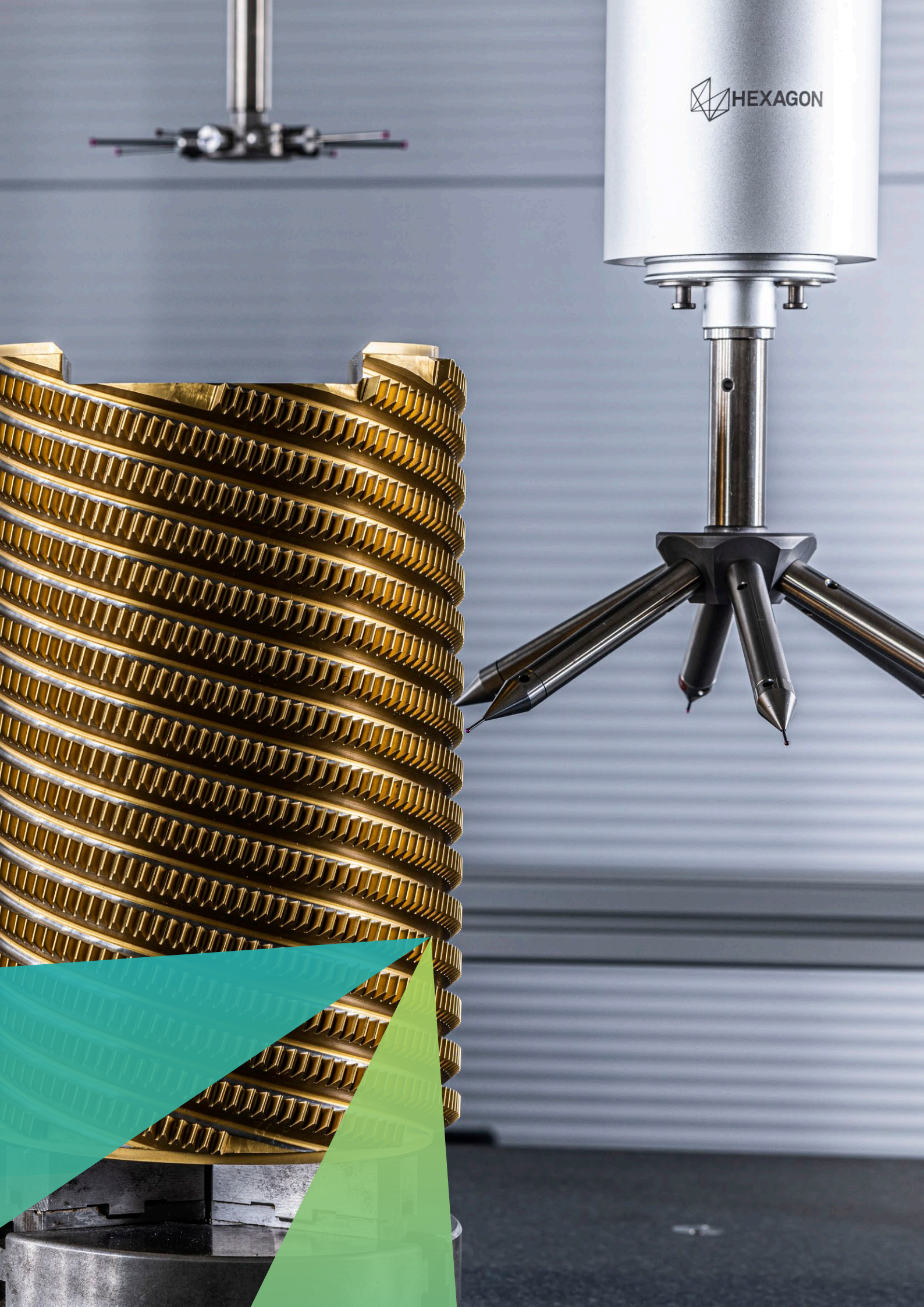
HEXAGON

Brochure

Leitz PMM-C

Efficient and versatile ultra-high accuracy coordinate measuring machines




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Leitz PMM-C

Certainty that manufacturers can trust

Manufacturers face ever-increasing pressure to produce higher quality products whilst reducing costs. This requires making the manufacturing process more efficient to minimise the number of scrap parts and rework.

Leitz PMM-C coordinate measuring machines (CMMs) are highly precise, premium metrology devices that deliver fast, ultra-high accuracy results to fulfil the most demanding inspection requirements across a range of precision applications.

- Measuring complex parts at the tightest part tolerances with maximum accuracy
- Increasing the acceptance range of produced parts thanks to minimised measurement uncertainty
- Calibrating master parts and gauges

The latest generation of machines offers exceptional accuracy across the series, with specific configurations and capabilities to serve individual application needs. Compared with other offerings in this measurement class the PMM-C range offers higher accuracy, greater measurement flexibility, faster throughput, enhanced software tools and future-readiness built-in.

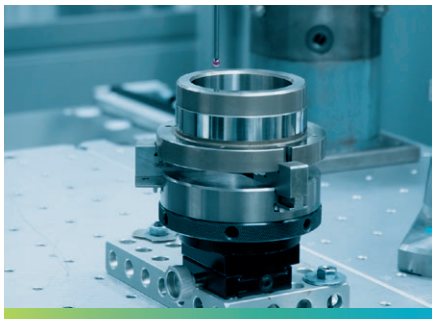
Easy system upgradability ensures the Leitz PMM-C is a versatile future-proof investment that is adaptable to users' evolving application requirements now and in the future.



