HEXAGON

Brochure

Leitz Reference Line

Flexible and ultra high accuracy
coordinate measuring machines

Decision-making made easy

Some decisions are very easy to make, even in the complex world we live in. When it comes to accuracy, efficiency and flexibility, for example, all roads lead to Leitz Reference.

Regardless of whether it's a high accuracy coordinate measuring machine (CMM) testing all types of geometries or a gear measuring centre with no rotary table at all, the Leitz Reference machines provide an all-round solution for quality testing, even in the production environment. The Leitz Reference line is a versatile solution for a broad range of applications.

Automotive

Engine blocks, cylinder heads, valve seating and guides, cam shafts, control cams, gearboxes, axles and shafts, brake discs

E-Mobility

Hairpins, stator, rotor, planetary gears, e-drive housings

Aerospace

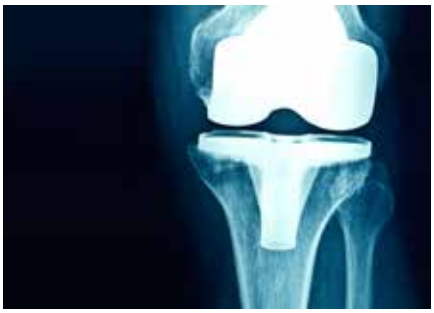
Drive train components, blades and blisks, support structures, housings

Precision Industry

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

Smart solutions through advantageous design

The Leitz Reference line is a versatile range of CMMs that meet the needs of modern manufacturing with an enhanced range of features.

An integrated future ready cabling system offers compatibility with the SENMATION intelligent sensor system, enabling manufacturers to switch automatically between different sensors seamlessly during a single measuring cycle.

Advanced adaptability options available for the CMMs include the PULSE real-time monitoring system. It provides environment traceability in order to ensure data integrity whilst improving safety and security during the measurement process. This also makes it possible to relate recognisable data to possible changes in condition to support root cause analysis.

The ceramic ram helps to provide a more robust performance and messaging lights integrated into the Z covers allow at-a-glance monitoring of the machine condition.

Maximised Measurement Productivity
Automatically switch between tactile probe heads and sensors, optimising measurement cycle time with SENMATION

Solid Base
Stable granite table with a low centre of gravity

Enhanced User Experience
The integrated messaging lights visualise the operating mode at a glance.

Safety
Patented weight compensation of the Z-spindle

High Dynamics
TRICISION™ design featuring reduced mass and triangular portal profile

Temperature Independent
Thermally decoupled encoder motors and decoupled belt tension

Real-Time System Traceability
PULSE enables the user to monitor and log any environmental conditions surrounding the CMM and receive real-time machine information

Maximum Robustness
The Z-ram is crafted using robust ceramic materials for a highly accurate measuring performance.

High System Stability
Granite table with integrated dovetail guide and preloaded air bearings in all axes

Low Vibration
Flat and V-ribbed belts for smooth, low-vibration running of the axes

Flexibility and high levels of accuracy combined

Leitz Reference machines can be adapted to a wide range of applications without reducing their all-round capability, and the selection of different sensors makes them exceptionally flexible. From the ultra high accuracy Leitz Reference ULTRA to the extremely flexible Leitz Reference Xi, the Leitz Reference line offers the highest standards in flexibility and accuracy across a broad range of applications.

Leitz Reference Xi

The flexible machine for a wide range of applications

Equipped with sophisticated technology from Hexagon, the Leitz Reference Xi is a flexible all-around tool. Thanks to a large selection of different sensor systems and hardware options, the Leitz Reference Xi is optimised for adaptation to the most demanding of measurement tasks, even in shop floor enviroments up to 35° C.

