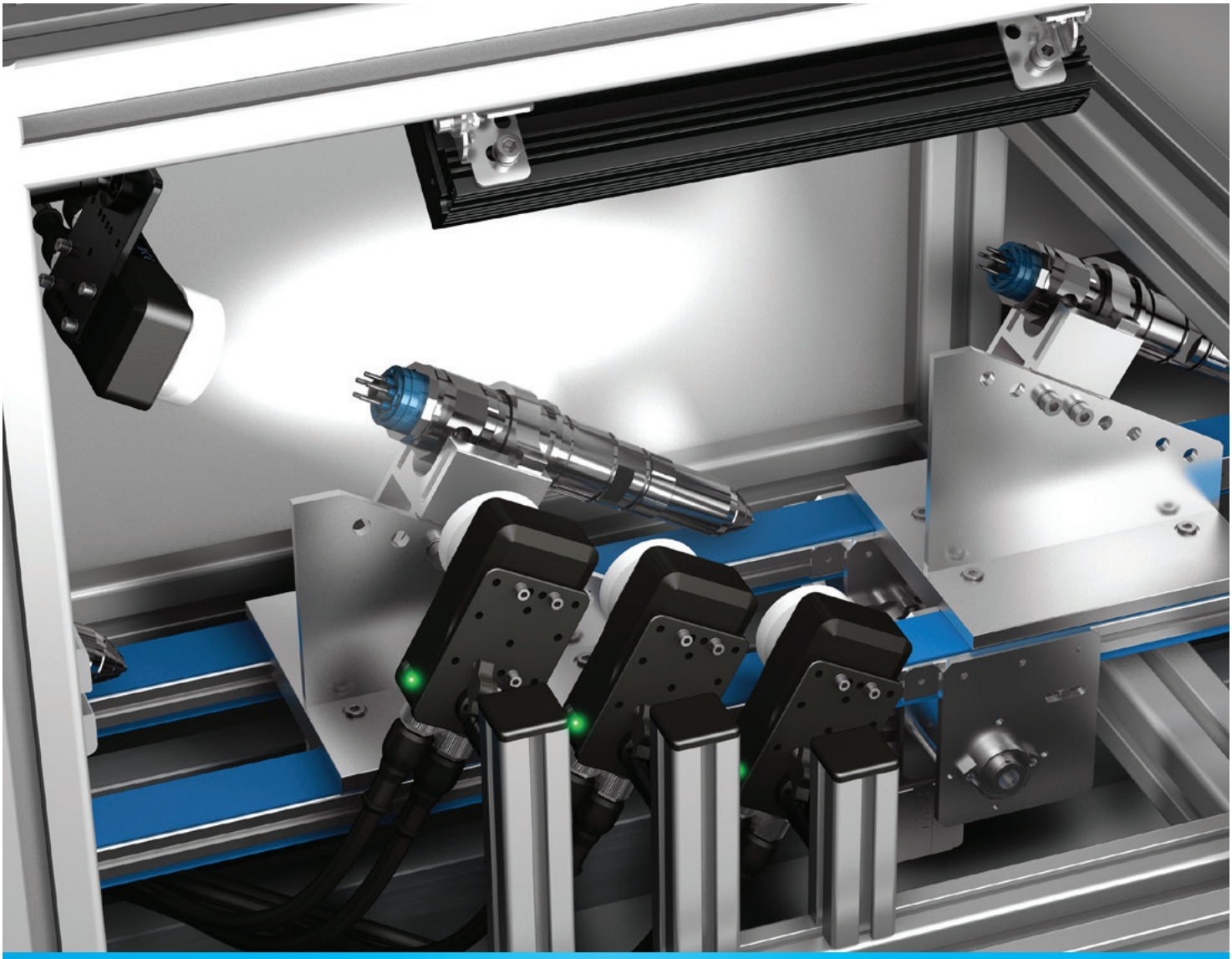


QUALITY INSPECTION

di-soric

WELCOME
TO DI-SORIC

Over 40 years of experience in the development and production of solutions for industrial automation

- **100% owner-managed**
- **Headquarters**
  Urbach, Germany
- **Technology and production center**
  Lüdenscheid, Germany
- **Representatives and branch offices**
  in more than 40 countries
- **Certifications**
  IQNet, DQS - ISO 9001:2015, UL, RoHS

For over 40 years, di-soric GmbH & Co. KG has been producing and selling sensors featuring a wide variety of technologies. These sensors are used in industrial automation – primarily in assembly and handling technology, in the automotive, electronics and pharmaceutical industries and in packaging technology. Other important cornerstones of our product range are innovative vision sensors and code readers, high-quality LED lighting for machines and image processing, and products from the segment of safety technology.

Our own ambition is to benefit you. When we develop products and solutions to handle your tasks, we alway strive to make them both as simple and as practical as possible.

We draw upon our high level of technical know-how and a clear view of the developments of tomorrow to support our customers – today and in the future – with precise, non-disruptive and efficient production processes.

OUR PROMISE TO YOU:

SOLUTIONS.

To us, finding solutions means:

- Targeted consultation and technical expertise for efficient product solutions
- A very broad, high-performance product range

CLEVER.

To us, being clever means:

- Developing products with clear benefits
- Products that are easy to use thanks to clever functions
- Joint dialog for the most efficient and most suitable solution

PRACTICAL.

To us, being practical means:

- Solution expertise with the best possible functionality at affordable prices
- Cooperative and straightforward working relationships for mutual success
- Focus on the key issues for greater efficiency

OPTIMAL QUALITY INSPECTION WITH DI-SORIC

Quality assurance is a crucial process step for all modern production systems.

Availability and low pseudo-waste when checking qualitative requirements are highly significant here. Quality inspection systems are used for a wide variety of applications such as the production of single parts, the assembly of components as well as the inspection of finished products before packaging (end of line).

The processes for checking the presence of components, checking the correct mounting position or even checking whether or not parts are undamaged are all performed with high accuracy and availability guaranteed.

di-soric offers a wide-ranging portfolio of high-performance sensors based on various technologies with innovative interfaces, all of which offering you enhanced added value.

Application requirements for the selection of the optimal sensor

- Type of inspection
- Component size
- Working distance
- Resolution
- Ambient light
- Cycle time
- Communication interface

Inspections for quality assurance

FLEXIBLE SOLUTIONS FOR AUTOMATED QUALITY INSPECTION

di-soric makes various sensors and lighting that can make a decisive contribution to the overall efficiency of your production process: They directly indicate quality fluctuations and ensure that only those products manufactured within the defined parameters are further processed or packaged.

Machine Vision Sensors

CS-60 Vision Sensor

- High-quality, precise 2D image of the field of view
- Simple localization, detection, counting and measuring of structures in the image
- High-performance reading of ID codes (printed, directly marked (DPM))
- Transfer of results and images via various interfaces

PS-30 Profile Sensor

- Reliable comparison of the taught reference profile with the live profile of the inspection object
- Accurate position transfer in mm through calibration of the sensor
- Distinction accuracy of 0.5 mm
- Measurement values and additional data via IO-Link

Working distance, depth of field on the inspection object, resolution of the inspection object and the size of the field of view play a decisive role in a successful solution (see page 26). Our Machine Vision Sensors offer you the necessary flexibility to meet these requirements.

Handheld ID Readers

ID-200 Hammer Handheld Reader

- Durable and a safe investment
- Fast and reliable decoding
- Outstanding DPM code decoding
- Reads every kind of 1D and 2D codes
- Can be set up / used for ESD-sensitive applications (using ESD-compatible accessories)

ID-100 Advanced Handheld Reader

- Fast and reliable decoding
- Outstanding DPM code decoding
- Reads every kind of 1D and 2D codes
- Clear reading feedback
- Flexible data processing

When data needs to be read fast, reliably and flexibly, the ID handheld systems from di-soric are the first choice – from the lightest to the extremely robust reader made of aluminum. The automatic scanners read and decode 1D and 2D codes in any process environment for an accelerated, stable process.

Lighting for industrial image processing

BE-F Area lights

Area lighting is optimally suited for illuminating backgrounds and checking contours and therefore for a camera top view for contour detection of countless objects for which contours must be monitored. The BE-F is available in all application-relevant color temperatures and can be used for objects with sizes from 30 x 30 mm^2 to 200 x 200 mm^2.

