EN

intern

SENSOR SOLUTIONS

for the foil industry

IPF ELECTRONIC

High-End in High-Tech.

SCAN QR CODE
AND READ FLYER DIGITALLY

A WIDE VARIETY OF MATERIAL AND SURFACE SURFACE PROPERTIES…

Plastic and aluminum foils and similar thin strip materials have very different material and surface properties: transparent, opaque, high-gloss, matt, monochrome, multicolored, light, dark, extremely thin, embossing with fine or rough surface structures, special coatings and so on and so forth.

…DIVERSE CHALLENGES

It is these properties in particular that make the detection of different materials more and more difficult and present the industry with a variety of challenges. In addition, there are usually very fast processes in production and further processing, which demand a great deal from the corresponding sensor solutions in terms of precision and response time.

SAVE TIME AND MONEY INSTEAD OF SEARCHING FOR A LONG TIME…

In view of the multi-layered tasks associated with sensor technology (be it presence monitoring, web edge control, thickness measurement, diameter determination, length measurement, print mark detection, etc.), it is usually not easy to find a truly optimal solution for a specific application.

But don't waste any valuable time, because ipf electronic certainly has exactly what you are looking for. Our extensive portfolio for the film industry is impressive.

… FEATURES THAT ARE IN DEMAND…

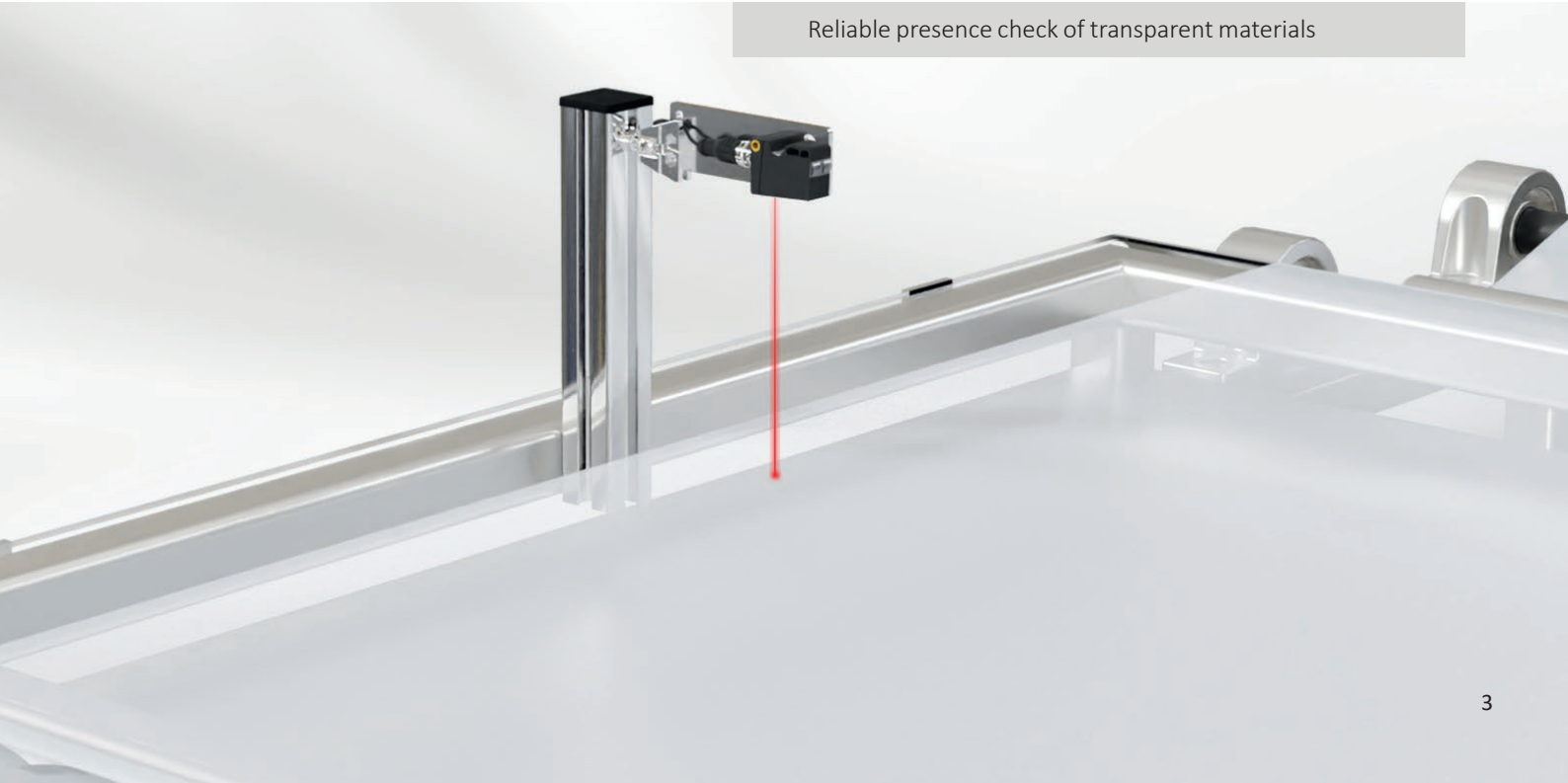
Our sensors have a number of special properties that are in high demand in a wide range of applications to meet the diverse requirements in practice.
Here is just a small excerpt:

- devices specially developed for transparent materials
- contactless and therefore wear-free detection
- very fast response times
- reliable detection almost independent of material's color and surface
- high-precision queries and measurements
- immensely high ranges
- reliable detection of material surfaces with unfavorable reflective properties
- robust and reliable, even under the most adverse condition
- high shock and vibration resistance
- very compact designs for confined spaces
- particularly easy installation and adjustment
- flexible parameterization thanks to IO-Link

…COMPREHENSIVE RANGE OF SOLUTIONS

As a sensor specialist, we offer an extremely wide range of very different technologies that leave nothing to be desired. Whether optical scanners, ultrasonic sensors, line scan cameras, contrast sensors, light barriers or distance measuring systems, our comprehensive range of proven sensors solves almost any task and also overcomes real challenges in all conceivable processes. You can also expect more from us than sophisticated sensor technologies, because as a competent partner with decades of experience in many areas of application, we can support you with comprehensive know-how and valuable experience as a leading sensor supplier for demanding industrial applications.

And what is your task or challenge?



Reliable presence check of transparent materials

PRESENCE CHECK
OPTICAL SENSORS

Many processes are only really safe if it is possible to reliably monitor whether material is present in a system or not. For non-contact and therefore wear-free presence monitoring, the optical sensors and ultrasonic sensors from ipf electronic in particular offer a wide range of advantages in a variety of designs.

