

ROMER

HEXAGON METROLOGY



ROMER

Portable Coordinate Measurement Systems





ROMER portable coordinate measuring machines are unlike traditional CMMs.

Designed with inherent flexibility and versatility that stationary CMMs simply can't match, ROMER portable CMMs are ideal for dimensional inspection, measurement and reverse engineering applications on the shop floor or in the metrology lab. They're the perfect answer for workpieces that are impractical or impossible to measure on a frame CMM. Available in six- and seven-axis configurations, ROMER portable CMMs provide measuring ranges from 4 ft. to 12 ft. (1.2 m to 3.6 m). ROMER measuring equipment is used worldwide in the automotive, aerospace and general manufacturing industries. In addition to portable CMMs, ROMER offers a complete selection of software and accessories to provide total metrology solutions.



ROMER



ROMER portable CMMs and accessory systems offer the ideal metrology solution for large, unwieldy workpieces.

Here, the patented ROMER GridLOK[®] measuring system and a ROMER portable CMM combine in an economical, easy-to-use dimensional inspection system that provides high volumetric accuracy in an extremely large measuring area. See page 10 for more details.

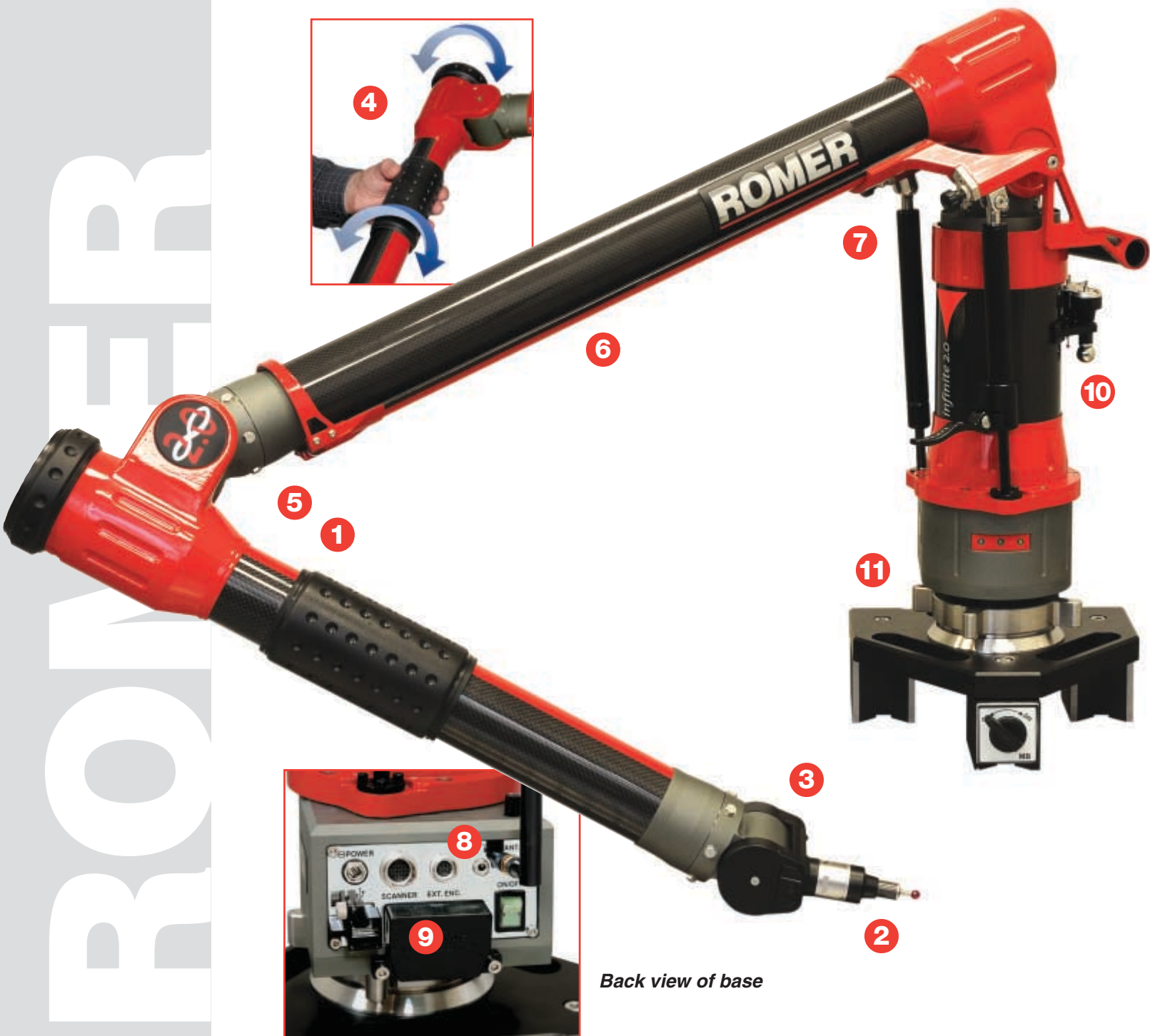


Optional mobile work station.



INFINITE[®] 2.0 Portable CMM

The new INFINITE 2.0 is ROMER's easiest-to-use and most accurate articulating arm ever. New handling and performance features — along with patented infinite rotation, quick-change probes, exclusive wireless connectivity and battery power — provide *INFINITE* portability and measuring power. INFINITE 2.0 Plus models, with unsurpassed repeatability and volumetric accuracy, are ideal for the most demanding inspection tasks. ROMER also offers system verification “in the field” with a NIST-traceable calibrated length standard with every arm. This allows the operator to easily verify and document system performance for ISO or vendor requirements.





The interchangeable ScanShark V4ix probe can be used with Brown & Sharpe bridge-type CMMs.

INFINITE 2.0 seven-axis CMM with new **ScanShark™** non-contact laser scanning technology.

Get unsurpassed real-time laser scanning capability that's ideal for inspection and reverse engineering applications. Infinite rotation and internal cable design enables access to those difficult-to-reach places. See pages 8-9 for all the details.



1. Patented infinite rotation of principle axes allows inspection in difficult-to-reach areas.