Industries and applications

The Leitz PMM-C series of CMMs set the performance standard for ultra-high accuracy inspection across a broad range of precision applications.

Whether calibrating master parts and gauges or inspecting complex geometries and high-value sensitive parts with the tightest tolerances at sub-micron levels, there is a machine for almost every application – even in precision production environments.



Gauge calibration

Periodic calibration of gauges and master parts to national standards



Automotive

Hairpins, stator, rotor, planetary gears, e-drive housings, fuel cell bipolar plates, engine blocks, cylinder heads, cam shafts, gearboxes, brake discs



Aerospace

Drive train components, blades and blisks, support structures, housings



Precision industries

Optics, electronics, bearings, watch plates, small complex components



Drive technology

Straight and helical gears, bevel gears, worm gears, gear racks, gear-cutting tools



Medical technology

Implants, medical instruments, internal and external fixators, prosthetics

The identity of Leitz PMM-C CMMs

Intelligent design and technologies deliver high precision, adaptable performance

The Leitz PMM-C brings together innovative technologies that make it the pinnacle of high-performance metrology. Every detail of the CMM is directed to achieving certainty with accurate information that manufacturers can trust.

The outstanding stability of the Leitz PMM-C platform guarantees maximum accuracy and reduced measurement uncertainty across the range. In addition, the latest generation of machines adds functionalities and features to lift the system to the next level of ultra-high accurate dimensional inspection.



Closed-frame design

The granite base and fixed portal guarantee long-term stability. The high stiffness of the measurement axes ensures consistent accuracy over the entire measurement volume.

Messaging lights

Know what the CMM is doing. Messaging lights on the machine provide at-a-glance monitoring of the CMM's operating mode.

Automatic sensor exchange

SENMATION makes a CMM a multisensor inspection device capable of completing the most intricate measurement challenges with fully automatic sensor exchange during a measurement cycle.

High-speed and safety

Monitoring by two 2D laser scanners allows worry-free high-speed measurement in CNC mode. The machine will stop automatically when the user or an object encroaches upon the protected area.

Moving table

An efficient and precise travelling measuring table on pre-loaded air bearings ensures stable dimensional relationships and efficient movement, with no tilting or twisting.

Sweet spot

Achieve ultimate accuracy levels for measurement of very tight tolerances on smaller parts or features that need to use only a limited area of the potential measurement volume.

High speed and accuracy

Servo-drives with recirculating ball screws support fast measurement. The CMM accelerates rapidly while retaining positional accuracy, reaching top speeds even over short movement paths.

Wider operating temperature range

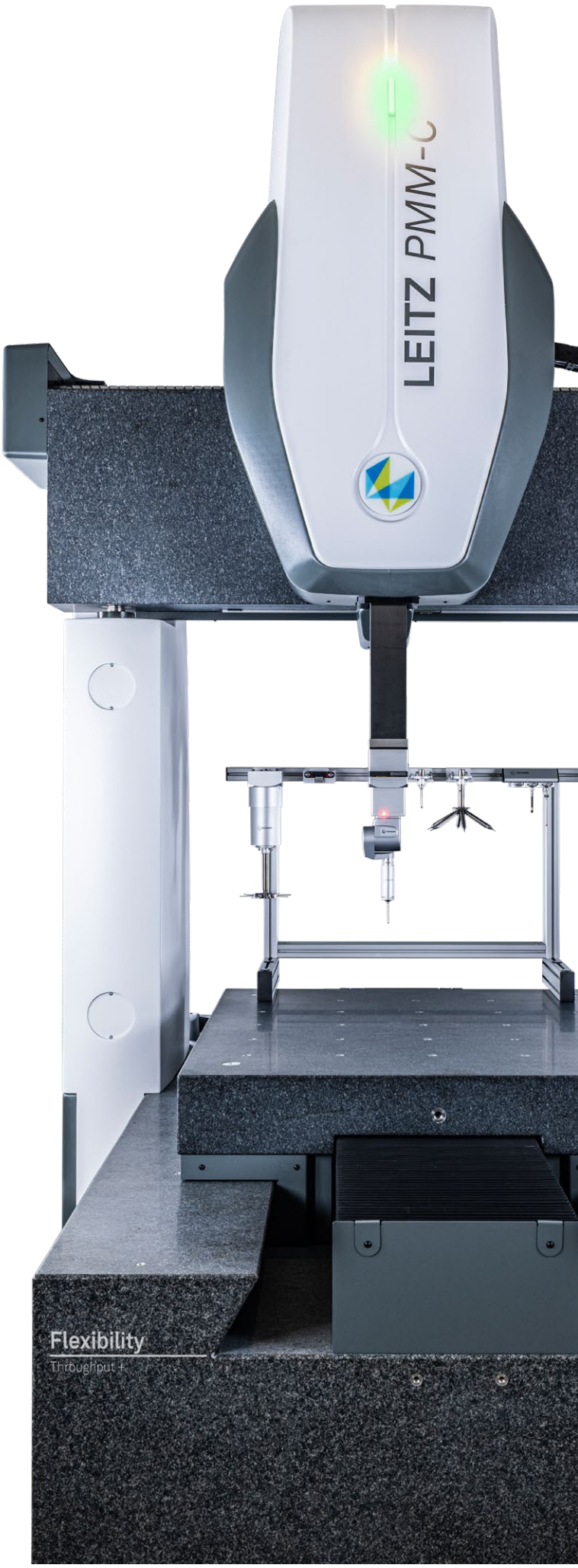
The **XT** (extended temperature) option enables use in precision production environments that meet measurement room quality class 4 specifications – without needing a costly climate room.