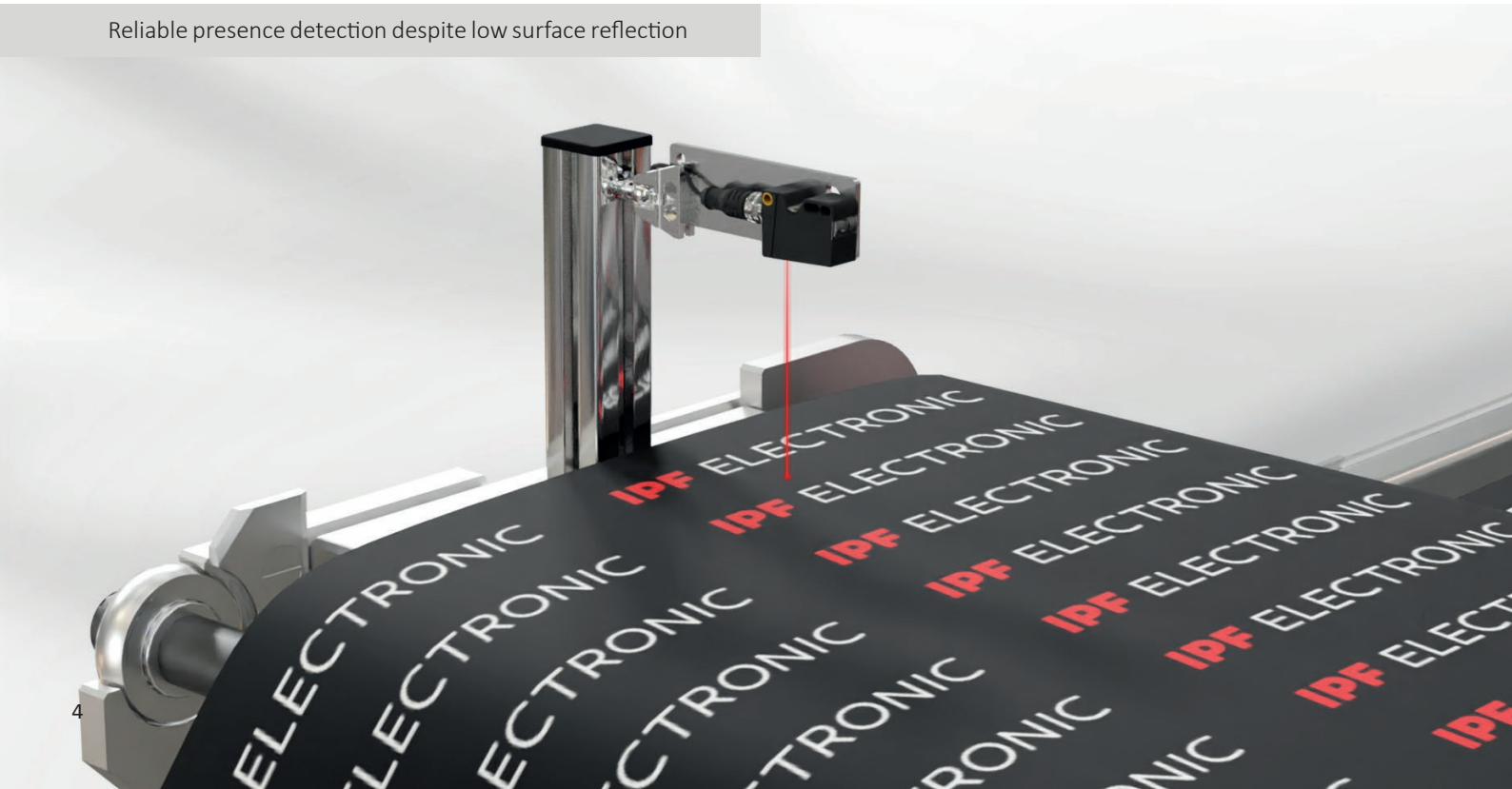
Optical sensors (examples from the product portfolio):
ON450522 (auto-reflective light barrier), **OR450521** (retro-reflective light barrier) or **OT450520** (scanner with background suppression).

Mode of operation: The basic function of optical sensors is based on the transmission and reception of light. Auto-reflective light barriers and retro-reflective barriers combine a transmitter and receiver in one compact device. While retro-reflective barriers work with any reflective reference surface (e.g. machine part), retro-reflective light barriers require a reflector. Both technologies evaluate the interruption of the light signal. Scanners with background suppression also integrate transmitter and receiver in one device. The receiver elements of the scanner evaluate the object position from which the incident transmitted light is reflected.

HIGHLIGHTS:

- ☑ contactless, wear-free sensing
- ☑ suitable for transparent or reflective materials
- ☑ high ranges
- ☑ high switching frequencies
- ☑ short response times
- ☑ simple installation thanks to visible red light
- ☑ simple adjustment via teach-in
- ☑ flexible parameterization thanks to IO-Link

Reliable presence detection despite low surface reflection



Simple detection of a transparent film in confined installation situations

PRESENCE CHECK

ULTRASONIC SENSORS

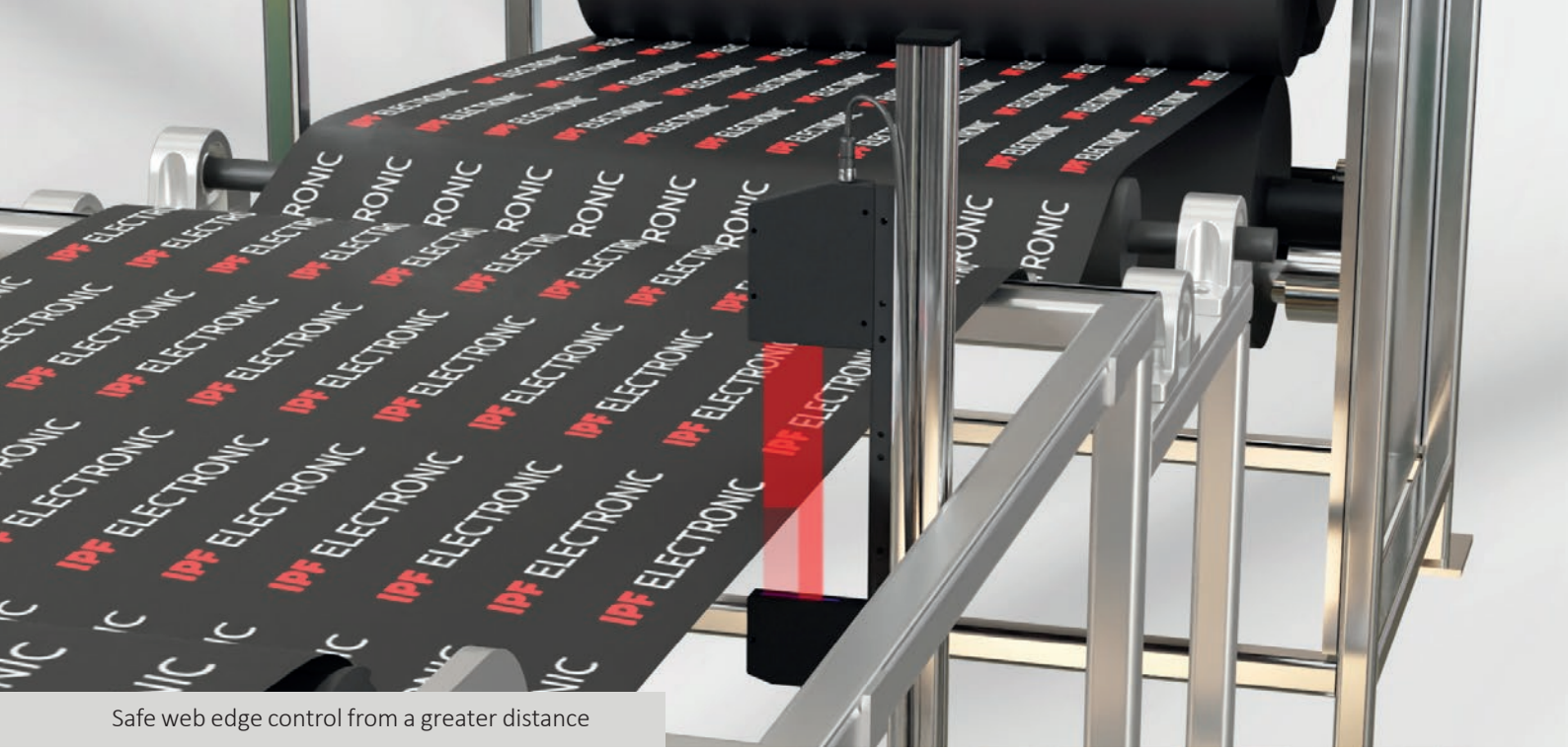
Ultrasonic sensors (examples from the product portfolio):
UG800170 (ultrasonic fork), **UY210100** (through-beam system) and **UT189523** (probe with IO-Link)

