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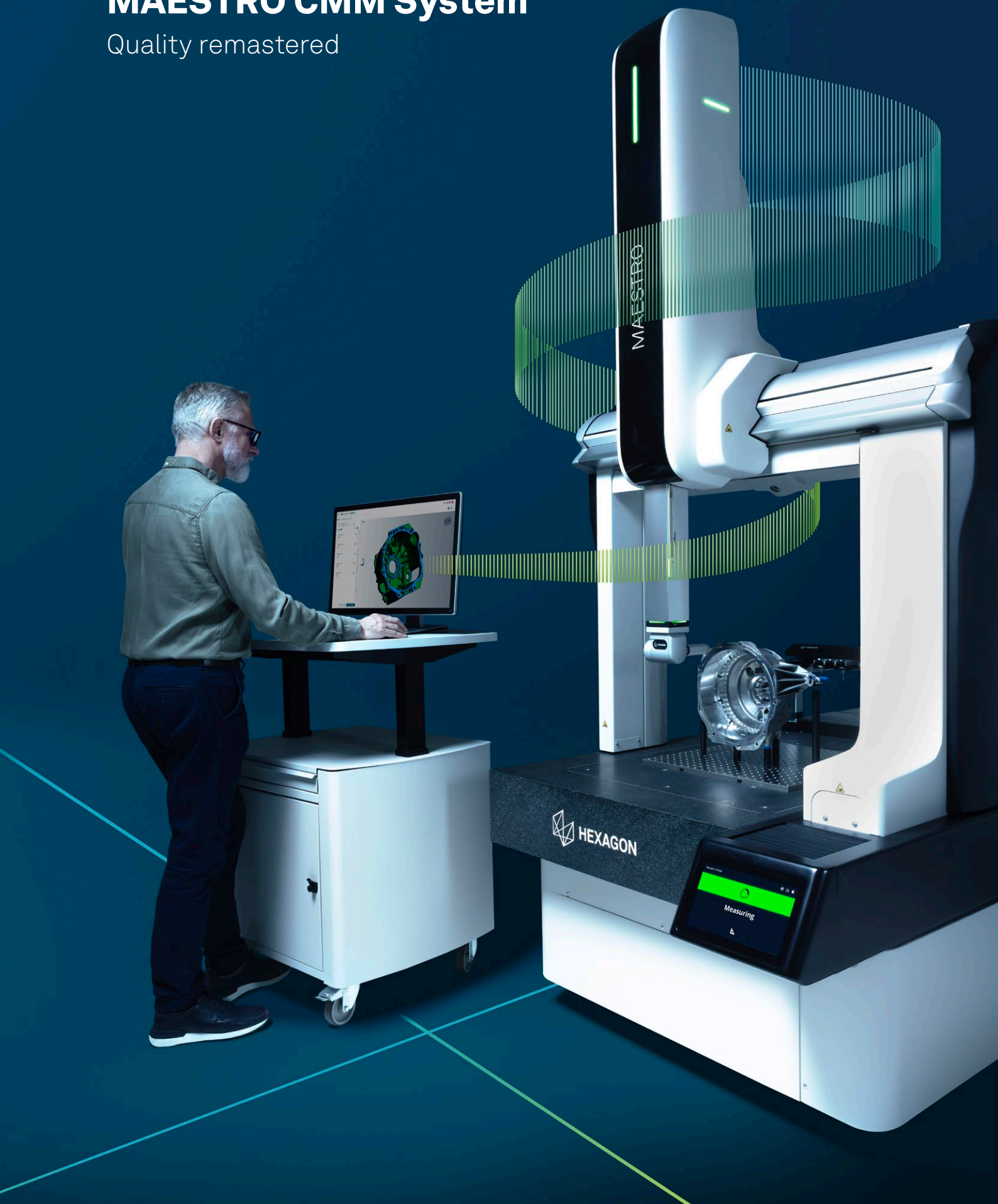
Brochure

MAESTRO CMM System

Quality remastered



MAESTRO.
Quality remastered.

MAESTRO is the all-digital CMM solution that's leading a revolution in metrology. MAESTRO's pioneering hardware and software combination delivers unparalleled speed, unmatched ease of use, seamless connectivity, and future-proof adaptability.

Why MAESTRO, why now?

In today's constantly shifting economic landscape, your business must stay laser-focused on efficiency, productivity, and cost reduction. But while challenges remain, the digital revolution, presents a golden opportunity to reshape industry norms, through the convergence of technology, hyper-connectivity, and data analytics.

The time is right to bring a more powerful, advanced CMM solution to market. One that meets your business challenges by revolutionising traditional metrology processes.

With MAESTRO, Hexagon delivers a paradigm shift in CMMs, leading the charge on accuracy and quality, all to keep you ahead of the game.

The metrology revolution starts here, with MAESTRO. Quality remastered.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Ready

MAESTRO is the next-generation IIoT measuring device ensuring manufactured quality – quickly and easily.

The all-digital, connected CMM system makes metrology data readily accessible to your whole team, and enables you to leverage the latest measuring technologies for your business – today and tomorrow. MAESTRO delivers accurate measurements, faster and easier than ever before.

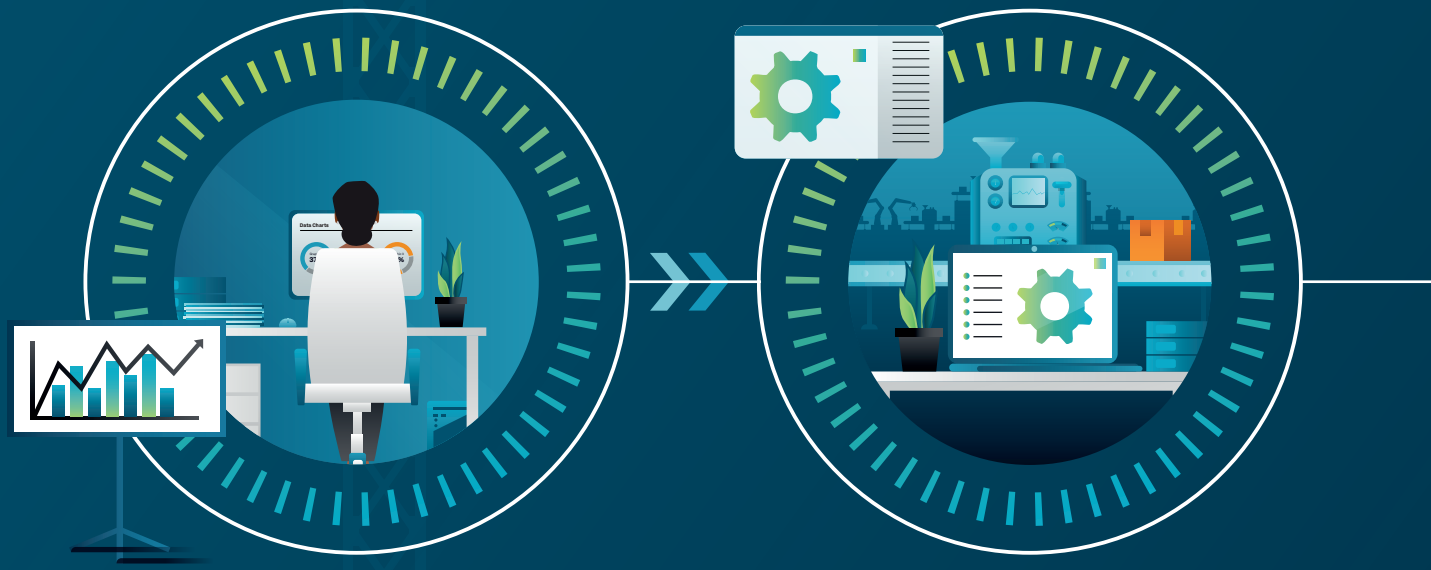
With MAESTRO, you can simplify every part of the CMM measurement workflow using our intuitive software and hardware ecosystem. You can program on- or offline using Metrology Mentor and create realistic simulations with the digital twin.

