

# PORTABLE COORDINATE MEASURING MACHINES

PRODUCT BROCHURE 2009





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# METRONOR PORTABLE CMM

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## UNIQUE PORTABLE CMM

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- Maximum ease-of-use and operator comfort with no arms, cables or beams
- Excellent for alignment of large parts with unique 6DOF ability
- Complete family of solutions for shop-floor manufacturing
- Excellent reliability, no moving parts



## QUICK AND EASY SETUP

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- Rapid set-up
- No warm-up or initialization required
- Highly portable - single case system with wheels and pull-out handle



## LARGE VOLUMES

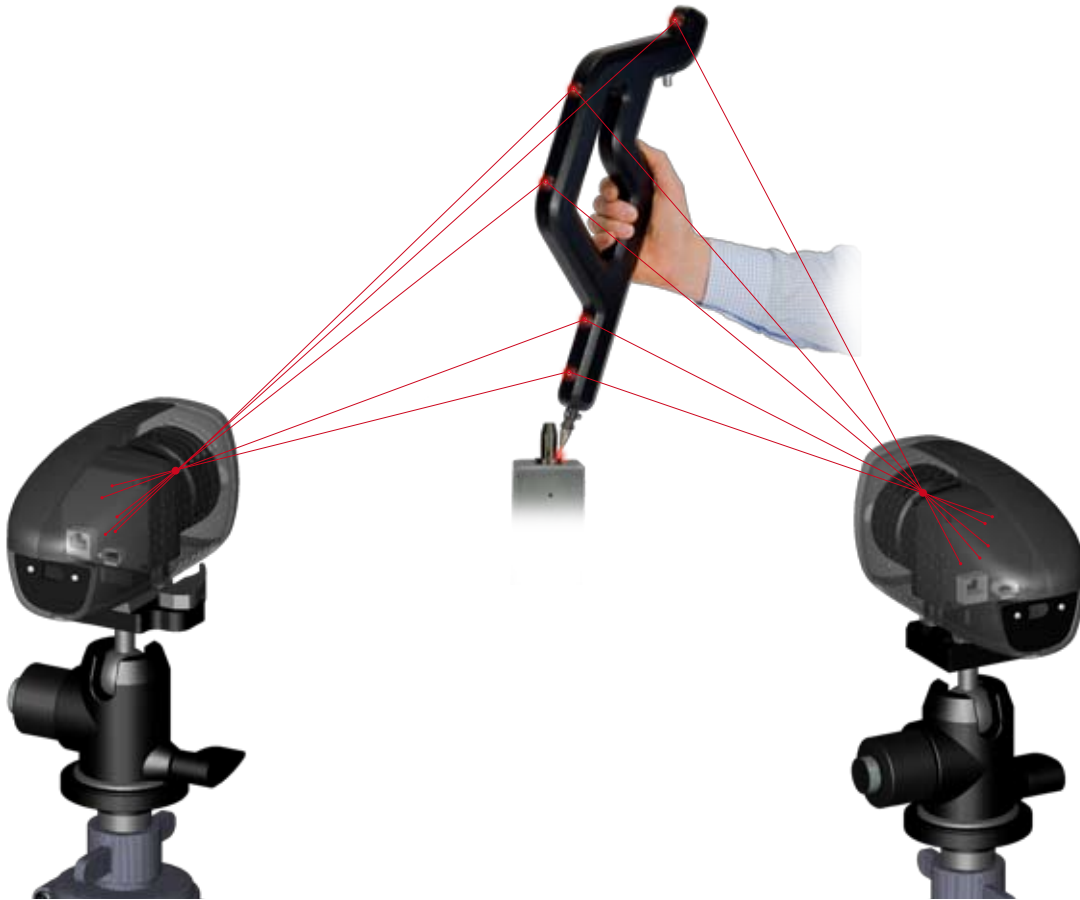
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- Optimised for car and truck sized volumes of 6x4x4 meters
- High accuracy in distances of 20 meters or more
- No need for direct line of sight - up to 1 meter offsets can be used



# METRONOR PORTABLE CMM

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## METRONOR SYSTEMS - HIGH-ACCURACY 3D PCMM

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Metronor was founded on the vision of bringing high-accuracy 3D portable measurement machines to the factory floor, enabling new and better manufacturing and assembly processes to be exploited. Today Metronor's product family of portable CMMs enable companies in many industries to build products faster, cheaper and smarter.