BE-B Barlights

Joist lighting systems are used for a light-intense, homogeneous barlight of the objects examined in the most varied applications for surface and outline detection. The BE-B is available in lengths from 100 mm up to 500 mm, as well as all application-relevant color temperatures.

These lighting systems are used for contrast amplification in image-processing applications. The product range includes solutions for an extremely wide range of lighting scenarios, including area, bar, spot, ring, coaxial, dark field and dome lighting systems.

BE-R
Ringlights

Ringlights ensure shadow-free illumination of the objects examined. They create symmetrical light around the camera lens and are used for surface and outline detection. The BE-R is available with various beam angles, in all application-relevant color temperatures and with installed diffusers and polarizers.

BE-D
Dark field lights

Dark field lights are used to increase contrast in case of surface defects, while the coupling of light is performed transversely to the camera's line of sight. They are available in all relevant color temperatures and are distinguished by features such as trigger inversion and brightness adjustment.

BE-P
Spotlights

Spotlights accentuate the objects examined in a targeted manner. They are perfectly suited for confined installation spaces in the most varied applications for surface and contour detection. Our BE-P spotlight is available with various beam angles and in all application-relevant color temperatures.

The products are distinguished by various color temperatures, a high IP protection class, load-free trigger and trigger inversion.

Optical distance sensors

LAT-52 Compact

- Measuring range 30 – 500 mm
- For precise distance measurement
- Universal through 3 measuring ranges
- Sensor modes, filters for optimal measuring results
- Operation using keys or via IO-Link

LVHT-52 Compact

- Measuring range 50 – 500 mm
- For precise distance detection
- Compact, large measuring range
- Foreground and background suppression
- Operation using keys or via IO-Link

LAT-61 Precise

- Measuring range 26 – 180 mm
- For highly precise, quick measurements
- Resolution in the micrometer range
- Up to 5,000 measurements per second
- Operation with keys and display

Our optical distance sensors measure distances quickly and precisely with a red light laser. Thanks to the metallic housing, all sensors are very robust. They offer a wide bandwidth of measuring ranges and ranges of up to 10 m, and resolutions into the micrometer range.

Color sensors

FS-100 Advanced

- 100 internal color memory
- For differentiating the smallest color nuances
- Fast, short activation time
- Fiber optic connection
- With PC software
- With interface, optional with fieldbus

FS-50 Extended

- Up to 100 internal color memory
- For differentiating the smallest color nuances
- Fast, short activation time
- Fiber optic connection or fixed optics
- Optional with PC software

FS-10 Compact

- 1 internal color memory
- For differentiating small color nuances
- Fiber optic connection
- Intuitive button operation

FS-Z Accessories color sensors

- Optimized fiber optics for color sensors with a fiber optic connection
- Durable, mechanically robust
- Sensor probe made of stainless steel
- Focus optics
- Connection technology

di-soric color sensors detect colors and compare them to 100 saved reference color values. Through their perceptive functioning, which is similar to the human eye, small differences can be detected precisely. This makes the use of the devices in the area of quality testing possible – even under industrial ambient conditions.

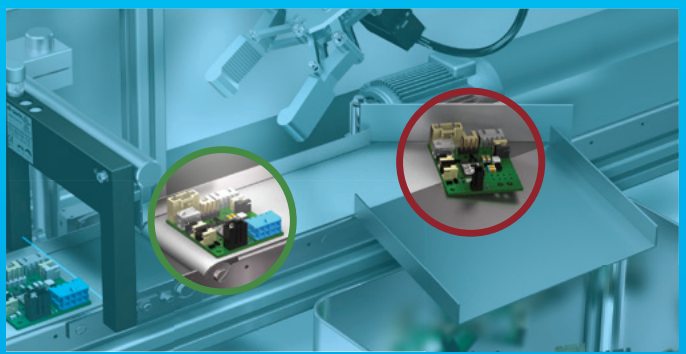
PRESENCE CHECK

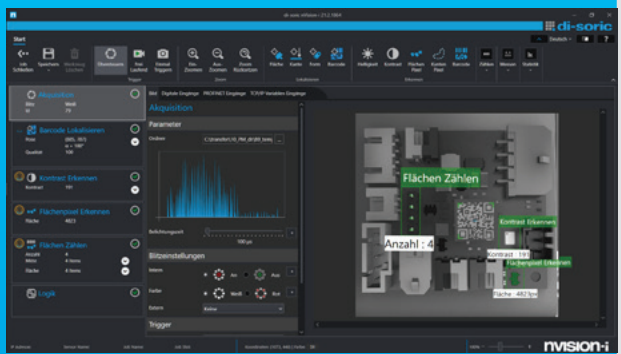
The presence check of components is a standard request for quality inspection in all industries. di-soric offers a portfolio of sensors with a wide variety of physical functional principles for a component presence check to always ensure secure processes. High ambient light immunity and reliable object detection are decisive in this situation.

Completeness inspection with the transfer of position to parts handling

The product quality and position is checked by the CS-60 at the interface to the next process step. Through its adaptation options relating to working distance and image field (changing lenses), as well as the internal high power illumination, the CS-60 delivers the depth of field required for the representation of the entire product characteristics in the inspection image. The robot is thus enabled to grasp safely.

Vision Sensor
CS-60

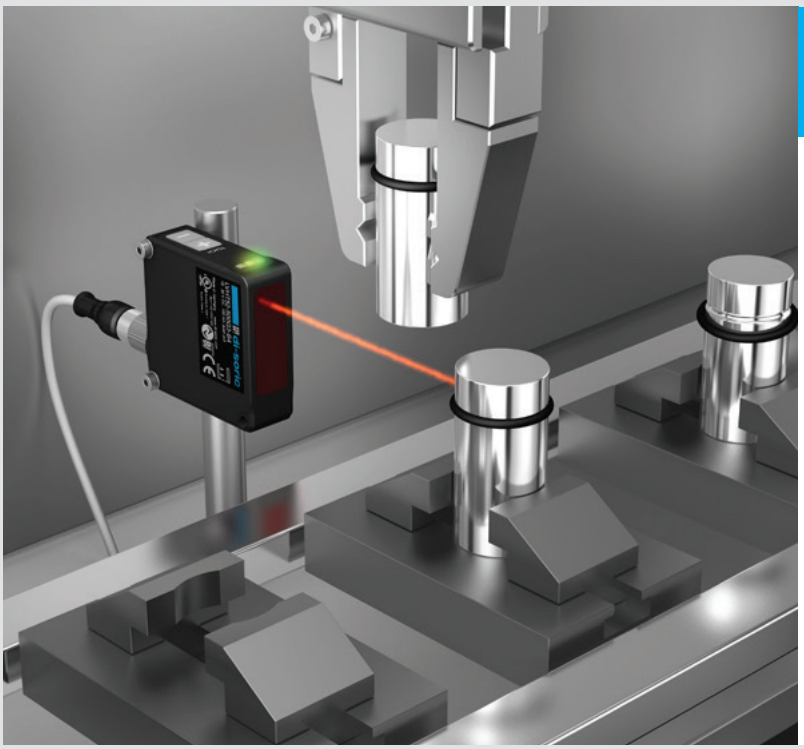




Another important feature of application solutions using the CS-60 is the easy configuration of the Vision Sensor. Our nVision-i software is our ace up our sleeve when it comes to this.

Its clearly structured user interface and simple, integrated inspection methods quickly lead to solution success.

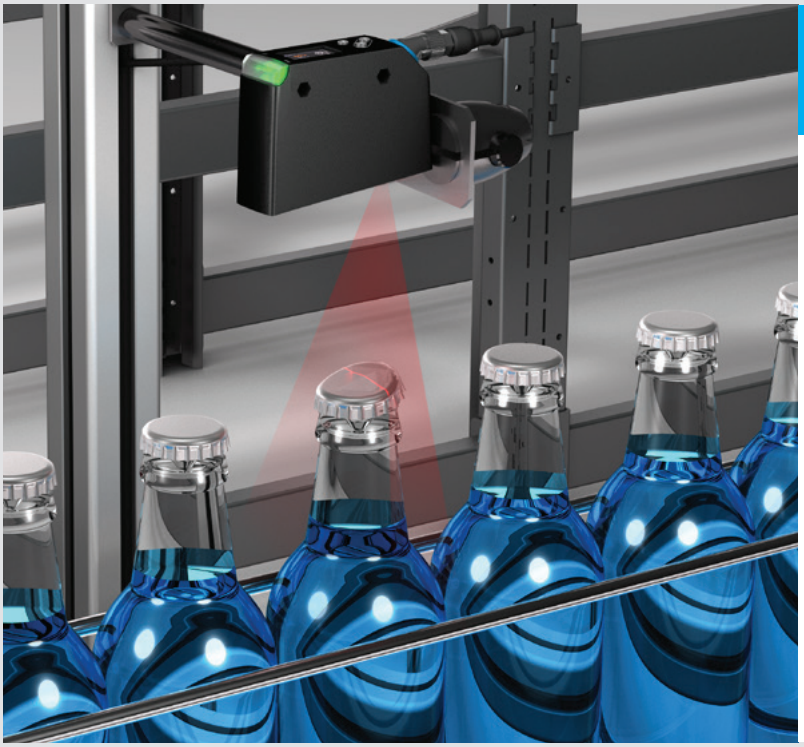
Our external lighting, which can further optimize the process stability in many applications, round off our sensor portfolio.



