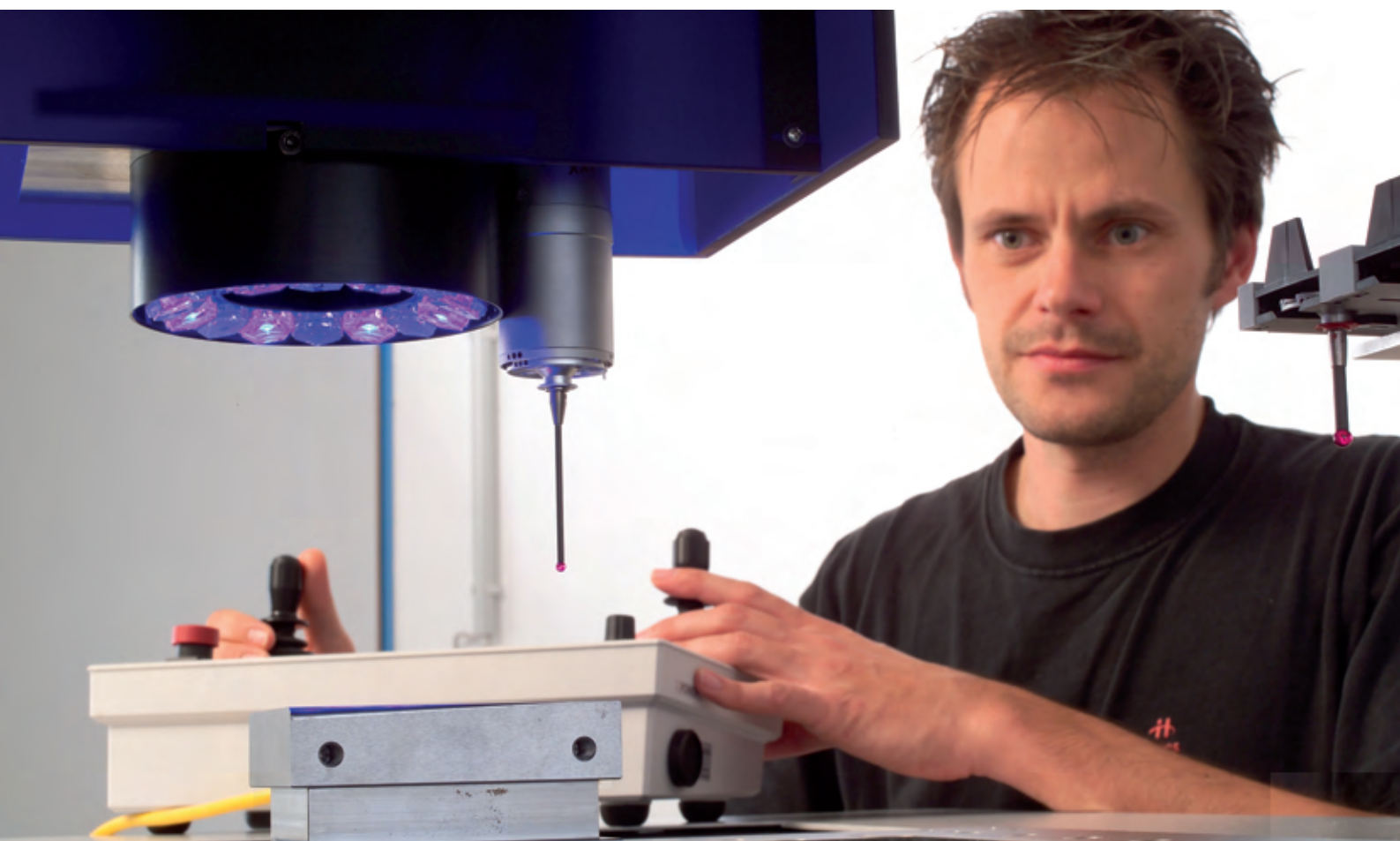
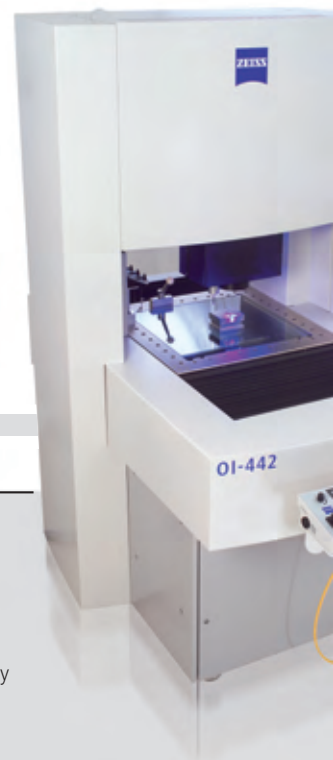


O-INSPECT. The Next Generation of Optical Contact Scanning.

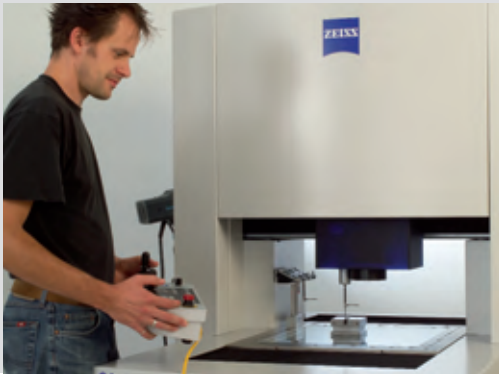


We make it visible.

O-INSPECT. Multi-sensor system.



Key features



Proven design principle

- Bridge-type measuring machine with fixed bridge and moveable table for high accuracy and optimum accessibility

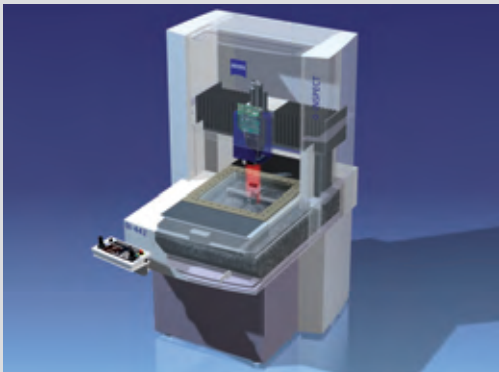
Well-equipped basic configuration

- Standard configuration with multi-sensor technology
- Optical measuring and contact scanning with VAST XXT technology in one machine

Ergonomically optimized design

- Can be operated and loaded from all sides
- Direct connection to palletizing system possible

Machine technology



Reliable drive technology

- Precision roller bearings in all axes
- Highly dynamic drives and automatic drive monitoring
- Compensation of guideway errors (CAA corrected)