2. With the new Bridge-CMM class TESA kinematic multiwire probe joint,

you get unsurpassed measuring performance. Carbon fiber probes feature automatic probe recognition.

3. A new smaller, easy-grip head features an LED worklight and an integrated digital camera that allows the operator to graphically document a setup.

4. New SpinGrip infinite-rotating grips at elbow and forearm provide two low-friction grip positions for better ergonomics. SpinGrips allow the CMM to “float” in the operator’s hands, maximizing accuracy and minimizing operator fatigue.

5. Heidenhain encoders, manufactured to our specifications, offer “wide-track” bearing support that enhances performance.

6. Advanced carbon fiber arm tubes are strong, light weight, thermally stable and feature a lifetime warranty.

7. An improved, low-profile Zero-G counterbalance reduces operator fatigue and delivers effortless control in all positions, including above and below the centerline.

8. An upgraded 802.11g WIFI connection — transmitting up to 6 times farther and 50 times faster than Bluetooth — allows the operator to position the computer where it is most convenient.

9. A Li-Ion battery allows on-site inspection without AC power or cables. A sealed battery cover prevents

contamination of the battery compartment or accidental dislodging of the battery.

10. A quick-clip probe holster keeps three spare probes and the change key safe and handy.

11. The universal mounting system attaches to a variety of bases, including a magnetic mount for a smaller footprint and simplified set-up.

PC-DMIS Portable is standard

With the world’s largest installed base of any dimensional measurement and inspection software, PC-DMIS is the ideal match for the INFINITE 2.0. PC-DMIS Portable makes it easy to inspect parts in real-time, quickly generate new inspection programs and produce customizable results reports. PC-DMIS

is compatible with most CAD files, and is available with optional direct CAD interfaces for even faster programming and improved accuracy.



STINGER Ili™ Portable CMM

The **NEW** STINGER Ili brings ROMER's patented infinite rotation portable CMM technology within your reach. It's the versatile, lower-cost solution for hundreds of inspection, measurement and reverse engineering applications. You can take a STINGER Ili to virtually any large part or fixture and begin inspection quickly and easily. STINGER Ili's compact design, weighing just 8 to 10 lbs. (3.6 kg to 4.5 kg), lets you move it easily throughout a job site.



