



# 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, GER*



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

Sometimes the smallest detail determines success. As structures shrink but the demands on them grow, rigorous quality control takes on a whole new level of importance. Whether for coating thickness measurement, material analysis or material testing, Helmut Fischer has been your partner of choice for automated measurement technology for 70 years. Together with you, we develop customized (partially) automated measuring solutions that can be seamlessly integrated into your system to make your onsite work immensely easier.

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

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

---

Helmut Fischer – Measuring Made Easy	6–7
The Fischer Advantage	8–9
Many applications, a solution for everyone	10–11
Product overview table	12–13
FISCHERSCOPE® X-RAY 5000 series	14–15
FISCHERSCOPE® X-RAY 4000 series	16–17
FISCHERSCOPE® X-RAY XDV®-μ SEMI	18–19
FISCHERSCOPE® MMS® Automation	20–21
FISCHERSCOPE® MMS® Automation Modules and Probes	22–23
FISCHERSCOPE® XAN® LIQUID ANALYZER	24–25
Special Solutions	26–27
Test methods at a glance	28–31
Standards you can rely on	32
Everything concerning your measuring task	33
A reliable partner for the entire life of your device	34–35

---

## FISCHER TRUSTED BRANDS

---

FISCHERSCOPE®  
MMS®  
NICKELSCOPE®  
PERMASCOPE®  
PHASCOPE®  
SIGMASCOPE®  
SR-SCOPE®  
TERASCOPE®  
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, Helmut Fischer 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 matched 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 a large dealer network, 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, then you should work with quality tools. For many decades, Helmut Fischer has stood for outstanding products at the highest level. Absolutely reliable measurement values – that is our promise to our customers. That is why we develop our measuring instruments in-house and produce most of them at our company headquarters in Germany. And 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 impacts to a minimum. Whether recycling or upcycling, corresponding material and energy savings are not only to the benefit of the environment, but also of our customers.

## HOW IT ALL BEGAN ...



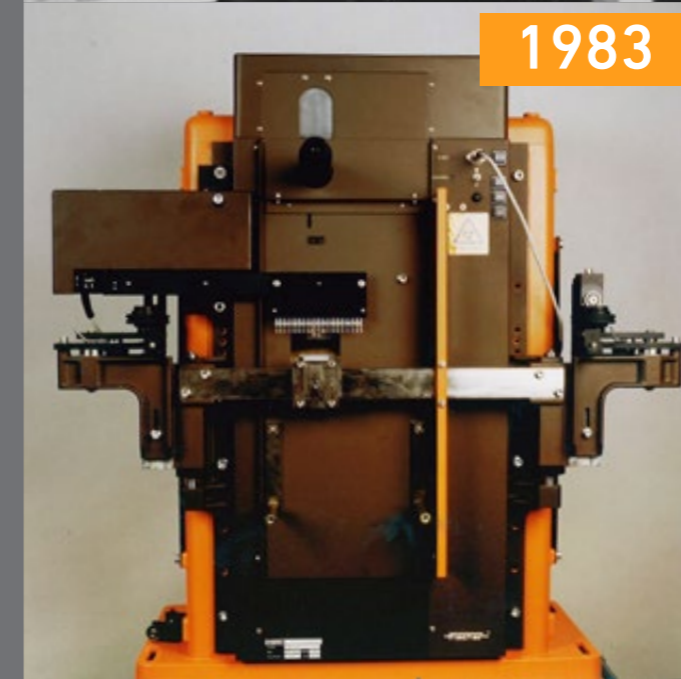
1953

### The ambitious start

Helmut Fischer 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.



1983

### The innovations

At the beginning of the 1980s, Fischer greatly expanded its product range. In 1982, the first XRF X-ray fluorescence measuring instrument was launched. Further measuring and testing devices in the fields of nanoindentation and scratch testing, as well as automated measuring solutions, 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.



TODAY

### The life's work

It has always been important to Helmut Fischer to build instruments that will last for many years. The company itself should be just as durable. Our declared goal is to develop measuring instruments 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, Helmut Fischer transferred his company shares to the Helmut Fischer Foundation, which has ensured the continuity of the company and supported artists and young scientists since 2003.

# The Fischer Advantage

**Automated Fischer measurement technology:**

From retrofitting your existing plant to complete turnkey solutions

*CERTIFIED DAKKS  
CALIBRATION LABORATORY  
IN GERMANY*

**Universal software**

**WinFTM®:** Most powerful application software for coating thickness measurement and material analysis on the market

*HIGHEST QUALITY –  
MADE BY FISCHER*

**Concentrated competence in measurement technology and automation from a single source:**

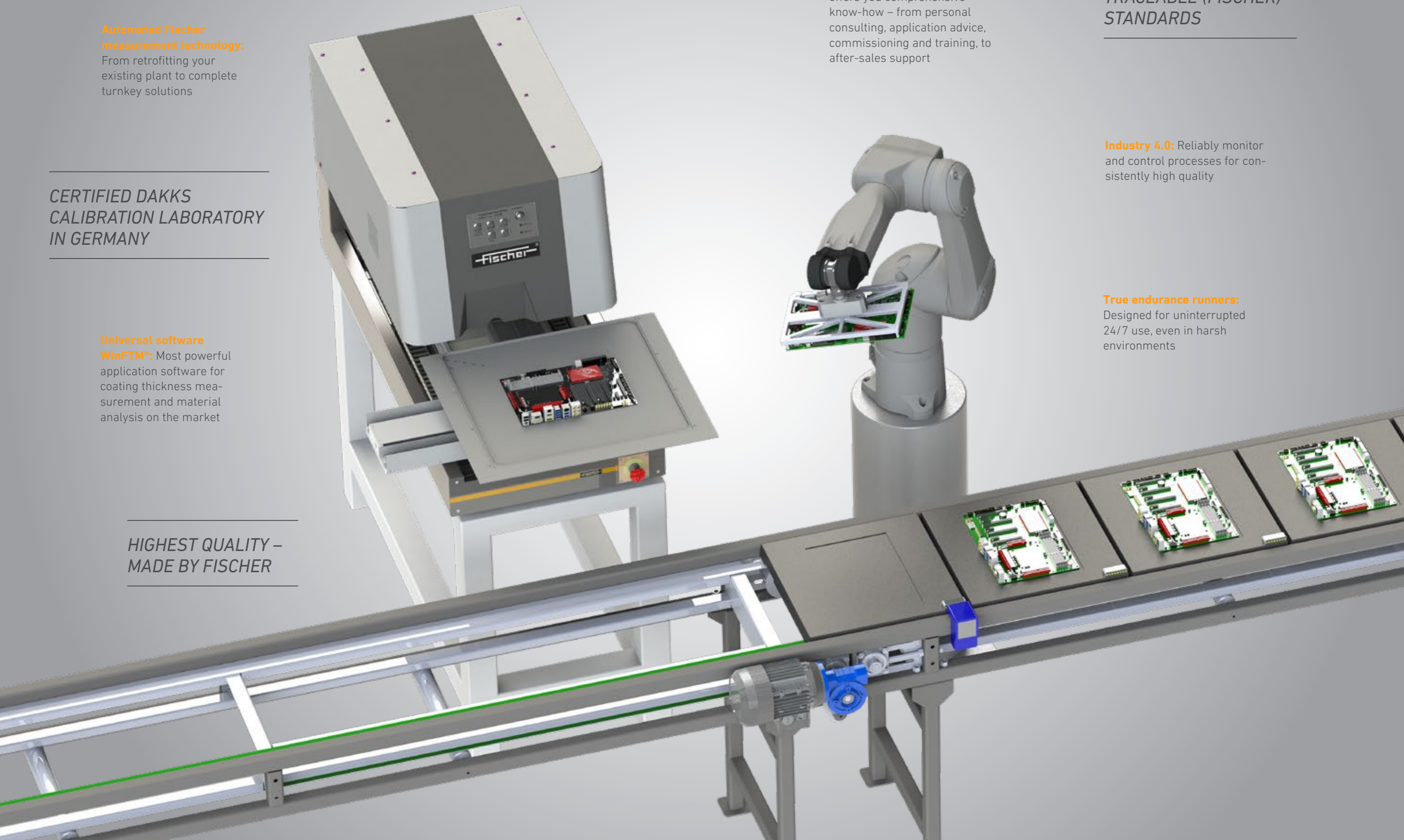
Our team of experts offers you comprehensive know-how – from personal consulting, application advice, commissioning and training, to after-sales support

