

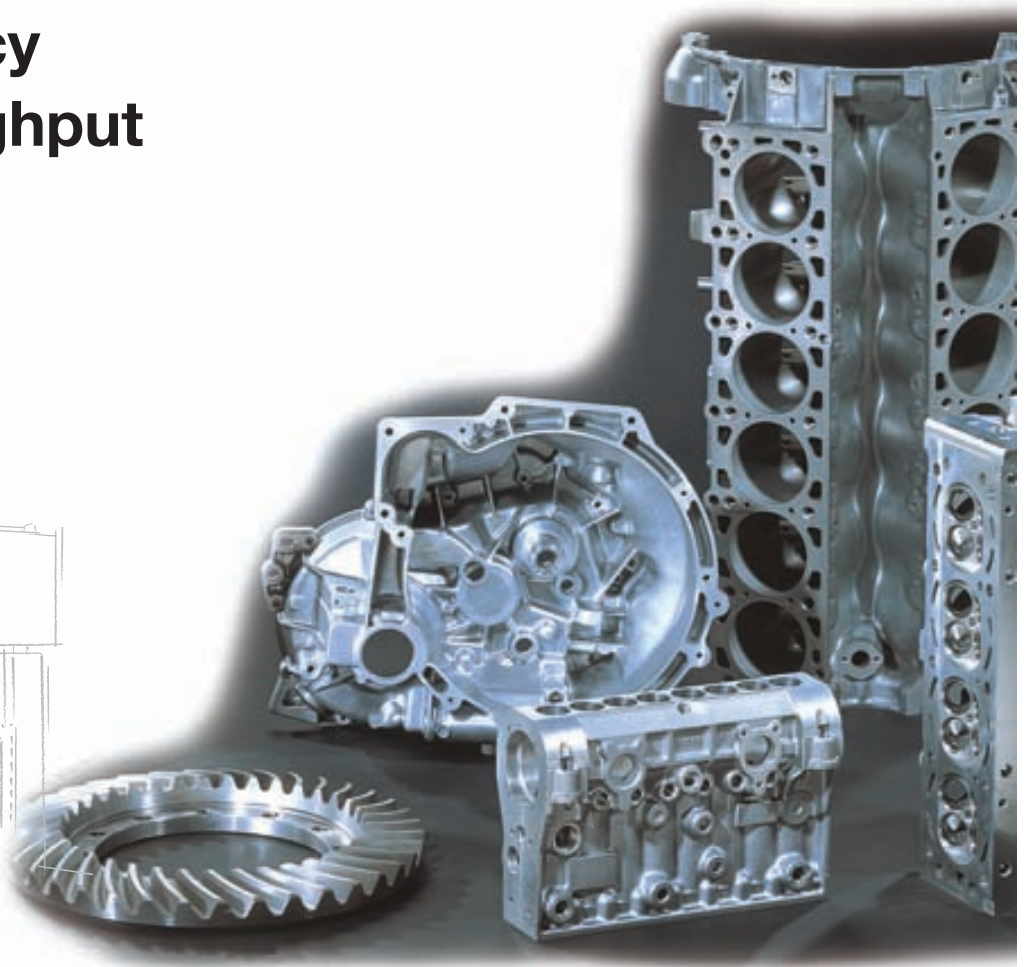
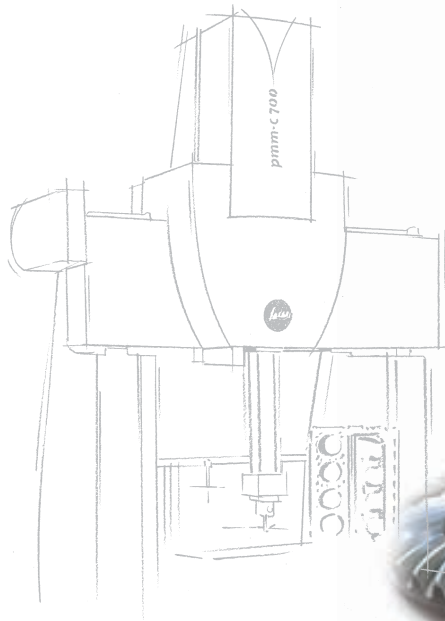
pmm-c

