PORTABLE COORDINATE MEASURING MACHINES

PRODUCT BROCHURE

METRONOR

VER 1.4

METRONOR PORTABLE CMMs

Metronor – a complete range on a common technology basis

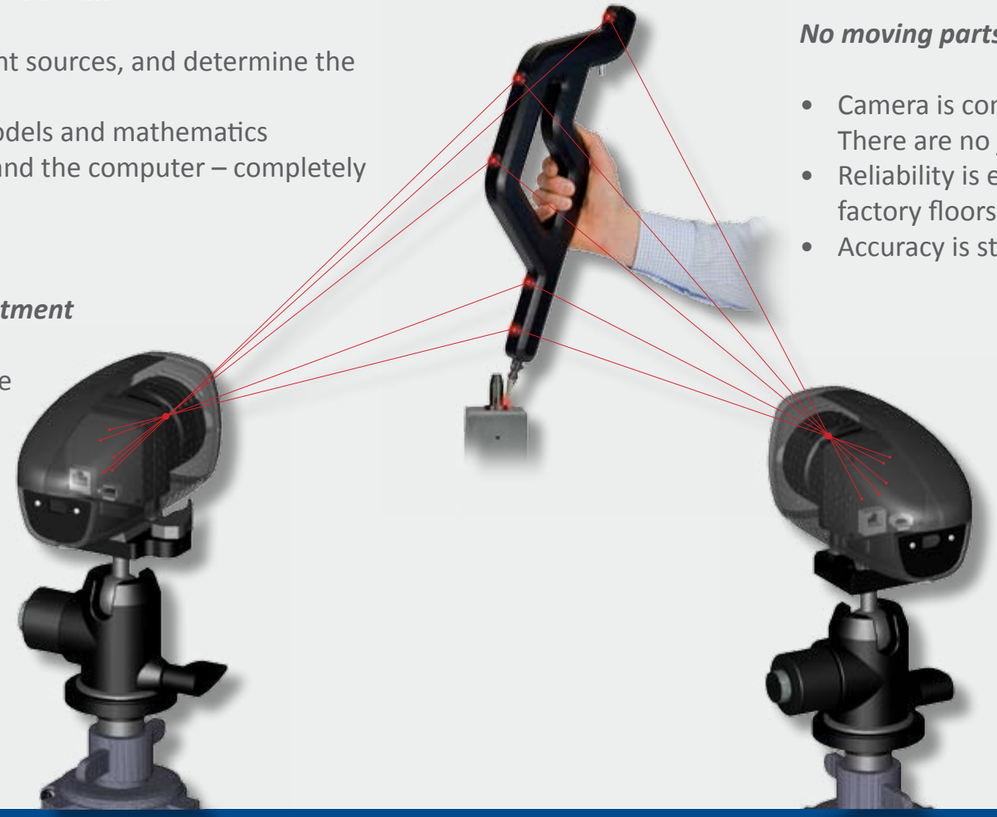
The Metronor range of portable measurement systems share common technology and advantages:

Metronor systems measure with light – not arms, joints or beams

- One or more cameras observe a known pattern of light sources, and determine the position and orientation of the pattern in space.
- Simple – in principle and in use. The very complex models and mathematics needed to achieve accuracy is handled by Metronor and the computer – completely transparent to the user.

Quick to learn, efficient to operate, fast return-on-investment

- Simple and intuitive operation with a hand-held probe – touch and measure.
- Rapid camera setup with no warm-up required – simply point and measure.
- Market-leading PowerINSPECT measurement software included. All systems are compatible with most other solutions, too.



Probing that covers it all

- Cameras only need to see the light sources – probe tip can be hidden from view.
- Standard probes handle just about any object with ease.
- Special probes can be designed, from small probes for measuring inside tubes up to 2 meters long probes for huge structures or deep channels no other system can reach.