*CALIBRATION WITH  
TRACEABLE (FISCHER)  
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 – for example platinum – on the proton exchange membrane are part of the heart of a fuel cell. Our automated measuring systems continuously monitors the precious metal content inline to ensure consistent quality with minimum material input.

**Connectors:** Plug contacts are often made of electroplated strip material. By measuring during production with the FISCHERSCOPE® X-RAY 4000 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.

**Lacquer multilayers:** With the TERASCOPE® organic single and multiple layers on plastic or metal on plastic or metal substrates can be measured contactless and quickly. The terahertz measurement method allows the separate measurement of coating thickness, e.g. of paint buildup on car bodies and other components as well as material characterization.

**Solar cells:** Thin-film solar cells consist of complex, functional multi-layer systems. Fischer's inline measurements reliably measure the optimal function of, for example, CIGS, CdTe or perovskite solar cells. Minor deviations are detected precisely and immediately. Corrective measures can be initiated.

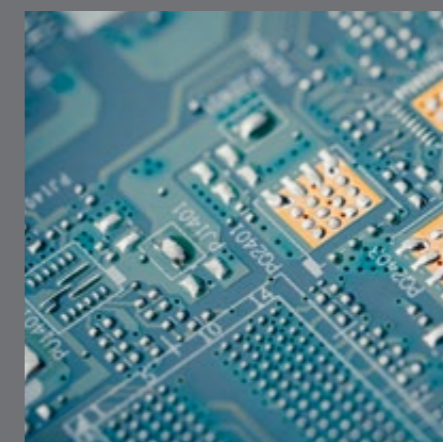
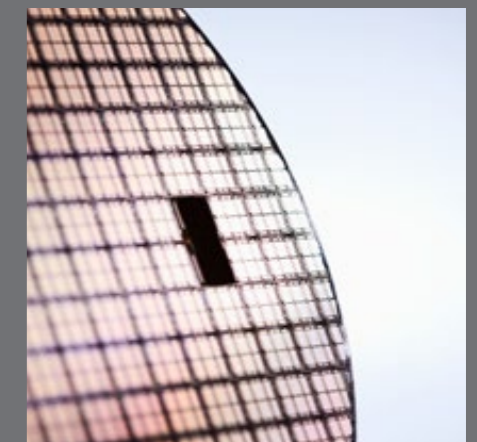
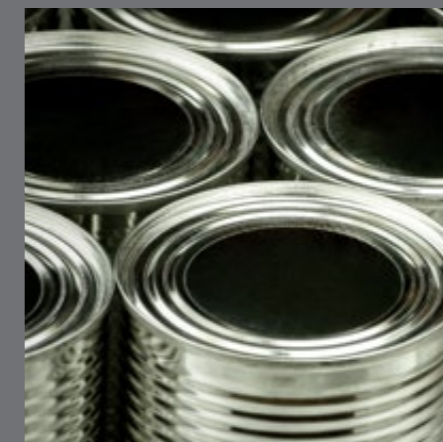
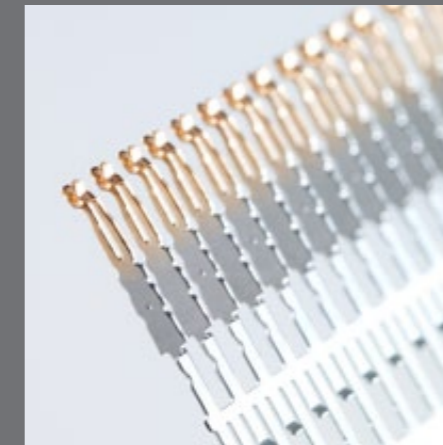
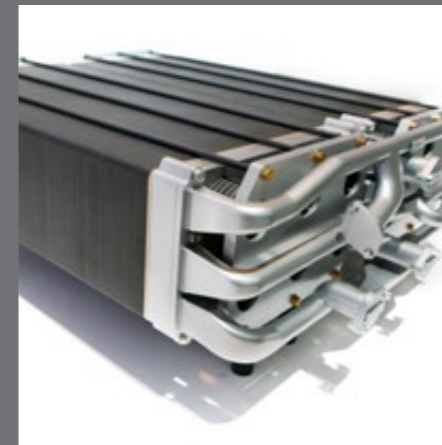
**Packaging films:** Food packaging requires complex manufacturing processes due to various specifications. At Fischer you will find proven measuring solutions to ensure the correct coating thickness. The FISCHERSCOPE® X-RAY 5400 can be mounted on vacuum systems, detecting the smallest changes in the 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.




