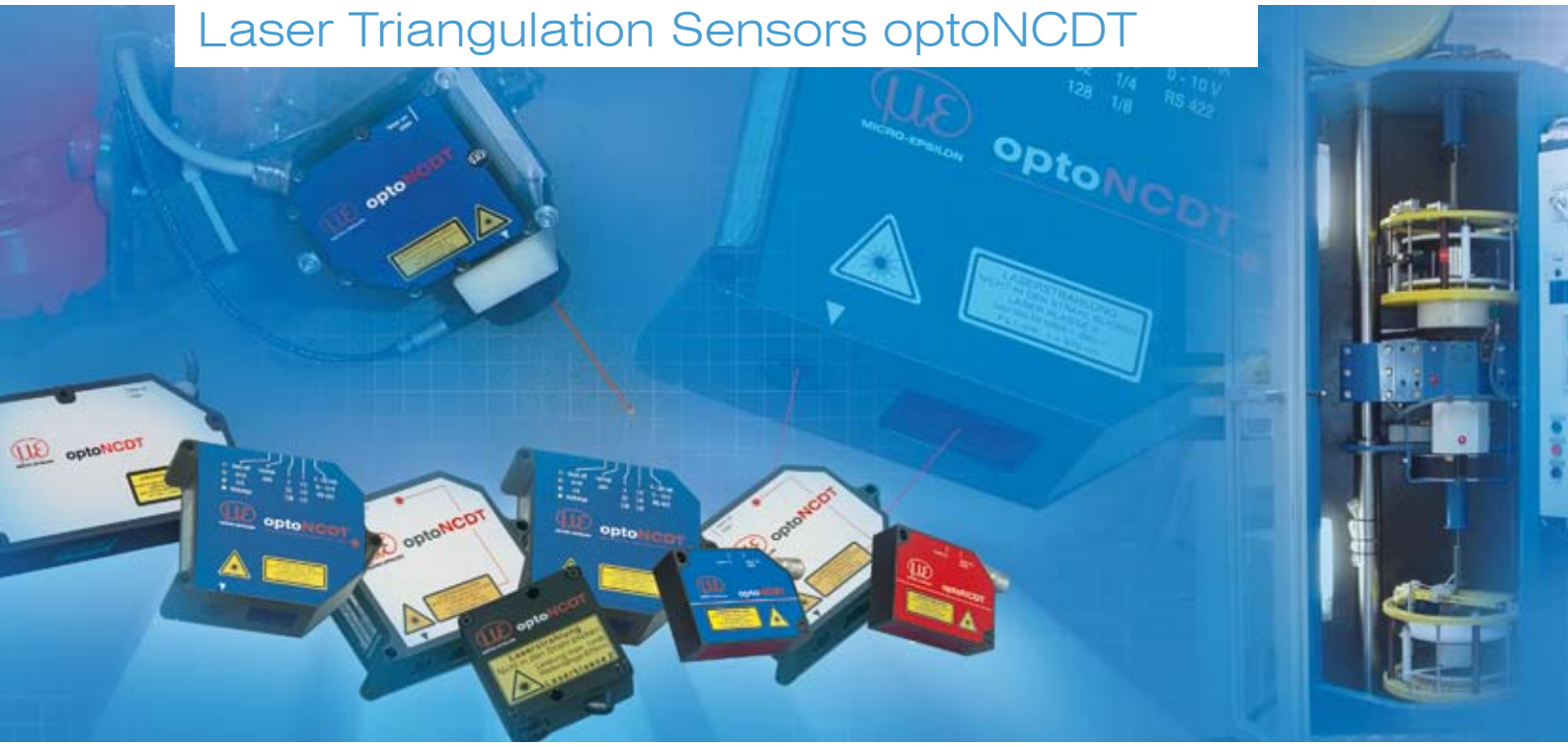
MICRO-EPSILON

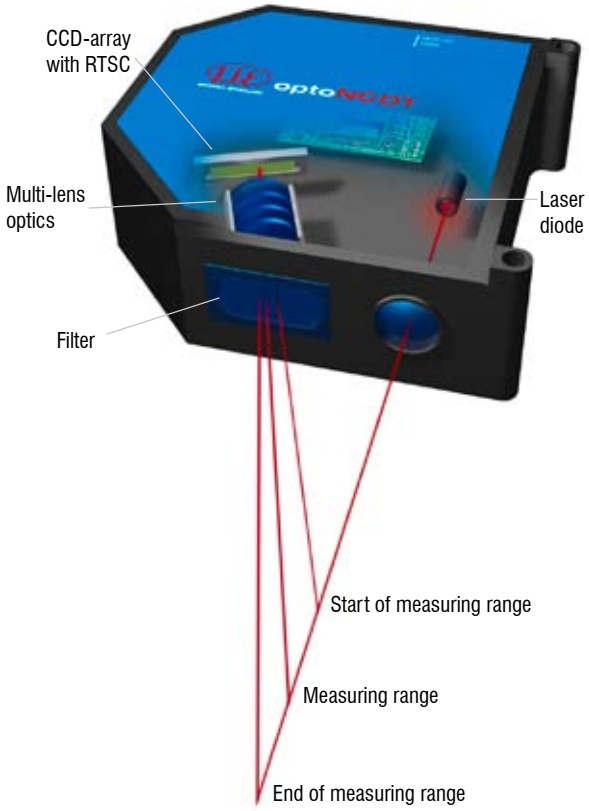
More Precision.

Application Guide
Laser Triangulation Sensors optoNCDT



optoNCDT - Measurement principle:

Laser triangulation sensors operate with a laser diode, which projects a visible light spot onto the surface of the measurement target. The light reflected from the spot is imaged by an optical receiving system onto a positionsensitive element. If the light spot changes its position, this change is imaged on the receiving element and evaluated. With the 1607 Series an analogue PSD module is used as the position-sensitive measuring element, whereas with the remaining sensors CMOS elements and CCD elements are used.



Widespread Product Group for Various Tasks

The product group optoNCDT includes 9 different series of laser sensors. The product group varies from favourable basic models for easy tasks, to standard models for laser measurements, up to completely high-end products for high-resolution and fast measurements. 49 different sensor models with measuring ranges from 0.5mm up to 750mm cater for a wide range of applications. In addition, all sensors can be customised in order to find the appropriate sensor for each measurement task.

Laser sensors are applied in almost every sector in which the measuring object can be detected optically. These sensors are used as static or traversing sensors or are mounted on robots.

