Sectors and applications

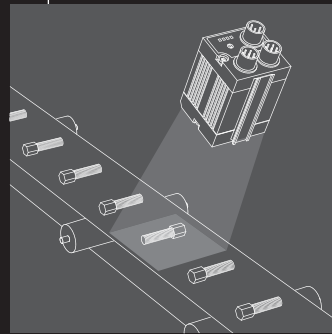## The best solution for you

Object detection
from Page 26

- Correct feed positions
- Inspection of completeness and presence
- Counting of parts
- Inspecting assembly processes
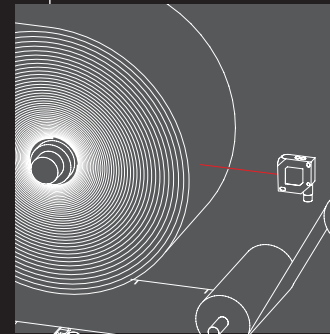- Part detection and differentiation

Position/ orientation detection
from Page 30

- Highly precise front-edge detection, e.g. on transport belts
- Pick & place (2D position)
- Localisation of parts
- Assembly inspections
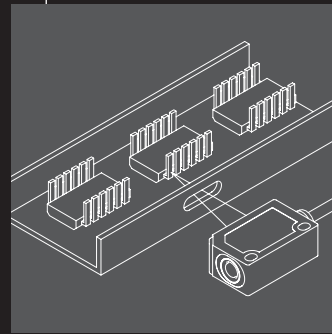
Measurement
from Page 32

- Measurement of components
- Distance measurement in the µm range
- Monitoring sag & dancer rolls
- Technologies: triangulation, time-of-flight, ultrasonic, 2D camera

Colour, contrast & luminescence
from Page 34

- Detection and differentiation of coloured parts
- Detection of colour marks
- Inspection of self-lighting components such as LEDs or displays
- Printed mark detection
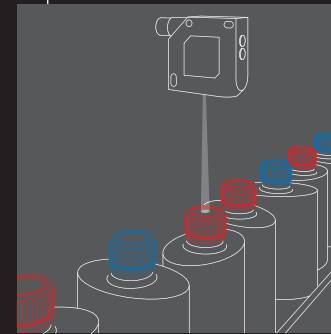
Identification
from Page 36

- Product labelling
- Product identification
- Automated product tracking
- Product picking
- Quality assurance, determination of quality parameters
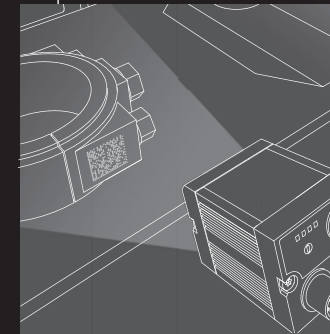
Applications for the solar sector
from Page 37

- Position and edge damage inspection
- Wafer dimensions
- Code reading on solar cells
- Checking projections on wafer boxes
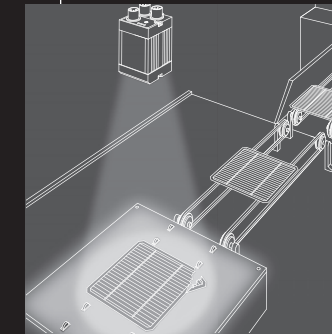
Transparent objects
from Page 38

- Detection of transparent objects of all types: glass, foils, PET
- Detection of objects of all shapes: flat glass, bottles
- Presence of objects
- Precise front-edge detection

3

From practical experience, for practical use.
As versatile and varied as our sensors are, they have this in common: they are all extremely reliable. Because during development of our products we not only aim for the maximum that is feasibly possible, but also for innovative and solid solutions that can cope with the demands of daily practice.

There is nobody in sight, everything is moving as if by magic: transport belts rattle; robot arms whirl; workpieces are individualised, picked up and set down again, further transported on belts, put together to create assemblies. Sensors from SensoPart ensure that all these processes run smoothly and without human intervention – we offer the appropriate sensor type for every task in the process.

In the area of optoelectronics alone there is an enormous and comprehensive variety of sensors: whether through-beam photoelectric sensors, proximity sensors with background suppression, colour sensors, code readers, fibre-optic sensors, fork sensors, sub-miniature sensors, glass photoelectric sensors or ultraviolet sensors, with laser light or LED, in cuboid or metric housings – every housing and every technology has its specific strengths and areas of application.

Our switching sensors cover numerous standard industrial applications such as monitoring presence and completeness, distance and position determination, colour and mark detection, as well as customer-specific requirements in a great variety of sectors. Our vision sensors and systems detect complex objects or fluorescent colours, decipher data matrix codes, and detect crooked bottle tops or the broken edges of solar cells.

On the following pages we present a small selection of what our sensors can do for you. Contact us if your application is not included: we are certain that we will find the right solution for your process, too!
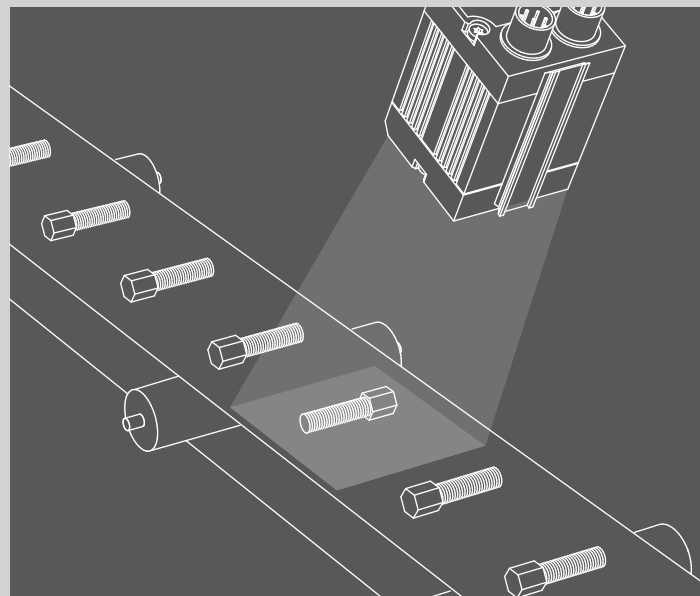
VISOR® Solar sensor for position and edge-break detection.
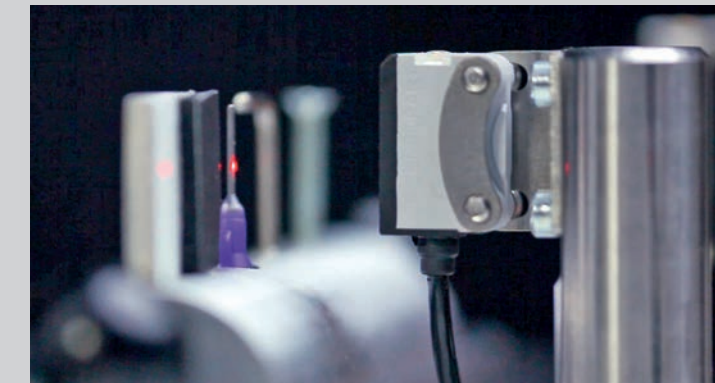
Small-part detection with the world's smallest laser scanner: FT 10.