Mode of operation: Ultrasonic scanners work according to the echo transit time method (transit time measurement) and integrate a transducer that acts cyclically as a transmitter and receiver. The transducer emits a certain number of sound waves that are reflected by a material to be detected, regardless of its shape, color or transparency. The transducer then switches to receive and detects the signal echoes. The time that elapses between sending and receiving the signals is proportional to the distance between the sensor and the material surface.

Ultrasonic forks always integrate optimally aligned transmitters and receivers in one device. Disposable systems consist of a separate transmitter and receiver. With both solutions, the interruption of the ultrasound is evaluated.

HIGHLIGHTS:

- ☑ non-contact, wear-free detection of all materials regardless of surface, color and transparency
- ☑ ideal for the precise detection of highly transparent, thin strip materials
- ☑ high ranges
- ☑ simple adjustment via teach-in
- ☑ flexible configuration via IO-Link interface
- ☑ easy to switch from diffuse-reflection to retro-reflective mode thanks to IO-Link



Safe web edge control from a greater distance

WEB EDGE CONTROL

LASER LINE SENSOR

A web edge control system is required to ensure that a material web remains within its defined limits during a process. It uses sensors to control the alignment or guidance of the material web, which runs over a roller, for example. Actuators use the sensor signals to exert a corrective influence on the path of the web.For high-precision web edge control, laser line sensors and line cameras from ipf electronic are recommended.

Laser line sensors (examples from the product portfolio):
Through-beam sensor **PS500046** (transmitter, laser class 1) and **PE500146** (receiver).

Mode of operation: As through-beam sensors, laser line sensors consist of a transmitter and a receiver. The system's receiver integrates a CCD line detector with closely spaced receiver elements or pixels. The transmitter generates a homogeneous linear laser light beam. If a material web is located in the light beam of the sensor system, its shadow image is mapped on the individual pixels of the receiver CCD line and converted into a continuous analog signal (0...10V or 4...20mA), which is used for web edge control. The level of the signal provides an exact indication of where the web edge is located in the detection range of the light barrier.

HIGHLIGHTS:

- ☑ simple installation thanks to visible red light (laser diode)
- ☑ ideal for web edge control of thin materials
- ☑ linear light: the position of the web edge can be anywhere between the transmitter and receiver when the sensor is being mounted
- ☑ Height fluctuations of the web edge due to low material tension have no influence on the accuracy of the measurement result

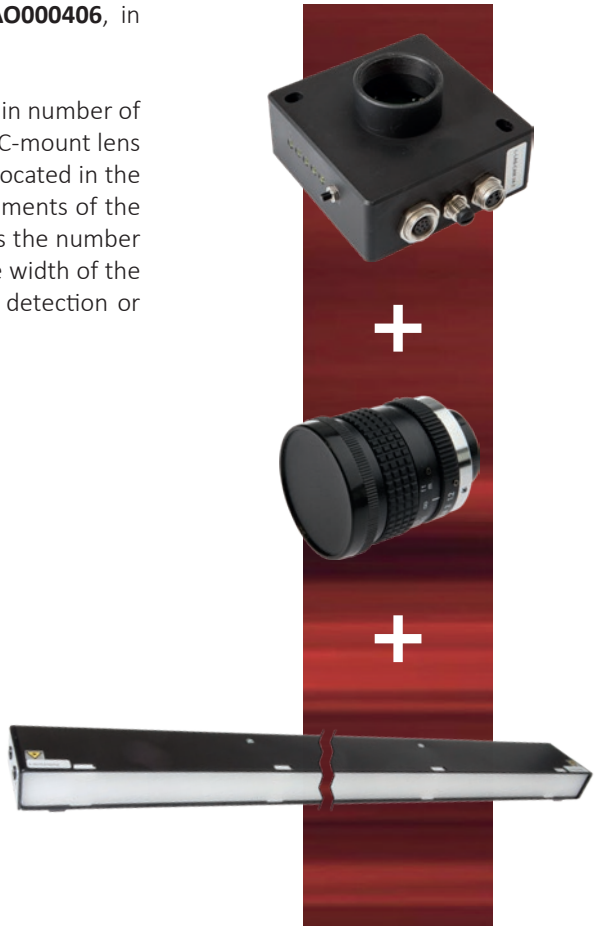
WEB EDGE CONTROL

LINE CAMERAS

SYSTEM SOLUTION

Line camera: **PYSI0317** with C-mount connection for various lenses, e.g. **AO000406**, in combination with LED line lights, e.g. **AO98E124**.

Operating principle: Line cameras work in a similar way to line sensors. A certain number of receiving elements (line detectors) are located in a rectangular housing with a C-mount lens connection. An LED line light serves as a counter element. If a material web is located in the light beam of the LED light, its shadow image is displayed on the receiving elements of the camera and converted into a continuous analog signal (0...10V or 4...20mA). As the number of line detectors is fixed, the resolution of the system depends primarily on the width of the measuring range (depending on the choice of lens). The wider or larger the detection or measuring range, the lower the resolution of the line camera.



HIGHLIGHTS:

- ☑ ideal for monitoring larger web edge areas
- ☑ large measuring range, depending on the lens (e.g. 400mm)
- ☑ high resolution <0.5mm
- ☑ parameterization software for PC

Precise monitoring of a large web edge area

LENGTH MEASUREMENT

MAGNETIC DISTANCE MEASURING SYSTEM

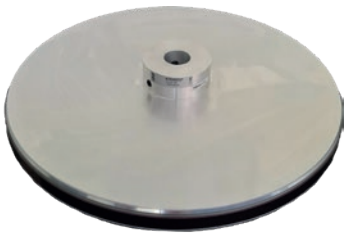
Length measurement of strip materials can be used to determine the production quantity of a system over a certain period of time (e.g. daily production). In addition, length measurement can be used to position roll knives for material cutting, for example. Magnetic position measuring systems and flexibly parameterizable rotary encoders from ipf electronic are particularly suitable for precise length measurements.

Magnetic distance measuring system (examples from the product portfolio):
Sensor **MW100100** and measuring wheel **AM000057**.

