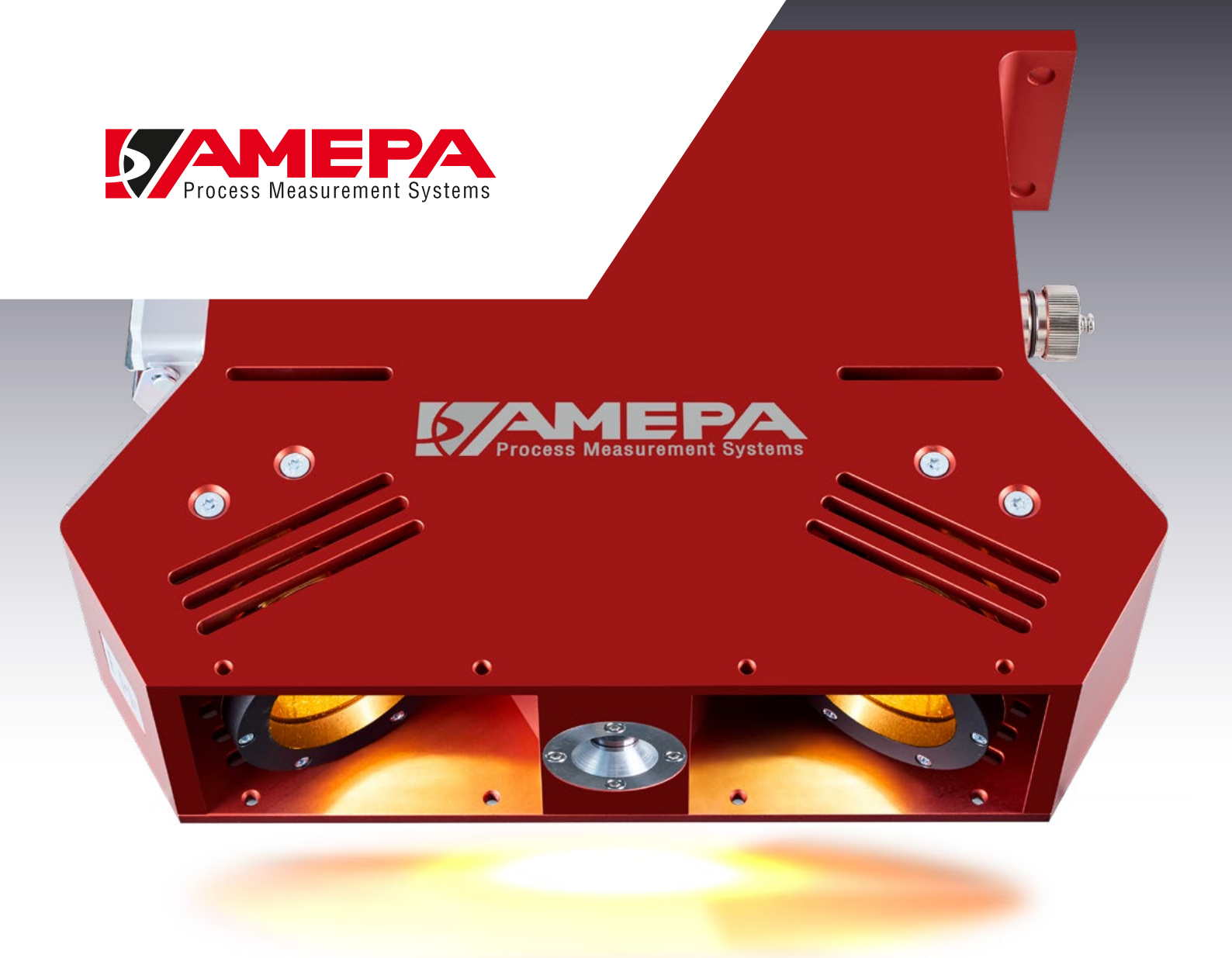
AMEPA
Process Measurement Systems



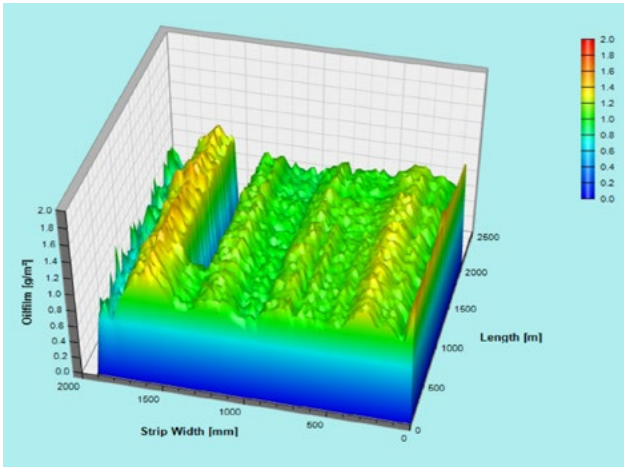
Perfect Surface with Online Oil Film Measurement

OFM 300

Measure it. Control it.