Object detection

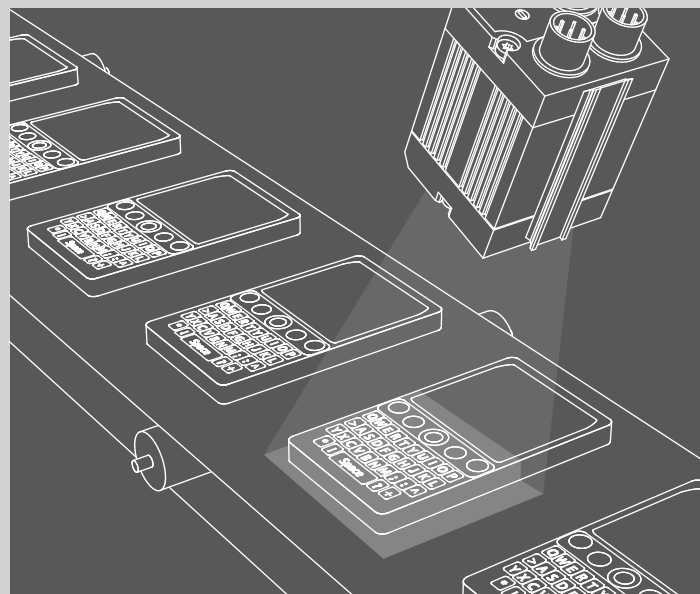Checking presence, inspecting completeness, counting and sorting

Is the object present? How is it lying on the belt? Is a detail missing or is it wrongly mounted? These and other applications can be reliably automated with sensors from SensoPart. For object detection tasks we recommend, for example, the use of photoelectric sensors or proximity sensors of the **F 10**, **F 25** or **F 55** series, or one of the fibre-optic cable sensors from the **FL 70** series. And our vision sensors in the **VISOR®** series are a good choice for checking the completeness of complex objects.

Checking filling levels and the correct sit of bottle tops
Page 74

In a single pass, the **Eyesight vision system** checks whether the bottles have been filled to the correct level and whether the caps are sitting straight
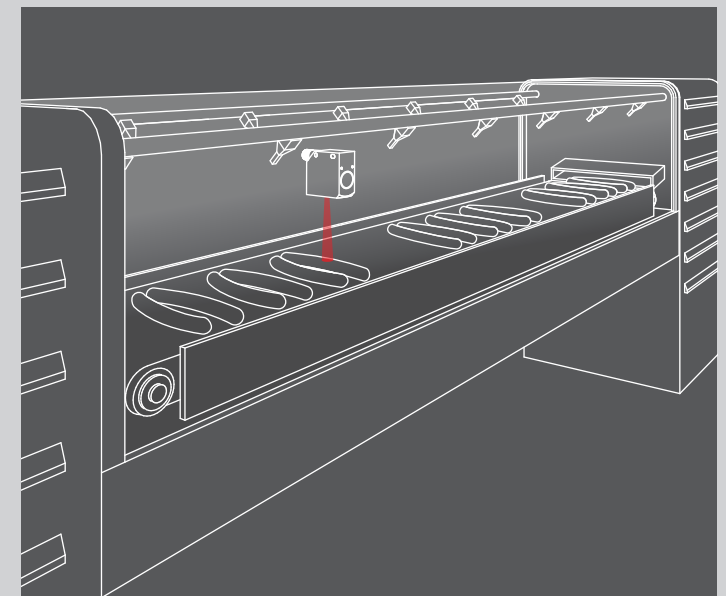- Universally applicable stand-alone image processing system
- Rapid graphic parameterisation via drag & drop
- Comprehensive functions library with numerous image-processing tools
- Complex, iterative linkage of individual inspections
- Free definition of output data
- Easy and rapid commissioning

Feeding of small parts in correct alignment
Page 52

On the basis of a pattern comparison, a **VISOR® object sensor** detects whether the parts have been supplied in the correct orientation.
- Highly precise determination of orientation (X-/Y-position and orientation)
- Comprehensible configuration software with user guidance and online Help
- Viewer software with hierarchical user rights
- Image recorder for simulation of the application without a sensor

Detection of food before packaging
Page 254

With its tightly sealed stainless steel housing, the **FT 55-RHM laser scanner with background suppression** is suitable for applications in hygienically sensitive areas.
- Object detection almost completely colour-independent due to distance principle
- Reliable detection with differing backgrounds
- Bright light spot, also visible in daylight
- Robust, tightly sealed housing (IP 69K) with Ecolab approval
- Resistant towards chemicals and high temperatures
- Smooth housing surface for easy cleaning

Inspecting completeness of a mobile phone keyboard
Page 52

A **VISOR® object sensor** inspects whether all the keys are present on a mobile phone and mounted in the correct positions.
- Powerful part finding and tracking (five detectors plus position tracking)
- Simultaneous inspection of several object features
- Comprehensive logic functions
- 6 configurable result outputs
- Comprehensible, multi-lingual configuration software with user guidance and online Help

Checking the presence of small parts on a vibrating feeder
Page 398

An **FL 70 fibre-optic sensor** registers the presence of workpieces at the end of the feed section.
- Extremely precise switching behaviour
- Simple teach-in with support from display
- Very good small-part detection through the use of focused fibre-optic cable
- Wide, individual range of fibre-optic cables for differing tasks
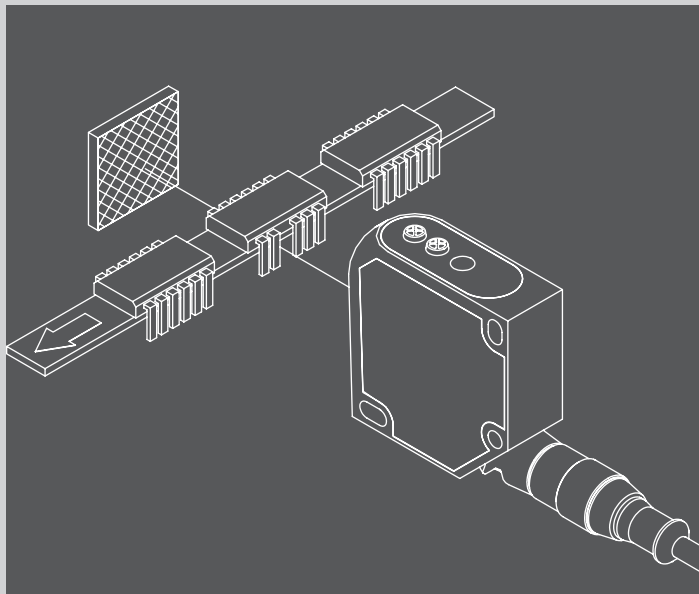- Flexible fibre-optic cable arrangement