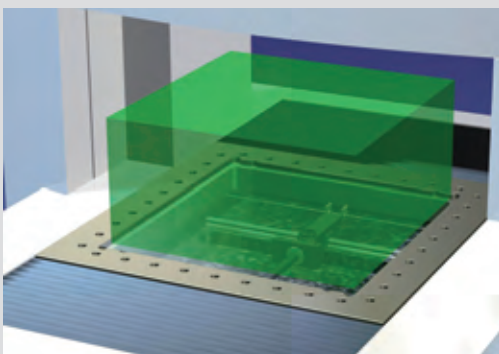
Ideally equipped for inline measuring

- Completely covered guideways
- Integrated damping

Field-tested components

- ZEISS Discovery zoom lens for optical measuring

Measuring range



Measuring range for a broad measuring spectrum

- 400 x 400 x 200 mm

Max. workpiece weight

- 40 kg

Wide range of uses

- Electronics, plastics, medical and automotive industries, precision mechanics

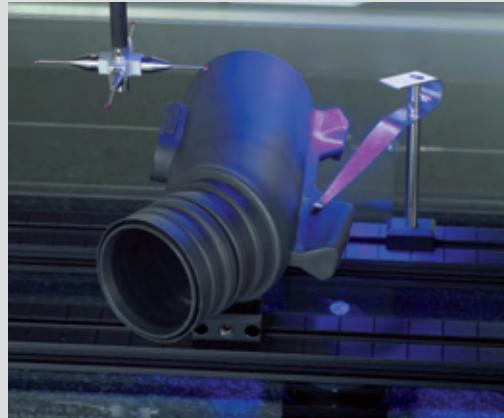
Sensor systems

Discovery zoom lens from Carl Zeiss

- Optical 2D camera sensor with image processing functionality
- 12x zoom lens from Carl Zeiss
- Unique illumination through coaxial transmitted light and 16 segment multi-color ring light

VAST XXT scanning sensor

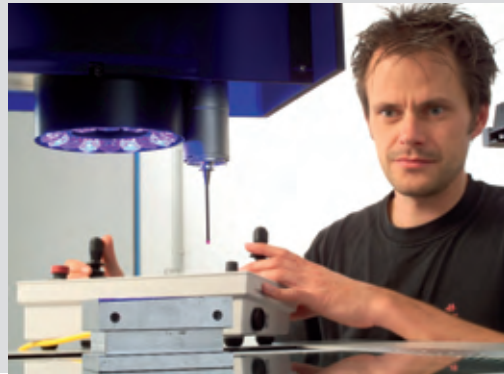
- Passive measuring probe for single-point probing and scanning
- Stylus receptacle for CNC-guided stylus change
- Lateral styli up to 40 mm, styli in three directions



Operation

Simple and self-explanatory

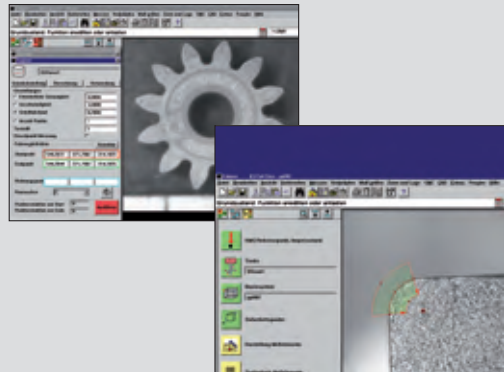
- Optical measuring based on the "What-you-see-is-what-you-get principle": what is sharply focused on the monitor can be measured accurately
- Easy change between contact scanning and optical sensor (also during CNC operation)
- Combination of optical-contact measuring methods in one run
- Metrology evaluation in a familiar software environment (CALYPSO)
- Standard control panel for manual control
- Potentiometer for speed control during CNC operations
- Easy operation and palletizing from all sides



Software

Two sensor systems – evaluation with one software

- New optical measuring technology, known evaluation environment: CALYPSO for everyone
- 3D, CAD-based measuring software with fully integrated optical functionality
- Measurement reports already created with CALYPSO can also be used for a contact measuring machine
- Simple user interface



Precision

Precision

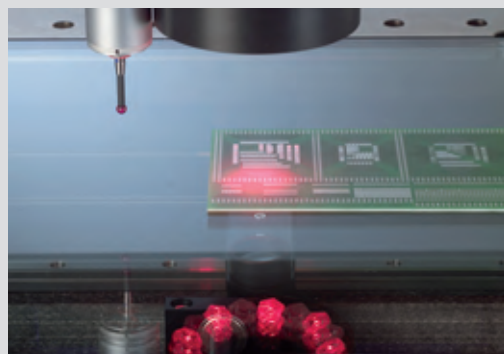
Accuracy complies with DIN EN ISO 10360-2:

VAST XXT

- $MPE_E = 1.9 + L/250 \text{ } \mu\text{m}$ (L in mm)
- $MPE_P = 1.9 \text{ } \mu\text{m}$

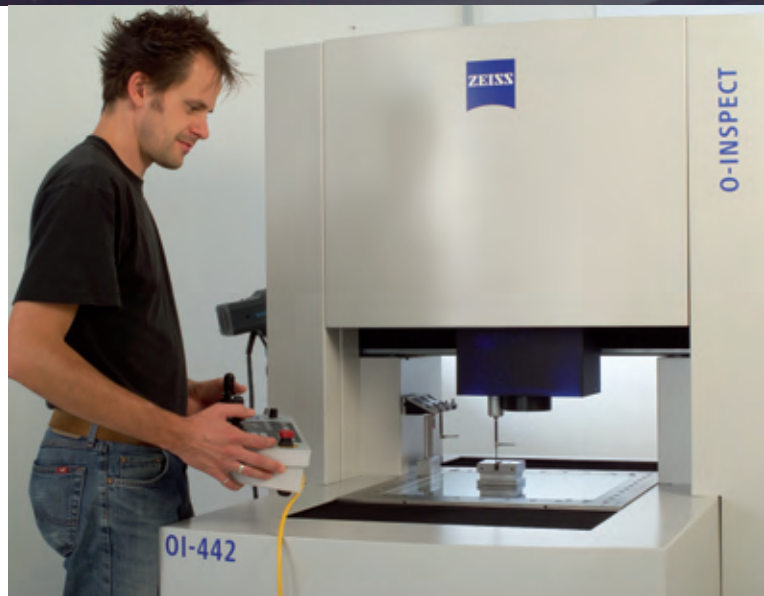
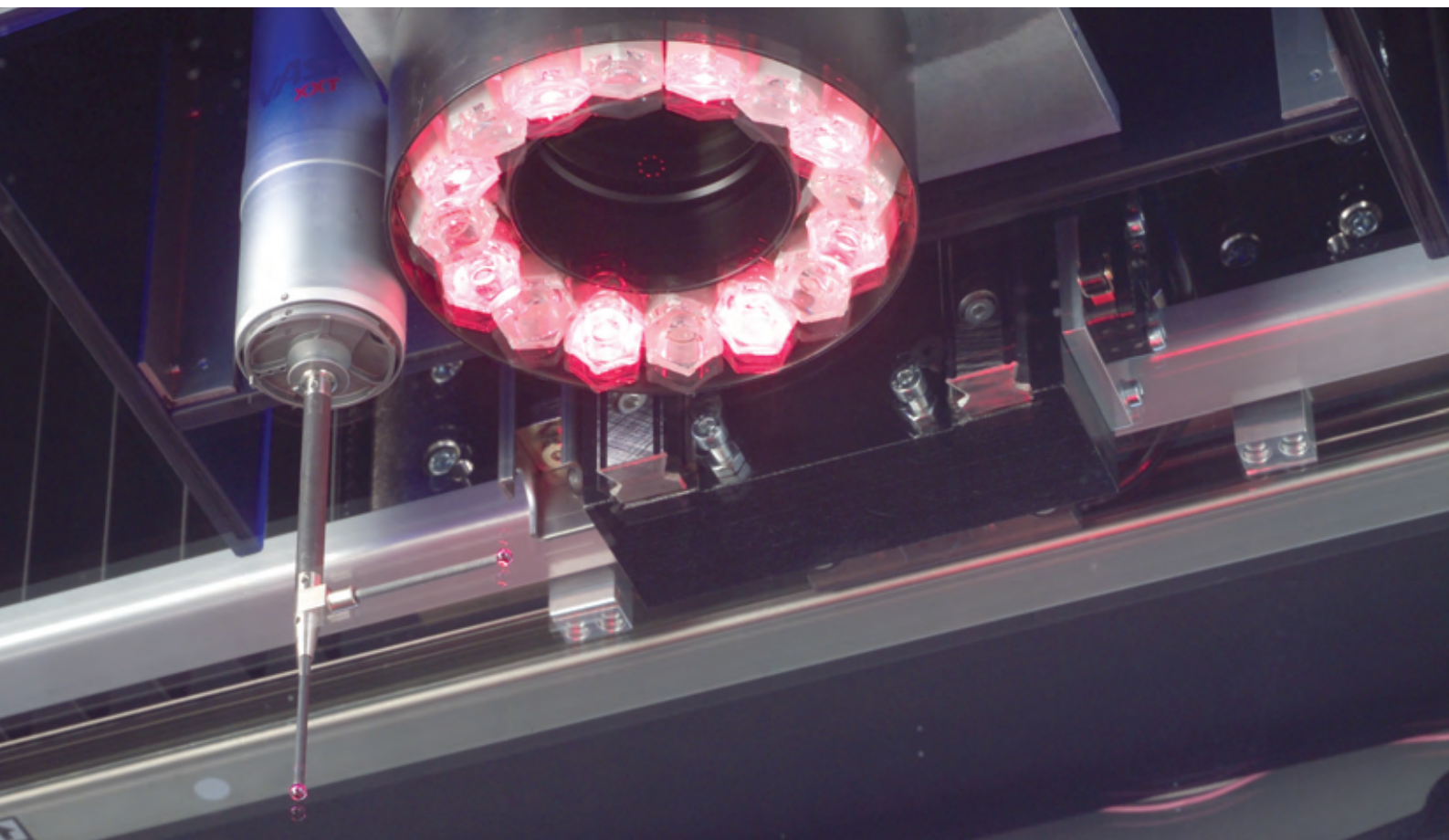
Discovery zoom lens

