



thicknessCONTROL MTS 8201.LLT Non-contact thickness measurement of metal strips

POTENTIAL APPLICATIONS

- Thickness profile measurement in
- Hot and cold rolling
- Splitting lines
- Coating
- Casting
- Drawing lines
- Cutting

MATERIAL PARAMETERS

- Material width to 3,000mm
- Material thickness from < 1mm to 50mm
- Measuring accuracy from $\pm 5\mu\text{m}$

SPECIAL FEATURES

- No consequential costs due to isotopes or X-rays
- Laser scanner for precise and stable measurements
- In-situ calibration for automatic system for monitoring inspection





All metals can be detected even in the case of high strip speeds

Measurement does not depend on alloy

Different strip thicknesses detectable



FUNCTIONAL PRINCIPLE THICKNESS MEASUREMENT

Traversing laser line scanners which operate according to the triangulation principle are integrated in the upper and lower flange of the O-frame of thicknessCONTROL MTS 8201.LLT. By using special lenses, a laser beam is enlarged to form a static laser line and projected onto the target surface. A high-quality optical system projects the diffusely reflected light of this laser line onto a highly sensitive sensor matrix. In addition to the distance information (z-axis), the controller integrated in the sensor also uses this camera image to calculate the position along the laser line (x-axis) in a two-

dimensional coordinate system. In order to detect the thickness of the target material according to the differential principle (difference between the sensor signals and the measuring gap), the coordinate systems of the upper and lower flange are synchronised during the in-situ calibration.

In order to achieve precise thickness measurement results both laser lines have to be congruently projected on the upper and lower side of the material. To ensure this, they are precisely adjusted and calibrated by using optoelectronic tools in the factory.



The measuring system can be equipped with a speed and length sensor. This sensor allows an exact length recording of the strip or the single rings. Additionally, the system can be expanded by a special sensor which measures the strip or ring width.



The fully-automatic calibration allows long-term stability measurements. A reference object moves in the beam path and therefore provides the compensation of the system.

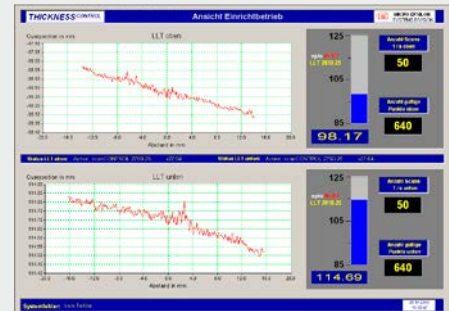
AUTOMATIC CALIBRATION & TEMPERATURE COMPENSATION

The system is equipped with an in-situ calibration in order to compensate effects which vary with temperature. During this calibration a calibration target is put into the measuring gap and afterwards moved over the total traversing width of the system. In doing so, the geometry of the measuring gap regarding a compensation frame which does not vary with temperature is recorded. During this process, changes of the measuring gap of this frame geometry caused by temperature are measured and compensated using software. Therefore, a virtual measuring gap offering temperature stability which even allows precise measurements under harsh conditions is generated.

RESOLUTION/MEASUREMENT RANGE

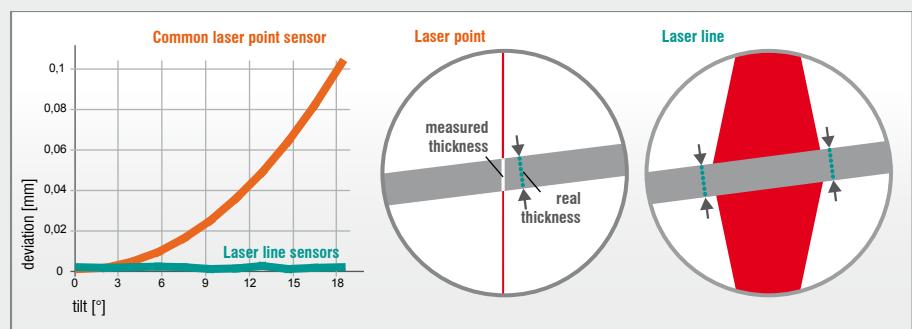
However, the resolution shows the smallest thickness change to be measured during point triangulation, it is more complex in the case of the laser line triangulation. Here, several points or even a profile are used in order to determine the resolution instead of a single point. The resolution achieved therefore depends on the individual measurement task in the case of a laser line triangulation. For example, a reference straight line is detected crossing all

points of the profile in the case of a thickness measurement on plane material. The smallest thickness change between to corresponding reference straight lines is therefore the resolution and much higher than in case of point triangulation. thicknessCONTROL MTS 8201. LLT uses this effect to provide a large measurement range despite high resolution. A large measurement range is mostly appreciated in applications in cutting lines.