More than just a measurement tool.

It's likely your business is already using transformative technologies to improve efficiency, flexibility, and quality in your manufacturing processes. Adopting the principle of the smart factory through Artificial Intelligence (AI), the Industrial Internet of Things (IIoT), and Big Data analytics is vital if you're to remain competitive in your market.

MAESTRO embraces these transformative technologies, now. It already has the capabilities to become an integral component of your smart factory, providing quality data quickly for the factory's efficient, effective – and increasingly autonomous – operation.

How MAESTRO becomes an integral component of smart manufacturing.



Gate #1 Planning –
Maximised CMM utilisation

With MAESTRO, unplanned downtime is dramatically reduced thanks to easy monitoring of machine status and calibration history.

Using Nexus software, machine utilisation can be monitored in real time, from anywhere, for optimised fleet planning.

Gate #2 Programming –
First-time-right measurement, every time

MAESTRO offers offline programming, simulation and validation of part programmes using the digital twin with Metrology Mentor and PC-DMIS software. Thanks to technology such as probing path optimisation and collision protection, MAESTRO makes 'first-time-right' measurement a reality.

At the same time, based on optimised, digital validation, program creation is faster than ever before, removing non-productive steps and avoiding downtime during programming.

Gate #3 Setup & execution – Measurement that keeps pace with production

MAESTRO is the CMM with the highest speed in its class. No other CMM moves faster or captures points quicker. Plus, the ability to upgrade the standard speed and accuracy of your CMM at any time means you're always competitive, always productive.

Digital machine components (such as sensors and racks) are instantly identified and initialised when mounted and synchronised with the digital twin. In addition, probe calibration allows for up to 85% calibration time savings.

As your processes become more automated, MAESTRO delivers even more value. The all-digital, connected CMM offers seamless integration with smart manufacturing environments and easy connectivity with major industrial automation ecosystems.

Gate #4 Analysis & reporting – Driving collaboration and agility across teams

Cut decision-making times and increase communication between teams with data-driven collaboration. Together, MAESTRO and Nexus offer centralised, cloud-based reporting, with the ability to share quality data and insights in real time.


DW 2.5

MAESTRO leads the metrology revolution in four powerful ways.

Faster throughput, simpler operation, ultra-connectivity, and readiness for tomorrow all come together, to take metrology to the next level.

Decades of metrology experience have gone into designing MAESTRO.

Hexagon looked deep into the needs and challenges of various industries. Only after scrutinising these from all angles did the meticulous work of designing, developing, building, and exhaustively testing MAESTRO begin. This ensured it delivers against four criteria:

Speed of operation.

Faster throughput is necessary thanks to the sheer pace of technological advancement and innovation in almost every industry, from Aerospace to Automotive.

Ease of use.

MAESTRO makes metrology accessible for all kinds of skill sets by making even the most complex measurement task simpler.

Digital connectivity.

No longer a nice-to-have, digital connectivity is now a must-have for any business demanding better collaboration. Access to data anywhere, anytime is critical to keeping ahead of the competition.

Future-proof design.

While always significant, futureproofing is now critical. The investment in the best equipment, delivering ROI, and lowering the total cost of ownership is too important.

From downtime to on time, every time.

Capture accurate measurements at the speed of production, with the fastest CMM throughput on the market.

With MAESTRO, unparalleled speed is achieved through a combination of synchronised movement and swift sensor changes during operation. The machine moves fluidly and extremely fast, without interruption. Wrist axis and machine axis operate in sync. Even probe changeovers are much faster with MAESTRO. Improvements of up to 50% are possible.

It's fast and easy to set up MAESTRO, create and run programs with Metrology Mentor and PC-DMIS, and interpret the data with Metrology Reporting. Hexagon's connected hardware and software are designed to work together to provide the fastest and easiest CMM experience anywhere.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MAESTRO delivers the highest throughput on the market for a CMM system in its class.

MAESTRO delivers fast, industry-leading accuracy.

With synchronised movements of all axes, faster and easier calibration routines, and extremely fast acceleration (up to and 6500 mm/s^2), movement (up to 1100 mm/s) and measurement speeds, MAESTRO delivers the highest throughput on the market for a CMM system in its class.

Using Hexagon's cloud-based connected software, customers can generate and manage measurement programs, manage assets and reported data via a single dashboard – and establish a digital thread for smart and swift metrology workflows.

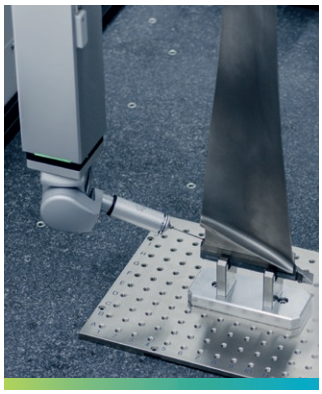
Thanks to its intuitive user interface, Metrology Mentor software makes programming MAESTRO extremely fast. Measurement programs are created rapidly, reliably and repeatably.

New levels of speed, new levels of efficiency.