Presence check for O-ring

The LVHT-52 is versatile thanks its large detection range and safely detects the presence of an O-ring via the switching point precisely taught with the plus/ minus keys.

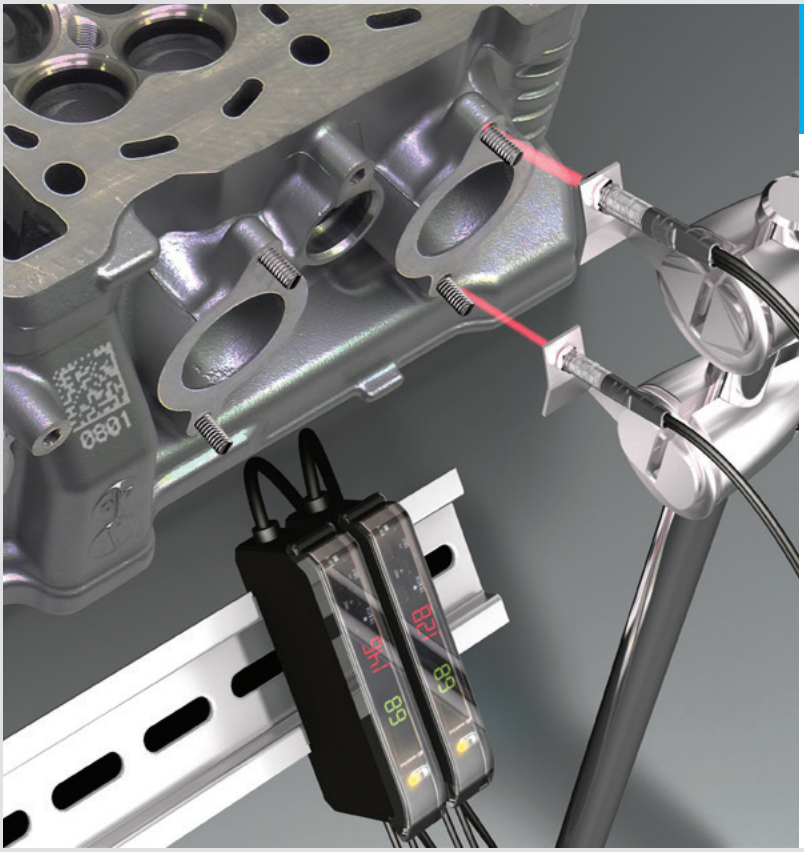
Optical distance sensor
LVHT52-500G3-B4



Sealing cap inspection

When checking the sealing cap, both the presence and the seal position as well as the cap position are scanned on the Z axis. Sensor calibration ensures that there are no scaling effects and that the pattern is detected precisely. The values are forwarded in mm via IO-Link to the control unit. This ensures exact tracking of quality in the process before packaging.

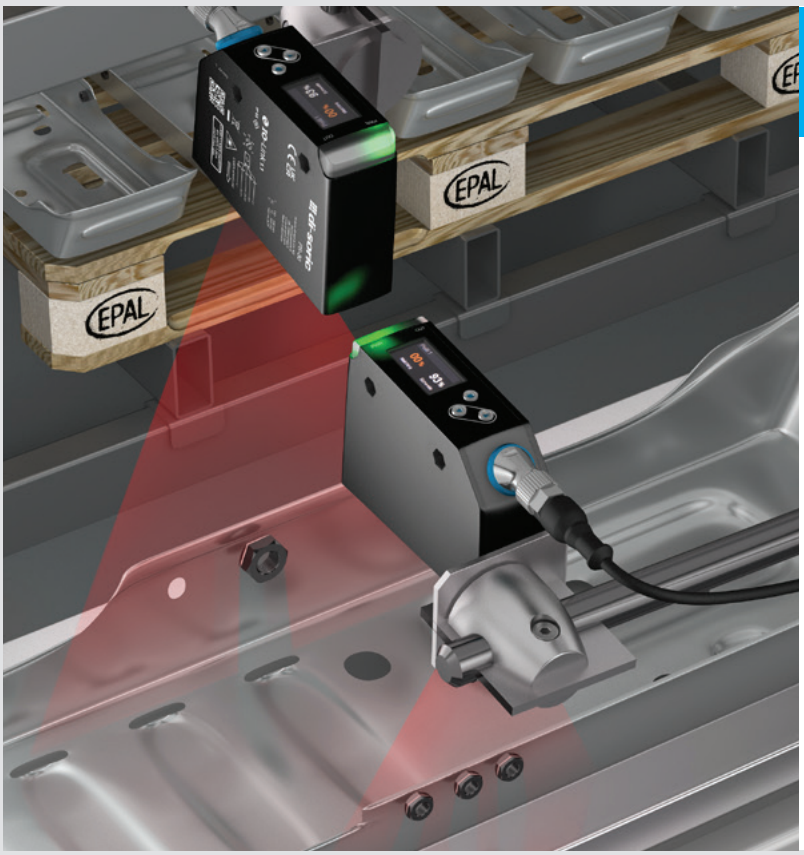
Profile sensor
PS-30



Thread presence check

The presence of an external thread on a pre-assembled bolt is to be checked. Fiber optics positioned at an angle with a narrow light beam enable detection at a working distance of up to 20 mm. Adjustment works by simple teach-in at the OLK 71.

Fiber-optic amplifier
OLK 71
Plastic fiber optics
KLT-M6-T2-1.5NB



Welding nuts inspection

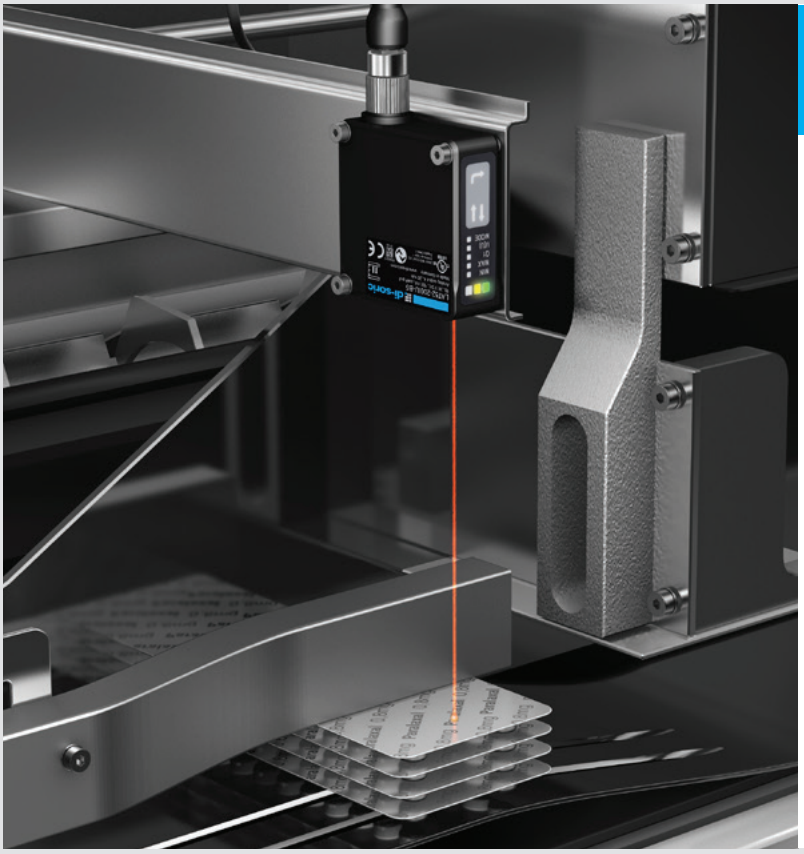
The nuts welded on to the profile carrier are checked for presence and position. The PS-30 detects not only the presence here, but also detects the position in the x and z directions and compares this with a previously learned pattern. Any resulting deviation can be transmitted numerically via IO-Link or the digital IO interface as an OK/NOK result.