pmm-c 600 / 700 / 1000



Coordinate Measuring Machine

High accuracy meets throughput



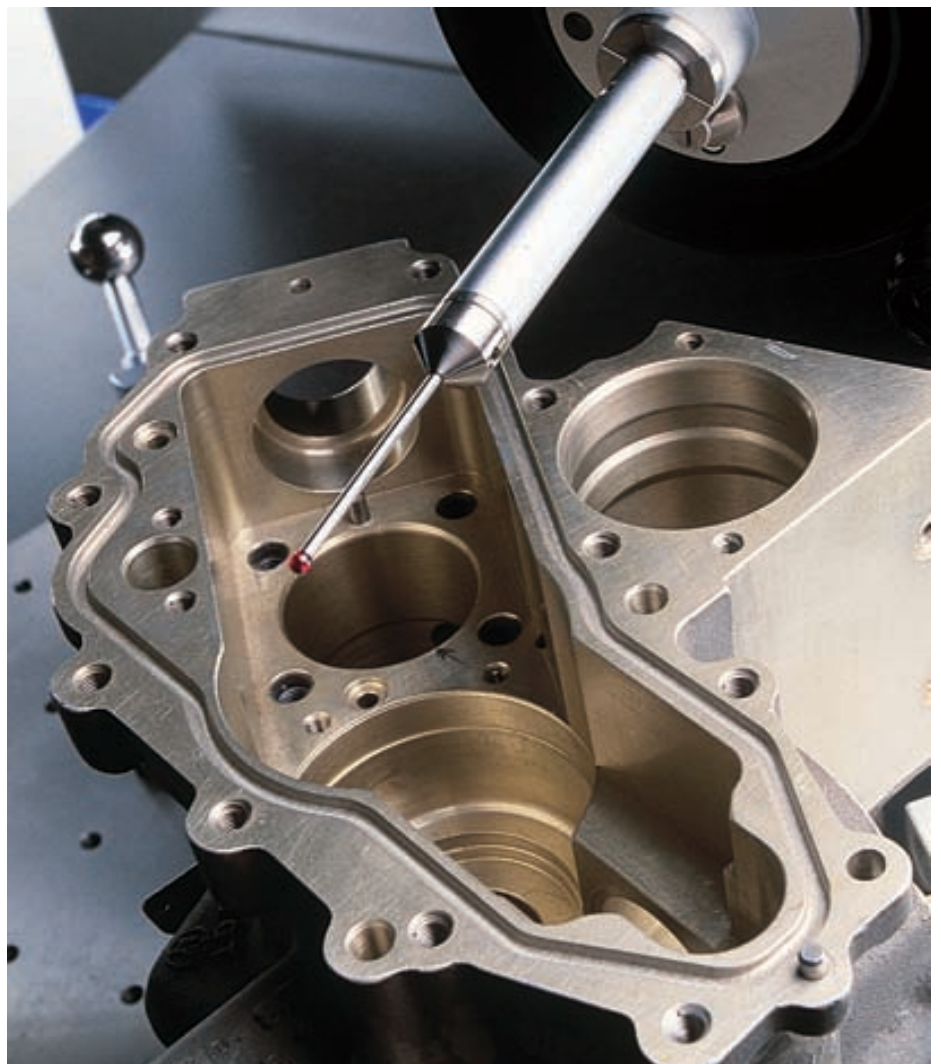
High product quality not only depends on the quality of the machine tools, but mainly on the performance of the measuring instruments used.

Accuracy, repeatability, speed and cost effectiveness are equally important when selecting a coordinate measuring machine.

High accuracy and repeatability is required to generate reliable and significant quality data to support intelligent feed-back decisions.

Measuring speed is essential to keep the manufacturing process under close control by minimizing reaction time.

High performance CMMs, combining high accuracy with fast throughput, assure low inspection costs per part and therefore a quick return on investment.