Ensure quality inspection is no longer the bottleneck in production, thanks to the many next-gen hardware and software innovations within MAESTRO. Create measurement programs in Metrology Mentor, interpret the data and share insights in real-time. Metrology Reporting helps boost collaboration and agility across your teams. Combined with its unique speed and movement during operation, MAESTRO increases efficiency throughout the entire metrology process.

Probe changeovers are 50% faster.

Intuitive, modern software for faster programming and sharing.



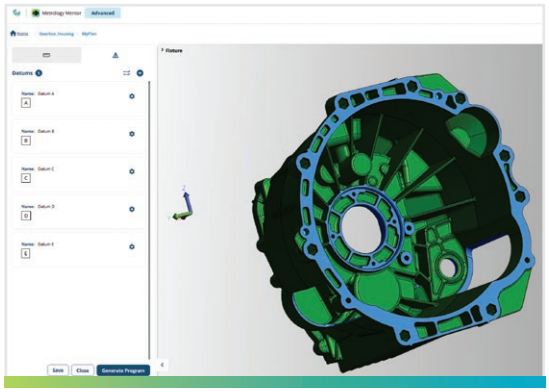
Faster speed never compromises superior accuracy, up to 1.8 µm/20 s.

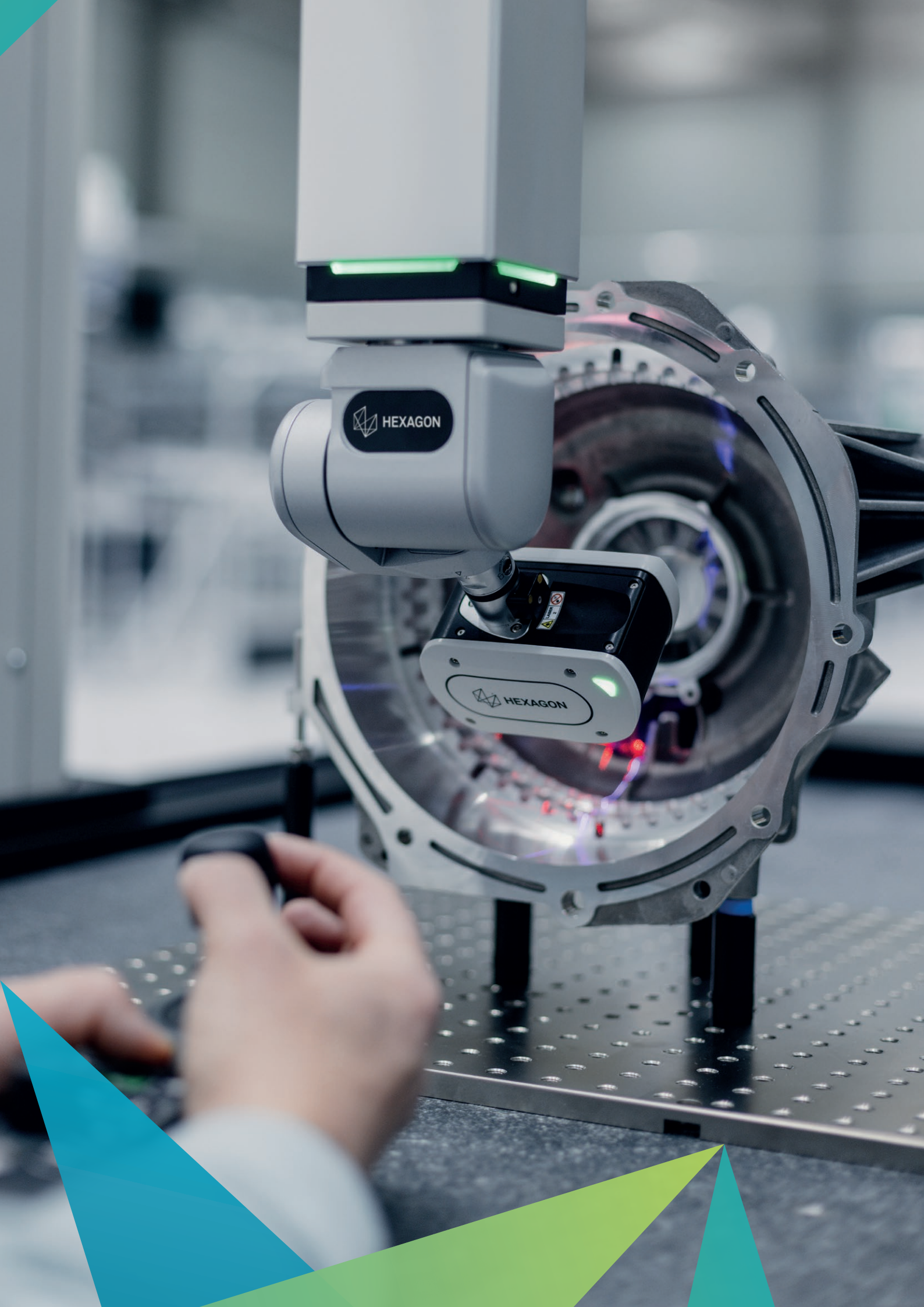
From complex work to simple workflows.

Get the right data first time, every time, with Hexagon's innovative assisted CMM workflow.

While measurement tasks can be complex, your quality process can be simple. Our ease-of-everything system features clear, intuitive user interfaces, workflows, tools and capabilities, ensuring reliable and repeatable measurements, independent of the operator.

The core principle behind all MAESTRO hardware and software is simplicity of operation. The machine's clear display gives detailed information – including warnings, status, and operator instruction – so decisions can be made quickly and efficiently. Metrology Mentor software simplifies workflows by removing the need for programming, enabling any user to apply the most appropriate measurement strategy to any task, and deliver accurate and reliable metrology results. And thanks to rapid and easy wrist replacement, downtime is minimised so MAESTRO can get back to work fast, with less service intervention.

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The core principle behind MAESTRO is ease of everything.

Every MAESTRO feature is geared towards making metrology more accessible for all users, on every level:

Using next-generation Nexus metrology apps and connected workflows, MAESTRO simplifies and accelerates every measurement workflow. CMM set-up, working with Metrology Mentor to create measurement programs, sharing real-time information and insights with Metrology Reporting, and using Metrology Asset Manager to monitor status and effectiveness of manufacturing systems – each component is designed and produced to work together, creating a seamless metrology ecosystem.

Ensuring seamless and right-first-time measurement through offline programming – and realistic simulations with help of the digital machine twin – MAESTRO's digital, self-aware system always ensures smooth operation.

The display and all-around LED indicators connect CMM operators to their machine and measurement workflows with the clearest, user-friendly interfaces and guidance. This makes their job easier than ever before. Machine status and performance data can be made available at any time, on any device.