Profile sensor
PS-30

Assembly check

A CS-60 checks the correct assembly of components on a PCB carrier at a manual workstation. If components are incorrectly assembled or are missing, this is signaled via the visualization. If the PCB is correctly assembled, the CS-60 releases the component for further processing via the signal lighting.

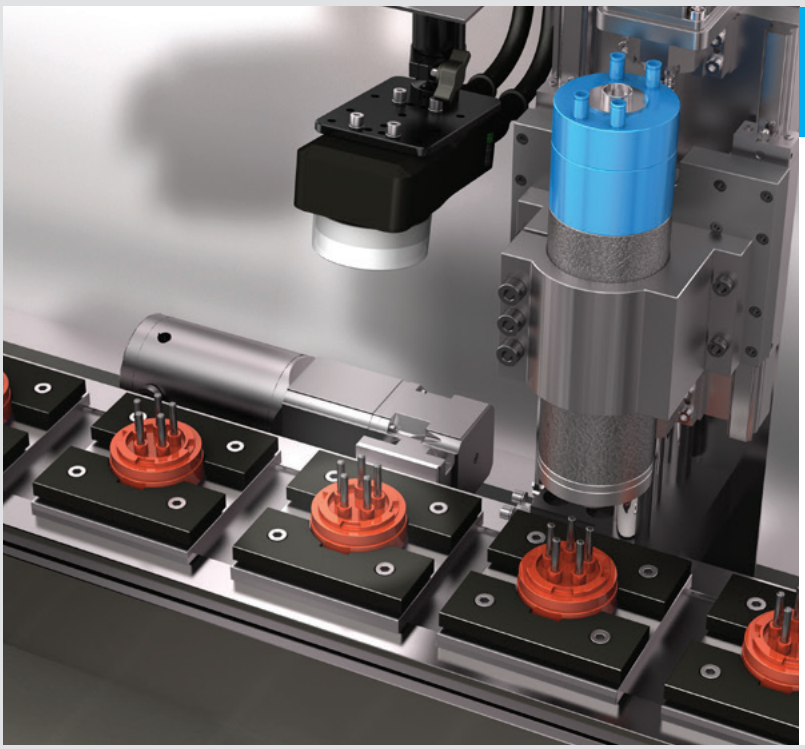
Vision Sensor
CS-60



Stack control for blisters in cartoning machines

In the cartoning machine, several blisters and the packing insert are introduced into the carton. Before the carton is filled, it must be ensured that the correct number of blisters were provided. The LAT-52 measures the height of the blister stack and thereby controls the number of the blisters shortly before the fusion process.

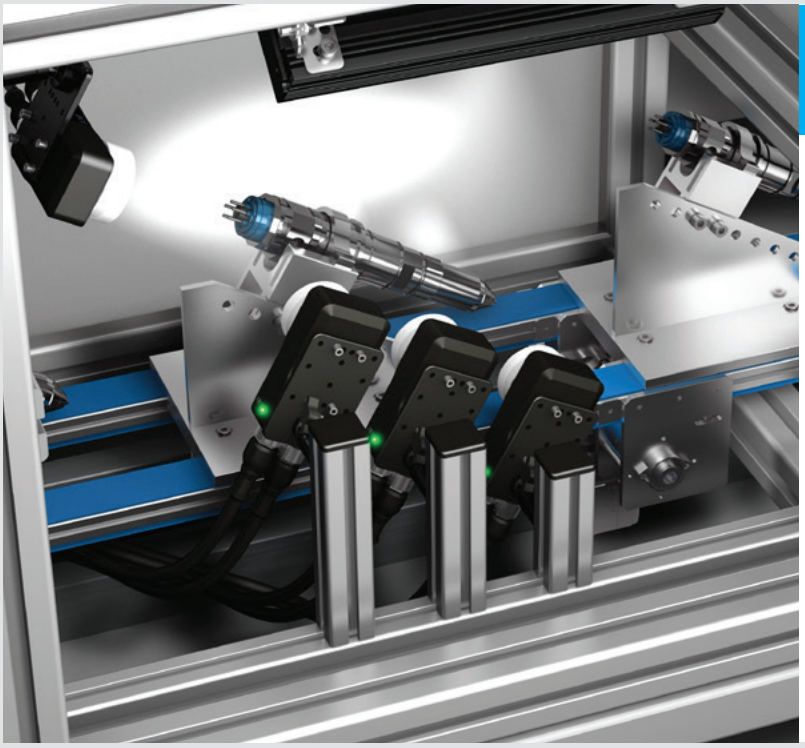
Optical distance sensor
LAT52-200IU-B5



Connector orientation before electrical inspection

The completeness of pins and the correct orientation of the overall setup must be checked during the automatic, electrical inspection of connectors.
The CS-60 reliably takes on multiple tasks by detecting the presence, orientation and position all in one cycle.

Vision Sensor
CS-60



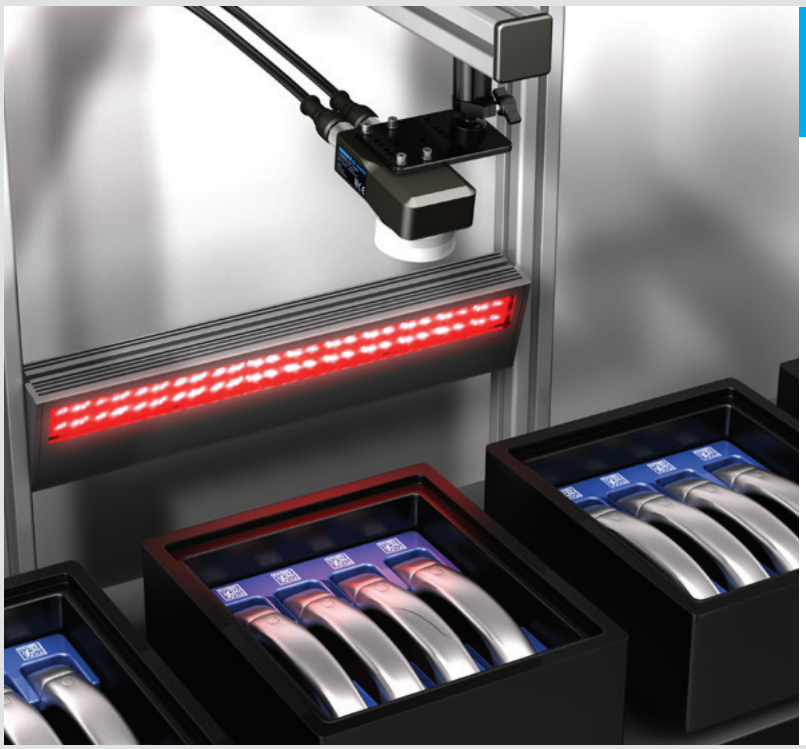
Product check before packaging

Products often must be checked before packaging for various, quality-relevant features. The flexibility of the Vision Sensor and the lighting is extremely important here because different accuracies and image field sizes play a role in this regard. The direct bright field illumination in the CS-60 with all possible filter attachments and the indirect through-light via the barlight ensure all options are covered for enabling the best inspection image for a stable quality inspection.

