YOUR TRAVEL GUIDE TO THE WORLD OF INDUSTRIAL METROLOGY
Hexagon Metrology is a world leading supplier of precision industrial metrology products, ranging from manual gages to coordinate measuring machines (CMM) and robots, from advanced metrology software to integrated systems for quality assurance.

Hexagon Metrology represents the largest concentration of internationally recognized brands in the dimensional metrology market in terms of product line width, superior technological level, and extended market presence.

Hexagon Metrology’s complete range of Portable CMM solutions includes articulated arms, laser trackers, wireless probes, hand-held contactless scanners and white light scanners.

The CMM product line, the most comprehensive currently on the market from a single supplier, ranges from small manual bridge machines to very large systems for the aerospace industry, to ultra-high precision, sub-micron CMMs. In addition to conventional and Portable CMMs, the Hexagon Metrology product line includes but is not limited to sensors (contact and non-contact), software, after-market service and support.

Norbert Hanke
CEO & President Hexagon Metrology
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PORTABLE MEASURING ARMS

Absolutely Groundbreaking

Portable measuring arms have fundamentally changed metrology. They make 3D measurement easy and fast. As a result, user productivity is heightened and measurement time is slashed. Where traditional measuring methods are impractical or impossible manufacturers, in more than 100 countries, rely on ROMER products to deliver the essential information quickly.

The ROMER Absolute Arm heralds a new era in this success story. ROMER produces a portable coordinate measuring machine which combines the entire experience of the Hexagon Metrology network.
ROMER measuring arms stand for maximum mobility in industrial metrology. Carbon fibre tubes ensure stability while maintaining the lowest possible weight. Fully integrated laser scanners make the ROMER Absolute Arm a top performing system for all metrology tasks. Absolute encoders, which assign an absolute value to each position of the arm, are used for the first time ever in a portable measuring arm. Initialisation is not necessary. Simply take the measuring arm to the part, switch it on and start measuring.

ROMER – Metrology to go

ROMER Absolute Encoders

A first in the world of portable measuring arms: The ROMER Absolute Arm features absolute encoders and is therefore the first measuring arm which does not require referencing before measurement. Absolute Encoders simplify the operation: When the arm is turned on, it’s ready to go.
ROMER Feature Packs

ROMER Feature Packs unfold the full potential of a portable measuring arm. These optional feature packs utilise the ROMER Feature Pack Port interface. All extensions are perfectly coordinated with the ROMER Absolute Arm and are part of an integrated system.

The ROMER Mobility Pack includes a battery and WiFi communication – maximum flexibility for the ROMER Absolute Arm.

The ROMER Scanning Pack is the interface for laser scanners. They connect directly to the arm. Feature packs are thermally and mechanically stable, easy to exchange for the user and open for new technologies and additional accessories.

The ROMER Wireless Scanning Pack for the integrated laser scanner makes high-speed 3D scanning completely wireless.

Infinite Rotation
ROMER’s patented infinite rotation of the principal axes allows a comfortable inspection of hard-to-reach areas.

Integrated Zero-G counterbalance
An optimized counterbalance reduces operator fatigue and delivers effortless control in all positions, including above and below the centreline.
ROMER Absolute Arm with integrated scanner

The ROMER Absolute Arm is available with a fully integrated and certified laser scanner system with seven rotation axes. The laser scanner is tuned for a vast variety of materials without compromise in accuracy.

This low-weight laser scanner solution comes as a cost-efficient package. No additional cable or controller between the laser scanner and the portable measuring arm permits the ROMER Absolute Arm’s infinite rotation of the main movement axis. Thanks to the perfect balance, the ROMER Absolute Arm with the integrated scanner, can be operated with one hand.
ROMER Absolute Arm with external scanner.

The ROMER Absolute Arm with external scanner is designed for the high performance laser scanner CMS108 from Hexagon Metrology. Third party scanners can also be connected.

The ROMER Absolute Arm with external scanner is a premium portable CMM for uncompromising scanning requirements.
CMS108 laser scanner for ROMER Absolute Arm

With CMS108, the ROMER Absolute Arm offers first-class performance even on complex surfaces and on work pieces made up of the most challenging material types. Teaching of the material is not required because the automatic laser power control of the CMS108 automatically adapts to the surface conditions. CMS108 is the first ever laser scanner with a zoom function – providing three different line widths.

ROMER Absolute Arm with external scanner:
- Designed for Hexagon Metrology CMS108 high performance scanner
- Elaborated system design – no external cable around the arm
- TESA connector for CMS108 – easily changeable, only one calibration
- Open platform for future integrations thanks to TESA connector and Feature Pack technology
ROMER Tube Inspection System

The quick non-contact measurement solution for the inspection of bent tubes in your work shop. ROMER Arm Tube is the ideal solution especially designed for tube shop and mainly in automotive, aerospace, furniture, air conditioning and subcontracting industries.

The latest technology in non-contact measurement:
- Non contact infrared and laser technology
- No tube deflection during measurement
- Simple and double precision measurement
- Works with 180° bend angles
- Option to move tubes during measurement
- Automatic bender adjustment through network or serial link
- Cost effective solution: no more expensive masters needed
- Minimum down time for new tubes in production

ROMER Gear Inspection System

The portable ROMER Absolute Arm and QUINDOS software – a perfect match for gear measurement tasks.
ROMER Multi Gage is the easy-to-handle portable CMM, with its innovative design and ROMER-exclusive features such as counter-weight, WiFi, plug-and-measure probes, and intuitive Multi Gage software make it the must-have 3D measurement tool for improving your productivity.

Designed exclusively for today’s machine shop, the six-axis ROMER Multi Gage is a portable precision CMM with a 1.2 m measuring volume. The ROMER Multi Gage is used for dimensional control of molds, parts, tooling, castings, and more. Its quickmount system allows the CMM to be setup for on-demand measurement and inspection of parts or assemblies on your machine tool or anywhere on the shop floor.
PC-DMIS® Portable

Bringing metrology to the shop floor, portable measurement arms are rapidly changing the way manufacturers use metrology. With them, it is possible to perform more measurements and do more analysis on the shop floor where they have the potential to do the most good. They make it easy to monitor manufacturing operations and correct problems before they result in increased scrap and unnecessary reworks. To take full advantage of portable measurement machines requires software to match their unique capabilities. PC-DMIS Portable does just that. It is a precise adaptation of PC-DMIS for CMM. Without compromising on usefulness, it makes it easy for shop floor personnel to measure parts with minimal training and maximum effectiveness.

PC-DMIS Portable offers a range of innovative features:
- Quick Start GUI – Programmers and operators can make full use of their machine’s most frequently used capabilities without being overwhelmed with detail.
- Any-order Measure™ – This powerful innovation lets operators probe parts in the most convenient and efficient order.
- Aligning contoured parts – PC-DMIS Portable makes short work of aligning the most complex parts. The optional CAD++ configuration includes a range of algorithms for best fit and iterative alignments.
- Arm as mouse mode – With the click of a button, operators can use the arm as a pointing device to choose menu items and select geometry.
- Sheetmetal Measurements – PC-DMIS Portable offers an optional library of sheetmetal measurement routines designed to meet the requirements of manufacturers of automotive parts.
- Cues for Measurement – Besides prompting users with text and graphics, the software provides a combination of dynamic audio and visual cues to guide them through the measurement process.
- Sharing Training – Because all EMS measurement products share a common look and feel, greatly reducing the need for costly cross-training and specialization.

**PC-DMIS Reshaper** software is a reverse engineering package able to generate surfaces and sections from digitized point clouds. Thanks to efficient and fast surface calculation, reverse engineering times can be dramatically improved. PC-DMIS Reshaper application for ROMER Portable Measuring Arms & Scanners: a complete 3D point-cloud processing software for users who need to handle rapidly generated point clouds files and obtain high-quality 3D meshes at an affordable price.
ROMER G-Pad Geometric measurement software is the basic, user-friendly geometric measurement package for the ROMER arms. An efficient and quick menu access makes G-Pad easy and intuitive to use. In addition to the basic interface, the package offers advanced inspection functions, automatic and guided measurement procedures and data export.

ROMER G-Tube is the latest technology in non-contact tube measurement: automatic tube-bending machine adjustment is included, as well as spring-back calculation and customized interfaces to the most common pipe-bending machines. G-Tube reduces bending machine setup times and tube manufacturing costs.

ROMER DOCS Tube Inspection is the premier CAD-based tube inspection software. Designed to revolutionize quality control in the tubing industry, DOCS stands for Data Overlay Camera System and is compatible with ROMER portable measuring arms. ROMER DOCS can inspect and measure round metallic and non-metallic wire, tubing, and piping used in almost any industry – automotive, aerospace, shipbuilding, medical, machinery, appliance, and more. DOCS can also produce corrected bend data for CNC tube benders.
**PowerINSPECT** – 3D Geometric measurement & surface inspection software is the reference for higher quality, higher efficiency during the production process. Geometric control and complex 3D parts inspection with CAD files. Standard PowerINSPECT applications: mouldings, prototypes, tools and models.

**PolyWorks** – The leading software solution for high-end point cloud inspection and reverse engineering applications. Whether you are casting, milling, molding or stamping, you can rely on PolyWorks to provide a complete solution for your process. The PolyWorks software suite is available as a complete package or – with regard to the two main applications – as a point cloud inspection or reverse engineering package.

