MICRO-EPSILON

Measuring and inspection systems for the metallurgical industry

Unique

Innovative

Superior

Efficient

Revolutionary

References (extract)

voestalpine
EINEN SCHRITT VORAUS.

SALZGITTER AG
Stahl und Technologie

Wieland
Metall
ist unsere Welt

AMAG
AUSTRIA METALL

SIEMENS
VAI

ArcelorMittal

SMS DEMAG
SMS group

ThyssenKrupp Steel

C-clamp: flexible strip thickness and profile measurement
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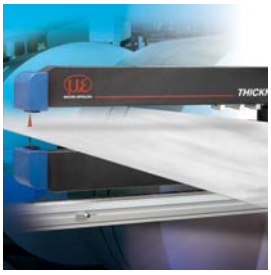

C-clamp: thickness measurement of large strip widths
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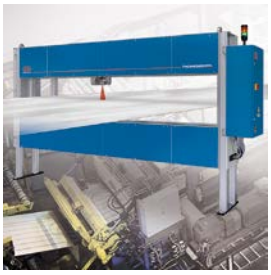

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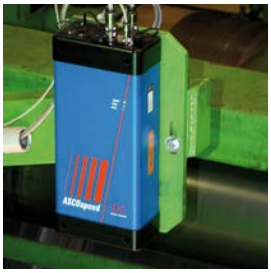

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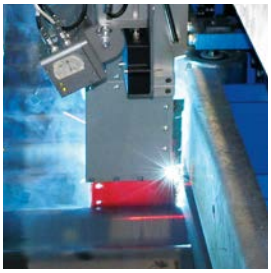

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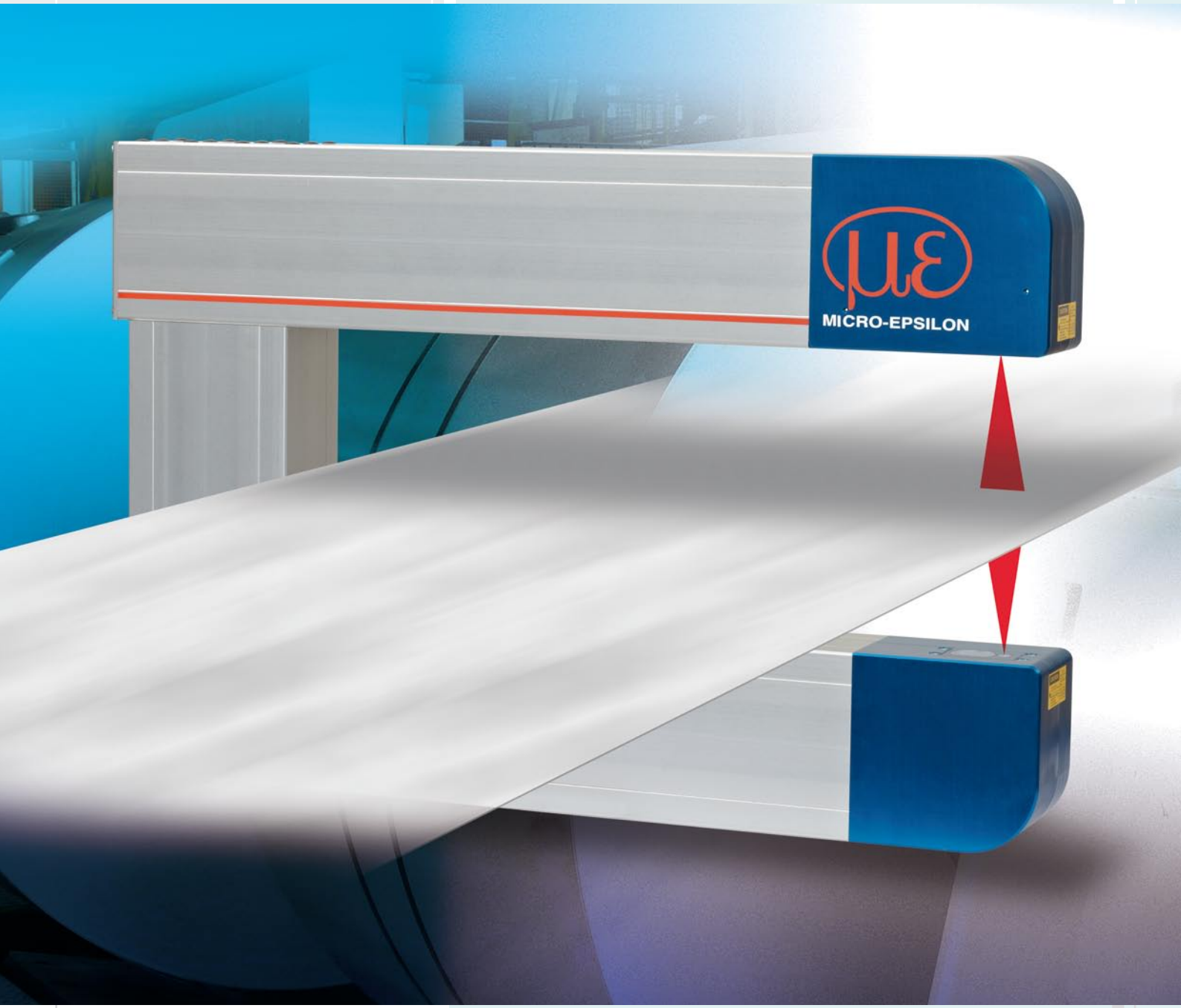
C-clamp: flexible strip thickness and profile measurement



APPLICATION FIELDS

Thickness profile measurement

- Hot and cold rolling
- Splitting lines
- Coating
- Casting
- Drawing lines
- Cutting

MATERIAL PARAMETER

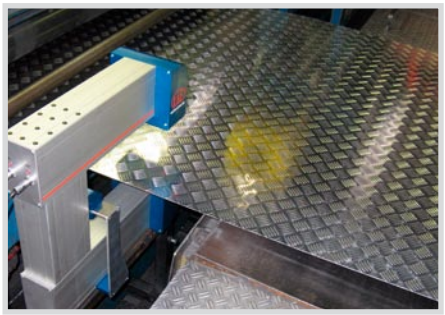
- Width up to 500mm
- Thickness <1mm up to 50mm
- Accuracy from ±1µm

thicknessCONTROL MTS 8202

The modularly-designed C-clamp systems of the MTS 8202 family are convincing due to their flexibility and performance in the metalworking industry. Applying them in rolling mills or Service Centres provides reliable measurement results in high precision and thus creates the basis for controlling the production process and eventually the quality achieved.

