

LEITZ REFERENCE

ULTRA-PRODUCTIVE COORDINATE MEASURING MACHINES
WITH HIGH FLEXIBILITY



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 universal coordinate measuring machine (CMM) for high-accuracy testing of geometries of all types 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



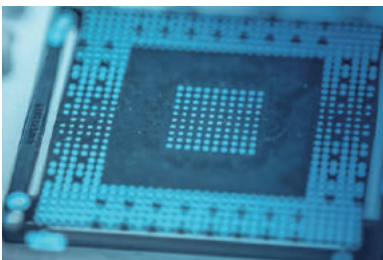
Aerospace

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



Mechanical Engineering

Gearboxes, axles and shafts, bearings



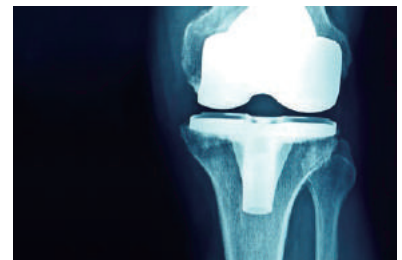
Precision Industry

Optics, electronics, small complex components



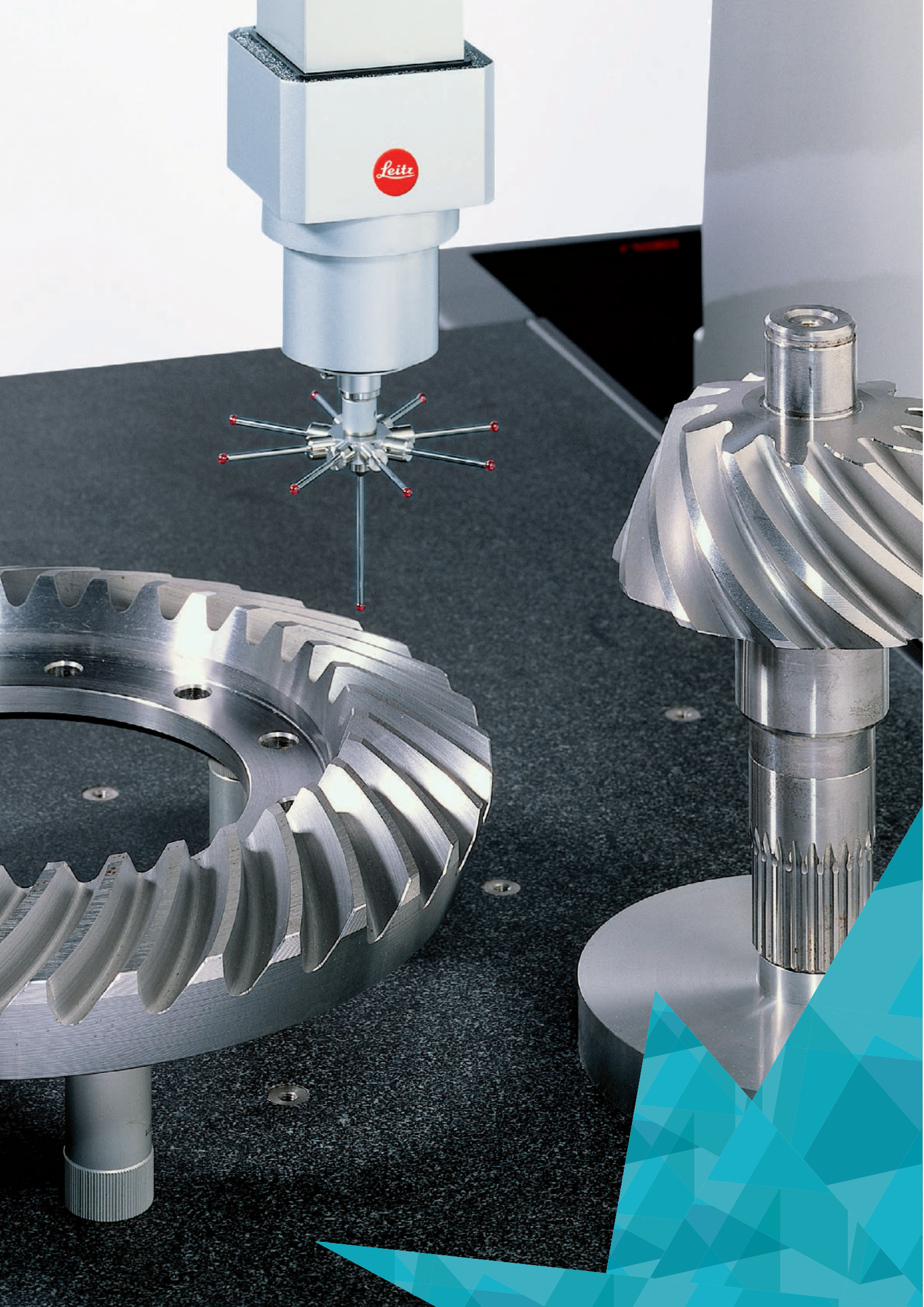
Drive Technology

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



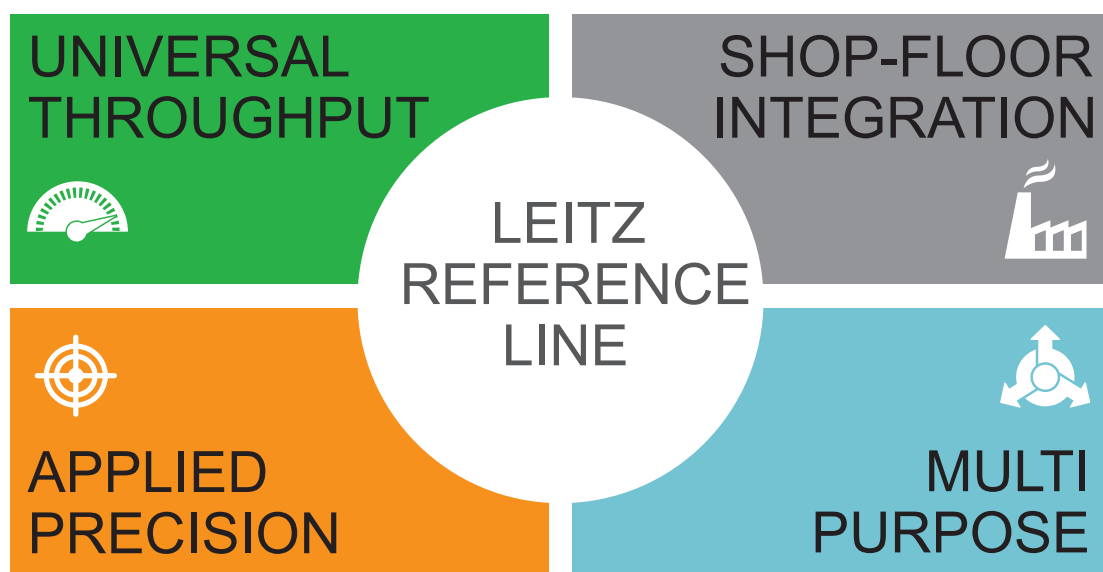
Medical Technology

Implants, medical instruments, internal and external fixators, prosthetics



OPTIMISED PERFORMANCE FOR ANY APPLICATION

The Leitz Reference CMMs are the perfect base for customised configurations, which meet the needs of an expansive range of customer requirements. These basic configurations are related to four key machine capabilities to drive maximum productivity in modern and demanding industrial measurement processes:



The multidimensional capabilities of the Leitz Reference machines are focused on an advanced modular frame concept to allow the flexible integration of capability enhancement package options, curated to enable the CMMs to be efficiently tailored to create application-oriented solutions for different use cases and environmental conditions.