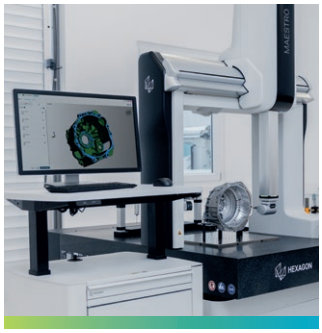
With Metrology Mentor, operators of any skill level can reliably and repeatably set-up industry standard compliant GD&T measurements, without a single line of code, through an assisted workflow.

Near-line or in-line integration with automation environments has never been easier, thanks to the built-in Metrology Communication Interface.

A built-in camera, for remote visibility of MAESTRO in operation, provides visual access to monitor measurements, supply recordings in case of unplanned machine stops, and to support operators.

Measurement simplified.

By integrating and combining industry-leading hardware and software, Hexagon has remastered quality inspection processes by simplifying CMM programming, removing workflow complexity, and reducing the risk of human error.



Simplify every part of your CMM measurement workflow using our intuitive software and hardware ecosystem.

MAESTRO's easy-to-read display delivers clear operator instructions, machine status and error warnings.

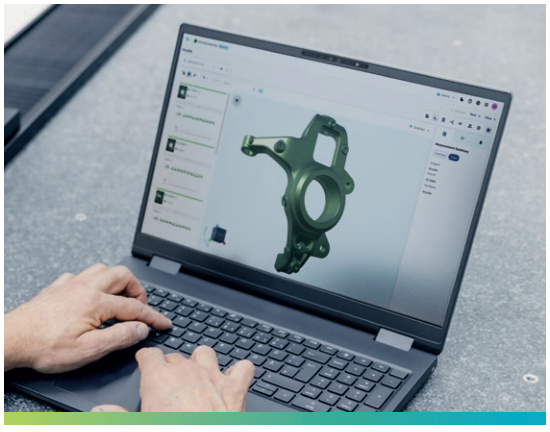
Quick and easy wrist replacement minimises downtime and the need for service intervention.

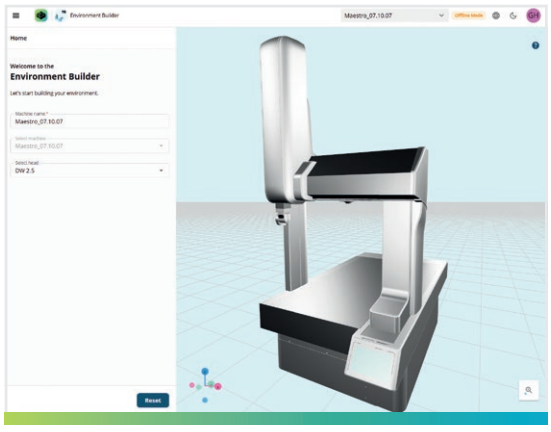
From disconnected data to complete connectivity.

Collaborate using data-driven decisions. Connect easily to existing industrial automation systems without additional hardware.

Think how you could increase efficiency through better collaboration – and the ability to make data-driven decisions to boost both productivity and quality. MAESTRO is an IIoT (Industrial Internet of Things) device by design, so it delivers rich data such as important controller and wrist information, machine status, remaining measurement times, sensor configuration and calibration data. All the data you need is at hand, for the most productive measurement processes.

Meanwhile, its open platform makes it easier to integrate any kind of automation or other software environments.





Increase efficiency and collaboration. Set up and monitor your CMM from anywhere in the world.

MAESTRO maximises efficiency and productivity, and boosts confidence in the measurement process via the following:

The all-digital, self-aware MAESTRO CMM system offers instant synchronisation to a digital twin, for reduced risk of collisions and faster set up times.

Integration with automation environments has never been simpler. MAESTRO easily connects to industrial automation systems.

The digital nature of the system enables remote access in case of service cases, to push software updates and support. For example, getting a live feed to the machine through the built-in camera Smart Machine Eye.

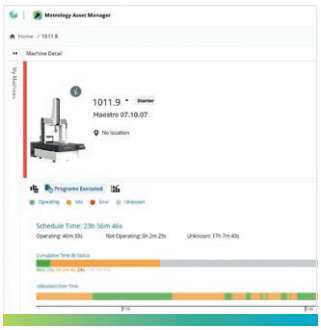
The Nexus ecosystem delivers quality parts data to smart manufacturing environments anytime, anywhere. It enhances team collaboration throughout the manufacturing process. Metrology Asset Manager maximizes Overall Equipment Effectiveness (OEE) with real-time monitoring of machine health, while Metrology Reporting provides insights for data-driven decision-making.

Unlock the power of connectivity.

MAESTRO drives improvements in quality inspection processes through connected data and insights. Through its capabilities as an IIoT device, MAESTRO unlocks the full potential of connectivity, and makes precision measurement faster and easier than ever before.

Program on- or offline, assisted by our Metrology Mentor.

Easily integrate MAESTRO with major industrial automation systems and gain optimum visibility.



Get real-time machine health and performance data.

Smart today, smarter tomorrow.

Meet evolving business needs with effortless upgrades, in the field, at any time – even years after initial setup.

We understand your CMM is one of your most significant investments. That's why MAESTRO is designed for growth, ensuring it remains a valuable asset – backed by continuous support and innovative upgrades – throughout its lifetime. As a single platform with a robust technology roadmap, MAESTRO can adapt to your evolving needs, expanding capabilities as operations and challenges grow.

MAESTRO is designed for growth, ensuring it remains a valuable asset throughout its lifetime.

The highly adaptable system enables you to benefit from future feature updates – and easily add and incorporate the latest technologies.

The system adapts to your operators' capabilities. Whether they're metrology newcomers needing easy-to-use tools like Metrology Mentor to create programs in a few clicks, or highly-skilled engineers creating more detailed programs.

CMM performance can be extended, and new capabilities added to ensure long-term value. Accuracy and throughput can be effortlessly upgraded in the field at any time, even years after initial setup.

Cloud-based Nexus and MAESTRO software products open up endless opportunities for enhancements and improvements.

Adapt easily. Evolve effortlessly.

MAESTRO is your future-proof investment, boosting manufacturing productivity now and in the future. Because MAESTRO is simple to upgrade and adapt to the latest technologies, it's able to meet evolving applications and your changing business needs more easily.

Leverage the latest technologies, today and tomorrow, via a highly adaptable system.

Increase accuracy or throughput as upgrades become available.