The Leitz PMM-C series

– precise, reliable and fast



For more than 30 years Hexagon Metrology GmbH (formerly Leitz Messtechnik) in Wetzlar, Germany, has provided customers with unsurpassed Coordinate Measuring Machine technology.

The Leitz PMM-C line of high-performance CMMs combines ultra high accuracy with unmatched machine dynamics. This results in extreme short cycle times and therefore very high throughput. Fast data

gathering and advanced High Speed Scanning further improve the throughput for efficient process-control.

The Leitz PMM-C is available in three models with measuring ranges from 800 mm x 1000 mm x 600 mm and up to 2400 mm x 1200 mm x 1000 mm.

- High accuracy and repeatability ensure excellent measuring capabilities.
- Unmatched probing frequency (up to 40 probings/min.), high speed (up to 400 mm/s) and fast acceleration (up to 3000 mm/s²) provide shorter cycle times and higher throughput compared to any other high precision CMM. Significant reduction in inspection costs and machine tool idle time.
- Rapid processing of the measuring results allows fast job changeover.
- Accessibility to the measuring envelope from all four sides allows easy manual part handling, or integration into automatic loading systems.
- Easy, user friendly operation.
- Integration into existing CAD and CAQ networks.
- Reduced maintenance costs through collision protection for the entire machine.
- Superior design concept assures long service life and trouble free operation.

Ultra high precision makes a true universal measuring machine



In addition to standard measuring tasks, such as the inspection of engine blocks, the Leitz PMM-C, due to its high precision, can also handle complex measuring jobs – a true universal measuring machine.

The PMM-C can replace conventional single-purpose measuring machines, such as form testers, gear testers and camshaft inspection systems for added flexibility and cost effectiveness.

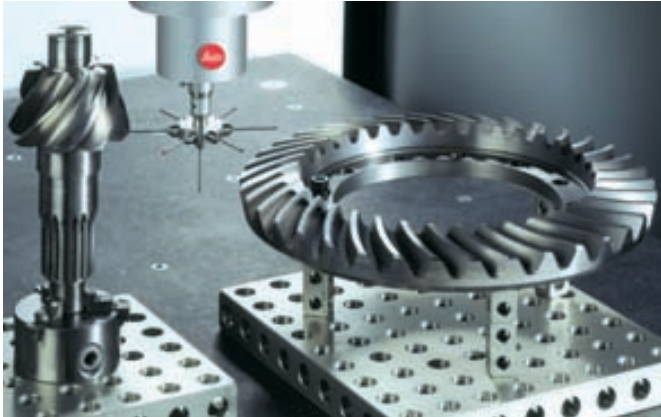
The combination of Leitz PMM-C and QUINDOS allows the inspection of almost any complex geometry without the need for a rotary table.

This results in:

- Higher overall accuracy.
- Simplified operation.
- High throughput, even during manless shifts
- Easy clamping of parts without centering. Vertically and horizontally.



Simple six- or eight styli configurations allow the measurement of gears and other complex geometries without a rotary table.



The Leitz PMM-C can also be used as a gear inspection center for gear diameters of up to 1500 mm.

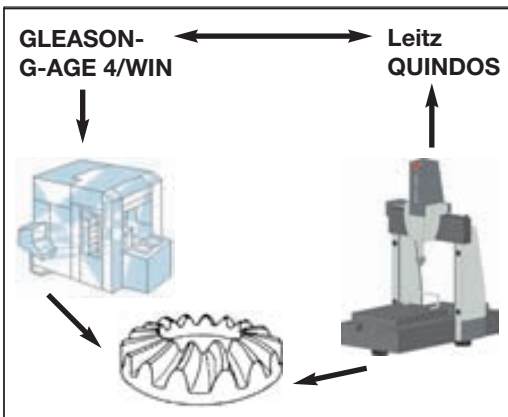
Due to its extreme high probing accuracy it is not only capable of measuring gears of any kind. Also the cutting tools used to manufacture gears, such as hobs, broaches, shaper cutters and shaving gears can be measured on a PMM-C, if equipped with the appropriate QUINDOS packages.