Spot Size in Micrometres

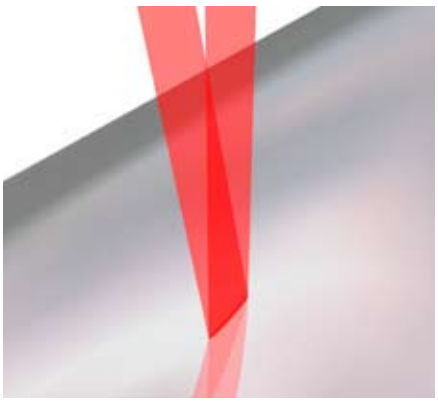
In the case of standard sensors, the laser beam is strongly bundled using a special lens design in order to detect only a few micrometres in diameter on the measuring object. This is of particular benefit in the case of very small measuring objects. Even where measurements on structured surfaces are required, a small spot size is often advantageous.

High Speed for Fast Processes

All high speed sensors with 20kHz measuring rate measure with this speed across the whole measuring range. This measuring rate of 20,000 measurements per second enables the detection of rapid movements without any signal distortion.

optoNCDT LL Series - Anti speckle sensor

The distance information for the triangulation principle is obtained via the reflection of the laser beam. Surface roughness in the sub-micrometre range causes interference in the laser spot, which leads to measurement errors being obtained. This physical effect is particularly predominant in shiny, highly polished objects and cannot be avoided using currently available products on the market. Micro-Epsilon, a specialist in measurement technology, has launched its new optoNCDT LL, which provides reliable measurements on shiny metallic objects due to an oval light spot. The point-shaped laser beam has now been widened using a special cylindrical lens and projected onto the target. The light spot is absorbed by a receiving array and evaluated. As the light spot is averaged using a special software algorithm, interference is completely filtered out. Another application area for the optoNCDT LL is structured surfaces, where the distance and not the structure itself need to be measured. The distance information is not influenced by the structure of the surface but instead provides a constantly reliable value of the distance from the target. The optoNCDT 2200LL is based on the successful optoNCDT 2200 model and so has all the other advantages of the series, including fast measured data evaluation and automatic exposure regulation in real-time. The optoNCDT 1700LL has the benefit of an integrated controller, which greatly simplifies the mounting of the sensor in confined spaces, or on robots.



optoNCDT DR - For Use with Direct Reflecting Material

Particularly in the case of optical distance measurement on directly reflecting target materials, the optoNCDT 1700 series DR version is now available. In the case of direct reflection the laser beam is reflected in one direction and so a special alignment of the sensor is required. It is essential to comply with the optical principle “incident angle similar emergent angle“. The reflected laser beam is guided into the receiving array by tilting the sensor and is then directly converted into an electrical signal by the integrated controller. The alignment of the sensor on the measuring object is effected by means of special mounting templates.

Three sensors with the measuring ranges of 2mm, 10mm or 20mm are specially designed for use with polished metals, glass or chrome-plated products. The high measuring rate of 2.5kHz and the maximum resolution of 0.1μm enable precise measurement of the requested targets. The design is similar to the popular standard optoNCDT 1700 series.

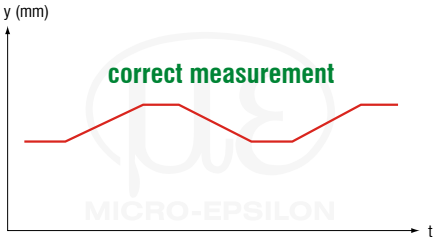
A world first: Real Time Surface Compensation (RTSC)

Through the unique RTSC function, the amount of reflected light from the target surface is compensated for during continuous exposure and in real-time. The exposure time or the amount of light produced by the laser is optimally matched to the reflection characteristics of the target surface. Unique to Micro-Epsilon sensors, this innovative real-time control always achieves optimum results, even with rapidly changing reflection characteristics.

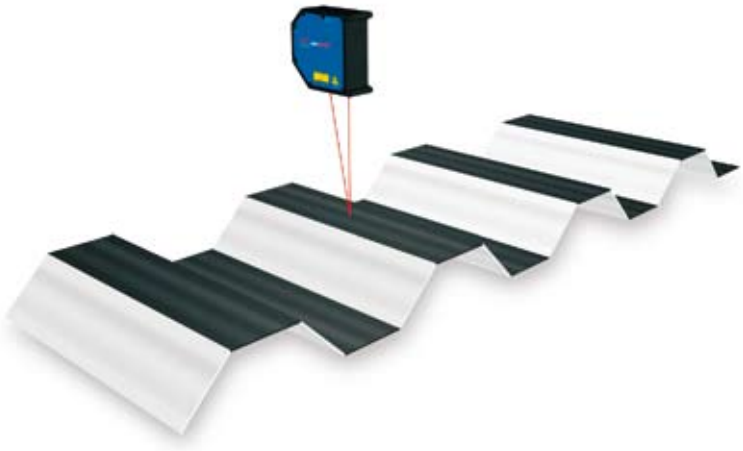
Standard, commercially available laser triangulation sensors normally operate with a time-shift control, which builds on previous measurement cycles. In this case, the amount of reflection from previous measurements is used to derive the degree of reflection for the next measurement. With changing or textured surfaces the measurement results therefore deviate noticeably from the actual measurement value, whereas optoNCDT is controlled in real time and as such, is adjusted to the optimum reflection conditions without having to apply averaging filters.

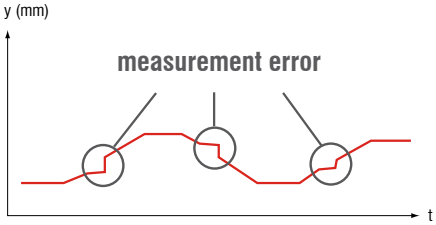
[available for all series except 1300, 1402, 1607]

Comparison: optoNCDT with RTSC and conventional sensor



optoNCDT with RTSC real-time control





Conventional laser sensors with time-shift control - noticeable errors in measurement during change of surface conditions.

Measurement of the radial deviation of a cutter disk

During the manufacture of veneer strips from laminated wood, the precision of the cutting disk determines the quality of the final product. High demands are made on the veneer strips in terms of dimensional conformance. The thickness of the strips must be less than 1mm and can only exhibit tolerances in the micrometre range. Thicker parts or splinters should never occur. These „fractions“ are only later partly plastified during the pressing process of the veneer strips to form a plate material. Consequently, pores, which substantially reduce the quality and strength figures of the veneer strips, occur in the plate cross-section.

