



Measuring and inspection systems for the metallurgical industry





Unique
Innovative
Superior
Efficient
Revolutionary

References



ThyssenKrupp Steel



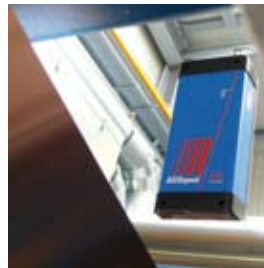
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C-clamp: flexible strip thickness and profile measurement



APPLICATION FIELDS

Thickness profile measurement

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

MATERIAL PARAMETER

- Width up to 500mm
- Thickness < 1mm up to 50mm
- Accuracy from $\pm 1\mu\text{m}$

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.



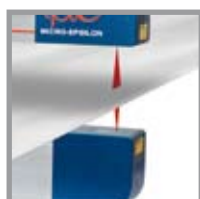
The data acquisition is effected via an industrial PC or a compact universal controller.

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 technologies:
 - Laser triangulation (point or laser line)
 - Capacitive
 - Confocal
- Control of several measuring systems with only one terminal



MTS 8202.LLT
Laser line triangulation



MTS 8202.K
Confocal



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.

O-frame systems for thickness profile measurement



APPLICATION FIELDS

Thickness profile measurement

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

MATERIAL PARAMETER

- Width up to 4000mm
- Thickness < 1mm bis 200mm
- Accuracy from $\pm 5\mu\text{m}$

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

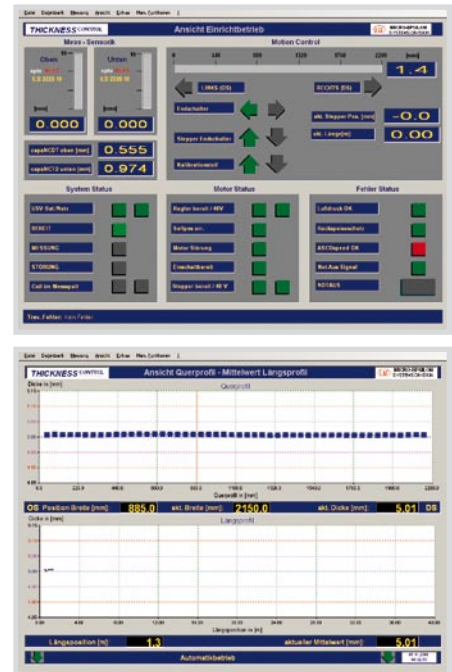
The systems measure differentially i.e. an application-specific displacement sensor is integrated on a mechanical carriage in the upper and lower flange of the O-frame. The thickness of the target material is the difference between the sensors to each other and the amount of signals. Additionally, high-speed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



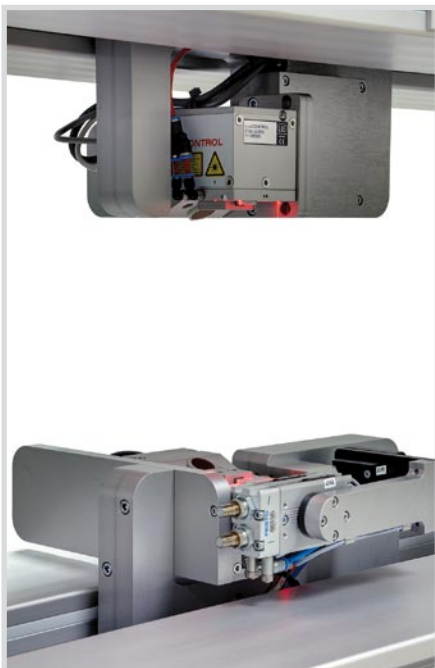
Set up and process visualisation software

SYSTEM INTEGRATION

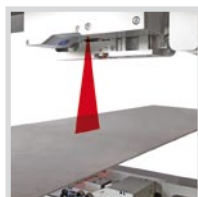
For different application areas, corresponding tools for process visualisation and documentation are provided for the plant operators. Various interfaces which enable an excellent integration to the line are available to communicate with the control system of the production line.

SPECIAL FEATURES

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



ASCOSpeed speed and length sensor (optional) for logging the length and for synchronisation with the cutter spindle



MTS 8201.LLT
Laser line triangulation



MTS 8201.T
Laser triangulation



MTS 8201.C
Capacitive

ASCOSpeed: non-contact length and speed measurement



APPLICATION FIELDS

- Coatings
- Stretch lines
- Rolling mills
- Cutting 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 24 VDC 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.