4-axis scanning

The optional rotary table allows measurement to be carried out with continuous 4-axis scanning, so highly complex parts can be inspected quickly with a high point density.

Save air, save energy

Eco Mode+ reduces compressed air consumption, contributing to a more sustainable future. Save up to 100% of compressed air when the machine is idle and reduce overall air consumption during a typical measurement routine.

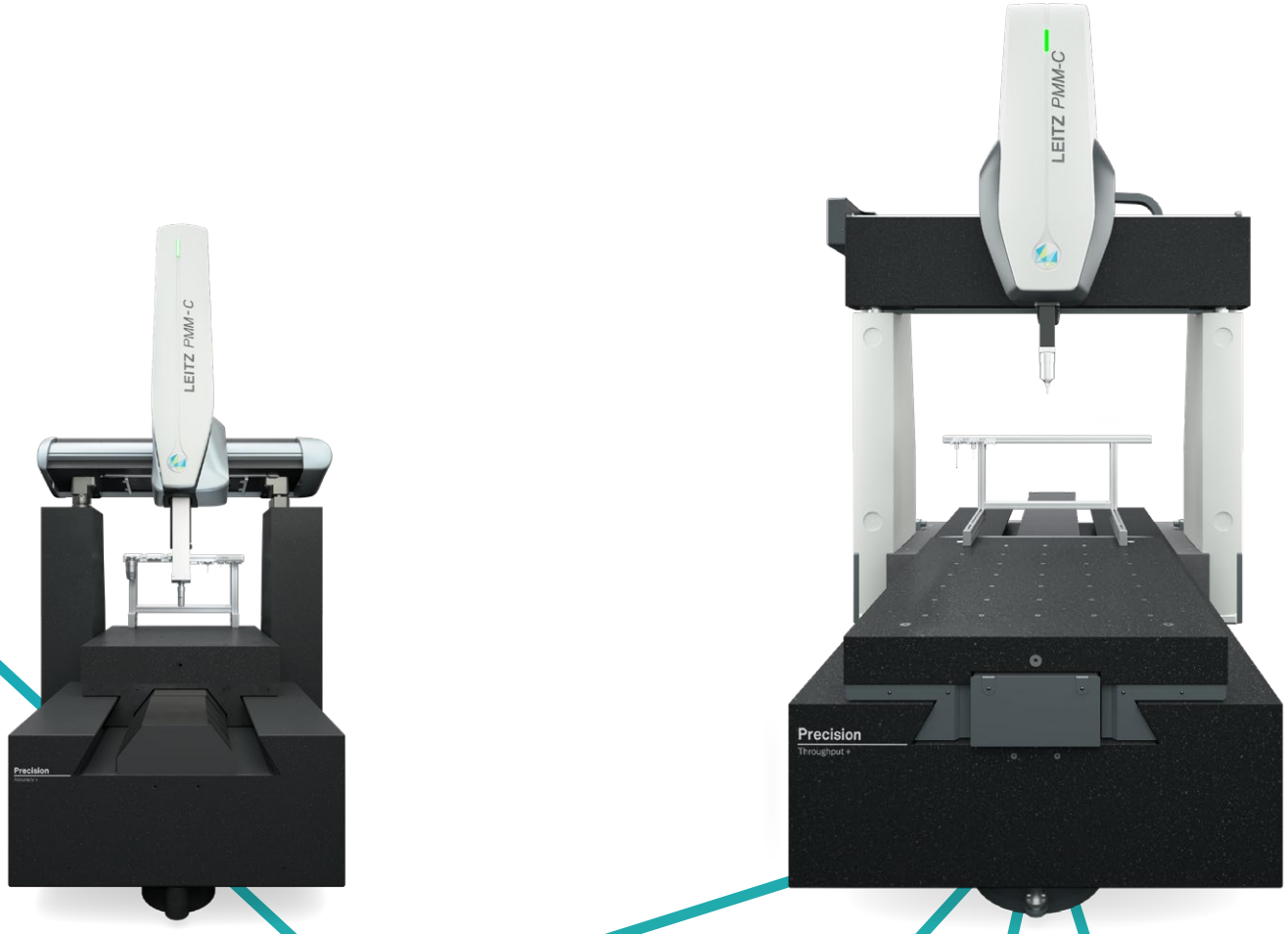


Small to large – leading across the range

Six machine sizes for applications of almost any scale

Precision parts and gauges come in all shapes and dimensions – from tiny precise smartphone lenses of just a few millimetres in diameter, to geared shafts that can be more than two metres long. Likewise, mid-size ring gauges are a few centimetres in diameter, while large aero engine blisks can have a diameter of one metre or more.

With a range of six machine sizes starting at 7.7.5 (700 x 700 x 500 mm) and extending to 24.16.10 (2400 x 1600 x 1000 mm), the Leitz PMM-C series is perfectly matched to measuring workpieces of a wide variety of sizes and shapes, providing the highest levels of accuracy across the series.





Modular configurations tailored to specific applications

Precision and **Flexibility** models on a future-ready platform

The PMM-C range offers targeted metrology capabilities to fulfil the specific requirements of two broad application classes.