The quality of wood plate materials is determined by the quality of the chips or veneer strips. The latter depends to a high degree on the precision of the cutting disk and the associated tolerances (cast body, blade holder, slicing blade) under production conditions and loads. To maintain the quality criteria the radial deviation of the cutting disk is measured and monitored during the production process with a non-contact laser triangulation sensor from the optoNCDT 2200 Series. This means that high demands are placed on the measurement system: dust, chippings and a shiny target surface must not affect the measurement accuracy.

The cutting disk has a diameter of 3,200mm and is fitted with 24 blades. The rotational speed is 180 to 210rpm. optoNCDT 2200 supplies constant measurement results even under these difficult conditions. A protective housing protects the laser beam from dust and chippings, which could impair the measurement results by casting shadows. The integrated high performance optical system ensures precise results, even at high speeds and with the strongly reflecting surface characteristics of the cutting disk. The measurement results are output directly to a PC via a serial interface for further processing.

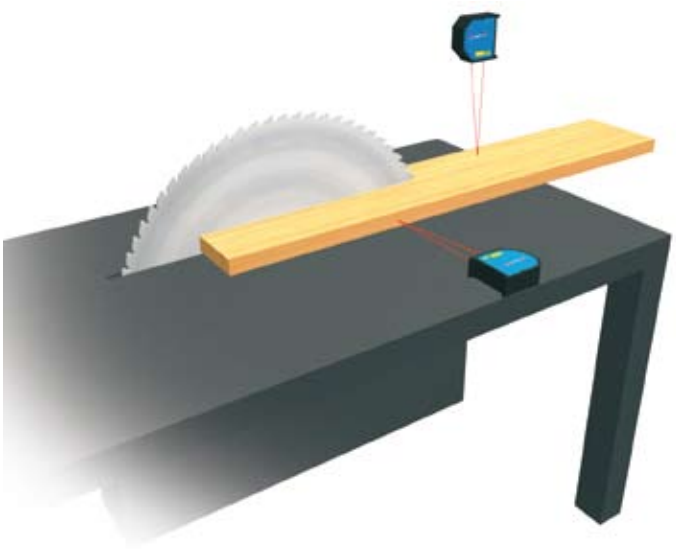
Advantages for the customer:
- High reproducibility
- Low noise
- High accuracy at a large base distance
- Direct data transfer to a PC

Optical sensors in side trimming systems of saw mills

In a saw mill, the tree trunk is stripped of its bark and then separated into planks using a gate saw, circular saw or band saw. These planks still have a so-called wane (waney edge) on their narrow sides - the original surface of the circular tree trunk. The wanes should be removed by using a side trimming system. Depending on the position of the plank in the original tree trunk, the wane can be flatter or steeper and the plank broader or narrower. If as large a yield as possible needs to be achieved during side trimming, the width of the wane must be determined, so that this can be sawn off at the appropriate width. If too much is sawn off, valuable material is wasted; on the other hand, if too little is removed there are still residues of wane on the finished board. The company Esterer WD from Altötting in Germany is using the optoNCDT1401 laser sensor for this task. Particularly when wood is wet it has a shiny surface, which conventional optical sensors have difficulties measuring. Therefore, optoNCDT sensors from Micro-Epsilon are used for the Combimes side trimming system. The planks arrive horizontally in the side trimming system and are measured. Every 30cm to 50cm, an optoNCDT 1401 sensor is positioned, which has a 200mm measuring range and measures the profile of the cross-fed plank. As standard, the measurement is made from above. The side trimming system can also be fitted with optical sensors on the top and bottom side if required. In this way, any position of the planks – wane at the top or bottom – is possible.

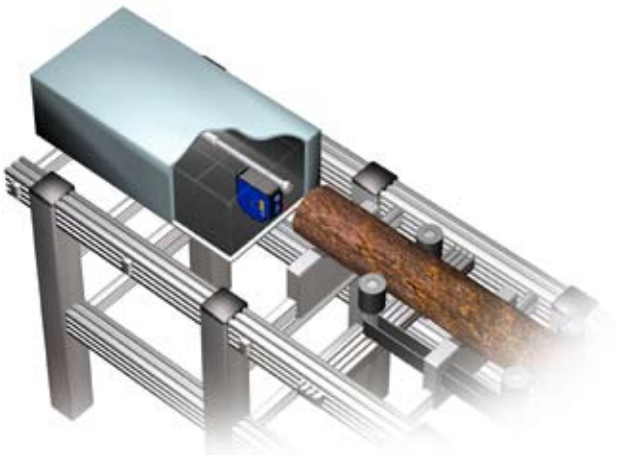
Requirements for the measuring system:
- Fast profile measurement
- Analogue output
- Low cost solution for optimum side trimming

Further applications in timber industry



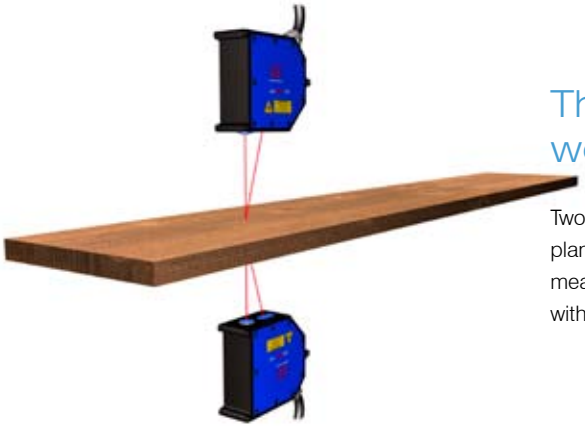
Plank position at circular saws

optoNCDT sensors are used in woodworking plants to ensure the dimensional conformance of the work pieces. Here, both treated and untreated pieces are acquired.



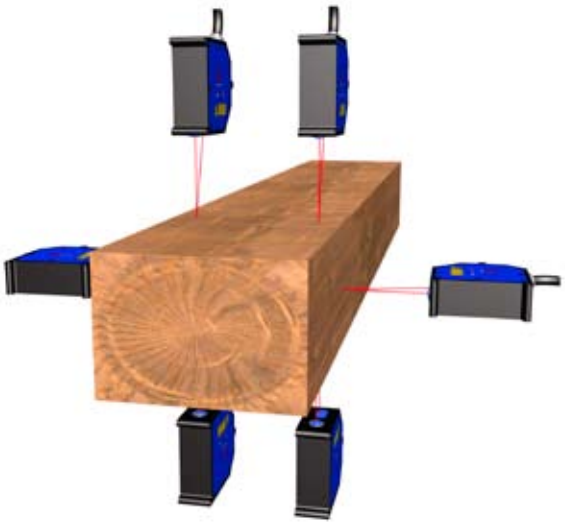
Quality inspection of wood

The E module of wood is specified during the quality inspection before cutting. In this case a plunger knocks against the wood, the subsequent vibration is detected by an optoNCDT sensor.