**QUINDOS** – In the field of portable metrology, the QUINDOS measuring software is able to measure almost any special geometry produced in industry today. Its comprehensive measuring and evaluation options make QUINDOS the ideal choice in particular for the mobile measurement of gear systems with ROMER measuring arms. Supporting all necessary measuring and evaluation options, QUINDOS Reshaper is available for point cloud inspection applications.
The **Leica Absolute Tracker AT402** is a portable coordinate measuring machine (CMM) that allows extreme precision over ultra large distances. It is able to be powered by its own internal battery and is able to work in the most demanding environment, yet maintains the highest level of precision and the largest ever work envelope. The Leica Absolute Tracker AT402 has a unique “All in One” system design that incorporates such needed accessories as built in live video, level to gravity, environmental monitoring and even an integrated IR remote control. By utilizing the integrated Wireless LAN communication the sensor can be used completely wirelessly making this the most portable Absolute Tracker ever.

Especially large structures require highly accurate, flexible and portable metrology equipment. This surrounding is right for the Leica Absolute Tracker AT402. It redefines large scale portable measurement and opens the door for unprecedented metrology applications.
A new level of portability & durability.
The complete measurement system weighs less than 15 kg including the case and in a minimum configuration it will fit into the overhead compartment of most commercial airliners. This is truly the world’s most portable CMM.

Ready for any environment
Utilizing a completely sealed design that is independently IP54 (IEC 60529) certified means this sensor can be installed in the most unforgiving environments. Spraying coolant, dust, weld splash, nothing is too harsh for this sensor. The Leica Absolute Tracker AT402 is the first laser tracker certified for outdoor use.

PowerLock – This vision technology detects a reflector and automatically locks the laser beam onto it, even when the target is moving. The laser beam moves to the user, not the other way around.
**Leica B-Probe-Ultra-Portable Entry-Level Probing System**

The perfect match: A handheld probing tool for the Leica Absolute Tracker AT402. The Leica B-Probe can gather hidden 3D points in a measurement volume of 20 m (Ø). For very large structures that require highly accurate measurements, the volume can be extended within a working volume of 320 m (Ø) with virtually no loss in probing accuracy by completing a laser tracker move station.

**Size Does Not Matter**

The Leica B-Probe can gather hidden 3D points in a measurement volume of 20 m around the Leica Absolute Tracker AT402. With endless telescope rotation, the Leica AT402 covers a full 360° horizontal and a 290° vertical dome.
A Leica Absolute Tracker AT901 from Leica Geosystems is a portable measurement system that relies on a laser beam to accurately measure and inspect in a spherical volume of up to 160 m (525 ft). The Leica Absolute Tracker can gather 3D coordinates in 4 ways: by following a small mirrored sphere, also known as a reflector; by tracking a Leica T-Probe, a hand-held “Walk-Around” wireless contact probe; by tracking a Leica T-Scan, a contactless high-speed laser scanner; or by tracking a 6DOF device for automated applications such as with machines or robots. Which measurement method you should use will depend on your application.

The Leica Absolute Tracker AT901 is equipped with PowerLock: For the first time in the history of laser trackers, the laser beam moves to the user, not the other way around.
Leica Absolute Tracker AT901-Basic
If your application requires positioning machines, fixtures or jigs, or if you are in the business of installing and aligning machine tools, roll mills, presses or gantry based machines, the Leica AT901-Basic is your tracker. Operating solely with a reflector, it is optimized for inspections within a typical measurement volume of up to 160 m (525 ft), and comes standard with our Leica Absolute Interferometer and PowerLock technologies.
Leica Absolute Tracker AT901-Mid Range

Since the introduction of the Leica T-Products in 2004, practically all leading automobile manufacturers have joined the ranks of our customers. When a reflector simply won’t cut it because there is no clear line of sight to the part you are trying to inspect, the part is hidden or sunken deep beneath surrounding sheetmetal, or because you need to reverse-engineer a part right there on the spot, the Leica AT901-MR is all you will need. When coupled to the Leica T-Scan, T-Probe, or T-Mac the Leica AT901-MR gives you a measurement volume of up to 18 m (59 ft). Of course, it can also be used with a standard corner cube, in which case its measurement volume goes up to a full 50 m (164 ft). The sensor is designed for large vehicle size objects and of course comes standard with our Leica Absolute Interferometer and PowerLock technologies.
Leica Absolute Tracker AT901-Long Range
This is the laser tracker that set the new benchmark for aerospace and other large scale precision measurements such as windmill blade inspection or industrial machinery alignment. It gives you hand-held wireless probing (Leica T-Probe), hand-held contactless scanning (Leica T-Scan), and full machine control abilities (Leica T-Mac) in a volume of up to 50 m (164 ft). Of course, it can also be used with a standard corner cube, in which case its typical measurement volume goes past 160 m (525 ft). This is the laser tracker that set new standards for usability with the Leica Absolute Interferometer and PowerLock, and continues to be the best selling 6DoF laser tracker in the world.
Leica T-Probe, the “Walk-Around” armless wireless device for probing of hidden, hard-to-reach points and measuring of up to 9 cars in one setup with minimal setup times, sets new standards by increasing accuracy, offering a ten-fold increase in point acquisition rate and providing user-assignable multi-function buttons. It is small, light, user-friendly, and more accurate than any other hand-held probe in the world.

Leica T-Scan – Leica T-Scan TS50 is a high-speed hand scanner for large-volume portable applications. This third-generation Leica T-Scan is more accurate, provides a better performance on challenging material types and offers double the point acquisition rate compared to the previous generation. The Leica T-Scan is more than just a line scanner. Its Flying Dot technology is the only truly automated scanning solution. The adjustment of the laser power to obtain the best measurement result of a specific surface type is completely autonomous. This ensures the best possible results – independent from the operator. Leica T-Scan scans large objects more accurately and 50 percent faster than comparable products.
Leica T-Mac – Leica T-Mac (Tracker-Machine control sensor), the next-generation 6DoF tracking device for automated applications, answers the needs of a growing number of Leica Geosystems customers who have either modified the existing Leica T-Probe for automated measurement applications or have expressed interest in doing so. Leica T-Mac is an off-the-shelf solution that can be custom-tailored to the needs of a specific application. For example, when needed, an interface for precise tool exchange units can be included. Operating specifications and accuracy information, including the maximum range of 50 m (164 ft) correspond to those of Leica T-Probe.

Leica Automated Solutions – The Leica Absolute Tracker AT901 turns an ordinary robot into an incredibly accurate metrology device. Leica Automated Solutions are capable to control and inspect large-volume work pieces.
Automation makes measurement processes more time and cost efficient than ever before. The process accuracy is no longer limited by the positioning device. The unparalleled accuracies of the 6DoF Leica Absolute Tracker AT 901 can be applied to any robotic positioning system turning it from an ordinary robot into an incredibly accurate metrology device. With a Leica T-Scan mounted on a robot or a Leica T-Mac equipped with a tactile probe, the Leica Absolute Tracker AT 901 is the core of a completely automatic coordinate measuring installation.
Leica Geosystems’ Laser Stations and Industrial Theodolites are known around the world for being the most accurate and easiest to use. With advanced features like Piezo direct drives, color touch screen display and an intuitive user interface, the TPS6000 family takes industrial measurement to a whole new level.

The **Leica TM6100A** is the world’s most accurate theodolite with the highest angular accuracy, panfocal telescope and autocollimation device. With unrivalled precision and superb optics, the Leica TM6100A has become the standard instrument of choice in the aerospace industry for satellite alignment as well as for system and Heads Up Display alignment for combat aircraft. When the need arises, the system can be expanded to a multi-instrument system.
The **Leica TDRA6000** is the most accurate laser station ever designed for industrial use. It has the ability to automatically target both CCR and tape targets and can even measure without targets maintaining a typical reflectorless accuracy of 1 mm. Optimized for use within 300 meters and combined with the Leica Geosystems PowerSearch module, the new Leica TDRA6000’s tracking performance is simply unbeatable.
SPATIAL ANALYZER®

SpatialAnalyzer® (SA) is a powerful, traceable and easy to use metrology and analysis software package, tailored for the Hexagon Metrology portable CMM family. SA offers a vast number of benefits, including intuitive, state of the art graphical environment, interfaces to all portable CMMs, all common CAD exchange and native formats, easy multiple station instrument bundling and multiple language support.

PC-DMIS Portable supports the complete Leica Laser Tracker family including Leica T-Probe. The package enables existing PC-DMIS user to utilize one common SW platform across all their CMM's and portable sensors. The state of the art tracker interface combined with the powerful functionality supports your most demanding measurement tasks. While you do your measurement job, PC-DMIS Portable is automatically creating a program for repetitive tasks.
DCP Pocket is a mobile large volume metrology software package for the Leica TDRA6000 or the Leica Absolute Tracker AT402 on a fully rugged Pocket-PC offering wireless sensor communication and data exchange, IP54/67 Standard for truly industrial applications, feature based measurements and reflectorless scanning, sunlight readable touch screens, motorized and automatic inspection, data viewer with feature group display and laser pointer function, automatic point recognition during move station process and compatibility with DCP Project and DCP 05 Onboard.
The Hexagon Metrology WLS400 is the next generation of Hexagon Metrology White Light sensors featuring the latest technologies including high-resolution digital cameras, Blue LED-based illumination, carbon fibre structure, and the fastest data-acquisition and processing in the market.

The Hexagon Metrology WLS400M white light scanner is a manually operated system used for 3D metrology, quality inspection and digitizing. The system features unique measurement capabilities and ability to work in the shop-floor, which emphasize its value for multiple industrial applications.
Hexagon Metrology WLS400A for quality iterations during tryout, production ramp up, quality assurance and dimensional process control.

