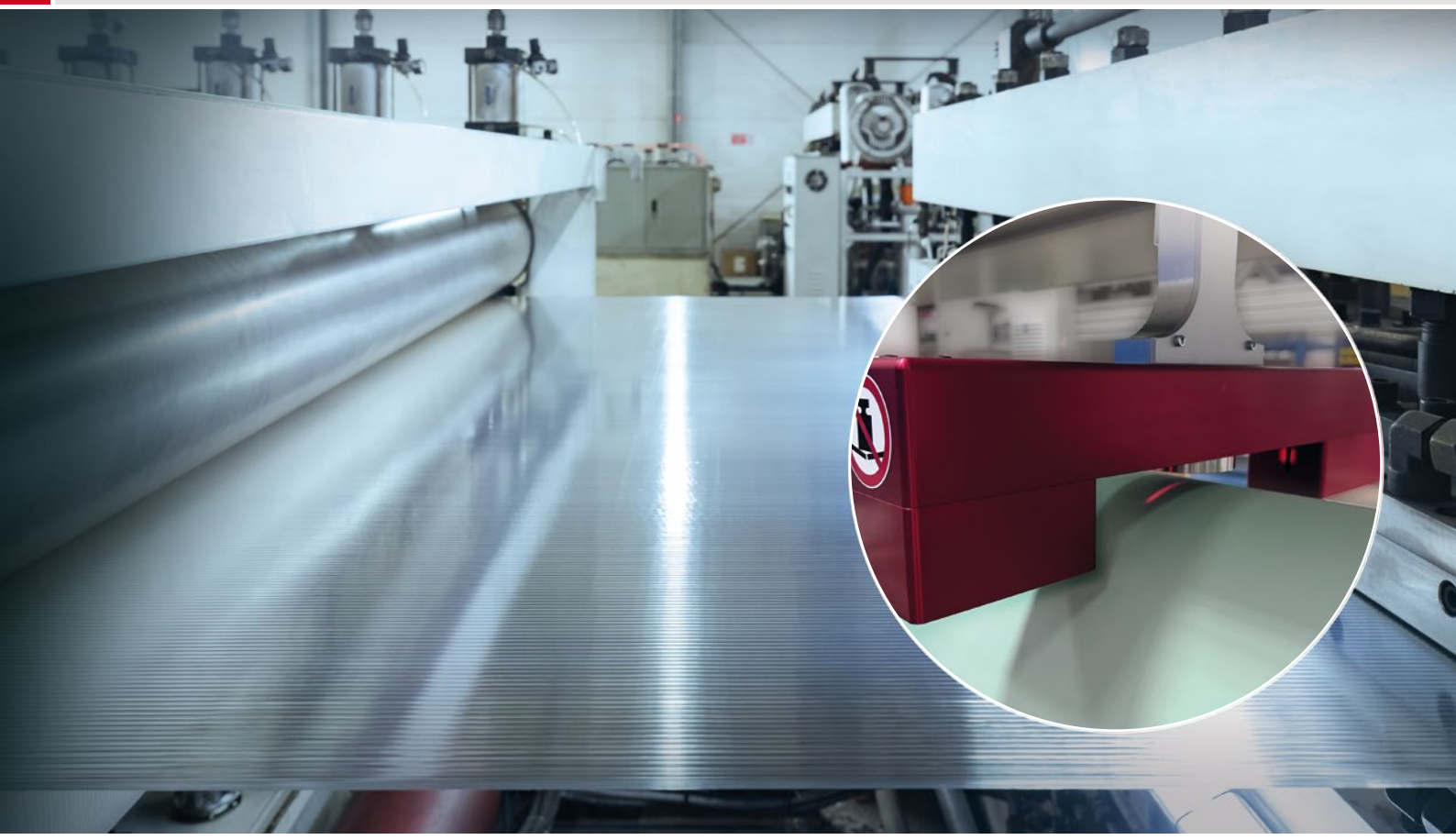
MICRO-EPSILON

More Precision

Gauges and inspection systems // Extrusion and calender lines



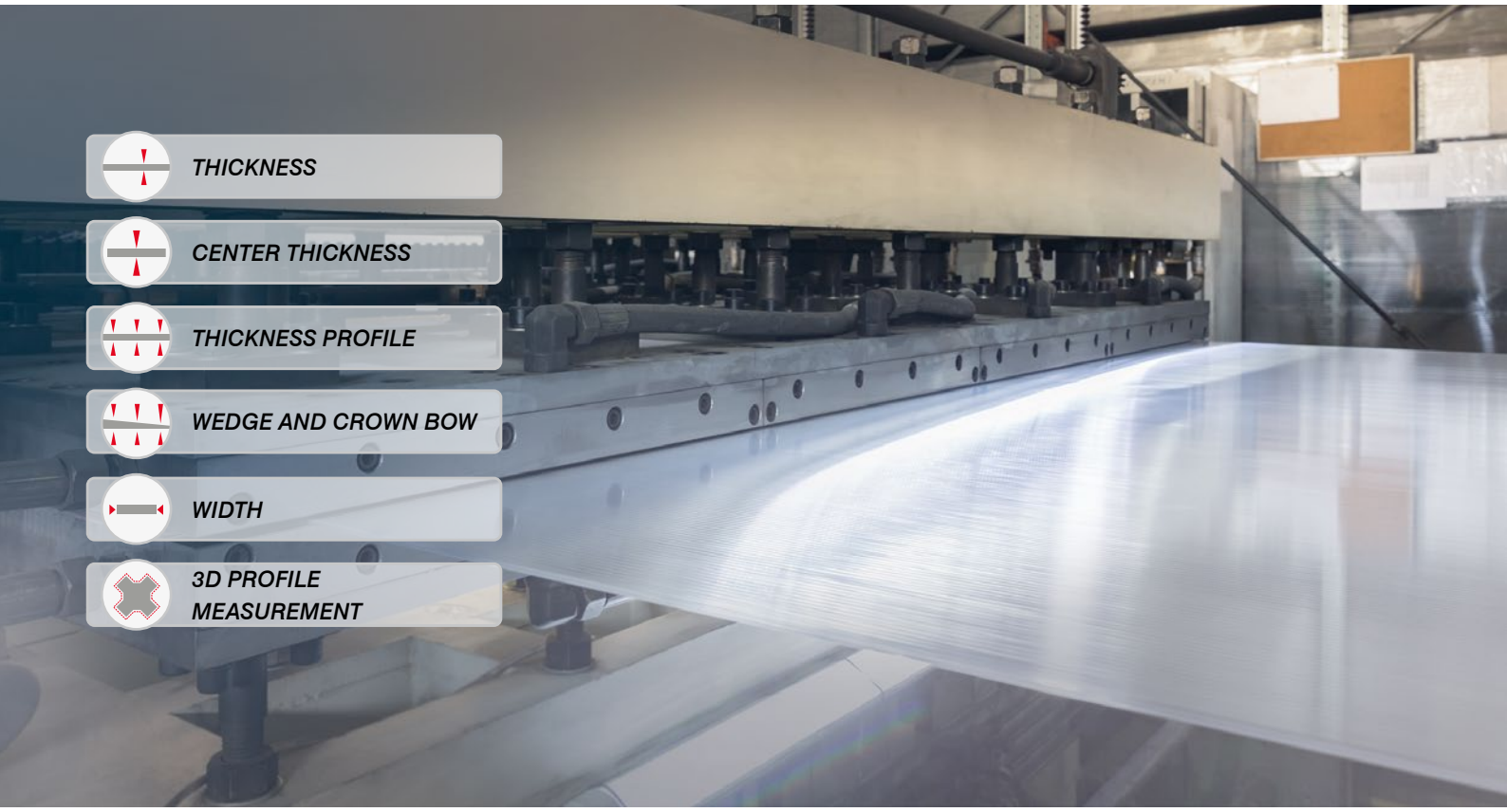
References (extract)

Continental The Future in Motion
TROESTER EXCELLENCE IN EXTRUSION.
RODOLFO COMERIO WORLD LEADING MACHINES FOR PLASTICS AND RUBBER 1878
Reifenhäuser
coperion confidence through partnership
WINDMÖLLER & HÖLSCHER
EVONIK INDUSTRIES
Krauss Maffei Berstorff
BREYER extrusion lines
OPTIpack
habasit
nora® by Interface®
COLLIN LAB & PILOT SOLUTIONS

MICRO-EPSILON

THE BENCHMARK IN OPTICAL THICKNESS MEASUREMENT
25 YEARS OF INNOVATION WITH MORE PRECISION

Measurement parameters



Overview

Precise inline thickness measurement

thicknessGAUGE C

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O-frame system with measuring roller

thicknessCONTROL STG 8301

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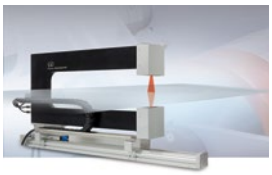