Two base models – **Precision** and **Flexibility** – address high precision applications with very tight form tolerances and applications that also require a high degree of sensor flexibility. Each model combines sensors, components and software to offer an all-in-one solution to cover the measurement tasks typical in that application class.

The **Leitz PMM-C Precision** model is configured to achieve the best possible measurement capability using ultra-high precision fixed probe head measurements.

This model offers maximum repeatability and form measurement accuracy, even for long or multi-styli configurations in fast single-point probing or variable high-speed scanning procedures.

The **Leitz PMM-C Flexibility** model builds upon the capabilities of the Precision configuration to boost the machine's adaptability to more challenging applications and part features and decrease cycle time.

This model has an articulating probe head that measures at any angle to add accessibility to complex 3D part geometries. In addition, the SENMATION sensor automation system increases measurement flexibility by allowing the seamless integration of a variety of tactile and optical sensors within one measurement routine to address multi-part or multi-feature applications.

Enhanced performance

Options to tap the full potential

Measurement requirements for precision components can widely differ. Depending on the characteristics of the part and the inspection intent, the maximum required level of accuracy and measurement throughput will vary. Also decisive is where the CMM will operate – in a quality lab or close to production.

That's why manufacturers can choose to enhance the **Precision** or **Flexibility** base models with additional capabilities, for even higher accuracy, operation in an air-conditioned precision production environment and faster throughput. One or more of these options can be selected to precisely tailor the CMM to specific application requirements. These capabilities can be configured at the start or set up later as upgrades to the in-service machine to meet changing needs.*

This future-ready modularity equips users for a range of metrology tasks in a broad spectrum of high-precision manufacturing applications, now and in the future.

* Available enhancement options depend on machine size. Please contact your local Hexagon representative to discuss your application requirements and configuration options.



Base models

- Precision
- Flexibility

Enhancement options

- **Accuracy+** Ultimate accuracy
- **XT** option Near production operation
- **Throughput+** Fastest throughput

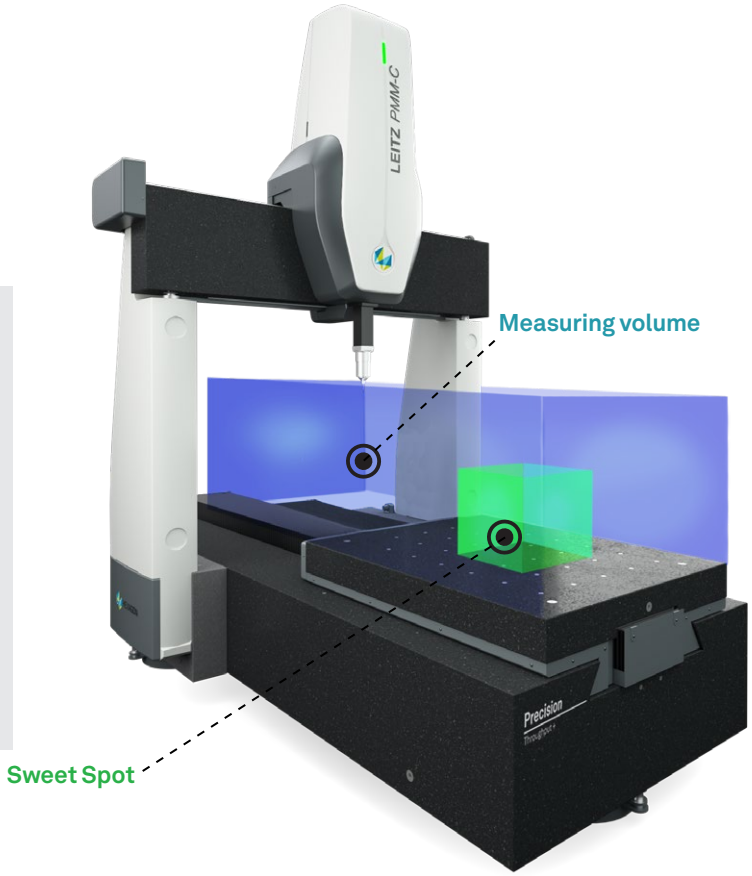
Other configuration options

- Probe heads and sensors
- 4-axis scanning
- Application-specific software

Ultimate accuracy for the tightest tolerances

Accuracy+ reduces the CMM's volumetric measurement error to the next level of sub-micron accuracy and increases repeatability to address the very tightest part tolerances. The need for such capability is a growing trend in many industries and precision gauge calibration.

For mid and large-size Leitz PMM-C models, **Accuracy+** includes an even more accurate **Sweet Spot** measurement volume. This delivers ultimate accuracy levels when measuring very tight tolerances on smaller parts or features that need to use only a limited area of the potential measurement volume.



Measure near production

Ultra-high accurate measurements have historically been confined to high-end measurement rooms. With the Leitz PMM-C, this is no longer true.

The **XT** (extended temperature) option allows medium and large-size machines to be used near the production line without needing a costly climate room, which is unprecedented for CMMs of this accuracy class. The option enables accurate and reliable measurement in a precision production environment with an operating temperature range of 18-24°C that meets class 4 measurement room quality specifications.

Higher production volume and faster output

Throughput is key to avoiding delays and ensuring parts are shipped on time. High measurement throughput is particularly important for near-line and 100% part inspection.

Throughput+ boosts measurement productivity by significantly increasing the machine's maximum axis acceleration and measurement speed without compromising accuracy or precision. Throughput+ achieves up to 20% faster throughput than the standard configuration – best in class in ultra-high accurate CMMs.