Precise

The system measures differentially i.e. an application-specific displacement sensor is integrated in the upper and lower flange of the C-clamp. The thickness of the target material is the difference between the sensors to each other and the amount of signals. In combination with highly-efficient signal processing algorithms of the analyses and visualisation software, accuracies in the sub-micrometer range are ensured.



Robust

A fully-automatic calibration ensures the measurement to be independent from temperature influences, thus the system can be applied in harsh industrial environments being characterised by permanently providing inline precision. All sensor technologies applied, measure without contact, wear-free and without isotopes or X-rays. This process provides long-term reliable measured data while avoiding consequential costs.

Unique

Being supported by various physical measurement technologies thicknessCONTROL MTS 8202 offers a unique range of solvable applications regarding profile thickness measurement in the metallurgical industry.

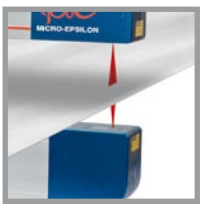
The data acquisition is effected via an industrial PC or a compact universal controller.

SYSTEM INTEGRATION

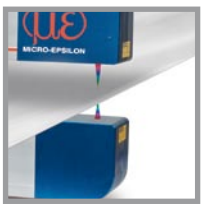
The C-clamp can be used as a traversing thickness measurement system on applying linear axis in order to ensure complete width measurements of the target. The control and analysis software provides all required functions in order to record and evaluate the quality of production without any interruption. Various interfaces which enable an excellent integration to the line are available to communicate with the control system of the production line.

SPECIAL FEATURES

- No isotopes or X-rays
- Measurement independent from strip movement
- Independent to alloys
- Different sensor technolgies:
  - Laser triangulation (point or laser line)
  - Capacitive
  - Eddy current
- Control of several measuring systems with only one terminal