Sensor system for precise inline thickness and profile measurements

thicknessGAUGE 3D

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O-frame system for thickness measurement

thicknessCONTROL STG 8101

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Precise inline thickness measurement

thicknessGAUGE O

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Wear inspection of the inner diameter of extruder housings

idiamCONTROL

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Non-contact thickness measurement

thicknessCONTROL STG

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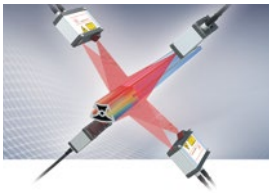

3D geometry and profile measurement of extruded products

3D Profile Unit

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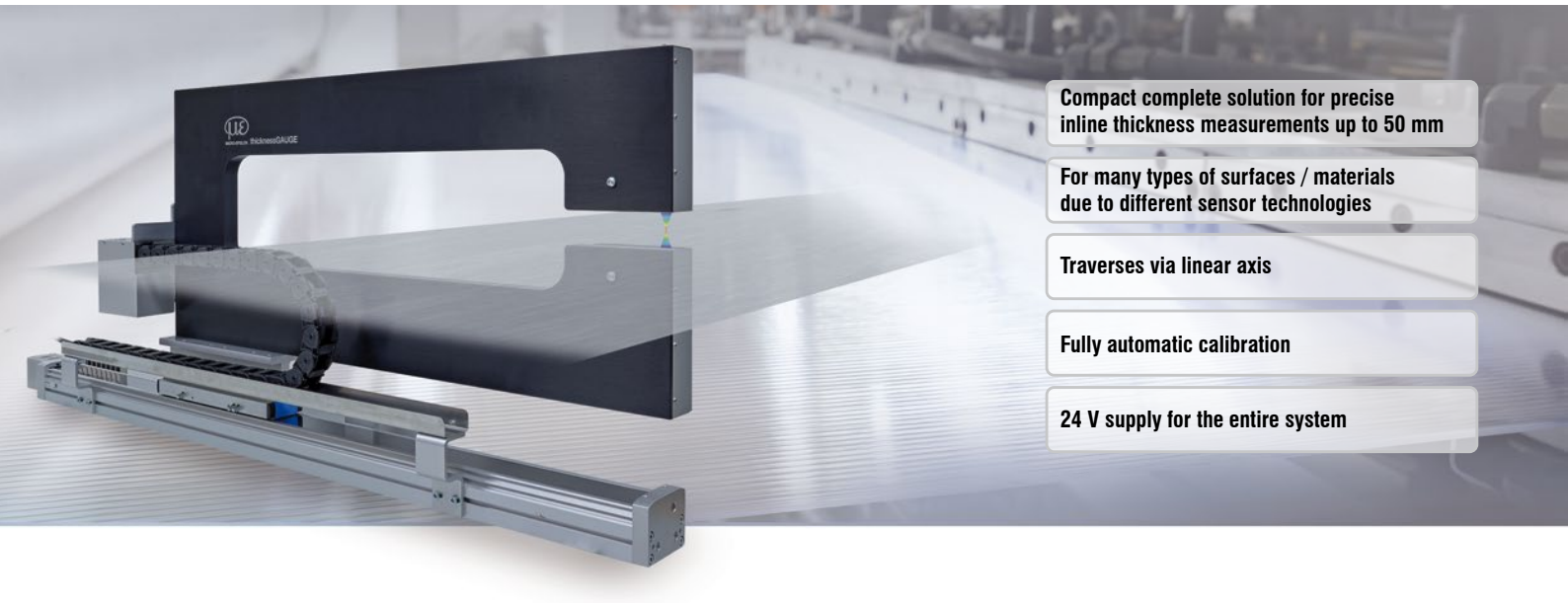
Sensor systems for precise inline thickness measurement
thicknessGAUGE C



Compact complete solution for precise inline thickness measurements up to 50 mm

For many types of surfaces / materials due to different sensor technologies

Traverses via linear axis

Fully automatic calibration

24 V supply for the entire system

Thickness measurement with high precision

thicknessGAUGE sensor systems are used for precise thickness measurements of strip materials, plates and sheets up to 50 mm. Several models with different sensor types, measuring ranges and measuring widths enable the inline thickness measurement of different materials and surfaces. The turnkey system consists of a stable frame with two optical distance sensors attached to it. These detect the thickness of the measuring object according to the difference principle.

The sensors are perfectly aligned to each other and calibrated at the factory. A linear axis moves the sensor system from the parking position to the measuring position.

Operating principle of thickness measurement

The principle of dimensional, geometric thickness measurement includes one optical distance sensor on each side of the material. The distance (=operating range) between the two sensors is determined in a calibration process. The basis of the calibration is a DAkkS-certified measurement standard, to the thickness of which the sum of the distance values is added to determine the operating range.

Compact complete system for easy integration

These compact systems are comprised of an integrated linear unit including motor control, a compact bus terminal box, an automatic calibration unit as well as a multi-touch PC with pre-installed software. The entire system is powered via a 24 V source.

Automatic calibration and temperature compensation

To compensate for effects of fluctuating temperatures, the thicknessGAUGE systems are equipped with an in-situ calibration, which is carried out in the parking position. Calibration is performed automatically and at freely selectable intervals. In addition to temperature compensation, in-situ calibration enables proper functioning of the system.

Available options:

- Selectable cable lengths
- Customer-specific axis length
- Encoder
- Interface for fieldbus connection
- Digital inputs/outputs

Technologies

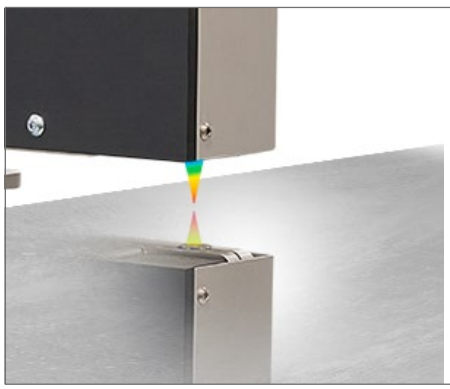
thicknessGAUGE C.LL

Sensor technology used:
Laser triangulation displacement sensors

- Measuring range (thickness): 6 / 50 mm
- Accuracy: ±1 / ±5 µm
- Measuring rate: up to 10 kHz

Reasonably priced sensor system for common surfaces from plastics to metals

Compact design meets high performance & excellent price/performance ratio



Model	C.LL-6/200	C.LL-6/400	C.LL-6/600	C.LL-50/200	C.LL-50/400	C.LL-50/600
Article number	4350127.811	4350127.812	4350127.813	4350127.820	4350127.821	4350127.822
Measuring width	200 mm	400 mm	600 mm	200 mm	400 mm	600 mm
Measuring range		6 mm			50 mm	
Max. travel path [1]	380 mm	580 mm	780 mm	380 mm	580 mm	780 mm
System accuracy [2]		±1 µm			±5 µm	
Resolution		0.1 µm			1 µm	
Measuring rate			up to 10 kHz			

[1] Other lengths on request
[2] 2 sigma; data valid for diffusely reflecting, metallic measuring standard (DAkkS certified)

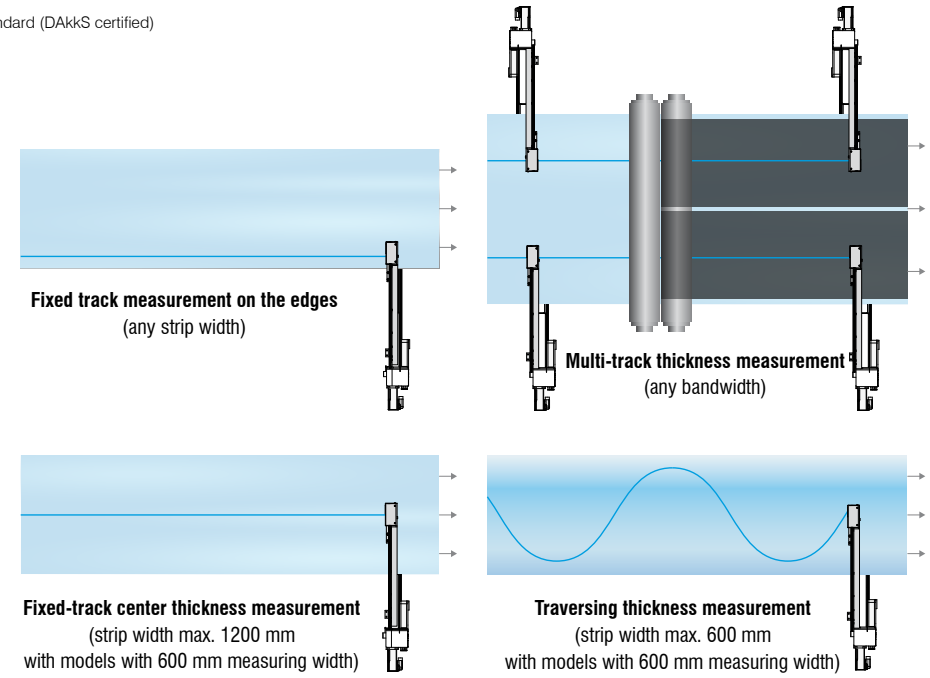
Model	C.C-2.5/200	C.C-2.5/400	C.C-2.5/600	C.LP-15/200	C.LP-15/400	C.LP-15/600
Article number	4350127.920	4350127.921	4350127.922	4350127.720	4350127.721	4350127.722
Measuring width	200 mm	400 mm	600 mm	200 mm	400 mm	600 mm
Measuring range		2.5 mm			15 mm	
Max. travel path[1]	380 mm	580 mm	780 mm	380 mm	580 mm	780 mm
System accuracy [2]		±0.4 µm			±1.2 µm	
Resolution		40 nm			0.2 µm	
Measuring rate		up to 10 kHz			100 Hz	

[1] Other lengths on request
[2] 2 Sigma; data valid for highly reflective, metallic measuring standard (DAkkS certified)

The new class for inline thickness measurements

thicknessGAUGE sensor systems are used for precise thickness measurement in numerous strip materials, plates and sheets. A linear unit with electromechanical drive enables thickness measurements in traversing mode.