Probes and sensors

High performance for every application

Tactile form and profile scanning

Tactile sensors from Hexagon are well-known for their dynamics and accuracy, supporting single-point probing, self-centring 3D scanning and variable high-speed scanning for fast and accurate form and profile measurements of complex geometries.



Highly accurate and flexible heavy-duty probes: LSP-S2-O / LSP-S2-WL

The LSP-S2-O / LSP-S2-WL fixed scanning probe systems combine maximum accuracy with outstanding high-speed scanning properties, even when using sensor extensions up to 800 mm in length and 1000 grams in weight. The systems also support HP-O and Precitec S0.3 optical sensors for fast, highly accurate, non-contact measurements. The probes are an option for larger Leitz PMM-C Precision models.



Precise and interchangeable: HP-S-X5-HD

HP-S-X5-HD fixed scanning probes measure complex geometries at the tightest tolerances with high precision and repeatability. The system enables 3D probing, supports heavy styli configurations, and has a maximum sensor extension of 800 mm for measurement at great immersion depth. The system is compatible with the SENMATION automatic exchange interface and is a standard sensor for most Leitz PMM-C Precision models and an option for the Flexibility model.



Compact and rugged for small machines: HP-S-X3

The HP-S-X3 fixed sensor system features a short, rugged design that suits the needs of small-sized CMMs. The maximum usable styli extensions of 360 mm enable easy accessibility to a variety of workpieces. The probe is standard on small Leitz PMM-C Precision models.



Slim design for standard and low probing force applications: HP-S-X1C / HP-S-X1LF

The versatility of the HP-S-X1C make it optimal for a broad range of applications. The ultra-low probing force of the HP-S-X1LF, ranging between 0.05 – 0.2N, makes it specialised for the most sensitive part surfaces, from lens barrels of smartphones to micromechanical parts. The system, which is mounted on a fixed probe head interface, is an option for small Leitz PMM-C Precision models.



Highest flexibility for complex parts: HP-S-X1H with HH-AS8-(OW)T2.5

The HP-S-X1H uses the same sensor design as the HP-S-X1C and is combined with an articulating probe head featuring many indexable positions, enabling easy access when measuring highly complex workpieces. The probe and head are equipped with a kinematic joint, allowing automated probe changes. The articulating head is also compatible with the optical HP-OW and HP-O Flex sensors. The sensor can also be flexibly used with a maximum sensor extension of 225 mm. The system is standard for the Leitz PMM-C Flexibility model.



Surface and roughness scanning: PROFILER R

The PROFILER R measures all common roughness parameters through tactile surface scanning. The sensor is adapted to the HP-S-X5 HD or LSP-S2-WL scanning probe heads and is automatically integrated into the measurement process using the standard stylus changer interface. The sensor is an option for all Leitz PMM-C models equipped with the HP-S-X5 HD or LSP-S2-O / LSP-S2-WL.

Optical measurement

Optical sensors add flexibility to a metrology setup. They are typically used to optimise measurement or to inspect objects that contact-based probes cannot. Touch-free measurement allows the inspection of sensitive and soft materials with no risk of damaging the workpiece surface. Several non-contact sensors are available for the Leitz PMM-C, including chromatic white light, interferometric and laser scanning sensors for various applications.



Highly accurate white light measurement for multiple surface finishes: HP-OW / Precitec S0.3

HP-OW and Precitec S0.3 sensors are highly accurate optical sensors that use focused white light to measure almost all materials, including the most challenging surfaces like glass, ceramic or carbon fibre. For optimum accessibility, the HP-OW sensor is available with the 2.5° indexing probe head. The fixed Precitec sensor is ideal for easy-to-access form and surface features. Precitec S0.3 is an option for the Leitz PMM-C Precision model, and HP-OW is an option for the Flexibility model.



Unrivalled speed, precision and part access: HP-O

The high-resolution HP-O optical sensor range delivers the highest accuracy making it perfectly matched to ultra-high accuracy CMMs. Based on interferometric optical distance measurement, the sensor measures exceptionally well on metallic technical surfaces. The sensor's thin carbon shaft provides excellent access to complex parts and features. The HP-O is available as a fixed version and in combination with a 2.5° indexing probe head. HP-O Adjustable and HP-O Hybrid are options for the Leitz PMM-C Precision model, and HP-O Flex is an option for the Flexibility model.



SENMATION

Intelligent sensor automation

To allow a CMM to perform the most complex measurement tasks using multiple sensor types, Hexagon developed the SENMATION intelligent sensor automation system, which is included as standard on the Leitz PMM-C Flexibility model.

With fully automatic sensor exchange, SENMATION transforms a CMM into a multisensor inspection device capable of completing the most intricate measurement tasks. The system enables the use of a wide variety of tactile and optical sensors within the same measurement routine, ensuring the right type of sensor is used for every part feature.

The flexibility of multisensor measurement delivers large productivity and quality benefits in applications across many industries.

Future-ready

Leitz PMM-C machines are ready for whatever comes next. An integrated future-ready cabling system enables straightforward upgrades to the SENMATION system and integration of additional sensors at any time.

Benefits

- Automatic sensor detection
- Fully automatic exchange of sensors within a measurement routine
- Sensor changes with no need for recalibration
- Enables maximum flexibility and full CMM capacity utilisation
- Adaptability to future technologies and processes



4-axis scanning

Measure highly complex parts using a rotary table

Coordinate measurement can reach its limits when inspecting parts that require multiple probe changes, such as very small and complex internal gearing or aero engine blisks.