- $MPE_{E2D(OT)} = 1.9 + L/250 \text{ } \mu\text{m}$ (L in mm)
- $MPE_{PF(OS)} = 1.9 \text{ } \mu\text{m}$



Fusion of the best.

The best from coordinate metrology combined with the best from optics, both from Carl Zeiss. With O-INSPECT, we succeeded in bringing this multi-sensor system work of art to life. See for yourself how flexible and extensive the range of applications of this new measuring machine is.





Four in one

Before O-INSPECT, if you wanted to manage the entire range of measuring applications, you needed four measuring machines: a profile projector, a measuring machine, a microscope and a contour measuring machine. However, O-INSPECT is much more than a four-in-one machine: this multi-sensor measuring machine provides very precise measuring results with optimum reproducibility, measuring results that can be evaluated and statements on form and position tolerances.

Multi-sensor system

Plugs no larger than a few millimeters, the smallest springs and implants – workpieces in metrology are becoming smaller and more complex, and part features increasingly more difficult to inspect. A measuring machine which makes it possible to complete this variety of tasks must be a true all-rounder. Traditional contact measuring methods are often no longer sufficient, extremely small and complex parts can often only be inspected optically. O-INSPECT, the new multi-sensor measuring machine from Carl Zeiss, is the ideal solution for applications in the plastics industry, medical and automotive technology and in precision mechanics –



always when a large number of components have to be measured with high accuracy.

The best from ZEISS in one measuring machine

Contact and optical, two distinctive systems in one machine – this is what makes O-INSPECT unique. With VAST XXT, scanning is integrated as a standard function and ensures maximum accuracy. In addition to this contact measuring system, O-INSPECT is equipped with an optical sensor. The optical 2D camera sensor is not only capable of highly accurate image processing, it also works with the best from our optics division: the 12x Discovery zoom lens detects extremely small or complex part features with razor-sharp definition. Additionally, a professional HD measuring camera chip has been integrated into the camera sensor.

O-INSPECT means optical and contact measurements with one measuring machine, in one setting, on one workpiece, in one measuring run.

Proven design with high-tech equipment.

The environment of an installed coordinate measuring machine is often as varied as the range of parts measured on a multi-sensor measuring machine. O-INSPECT delivers very precise results in any measuring environment.

Traditional design

A particular feature for a measuring machine from Carl Zeiss: the proven design with a fixed bridge was chosen for O-INSPECT. The coordinate measuring machine is more flexible, can be loaded from all sides and the stylus changer can be easily set up.

Fast, but still accurate

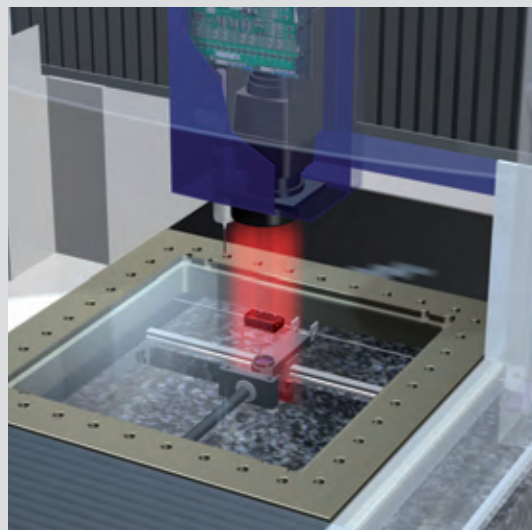
All axes are equipped with precision roller bearings, highly dynamic drives and automatic drive monitoring – the foundation for acceleration values of 500 mm/s². Guideway errors are largely compensated for with O-INSPECT, the same as with all measuring machines from Carl Zeiss. All 21 component deviations of the axes are CAA-corrected. With this optimization, the guideways establish the design basis for speed and accuracy which are particularly necessary for scanning.

