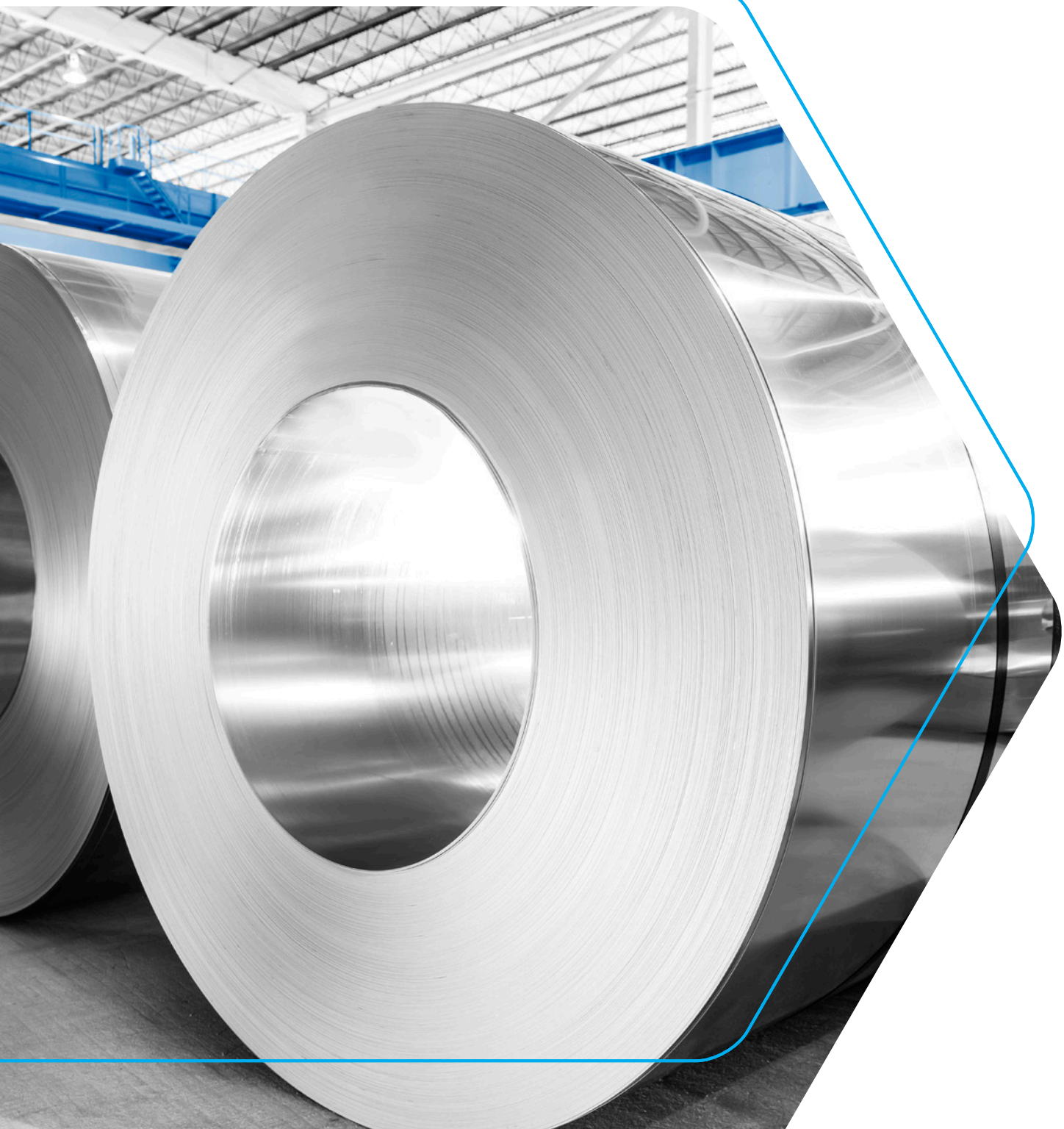
EMG
an elexis company

Optimise your processes and increase your quality

Quality assurance systems for cold and electrical strip



EMG Automation GmbH

The company

EMG is the specialist when it comes to intelligent and complex automation solutions. As a technology leader, EMG is the first point of contact for you, our customers.

Central areas of application for series products, individual components and complex system solutions from EMG are continuous production processes in the metal industry.

As a traditional company and world market leader with more than 80 years of experience, EMG offers its customers, i.e. you, complete solutions for your respective individual requirements.