Metronor has been a leader in innovative opto-electrical measurement technology since its inception 20 years ago. Leading companies within the automotive, aerospace, energy and other industries use Metronor systems every day to help build better products.

Metronor fills the gap between articulated arms and laser trackers, often being the most cost-effective shop-floor portable CMM.

Continuous product development lets Metronor expand the product family of portable CMMs and bring out new innovative solutions that allow customers to build products in new ways, to improve quality at the same time as realizing cost savings.



# METRONOR PORTABLE CMM

## LEDs

Embedded high-performance infra-red light emitting diodes act as active targets



## LED (RED/GREEN)

Red and green LEDs give instant operator feedback even if far from computer

## CARBON FIBER SHELL

Advanced carbon-composite shell ensures total temperature stability and extreme rigidity and strength while keeping weight down for enhanced operator comfort



## CONNECTOR

Communications interface



## OPERATING BUTTONS

Operating button for measurement and sampling control along with an additional Metronor PowerINSPECT interface button

## PROBE

User-configurable straight or angled probes



## OPERATING BUTTON

Buttons control for measurements and sampling



## CHUCK

High precision built in chuck enables quick probe change without the need for re-calibration



# METRONOR PORTABLE CMM



## **CAMERA**

*CCD-based digital camera with precision optics, connected to the system through a reliable high-speed IEEE1394 FireWire interface connection*



## **PAN/TILT HEAD**

*Compact and lightweight head providing a flexible and stable mounting to the camera*



## **TRIPOD**

*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*



# METRONOR PORTABLE CMM

## SOLO SYSTEM

Based on a patented principle allowing accurate 3D measurement with just one single camera and a hand-held probe, SOLO is a uniquely portable and affordable coordinate measurement system offering full CMM capability including comparison of just about any geometry to CAD data or blueprint.

Ideally suited where fast setup, ease of use and high portability is critical, SOLO offers a superior working volume and can be operated through a wireless connection - without cumbersome arms to balance or cables to untangle.

Highly affordable, SOLO provides excellent return on investment in industries as diverse as automotive, forging, machining, casting, energy and aerospace – as well as in numerous special applications such as high-radiation nuclear power plant maintenance or custom-fit boat decks. A special MIL-STD version of SOLO is also in operational use with several air forces as part of the ground support kit for maintenance of military jets, this adding to its credibility as being reliable, versatile and adaptable.

While highly capable on its own, SOLO is also a very flexible investment and a wide range of options and upgrade paths are offered, permitting your SOLO to grow along with your future requirements or needs.

- Complete and truly portable: One case (with wheels and pull-out handle for easy maneuvering), weighing 24kg for the complete system, including computer and tripod.
- Extended probing capabilities including hidden features (450mm plus probe length)
- Operator friendly: Probing without beams, cables or arms
- Fast and easy set-up and use
- No warm-up, initialization or leap-frogging
- No moving parts eliminate re-calibration
- Can be upgraded to a DUO or a DUET system
- Price/performance winner

### The SOLO system comes delivered with:

- *Metronor Camera 8.5*
- *RadioLink24 system*
- *RadioLink24 I/O base unit*
- *Carbon fiber Light pen, CLP8900*
- *Probe kit*
- *Laptop*
- *Cabling*
- *Tripod incl. Pan/tilt head*
- *Basic SOLO SW license*
- *Metronor PowerINSPECT SW license*
- *Transport case*



### SOLO in transport case

The complete system is housed in a single transport case with wheels and handles that will transport equally well around a factory, by car or by commercial airlines.



### ACCURACY

U95 distance measurement accuracy

0.12mm (1,5x1,5x1,5 m<sup>3</sup>)



# METRONOR PORTABLE CMM

## DUO SYSTEM

Metronor's top-of-the-range DUO system combines large volume and high accuracy with the widest range of applications. Extremely portable – the complete system comes in a single, roll-away transport case weighing only 30 kilos – DUO provides high-end coordinate measuring capability anywhere in your production process.