The white light measuring system WLS400A is a flexible solution for real-time shop floor metrology. It acquires rich dimensional information from measured objects regardless of size, complexity or geometric features.

WLS400A is designed to ensure highly reliable measurements without compromising on measurement throughput, flexibility and ease of use critical for recurring operations.
The **Hexagon Metrology WLS qFLASH** is a compact non-contact measurement solution which rapidly carries out 3D measurements, creates reports and digitizes right on the spot. Lightweight, easy to handle and robust. It is designed for use on a tripod and in hand-held mode, for ultra-portable measurements of small to mid size parts in shop floor or quality rooms.
The White Light Dimensional Measurement Software Suite is comprised of various added value software products which enhance the benefits generated by using WLS400M, WLS400A and WLS qFLASH dimensional measurement platforms. This software suite along with innovative business processes, allow manufacturers to migrate from traditional methods of costly checking fixtures and other technologies to flexible non-contact dimensional gauging.

Our Dimensional Measurement Software Suite offers numerous Advantages and benefits which allow companies to better leverage our platforms and generate higher returns:

- Improves the utilization and throughput of WLS400M, WLS400A and WLS qFLASH platforms
- Supports a distributed working environment including multiple sites
- Accelerates the learning curve for new users
- Enables effortless definition of measurement programs from remote locations
- Provides comprehensive reporting, customization and distribution of measurement information
- Allows you to pinpoint cause and effect of complex engineering problems
- Helps streamline complicated processes such as part approval for production
- Manages dimensional information from across the organization and making it available for end users in real time.
Our software products offerings
The Dimensional Measurement Software Suite includes the following products:

CoreView Plan
Dedicated software tool used for accelerating tasks of planning, defining and preparing comprehensive dimensional measurement programs for systems.

CoreView Measure
The software that operates the WLS400M and WLS qFLASH systems for 3D measurement inspection and analysis processes. Runs by shop floor / quality operators.

CoreView Teach / AM
The software that operates the WLS400A system from programming a new part through approval for automated measurement to recurring 3D inspections runs by shop floor / quality operators.

CoreView Pro
Powerful software offering easy-to-use tools for dimensional measurement analysis, reporting and collaboration.

CoreView Master Part
Unique software tool that allows generating virtual master part benchmarks from multiple measurement results. Used for conducting future comparisons vs. actual dimensional conditions and driving focused quality efforts using functional build methodology.
CoreView Lite
Free results viewer for cross company / supply chain collaboration and quality improvements.

CoreView Analysis
Allows offline analysis, report generation, virtual assembly studies and more based of a full dimensional data set which white light systems generate.
DEA Micro-Hite, the line of small CMMs featuring excellent performance, is the result of the synergy among Hexagon Metrology companies in research, design and manufacturing. That’s why DEA Micro-Hite boasts the best price/performance ratio in the market.

The manual version, DEA Micro-Hite 3D, is ergonomic and easy to use: it is therefore the ideal replacement of hand tools and gages.

Measuring Range (mm)
from 460 x 510 x 420 to 460 x 710 x 420

ISO 10360 Performance Specs (µm)
MPEE = from 3.0 + 4.0 L/1000
The automatic version, **DEA Micro-Hite DCC**, features performance and flexibility typical of larger measuring volume CMMs.

Measuring Range (mm)
from 460 x 490 x 390 to 460 x 690 x 390

ISO 10360 Performance Specs (µm)
MPEE = 2.5 + 3.9 L/1000
DEA PIONEER is the perfect fit for manufacturers purchasing their first coordinate measuring machine (CMM), and for large manufacturing operations needing multiple CMMs with maximum price-to-performance ratio.

DEA PIONEER CMMs are used in quality inspection for first and final part acceptance, fixture qualification and process control. DEA PIONEER is the ideal measurement system for handling a variety of dimensional inspection tasks on general mechanic and prismatic components. You can tailor your DEA PIONEER CMM with a complete range of Swiss-made TESASTAR touch probes, probe heads and probe accessories.

Measuring Range (mm)
from 500 x 600 x 400 to 800 x 1200 x 600

ISO 10360 Performance Specs (µm)
MPEE = from 2.8 + 3.5 L/1000
The **DEA MICRA** coordinate measuring machine (CMM) is naturally predisposed for quality inspection of small high-precision parts. It unites high accuracy and exact single-point inspection with accurate scanning of surfaces and profiles. The miniaturized LSP-X1 high-tech scanning probe system provides DEA MICRA's foundation. With this high-accuracy 3D probing system, the DEA MICRA provides both single-point inspection and surface scanning as standard features.

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**Measuring Range (mm)**
400 x 500 x 300

**ISO 10360 Performance Specs (µm)**

\[\text{MPE}_E = 1.0 + 2.5 \frac{L}{1000}\]

\[\text{MPE}_{\text{THP}} = 2.0 \, \mu m/68 \, s\]
The **DEA GLOBAL Silver Classic** is an affordable all-purpose CMM for the dimensional inspection. The machine can be equipped with touch trigger probes or scanning probes. DEA GLOBAL Silver Classic CMMs are used in a number of industries for first and final part inspection, fixture qualification and process control. DEA GLOBAL Silver Classic is the ideal measurement system for handling a wide variety of dimensional inspection tasks on general mechanic and prismatic components with good accuracy and productivity.

**Measuring Range (mm)**
from 500 x 500 x 500 to 900 x 2000 x 800

**ISO 10360 Performance Specs (µm)**
MPE_E = from 1.9 + 3.3 L/1000
MPE_THPY = from 3.5 µm/68 s
DEA GLOBAL Silver Performance brings affordability to multi-sensor technology. It is the best tool for the user who needs to perform a wide variety of metrology operations on a single, flexible and accurate CMM. With its new capabilities, DEA GLOBAL Silver Performance provides a scanning throughput improvement of up to 35% in comparison to the previous generation of DEA GLOBAL. Benefit from multi-sensor technology: single-point measurement, continuous scanning, non-contact probes... everything in one system. CLIMA structural thermal compensation allows optimum CMM accuracy in a wider temperature range (16 - 26 °C).

Measuring Range (mm)
from 500 x 500 x 500 to 1200 x 3000 x 1000

ISO 10360 Performance Specs (µm)
MPEE = from 1.5 + 3.0 L/1000
MPE_{TH}_{PE} = from 2.9 µm/45 s
DEA GLOBAL Silver Advantage are fast and accurate CMMs that can handle any measurement and inspection task quickly and efficiently. The new DEA GLOBAL Silver Advantage provides a scanning throughput gain of up to 35% in comparison to the previous generation of DEA GLOBAL. The outstanding dynamics and first-class accuracy make DEA GLOBAL Silver Advantage the ideal tool to keep manufacturing process under close and permanent control. Standard on all DEA GLOBAL Silver Advantage models, CLIMA structural thermal compensation allows first-rate measuring accuracy even in non-ideal temperature conditions (16 - 26 °C).

Measuring Range (mm)
from 500 x 700 x 500 to 2000 x 4000 x 1800

ISO 10360 Performance Specs (µm)
MPEE = from 1.4 + 3.0 L/1000
MPE_THP = from 2.5 µm/45 s
For enhanced productivity on the shop floor. The DEA GLOBAL Silver SF ensures most accurate results in a temperature range of 15 to 30 °C. A network of thermal sensors detects the temperature on the CMM frame and on the workpiece. Advanced structural thermal compensation algorithms perform real-time compensation of temperature-induced deformations of the machine and the part. CTE-certified optical scales minimize measuring errors and contribute to first class metrology performance also in typical shop floor environments. The DEA GLOBAL Silver SF provides extra protection against dirt and dust by means of bellows and guards on the X and Y axes.

Measuring Range (mm)
from 700 x 700 x 500 to 1200 x 3000 x 1000

ISO 10360 Performance Specs (µm)
MPEE = from 1.4 + 3.0 L/1000
MPE_{THR}\_T = from 2.5 µm /45 s
DEA GLOBAL eXtra can accommodate large and heavy workpieces without the need for special foundations. The DEA GLOBAL eXtra, designed for measurement in the production environment, features ACTIV® structural thermal compensation, protection bellows on X and Y guideways and operating temperatures up to 30°C. For unlimited access to hard-to-reach features, these larger size DEA GLOBALs can be equipped with the DEA exclusive CW43L-mw servo wrist.

Measuring Range (mm)
from 2000 x 3300 x 1500 to 2000 x 4000 x 1800

ISO 10360 Performance Specs (µm)
MPE_E = from 12 + 18 L/1000
GANTRY CMMS

**DEA ALPHA** is an innovative product line of cost-effective medium-capacity CMMs, which combine high throughput and high accuracy with excellent operating reliability and reduced maintenance. It is the ideal system for die and mold manufacturing support.

Measuring Range (mm)
from 2000 x 3300 x 1000 to 2500 x 5000 x 1800

ISO 10360 Performance Specs (µm)
MPEE = from 3.5 + 3.5 L/1000
MPEₜₚₙₜ = from 5 µm/100 s
DEA DELTA SLANT is a range of gantry CMMs that excels in the high-accuracy inspection of large machined parts due to its superior mechanical structure. DEA DELTA SLANT comes in two versions: Classic and Performance. The “SF option” is available for the installation of both Classic and Performance models in workshop environments.

Measuring Range (mm)
from 2500x3300x2000 to 4000x8000x3000

ISO 10360 Performance Specs (μm)
MPEE = from 3.8 + 3.5 L/1000
MPE_{THP} = from 5 μm/ 83 s
DEA LAMBDA SP is the largest CMM line on the market. DEA LAMBDA SP excels in high-speed, high-accuracy inspection of huge components, such as marine engines, aircraft structures, nuclear vessels, or turbines that require open, modular, easily customizable structures with virtually unlimited measuring volumes.

