific properties and meet certain criteria to provide you with a result of the highest accuracy. Here are a few examples of measurement conditions for selecting the optimal probe:

- Dimension of measurement area
- Geometry of specimen or the measuring site
- Surface condition of specimen
- Combination of coating and base material
- Thickness of coating and base material
- Coating hardness
- Manual or automated measurement
- Ambient conditions, e.g. wetness

SPECIAL SOLUTIONS

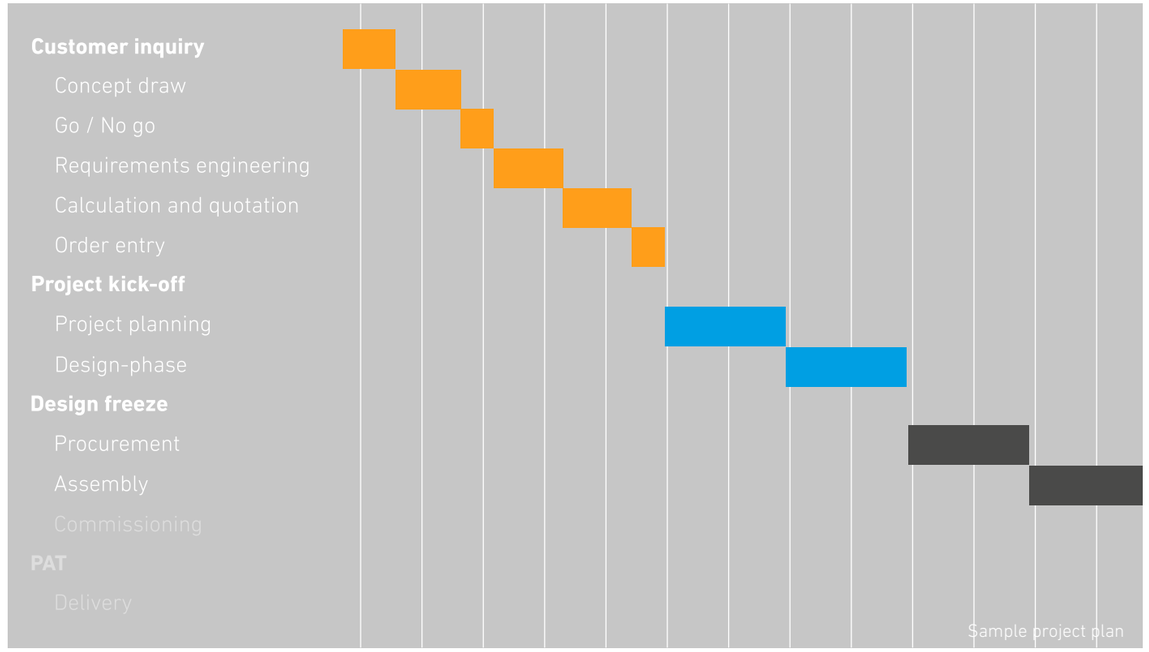
Automation at its best.
Measuring solutions for coating thickness measurement, material analysis, conductivity, IO/NIO evaluation

Tailor-made.
Customized concept for your requirements

Easy integration.
Precise integration of proven FISCHER measurement technology into your production

Always fits. Solutions for your infrastructure and interfaces. Conveyor belt, robot, axis system and more

Note: Image shows a conceptual solution only.

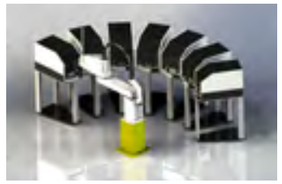


Sample project plan

Customized measurement technology.

At FISCHER, you can draw on a diverse portfolio of modular and standardized measuring systems. Where previous concepts do not provide a convincing solution and further innovations are required, we realize custom-made special solutions. Together with you or the integrator, we develop tailor-made, intelligent measurement solutions for your application: fully automated, semi-automated or as a stand-alone variant.

Special solution with large radiation protection wall. Safety first.