No moving parts give high reliability and stable accuracy

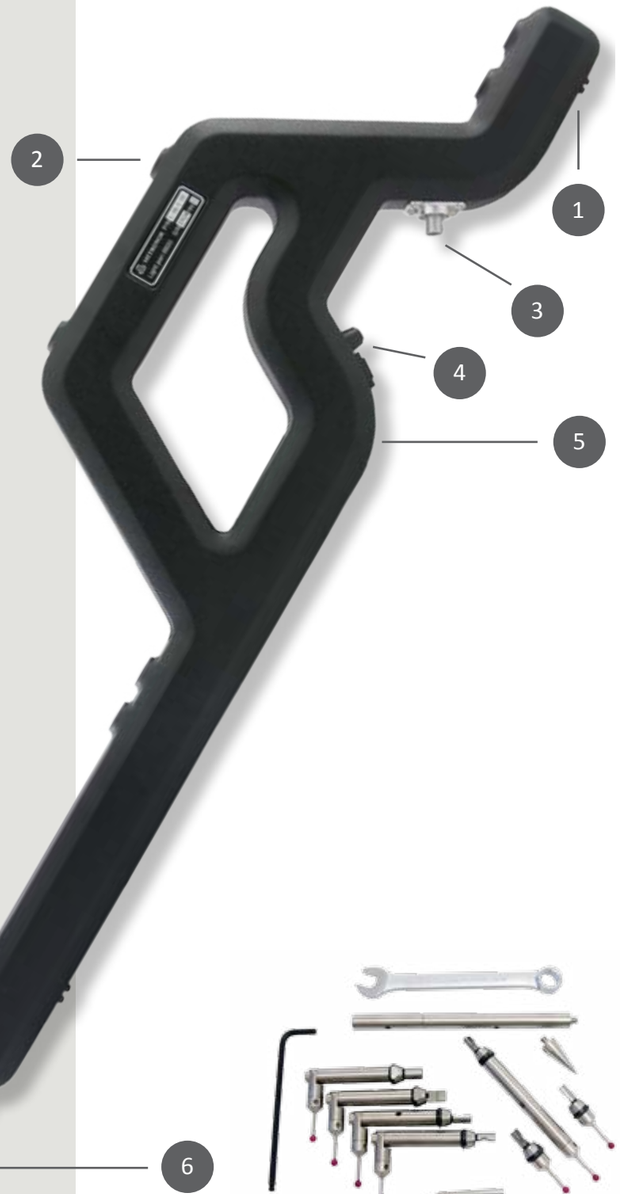
- Camera is completely solid state, and probe is a carbon fiber structure. There are no joints to wear, encoders to calibrate and adjustable optics at all.
- Reliability is excellent, and systems are made to perform well on harsh factory floors – year after year.
- Accuracy is stable over time, and can be verified on-site anytime.

Metronor takes care of you – and your investment

- Metronor support – either direct or through our local partners – ensures timely attention to any issues and upgrades to keep your system current for years to come
- Modular design means your investment can grow with your business. With few exceptions, any Metronor system can be upgraded or re-configured to any other configuration.
- No other company offers the same flexibility and long-term security that your investment will keep paying for itself whatever the future may bring.

Light-weight probe

1. Red and green LEDs give instant operator feedback even if far from computer
2. Embedded high-performance infra-red light emitting diodes act as active targets
3. Communications interface, connects via radio or cable
4. Operating button for measurement and sampling control along with an additional Metronor PowerINSPECT interface button
5. Advanced carbon-composite shell ensures temperature stability and extreme rigidity and strength while keeping weight down for enhanced operator comfort
6. User-configurable set of straight or angled probes
7. High precision built in chuck enables quick probe change without the need for re-calibration



Note: *Probe type & dimensions may vary depending on system configuration*

Complete & compact systems

1. CCD-based digital camera with precision optics, connected to the system through a reliable high-speed IEEE1394 FireWire interface connection
2. Compact and lightweight head providing a flexible and stable mounting to the camera
3. Carbon fiber lightweight rigid tripod - temperature stable and quick to operate. Comes with removable rubber caps to ensure a stable set-up on various types of floors
4. Roll away case holds entire system for easy and safe transport

Note: *Case type may vary depending on system*

MetroArm

MetroArm is the ideal portable measurement system for objects of limited size. The light-weight handheld probe works through optics and avoids any mechanical linkages. It is therefore convenient and flexible to operate also for long periods, and is reliable and accurate over time.