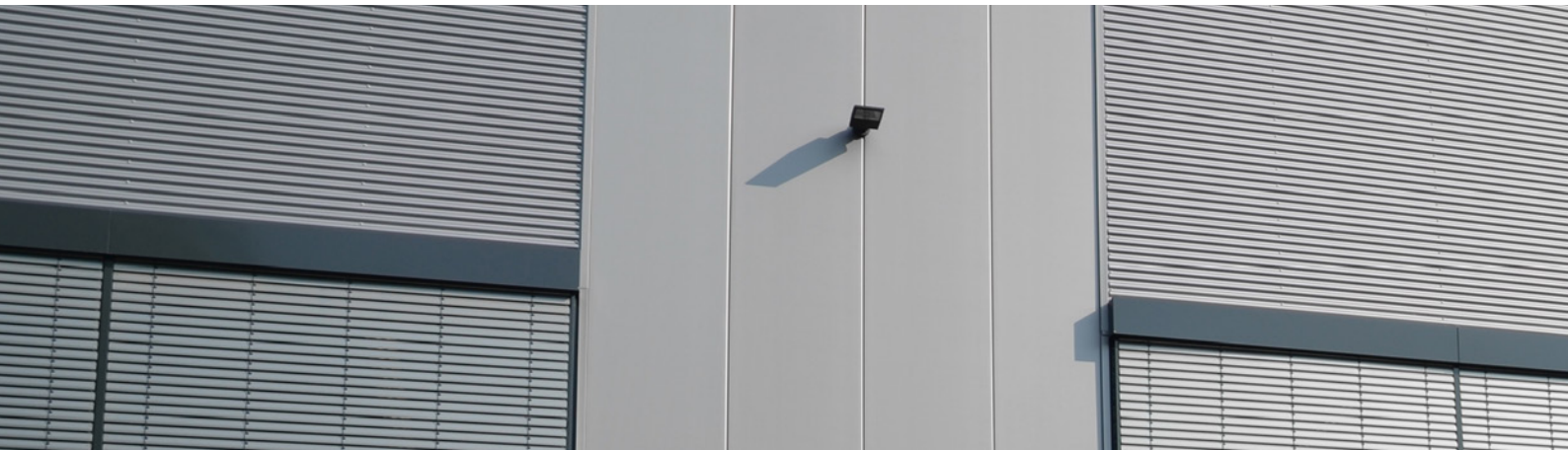
Consultation, joint planning and intensive support up to commissioning therefore play a decisive role in addition to the pure technical products.

Here, we focus on process automation and visualisation as well as process control and monitoring.

Solutions for the cold and electrical strip sector:

In this brochure, you will get to know EMG's innovative quality assurance systems for the cold and electrical strip sector in order to optimise your processes and thus your product quality!

All EMG systems are based on the same hardware and software structure. Benefit from the use of our broad solution portfolio and reduce your TCO (Total Cost of Ownership)!



EMG

perfecting your performance

EMG Strip guiding solutions

With our high-quality strip guiding systems, we provide safe, low-maintenance and technically mature components as well as complete solutions that optimally support your respective technological production process.

Due to the constantly increasing demands on quality and high availability in combination with reduced operating and maintenance personnel, your requirements are also constantly increasing. Through the continuous optimisation of our solutions, we are able to meet these requirements.

Together with our quality assurance systems, we offer versatile and reliable solutions for improving your process and product quality - all from one single source!

Our goal: perfecting your performance!

EMG Quality assurance systems:

EMG's innovative quality assurance systems enable you, as our customer, to continuously optimise your manufacturing processes and increase your production quality in order to optimally meet the constantly growing demands on your end product in the long term.

- **EMG SOLID®:**
  Online oil layer and dry film thickness measurement
- **EMG SORM®:**
  Online roughness and waviness measurement
- **EMG IMPOC:**
  Online measurement of tensile and yield strength
- **EMG eMASS®:**
  Strip stabilisation
- **EMG eBACS:**
  Bafffe blade control
- **EMG BREIMO:**
  Strip width measurement
- **EMG iCAM®:**
  Online measurement of strip and slit strip width and hole detection

EMG process optimisation with AI

In recent years, EMG has been intensively focusing on the application of analysis and modelling methods for process improvement and control in flat metal production lines.