Vision Sensor
CS-60

SURFACE CHECK

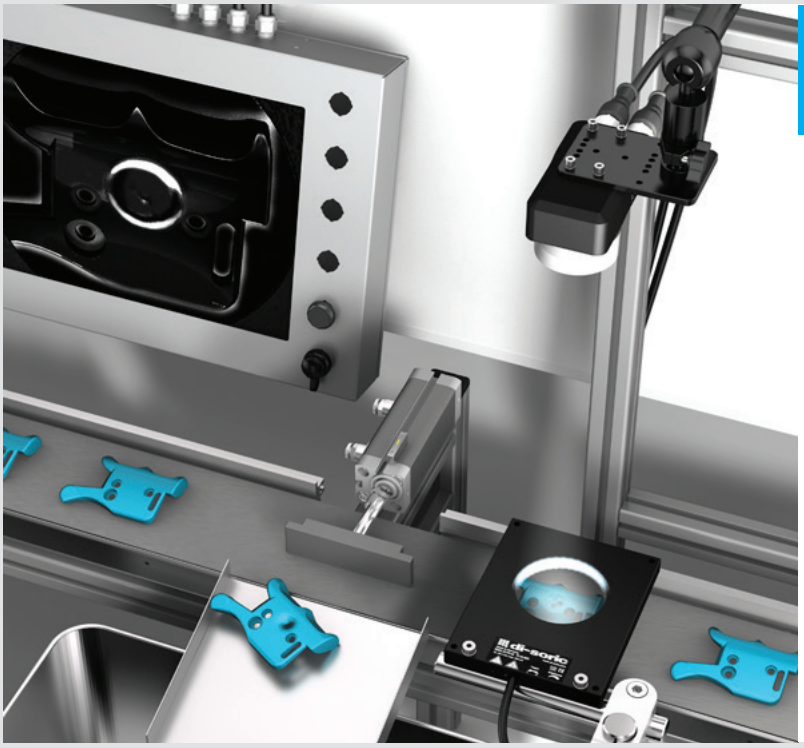
Surfaces are not only checked to safely detect damage such as scratches, cracks or deformations – design specifications must also be met and functional characteristics ensured. In many of these situations, the right lighting setup is of vital importance. The di-soric portfolio offers the right solutions here for any type of application.



Scratch check on handles

Several products of the same type are in one tray. The surface must be checked for damage before further processing. The CS-60 also simultaneously scans the individual product serial numbers to document the quality in a database. The BE-B barlight ensures optimal illumination.

Vision Sensor
CS-60



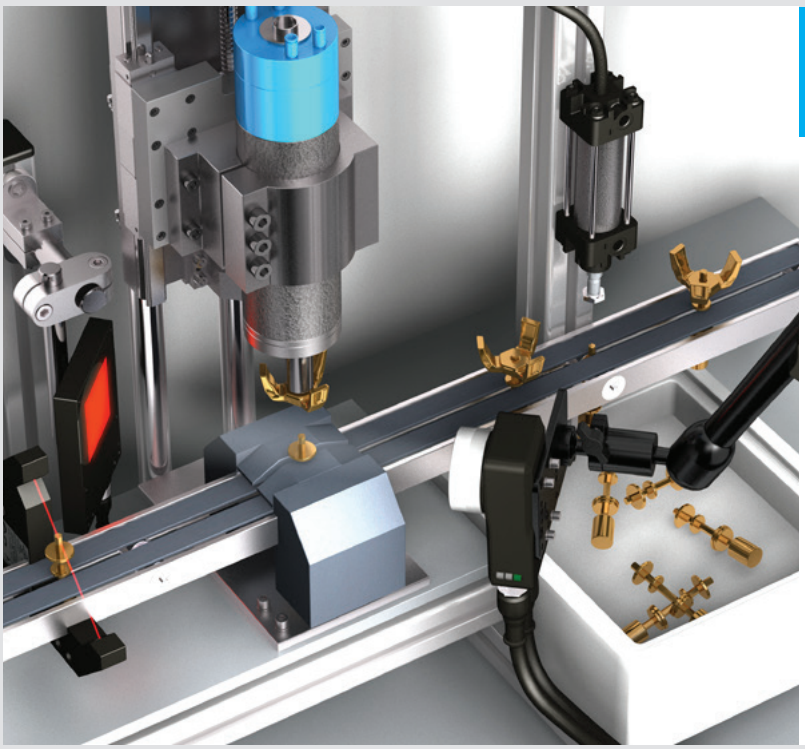
Deformation on injection molded parts

Components are checked using a CS-60 and lighting specially developed by di-soric to ensure the quality of products before the next processing step. This combination makes it possible to detect and sort out suboptimal injected molded parts.

Vision Sensor
CS-60

SIZE ACCURACY CHECK

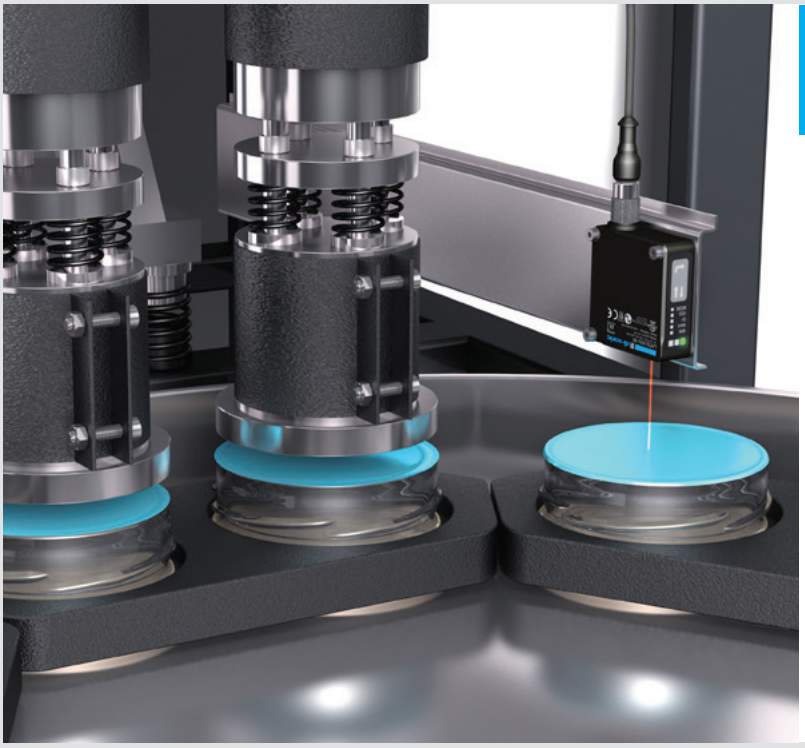
When joining components, it is important to check individual parts for size accuracy. This can be done in a manner that is comparative, relative as well as measuring. di-soric has the right solutions in its portfolio for all requirements.



Brass journal diameter check

The required accuracies for joining must be checked before individual components are mounted to assemblies. This takes place either sporadically or like here, before each joining process. The CS-60 deliveries high performance in this situation in combination with a di-soric through-light.

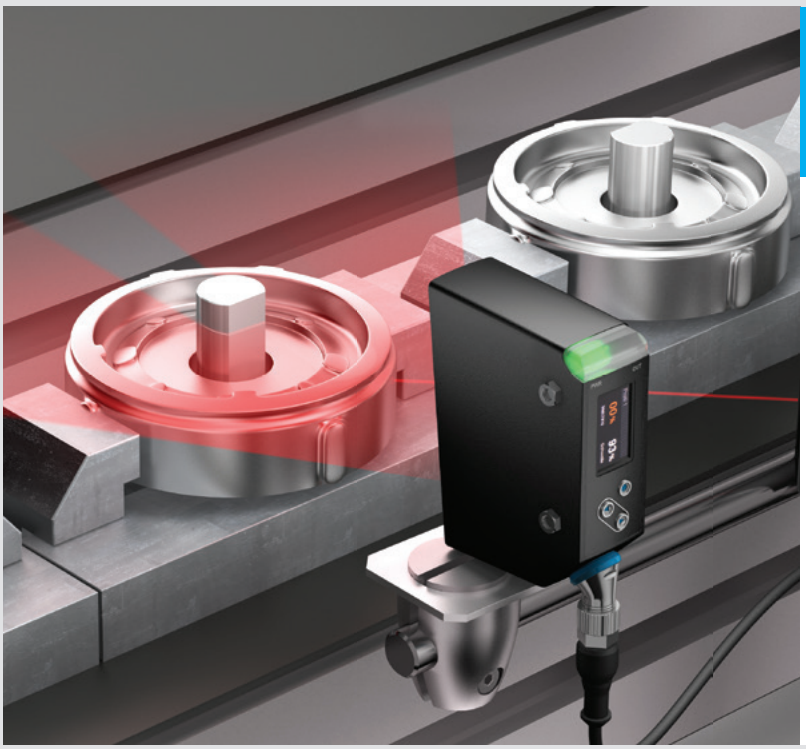
Vision Sensor
CS-60



Closure control for filling and sealing machines

In a cup-filling machine, liquid products (e.g. yogurt) are filled in containers and sealed with a printed cover film.
After sealing, a LAT-52 high-resolution laser distance sensor checks the sealing film at a high measuring rate for size accuracy in order to detect faulty sealing.