Thickness measurement of wood, planks and plates

Two optoNCDT sensors are used to measure the thickness of wood, planks and plates. These sensors measure in one axis on the wood. As measurements are differential, the measuring object is able to move within the measuring gap.

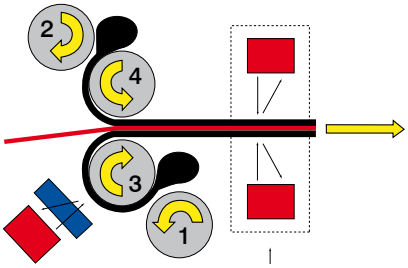


Dimension control of beams and composite lumber

In order to inspect the quality of beams and composite planks, optoNCDT sensors are used. At the end of production the sensors analyse the actual value.

Thickness measurement on the calender

Rubber-coated textile and metal fabrics form the basis of tyre manufacture. The rubber is applied to the fabric by calender rolling, which demands a uniform layer thickness for the manufacture of high quality tyres. The strength and the dimensional conformance of the tyre directly depend on the coating process. Measurement of the thickness of the rubber on both rolls is often not possible due to the way the calender is constructed. Therefore, additional measurements are made at the outlet. Two laser-based optical optoNCDT sensors are positioned above and below the coated fabric web. Due to the small measuring spot and the high resolution, it is possible to not only measure the thickness, but also the surface structure of the coated fabric. The sensors are protected against the high ambient temperatures by a protective housing cooled by compressed air.

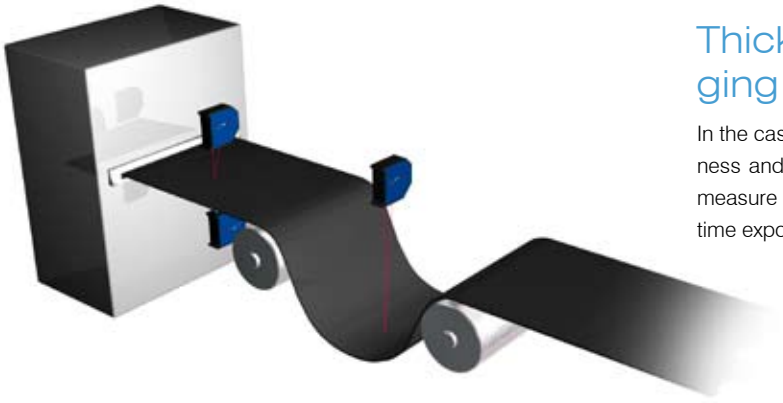


Advantages for the customer:
- Non-contact measurement
- High precision measurement against structured, high gloss, black rubber
- Small measuring spot
- Large base distance
- High measuring speed

Thickness measurement of black rubber strip for the construction industry

The measurement occurs without contact, very accurately and fast. For constant thickness measurement, two optoNCDT 1700 sensors are used which, due to the different strip widths, can be adjusted in the traverse direction. The strips must be produced with a thickness of 5 or 7mm and with a low tolerance. The measurements are passed to the existing control system via an analogue link. The distance of the reference roll is specified fixed in the controller. Therefore, only the distance to the rubber surface is required for the layer thickness measurement. Due to its controlled exposure time and measuring rate, the optoNCDT 1700 compensates for weak reflection. In this case, the measuring rate was halved, the exposure time doubled and the measurement filter set to averaging. Due to the extremely high resolution of the optoNCDT 1700, in addition to the distance, the structures in the mesh of the rubber can also be detected.

Advantages for the customer:
- Thickness measurement and detection of trends, independent of machine manufacturer
- Stable signal despite poor reflectivity
- No hazard due to emitted radiation
- Savings due to elimination of safety checks for radiometric measurement



Thickness measurement and sagging of a rubber web

In the case of extrusion and calendar planning of rubber webs, the thickness and sag play an important role. Sensors of the optoNCDT series measure each type of rubber. Precise results are achieved by using real time exposure regulation (RTSC).

Thickness of injection moulded parts

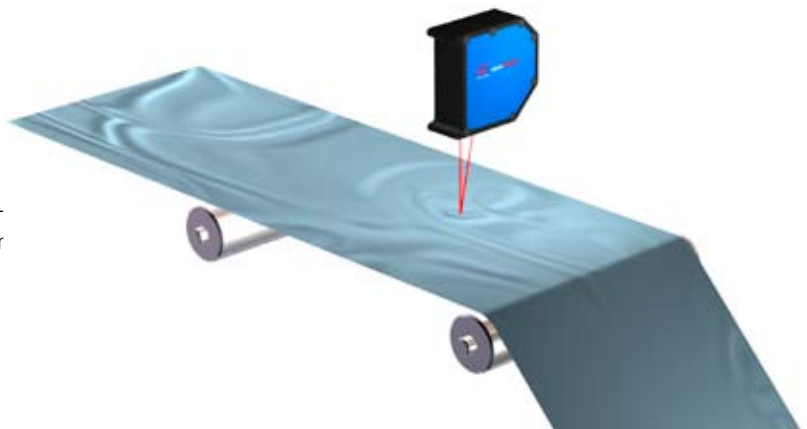
In production, optoNCDT sensors are used to detect roughness, profiles and shapes of casting and deep drawn parts. The sensor's extremely small measuring spot is of particular benefit here.

Measurement of tyre operating performance

Regardless of whether the measurement system is highly automated or manually operated, laser sensors from Micro-Epsilon are used for the quality inspection of tyres. The optoNCDT sensor operates reliably regardless of the position of the tyre to be measured.

Detection of folds of films

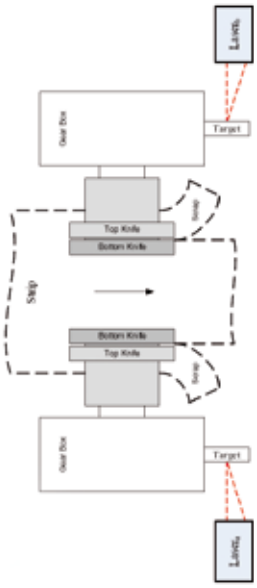
Due to the high resolution of the optoNCDT sensors, folds can be detected even on micron-thick film. Mounted over the film lane, the sensor detects where folds occur or deflection of the film.



Strip width when trimming metal strips

In the production of metal strips, it is often necessary to trim the edges of the metal strip. If the width of the metal strip has to be changed, new setpoint data of the machine controller is specified. The movable cutters automatically move to the new setpoint width. As constant faults can occur, an operator previously had to manually check the actual width using a tape measure. This procedure was neither accurate nor safe, as the operator had to intervene directly in the process. The AIM (American Industrial Metrology) company from Ohio, USA, uses laser sensors from Micro-Epsilon to measure the width of the metal strip.