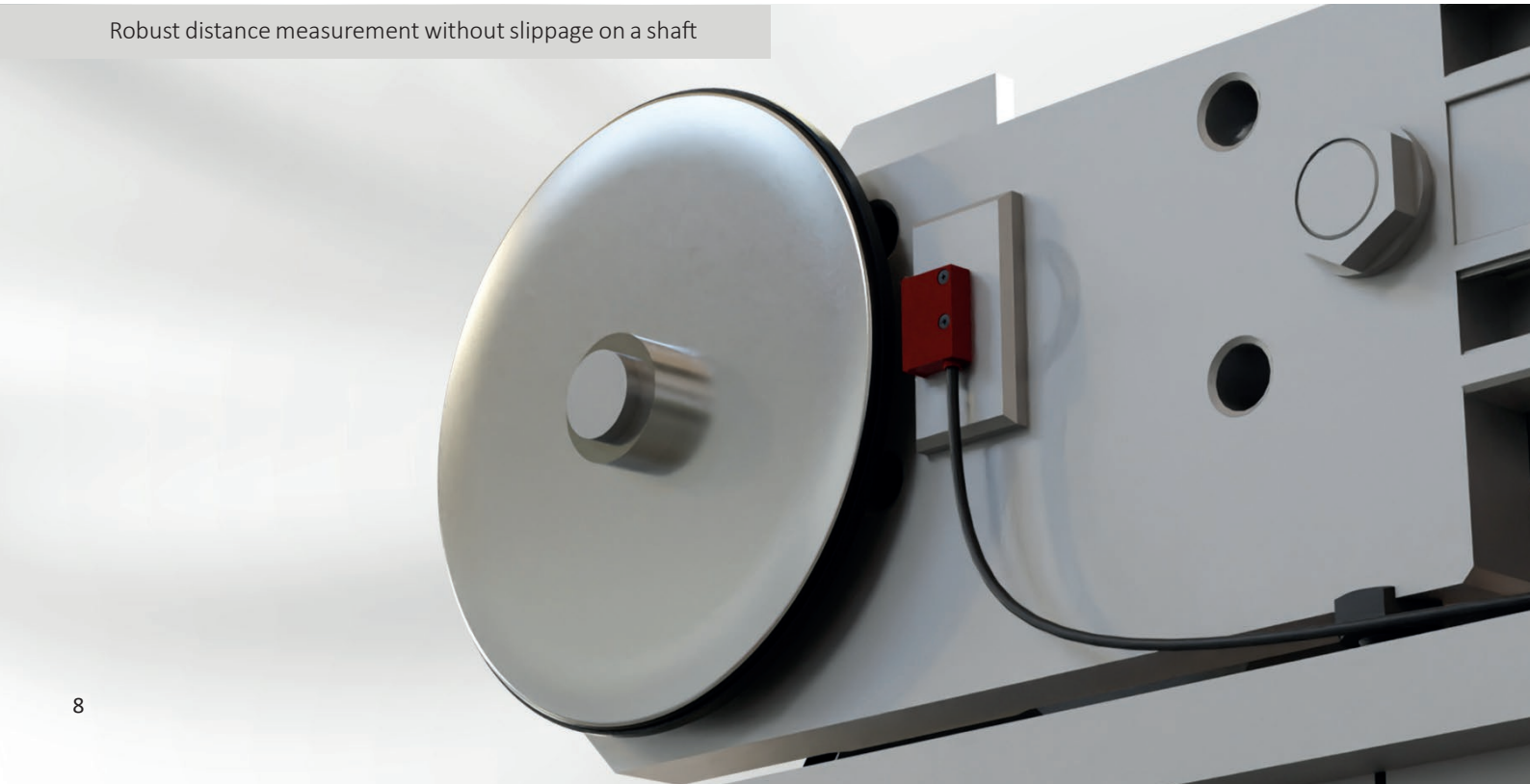
Operating principle: A magnetic distance measuring system consists of a sensor (probe) and a measuring wheel, on the circumference of which north and south poles alternate in the longitudinal direction with an exact pole width. The sensor detects the magnetic fields of the north and south poles without contact and generates encoder-like signals for precise displacement and length measurements, which can be further processed on a controller.

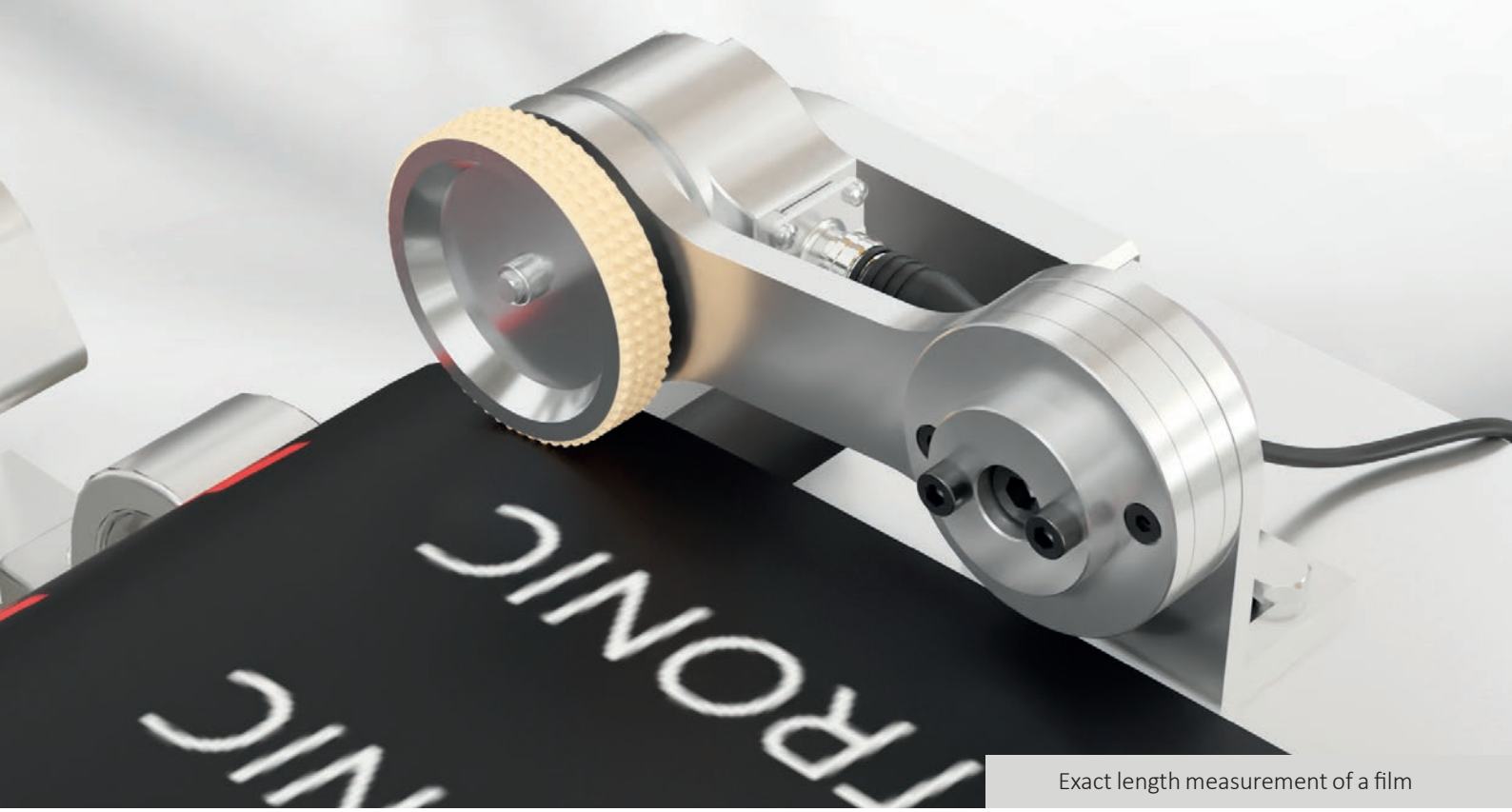
HIGHLIGHTS:

- ☑ wear-free and slip-free length measurement
- ☑ insensitive to dirt and moisture
- ☑ simple solution for length measurement of strip materials
- ☑ sensor in robust industrial design (IP67)
- ☑ high travel speed of up to 25m/s



Robust distance measurement without slippage on a shaft





Exact length measurement of a film

LENGTH MEASUREMENT

PARAMETERIZABLE ROTARY ENCODERS

Parameterizable rotary encoder **VD58982x** optionally with:
6mm solid shaft, 10mm solid shaft or 12mm hollow shaft.

