

# **OPTIV multisensor CMMs**

Flexible multisensor CMMs that adapt to specific productivity needs







# Driving productivity with flexibility

A coordinate measuring machine (CMM) that can assure the quality demands of complex, freeform or delicate parts, while maximising throughput gives manufacturers a key competitive advantage. Especially if the CMM is designed for flexibility and is easy to configure around a manufacturer's individual productivity drivers.

Hexagon's Manufacturing Intelligence division has developed the OPTIV range of multisensor CMMs to give manufacturers the flexibility they need to overcome today's specific productivity challenges and at the same time evolve at their own pace towards tomorrow's smarter factories.

- **Flexibility.** By combining a variety of tactile and non-contact sensor technologies in a single machine, the multisensor OPTIV CMM can adapt to a range of complex measuring tasks, enabling the completion of measuring processes in one cycle and reducing the need for multiple machines in the inspection area.
- **Upgradability.** Designed for scalability, OPTIV CMMs allow users to adapt and add hardware and software with ease, in line with their evolving needs.

All OPTIV CMMs are made of robust granite for maximum performance in the harshest conditions. Whether manufacturers are looking for an entry-level machine or a system capable of executing complex routines, quickly and accurately, the range of multipurpose, multisensor OPTIV CMMs provides the answer.

# Maximised modularity for greater customisation

Whether inspecting delicate, sensitive materials, freeform surfaces, or large or small parts, there is an OPTIV CMM ideal for each particular set of geometries, materials, and accuracy requirements.

A key source of flexibility for OPTIV CMM users is the ease with which they can customise software, sensors and computing power. A modular system means the OPTIV range scales to meet new challenges, whether they involve expanding application capabilities, or branching into new markets. With an OPTIV CMM it is simple to combine contact and non-contact sensors, deploy new measurement software, and upgrade the controller.

The OPTIV CMM range is built on three foundational platforms, with varying degrees of measurement uncertainty and levels of flexibility.

**OPTIV overview table**

Construction																							Sensors					Accessories				
Measuring range in mm				OPTIV Dual Z design	Design				Axes		Vision Sensor			Tactlie Sensors																		
X	Y	Z	Loading capacity in kg		Cross-table design	Moving bridge design	Fixed bridge design	Mechanical bearings	Air bearings	CNC zoom	OPTIV Dual Camera	CWS	OPTIV LTS	Touch-trigger probe	HP-S-X1 Scanning probe	Probe changer	Motorised indexing probe head (only for OPTIV Dual Z)	Rotary indexing table	Rotary table	OPTIV Dual Rotary	Vibration damper											
OPTIV Classic																																
Model	3.2.2	300	200	200		16	✓			✓		✓				○		○		○												
	4.3.2	400	300	200		16	✓			✓					○		○		○													
	8.10.2	800	1000	225		35		✓			✓ <sup>1)</sup>	✓																				
	12.15.2	1200	1500	225		40		✓			✓ <sup>1)</sup>	✓																				
OPTIV M																																
	3.2.2	300	200	200		20			✓	✓		✓	○	○	○	○	○	○		○												
	4.4.3	400	400	300		30			✓	✓		✓	○	○	○	○	○	○		○		○										
	6.6.3/ 6.6.4	610	610	305/ 405		50			✓	✓		✓	○	○	○	○	○	○		○	○ <sup>2)</sup>	○										
OPTIV Reference																																
	5.4.3	530	400	300		150			✓		✓	○	✓	○		○	○	○	○		○	○ <sup>3)</sup>										
	7.6.3	730	600	300		150			✓		✓	○	✓	○		○	○	○	○		○	○ <sup>3)</sup>										
	10.10.3	890/ 930 <sup>3)</sup>	980	300		300			✓		✓	○	✓	○		○	○	○	○		○	○ <sup>3)</sup>										

✓ Standard

○ Option

1) X axis and Y axis with precision air bearing guides, Z axis with mechanical linear guides.

2) For OPTIV M 6.6.4 Dual Z model only.

3) For Dual Z models only.





