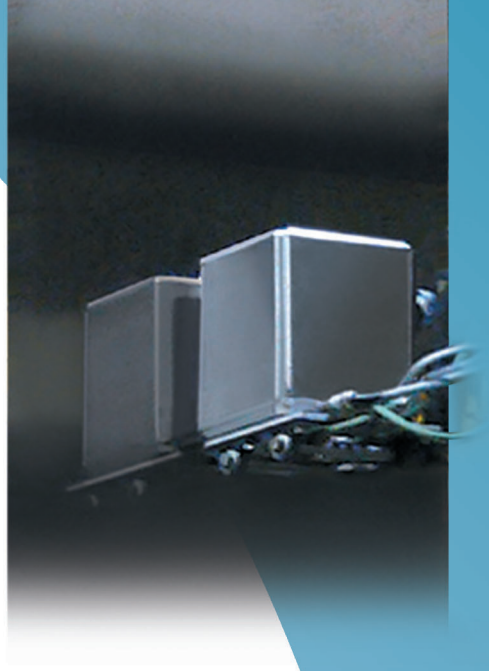
Our Commitment –
Your Success

rayonic®



Coating Thickness Measurement:

X-Ray Fluorescence Gauge RS-40

In hot-dip and electrolytic galvanizing lines the RS-40 X-ray fluorescence gauges are installed for non-contact, continuous and precise measurement of the coating thickness.

The gauge-heads for the measurement of top and bottom face can be mounted on a double beam, O-frame type scanner for measurement against the free running strip or can be supplied with individual single beam scanners for measurement against a roll.

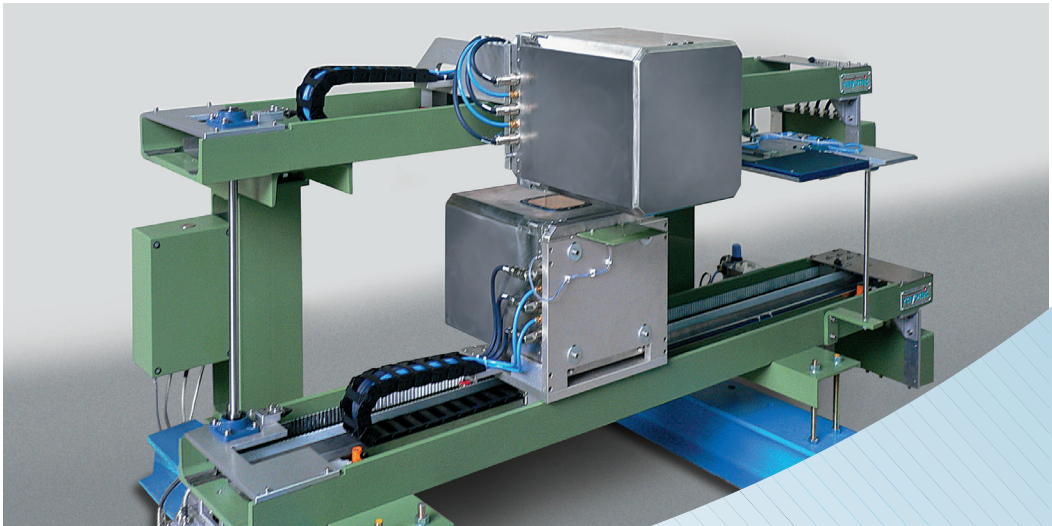
In hot-dip galvanizing lines the RS-40 X-ray coating weight gauge can be supplied for the so-called hot, warm and cold positions. The gauges for the different locations differ mainly in the cooling capacity and the thermal insulation of the gauge-heads. For the hot position customer specific mechanics are supplied.

Like all Rayonic sources and sensors the RS-40 gauge-heads have a robust stainless steel housing that contains the X-ray source with a metal-ceramic tube, the high voltage generator and emission control and the detector modules with application specific pre-filters.

Technical Data

	Zinc	Tin	Nickel
Processing Line	Hot-Dip Galvanizing	Hot-Dip and Electrolytic Galvanizing	Electroplating
Type	Hot, Warm and Cold Gauge	O-Frame Scanner or Single Beams	O-Frame Scanner or Single Beams
Operating Parameters	32 kV / 0.6 mA	25 kV / 0.8 mA	32 kV / 0.6 mA
Measurement Range	10 - 350 g/m²	0.01 - 5.0 µm	0.01 - 10.0 µm
Measurement Gap	30 - 60 mm	40 mm	40 mm
Accuracy	0.10 %	0.10 %	0.10 %

Metal coatings that are frequently measured with the RS-40 gauge are **zinc** and **zinc alloys (Zn/Ni, Zn/Al), aluminum** and **tin.** Other typical applications are **copper, brass, nickel, cobalt** and **chrome** coatings. For alloys like **Zn/Al** the **composition of the alloy** can optionally be determined in addition to the total coating thickness. For galvannealed coatings the **iron-content** is measured together with the coating thickness.