Using two cameras and a hand-held, wireless probe, DUO provides the capability to study any geometry-related issue in detail – compare tools, parts and assemblies to CAD or blue-print, use the LED application kit option to efficiently study stability, deformation and process repeatability, or take the system to your supplier or customer to investigate problems with interfacing parts. DUO provides probing capability as well as accuracy, versatility and portability to address all your geometry-related issues.

DUO - like all Metronor systems - was designed for use in rough shop floor environments and exhibits industry-leading reliability and availability. DUO is the most affordable high-end large-volume portable CMM system on the market.

- High accuracy portable CMM
- Complete and truly portable: One case (with wheels and pull-out-handle for easy maneuvering), weighing 30kg for the complete system, including computer and tripods
- Extended probing capabilities including hidden features
- (1000 mm with optional Light pen)
- Operator friendly: Probing without beams, cables or arms
- Fast and easy set-up and use
- No warm-up or leap-frogging required
- No moving parts eliminate re-calibration
- Can be upgraded to a DUET system
- Flexible and extendable

### The DUO system comes delivered with:

- 2 Metronor Camera 8.5
- RadioLink24 system
- RadioLink24 I/O base unit
- Carbon fiber Light pen, CLP5500
- Probe kit
- Laptop
- Cabling
- Reference bar, CRB6800
- Tripods incl. Pan/tilt head
- Basic DUO SW License
- Metronor PowerINSPECT SW license
- Transport case

### DUO in transport case

The complete system is housed in a single transport case with wheels and handles that will transport equally well around a factory, by car or by commercial airlines.



### ACCURACY

U95 distance measurement accuracy

0.025 + L/60000 mm



# METRONOR PORTABLE CMM

## SOLO TWIN SYSTEM

SOLO TWIN is based on the proven and patented SOLO technology but offers a further expanded application area.

SOLO TWIN offers high efficiency and ease-of-use - simply point the camera and measure anything inside the field-of-view. Using new software and calibration techniques, Metronor has been able to add a second camera that doubles the system's field of view to 70 by 32 degrees. The two cameras of SOLO TWIN work as one seamless unit retaining all of SOLO's efficiency and ease-of-use benefits.

However, shorter object-to-camera distances allow for increased accuracy on larger objects, and enables SOLO TWIN to handle larger objects in confined areas with ease. These additional advantages make SOLO TWIN extremely well suited for applications where ease-of-use, speed of set-up and ability to measure large objects in tight environments is required - such as e.g. in automotive or aerospace production line maintenance.

SOLO TWIN can be configured as you need it - the two cameras can be re-aligned in seconds by determining their field-of-view overlap zone. For example, to measure assembly tooling in crowded volumes, SOLO TWIN in the standard configuration shown in the illustration is perfect, while to measure parallel shafts e.g. in marine gear boxes accurately a configuration with two wider separated and paralleled mounted cameras is advantageous.

- High accuracy on large objects
- No setup - just measure
- Operator friendly: Probing without beams, cables or arms
- Tool certification within minutes
- Flexible and versatile
- Affordable capability
- Exceptional 70° field of view
- Unique solution for shaft alignment
- Ideal for narrow and crowded environments



**The SOLO TWIN system comes delivered with:**

- 2 Metronor Camera 8.5
- SOLO TWIN camera mounting plate
- RadioLink24 system
- RadioLink24 I/O base unit
- Carbon fiber Light pen, CLP8900
- Probe kit
- Laptop
- Cabling
- Tripod included Pan/tilt head
- Basic SOLO SW License
- Metronor PowerINSPECT SW license
- Transport case



*Carbon fiber Light pen, CLP8900*



## HARDWARE OPTIONS



### 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).



### DUET KIT (FOR DUO)

Companies can further increase the value of their Metronor DUO system by adding DUET capability. This allows the system to operate either as a single DUO where ultimate accuracy is required, or as a pair of totally independent SOLO measurement systems to double the measurement capacity.



