Optiv
The multitalented system for industrial metrology
A NEW PERSPECTIVE.

The Optiv multi-sensor brand from Hexagon Metrology opens countless opportunities for you in the quality assurance of precision components. The measuring machines combine a great deal into one system: optical and tactile measurement procedures, flexibility and accuracies from a few microns down to the sub-micron range. Optiv offers you a new perspective on multi-sensor metrology.
The advantages of multi-sensor technology are plain to see: optical and tactile sensors can be called upon during the same measuring routine. Parts need to be re-clamped less frequently and absolute references are not lost. Optiv is the choice when three-dimensional data with a high measuring point density is required.

**CAD integration? Of course!**
Full 3D CAD integration, offline programming with efficient simulation tools, form and position tolerances are second nature to our PC-DMIS Vision software. With PC-DMIS Vision we provide software specially designed for optical and multi-sensor measurement. Unique features are part of the software. Click-and-Measure, MultiCapture, AutoTune and OptimizePath ease the task of taking multi-sensor measurements – at the touch of a button. Capturing and evaluating measurement data using multi-sensor measuring systems has never been as simple.

**Backed by quality**
A strong team of developers with links all over the world ensures the continuous development of the Optiv measuring system. Optiv measuring systems are highly precise, user friendly and versatile. Our centre of excellence in Saarwellingen, Germany integrates development and production. And of course it is ISO 9001 certified. Here we calibrate measuring machines to the highest accuracies in climatised, temperature-controlled production areas.

**Service on site**
Our commitment to you begins with the delivery of the system: Hexagon Metrology is represented worldwide with over 60 Precision Centres supplying full customer support and on-site service. We are here for you from A to Z with servicing, repair, upgrades, programming and training.
Systems that combine optical and tactile measurement offer one thing above all: flexibility. Various sensor technologies and measurement strategies come into play, depending on the 3D geometry, material, reflection characteristics and accuracy requirements of the part to be inspected. Optiv has the solution for your application – no matter how complex.

FROM THE SMALL TO THE UNTOUCHABLE.
**Flat parts**
Stampings, gaskets, circuit boards, patterns, films, foils, gauges and glass masks. These parts are made typically from thin materials. They deform easily, have delicate surfaces and the smallest features or finest surface structures. The optimum measurement strategy: quick, non-contact measurement using very high precision with the Vision-Sensor and the Chromatic White Light Sensor (CWS).

**Die-cast and injection-moulded parts**
These manufacturing techniques are capable of producing very complex 3D components in miniature detail. Using optical and tactile sensors accelerates and simplifies the inspection of these items. Components and tools can be fully measured from one clamping position using one programming routine. The measurement time is reduced – a great opportunity for pallet inspection.

**2D and 3D precision parts**
Precision nozzles, watch and clock components, gears, keys, tools, dies, pistons, valves and implants. These parts are normally very small and call for very tight tolerances. This can be solved by using a high resolution Vision-Sensor with a digital CCD camera, variable and high contrast illumination with powerful image processing.

**Rotationally symmetrical parts**
Drilling tools, injection nozzles, bushes, gears and other parts with features distributed around the workpiece. CNC-controlled rotary tables and combined rotary-swivel tables allow access to the otherwise hidden parts.

**Contours**
Measurement points are captured by scanning the shape using the Vision-Sensor, tactile sensors, the TTL-Laser or CWS. The point density can be modified to suit the particular application. PC-DMIS Vision CAD is comparing the actual dimensions with the specified contours during the measurement process.

**Free-form surfaces**
Free-form surfaces are inspected by comparison with a CAD model. With the help of the innovative CWS, TTL-Laser or tactile sensors, the surfaces of the parts can be digitised by surface scanning. The resulting surface data is suitable for direct comparison with the CAD model; this can also be of use in surface reconstruction for reverse engineering.
The fundamentals have to be right. We work with different components and mechanical concepts for each series in the Optiv range. The approach of individually fine-tuned solutions is at the heart of this measuring system. The Optiv family is as flexible as the diversity of its many applications.

**Mechanical bearings**
All the axes on the Optiv coordinate measuring machines with mechanical bearings have high-precision linear guides. This robust and cost-efficient design principle is particularly suitable for quality monitoring in a production-floor environment.

**Air bearings**
The drive and guide concepts based on pre-loaded air bearings ensure maximum positioning and measurement accuracy. The axes float on their air bearings only a few microns above the precision-designed granite guideways.

**Exclusive Dual-Z-Design**
This is available only on the Optiv system: the Dual-Z-Design further reduces measuring cycles and increases the flexibility of use. The Dual-Z-Design consists of two mutually independent vertical axes. The distribution of the sensors on both Z axes simplifies sensor positioning when measuring complex 3D parts.

**Damping system and protected guideways**
These are a must for systems intended for use on the production floor to protect the measuring machine from environmental influences such as dirt and floor-borne vibrations.

**Fixed bridge and moving table**
An extremely rigid and low vibration construction. Structurally separated X and Y axes considerably reduce the moving mass. The perfect solution for high accuracy measurement combined with high speed movement.

**Moving bridge, fixed table**
In this form of construction, the X, Y and Z axes are built on a moving bridge, a unique characteristic of the Optiv Classic 453. Ideal for inspecting heavy components.

**Column machine with cross-table**
A high-precision XY cross-table on a granite base is the distinguishing feature of this model. This cost-effective architecture is particularly compact and is suitable for light to medium table loads.

**Granite base**
This fine-pored, temperature and structurally stable natural granite mineral provides the basis for almost all Optiv measuring machines. Higher accuracy machines benefit from machined granite guideways.

**Measurement ranges for all inspection tasks**
Details of the equipment and measurement ranges of each model can be found on page 15.
ACCESSORIES

**Rotary tables**
CNC-controlled rotary tables increase the flexibility for optical and tactile measuring on rotationally symmetrical parts. Inspection does not require the parts to be manually repositioned — and is carried out without the need for complicated styli configurations.

**Rotary-swivel tables**
Rotary-swivel tables allow the rotary axis to be pivoted around the swivel axis. This allows features to be rotated normal to the sensor for measurement access. Up to six CNC-controlled axes are available to place the component and sensors in the ideal position.

**Machine enclosures**
Temperature-controlled machine enclosures with integrated damping systems are suitable for use on the production floor. They provide excellent protection against adverse environmental influences, such as temperature fluctuations, dirt and floor-borne vibrations.

**Flexible clamping devices**
For secure and simple clamping of the inspected items.

**Customer-specific user interfaces**
We can design customer-specific user interfaces for use in production environments to allow simple and error-free machine operation, e.g. if you wish to integrate bar code scanners for part selection or import/export interfaces for statistical evaluations.
Optiv measuring machines support inspection with the Vision-Sensor, Chromatic White Light Sensor (CWS), Through-The-Lens-Laser (TTL-Laser) and tactile probes.

**Vision-Sensor**
The high-resolution Vision-Sensor performs non-contact measurements of the smallest items subject to the tightest tolerances as well as features that would be deformed if probed with tactile sensors.
- High-resolution CCD camera, black/white or colour, analogue or digital
- Equipped with CNC zoom, fixed optics or electronically switched 2-step fixed optics
- Variable, high-contrast illumination with incident light, transmitted light and multiple segment ring light

**Chromatic White Light Sensor (CWS)**
The CWS is a scanning measuring sensor with an extremely high resolution, which can even cope with glossy, transparent or porous surfaces. It is also suitable for the topographical acquisition of microstructures.
- Measuring range from 300 μm to 10 mm
- Working distance from 4.5 mm to 75 mm
- Resolution up to 10 nm

**Through-The-Lens-Laser (TTL-Laser)**
By coaxially projecting the laser light into the optics, the laser is focussed in the centre of the field of view of the Vision-Sensor. Measuring by laser and video at the same time in one measurement routine accelerates measuring speed. The TTL-Laser is suitable for simple scanning tasks.
- Resolution ± 0.1 μm
- Focusing speed 0.2 s
- Contour and surface scanning at 350 measured points per second

**Tactile Sensor**
Contact sensors complete the multi-sensor package. Ideal for measuring 3D elements such as spheres, cones and cylinders and features that cannot be seen in plan view.
- Motorised rotating/pivoting probes
- Probe changer with up to 6 module positions
- Stylus modules with different trigger forces

TACTILE OR OPTICAL?
MULTI-SENSORY!

A broad range of tactile and optical sensors is key to any multi-sensor system. For efficient inspection. For many applications.
NEW PERSPECTIVES WITH PC-DMIS VISION.

PC-DMIS is a pioneer in the integration of CAD data into metrology. The advantage to you: the CAD model is the ideal master part on which you can quickly and easily select the elements and features to be inspected. In addition PC-DMIS Vision has some unique features up its sleeve that allow you to achieve your goals more quickly when performing multi-sensor inspections. It could not be simpler to create measuring programs.

PC-DMIS Vision supports the combined use of optical and tactile sensors on one system and within one measuring program. Programming with the help of CAD models can be done off-line – minimising the amount of time on your measuring machine. Collision checks and sensor path optimisations are carried out with 3D simulations. The simulations also take into account critical parameters of optical measurement, such as illumination, focusing and magnification.
OptiFeature
The OptiFeature function can place any number of measuring windows on the inspected feature. A different video parameter can be set for each measuring window. Ideal when, for example, contrast, reflection and other factors vary greatly along an edge.

OptimizePath
The less a sensor moves, the shorter the inspection time. This simple premise lies behind the OptimizePath function. OptimizePath calculates the most efficient path with the least sensor movement.

AutoPosition
The Vision-Sensor’s field of view reduces or increases after you change the zoom setting or the lens. However, in order to be able to measure the originally programmed element, AutoPosition recalculates the necessary measuring window sizes and positions and adds them automatically to the measuring program.

Exclusive features
In addition to the basic functions, Optiv has special features available for optical and tactile measurements:

EdgeDetector
EdgeDetector comprises a number of powerful image and element filters with which PC-DMIS Vision can recognise the edges of parts, even in conditions of poor contrast. The effects of burrs, dust or non-homogeneous contrast on the measurement are effectively eliminated.

MultiCapture
In only one shot MultiCapture measures all the elements in the image field of the camera. The simultaneous acquisition and measurement of different features tightly packed together accelerates the inspection process by 35 to 70% - depending on the size of the features and how densely they are arranged.
AutoTune
Transferring measuring programs from one multi-sensor measuring machine to another with a different optical magnification, illumination or stylus configuration may require time-consuming program modifications. AutoTune compensates for different machine configurations and automatically brings the measuring programs into line.

Click-and-Measure
Click the feature to be measured in the camera image or the cAD model. Click-and-Measure automatically measures the selected element.

MultiSelect
You would like to select several features on the CAD model with just one click? MultiSelect allows you to select several elements at the same time using the cursor. PC-DMIS Vision transfers all the selected features into the measuring program. You no longer have to program the features one by one.

GapFinder
Nothing escapes the GapFinder: the function tracks down gaps in the features. Breaks in elements are filtered out.

EasyGage
If you do not have to program angle, diameter and distance measurements, then you will work fastest with EasyGage. This function quickly and simply checks the feature against a virtual gauge.

SensiLight
The SensiLight function helps you select the right lighting settings.

Probe-and-Measure
Measuring points are recorded on the part using the tactile sensor to speed up the programming process. Probe-and-Measure collects all the measured points and stores them in the program. As soon as the End button is pressed, the element type, e.g. straight, circular or planar, is determined and added into the measuring program.

DualView
DualView allows you to switch conveniently between CAD view and camera view. On the same screen. For optimum ergonomics.

DataPage+
DataPage+ is the integrated SPC package for PC-DMIS. DataPage+ is able to automatically collect data and store everything in a standard Microsoft SQL database. Powerful customisable reporting tools allow SPC data to be displayed visually, showing the relationship to the original CAD file.

PC-DMIS Gear
New: PC-DMIS Gear is available for PC-DMIS Vision, too. PC-DMIS Gear makes gear measurement easy. It eliminates the complexities associated with gear measurement and makes it possible for non-experts to measure gears quickly and productively.
FOUR SERIES.

The Optiv range consists of four series, each with a different accuracy, construction, and range of available sensors and accessories. Starting with the Optiv Classic for an economic entry into multi-sensor measuring technology right up to the top Optiv Reference series for satisfying the highest demands.
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Optiv
Hexagon Metrology is the all-rounder in the world of metrology. With its new brand Optiv, the world's largest metrology group keeps this promise once again. Optiv stands for multi-sensor measuring machines of any kind. The portfolio ranges from benchtop measuring machines to high-accuracy multi-sensor measuring machines which achieve top performances even in the nano range. Multi-sensor measuring machines combine optical and tactile measuring techniques and thus, enable the user to measure all features of a workpiece in one measurement cycle. At the same time Optiv features both: flexibility and accuracy.

Optiv. Optical Performance Technology in Vision.

Hexagon Metrology
Hexagon Metrology is part of the Hexagon group and brings leading brands from the field of industrial metrology under one roof.

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