Compact, rugged and reliable, MetroArm includes computer and software and comes in a compact water-proof roll away case.

Main benefits:
- Cost-efficient – as well as fast to learn and very durable
- Hand-held probe without linkages – convenient and reliable
- Compact and capable in limited volumes

SOLO

Capable of measuring 20 meter sized objects and beyond, SOLO is a flexible and cost-efficient solution for a wide variety of applications. The wireless handheld probe is easy to use and measures features hidden from view by 450mm plus the probe length.

Fast to learn and very durable, SOLO provides return-on-investment both in the short and long perspective.

Main benefits:
- Large volume capability
- Extremely easy to learn, very fast to set-up with no warm-up time
- Probing of any detail, including hidden and recessed details

DUO

DUO delivers the highest levels of portable CMM accuracy. Using two cameras, not only is very high accuracy achieved, it also becomes possible to track any number of individual targets – e.g. to track multiple targets relative to each other, or to determine the deformation of structures. Well established inside e.g. the automotive, aerospace and machining markets, DUO systems can also be operated as a SOLO by simply unplugging one of the cameras.

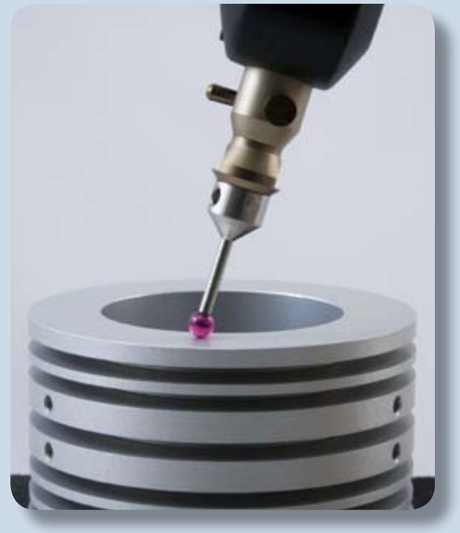
Main benefits:
- Highest accuracy
- Widest range of applications, including deformation and multiple object tracking
- Unique capabilities like SwitchMode, deformation monitoring, tracking of objects in all 6 degrees of freedom and process repeatability testing

DUET

The most flexible measurement solution in the market, DUET is essentially two independent SOLO systems that can be combined into a high-accuracy DUO system when required. For normal tasks, the two SOLOs provide high measurement capacity. When particularly challenging or tight-tolerance inspection is required, DUO operation ensures all requirements are met.

Same software, same way of operating – DUET gives a cost-efficient and adaptable capability.

Main benefits:
- Most flexible investment
- Twice the capacity – or very high accuracy
- Best solution when needs vary over time



SOLO TWIN

Essentially doubling the field-of-view compared to the standard SOLO system, SOLO TWIN makes measurements in tight or confined areas simple. Additionally, larger parts can be measured with high accuracy as the cameras can be placed close to the part

Main benefits:
- Full 70° field-of-view
- Efficient in tight and confined spaces
- High accuracy on large volumes

SOLO SPIN

The patented SOLO SPIN provides unlimited 360° field-of-view and is ideally suited to 'inside' measurements where the object is enclosed – e.g. for interiors, processing plants or ship modules. The spin camera has attached targets and can be pointed in any direction. A second camera determines where the spin camera is pointing, and the operator can use the Light pen to measure anywhere around the spin camera.