Optimal results in every environment

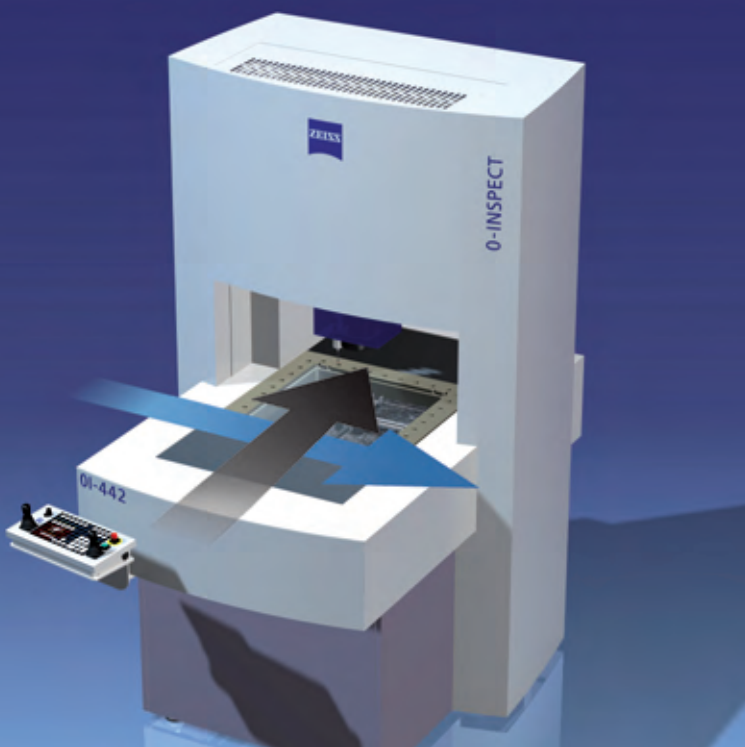
A measuring machine should be capable in any environment. Ideal conditions such as those in a measuring lab are unrealistic given the broad range of applications of O-INSPECT. For this reason, O-INSPECT is built for every measuring environment – the measuring lab, near the production line or on the shopfloor. Enclosed guideways and an integrated damping system ensure to dirt, dust and floor vibrations at the sensitive locations.

Open on all sides

O-INSPECT is designed to measure a large number of parts quickly and very accurately. For a measuring machine, this means optimum accessibility and a direct connection to palletizing systems. The fixed bridge enables the operator to load O-INSPECT



from all sides – front and back, left and right. The stylus rack system was specially placed outside to avoid unnecessarily limiting the measuring range and keep the machine open on all sides.

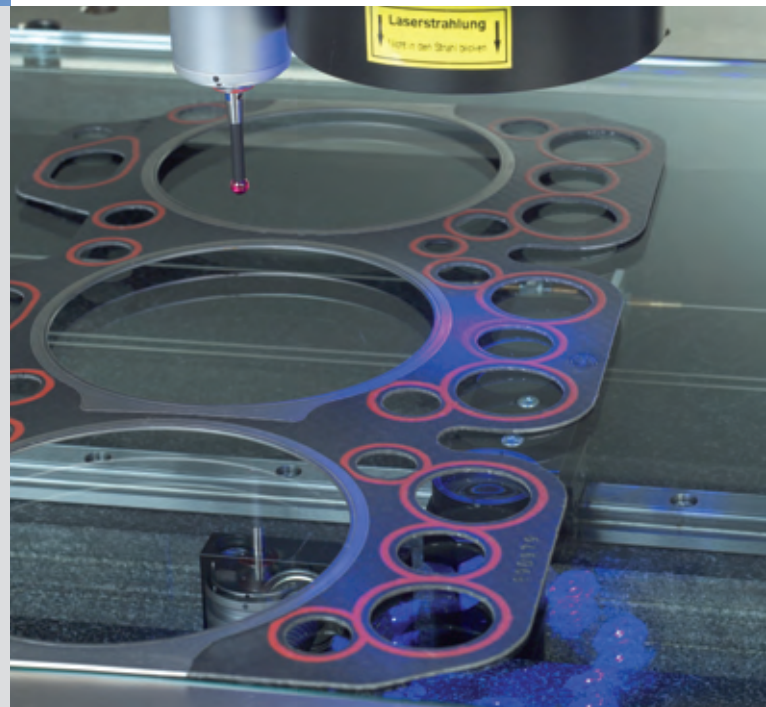


Airbag for the sensor system

The sensors are well protected: the support arm is equipped with a magnet mechanism to ensure that the styli can be quickly and safely switched. The sensors themselves feature the proven collision protection from Carl Zeiss. If the sensors collide with the workpiece, the sensor carrier bends downward and the drives automatically shut down. The result is a cost-saving bonus not available on every measuring machine.

Plug and measure

O-INSPECT is ready for use faster than any other machine. The installation is usually completed within one day depending on the size of the machine. This plug-and-measure principle is very practical for your everyday routine. If the production process changes, the coordinate measuring machine can be easily moved with a forklift if necessary. Simply turn it on and continue measuring.



O-INSPECT - FUSION OF THE BEST

- Fixed bridge, moveable table
- CAA corrected
- Suitable for the measuring lab, near the production line or on the shopfloor
- Can be loaded from all sides
- Plug and measure: turn it on and measure

Optical expertise from the market leader.

Lenses and optics from Carl Zeiss stand for maximum quality and unparalleled focus. O-INSPECT features all our optical knowledge, coupled with the measuring technology of the innovation and technology leader. It is simply impossible to measure more precisely or powerfully.

IPcam: perform optical measurements very accurately and quickly

O-INSPECT is equipped with an optical 2D camera that features image processing functionality. As with a camera, the lens reproduces the object on the camera. Combined with the lens and the additional software, the integrated professional HD measuring camera chip achieves maximum measuring accuracy. Unlike other optical measuring devices, the CCD chip is extremely fast: it takes up to 50 images per second – the basic requirement for fast measuring and optical scanning.

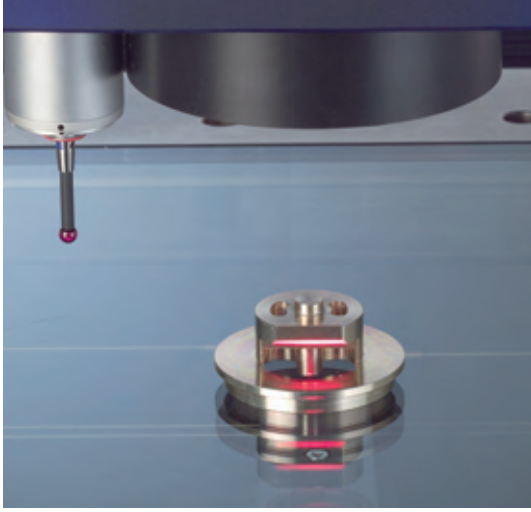
Continuous zoom

IPcam consists of a gigabit-ethernet camera system and the Discovery lens from Carl Zeiss. The 12x zoom lens features an image field of 1 x 1 – 12 x 10 mm. Unlike other manufacturers who work with fixed lenses, the working distance to the workpiece always remains the same because of the optical zoom. Lenses do not have to be changed.

The benefit: a part can always remain in the same location during a measurement; the optical sensor can be set to a very large object field of approx. 12 x 10 mm. The fixed calibration steps which ensure the maximum calibration routine and thus high reproducibility of the measuring results are also unique. The combination of the 12x zoom, fixed calibration steps and a large image field on O-INSPECT enable the operator to adjust the visual field to the measuring task, not vice versa.