Object detection

Checking presence, inspecting completeness, counting and sorting

SENSOPART
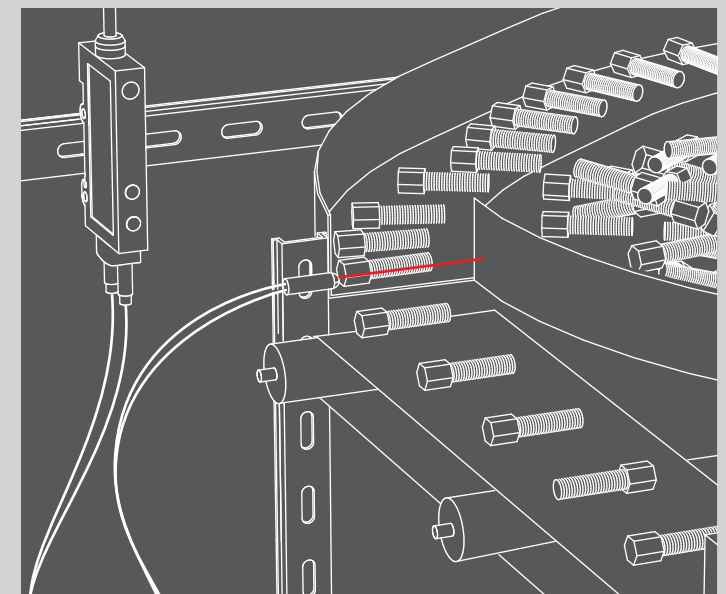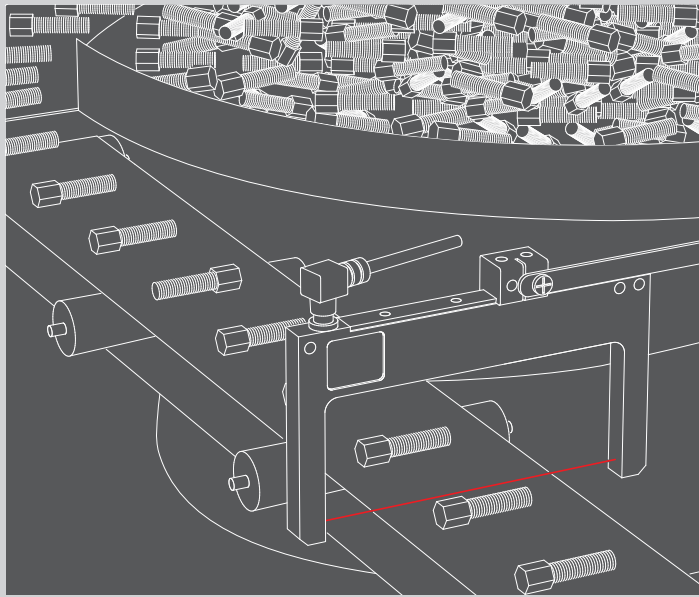
Counting parts on a vibrating feeder
Page 492

An **FGL fork sensor** monitors whether the feed section is completely occupied with workpieces and, if necessary, stops the transport belt.
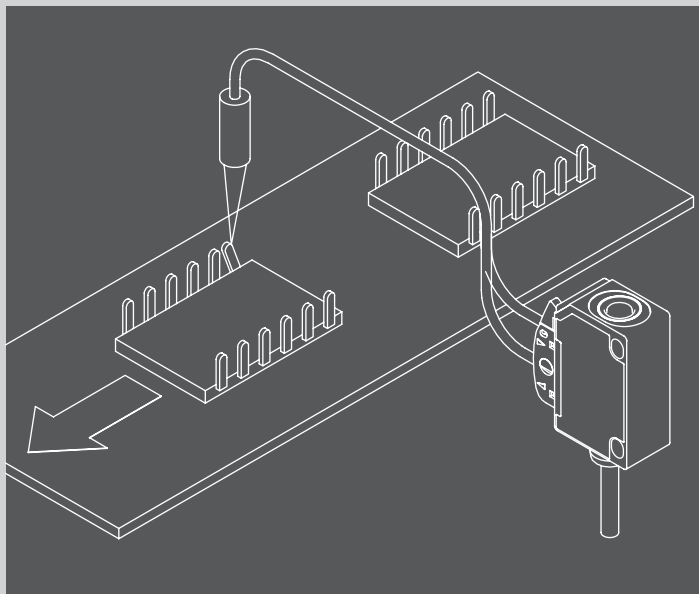- Small-part detection down to 0.2 mm
- High switching frequency for rapid conveyor processes
- Vibration-proof plastic housings
- Wide variety of mounting possibilities for economical, easy mounting
- Status LEDs with all-round visibility on fork ends
- Sensitivity adjustment via teach-in

Checking lids
Page 216

Lids lying the wrong way round are reliably detected with the **FT 25-RLH laser photoelectric proximity sensor** thanks to background suppression that works on the distance principle.
- Minimum height differences are detected
- Largely independent of object surfaces and colours
- Easy teach-in
- No impairment from highly reflective or moving backgrounds
- Most accurate small-part detection thanks to innovative laser technology (Laser Class 1)
- Versatile mounting possibilities

3

Counting plug pins
Page 262

The precise **FR 55-RL laser retroreflective photoelectric sensor** detects pins even with very small diameters.
- Reliable small-part detection thanks to fine laser beam
- Laser Class 1, no risk for the human eye
- Sensitivity adjustment via teach-in or control line
- Dovetail designs and rotatable plug/cable connection for simple and flexible mounting

Diverting out uncoated parts
Page 226

Brightness differences can be reliably detected with the **FT 25-R diffuse photoelectric proximity sensor**.
- Detection of even the slightest of grey differences
- Long operating distances possible
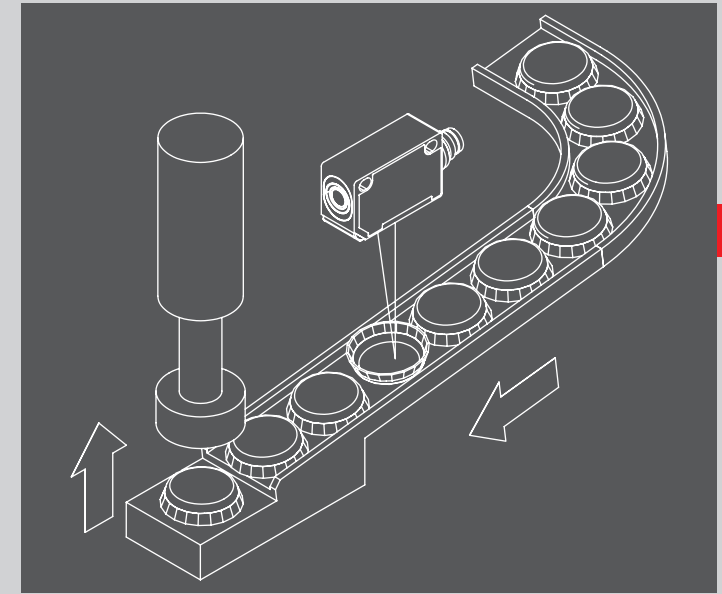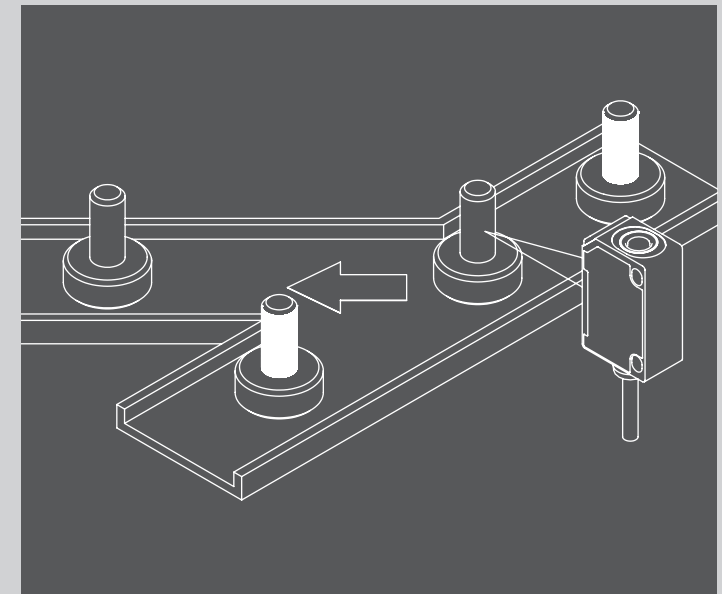- Simple teach-in