Profile measurements with close tolerances, such as globoidal, double enveloping worm gears, require a high accuracy measuring machine like the Leitz PMM-C.



Extremely long parts can be measured in horizontal position.

A special QUINDOS interface allows measurement data feedback to the GLEASON software program G-AGE 4/WIN for optimizing the spiral bevel gear manufacturing process.



The small radii and supporting pressure surfaces at the turbine root require high accuracy scanning, easily handled by the Leitz PMM-C.

When ultimate precision is required, for example at national metrology institutes, or for gage calibration according to ISO, the Leitz PMM-C can be offered with enhanced specifications in a „gauge accuracy“ version.



The PMM-C with its Leitz LSP probe head and QUINDOS software can even inspect step gears (roller gears) of any shape. Another unique feature of the Leitz PMM-C.

Closed frame design for maximum accuracy

The PMM-C series features a compact, robust closed frame design with a fixed portal and a moving table.

The main components are all made of granite and cast iron.

The use of aluminium in the structure has been deliberately avoided, guaranteeing stability, long time accuracy and insensitivity to temperature variations.

A massive, monolithic granite base and a fixed standing portal with cast iron columns and granite traverse assure structural rigidity and consistent accuracy throughout the entire measuring volume.

Preloaded air bearings provide friction-free table movement. Centrally arranged axis drives minimize tilting and twisting.

Individual axes are „mechanically uncoupled“ so that deviations of an individual moving axis do not affect the remaining axes, as it is usually the case with „moving bridge“ type CMMs.

The fixed portal, moving table design assures that measuring accuracy is not affected by vibrations, even during rapid acceleration and deceleration.

The patented Leitz LSP measuring probe head provides excellent probing accuracy. Any stylus deflection or bending is automatically compensated, even when using long extensions.

The integrated temperature sensors automatically compensate

temperature related deviations of machine scales and part, allowing operation under relaxed environmental conditions.

The air bearings are completely friction free and abrasion resistant, and are insensitive to dirt.

The scales are mounted as close as possible to the workpiece in accordance with the Abbe Comparator principle.

Servo drives with re-circulation ball screws make high acceleration possible without affecting positioning accuracy. Even short distances can be traveled at high speed.

Closed frame design with moving table consisting of granite and cast iron for maximum stability and minimum vibration.

State of the art modular electronic controller for easy serviceability.

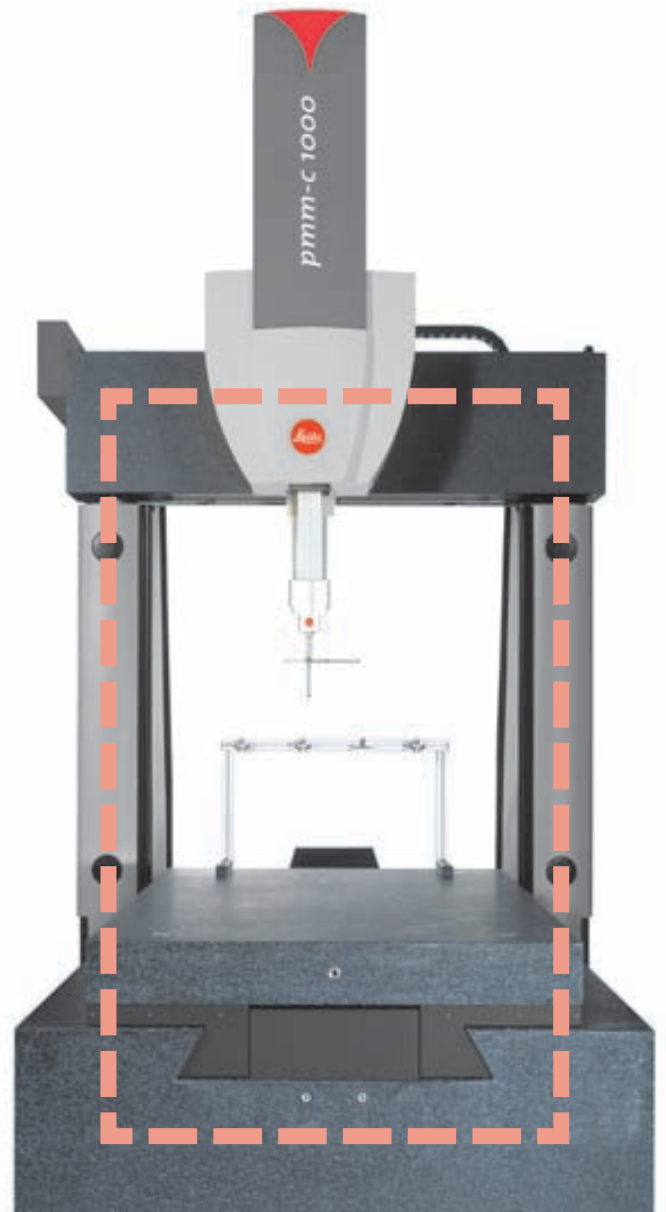
Extremely high resolution of 0.05 μm guarantees the highest repeatability.

