



# Automated Measurement Solutions

Customized for coating thickness measurement and material analysis

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## Measuring Made Easy

Sometimes it's the smallest detail that determines success. As structures get ever smaller and requirements ever tougher, rigorous quality control takes on a whole new level of importance.

Whether for coating thickness measurement or material analysis, Fischer is your partner for automated measurement technology. Working closely with you, we develop reliable solutions that are not only economical and precise, but also make your work as easy as possible.

**So you can focus on what really counts – your products.**









## At the beating heart of your manufacturing

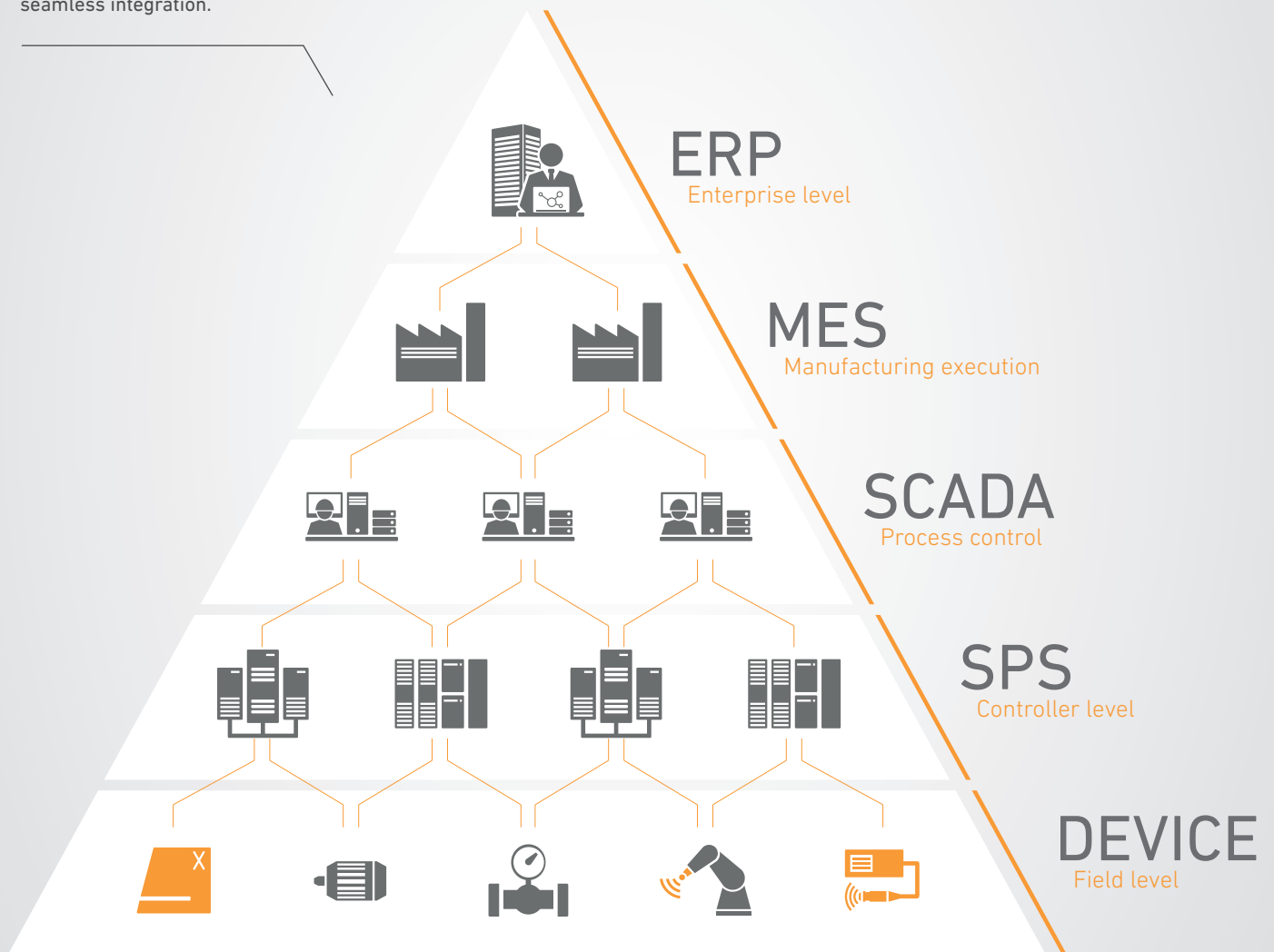
Whether in the automotive, electronics or electroplating industry, robots are increasingly being utilized in areas where repetitive sequences must be carried out with both precision and speed. Not only does this raise the quality, it also reduces costs, since the processes can be continually optimized under constant conditions..

For this vision to become reality, quality control has to keep pace with production. It requires powerful and fully integrated measurement technology. And here, Fischer offers tailor-made solutions: from cleanroom-compatible measuring systems for automated chip production to robot-assisted probes for paint thickness measurement. And Fischer solutions can be integrated seamlessly across all levels of your system.



# From the fieldbus level to the ERP

**The Internet of Things:**  
Networking is what turns a production line into a smart factory. Fischer measuring systems are equipped with all the common interfaces to ensure seamless integration.



# Put your trust in automation – rely on Fischer

**At Fischer, we set our sights on automated quality control some 25 years ago. Since the early 1980s, we've offered sophisticated, automated measuring systems – from standard units to individually tailored solutions.**

Automation also requires increasing the interlinkage between production processes and information technology: in today's smart factory, the Internet of Things connects machines, measurement systems, components and the products themselves. The systems can communicate with each other at every phase of the value chain. That means that comprehensive data is available at each step, so the finished product can be traced all the way back to the raw materials, if necessary.

## **Efficiency on the rise**

Networking not only makes your production transparent, it also helps it to work more efficiently. That's why many modern factories rely on inline quality inspection. So if, for example, the coating thickness in an electroplating shop changes over time, automated measuring systems detect the drift and report it to the control unit, which corrects the coating process in real time.

And this not only helps prevent rejects, it lets you set the target value for the coating closer to the lower limit. Especially when expensive materials like gold are being used, the system quickly pays for itself through savings in raw materials alone.

## **A solution as individual as your task: from as simple as possible to as complex as necessary**

Every one of Fischer's automated measurement systems is developed in close cooperation with our customers. How fast do you want to measure, and how precisely? Online or inline? Random sampling or 100% control? Our experts will discuss these questions with you in order to find the best measurement solution for your task.

Worldwide, small and medium-sized enterprises form the very backbone of the industry. And they often still rely on traditional production processes. But there are also ways for SMES to benefit from the advantages of the intelligent manufacturing without having to retool your whole factory all at once.

To this end, Fischer offers cost-effective X-ray fluorescence measurement systems with automated features. For example, the X-RAY XDV® SDD is equipped with a programmable measuring stage and image recognition software. The device finds the given measuring positions independently and is thus able to work autonomously for longer periods of time. For further information, see our FISCHERSCOPE® X-RAY SERIES product overview or contact one of our experts.









## From industrialization to automation

When Henry Ford first implemented conveyor-belt production in his factory some 100 years ago in the USA, he could not possibly have imagined that, only a few generations later, there would be individually-configured cars rolling off assembly lines – with everything entirely automated. Progress like that is only possible when the quality control is really tight, and this requires measuring devices that can do more than just measure! That's why Fischer offers fully integrable measurement solutions for inspecting surfaces quickly and under constant conditions.





## The best probe for every measuring task

### Special probes for

- Curved surfaces and small samples
- Soft coatings
- Especially thin layers just a few micrometers thick
- Simultaneous measurement of zinc and paint coatings on car bodies
- Measurements on multilayer PCBs
- Measuring electrical conductivity

### We've been thinking about the future for 65 years

The Helmut Fischer Group is a global market leader in high-precision measurement technology. Since the 1950s, we have developed devices that can test coating thicknesses – non-destructively – using the magnetic-inductive and eddy-current methods.

Over the course of the past six-plus decades, Fischer has perfected this technology; today we offer automated systems that meet all industrial requirements.

At the heart of any electromagnetic measuring system lies the probe; this is what generates the signal that's subsequently evaluated. That's why, depending on the application, the probe must meet certain requirements and must not, for example, damage soft coatings.

Fischer offers a wide range of probes for a variety of measuring tasks. Our experts will be happy to advise you in selecting the right one for your project.



# Electromagnetic methods

**Safe and reliable:**

All automation-ready probes from Fischer are EMC-tested and extremely wear-resistant.

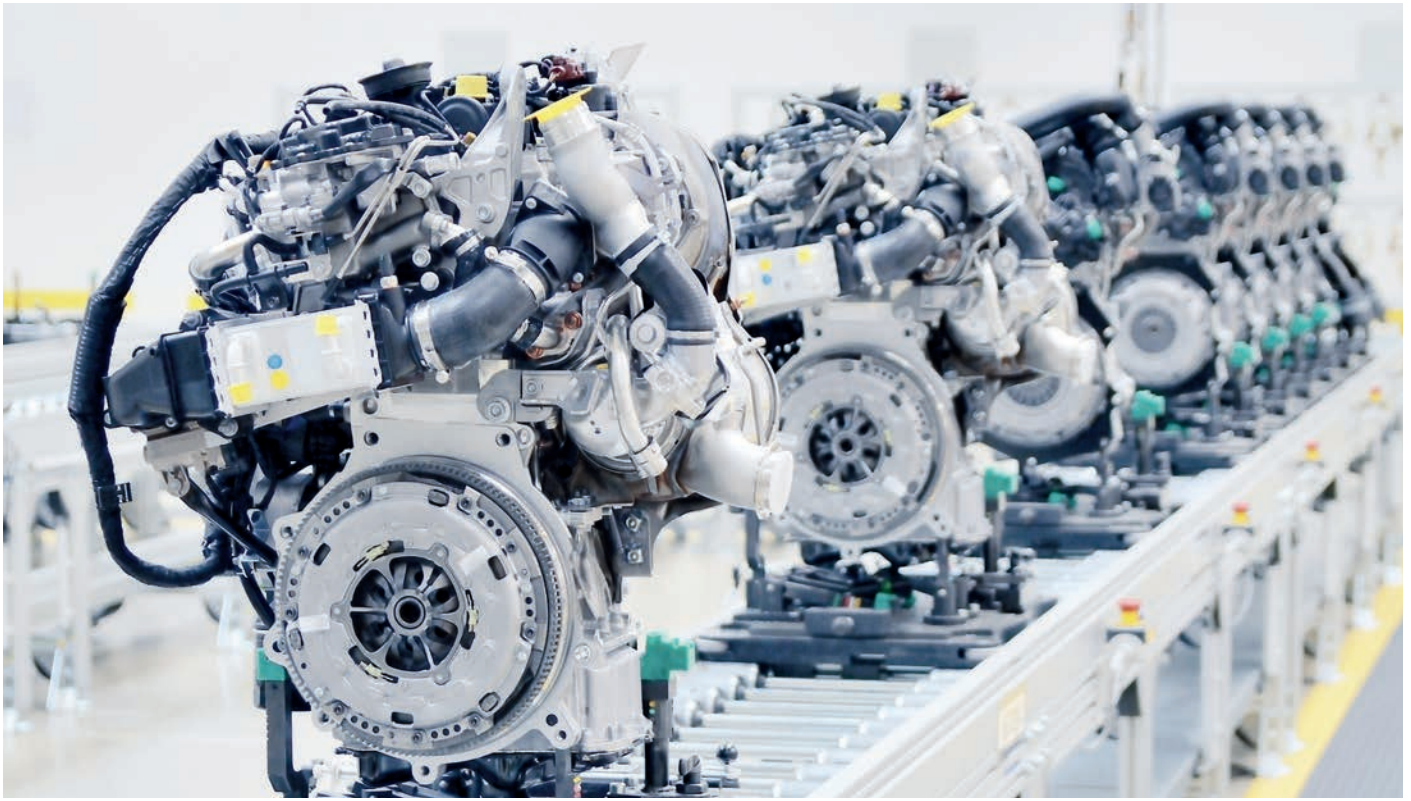


# FISCHERSCOPE® MMS® Automation



The FISCHERSCOPE MMS® Automation forms the basis for automated quality control in a wide range of applications. Here, the probe is mounted on a robot or an automated measuring stand. Because the measuring conditions remain constant, it's possible to reliably detect even very small deviations in the coating thickness. This helps you save valuable materials – day after day, year after year.





## The inline all-rounder: Multi Measuring System

### Built for automation

The MMS® Automation system is modular in build and consists of three main parts. The measured values are taken by probes mounted on a robot arm, for example. These signals are transmitted to the base unit via a digitizing unit – the MMS® module, which also determines the measuring method.

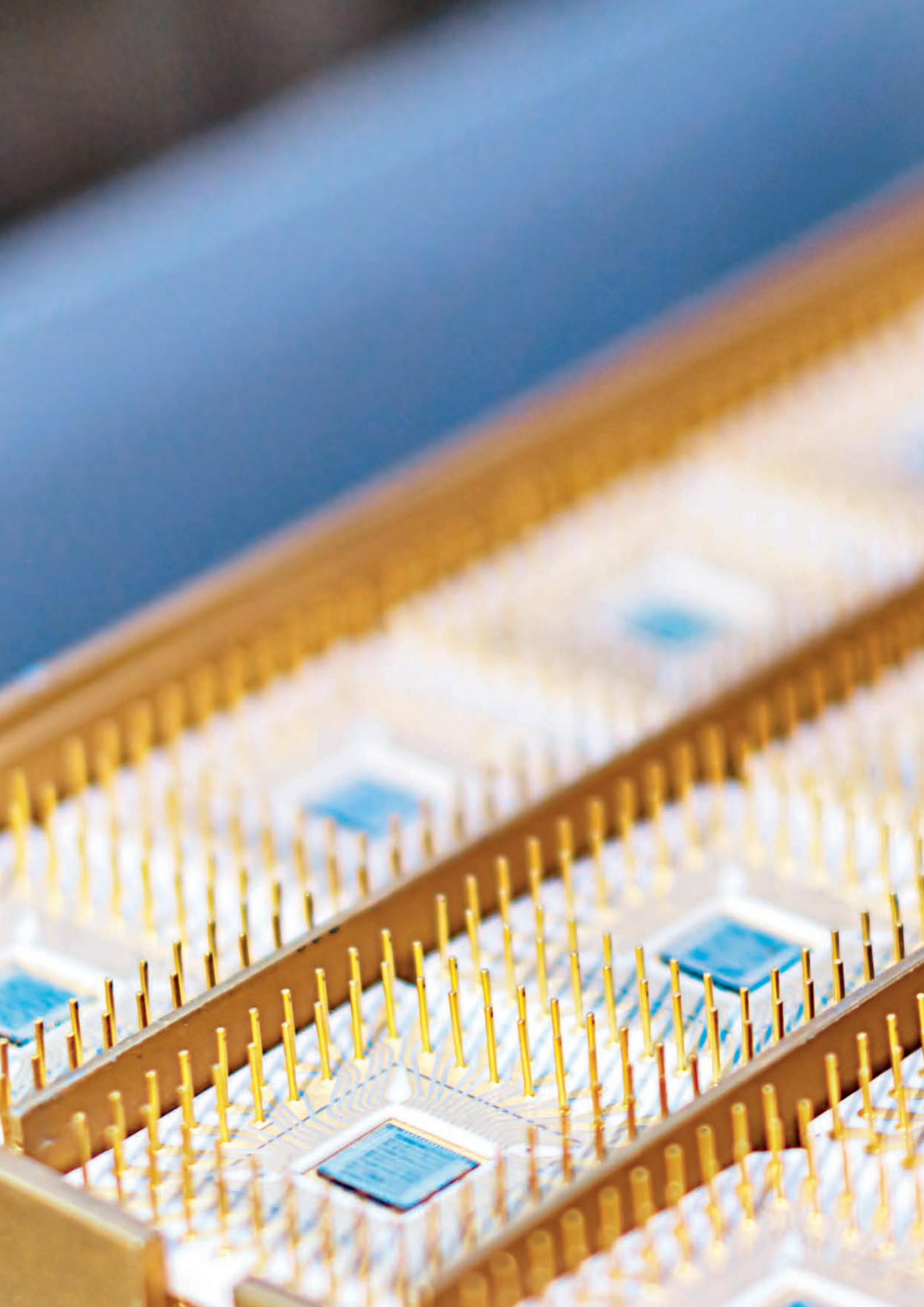
The base unit – mounted in a control cabinet – is responsible for monitoring the measurement procedure. It communicates with higher-level units via an RS-232 interface.

The MMS® Automation is designed for flexibility: for example, you can equip the system with up to 4 different modules and probes to solve a wide variety of measurement tasks. Or, you can measure simultaneously in a single application with up to four identical probes to cover a much larger number of measuring points.

Fully remote-controllable, the system is meant for heavy industrial use. With its long cables suitable for drag chains, the instrument can be placed far away from the actual measuring station, allowing it to be implemented in any manufacturing environment.

### Choose from five different MMS® modules

- The PERMASCOPE® is our versatile unit for coating thickness measurement. Typical applications: Paint layers on metals like steel or aluminum, or galvanic layers such as zinc, copper or chromium on steel
- The PHASCOPE® DUPLEX is designed especially for the automotive industry. Its specialty: the thicknesses of both the zinc and the paint layers on the car body can be measured in a single step.
- The SIGMASCOPE® determines the electrical conductivity of metals and can be used either for coating thickness measurement or for identifying non-ferrous metals.
- The SR-SCOPE® is a module designed specifically for the electronics industry to measure the thickness of individual copper layers on multilayer PCBs.
- The application area of the NICKELSCOPE® is right in its name: it measures electroplated nickel layers on non-ferrous metals and insulating base materials.







## First milli, then micro, now nano

Back in 1943, IBM's CEO, Thomas J. Watson, is supposed to have said, "I think there is a world market for maybe five computers." Back then, when the first computers were built, these gigantic calculators filled whole floors of buildings. However, the science of miniaturization is nearly as old as the field of electronics itself. Now, computers many times more powerful than the behemoths of yesteryear fit neatly into our pocket. The road there took us past relays, electron tubes and chips. Today, Fischer offers automated measurement technology for quality control of modern ICs with complex 3D structures.

# X-ray fluorescence analysis

**Focus on precision:** One of Fischer's core competencies is the development and production of high-precision capillary optics. These make it possible to focus the X-rays on measurement pots of just 10  $\mu\text{m}$ .







## Our X-RAY: perfectly suited to your measuring task

Fischer offers modular concepts to create robust and flexible measuring solutions that meet the strict requirements of a running production line. Using components that are perfectly aligned with one another, you can create instruments that are optimized for your purposes.

### Always the right detector

The quality of the detector determines which measuring tasks can be solved with a single device. Fischer offers three different types of detectors:

**Proportional counter tube:** The proportional counter is a tried-and-tested detector for simple measuring tasks, well suited for measuring thicker layers with small measuring spots.

**Silicon PIN diode:** The PIN is a mid-range detector. While it can be used for both material analysis and layer thickness measurement, it requires longer measuring times for small measuring spots.

**Silicon drift detector:** The SDD is a modern semiconductor detector with excellent resolution. Its strength lies in measuring very thin layers and in material analysis in the per mil range.

### X-ray optics

On its way from the source to the sample, the X-ray beam passes through the optics. The simplest kind of X-ray optics is an aperture. The opening of this aperture restricts the X-ray beam and thus defines the size of the measuring spot. Apertures are well suited for larger spot sizes.

With very small apertures, on the other hand, only a small amount of the radiation ever reaches the sample, so the generated X-ray fluorescence is weak. To measure accurately requires longer measuring times.

An alternative to an aperture is a polycapillary tube made of glass. The capillaries focus the entire X-ray radiation onto a small surface, which allows for short measuring times even with small measuring spots. Fischer is one of the few producers of polycapillaries worldwide.

### Primary filters

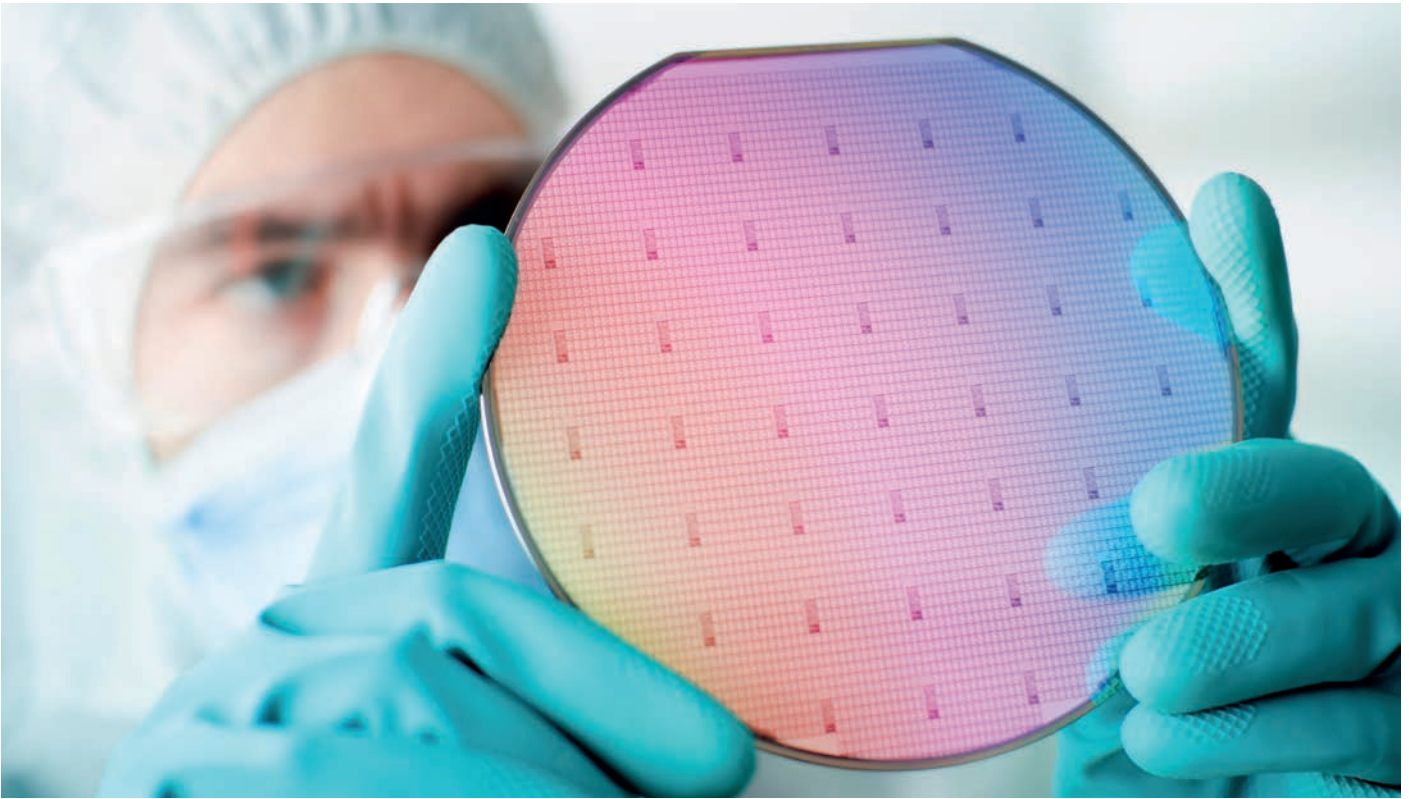
Filters allow only certain spectral components of the X-rays to reach the sample. Different kinds of filters can be used to optimize the conditions for specific measurement tasks; for example, a filter made of aluminum is particularly suitable for analysis of gold.

# FISCHERSCOPE® X-RAY XDV®-μ SEMI



Not only measuring but also handling wafers presents a challenge. The XDV- $\mu$  SEMI is equipped with an automated manipulator. It removes the wafers from the FOUP or SMIF boxes and positions them with utmost care in the encapsulated measuring chamber. The measurement process is fully automated. The device's image recognition system finds the preset measuring positions automatically, enabling the XDV- $\mu$  SEMI to work completely autonomously for several hours.





## High-end instruments for high-end applications

### Focus on precision

Wafers place the highest demands on the measurement technology used. First of all, cleanroom conditions must be met in order to protect the expensive and sensitive parts from environmental influences. Secondly, the structures on the wafers are so small that only special devices can analyze them.

The XDV<sup>®</sup>- $\mu$  SEMI is tailored precisely to the needs of the electronics industry for 2.5D/3D packaging applications. It's designed to carry out fully automatic analyses of microstructures. Typical measuring tasks include the characterization of base metallizations, material analysis of solder bumps and coating thickness measurement on contact surfaces.

In order to inspect these tiny structures without environmental influence, even tinier measuring spots are required. That's why the XDV<sup>®</sup>- $\mu$  SEMI is equipped with a modern polycapillary optics, which focuses the X-rays onto a measuring spot of just 10 or 20  $\mu\text{m}$ . With this excellent spacial resolution, the XDV<sup>®</sup>- $\mu$  SEMI allows for much more precise characterization of the individual microstructures than conventional devices can achieve.

### Features

- Suitable for wafers up to 300 mm in diameter
- Silicon drift detector for maximum precision with up to 50 mm<sup>2</sup> sensitive surface
- Excellent spacial resolution due to modern polycapillary optics for measuring spots of 10 or 20  $\mu\text{m}$
- Automatically exchangeable filter (set of 4) ensures optimal measuring conditions
- Automated manipulator that handles the wafers and positions them in the measuring chamber
- Cleanroom appropriate, optionally equipped with fan filter units to further reduce dust exposure
- Conforms with DIN ISO 3497 and ASTM B 568

# FISCHERSCOPE® X-RAY 4000



Gold and platinum are very popular in the industry because they lend electronic components the best properties. But precious metals are expensive. Continuous quality control not only prevents rejects, it also allows the target value for the coating to be set closer to the lower limit. In the long run, this leads to massive savings in gold, so an automated measuring system can easily pay for itself after a very short period of time.





# Maximum endurance in strip electroplating and the steel industry

## Added value can be measured

As the demands placed on electronics continually rise, the production tolerance limits get ever tighter. It's one reason why modern electroplating often relies on continuous testing of the coating – directly in the production line.

In addition, real value is added when production is networked with automated quality control. If, for instance, the coating becomes thinner over time, the automated X-RAY 4000 measuring system can detect this change and report it directly to the control unit. This in turn corrects the coating process in real time – and helps you avoid rejects.

The devices of the X-RAY 4000 series have a highly flexible architecture. They can be adapted for a wide variety of applications: the main areas include measuring the thickness of metal coatings on foils, strips or plug contacts in hot-dip galvanization or electroplating. However, the device's great strength is the characterization of stamped strips – a unique selling point for Fischer.

## Features

- Measurement on steel strips, solid strips and stamped strips (with flexible strip guiding) from a few millimeters up to one meter wide
- Several interfaces for flexible process control, e.g. TCP/IP, PROFINET and PROFIBUS via OPC DA or RS-232
- Various detector and X-ray tube options available
- Optimum measuring conditions ensured by either a permanently installed or a set of 6 exchangeable filters
- Slot or circular apertures in an automatic changer, also individually configurable
- Automated measuring equipment monitoring and calibration for short set-up times and guaranteed correct results
- Conforms with EN 61010, EN 61326, DIN ISO 3497 and ASTM B 568

# FISCHERSCOPE® X-RAY 5000



The X-RAY 5000 can be operated either in normal atmosphere or under vacuum. But the device is also designed to be easy to maintain. Its sealing flanges make it possible to service the measuring head without breaking the vacuum. Even high heat is no obstacle for the X-RAY 5000: if necessary, the measuring head can be equipped with a water cooling system that also allows measurements on hot surfaces up to 400 °C.





## Utmost precision for the thinnest layers

### Highly efficient with inline quality control

CIS/CIGS and cadmium telluride solar cells are complex multilayer systems in which each layer must perform a specific function. If the thickness of a coating fails to meet the specifications, or if it fluctuates within a given panel, that can reduce the efficiency of the entire system.

For automated production plants in the photovoltaics industry, Fischer's X-RAY 5000 provides an inline solution for the continuous and non-destructive characterization of alloys and thin films on products with a large surface area.

To fit optimally into a specific process, the X-RAY 5000 can be adapted to meet the customer's own requirements. Our experts will be happy to advise you on the best combination of X-ray source, primary filter and semiconductor detector for your application.

If the product moves or bulges during fabrication, it can influence the measuring results. For this reason, Fischer's WinFTM® software also has a built-in function for distance compensation, which can compensate for fluctuations of up to 1 cm – without requiring additional distance sensors.

### Features

- Measurement of multilayer systems on glass panels as well as films and strips
- Peltier-cooled detector: either silicon PIN diode or silicon drift detector
- Aperture and primary filter with no moving parts, minimizing the probability of failure of mechanical components
- Microfocus tube with a tungsten cathode; other X-ray sources available on request
- Easy to install in existing systems with a standardized ISO 250F flange, optionally with water cooling for measurements on very hot substrates (up to 400 °C)
- Various interfaces enable connection to the PLC, e.g. OLE-Automation, PROFINET and PROFIBUS via OPC and RS-232
- Conforms with EN 61010, EN 61326, DIN ISO 3497 and ASTM B 568

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*“ At Fischer, the customer relationship doesn't end with the sale of the device – that's just when it starts! ”*

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







## **Always on your side – right from the very start**

In manufacturing processes, every second counts. That's why Fischer places the same value on its prompt and professional services as it does on the quality of the products themselves. Fischer stands by you as a reliable partner. Regardless of where you're located, Fischer is never far away. With 21 subsidiaries and over 50 agencies, our worldwide presence is comprised of regional personnel. With our maintenance, training and calibration services, we ensure that all measuring devices always function perfectly and that their users know what matters.



## Fischer supports you throughout the entire service life of your measurement solution

### Our services at a glance

- Scheduled maintenance
- Quick response times in the event of problems
- Rapid provision of spare parts
- Calibration service
- Calibration standards traceable to ISO 17025 made from your own samples
- User training courses and seminars on the basic principles of measurement technology
- Advice on metrological questions from our application laboratory

Fischer provides complete solutions for automated quality assurance. And that includes end-to-end service over the entire lifetime of an inline measuring system. From the very first conversation to the decommissioning of an instrument – Fischer services are tailored to the respective phase of the measuring system's life cycle.

Before introducing a new measurement solution, for example, our experienced engineers work with you to define the measurement strategy and select the optimal measurement technology for your application. And existing production landscapes are not an obstacle: our measurement solutions are ideally suited for retrofitting into a working system.

During the installation, our project managers monitor the punctual delivery and professional assembly of the equipment according to international standards. And Fischer offers customized maintenance concepts for the operational phase. In this way, quality assurance can always keep up with production in the modern factory.





# More than just a piece of equipment



You can find us in:

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



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

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