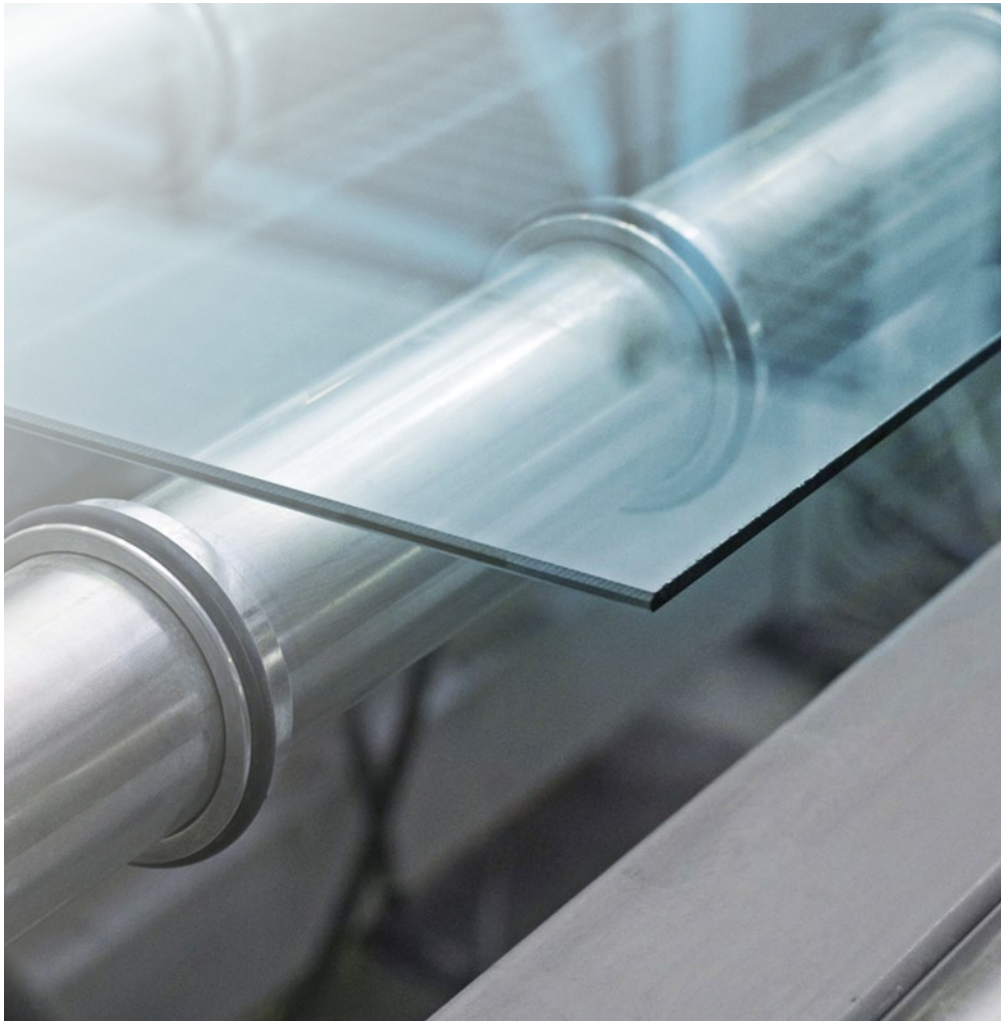