AMEPA Oil Film Measurement:
Perfectly oiled surfaces in the rolling mill and press shop

Demands on sheet metal surface lubrication are continually increasing. With increasing frequency, lubricants are pre-applied on process lines according to the specifications for downstream processing in the press shop. Uniformly applying the correct quantity of oil is essential. In the press shop, the reliable detection of dry streaks and incorrect oiling is critical for fault-free forming with a high production rate.



Dry streaks and incorrect lubrication is visible directly within the visualization.

The classic method of measuring the oil film thickness on an oiled sheet metal is completed offline, in a laboratory, using gravimetric analysis (known in the industry as weigh, strip, weigh). This method requires taking and transporting a sample from the process line, which is very susceptible to interference. A single offline measurement cannot show the oil quantity and distribution over the entire surface of a coil or a blank. As a result, oiling problems are recognized too late or not at all.

Online Oil Film Measurement does not require sampling and immediately provides all the information necessary for evaluating lubrication.

The OFM 300 online oil film measuring system offers the following benefits:

- **Direct, non-contact online measurement of the oil film thickness**
- **Improved measuring accuracy with reduced maintenance expense**
- **Objective criteria for assessing lubrication**
- **Reliable detection of dry streaks and incorrect oil coverage**
- **Immediate online warning of deviations in oiling**
- **Assessment of the system condition through statistical evaluations**
- **Long-term archiving of quality data for TQM**
- **Avoidance of customer complaints**

OFM 300:
Proven technology consistently improved

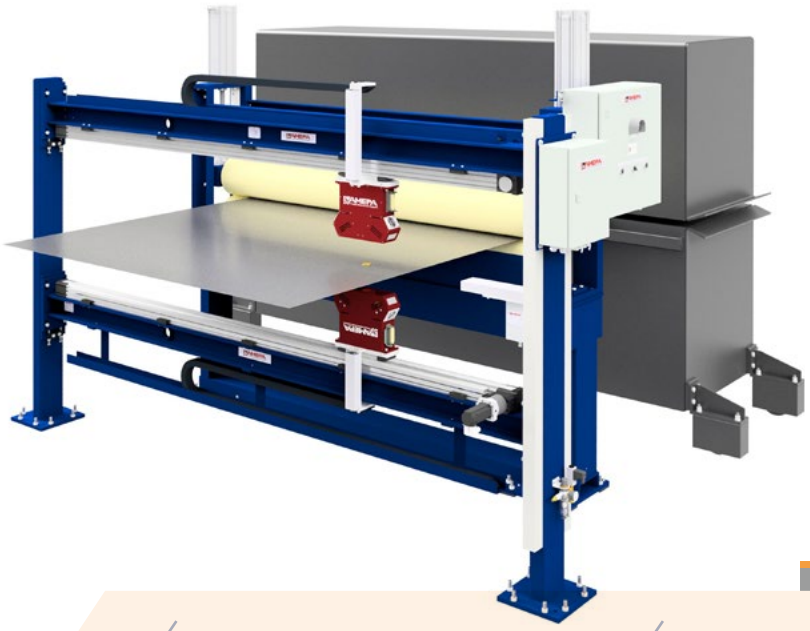
The new OFM 300 sensor generation achieves increased measuring accuracy while simultaneously reducing maintenance costs. The optimization of selected device components and an internal signal adjustment improve the measuring accuracy to ± 0.05 g/m² in the measuring range ≤ 1 g/m² or ± 5 % of the measured value for oil layers > 1 g/m². Tight process tolerances can be recorded by the customer. Quality parameters of the end product can be recorded more precisely.