Operating principle: Rotary encoders detect rotational movements and convert them into evaluable digital output signals for processing in a controller (PLC). Rotary encoders from ipf electronic work on the principle of optical sensing and have a pulse disk with a repeating (incremental) line graduation. This is scanned by an optical system and converted into encoder-specific output signals (multiturn, RS422, etc.) by integrated electronics.

The incremental encoders of the **VD58982x** series are parameterizable and can therefore be set on site to the required number of pulses per revolution (between 1 and 65,536 pulses). For length measurement, the encoder shaft can be connected directly to an idler pulley, for example. Alternatively, a measuring wheel can be attached to the encoder shaft.

HIGHLIGHTS:

- ☑ length measuring system can be flexibly parameterized on site via PC
- ☑ for high speeds and high-speed processes
- ☑ high shock and vibration resistance
- ☑ high resolution, variably parameterizable

LENGTH MEASUREMENT

PARAMETERIZABLE OPTICAL DISTANCE MEASURING SYSTEM

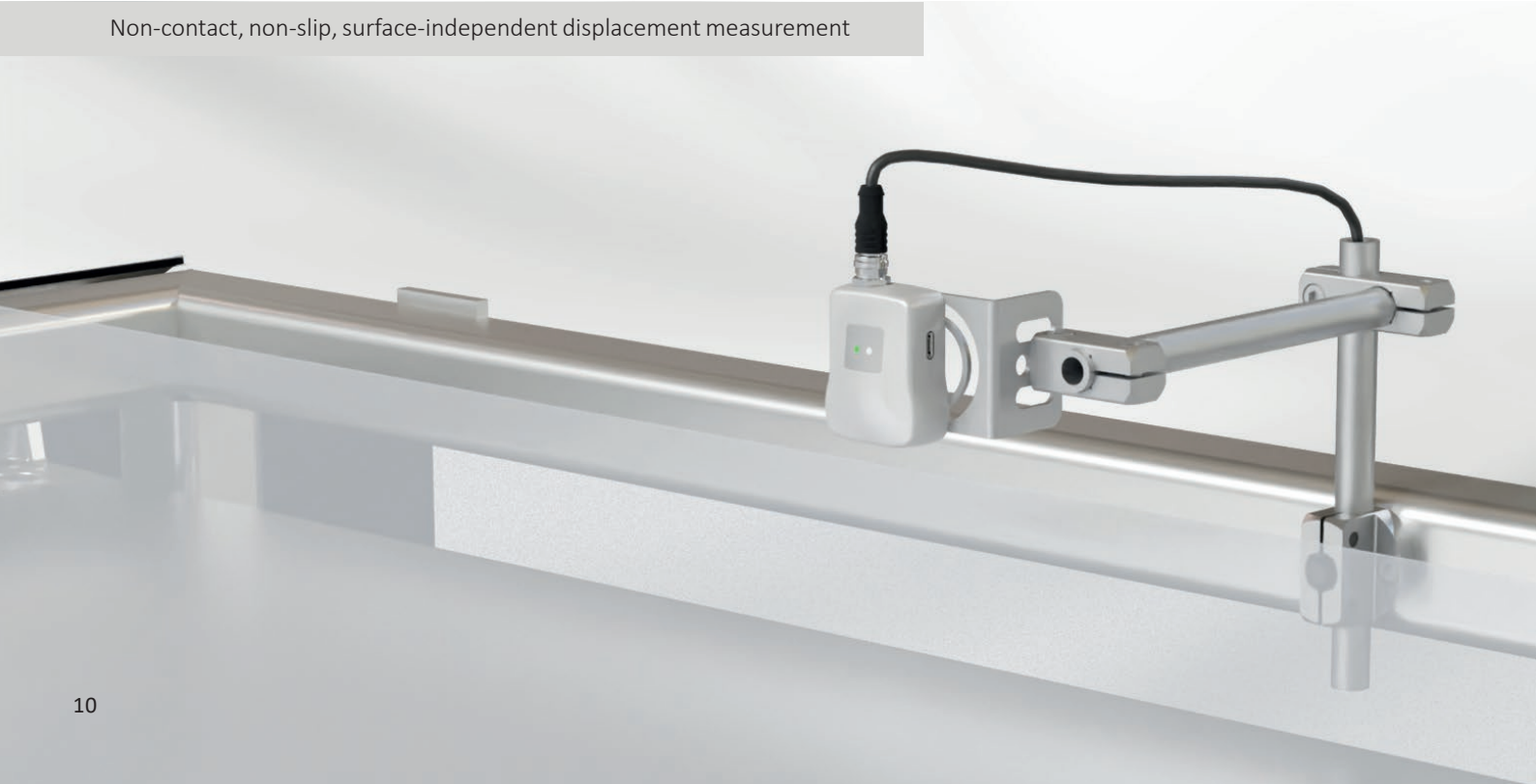
Incremental sensor **VO330570**

Operating principle: This sensor has a laser that works with infrared light (laser class 1), which periodically emits light pulses that are reflected by a moving material surface. A photosensor integrated into the device receives the reflection signals and records the pixel changes that occur from image to image due to the moving object surface. Based on these pixel changes, the distance traveled by the material to be detected can be determined without contact or slippage.

HIGHLIGHTS:

- ☑ parameterizable optical system with a wide range of functions
- ☑ distance measurement, display of travel speed or travel distance
- ☑ configurable zero point or alarm output
- ☑ rotary encoder output
- ☑ non-contact, wear-free and slip-free length measurement
- ☑ independent of the material surface