For the AIM solution, a target is provided on each of the cutter drives, which the laser sensor measures the distance to. The optoNCDT 1700-500 long range laser sensor with a 500mm measuring range is used for this. The distance of the target to the cutters and the distance of both laser sensors from each other are known. The current cutting width is now measured using the differential method. The measurement results together with the setpoint data are output on a display. An operator can manually adjust afterwards or the data is used in the controller to automatically regulate the trimming process. Fully automatic regulation of the process is possible using the optoNCDT 1700 sensor. The sensors can be positioned with sufficient spacing between so that there is no danger of collision if there is a malfunction in the process.



Reason for selecting the system:
- Integrated controller
- Active exposure regulation
- Sensors at a safe distance
- High reliability

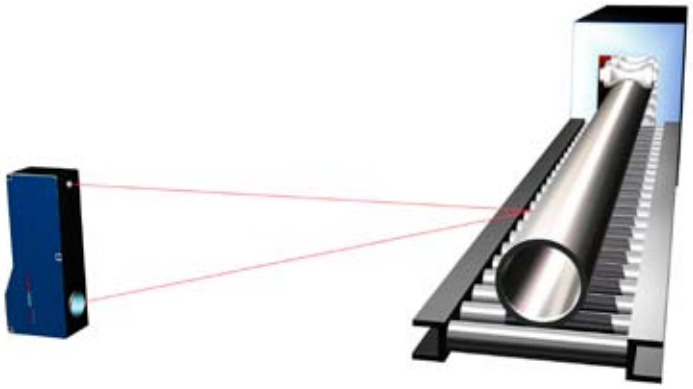
Automated inspection & repair of marine propellers

Traditionally, the inspection and repair of marine propellers has been very labour intensive, with all data collection, documentation, and blade manipulation having to be performed manually by human operators. An innovative machine has been developed to automate these processes, providing the benefits of reduced labour time, increased safety, improved repeatability, as well as computer-based data storage and reporting. The machine's designers required a high-speed, non-contact displacement sensor that is capable of dynamically profiling the blades, which can be as large as 1.5m in diameter. Due to the large size of the propellers being measured, very long measurement ranges were required for the displacement sensor. The most challenging aspect of the sensor requirement was target material and angle, since the propeller blades can be made from very shiny stainless steel at angles as high as 45 degrees from normal.

The laser triangulation model optoNCDT 1700 is uniquely capable of profiling the large and shiny propeller blades, due to its proprietary and highly sensitive CCD array. Should a propeller be too shiny for the sensor with its default settings, the unit's exposure time can be increased to allow for adequate light quantity and successful measurement. Not only did the sensor outperform everything else the engineers evaluated for this application, but it did so with standard class II laser power. This means that the shops using the machine do not need to address any regulatory requirements such as on-site laser safety officers or additional signage.

Decisive advantages:
- Ability to measure polished stainless steel target at up to 45 degree angle
- Large base distance
- Laser class II
- Integrated electronics

Further applications in metallurgical industry

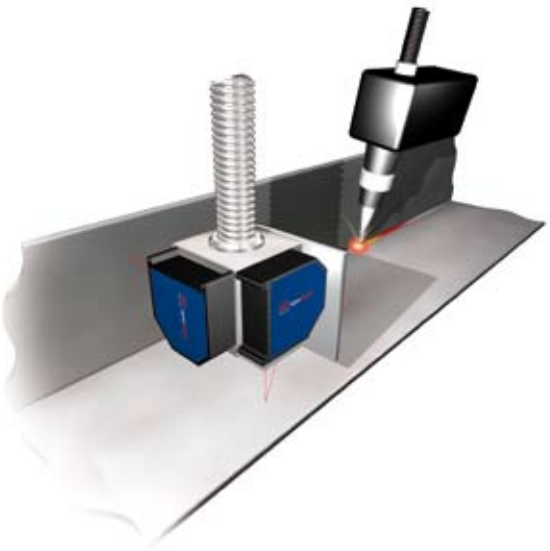


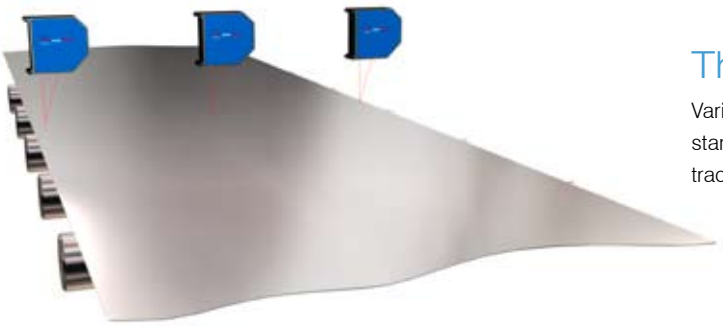
Position of steel pipes

The centre position of pipes on the lane during production is inspected by optoNCDT laser sensors. The LL function is particularly beneficial when measuring metallic surfaces.

Controlling of welding processes

optoNCDT sensors are used for the control of welding robots. The sensors recognise the exact position of the welding parts within a short time and their data provides optimum robot guidance in the running process. The partially shiny surface of the parts can be reliably measured using these sensors.





Thickness of a steel strip

Various optoNCDT sensors mounted over a metal strip measure the distance. Mounted on both sides, the thickness is measured over several tracks. LL models measure interference-free on metal surfaces.

Detection of double reduced sheets

In the case of standard processing machines, sheets or plates are worked individually. In order to prevent more sheets are worked on at the same time and that the machine is not damaged as a result, the thickness of sheets is measured at the entrance to the machine. In the case of a deviation from the specified dimensions, an error is shown.

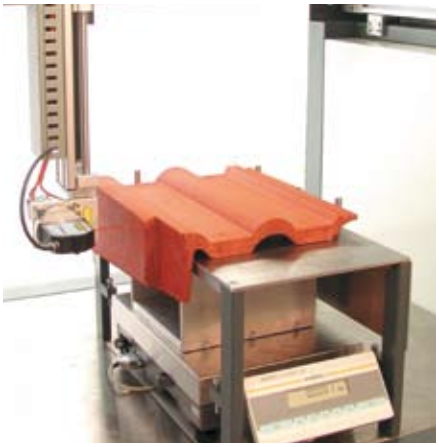
Applications in construction (industry)

Surface assessment of roof tiles

The production of roof tiles places high demands on measurement and testing methods for ensuring constant high quality product. In the DASTOKON semi-automatic measurement and test system and in the BSPK pilot plant a laser triangulation optoNCDT sensor is used for the 3D inspection and for surface assessment. The laser-based optical sensor ILD 2200-50 is mounted on a rotating, movable fixture. The profile of the roof tile in the longitudinal and transverse directions is acquired by moving along defined measurement lines over the x and y-axes in order to check the complex dimensional-conformance specification.

