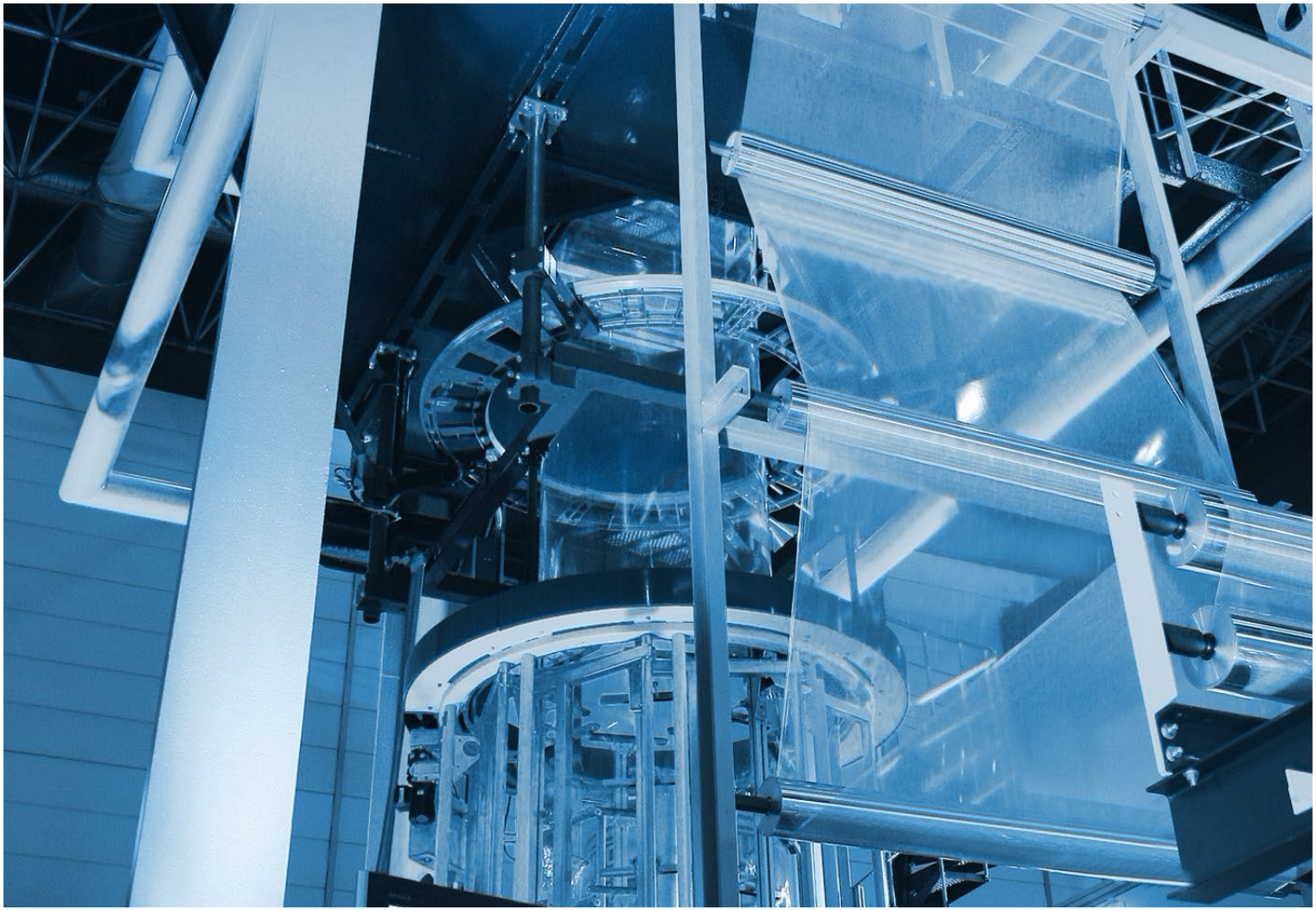
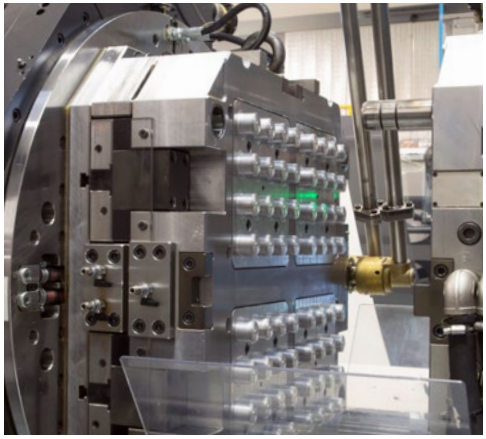
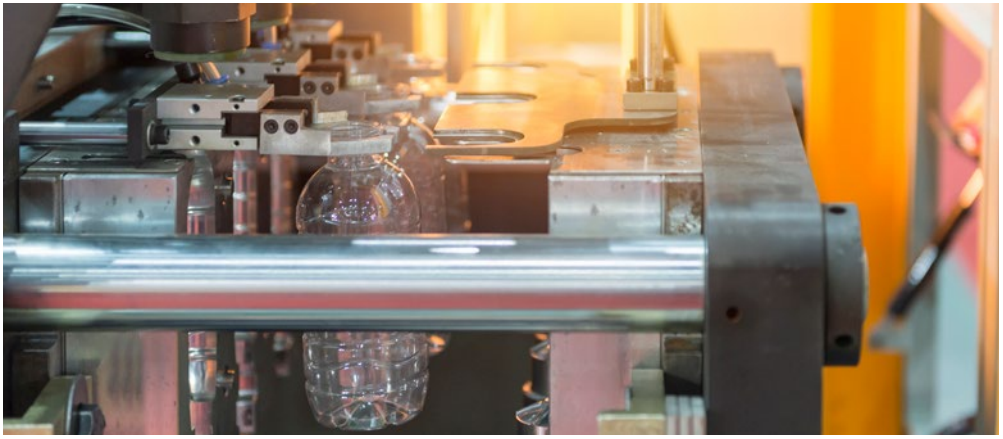
Sensors & Applications
Plastics Industry