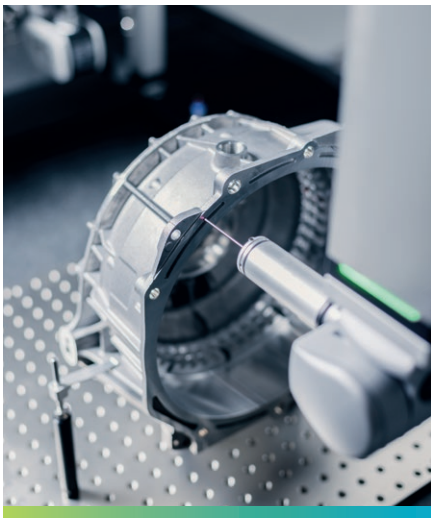
Hexagon's broad portfolio of sensors and accessories ensures long-term value.

Industries and applications.

MAESTRO is the CMM for everyone.

MAESTRO was created from scratch, with users and use cases in mind through each step of its design process. By rethinking every aspect of a CMM – from controller, to firmware, to sensors, to the deep integration of the metrology software – MAESTRO was designed to meet the specific challenges of your industry.

GD&T-compliant parts such as gearbox housings.

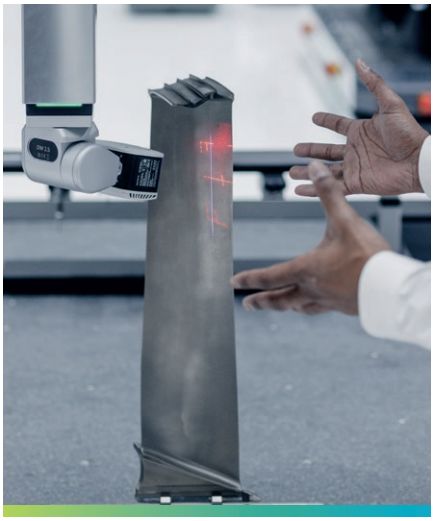


In this instance, the demands on time and accuracy of measurement are particularly high. With bores, bearing seats, sealing surfaces and more, the geometry of, for example, a gearbox housing consists of multiple features all around the part – in different sizes and form, and in various spatial orientations.

To ensure the entire geometry of the part is captured quickly – in a single setup usually within fully automated production cells – a fast, flexible sensor positioning on the workpiece is crucial. With synchronised motion of the CMM and the probe head axes during routine execution, MAESTRO eliminates dynamic CMM errors and dramatically reduces inspection cycle times.

Integrated with Metrology Mentor, individual portions from complete inspection plans are easy to select and publish for execution at downstream quality gates along the production process.

Highly accurate and freeform surface components, like turbine blades.

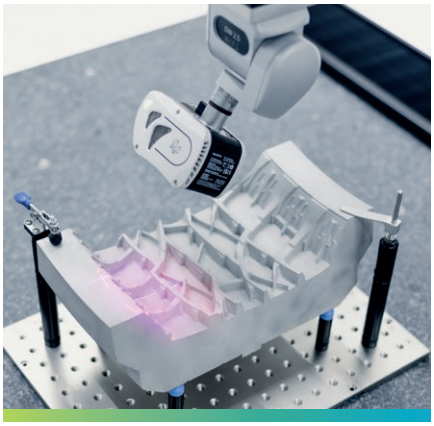


Components such as blades rotate at both high speeds and high temperatures. Errors in dimensions cause eccentric rotations that can damage other parts and cause catastrophic failure.

The surface profile on both sides of the turbine blade and the fir-tree geometry at its base must be measured with high point density during production. A scanning probe and non-contact laser scanner used in combination, for complete part capture in a single setup is the ideal. No problem for MAESTRO. In combination with market-leading metrology software, PC-DMIS, even parts as complex as turbine blades can be programmed and measured reliably.

To ensure uninterrupted high-throughput, multi-sensor measurements, automatic and fast sensor exchange during routine execution is also key. Using MAESTRO, digital changer racks integrate seamlessly with the CMM's digital twin and its real-world counterpart. This drives efficiency when planning, setting up and executing multi-sensor measurements of turbine blades.

Moulds and moulded parts with functional geometries.

