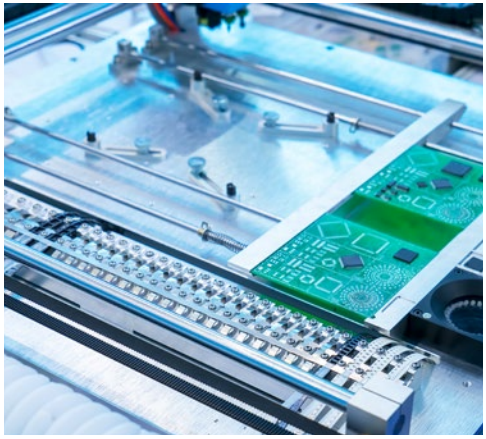
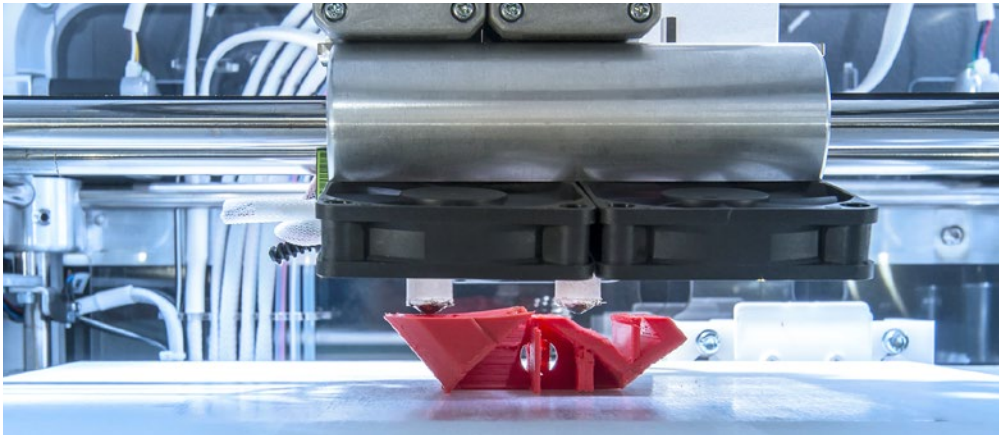
Sensors & Applications
Electronics Production

MICRO-EPSILON

More Precision





Ever smaller sizes and faster production speeds coupled with concurrently rising economy are the crucial factors in the electronics industry. The quality, function and feel of the end product require reliable measurement, testing and inspection at all stages of production.

Compact, fast and integrable sensors from Micro-Epsilon ensure maximum reliability in nearly every area where high precision is required – from machine monitoring to fully automatic quality control of the end product.

scanCONTROL

- Compact laser scanners for high precision profile measurements
- Inline measurement of gaps, profiles, steps and angles
- Models with red or blue laser line
- Measurement on numerous surfaces, even reflective and matt
- Scanners with the highest resolution worldwide on just 10 mm laser line for detecting the smallest details

confocalDT 241x

- High precision confocal sensors for precise distance and thickness measurements
- Compact confocal controllers and ultra-compact sensors
- High-resolution displacement & distance measurements on almost all surfaces
- Reliable thickness measurement of glass and transparent objects
- Extremely small measurement spot for detecting the smallest parts

surfaceCONTROL 3D 3500

- 3D snapshot sensors with ultra-high precision
- Precise inline inspection of geometry, shape and surfaces
- Ultra-high precision of repetitions of up to 0.25 μm
- Up to 2.2 million 3D points per second
- State-of-the-art interfaces with GenICam and GigE Vision standards

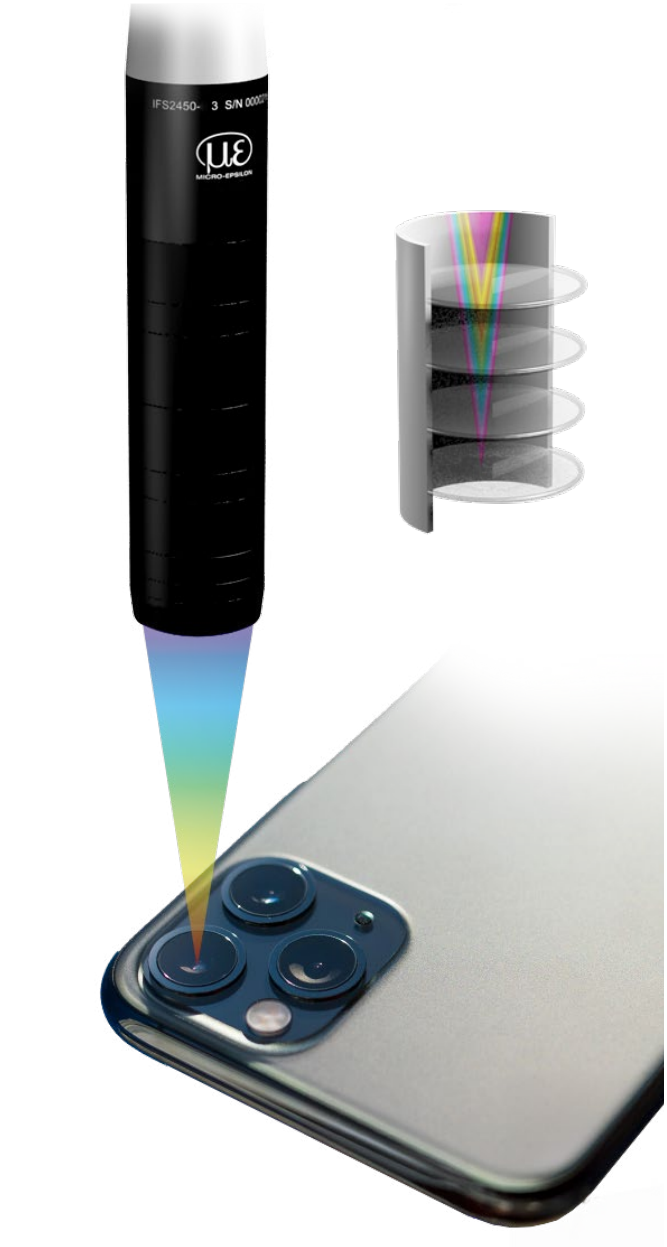
optoNCDT

- Compact laser triangulation displacement sensors for fast and precise measurements
- Non-contact displacement and distance measurement with measuring ranges from 10 to 500 mm
- High accuracy
- High measuring rate for dynamic measurements
- Compact design and easy mounting
- Small measurement spot for detecting the smallest objects