MICRO-EPSILON

More Precision



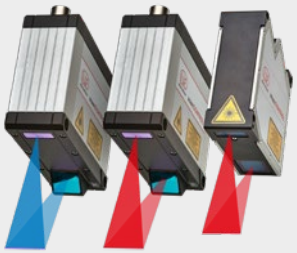




Sensors and measuring systems for plastics production

Miniaturization and increased production speeds together with rising economic efficiency are the determining factors in the production and processing of plastics. Quality, function and touch-screen communications of the final product require reliable measurement and inspection procedures in every manufacturing stage.

Compact and high speed sensors ensure highest reliability in almost any area where high precision is expected - from machine monitoring to fully automatic quality control of the final product.



scanCONTROL

High-end laser scanner for high precision profile measurements

Inline measurement of gap, profile, step, angle

Red or blue laser line versions

Measurement on numerous surfaces, also reflecting and mat

colorSENSOR CFO100 & CFO200

Sensors for color recognition in industry and automation

Ideal for integration into processing lines due to high measuring rates

High accuracy

Robust and suitable for industrial applications

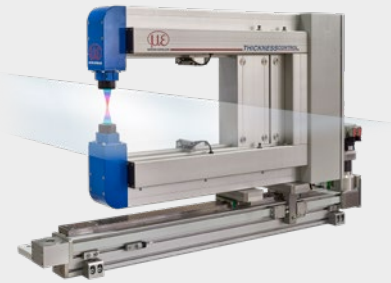
interferoMETER

High precision white light interferometers for distance & thickness measurements

Distance-independent thickness measurements and multi-layer thickness measurement

Miniature light spot of 10 µm for the detection of smallest details

Robust and suitable for industrial applications



thicknessCONTROL

Turnkey measuring systems for thickness measurement of films and plates

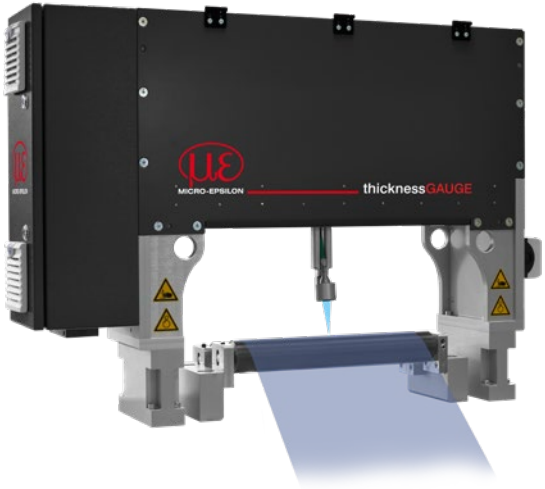
Measurement of thickness and thickness profile

No consequential costs for radiation protection due to isotope and X-ray free measuring principle

Easy integration into processing lines

Film thickness from 30 µm to 6 mm

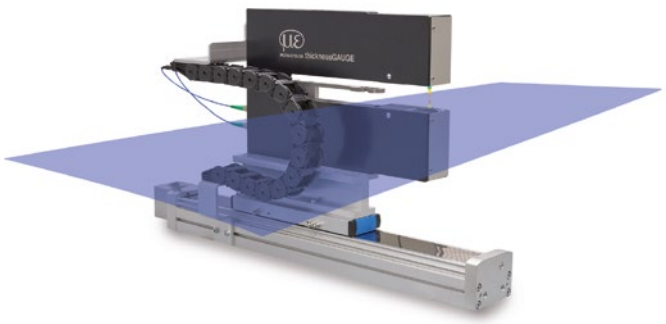
Thickness & geometry measurements



Precise thickness measurement of coated plastic film

The compact thicknessGAUGE sensor system is used for coating thickness measurement of separator film. It is equipped with a white light interferometer and detects both the film thickness and the coating thickness with submicrometer accuracy.