O-INSPECT - FUSION OF THE BEST

- 2D camera sensor with image processing functionality
- Professional HD measuring chip with 50 images per second
- Pre-calibrated zoom setting for maximum calibration routine
- 12x zoom

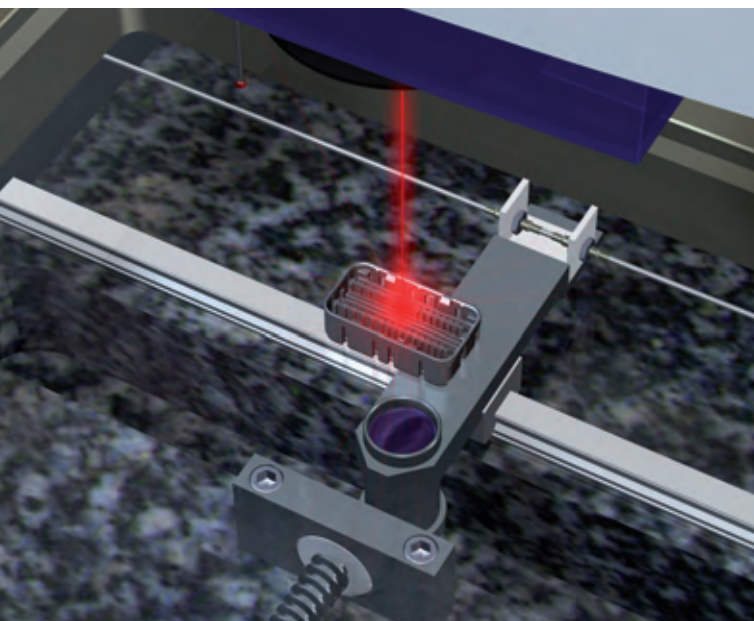


The right combination is key

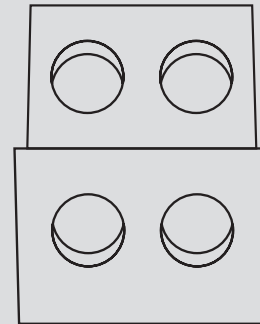
The quality of an optical measurement largely depends on two factors. You can only measure what you can see. This means that the optical sensor must be fast enough to ideally display the part at any level of magnification. What appears sharply focused and true to scale in the image can be precisely measured. For this reason, the optical sensor must feature telecentricity for the part to be imaged true to scale. A good optical sensor features both.

The secret of telecentricity

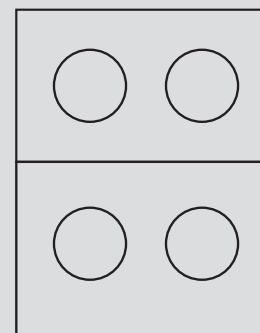
Telecentric means the imaging scale does not change relevant to accuracy when distances in the telecentric region change. This has nothing to do with depth of field. However, the depth of field range is always smaller than the telecentric range. If the distance changes within the telecentric range, a telecentric lens does not require an autofocus between the single measurements to keep the reproduction scale constant. We developed an entirely new lens for O-INSPECT because standard telecentric lenses are often less powerful and have a lower Z probing accuracy.



Discovery is a 12x zoom lens that is only telecentric in the middle position. This has two reasons: highly precise measurements require the highest zoom level and extreme speed. Discovery is therefore not telecentric in the upper zoom range. The same applies to the lowest zoom setting: overview photos are primarily taken here which require intensive light, particularly with dark plastic.



A normal, non-telecentric lens works with the central projection principle. Here, you can clearly see the perspective imaging of the bores and the example workpiece.



A telecentric lens ensures the reproduction scale. The two bores and the entire workpiece are reproduced with the same size ratio. The size of all details of the image remain constant within the given telecentric range.

You see what you measure.

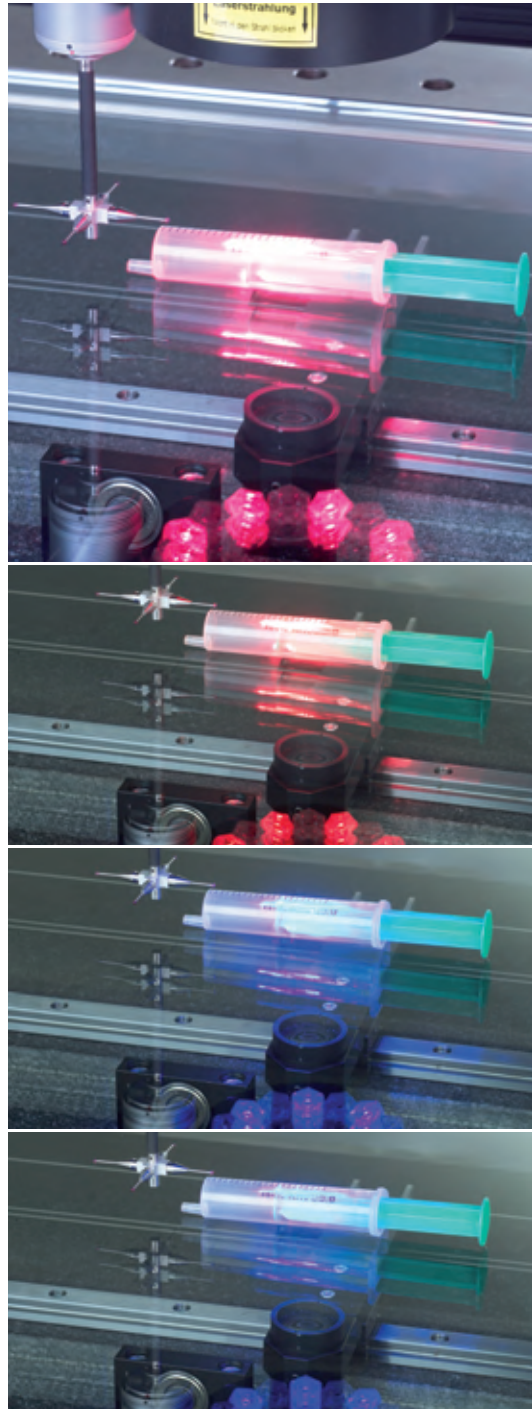
Optical measuring is based on the evaluation of gray values. The easier it is to recognize the contrasts and thus edges, the more precise the measuring result. Therefore, the optimal illumination of the part, in addition to the exact recording of a work-piece using a lens, is vital for the measuring accuracy.

Putting it in the right light

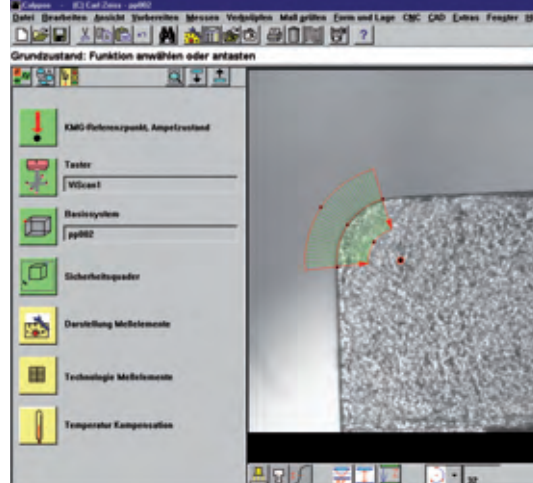
The basic requirement for efficient, precise optical measurements is illumination that can be adjusted to the measuring task. The better the illumination of the part features during an optical measurement, the better the contrasts and the accuracy of the measurement. O-INSPECT is therefore equipped with three illumination systems.