For the roughness measurement, the sensor is brought via the z-axis into an optimum distance position to the surface of the roof tile, giving the smallest diameter of light spot. From the large number of measurements, certain measuring points are extracted by appropriate algorithms (40 measuring points per mm) and the roughness determined.

Since optoNCDT operates with a semiconductor Class 2 laser, no special protective precautions are required against laser radiation.



Advantages for the customer:
- Checking the surface roughness
- Substantially increased inspection rate
- Systematically occurring faults are detected within the shortest time

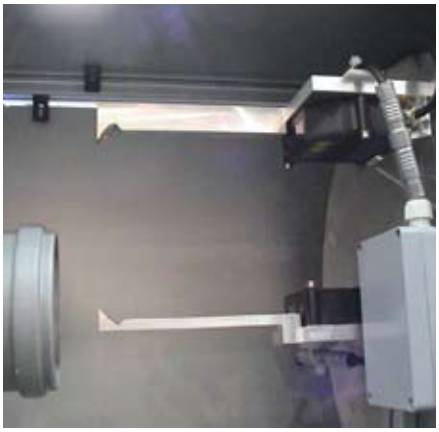
Applications in quality assurance / quality control

High precision pipe measurement

All piping systems have one thing in common; they must be absolutely leak proof for the medium to be transported. Therefore, a primary quality criterion is the maintenance of the specified target dimensions, in particular at transition points between two pipes.

The ConPro company produces complete measurement systems for the inspection of the required dimensions of pipes during production. The DimCon system is intended for random sample inspections. Pipes, fittings and sleeves made from plastic, ceramic or metals, are checked using this system. The test items are placed in the machine manually and inspected automatically.

Laser sensors are used here in order to make the measurements as fast and convenient as possible. Two optoNCDT 1700 laser sensors are used, which measure according to the differential method, i.e. both signals are evaluated together and diameter, ovality or eccentricity are output. The sensors are located on a plate with a stay and an adjustable mirror at the end, which deflects the laser beam by 90° so that one of the two sensors can measure the pipe from the inside. The plate continuously rotates and can be moved horizontally. Due to the rotation of both sensors, a continuous thickness profile of the measurement object is produced. The different measurement objects and materials place special requirements on the sensors. optoNCDT 1700 sensors measure many different materials using the RTSC function and do this with a large measuring range and base distance. Rapid evaluation of synchronous data acquisition is achieved by using the IF2004 PCI interface card.



Requirements for the measuring system:
- Accuracy < 250µm
- Large measuring range and base distance
- Synchronous operation of the sensors

Measurement of cardboard flap

Cardboard flaps that have not been closed correctly can interfere with downstream production processes. During this process, each item of packaging is inspected for the appropriate sealing. High measuring rates in the case of high resolution in the micron range are essential.

Inspection of low pressure in yoghurt pots

Since the low pressure in yoghurt pots is an essential quality characteristic before the production process is completed, all pots are inspected again. A traversing optoNCDT sensor mounted on a conveyor belt inspects any possible bumps on the cover.

Detection of dented screwtops

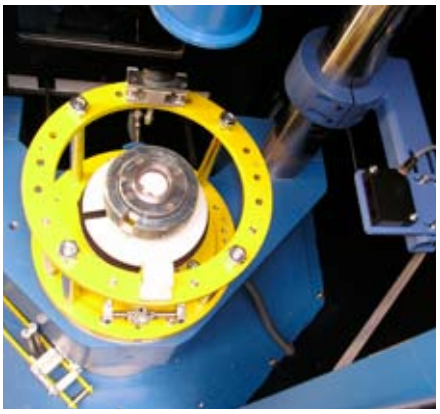
When there is too much pressure inside a bottle or the cover is faulty, this is detected by an optoNCDT sensor. Only bottles that have the correct distance to the sensor are packed. Baggy or dented screwtops are separated.

Detection of faulty labels

The process of gluing labels on glasses or pots could result in labels which develop folds. This error is detected by a laser sensor. Even being faced to a high production output in modern production optoNCDT works reliably. Since printing on the labels does not affect the measurement, the exposure regulation RTSC is of special benefit.

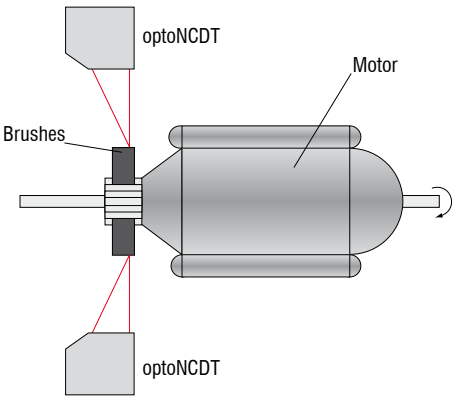
Laser sensors support cable banding

Cables are often sheathed with different materials because they are exposed to many different loads. The sheathing with different banding materials is performed by a banding machine, where optoNCDT sensors are installed. The cables can be banded with Kapton, Teflon, mica, polyester, copper or glass fibre yarn.
The unsheathed wire is fed into the banding machine from one side. The banding units consist of a receiver for the banding material, which is wound on a roll. The receiver is also referred to as a bobbin. A housing around the bobbin, also known as a head, takes over the guidance of the tape. The wire runs in the centre of this unit. When the wire is moving through the machine, the bobbin and head constantly rotate in order to band the wire with the inserted material. This is possible because the head and bobbin can rotate separately from each other and therefore achieve different tensile forces and angles.
The laser sensor is mounted in the machine next to the drum. The measurement data obtained is transmitted to a winding processor, which from this data calculates the desired torque of the bobbin drive. The problem in this application is the different materials ranging from shiny to transparent that can be located on the drum. Shiny metals present a problem for many laser sensors due to the direct reflection. The tapes used have a thickness of around 0.1mm and are 6 to 8mm wide. The optoNCDT 1401 with a measuring range of 200mm competently performs this measurement. The laser spot reflects onto the coil surface and makes a clear statement about the diameter of the coil possible. For the data acquisition, it must be noted that the head has many vertical cross members for the tape guide. These stays continuously cross the measuring range of the sensor and must be suppressed on the software side so that only the diameter value remains as the measurement result.