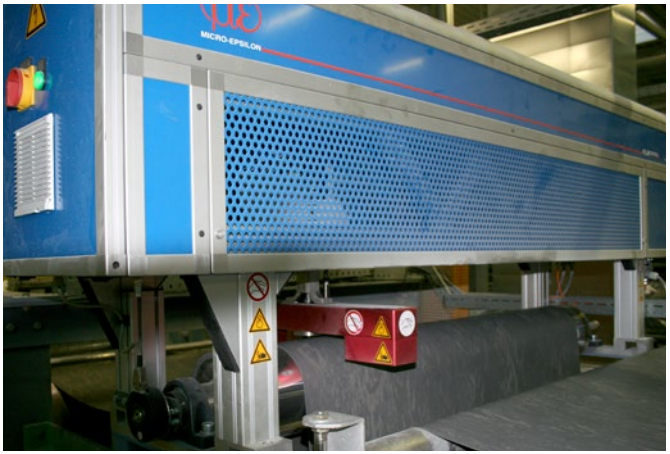
Measuring system: thicknessGAUGE



Thickness measurement of film, plates and sheets

thicknessGAUGE sensor systems are used for precise thickness measurements of strip materials, plates and sheets up to 25 mm. These systems can be equipped with different sensor types, measuring ranges and measuring widths, which enables inline thickness measurement of different materials and surfaces.

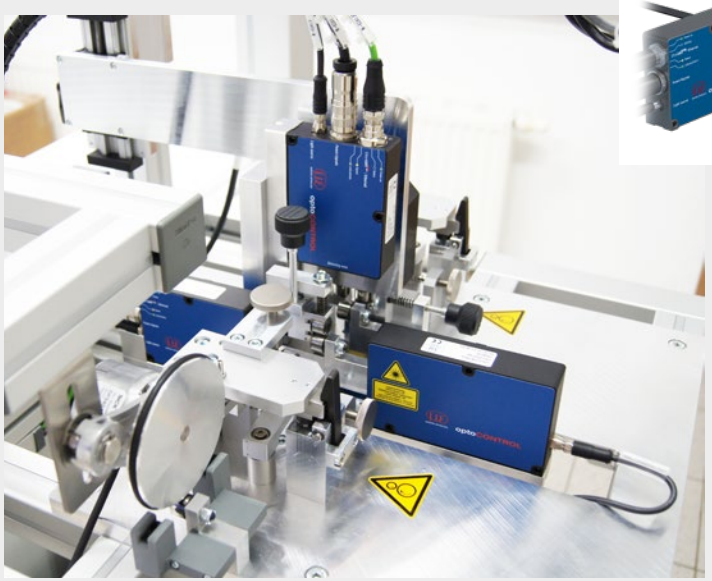
Measuring system: thicknessGAUGE

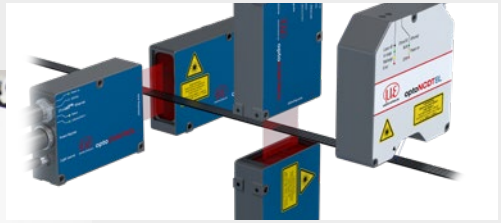


Thickness profile measurement of strips and plates

The thicknessCONTROL measuring system is used for thickness measurement of plates and strip materials. Depending on the measurement task and materials, the head is equipped with different sensors that measure in a fixed track or in a traversing method. Comprehensive software packages and interfaces enable measurement, evaluation and recording of readings.

Measuring system: thicknessCONTROL





Geometrical monitoring of cable ties

The “width” and “height” of the cable tie strap, as well as the “tooth pitch” are monitored constantly during the production of cable ties. The measurement is performed using two optical precision micrometers and a laser displacement sensor which are attached behind the extruder. The laser micrometers are positioned horizontally and vertically respectively while measuring the height and width of the strip. The laser sensor detects the tooth pitch from above. The sensors provide reliable and reproducible measurement results and accelerate the production process while minimizing the rejects.