Detection of IC pins
Page 396

Even the smallest of objects, such as IC pins, can be reliably detected with the **FL 20 R fibre-optic sensor** as a result of its small light spot diameter.
- Amplifier easily integrated due to small housing
- Wide range of fibre-optic cables, covering numerous applications

Baggage distribution
Page 322

The **FR 50 R retroreflective photoelectric sensor** detects the arrival of a piece of luggage at the end of the belt.
- Reliable detection of objects regardless of their surfaces
- Long ranges and operating distances possible
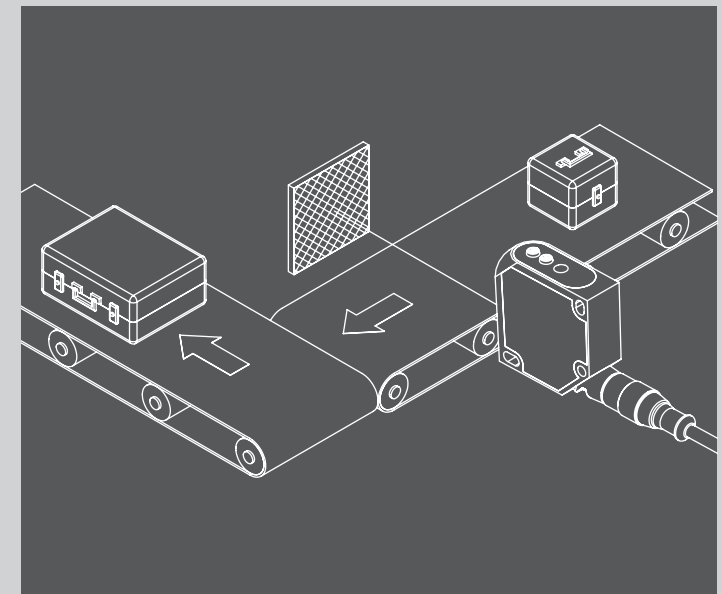
In order to be able to pick up a workpiece or component from a belt with a targeted robot gripper one has to know the exact position in advance. Our photoelectric proximity sensors with background suppression in the **FT 10** and **FT 25** series are ideally suited for such tasks. If, in a pick & place application, the X-/Y-position and orientation are also required, or if complex assemblies must be inspected for correct and complete assembly, we recommend our vision sensors in the **VISOR®** series, which can detect several features in a single pass.

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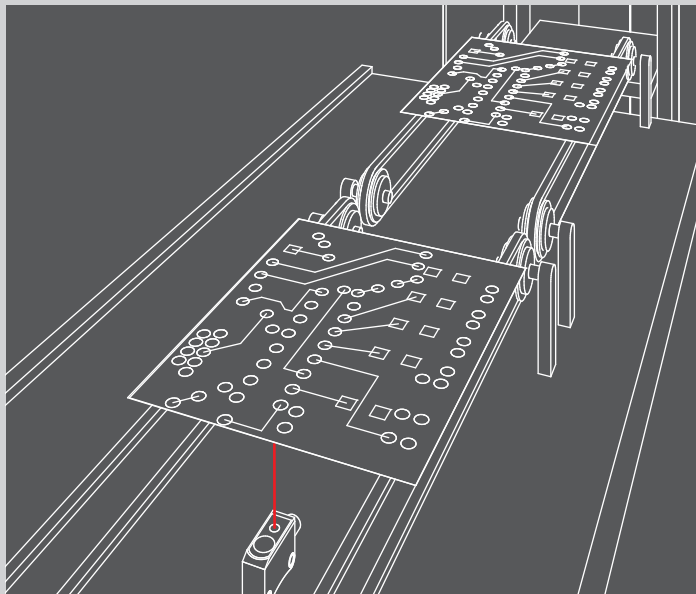
Precise circuit board front-edge detection
Page 202

The front edges of circuit boards are registered with the **FT 10-RLH sub-miniature sensor** with background suppression.
- Flexible mounting thanks to adjustable background suppression
- Reliable detection even with reflective metallic parts in the background
- Very low space requirement (dimensions only 21 x 14 x 8 mm^3)
- Precise switching behaviour due to small laser light spot (Laser Class 1)
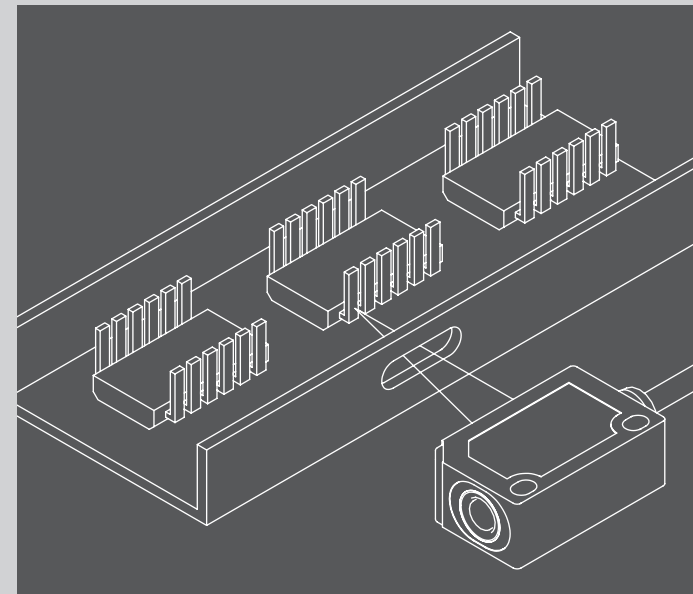
Monitoring IC pins
Page 216