Concept: Automated robot assembly of specifically adapted FISCHERSCOPE® devices

We design special holders to accommodate your workpiece carrier. In this way, entire batches can be measured automatically. If necessary, we check whether modifications to the series probes can shift their characteristic curve so that your application can be covered. If your production line or your higher-level system follows a defined protocol, we check how your FISCHERSCOPE® measuring device can communicate in your language.

We develop economical and reliable solution concepts tailored to your needs. Our experts work closely with you throughout the entire process – from consulting and conception to commissioning and after-sales support.

Our services

- Customized special solutions for coating thickness measurement, material analysis and material testing; fully automated, partially automated or stand-alone
- Individual feasibility check by our application experts
- Conceptual design of your automated measurement solution
- Design creation including interface management through interdisciplinary team of experts
- Declaration of conformity or installation
- Consideration of radiation protection for XRF special solutions

SOFTWARE PRODUCTS

For smooth workflows in your production process.

We make it suitable for you. Tailored to your production process, we integrate our software solutions optimally into your system architecture. Compatible with common fieldbus systems, the WinFTM® can be easily controlled via your PLC. Conveniently monitor your automated measurement technology from FISCHER remotely, receive your measured values in real time in your process control system and rely on efficient evaluation and reliable export of your measurement results.

Customized your industry. We design a customized solution for the requirements and standards of your industry

Easy integration. Compatible with TCP/IP, SECS/GEM or PROFINET, remote control via your PLC

User-friendly. The user interface offers optimum support for convenient programming and control of the measuring system

Graphic display of measured values. Detailed visualization of the measurement results

Reliable and efficient. Initially set up, your measuring system becomes a self-runner

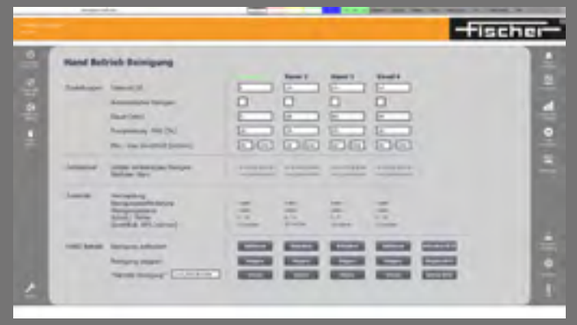
Automated measuring equipment monitoring. Your measuring device checks itself at predefined time intervals and reliably documents the results

Convenient data handling. Export of measurement results to all common data evaluation, statistics and reporting programs

Rely on decades of expertise and solid software solutions that work reliably. Automated FISCHER measurement technology stands for repeatable and high-precision measurement as well as convenient evaluation and secure export of your data.

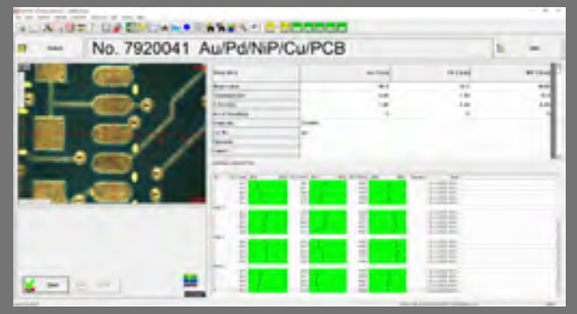
Intuitive user interface
With extensive parameters we provide you the possibility to adapt the standardized measurement process to your needs. Multi-level user profiles with different authorizations and various operating modes allow you to use your measuring device in a controlled and safe manner.

Picture shows: Manual operating mode



Automatic pattern recognition
With automatic pattern recognition, the WinFTM® recognizes taught-in structures down to the micrometre range and carries out automated measurements at the predefined measuring points.

Picture shows: High-resolution live image for positioning the measuring spot with SPC display of the current measured values



Your measurement results at a glance
Display your measured values either individually or in tabular form. You can also define your tolerance limits in color. So you always have an overview.