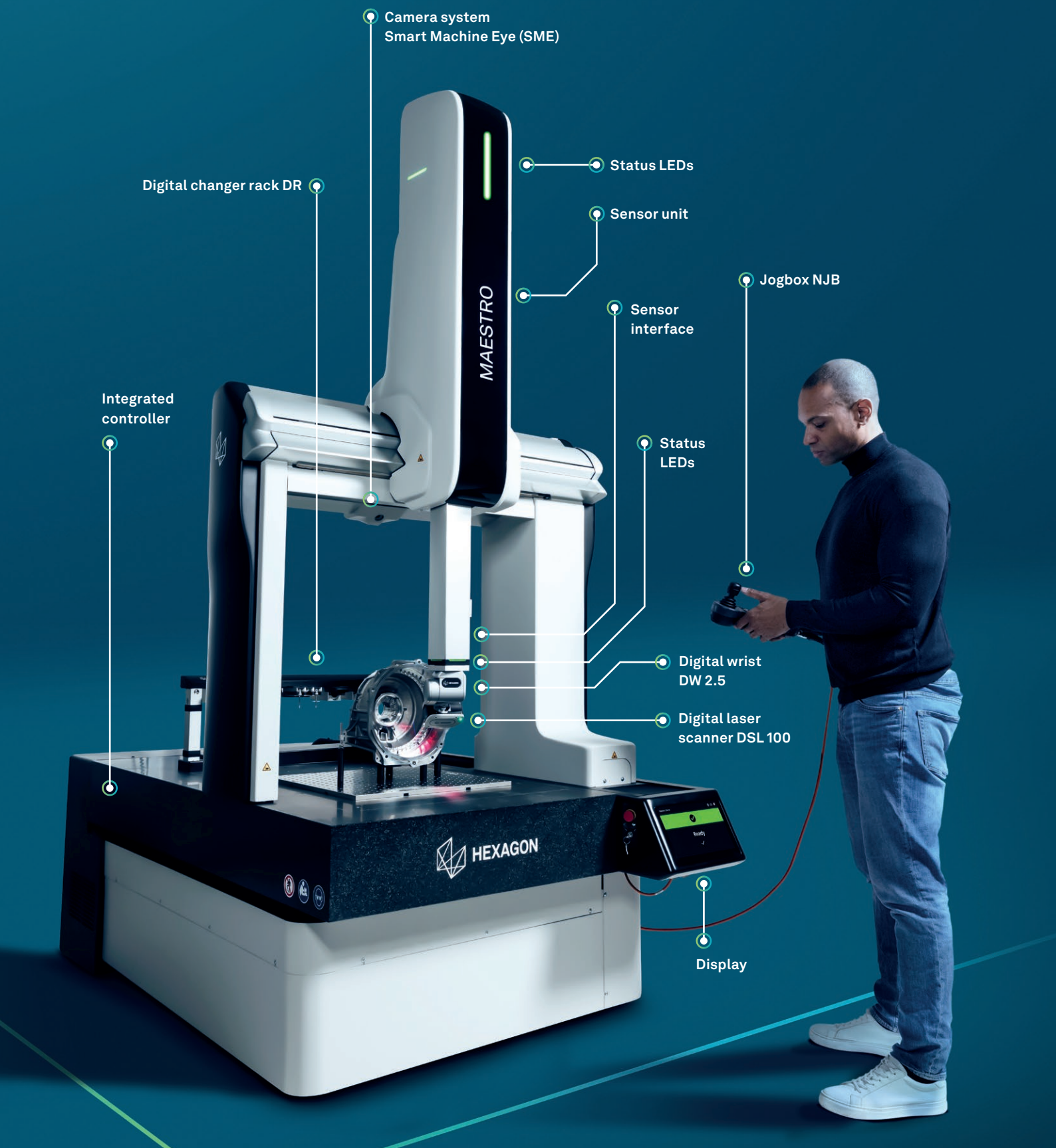


Beyond series measurement of moulded parts during a running production, dimensional inspection is also paramount in validating new moulding processes. This involves measurements of the production mould itself, to iteratively correct its functional geometries before the mould is finally used in production.

MAESTRO helps meet this challenge. Automated CMM inspections can be conducted all the way throughout the moulding process, with quality data captured continuously, using a digital thread approach. The consolidation and interconnection of these quality data sets on our central cloud-based platform reveals actionable insights into process and product quality, making data-driven manufacturing a reality.

Hardware features.

Functions working together to make MAESTRO a revolutionary CMM.



Digital sensors
The digital wrist DW 2.5 enables maximum measurement flexibility through optimal positioning of the sensor towards the workpiece. This wrist has an infinite rotation 360° B-axis and indexes in 2.5° increments to achieve 12 240 unique positions.

The digital touch trigger probe DTT is a 6-way probe for highly repeatable 3D point measurement. The modular design enables operators to quickly change modules and styli configurations without recalibrating.

The digital scanning probe DST 200 allows fast, accurate contour and form measurements with the best-suited orientation. Carries styli up to 200 mm in length (axial direction) and 225 wide (lateral directions). The scanning probe has additional styli clampings, so operators can change styli configurations fast, without recalibrating.

The digital laser scanner DSL 100 enables rapid, highly accurate non-contact capturing of complex part surfaces with high measuring point density. Unique usability features allow fast and easy programming and handling.

Digital changer rack
The only rack you need, this allows for automated exchange of sensors and styli configurations during the measuring cycle without recalibration. Easy to install and calibrate, it provides the highest modularity – e.g., by equipping it with up to three layers, in different widths, and available with various modular and easy-to-install sensor and styli ports.

The digital changer rack fully integrates with the digital twin to monitor the position and occupancy status of each installed port, in real time, to reduce programming and measuring cycle times. The known occupancy of sensor stations reduces the risk of sensor collisions.

Camera system Smart Machine Eye (SME)
An embedded camera system for enhanced remote trouble shooting, root cause analysis, user guidance and technical support. Can be deactivated by use of a mechanical blind.

Status LEDs and display
The MAESTRO CMM features Status LEDs and a display for comprehensive status monitoring.

Status LEDs, located on the Z-tower and sensor interface, allow users to view the machine's status from a distance. They indicate various states such as machine operation, warning, alarm, and standby or waiting mode.

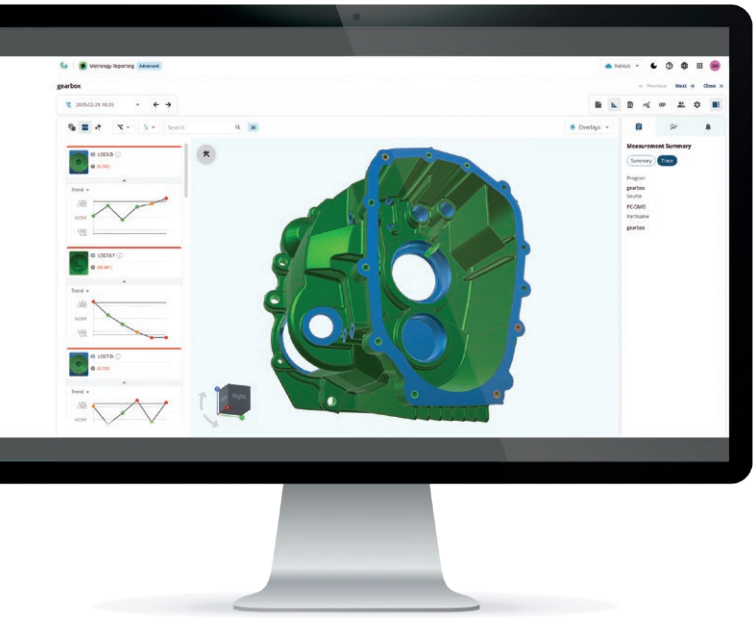
The display provides more detailed information about the machine's condition. It shows whether the machine is ready to operate, provides detailed warnings and alarms, and offers specific details when the machine is waiting for an operator's action.

Sensor unit and interface
Located on the Z-tower, the sensor unit supports current and future technologies with streamlined cabling for easy upgrades. The sensor interface connects to the Z-quill and CMM frame, featuring LEDs for immediate feedback, and facilitating easy replacement of probe heads.

Integrated controller
Integrated into the machine frame, this controller eliminates the need for an extra cabinet and requires just one cable to the operator's desk, allowing the operator PC to be the only device there. The controller supports software updates without hardware changes and is ready for automation.

System software.

Solutions enabling MAESTRO to make your metrology operations easy, faster and more efficient.



Software Metrology Mentor
Metrology Mentor automates CMM programming, streamlining the process for users at any experience level. Customers can generate and manage measurement programs via a single dashboard and establish a digital thread for smarter metrology workflows. Using PMI data, Metrology Mentor automates CMM programming to deliver rapid, reliable, and repeatable collision-free CMM programs. Programming is reduced to a few simple clicks, increasing proficiency. Adherence to ISO and ASME standards increases quality. And best practice measurement strategies deliver confidence.