A more complex device adjustment makes it possible to improve the internal device tolerance for the OFM 300 sensors in relation to each other, so that stable and meaningful results with high accuracy can be achieved in validation processes, regardless of the hardware tolerance of individual sensors. Procedures for adapting validation samples to the target values of individual sensors are no longer necessary.

The targeted re-engineering of the proven OFM technology has resulted in a fundamentally revised device design for the new OFM 300 sensors, which simplifies the maintenance process and the replacement of wearing parts. This achieves cost efficiency and guarantees improved operability and a customer-orientated scope of maintenance.

Ensuring High Quality: the OFM 300 system

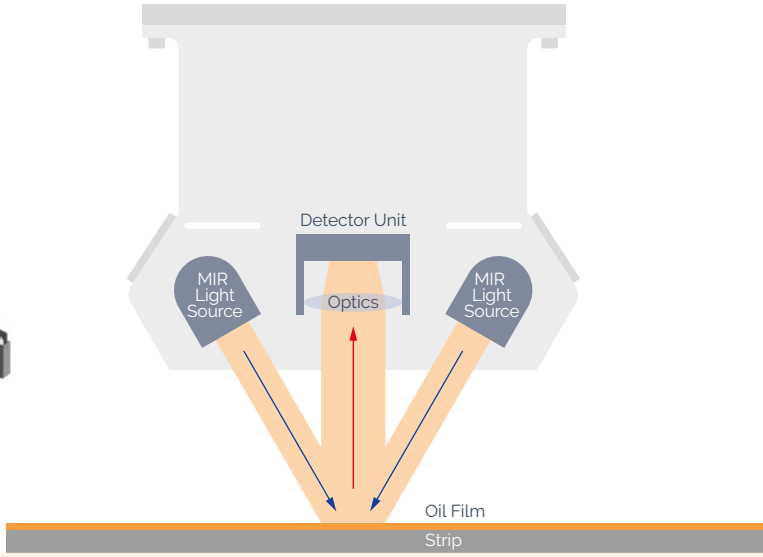
Two traversing units move the OFM sensors cyclically on both sides over the oiled sheet metal surface. The oil and position data are recorded in a central evaluation unit and processed for a graphic representation of the oil distribution of the entire coil. When a spray oil machine is used, a roller unit is required after the oiler to form the misted oil droplets into a uniform film.



Measuring Principle of Non-Contact Oil Film Measurement

The oiled sheet metal surface is illuminated by two spectrally broadband light sources, specific unique halogen lamps. The part of the light diffusely reflected perpendicularly from the metal surface passes through the oil film twice. The oil causes specific wavelengths in the mid-infrared range (MIR) of the electromagnetic spectrum to experience absorption dependent on the oil layer thickness.

Only a few selected wavelengths are analyzed in the MIR using a photometer. An evaluation based on Lambert-Beer's law results in the weight per unit area of the oil layer.



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Robust

Consistently designed to meet customer requirements:

- Non-contact measurement with a considerable distance to the measuring object
- Compensation for age-related changes in the light source
- Fully automatic detection and reporting of sensor faults by the validation unit

/02

Versatile

OFM Oil Film Measurement is used in steel, aluminum and automobile production.

Users in the rolling mill, finishing and inspection, and the press shop use the measurement results to document quality and optimize their processes.