The result of this development work is the software platform **EMG iCASS®** (intelligent Control and Analytical Software Solutions). It can be seamlessly integrated into a wide range of sensors, machines and higher-level systems (such as MES or ERP) and provides the necessary basis for monitoring, analysing and optimising production processes.

EMG SOLID®

Online measurement of oil layers and insulating varnishes on running strips

EMG SOLID® performs an online measurement within the production line to determine the oil layer or insulating varnish over the entire width and length and then visualises it over the entire measured surface. Thereby it reliably detects dry spots and over-oiling.

Advantages for your processes

- Improved process stability and reliability
- Transparency of input quality and targeted control of the forming process
- Minimised scrap
- Secure production release
- Transparency of the essential quality features
- Joint database and combined visualisation of the measured values possible
- Delivery and system integration from one single source
- Combination of further EMG quality assurance systems, such as roughness and waviness measurement, width and slip strip width measurement, etc. possible

Perfect for each application

Oil layer with EMG SOLID® IR & LIF

- Precise measurement of the surface weight of oil layer thicknesses
- Reduction of rejects in the pressing process
- Provision of measurement values for end customers or downstream processes
- Increased material yield

Cleanliness with EMG SOLID® LIF

- Oil residues after cleaning lithium battery terminals, electrical components, air compressors, refrigeration machines, etc.
- Oil residues on the exterior panelling parts of cars, on sunroof ceramics, on solder joints of car parts, etc.
- Cleanliness of medical and laboratory equipment
- Cleanliness of wires, cables and terminals

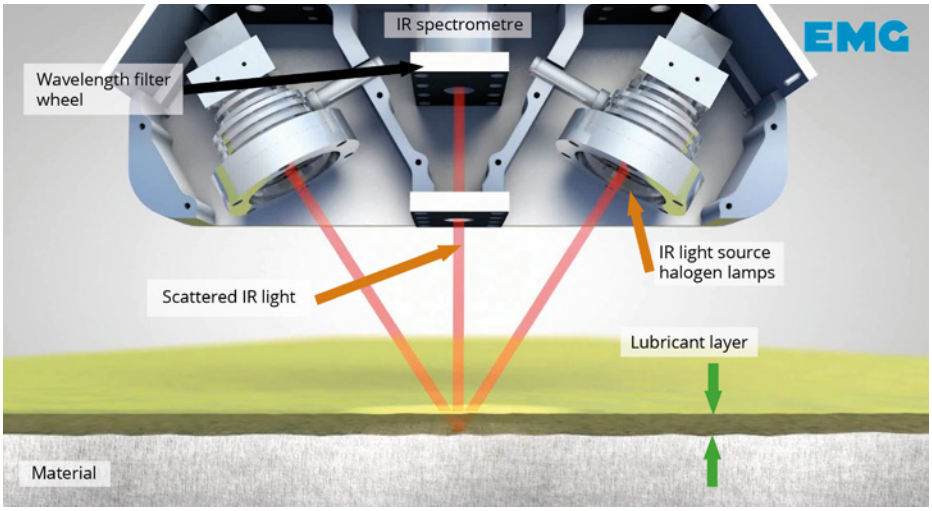
Insulating varnish with EMG SOLID® DFT

- Precise measurement of the dry film thickness of the transparent and low-pigmented coating layer on electrical steel strip
- Application on grain-orientated (GO) and non-grain-orientated (NGO) material in
  - Annealing and coating lines [ACL]

EMG SOLID®

Always the ideal technology

EMG SOLID® IR - InfraRed spectroscopy



Our solution **EMG SOLID® IR** is based on the infrared spectroscopy. The system emitts an infrared light that passes through the oil layer, is reflected from the strip surface and passes through the oil layer again.