Requirements for the measuring system:
- Non-contact optical measuring technique
- Measurement on shiny metal
- Measuring range of 200mm

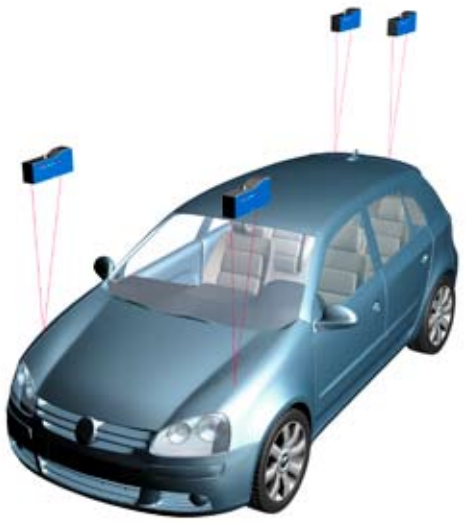
Measurement of carbon brush wear on electric motors



To increase the service life of electric motors and at the same time to optimise the current feed to the commutator, the wear of carbon brushes and the service life is tested at the development stage. The measurement takes place at the end of the brush and acquires the vertical movements of the brush, which is critical at high rotational speeds. Due to the non-contact measurement principle, there is no interference due to mechanical probing. As a result, the user obtains a true, undisturbed signal trace.
The wear measurement takes place on the test rig using laser triangulation sensors of the optoNCDT 2200 Series.

The measurement system consists of two laser-based optical displacement sensors, which are ideally suited to the measurement against dark and shiny surfaces. The carbon brush does not need to be modified for the measurement and coating of the end of the brush to improve the reflective properties is not necessary.

Reasons for the system selection:
- Precise measurement against black surfaces
- High measurement speed
- No interference due to electromagnetic fields

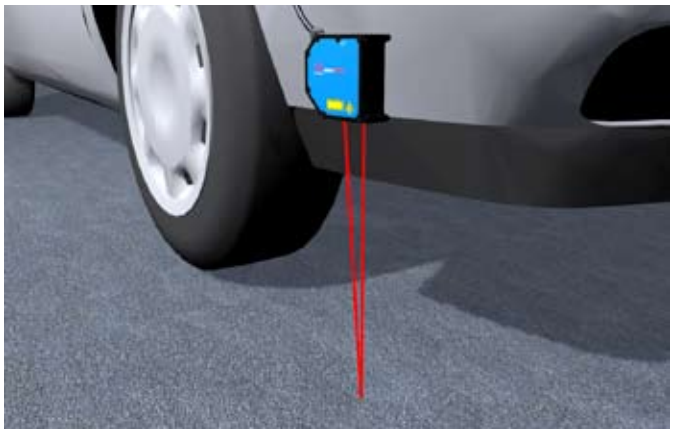


Vehicle height in case of air damping

When it comes to matching modern air damping systems, the inclination and height of the vehicle have to be continuously measured. In order to effect those measurements, sensors with a wide offset distance are used, which offer high precision and a relatively small measuring range. Different reflections due to various spray coatings are compensated for by RTSC.

Distance measurement to road traffic lanes

In road tests, pitching and rolling movements, spring compression during braking and other quantities are measured using optoNCDT sensors. optoNCDT is particularly suitable here due to its compact construction and the possibility of powering the sensor from the vehicle's own power supply. For these applications, special models with increased resistance to extraneous light and vibration are available.

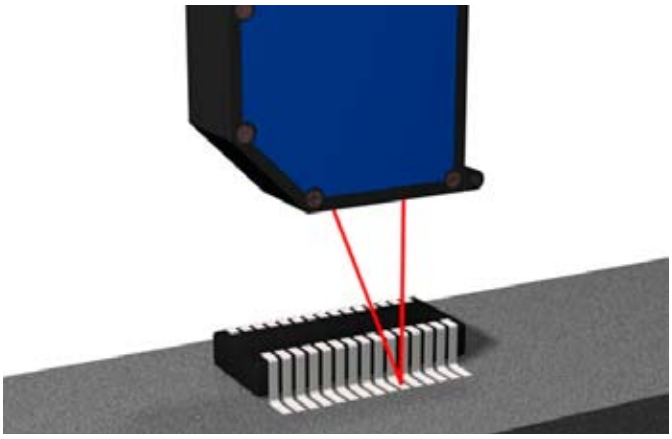


Car body positioning

For the automated processing of car bodies or vehicles, an exact determination of the position relative to the processing tool is necessary (drilling, punching, fitting, subassemblies). With its RTSC, the optoNCDT sensor is ideally suited to the highprecision acquisition of sprayed surfaces.

Shape inspection of aluminium wheels

After casting, aluminum wheels are measured for a range of properties, e.g. hub depth, roundness and bulging. If the dimension had been achieved, will be proofed on different test benches. For the dimension control, optoNCDT sensors are used.

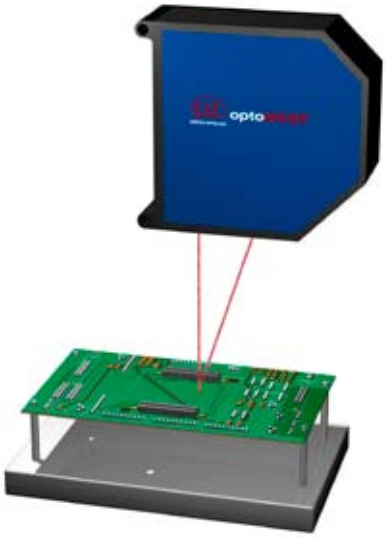


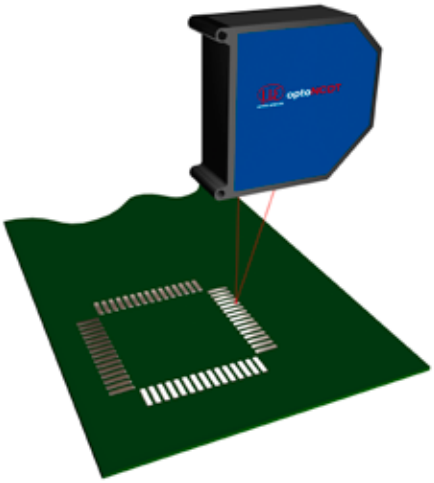
Inspection of IC pins

To achieve the highest quality during board assembly, all IC pins must lie in one plane. In modern automatic placement systems, the ICs are measured directly before placement. The tiny light spot diameters enable the measurement of the smallest pin geometries.