## OPTIV M

### A vision for productivity

The OPTIV M deploys Hexagon's Enhanced Productivity Series (EPS) range of configuration packages, which offers manufacturers a choice of productivity drivers based on their application's need for flexibility, throughput, precision or shop-floor capability. The preconfigured, highly evolvable EPS packages make it simpler for quality engineers and CMM operators to create, execute and analyse measurement routines that drive higher productivity. The Enhanced Productivity Series is available in three performance levels of Green, Blue and Chrome, making the OPTIV M ideal for a full range of budgets and applications.

A flexible, easily upgradable configuration makes the OPTIV M CMM future-ready and compatible with a comprehensive portfolio of contactless and tactile sensors, software and collaborative technologies.



# OPTIV Reference

The optimum solution for complex, high-precision 3D part measurements

OPTIV Reference is the range's premium, most accurate multisensor offering, with air bearings on all axes and measuring accuracies in the sub-micron range. The machine can be equipped with the revolutionary OPTIV Dual Z design, which reduces setup and inspection times by mounting tactile and optical sensors on two independent vertical axes.





# The right sensor at the right time

The multisensor OPTIV CMM is primed to tackle a range of measuring routines with varying degrees of complexity, making it the optimum choice for numerous applications. Depending on their inspection needs, users can choose to benefit from a combination of the following sensors:

## Vision Sensor

Enabling fast, automated point capture, non-contact vision sensors are perfect for tight tolerance measurements of very small and sensitive parts. The vision sensor offers powerful image processing with automatic feature detection, precision video autofocus, powerful image and element filters, a contour scanning mode and best fit routines.

Depending on the measurement task, two low distortion optics are available. The motorised CNC zoom optics ensure maximum flexibility in optical measurements through continuous variation of resolution and field of view. OPTIV Dual Camera electronically switches between two modes of magnification without compromising precision: Detail Mode, for high measuring accuracy, and Overview Mode, for simple navigation and fast measurement.

Offering increased visibility, the state-of-the-art variable illumination includes LED back light, coaxial LED top light and multi-segment LED ring light.

## Laser Triangulation Sensor OPTIV LTS

The OPTIV LTS is a point distance sensor and enables gathering single measuring points as well as scanning of surface profiles on smallest components with high resolution and measuring rate. With its real-time surface compensation technology, the sensor measures almost regardless of any colour against a wide range of material surfaces.