Production monitoring
Smartphone assembly

scanCONTROL

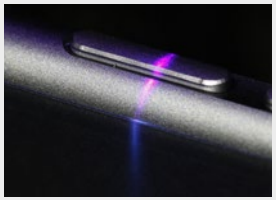
- 2D/3D laser scanners
- High-resolution profile measurements
- Compact with integrated controller
- Red laser and blue laser

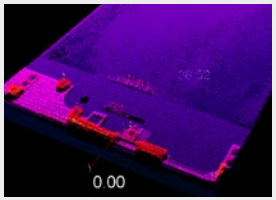


Camera autofocus measurement

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

Sensor: confocalDT

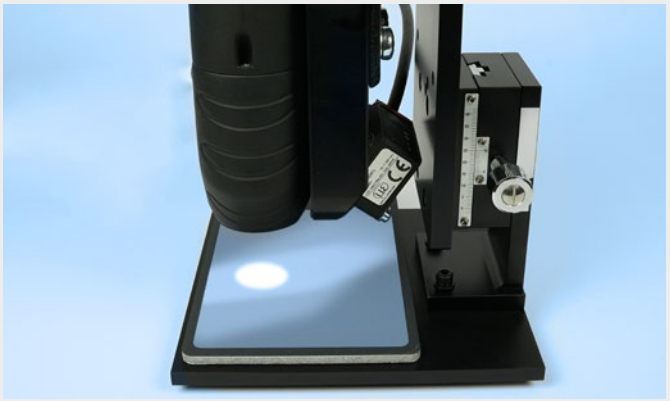




Inspection of the smallest mechanical structures and seals

During the assembly of components, laser scanners detect the dimensions of smallest structures. Geometric deviations are reliably recognized with blue laser scanners.

Sensor: scanCONTROL BL

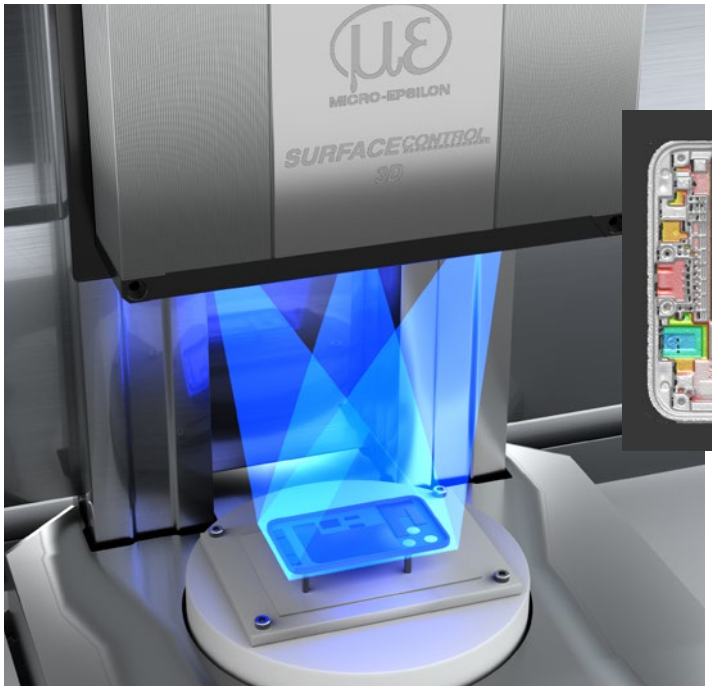


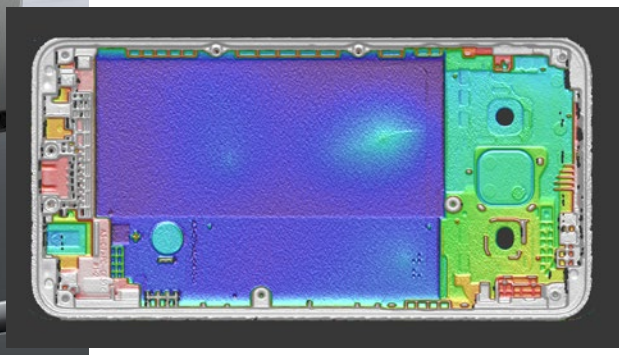
Color measurement of components

Ensuring the exact housing and component color for different batches is a major challenge, especially with glossy and curved surfaces. Color measuring systems from Micro-Epsilon detect color with the highest accuracy.

Sensor: colorCONTROL ACS


Production monitoring
Smartphone assembly

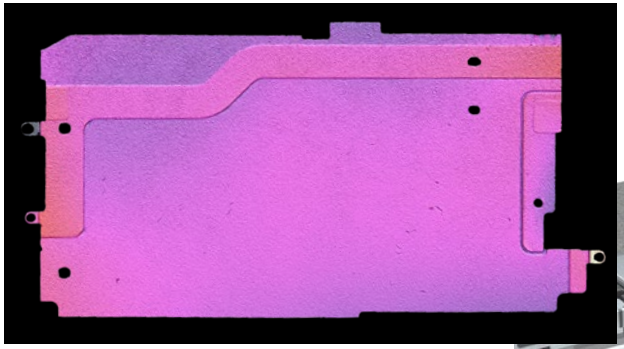


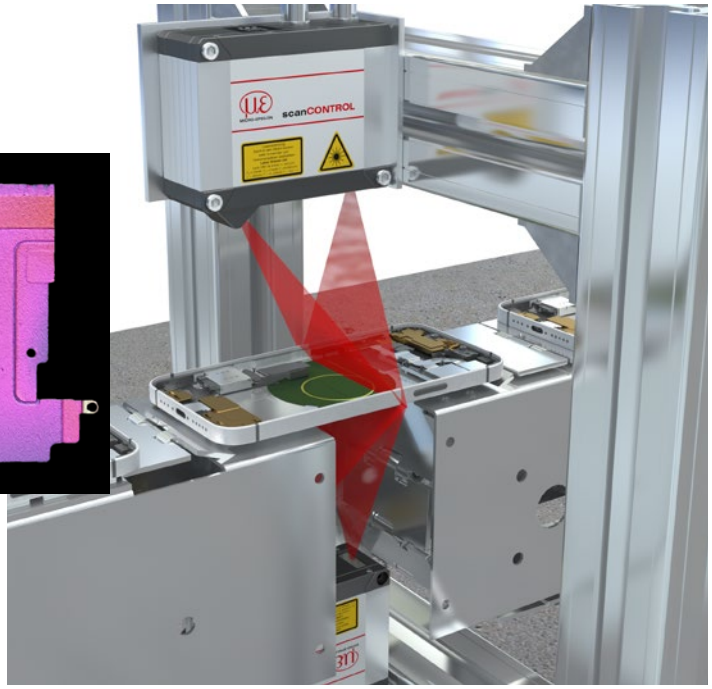


3D geometry check for smartphone assembly

3D sensors from Micro-Epsilon are used in various applications to check geometry and dimensional accuracy during smartphone assembly. The surfaceCONTROL snapshot sensors check the presence and positioning of the individual components.