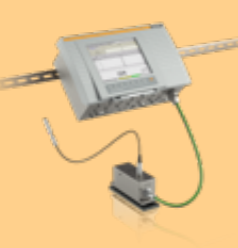


**Galvanic baths:** Put an end to wet chemistry, laborious and time-consuming measurements to analyze your electroplating baths. Analyze the metal content of your bath composition fully automated by Fischer in seconds using X-ray fluorescence analysis. This makes solution analysis more precise, faster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

**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.



## Product overview table

<b>Components</b>		<b>FISCHERSCOPE® X-RAY 5000 SERIES</b>
<b>Pre-engineered solution</b>		<b>FISCHERSCOPE® X-RAY 4000 SERIES</b>
		<b>FISCHERSCOPE® X-RAY XDV®-µ SEMI</b>
		<b>FISCHERSCOPE® MMS® AUTOMATION</b>
		<b>FISCHERSCOPE® XAN® LIQUID ANALYZER</b>
<b>Special machinery</b>		<b>SPECIAL SOLUTIONS</b>

Inline measurement with highest precision for thin layers	Measuring device as a pure component for integration into an existing plant	<b>p. 14–15</b>
Inline measurement with maximum endurance		<b>p. 16–17</b>
First choice for automated wafer measurement	<ul style="list-style-type: none"> <li>■ Existing hardware and software design</li> <li>■ Can be used as a stand-alone unit, or can be integrated modularly into existing or new production lines</li> </ul>	<b>p. 18–19</b>
The inline all-rounder: Multi-measuring system	<ul style="list-style-type: none"> <li>■ Modifiable and adaptable according to your requirement</li> <li>■ DPP+ digital pulse processor for higher count rates and significantly shortened measuring times</li> </ul>	<b>p. 20–23</b>
Efficient inline solution analysis for electroplating baths		<b>p. 24–25</b>
Individual measurement technology tailored to your requirements	<ul style="list-style-type: none"> <li>■ Completely customized designed system solution</li> <li>■ Use of existing Fischer measurement technology in the customer's plant design</li> <li>■ Special mechanical engineering</li> </ul>	<b>p. 26–27</b>

# 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

**DPP+ digital pulse processor:** Shorter measuring times or improvement of standard deviation



Quality control of solar panels

## Inline measurement with utmost precision for thin layers

The FISCHERSCOPE® X-RAY 5000 series is the perfect choice for non-destructive analysis and measurement of thin coatings on large-area products and substrates, such as in photovoltaics, fuel cells, on glass panels, films and tapes and very hot surfaces. The instruments of this series form modular units that can be easily integrated into manufacturing production lines. Their rugged design specifically meets the tough demands of industrial environments and for continuous operation.



FISCHERSCOPE® X-RAY 5100 Scanner



Simultaneous measurement by several FISCHERSCOPE® X-RAY 5100

Designed for automation, the measuring heads can be easily mounted on vacuum chambers via an ISO 250F flange or integrated inline in atmosphere. Calibration is quick and easy during the production process. With large apertures, state-of-the-art detectors and ultra-fast pulse processing, you benefit from excellent repeatability. The measuring heads can be integrated into existing lines or supplied as a complete customized 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<sup>2</sup> for highest precision on thin layers as well as Peltier cooling
- DPP+ digital pulse processor 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® 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

**DPP+ digital pulse processor:** Shorter measuring times or improvement of standard deviation



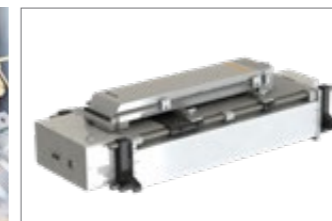
Electroplated stamped strip

## Inline measurement with maximum endurance

The FISCHERSCOPE® X-RAY 4000 series is developed for the continuous and non-destructive analysis and measurement of layers and layer systems in manufacturing processes. Designed for industrial requirements, the inline measuring system is used in production sites for the measurement of electroplated layers on solid and stamped strips. It also works with formed and stamped contact surfaces and measures the electrical contacts on strip materials or on membranes for fuel cells.



Stamped strip



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, stamped grids or coated membranes, from a few millimeters up to one meter wide
- Microfocus tube with tungsten anode; molybdenum anode optional
- 2-fold or 4-fold changeable apertures
- 6-fold changeable filter
- Silicon drift detector 50 mm<sup>2</sup> for highest precision on thin layers
- DPP+ digital pulse processor 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
- TCP/IP interface for process control

# FISCHERSCOPE® X-RAY XDV®-μ SEMI

## Fully automated:

Robot-controlled handling excludes human influences

**Tailor-made:** Customizable to your application

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

## Easy maintenance:

Large service hatches for access to individual components

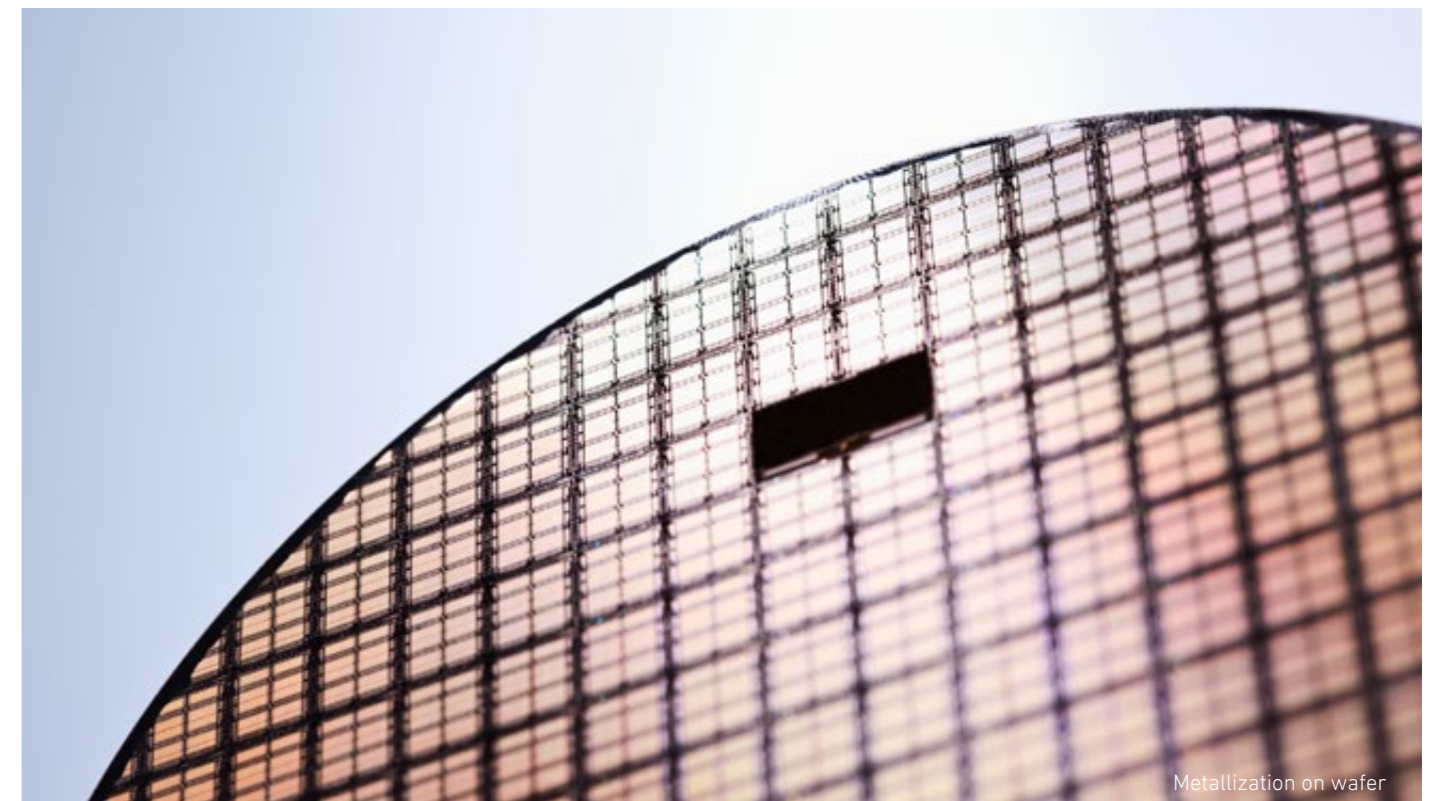
## Clean room compatible:

No contamination of the wafers as well as constant measuring conditions

## Most advanced polycapillary optics on the market:

Our in-house manufactured polycapillaries deliver outstanding measurement results with short measurement times

**Programmable:** Automatic recognition and approach of the measuring points



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 with molybdenum anode; tungsten anode optional
- 4-fold changeable filter
- Polycapillary optics allow particularly small measuring spots of 10 or 20 μm half-width at high intensity with short measuring times
- Silicon drift detector 50 mm<sup>2</sup> 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

# FISCHERSCOPE® MMS® AUTOMATION

## Easy integration:

Proven Fischer measurement technology in automation solutions

## Multi-channel measurement:

Four probes of the same type can be used parallel in one application

## Well connected:

Standardized connection to PLC control

## Measurement over long distances:

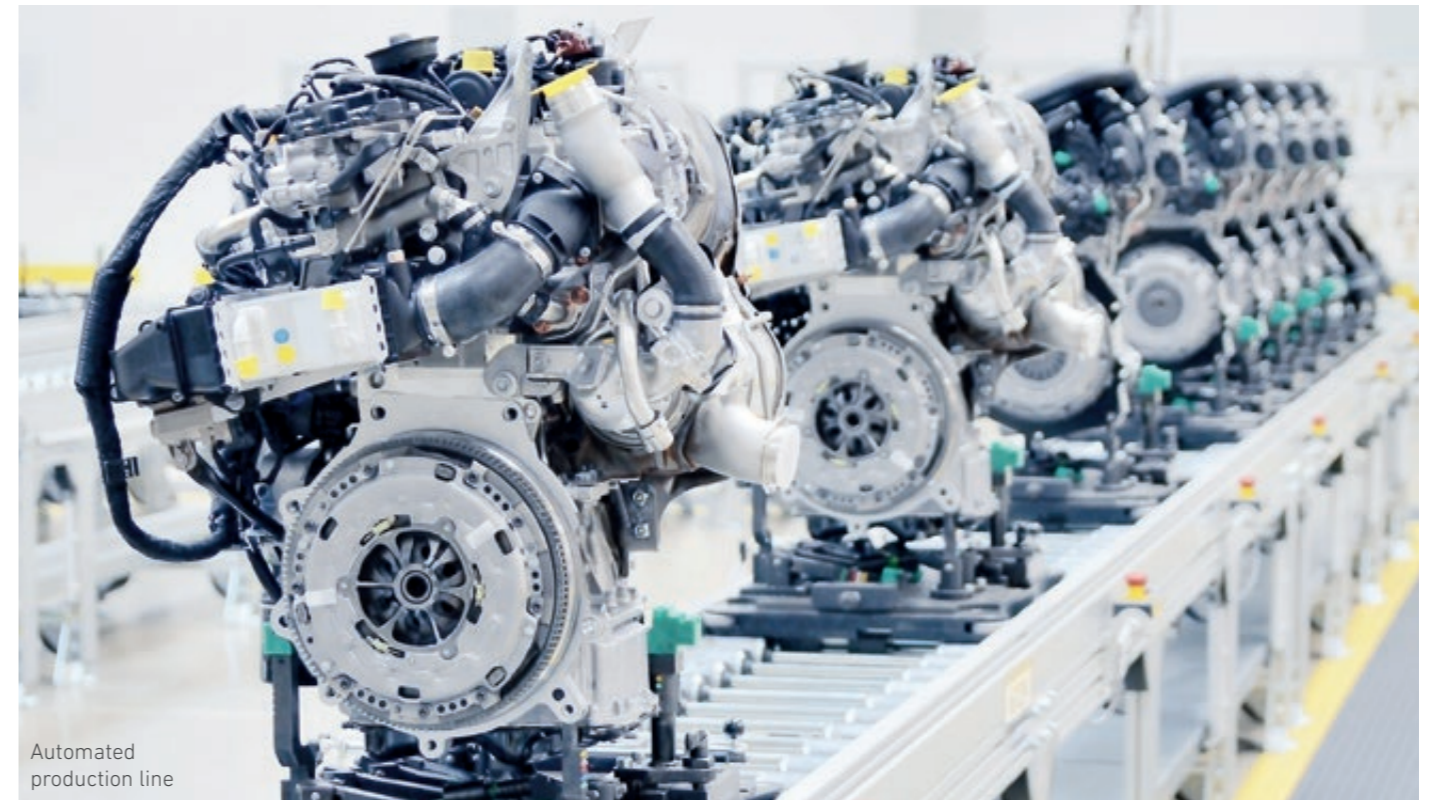
Drag chain capable cables up to 30 m length

## 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 specially designed for automated coating thickness measuring and material testing. The modular measuring system consists of three parts: The measured values are taken by probes mounted on a robot arm; the signals are transmitted to the basic unit via a digitizing unit – the MMS® module; the basic unit is mounted in the control cabinet and is responsible for monitoring. The entire system communicates with higher-level units via an RS232 interface.

Due to its modular design, the MMS® Automation provides maximum flexibility: You can equip the system with up to four different modules and probes to solve a variety of measurement 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. The system is fully remote controllable and designed for industrial use. With long cables suitable for drag chains, the device can be placed far away from the measuring station.



Measuring module and probe are mounted directly on an inline measuring station or a robot (see above)

## 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: 1,000,000 in 1,000 batches
- Measurement range: Depending on the combination of coating and base material and the used probe
- Multi-channel measurement of up to four identical probes in one application
- Various interfaces for process control
- Remotely controllable by PLC control system
- Probes for various applications available



## VIDEO:

Scan QR code and learn more about the FISCHERSCOPE® MMS® Automation.

# FISCHERSCOPE® MMS® Automation Modules

Whether you want to measure the paint layer 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 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 26.



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.

We offer you a comprehensive range of high-precision probes for coating thickness measurement and material testing. From over 100 standard probes and numerous special probes, we will work with you to find the right probe for your measuring task. 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.