## Chromatic White Light Sensor (CWS)

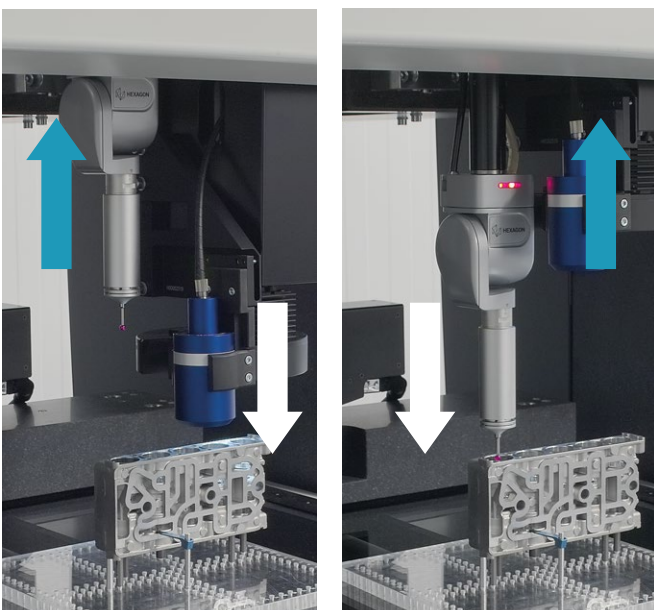
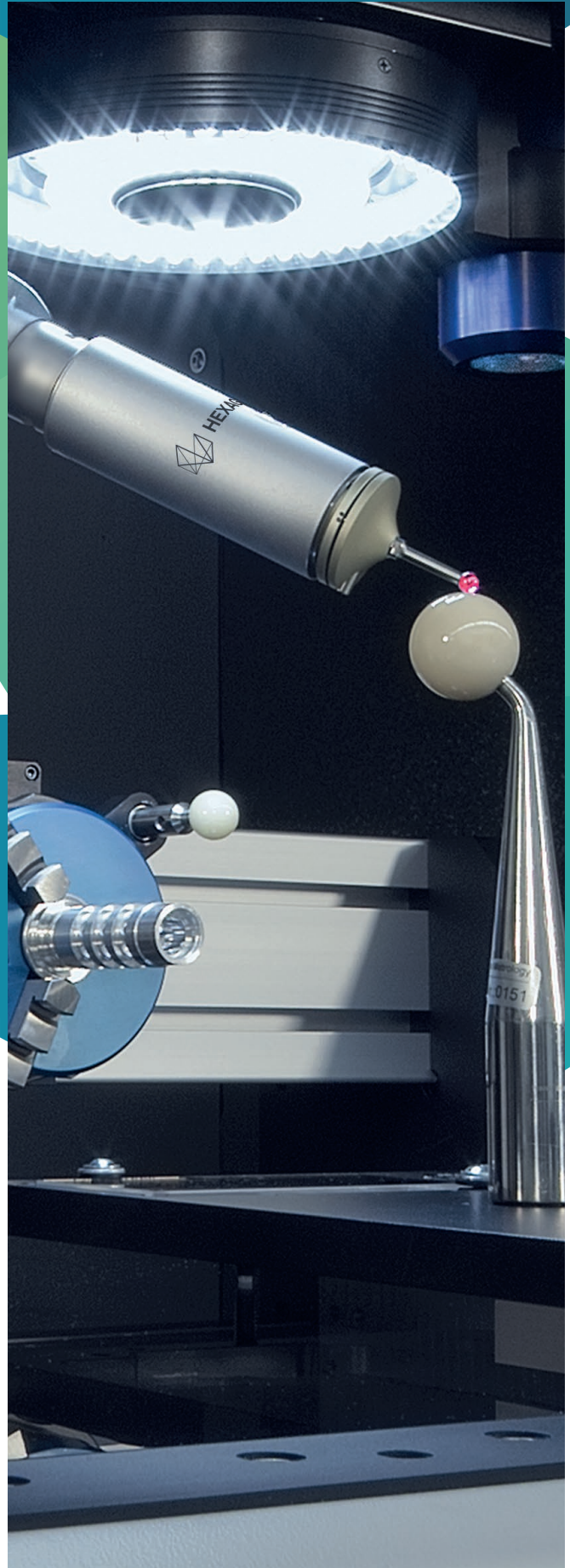
Achieving scanning rates of up to 500 points per second, the CWS excels at digitising transparent materials including thickness measurement, capturing the topology of microstructures, and measuring highly reflective objects such as mirrors. It is ideal for integrated circuits, medical implants, and microlens applications.

## Tactile Sensors

All types of OPTIV CMMs can be fitted with contact sensors, which enable measuring point acquisition on workpiece surfaces in any spatial direction. Throughput is increased by measuring features on the side or underside of the workpiece in the same clamping position used to capture the top of the part with the vision sensor.

Taking discrete points on a part, the touch-trigger probe is optimal for measuring 3D elements like spheres, cones or cylinders and the evaluation of three-dimensional position deviations. The analogue scanning probe provides measuring methods such as single point probing and continuous high-speed scanning of both known and unknown surfaces. With a wide range of styli lengths available, the versatile scanning probe features high measuring point densities and is perfect for fast and very precise form and contour inspection – with or without CAD-support.





## OPTIV Dual Z

Key technology for efficient multisensor measurements



# PC-DMIS – software with a vision

PC-DMIS is installed as standard on OPTIV multisensor CMMs from Hexagon Manufacturing Intelligence.

With optimised workflows across the full range of measurement operations, including program development, part measurement, results analysis and report generation, PC-DMIS removes complexity from naturally intricate measurement tasks.