- Patented Infinite Rotation of the principle axes allows easy inspection of hard-to-reach areas.
- Intelligent quick-change probes can be changed on-the-fly without tools or recalibration.
- Integrated ZERO-G counterbalance offsets arm weight, allowing one-handed operation.
- Carbon fiber composite arms are strong, light weight and dimensionally stable. ROMER's carbon graphite arm tubes feature a lifetime warranty.
- System verification capability – ROMER arms provide verification “in the field” with our NIST-traceable calibrated length standard.
- Available in measuring ranges from 8 ft. to 12 ft. (2.4 m to 3.6 m) to meet any measurement challenge.



STINGER Ili options include a laptop or desktop computer, PC-DMIS®, PowerINSPECT™ or PowerINSPECT Lite™ software (see page 15), magnetic base, portable stands and a wide range of probes.

Portable CMM Specifications

	Measuring Range	Point Repeatability	Volume Length Accuracy	Arm Weight
INFINITE 2.0 (Six Axis)	4 ft. (1.2 m)	0.0004 in. (0.010 mm)	0.0006 in. (0.016 mm)	15.18 lbs. (6.89 kg)
	6 ft. (1.8 m)	0.0006 in. (0.016 mm)	0.0009 in. (0.023 mm)	16.68 lbs. (7.57 kg)
	8 ft. (2.4 m)	0.0008 in. (0.020 mm)	0.0011 in. (0.029 mm)	17.24 lbs. (7.82 kg)
	9 ft. (2.8 m)	0.0011 in. (0.029 mm)	0.0016 in. (0.041 mm)	17.57 lbs. (7.97 kg)
	10 ft. (3.0 m)	0.0013 in. (0.034mm)	0.0020 in. (0.050 mm)	18.10 lbs. (8.22 kg)
	12 ft. (3.6 m)	0.0020 in. (0.050 mm)	0.0027 in. (0.068 mm)	19.00 lbs. (8.65 kg)
INFINITE 2.0 (Seven Axis)	6 ft. (1.8 m)	0.0009 in. (0.024 mm)	0.0014 in. (0.035 mm)	17.74 lbs. (8.05 kg)
	8 ft. (2.4 m)	0.0011 in. (0.028 mm)	0.0016 in. (0.040 mm)	18.36 lbs. (8.33 kg)
	9 ft. (2.8 m)	0.0018 in. (0.045 mm)	0.0025 in. (0.064 mm)	18.73 lbs. (8.50 kg)
	10 ft. (3.0 m)	0.0020 in. (0.050 mm)	0.0028 in. (0.071 mm)	19.51 lbs. (8.85 kg)
INFINITE 2.0 Plus (Six Axis)	12 ft. (3.6 m)	0.0028 in. (0.070 mm)	0.0040 in. (0.100 mm)	20.12 lbs. (9.13 kg)
	8 ft. (2.4 m)	0.00070 in. (0.017 mm)	0.00098 in. (0.025 mm)	17.24 lbs. (7.82 kg)
Stinger III	12 ft. (3.6 m)	0.0017 in. (0.043 mm)	0.0022 in. (0.058 mm)	19.00 lbs. (8.65 kg)
	8 ft. (2.4 m)	0.0019 in. (0.050 mm)	0.0027 in. (0.070 mm)	9 lbs. (4.1 kg)
	10 ft. (3.0 m)	0.0031 in. (0.080 mm)	0.0043 in. (0.110 mm)	9.5 lbs. (4.3 kg)
	12 ft. (3.6 m)	0.0043 in. (0.110 mm)	0.0061 in. (0.155 mm)	10 lbs. (4.5 kg)



Specifications are subject to change without notice. Go to <http://us.romer.com> for latest information.

Humidity: 5% - 95% noncondensing

Vibration: (55 to 2000Hz): < 100 ms/s²

Shock & Impact: 6ms, <1000 ms/s²

Power requirement: Universal worldwide voltage 110-240

Certification : CE compliant

Point Repeatability Test (also known as Single Point Articulation Test, or S.P.A.T.): Results analyzed via Range/2 method. The probe is placed within a trihedral seat or conical socket, and individual points are measured from multiple approach angles with maximum articulation of all of the principal joints. Each individual point measurement is analyzed as a range of deviations about the average value for the point locations. This test is to assess the arm's ability to provide similar values of a point coordinate, when the arm is articulated through the maximum possible range of motion for that single point.