Our experts will be happy to advise you on the selection of the right probe for your application. If required, we also develop individual special designs.

[sales@helmut-fischer.com](mailto: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. 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

# 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

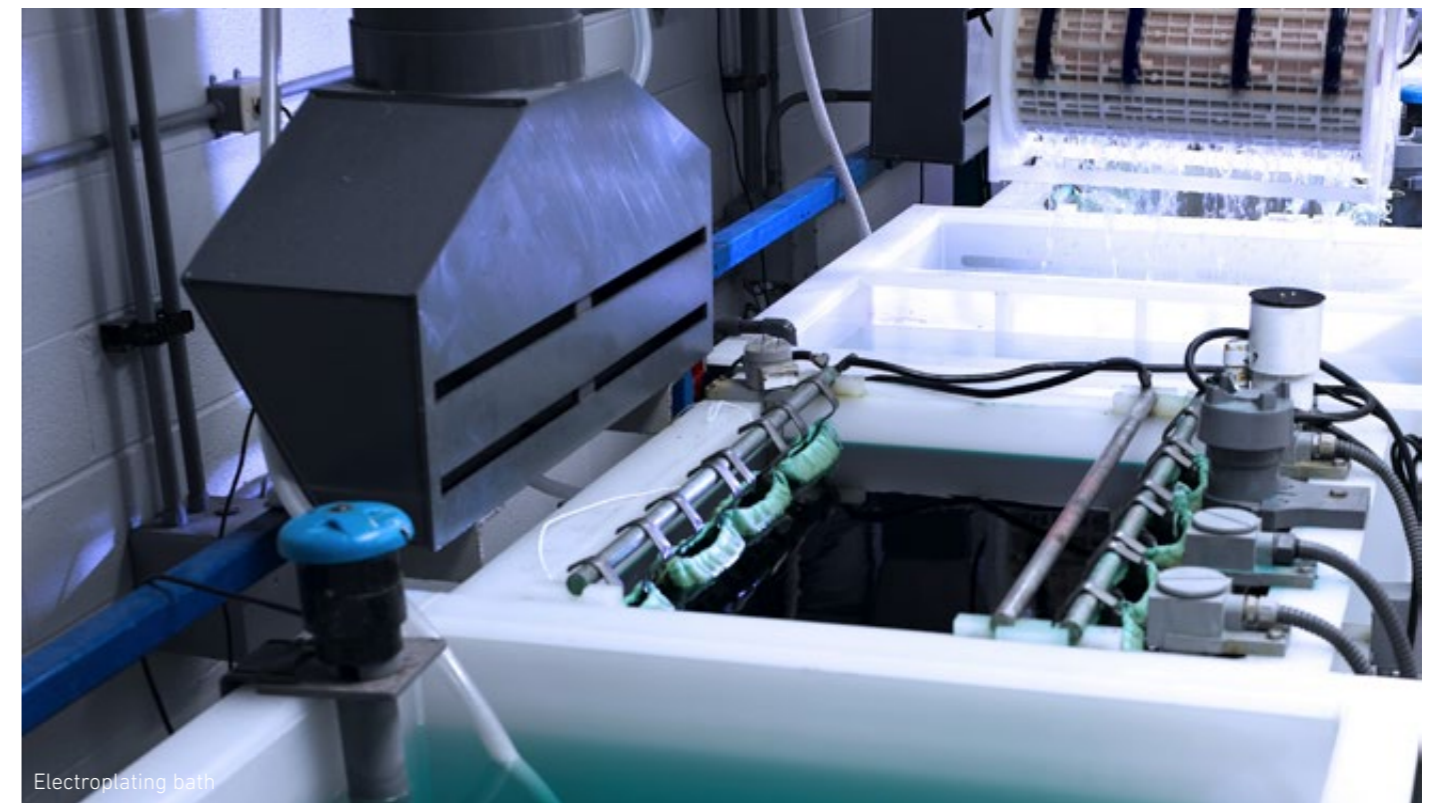
**Maximum service life:** High availability of  $\geq 1$  year\* due to innovative design and material selection

**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

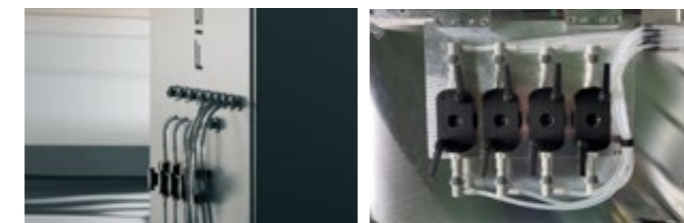
**Safety in real time:** Live measurement results as well as simple and fast documentation of these



Electroplating bath

## Efficient inline solution analysis for electroplating baths

With the FISCHERSCOPE® XAN® LIQUID ANALYZER you have your electroplating baths continuously in view – for an efficient control of your plating line. The high-precision inline measuring device enables the measurement of a wide range of metallic bath solutions, such as zinc, nickel, zinc/nickel, gold, palladium, chrome or even rhodium.



Closed Loop System

Sophisticated and patented flow cell

Each electroplating bath has its own supply line to the respective measuring cell to prevent contamination. The low-maintenance device can be used flexibly in an industrial production environment as well as a complex multi-channel inline measuring system with full integration into a local production control system (MES). The device enables continuously accurate results 24/7. Measurement data is provided quickly, easily and in real time via fieldbus interface. The data is visualized, quickly recognizable, centrally at the device and at the control station or decentrally. 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<sup>2</sup> 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
- WLAN connectivity



### VIDEO AND LANDING PAGE:

Scan the QR code and learn more about the FISCHERSCOPE® XAN® LIQUID ANALYZER.

\* Depending on, among other things, rinsing and cleaning cycles as well as composition of the plating baths.

# SPECIAL SOLUTIONS

## Automation at its best:

Measuring solutions for coating thickness measurement, material analysis, conductivity, IO/ NIO evaluation

## Tailor-made:

Customizable to your application

## Easy integration:

Proven Fischer measurement technology in automation solutions

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



Note: Image shows a conceptual solution only.