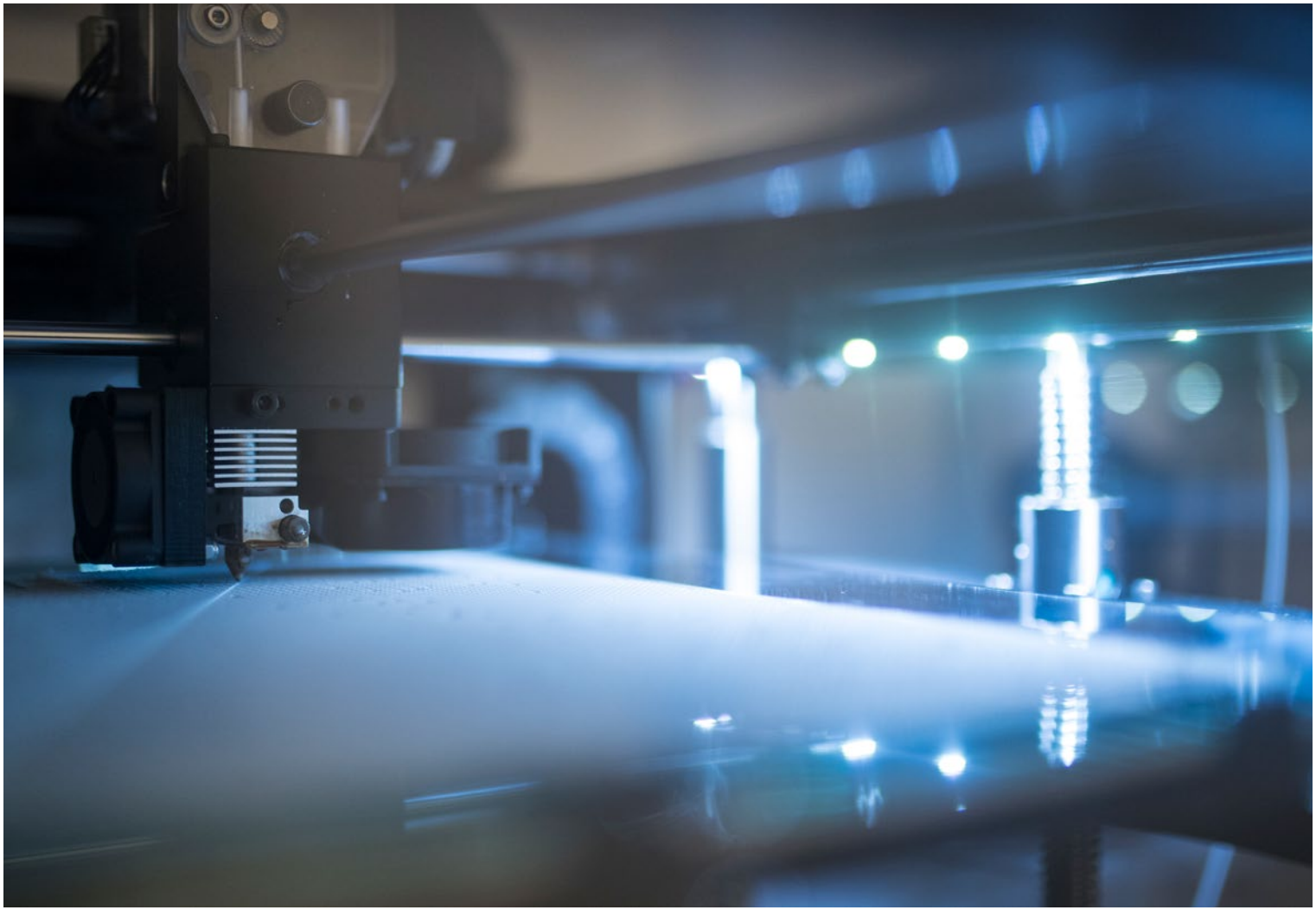
Sensors & Applications
Glass Industry