Main benefits:
- Full 360° filed-of-view
- Great for enclosed spaces or objects

METRONOR PORTABLE CMMs

OPTIONS

All Metronor systems are complete, turn-key solutions. For special applications, additional options are available. Some of these include:

LED APPLICATION KIT (FOR DUO)
Metronor DUO is unique in measuring many points simultaneously. The LED application kit enables a wide range of unique benefits such as vibration stability control, float mode, repeatability studies, deformation and alignment.

LIGHT PENS
Light pens are available in various sizes, thereby allowing optimal operator ease of use, maximum distances or probing deep and hidden features. The Light pens are made from stable carbon fiber and have a quick-release chuck for attachment of probes.

VIBRATION STABILITY CONTROL BAR
The Vibration stability control bar is designed for shop-floor use and includes unique features that cancel environmental changes such as temperature swings and vibration. It consists of a carbon fiber bar and 4 LEDs, and can be operated either through a cable or RadioLink24 connection (optional).

SYSTEM BATTERY OPTION
The System battery option allows you to quickly set up the system whether 110 – 240 V is available or not. Within minutes the system can be moved, set-up and the operator ready to measure and realign assembly tools when problems occur. Parts located in areas with no access to local power network can now be measured effortlessly. The battery life is approximately 9 hours per charge.

NAVITARGET
Metronor's 6 degrees of freedom navigation 'probe'. A stable carbon structure with LEDs pointing in all directions, NaviTarget is suitable for tracking or aligning objects in space and will allow a Metronor system to monitor the NaviTarget's position and orientation regardless of the relative position to the camera.

MIL-STD and ATEX systems
For particularly harsh or demanding environments, Metronor can supply components from our military product line. These are verified and qualified to MIL-STD 810, MIL-STD 461 as well as ATEX requirements. Contact your Metronor representative for details.

SOFTWARE solutions
Metronor systems run under Windows 7 and are compatible with a wide range of analysis software solutions. Whether you need special software for tube measurement or simply need a special software to adhere to company guidelines, Metronor will be happy to quote a suitable configuration.

Upgrades – your investment adapts to new requirements

Based on a common technology and using modular hardware, the Metronor range of measurement systems offers an important and unique benefit: Regardless of which system configuration meets your requirements today, it is possible to upgrade to a different configuration if requirements change. In a fast-changing world, your Metronor investment will keep up.

From a SOLO, upgrade to a DUO for ultimate accuracy. Or go for a SOLO SPIN if you get projects requiring measurement in tight, enclosed spaces. If ultimate flexibility and SOLO measurement capacity is what you are looking for, your choice should be a DUET.

Combined with available options, including scanners for reverse engineering of free-form surfaces, Metronor's range of measurement solutions meets measurement requirements, today as well as in the future.

METRONOR PORTABLE CMMs

SERVICE & SUPPORT

CUSTOMER SUPPORT

Our support team works hard to ensure a trouble-free life cycle for your Portable CMM, offering services ranging from preventative maintenance and online support to efficient repair and calibration services in case of an accident. Metronor takes pride in our many repeat customers.

The systems' inherent ruggedness and reliability together with our support services ensure that your Portable CMM will operate reliably for years to come. We understand that the Portable CMM is critical to your operations and represent a considerable investment - and we will work with you to ensure performance you can count on and excellent return on your investment both short-term and long-term.

You can contact our support team through your local Metronor representative, or call us on +47 66 98 38 00 or e-mail support@metronor.com.

APPLICATIONS

DIMENSIONAL MANAGEMENT
Minimization of all sources of variability from tool - to part - to subassembly - to final assembly.

PART INSPECTION
The Metronor system's portability and vibration stability control enables direct measurement at the place of fabrication - no matter how harsh the environment - and does not require a dedicated inspection area.

ALIGNMENT
Metronor offers the fastest and most flexible way to precision assemble parts with continuous part position and orientation updates in all 6 degrees of freedom – thereby saving the cost of expensive assembly and mating tooling.