Alternatively, fixed track measurements are possible for center-line measurements (center thickness) or for thickness measurements on the edges.



Technologies

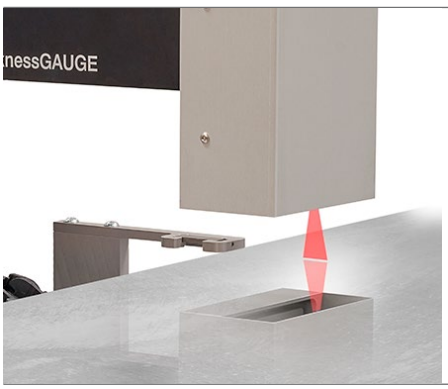
thicknessGAUGE C.C

Sensor technology used:
Confocal chromatic displacement sensors

- Measuring range for thickness: 2.5 mm
- Accuracy: ±0.4 µm
- Measuring rate: up to 10 kHz

Ideal for high resolution measurements of highly reflective and shiny surfaces

Also for transparent and semi-transparent film



Technologies

thicknessGAUGE C.LP

Sensor technology used:
Laser profile sensors

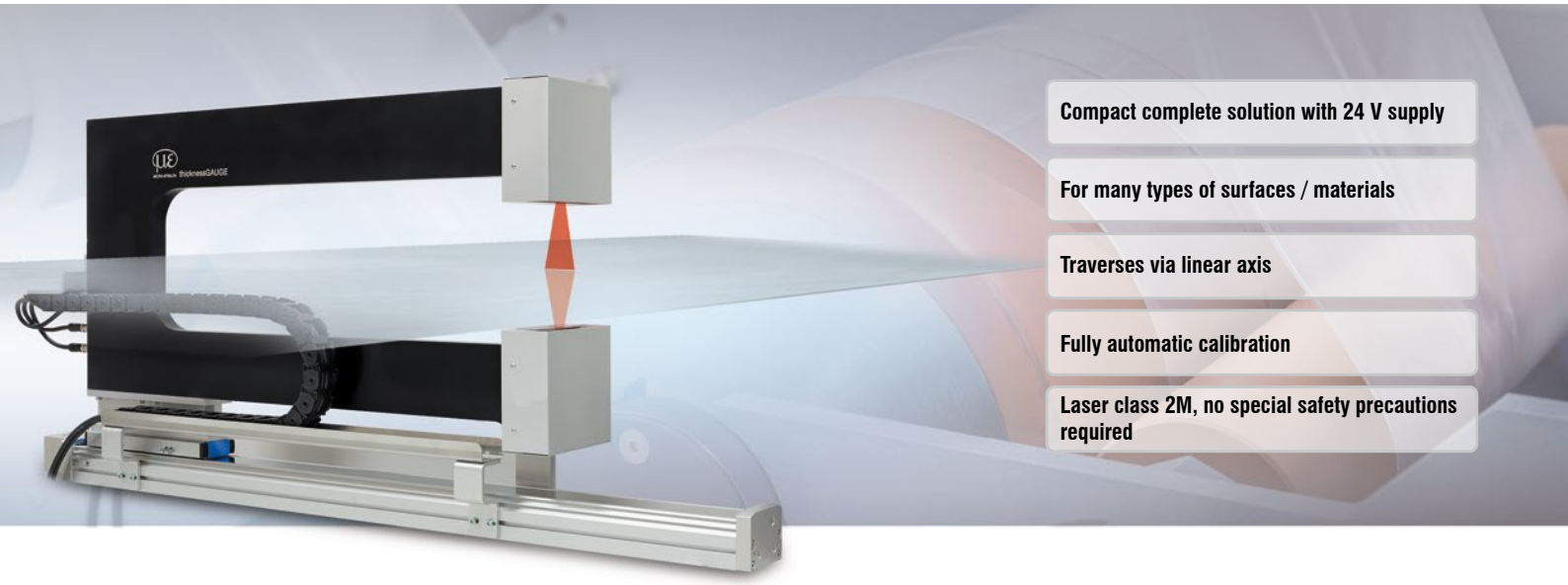
- Measuring range for thickness: 15 mm
- Accuracy: ±1.2 µm
- Measuring rate: up to 100 Hz

For structured materials, e.g., embossed plates

Best-fit line possible

Compensation for tilted strips

Sensor systems for precise inline thickness and profile measurements
thicknessGAUGE 3D



- **Compact complete solution with 24 V supply**
- **For many types of surfaces / materials**
- **Traverses via linear axis**
- **Fully automatic calibration**
- **Laser class 2M, no special safety precautions required**

Inline thickness and profile measurements
The thicknessGAUGE 3D is a precise sensor system for two-sided profile and thickness measurements of sheets and extrusion materials. Two opposing laser profile scanners detect synchronized profile data along a linear movement, which is merged into a 3D point cloud. The thicknessCONTROL 3D uses this point cloud to calculate freely programmable target values in order to solve complex 2D or 3D measurement tasks.

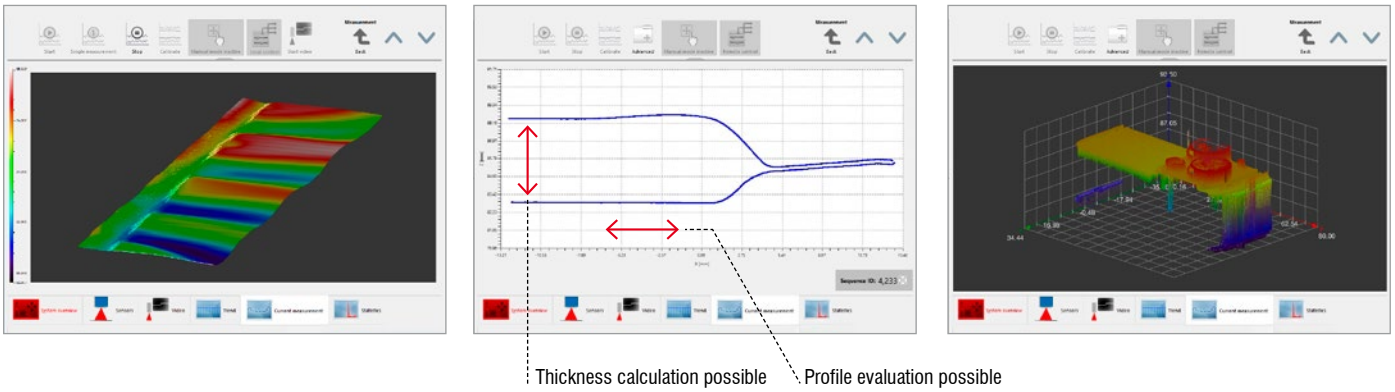
The specific evaluation is parameterized using the 3DInspect software, where the measurement programs and parameters are transferred to the thicknessCONTROL software, processed automatically and output as a result value.

A linear axis moves the sensor system from the parking position to the measuring position. A measurement standard for fully automatic calibration is in the parking position.

Automatic calibration and temperature compensation
thicknessGAUGE systems are equipped with in-situ calibration in order to compensate, e.g., for the effects of fluctuating temperatures. A linear axis moves the thicknessGAUGE to the parking position. The calibration cycles are individually adjustable. In addition to temperature compensation, in-situ calibration enables proper functioning of the system to be verified cyclically and at any time.