Software Metrology Asset Manager
Metrology Asset Manager tracks equipment use, identifies bottlenecks and spare capacity, and helps anticipate and avoid problems. It provides the data you need when you need it, wherever you are. Maximize your Operational Equipment Effectiveness (OEE) – even the slightest change in OEE brings great benefits to results. Metrology Asset Manager monitors CMM device health and performance to reduce downtime through preventative maintenance.

Metrology software PC-DMIS
PC-DMIS is an industry leading metrology software that provides a complete suite of programming capabilities for the creation and execution of measurement routines.

Used globally across a variety of manufacturing verticals, addressable applications include powertrain, automotive body and assembly, aerospace, heavy industry, medical devices and consumer electronics.

Cutting edge features enable users to tackle a wide range of inspection challenges, significantly reducing the time required for setup, execution, and analysis.

With industry leading support for GD&T, PC-DMIS supports ASME Y14.5 and ISO 1101 standards ensuring precision and consistency across manufacturing and inspection processes.

PC-DMIS is integrated with Nexus - Hexagon's next generation platform, providing access to a complete portfolio of manufacturing technology. Connect with a growing number of applications to extend and enhance the capabilities of PC-DMIS and Maestro CMM.

Software Metrology Reporting
Metrology Reporting provides real-time information and insights, enabling increased productivity based on data-driven decision making. Nexus-native, its centralised reporting functionality is simple to use, and provides intelligent insight, basic statistic calculations, and is accessible on any device at any time.

System functions.

Teach and Execute mode
This mode on the MAESTRO CMM enables users to switch between two modes with a key. In Teach mode, slowing down affects all operations, including machine throughput and scanning speed, aiding program testing. In Execute mode, only movement speed is reduced, while scanning and touch points remain at set speeds. This ensures consistent measurement accuracy, as it prevents changes in measurement speed from affecting results.

FastCal calibration
The inferred calibration method determines multiple head orientations and probe positions in a single operation, for precise and accurate measurements at any probe head angle. FastCal significantly reduces calibration time and is suitable for most applications.

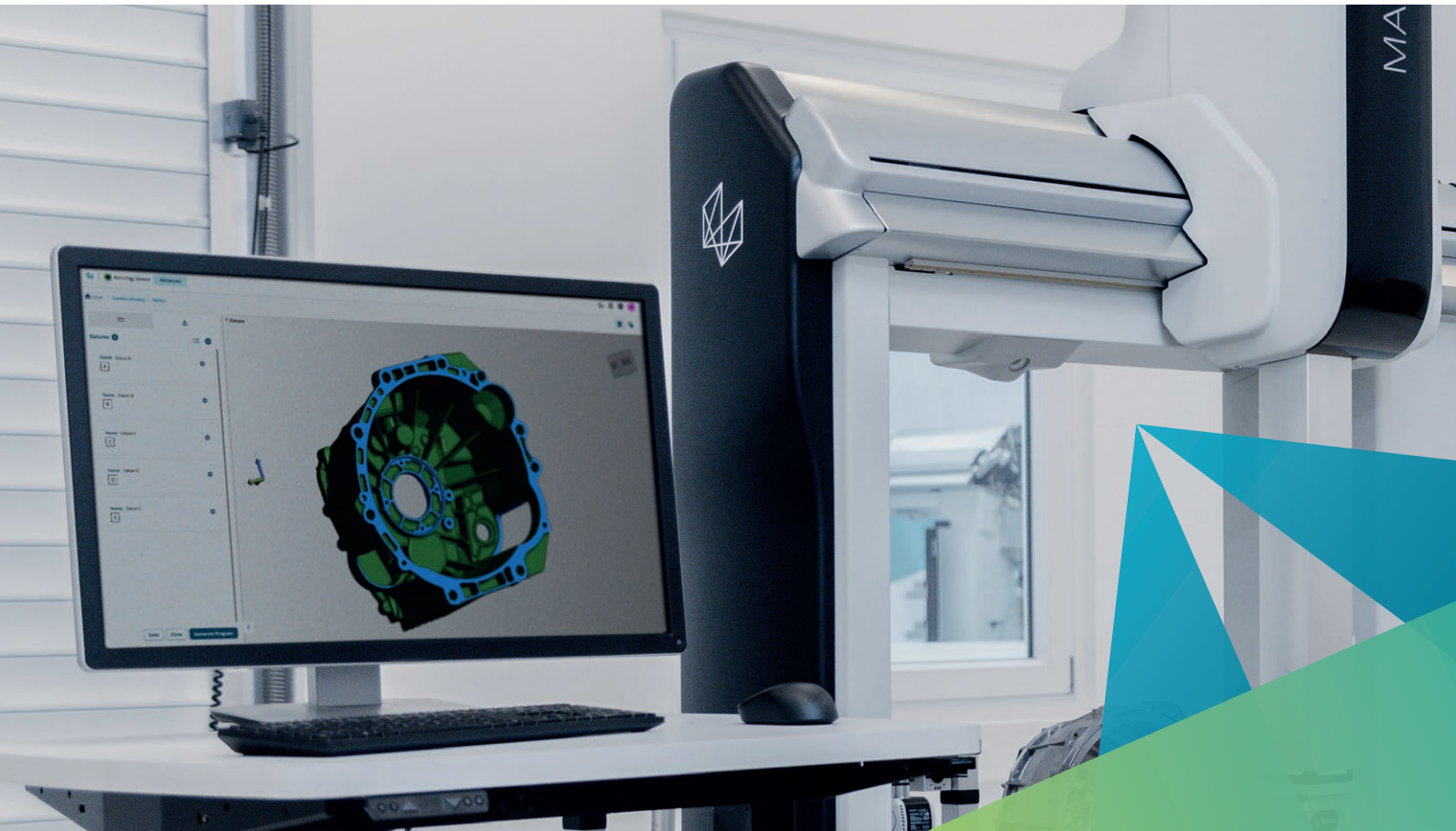
Environment Builder – Digital machine twin
This embedded software component in PC-DMIS manages the machine environment like a digital twin. Users can create and manage probe assemblies, racks, and calibration artefacts, and calibrate probes and align racks. It also visualises the entire CMM setup. Available on the CMM via PC-DMIS or Metrology Mentor.

Metrology Communication Interface
Seamlessly integrates the MAESTRO machine with external systems like ERP, MES or PLCs. Ethernet-based communication allows users to exchange data in from – and to – the CMM, as well as remotely triggering and monitoring measuring operations. Allows integrators to use familiar tools and simplifies the process without requiring extensive proprietary software. In combination with the safe I/Os, it has never been easier to integrate a Hexagon CMM in automation projects.

Performance upgrades
Standard configuration with base accuracy and throughput, this can be easily upgraded at a later date.