REPEATABILITY STUDIES
The Metronor DUO systems have the unique capability of measuring up to 50 or more points simultaneously.

AS BUILT DOCUMENTATION
Metronor portable CMMs with their large volume capacity and the unique probing capability enables to capture the exact geometry of most large objects – be it power generators, trucks, cars, aeroplanes or space satellites.

PROTOTYPING
Metronor's versatile measurement systems provide invaluable data during prototyping to enable better functional designs. Whether automotive, aerospace or other industries Metronor has the solution for fast and accurate capture of critical measurements and geometries.

VIBRATION COMPENSATION
Metronor's unique vibration stability control technology allows you to cancel out local vibration and perform fast and accurate measurements without having the vibrations affect the results.



METRONOR PORTABLE CMMs

APPLICATIONS

MOVING LINE ASSEMBLY
Embedding LEDs in the moving assembly line allows real-time measurements to be made at any time. Same concept can also be used when parts are unstable. Just attach LEDs to the part and part movements are cancelled out while light pen measurements are performed.

JIG-LESS ASSEMBLY
Metronor offers the fastest and most flexible way to precision assemble parts – saving the cost of expensive assembly and mating tooling.

EXCESS MATERIAL ANALYSIS
Metronor's unique "Excess Material Best-Fit" enables the CAD software to determine the optimal part balancing and alignment for machining becomes fast,efficient and guarantees enough material for a good part.

ASSEMBLY TOOL CERTIFICATION
To fully verify the performance of an assembly tool, it is necessary to verify the tool base condition for reproducibility of results, to verify the tool geometry to design CAD, to verify the repeatability of any moveable clamping devices and the overall ability of the tool to repeatedly position the parts. This is the job Metronor was originally designed for.

DEFORMATION ANALYSIS
With its ability to measure multiple points at the same instant, DUO along with the LED application kit is the ideal tool to measure deformation.

REVERSE ENGINEERING
With the Metronor system the basic geometries of even the most complex part with hidden features can be captured with ease.



INDUSTRIES

AEROSPACE
Our system is used for everything from inspecting large moulds and castings, through to detail part inspection and is used with great success in moving line assembly.

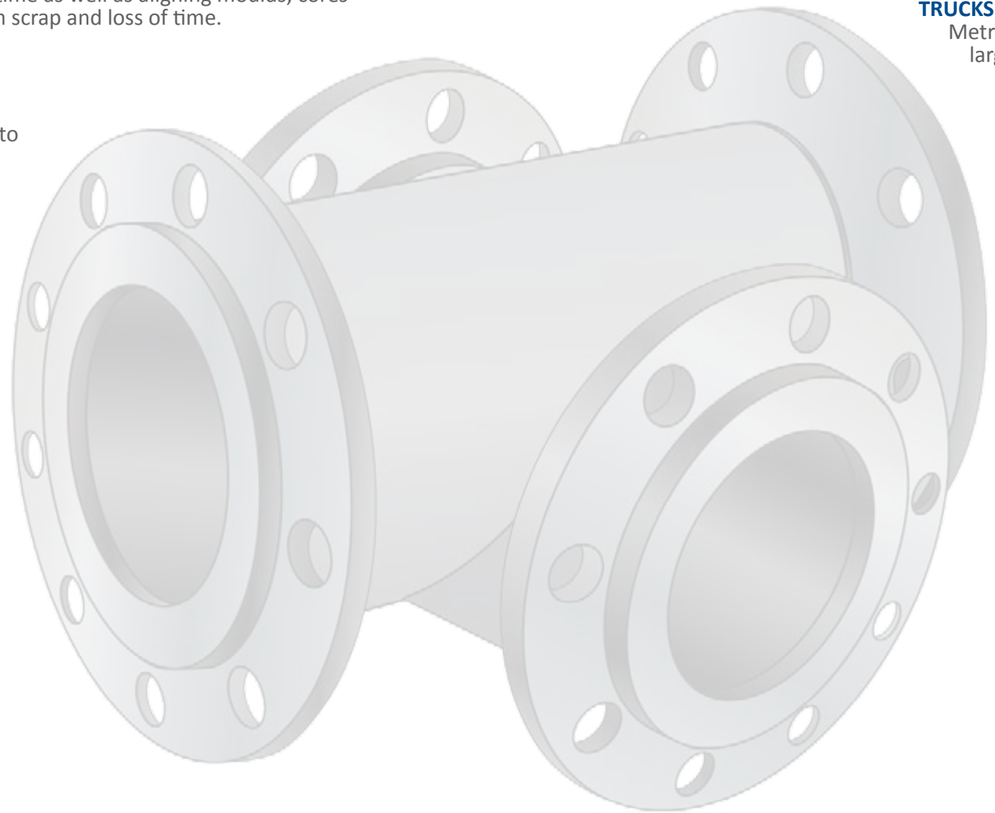
AUTOMOTIVE
The Metronor system was originally designed for modern automotive production and almost every auto maker in the world is using our equipment.