The optional use of a **rotary table** extends the CMM's capabilities to allow continuous **4-axis scanning** procedures. Rotary tables enable access to workpieces from any angle, so even highly complex parts can be scanned quickly, with fewer probe changes, increasing throughput.

Rotationally-symmetrical parts can be measured even faster using an optical sensor in **spin-scan** mode. Here, a part is continuously rotated while the sensor remains stationary, capturing the full surface features. Programming and measurement are quickly performed, reducing cycle times.

Application examples

Leitz PMM-C configurations in use

Multisensor measurement of smartphone camera lenses

Smartphone camera lenses are a challenging and complex inspection application with extremely tight tolerances. These tiny parts can be easily deformed when positioned for inspection, and inspecting form deviations of the lens in multiple scanning lines is a very intricate task.

The optimal inspection solution needs the utmost accuracy, plus sensor and fixturing capabilities that ensure part integrity without damage.

With low sub-micron precision and multisensor capabilities, the **Leitz PMM-C 7.7.5** – the smallest machine in the range – is purpose-built to efficiently measure lenses and other small precision components like lens barrels.

A tactile probe is typically used to ensure stable alignment of the lens or for ultra-low-force measurement of the lens barrel. Non-contact optical measurement is necessary to avoid part deflection or damage.

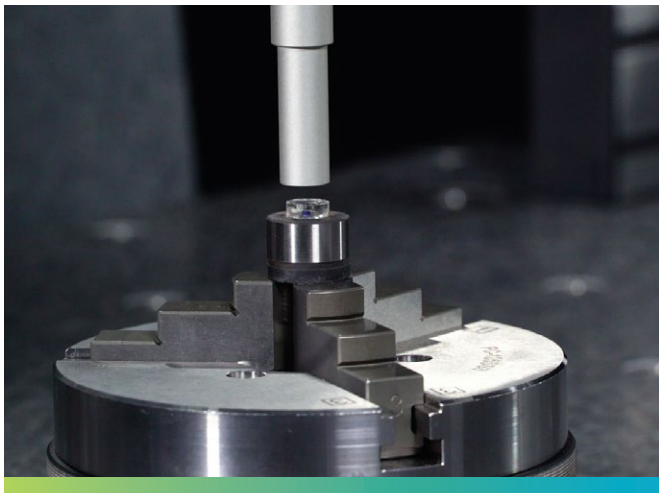
Flexible multi-part measurement for precision eDrives

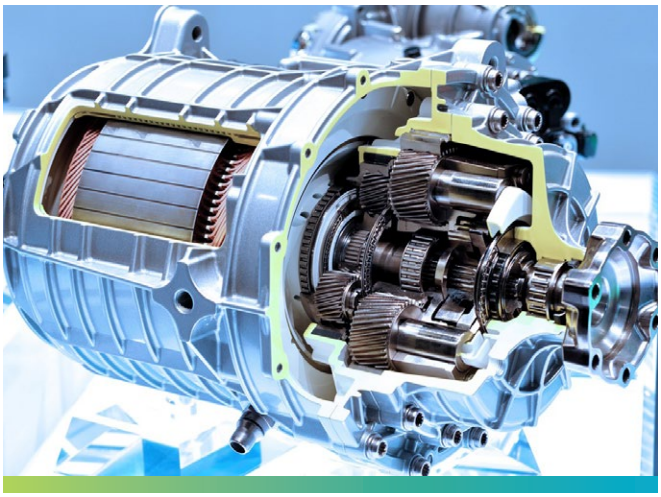
While drivetrains for electric vehicles have fewer components than combustion engines, the tolerances required in precision manufacturing and quality assurance of gears are typically tighter in electric vehicles because of the higher torque and maximum rotation speed of up to 20,000 rpm.

And while components like electric motor hairpins might be less challenging in terms of tolerances, their fragile nature and freeform structure require a complete optical surface inspection.

Leitz PMM-C Flexibility models are equipped with the **SENMATION** universal sensor exchange interface to solve both inspection tasks.

Ultra-high accurate fixed probe heads are used to measure gears with the tightest tolerances, while hairpins can be inspected by switching to a non-contact laser line sensor on an articulating head in an automated full surface inspection.





Sub-micrometre accuracy for master and gauge calibration

Gauges and master parts are critical determiners of product quality, which is why their calibration is essential for every manufacturing company.

Regular calibration is necessary to maintain the accuracy and precision manufacturers need. The periodic return to national standards guarantees reliable, standard-compliant, reproducible measurement results.

CMMs with the **Precision** configuration deliver the accuracy and reproducibility required for high-end calibration, making them ideal for these highly complex measuring tasks.