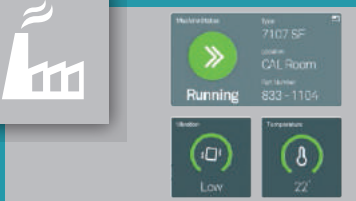


Universal Throughput

High machine dynamics and fast data generation provided by advanced sensor and scanning technologies enable the Leitz Reference line to deliver an increase in the overall throughput of the measurement process, resulting in a reduction in inspection costs.

Recommended configuration options:

- Rotary table for fast 4-axis scanning
- High speed option for maximum positioning speed



Shop-Floor Integration

When measurement is required in harsher environments the Shop-Floor Integration capability package makes the CMM more robust to meet the requirements of the tough environmental conditions on the shop floor including fluctuating temperatures, dust and dirt or vibrations.

These influences on the CMM can be monitored with the innovative environmental monitoring system PULSE, providing actionable information to support root cause analysis. The Shop-Floor Integration capability package makes CMMs more robust.

Recommended configuration options:

- XT Option for an extended temperature range and bellows protection
- An active damping system to compensate vibrations
- PULSE system to monitor environmental conditions and disturbing events
- Exchangeable temperature sensor



Applied Precision

The Leitz Reference HP CMM is especially dedicated to provide the highest level of precision possible. The high quality, precision-optimised design includes a well-engineered and advanced frame concept, ultra precise sensor technology and sophisticated mathematical compensation methods. This results in applied precision capabilities which allow easy and reliable measurement even of complex and challenging geometries.

Recommended configuration options:

- Leitz Reference HP coordinate measuring machine
- Fixed Probe Head LSP-S2 Scan+
- Exchangeable temperature sensor



Multi-Purpose

To face the challenges of increasing complexity and diversity of measurement parts and tasks the Leitz Reference line can be equipped with a wide range of tactile and optical sensors. With the SENMATION universal sensor interface all these sensors can be combined in one single measurement routine. The Multi-Purpose capability package enables the Leitz Reference CMM to execute complex measuring tasks to an optimum ratio of precision and throughput.

Recommended configuration options:

- SENMATION universal sensor interface
- Fixed probe head HP-S-X5 HD
- Indexing probe head HH-A-T2.5 and HP-S-X1H scanning sensor
- PROFILER R tactile roughness sensor

SMART SOLUTIONS THROUGH ADVANTAGEOUS DESIGN

The Leitz Reference is an economical measuring machine for solving complex scanning measurement tasks. It combines high accuracy and reliability with optimum throughput. Installation and setup are fast and a separate foundation is not required. Its compact footprint enables easy placement in the optimum location and ensures easy handling of the machine.

The technical features of the Leitz Reference are tried and tested in different applications every day.