The fine light beam of the **FT 25-RLH laser sensor** permits precise detection of even small objects
- Reliable even with highly reflective metal parts
- High scanning rate possible with high switching frequency
- Independent of object colour and surface
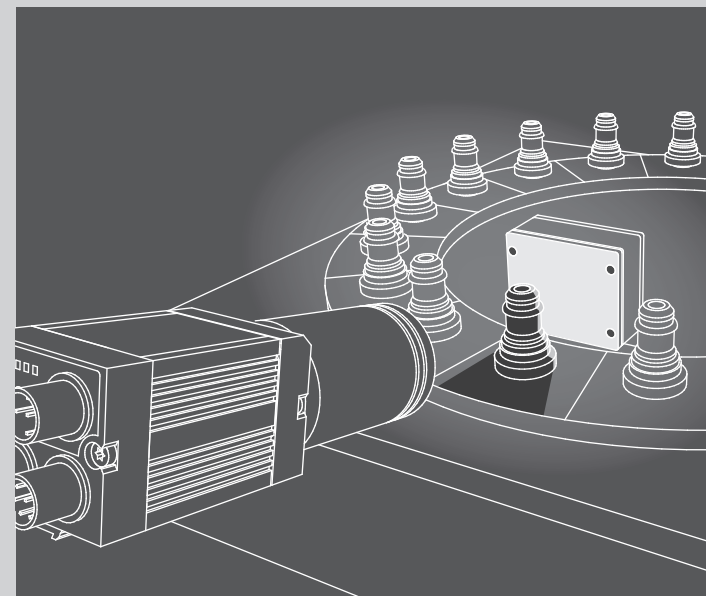- Backgrounds located very close to the object are reliably suppressed
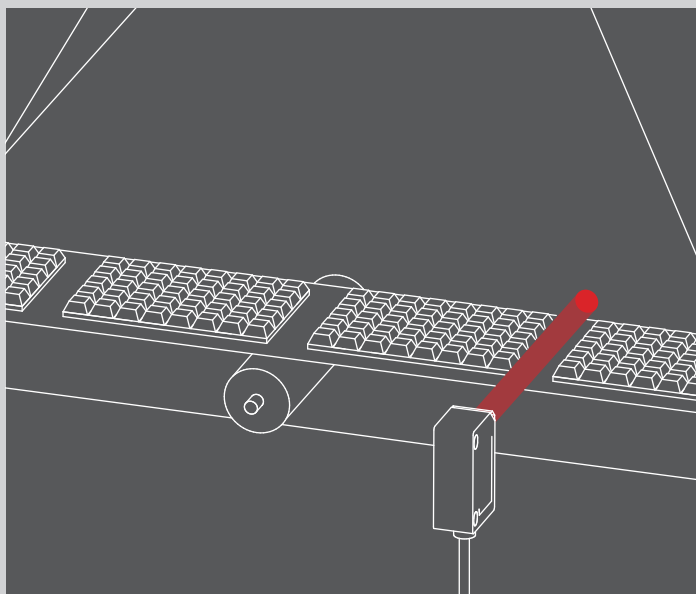
Object front-edge detection
Page 220

One **FT 25-RHD photoelectric proximity sensor** with background suppression detects the front edges of individualised chocolate bars.
- No impairment by highly reflective or moving backgrounds and transport belts
- High scanning distance with all common materials and surfaces
- Adjustable, precise background suppression (distance measurement principle)
- Simple scanning distance adjustment via teach-in
- Very easily visible light spot for simple alignment
- Wide range of different types and designs
- Also available as a laser version for highly precise detection tasks

Measurement

Measuring parts, monitoring sag, measuring thickness and distance
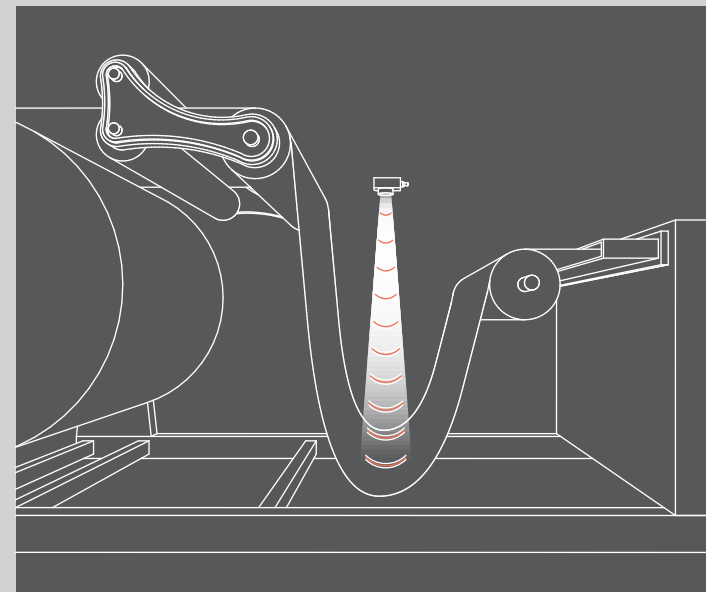
In many processes, similar values such as the distance or thickness of an object must be determined. In such applications, the laser distance sensors of the **FT 50 RLA** series (which operate using the triangulation principle), and the particularly far-sighted **FR 92** retroreflective photoelectric sensor (which measures distances of up to 250 m with an accuracy in the µm range by means of light time-of-flight technology), have proved useful. And our **Eyesight vision system**, with a function library of over 100 functions, is available for detailed inspections of dimensional accuracy.

Crane positioning with light time-of-flight distance sensors
Page 148

The **FR 92 distance sensor** measures the horizontal position of the jib on a gantry crane and thus improves collision prevention.
* Non-contact and robust light time-of-flight measurement instead of wear-prone mechanical distance determination
* Operating range of up to 250 m
* Various interfaces including SSI and RS 422
* High repeatability accuracy and high measurement rates

Measurement of turned parts on a rotary table
Page 74

Turned parts can be inspected for dimensional accuracy with the **Eyesight vision system**.
* Compact smart camera with C-mount lens and dirt protection tube
* Appropriate illumination (surface light) for a reliable solution
* Intuitive graphic user interface
* Comprehensive functions library with numerous image-processing tools
* Images and results visualised for users via Ethernet (ActiveX)

Dancer roll regulation and sag monitoring
Page 126

An **FT 50 RLA laser distance sensor** determines the position of the dancer roll and thus ensures even winding of the coil.
* Precise determination of dancer roll position for active traction force regulation of the web being wound
* Reliable detection regardless of the target object's surface properties
* Short response time for rapid processes
* Variety of measurement ranges for numerous tasks
* RS-485 interface and analogue output

