Product Specifications

The Thermo Scientific series of coating weight gauges provide you with the highest level of precise, non-contact coating weight cross-profile measurement of metal coatings applied to steel strip. For hot dip galvanizing lines, the gauges can be upgraded with the adaptive coating weight autocontrol system providing significant material savings and optimizing coating line efficiency.

Thermo Scientific RM 300 EC, RM 310 EC, RM 315 EC and RM 400 EZ

Metal coating weight gauges and autocontrol system

Applications

- Galvanized steel (Zn)
- Galvalume steel (Zn/Al)
- Binary coatings (Zn/Ni)
- Galvanneal (Zn/Fe)
- Aluminized (Al)
- Tin coated steel (Sn)
- Terne coatings (Pb/Sn)
- Other metallic coatings on steel

Features

- Serial or Ethernet interface to host computer
- Automatic report printout at the coil end
- Proven, reliable sensors
- Compact design of the measuring heads (X-ray measuring heads include X-ray source, detectors and HV-power supply)
- User-friendly operator interface
- Direct over-the-phone remote diagnostics
- Data archiving system

The Thermo Scientific metal coating weight gauges demonstrate excellence in non-contact coating weight measurement. The RM 300 EC and RM 310 EC gauging systems provide the user with reliable, proven sensor technology configurable for nearly every type of metal coated product. The RM 315 EC unique sensor design provides both total zinc coating weight and percent iron content measurements on the difficult-to-measure galvanneal coated sheet.

The measuring units of the gauges are installed at the exit of the hot dip galvanizing line or electrolytic coating line.

The RM 310 EC / RM 315 EC measuring heads use X-ray generators as the source of radiation for coating weight measurement. These sources provide fast response times with all the specific advantages of X-ray generation. The photons from the X-ray source cause X-ray Fluorescence (XRF) radiation to be generated in the coated strip. The X-ray Fluorescence radiation is detected by application specific detectors mounted within the measuring unit. With the use of specially designed filters, selective coating weight measurement of various metal layers on the strip is possible.

The RM 300 EC is equipped with gamma-ray sources instead of X-ray sources to generate the X-ray Fluorescence radiation in the coating.

Usually the measuring heads are mounted in an O-frame scanner available in different sizes to cover the various strip widths. Alternatively, single beam scanners can be supplied in order to install the measuring units on bridle rolls to provide stable pass-line conditions.

For hot dip galvanizing lines, the cold coating weight gauges can be connected with hot coating weight gauges, the RM 300 EH (gamma-ray) or the RM 310 EH (X-ray). Additionally, an adaptive autocontrol system, the RM 400 EZ for coating weight control, is available for this application.

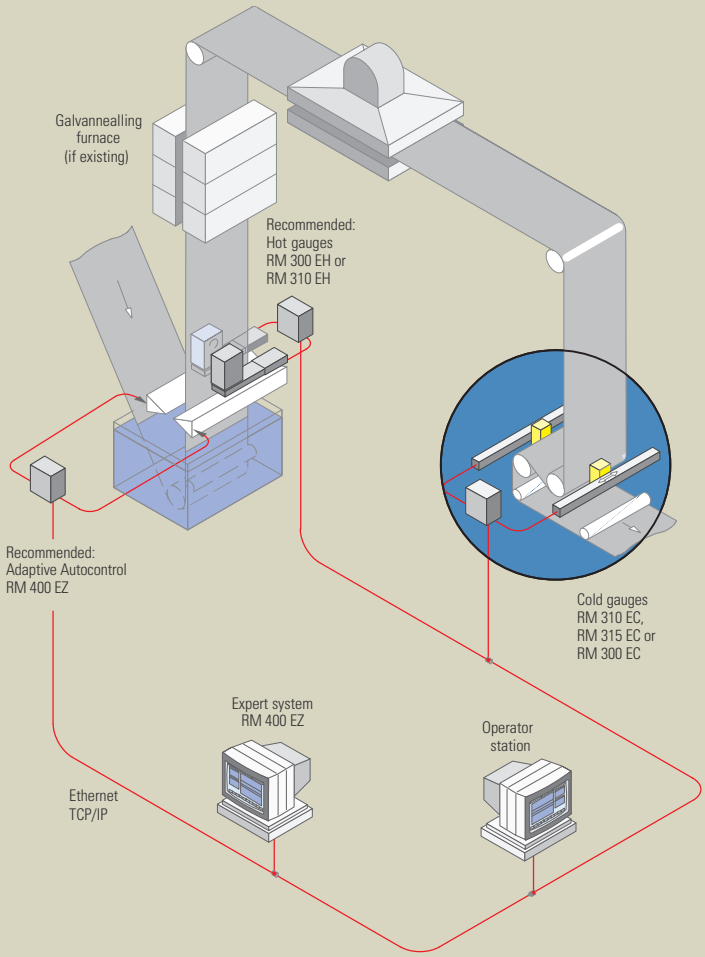
The Thermo Scientific coating weight measurement and control system can provide several profitable benefits.