Outstanding Scanning Properties

Innovative LSP-S2 Scan+

Solid Base

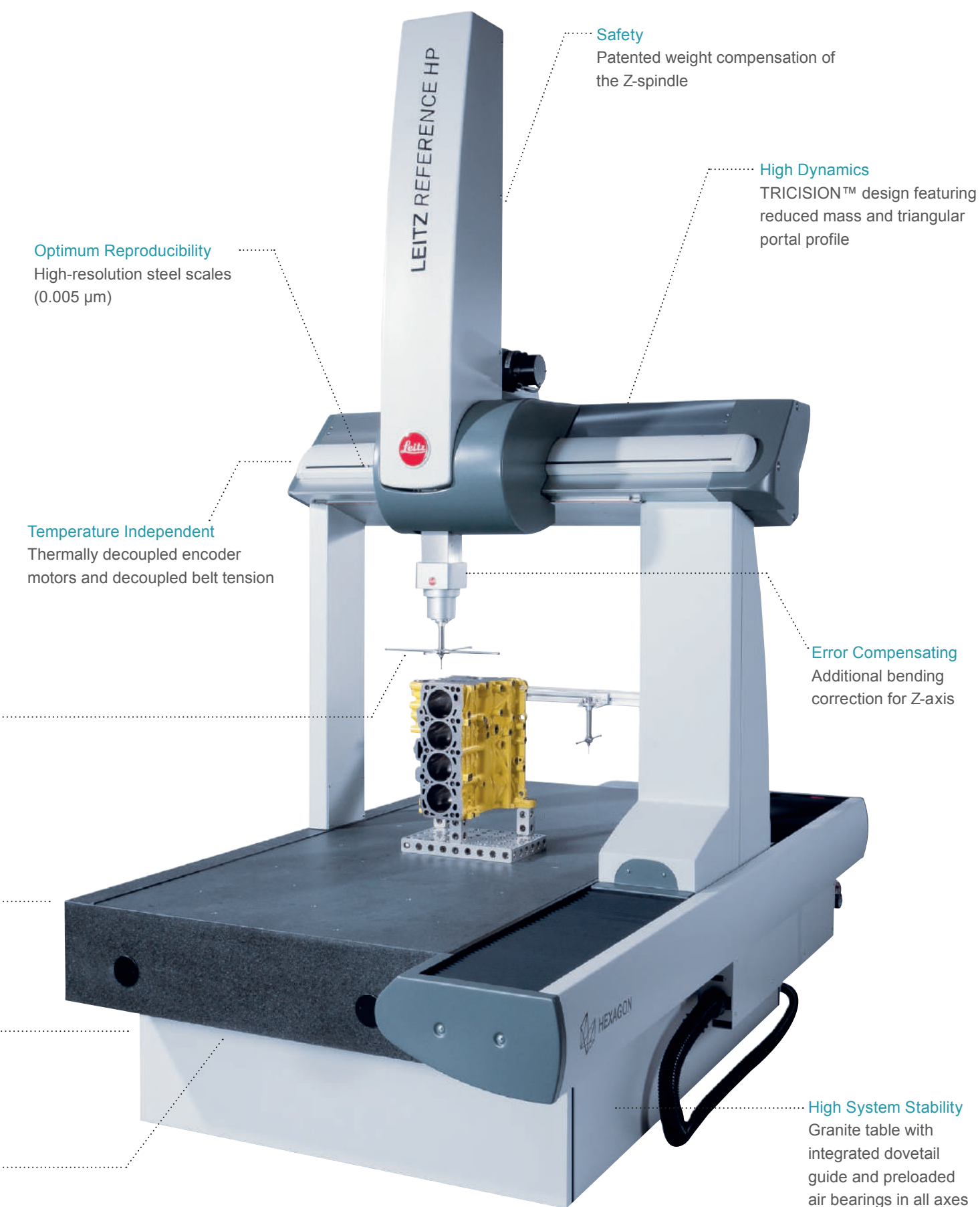
Stable granite table with a low
centre of gravity