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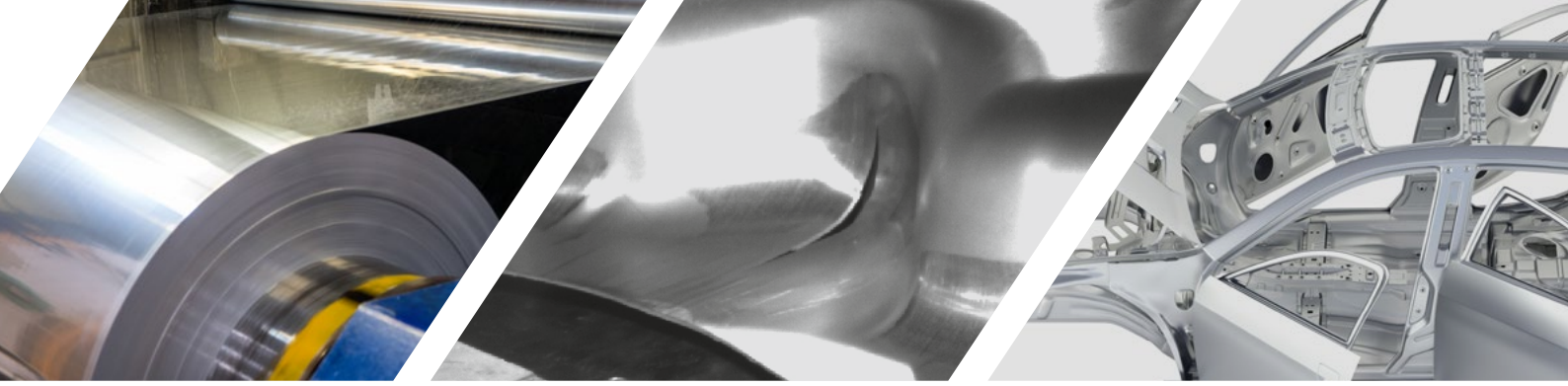
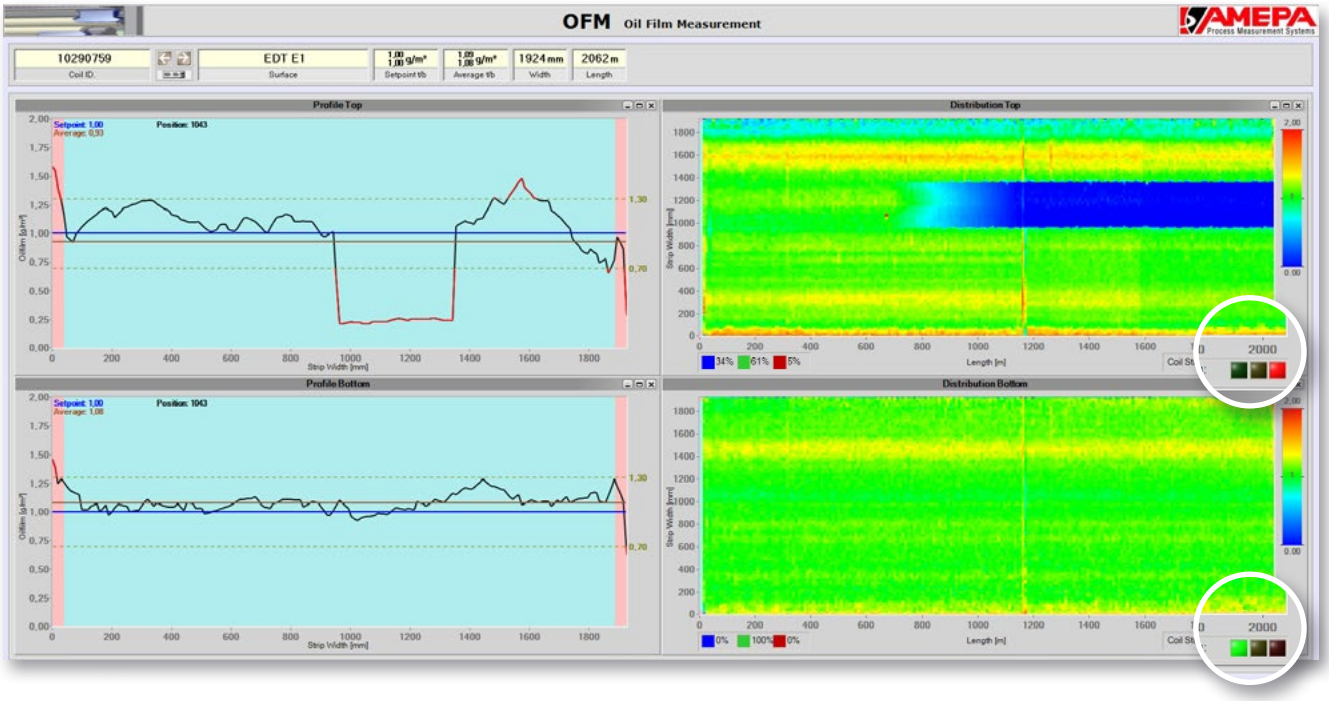
High Customer Benefit

The quick detection of lubrication errors with immediate online warning reduces the rate of customer complaints and defective production.

Statistical evaluations allow an objective assessment of the state of the plant or product.



The measurement results of the total area, target values, and tolerances are displayed using the OFM client software. The software can be explicitly configured by the customer to display the necessary data for their process. The automatic evaluation categorizes the area as insufficient, correct, or excessive lubrication by percent. It also enables a quick overall condition of the coil as good, caution, or bad through a traffic light display.