Optical distance sensor
LAT52-80IU-B5



Inspect reference distance and position between bearing and shaft

A journal and a bearing ring must be subjected to a type verification and position determination prior to final assembly. With simple learning of the desired journal profile, both can be determined with the PS-30.

Profile sensor
PS-30

Measuring of assembled plug contacts

High current plug contacts are mounted in a plastic carrier. The LAT-61 is moved with a linear axis and detects the position of the contacts with high precision.

Optical distance sensor
LAT 61 K 30/8 IUPN

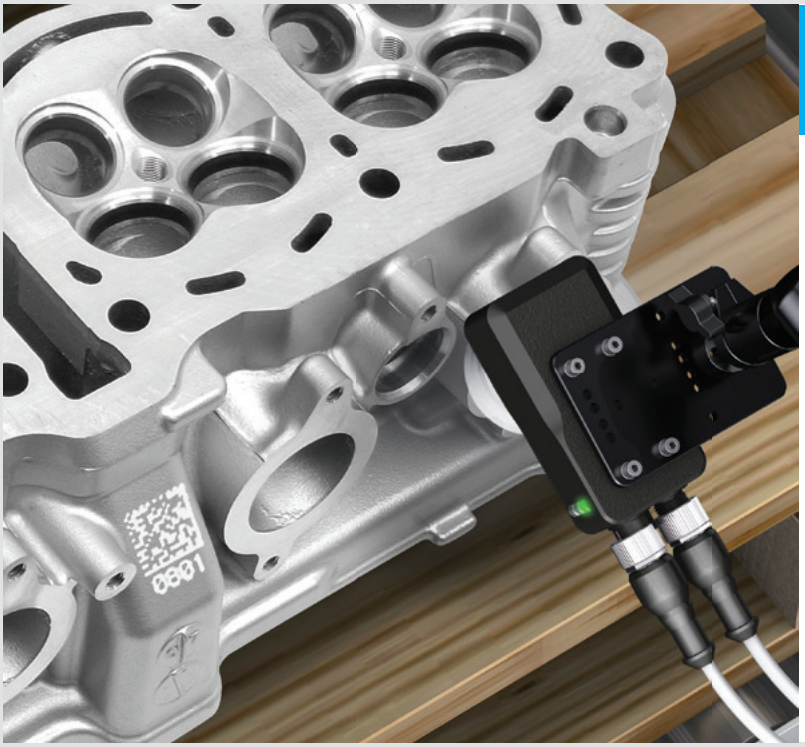
TYPE IDENTIFICATION

The tracking and tracing of parts is a central component of Industry 4.0. di-soric offers the right solutions to enable the reliable detection and further processing of contents for a wide variety of marking options, e.g. printed ID codes on labels or the direct marking on the component material (DPM).

Type detection in the production process via ID code

The conditions are often rough at type detection stations in metal processing operations – this requires a robust housing and excellent reading performance. The ID-200 was designed for these kinds of applications: high-performance reading properties for DPM ID codes on difficult surfaces with flexible detection distances.

Handheld reader
ID-200 Hammer



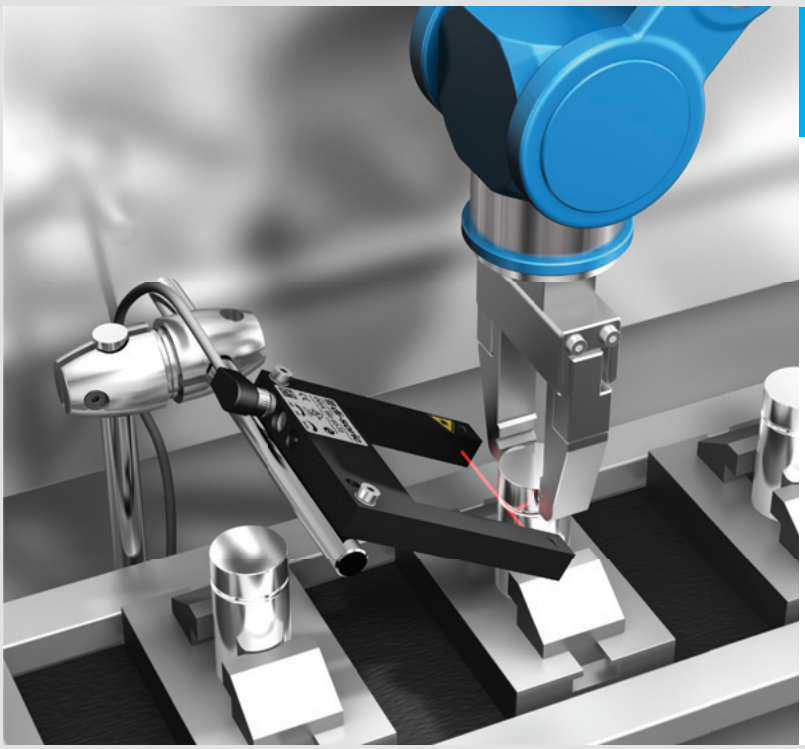
Reading ID codes on cast metal surfaces

It is important to be able to offer a robust ID reading function in a high bay warehouse for engine blocks made from cast metal or aluminum. The CS-60 meets this requirement with the additional DPM ID reading license.
Additional flexibility for reliable application solutions is achieved via the selection of the lens and lighting.

Vision Sensor
CS-60

TYPE VERIFICATION

The verification of requirements such as component geometry, design and color is an essential part of quality assurance. di-soric offers a wide-ranging portfolio of vision sensors, handheld ID readers, color sensors and trigger sensors to ensure a reliable result for each situation.



Type verification by component feature

The type of a cylindrical component is verified by the presence of a small groove. Our OGUL laser fork light barrier features a clearly visible laser beam and handles this task with functional reliability. In the NC position of the potentiometer, the switching output is switched off if no groove is present, and the product can be rejected.
The high-resolution OGUL detects even extremely small objects, down to a diameter of 0.05 mm.

Laser fork light barrier
OGUL 051 G3-T3

Type verification of secondary packaging

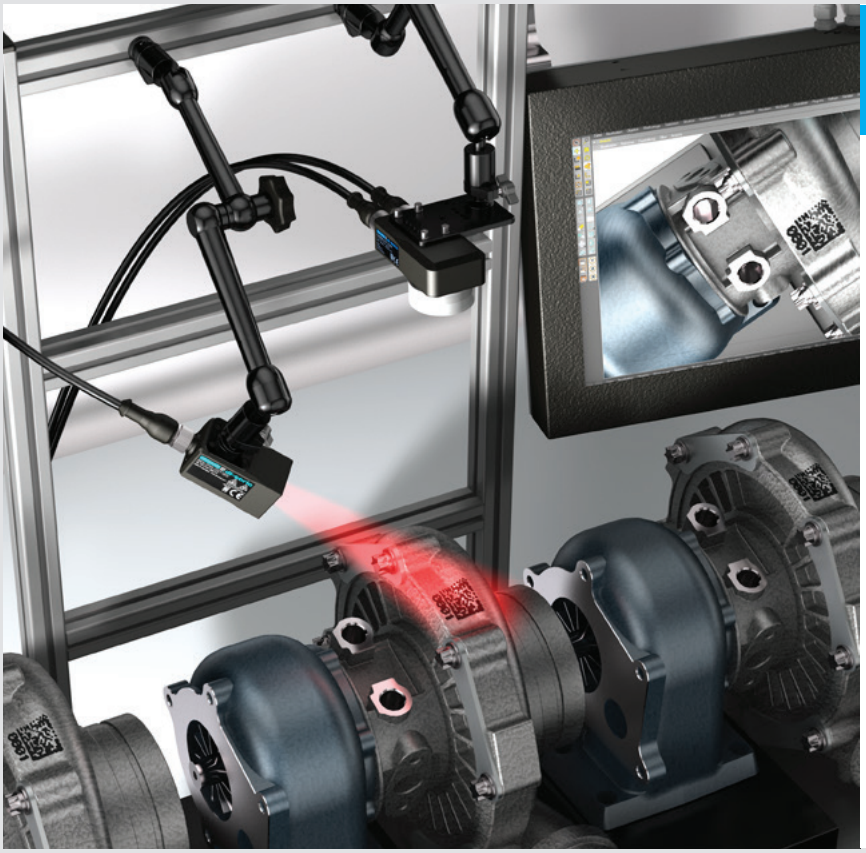
Using ID codes and the excellent ID reading performance, the sorting accuracy on the conveyor belt is ensured during the running process before product packaging.