Deflection of plates

Larger plates can bend or bow due to a defective assembly, which might result in the cutting of electrical connections. Deflection of plates is therefore measured using laser sensors.





Height measurement of soldering paste

In modern soldering machines, the soldering paste is applied automatically. Sensors of the optoNCDT series inspect wether the correct mass of paste has been applied.

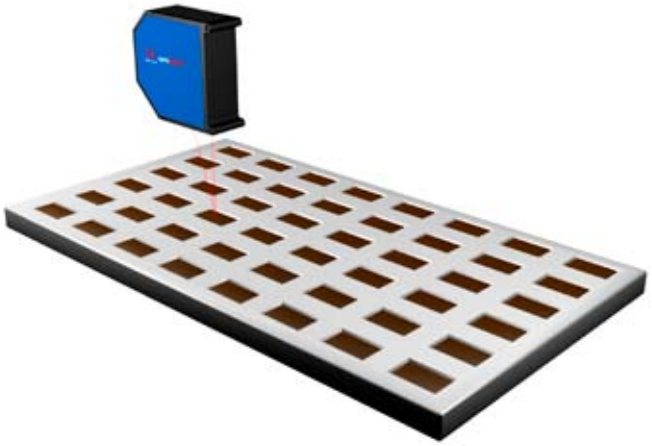
Bearing tolerances in hard drives

Due to the high speed of panes (Platter) of hard drives, no tolerances are allowed with regard to the spindle that connects the individual panes. The extent to which the panes oscillate is measured by optoNCDT sensors. An essential factor is therefore the resolution in nanometre range regarding shiny surfaces.

Other applications

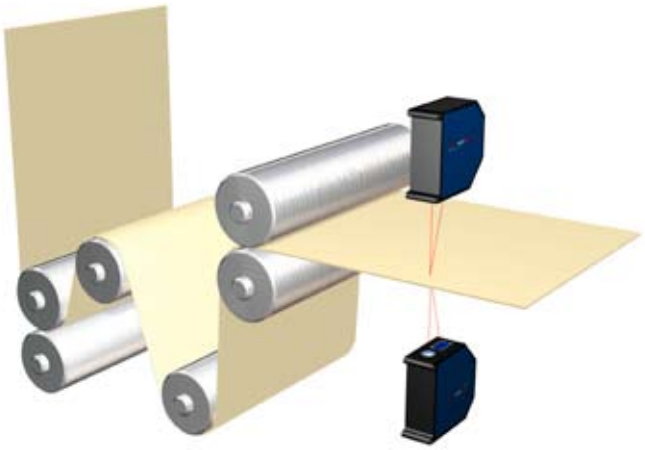
Dimension control

Even very small deviations in the dimensional accuracy of camshafts can significantly affect the smoothness of the engine. Therefore, camshaft dimensions are measured using optical sensors. Since the measurement of shiny surfaces can be carried out very easily, Micro-Epsilon's LL models are of great benefit here.



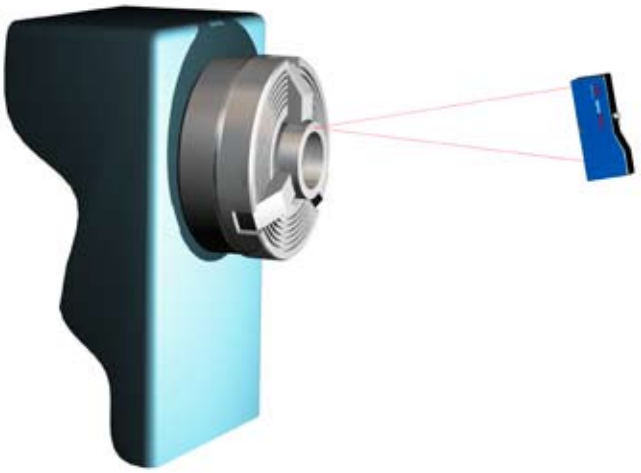
Fill quantity in confectionery

During the production of sweets and confectionery, individual moulds are filled with dough or raw mixture, the correct fill quantity is confirmed by using optoNCDT sensors. More sensors can be used to detect fill quantities during multi-lane processes.



Thickness of pasta dough

The thickness of permanent lanes, e.g. pasta dough, plays an important role in the food industry. Thanks to two optoNCDT sensors, the thickness can be easily measured. Alarm limits are set up and used for controlling further processes.



Tensioning of tools

In the case of machine tools, the tools are often picked up and placed automatically. Applying optoNCDT sensors enable inspection if the tensioning of the tool was successful.

Available sensor models

optoNCDT 1302

Our low cost series offers a basic entry-level sensor for standard measuring tasks. Measuring ranges between 20mm and 200mm cover a diverse range of applications. The sensor operates with an integrated controller and has a very compact design. The analogue output offers various possibilities with regard to further signal processing.

optoNCDT 1402

optoNCDT 1402 is a laser sensor with an integrated digital signal processor. Due to its automatic exposure regulation (RTSC) the sensor measures distances without contact against a wide variety of material surfaces. The sensor can easily be adapted to the measuring task by using a rotary cable connection, an analogue output and RS422.

optoNCDT 1607

The analogue series optoNCDT 1607 is ideal for high speed measurements. The intelligent sensor adapts to the reflection characteristics of the measuring object. The analogue output offers various possibilities for subsequent use of the signal.

optoNCDT 1700

This represents the standard on the market for precision laser distance measurement using laser sensors. The sophisticated concept uses an integrated controller that enables measuring rates and exposure times to be adjusted, offering numerous application possibilities. The integrated RTSC function changes the exposure time of the sensor in real time.

optoNCDT 1810/2210

Where there is a danger of collision or high temperature of the application, the long range models are recommended. Due to their large offset distance, these sensors are located a safe distance from the target object. However, the relatively small measuring range between 10mm and 50mm enables high precision measurements to be obtained.

optoNCDT 2200

The optoNCDT 2200 laser sensor series achieves excellent precision. As the optoNCDT 2200 operates with an external controller, the measuring head is extremely compact. High precision measurement against different surfaces is guaranteed by the Real Time Surface Compensation.

optoNCDT 2220

Laser sensors of the series optoNCDT 2220 offer excellent precision - in all measuring ranges and with a 20kHz measuring rate. The high performance model is suitable for fast processes and difficult measuring tasks.

Customised Sensors

Special applications often demand special requirements regarding the sensor technology. Therefore, we modify our sensors according to your requirements. This often concerns output types, housing material, offset distances or connectors. Furthermore, all sensors are available in special versions e.g. resistant to vibrations, for vacuums, lightweight versions, etc.

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