Non-contact, non-slip, surface-independent displacement measurement



EFFICIENT ADVICE ON ALL QUESTIONS

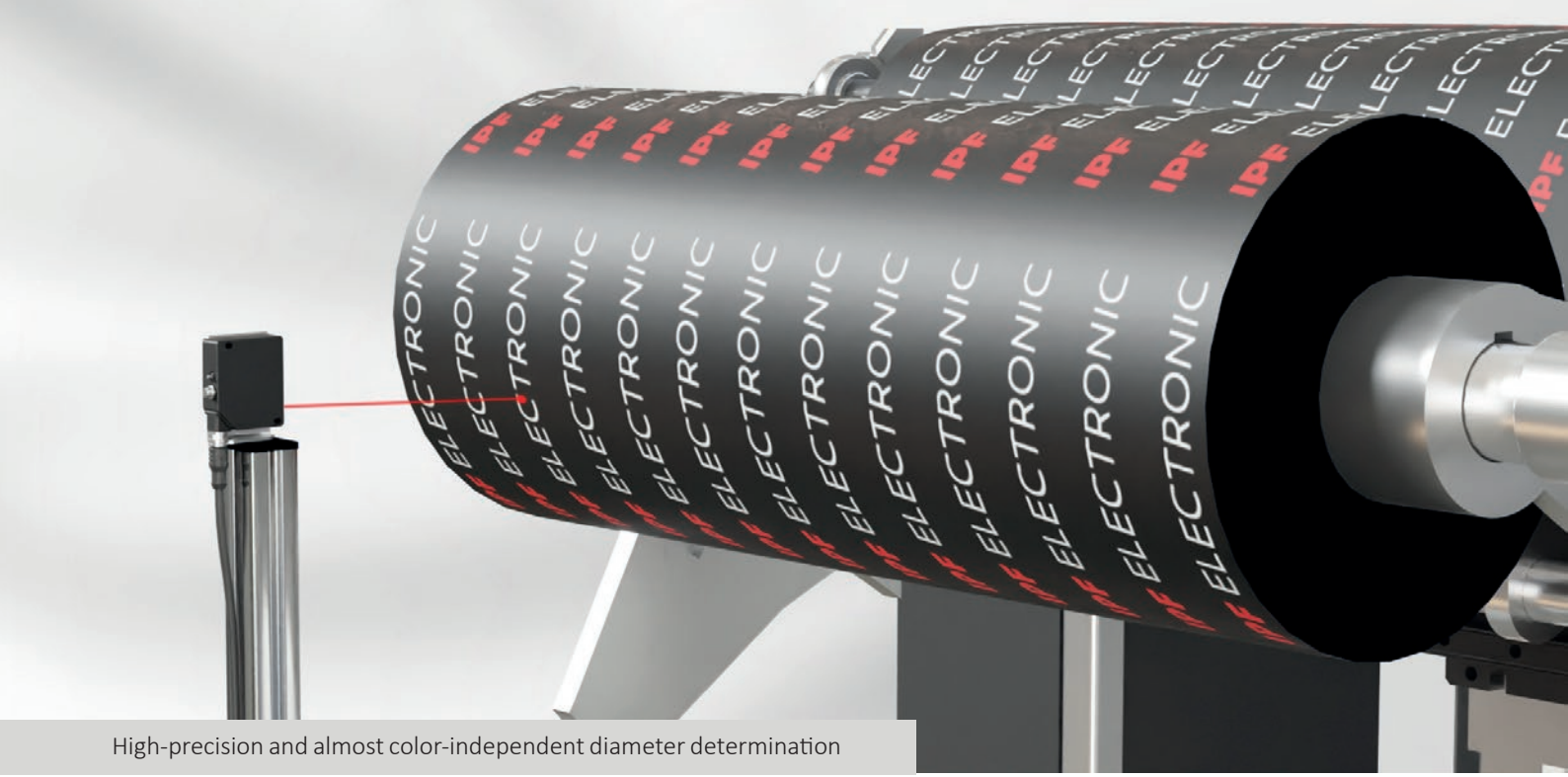
PERSONAL SERVICE AND PROBLEM SOLVING ON SITE

Every call is important! On our technical hotline, you will speak to experienced staff who will answer your questions competently and conscientiously. We want to provide you with comprehensive and individual advice at all times. Our experienced and specially trained team is on hand to help you. You can also contact your personal application specialist in our sales department. We coordinate closely internally so that we can respond specifically to your inquiry- quickly, competently and reliably.

Chellenges are becoming increasingly complex and varied in almost all industrial application areas. External expertise is often required to find the right solutions. And this is what you will find at ipf electronic, together with a high level of technical and problem-solving expertise. We will come to you on request. No distance is too far for us to talk to you personally, even if it is a seemingly simple task. Our more than 20 application specialists are also close to you. So don't hesitate to give us a call.

You know us as a renowned supplier of industrial sensor technology or will get to know ipf electronic as a reliable partner. No customer inquiry will be neglected, no customer appointment on site will be missed. Our extremely wide-ranging product portfolio will convince you.

Variety, expertise, advice, flexibility:
That is ipf electronic's formula for success.



High-precision and almost color-independent diameter determination

DIAMETER DETERMINATION OF FOIL COILS

DIFFUSE-REFLECTION LASER SENSOR

In many areas of strip material processing, the diameter of coils must be determined. This is a task for which optical sensors such as the laser triangulation sensors or ultrasonic sensors with IO-Link interface from ipf electronic are particularly suitable for distance measurement.

Diffuse-reflection laser sensors (examples from the product portfolio): PT640026 with point-shaped transmitted light or PT643026 with line-shaped transmitted light.

Mode of operation: The PT64 series diffuse-reflection laser sensors (laser class 1 or 2) are based on the triangulation method, in which the distance to a material surface is measured indirectly via the angle of incidence of the light reflected from the coil surface. To determine the angle of incidence, the receiver of the scanner has a line detector with a large number of individual receiver elements, which together form a receiver line. The position within this line at which the light reflected from a material surface hits a receiving element or several receiving elements depends on the angle of incidence of the light beam. This angle of incidence can be used to determine the distance and thus the distance to a coil surface.

The smaller the measured distance, the larger the diameter of a coil. An intelligent control circuit regulates the power of the PT64 sensor series' transmitting diode depending on the reflective properties of a coil surface. With dark surfaces, the power of the transmitting diode increases, while its power decreases with lighter surfaces.

HIGHLIGHTS:

- ☑ almost color-independent, non-contact detection of belt materials
- ☑ all device types optionally with laser dot or laser line
- ☑ freely parameterizable measuring ranges
- ☑ high resolutions of 0.25mm

DIAMETER DETERMINATION OF FOIL COILS

ULTRASCONIC SENSORS

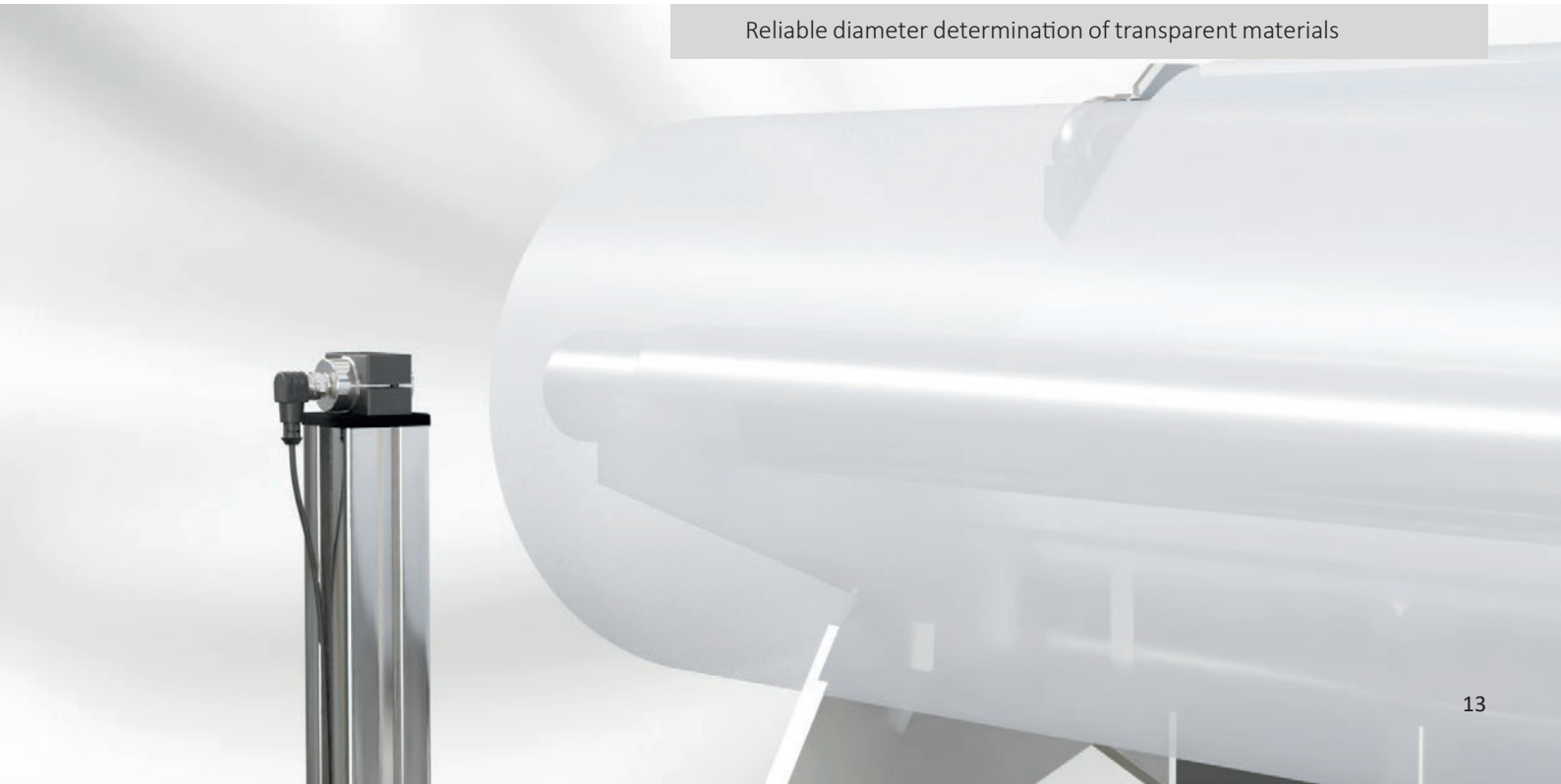
Ultrasonic sensors (example from the product portfolio):
Ultrasonic sensor with IO-Link interface **UT309520**.