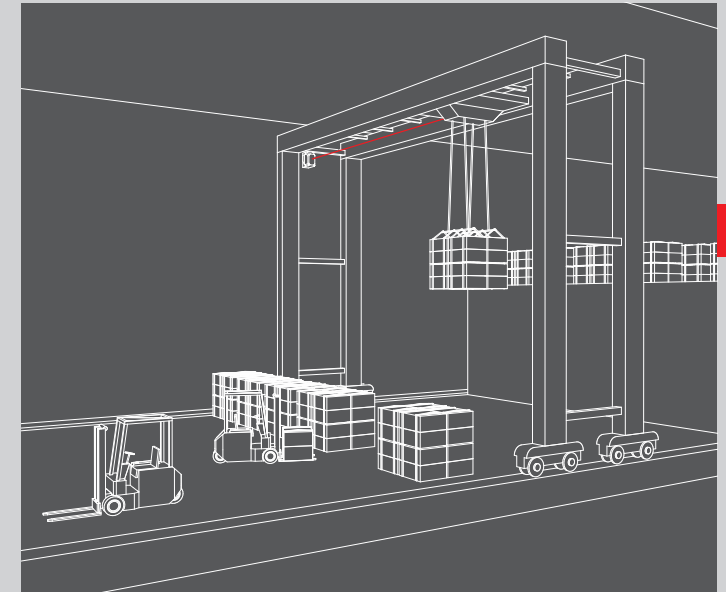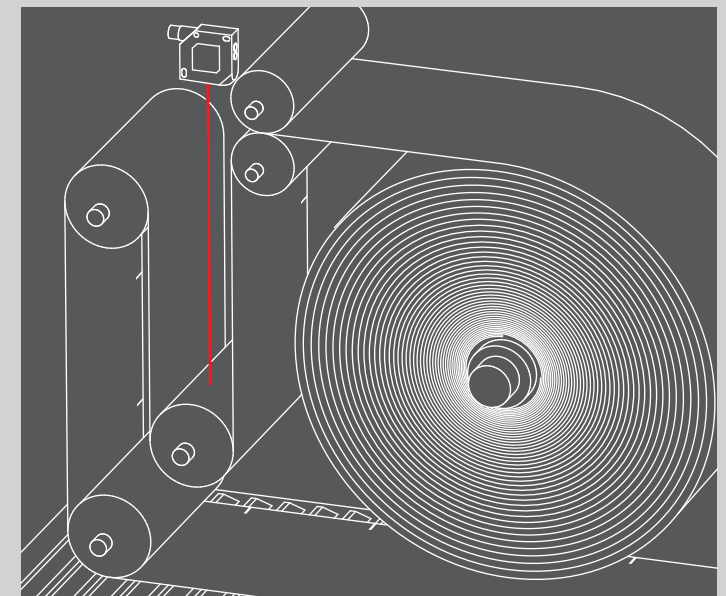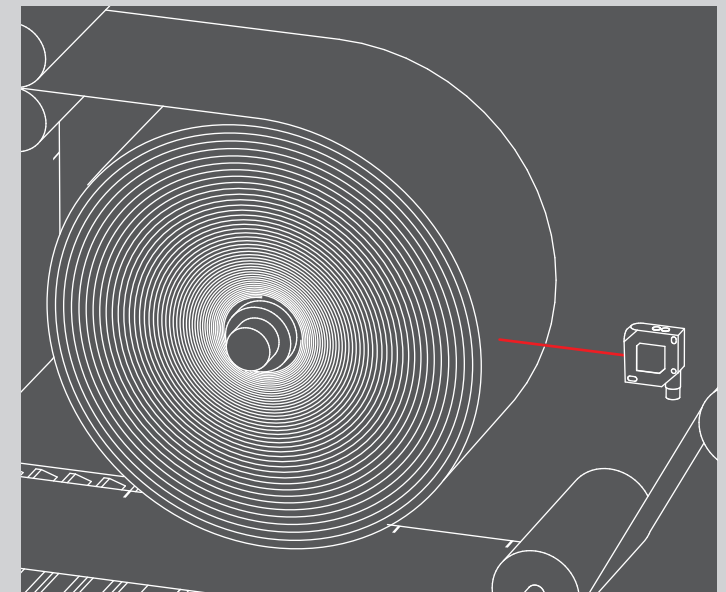### Monitoring the sag of carpets
Page 510

The **UT 20 ultrasonic sensor** checks the sag of textile floor coverings in order to ensure even winding.
* Highly accurate distance measurement
* Reliable operation on all surfaces: textiles, paper, foils (also transparent)
* Product range with analogue and switching outputs
* Very small housing for simple installation even when space is limited

Determining coil thickness on a packaging machine
Page 126

An **FT 50 RLA laser distance sensor** measures the distance to the coil surface in order to activate roll changes.
* Small housing for easy integration
* High accuracy regardless of target object's surface properties
* Short response time
* Programmable switching outputs

Colour, contrast and luminescence

Checking presence of coloured objects, printed mark detection, inspecting LEDs

Most sensors are colour-blind, but not all: with the **FT 25**, **FT 50 C** and **FT 50 UV** series, SensoPart offers special sensors for detecting colours, grey values and even invisible luminescent marks. Whereby either the colour or grey values of the target object or attached colour marks or labels can be evaluated. The **VISOR®** colour sensor, which can even detect self-lighting objects such as LEDs, is particularly versatile.

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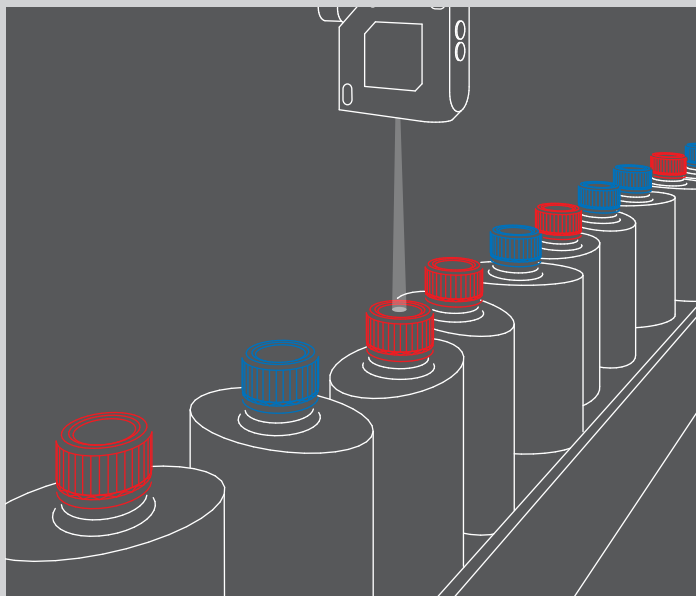
Detection of coloured bottle tops in a filling plant
Page 168

An **FT 50 C white-light colour sensor** checks whether the bottle tops are correct on the basis of their colour.
- High colour selectivity, independent of scanning distance fluctuations
- Reliable colour detection with tops made of metal or plastic
- Very reliable, even with wobbling or vibrating bottles and objects
- Teach-in of individual colours or scanning-in of colour ranges
- Available with three different light-spot geometries
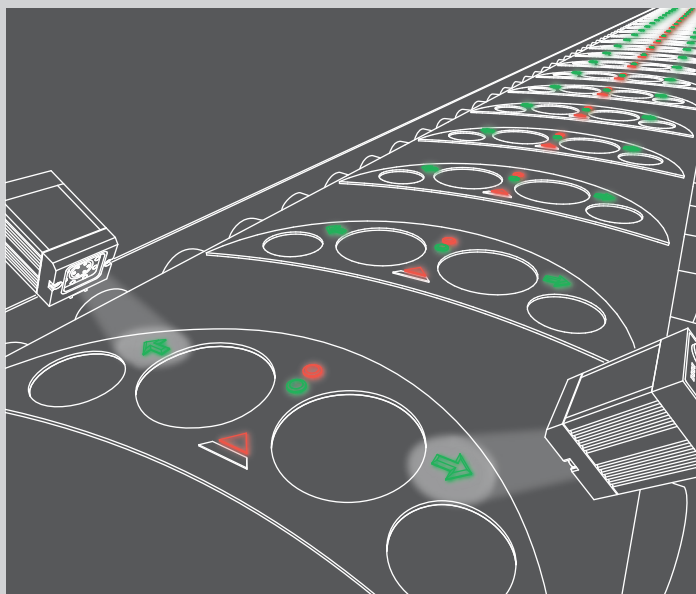
Inspecting LEDs in car production
Page 162