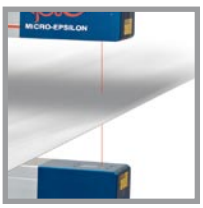


MTS 8202.LLT
Laser line triangulation



MTS 8202.E
Eddy current

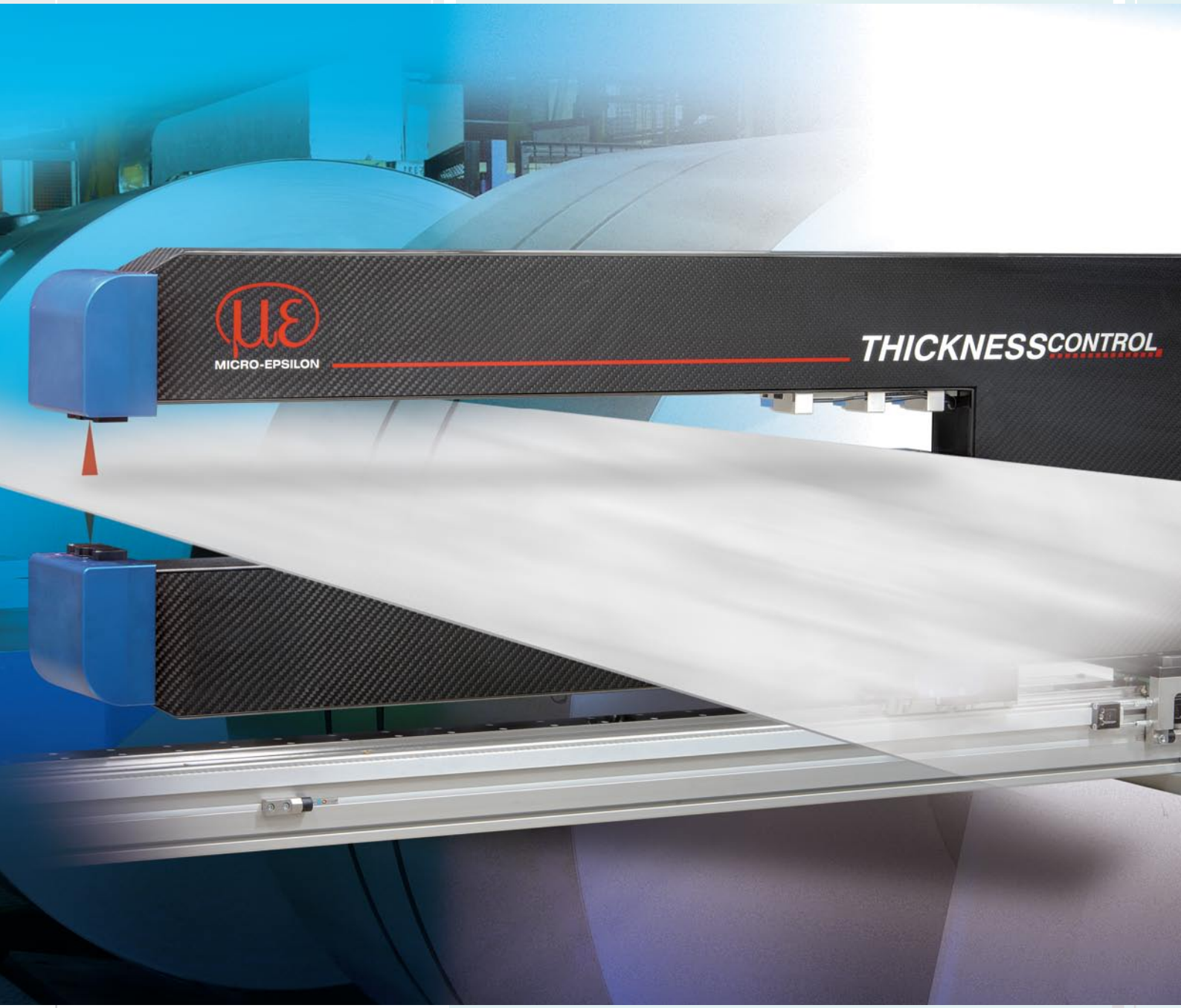
MTS 8202.C
Capacitive



MTS 8202.T
Laser triangulation

Thanks to diverse measurement technologies the measurement principle can be ideally adjusted to each application. In doing so, large free gaps, various material thicknesses and surfaces can be measured easily.

C-clamp: thickness measurement of large strip widths



APPLICATION FIELDS

Thickness profile measurement

- Hot and cold rolling
- Splitting lines
- Coating
- Casting
- Drawing lines
- Cutting

MATERIAL PARAMETER

- Width up to 1400 mm
- Thickness <1mm up to 50mm
- Accuracy from ±1µm

thicknessCONTROL MTS 8202.LLT CFK

In metal processing, if large strip widths that require C-clamp based measurement technology are requested, the CFK C-clamp systems of the MTS 8202.LLT CFK family, part of the MTS 8202 series, are provided. The highest precision in rolling mills or service centres is a factor of how rigid the measurement system is. As the CFK C-clamp systems are lightweight, they are ideal for applications on different measurement positions within the process.

Precise

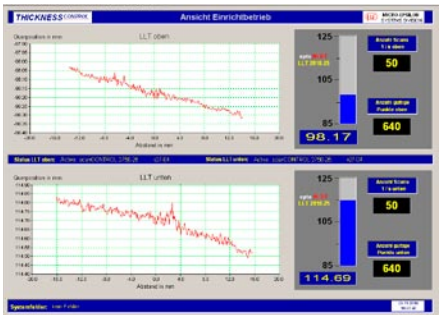
Due to the laser line triangulation measuring principle and the patented linearisation method used, tilt angles of the material can be detected and compensated for. This technology is therefore superior to measurement methods that use a single laser point. The high lateral resolution of the laser line enables additional geometrical thickness measurements of the chequer plate or button plate, the measurement of gap width, as well as the accurate profile measurement of strip edges. In addition, characteristics that cannot be detected by using common isotopes, x-ray machines or point-type laser sensors due to the size of the measurement spot can be detected using laser line sensors.

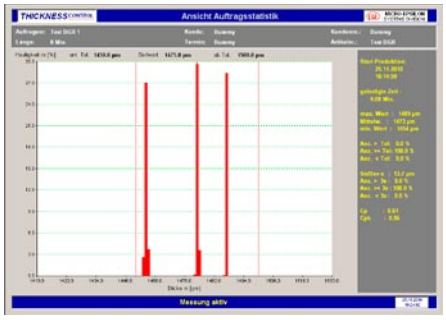
Robust

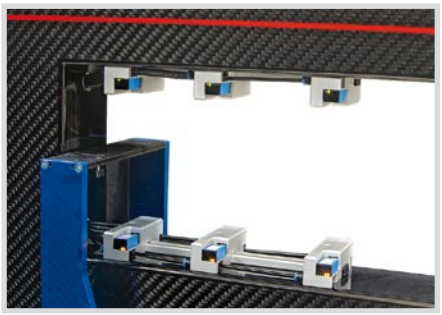
Fully-automated in-process calibration ensures that measurements are unaffected by any temperature fluctuations, enabling continuous inline precision measurement results. This demonstrates that the systems can also be applied in harsh industrial environments. The laser line triangulation sensor technology used measures with a large base distance from the strip. This means that any significant vertical movements of the strip do not interfere with system measurements. Thickness is detected via wear-free methods without using isotopes or x-rays. This process provides long-term reliable measurement data while avoiding unnecessary costs. Furthermore, uniform oil films on the strip can be detected and compensated for.

Revolutionary

Due to their basic body which is made from carbon fibre reinforced plastic, thicknessCONTROL MTS 8202.LLT CFK systems are very lightweight with respect to their measurement width. Therefore, the systems considerably reduce the loads transmitted by moving mechanical components of the machine, ensuring a longer service life and minimising maintenance.







SYSTEM INTEGRATION

For speed and length measurements, thicknessCONTROL MTS 8202 systems are equipped with user-friendly interfaces using standard ASCOspeed sensors. This product line offers a variety of design options and features for expanding the man-machine interface to enable optimal integration to the process line. Easy-to-use software tools for offline analysis of measurement data and for monitoring of production completes the range of options available to help increase and improve process efficiencies and quality.

SPECIAL FEATURES

- Outstanding ratio of measurement distance to precision
- High lateral resolution
- High precision, even for tilted strip
- Geometrical thickness measurement of chequered plate or button plate according to DIN 59220 or EN 1386
- Independent of surface type and alloys
- Compensates for lubricant film
- Saves costs of using isotopes or x-rays

O-frame systems for thickness profile measurement

APPLICATION FIELDS

Thickness profile measurement

- Hot and cold rolling
- Splitting lines
- Coating
- Casting
- Drawing lines
- Cutting

MATERIAL PARAMETER

- Width up to 4000mm
- Thickness <1mm bis 200mm
- Accuracy from ±5µm

thicknessCONTROL MTS 8201

The systems of the MTS 8201 family are designed as O-frames and significantly impress by large material width and stability as well as high precision in the thickness measurements. Applying them in rolling mills and Service Centres provides reliable measurement results in high precision and thus creates the basis for controlling the production process and eventually the quality achieved.