Vibration Damping

Outstanding damping systems

Low Vibration

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



OFFERING ENHANCED FUNCTIONALITY

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

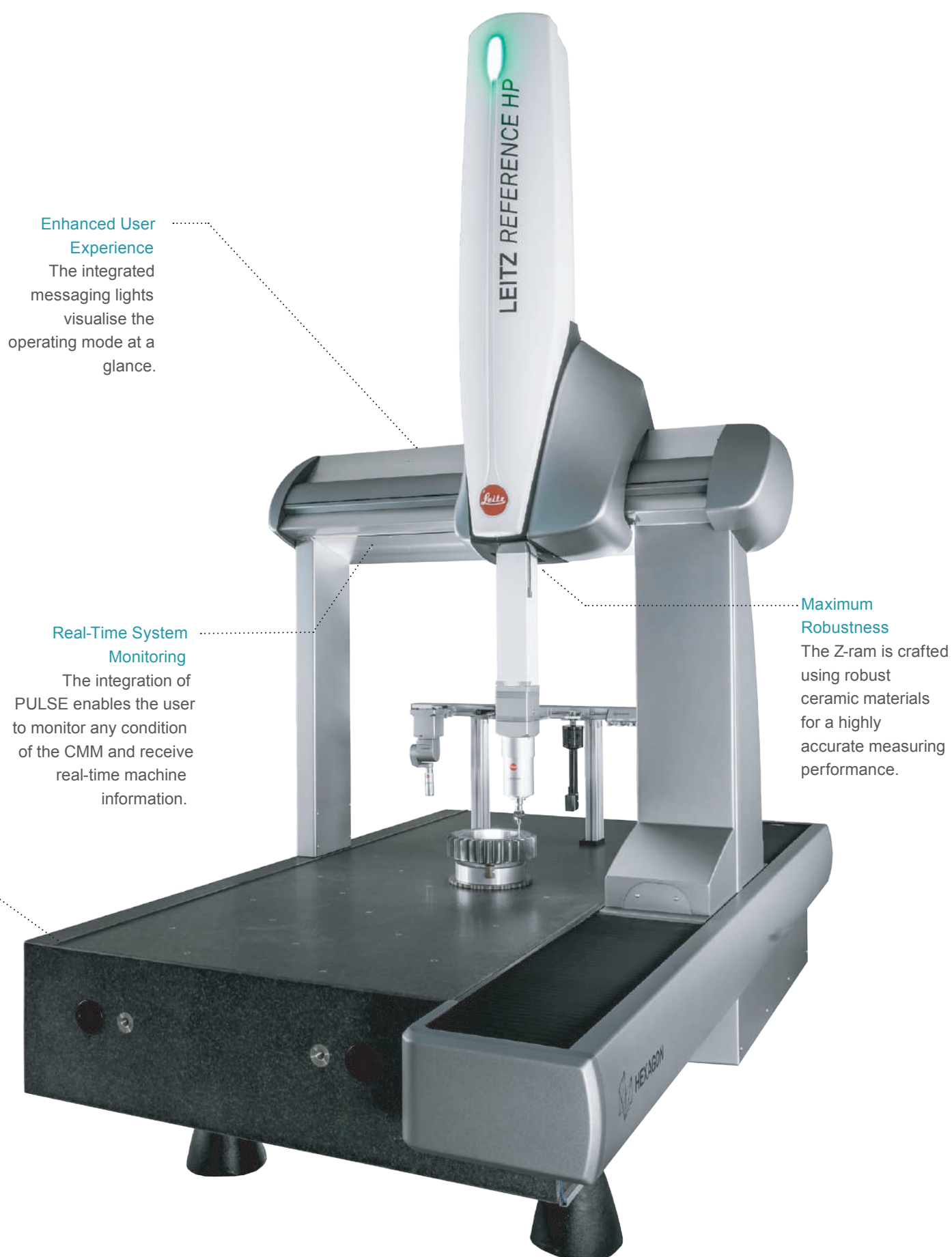
An integrated Future Ready cabling system enables compatibility with the SENMATION intelligent sensor system, enabling manufacturers to switch automatically between different sensors seamlessly during a single measuring cycle.

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.

Future Ready Capabilities

The universal cabling concept allows the integration of an extended tactile sensor range as standard with optional optical capabilities through the Future Ready Premium upgrade. The enhanced cabling concept enables optimised workflow through the SENMATION intelligent sensor automation system, which can be added to the CMM at any time, as required.



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. With the high accuracy Leitz Reference HP and 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 Manufacturing Intelligence, the Leitz Reference Xi is a flexible all-round 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. The ideal solution where measurement across a wide spectrum of applications is required.

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, the measurement of complex geometries with the tightest tolerances becomes a simple measurement task.