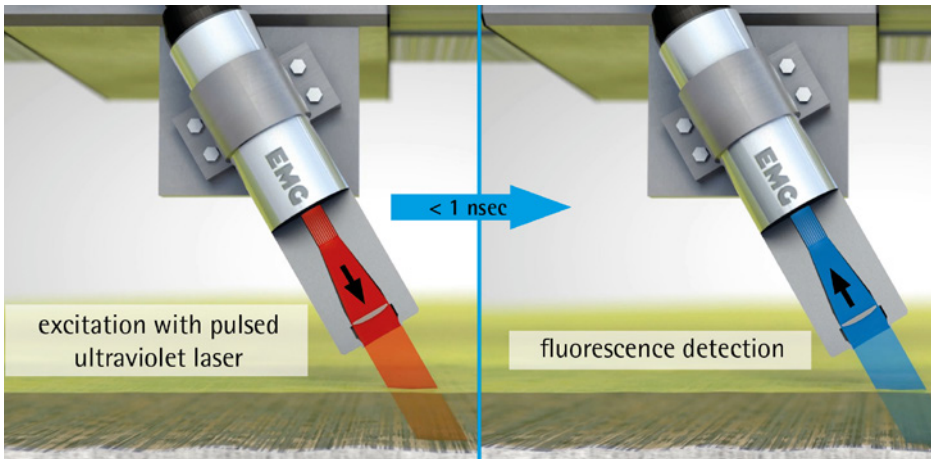
In doing so the intensity of specific wavelengths of the oil layer is attenuated - the thicker the oil layer, the less light is reflected.
According to the Lambert-Beer law, the layer thickness is then calculated.

Measuring range	0.1 – 6.0 g/m²
Measuring Accuracy	0.02 - 0.3 g / m²: +/- 0.025 g / m² * 0.3 - 2 g / m²: +/- 0.2 g / m² ** > 2 g / m² - 6 g / m²: 10 % of the measured value** * case-specific special calibration ** general group calibration, up to two times better accuracy achievable with specific calibration (Accuracy verification is permitted only with a precision laboratory balance)

EMG SOLID® LIF - LaserInduced Fluorescence spectroscopy

Via laser-induced fluorescence spectroscopy our system **EMG SOLID® LIF** measures the coating weight of the oil layer and visualises it over the entirely measured material surface:

- Special solid state laser delivers 10.000 single pulses per second and and stimulates the oil to glow
- The more oil on the surface of the material surface, the stronger the luminous effect
- A micro controller controls the analysing system, manages the system calibrations and calculates the results.



Measuring range	0 – 6 g/m²
Measuring accuracy	+/- 10 % of the measuring range end value (permissible comparison with a precision laboratory balance)

EMG SORM®

Online roughness & waviness measurement

Roughness and waviness parameters are important quality features of uncoated and surface-refined strip material.

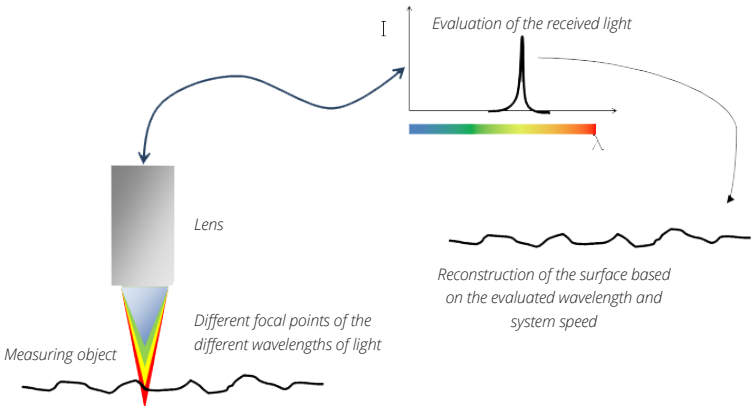
EMG SORM® is our contact-free, online roughness and waviness measuring system that can be used for metallic and many non-metallic surfaces.

Measuring range (strip thickness)	2.5 mm (without focus unit)
Measuring accuracy*	» **Ra/Wsa:** +/- 15 % compared to tactile measurement (for 85 % of all values) » **RPc:** +/- 20 % compared to tactile measurement (for 80 % of all values)

** based on experience gained in online testing*

Customer benefits

- Control and optimisation of the skin pass and/or rolling process
- Reduction of complaints thanks to an early detection of deviations from the requested roughness and waviness range
- Excellent coating results due to a homogeneous surface roughness
- Cost savings in comparison to manual stylus measurement

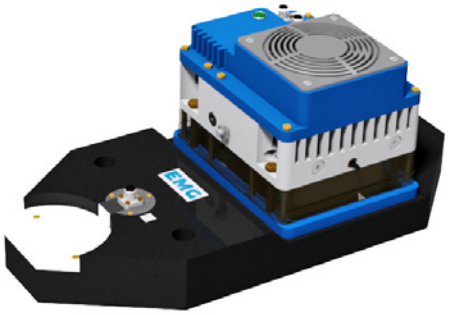


EMG SORM® measuring principle

EMG IMPOC

Online measurement of tensile and yield strength

EMG IMPOC is our tried and tested, magnetic-inductive measuring system for automatic, non-destructive online determination of the mechanical properties (tensile and yield strength) of ferromagnetic steel strip material.