Precise

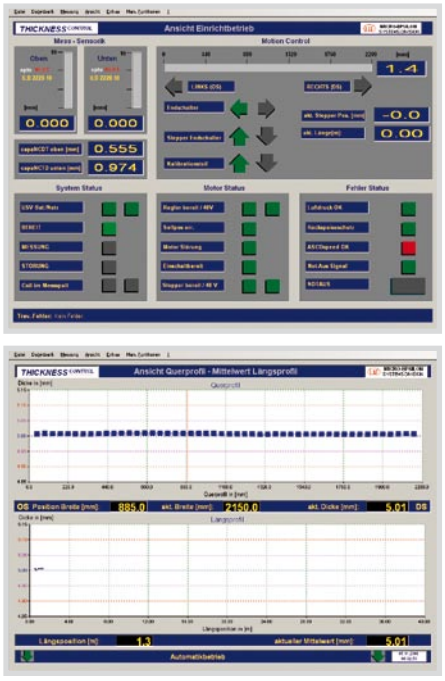
The systems measure differentially i.e. an application-specific displacement sensor is integrated on a mechanical carriage in the upper and lower flange of the O-frame. The thickness of the target material is the difference between the sensors to each other and the amount of signals. Additionally, high-speed gaging sensors are integrated on the traversing mechanical carriage in order to measure the width of the material (in slitting lines the width of each ring).

Robust

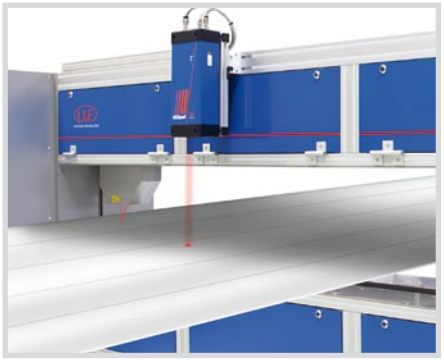
In addition to the fully-automatic calibration, the systems optionally dispose of temperature-invariant compensation frames which ensure that the measurement is not affected by temperature influences. Therefore, they are ideal for applications in harsh industrial environment. Furthermore, all sensor technologies applied measure without contact, wear-free and without isotopes or X-rays. This process provides long-term reliable measured data while avoiding consequential costs.

Innovative

Using different, application-specific measurement methods the systems of the family thicknessCONTROL MTS 8201 are, amongst other things, impressive due to their excellent ratio of measurement range to inevitable vertical material movement or the consideration of material tilting. Thus, they can be ideally applied – adapted to requirements – for the profile thickness measurement in the metallurgical industry.



Set up and process visualisation software



SYSTEM INTEGRATION

For different application areas, corresponding tools for process visualisation and documentation are provided for the plant operators. Various interfaces which enable an excellent integration to the line are available to communicate with the control system of the production line.

SPECIAL FEATURES

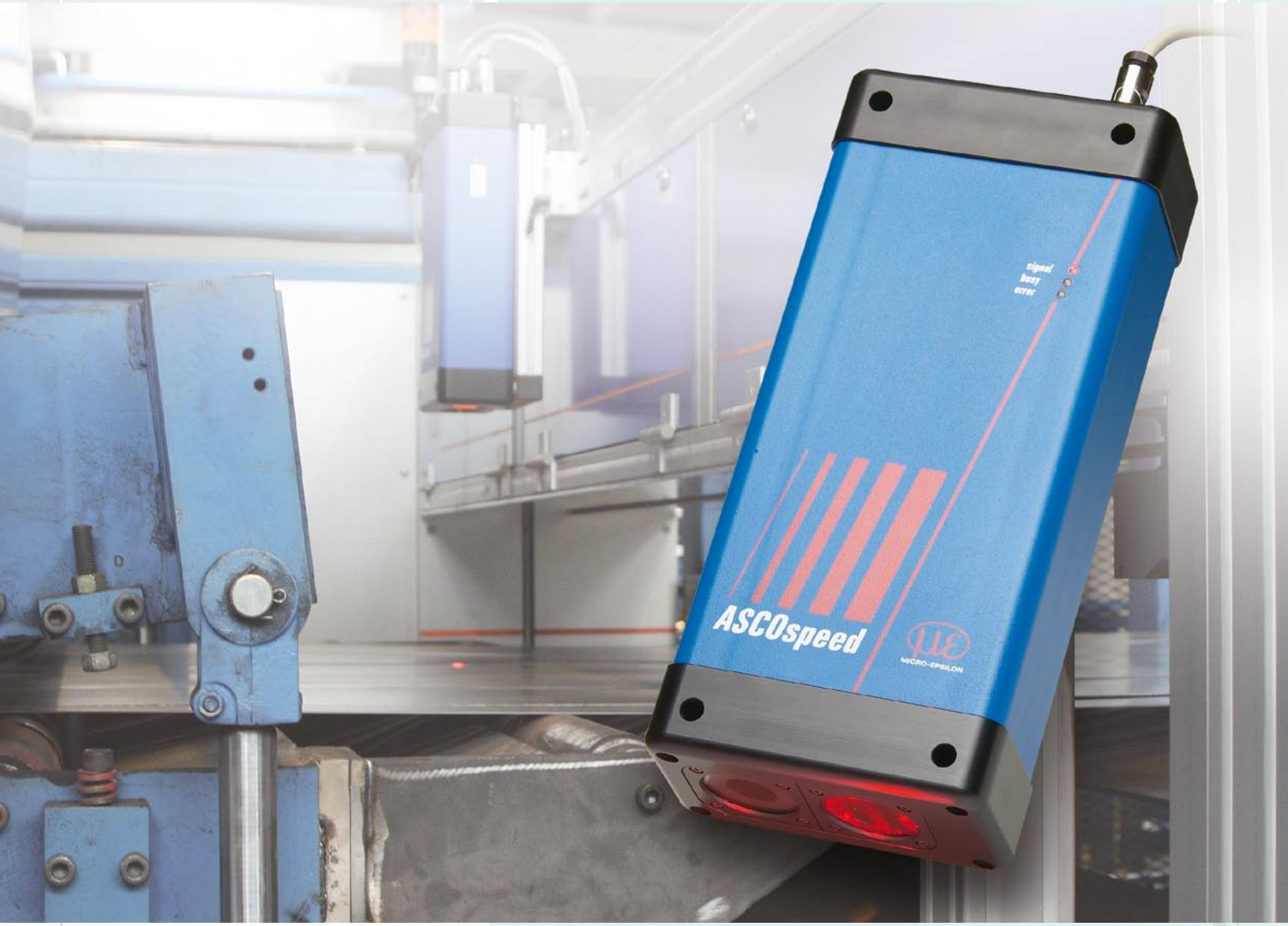
- No isotopes or X-rays
- Different sensor technolgies:
  - Laser triangulation (point or laser line)
  - Capacitive