Leitz Reference HP

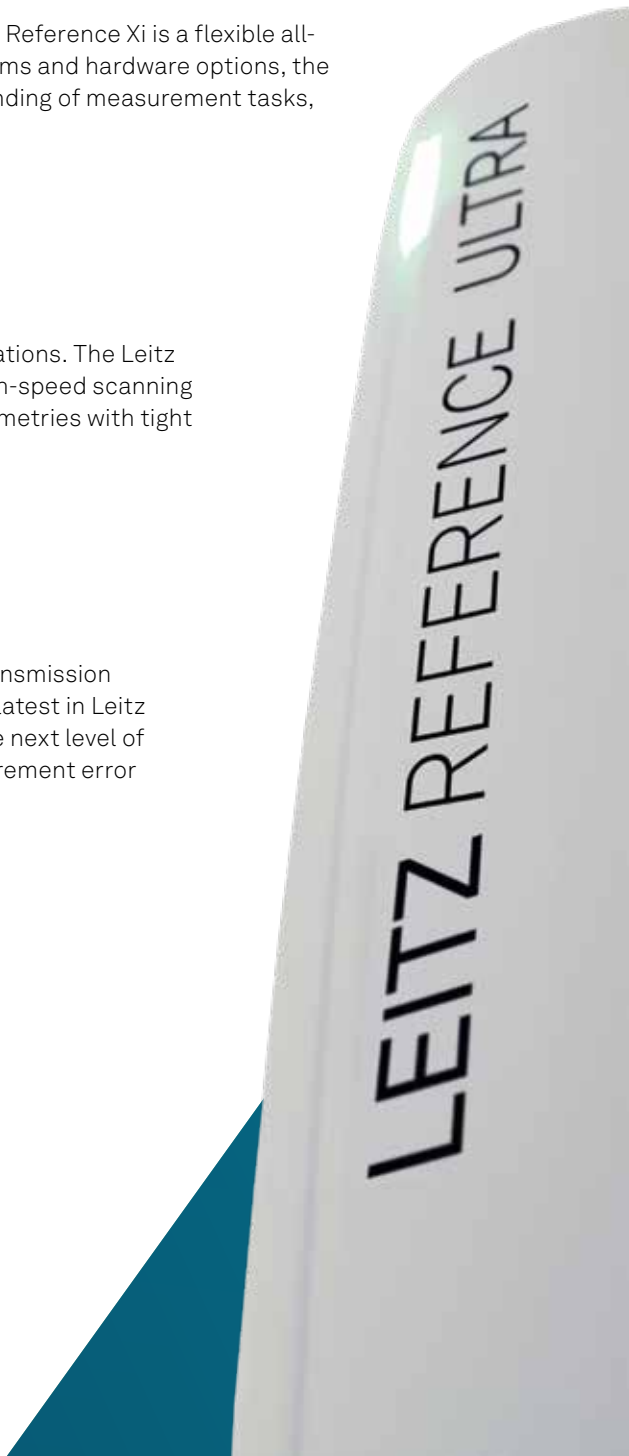
High-accuracy scanning performance

High precision is indispensable when it comes to complex applications. The Leitz Reference HP combines optimum precision with outstanding high-speed scanning properties. With the Leitz Reference HP, measuring complex geometries with tight tolerances becomes a simple measurement task.

Leitz Reference ULTRA

Next level of sub-micron accuracy

In order to address tighter part tolerances seen in the e-drive transmission and precision industries, the Leitz Reference Line leveraged the latest in Leitz technology to develop the Leitz Reference ULTRA. As a result the next level of sub-micron accuracy with best in class volumetric length measurement error is achieved.



Superior measurement capability - from small to big applications

Even small units like the Leitz Reference 5.4.3 and the Leitz Reference 7.7.5 offer considerably more measurement volume than comparable machines in their class. These compact models are especially suited for measuring the smallest workpieces with tight tolerances, offering low levels of measurement uncertainty typical of Leitz Reference machines. Manufacturers of precision parts, small gears and electronic parts can be confident that the Leitz Reference range will meet their needs.

On the other hand the Leitz Reference is also suitable for large workpieces. With measurement volumes of up to 3.300mm x 1.500mm x 1.400mm and a maximum workpiece load of 5.000 Kg even very large and heavy applications like ship engine parts, large housings or gears, shafts and long gear racks can be measured precisely.

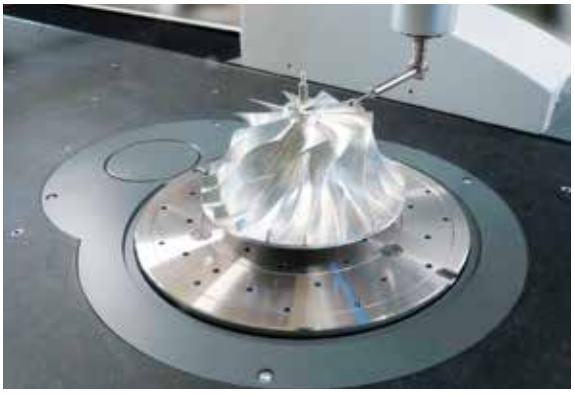
High-speed and safety

High measurement throughput is an important requirement for near or in-line quality inspection. Especially with 100% testing, the demands on the measurement throughput increase.

Thanks to a new safety feature using two 2D laser scanners that are monitoring the CMM's longitudinal side (x-axis), a maximum positioning speed of 860mm/s is achieved in CNC-mode. In case of a surpass of the protected area by the user or an object the machine is automatically slowed down to regular speed in conformity to the valid safety directives.