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



ASCOSpeed in stainless steel protection housing SGH5500

SENSOR VERSIONS

ASP5500-300-A-0-0-0-0
Standard Version

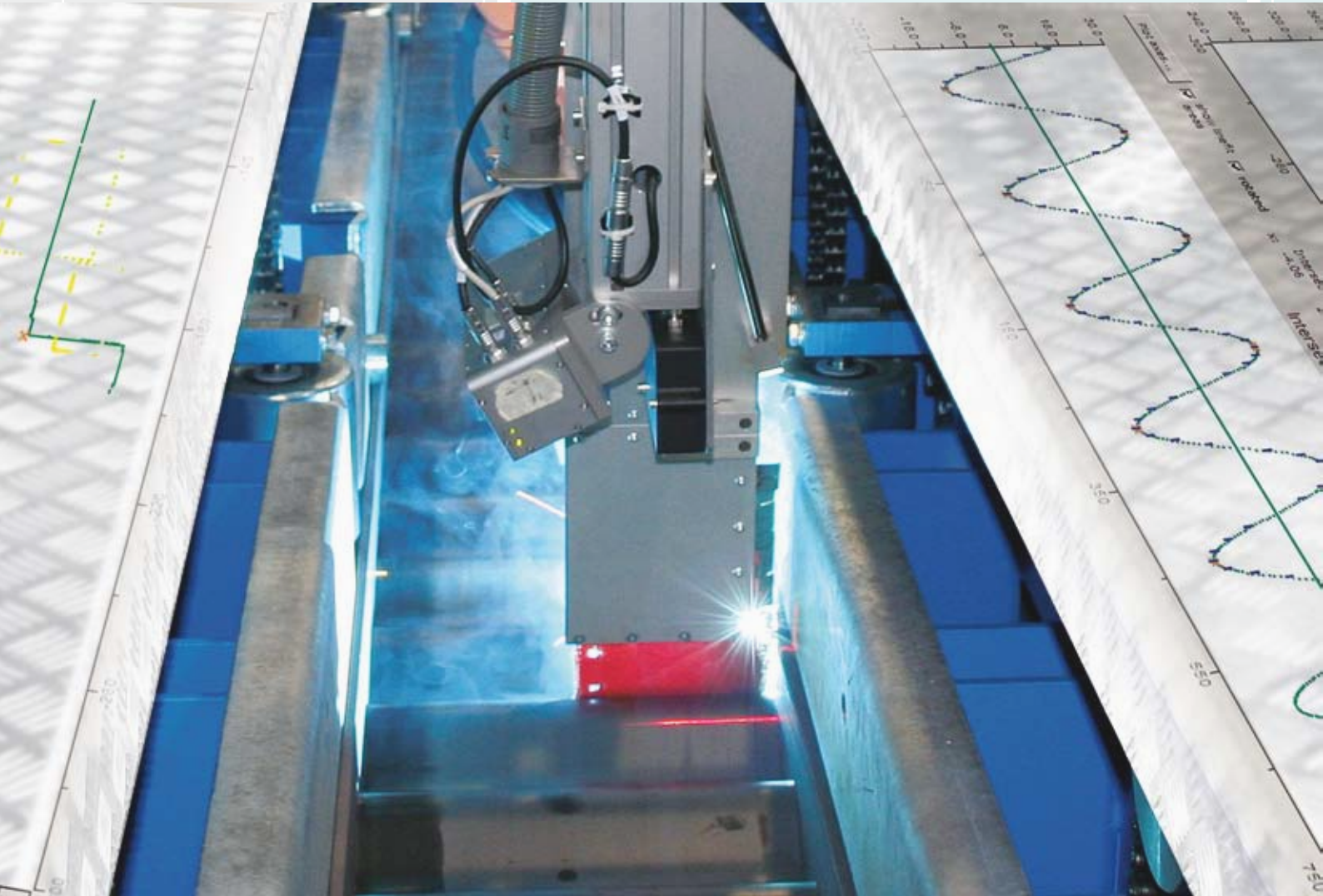
ASP5500-300-A-I-0-0-0
Version with interface

ASP5500-300-A-I-S-D-0
Synchron Version with interface and direction detection

ASP5500-300-A-I-S-D-E
Synchron Version, Heavy Duty
(Stainless steel protection housing)

ASP5500-300-A-I-M-D-0
Master-Slave-Version with interface and automatic direction detection

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 $\pm 15\text{mm}$

automationCONTROL WSS 8205.LLT dimensionCONTROL 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

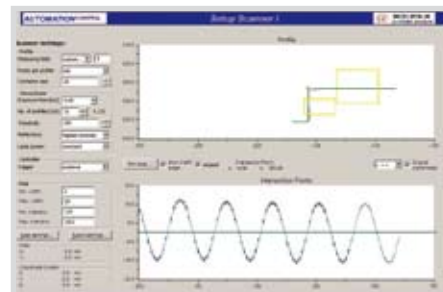
By means of a triangulation line scanner both, the semi-finished products subject to be welded or already welded units are detected. Eventually, their position is evaluated. Therefore, depending on the application, it is ensured that only correct welded parts are processed further or that parts can be 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.