Ring light with different wavelengths

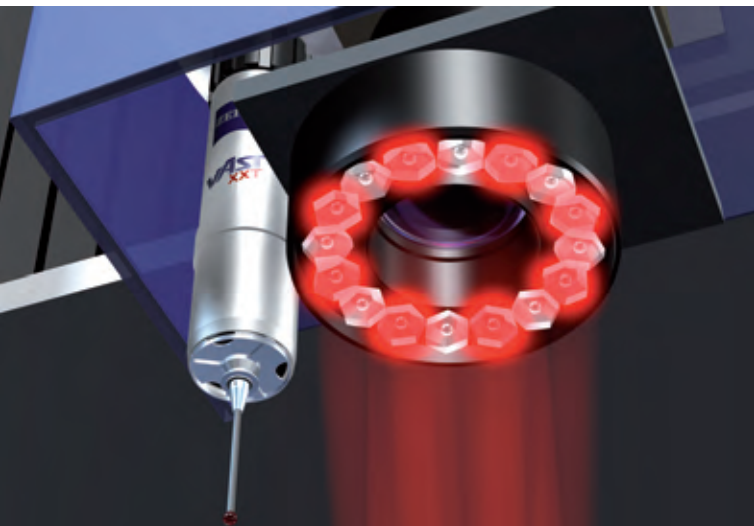
The ring light illuminates the part from the side and is used to enhance the contrast of 3D features. O-INSPECT is equipped with a ring light consisting of 8 blue and 8 red segments, and thus two different wavelengths. Plastic parts, in particular, are very spectrally sensitive and can be effectively illuminated with these colors. The 8 segments consist of high-power LEDs, their light intensity can be individually regulated, can be turned on individually or mixed as needed and can even be turned on automatically during a CNC run.



For O-INSPECT, we use high-power LEDs equipped with a booster function.



The gray values of the image must not be too close to each other, otherwise inaccurate, indefinable edges are created. The more contrast in an image, the more exact the measuring result.

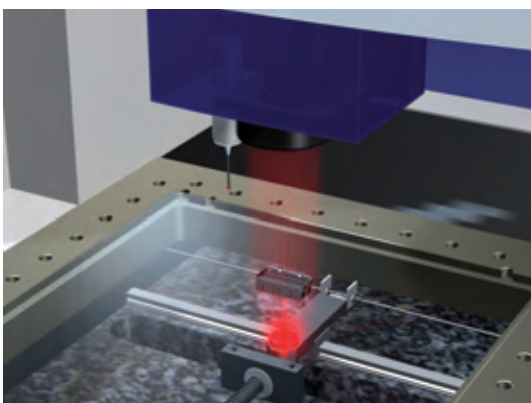


Flashlight in the lens

The coaxial light, or reflected light, works like a flashlight in the lens. It illuminates perpendicularly from the lens to the workpiece with particularly high light intensity. With deep bores, in particular, this is a vital illumination source for the inspection of size, form and position tolerances. A coaxial laser pointer simplifies navigation during the programming process.

Measure from below

The type of illumination that offers the highest contrast is transmitted light. This is frequently used particularly for measurements of openings or exterior edges. It helps detect simple punched components as well as inspect minute structures on particularly complex parts.



Unique: the suppression of external light

Enough is not good enough for us. In addition to the three types of illumination, O-INSPECT comes standard with an external light suppression system that suppresses approx. 50 percent of the light from room sources or sunlight. This is an advantage that no other manufacturer can offer with this accuracy.

O-INSPECT - FUSION OF THE BEST

- Illumination with sector ring light, coaxial reflected and transmitted light
- Illumination with two spectral colors (red and blue)
- High-power LED with booster function
- External light suppression

Scanning is standard.

Nowadays, industrial quality assurance and scanning go hand in hand. It is not possible to reliably achieve highly accurate measuring results faster with any contact measuring method. O-INSPECT featuring VAST XXT is equipped with a complete scanning system that features unparalleled performance.

Everything from one provider

As a part of the entire system, VAST XXT is the result of years of development work by the inventor of scanning. Carl Zeiss developed, integrated and forged all relevant components into a total metrology system which promises and delivers optimal performance. O-INSPECT works with the complete functionality of VAST XXT.

Easy auto-change between contact and optical sensors

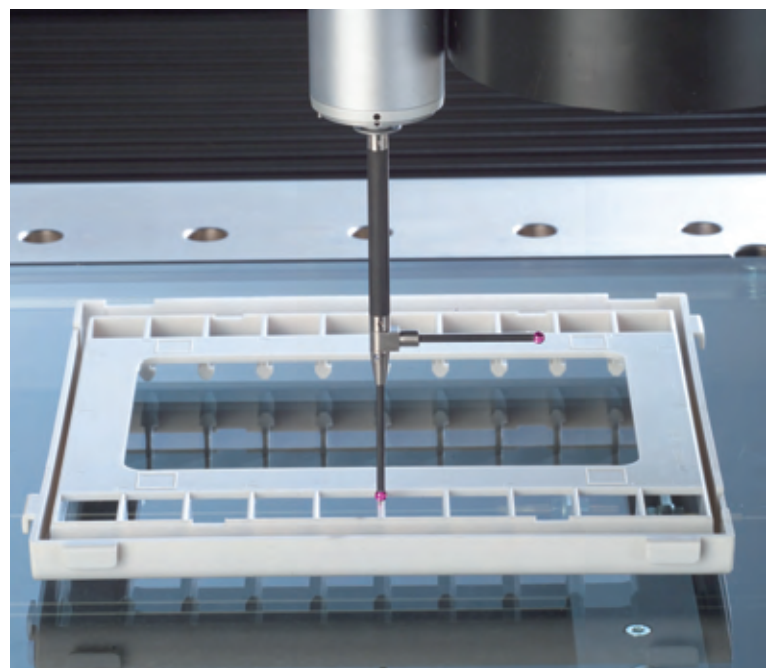
State-of-the-art production processes and innovative designs often require a combination of optical and contact measuring methods. Larger cavities or contours can usually be inspected by scanning,



while small and soft part features, however, can often only be reached optically. O-INSPECT is configured in a way that contact and optical sensors can be automatically switched during CNC operation, not only during a measurement, but also on one workpiece or a CALYPSO object. The precise interface of VAST XXT ensures that recalibration is usually not necessary.

Extremely versatile

As a multi-sensor measuring machine, O-INSPECT is configured for a very wide range of applications. This is precisely where VAST XXT is at its best: stylus lengths of 30 to 125 mm make it possible to easily measure even deep boreholes. VAST XXT measures complex workpiece geometries with only a few stylus configurations: star probes up to 40 mm and stylus configurations in 3 directions ensure the greatest possible flexibility here. Automatic or manual stylus change: the sensor recognizes the module, eliminating the need for time-consuming recalibration.



Make it optical – with CALYPSO.

1 Scanning the workpiece

CALYPSO imports all standard data formats such as IGES, VDAFS, DXF and STEP, as well as the formats from different CAD manufacturers, CATIA V4/V5 or ProE, for example. Simply load the CAD file, select the part features in the CAD window and CALYPSO automatically generates the measurement strategy, including all size and position tolerances.