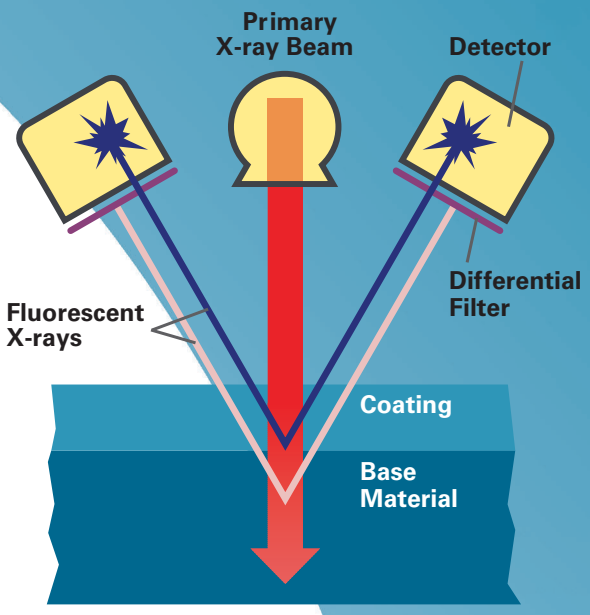


Measurement Principle

The measurement of the thickness of metal coatings on steel strip utilizes the X-ray fluorescence (XRF) effect. The primary beam of an X-ray source is directed at the material to be measured and produces in the coating and the base material a secondary, isotropic X-radiation, the so-called fluorescence radiation.

The energy of the fluorescence radiation is characteristic for the element that produced the radiation. The radiation produced in the steel strip has a different energy as the fluorescence radiation produced in the coating e.g. zinc. Using the method of differential filters one or the other component of the radiation can be selected for measurement. The detector modules installed in the gauge-head detect the selected radiation component in the backward directions, e.g. the radiation from the metal coating.

An increase in the coating thickness also increases the intensity of the fluorescence radiation of the coating. The measurement of the intensity of the fluorescence radiation allows a precise determination of the coating thickness.

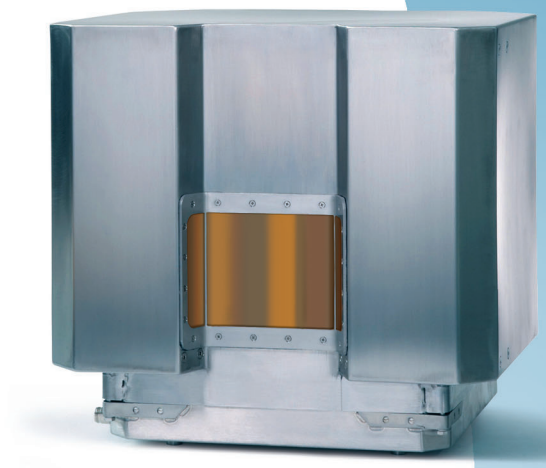


Fast Return on Investment

Rayonic Sensor Systems GmbH designs, manufactures and services innovative measurement and control solutions for the continuous, non-contact measurement of thickness and coating thickness of metal and non-metal strip, web and sheet.

The fast and very precise measurement data continuously monitor the product quality. In connection with the automation system the thickness measurement improves and guarantees the quality of your product and saves raw materials.
Further economic benefits result from the reduction of scrap and energy consumption.

State of the Technology at Rayonic



1. X-ray sources and sensors in sealed stainless steel housings with thermal insulation and cooling.
2. Metal-ceramic X-ray tubes operated at about 30% of the maximum ratings (voltage and power consumption) guarantee high stability and lifetime
3. Electrical shutter for radiation with monitoring of stop positions and movement time
4. Ionization chambers with noble gas filling for fast, stable and precise response, long lifetime and high availability
5. Digitizing of measurement signals directly in the gauge-head
6. 24 VDC operation of X-ray sources and sensors because of internal generation and control of the high voltage
7. Process electronics based on an Industrial PLC with all standard interfaces (Ethernet, Profibus etc.) facilitate a fast and cost effective adaption to the mill requirements and integration into the automation system
8. Client-server technology for visualization and long term data storage for the required plant and gauge configurations

Problem Solving – The Rayonic Approach

For a customer specific coating gauge for nickel and cobalt the Rayonic faced a double challenge:

- The simultaneous measurement of sequentially applied layers of Nickel and Cobalt and
- Very restricted space for the installation of the gauge.

The measurement of cobalt coatings with the X-ray fluorescence method is extremely difficult and no online measurement had been realized previously. As if this would not be enough of a challenge a second layer of nickel coating had to be measured in addition. Rayonic presented a convincing concept and realized the novel measurement within few months.

The existing scanner frames could not be used in the restricted space of the electrolytic coating line. The problem was solved by the design of a totally new scanner frame that was installed with centimeter precision to its final position.

Since then the measurement system has facilitated significant savings of raw materials and allowed to optimize the coating quality and production process.

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