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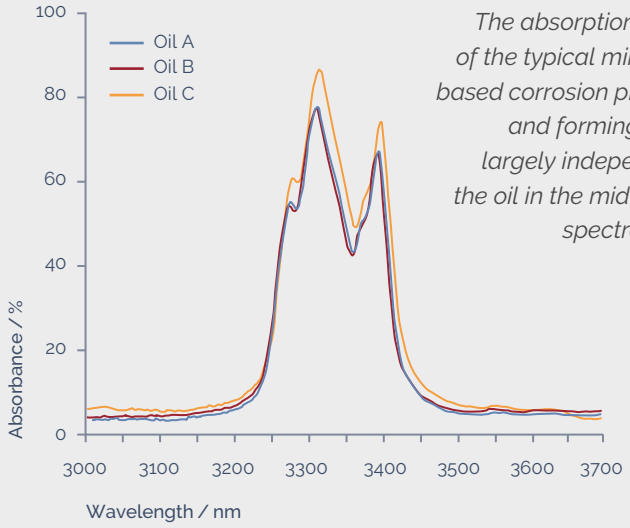
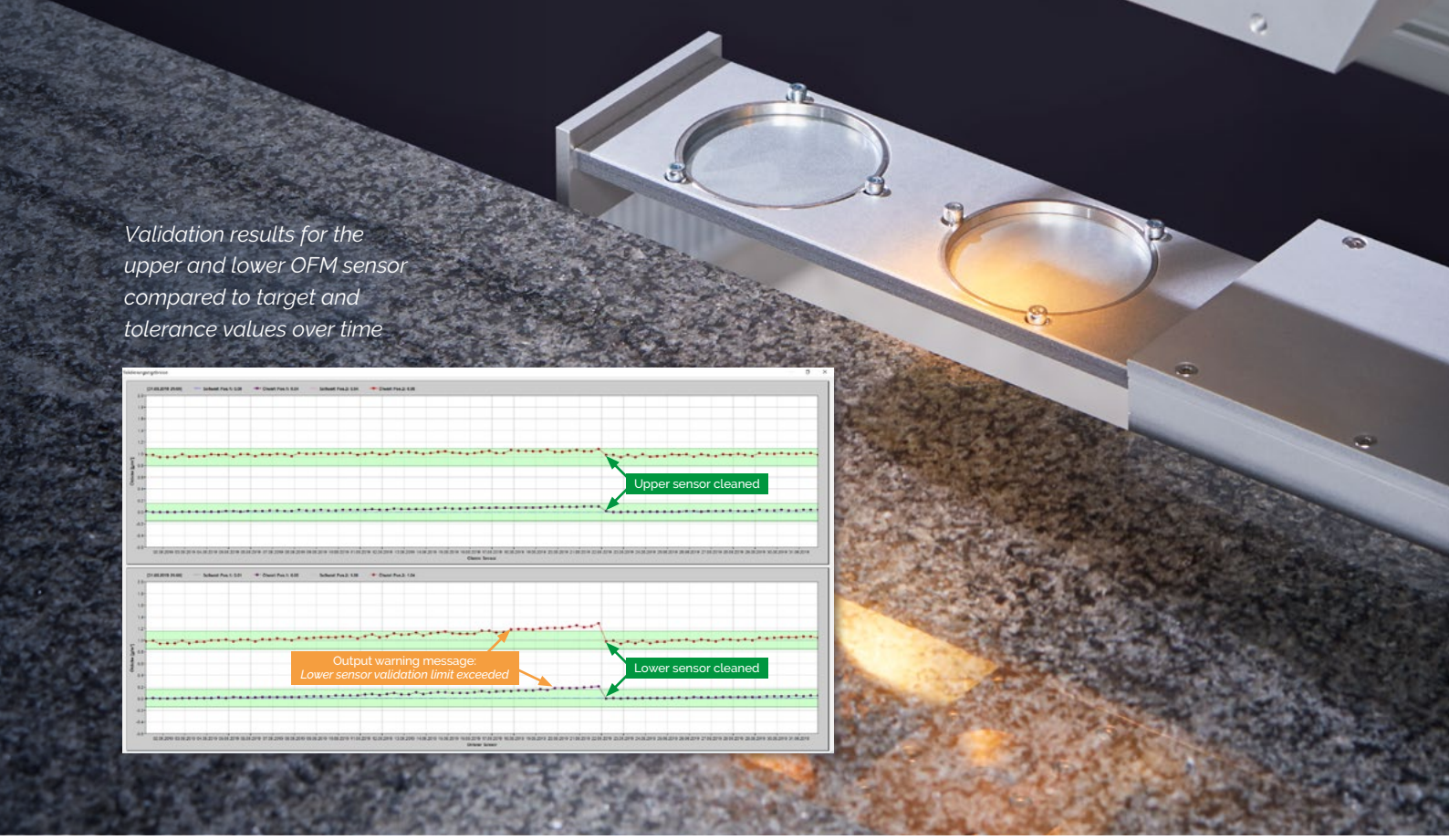
Proven