Sensor: optoCONTROL 2520 / optoNCDT 2300-2DR

Color measurement

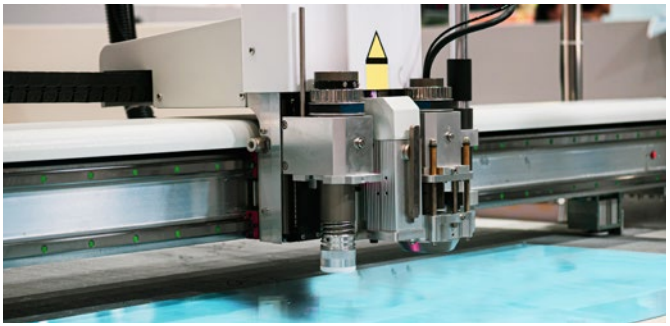
colorSENSOR CFO100 / CFO200

- High measurement speed for dynamic processes
- Large color memory for different test batches
- High color accuracy
- High measuring rate, ideal for quality assurance and documentation in the processing line

Inline color monitoring of plastic bottles

Plastic bottles are frequently manufactured in different shapes and sizes. In this respect, color homogeneity is indispensable particularly with brand products. Due to different bottle shapes, distance-dependent color deviations occur which must be compensated for by the color sensor. Therefore, colorSENSOR CFO200 sensors are used as they offer a multi-teach function combined with a high measuring rate and color accuracy. With more than 320 colors in 256 color groups, different production batches and variants can be detected reliably.

Sensor: Circular sensor CFS2, colorSENSOR CFO200



Inspection of polycarbonate sheets

The production of polycarbonate sheets involves inline color monitoring. The measuring principle applied with these transparent sheets is based on the transmitted light principle using colorSENSOR CFO200 sensors. The sensors detect color deviations from taught reference colors. If deviations occur, the plastic mixture is adapted accordingly. With its high light intensity, the CFO200 is also suitable for semi-transparent objects. The CFS3 transmission sensor used enables measurement of different material strengths with only one channel.

Sensor: CFS3 transmission sensor, colorSENSOR CFO200

Color recognition in component sorting tasks

Particularly with automated mounting, components must be sorted according to their color. The colorSENSOR CFO is ideally suited for these high production speeds. Adjustable colors and tolerances enable high flexibility.

Sensor: CFS4 reflection sensor, colorSENSOR CFO

Inline color measurement of granulate

For color monitoring of granulate, True Color sensors such as the colorSENSOR CFO200 from Micro-Epsilon are used. The sensor measures the color of the pellets and reliably detects the smallest color deviations ($\Delta E < 1$). The measurement takes place on the inside wall of the extruder, at up to 200 bar pressure and up to 250 °C. The recorded values are forwarded directly from the sensor to a higher-level control system via a signal output.

Sensor: CFS2-M11, colorSENSOR CFO200

Color measurement

colorCONTROL ACS

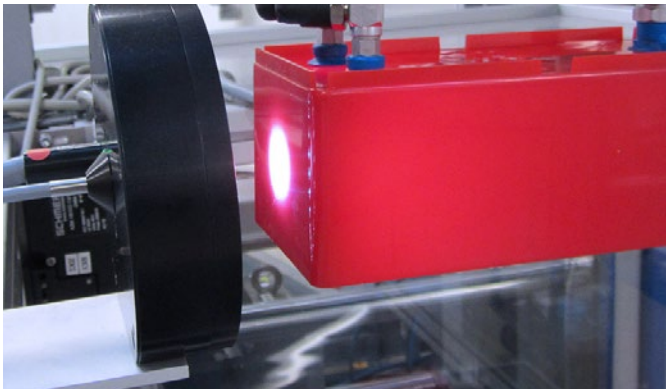
- Inline color measurement at the highest precision
- Optimized sensor models for different surfaces, e.g., reflecting, transparent, curved
- High measuring rate, ideal for quality assurance and documentation in the processing line

Photo: University Duisburg-Essen, Institute for Product Engineering, Chair for Construction and Plastics Machinery

Inline color measurement of transparent films

As well as color fluctuations, streaks can occur during production. With translucent films it is possible to measure the color based on the transmitted light principle. The colorCONTROL ACS7000 measures the film color inline at high speed and at maximum precision.