Fully automatic calibration enables reliable measurements

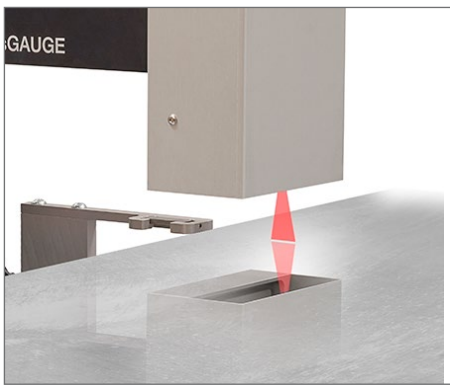
Example of measured data:



Modell		C.LP-3D-15/200	C.LP-3D-15/400	C.LP-3D-15/600
Article number		4350127.730	4350127.731	4350127.732
Measuring width		200 mm	400 mm	600 mm
Operating range		144 mm		
Measuring range [1]	Z-axis (thickness)	15 mm		
	X-axis (3D measurement)	max. 26.8 mm		
Max. travel path [2]		380 mm	580 mm	780 mm
System accuracy [3]		±1.2 µm		
Resolution	Z-axis (thickness)	0.2 µm		
	X-axis (3D measurement) [4]	1,024 points/profile		
Measuring rate [1] [5]		500 Hz		
Calibration		Automatic		
Weight	Axis, motor and C-frame	17.6 kg	22.3 kg	26.8 kg
	Bus terminal box and panel IPC	14.1 kg		
Supply voltage		24 V		
Humidity		5 % RH ... 95 % RH (non-condensing)		
Protection class (DIN EN 60529)		IP40 (bus terminal box IP54)		
Temperature range	Storage	-20 ... 65 °C		
	Operation	5 ...45 °C		
Control and indicator elements		Panel IPC with software included in the scope of supply		
Special features		Compact bus terminal box measuring just 300 x 300 x 210 mm		

[1] Depending on the measurement task
[2] Other lengths on request
[3] 2 Sigma; data valid for diffusely reflecting, metallic measuring standard (DAkkS certified)
[4] 1,024 points/profile (standard); 2,048 points/profile on request
[5] 500 Hz (standard); up to 2000 Hz on request

Technologies



thicknessGAUGE 3D

Sensors used:
Laser profile sensors with red laser

- Measuring range for thickness: 15 mm
- Accuracy: ±1.2 µm
- Measuring rate: up to 500 Hz

Inline profile evaluation and 3D measurement of strip and sheet material

Sensor systems for precise inline thickness measurement
thicknessGAUGE O

- One-sided geometric thickness measurement
- Different material widths up to 1,250 mm
- Traversing measurement or fixed track measurement
- Comprehensive software package for data acquisition, signal processing and automation
- Suitable for OEMs

The new class for inline film thickness measurements

The thicknessGAUGE O series offers compact inline measuring systems in O-frame or gantry form and is used for precise thickness measurement of non-conductive strip material. These compact systems consist of a stable base frame, an integrated control cabinet and one measuring roller or two guide rollers. Currently, they can be equipped with the combiSENSOR KSS6430 or the interferometer IMS5400MP-DS19.

The combiSENSOR has a concentrically arranged eddy current coil and measurement electrode. Both sensors measure against the same spot. The signal of the capacitive displacement sensor is a function of the working distance, the thickness of the insulator (D) and the dielectric constant of the insulator material (εr). At the same time, the eddy current displacement sensor measures the distance to the measuring roller and thus compensates for a change in the working distance of the capacitive sensor during thermal deformation of the measuring frame. The interferometer works with polychromatic white light. Their integrated light source uses an extended wavelength spectrum instead of a defined wavelength.

Thus, significantly more information is available for the evaluation of the superposition from transmitted and received wavelengths. Multi-peak distance measurement on transparent objects is realized, thin transparent coatings can be measured with high precision.

Flexible integration into production line

thicknessGAUGE O.EC can generate both a transverse profile of the material thickness in traversing mode, and a longitudinal profile at any width position. The measurement data is displayed on the touch panel IPC included in the scope of supply. Via the optional network or fieldbus interface, thicknessGAUGE O can be coupled with the production line to automate the measuring operation.

thicknessGAUGE OEC

Technologies

thicknessGAUGE O.EC

Sensor technology used: combiSENSOR capacitive/eddy current

- Measuring range for thickness: 5 mm
- Accuracy: ±0.3 µm
- Measuring rate: up to 3.9 kHz

Compact sensor system for one-side measurement of the total thickness of non-conductive materials

Model	O.EC-5/500	O.EC-5/750	O.EC-5/1000	O.EC-5/1250	O.IMS-5/500	O.IMS-5/750	O.IMS-5/1000	O.imS-5/1250
Art. no.	4350123.10	4350123.11	4350123.12	4350123.13	4350123.510	4350123.511	4350123.512	4350123.513
Max. measuring width	500 mm	750 mm	1000 mm	1250 mm	500 mm	750 mm	1000 mm	1250 mm
Measuring range	3 mm				1.4 mm			
Accuracy [1]	±0.3 µm [2]				±0.2 µm			
Resolution	0.045 µm				0.001 µm			
Repeatability	±0.06 µm				±0.04 µm			
Material temperature	45 °C				45 °C			

[1] 2 σ, [2] $\varepsilon_r = 1$

Powerful software

- Visualization of measurement results in numerical form and adjustable display of cross profile and longitudinal profile for ease of use
- Display of either imperial or metric units
- Flexible interface for control signals and process data for production line, especially for length/speed signal (=encoder signal)
- Preconfigured for teleservice via VPN connection
- Integrated, full automatic test of equipment capability
- Based on Windows 10

EtherNet/IP OPC UA PROFIBUS PROFINET

Technologies

thicknessGAUGE O.IMS

Sensor technology used: Interferometer

- Measuring range for thickness: 1.4 mm
- Accuracy: ±0.2 µm
- Measuring rate: up to 6 kHz

Compact sensor system for one-sided measurement of the total and layer thicknesses of transparent materials

Non-contact thickness measurement
thicknessCONTROL STG 8102

- Wide variety of technologies
- Non-contact measurement
- Suitable for different materials
- Can be equipped for the harshest of environments
- Multi-touch human-machine interface

The modularly designed, C-frame based systems of the thicknessCONTROL TCP STG 8102 series impress due to their flexibility, robustness and performance. Their compact design enables to install precise inspection technology also in lines with low packaging space.

Wide variety of technologies

Either laser point triangulation sensors (ILD), confocal chromatic sensors (K) or laser profile scanners (LLT) are integrated in the lower and upper belts of the C-frame. The result of the measurement is the difference between the sum of the sensor signals and the working gap determined in the calibration. In combination with highly-efficient signal processing algorithms of the analysis and visualization software, accuracies in the micrometer range are achieved. Due to the wide range of technologies that can be used in the thicknessCONTROL STG 8102 series, a wide variety of applications can be realized on a wide range of non-conductive materials, from transparent over glossy to mat black.

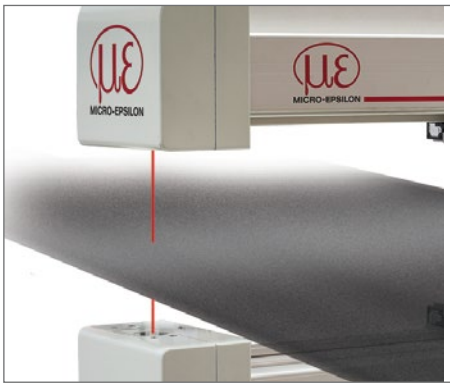
Integration in difficult environments

A fully-automatic in-situ calibration enables the measurement to be independent from temperature influences, thus the system can be applied in harsh industrial environments being characterized by permanently providing inline precision. All sensor technologies are non-contact, wear-free and do not use any isotopes or X-rays. They provide reliable long-term data without consequential costs. The systems are mounted on linear axes. They have electric drives to position them firmly for measuring a longitudinal profile, for example in the middle of the strip material, or traversing to measure a transverse profile of the material.

Furthermore, they can be equipped with cooling and protection units so that they can also be used in harsh environmental conditions.

thicknessCONTROL STG 8102.T

Technologies



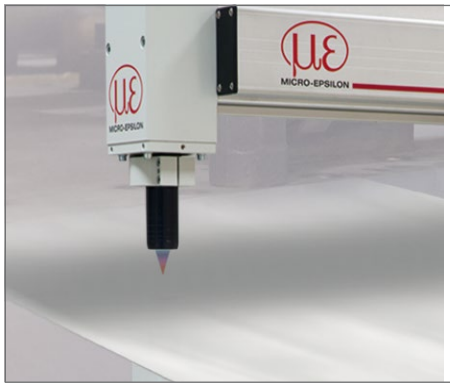
thicknessCONTROL STG 8102.T

Sensor technology used: Laser triangulation displacement sensors

- Measuring range (thickness): 20 / 50 mm
- Accuracy: ±4 / ±10 µm
- Measuring width: up to 1000 mm

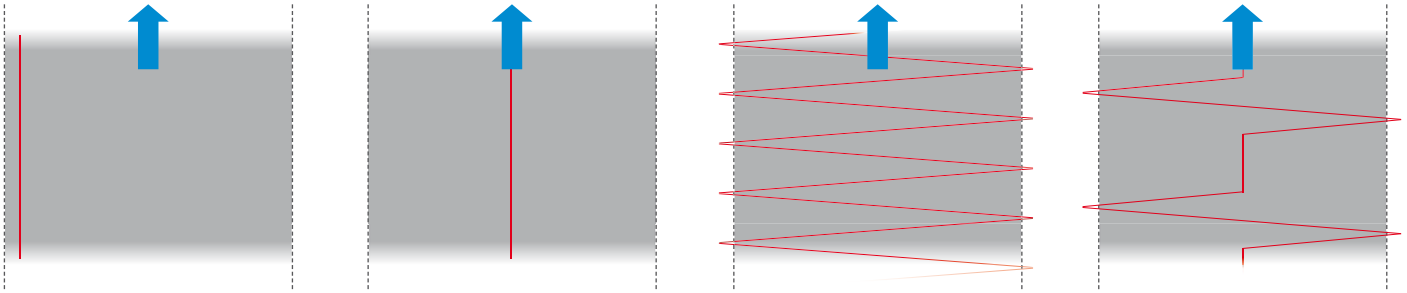
Robust thickness measuring system for films and plates with simple surfaces