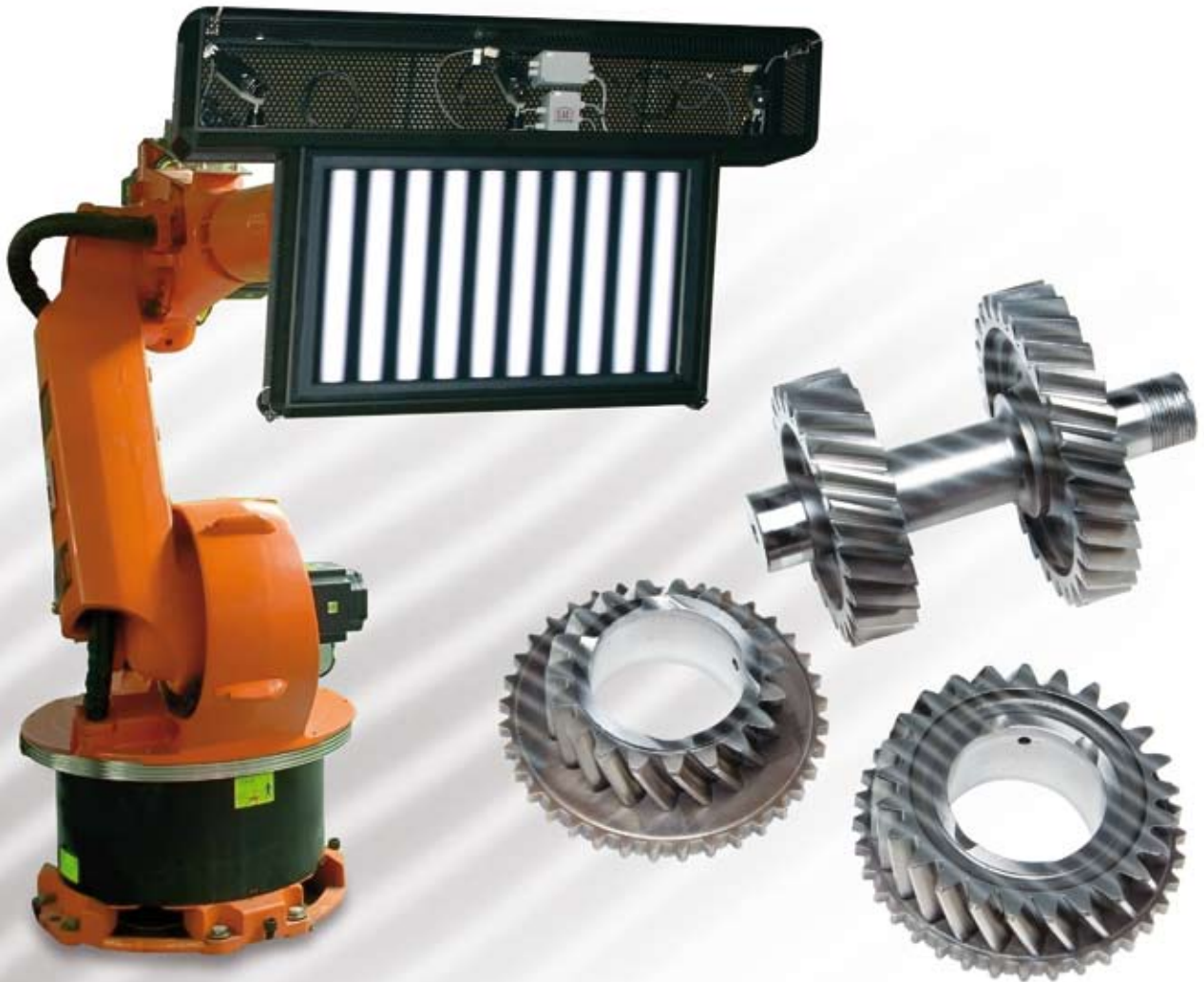
SPECIAL FEATURES

- 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 $\pm 15\text{mm}$



The automationCONTROL technology improves the process efficiency.