Areas of application include the production of cold-rolled and surface-coated steel strip material, for example, in:

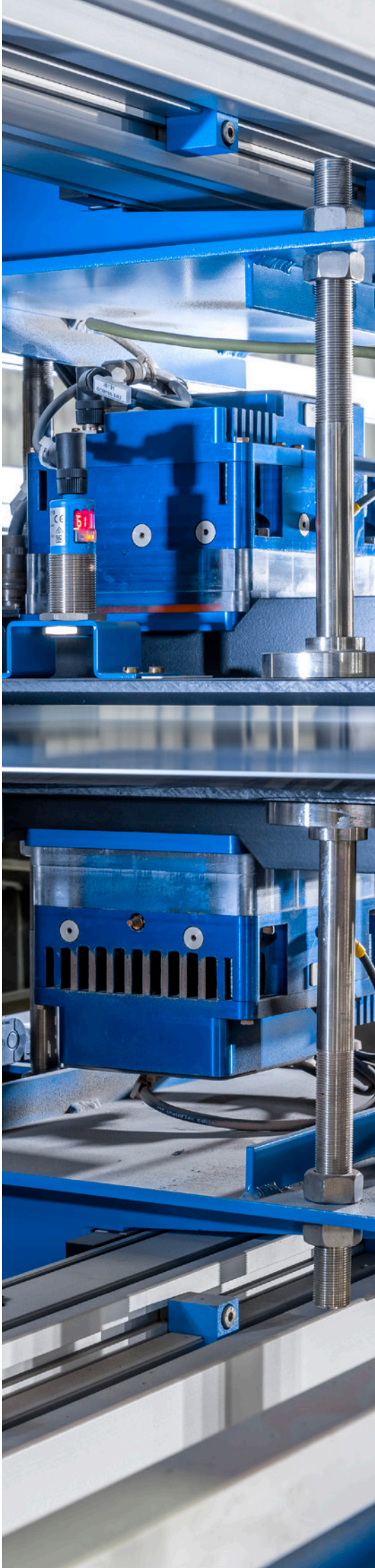
- Hot-dip galvanising lines
- Continuous annealing lines
- Tinning lines
- Continuous pickling lines*
- Processing lines*

**on request*

		IMPOCpro	Power IMPOC
Measuring range	» Strip thickness » Strip width » Strip speed	0.15 – 3.0 mm > 500 mm 6 – 900 m/min	0.15 – 6.0 mm > 500 mm 6 – 600 m/min
Measuring accuracy	» IMPOC value: +/- 5 % [A/m²] » tensile strength: +/- 5 % of measuring value [MPa]* » yield strength: +/- 10 % of measuring value [MPa]* **this accuracy will be reached at 90 % of the measured values*		

Customer benefits

- Transparency about material properties over strip length
- Cutting optimisation
- Increase in yield and material output
- Reduction of destructive material testing
- Statements regarding the degree of recrystallisation



EMG iCASS®

Data-based process analysis and optimisation

Machine learning and AI-based data analysis for the steel and aluminium industry – an approach that combines advanced digitalisation and industrial experience to enable genuine innovation and added value.

EMG has been working intensively on the application of analysis and modelling methods for process improvement and control in flat metal production lines as part of an extensive development project and, since 2023, in an industrial cooperation with AI specialist NeurologIQ.

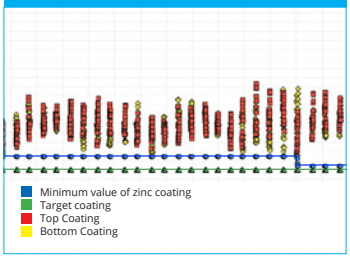
The result of this development work is the **EMG iCASS®** (intelligent Control and Analytical Software Solutions) software platform. **EMG iCASS®** can be seamlessly integrated into a wide range of sensors, machines and higher-level systems (such as MES or ERP) and provides the necessary basis for monitoring, analysing and optimising production processes.

This extends to real-time production control.