Can be equipped with cooling and pneumatic protective equipment for the optical system for harsh ambient conditions



Model	thicknessCONTROL STG 8102.K							
Art. no.	4350127.410	4350127.41	4350127.44	4350127.411	4350127.42	4350127.45	4350127.43	4350127.46
Measuring width	250 mm			500 mm			1000 mm	
Measuring range	3 mm	10 mm	30 mm	3 mm	10 mm	30 mm	10 mm	30 mm
Resolution	0.07 µm	0.12 µm	0.36 µm	0.07 µm	0.12 µm	0.36 µm	0.12 µm	0.36 µm
Accuracy [1]	±0.4 µm	±0.7 µm	±2.5 µm	±0.4 µm	±0.7 µm	±2.5 µm	±0.7 µm	±2.5 µm
Repeatability [1]	±0.3 µm	±0.5 µm	±2 µm	±0.3 µm	±0.5 µm	±2 µm	±0.5 µm	±2 µm
Material temperature [2]	up to 70 °C							

[1] 2 σ
[2] without additional cooling



Edge thickness | Center thickness | Cross profile | Combination of center thickness / cross profile

1-track measurement mode

When choosing a C-frame, the measurement width plays an important role. If only the edge is to be measured, the smallest measuring width is sufficient. When measuring the center thickness, the measuring width must correspond to 50 percent of the material width. If the cross profile is to be measured, the measuring width must correspond to the maximum material width.

Model	thicknessCONTROL STG 8102.T/LLT							
Article no.	4350127.230	4350127.231	4350127.232	4350127.233	4350127.234	4350127.235	4350127.236	4350127.237
Sensor	Laser point sensor				Laser line sensor			
Measuring width	500 mm		1000 mm		500 mm		1000 mm	
Measuring range	20 mm	50 mm	20 mm	50 mm	50 mm	100 mm	50 mm	100 mm
Resolution	0.45 µm	1.1 µm	0.45 µm	1.1 µm	1 µm	2 µm	1 µm	2 µm
Accuracy [1]	±4 µm	±10 µm	±4 µm	±10 µm	±3 µm	±7.5 µm	±3 µm	±7.5 µm
Repeatability [1]	±1.5 µm	±3.5 µm	±1.5 µm	±3.5 µm	±1 µm	±2 µm	±1 µm	±2 µm
Material temperature [2]	45 °C							

[1] 2 σ
[2] without additional cooling

Technologies

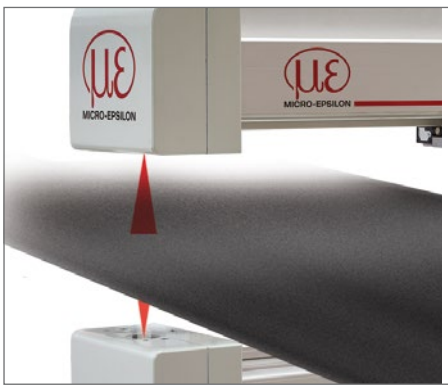
thicknessCONTROL STG 8102.K

Sensor technology used: Confocal sensor technology

- Measuring range: 3 / 10 / 20 mm
- Accuracy: ±0.4 µm / ±0.7 µm / ±2.5 µm
- Measuring width: up to 1000 mm

Highly precise thickness measuring system for thin films with complex surfaces or transparent coatings

Multi-peak functionalities for multiple-layer measurement



Technologies

thicknessCONTROL STG 8102.LLT

Sensor technology used: Laser profile scanner

- Measuring range: 60 / 100 mm
- Accuracy: ±0.3 µm / ±7.5 µm
- Measuring width: up to 1000 mm

High performance thickness measuring system for thick webs or sheets even for profile thickness measurement

Can be equipped with cooling and pneumatic protective equipment for the optical system for harsh ambient conditions

O-frame system with measuring roller
thicknessCONTROL STG 8101

- Measurement independent from color and surface
- Suitable for very large material widths
- High traversing speed
- Integrated measuring equipment capability index
- Robust in difficult environments

Operating principle of thickness measurement

The thicknessCONTROL STG 8101.EO systems are designed as O-frames and impress with their stability and extremely high precision in thickness measurement, especially for large material widths.

Color-independent thickness measurement

The system measures in traversing mode i.e. the thickness of the material is calculated from two distance signals. The combination of an eddy current sensor and a ThruBeam sensor is applied on the upper side of the material that is guided over a measuring roller. While the ThruBeam sensor detects the upper side of the material, the eddy current sensor measures the lower side indirectly by means of the surface of the measuring roller.

The thickness of the material to be measured results from the difference between the two signals. With the color-independent functioning of the integrated ThruBeam sensor, the system provides highly precise results.

Suitable for harsh environments

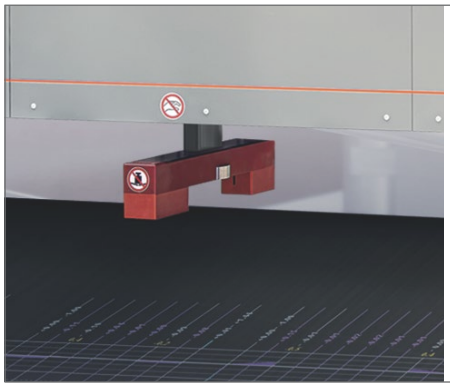
The integration of an efficient, pneumatically operating protective device for the optics of the ThruBeam sensor makes the system insensitive to vapors and particles. An optional tempering of the measuring roller ensures highest precision at high material temperatures. Therefore, the system is ideal for applications in harsh industrial environments. Furthermore, STG 8101.EO offers efficient operation facilities due to large maintenance-free intervals.

High degree of coverage

With O-frame shaped measuring systems, only the sensor technology traverses. Since it has only little weight, it can be accelerated quickly to scan correspondingly fast over the material during the traversal measurement. This is particularly favorable for large widths, as a very large number of cross sections can be detected per linear meter of material.

thicknessCONTROL STG 8101.EO

Technologies



thicknessCONTROL STG 8101.EO

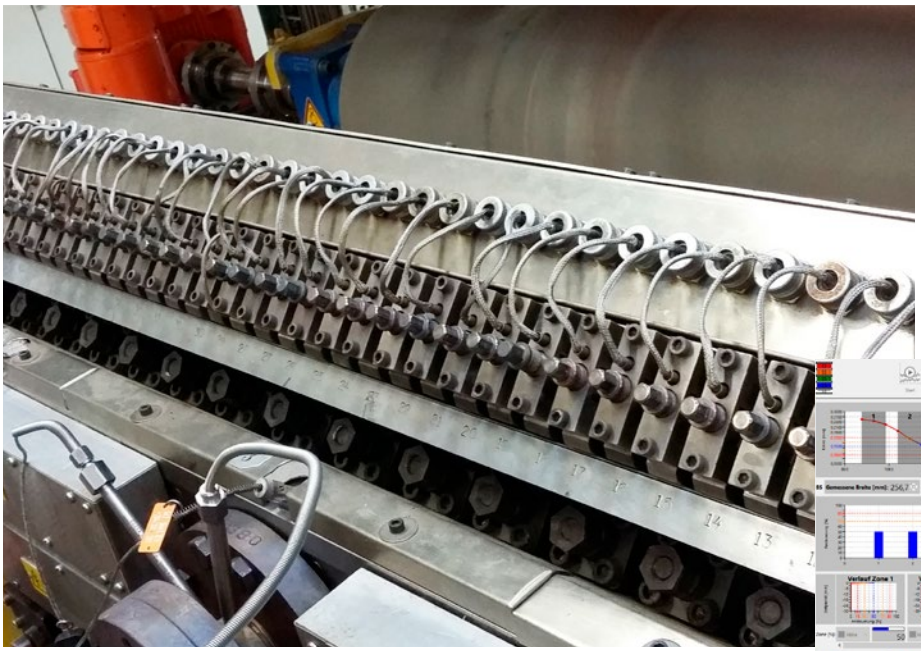
Sensor technology used: ThruBeam Sensor combined using eddy current sensor and measuring roller

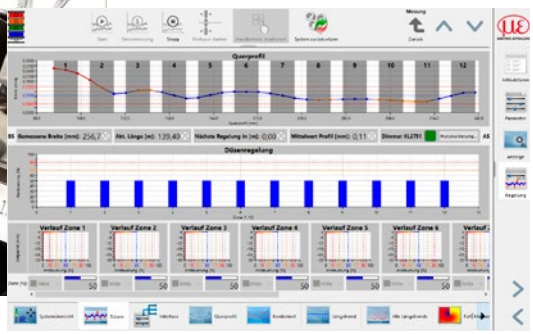
- Measuring range: 10/20 mm
- Accuracy: ±1 µm / ±3 µm
- Measuring width: up to 4000 mm (on request)

Thickness measuring system for very large films independent from color and surface

Model	thicknessCONTROL STG 8101.EO							
Article no.	4350039.100	4350039.101	4350039.102	4350039.103	4350039.104	4350039.105	4350039.106	4350039.107
Measuring width	1000 mm	1500 mm	2000 mm	2500 mm	1000 mm	1500 mm	2000 m	2500 mm
Measuring range	10 mm				20 mm			
Resolution	2 µm							
Accuracy [1]	±1 µm				±3 µm			
Repeatability [1]	±0.5 µm				±1.5 µm			
Material temperature [2]	60 °C							

[1] 2 σ
[2] Without additional cooling





Control of calender roller or extruder nozzle

In addition to the thickness measuring systems, Micro-Epsilon offers both software and hardware for controlling the roller gap in calenders or regulating the nozzle gap via the thermal bolts of the extrusion nozzle.