A **VISOR® colour sensor** inspects the correct colour of LEDs installed in dashboards.
- Application-specific pre-configured vision sensor
- Detection of active (i.e. self-lighting) colours as well as "non-colours" (white, grey, black)
- High detection accuracy, even with very slight colour nuances
- Simple alignment with user-friendly configuration software
- Image recorder for offline simulation without sensor
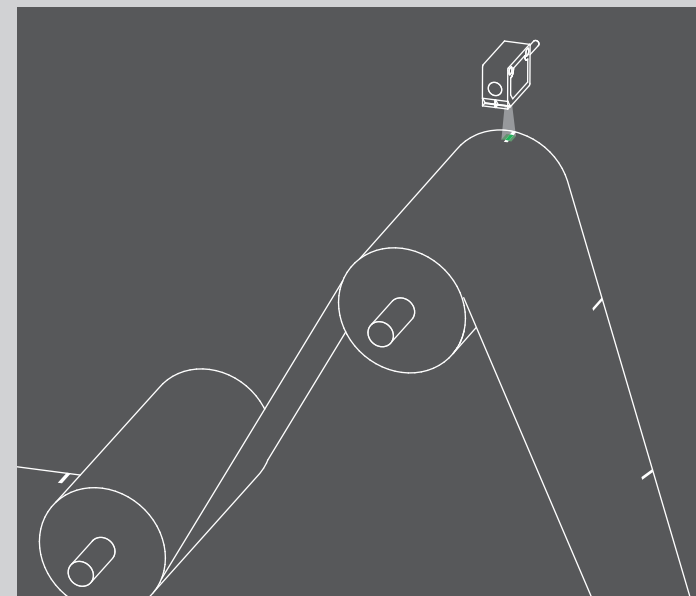
Printed mark detection on endless packaging
Page 182

The cutting position is determined on the basis of printed marks detected using an **FT 25-RGB contrast scanner**.
- Resolution of 30 contrast levels
- Reflective foils are also reliably detected
- Unaffected by vibrations or flapping material
- High switching frequency for maximum positioning accuracy
- Comfortable teach-in operation, with feedback of signal/contrast quality
- Very small housing
- Automatic selection of the ideal transmission colour for the taught-in contrast
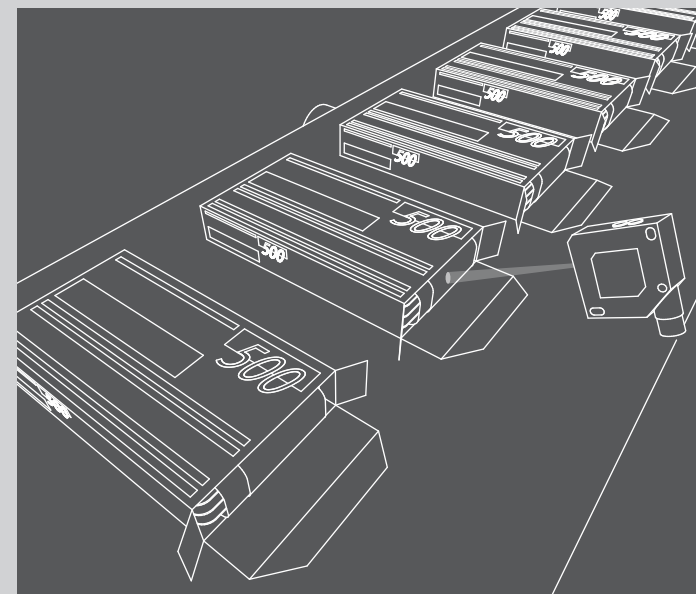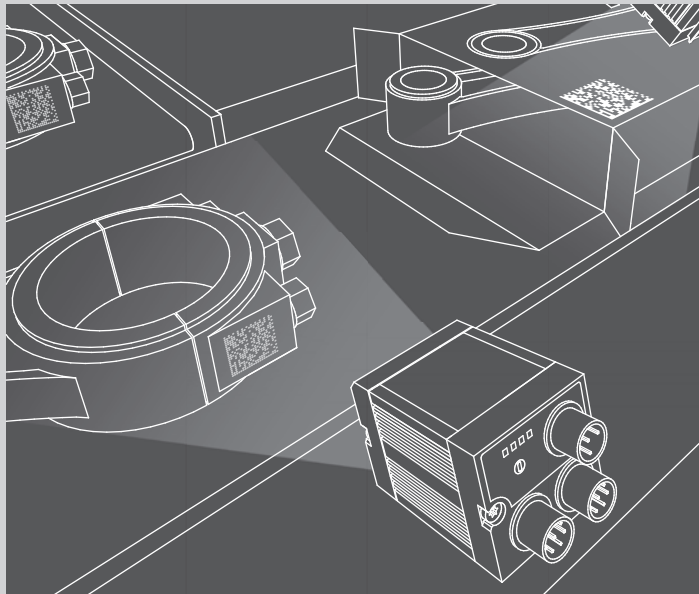

Checking the presence of package inserts
Page 190

An **FT 50 C-UV luminescence sensor** detects the package inserts in the medical package. Whereby it uses the luminescent properties of the paper for reliable detection.
- Extremely reliable detection at varying distances between sensor and target object using a patented sensor concept
- Also suitable for narrow packages thanks to small light spot
- Small, compact housing (dimensions just 50 × 50 × 17 mm³)
- Reliable suppression of luminescence in the background of the target object

Identification

Reading of bar codes and data matrix codes, OCR, tracking of components

Applications in the solar sector

## Positioning, detecting edge breaks, front-edge detection and checking for projections

The unbroken tracking of parts and products plays an increasingly important role in industrial processes. This is why parts are provided with one- or two-dimensional codes that are either attached using labels or directly placed on the part by means of dot peening or laser (direct marking). Our code readers in the VISOR® series read bar codes and data matrix codes of numerous types. Even extremely small printing or marked codes on difficult substrates (wrinkled, reflective, rough) can be reliably detected using a variety of optical and illumination variants.

SensoPart has developed customised automation solutions for the photovoltaic industry. These include, for example, monitoring the positions and broken edges of solar wafers and cells in handling areas, as well as the unbroken tracking of crystalline and thin-layer solar cells via directly marked data matrix codes. In addition to switching sensors, application-specific solar sensors from the VISOR® series are used for these applications.

3

Evaluation of printed and directly marked codes
Page 94

A **VISOR® Code Reader** checks both the dot-peened data matrix code on a die-cast part and the code printed on the corresponding packaging.
- For all conventional 2D data matrix codes and 1D bar codes
- Optimum cost-effectiveness due to the combination of code reading and object detection in a single device
- High operational reliability thanks to reliable detection of even poorly legible codes
- Flexible and simple integration in PC and PLC environments
- Very high flexibility, e.g. reading of several similar or differing codes types in a single read process
- Reading of optical characters with OCR
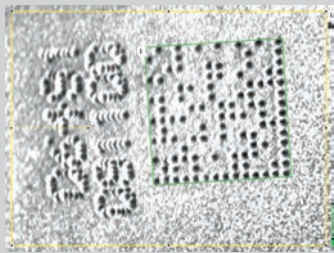
Dot-peened code on rough substrate
This is made readable by means of powerful algorithms. The dot-peened imprint in optical characters can be checked for presence using object detection.