Compact Models in the Leitz Reference Range are Equally as Impressive

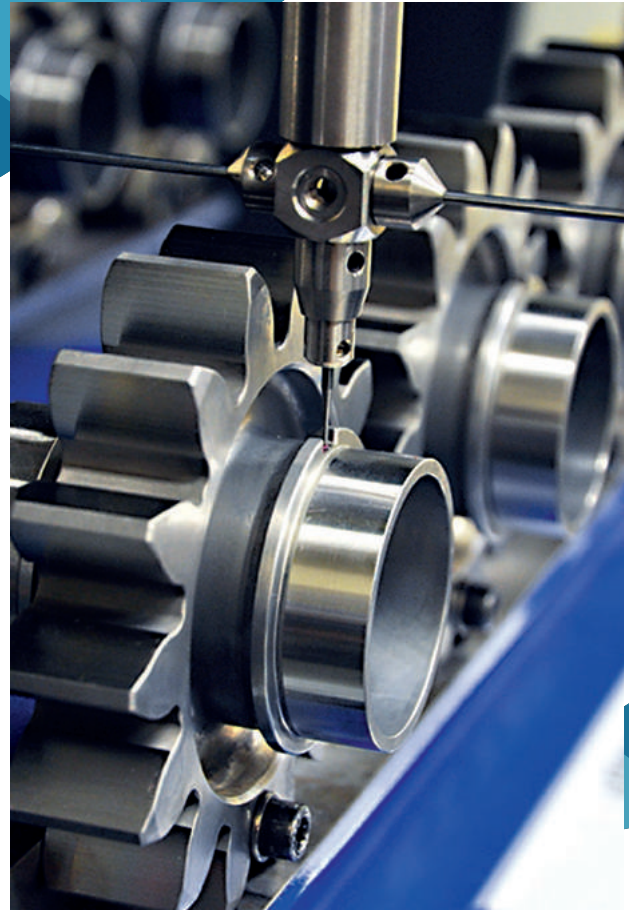
Even small units like the Leitz Reference 5.4.3 and the Leitz Reference 7.7.5 offer considerably more measurement volume than comparable machines in their class. These compact models are especially suited for measuring the smallest workpieces with tight tolerances, offering low levels of measurement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





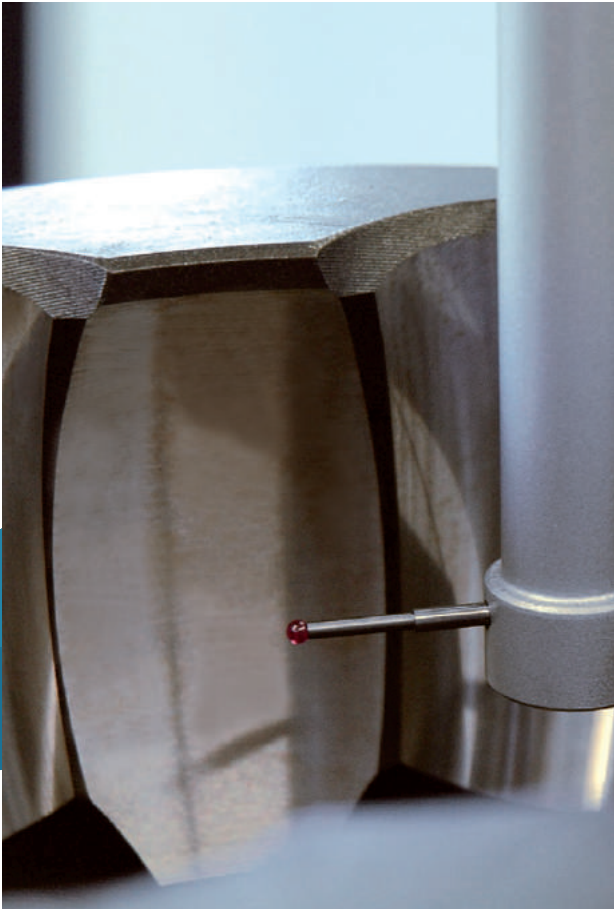
FLEXIBLE SOLUTION FOR PRISMATIC COMPONENTS AND GEARS OF ALL TYPES

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, gear racks, curvic couplings and many more. The CMM can fulfil measuring routines without a rotary table, removing the need for laborious centring and alignment of the gears. The pallet-measurement function also enables the fully automated measurement of a large number of gears without manual interaction, maximising potential throughput.