Sensor: surfaceCONTROL 3500





Flatness inspection of smartphone carrier plates

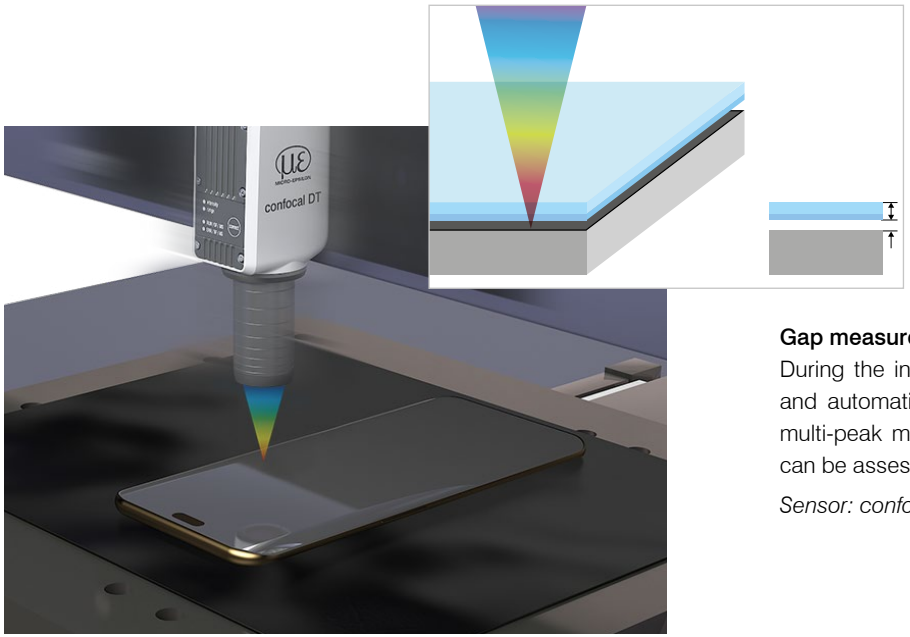
scanCONTROL laser scanners are used for flatness inspection and position monitoring of smartphone carrier plates. The signals from both laser scanners can be merged into a common point cloud.

Sensor: scanCONTROL 3D

Production monitoring
Smartphone assembly

confocalDT

- Confocal sensors for displacement and thickness measurements
- Small measurement spot
- High repeatability
- For dynamic measurements

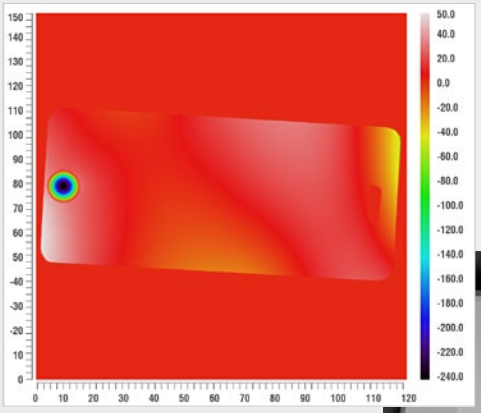


Gap measurement during the installation of glass displays
During the installation of glass displays, confocal sensors quickly and automatically measure the air gap. Thanks to the integrated multi-peak measurement, individual layers, air gaps and coatings can be assessed.

Sensor: confocalDT

Surface inspection of display glass
reflectCONTROL deflectometry systems recognize defects in smartphone displays fully automatically. The smallest inclusions, distortions or imperfections are reliably detected.

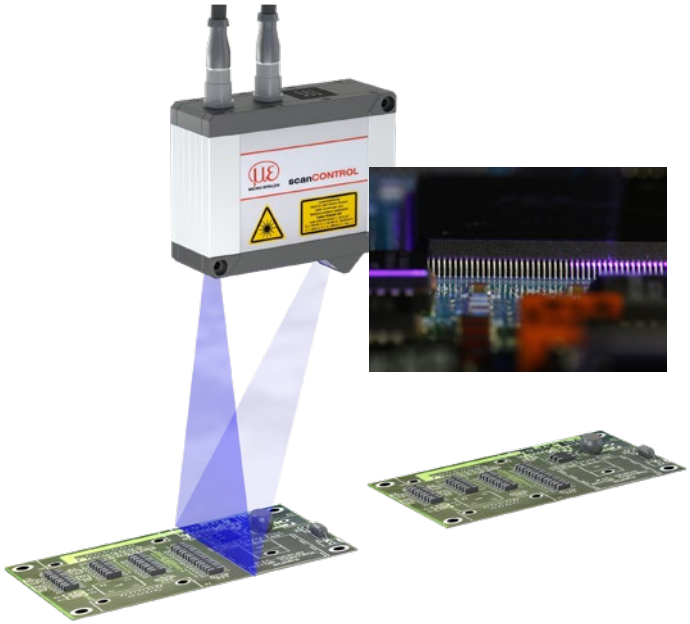
Sensor: reflectCONTROL



Inline monitoring
PCB production

optoNCDT

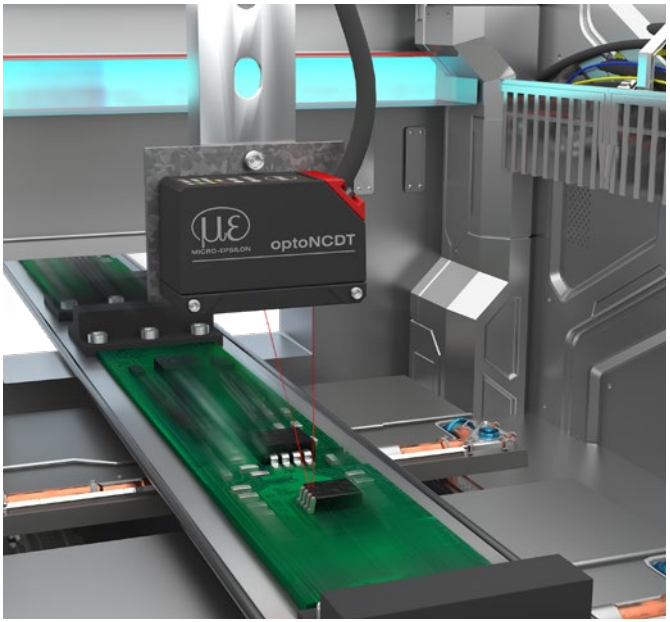
- Laser displacement sensors
- Small measurement spot
- Highest accuracy in the sensor class
- High measuring rate and adaptation to changing surfaces
- Small light spot for the smallest details
- Compact with integrated controller