MICRO-EPSILON



More Precision



Sensors and measuring systems for glass production

Modern glass production is determined by maximum efficiency. Therefore, rapid access to fundamental process variables is required in order to ensure fast control of the process. With products such as container glass, flat glass or special glasses, tight manufacturing tolerances must be adhered to while maintaining the shortest possible cycle times.

Due to their high degree of integration as well as the high accuracy and measurement speed, sensors from Micro-Epsilon are used in the glass industry for different measurement tasks: robust inductive long-stroke sensors are integrated into machines in order to detect machine movements while optical sensors monitor glass products in processing lines. Typical measurement parameters include displacement, position, thickness, color and temperature.

confocalDT

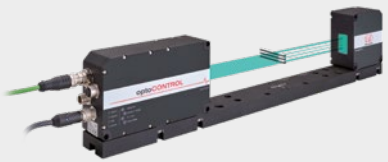
High precision confocal sensors

- High-resolution displacement & distance measurements on almost all surfaces
- Reliable thickness measurement of glass and transparent objects
- Extremely small measurement spot for the detection of smallest objects

colorCONTROL ACS

Sensors for color measurement of transparent materials

- Ideal for integration into processing lines due to high measuring rates
- High accuracy
- Robust and suitable for industrial applications



optoCONTROL

High-performance micrometer for the highest demands

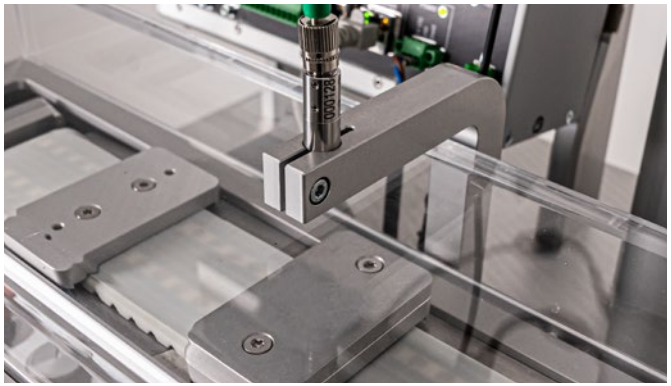
- Precise measurement of diameter, gap, edge & segment
- High measurement accuracy and sampling rate
- Measures tiny objects from 0.05 mm

interferoMETER

High precision white light interferometers for distance & thickness measurements

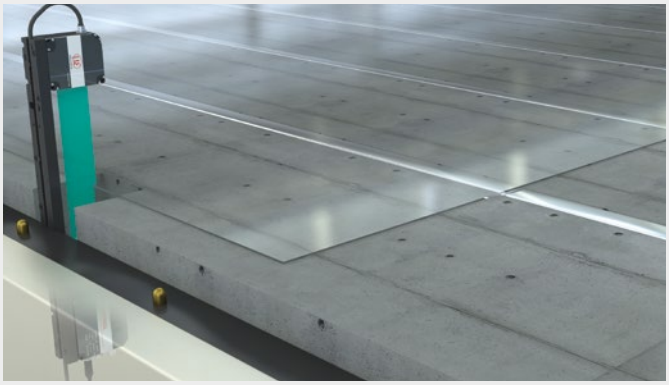
- Distance-independent thickness measurements and multi-layer thickness measurement
- Miniature light spot of 10 μm for the detection of smallest details
- Robust and suitable for industrial applications

Flat glass



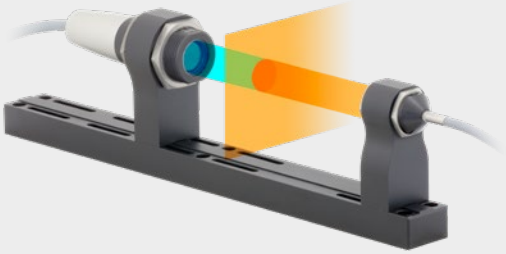
Thickness measurement of displays and flat glass
For the production of display glass, glass sheets with a homogeneous thickness profile are required. White light interferometers from Micro-Epsilon are used for high precision thickness monitoring, which determine the thickness without contact and from one side. Due to their high measuring rate, the sensors are also applied in high speed processes.

Sensor: interferoMETER



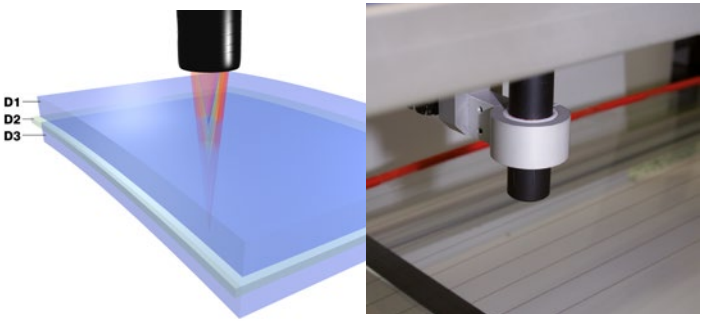
Edge control of glass sheets
The exact positioning of glass sheets in the manufacturing process during separation is a prerequisite for the exact size of the glass pane. Two optoCONTROL 2700 micrometers measure the exact position on both sides of the glass pane and transmit the signal to the production control system. The control unit corrects the exact alignment of the glass sheet based on the position signal.

Sensor: optoCONTROL 2700



Color measurement of glass
The color of glass is the crucial and visually distinctive feature of many different glass products. This is particularly true with natural and recycled raw materials based on varying compositions, where continuous and objective control of the color effect is a decisive factor in consistent, homogeneous quality. Color sensors from Micro-Epsilon are used in order to inspect colors and shades of the glasses in the production process.

Sensor: colorCONTROL ACS-3



Gap monitoring of safety glass
For quality and process control during the production of safety glass, confocal chromatic displacement sensors are used which offer a multi-peak option. Confocal chromatic sensors from Micro-Epsilon enable thickness measurements to micron accuracy. The sensors detect up to 5 layers by evaluating 6 measurement values on the boundary areas. This determines the film thickness, gap sizes, adhesive beading and coating thickness reliably.