NON-STOP 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.



PARAMETRISED MEASURING PROGRAMS FOR CONSTANT VELOCITY JOINTS

The design of measurement processes for constant velocity joint component families are kept as simple as possible, through the use of extensive parametrisation options within the QUINDOS measuring software. The principle behind it: All the features of the constant velocity joints specified in the test plan or drawing can be described with parameters. This covers a broad spectrum of components without having to create hundreds of measuring programs. The operator need only enter the relevant form in each respective case, as the software generates the measuring program on its own.



PRECISE WEAR MEASUREMENT OF ENGINE PARTS

New and unused engine parts physically on hand are used for reference when evaluating wear measurements following engine tests. They are used to generate reference values before the engines are subjected to various test procedures on the engine test rigs. Cylinder bores, pistons, piston rings, cam shafts and bearing shells are measured and evaluated with a Leitz Reference CMM. Following the tests on the test rigs, another measurement process with the CMM is carried out to record the condition of the components. Using the QUINDOS measuring software, the measurement results of the reference measurement and the follow-up measurement of the worn component are compared and displayed graphically in a wear map.

MAXIMISING FLEXIBILITY ACROSS A WIDE RANGE OF APPLICATIONS

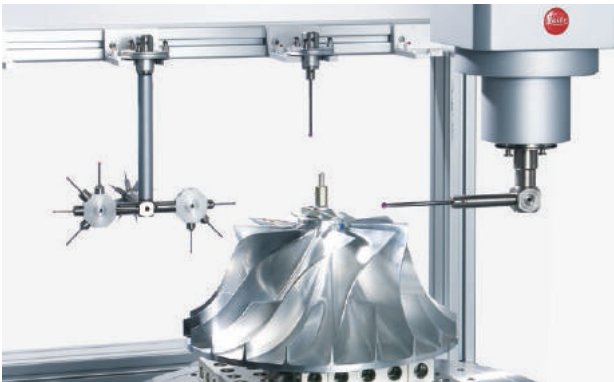
The variety of machines within the Leitz Reference range caters for a broad spectrum of applications, and along with a broad selection of sensors, users are equipped to meet the widest range of metrology tasks. Each machine can be easily set up to best support the needs of the production environment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



We were looking for a measuring machine with which we could simplify handling and work more flexibly, since we need to measure many different highly complex parts with customer-specific requirements.“

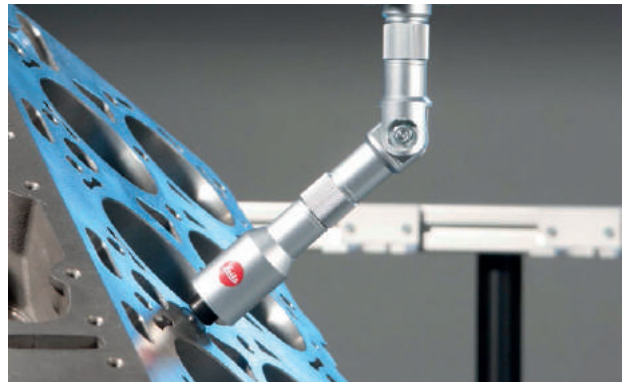
Markus Grünewald,
Grünewald Feinmaschinenbau





Rotary Tables

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 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 (integrated in the measurement program).



XT Option

This option enables accurate and reliable measurement in the expanded temperature range, which is indispensable in the production environment.



Travel Rack

An accompanying styli changer rack on the left bridge pillar allows automatic styli changing in conjunction with the HH A-T2.5/T5 and HP-S-X1H without restricting the measurement volume in the process.