Coplanarity of IC pins

In assembly and soldering processes, the coplanarity of the pins must be detected to ensure flawless soldering quality and avoid failures.

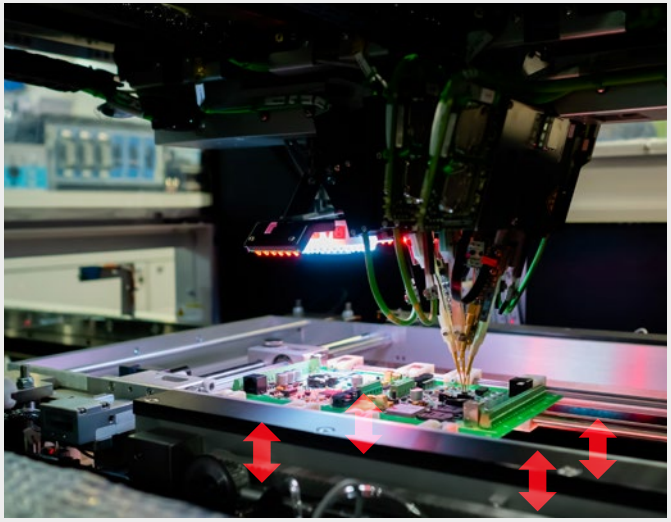
Sensor: surfaceCONTROL | optoNCDT | scanCONTROL

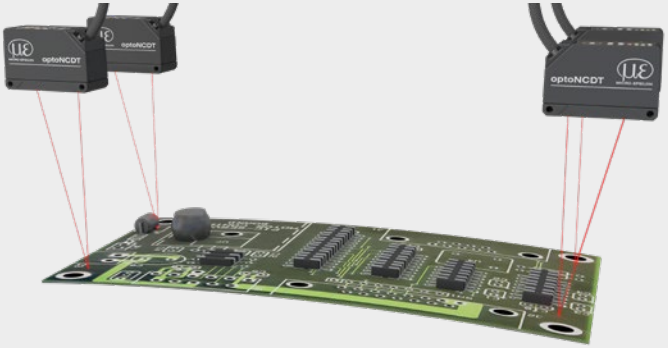


Check for presence of electronic components

Laser triangulation sensors and fiber-optic sensors are used to check the presence and position of components on printed circuit boards fully automatically. Thanks to the small light spot, the smallest details can be reliably detected.

Sensor: optoNCDT 1220 | optoCONTROL CLS1000





Deflection measurement of printed circuit boards

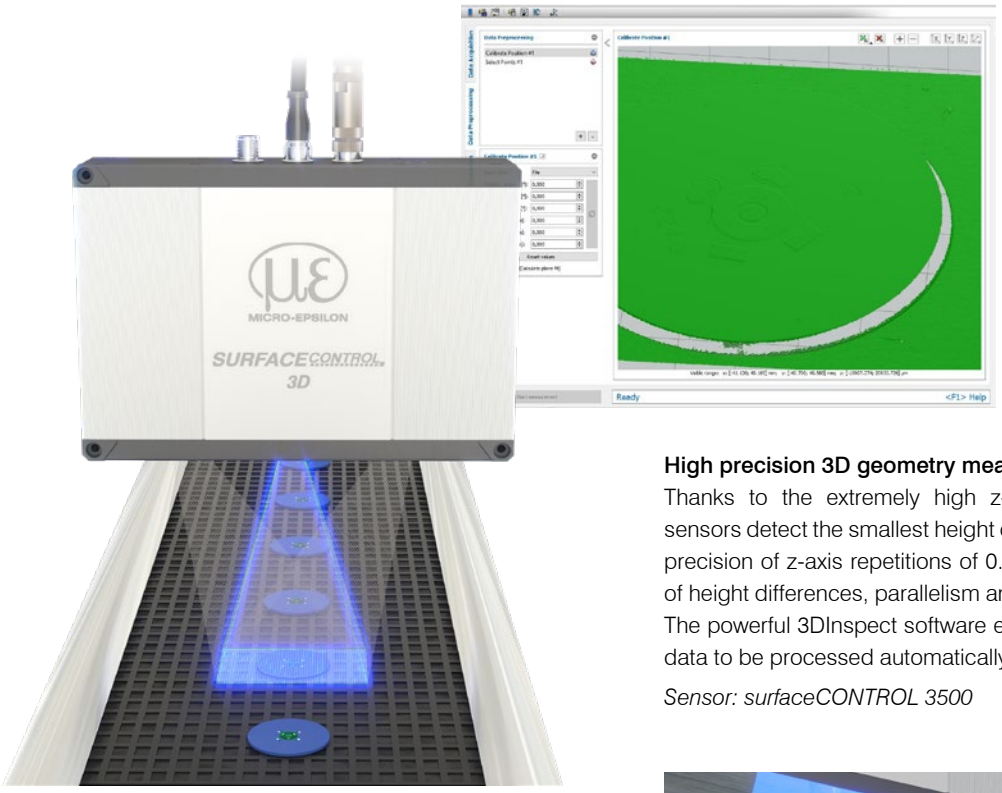
Large-format PCBs are checked for deflection and curvature to ensure that the components can be correctly positioned.