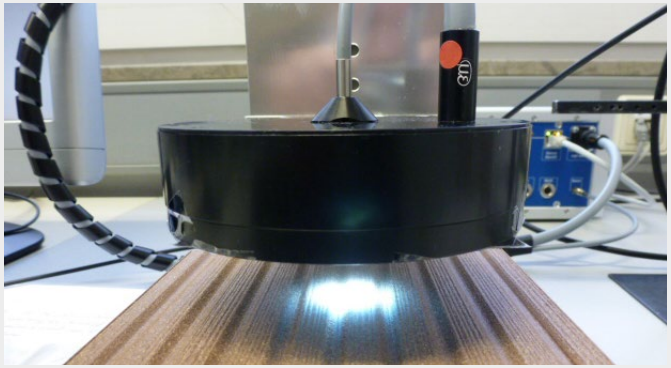
Sensor: ACS3 transmission sensor, colorCONTROL ACS7000



Inline color measurement of injection-molded plastic parts

In plastics injection molding, color measurement can be performed only after the cooling process, as colors still can change. An empirically determined correlation between warm and cold pieces enables the ACS7000 to measure the color directly after the injection molding process and to determine any deviations early.

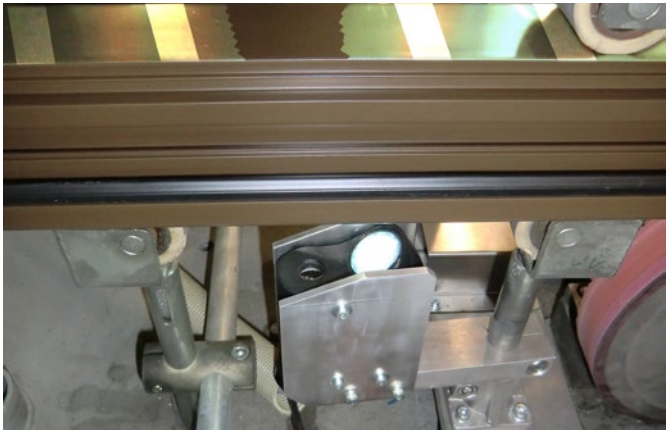
Sensor: ACS2 circular sensor, colorCONTROL ACS7000



Color measurement of floorboards

Plastic floorboards are made of colored granules and shaped in a deep-drawing process. Here, it must be ensured that the color of the floorboards is homogeneous and that there are no color differences. The inspection is carried out using the colorCONTROL ACS7000 spectral color measuring system and the ACS2 circular sensor (R45°c:0°). Absolute color measurement enables monitoring of the actual produced color shade and to recognize early any process-related defects.

Sensor: ACS2 circular sensor, colorCONTROL ACS7000

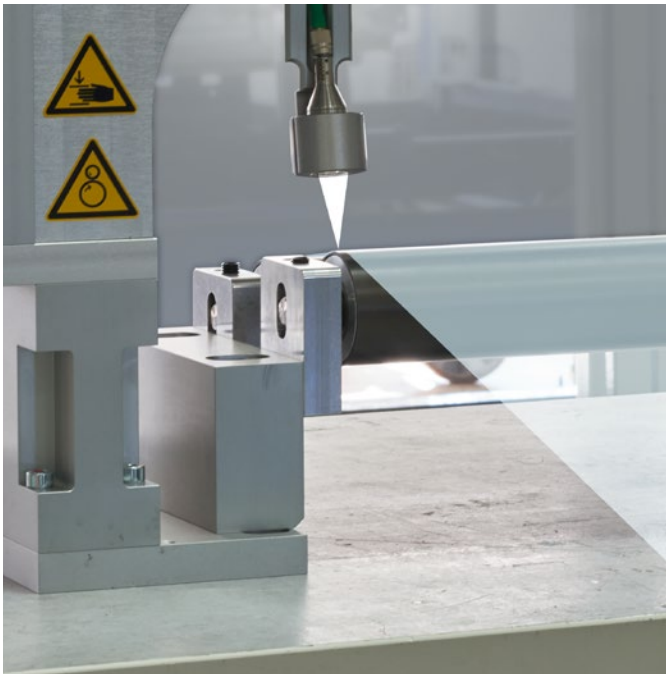


Inline detection of protective film on PVC window frames

After their extrusion, a transparent protective film is applied onto the plastic profiles The color shade of the plastics profile alters a little after the transparent film has been applied. Based on this color change, the colorCONTROL ACS7000 color measuring system recognizes if the film has been applied on the window frame. Its high measuring rate enables the color measuring system to be used inline.