ABSOLUTE FLEXIBILITY FOR OPTICAL MEASUREMENTS

The HH-AS8-OT2.5 indexing head allows absolute flexibility for optical measurements with the HP-O interferometric sensor. The optical sensor can be aligned and positioned within the measurement volume in 2.5°-steps. This combination of indexing head and optical sensors allows the ideal alignment to the workpiece. In addition, the small dimensions of the HP-O make easy access even to highly complex parts possible.

Due to the use of a probe changer, the HP-O optical sensor and the HP-S-X1H tactile scanning sensor can be used for measurement tasks.



SENSORS FOR EVERY REQUIREMENT

Leitz Reference coordinate measuring machines (CMMs) are equipped with sensors developed and manufactured by Hexagon Manufacturing Intelligence in Wetzlar, Germany. Using Hexagon 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-X3C

The HP-S-X3C is a fixed sensor system featuring a compact design, 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

Outstanding scanning properties and a compact design characterise the sensor systems of the HP-S-X1 series. Scanning and machine performance are optimally attuned to one another, thus enabling highly dynamic measurement processes. Thanks to their compact design, even elements lying deep in the workpiece can be captured. The HP-S-X1C is a fixed sensor system which is ideal for fast and very precise form and contour measurements. The use of styli extensions with a maximum length of 225 mm axially and 50 mm laterally is possible.

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

Using the HP-S-X1 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 HHA-T2.5 or T5 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 HP-O

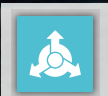
The HP-O optical sensor captures measuring points on a wide variety of different materials quickly and efficiently. Even shiny and reflective surfaces can be measured reliably with maximum accuracy. The HP-O is used for both single-point probing and continuous scanning tasks.

8 HP-L-10.6T

The contactless capture of entire surfaces and individual features is possible using the HP-L-10.6T. 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.

9 HP-O/HP-S-X1 with HH-AS8-OT2.5

The HH-AS8-OT2.5 indexing head utilises the fast and precise measurement processes of the HP-S-X1 sensor systems, with the added benefit of optical measurement capability with the HP-O 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.



SENIMATION – INTELLIGENT SENSOR AUTOMATION

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

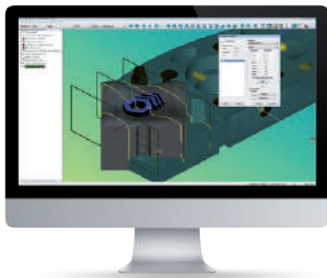
THE FUTURE-READY CONCEPT

The Future-Ready Concept optimises the CMM for the SENIMATION 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 program
- Sensor changes occur with no need for calibration
- Enables maximum flexibility and full CMM capacity utilisation

COMPREHENSIVE SOFTWARE – DEVELOPED BY PROFESSIONALS, FOR PROFESSIONALS



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 CAD++ is available with optional modules 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 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.





Hexagon Manufacturing Intelligence helps industrial manufacturers develop the disruptive technologies of today and the life-changing products of tomorrow. As a leading metrology and manufacturing solution specialist, our expertise in sensing, thinking and acting – the collection, analysis and active use of measurement data – gives our customers the confidence to increase production speed and accelerate productivity while enhancing product quality.

Through a network of local service centres, production facilities and commercial operations across five continents, we are shaping smart change in manufacturing to build a world where quality drives productivity.

Hexagon Manufacturing Intelligence is part of Hexagon (Nasdaq Stockholm: HEXA B; hexagon.com), a leading global provider of information technologies that drive quality and productivity across geospatial and industrial enterprise applications.

-  COORDINATE MEASURING MACHINES
-  3D LASER SCANNING
-  SENSORS
-  PORTABLE MEASURING ARMS
-  SERVICES
-  LASER TRACKERS & STATIONS
-  MULTISENSOR & OPTICAL SYSTEMS
-  WHITE LIGHT SCANNERS
-  METROLOGY SOFTWARE SOLUTIONS
-  CAD / CAM
-  STATISTICAL PROCESS CONTROL
-  AUTOMATED APPLICATIONS
-  MICROMETERS, CALIPERS AND GAUGES



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