Fig. 1 shows: Large number display of the current measured values, highlighted in color

Fig. 2 shows: Tabular display of individual layer thicknesses, color-coded

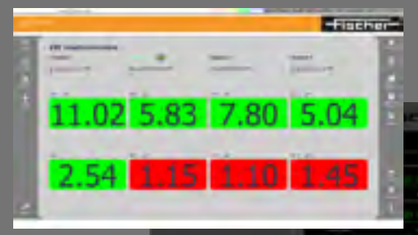


Fig. 1

Fig. 2

Set with calibration standards

Standards you can rely on

It all depends on the right measure
Only a well-calibrated measuring instrument delivers correct results. For this reason, FISCHER relies on the highest accuracy for its calibration standards. Our in-house calibration laboratories produce traceable calibration standards, also known as reference or comparison standards, which are recognized all over the world.

Calibration standards are foils or coated base material. Foil standards can be combined with other materials for further adherence to your measuring task.

Whether coating thickness measurement, material analysis or material testing, with well over 500 different calibration standards, FISCHER has the right standards for every application in its range. With prefabricated sets, for example for printed circuit boards, you are also ideally equipped for special tasks.

Safety through our DAkkS calibration laboratory
FISCHER runs several accredited calibration laboratories worldwide. Our speciality: We are the first and only company with its own calibration laboratory in Germany that is accredited according to DIN EN ISO/IEC 17025 for the mechanical measurand "mass per unit area". By tracing the measurements back to national standards and thus to national metrology institutes such as the Physikalisch-Technische Bundesanstalt (PTB), the National Institute of Standards and Technology (NIST) or the National Institute of Metrology (NIM), we achieve the highest quality standards. The internationally recognized calibration certificates and certificates of analysis give you the necessary security for your product quality and strengthen the confidence of your customers.

Unique service – Your product as an individual calibration standard
In addition to in-house manufactured and certified standards, HELMUT FISCHER's calibration laboratory also offers ISO/IEC 17025 certification for specific customer material. Benefit from customized calibration standards by having your sample certified as a calibration standard by our measurement experts. So now you can use your workpieces for process control, quality control or development – all thanks to the calibration certificate!

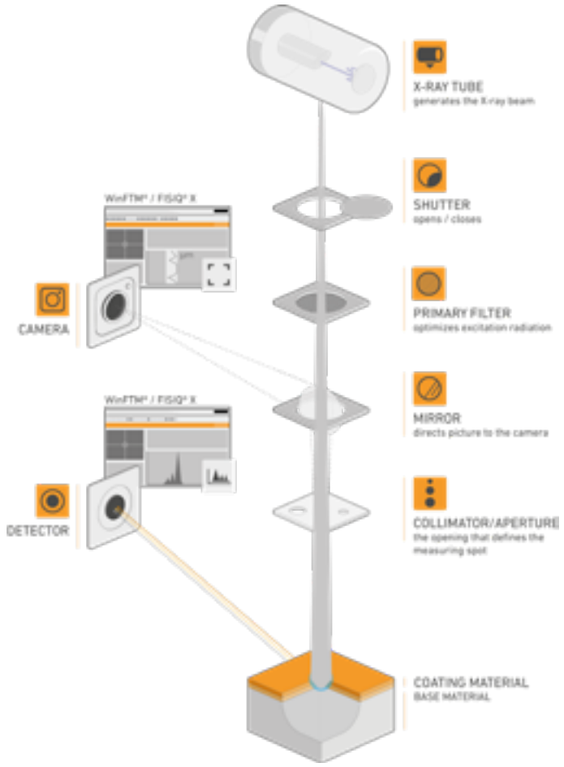
Get in touch with us!
We'll be happy to advise you on the right calibration standards and the optimal calibration strategy.
sales@helmut-fischer.com

How exactly does it work?

XR X-ray fluorescence analysis

When the measurement is started, an X-ray tube emits high-energy X-rays – the primary radiation. These beams strike the atoms in your sample, ejecting a near-nuclear electron from the atom and creating an imbalance. This state is unstable. Therefore, an electron from a higher shell jumps onto the now free space and emits fluorescence radiation.