To monitor the functionality and precision of the system, several methods for the gauge capability test are integrated in the software and can be performed fully automatically.

O-frame system for thickness measurement
thicknessCONTROL STG 8101

- Can be equipped with different sensor technologies
- Patented, controlled compensation of thermal effects
- Suitable for very thick and large materials
- High performance signal processing
- Integrable width measurement

Sturdy system design

The STG 8101.CT/CLLT systems are designed as O-frames with opposing optical sensors. Their impressive precision is based on a harmonized package of sensors, mechanics and software.

Technical design for harsh industrial environments

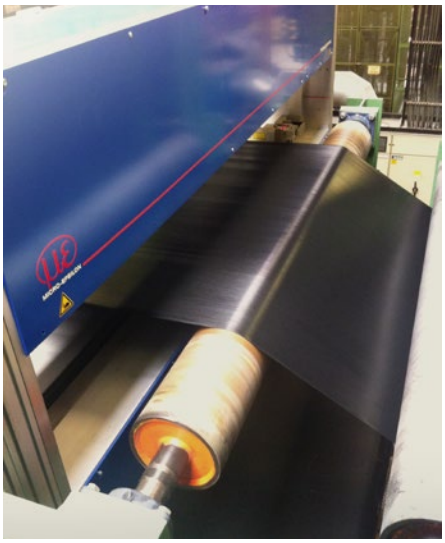
The systems measure in traversing mode. The thickness of the material is determined from the difference resulting from the sensor distance and the sum of the sensor signals.

The sensor distance is determined in an automatic in-situ calibration that can be performed in seconds.

The sensors integrated on carriages in the lower and upper belt of the O-frame can be equipped with cooling elements and pneumatic protection devices for the optics. This means that the systems can be used at high material temperatures and have a high resistance to vapors and particles. All sensor technologies are non-contact, wear-free and do not use any isotopes or X-rays.

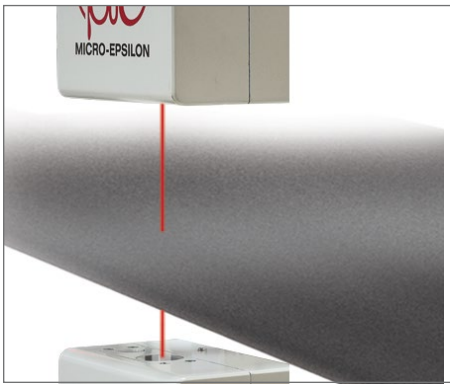
Patented stability

The thicknessCONTROL STG 8101.CT/CLLT series exhibits revolutionary long-term stability in production thanks to its patented compensation concept for temperature-related parasitic effects acting on the mechanics.



thicknessCONTROL STG 8101.CLLT

Technologies



thicknessCONTROL STG 8101.CT

Sensor technology used: Laser triangulation displacement sensors

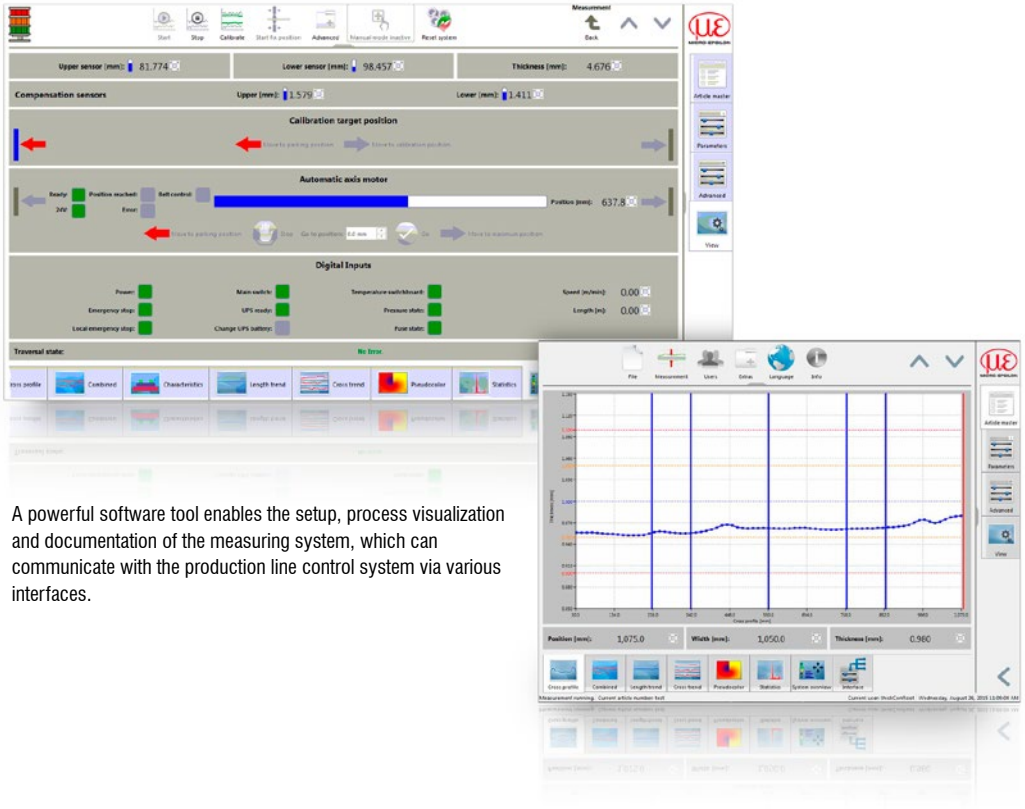
- Measuring range: 50 mm
- Accuracy: ±0.5 µm
- Measuring width: up to 4000 mm (on request)

Robust thickness measuring system for films and plates with simple surfaces

Can be equipped with cooling and pneumatic protective equipment for the optical system for harsh ambient conditions

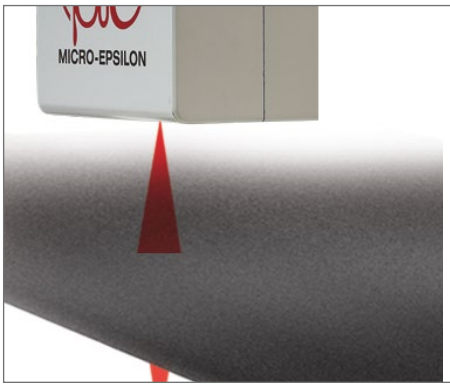
Model	thicknessCONTROL STG 8101.CT/CLLT							
Article no.	4350133.100	4350133.101	4350133.102	4350133.103	4350006.520	4350006.520	4350006.520	4350006.520
Measuring width	700 mm	1200 mm	1700 mm	2200 mm	700 mm	1200 mm	1700 mm	2200 mm
Measuring range	50 mm				75 mm [3]			
Resolution	1 µm							
Accuracy [1]	±5 µm				±3 µm			
Repeatability [1]	0.5 µm				0.5 µm			
Material temperature [2]	60 °C							

[1] 2 σ
[2] Without additional cooling
[3] Min. material thickness 15 mm



A powerful software tool enables the setup, process visualization and documentation of the measuring system, which can communicate with the production line control system via various interfaces.