Sensor: optoNCDT 1220

Inline monitoring
PCB production

surfaceCONTROL

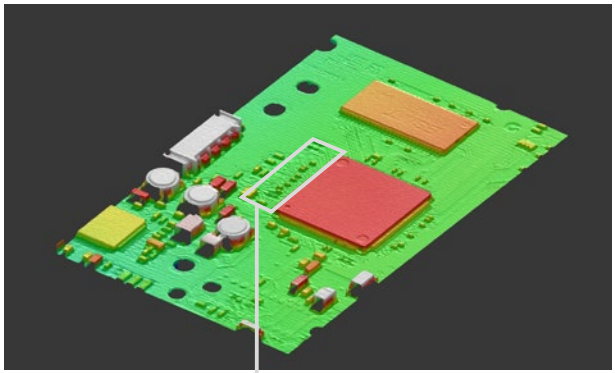
- 3D snapshot sensors with ultra-high precision
- Precise inline inspection of geometry, shape and surfaces
- Ultra-high precision of repetitions of up to 0.25 µm
- Up to 2.2 million 3D points per second
- State-of-the-art interfaces with GenICam and GigE Vision standards
- Real 3D data in the highest image quality

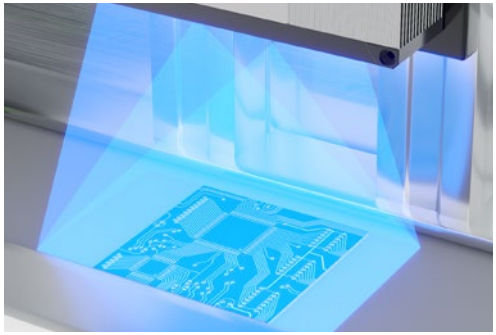


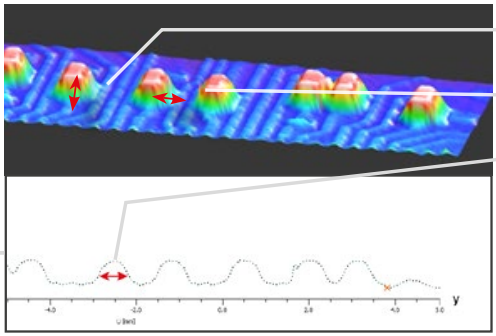
High precision 3D geometry measurement of substrates

Thanks to the extremely high z-axis resolution, the surfaceCONTROL 3D sensors detect the smallest height differences with extremely high precision. The precision of z-axis repetitions of 0.25 µm enables high precision measurement of height differences, parallelism and coplanarity even with the smallest objects. The powerful 3DInspect software enables the point clouds to be evaluated and data to be processed automatically.

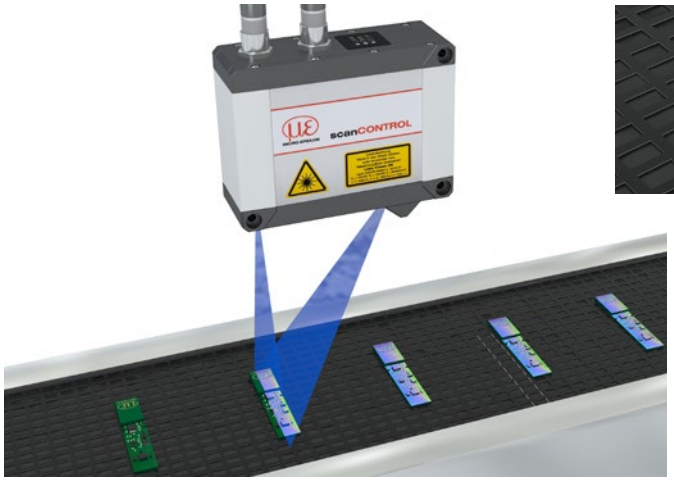
Sensor: surfaceCONTROL 3500

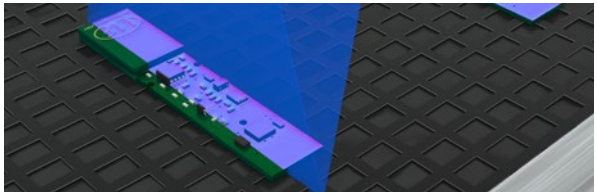






Inline production monitoring **of assembly processes**

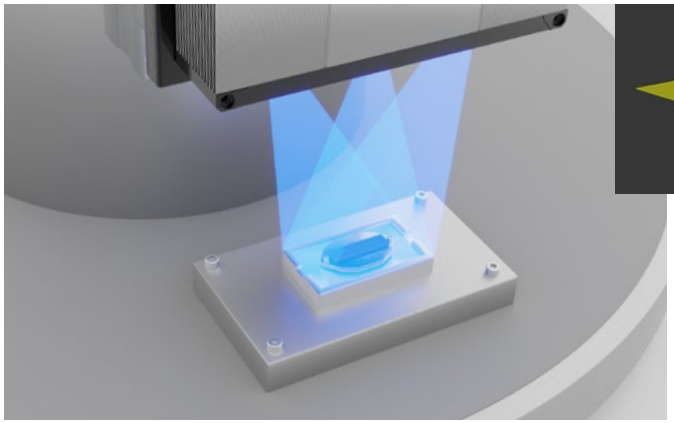


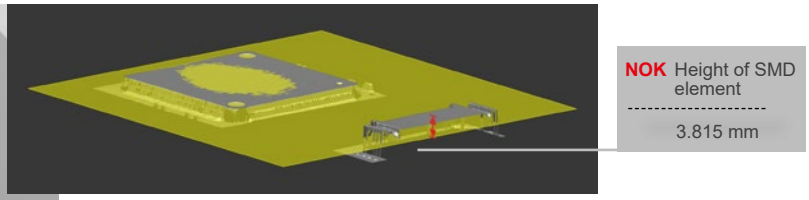


3D geometry inspection of circuit boards

scanCONTROL laser scanners are used for 3D geometry inspection of circuit boards. This allows the smallest details to be checked for presence, positional accuracy and location.