Sensor: confocalDT

Container glass

confocalDT

- Confocal sensors for measuring displacement and thickness
- Small measurement spot size
- High repeatability
- Ideal for dynamic measurements

Measuring the wall thickness and roundness of bottles

With the wall thickness and roundness measurements in star wheel inspection machines, a fast measuring rate is required in order to support the ongoing process. Micro-Epsilon's confocal chromatic measuring systems provide a high measuring rate and fast exposure time control. This also enables the measurement of thickness when the glass colors vary.

Sensor: confocalDT

Thickness measurement of medical container glass

Consistent thickness of walls and bottom are vital quality factors in medical container glass. In order to determine the glass thickness of the bottom and the walls, confocal chromatic sensors from Micro-Epsilon are used. These sensors also measure thin glass. Thanks to thickness calibration, the distance between the containers and the sensor can vary without affecting the measurement accuracy

Sensor: confocalDT

Machine monitoring

Plunger measurement in IS machines

In hollow glass production, IS machines are used. This production environment is characterized by harsh ambient conditions such as vibration, steam and high temperatures. Micro-Epsilon has developed an inductive EDS displacement sensor, which is specially intended for 24-hour operation in IS machines to determine the exact plunger position. The robust sensor design compensates for temperature influences, including those caused by temperature gradients along the measuring range.

Sensor: induSENSOR EDS

Distance control of print heads for glass printing

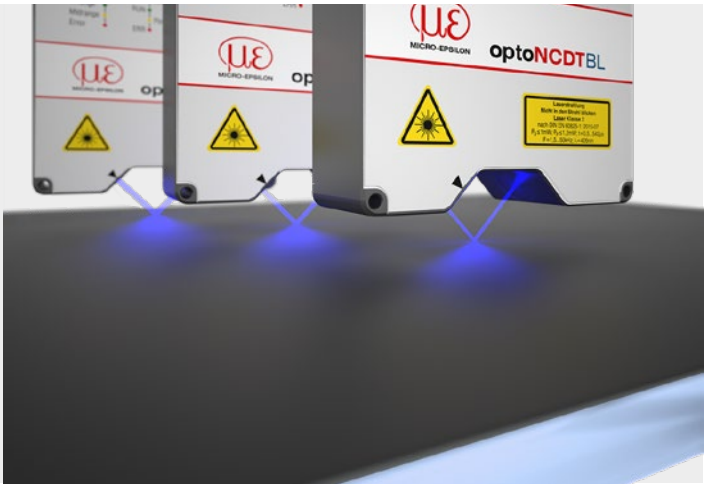
When printing on materials such as glass and ceramics, very fine detailed structures are applied on the carrier material, which requires precise positioning of the print head. For distance measurements, optoNCDT 1420 laser triangulation sensors from Micro-Epsilon are used. With a measuring range of 10 mm, these determine at various points in the print head the respective distance from the surface to be printed. The data obtained enables the determination of the edges and the surface tilt and therefore the exact positioning of the print head.

Sensor: optoNCDT 1420

Distance measurement on anti-reflective coated glass

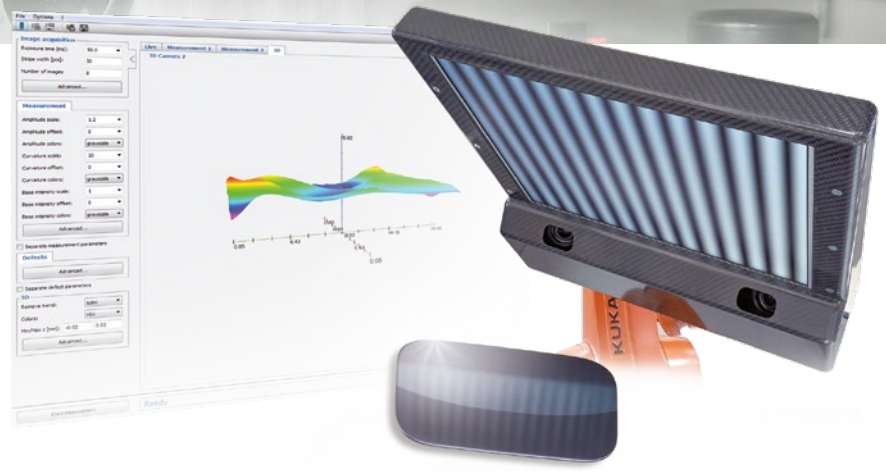
Anti-reflective coated glass is inspected during the coating process using laser-optical displacement sensors from Micro-Epsilon in order to determine undulations and torsion. The planarity of the coated glass surface is measured in several tracks. Based on the patented Blue Laser Technology, optoNCDT 2300-2DR sensors provide high measurement accuracies on coated glass surfaces.