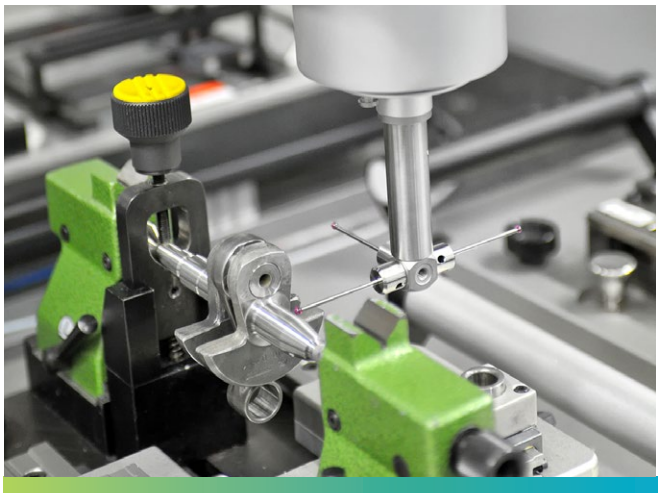
Fast, accurate and repeatable measurement of small crankshafts

The crankshaft and connecting rod are at the heart of power tools like chainsaws and other motorised tools for forestry, agriculture, landscaping and construction. The perfect running of these components is the basis for vibration-free operation and long service life.

These are high-precision parts with the tightest of tolerances in the micron range. Quality inspection must ensure that all form and position tolerances are met. The most important parameters to check are roundness, runout, cylindricity and parallelism.

Variable high-speed scanning on a **Precision** model delivers fast, effective and exceptionally repeatable measurements. This configuration captures a large volume of data points while ensuring the optimum measuring speed, depending on tolerances and part geometry.

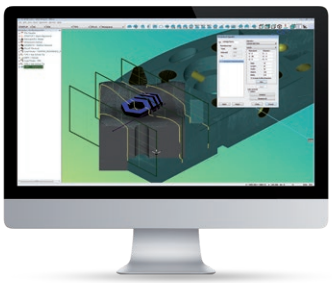





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Comprehensive software

Developed to provide the best support



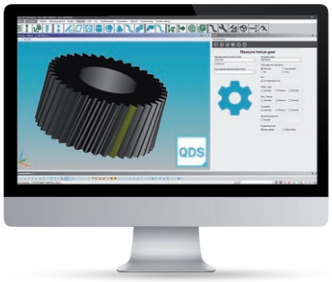
PC-DMIS

PC-DMIS has powerful capabilities to enable users to measure everything from simple prismatic parts to the most complex aerospace and automotive components. PC-DMIS is available in the CAD++ configuration, with optional modules available to fine-tune the software for specific applications.



QUINDOS

QUINDOS is the specialist, expandable software that sets the standard for special geometry metrology. Developed to work in partnership with Hexagon's ultra-high accuracy measuring machines, nearly every measurement task can be solved for a wide variety of different components. QUINDOS can be freely configured for any measurement requirement and expanded later if required using any combination of over 50 available options. All performance and evaluation of measurements are carried out in accordance with the respective national and international standards.



QUINDOS: Gears

The QUINDOS options for gear inspection enable fast and efficient measurement of gear wheels, bevel gears and gear-cutting tools even without a rotary table. The applicable tolerance standards are included in the options. QUINDOS Gear modules also support the pallet measurement option for gears to ensure high throughput.



Q-DAS

Reliable quality data is a vital tool for process evaluation and control. Q-DAS provides the software and the service for the efficient and reliable application of statistical methods necessary to set up a quality ratio system in industrial production.

Greener metrology

Save air, save energy



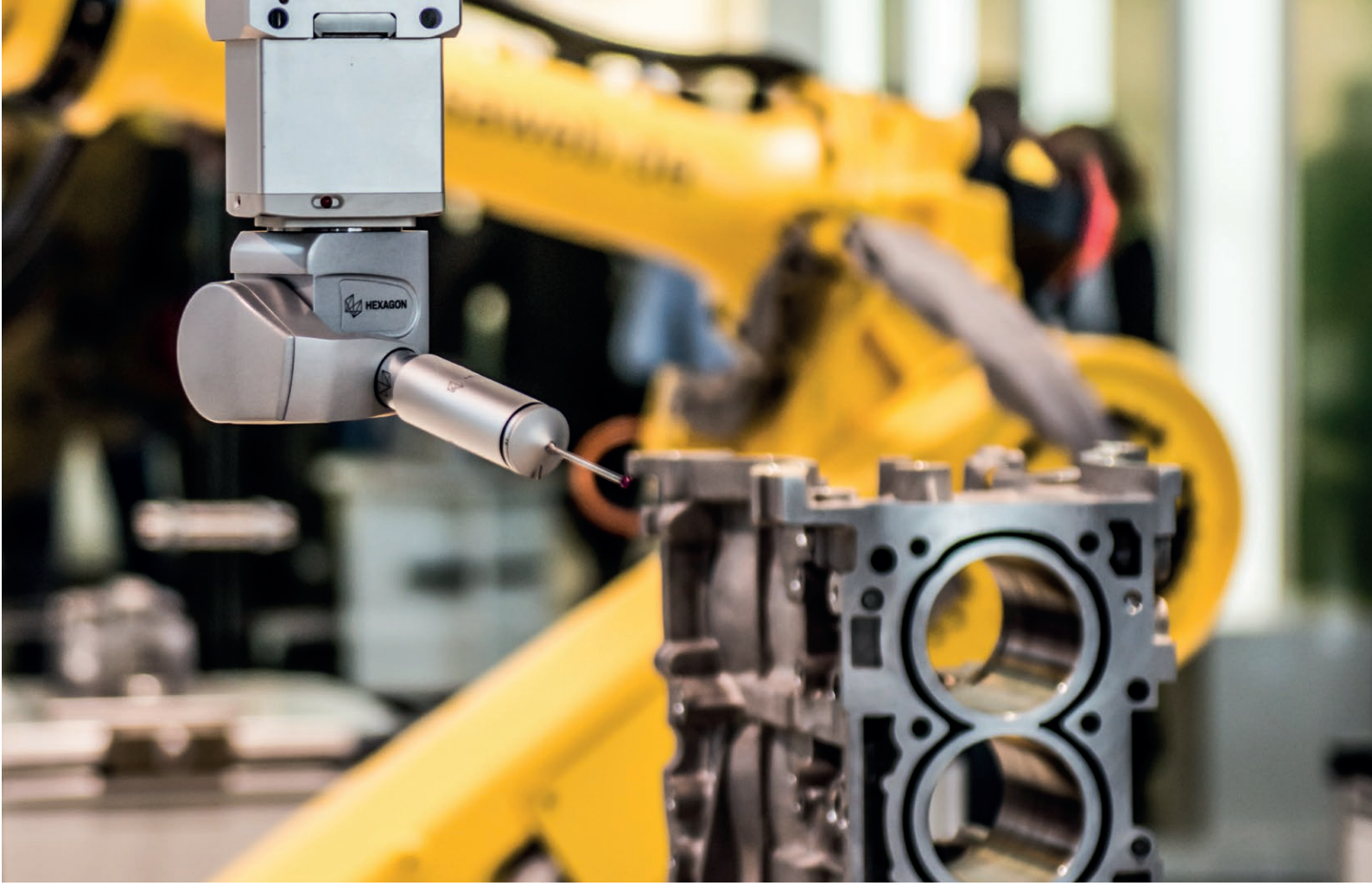
To achieve global sustainability goals, much faster progress is needed in reducing the energy required to provide products and services.