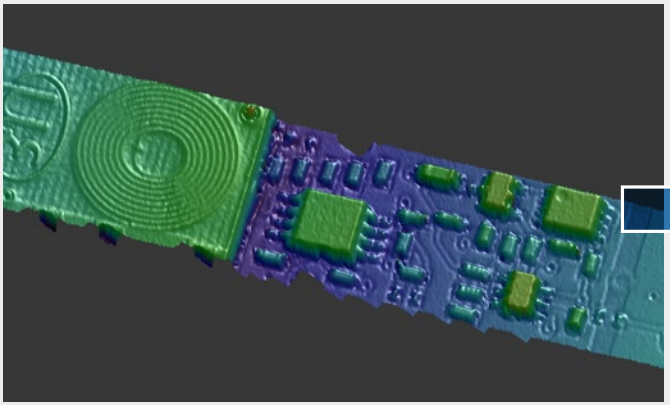
Sensor: scanCONTROL 3D



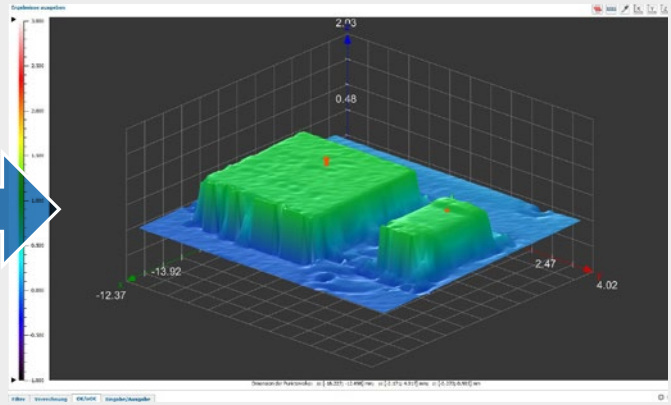


High precision 3D geometry inspection of electronic components

The surfaceCONTROL 3D sensors are used in production lines and on rotary indexing tables. The measurement is performed within 0.2 seconds. Thanks to the high accuracy, the smallest deviations in geometry can be reliably detected.

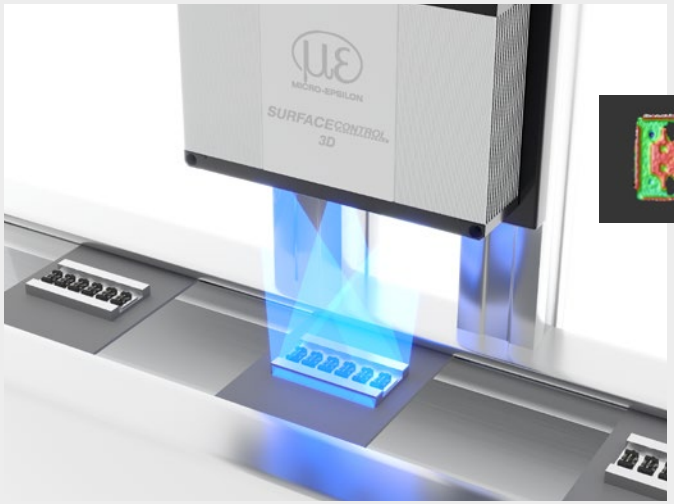


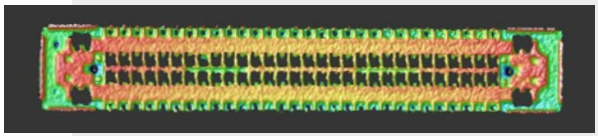
Detailed 3D display based on outstanding z-axis resolution



Automated evaluation in Micro-Epsilon software


Monitoring of
assembly processes

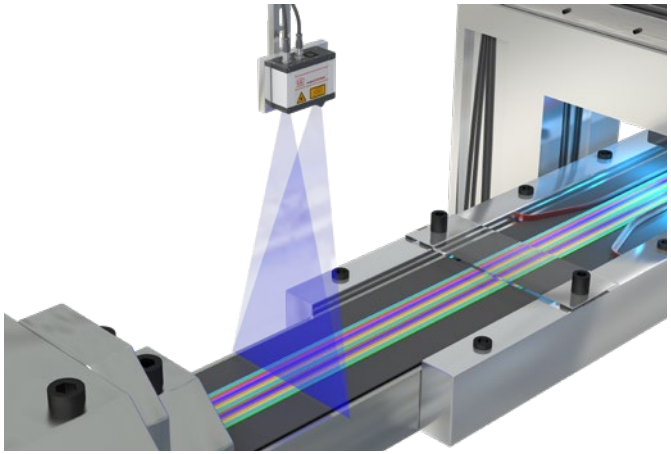




Inline geometry testing of connectors

The 3D snapshot sensors are used for inline geometry testing of connectors. In this process, the position, presence and alignment of the individual elements in relation to each other. Fast data acquisition and reliable evaluation allow errors to be detected early and reject rates to be significantly reduced.

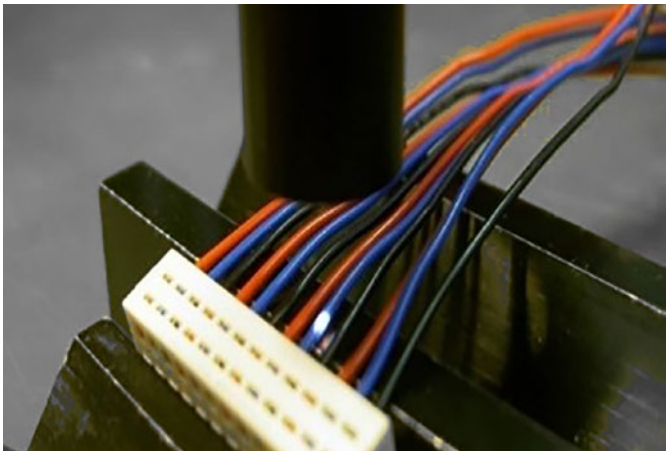
Sensor: surfaceCONTROL 3500



Geometry inspection of cable harnesses

scanCONTROL laser scanners are used for automated inspection of wire harnesses. The position, geometry and completeness of wire harnesses is reliably monitored.