Raw material savings
The low noise measurement of the total coating allows the target set point to be lowered closer to the product specification. Reducing the over-coating by a few percent results in material savings that can be applied directly to the bottom line.

Pre-setting air knife pressure on product changes
Even before a new coil reaches the air knife position, the RM 400 EZ autocontrol system can instruct the air knife control to run the best parameter set which has been recorded in a previous production. The product changeover will be exactly at the defined length position, e.g., weld seam. This results in significant reductions in scrap during product changeover. Additionally, fast changeover can provide flexibility in planning production campaigns for the galvanizing line.

High quality product
The scanning profile feedback from gauges can be used by the RM 400 EZ to adjust the air knife settings to result in a more uniform coating across the strip. In electro-deposited coatings, the gauge profile can reveal anode performance and adjustments or maintenance can be carried out during a scheduled down time, rather than causing profit consuming outages.

Coating Weight Measurement and Control System



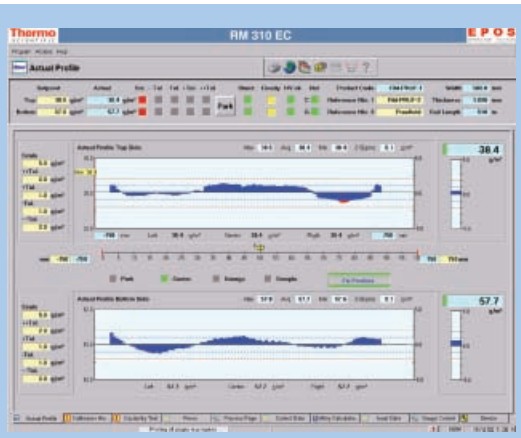
Thermo Scientific EPOS Interface Software
The hot and cold coating weight gauges as well as the Adaptive Autocontrol system are operated via one central EPOS interface.

The screens depict all critical information in a clear easy-to-interpret fashion. Screens can be customized to focus operators on the most important variables of the coating process.

The pages are divided into the following logical groups:

- Data input: product information
- Operation: gauge functionality
- Measured values: gauge output
- Reports: statistical data from last coil
- Configuration: select the parameters for each page
- Service: error and alarm messages, AIO, DIO

Access to the various pages and the Windows® operator system can be managed through administrator assigned passwords.The EPOS interface also offers detailed report printouts that can be triggered from any digital mill event of the galvanizing line.

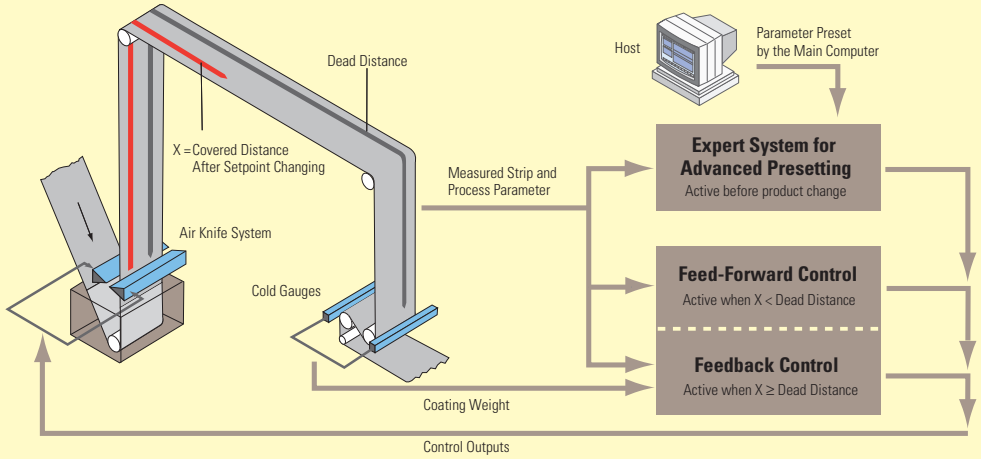


Actual Profile

This screen is generated while the measuring heads are in continuous scanning mode (scanning continuously from edge-to-edge of the strip). After each scan, the coating weight cross profiles of the top and bottom side are calculated and displayed. The bar graphs to the right of each profile indicate the coating weight cross-profile averages.

The top of all EPOS screens include a hot keys tool bar for page navigation, printing, language selection and product data memory. Immediately below the tool bar is a configurable measured value and status bar which provides a quick view of the current status of the actual coating weight, set point, product code, etc., as well as gauge status and tolerance status.

RM 400 EZ Autocontrol Data Flow



RM 400 EZ Adaptive Autocontrol System

The RM 400 EZ Adaptive Autocontrol System requires the use of a RM 310 EC / RM 315 EC or RM 300 EC gauge with scanning gauge heads at the cold end of the line. The control can be supplemented by measurement values obtained at the hot end by a RM 300 EH or RM 310 EH system.