MTS 8201.LLT
Laser line triangulation

MTS 8201.T
Laser triangulation

MTS 8201.C
Capacitive

ASCOspeed: non-contact length and speed measurement

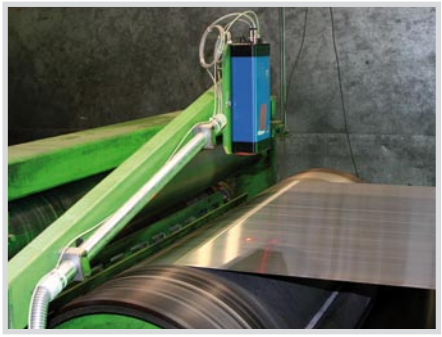


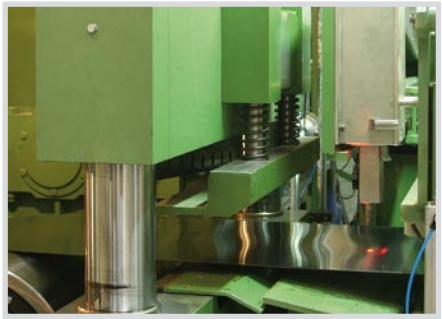
APPLICATION FIELDS

- Controlling complex production systems
- Rolling mills, tension levellers and stretch formers
- Inspection and coating systems
- Cutting lines, winding machines and extruding plants
- Inspection, welding and bending lines
- Wire rod mills and profile lines

ASCOspeed – the new generation

The ASCOspeed 5500 is a powerful speed sensor which has been focused on applications in the metal industries. It operates according to the signal phasing group method and is therefore a further development within the proven spatial frequency filter technology. Thereby the moved material surface and measured by means of the precise grid structure of the detector and converted into an electrical frequency which is proportional to the speed of the object.





Precise

State-of-the-art signal processing structures ensure that each change in the material speed is measured precisely. This is provided by extremely fast hardware which is able to register, check and compress the current speed values in the microseconds range up to maximum material speeds of 3000 m/min. It is only in this way that maximum precision can be realised for acceleration processes. The sensor also provides a reliable speed signal for the minimal averaging and output time of 0.5 milliseconds.

Robust

The compact design combines sensor and controller in one robust case and thus guarantees use in many different systems without problems. The device operates autonomously, has low power consumption and thus only needs a 24VDC power supply. Internal temperature monitoring makes possible the integration in the controller of climatised applications and thus increases the operational reliability. Standardised interfaces open up many possibilities for the user in the automation of process lines.

Superior

Conventional mechanical systems can be replaced without problems by the ASCOspeed 5500. The device has free scaleable quadrature pulse output channels and can therefore be used as an alternative to rotary shaft encoders. The synchronous operation provides significant benefits for the measurement of differential speeds such as for mass flow control or skin pass level control. Using trigger pulse from the controller, several hardware-controlled measuring process devices can operate exactly synchronously and in this way provide more precise results in acceleration phases.

The master / Slave operation of two autonomous ASCOspeed gauges now makes possible the output of differential speed without additional PLC using internal calculation functions in the Master gauge. The interconnection of several devices in inspection lines simplifies the transmission of the speed information.

Due to the use of a new type of LED illumination, the potential danger with respect to radiation exposure of well known Laser Doppler systems has been clearly minimised.

The functional principle, evaluation and the mode of operation with LED light offers the requirements for an exact and very stable non-contact speed measurement in order to meet the requirements of the modern regulation even under harsh conditions which can be seen in rolling mills.