The infrared spectroscopy used has been a powerful method in the chemical analysis of organic substances for decades.

For many years, users have successfully used our reliable and continuously developed systems.



The absorption spectra of the typical mineral oil-based corrosion protection and forming oils are largely independent of the oil in the mid-infrared spectral range.



Validation results for the upper and lower OFM sensor compared to target and tolerance values over time

OFM Validation Unit

The validation unit is attached outside of the sheet metal run. A compressed air-operated drawer contains a validation sample for both the zero value and a reference value.

The OFM sensors are checked regularly, including the degree of soiling of their optical windows. The validation results are visualized, evaluated, and saved. As soon as the validation limits are exceeded, a warning message is issued, indicating the optical windows of the OFM sensors should be cleaned.

OFM Calibrations

Depending on the surface coating and texture, the sheet metal surface has typical reflective properties and requires specific calibration for quantitative measurement. In our calibration laboratory, we create high accurate calibrations for our systems using precise scales and calibration stations with many years of experience and extensive expertise. These can be transferred to all OFM sensors and can be implemented at any time.

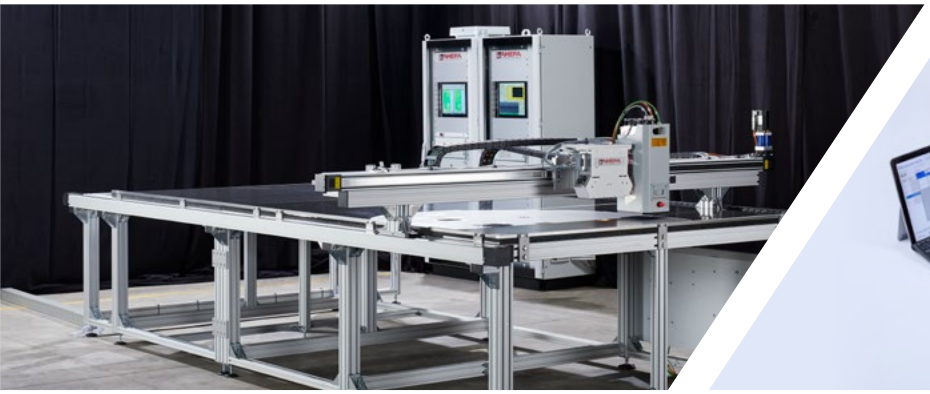
Technical Specifications

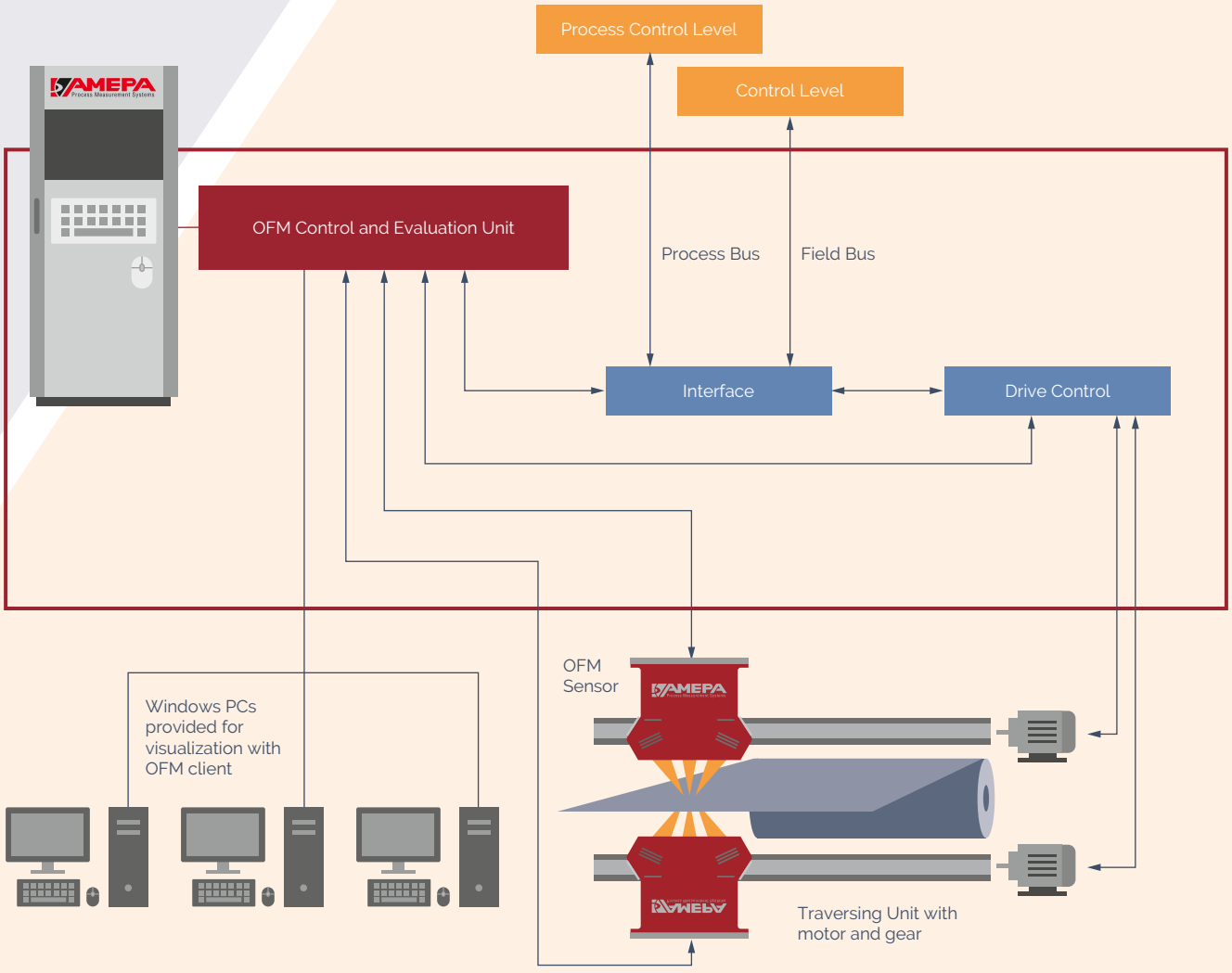
- Measuring range: up to 5.0 g/m²
- Measurement resolution: 0.01 g/m²
- Measurement accuracy:
  Measuring range up to 1 g/m²: ± 0.05 g/m²
  Measuring range beyond 1 g/m²: ± 5 % of the measured value
- Distance of sensor to measuring object: 120 mm
- High tolerance to vibrations of the sheet metal (± 10 mm)
- Sampling rate 12.5 Hz (standard), up to 50 measured values per second possible
- Adjustable traversing speed (200 - 1000 mm/s)
- Sensor dimensions 343 x 257 x 88 (mm³)
- Environmental conditions:
  Temperature: 0 to 40 °C, optional up to 50 °C (with fan)
  Air humidity: maximum 90 %, non-condensing

Further Applications and Designs

The OFM sensor is used on an **(R)OM** measuring table to measure lubricant distribution on blanks with a selectable local resolution. Simultaneous measurement of surface roughness (Ra, Rz, RPc) with an SRM sensor is optional.

The **OFIS,** a portable oil film measuring device, is developed on the same measuring principle as the OFM. This device allows the oil layer in problematic areas on coils, blanks, and even formed parts to be measured.