A highly user-friendly tool, PC-DMIS offers a variety of features ideal for multisensor measuring, helping users maximise the CMM's potential.

## Enhancing productivity in a virtual CMM environment

Machine time is a valuable commodity. PC-DMIS offers offline licences that allow the CMM to be used primarily for measuring parts and not for measurement routine creation. An offline licence allows users to develop, test and debug inspection routines away from the CMM using CAD models, including simulated program execution with 3D simulated collision checks and sensor path optimisations.

## CAD-based measurement

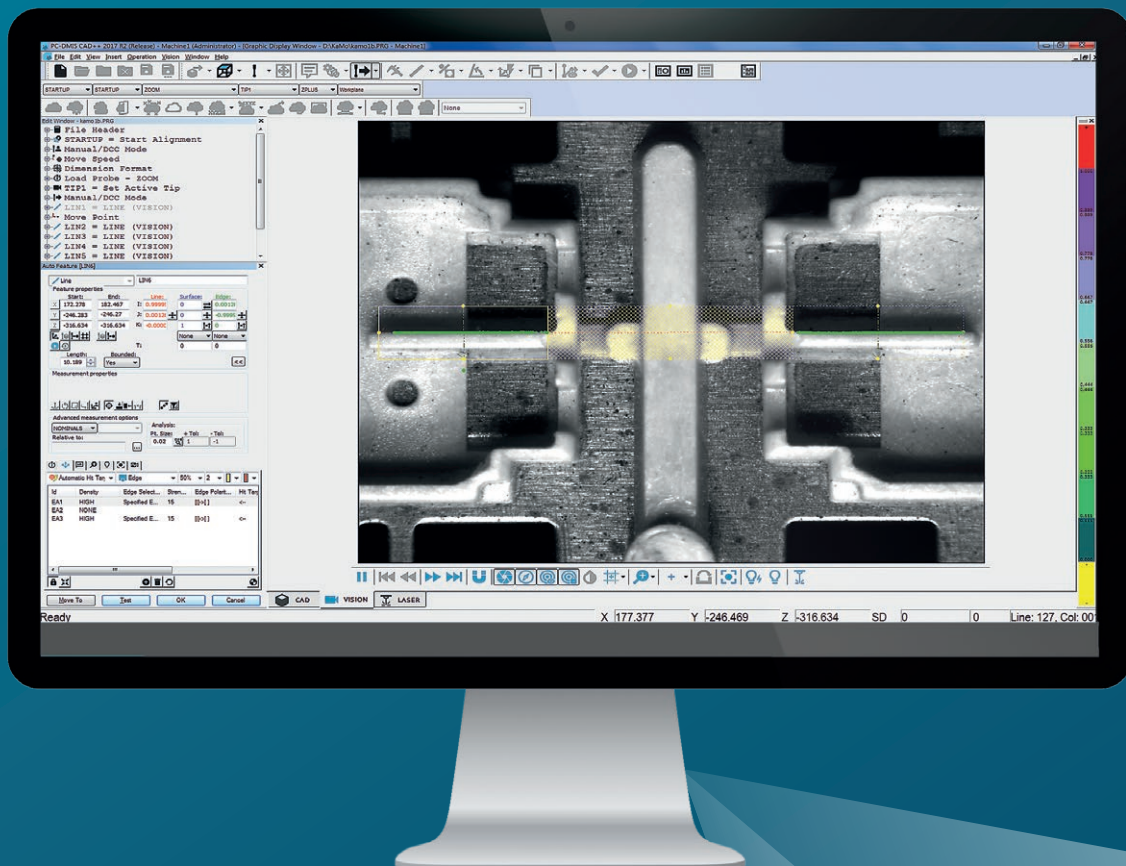
PC-DMIS seamlessly translates GD&T data from 2D drawings to the most complex solid 3D models using GD&T Selection from Capture. Powerful CAD-based tools help develop the inspection routines, slashing the creation time by up to 90%.