Volumetric Length Accuracy Test (Volumetric Performance Test): Results analyzed via Range/2 method. Volumetric length accuracy is determined by using certified length standards (included with all arms) that are measured at various locations and orientations throughout the measuring volume. This test most accurately represents the reasonable expectations for machine performance in practical measuring applications. The Volumetric Length Accuracy Test is the most appropriate test for determining machine accuracy and repeatability since it involves measuring a certified length standard many times in several locations and orientations and compares the resultant measurements to the actual length.



SCANSHARK
2014 CONTOUR PROBE



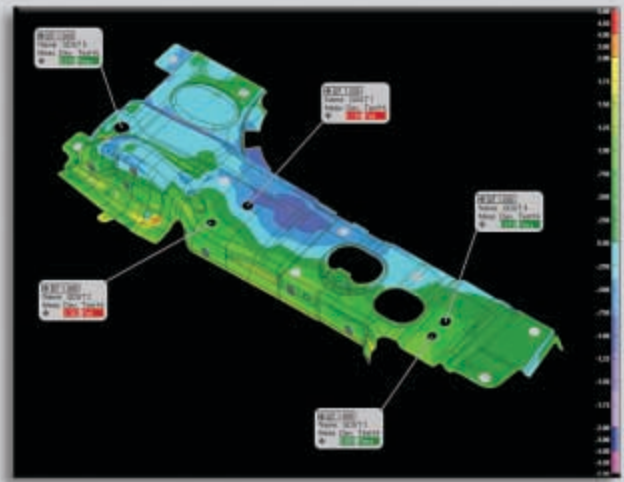
ScanShark V5

ScanShark™
**non-contact laser scanning
system devours the toughest
inspection and reverse engineering jobs.**

- ScanShark can gather up to 25 times more points per second than other laser systems. It's perfect for quick surface inspection of large, complex areas and generating point clouds for reverse engineering.
- It's ideal for all kinds of surfaces, especially flexible, fragile or soft-bodied parts that could be marred or deflected by a contact probe.
- ScanShark probes capture up to 458,000 points per second (V5 model), comparing each point scanned to a CAD model in real-time. With so many scanned points, you get far more detailed inspection of both geometric and surface features than with a conventional touch-trigger probe.

ScanShark is powered by state-of-the-art PC-DMIS® and PolyWorks® software packages:

- Scanning reverse engineering package with PolyWorks®/Modeler™
- Scanning inspection package with PolyWorks®/Inspector™
- Combination inspection and reverse engineering with both PolyWorks/Modeler and PolyWorks/Inspector. See page 15 for more details.



ScanShark™ non-contact laser scanning . . .

. . . combines portable CMM flexibility with laser scanning to provide real-time surface inspection and reverse engineering in a complete, powerful turnkey package. A ScanShark-equipped INFINITE 2.0 portable CMM is ideal for large workpieces that cannot be easily moved, or in areas that are difficult to access such as inside or underneath a workpiece. And the INFINITE portable arm features an ergonomic design that reduces operator fatigue and increases usability.

- Real-time inspection enables rapid identification of errors, allowing quick correction.
- Data can be used for more detailed off-line analysis and reporting via a wide range of editing options.
- It's ideal for generating point clouds for reverse-engineering applications. The point-cloud file can be output to CAD applications in a variety of formats.
- ScanShark probes are less sensitive to surface finish and ambient lighting conditions than other non-contact technologies.

A ScanShark laser scanning system includes a six- or seven-axis portable CMM, a laser scanning probe, and your choice of full-featured geometric, surface inspection and reverse engineering software package options.