Measuring Range (mm)
from 4000 x 5100 x 2500 to 6000 x 10000 x 4000

ISO 10360 Performance Specs (µm)
MPE_E = from 5.5 + 6.0 L/1000
MPE_{LHP/τ} = from 6.0 µm/120 s
DEA TRACER is a manual coordinate measuring and scribing device. Its construction features a horizontal arm that is ideal for measuring and scribing medium- to large-sized parts such as design models, mould and die cores, carpentry structures or sheetmetal parts.

The mechanical structure of DEA TRACER has been optimized for easy manual motion. The horizontal arm is always balanced out, thus, users can position the arm precisely without fatigue, even after extensive use. Axis motion and locking are handled via control knobs and independent brakes for all axes. The axes slide on linear guideways and recirculating bearings that do not require air supply. The basic model of DEA TRACER consists of a simple single-arm configuration. Also a digital readout and the TESASTAR probe head are part of the standard package. As an option dual arm versions, special work tables, a tracing kit and the PC-DMIS measurement software are available.

Measuring Range (mm):
- from 2000 x 1000 x 1000 to 12000 x 2000 x 2500 (single arm)
- from 2000 x 2000 x 1000 to 12000 x 4000 x 2500 (dual arm)

ISO 10360 Performance Specs (µm):
MPE_E = 45 + 30 L/1000
DEA TORO is an innovative line of automatic horizontal-arm measuring machines for dimensional inspection of sheet metal components and large size parts. DEA TORO features an extraordinary price/performance ratio and is available in the Runway structure with main guideway fixed to the floor.

The machine is supplied with a temperature sensor based linear thermal compensation. The DEA TORO systems are available in single and dual arm configuration.

Measuring Range (mm)
from 4000 x 1600 x 2100 (single arm)
to 7000 x 3218 x 2500 (dual arm)

ISO 10360 Performance Specs (µm)
MPEE = from 30 + 25 L/1000
DEA MERCURY stands for three different versions of horizontal-arm coordinate measuring machines (CMM). All of them are based on a modular concept. Automatic machines, disengageable drives for manual operations, single-, dual- or multiple-arm-configurations, tactile probes, optical sensors, scribing devices, fixtures... You name it. The DEA MERCURY line offers it.

DEA MERCURY’s outstanding price performance ratio is especially attractive for companies with limited budgets. Thanks to its modularity this CMM line is suitable for rebuilding existing installations which require a technological update. To make previous investments really pay off.

Measuring Range (mm)
from 2000 x 1200 x 1200 to 12000 x 2000 x 3000 (single arm)
from 2000 x 2400 x 1200 to 12000 x 4000 x 3000 (dual arm)

ISO 10360 Performance Specs (µm)
MPE_E = from 15 + 20 L/1000
The **DEA BRAVO Console** is a technically advanced and cost-effective solution for flexible and accurate dimensional inspection of thin-walled components, ideal for mid-size parts in industrial environments. The guideways located on the side of the machine base (Console architecture) allow the arm to be moved fully outside of the working area. This allows for optimal access to the work area for simple part loading/unloading operations. The cast iron machine table features the exclusive three-point support system, which eliminates the need for costly dedicated foundations, and makes the installation on vibration dampers easier. Two versions are available: DEA BRAVO C and DEA BRAVO C HS (High Speed).

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**Measuring Range (mm)**
from 3000 x 1400 x 1600 (single arm)
to 6000 x 1600 x 2500

**ISO 10360 Performance Specs (µm)**
MPE_E = from 15 + 10 L/1000
DEA BRAVO HD is a line of heavy-duty superior performance horizontal arm measuring machines, designed and engineered to provide accurate dimensional measurements on automobile bodies, subassemblies and panels in shop environments and metrology rooms. DEA BRAVO HD’s structure has been conceived and engineered in compliance with the most stringent industry standards to ensure accuracy, reliability and ease of use under all operating conditions and for maximum operator safety. All models are direct computer control systems capable of high dynamics, high accuracy and very long measuring strokes, thus providing maximum productivity and higher operating efficiency. DEA BRAVO HD is available in either a single or a dual arm configuration, equipped with the TESASTAR-m motorized indexable probe head in the standard configuration and with the CW43L-mw continuous servo wrist as an option.

**Measuring Range (mm)**
from 4000 x 1600 x 2100 (single arm)
to 9000 x 3120 x 3000 (double arm)

**ISO 10360 Performance Specs (µm)**

\[
MPE_E = \text{from } 20 + 13 \frac{L}{1000}
\]
**DEA BRAVO HP** is the series of horizontal-arm automatic systems characterized by high performance, and designed to meet in an optimum way the requirements of dimensional inspection and analysis of bodyshells, chassis, and subassemblies on the shopfloor. The DEA BRAVO HP systems are designed to guarantee maximum uncompromising operating flexibility, and for best-in-class dynamic and metrologic performance. The DEA BRAVO HP systems are available in single and dual arm configuration. They may be equipped both with the TESASTAR-m motorized indexable probe head and with the CW43L-mw continuous servo wrist, also in 3 continuous axes configuration for optimum control of non-contact sensors.

**Measuring Range (mm)**
from 4000 x 1600 x 2100 (single arm)
to 9000 x 3130 x 3000 (double arm)

**ISO 10360 Performance Specs (µm)**
MPEE = from 15 + 10 L/1000
DEA BRAVO HA is an advanced line of measuring and inspection robots for high-speed flexible in-process gaging of car bodies and subassemblies. DEA BRAVO HA are rugged, fast, and highly reliable systems designed to operate in the harshest industrial environments, for production process monitoring and control. The systems are designed to be easily integrated into the production line and can be equipped with exclusive high-speed non-contact measuring heads that allow inspecting sheet metal features in 1/10 of the time currently needed with conventional probing systems.

Measuring Range (mm)
from 6000 x 1400 x 2000 (single arm)
to 7000 x 3150 x 2400 (double arm)

ISO 10360 Performance Specs (µm)
MPE_E = from 13 + 8 L/1000
FIVE U-nique is an advanced flexible fixturing system that allows program-driven configuration of very accurate part holding fixtures for measurement and inspection applications. The CMM, equipped with a special locating gripper, drives the operator in building the fixture using modular supports and reference devices.

An interactive software program supports rapid production of complete fixturing programs for an unlimited number of part configurations.

Benefits: reduction of the costs associated to the development, production, maintenance, and storage of part holding fixtures.
The Leitz PMM-C is a fixed bridge/moving table-type coordinate measuring machine in closed frame design. It combines ultra-high accuracy with outstanding speed, thus ensuring a very high throughput. This coordinate measuring machine is fast, affordable and allows to perform all measuring tasks, even the most complex ones.

The Leitz PMM-C is also offered as a Gear Inspection Center. It can accommodate maximum outside diameters up to 1550 mm. Thanks to its fixed position LSP-S2 3D probe system, the CMM is able to meet the requirements of any measuring task, whether in variable high-speed scanning, dynamic single-point probing or self-centring 3D scanning.

Measuring Range (mm)
from 800 x 1000 x 600 to 2400 x 1600 x 1000

ISO 10360-2 Performance Specs (µm)
E₀ = from 0.4 + L/850
PRTU = from 0.5
THP = from 1.2 µm/45 s
For the **Leitz Infinity**, Hexagon Metrology drew on the whole of their long-standing experience, optimizing the latest technical developments to create a CMM boasting the highest available accuracy. The Leitz Infinity achieves measurement results which are excruciatingly exact. The result is the interplay of different components, giving an absolute accuracy better than 0.3 µm with a reproducibility better than 0.1 µm.

The Leitz Infinity is equipped with the 3D-Scanning System LSP-S4 for extremely precise form and profile measurements. LSP-S4 is enhanced by the ultra-low probing force of 0.02 to 0.16 N. The Leitz Infinity can also be fitted with the Leitz Precitec LR (Lateral Resolution) optical sensor.

**Measuring Range (mm)**

1200 x 1000 x 600/700

**ISO 10360-2 Performance Specs (µm)**

- $E_0 = 0.3 + L/1000$
- $P_{FTU} = 0.4$
- $THP = 1.1 \mu m/60 \text{ s}$
A cost-efficient entry-level model, the Leitz PMM-Xi complements the Leitz PMM-C product line and enables users to make the transition to the high-end Leitz products. Based on the proven portal design, the machine delivers both precision and dynamics and supports a variety of measuring ranges. It is particularly suitable for use by SMEs. The Leitz PMM-Xi features the high-precision fixed position Leitz LSP-X5 sensor which is able to master the Leitz scanning functions and offers the perfect match for measuring gear systems.

Measuring range [mm]
800 x 1000 x 600 to 2400 x 1600 x 1000

ISO 10360-2 Performance Specs
\[ E_0 = \text{from } 0.6 + L / 550 \]
\[ \text{PFTU} = \text{from } 0.6 \]
\[ \text{THP} = 1.2 \mu m/45 \text{ s} \]
The **Leitz Reference HP** (High Precision) is a bridge-type CMM with a moving portal – the ideal machine in its class for complex measuring tasks, combining high accuracy with optimum throughput. Available in various sizes it ensures a fast, precise and cost-effective inspection of workpieces. Equipped with the Leitz LSP-S2 3D probe system, the Leitz Reference HP is able to master Leitz scanning functions such as single-point probing, self-centring 3D scanning and variable high-speed scanning. The Leitz Reference HP can also be used as a gear inspection centre, supporting maximum outside diameters of up to 1150 mm. With the option XT the Leitz Reference HP measures reliably throughout the extended temperature range of 15 to 30 degrees Celsius.