Sensor: Standard ACS1, colorCONTROL ACS7000

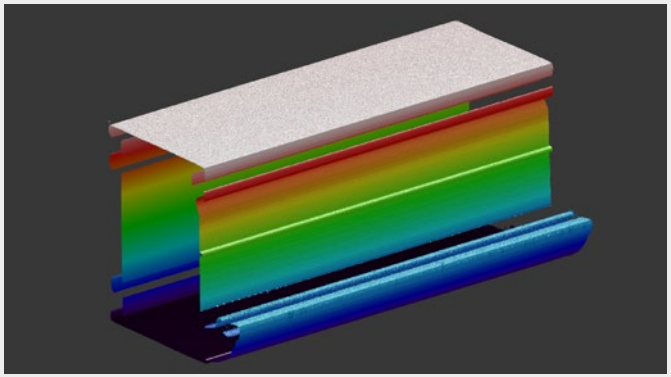

Non-contact
process monitoring



High-precision film thickness measurement

The interferometer is used for high-precision thickness measurements of transparent flat film. A decisive advantage is the distance-independent measurement, where a stable nanometer-accurate thickness value is achieved. This is how the target can move within the measuring range without influencing the accuracy.

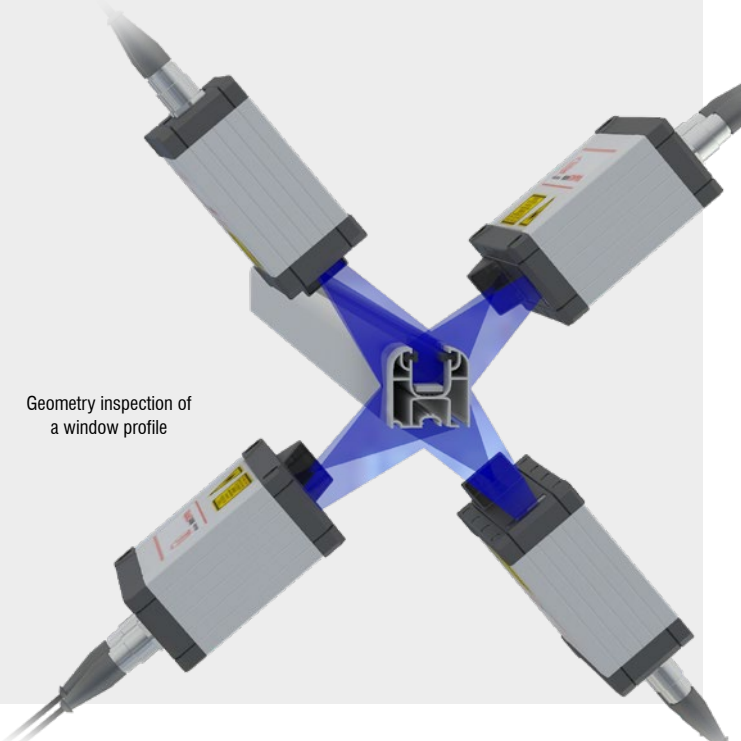
Sensor: interferoMETER IMS5400-TH



3D geometry inspection of extruded material

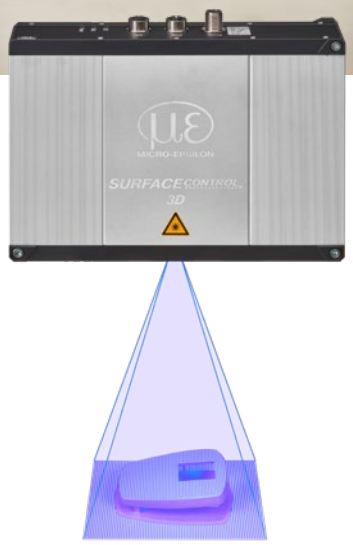
The 3D Profile Unit enables the calculation of several individual profiles from scanCONTROL laser scanners into a common coordinate system. This is how a composite 2D profile or a composite 3D point cloud can be generated. It enables the detection of various geometries, the extension of measuring ranges and the performance of thickness measurements.

Sensor: 3D Profile Unit



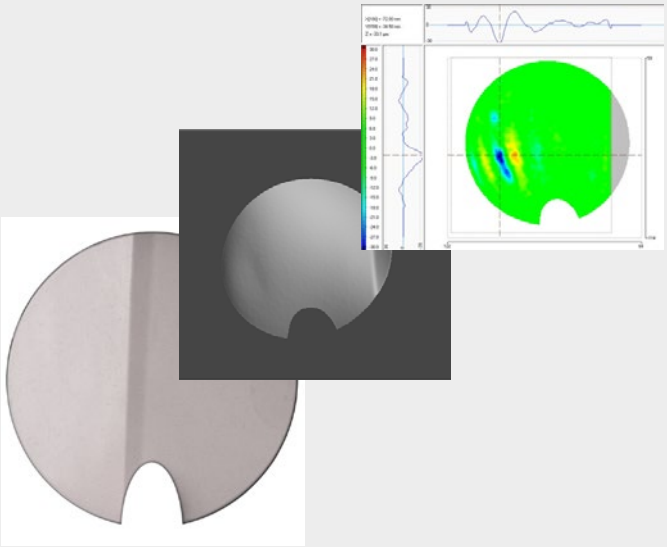
Geometry inspection of a window profile

Surface inspection
of injection-molded parts



surfaceCONTROL

- Highest z-axis repeatability up to 0.25 µm
- Automated inline 3D measurement for geometry, shape and surface inspections
- Up to 2.2 million 3D points / second
- Fully integrated industry sensor (IP67) with passive cooling
- Real 3D data via latest 3D GigE Vision standard
- Easy integration in all common 3D image processing packets