Code with low contrast
This is made readable by the high tolerance to weakly contrasting codes.
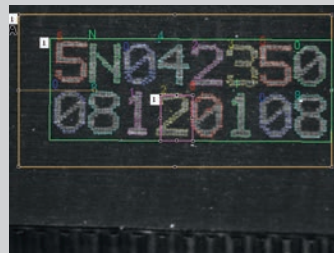
Reading optical characters
Dotted fonts can also be read with OCR.
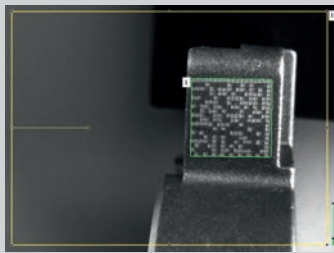
Code with small "quiet zone"
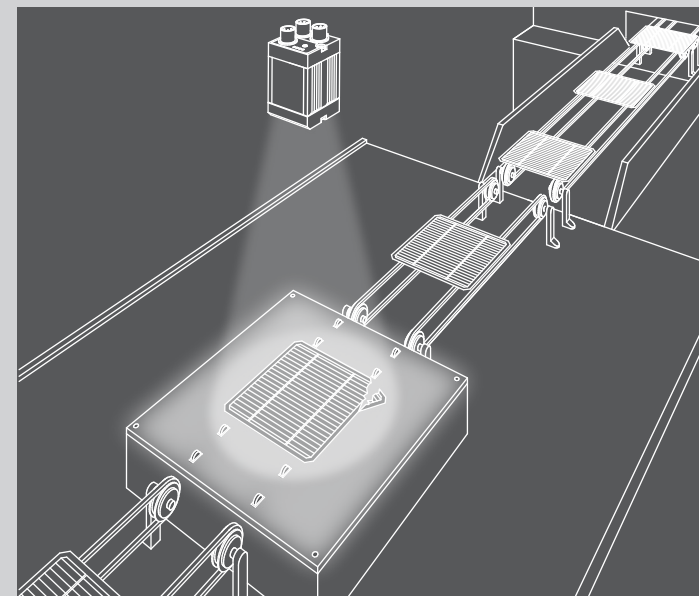Even codes with a small quiet zone or damaged finder pattern can be read.

Code reading on solar cells
Even extremely small codes, such as those on silicon solar cells, or highly reflective codes, e.g. on thin-layer solar cells, can be read.

Printed codes on pharmaceutical packaging
It is possible to search for both ECC200 or bar codes (e.g. EAN 13) simultaneously. In addition to code reading, the presence of optical characters can be inspected using object detection.

Monitoring the positions and broken edges of solar wafers
Page 66

VISOR® Solar sensors check the correct position of the wafer and detect any broken edges during various phases of solar cell production.
- Precise detection of position and orientation of wafers and cells
- Breakage detection regardless of type of wafer or cell
- Edges monitored with sub-pixel accuracy
- Simple integration in just a few steps
- No background suppression necessary
- Measurement of wafers
- Position and orientation of busbars
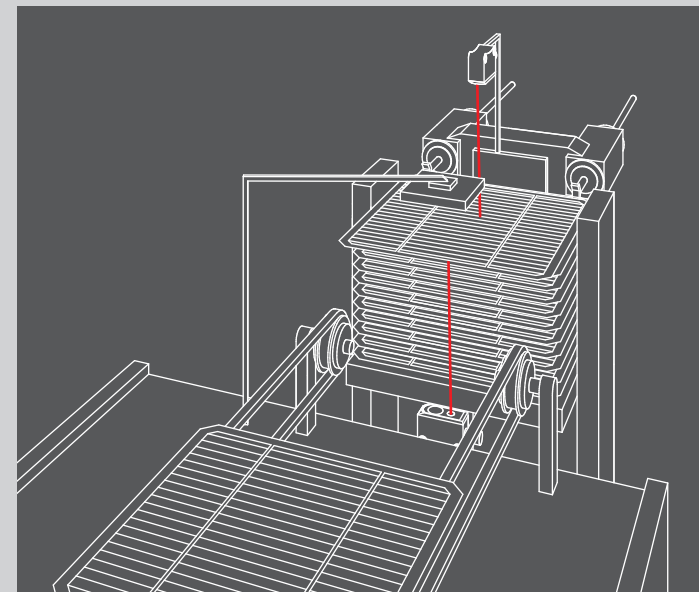
Checking for projections on wafer boxes
Page 208 / Page 124

An **FR 10 sub-miniature retroreflective photoelectric sensor** detects projecting wafers or cells in wafer boxes.
- Bright, precise light spot for accurate switching behaviour and easy alignment
- Sub-miniature housing for installation in the smallest of spaces (dimensions only $21 \times 14 \times 8$ mm^3)
- Reliable and precise height detection and determination with the **FT 50 RLA distance sensor**

Transparent objects

Checking presence of bottles, foils and small transparent parts

Transparent objects pose special challenges for sensors because their low absorption rates require very high switching sensitivity and accuracy. SensoPart offers special retroreflective photoelectric sensors **(FR 25-RGO)** as well as ultrasonic sensors (**UT 20, UT 20 Soundpipe, UMT 30** and cylindrical housings) for the reliable detection of such objects. This permits the reliable detection of transparent objects of any shape, and made of any material.

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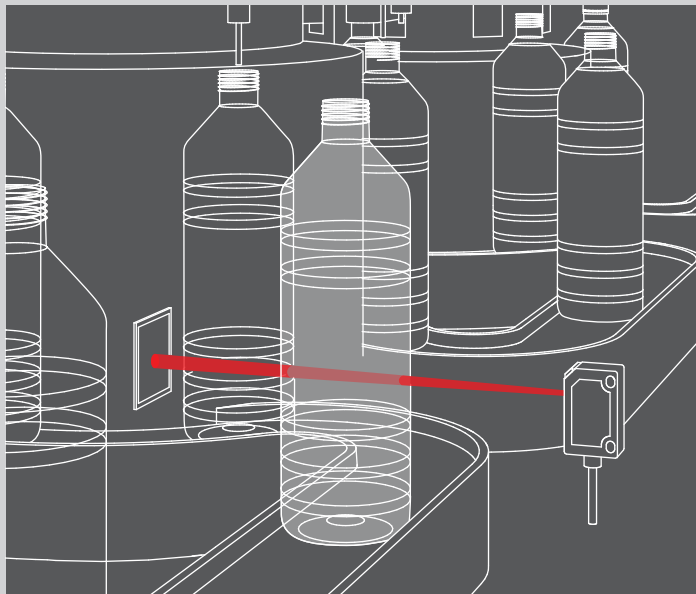
Checking the presence of bottles in a filling plant
Page 228

The **FR 25-RGO retroreflective photoelectric sensor** detects transparent bottles in a filling plant.
- Reliable detection of glass and transparent plastic using the autocollimation principle
- Reliable detection of any bottle diameters and objects, e.g. small ampoules in the pharmaceutical industry
- Trouble-free flat glass and foil detection
- Operating range of up to 2 m, reliable detection from range of 0 mm
- DELTA function: automatic adaptation of the sensor to changing ambient conditions

More applications:
Page 506

UT 20 Soundpipe ultrasonic sensors in cuboid housings and the **UMT 30 ultrasonic sensor** reliably detect transparent objects in various industrial sectors.
- Reliable detection of ampoules in the pharmaceutical industry
- Dependable monitoring of blister packages for tablets
- Reliable detection of transparent foils in the print industry
- Control of pallet packaging plants with transparent stretch foil