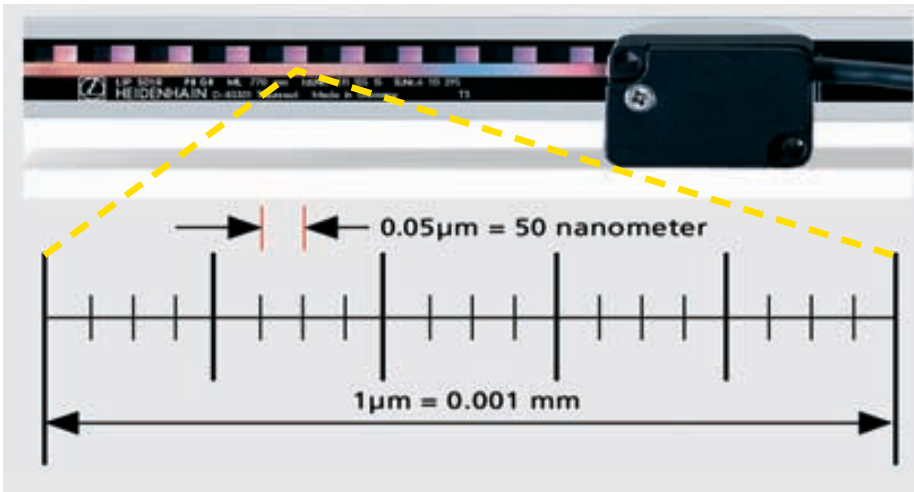
Steel scales with the same expandability as most workpieces assure high accuracy over a large temperature range.

Servo drives combined with precision re-circulating ball screws achieve optimum acceleration and positioning accuracy.

Collision protection and user safety devices are installed throughout the machine.

Air bearings with electronic gap monitoring.





Steel scales guarantee the same thermal expansion coefficient of the measuring system as that of most workpieces. The PMM-C's extremely high scale resolution is the basis for the unmatched repeatability of the measuring data. Repeatability determines the measuring capability index C_g . Thanks to its high resolution the Leitz PMM-C achieves a measuring capability index $C_g > 1$ even for tolerances < 0.010 mm.

Formula:

$$C_g = \frac{0.1 * T}{6 S} > 1 \Rightarrow S < \frac{0.1 * 10 \mu m}{6}$$

$$S < 0.17 \mu m$$

- C_g = Measuring capability index
- T = Tolerance
- S = Standard deviation of the measuring result

The mechanical design of the PMM-C series was adapted from the successful PMM series, of which more than 800 have been sold all over the world. It features a fixed portal with a moving table. Drives and scales are mounted as close as possible to the center of each axis to ensure a superior measuring accuracy.



The high-resolution Leitz 3D-probe system is the core of the PMM-C series. It can carry extra-long stylus extensions to access all inside features on large components. Stylus and extension configurations weighting up to 1000 g can be automatically changed without being recalibrated.