TILT COMPENSATION

Contrary to point triangulation, tiltings, distortions and bendings of the target material permanently occurring for example in cutting lines in the metal processing industry are detected in compensated during measurements by means of line triangulation. Therefore thicknessCONTROL MTS 8201.LLT provides reliable measurement results in the micrometre range even in the case of sheets several millimetres wide



By means of the laser line triangulation, tiltings, distortions and bendings are reliable compensated.

ANALYSIS AND CONTROL SOFTWARE

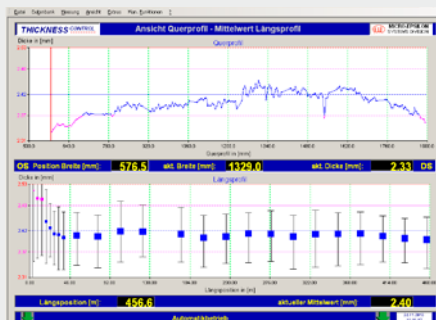
The data acquisition and analysis software thicknessCONTROL offers

- Article and order databases
- Production archive
- Customer-specific evaluations
- Limit value monitoring including production return (field bus interfaces optionally)

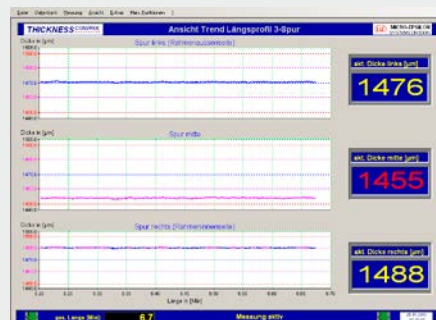
Therefore, a fully automatic documentation and control of the production process is guaranteed. A division of the scanner line in more zones of the product wide is also possible as monitoring characteristics such as wedge shape and crowning.

Optionally, the software can be enlarged by special features for the support of cutting lines e.g.:

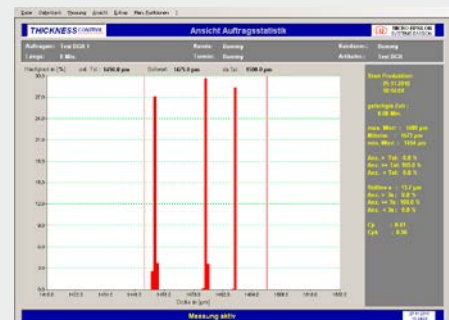
- Thickness and profile measurements for each ring cut
- Width measurement for each ring
- Documentation for each ring



Combined profile traversing measurement (Cutting line 8 single rings)



Longitudinal profile, line divided into three thickness sections



Statistical evaluation of a coil

thicknessCONTROL MTS 8201.LLT								
Description	-25/500	-50/500	-25/1000	-50/1000	-25/1500	-50/1500	-25/2000	-50/2000
Article nr.	4350006.10	4350006.11	4350006.12	4350006.13	4350006.14	4350006.15	4350006.16	4350006.17
Orientation	Laser line transverse towards material							
Laser class	2M							
Traversing width in mm (Gross width)	846mm		1346mm		1846mm		2346mm	
Material width max. (net width)	500mm		1000mm		1500mm		2000mm	
Measuring gap in mm	190mm	420mm	190mm	420mm	190mm	420mm	190mm	420mm
Nominal measuring gap	25mm	50mm	25mm	50mm	25mm	50mm	25mm	50mm
Measuring gap max.	40mm	100mm	40mm	100mm	40mm	100mm	40mm	100mm
Linearity nom. MG	5 μ m	10 μ m	5 μ m	10 μ m	5 μ m	10 μ m	5 μ m	10 μ m
	0.02%							
Sampling rate max.	0.25ms							
Dimensions (WxD*xH)	1776x450x1614	1776x450x1844	2276x450x1614	2276x450x1844	2776x450x1614	2776x450x1844	3276x450x1614	3276x450x1844
Weight	from 1200kg							
Protection class	IP54 (higher on request)							
Ambient temperature	min. + 15°C max. + 40°C							
Relative air humidity	75% max. within temperature range stipulated without condensation							

MG = measuring gap * without speed sensor