2 Setting the illumination

O-INSPECT is equipped with an 8-segment, multi-color ring light. You select the color and segment in the illumination menu and set the light intensity on the slider as needed. The same applies for transmitted and coaxial light.

3 Auto focus

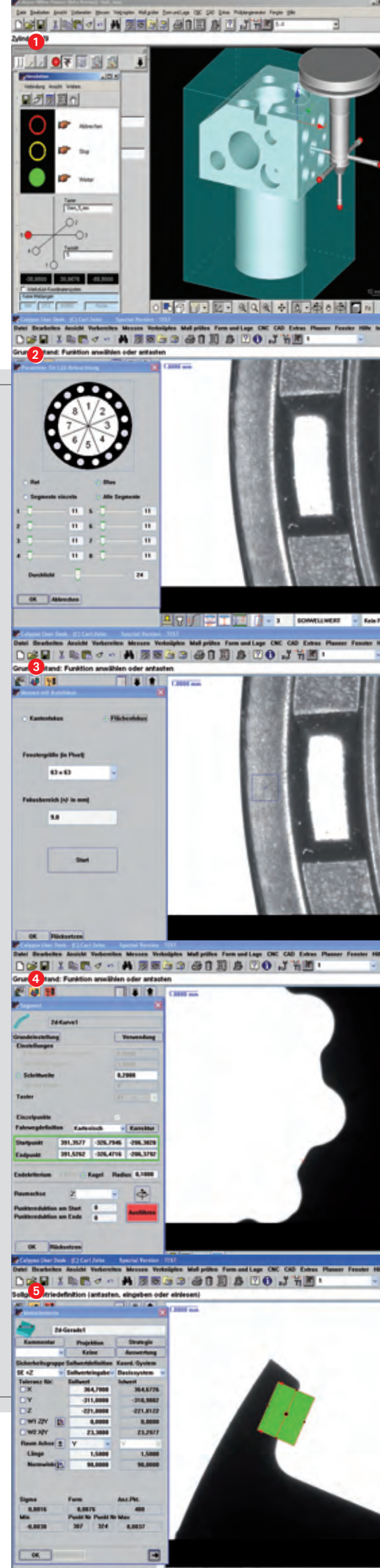
You can only measure accurately using optical methods when the image is free from distortions, i.e. in focus. For this reason, CALYPSO works with a sophisticated auto-focus algorithm. This allows you to focus precisely and absolutely on edges and surfaces.

4 Measure a 2D curve

Simply press "Scan unknown contour" and the optics automatically track every 2D curve. The resulting point cloud can be compared with the CAD data in the geometry comparison or broken down into the single geometric elements.

5 Measure a 2D line

Thanks to several image processing tools, CALYPSO enables you to also measure the tiniest geometric structures with a very high point density or eliminate outliers using various filters.



O-INSPECT: four in one.

Nothing says more about a measuring machine than its suitability for everyday use. After all, it would be nice to know if O-INSPECT also fits your specific requirements. See for yourself which measuring tasks you can complete with a multi-sensor measuring machine that is equipped with the best that Carl Zeiss has to offer.

Workpiece

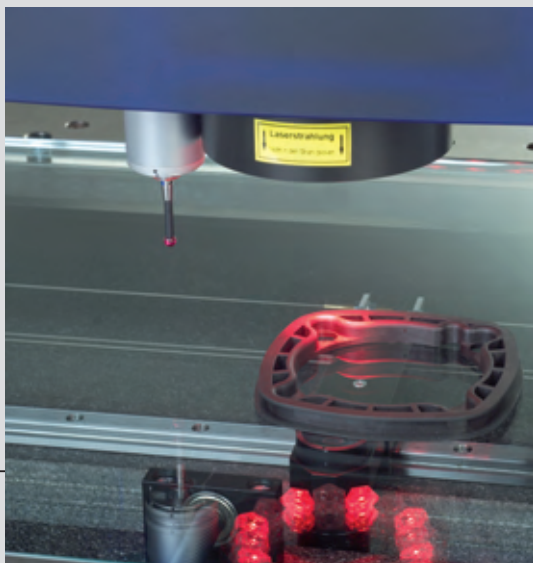
Gasket for a household appliance made of plastic

Measuring task

Geometry comparison of actual and plan data for a contour profile

Optical measurement with O-INSPECT

Data capture for the comparison of geometries: the optical sensor automatically follows the actual contour and generates a point cloud that can be compared to the CAD data.



Workpiece

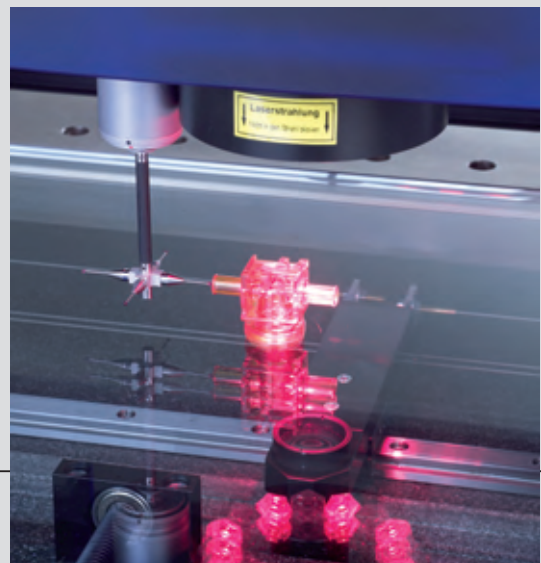
Medical part made of plastic, module from micro-hydraulics / micro-fluid.

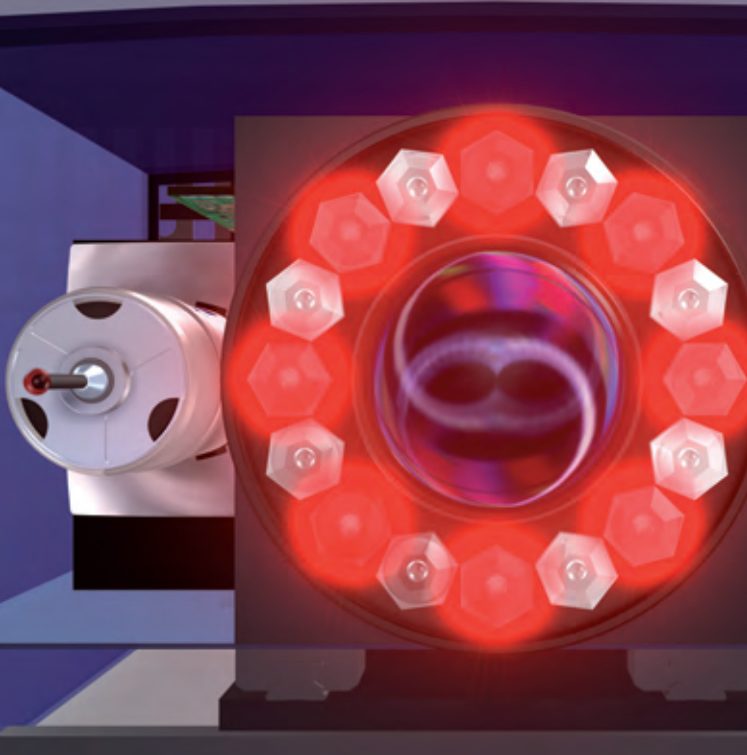
Measuring task

Form and position checks of the inlet and outlet

Contact measurement with O-INSPECT

VAST XXT scans the entire length of the outlet with a stylus tip diameter of 0.3 mm. CALYPSO calculates and documents roundness and concentricity.