## Customer inquiry

Concept draw  
Go / No go  
Requirements engineering  
Calculation and quotation  
Order entry

## Project Kick-off

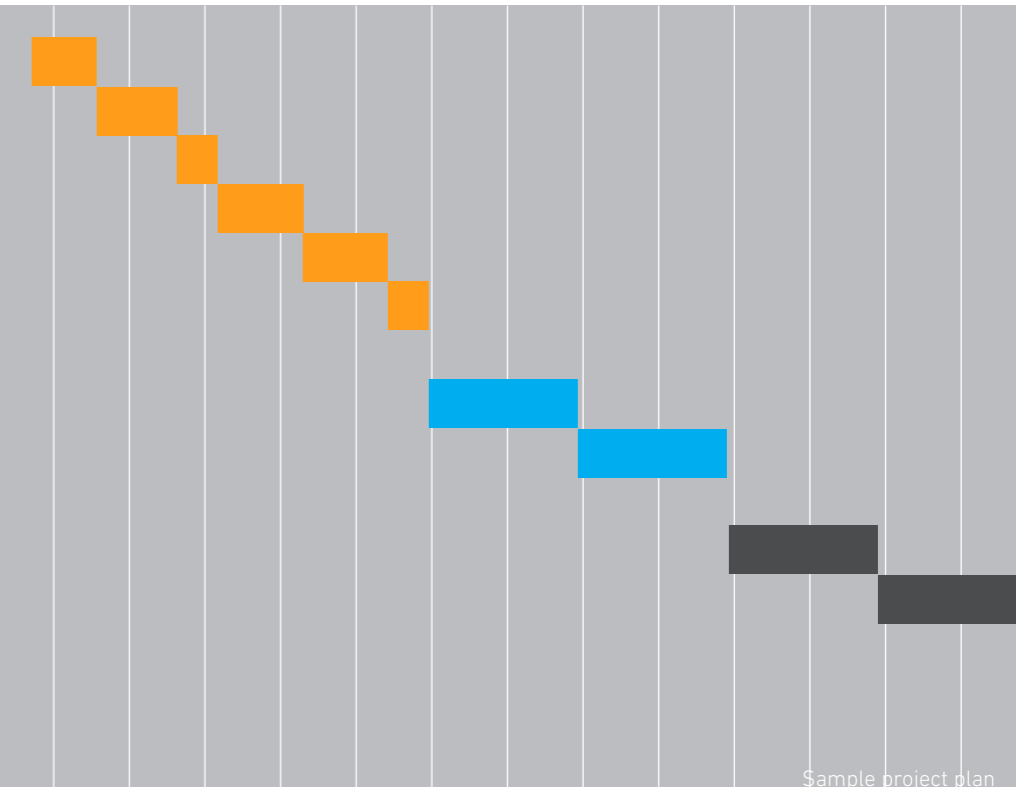
Project planning  
Design-phase

## Design freeze

Procurement  
Assembly  
Commissioning

## PAT

Delivery



Sample project plan

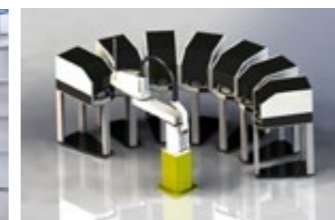
## Customized measurement technology

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, we develop customized, intelligent measuring solutions for your application: Automated, partially automated or as a stand-alone variant.

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.



Special solution with large radiation protection wall. Safety first.



Concept: Automated robot assembly of specifically adapted FISCHERSCOPE® devices

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

### Our services

- Customized special solutions for coating thickness measurement, material analysis and material testing; automated, partially automated or stand-alone
- Individual feasibility check by an application expert
- Conceptual design of your measurement solution
- Design creation through interdisciplinary team of experts
- Interface definitions: Mechanics and data
- Declaration of conformity or installation
- Consideration of radiation protection for XRF special solutions

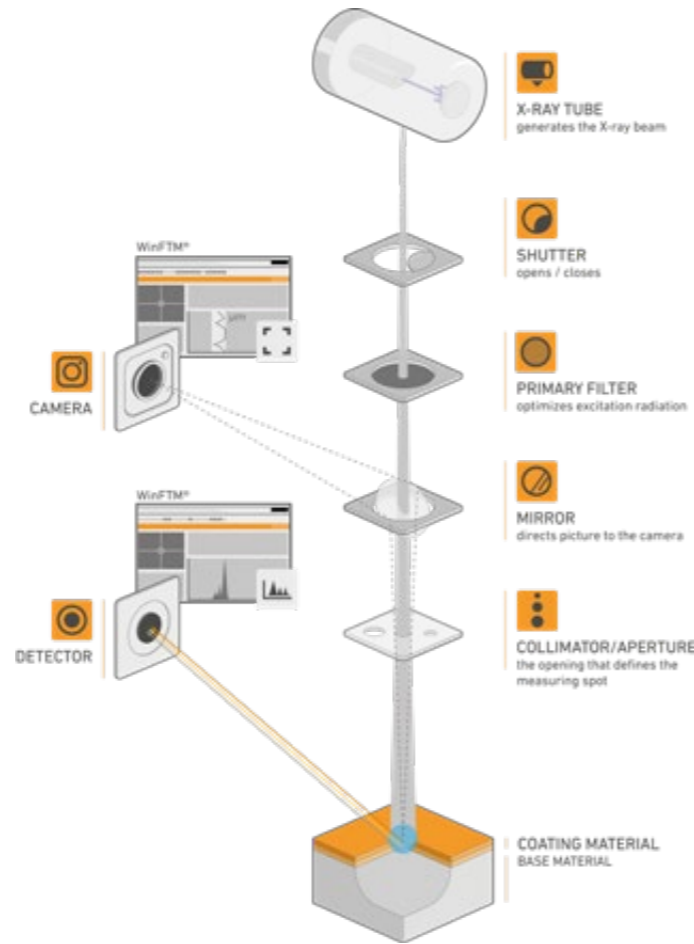
# How exactly does it work?








## Test methods at a glance

### 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.

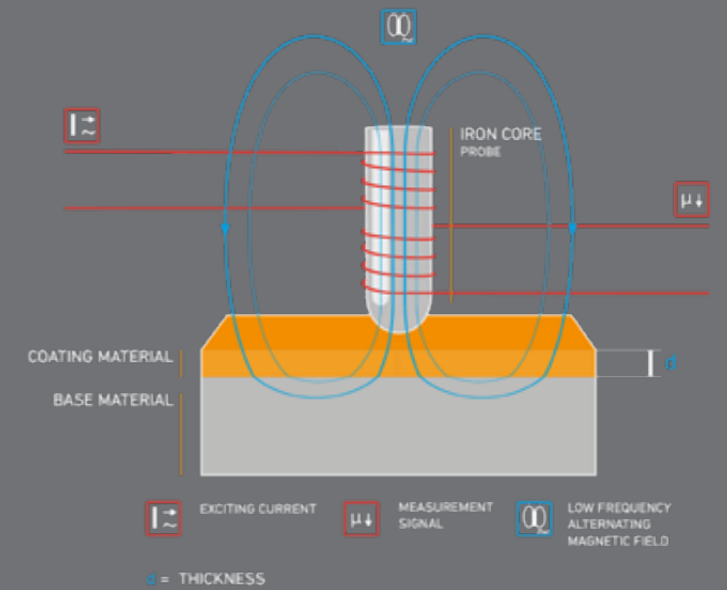
The energy level of this radiation is like a fingerprint – characteristic for the respective element. A detector measures the fluorescence radiation and digitizes the signal. Our software processes this signal and creates a spectrum. The spectrum of the emitted radiation allows conclusions to be drawn 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