Vision Sensor
CS-60

Checking labels on ampoules

When it comes to manually loading automation processes, handheld readers play an important role – these readers must ensure fast and reliable reading. The high-performance ID-100 is optimally suited for this due to dual optics and the corresponding tailored lighting.

Handheld reader
ID-100 Advanced



Checking direct part marking (DPM) on cast metal

The master data must be verified before products undergo a function check in test environments. Directly marked cast metal housings are reliably detected by the CS-60 in conjunction with a BE-P spotlight because of the lighting technology and the high-performance ID reader module being used.

Vision Sensor
CS-60

Checking cover color

The color of a screw cap must be checked before labeling. The FSB 10 color sensor with a fiber optic connection is used to check the cover color. It is very easy to teach the FSB 10 the target color by simply pressing the Teach button on the color sensor. The optional focus optics enables color detection at large working distances.

Color sensor
FSB 10 M G1-B8
fiber optics
WRB 120 P-SG M6x30-2.5
attachment optics
VO-M6/35-M6x30-2.5

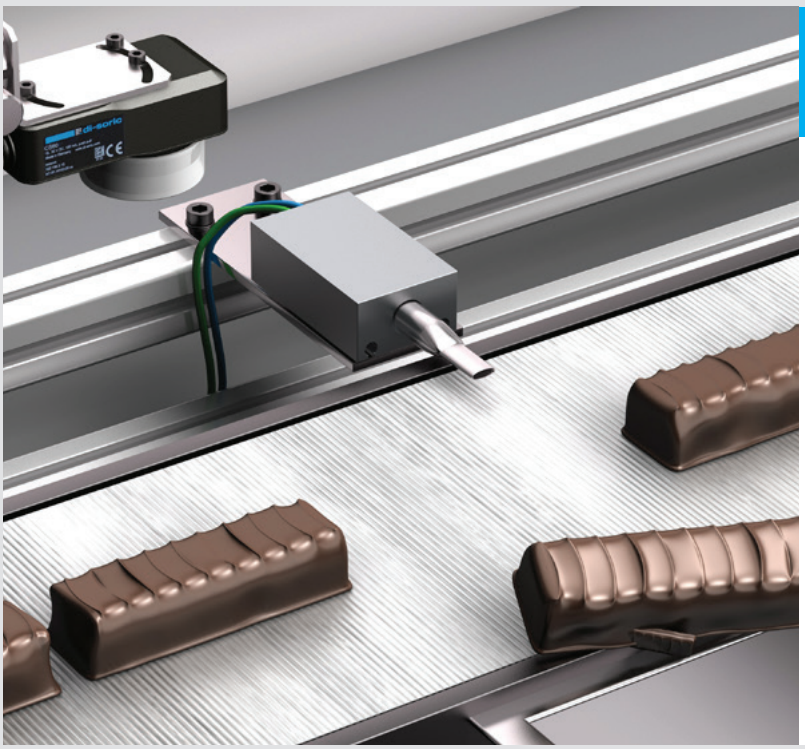
Automobile side panel color check

The FS 12-100 with a fiber optic connection is used to check the color and quality of the leather surface of automobile side sections.
These sensors can reliably distinguish between minor color nuances – it can save and detect up to 100 colors – and ensures that only those side sections are delivered which meet the application parameters.

Color sensor
FS 12-100-1 M G8-B8,
with fiber optics
WRB 120 S-SG-M4-2.5

POSITION CHECK

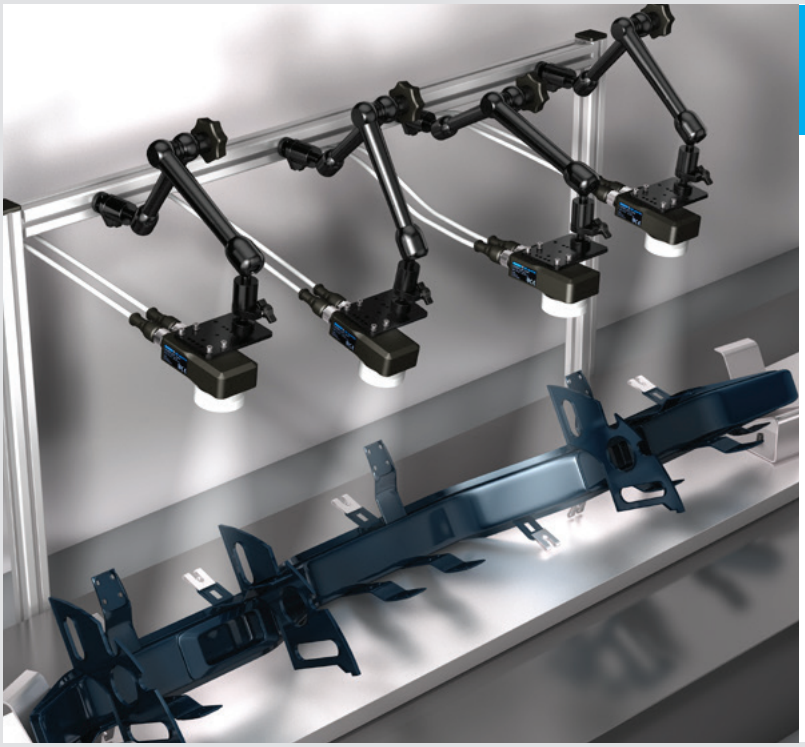
Along with the location, the orientation of a single component as well as the position of a group of components or packaging can be detected. di-soric has combined the numerous methods for this inspection into one product portfolio for quality inspection.



Feed control in tubular bag packaging

Due to the narrow inlet of a tubular bag packaging machine, the correct position of chocolate bars must be monitored. Our CS-60 Vision Sensor monitors the fast-moving bars, checking their orientation and dimensions to prevent rejects and machine downtimes.

Vision Sensor
CS-60



Checking the mounting position of screw-on clips

During the pre-assembly phase of automobiles, the mounting position of screw-on clips on an instrument panel are checked with CS-60 Vision Sensors using flashed internal lighting. The limitation of the CS-60's light dispersion characteristic provides a full reflection with high ambient light shadowing during clip detection, which can be increased even more via a red bandpass filter and the use of the internal, red lighting.

Vision Sensor
CS-60

Position check of content and outer packaging

The position of outer packaging and the position of products in the outer packaging are checked by a CS-60. This is done using direct status messaging via the connected signal light. A direct audit trail that enables a semi-automatic check process without major control effort.

Vision Sensor
CS-60

Checking the position before final packaging

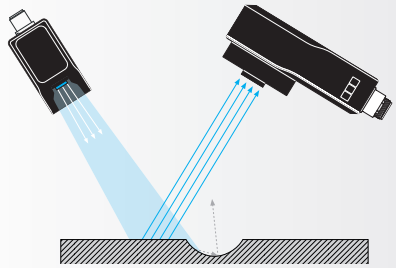
Is the packaging in the correct position on the belt, is it also the right product type? Both of these can be quickly and reliably verified by the CS-60.
The ejection cylinder can also be controlled via the configurable CS-60 outputs. Thus there is no major control effort.

Vision Sensor
CS-60

GLOSSARY
LIGHTING PRINCIPLES

80% of quality inspection solutions are determined by the lighting. It makes a significant contribution to the feasibility and stability of a solution. Various lighting principles and lighting scenarios pave the way to the best result. Whether product-integrated lighting or external lighting types, you will find the right products in the di-soric portfolio.