Despite its compact design, the IO-Link interface provides the sensor with a range of intelligent additional functions. These include temperature compensation that can be activated as required to ensure constant measuring accuracy at all times. Thanks to IO-Link, the device also provides a range of valuable information and enables individual settings, e.g. switch-on processes, operating hours counter, time functions, number of switching operations, recording of the current and maximum device temperature, minimum and maximum object distance and hysteresis setting.

Operating principle: Like all ultrasonic diffuse-reflection sensors (see page 5), ultrasonic diffuse-reflection sensors work on the principle of time-of-flight measurement and integrate a transducer that works cyclically as a transmitter and receiver. The transducer emits a certain number of sound waves, which are reflected by the material to be detected. The transducer then switches to receive and records the signal echoes. The time that elapses between sending and receiving the signals is proportional to the distance between the sensor and the material surface. The shorter the elapsed time, the larger the coil diameter.

HIGHLIGHTS:

- ☑ non-contact diameter determination independent of color, transparency and reflective properties of the coil
- ☑ high range e.g. 3,000mm
- ☑ freely parameterizable measuring range
- ☑ fast response time for high-speed processes
- ☑ robust sensor in industrial design
- ☑ simple commissioning via teach-in or parameterization (IO-Link)



Reliable diameter determination of transparent materials

THICKNESS MEASUREMENT

LASER FORK LIGHT BARRIER

SYSTEM SOLUTION

Thickness measurements of very thin strip materials such as plastic films require highly accurate sensor technology such as the extremely precise laser through-beam sensors from ipf electronic.

Laser fork light barrier **PGSI0302** with macro lens **AOSI0303** for the receiver.

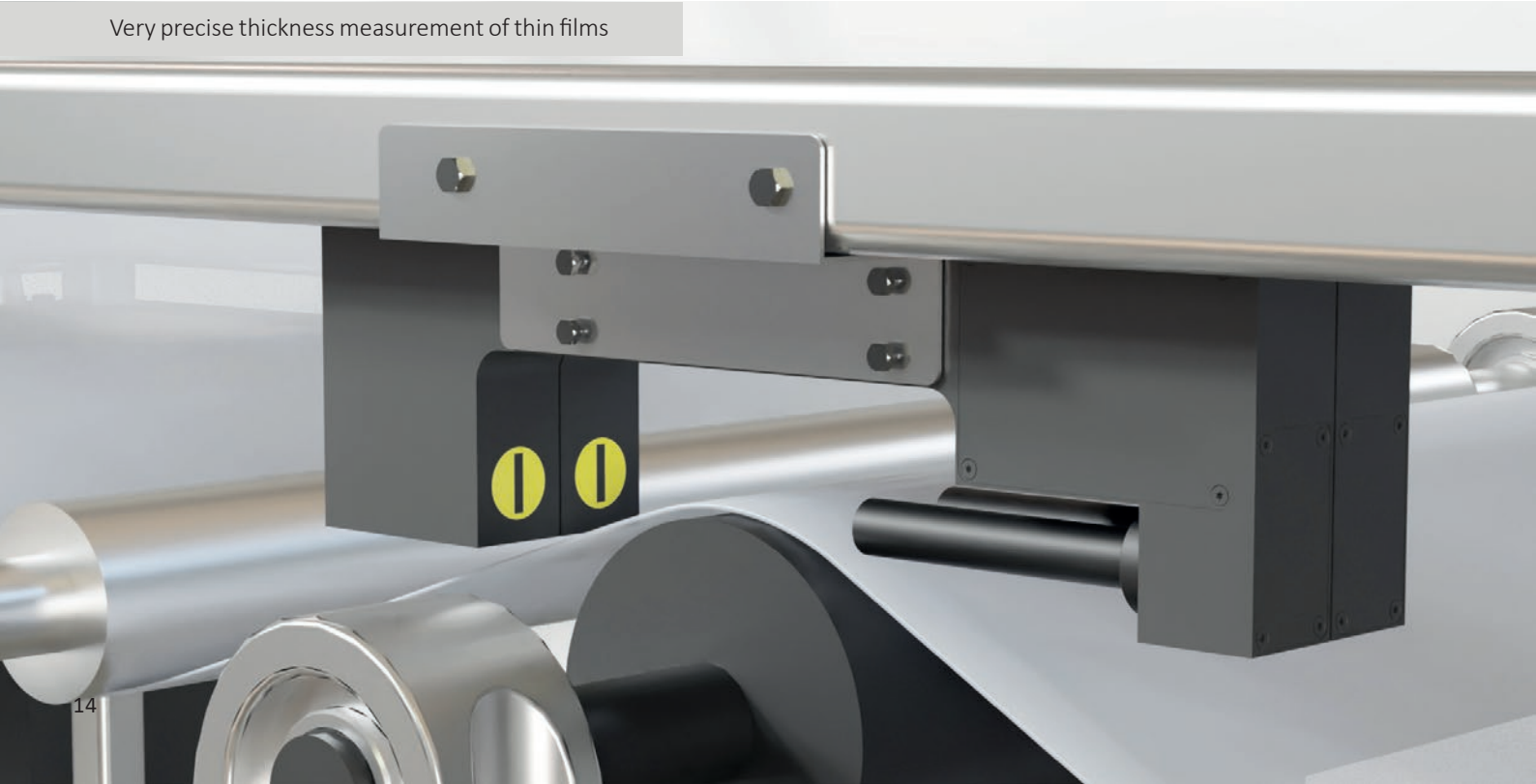
Operating principle: The laser fork light barrier consists of a transmitter with a homogeneous linear laser light beam and a receiver with closely spaced receiver elements (CCD line detector) for which macro lenses are available to increase the resolution. If an object is located in the light beam of the fork light barrier, its shadow image is displayed on the individual pixels of the receiver's CCD line. As the number of pixels on the CCD line is known, the exact dimension of the shadow image can be precisely determined.