The energy level of this radiation is like a fingerprint – characteristic for the respective element. A detector measures the fluorescence radiation and digitizes the signal. Our software processes this signal and creates a spectrum. The spectrum of the emitted radiation allows conclusions to be drawn about the nature of the sample. In this way, both the material composition and the thickness of a coating can be analyzed.



X-ray tube: Generates the X-ray beam

Shutter: Interrupts the X-ray beam

Primary filter: Modifies excitation conditions

Camera: The mirror directs the image onto the camera

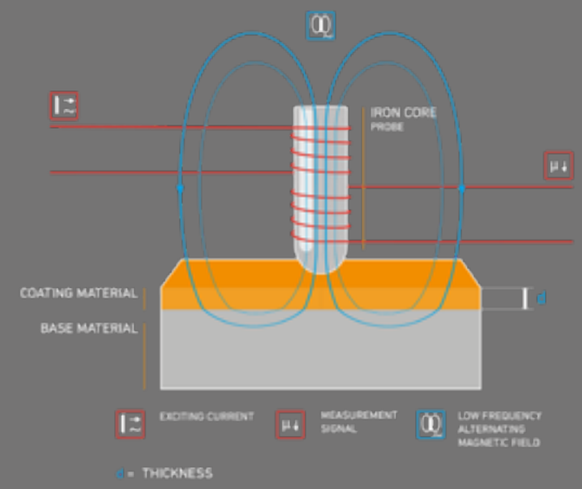
Collimator / Aperture: Defines the measuring spot

Detector: Absorbs the fluorescence radiation

Digital pulsprocessor (DPP): Processes very high pulse and count rates

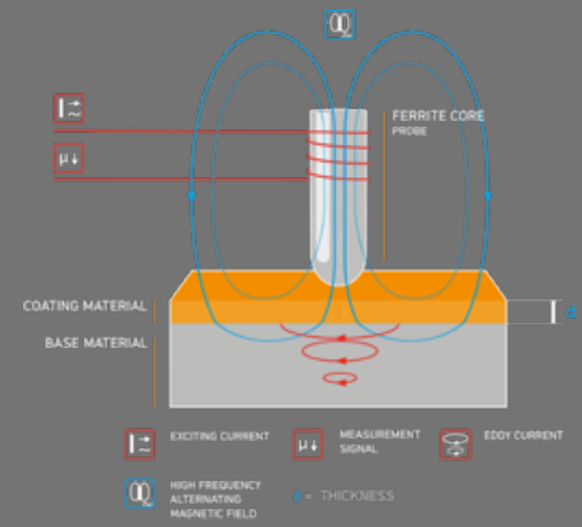
MI Magnetic induction method

Probes for magnetic induction measurements consist of an iron core around which an excitation coil is wound. A low-frequency alternating current flows through this coil, creating an alternating magnetic field around the poles of the iron core. If now the probe approaches a magnetizable object – the iron base material of a sample, for example – it amplifies the alternating magnetic field. A measuring coil registers this amplification as a voltage. How high the voltage difference is depends on the distance between the pole(s) and the iron part. For coated parts, this distance corresponds exactly to the coating thickness. The base material must be magnetized, or ferrous, the coating not. This test method is in accordance with DIN EN ISO 2178 and is suitable for coating thickness measurements of galvanic coatings such as zinc and chromium as well as for coatings and plastics.



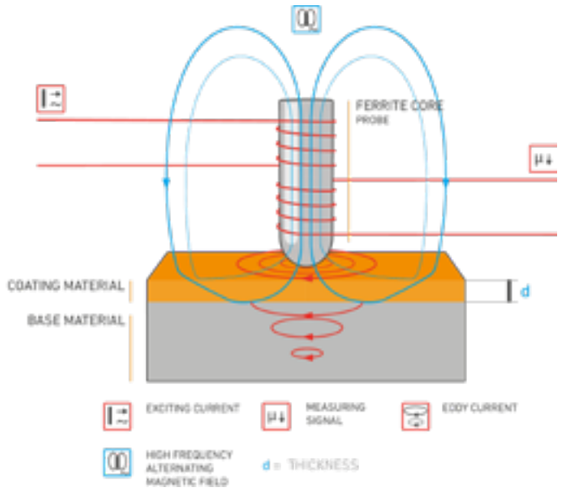
AE Amplitude-sensitive eddy current method