Fuel filler flap inspection

One component that many automotive manufacturers and suppliers produce in plastic is the fuel filler cap. As fuel filler flaps are positioned in a prominent location, the surface must meet the high quality requirements. During production, small sink marks can appear on the visible side of the flap. These are only a few micrometers deep but visible to the human eye depending on the painting. The surfaceCONTROL is used for surface inspection of fuel filler flaps. Both in production monitoring and when inspecting incoming goods, the system reliably detects and evaluates the fuel filler flaps.

Inspection system: surfaceCONTROL

Surface inspection of cockpit and dashboard

As well as the visual requirements, instrumentation panels also have to fulfill functional and security requirements. Often the passenger airbag has a predetermined breaking line which is generated using a laser. This "weak point" ensures the safe opening of the airbag at the predetermined breaking line. Sink marks may appear, which can be recognized under certain light conditions. In order to recognize these defects, surfaceCONTROL inspection systems are used. They enable fast, objective evaluations of any shape deviations, both on grained and smooth surfaces.

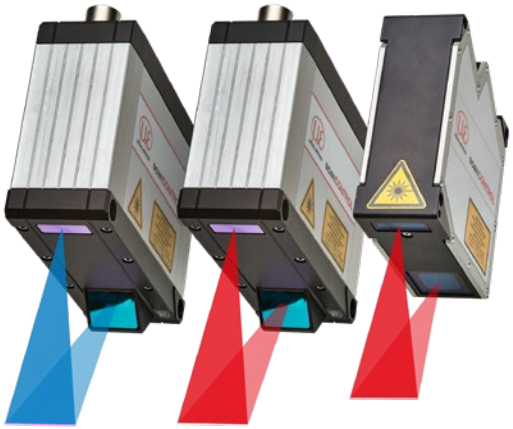
Inspection system: surfaceCONTROL

Measurement of the sprayed skin thickness

Sprayed skins for vehicle dashboards and for airbag cladding are sprayed into a heated mold using a robot-guided nozzle. For safety reasons, extremely low tolerances are required for airbags. For this reason, the thickness of the sprayed skin must be inspected inline during the spraying process. The measurement is performed using a combination sensor (an eddy current displacement sensor and a laser displacement sensor) which is attached to the robot arm. The eddy current sensor measures the distance to the nickel-coated spray mold and has an opening in the center through which the laser sensor measures the distance to the sprayed skin. When subtracted, both signals provide the thickness of the sprayed skin.