The high performance RM 400 EZ computer is coupled with a central operator's terminal to provide autocontrol of air knife pressure for optimization of the coating process. These adjustments are made with the aid of an archived history of data sets and their resulting effects.

The RM 400 EZ Adaptive Autocontrol System reacts quickly to changes between the measured coatings values taken by the gauges at the cold end and a predicted coating derived from the relevant process parameters.

Changes of process parameters, such as strip speed, distance of the air knife to strip and desired zinc coating, are taken into consideration through feed-forward control. The Adaptive Autocontrol System uses the relevant process values to continuously compute the necessary pressure to be applied to the air knife.

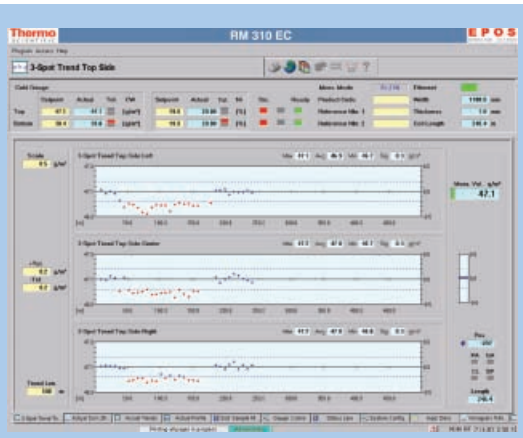
Measurement information from the scanning gauge heads are used for dynamic optimization of the coating set-point. This is referred to as Target Adaptive Control (TAC). Through evaluation of the statistical spread of the coating in process direction, the set-point can be changed, taking into account the given tolerance limits for top side, bottom side and sum coating weight, resulting in a minimum use of zinc.

Control of average coating weight and wedge-shaped profile is based on the measurement values taken by:

- RM 300 EC / RM 310 EC / RM 315 EC cold gauges
- Additional RM 300 EH / RM 310 EH hot gauges for highest control performance
- Both cold and hot gauges running in cascade control mode

Histogram

Shows the measured coating weight values in the form of a distribution curve. Besides minimum, maximum and average coating weight, the percentage of measured values below the lower tolerance limit and above the upper tolerance limit are indicated. Additionally, the percentage of measured values within the ±2 Sigma range and the process capability indices c_p and c_{pk} (defined in appropriate standards) are calculated and displayed.



Triple-Spot Trend

This screen is generated in the measuring head's triple-spot mode. The measuring heads are positioned in cycles so that the measurement is carried out at a selectable distance from the left strip edge, at center, and at a selectable distance from the right strip edge. The measurement time at the triple-spot positions can be pre-set. Coating weight is averaged during the measurement period, and then displayed as a trend element at each spot position (left edge, center, right edge).

RM 300 EC

General Specifications	
Material to be measured	Zn, Zn/Al, Al, Sn on steel
Measuring range	25 to 300 (350) g/m² per side depending on alloy
Sources	2 x Am 241, 11.1 GBq
Detectors	Ionization chambers
Measuring mechanism	O-frame scanner or 2 x single beam scanners
Strip width	Typically up to 2,000 mm (78.7 in)
Number of measuring heads	Two in total (for top and bottom side of the strip)
Measuring gap	Approximately 30 mm (1.18 in)
Motion modes	Triple spot (edge–center–edge); continuous scanning; fixed position mode

RM 310 EC

General Specifications	
Material to be measured	Zn, Zn/Al, Zn/Ni, Al, Sn, Pb/Sn and other metallic coatings on steel
Measuring range	25 to 300 (350) g/m² per side depending on alloy
Sources	2 x X-ray, typically 25 kV
Detectors	Multiple ionization chambers
Measuring mechanism	O-frame scanner or 2 x single beam scanners
Strip width	Typically up to 2,000 mm (78.7 in)
Number of measuring heads	Two in total (for top and bottom side of the strip)
Measuring gap	Approximately 20 mm (0.78 in)
Motion modes	Triple spot (edge–center–edge); continuous scanning; fixed position mode

RM 315 EC

General Specifications	
Material to be measured	Galvanneal Zn/Fe and Zn, Zn/Al
Measuring range	25 to 300 (350) g/m² per side depending on alloy
Sources	2 x X-ray, typically 25 kV
Detectors	Multiple ionization chambers
Measuring mechanism	2 x single beam scanners
Strip width	Typically up to 2,000 mm (78.7 in)
Number of measuring heads	Two in total (for top and bottom side of the strip)
Measuring gap	Approximately 12 mm (0.47 in)
Motion modes	Triple spot (edge–center–edge); continuous scanning; fixed position mode

X-ray Fluorescence Measuring Head for One Side of the Coated Strip

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