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.

With **Eco Mode+**, an energy-saving feature standard on all Leitz PMM-C machines, manufacturers now have a green light to more responsible, more sustainable metrology.

Eco Mode+ stops the flow of air supplied to the air bearings of the CMM after a period of machine inactivity. This reduces compressed air consumption by up to 100% when the machine is idle, significantly reducing total operating costs while contributing to a more sustainable future.





Automation solutions

Make manufacturing smarter

CMMs don't operate in isolation – they're part of their broader manufacturing ecosystem and workflows. When strong value can be added, manufacturers are increasingly combining CMMs with automated solutions to create smart connected systems that further boost process efficiency and product quality.

Hexagon's automation solutions for the PMM-C range include automated part storage, recognition, and feeding systems, in-line integration with collaborative robots and data transfer to other process operations. The benefits can be substantial, including:

- Increased testing capacity and greater measurement throughput
- Reduced operator influence in reproducible processes
- Autonomous process flow with off-shift measurement
- Significantly reduced quality costs

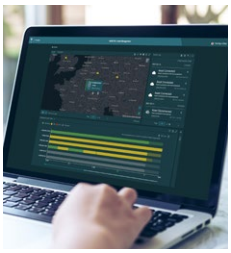
The value of any automation project depends on the use case of the CMM and manufacturing context. That's why Hexagon's automation systems for ultra-high accuracy machines are highly customised to specific customer requirements.

Reach out to your local Hexagon representative to learn how your processes might benefit.

Metrology Asset Manager

Real-time performance data in a centralised user-friendly dashboard, now as standard

Hexagon's Metrology Asset Manager delivers a simple, accurate and reliable way to monitor and analyse how key assets are performing via a centralised, user-friendly dashboard, whether on a single site or distributed across multiple locations around the world.



This future-proof solution provides manufacturers with easy and intuitive access to important information in real-time to allow for better informed decision making. Smart measurement and smart monitoring are the future of smart manufacturing.

- Monitor and manage device status, usage and performance
- Securely access information from anywhere in real time
- Identify production bottlenecks and other sources of inefficiency
- Receive customisable critical event notifications
- Track assets across a single site or at multiple worldwide locations



Every Leitz PMM-C comes bundled with a one-year Metrology Asset Manager Advanced subscription. Contact your local Hexagon representative for more details.

Metrology Asset Manager

Metrology Asset Manager

nexus APP

Visit our shop

Accessories

Making the most of 3D metrology

Driven by a truly end-to-end approach to innovation, Hexagon's wide range of accessories for Leitz PMM-C products reaches from added functionality to improved productivity while covering every need in between.

Hexagon's Manufacturing Intelligence online shop offers a streamlined search, order and delivery service for a wide range of accessories and spare parts in many countries worldwide. Whether you're buying single items or in bulk, shop.hexagonmi.com takes the time and stress out of securing the measuring equipment you need.

Please direct any questions about Hexagon products or accessories to an authorised local sales representative to receive guidance and assistance in making an appropriate purchasing decision.

Service and support

World-class products to rely on

Drawing on decades of research and development experience, CMM technology from Hexagon's Manufacturing Intelligence division is built on a long history of outperforming technological innovation. Deriving quality from experience to drive productivity is what keeps Hexagon in front and able to deliver first-class solutions for industries around the world.

That's why every Leitz PMM-C CMM comes with a 24-month factory warranty as standard, as well as a guaranteed 10 years of serviceability through official Hexagon service channels.

World-class support delivered locally

The international presence of Hexagon guarantees comprehensive aftersales support and services across the globe. With the largest dedicated service team of any metrology equipment manufacturer and an emphasis on locally delivered solutions, Hexagon is unmatched from service, repair, certification and calibration through operator training and software maintenance and upgrades.

● Customer and demo centre





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.

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