Maximising flexibility across a wide range of applications

The variety of machines within the Leitz Reference line caters to a broad spectrum of applications, equipping users to meet the widest range of metrology tasks. Each machine can be easily set up to best support the needs of the production environment through the extensive range of compatible sensors and accessories.



4-Axis Scanning

As an integrated or on-top version, rotary tables up to a diameter of 600 mm and a maximum table load of 550 kg can be used for continuous 4-axis scanning and component positioning.

Temperature Sensor

An exchangeable temperature sensor for the LSP-S2 Scan+ and the HP-S-X5 HD enables automatic temperature measurement at the workpiece within the measurement routine.

XT Option

For production environments this option enables accurate and reliable measurement in the expanded temperature range of 15-35°C.

Travel Rack

An accompanying styli changer rack on the left bridge pillar allows automatic styli changing without restricting the measurement volume. Due to shorter traveling distances the styli change process is accelerated as well.

Optimised development through digital twin generation

In the research and development phase, prototypes can be fully captured and converted into a digital model using the Nikon LC15Dx. By using these digital models in simulations, such as with simulation packages from MSC, the entire development and production process can be optimized and its costs reduced. In regard to production, a complete surface measurement provides valuable information to monitor and adjust the production process in a feedback loop. If parts are measured with a multi-sensor CMM and the digital twin is archived, then simulations of the transmission can be carried out long after the actual measurement if required.

Non-contact measurements of gear racks

The serial production of high-performance steering components like gear racks requires a fast and precise metrological solution to control the production process reliably. By using a multi-sensor setup on a Leitz Reference CMM with dedicated metrology software, manufacturers are capable of reducing cycle times by up to 75%. Optical sensors are used to capture the axial profile by a single-axis move along the complete length of the rack and the pitch points are extracted from the scan. Compared to one point per second using tactile, the optical system can capture up to 1,000 points per second, eliminating pitch measurement, the time-consuming part of the process. The automatic sensor exchange interface enables additional tactile measurement on difficult-to-reach features like the tooth and flank profiles, providing an all-in-one high-speed measurement solution.

Flexible solution for prismatic components and gear of all types

In conjunction with the QUINDOS measuring software, the flexibility of the Leitz Reference coordinate measuring machines allows all types of gears to be measured such as cylindrical gears, straight and spiral bevel gears, cylindrical worms, stepping gears, coupling gears, curvic couplings and many more. The CMM can fulfil measuring routines without a rotary table. The pallet-measurement function also enables the fully automated measurement of a large number of gears without manual interaction, maximising potential throughput.

Continuous operation with part automation

24-hour operation of the Leitz Reference is possible thanks to part automation. Should a fault occur during the measurement of palletised parts, a defined condition handler in the QUINDOS measuring software ensures that the machine moves out of the collision zone and continues serial measurement with the next part. Improper loading, large geometry deviations and machining residue from production do not lead to a standstill or the need for manual intervention.

Sensors

for every requirement

Leitz Reference coordinate measuring machines are equipped with probe heads developed and manufactured by Hexagon in Wetzlar, Germany. Using Hexagon probe heads and optical sensors ensures smooth synergy between the CMM and software. The large selection of different sensors and sensor-changing systems available make Leitz Reference range the accurate choice for precise geometric applications.

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1 **LSP-S2/LSP-S2 Scan+**

The LSP-S2 probe head stands for maximum measurement performance. Combining maximum accuracy with outstanding high-speed scanning properties, even when using styli extensions up to 800 mm. The measurement of complex geometries with the tightest tolerances becomes a standard measurement task with this fixed probe head.

2 **HP-S-X3**

The HP-S-X3 is a fixed sensor system featuring a compact design that suites the needs for small CMM sizes, fast single-point probing and outstanding scanning properties, even at high speed. The maximum usable styli extensions of 360 mm enables easy accessibility to a variety of different workpieces.

3 **HP-S-X5 HD**

The HP-S-X5 HD fixed probe head offers single-point measurement for all standard inspection tasks and variable high-speed scanning for the form and profile measurement of complex geometries such as spur gears, worm gears, turbine blades and worm wheels. With a maximum styli extension of 800 mm, even elements at a great immersion depth can be measured.

4 **HP-S-X1C**

The HP-S-X1C is the only robust and compact scanning probe head on the market that is optimised for a range of different styli lengths without the need to exchange modules. The use of styli extensions with a maximum length of 225 mm axially and 50 mm laterally is possible.Thanks to their compact design, even elements lying deep in the workpiece can be captured.