The Leitz 3D probe system – superior precision and speed

The PMM-C's 3D measuring probe system Leitz LSP, developed at Hexagon Metrology in Wetzlar, Germany, is unique in its flexibility and performance.

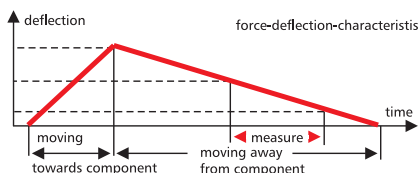
It offers high speed Single Point Probing with a very high frequency (up to 40 points/min) for all standard measuring tasks as well as High Speed Scanning for form and profile inspection.

The performance of the Leitz LSP probe system is a decisive factor for the accuracy and repeatability of the PMM-C's measuring results. It measures always in all 3 axis, i. e. always perpendicular to the part surface.

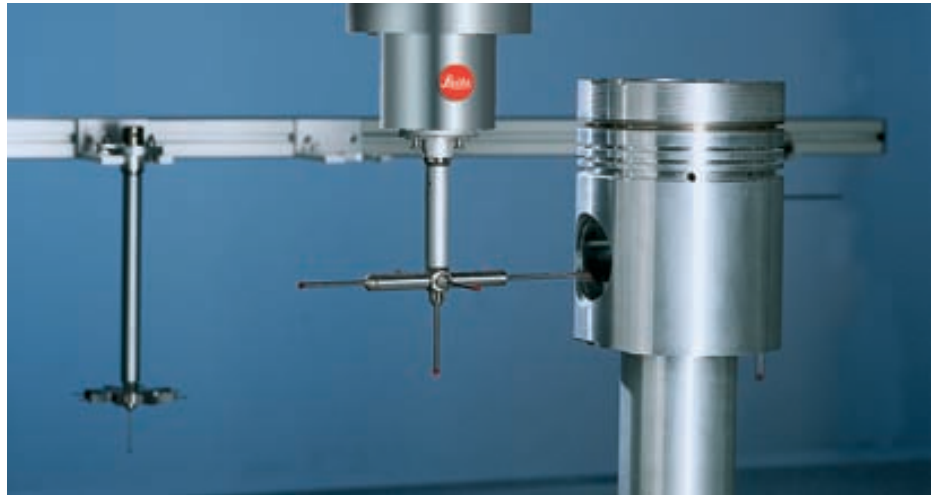
Therefore the Leitz LSP is a truly „3D probe system“!

The design principle has several advantages:

- The deflection of the probe is recorded electromagnetically with a high resolution.
- The patented Force-Deflection-Characteristic ensures a large safety range without applying high forces to the part.



- The probing force is always applied perpendicular to the part surface, i. e. true 3D probing. As a result, the bending of the



**High Speed Scanning
for fast form testing of any contour**



stylus can be calculated and compensated.