**Measuring Range (mm)**
from 500 x 400 x 300 to 4500 x 1200 x 900

**ISO 10360-2 Performance Specs (µm)**
\[ E_0 = \text{from } 0.7 + L/400 \]
\[ \text{PrTu} = \text{from } 0.7 \]
\[ \text{THP} = \text{from } 1.6 \mu m/45 \text{ s} \]
The excellent Leitz scanning performance continues in the new Leitz Reference Xi series, which can be relied upon to provide accurate measurements at all times, whether with indexable or fixed probe heads. The Leitz Reference Xi series is also ready, willing and able for the integration of optical measuring sensors. The name of the Leitz Reference Xi speaks for itself: “Xi” stands for “fleXiible”. With the option XT the Leitz Reference HP measures reliably throughout the extended temperature range of 15 to 30 degrees Celsius.

Measuring Range (mm)
from 500 x 400 x 300 to 4500 x 1200 x 1000

ISO 10360-2 Performance Specs (µm)

\[ E_0 = 1.1 + \frac{L}{350} \]

\[ P_{FTU} = 1.1 \]

\[ THP = 2.0 \mu m/45 \text{ s} \]
Leitz PMM-F is a high-accuracy monolithic gantry measuring machine for large workpieces. It has been designed to combine high throughput with maximum accuracy. The Leitz PMM-F is available with a large measuring volume of up to 9.6 m$^3$. It does not require foundations and can therefore be made ready for operation quickly when required. Furthermore, being equipped as standard with the active pneumatic vibration damping system, the Leitz PMM-F is fully resistant to shocks and vibrations. With the LSP-S2 3D probe system, it can perform accurate and fast single-point probing, variable high-speed scanning for form and profile measurements and self-centring 3D scanning.

Measuring Range (mm)
from 3000 x 2000 x 1000 to 3000 x 2000 x 1600

ISO 10360-2 Performance Specs (µm)
temperature range 18-22 °C 18-24 °C
$E_0$ from 1.7 + L/400 from 1.7 + L/300
$P_{FTU}$ from 1.5 from 1.5
THP from 2.0 µm/52 s from 2.2 µm/52 s
The Leitz PMM-G provides highest accuracy and a highly enhanced throughput for large-size XXL workpieces. These workpieces are used for example in aircraft and aerospace industries, ship engine constructions and measurement of large gears used in wind turbines. This measuring machine benefits from improvements in probing frequency, acceleration, speed and scanning speed. The Leitz PMM-G features an overhead design with integrated U-shaped foundation for highest accuracy and high throughput. The enhanced design minimises moving masses. The X axis is equipped with dual drive motion and transducer systems. The Leitz PMM-G is equipped with the Leitz LSP-S2 Scanning Probe system. This probe head measures very precisely even with long and heavy styli. Styli configurations of up to 800 mm and 1 000 g are possible.

Measuring Range (mm)
from 3000 x 2000 x 1200 to 7000 x 4000 x 3000

ISO 10360-2 Performance Specs (µm)
\[ E_0 = \text{from} \ 2.0 + L/400 \]
\[ \text{PFTU} = \text{from} \ 1.5 \]
\[ \text{THP} = \text{from} \ 2.2 \ \mu \text{m}/64 \text{ s} \]

*\(^1\) other sizes available upon request
SCANNING PROBES

LSP-S2 – The probe heads in the Leitz LSP-S and LSP-X series have been designed specifically for fast and accurate measuring with high-precision sensors. The LSP-S2 is the most high-performing all-rounder for Leitz measuring machines. With horizontal probe extensions of up to 800 mm and a probe weight of up to 1000 g, features can be measured deep within a workpiece.

LSP-S4 – Thanks to its reduced probing forces, the LSP-S4 is ideal for sensitive surfaces and has been developed specifically for use on the high-precision Leitz Infinity.
**LSP-X5** – Ultra-precise, full 3D, fixed scanning probe head capable of simultaneously measuring in the X, Y, and Z directions to precisely define the orientation of the workpiece surface. This heavy-duty analogue probe features very high and repeatable accuracy even with extra-long probe extensions and heavy styli clusters (up to 500 mm of length and 500 g of weight). It includes a proprietary anti-collision system for extra protection of the head. The LSP-X5 is the ideal tool to verify high accuracy mechanical parts and complex geometries.

**LSP-X3c** – A compact, cost-effective yet extremely accurate, 3D fixed scanning probe head which can carry up to 360 mm long probing extensions and styli clusters. The LSP-X3c offers fast single-point probing for all standard measuring tasks as well as high-speed scanning for form and profile inspection and is ideally suited for dimensional control of small-to-medium high accuracy prismatic parts and complex geometries.
**LSP-X3t** – A 3D scanning probe for use on an articulated wrist featuring very high and repeatable accuracy. It can rapidly and automatically collect thousands of data points for the complete and precise evaluation of all part features, including form, location and size. LSP-X3t high-speed data collection greatly increases the accuracy, speed and flexibility of measurements.

**LSP-X1c** – Fixed 3D scanning probe head. The LSP-X1c is a cost effective solution with a fixed dove-tail quill mount. This probe head is optimised for stylus lengths up to 115 mm vertically and 50 mm horizontally. All standard measurements such as dynamic single-point inspection, High-Speed-Scanning as well as Self-Centering measurements for highly accurate form and contour inspection are possible.

**LSP-X1s/LSP-X1h** – scanning probes of the Leitz X-Series that have been specifically designed for CMMs equipped with motorized indexing probe heads. The LSP-X1 is available in different probe modules, each optimized for a specific stylus length ranging from 20 to 225 mm. The LSP-X1 supports all standard probing modes: single-point probing and self-centring as well as variable high-speed
scanning for accurate form and profile measurements. Like all other Leitz Probes, LSP-X1 allows simultaneous, unclamped probing on all axes, always orthogonal to the contact surface.

**Styli racks for probes**
The automatic tool changing capability allows styli change within a measuring program without the need for probe requalification. Magnetic or pneumatic clamping of styli on the head permits fast and reliable changes.

**Leitz Precitec LR**
The high-precision measuring machines in the Leitz Infinity and Leitz PMM-C series can be fitted with the Leitz Precitec LR (Lateral Resolution) optical sensor. The contactless sensor is able to take measurements on all types of surface, achieving previously unseen levels of precision in the submicron range. Not even transparent, reflective or shiny surfaces pose a problem. Thanks to full integration in the measuring system, automatic changeover between contact and non-contact measuring is possible within a single measuring run.
OPTICAL AND MULTI-SENSOR MEASURING SYSTEMS

The Optiv multi-sensor brand from Hexagon Metrology opens countless opportunities for you in the quality assurance of precision components. The measuring machines combine a great deal into one system: optical and tactile measurement procedures, flexibility and accuracies from a few microns down to the submicron range.

The advantages of multi-sensor technology are plain to see: optical and tactile sensors can be called upon during the same measuring routine. Parts need to be re-clamped less frequently and absolute references are not lost. Optiv is the choice when three-dimensional data with a high measuring point density is required.

A strong team of developers with links all over the world ensures the continuous development of the Optiv measuring system. Our centre of excellence in Saarwellingen, Germany integrates development and production. And of course it is ISO 9001 certified.
The **Optiv Classic line** crosses the threshold into optical and 3D multi-sensor metrology. The device base of all models is manufactured from granite. Both Vision-Sensor and touch trigger probes are available across the range.

Robust design, a mechanical support system for the axes and the outstanding reliability of the opto-electronic measuring system make the Optiv Classic models particularly suitable for use of quality monitoring in production environments. The devices support palletising of workpieces and impress by offering easy access to the measuring table from all sides.

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**Measuring Range (mm)**
from 300 x 200 x 150 to 400 x 400 x 300

**ISO 10360-7**
from MPE (Exy) = 1.9 + L/250 µm
The **Optiv Performance** range can tackle many measuring tasks with its robust design in granite, its axes with mechanical bearings and the complete range of sensors including the 3D scanning probe head LSP-X1. The Optiv Performance line is the first choice for measuring both smaller and larger workpieces – including those in a production environment. Harsh environmental conditions in the production environment such as dirt, dust, and floor vibrations, are eliminated by the covered guideways and the optional active vibration damping system. The effects of temperature in the production environment can further be addressed with optional machine enclosures. The exclusive Dual Z-Design is optionally available on the Performance 443.

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**Measuring Range (mm)**
from 250 x 200 x 200 to 600 x 600 x 400

**ISO 10360-7 Vision Performance Specs (µm)**
Exy = from 1.5 + L/150

**ISO 10360-2 Tactile Performance Specs (µm)**
E3 = from 2.9 + L/100
The premium offering with respect to measuring accuracy and design is the **Optiv Reference** line. It provides high precision 3D measurements with very tight production tolerances. A stiff granite construction with the most advanced design materials, air bearings on all axes and optional vibration dampers provide an unsurpassed solution for your metrology requirements. The exclusive Optiv Dual Z-Design is optionally available on all Reference models, as is the complete range of sensors and extensive additional equipment, for example motorised indexing probe heads, touch-trigger and scanning probes, rotary tables or Dual Rotary tables. The Optiv Reference line is the optimum solution for complex, high precision 3D part measurements.