Sensor: scanCONTROL

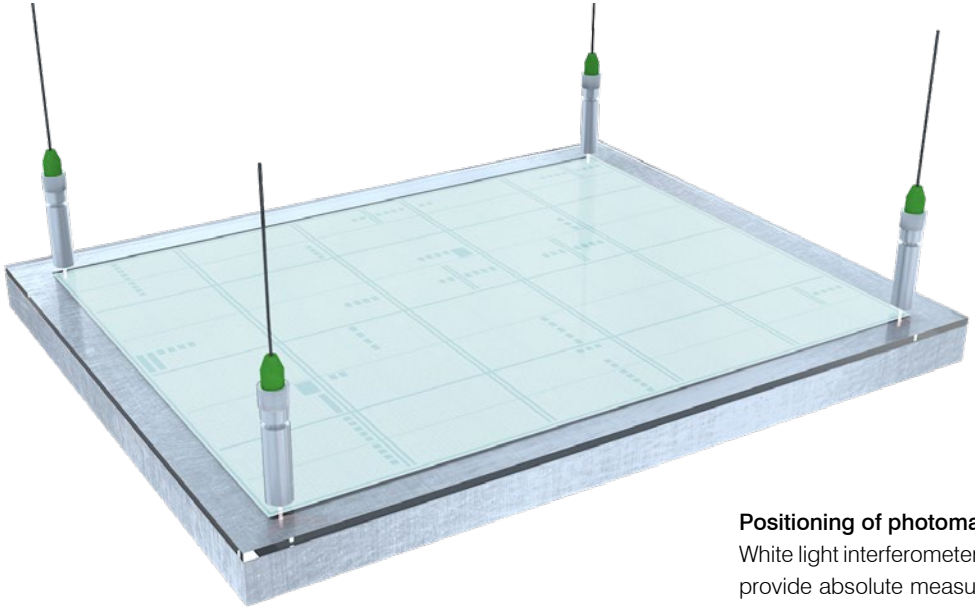


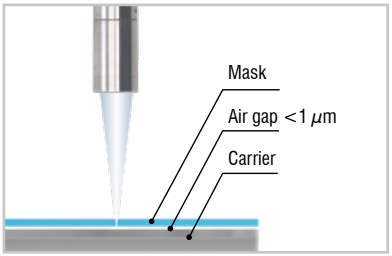
Reliable color test of cables

In automated production processes, cables must be arranged correctly in the wiring harness. A color sensor checks the color sequence of the 0.5 mm wires directly at the connector. The powerful sensor even detects two-color wires, and the sensor distinguishes both the mixed color and the individual color components.

Sensor: colorSENSOR CFO100

Closed-loop control
in manufacturing processes

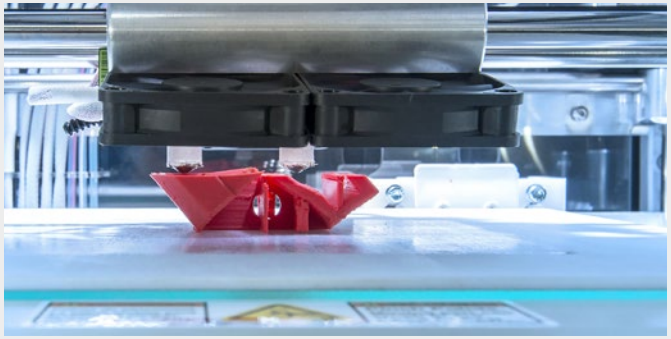




Positioning of photomasks

White light interferometers are used to align photomasks. The interferometers provide absolute measured values in the sub-nanometer range and enable the mask to be positioned precisely. In addition to absolute position measurement, the interferometers can also be used for air gap measurement.

Sensor: interferoMETER



Print head positioning and focus control

In printing and imaging processes, the exact height of the print head is crucial for the quality of the end product. Fast detection of the distance to different material surfaces and edge detection enable quick readjustment.

Sensor: optoNCDT

Adhesive bead measurement in metering systems

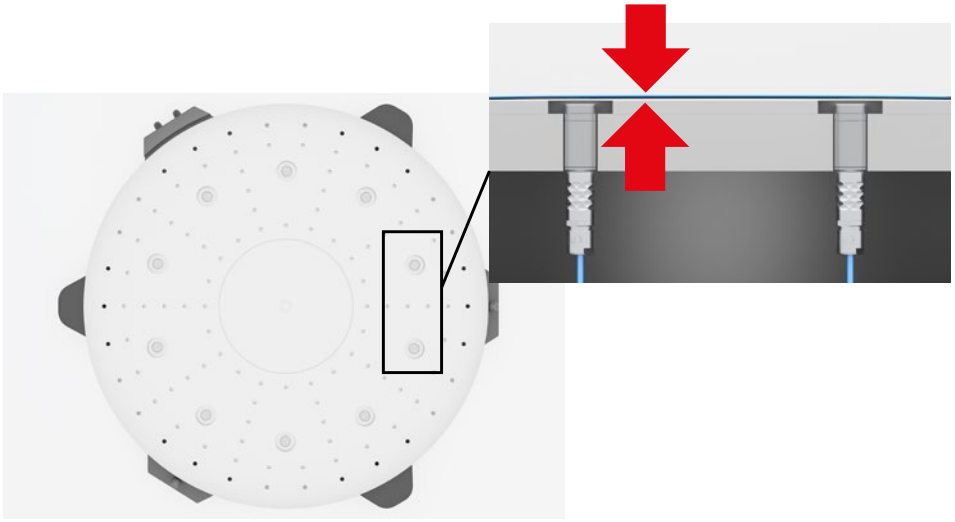
After the reflow soldering process, adhesive is applied at certain points to protect the circuit. The completeness of the adhesive bead is a crucial factor and is reliably checked using laser sensors.

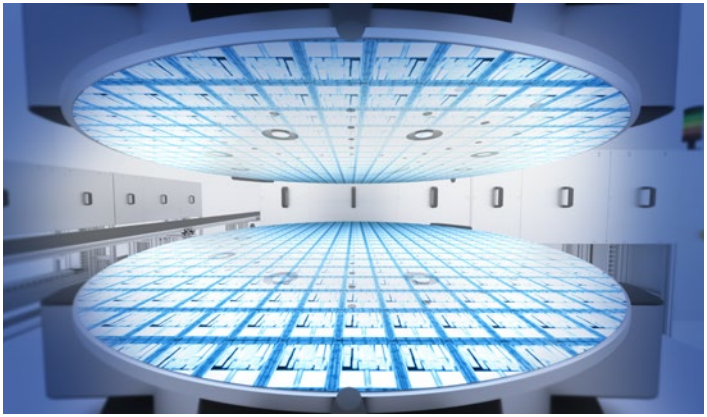
Sensor: optoNCDT 1420

Position monitoring
during bonding

capaNCDT

- Capacitive displacement sensors for high precision distance measurements
- High precision measurement of displacement, distance, gap & position
- The world's most modern product portfolio for a wide range of applications
- Vacuum-compatible and robust
- Highest interference resistance to electromagnetic fields





High-resolution planarity test for hybrid bonding

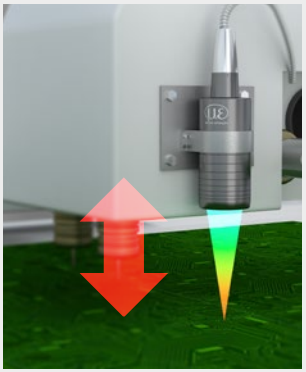
In modern die-to-wafer and wafer-to-wafer hybrid bonding, real-time planarity measurement is crucial for a reliable process. Capacitive distance sensors enable non-contact measurement of shape deviations on wafers – for example due to bending, twisting or local distortion – and thus provide essential data for adaptive leveling of the bonding units. If a height difference is detected, the bonding unit can be precisely adjusted in the Z-axis direction using a precision axis, for example. For very small chips, segmented areas on the chuck are also used, which can be leveled locally.