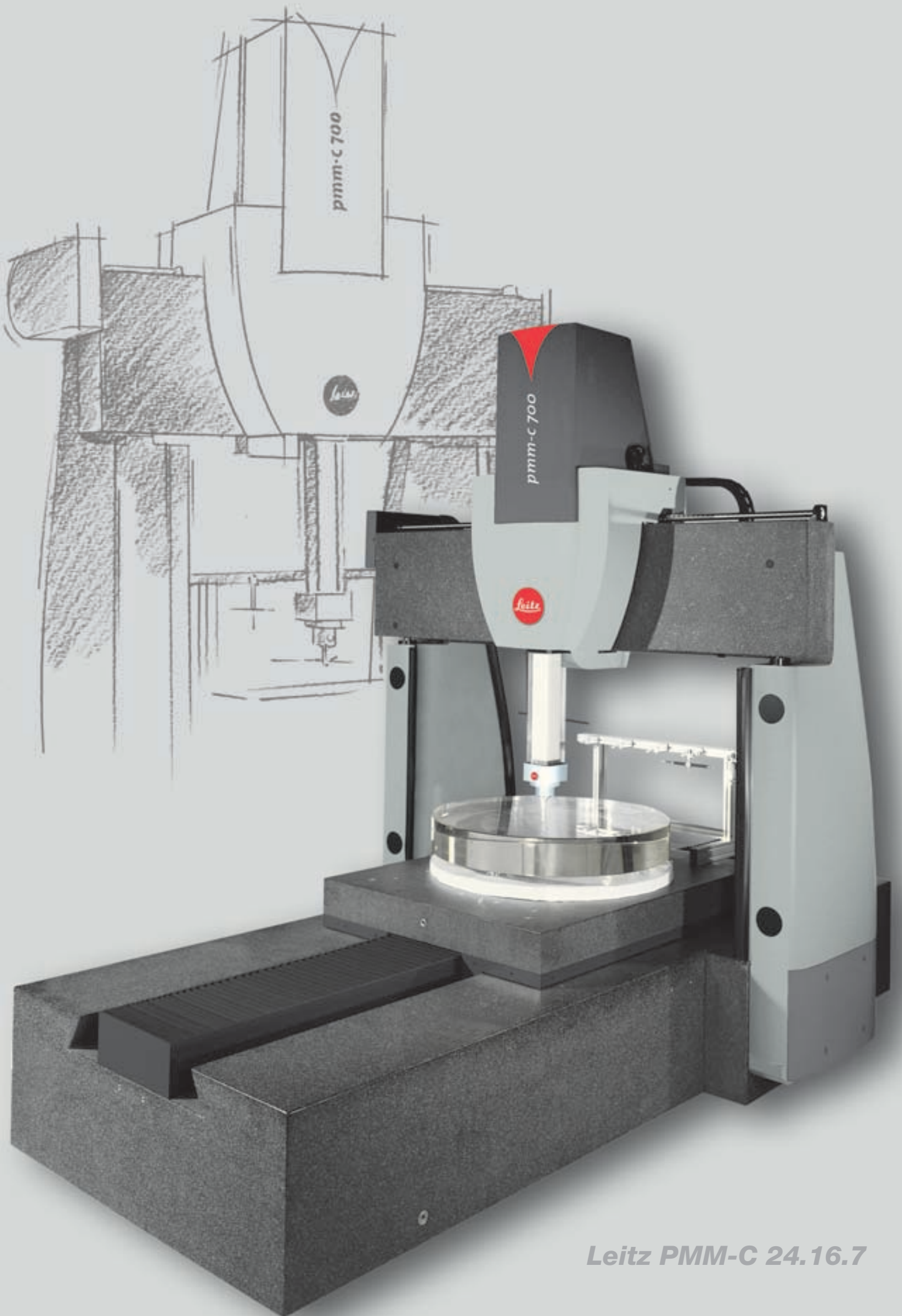
- High accuracy even with very long and heavy stylus systems.
- Due to its mechanical design the Leitz LSP probe system is practically maintenance free.
- The PMM-C series offers complete collision protection for the probe system as well as for the entire machine. An important design feature, avoiding costly repairs after collisions.

The result:

Excellent probing accuracy „P“ in accordance with ISO 10360-2.

All types of form measurements can be carried out, including critical geometries such as cutting edges of hob cutters. High Speed Scanning and ISO-conforming filter algorithms enable the PMM-C to take over inspection jobs previously done by form and roundness testers.

Complete inspection of the part on just one machine – in one set up!



Leitz PMM-C 24.16.7

The Software - QUINDOS or PC-DMIS

QUINDOS

The software for ALL applications – from simple parts to complex special geometries

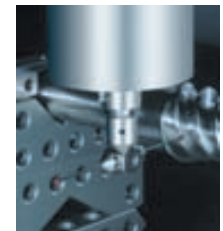
Whether simple housing parts or hob cutters, camshafts or valve guides, spiral bevel gears or screw rotors, QUINDOS can measure virtually any geometry – more than 30 optional packages are available.

Another focus is on the inspection of gears of any kind, as well as of gear cutting tools.

Thus the Leitz precision CMMs coupled with QUINDOS software can also be used as gear testers.