Technologies



thicknessCONTROL STG 8101.CLLT

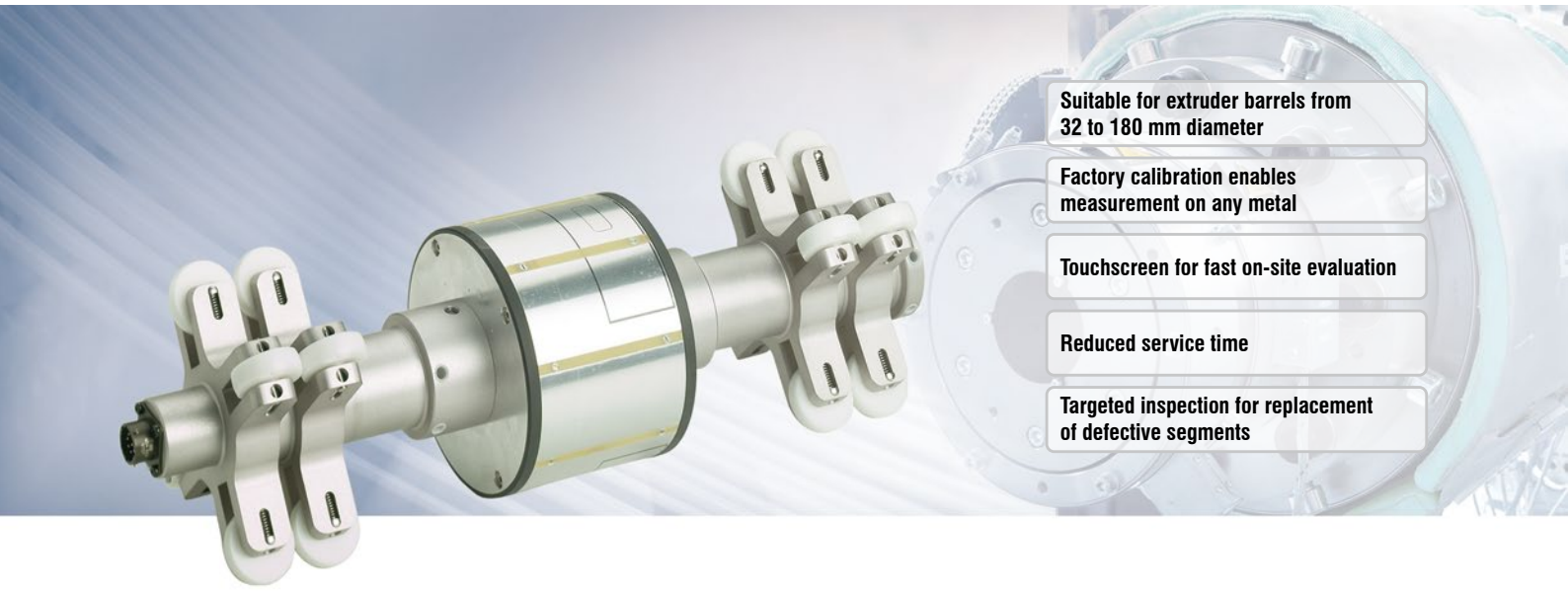
Sensor used: Laser profile scanner

- Measuring range: 75 mm
- Accuracy: ±3 µm
- Measuring width: up to 4000 mm

High performance thickness measuring system for thick webs or sheets even for profile thickness measurement

Can be equipped with cooling and pneumatic protective equipment for the optical system for harsh ambient conditions

Wear inspection of the inner diameter of extruder barrels
idiamCONTROL



- **Suitable for extruder barrels from 32 to 180 mm diameter**
- **Factory calibration enables measurement on any metal**
- **Touchscreen for fast on-site evaluation**
- **Reduced service time**
- **Targeted inspection for replacement of defective segments**

Precise determination of the inner diameter of pipes

The idiamCONTROL sensor system precisely measures the inner diameter of bore holes such as in extruders in order to determine the wear. As the sensor measures a total of 6 tracks, the readings provide more accurate and meaningful measurement results.

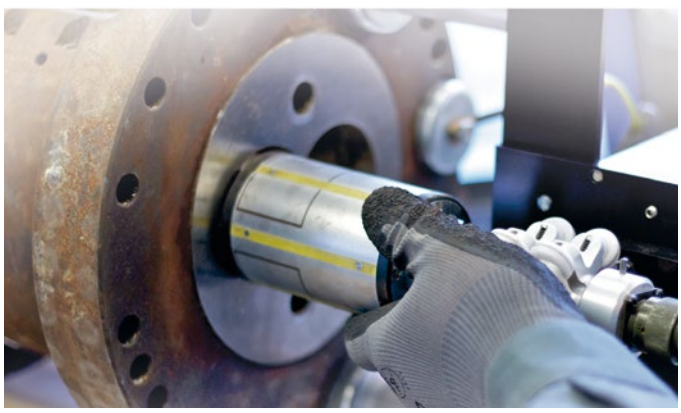
For reliable guidance, the sensor system is centered at both ends by spring-loaded rollers. By rotating each cross roller through 40 degrees, the barrel bore can be measured in 6 tracks. The measurement itself is contactless.

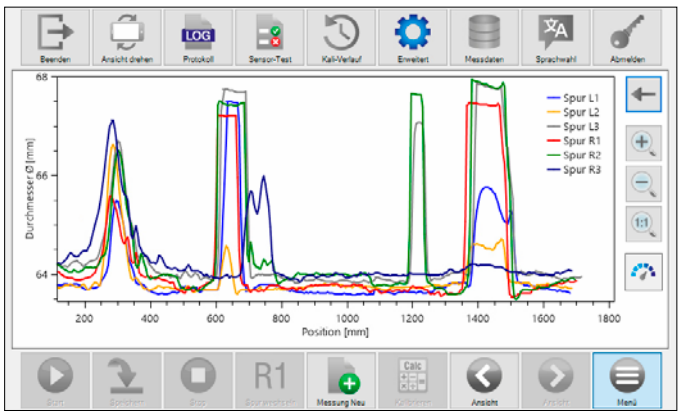
On-site evaluation via touchscreen

The measurement results are displayed on a compact touchscreen. The measurement signal represents the diameter over the complete bore length and any tolerance deviations are immediately displayed.

For data output the device is equipped with a USB port. A calibration control system checks the functionality of the measuring system.

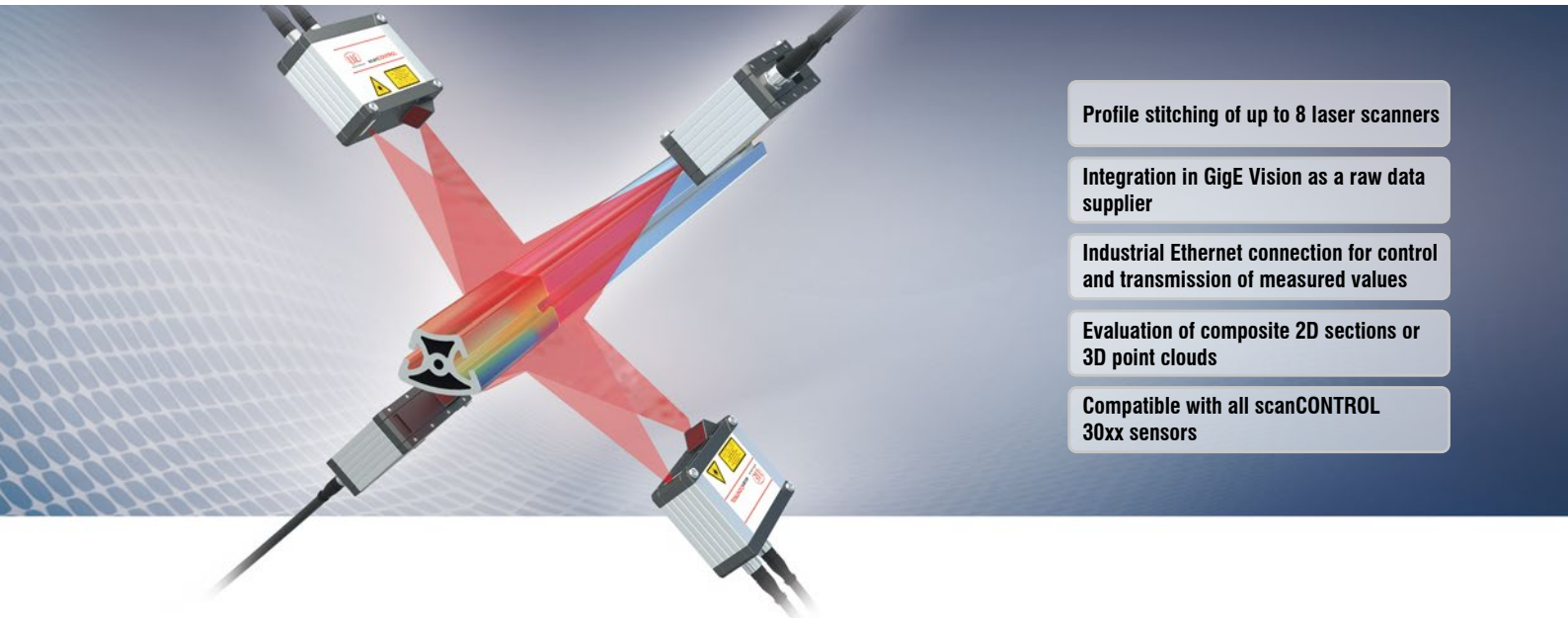
Model	IDC803E / IDC801-SUxx
Measuring range	8 / 18 mm
Accuracy	±0.02 mm
Resolution	16 bits (1 µm)
Spatial resolution (longitudinal position)	1 mm (max. speed: 100 mm/s)