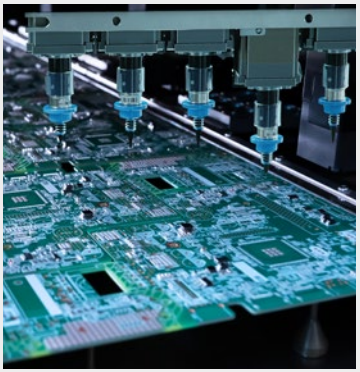
Sensor: capaNCDT

Precise distance control of the bond head

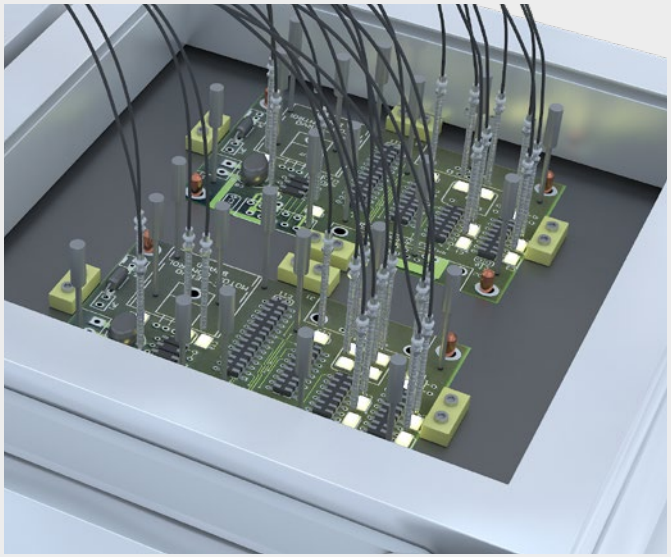
Confocal sensors are used to keep the Z-axis height of the bond head at the exact distance. These are attached to the head and measure the distance to the circuit board with high precision. Thanks to the high measuring rate, even the fastest bonding processes can be monitored and adjusted.

Sensor: confocalDT





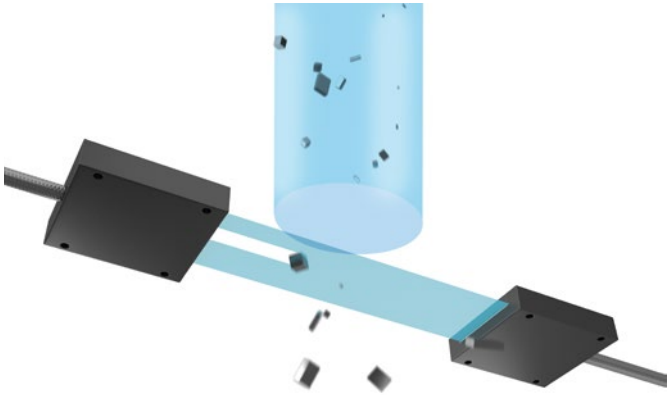
Production monitoring
Electronics industry



LED testing on electronic assemblies

The colorCONTROL MFA multi-point color recognition systems check the function, color, intensity, color temperature and dominant wavelength of LEDs during the function test. Due to the small size of the MFS receiver sensors, it is possible to measure even difficult-to-access LEDs between the hold-down devices and test pins. Up to 28 receiver sensors can be connected to one MFA controller. After internal signal processing, the measured values are output through the RS422 interface to an external controller for further processing. This allows the desired measured values to be evaluated and defective LEDs to be detected reliably.

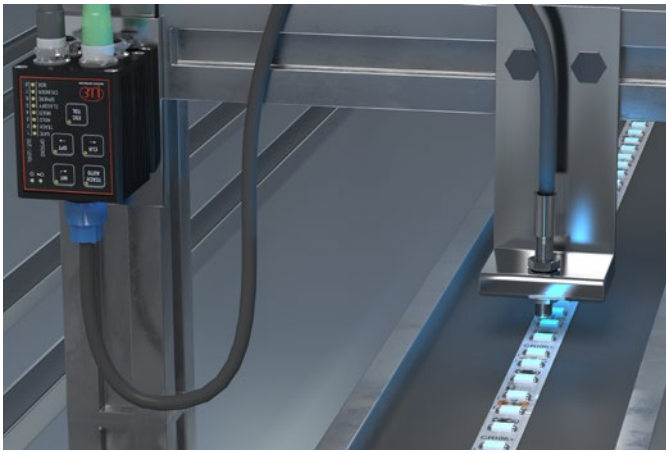
Sensor: colorCONTROL MFA



Counting electronic micro-components

The optoCONTROL CLS1000 with the CFS-Q3 transmission sensor enables precise counting of micro-components such as precision resistors. The micro-components fall through a transparent tube, toward which the CFS-Q3 transmission sensor is directed. The fiber-optic sensor detects the shadowed area and outputs this as a change in the analog value.

Sensor: optoCONTROL CLS1000



Inspection of LED strips

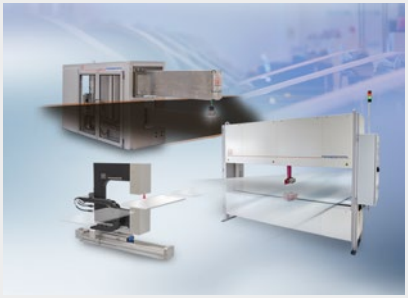
To ensure consistent quality of LED strips, a comprehensive inspection of each individual LED is required. The colorSENSOR CFO is used for fast and precise quality control of LED products. The compact fiber optics have a small light spot and can be precisely positioned. This allows each individual LED to be checked for function, intensity and color.

Sensor: colorSENSOR CFO

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