Workpiece

Plastic cap for packaging (cosmetics industry)

Measuring task

Determine the position of small bores of a freeform surface

Workpiece

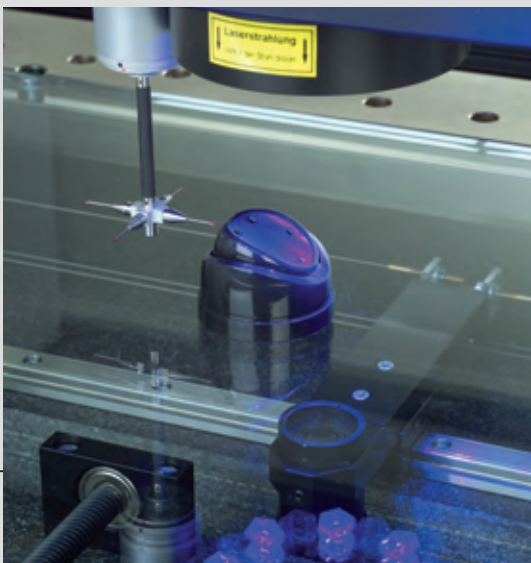
Connecting tube from the automotive industry

Measuring task

Determine the position in the space between two cylinders

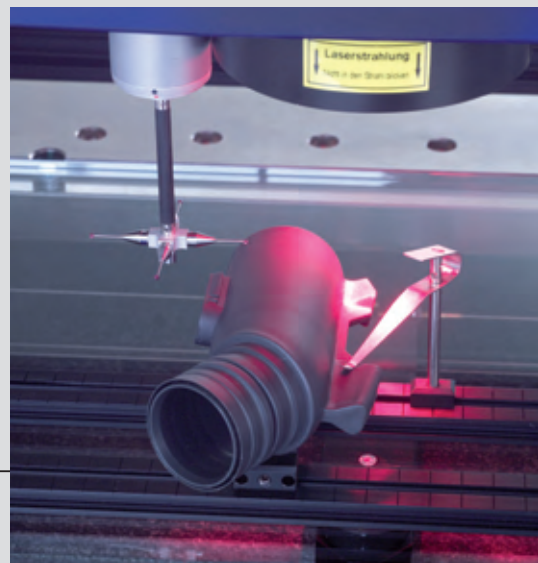
Optical measurement with O-INSPECT

Small diameter and minimal material thickness: the 12x zoom provides such high resolution of the small bores that they can be measured with high point density.

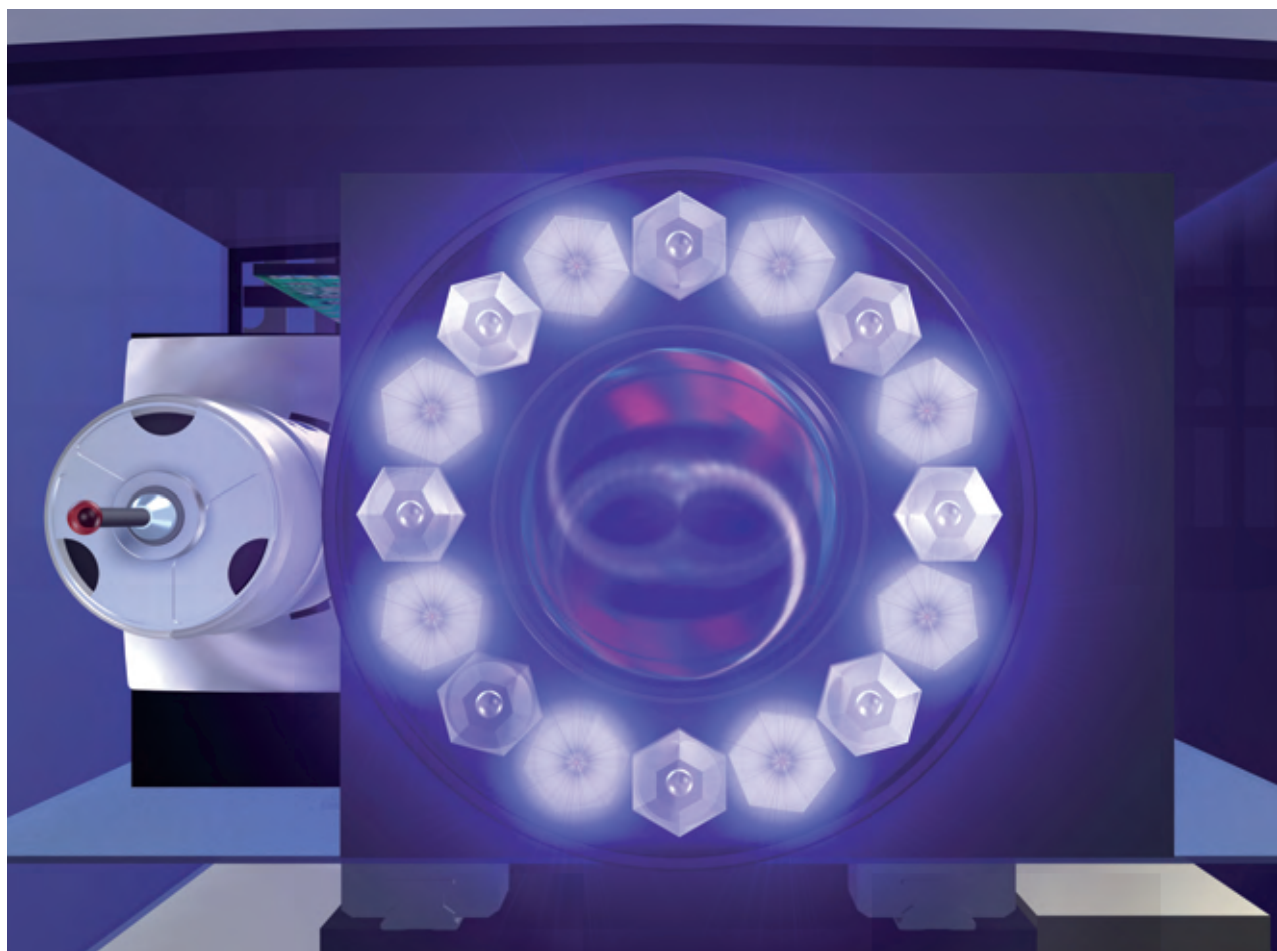


Contact measurement with O-INSPECT

Several sections are defined using the star probe and VAST XXT, and then included in the cylinder geometric parameters. CALYPSO documents the position and inclination.



60-20-144-e Printed in Germany LBW-TS-V/2007 Loo
Some of the options shown are not included in the basic package. Subject to change in design and
scope of delivery and as a result of ongoing technical development. Printed on chlorine-free bleached paper.
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