SPECIAL FEATURES

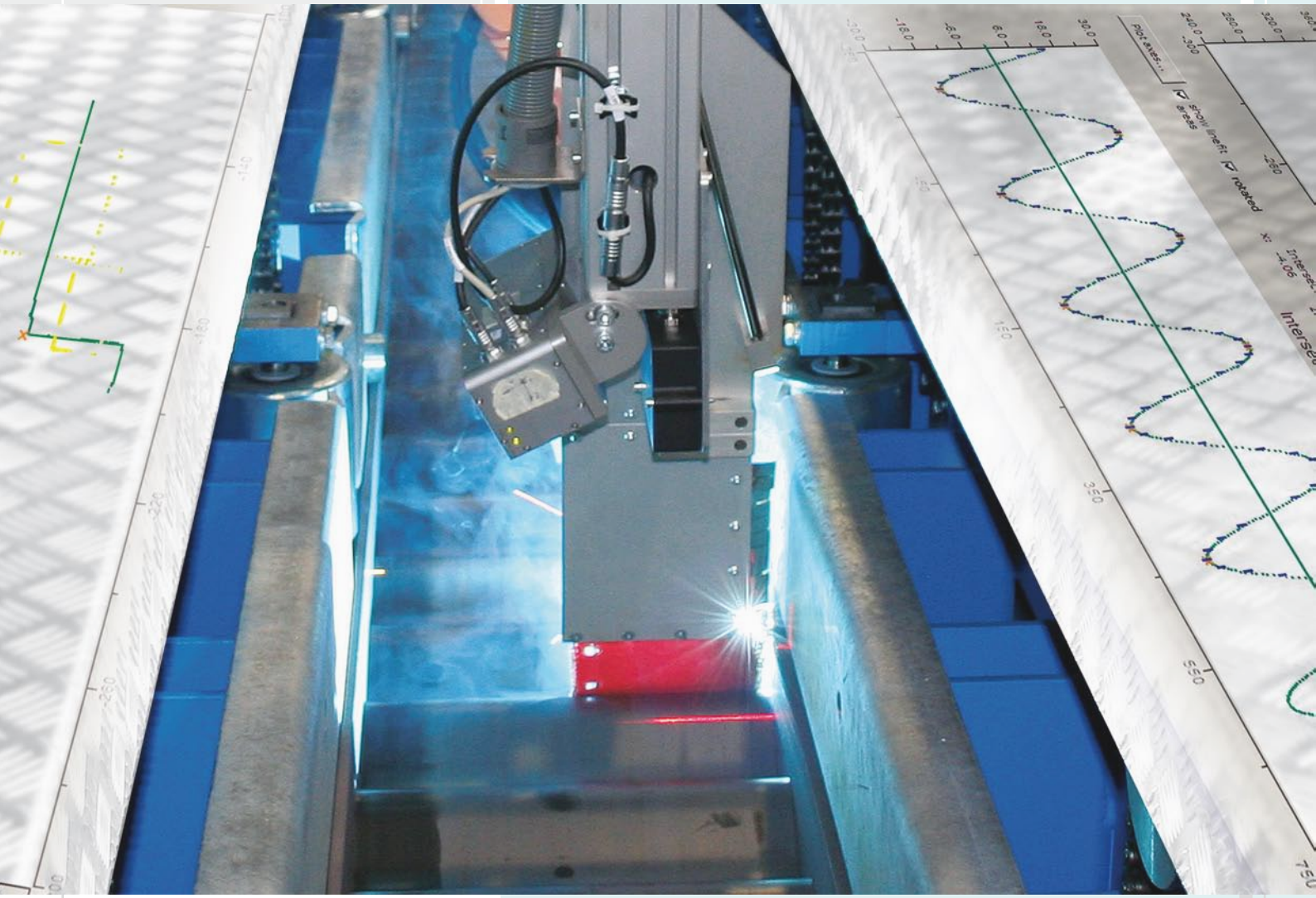
- In stable extruded aluminium profile case
- Ease of use due to non-hazardous LED light source
- Powerful due to optimum functionality
- Measuring range selection can be parameterised
- Real-time signal processing with multi-chain plausibility analysis

Technical Data ASCOspeed

Measuring range	up to max. 3000m/min
Measuring distance	300 ±15mm
Linearity	± 0.05%
Repeatability	± 0.03%
Protection standard	IP 65, 0°C to 50°C optional: stainless steel protective housing
LED	Class 1

ASCOspeed in stainless steel protection housing SGH5500

Systems for automation and inspection of industrial welding processes



APPLICATION FIELDS

- Automation of welding processes (e.g. girder production, pipelines)

Detection of e.g.

- Missing seam
- Double seam
- Spillings / Dross
- Pores
- Seam width
- Seam position

MATERIAL PARAMETER

- Shiny and matt surfaces
- Compensation of geometrical elements like holes or cut out
- Material feed up to 1m / min
- Position tolerance ±15mm

automationCONTROL WSS 8205.LLT

The systems WSS 8205.LLT are equipped with triangulation laser scanner. They achieve excellent results in the automation or inspection of welding processes. Therefore, the systems make an important contribution for more efficiency and quality.

Precise

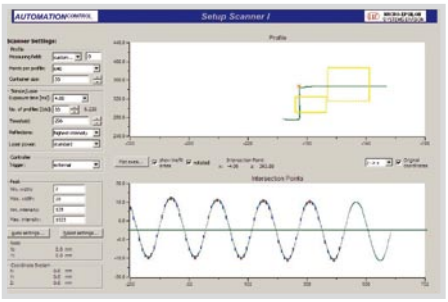
By means of a triangulation line scanner both, the semi-finished products subject to be welded or already welded units are detected. Eventually, their position is evaluated. Therefore, depending on the application, it is ensured that only correct welded parts are processed further or that parts can be re-adjusted before assembling them. The WSS 8205.LLT of the family automationCONTROL has one additional interface for the welding robot and calculates the line which has to be followed during the welding process.

Robust

The systems are protected by means of special mechanics during the welding process, when they measure close to the welding electrode. The mechanics avoid the optics being affected by welding sparks or consequently being blinded by the arc.

Efficient

Having the knowledge of the thermal deformations built and the shape of the welding seam which is provided by the systems of WSS 8205.LLT, important information regarding the welding parameters can be deduced. Therefore, the complete welding process can be controlled and is eventually more energy-saving and quicker.



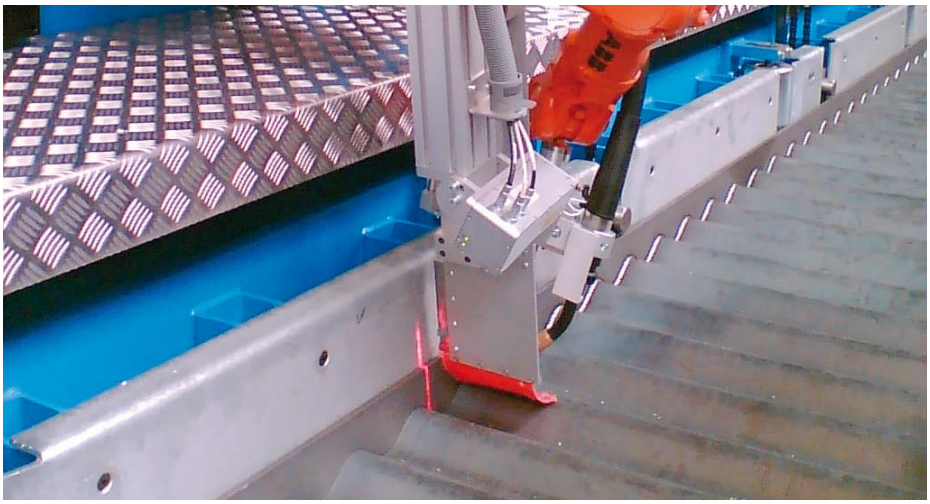
The laser line sensors provide exact profile data on the weld seam profile.