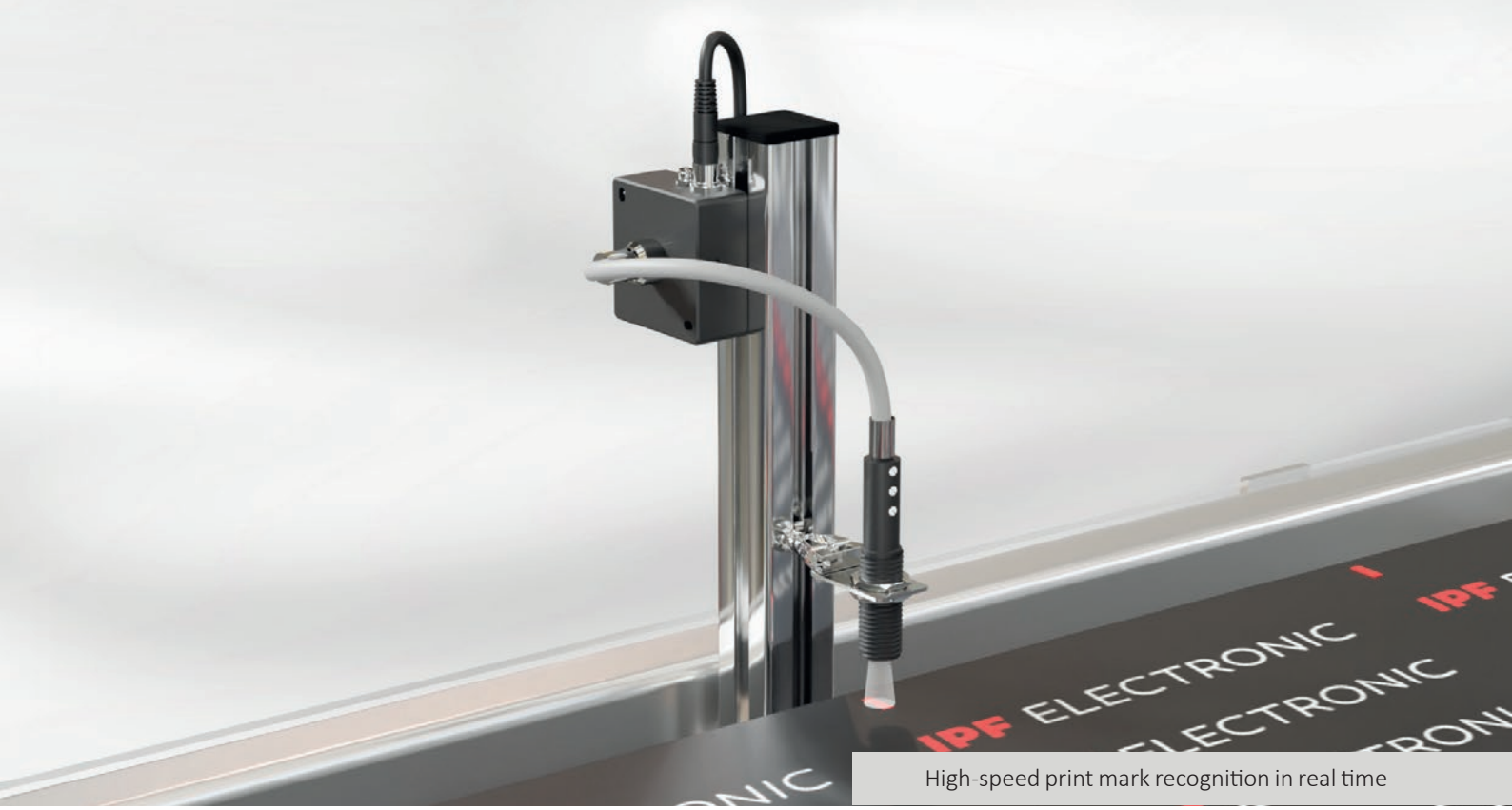
For high-precision thickness measurement, two coupled systems are used, which are positioned tangentially to the strip material on a deflection roller. One photoelectric sensor acts as a slave and detects the deflection roller, while the second system acts as a master and detects the strip material on the deflection roller. The master generates a signal for a control system (PLC) from the difference between the measurement results of the two light barriers, which is proportional to the thickness of the belt material.

HIGHLIGHTS:

- ☑ high-precision thickness measurement with two fork light barriers
- ☑ very high resolution of 0.25µm
- ☑ only 1 output signal for processing in the control unit
- ☑ simple installation and adjustment thanks to visible red light (laser class 1)
- ☑ transmitter and receiver are always perfectly aligned

Very precise thickness measurement of thin films





High-speed print mark recognition in real time

PRINT MARK RECOGNITION

CONTRAST SENSOR

To ensure that the color print on films or similar tape materials is perfect, the printing units must work in sync with each other to apply the colors evenly to the material surfaces. For this purpose, print marks are scanned at the edge of the material, with the detection of the marks serving as a control signal for the respective printing units. The optical contrast sensors from ipf electronic are extremely responsive and, in combination with various optical fibers and attachment optics, enable high precision in print mark detection.

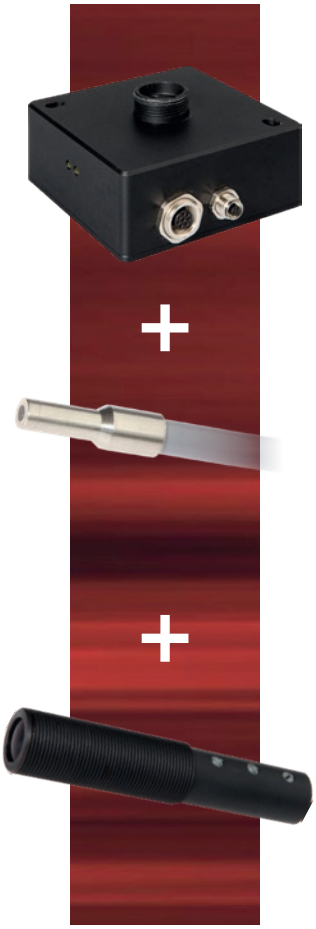
System solution consisting of **OK630180** (contrast sensor), **LT120481** (fiber optic light guide) and **AL000078** (attachment optics).

Operating principle: Contrast diffuse-reflection sensors detect the visual differences (e.g. reflectivity, differences in brightness) between directly adjacent areas on a material surface. To ensure that the sensor can be optimally adjusted under the specific operating conditions, free parameterization software is available for optimum adjustment of the switching threshold. If the amount of light reflected reaches or falls below the set threshold during operation, the sensor emits a switching signal. If more light is reflected and therefore exceeds the previously set switching threshold, the sensor does not generate a switching signal.

HIGHLIGHTS:

- ☑ large selection of light guides and optics for the sensor
- ☑ ideal for high-speed applications such as color and print mark detection
- ☑ very high switching frequency of 200.000Hz
- ☑ robust components in industrial design
- ☑ high ranges from 100mm to 200mm
- ☑ print mark detection insensitive to ambient light
- ☑ optimum setting via free software
- ☑ space-saving installation thanks to compact light guides plus optics

SYSTEM SOLUTION



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