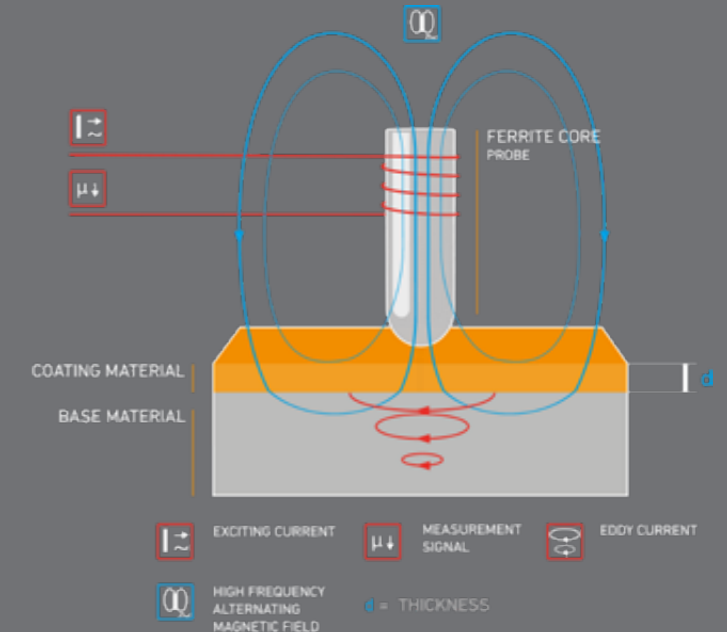
### MI Magnetic induction method

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.



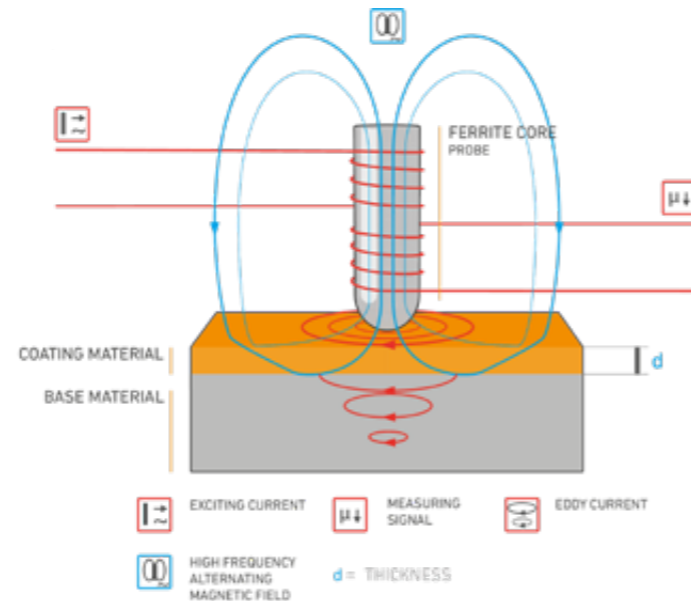
### AE Amplitude-sensitive eddy current method

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.



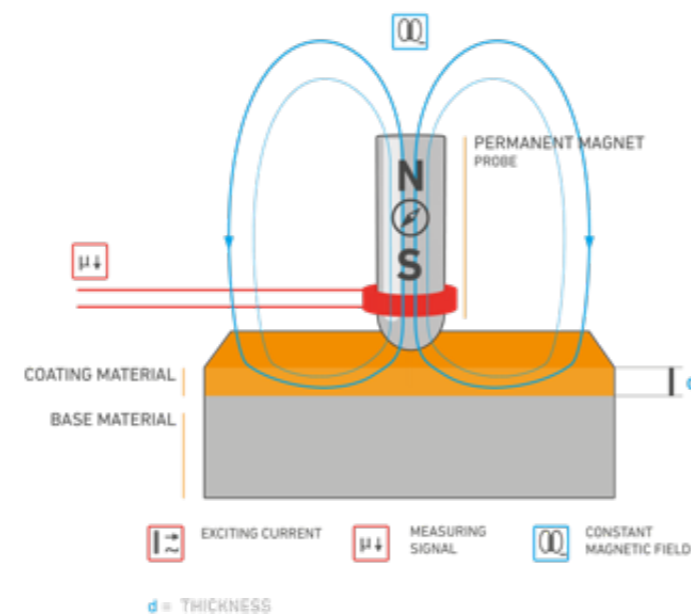
## PE Phase-sensitive eddy current method

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.



## 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.

## MR Microresistivity method

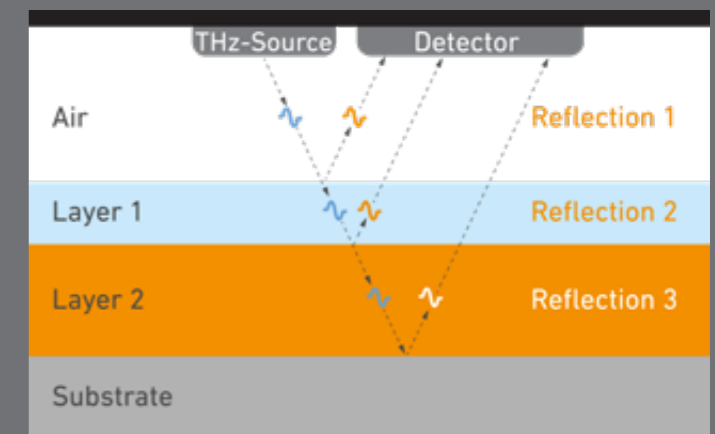
This method is suitable for measuring the thickness of electrically conductive layers on insulating substrates in accordance with ISO 14571. Copper coatings on printed circuit boards and multi-layer PCBs are frequently checked using this method. The advantage of this method is that other layers or intermediate 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.

## TH Terahertz

The terahertz radiation used consists of electromagnetic waves with frequencies between 0.1 and 10 THz. Thus, this radiation is shorter wavelength than microwaves but longer wavelength than visible light. With THz radiation, individual layers within a multilayer system can be detected separately. The terahertz radiation is generated in the measuring head by an optoelectronic unit with a laser. This emits an ultrashort THz pulse that is sent onto the sample. This pulse penetrates the different layers. At the transitions between the layers, the radiation is partially reflected. These echo pulses arrive at the detector with characteristic time differences. Since each layer and each material has specific absorption spectra, the signal characteristics can be used to precisely determine individual layers and their thickness, as well as other parameters such as homogeneity and porosity.







## Standards you can rely on

### The right measurement is what counts

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.

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.

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

### Safety through our accredited test 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), National Institute of Standards and Technology (NIST) or National Institute of Metrology (NIM), the highest quality standards are achieved. Our internationally recognized calibration certificates and certificates of analysis give you and your products the necessary security and strengthen the confidence of your customers.