SYSTEM INTEGRATION

The system can easily be coupled to various robot systems. Additionally, the system is equipped with appropriate software tools for the visualisation and documentation of the monitored and automated process.

SPECIAL FEATURES

- Suitable for matt and shiny metal surfaces
- High feed rate possible
- Consideration of geometrical elements in the semi-finished products
- Maximum positional tolerance to be measured ±15mm



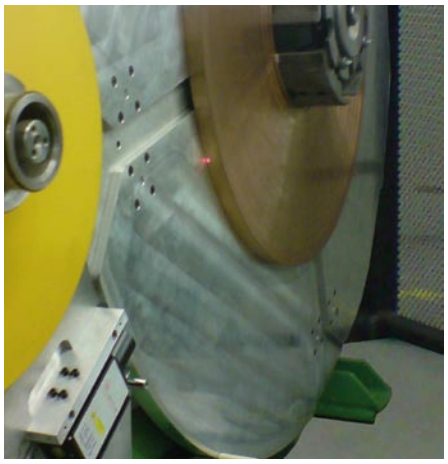
The automationCONTROL technology improves the process efficiency.

Micro-Epsilon sensors in the metallurgical industry

Micro-Epsilon has been a reliable industrial partner for more than 40 years for precision measurement technology for inspection, monitoring and automation. Systems and components from Micro-Epsilon are used in the metallurgical industry and metalworking in order to develop efficient production. The application range of the measurement systems covers rolled products up to the final product. The medium size company employs approx. 500 people throughout the world and provides Europe's most comprehensive range of measuring technology for measuring thickness, width, profile and surface – however also temperature, length and speed, for measuring vibration, impact, gap and many other factors. As components, they are often indispensable integral parts in the products of many machine and line constructors and electrical equipment suppliers world wide. But the company, specialising as it does in measurement technology, is also known for unconventional solutions where requirements are strict in the area of process lines. Solutions are devised in the shortest time and matched onsite.

Flatness measurement in rolling mills

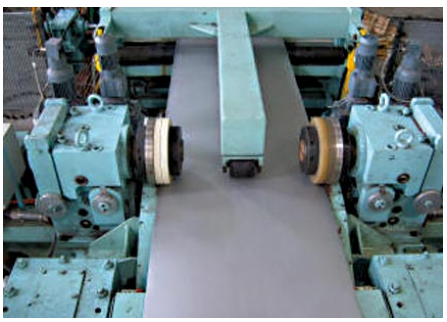
The requirements on the surface quality of rolled sheet are continually increasing. This may be steel sheet which is used, for example, for stainless steel fronts in kitchens, or also aluminum sheet used in the automotive field. Due to the enormous tensile forces when rolling the sheet, there is the risk that the tensile distribution varies over the width of the sheet and that the sheet will distort in a wave shape at the edges. Due to a new type of method developed by Siemens the sheet is pneumatically excited to vibrate. The amplitude of the vibration is acquired with non-contacting displacement sensors from Micro-Epsilon Messtechnik and from it the tensile stress is computed transversely over the width of the sheet. The significant advantage of this noncontacting measurement method is that no damage occurs to the surface.



Drive controller in precision rewinding machines

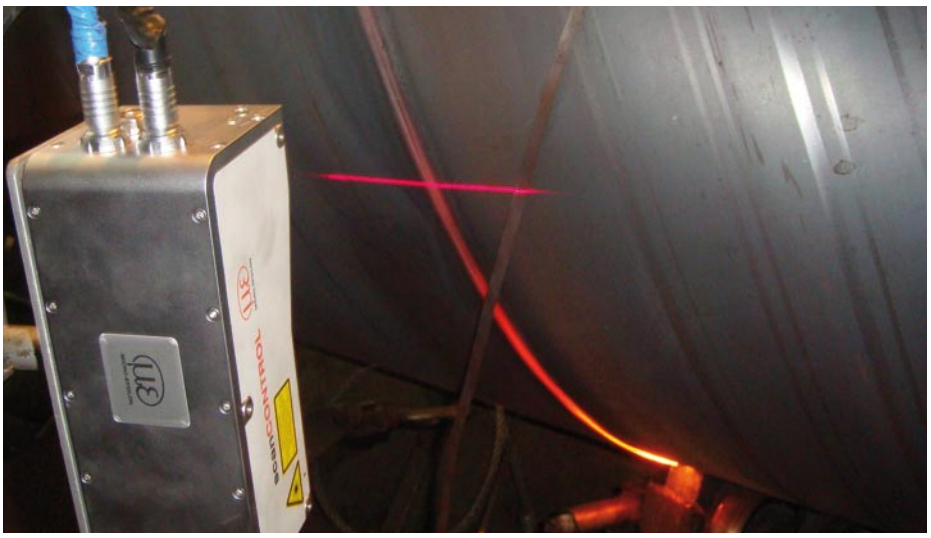
Finished coils are produced in the rewinding machine from individual ring-shaped metal bands. The metal rings are joined together coil by coil so that one continuous wound coil or spool is produced at the end. The ring end is measured with optoNCDT ILR laser distance sensors.

In further applications these sensors measure the diameter on coils in rolling mills and for the diameter measurement of paper rolls.