CASTING, FORGING & MACHINING
From aligning mould halves to verifying and optimizing excess material through to efficient alignment of cast parts for optimized machining with guaranteed coverage, Metronor systems offer the fastest and most cost-efficient process improvement tool available.

MOULD & DIE
Metronor enables comparing moulds to CAD design data in minimum time as well as aligning moulds, cores and inserts precisely to ensure quality product first time with minimum scrap and loss of time.

BOATS & YACHTS
Increasing demand for high quality and accuracy while keeping manufacturing costs down has led the boat and yacht industry to look to Metronor for portable CMM equipment, capable of handling large volume and demanding environment of modern yacht manufacturing.

METAL FABRICATION
From part inspection to jig less assembly and alignment of large parts, capturing geometry and as built data to recording fast alignment of parts on machine beds, the Metronor solutions are flexible and value-adding.



INDUSTRIES

RAILWAY
Metronor portable CMM systems handle large volumes and efficiently and accurately inspect axles and bogies for flatness, squareness and straightness, as well as inspecting ‘any’ geometry to CAD design intent - ideally suited both for new production and maintenance work.

FARM EQUIPMENT
Handling large volumes, aligning large parts like axles and bogies, inspecting parts for flatness and verifying geometries makes the Metronor system ideally suited for farm equipment manufacturers.

CONSTRUCTION EQUIPMENT AND EXCAVATORS
Large construction machines and equipment can be built faster and with better geometry control using Metronor’s portable CMM.

TRUCKS & BUSES
Metronor’s SOLO system is perfectly suited for assembly and fabrication of large vehicles such as buses and trucks.

ENERGY
Metronor has a diversified range of customers in all branches of the energy industries: Oil and gas exploration, wind energy, hydro-electric power plants, gas turbine production and nuclear power plants - as well as maintenance of the same.

OTHER INDUSTRIES
The flexible and unique nature of the Metronor portable CMM family of products has allowed it to be adopted and adapted in many different industries.

Metronor AS

Metronor is a privately held ISO9001:2008 certified high technology company headquartered outside Oslo, Norway. Metronor has developed a range of high accuracy, large volume portable electro-optical coordinate measuring systems that provide excellent return on investment for our customers as well as facilitate a highly efficient dimensional management of their manufacturing processes.

Metronor's Industrial Systems Business Unit - develops and markets a range of portable coordinate measuring machines for large measurement volumes that combine an ever-expanding range of functionalities with high accuracy at an affordable price.

Metronor's Military Systems Business Unit develops and markets custom solutions for 3D and 6D alignment of navigation and weapons systems for air, sea and land platforms. Fully qualified to MIL-STD and designed for use in extremely rough conditions, the systems are used for example on the Lockheed-Martin F-16, SAAB Gripen, KAI T-50 and BAE Systems Hawk.

More information about all Metronor Business units can be found at www.metronor.com

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