Automatic surface defect inspection systems



APPLICATION FIELDS

Inspection of reflecting surfaces

- Inclusion, scratch
- Hair, bump
- Large scratch, droplet, lint
- Runner
- Polluted paint, dent, contact

MATERIAL PARAMETER

- Defects from $2\mu\text{m}$ lateral
- 3D defect reconstruction
- Color independent modes
- Provides OK / NOT OK decisions, evaluations and defect reports

reflectCONTROL MSS 820X.D

The systems of the series MSS 820X.D are based on the phase measuring deflectometry principle. Their performance during inspection on reflecting surfaces is excellent. The systems are available in different designs which are adapted to respective requirements in the metallurgical industry.

Precise

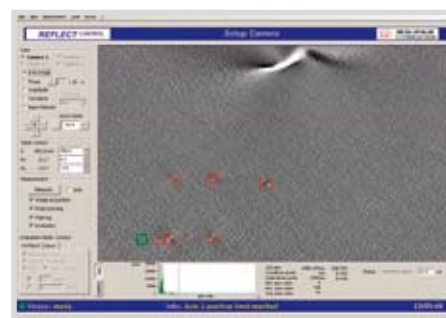
The irregularities in the mirror image of a given pattern are evaluated by the surface analysis based on deflectometry, similarly to an auditor who "puts the image in perspective" in order to detect irregularities in the mirror image.

Robust

Contrary to manual and visual inspection which is laborious and time-consuming and unfortunately subject to strong daylight fluctuations particularly in the case of boundary samples regarding repeatability, the surface quality is assessed quickly, reproducibly and objectively on applying products of the reflectCONTROL series.

Revolutionary

Systems and lines of the family reflectCONTROL not only master the detection of surface defects but manage the measurement of characteristics and depth. Even dents and bulges are detected accurately in the micrometer range.



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

- Surface resolution can be adjusted down to the micrometer range
- Suitable for complex characteristics and web-shaped material
- Modular concept for the application in production and laboratory
- Objective surface inspection
- Complete integration in the production line
- Intuitive user interface



reflectCONTROL Robotic during defect inspection on painted bodyshells



MSS 8205.D
reflectCONTROL Robotic



MSS 8206.D
reflectCONTROL Compact



MSS 8200.D
reflectCONTROL Sensor

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.



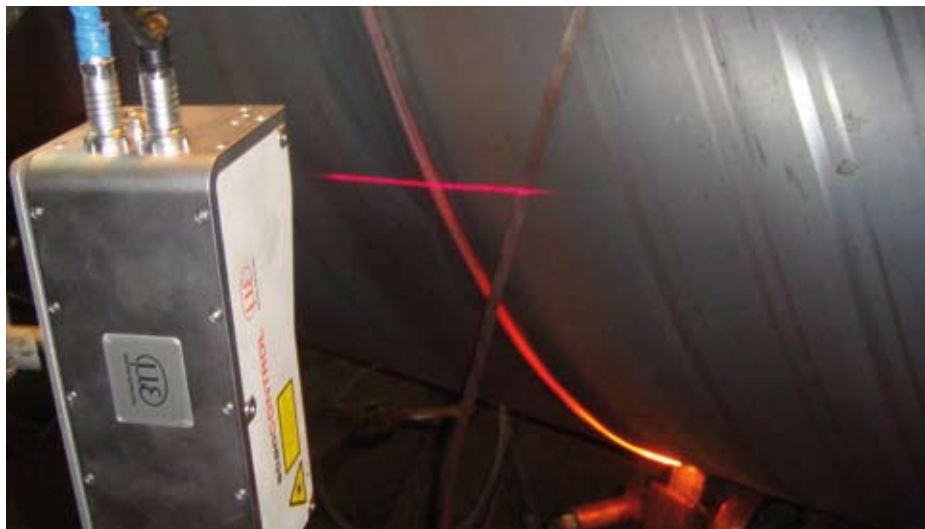
Drive controller in precision rewinding machines

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.



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.

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.



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, position and dimension

Eddy current sensors
Optical and laser sensors
Capacitive sensors
Inductive sensors
Draw-wire sensors
Optical micrometers
2D/3D profile sensors
Image processing



Sensors and measurement devices for non-contact temperature sensors

Thermal imager
Online instruments
Handheld devices



Measuring systems for quality control

for plastic and film
for tyre and rubber
for web material
for automotive components
for glass and panes



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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