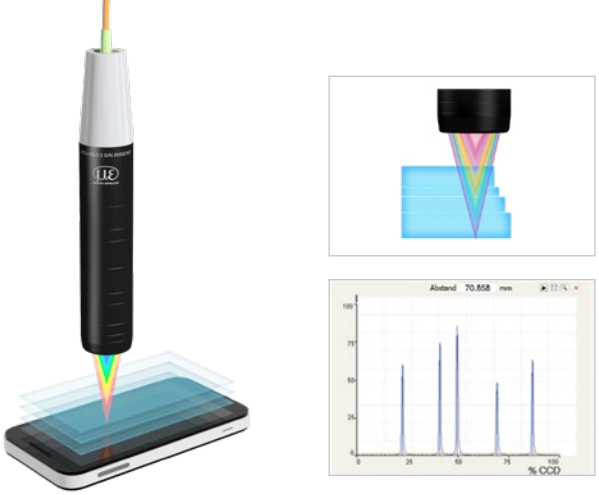
Sensor: optoNCDT 2300-2DR



Production monitoring

of displays and optical glasses





Gap sizes of display glass and thickness measurement of multi-layer transparent materials

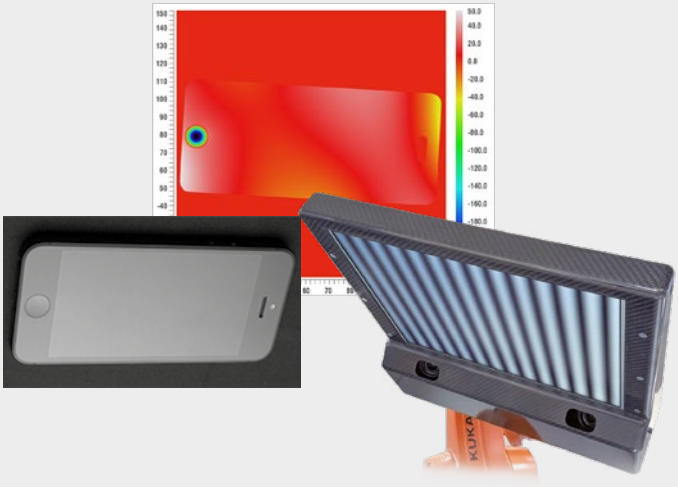
While smartphone display glasses are fed automatically into the line, a fast thickness measurement is carried out. With the single display glass layers presenting different refractive indices, several glass layers can be measured using only one confocal sensor.

Sensor: confocalDT

Camera autofocus measurement

Confocal sensors measure the distances between the autofocus lenses to provide the camera with the highest possible image quality.

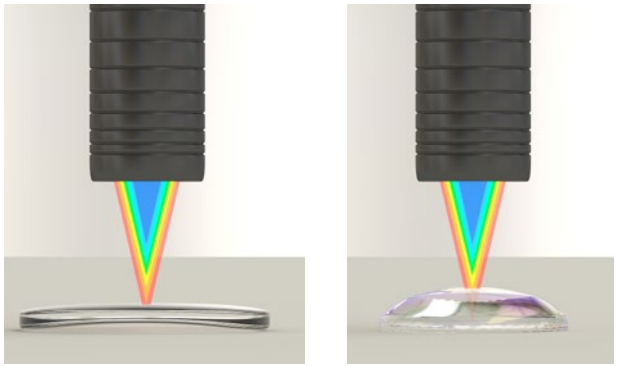
Sensor: confocalDT



Surface inspection of display glass

Fully-automatic defect detection on shiny surfaces is based on deflectometry systems. Extremely small inclusions or defects are detected reliably.

Sensor: reflectCONTROL



Curvature measurement of optical glass

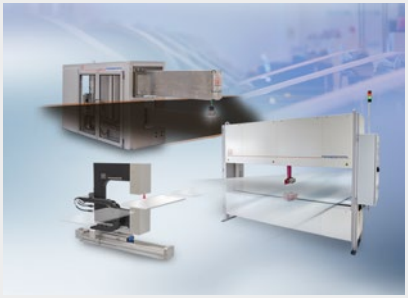
In order to meet production tolerances, the contour of optical lenses such as eyeglass lenses or objectives is measured using confocal chromatic sensors. Based on the distance values, statements about the surface properties can also be made. Furthermore, the center thickness of the lens is determined. Due to the large tilt angle the sensors can also detect strongly curved surfaces.

Sensor: confocalDT

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

www.micro-epsilon.com