5 **HP-S-X1H with HH-A-T2.5/T5**

Using the HP-S-X1H probe head, fast and precise measurement processes are guaranteed for all probing procedures, from single-point probing to self-centring scanning to variable high-speed scanning. The HP-S-X1H is combined with the HH-AS8-T2.5/T5 or OT2.5 indexing head and makes it easy to access highly-complex workpieces. The sensor can also be flexibly used with a maximum extension of 225 mm.

6 **Profiler R**

The PROFILER R enables roughness measurements to be made with the CMM. The sensor is adapted to the HP-S-X5 HD or LSP-S2/ LSP-S2 Scan+ and automatically integrated into the measurement process using a styli changer rack. Roughness is measured through tactile surface scanning, and the measurement values are transferred to the measuring system via Bluetooth.

7 **Nikon LC15Dx**

The contactless capture of entire surfaces and individual features is possible using the Nikon LC15Dx. This triangulation laser line sensor even enables the quick capture of highly reflective, glossy surfaces. An indexing head ensures that the sensor is always in ideal alignment to the workpiece surface.

8 **HP-O Adjustable**

The HP-O optical interferometric sensor provides accurate and reliable high-speed non-contact measurement on metallic technical surfaces with the potential to significantly reduce inspection times for rotational symmetric parts. Due to the small sensor diameter it is especially suitable for hard to access features like bore holes or small inner splines. Touch sensitive materials are not damaged by the contactless measurement process.

9 **HP-O Flex**

The HH-AS8-OT2.5 indexing head utilises the fast and precise measurement processes of the HP-S-X1H sensor systems, with the added benefit of optical measurement capability with the HP-O Flex sensor. The flexibility of this 2.5° indexing head allows users to measure complex applications such as blisks, blades, small radii and chamfers with ease. Switching between sensors is simple and efficient with the use of HR-R changer rack system.

10 **Precitec S0.3 Flex**

The Precitec S0.3 Flex is a highly-accurate optical sensor which uses focused white light to measure the most challenging surfaces like glass, ceramic or carbon fiber materials with maximum speed. Due to the adaption on the 2.5° indexing head the sensor provides optimum accessibility.

Absolute flexibility for optical measurements

The Precitec S0.3 Flex allows absolute flexibility for optical inspections based on chromatic confocal measurement. The optical sensor can be aligned and positioned within the measurement volume in 2.5°-steps. This combination of indexing head and optical sensor allows the ideal alignment to the workpiece. In addition, the chromatic white light sensor is perfectly suited for high precision measurements on demanding surfaces like sensitive, relfective, low-contrast or transparent materials.

High speed full surface inspection

The Nikon LC15Dx allows optical high speed inspection of workpiece surfaces with outstanding measurement accuracy. Based on laser line triangulation a very high point density of 70,000 points/s is achieved during scanning on freeform or prismatic parts. Thanks to the ESP3 Technology the laser settings are automatically adjusted for each measurement point in real-time. Thus accuracy, speed and data quality are maintained independently from the workpiece surface structure and material to be measured.

The sensor is mounted on the 2.5° articulating head to achieve a high degree of flexibility even on hard to access features. To further increase measurement cycle time it can be utilized with a rotary table for continuous 4-axis scanning.


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SENMATION

Intelligent sensor automation

To allow even the most complex measurement tasks involving different sensors to be carried out on a coordinate measurement machine, Hexagon developed the SENMATION intelligent sensor automation system. Using a universal interface, a wide variety of different sensors are changed automatically, guaranteeing a high degree of flexibility.

The Future-Ready concept

The Future-Ready Concept optimises the CMM for the SENMATION intelligent sensor automation system upgrade. The universal pre-cabling enables a simple integration process at any time, allowing for flexible application changes without costly downtime.

Advantages

- Automatic sensor detection
- Fully-automatic exchange of sensors within the measurement routine
- Sensor changes occur with no need for calibration
- Enables maximum flexibility and full CMM capacity utilisation

Comprehensive software

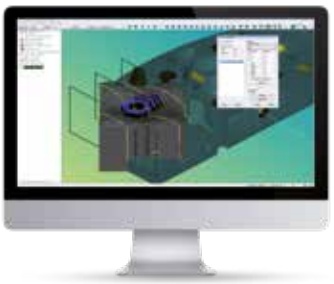
Developed by professionals, for professionals

QUINDOS

QUINDOS is the specialist, expandable software that sets the standard for special geometry metrology. Developed to work in partnership with the ultra high accuracy Leitz Reference 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 option for gear measurement has the ability to measure gear wheels, bevel gears and gear-cutting tools even without a rotary table. The applicable tolerance standards are included in the options. QUINDOS Gears also supports the pallet measurement option for gearing to ensure high throughput.



PC-DMIS

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


SENMATION
HH-AS8S-OT2.5
ATLANTA

HEXAGON

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

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

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

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