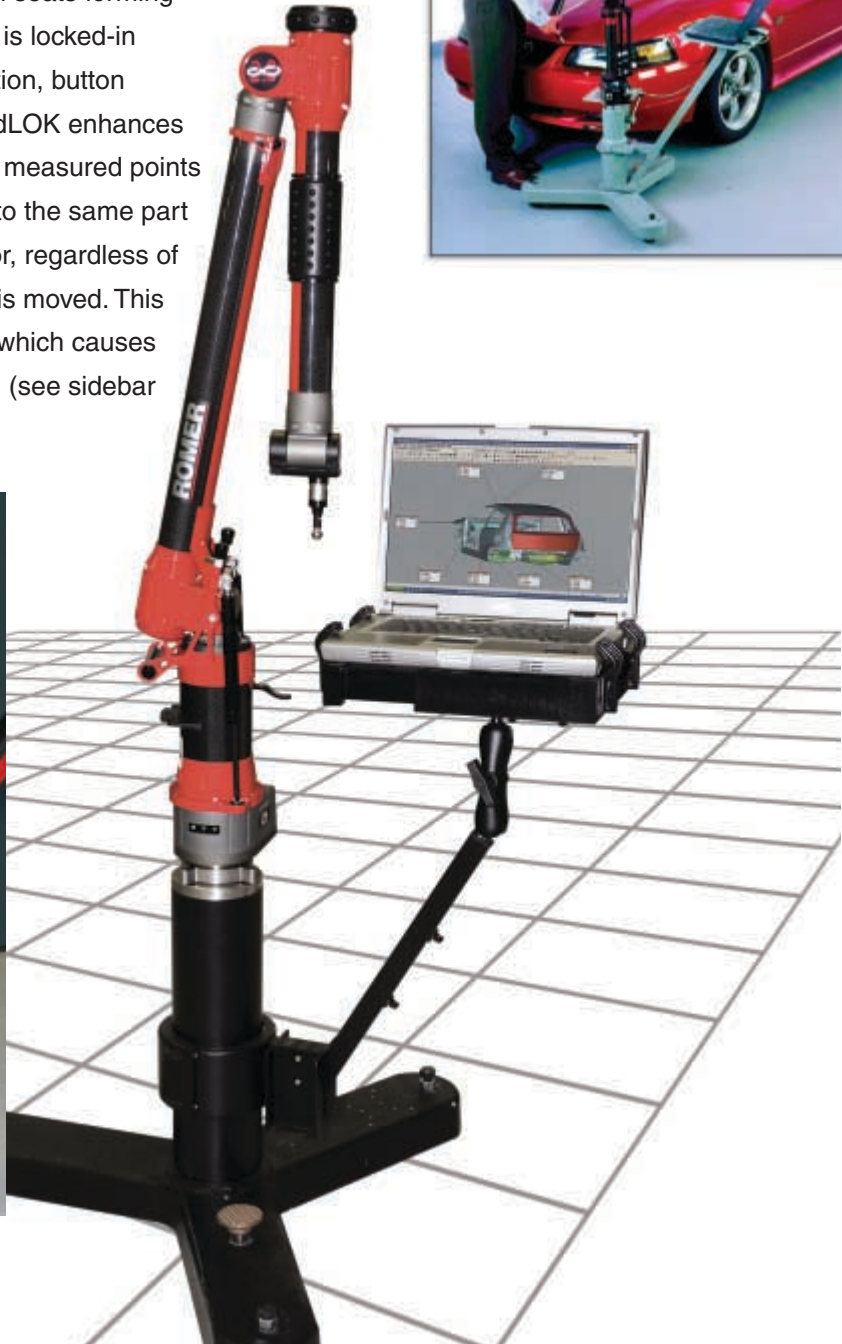


GridLOK[®]

The GridLOK measurement system combines with a ROMER portable CMM to create a giant CMM — one that covers a remarkably large inspection envelope. Unlike large stationary or gantry CMMs, GridLOK's patented design lets you measure anywhere you need, including inside, behind, and underneath large workpieces. With GridLOK, you can handle inspection tasks easily, quickly and economically.