Accuracy+ boosts length measurement capabilities (ISO 10360-2:2009) and scanning capabilities (ISO 10360-5:2020). Throughput+ increases speed and acceleration, also upgradeable in the field without hardware modifications.

Both features can be switched easily, enabling users to adapt quickly to changing applications or requirements.



MAESTRO frame sizes.

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X: 500 mm

Y: 700 mm

Z: 500 mm

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X: 700 mm

Y: 1000 mm

Z: 700 mm

09.YY.08

X: 900 mm

Y: 1200 mm | 1500 mm | 2000 mm

Z: 800 mm

MAESTRO pre-configured packages.

MAESTRO can be configured using pre-configured packages, or by configuring all components such as size, sensors, racks, software, and accessories, completely individually.

MAESTRO Touch+

General-purpose measurements of size features with highly repeatable touch trigger probing.

Digital touch trigger probe DTT

Metrology software PC-DMIS

MAESTRO Scan+

General-purpose measurements of size and form features with high performance tactile scanning.

Digital scanning probe DST 200

Metrology software PC-DMIS

Scan Pilot for improved scanning performance

MAESTRO Speed

High-throughput measurements of complete part surfaces with high measuring point density.

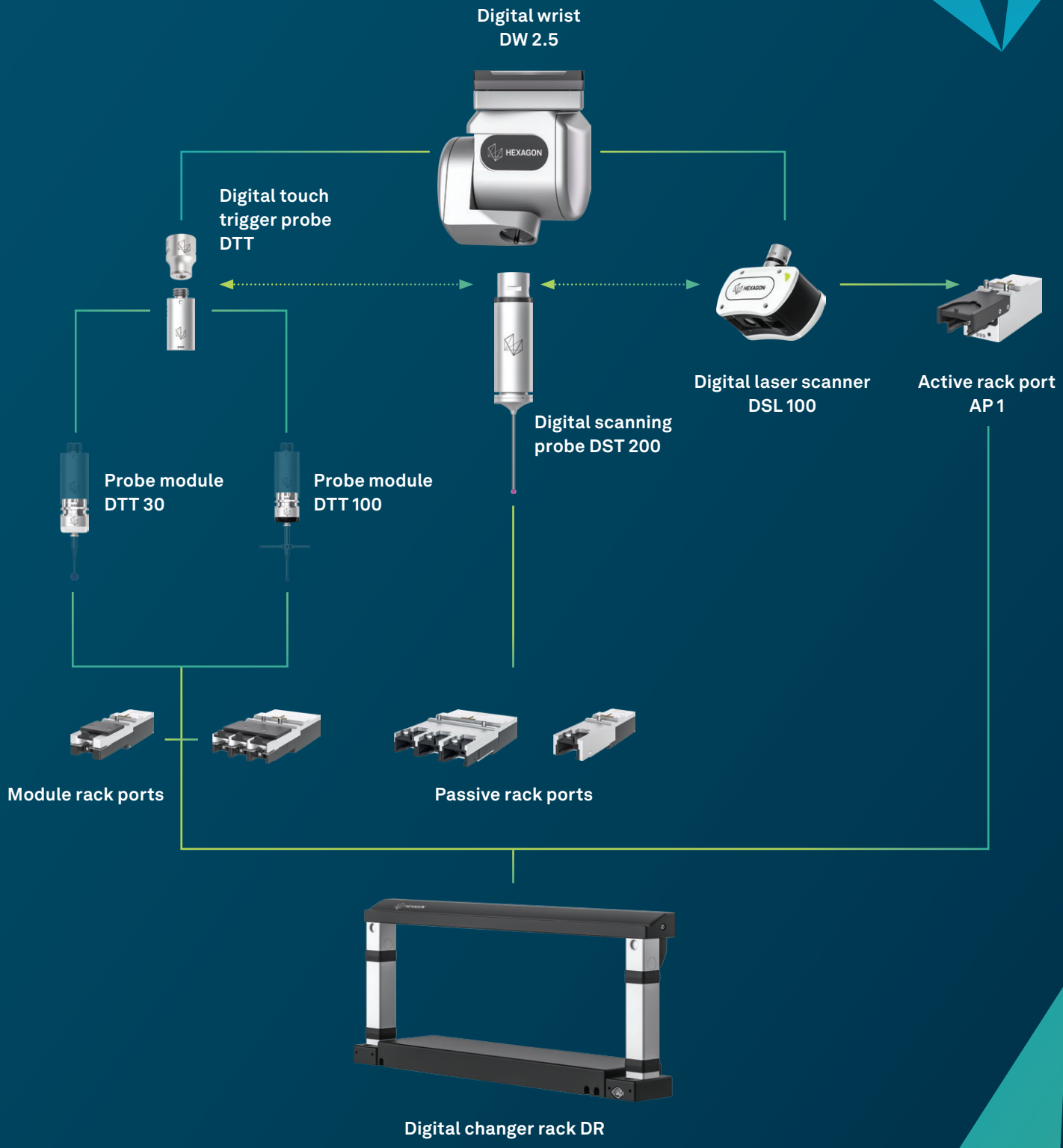
Digital laser scanner DSL 100

Metrology software PC-DMIS

Scan Pilot for improved scanning performance

Digital changer rack DR including modules for DSL 100

Probe and sensor availability.



Aftercare and support.

Local teams delivering world-class support and service.

With Hexagon's comprehensive service program, MyCare, your system is maintained in optimal condition, ensuring peace of mind throughout its lifetime.

Hexagon provides the largest dedicated service team of any metrology equipment manufacturer. Our international presence guarantees a comprehensive local aftersales service, wherever your business is located.

The industry-leading technology within MAESTRO is underpinned by unmatched support from a team of experts delivering service, repair, calibration, and software maintenance and upgrades.

Greener metrology.

Save energy.

To achieve global sustainability goals, much faster progress is needed in reducing the energy required to provide products and services. The energy consumption of a CMM is driven mainly by the supply of compressed air needed for a smooth run of the axis driving system. Energy-saving features are standard on all Hexagon MAESTRO CMMs, giving manufacturers a green light to more responsible, more sustainable metrology.

EcoMode / EcoMode+
This feature partially powers down the CMM when idle, enhancing system and energy efficiency while keeping the machine operation ready. It reduces component stress and operating costs without affecting performance. Eco Mode+ extends these benefits by stopping the flow of compressed air to the air bearings after a period of inactivity, significantly reducing compressed air consumption and the electricity needed to generate it.

eco MODE+

Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications.

Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that use data from design and engineering, production and metrology to make manufacturing smarter.

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at hexagon.com and follow us @HexagonAB.