This test method in accordance with DIN EN ISO 2360 uses probes with and without ferrite core. A coil is wound around the core and a high-frequency alternating current flows through it. This produces a high-frequency alternating magnetic field around the coil. If the probe pole comes close to a metal, a so-called eddy current is induced in this metal. This also generates an alternating magnetic field. Since this second magnetic field is opposite to the first, the original magnetic field is weakened. The extent of this weakening depends on the distance between the pole and the metal base material of the object to be measured. For coated parts, this distance corresponds exactly to the value of the coating thickness. Factors that can strongly influence the measurement using the eddy current method include the shape and size of the test part or the roughness of the surface.



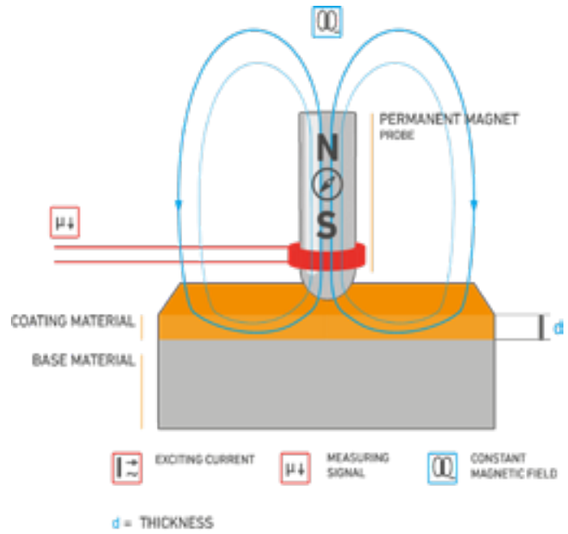
PE Phase-sensitive eddy current method

The method in accordance with ISO 21968 is based on the fact that the coating material and the base material differ sufficiently in electrical conductivity and/or magnetism. The probes have measuring systems consisting of several electrical coils that are placed on a common ferrite core. An excitation current generates a high-frequency magnetic field that induces eddy currents in the material. These, in turn, generate an opposing electromagnetic field that is superimposed on the first field. The resulting field leads to a change in impedance in the measuring coil (= phase shift). The different formation of eddy currents at different coating thicknesses is used for coating thickness measurement. The method is not very sensitive to external influences such as curvature or roughness. Metal layers under an electrically insulating layer, e.g. paint, can also be measured.



M Magnetic method

The test method is based on the different magnetic properties between a coating and its base material and is used to measure magnetic coatings on non-magnetic metals or plastics or to test non-magnetic coatings on steel or iron. The measurement is based on the Hall effect, which occurs when a current-carrying conductor is in a constant magnetic field. Magnetic materials, for example a nickel coating, amplify the static magnetic field, which also increases the Hall voltage. This voltage is measured and converted into a coating thickness value in the measuring instrument. The magnetic procedure is carried out in accordance with DIN EN ISO 2178.



MR Microresistivity method

This method is suitable for measuring the thickness of electrically conductive layers on insulating substrates in accordance with ISO 14571. Copper coatings on printed circuit boards and multi-layer PCBs are frequently checked using this method. The advantage of this method is that other layers or intermediate layers in the PCB have no influence on the measurement, so that the thickness can be determined precisely even with thin layers. This method uses probes with four needles arranged in a row on the underside of the probe. When the probe is placed, current flows between the two outer needles. The coating acts as an electrical resistance to which a voltage drop is measured with the two inner needles. The resistance and thus the voltage drop increase as the coating thickness decreases, and vice versa. Probe-specific specifications (minimum specimen size, minimum distance to the specimen edge) prevent systematic error with particularly specimens.