### VOICE COMMAND MODULE

The Voice command module makes single-user system operation even more efficient. With the headset and associated software, the user can use voice command to carry out common operations like Probe change, Probe mode, 'Next', 'Delete last', etc. The Voice command module includes software that enables simple adaptation to the operator's pronunciation and works well also in environments with background noise.



### 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 unique 6 degrees of freedom navigation tool. The DUO system will determine this highly stable carbon fiber structure's spatial position and orientation by flashing LEDs embedded in the aluminum-balls. Snap it on to the object to be aligned and quickly move the object into nominal location. Dedicated software and graphics will assist the operator by providing 6 DOF data at about 2 Hz updating frequency. Perfect for aligning parts on CNC machine beds, navigating scanners, mating parts like aircraft wings to fuselage etc.



## SOFTWARE OPTIONS



### POWERINSPECT

Metronor PowerINSPECT is a complete CAD based inspection solution that **comes as standard** with the Metronor SOLO and DUO systems. It provides quality with minimum effort and has a simple interface which makes it intuitive and easy to use. The learning curve is short, allowing the operator to get the most from the measuring device in the shortest possible time.



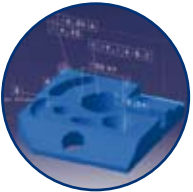
### TEZET CAD

Easy to use and quick to learn, Tezet provides very efficient software tools for inspecting, documenting or reverse-engineering tubes, hoses and cables in applications ranging from oil and chemical industries to vehicles and airplanes.



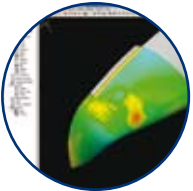
### VERISURF

Verisurf is a family of comprehensive CAD-based measurement solutions built on top of the MasterCam CAD design system. A wide variety of modules are available for data import/export, part inspection, build, analysis and surface generation.



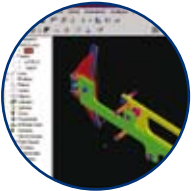
### METROLOGIC

Metrologic provides several variants of their widely-used 3D measuring software which offers a broad range of CAD and non-CAD functions and has a solid customer base in many industries such as automotive and aerospace.



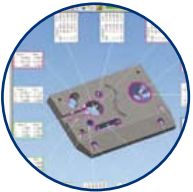
### POLYWORKS/ Inspector Probing

Providing point-by-point inspection including advanced functions for comparison between measured data and CAD models, this software can be expanded to also include the well-known Polyworks point-cloud tools.



### SPATIAL ANALYZER

Spatial Analyzer aims to provide a measurement software system that looks the same regardless of the measurement system it runs on, and that permits measurements to be made by several systems working together.



### OTHER 3D PARTY SOFTWARE

Metronor systems have been interfaced to a multitude of various software solutions, either to meet customers' specific company standards or to support special applications. A software development kit is available for 3rd party software developers. Please contact your Metronor representative with your requirements for more information.



## 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, airplanes 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.

#### 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.

#### 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 repeatably 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.



# METRONOR PORTABLE CMM

## 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 jigless 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.



### 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

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.



### 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 6698 3800 or e-mail [support@metronor.com](mailto:support@metronor.com).



# ABOUT US

## METRONOR AS

Metronor is a high technology company headquartered just outside Oslo, Norway, with subsidiaries in Seattle and Beijing, supporting partners and customers on a global basis. Based on in-house innovation and research, Metronor has since 1989 developed a range of electro-optical portable coordinate measuring systems that have become very popular among leading manufacturers worldwide.

In the recent years the company has expanded its product range from not only industrial metrology systems, but also offering products and solutions for boresighting applications in the military business area. Moreover, as a joint initiative with the Boeing Company, Metronor provides state-of-the-art Dimensional Management Solutions for complex assembly programs.

The company has developed its core photogrammetric technology into a variety of product versions addressing the moderate to highest degree of accuracy requirements. A vast number of applications in various industries can be accurately and efficiently documented, providing the customer with excellent ROI from his investment.

Principal products include Portable CMMs, Boresight systems and AIMS Dimensional Management product suite.

Metronor's management system is certified to ISO9001:2000 and complies with ISO14001:2004

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