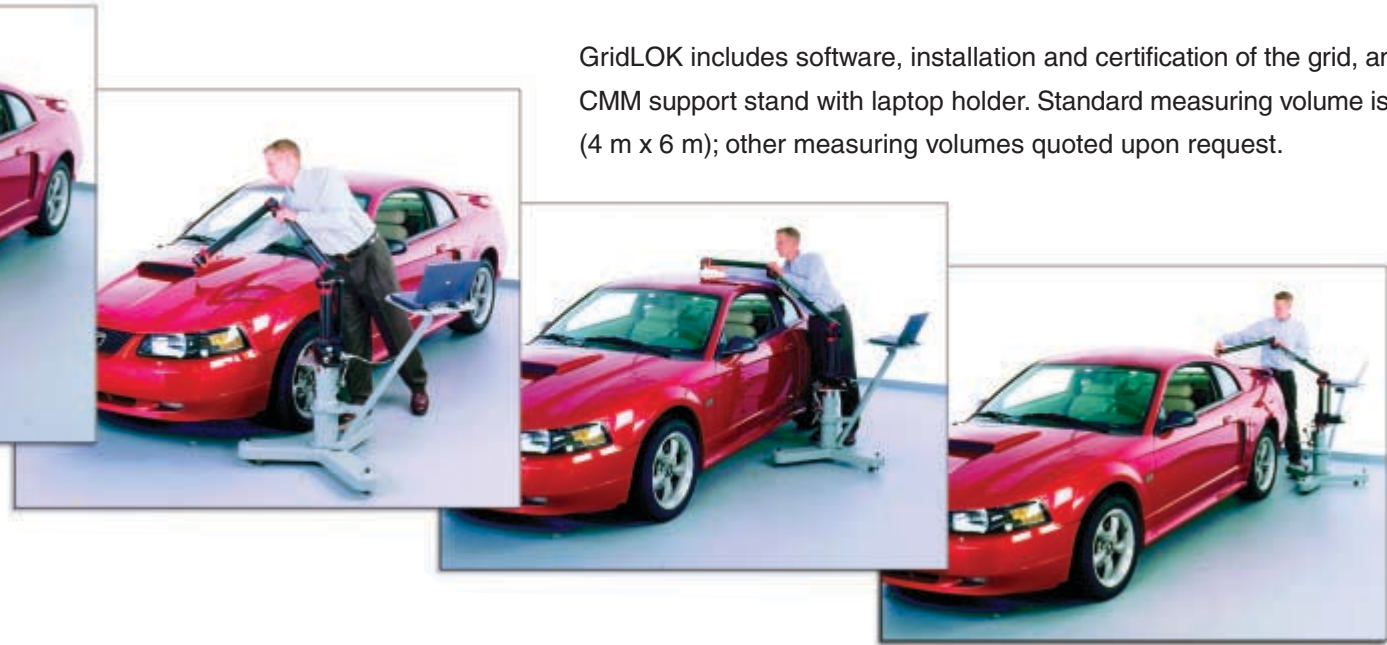
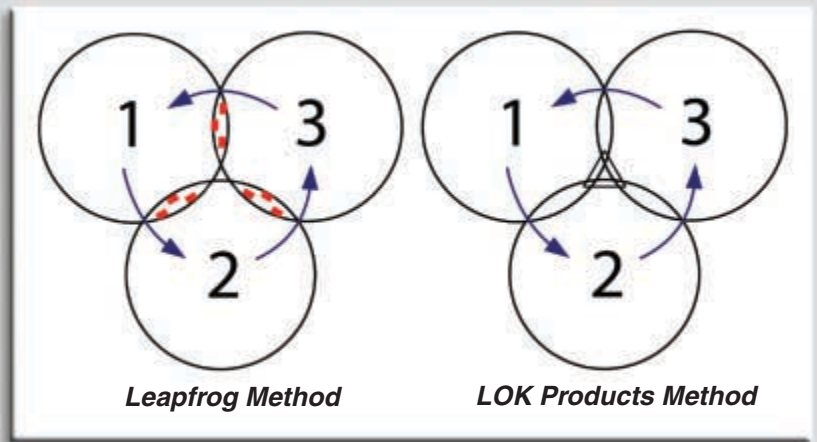


GridLOK lets you establish an absolute reference point for any point within its 3D area. It consists primarily of a grid system with conical seats installed in a concrete floor or steel plate. Simply touch the ball probe into three different conical seats forming a right angle and the portable CMM is locked-in automatically—no program interruption, button pushing or keyboard selections. GridLOK enhances measurement accuracy because all measured points are in absolute dimensions relative to the same part origin—there's no accumulative error, regardless of how many times the portable CMM is moved. This replaces the old "leapfrog" method, which causes accumulative accuracy deterioration (see sidebar on opposite page).



Avoid “Leapfrogging”

The circles in the figures illustrate three measuring volume “leaps” of a portable CMM as it moves around a large workpiece. The old “leapfrog” method requires a new reference point each time the CMM moves (shown by the red targets); measuring uncertainty compounds with each leap. ROMER SpaceLOK (shown) and GridLOK systems establish an absolute reference point, so measuring uncertainty doesn’t accumulate.