### Unique service: your product as an individual calibration standard

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

Please feel free to contact us! We can advise you on suitable calibration standards and what calibration strategy to follow: [sales@helmut-fischer.com](mailto:sales@helmut-fischer.com)



## Everything concerning your measuring task

### Application advice for precise measurement results

The formula for successful quality management is: the right measurement technology paired with the appropriate test method. These traits combined with the correct application of the equipment creates reliable, valid and controlled measurements. For the examination of the complete measurement technology and your automation requirements, the feasibility and other questions concerning your measurement task, our specialists are ready to assist you.

An interdisciplinary team of about 15 people, consisting of mechanical and electrical designers, PLC and high-level language programmers 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 are well connected, both with our application laboratories and with universities, educational institutions and the industry. This is how we make sure

that the latest technology is available to you worldwide and how we ensure that we find the right answer to your question.

### Our services at a glance

- Realization of feasibility studies on real parts to identify optimal measurement solutions
- Conceptual design of your request together with our team of experts
- Support and training in the use of our measuring instruments, e. g. operation, calibration and new measuring tasks
- Individual task programming
- Safety first: Our safety concepts, in particular for radiation protection, comply with applicable standards and regulations and protect you and your employees



## A reliable partner for the entire life of your instrument

### All-around, worry-free package with maximum flexibility

For 70 years, we have been there for our customers with outstanding products and unparalleled 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 equipment. With our training courses and product training, you will learn how to get the most out of your devices.

### The advantages of regular inspections

To ensure that your instruments stay with you over a long period of time and provide reliable measured values, we recommend regular inspections – ideally on an annual basis. All inspections are carried out by our trained and experienced service personnel. Thanks to our worldwide support network, we can be flexibly deployed in your vicinity, enabling us to provide individual advice and onsite support with fast response times.

Through regular inspections, you extend not only the life of your device, but also keep your downtimes to a min-

imum. We plan your inspection times together with you at an early stage and take your production schedule into account. To ensure that you remain able to measure, we are happy to provide you with a rental device to bridge any inspection or repair. The same applies to our spare parts: We only use original parts that are protected by our Fischer parts warranty.

### There for you in every respect

- Telephone hotline and online diagnosis
- Regional service centers – worldwide
- On-site service in 21 countries
- Individual product training
- Customized inspection contracts
- Recertification and calibration service for reliable measurement results
- Scheduled maintenance
- Individualized task programming
- Provision of rental equipment upon request (only for selected devices and in selected subsidiaries)

“ At Fischer, the customer relationship does not end with the sale of an instrument – that is only when it begins. ”

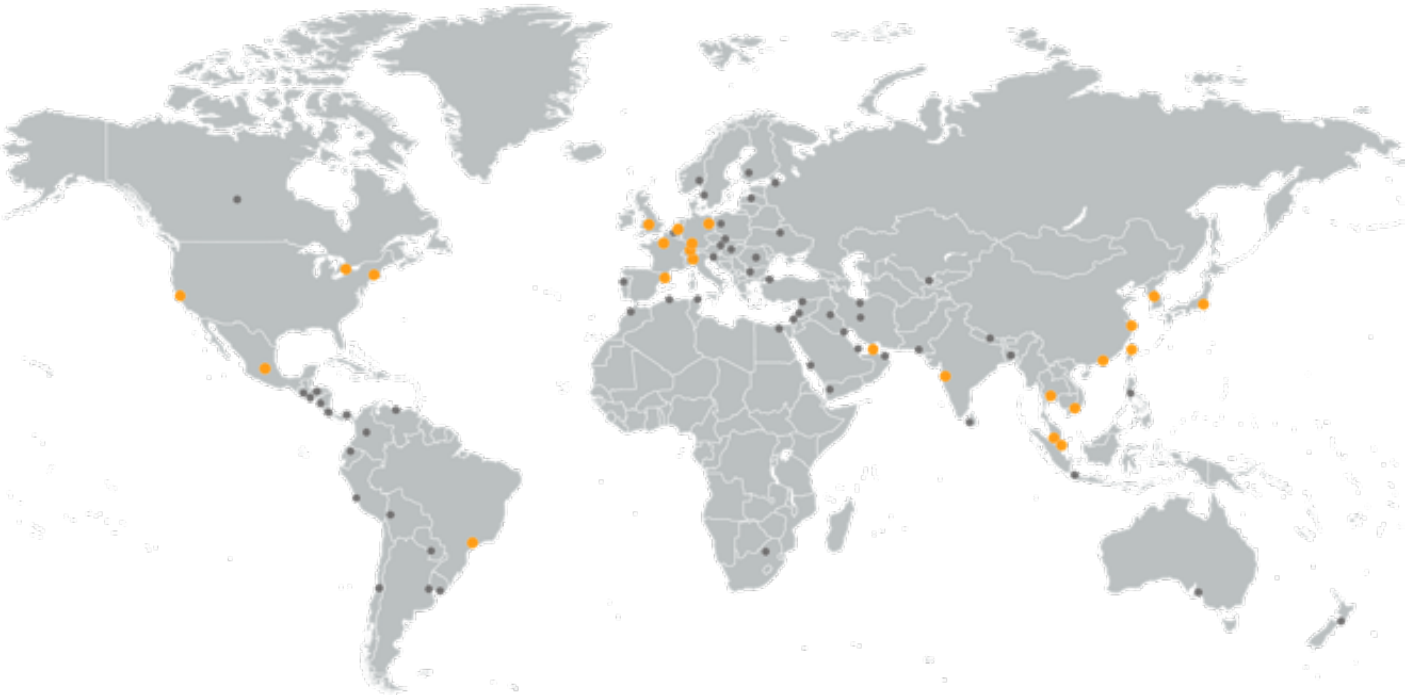
*Paul Comer, Technical Director at Graphic Plc, England*



**Do you need technically sound advice?  
Then contact us!**  
sales@helmut-fischer.com

You can find us in:

**AFRICA | ASIA | AUSTRALIA | EUROPE | NORTH AMERICA | SOUTH AMERICA**



● Subsidiary






● Authorized Distributor

**Our measuring instruments, software and accessories are developed, produced and constantly optimized in-house. The goal is to make the world of our customers measurably easier – made in Germany!**

**Our experienced staff will be happy to advise you locally and in your national language. Please find your personal contact at:**

[www.helmut-fischer.com](http://www.helmut-fischer.com)



-  [linkedin.com/company/helmut-fischer-global](https://www.linkedin.com/company/helmut-fischer-global)
-  [www.facebook.com/helmutfischerglobal](https://www.facebook.com/helmutfischerglobal)
-  [www.youtube.com/helmutfischerglobal](https://www.youtube.com/helmutfischerglobal)
-  [www.instagram.com/helmutfischerglobal](https://www.instagram.com/helmutfischerglobal)
-  [twitter.com/helmutfischerGl](https://twitter.com/helmutfischerGl)

**Global Sales, Application and Service**