Current fields of application include the optimisation of the hot-dip galvanising process, optionally supported by **EMG eMASS®**, and the prediction of material properties with **EMG iCASS®**. For ferromagnetic steels, this can be combined with the **EMG IMPOC** magnetic-inductive measuring system.

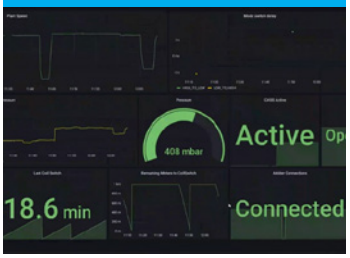
Virtual HM / Strip Transition

Safety Margin Adjustment



Nozzle Position Optimisation

Real Time Coating Control



Applications hot-dip-galvanising:

- Virtual hot measurement
- Optimisation of safety margins
- Optimisation of coating profile (avoidance of wedges and deviations between the top and bottom of the strip)
- Closed-loop control of the air knife control
- Process monitoring / alarm function

Customer benefits:

- Safe transitions when changing coatings
- No conventional hot measurement required
- Optimised coating profile
- Minimal zinc consumption due to optimised safety margins
- Process transparency and identification of process deviations
- AI-based control as an alternative or supplement to conventional controls

Applications process lines:

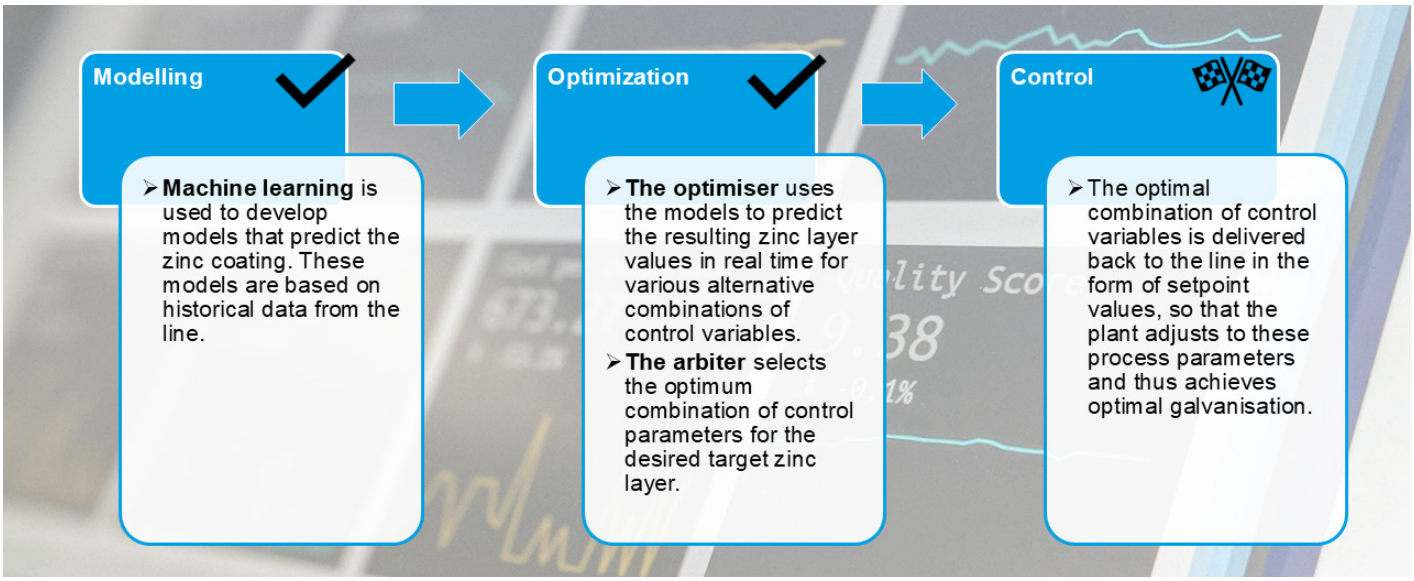
- Virtual IMPOC (process data-based prediction of material properties for steel and aluminium strips)
- IMPOC Booster (improvement of the accuracy of online measurement results for tensile strength and yield strength with EMG IMPOC)

Customer benefits:

- Extended spectrum for predicting material properties, including for non-ferromagnetic strips

EMG iCASS®

From Data to Value



For producers aiming to unlock the full potential of their process data, **EMG iCASS®** offers a future-ready pathway toward smarter, more stable, and more sustainable production.