Strip width when trimming metal strips

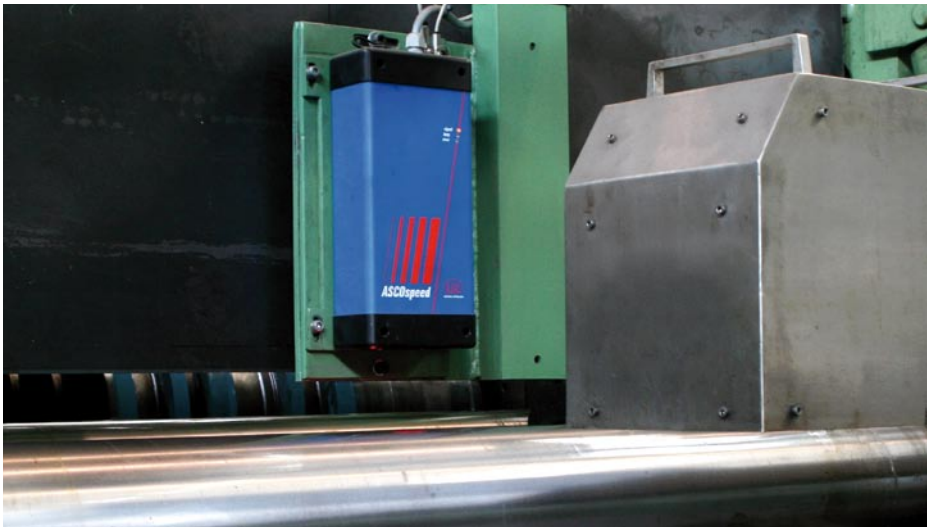
In the production of metal strips, it is often necessary to trim the edges of the metal strip. If the width of the metal strip has to be changed, new setpoint data of the machine controller are specified. The movable cutters automatically move to the new setpoint width. For the AIM solution, a target is provided on each of the cutter drives, which the laser sensor measures the distance to. The optoNCDT 1700-500 long range laser sensor with a 500mm measuring range is used for this. The distance of the target to the cutters and the distance of both laser sensors from each other are known. The current cutting width is now measured using the differential method.



Inspection of pipe weld seams

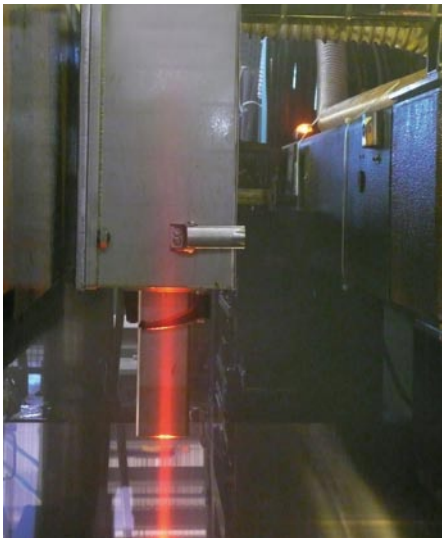
Big pipes are used for carrying sewage, water, oil or gas. Therefore, the weld seams produced during the manufacture of the pipe must be absolutely leak tight. The sections of pipe are joined using spiral welding techniques.

The positioning of the metal sheets for this process used to be carried out manually. However, the difficulties associated with precisely aligning the pipe ends resulted in constant quality issues. Using the scanCONTROL 2710, this positioning process is now performed automatically. The calculated profile information is used directly to position the pipes for welding.



Exact strip speed measurement for cutting lines

Cut to length shears for splitting strip material are used in the adjustment for practically all materials. The most important criteria are the edge quality after the cutting and the winding result with an accurate winding pattern for as large as possible finished coil diameters. This requires exact measurement of the current strip speed. Due to its non-contacting way of working and powerful interface option, the ASCOspeed is preferred for use as speed master in strip lines. The device measures without contact from a distance of 300mm and is thus not too close to the belt.



Speed measurement in rolling mills for thickness control

According to the law of constant volume in the forming, the emerging strip thickness from the incoming strip thickness at the moment of rolling and the infeed and discharge speed can be calculated and thus suitable correction values for the actuators can be determined. High precision thickness measurement and reliable speed measurement without slippage are the prerequisites for the realisation of this modern control concept.

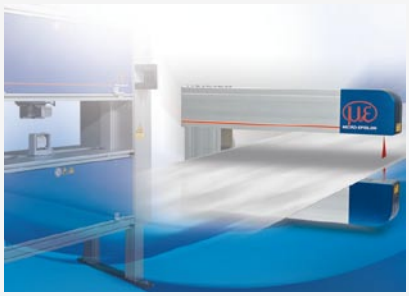
Non-contact stretch coefficient measurement

The production of strips and foils today is marked by larger and larger track widths and line speeds. Therefore, precise and reliable stretch coefficient measurement is an indispensable requirement for compliance with a uniform, exact flatness. Stretching foils and strips is the only possibility in many technological processes to achieve an exact flatness. What sounds so simple is a challenging technology due to the multitude of materials and alloys. On the infeed side, an ASCOspeed 5500 as slave determines the current strip speed before the stretch zone. The stretched strip is measured for speed by a second ASCOspeed, the master.

High performance sensors made by Micro-Epsilon

Sensors and systems for displacement and position

Sensors and measurement devices for non-contact temperature measurement



Measuring systems for quality control

Optical micrometers, fiber optic sensors and optical fibers

Color recognition sensors, LED analyzers and color online spectrometer

Technical endoscopes

Micro-Epsilon (Germany)

Atensor (Austria)

ME Inspection (Slovakia)

MICRO-EPSILON

Micro-Epsilon Systems technology is specialised on system solutions within the group of companies. The required components such as measurement technology, software and mechanics are developed and produced on three locations. All core capabilities and the corresponding know-how come from one group of companies – and this is mirrored in the innovative and reliable products of Micro-Epsilon.

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