O-INSPECT

The best of optical and contact measuring technology for true 3D measurements.
The moment you realize that new requirements do not require new equipment. 

This is the moment we work for.
This is O-INSPECT

Each of the components used on O-INSPECT is a top performer in its own right. Combined, they ensure maximum effectiveness. With O-INSPECT you avoid unnecessary travel to quality inspection because the various jobs can be completed on the same machine. Furthermore, O-INSPECT reduces the need for training thanks to its simple, uniform operating concept.

**High-end optics**
- Discovery telecentric, 12x zoom lens from Carl Zeiss
- CCD camera chip
- Illumination: ring light, mini ring light, coaxial light, coaxial laser pointer and transmitted light
- External light suppression
- Optional white light distance sensor to optically capture 3D topographies

**Clever design**
- Bridge-type measuring machine with fixed bridge and movable table
- Accessible from all sides
- Direct connection to palletizing system possible
- Easy configuration of the stylus rack
- Optional rotary table for easier measurement of rotationally symmetric and prismatic parts

**Contact measuring system with scanning functionality**
- VAST XXT passive measuring probe for single-point probing and scanning
- CNC-guided stylus change

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

**Direct shopfloor use**
- Completely covered guideways
- Integrated damping

**User-friendly software**
- Uniform control and evaluation of all measuring processes with CALYPSO
- Visualization of plan, actual and error in one view

Particularly beneficial:
O-INSPECT is flexible.
You measure by contact
- when the characteristics cannot be captured optically, e.g. because they are hidden
- when the dimensional accuracy of three-dimensional bodies is being checked

Four in one

O-INSPECT from Carl Zeiss combines the speed and high resolution of optical high-end sensors with the precision and three-dimensional detection capabilities of a contact measuring system.

Until now, four individual systems were required to cover the functionality of O-INSPECT: a microscope, a profile projector, a measuring machine and a contour measuring instrument. O-INSPECT can complete all these measuring jobs with a single system, and in one setting in a best case scenario.
This multi-functionality makes O-INSPECT the ideal solution for inspection jobs in the medical technology, plastics technology, electronics and precision engineering industries. Thanks to its enclosed guideways and integrated damping system, O-INSPECT can be used directly on the shop floor.

You measure optically
- when particularly fine structures have to be checked
- when materials are being inspected that would be deformed with contact methods
- when the speed of the measurement is important
The optical system on O-INSPECT

Optical measuring technology is limited only by how well a characteristic can be made visible. This depends on a variety of factors:
- the part itself, its shape, color and surface quality
- the quality of the optical detection system
- the illumination

O-INSPECT lays the foundation for optical measurements: with the powerful and flexible Discovery lens, the adaptive illumination system and the optional white light sensor. In other words, O-INSPECT embodies the optical expertise of Carl Zeiss.

**Discovery 12x zoom lens**
Unlike other manufacturers who work with multiple fixed lenses, O-INSPECT uses a zoom lens with 10 defined magnification levels. The benefit: quality inspection is faster because the lenses do not have to be changed and the defined magnification levels ensure high reproducibility of the results. Furthermore, Discovery is unparalleled regarding light intensity and focus.

**Telecentricity and light intensity**
Measuring technology has two demands on an ideal lens: it must be telecentric to be able to measure characteristics dimensionally regardless of the distance to the object and it must be powerful to ensure that characteristics can be crisply and precisely imaged at any magnification level. Standard telecentric lenses are generally less powerful and have lower Z probing accuracy. Discovery is different. It adjusts to the measuring job: at the middle zoom levels where light intensity is less important, it is absolutely telecentric. At maximum and minimum zoom, light intensity takes priority over telecentricity.

### Telecentricity
Our eye and standard camera lenses work based on the central perspective principle: the farther away an object is, the smaller it is projected on the retina or sensor plane. A telecentric lens, on the other hand, does not change the reproduction scale when the object is moved axially. This enables the capture of the dimensional accuracy regardless of the distance to the object.
Optionally with white light distance sensor
The white light distance sensor is primarily recommended when 3D micro-structures will be measured efficiently without contact. It is based on the chromatic-confocal principle which has the advantage of the sensor not requiring any moving mechanical parts to obtain depth information.

For glossy and matte surfaces
The white light distance sensor can be used to inspect reflecting or transparent objects such as glass, and also from highly absorbent, matte surfaces.
Optical measuring is based on the evaluation of gray values. The easier it is to recognize contrast and thus edges, the more precise the measuring result. The ideal type of illumination depends on the measured part or characteristic: a coaxial or lateral light source, a steep or flat illumination angle, or illumination from below. O-INSPECT features an adaptive illumination system to ensure that it is ready for anything.
Large ring light for lateral illumination
The large ring light provides complete lateral illumination. This enables the identification of the contrasts of 3D characteristics, in particular. The intensity of the eight red and eight blue power LEDs on the ring light can be regulated and automatically turned on and off during a CNC run. The possibility of selecting a color is primarily beneficial with colored workpieces.

Mini ring light for a steeper illumination angle
The mini ring light consists of four blue and four red LEDs. The central positioning improves the recognition of deep-laying characteristics.

Coaxial light in the lens
The coaxial light shines on the workpiece at a right angle. With deep boreholes, in particular, this is a vital illumination source for the inspection of size, form and position tolerances.

Coaxial laser pointer
The laser pointer in the center of the lens simplifies navigation during the programming process.

Transmitted light
Transmitted light offers the highest contrast. It is used to measure openings or outside edges, e.g. to check simple punched parts or to inspect fine structures on complex parts.
The only system in its class with a scanning sensor

With the VAST XXT passive measuring probe, O-INSPECT is equipped with a flexible, fast and highly precise contact measuring system. Thanks to scanning technology, it is not only possible to measure with single points, but also to efficiently make precise statements on the form – a unique feature in this class.

VAST XXT accommodates 30-125 mm styli, thus also enabling the convenient measurement of deep boreholes. Star styli with styli in three spatial directions and 40 mm projection ensure maximum flexibility: VAST XXT measures even complex workpiece geometries without changing the stylus.

Easy auto-change between contact and optical sensors

O-INSPECT allows the automatic change-out of both contact and optical styli in CNC operation – even within a feature. The stylus is also automatically detected when a manual change-out occurs. Time-consuming recalibration is therefore not required.
Seeing is believing – visualization with CALYPSO

O-INSPECT and CALYPSO measuring software offer new visualization options. The camera image, CAD drawing and results can now be displayed together in one view. You see the actual status, nominal display and deviations simultaneously, making it particularly easy to properly allocate and interpret the measuring results.

The best software for everyone
O-INSPECT does not skimp with software either. With CALYPSO, you have access to the same program used to operate our other coordinate measuring machines. CALYPSO provides a universal, intuitive operating concept for an incredible range of functions and flexibility. Therefore, with CALYPSO you can be sure that all your measuring jobs can be completed quickly and easily the same way.
Thanks to the practical loading system for O-INSPECT, workpieces can be clamped away from the machine and prepared for the measurement. This prevents you from unnecessarily blocking the machine. The loading system supports all measuring methods – alone or combined – to ensure full utilization of the sensors.

**Bearing plate**
The three bearing elements for the bearing plate are mounted on the hole grid on the machine. Installation is simple and can be completed by the customer. The bearing plate ensures a structurally clear and reproducible rack for the support frame. During the design phase, engineers focused on minimum height.

**Support frame**
The support frame is the ideal mount for the glass plate and the hole grid plate. It is placed loosely on the three bearing elements. It can be adjusted in the XZ and YZ directions using two adjusting screws for plane-parallel alignment of workpieces. Workpieces can be quickly and easily switched together with the entire frame construction.

**Glass plate**
The glass plate is used for optical measurements using reflected and transmitted light methods. In particular, it simplifies the measurement of freeform parts which are simply placed between the mounting frame and the glass plate. This enables plan-parallel alignment of gaskets, for example, with minimal work.

**Hole grid plate**
The hole grid plate made of wear-resistant hard anodized aluminum supports all contact measuring methods and optical measurements using the reflected light method. The hole grid is designed for use of the CARFIT CMK fixture kit. Either the entire frame construction or the hole grid plate can be switched to change workpieces.
Multi-sensor check

The multi-sensor check is a procedure to monitor coordinate measuring machines (CMMs) with contact/optical sensors. The universal, calibrated test piece comes with the associated control and evaluation software.

Application
For the inspection of coordinate measuring machines in accordance with DIN EN ISO 10360 and VDI/VDE 2617
- Probing error of the probe system
- Scanning error of the probe system
- Length measuring error

Probing error and length measuring error are inspected using both contact and optical methods.

Description of the test piece
The base of the test piece is a bend-resistant basic body on which highly precise, calibrated measurement standards are mounted:
- a special adjusting ring for contact and optical measurements, 16 mm diameter
- one precision ceramic sphere, 25 mm diameter
- two gauge blocks, 50 mm and 200 mm long
- one 200 mm long glass scale

Test piece calibration
DKD (German Calibration Service) calibration:
- Adjusting ring
- Precision sphere
- Two gauge blocks
Factory calibration:
- Glass scale

Software
Control and evaluation software is available for coordinate measuring machines under the name CALYPSO. It provides:
- CNC run of the measurements
- Standard-compliant evaluation
- Additional analysis of the measuring results on the basis of monitoring factors
- Statistical preparation of the measuring results

User support
Upon request, we will install the test piece on site and train you to use the system.

Optionally available with rotary table

For optical measurements all around
A workpiece must be rotated to optically inspect characteristics on all sides. The optional rotary table makes it possible. It provides O-INSPECT with a programmable rotary axis.