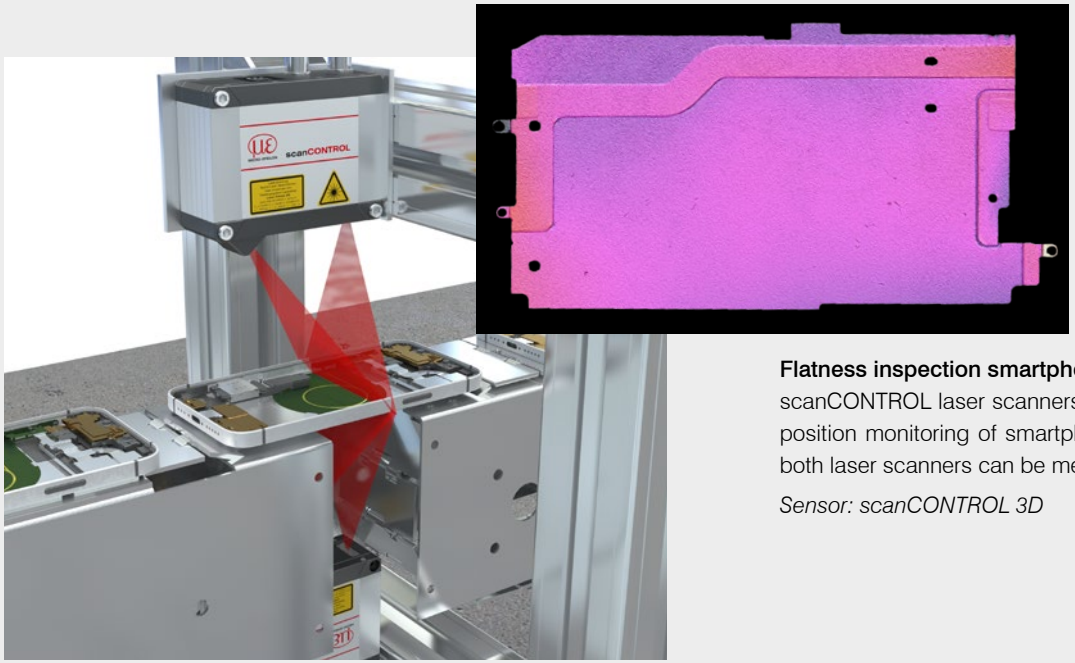
Sensor: optoNCDT / eddyNCDT

Profile measurement



scanCONTROL

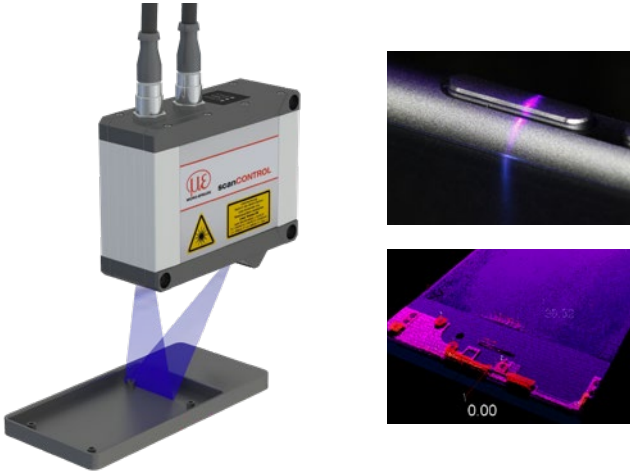
- 2D/3D laser scanners
- High resolution profile measurement
- Ready for dynamic measurement tasks
- Compact with integrated controller
- Red laser and patented blue laser



Flatness inspection smartphone carrier plates

scanCONTROL laser scanners are used for flatness inspection and position monitoring of smartphone carrier plates. The signals from both laser scanners can be merged into a common point cloud.

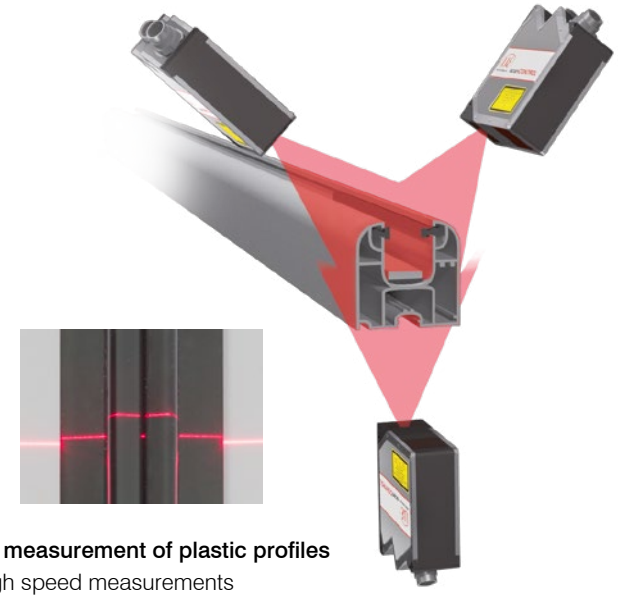
Sensor: scanCONTROL 3D



Dimensional detection of extremely small structures

While the plastic components are fed into the line, the laser scanner detects the dimensions of the smallest of structures. Deviations in the micrometer range are reliably measured using a Blue Laser Scanner.

Sensor: scanCONTROL BL



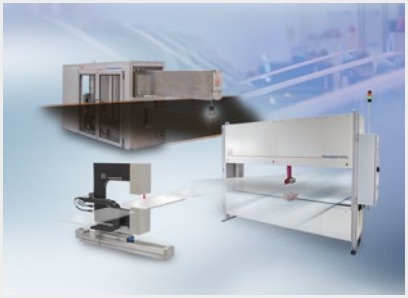
Gap measurement of plastic profiles

- High speed measurements
- Shiny, black surfaces

Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for metal strips, plastics and rubber

Optical micrometers and fiber optics, measuring and test amplifiers

Color recognition sensors, LED analyzers and inline color spectrometers

3D measurement technology for dimensional testing and surface inspection

More Precision

Whether it is for quality assurance, predictive maintenance, process and machine monitoring, automation or R&D – sensors from Micro-Epsilon make a vital contribution to the improvement of products and processes. High precision sensors and measuring systems solve measurement tasks in all core industries – from machine building to automated production lines and integrated OEM solutions.

MICRO-EPSILON

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