Measuring Range (mm)
from 530 x 400 x 300 to 930 x 1000 x 300

ISO 10360-7 Vision Performance Specs (µm)
Exy = from 0.8 + L/600

ISO 10360-2 Tactile Performance Specs (µm)
E₃ = from 1.3 + L/400
Vision-Sensor – The Vision-Sensor is the image-processing measurement sensor for Optiv measuring machines. It can perform non-contact measurements on the smallest features subject to the tightest tolerances, accomplishing the sort of tasks that could not be accomplished with a probe, while avoiding deformations of the inspected part often caused by mechanical probes. The object being measured is captured through the lens on a matrix camera (CCD camera). The optical signals are converted into a digital image and further processed to calculate the coordinates of the measured points by the imaging processing routines in the PC-DMIS Vision measurement software package.

Through-The-Lens-Laser (TTL-Laser)
By coaxially injecting the laser light into the optics, the laser is focussed in the middle of the field of view acquired by the camera (Vision-Sensor). As a result the measuring speed on the simultaneous usage of laser measurement and video measurement in a measuring routine is accelerated.

Example applications for the TTL-Laser:
- Quick focussing of the Vision-Sensor
- Precise measurements of heights, hole depths and flat surfaces
- Contour and surface scanning
Chromatic White Light Sensor (CWS)
A measuring sensor with extremely high resolution is required for measurements in the micron range. Glossy surfaces also represent a challenge in vision metrology. The Chromatic White Light Sensor (CWS) is the ideal choice:

- For the topographical acquisition of microstructures
- For the digitization of glossy surfaces (e.g. glass, polished metal)
- For the digitization of transparent materials

Leitz scanning probe head LSP-X1
The LSP-X1 probe head provides measuring methods such as point-to-point probing and continuous High-Speed-Scanning in open- and closed-loop-scanning-mode. Thus, fast and very precise form and contour measurements are possible also in combination with star styli – with or without CAD-support.
CMM-Ve Sensor
CMM-Ve cameras are designed to be a general purpose image analysis tool for enhancing the measurement capabilities of a CMM. It provides oblique overhead illumination of the feature being inspected. CMM-Ve cameras are very versatile and have many potential applications for the CMM user. Due to their general-purpose nature CMM-Ve cameras are provided with a fixed magnification and are intended for taking data points in a static condition. The CMM-Ve contains a customisable illumination system, which makes it a self-contained measuring system, suitable for a wide range of applications. The CMM-Ve is compatible with the automatic probe changer TESASTAR-r. This system allows the CMM to change the sensor being used, enabling the CMM-Ve to be integrated within multiple sensor part programs, and allows sensor exchanging without the need for any operator intervention.

CMS Sensor
The CMS106 is a laser line scanning probe with two unique features:
- three level zoom offering a 24, 60 or 124 mm laser line
- automatic, real-time laser power adjustment
The CMS106 is available on bridge and horizontal arm coordinate measuring machines. The probe offers rapid non-contact metrology for three key application areas: free form surface inspection, sheet metal feature inspection and reverse engineering.
**CW43L-mw**

CW43L-mw Continuous Wrist is a heavy-duty precision mechanism able to quickly orient the probe to any attitude following precise 3D trajectories. Its speed and motion are continuously controlled by the system controller to reach maximum machine efficiency. Its ability to orient the probe as needed in space (virtually infinite angular positions) along with the possibility to handle exceptionally long probe extensions, allow full access to the part being measured. The CW43L-mw is also available in the configuration with integrated 3rd continuous axis developed for the optimized use of non-contact sensors. The CW43L-mw wrist is compatible with both point-to-point TESA probes and other probes and tip/tool changers, thus enabling measuring both in point-to-point and scanning modes.

**CW43L-mw AC**

CW43L-mw AC is an automatic tool changer that allows fast automatic change of probes and extensions on the CW43L-mw continuous wrist without the need for requalification.
TESASTAR-i Indexable Probe Head
TESASTAR-i is a manual indexable probe head with integrated high-precision touch trigger probe. The indexing capability in increments of 15° in two axes allows the operator to tilt the stylus through a number of positions as high as 168 without the need for requalification. A numeric display on the head shows the angular position of the probe. Axes can be released with one hand using a device located on the main body of the head.

TESASTAR-i M8 Indexable Probe Head
The key to this version is its ability to accommodate any type of probes or accessories fitted with a M8 threaded connection like all TESASTAR-p, TESASTAR-mp or TESASTAR-rp probes.
TESASTAR-m Motorised Probe Head
TESASTAR-m is a motorized articulating probe head capable of indexing in 5° increments for a total of 3,024 possible positions. A new version is available with 7.5° increments for a total of 720 possible positions. The indexing speed of the TESASTAR-m is higher than the one of corresponding products on the market, allowing for dramatically reduced cycle times. This head also features robust construction and rugged design permitting extension rods with lengths up to 300 mm. The TESA kinematic joint allows the direct docking of continuous scanning sensors. Coupled with an M8 adaptor, it can be used with TESASTAR-mp touch-trigger probes as well as probes of other makes.

TESASTAR-m M8 Motorised Probe Head
Similar to TESASTAR-m, this probe head is fully automated and controlled over PC-DMIS. Due to its compatibility with any accessory having a M8 mounting thread, no adapter is required. Combining robustness with coupling force, this efficient tool further expands the wide range of Swiss-made high-accuracy components designed and produced by TESA.
TESASTAR-sm Motorised Probe Head
TESASTAR-sm is a fully motorised probe head that offers excellent positional repeatability. The indexing capability in increments of 5° allows the probe head to rotate through to 180° as well as angles ranging from +90° to -115° to be reached. The total number of positions is as high as 3,024. A new version is available with increments of 7.5° allowing to reach angles ranging from -180° to +180° on the B-axis and 0° to +105° on the A-axis for a total of 720 positions.

Being compactly sized, this probe head can directly be fitted on the Z-axis (65 or 80 mm square section) of nearly all existing CMMs, thus resulting in a noticeable volume increase. Available in two distinct versions, this new model can either be supplied with a kinematic joint or an M8 mounting thread for coupling the needed accessory.

TESASTAR-p
Full selection of omni-directional touch-trigger probes. Fitted with a common M8 threaded connection, they can be used with most existing probe heads. These probes are available in 4 choices of trigger force – from 0.55 N to 0.1 N. For automatic operation, TESASTAR-p is fitted to the TESASTAR M8 automatic joint: this way the automatic change of the probe can be performed with the TESASTAR-r tool changing device. Thanks to the high accuracy of the tool changing system, probe requalification is not required after change.
TESASTAR-mp
This probe consists of two main parts, i.e. the mounting module and the probe itself. Both parts are put together by means of a magnetic coupling system ensuring a repositioning repeatable to 0.1 µm while allowing manual or automatic probe changing with no need for recurrent qualification. The four models available have also a varying measuring force contained within 0.055 N and 0.10 N. Their M8 threaded connection permits a direct assembly with nearly all existing measuring heads. Used in conjunction with TESASTAR-pr specially made to handle this type of probes, TESASTAR-mp is the ideal solution for fast and accurate coordinate measurement of part features.

TESASTAR-rp Probe
TESASTAR-rp is a rugged and accurate touch trigger probe that can be mounted on many kinds of coordinate measuring systems. This probe can operate in any industrial environment even in the most hostile. Optimized accuracy is ensured through an adjustable trigger force according to the chosen stylus configuration.
**TESASTAR-r Automatic Probe Changer**

Automatic modular probe changer. Available in 3 configurations – with 3, 5 and 9 modules. It allows the automatic change of extensions, sensors and styli without the need for tool requalification. When required, further modules, 40mm or 65mm long, can be added to sensors with particularly large working volume. The probe supplied with the tool changer is generally used for qualification but can also be used for normal measurement tasks.

**TESASTAR-pr Automatic Module Changer**

This model is specially designed for swapping magnetic probes. Available in two sizes (90 or 150 mm), the three main versions include 2, 4 or 6 modules. Extra modules that are also compatible with TESASTAR-r can any time be installed.

**Probe styli**, extensions and all other accessories included in the dedicated program for three-axis measurement have been specially designed by our engineers. Produced at Renens under the SWISS MADE label, each product gives evidence of a consistent family to customers.
Electronic Calipers TWIN-CAL IP67 and IP40
The Highest IP67 standard protection against liquids and dust, also with cable connection. Biggest LCD screen ever with 11 mm digits, more than 12,000 hours autonomy, ABS measuring mode, unique TLC TESA Link Connector connectivity concept, plus evolutionary output capability with all TWIN-CAL, Soft touch feature for smooth measurements, Stainless steel plate cover with PVD deposit for optimal protection.

The new DIGICO 705: Effective easiness!
Electronic indicators featuring a combined analogue/digital indication with the most up-to-date technology. Mechanical dial gauges with high-precision movement and smooth pointer revolution, shockproof mechanisms as well as measuring spans up to 25mm. DIGICO 705 use in conjunction with bore gauges with 2-point contact. Allows setting of the dial gauge on the minimum setting ring value.

TESA IMICRO capa µsystem
A successful combination of the patented TESA capacitive system. Its unique internal threaded cone makes of the Imicro the only internal micrometer that respects Abbe principle, ensuring most reliable measurements. Depending on the model that is being used, through holes and blind bores along with short centering shoulders can be inspected.
TESAMASTER Precision Micrometers

Precision measurement requires the use of micrometers. TESA SA decided to manufacture external micrometers making them the first products produced by the company. Yet no matter what you measure – internal or external dimensions – all micrometers are world-class products in design and quality.

Universal Measuring Instrument TESA UNIMASTER.