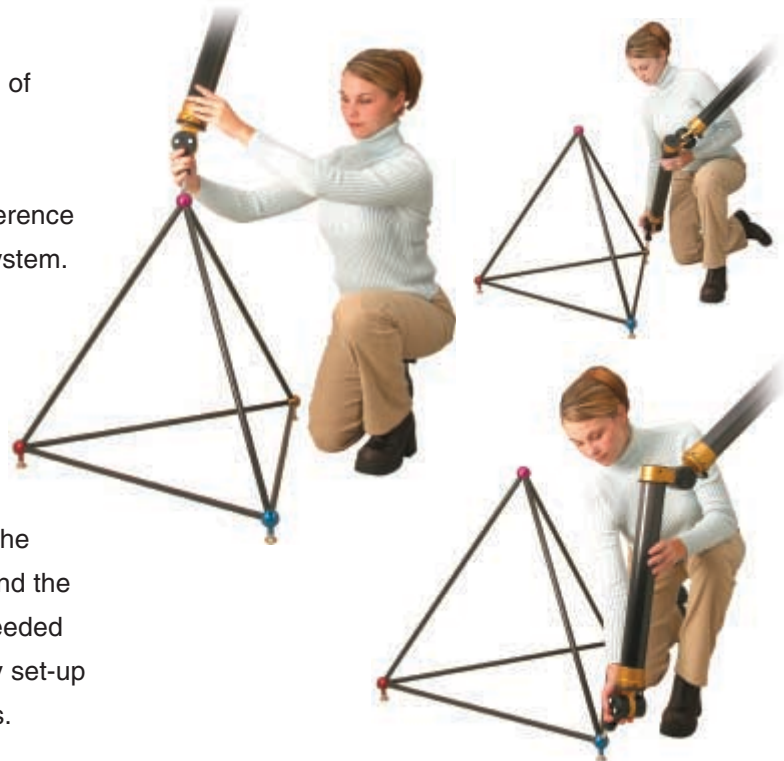


GridLOK includes software, installation and certification of the grid, and a portable CMM support stand with laptop holder. Standard measuring volume is 13 ft. x 20 ft. (4 m x 6 m); other measuring volumes quoted upon request.

SpaceLOK™

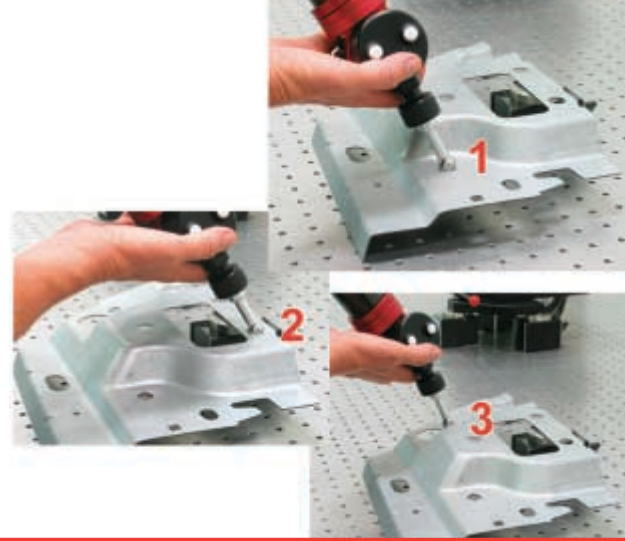
SpaceLOK multiplies the volumetric measuring area of your ROMER portable CMM without increasing arm measuring uncertainty. Like GridLOK, SpaceLOK enhances measuring accuracy by establishing a reference for all points in a 3D area, but in a handy portable system. Since all point locations are known, there is no accumulated error when relocating within the measurement volume (such as with the “leapfrog method”).

SpaceLOK is easy to use—after referencing the ROMER arm to one of the three SpaceLOK facets, the user repositions the arm, touches off three points, and the system automatically relocates. No user interface needed and nothing additional required for operation. Simply set-up and begin measuring your large-volume applications.



TooLOK™

Automated inspection and set-up of fixtures, tools and parts is as easy as 1-2-3. