OPERATOR'S MANUAL

FISCHERSCOPE® X-RAY XDAL® 237

Coating Thickness | Material Analysis | Microhardness | Material Testing

fischer

2.4 Functional Principle of the Instrument

The following figure shows the principle structure of the instrument:

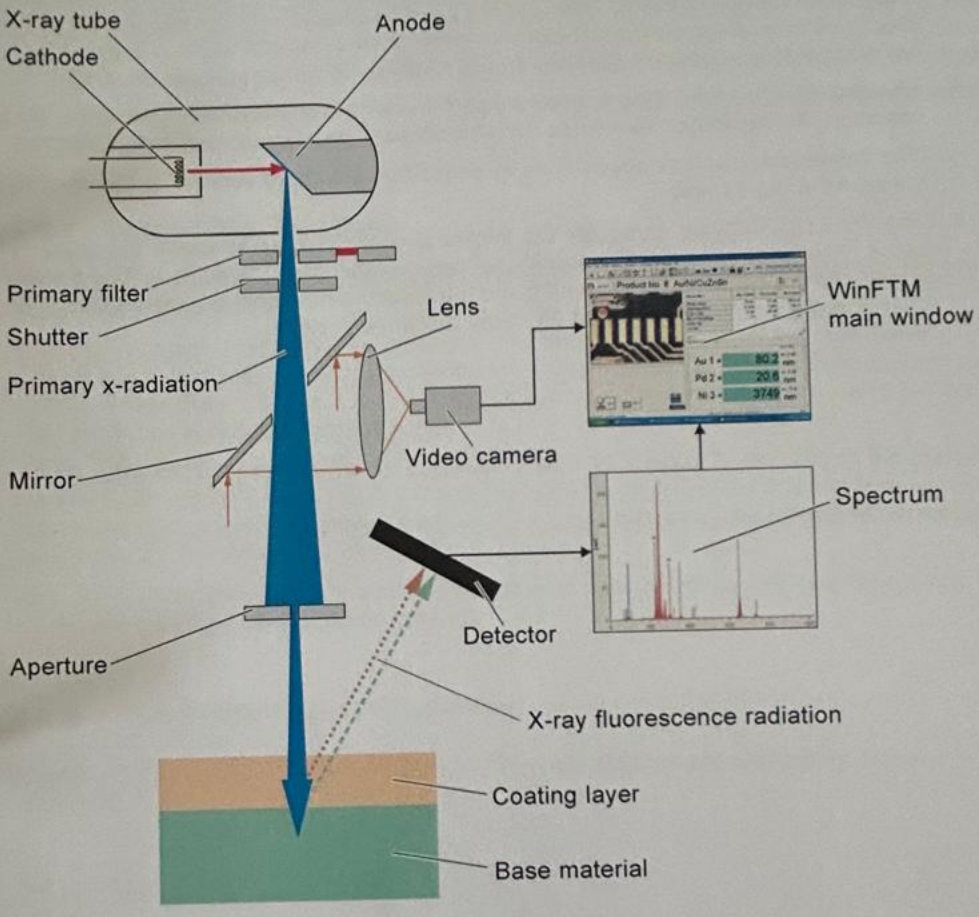

Fig. 2-2: Functional principle of the instrument

Functional principle

1. The x-ray tube generates the primary x-radiation (primary radiation). The electrically heated cathode emits electrons. Accelerated by the applied high voltage to very high speeds, the electrons bombard the anode material. This generates the primary x-radiation.
2. The primary filter optimizes the energy distribution of the primary x-radiation.
3. The shutter serves as a safety device and closes the access of the primary x-radiation to the measurement chamber, if needed.

2.3 X-Ray Fluorescence

The specimen is excited with the primary x-radiation. In the process electrons from the inner electron shells are knocked. Electrons from outer electron shells fill the resultant voids emitting a fluorescence radiation that is characteristic in its energy distribution for a particular material. This fluorescence radiation is evaluated by the detector.

The generation of the x-ray fluorescence radiation is shown simplified in Fig. 2-1. One electron from the K shell is knocked. The resultant void is filled by either an electron from the L shell or an electron from the M shell. In the process the K_α and K_β radiation is generated, which is characteristic for the particular material.

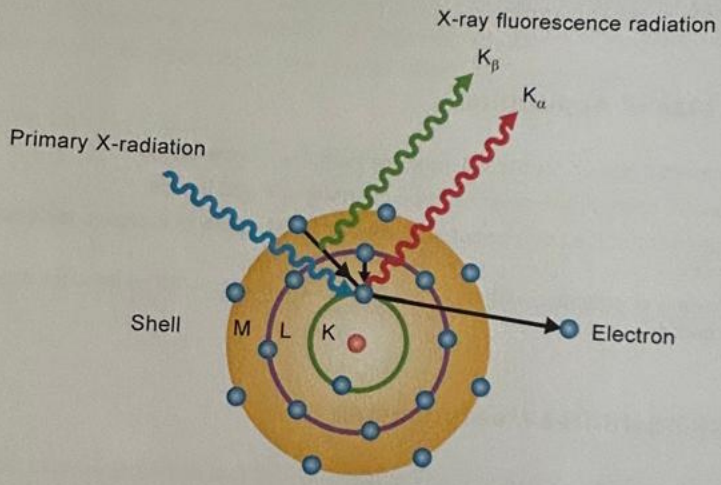

Fig. 2-1: Generation of the x-ray fluorescence radiation

3 Set up

3.1 Set-up Location

DANGER	
⚠	**Explosion hazard** High voltage discharges inside the instrument can be dangerous in explosion hazard zones. ► Do not place the instrument in explosion hazard zones.

The instrument is designed for the following conditions:

Operation temperature	10°C – 40°C / 50 °F – 104 °F
Storage temperature	0°C – 50°C / 32 °F – 122 °F
Humidity of ambient air	0 – 95 % non condensing

Although the instrument is designed as a lab unit, due to its sturdy construction, it is also possible to run it in a production hall.

ATTENTION
Destruction hazard caused by improper environmental conditions The instrument can be destroyed, if you place it in hot or corrosive environments. ► Place the instrument in rooms with a suitable operating/storage temperature only. ► Make sure that the air can circulate freely in the area of the fan. ► Do not expose the instrument to direct sunlight. ► Do not place the instrument in corrosive environments such as plating areas.

The set-up location influences the product life and maintenance effort directly.

Corrosive environments cause corrosion on mechanical and electronic components. This can lead to the following problems:

- Rough-running or total breakdown of mechanical adjustment mechanisms
- Contact problems on plug connectors or total breakdown of electronic components

Salt acid steams or salt aerosols (salt spray test) in the ambient air cause defects on x-ray tubes, proportional counters and silicon detectors in short intervals. Salt acid corrodes the Beryllium window of these components. Thus, the components will be damaged rapidly.

If the instrument is located in a room, separated from the electroplating, make sure that the exit air of the electroplating cannot reach the room via doors, windows or extraction of air systems.

Heavy ambient air pollution causes the ventilation ducts getting clogged. Thus, the maximum permissible temperature of components can be exceeded. Additional damage can be caused by deposits of aggressive dirt.

4. A light source (not shown in Fig. 2-2) illuminates the sample. A mirror and lens direct the image of the measurement location to a color video camera. The mirror has a hole in its center for the primary radiation to pass through.
5. The aperture (collimator) limits the cross-section of the primary beam in order to excite a measurement spot of a defined size.
6. The primary x-radiation impacts the atoms on the sample surface (coating layer and base material) and in the process knocks electrons from the inner electron shell. Electrons from outer electron shells fill the resultant voids emitting a fluorescence radiation that is characteristic in its energy distribution for a particular material.
7. The energy dispersive detector measures the energy distribution of the fluorescence radiation. A multistage electronics circuit processes the measurement signals.
8. The measured spectrum shows lines or peaks that are characteristic for the chemical elements in the sample.
9. The WinFTM Software computes the thickness of the coating(s) and/or the analysis result. The video image of the sample is shown in the WinFTM window. The precise position of the measurement location and the measurement spot is possible due to the special design of the optical and the x-ray guidance systems.

2 Instrument Overview

The FISCHERSCOPE® X-RAY is a high performance energy dispersive x-ray fluorescence (EDXRF) spectrometer.

The WinFTM® (**F**ischer **T**hickness **M**anagement Software for **Win**dows®) software controls the instrument and handles the evaluation of the signals supplied by the instrument.

The measured values (coating thickness, material compositions, mass per unit area) are stored and displayed on the monitor. Using WinFTM, you can conveniently design the measurement results as a print form for printout and export them to other applications.

WinFTM runs under Windows®.

2.1 Areas of Application

The instrument is suited for the following measurement applications:

- Analysis of solid, powdery and compound materials and liquids
- Measurement of the composition and coating thicknesses of complex multi-layered systems

The instrument is equipped with a programmable XY-stage, which allows for automated measurements.

2.2 Standard-free Measurements

The instrument allows for standard-free measurements, that is measurements without calibration standards. Coating thicknesses and compositions can be determined in one measurement without the use of calibration standards. This is especially interesting when you develop new multi-layered systems, where applicable calibration standards are not available.

Fischer

Schichtdickenmeßgeräte · Werkstoffprüfgeräte · Instruments for Coating Thickness Measurement · Materials Testing Equipment

Kalibrierservice

Auftragsnr.: 24576
Kunde: Prominent spol.

Empfänger:
FMC-2020 SN: SN110004793
XDAL 237 SN: SN110004793

Kunde:
Strasse:
Plz, Ort:
Kontakt:

durchgeführt von O. Wortmann am: 06.07.2011 Intern X Extern

Folgende Messaufgaben wurden vorbereitet:

Messaufgabe	Artikel-nummer	Mess-modus	Bestell-nummer	Serien-nummer des Kal-Satzes	Kal-Satz Kunde	Kal-Satz Fischer	Kal-Satz Std.-frei	Normierung notwendig Ja	Normierung notwendig Nein
Au/NiP/Cu/Epoxy	790227	ddd	602-321	19449	X				
Au/Ni/Cu/Epoxy	790226	ddd	" - "	"	X				
Sn/Cu/"	502004	d	602-319			X			
Au/Base	790107	d	" - "	19180	X				
Sn/Base	500100	d	" - "	18564	X				
Au/NiP/Base	790207	dd	602-320	19180	X				
Au/Ni/Base	790220	dd	" - "	"	X				
Au/NiP/Cu sat.Epoxy	790204	dd	" - "	19449	X				
Au/Ni/Cu sat.,Epoxy	790202	dd	" - "	19449	X				

Die Unterlagen und Messwerte der durchgeführten Kalibrierungen sind auf der beigefügten Datensicherung im Unterverzeichnis LogFiles der WinFTM© abgelegt.

HELMUT FISCHER GMBH
INSTITUT FÜR
ELEKTRONIK UND MESSTECHNIK

Hiermit wird die Vollständigkeit des durchgeführten Kalibrierservice anerkannt:

(Datum, Unterschrift)

(Datum, Unterschrift)

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CERTIFICATE

FOR THE FULL-PROTECTION INSTRUMENT FISCHERSCOPE® X-RAY XDAL®, ACC. TO § 4 ABS.3 RöV

We hereby confirm, that the instrument FISCHERSCOPE® X-RAY XDAL® with

MEASURING HEAD TYPE:	XDAL®		
APPROVAL No:	B f S 12 / 07 V RöV		
INSTRUMENT No.:	110004793		
X-RAY GENERATOR:	GCA510M....	Oxford	76552
	TYPE	MANUFACTURER	SERIAL NO.

was checked acc. to the requirements of the Certificate of Approval BfS 12/07/RöV.
The instrument corresponds to an Enclosed Beam X-ray system with respect to radiation protection.
Its features were certified in the test certificate 6.32 – V 250 of the Physikalisch-Technische Bundesanstalt (National Metrology Institute of Germany) in Braunschweig.

- ☒ The maximum operating value of the high voltage does not exceed 50 kV (DC).
- ☒ The maximum operating value of the anode current does not exceed 0.8 mA.
- ☒ The detector passed all specification tests.
- ☒ At maximum operating values, the local radiation dose rate does not exceed 3.0 µSv/h in any accessible region within a distance of 0.1 m from the surface of the measuring table.
- ☒ The inspection and test of all protective devices has been performed. Two independent fail safe circuits ensure, that the X-ray generating system can only be operated, while the protective housing is closed. If the protective housing is opened during the measurement, the shutter closes automatically.
- ☒ The touch current is < 0.5 mA, according to the standards: DIN/VDE 0701, EN 60 990, IEC 60 990

Inspector: Fleischer
i.A. Fleischer
Inspection date: 07/07/2011

Production manager: Wortmann
i.A.
Inspection date: 07/07/2011

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