For direct measurement of extra large internal and external dimensions up to 3000 mm with optional extension elements. TESA UNIMASTER is similar to internal micrometers based on two-point contact measurement. Quick configuration by simply mounting the needed extensions to the measuring element.

- Robust and easy-to-handle.
- Can be used in either vertical or horizontal position.
- The constant measuring force coupled with tungsten carbide contact points ensures accuracy and consistency of reading.
- Incorporates a lever-type dial test indicator that clearly shows the turnaround point.
- Stability thanks to both a negligible deflection and thermal insulation on each extension.
Surface Roughness Testing. Instruments made for inspecting any work piece surface finish and capturing roughness parameter values. TESA RUGOSURF Roughness Testers, portable, versatile and providing maximum ease of use – Ideally suited for high-precision measurements on the shop floor or in the inspection laboratory.

TESA-Hite magna 400/700 with unique IP65 protection against dust and liquids, specially adapted for the difficult environments in a workshop, with opto-electronic measuring system, aerostatic tracks and integrated operator panel. The «must have» of height gauges for its simplicity, quickness and accuracy. TESA-Hite plus M 400/700 feature motorised movement and advanced measuring functions.

In an effort to continuously improve their state of the art height gauges, TESA recently added a new driving motor to their MICRO-HITE Plus M models, ensuring enhanced accuracy. A strictly controlled measuring force guarantees unmatched repeatability.
Making automatic function more user-friendly! The **TESA MH3D Dual** is unique in its genre due to the machine’s flexible bi-modularity and its simple to manage automatic function, which makes it accessible to everyone, from the workshop to the laboratory.

The whole **TESA-SCAN** product line belongs to the range of opto-electronic measuring centres that provide users with a complete solution for fast inspection of small round parts. As each center includes several systems such as those usually integrated into profile projectors or microscopes, they provide a more capable alternative to traditional inspection methods. TESA offer a full product family that’s able to measure round parts with diameters from 0.3 to 80 mm whose length can reach up to 500 mm.

**BPX44** and **TWIN Station** electronic interfaces for TESA half-bridge probes for simple or multigauging applications. BPX44 for the management of standard and linearized probes. 1 to 4 probes connection by BPX44 interface, with 1 digital input and 3 digital outputs (IN/OUT) signals. Compatible with the TWIN Station for the management and synchronization of wireless probes Includes TESA Interface Software (TIS) software.
TESA UPD – The flexible concept that provides distinctive metrological features with substantial savings.
- Permits over 90% of a 122-piece set to be checked using the same Reference gauge block. All nominal lengths of the full gauge set being contained within 0.5 and 25 mm, the measuring span is therefore not exceeded.
- Allows the gauge blocks of same nominal lengths to be measured by comparison.
- Reduces the number of systematic errors through limited length related influences of both the upper probe A and the gauge block to be compared.

TESA Electronic Probes at the fore front in precision measurement
TESA has been a leading designer, manufacturer and user of inductive probes for more than 40 years. Its high-precision electronic probes are made to withstand the stress sustained in the production environment where they can be constantly used for series inspection. At the same time, these probes are also designed for high-accuracy measurements such as those performed in gauge block measurement.
TESA Wireless Data Transmission

Use TLC-TWIN to transmit wirelessly a measurement data to the computer. Data can also be requested remotely thanks to its bidirectional wireless communication protocol. As many as 48 instruments equipped with TLC-TWIN can be managed per TWIN station receiver! Acquire data directly in Excel© using Data-Direct software or further integrate data into a measurement program, XR chart, simple SPC and measurement reports with Stat-Express!

Vision measuring made easy!

Machines characterised by a granite structure for increased sturdiness, the TESA-VISIO are also equipped with better optical and mechanical components for quality results over time.

The modules TESA-REFLEX Vista and TESA-REFLEX Vision are intuitive to operate and meet all your requirements. The optional module «Compare » is available with TESA-REFLEX Vista and enables visual comparison of your components and their CAD models.
MEASURING ON MACHINE TOOLS

Infrared Probing Systems
- HDR (High Data Rate) transmission excludes interference of measuring from ambient light
- Large transmitting and receiving angles guarantee reliable transmission and enable a large working area

Infrared Touch Probe IRP25.41
Modular probe used on vertical and horizontal machining centers. Chameleon function providing compatibility with nearly all other IR probe systems on the market.

Infrared Touch Probe IRP40.01 with THERMO-LOCK® technology
Compact probe with bi-directional transmission used on HSC machines with small shanks and small tool changers as well as on lathes. Shanks equipped with THERMO-LOCK® technology prevent heat transfer from the spindle to the probe.

Infrared Tool Setter IRT35.70
Tool measurement system for milling machines and machining centers. Mounting directly on the machine table at different locations is made possible by magnetic clamping. It has a very high level of repeatability when placing it in the machine, also with twin table machining (patented).
Radio-wave Probing Systems
• Protected frequency range, proven worldwide
• Safe signal transmission redundant transmission protocol
• 64 channels freely adjustable
• High transmitting power

Radio-wave Touch Probe RWP20.41
Modular probe for the use on large sized machine tools. Adjustable trigger force supports complex measurement tasks, including measurements deep inside of workpieces.

Radio-wave Touch Probe RWP38.41
Compact, modular probe with adjustable trigger force used on machine tools with limited tool diameters and limited Z-Axis height. Ideal for complex measurement tasks.

Radio-wave Tool Setter RWT35.50
Freely positionable tool measurement system with radio transmission for vertical lathes, large mills, and machining centers. Held in place with magnetic force, it can be placed anywhere in the machining area without tools. Wireless operation and minimum footprint ensure maximum use of the machining area.
Tool Setters
Constant production quality requires the use of reliable accurate tooling. One vital requirement is precise tool data. m&h Tool Setters for tool measurement detect tool length and tool radius directly on the machine.

Laser Tool Setter LTS35.65
Cost-efficient standard laser tool setter for everyday measuring tasks on the machine tool for tools from Ø 0.030 mm. Integrated m&h cleaning nozzles and air curtain during measuring prevent pollution. Simple measuring cycles ensure high functional reliability and easy handling.

Tool Setter TS35.20
The tool setter TS35.20 is designed for use on milling and machining centres and is used to determine tool geometries. The precision measuring mechanism reliably measures tool lengths and tool radii, measures individual cutting edges and detects tool breakage.

Tool Setter TS35.30
The m&h tool setter TS35.30 is designed for use on milling and machining centres. It is suitable for tool length measurement and tool breakage detection on stationary tools.
Temperature Probes
Probes with infrared or radio transmission for automatic workpiece temperature measurement (patented). Temperature measurement can be used to control manufacturing processes and to adjust machining parameters during production.

Production Probe PP41.00
A very compact probe which is completely compatible with existing systems on the market, used on tool grinders, cylindrical grinders, rotary transfer machines, and for special measurement tasks.
Measuring Software
As a technological leader in the on-machine probing and tool checking markets, m&h Inprocess Messtechnik GmbH understands the importance of software in delivering high-productivity solutions for in-process measurement. Only through applying cost-effective, easy to use, capable software, the demands of today’s manufacturing processes can be met.

3D Form Inspect
Measuring and quality control on the machine tool is gaining increasing importance in progressive manufacturing plants. This software enables quick, easy measuring and logging of important geometries and shapes on all sides and with all axes directly on the machine tool. This saves time, provides safety, and enhances quality.

PC-DMIS NC Gage
Developed for easy, quick and safe application of touch probes without requiring the operator to have programming skills or special knowledge of measuring technology. The unique “teach-in method” in manual operation enables a dialogue-based procedure. This process will immediately deliver the desired result. Setup operation of the machine, manual measuring cycles as well as automatic measuring and logging – it is a child’s play.
SOFTWARE FOR CMMS

**PC-DMIS** is the world’s leading metrology software for Coordinate Measurement Machines. It has an installed base of over 30,000 and is the foundation of the EMS product suite. PC-DMIS is for manual and DCC machines and comes in three versions: PC-DMIS® PRO, PC-DMIS® CAD and PC-DMIS® CAD++. Each version is carefully tuned to meet differing levels of customer requirements. In addition, a rich set of optional modules enables users to configure PC-DMIS according to their specific needs.

All PC-DMIS products let users:

- Create part programs, inspect parts and report results using a fully configurable GUI (Graphic User Interface) that makes complex operations simple without sacrificing capabilities.
- Define datums, construct features, select geometry and dimension parts with a few mouse clicks, working with a graphical representation of the features.
- Generate reports from a full set of pre-defined templates or customize their output using PC-DMIS’s powerful report-builder module.
- Add macros and high-level language routines to meet specific requirements.
PC-DMIS CAD lets users:

- Import and export CAD models in most standard formats.
- Develop, test, and debug part programs directly on CAD models and extract information directly from the models, eliminating an entire class of errors.
- Compare measured data to the CAD nominals. Report the deviations graphically against the model.
- Simulate program execution on the CAD model, use QuikFixture© to build fixture models into part programs and detect collisions with either parts or fixtures.

For the most demanding applications PC-DMIS CAD++ lets users:

- Scan parts using a wide range of probes including touch trigger, analogue, lasers and white light. Take advantage of seven built-in scanning methods.
- Align the most complex aerospace and automotive parts with iterative alignments that allow for the most accurate 2D and 3D fitting of the part to the CAD geometry.
- Measure thin-wall parts and complex contoured geometries with a powerful library of pre-defined routines.
- Troubleshoot problems with a sophisticated set of analytical tools and reverse engineer even the most complicated parts.
PC-DMIS® Vision sets a new standard for Vision Metrology Software. It is the industry's first CAD-based software package, and it is both powerful and easy to use.