Contact EMG today to discuss your use case and begin your **EMG iCASS®** journey.
Mail to: iCASS@emg-automation.com.

EMG eMASS®

Electromagnetic strip stabilisation

In hot-dip galvanising lines the zinc coating thickness is determined by air knives. This is where **EMG eMASS®**, our turnkey system for stabilising fast-running ferromagnetic steel strips based on electromagnets, is mainly used. **EMG eMASS®** optimises and economises the use of the metal coating at the blow-off nozzle of a hot-dip galvanising line for zinc coating, GALVALUME®* and aluminisation processes.

The system is installed above the air knife and as close as possible to the air knife lip, which wipes off the liquid metallic layer. Based on the experience of more than 75 installations around the world, EMG designs the integration of **EMG eMASS®** systems for the air knife area in an optimal and customer-specific manner.

Customer benefits

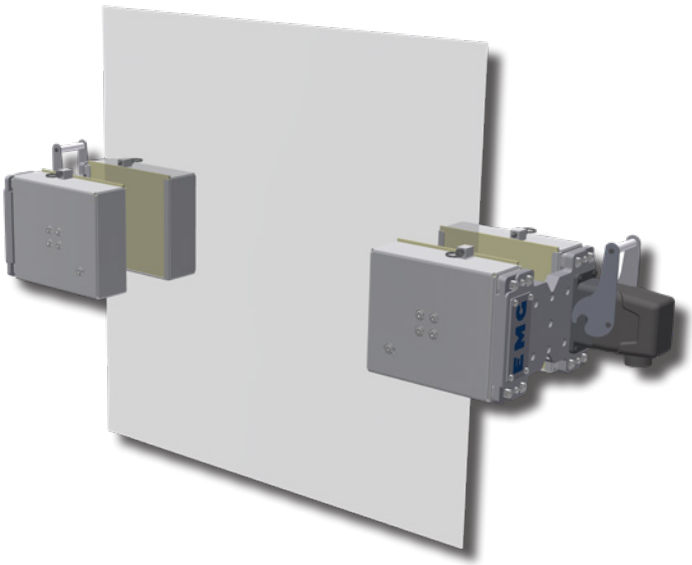
- Homogeneous zinc layer across the width and length of the strip
- Stable pass line of the strip and reduction of the “cross-bow” effect
- Narrower air knife gap
- Zinc savings as a result of reduced overcoating
- Targeted and reliable production of low coating weights

**GALVALUME® is a registered trademark of BIEC International Inc.*

EMG eBACS

Edge mask control

In the area of blow-off nozzles the metal strip passing through the system is enlarged by so called “baffle blades” to avoid any form of air turbulence, which can lead to damage of the zinc layer around the strip edge. The baffle blades must continuously follow the strip edges, the position of which can change due to swarming of the strip or alteration of the strip width. The inductive edge sensors used with **EMG eBACS** enable high precision and contact-free tracking of the baffle blades.



Customer benefits

- Homogeneous zinc coating of the strip edge
- No chipping of the zinc layer
- No deformation of the strip edge
- Inductive, contact-free position measurement
- Insensitive to dust and zinc splashes
- Low maintenance requirements
- Compact integration
- Avoidance of mechanical contact rollers

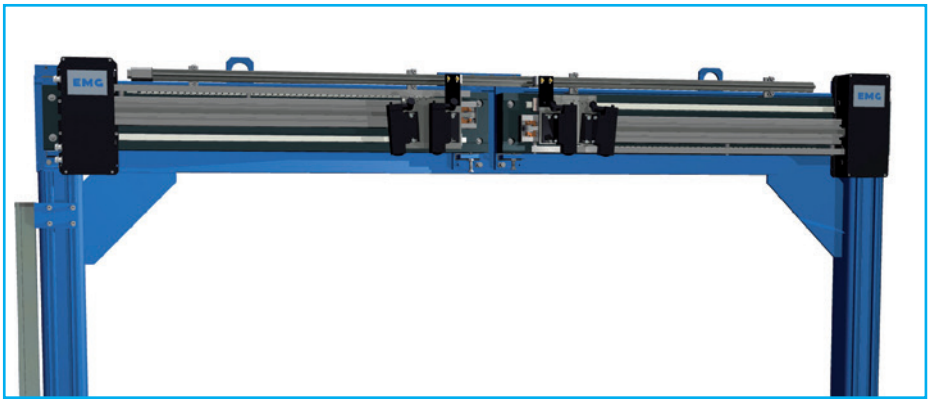
EMG BREIMO

Strip width measurement

EMG BREIMO is our contact-free, optical strip width measuring system for metal strip material in continuously running processes. Consisting of a measuring frame with two sensor positioning devices EVK, the corresponding light emitters and a common linear stroke transducer, **EMG BREIMO** is an extremely reliable strip width measuring system.