1 Barlight – bright field lighting

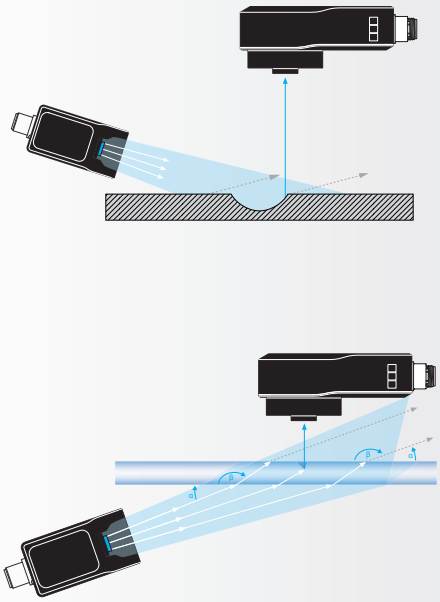


The spotlights from the BE-P series are designed so that the light from the object level is reflected back to the camera. Thus the object is illuminated evenly and shadow-free. Flat surfaces appear bright because the incoming light is reflected back directly into the camera. While unevenness in the surface deflects the incoming light and this appears dark.

Particularly suited for:

- Checking surfaces
- Visualizing imprinted, needle-embossed and laser-engraved characters and codes

2 Dark field light



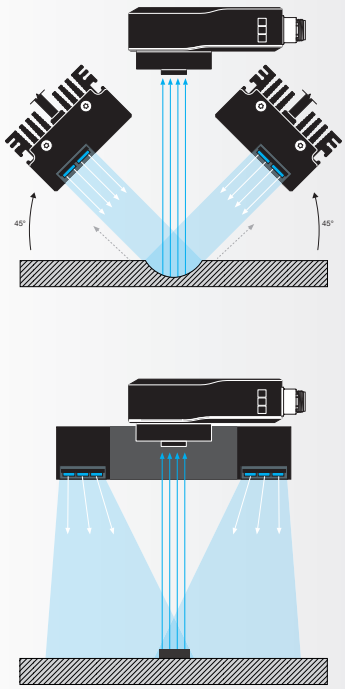
When a BE-P series spotlight is positioned so that the light returned to the product surface is reflected away from the camera, this is called dark field lighting. Contrary to bright field lighting, the object appears dark in the image. Unevenness, contours and edges appear as a bright feature on a dark background.

Particularly suited for:

- Checking surfaces
- Checking needle-embossed or laser-engraved codes
- Checking engravings, stampings, number punches and raised structures
- Inspecting edges

The BE-P spotlight can also be positioned as a dark field behind an object in special cases. This can be used to highlight the defects of semi-transparent or transparent test parts.

3 Barlight – partial bright field

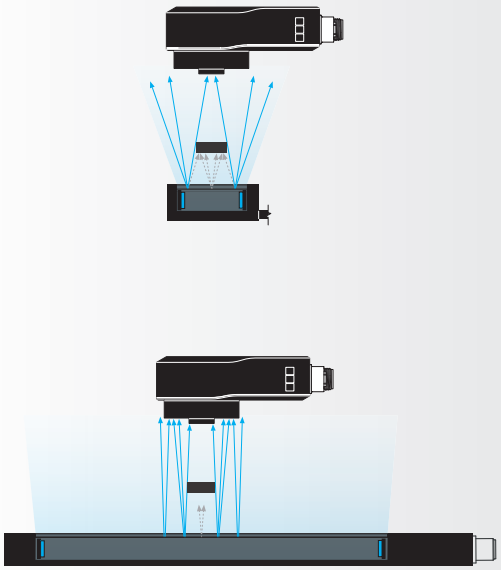


Using a BE-B barlight or a BE-R ringlight, the light radiates from the direction of the camera to the test part. The complete image field for this type of lighting needs to be illuminated as homogeneously and intensively as possible.
The highlighting of surface errors, edges and unevenness is not the goal here.

Particularly suited for:

- Detecting the assembly, type and position
- Checking imprints
- OCR/OCV

4 Diffuse through-light



A BE-F area light is positioned behind the test object. This way it is not the test object itself that is illuminated, but rather its contour. This creates a silhouette in which the object appears as a black surface in front of a white background.
Exterior contours and free interior contours of the test object can be clearly detected.

Particularly suited for:

- Checking contours
- Checking presence
- Checking drill holes
- Checking position and orientation
- Analyzing residual dirt

Diffuse through-light illumination is also suitable for imaging transparent and semi-transparent objects (e.g. bottle fill level monitoring) or the contrast-rich display of features and defects in translucent plastic or glass.

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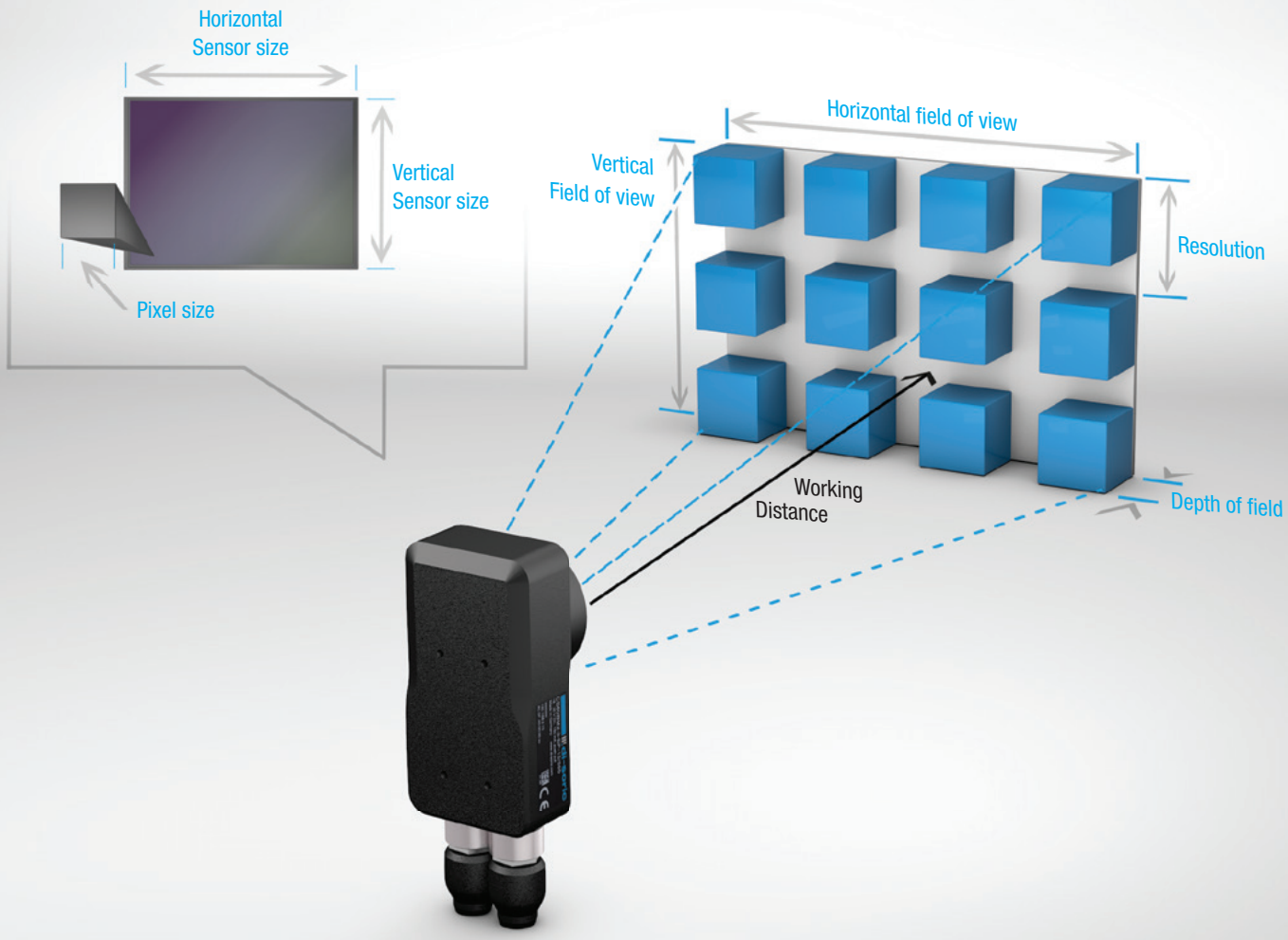
DUE TO THE BEST POSSIBLE IMAGES

The key factors for images that can be evaluated optimally are the working distance, the depth of field (DOF) on the test object, the resolution of the test object and the size of the field of view (FOV).



CUSTOMIZED ACCESSORIES

It is not only the quality of the sensors that plays a major role in the process-reliable detection of parts and objects. The accessories are also very important. They can ensure flexible, stable mounting, secure signal transmission and much more.

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