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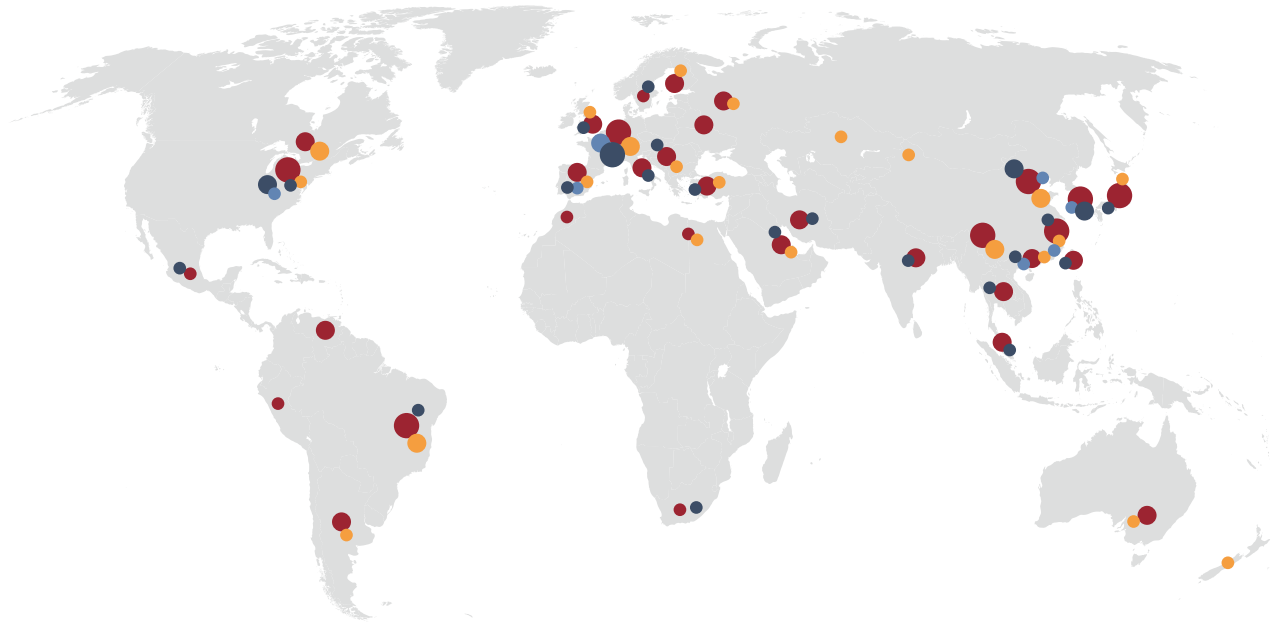
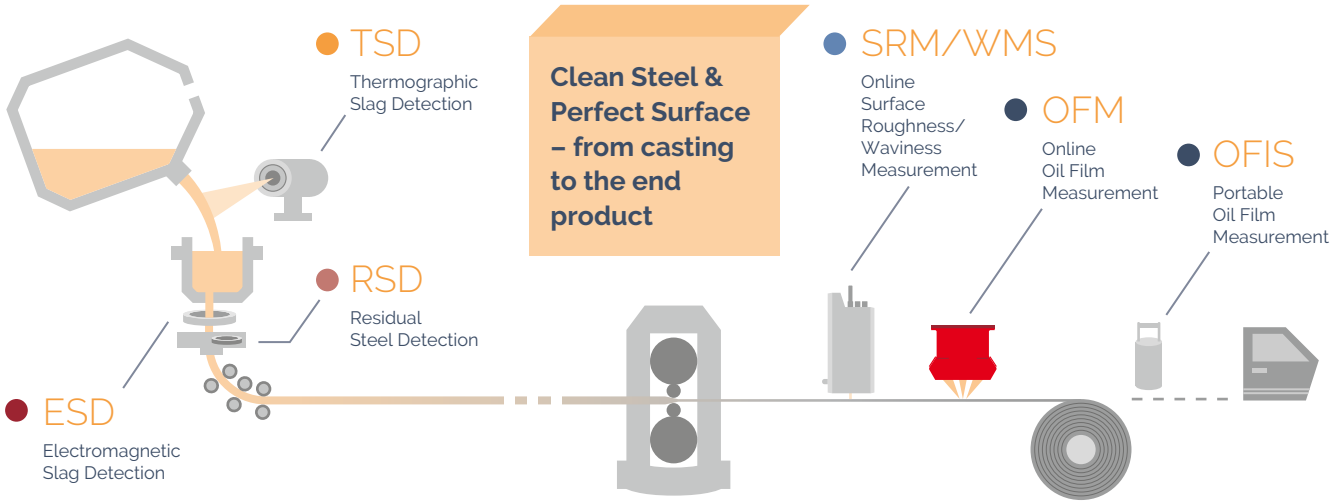
Worldwide successful





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