This software gives vision metrologists the same capabilities long enjoyed by PC-DMIS CMM users. And because PC-DMIS Vision is part of EMS, all of the systems analytical, reporting and data management capabilities are available.

PC-DMIS Vision lets users:

- Work directly on 3D CAD models to develop, debug and edit programs. Like PC-DMIS CMM, this software extracts information right from the CAD model, eliminating errors of data interpretation and input.
- Program off-line using the CAD drawing and simulate program execution using the unique CADCamera® module, which accurately mimics the operation of the system’s camera.
- Reduce the need for the expensive cross-training of operators to use different measurement software and arms.
- Turn a manual machine into a virtual DCC machine using AutoShutter™, which automatically finds and measures features as they come into the camera's field of view.
- Eliminate hard to “see” areas from the measurement. The Split Feature function
gives full control over which parts of a feature the software includes in its evaluation.

- Use an adaptation of the PC-DMIS’s auto feature capability to automatically measure features and create appropriate measurement parameters. Select multiple features to measure by boxing them together.

- Edit inspections sequences easily by changing measurement parameters like point density, edge type and edge strength.

- Share a single screen and toggle between camera and program view with a keystroke.

**PC-DMIS® Inspection Planner Suite** makes “paperless inspection” a reality. It seamlessly links design, manufacturing and metrology operations into a single, lean system.

IP Planner Suite consists of two modules. The first, IP Planner, is CAD based. It lets design engineers build inspection requirements into their models. The second, IP Measure is PC-DMIS based. It reads the inspection plan and converts design intent into measurement programs.
IP Planner lets designers:

- Use a CAD model to create a virtual, marked-up blueprint.
- Define the part’s datums, dimensions and tolerances off the CAD system’s built-in GD&T. This software is an add-in, sharing the look and feel of the host software.
- Electronically close the loop between design, manufacturing and metrology operations and drastically reduce delays and misinterpretations.
- Send inspection plans to any of the PC-DMIS EMS measurement programs.

IP Measure lets metrology programmers:

- Automatically turn inspection plans into measurement programs decreasing part programming time by up to 70%.
- Stop manually typing in measurement parameters and minimize data input errors.
- Optimize probe paths for new and existing part programs and detect collisions with both parts and fixtures.
- Use IP Measure without an inspection plan to program feature measurements automatically as well as define and optimize probe movement.
PC-DMIS Touch – Tablet-based measurement for ROMER Absolute Arms

PC-DMIS Touch is the new easy-to-use entry-level measurement software for probing applications with the ROMER Absolute Arm. It combines the simplicity of a touch-screen interface with the power of PC-DMIS measurement software.
**QUINDOS** is the most high-performing analysis package for the dimensional inspection of complex contoured components on CMMs. QUINDOS is the market leader for special geometries and various applications in the powertrain field (drive engineering in automotive manufacture, aviation and the construction of machinery and power plants, for example).

This measuring software is characterised by the cross-version compatibility of the measuring programs and the database system. It can be relied upon for rapid processing of large data volumes and accessibility to all recorded and calculated data.

With QUINDOS, users can create their own measuring and evaluation instructions. Thanks to the integrated editors provided as standard with the basic package, the user interface can be adapted to prevailing process sequences and customised to meet all audiovisual requirements for user guidance. It is even possible to set up company-specific measurement reports. Alternatively, users can take advantage of structured programming options to manage the tasks assigned to them, without having to use additional external programs.
Every one of the 50 QUINDOS options features straightforward user guidance and graphics-based interactive 3D display of measuring points, calculated elements and evaluations. As a result, not only geometry but also free formed surfaces and curves can be analysed visually without the need for CAD models.

Alongside options for all part families, QUINDOS also supports general extensions including, for example:

- CAD options (CAD Basic, CAD Surfaces, CAD Import CATIA V4, CAD Import CATIA V5, CAD Import Unigraphics, CAD Pro/Engineer, etc.)
- Statistics options (statistics, statistical features overview, STATviewer)
- Other options, e.g. for measuring curves, measuring polygons, digitising surfaces, part measurement on pallets, feature-based inspection, etc.

QUINDOS supports the user with helpful planner tools which make programming much easier for part families/components with identical geometries or geometry groups. Examples:

- The safety base can be relied upon for automatic collision detection, automatic generation of travel paths and automatic probe selection.
- Automatic selection of features to be measured based on their geometrical properties and automatic detection of groups of features with identical measuring and evaluation strategy.
- Import of workpiece reference variables, dimensions and tolerances stored in the CAD model.
The QUINDOS Reshaper option supports full analysis of components detected via laser sensor at high speeds. The surface of the component that has been captured in point cloud format is converted into digital format with the 3DReshaper software. This produces a very accurate image of the actual part which can be measured and analysed offline with QUINDOS Reshaper. During calculation and analysis, the user draws on the entire functional scope of QUINDOS.

Measuring points are selected for import by marking the points on the digital component. 3DReshaper supplies the true actual points. QUINDOS then processes the measuring points in the same way as measuring points supplied by a connected CMM. Existing component programs can be executed on the virtual component. All of the analysis options supported by QUINDOS are available to users.

QUINDOS Reshaper even enables set points to be generated on a CAD model loaded in the software. 3DReshaper finds and returns the corresponding actual points on the generated model.

QUINDOS Reshaper impresses with:
• Component digitisation at high speeds
• Reduction in measuring time as there is no need for sensor calibration in offline mode
• Quality control independent of machines: Measuring and analysis processes take place at different times and in different places
• Use of existing QUINDOS component programs
• Support for all measuring strategies integrated in QUINDOS, from single-point probing to scanning
• Convenient scan line generation on models
• Import of point clouds in real time without any loss of detail
• High-performance, user-friendly functions for processing point clouds
• Easy-to-use alignment functions and best fit
• 3D set/actual comparison
• User-friendly, informative report output in graphical format

I++Simulator is a stand-alone software package which enables users to program, test and optimise the entire measuring process offline. The simulator is able to visualise the measuring machine, the probe system, the probe and tool changes, as well as the workpiece and tool-changing devices. This makes it possible to run the measuring program, including collision and accessibility inspections, in virtual space. This procedure does not block the CMM. When a new product is introduced, only the CAD part model is required for measurement programming. With the I++ Simulator, plans for inspection equipment can be made and measuring programs created before the first actual component has even been produced. Less time has to be spent on planning, decision-making and purchase order processes.
Projects involving the measurement of large numbers of parts can be processed more efficiently. When measuring individual parts, the measuring machine can be relieved entirely of programming tasks. The part programs created in the virtual measuring run can be transferred 100% to the CMM. Programs do not have to be adapted before being imported.

Features:
• Direct connection with measuring and analysis software that is compatible with I++
• Teach-in programming with game pad
• Integration of standard measuring machines by various manufacturers
• Extensive library of probes
• Libraries for additional components (probe changer, rotary table, etc.)
• Dialog wizards for creating probes for special geometries, special designs for probe changers, rotary tables, etc.
• Import of workpieces, tool-changing devices, probes, etc. in CAD format
• Option to select views during measuring run
• Documentation of measuring situation
Powertrain Solutions

Part of the Hexagon Metrology group of companies, Hexagon Metrology PTS (PowerTrain Solutions) specialises in the measurement of powertrain components and special geometries, making it the place to go for companies active in the automotive industry, aerospace, power engineering, general machine construction and many other sectors.

The company’s portfolio includes metrological concepts and their operational implementation as well as the QUINDOS software package supporting almost 50 options and the I++ Simulator.

Services offered include:

- Measuring rooms including layout planning and approval
- Feeder systems which reduce the set-up times and downtimes of CNC 3D CMMs and increase part throughput
- Fixtures and palletising systems for rapid and straightforward component positioning with repeat accuracy
- CMM monitoring to safeguard measuring uncertainty associated with inspection features and the suitability of the inspection process
- Measurement programming
- Project management from analysis of the measuring task to SOP support
- Customised turnkey measuring solutions
**Hexagon Metrology** offers a comprehensive range of products and services for all industrial metrology applications in sectors such as automotive, aerospace, energy and medical. We support our customers with actionable measurement information along the complete life cycle of a product – from development and design to production, assembly and final inspection.

With more than 20 production facilities and 70 Precision Centers for service and demonstrations, and a network of over 100 distribution partners on five continents, we empower our customers to fully control their manufacturing processes, enhancing the quality of products and increasing efficiency in manufacturing plants around the world. For more information, visit www.hexagonmetrology.com.

Hexagon Metrology is part of Hexagon (Nordic exchange: HEXAB; www.hexagon.com). Hexagon is a leading global provider of design, measurement and visualisation technologies that enable customers to design, measure and position objects, and process and present data.

**Systems Consultation**
- Our specialists and engineers help select the solution that best suits specific manufacturing and inspection needs.

**Skills Training**
- Introductory to advanced metrology courses to optimize CMM productivity.

**First Part Programming**
- Part programs developed by experts for proper start-up of inspection of new components.

**Contract Inspection and Programming**
- A professional solution to production overload or unique measuring applications.
- Possibility of outsourcing dimensional inspection resources and activities to Hexagon Metrology.

**Software Maintenance Agreements**
- Periodic software updates to meet any high technology challenge.

**Certification and Calibration**
- Regular certification and calibration to guarantee the highest levels of system accuracy and repeatability.

**System Upgrades and Rebuilds**
- Old systems revitalized by combining advanced hardware and software with the existing equipment.

**Service and Repair**
- Genuine Hexagon Metrology parts and certified factory service to keep systems running in peak conditions.
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