D Duplex method

Duplex coatings are often used in corrosion protection and automotive construction because they are characterized by a very long service life. Duplex coatings consist of a zinc coating in combination with one or more colored coatings. The overall system of zinc and paint can protect the steel from corrosion for many years. For the measurement of duplex systems, magnetic induction and phase-sensitive eddy current test methods are used together in one probe. For zinc coatings from about 150 µm, however, the penetration depth of the phase-sensitive eddy current method is no longer sufficient to reliably determine the coating thickness. For this reason, the combination of the magnetic induction and the amplitude-sensitive eddy current method is used in such cases. According to the DIN EN ISO 12944 standard, the measurements are performed in accordance with DIN EN ISO 2178, DIN EN ISO 2360 and DIN EN ISO 21968.

EC Electrical conductivity

Conductivity measurement not only provides information on how well a metal conducts electricity, i.e. whether it has a high or low conductivity, but also indirectly provides information on its composition, microstructure or mechanical properties. Thus, in many applications, conductivity is an important component of process control or product monitoring. The method used for non-destructive conductivity measurement is the phase-sensitive eddy current method in accordance with DIN EN 50994 standard.

Application consulting

Everything for your measuring task

Your quality is our mission
Successful quality management is the foundation of a successful company. We make a measurable contribution to this, as only the right measurement technology combined with the right measuring method and correct use of devices lead to reliable, valid quality control measurements. Our specialists are just the right point of contact for your concerns and challenges, your requirements in measurement technology, and for all other questions relating to your measuring task.

Wide-ranging expertise for precise measurement results
An interdisciplinary project team of about 15 people, consisting of mechanical and electrical design engineers, programmers for PLC and high-level languages as well as project managers, are available to provide you with advice and assistance, whether helping to choose the right measuring instrument, developing an in-depth measuring strategy or defining the right measurement program. Especially when solving complex measuring tasks, you benefit from our application consulting. This way, your employees always know what is important for the measurement.

Our specialists have excellent networks with all our application laboratories as well as with research and educational institutions and industry. In this way, we ensure that you have access to cutting-edge expertise worldwide. And we make sure that we have the right answers to your questions.

Our services at a glance

- Conceptualizing of your request together with our team of experts and potential partners (integrators)
- Individual sample testing with your components
- Parameterization and customized task programming
- Support with operation and calibration as well as with the implementation of new measurement tasks
- Safety first: Our safety concepts - especially for radiation protection - comply with applicable standards and regulations and protect you and your employees
- Technical advice by remote, email and telephone

Service

A reliable partner for the entire life of your device

All-round worry-free package with maximum flexibility
For over 70 years, we have been supporting our customers with outstanding products and unique services. We attach just as much importance to fast and reliable service as we do to the quality of our products. As part of our 360° support, our service experts will assist you with the commissioning, inspection, and maintenance of your device. With our product trainings, we teach you how to use your measurement system.

Your advantages of regular inspections
To ensure that your devices stay with you over a long period of time and provide reliable measured values, we recommend regular inspections – ideally at annual intervals. All inspections are carried out by our trained and experienced service personnel. Thanks to our global support network, we are flexibly available in your area and provide individual advice and support on site with fast response times.

Through regular inspections, you extend not only the life of your device but also keep your downtimes to a minimum. We plan inspection times together with you at an early stage and coordinate them with your production schedule. The same applies to our spare parts: We only use original parts of the highest quality.

There for you in every respect

- Individual service concept tailored to your requirements for the quality control process
- Telephone hotline and remote support
- On-site service in 21 countries and in your national language
- If required, individual instruction during initial commissioning, customized task programming and product trainings (user training)
- Customized inspection contracts with scheduled maintenance
- Recertification and calibration service for reliable measurement results
- Provision of rental equipment on request*

* Only for selected devices and in selected subsidiaries.

Get in touch with us! We're happy to provide personal advice. **sales@helmut-fischer.com**

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- Subsidiaries
- Authorized distributors

Made in Germany! Our measuring devices and software as well as all accessories are developed, produced, and continuously optimized in-house – always with the goal to make our customer's world measurably easier.

Our experienced staff will be happy to advise you on site and in your national language. Please find your personal contact at www.helmut-fischer.com

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