PC-DMIS' QuickFeature functionality enables the user to quickly create Auto Features from a single click on the CAD model, no menu options and no dialog boxes required. Users can create multiple features of the same type at the same time in both the Live View and in the CAD View. PC-DMIS automatically applies the initial feature parameters from the default parameters defined in the Measurement Strategy Editor. Feature-Sensor Mapping enables enhanced QuickFeature control for multisensor measurement routines, providing a single interface to quickly associate QuickFeatures, sensors and measurement strategies.

Extraction of information from the CAD model eliminates errors of data interpretation and input. Reliability is increased with Product and Manufacturing Information (PMI) automatically translating embedded GD&T information into measurement routines, while real-time part to CAD and GD&T analysis allows for quick conformity statements.

## Flexibility and scalability

The modular design enables the software to be easily customised to meet the varying requirements of a diverse customer base. Advanced users can increase performance and adaptability to complex measuring tasks by utilising its full range of capabilities.







# Extend your CMM's capability

Manufacturers' varying production requirements influence their productivity drivers. For example, while some manufacturers might need the inspection process to be optimised for maximum speed of output, others require a higher level of accuracy. To help manufacturers target their primary productivity driver, the CMM can be configured with additional technologies, hardware and software to drive throughput, flexibility, and precision.





## Throughput

- **Speed up the inspection process.** Rotary tables and stacked rotary tables (OPTIV Dual Rotary) simplify accessibility to all measuring positions via workpiece rotation, avoiding multiple setups and fixturing of the part. The number of probe changes is reduced since complex geometries become easily accessible with only a few simple styli configurations.
- **Cut rework cycle times.** Free for PC-DMIS users, the INSPECT interface allows users to run complex inspections without having to launch PC-DMIS and offers real-time graphical reporting to monitor potential manufacturing defects for quick resolution. It also allows operators to run predefined part programs quickly and with minimal training.
- **Control the production process in real time.** By helping automate the analysis of measurement results, Q-DAS Statistics software makes quality data fully actionable throughout the production process.
- **Improve processes.** With the cloud-based HxGN SFx | Asset Management software manufacturers have instant access to aggregated CMM status and performance data via a centralised user-friendly dashboard, whether the equipment is on a single site or in multiple factories around the world. Remote monitoring of CMMs and customisable real-time notifications help manufacturers to increase the efficiency and effectiveness of inspection processes by preventing downtimes, enhancing resource allocation and optimising CMM utilisation.



## Precision

- **Reduce measurement uncertainty.** OPTIV Dual Rotary enables the referencing of measurements between features from different rotational positions without realignment of the workpiece.
- **Increase accuracy.** Geometric errors in axis positioning throughout the whole measuring volume are compensated. OPTIV multisensor CMMs conform to ISO 10360, the international standard for CMM accuracy testing and performance verification.
- **Ensure precise measurements and data integrity.** The temperature compensation system adjusts the effects of ambient temperature. Integrated tools can include measuring the part's temperature at different points during the cycle and compensating for any calculated change, or creating a temperature reference scale bar for the material of the part to be measured. The PULSE monitoring system helps ensure data integrity by notifying users of environmental events including vibration, humidity, air pressure and a range of other events that could affect the CMM.



## Flexibility

- **Reach more complex geometries.** With OPTIV Dual Rotary function, two CNC rotary tables are combined to enable two-axis rotations, optimising the measuring volume of the machine.
- **Enhance visibility and capture of parts.** OPTIV Dual Camera offers high accuracy measurements with two fields of view and resolutions via fixed focal length optics incorporating two magnification stages. Many camera types are available depending on the optics deployed, including CMOS chip, and monochrome or colour.
- **Expand inspection capabilities.** OPTIV Dual Z function assigns optical and tactile sensors to two independent vertical axes so that the sensors reach more measuring positions within the entire measuring volume and with minimised risk of collision. By making optimal use of the measuring volume, OPTIV Dual Z extends the application range of the CMM for the most complex 3D parts and additionally enables the use of motorised indexing probe heads.