You can find a complete overview about the capabilities of QUINDOS in the internet at www.leitz-metrology.com/q00_quindos_overview.

No other measuring software on the market is this versatile.



PC-DMIS

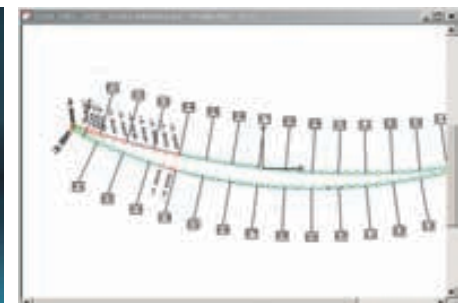
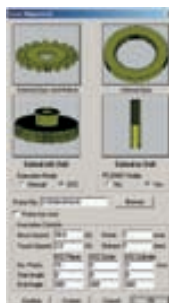
The software for CAD-based computer simulated programming solutions

PC-DMIS features are easy programming functionality, the possibility of using CAD data, a graphical user-friendly interface and powerful tools for representing results.

Apart from measuring regular geometries, PC-DMIS CAD++ also allows the inspection of free form surfaces through very fast measurement using the scanning function.

The new options PC-DMIS Blade and PC-DMIS Gear extend the product range by two important

functionalities for the measurement of turbine blades and gears. Programming is done by entering the mathematical part parameters. All probing paths are generated automatically.



System Engineering

Automatic part feeding systems

Innovative air conditioned rooms

Integration into networks

Fixturing systems

Part programming



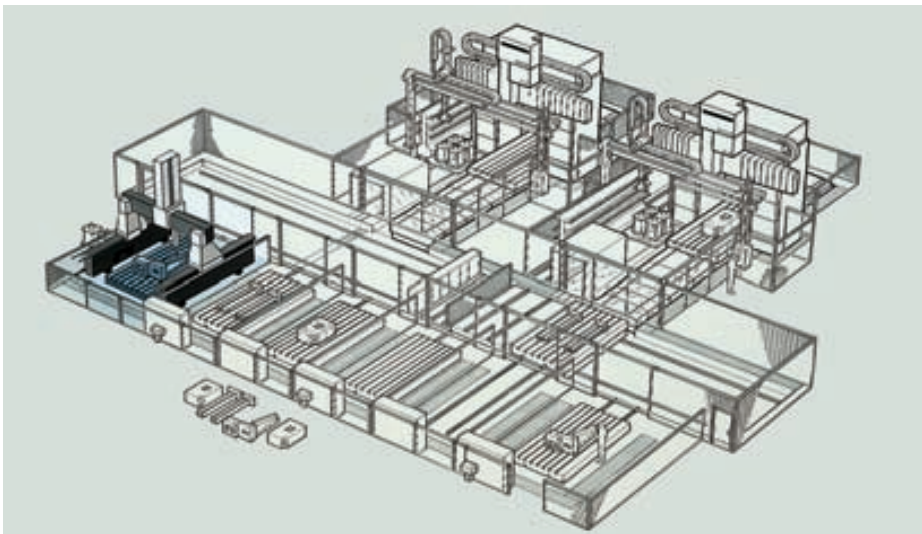
Single sourcing for a perfect fit!

Hexagon Metrology GmbH design and supply manual or fully automatic part feeding systems with an integrated measuring machine.

For maximum machine utilization and minimum set-up times we supply metrologically optimized fixtures and pallets according to customer specifications.

Of course, we also provide the complete programming of your parts as required.

Maximum machine utilization from the word go!



Your partner for precise and fast inspection

Precision

Large Volume

Flexible

Shop Floor

Software

PMM-C

PMM

Reference

PMM-F

QUINDOS



Ultra high precision coordinate measuring machines and gear checkers

CMMs with measuring envelopes up to 115 m³ and for gear diameters up to 3700 mm

Coordinate measuring machines for any application

High speed measuring robots with lab accuracy for harsh shop floor environments

Software for all applications in coordinate metrology



PMM-F

SIRIO

PC-DMIS

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