3D geometry and profile measurement of extruded products

3D Profile Unit

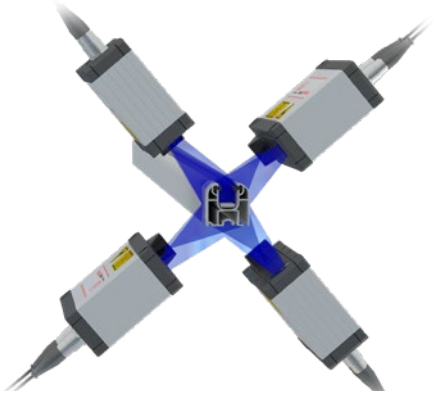


- **Profile stitching of up to 8 laser scanners**
- **Integration in GigE Vision as a raw data supplier**
- **Industrial Ethernet connection for control and transmission of measured values**
- **Evaluation of composite 2D sections or 3D point clouds**
- **Compatible with all scanCONTROL 30xx sensors**

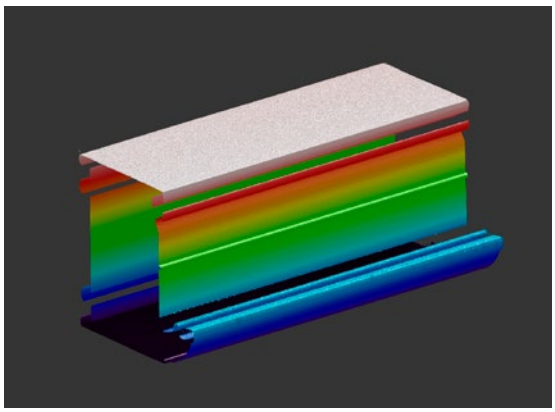
The 3D Profile Unit enables the calculation of several individual profiles of scanCONTROL 30xx sensors in a common coordinate system. This is how a composite 2D profile or a composite 3D point cloud can be generated. It enables the detection of various geometries, the extension of measuring ranges and the performance of thickness measurements. The exact assignment of the position of the sensor to the position of the measuring object can be carried out via the integrated encoder inputs.

The evaluation of the data and the parameterization of the system can be implemented in the 3DInspect software. The 3D Profile Unit controller has an integrated evaluation feature in conjunction with the Industrial Ethernet connection, enabling the application to be controlled and measured values to be output to a PLC. Alternatively, the 3D Profile Unit controller can also be integrated into common image processing programs via GigE Vision and acts as a raw data provider.

Model	3DPU-2/IE	3DPU-4/IE	3DPU-8/IE
Operating mode	2D (profiles) / 3D (point clouds)		
Connectable sensors	2	3 … 4	5 … 8
Output of measurement values	Profile data / point clouds via GigE Vision Integrated evaluation and measured value output to Industrial Ethernet		
Digital interface	Gigabit Ethernet (GigE Vision / GenICam) / PROFINET / EtherNet/IP / EtherCAT / Modbus TCP		
3D evaluation software	Configuration and visualization via Micro-Epsilon 3DInspect		



Geometry inspection of a window profile

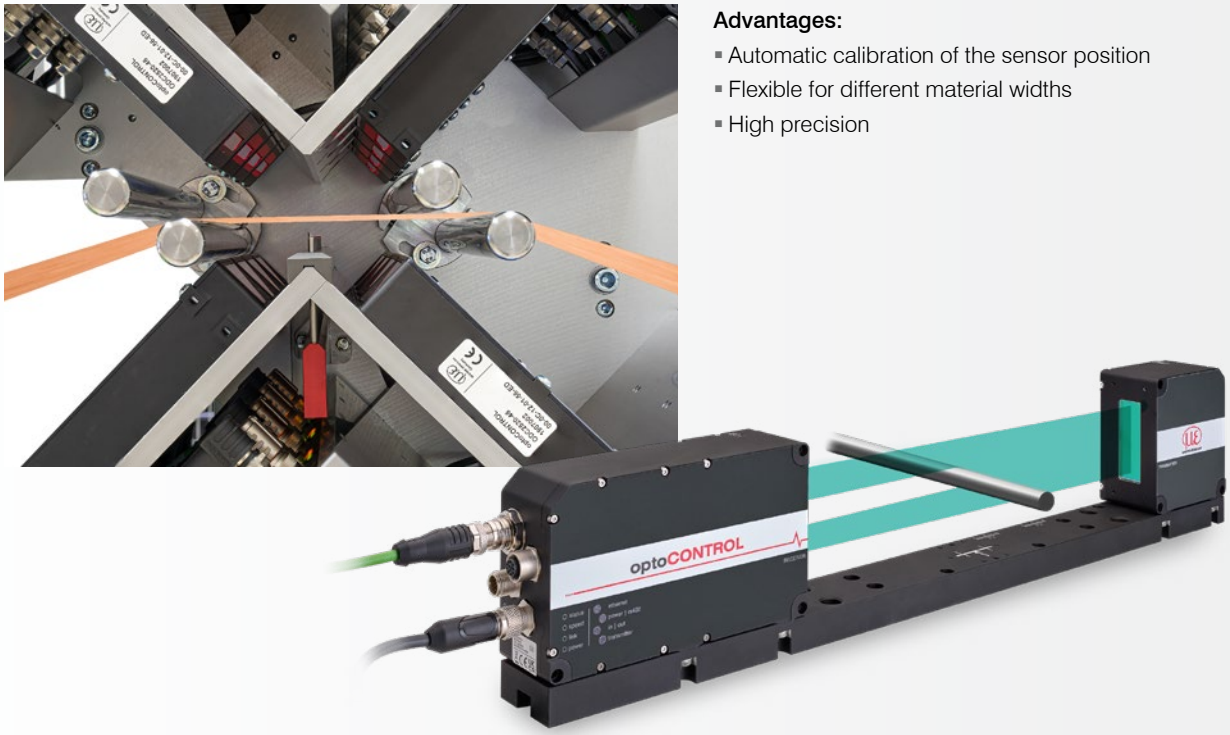


Stitched 3D point cloud of the window profile in 3DInspect

Application examples

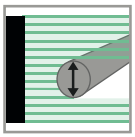
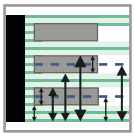
Sensors in the plastics industry

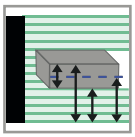
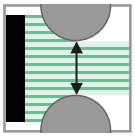
Dimensional inspection using the optoCONTROL 2700 ThruBeam micrometer



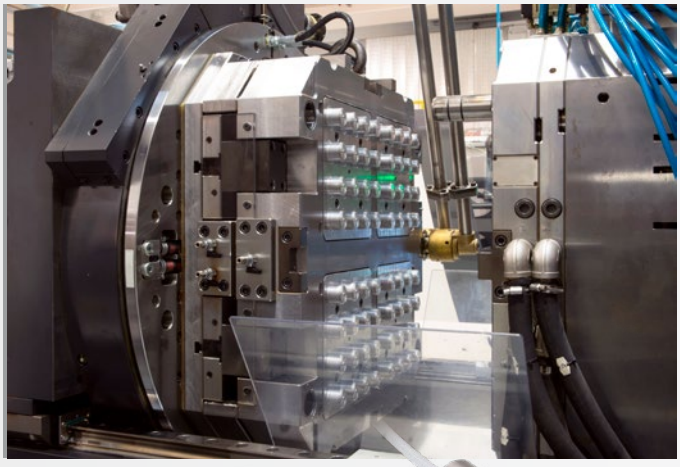
Advantages:

- Automatic calibration of the sensor position
- Flexible for different material widths
- High precision

Web edge 	For controlling and measuring strip edges, such as paper, glass, sheet metal or film. The signal quality is simply adapted to the material.
Diameter 	For measuring the diameter of cylindrical objects (e.g. dowel pins, bolts, bar stock, pipes, hydraulic lines). The tilt angle of the object in relation to the measurement plane is compensated for in real time by the active inclination correction.
Multi-segment 	For simultaneous measurement of several objects in the beam path (e.g. strips or wires) or for targeted detection of segments selected by the user. The individual definition of user and application-specific segments is possible.

Wire measurement 	For measuring a thin, fast-moving object (e.g. wire). The measurement provides the current measurement value at all times and is therefore insensitive to vibrations.
Contour 	For measuring component contours on a stepped turned part. The lower edge, upper edge, center axis, diameter and the encoder value are detected
Gap measurement 	For measuring the gap between two objects. The width of the gap and the angular deviation of the gap edge are output. Application in roller systems such as calender rollers.

Non-contact temperature measurement with thermoMETER



Advantages:

- High signal quality and temperature stability
- Fastest temperature measurement from -50 °C to +1100 °C
- Wide range of integration options via analog and digital interfaces or fieldbus

Inline color measurement of transparent films using the ACS3 transmission sensor and colorCONTROL ACS7000

Advantages:

- Accuracy and high speed for inline integration
- 100% quality control due to automatic and continuous color inspection
- Increase in productivity and reduction of waste

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Performance and quality, as well as reliability of products and services have made Micro-Epsilon Messtechnik GmbH & Co. KG one of the leading suppliers of inspection systems for optical thickness measurement used in the metal industry. Numerous, successful installations in 13 countries around the world in milling lines and processing lines speak for themselves. Developing and producing all the necessary core components such as sensors, software and measurement-specific machine building inside the company group provides unique innovative skills that are mirrored in the product portfolio of Micro-Epsilon.

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