EMG BREIMO offers a robustness to external malfunctions. Changes to the strip edge position are continuously detected and taken into account when calculating and displaying the strip width.

	EMG BREIMO	EMG BREIMO-H
Measuring range	300 - 3,000 mm	
Measuring accuracy	+/- 0.5 mm	+/- 0.2 mm
Strip height variation	< +/- 20 mm	< +/- 10 mm



EMG BREIMO-H (high precision)

Customer benefits

- Precise and reliable measuring accuracy
- Safety for incoming and outgoing material widths
- Active dirt compensation
- Insensitive to ambient light
- High availability
- Minimum installation space required
- Sturdy, ready-to-install measuring frame according to individual customer requirements
- Reduction in the amount of scrap from trimming (in combination with Strip Width Optimisation **EMG SWOp**)

EMG iCAM®

Online measurement of strip and slit strip width

The EMG iCAM® system is based on the multi camera array technology and can be used in multiple strip processing lines for the measurement of strip width and slit strip width as well as for hole detection.

The high-precision measurement of the strip and slit strip width allows the exact control of the knife distances as well as the knife positions.

This information can be used as a valuable reference for the next process step to avoid inaccuracies and improve the quality of the end products.

Furthermore due to defects or any foreign materials being pressed into the material within the running production process, holes will form on the surface of the strip, which will also cause failure and shutdown of machines. Pressing and coating processes for sheet metal require flawless base materials without holes.

Hole detection enables the selection of the required material quality in accordance with customer specifications. Material that does not meet the required quality is sorted out. The sorted-out material is not used for the pressing processes, which saves time, energy and money.

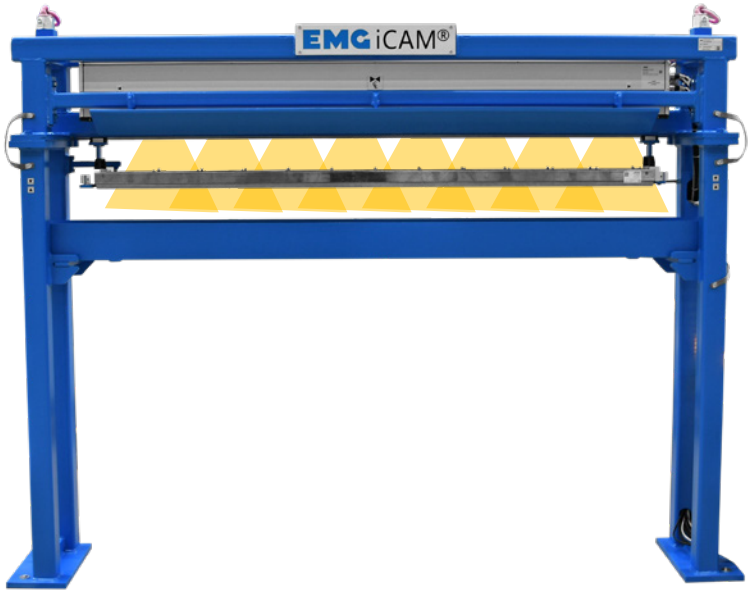
Holes must not be confused with pinholes at this point.

EMG iCAM®	
Measuring range	up to 2,950 mm strip width (others on request)
Measuring accuracy	Strip width: up to +/-0.1 mm (2 σ) Slit strip width: up to +/-0.05 mm (2 σ)
Passline detection area	19 mm (incl. strip thickness, strip edge ripple, strip waves)
Smallest detectable hole size	up to 0.2 x 0.2 mm*

*depends on the line speed and material thickness, deviations must be taken into account for holes that are not perfectly vertical

Customer benefits

- Transparent incoming inspection and precise process control
- Minimisation of edge trim and efficient process release through data management and visualisation of measurement data
- Automatic dirt detection on the LED backlight unit
- Insensitive to ambient light
- Inline measurement (continuous strip measurement, logged)
- No moving components; low maintenance



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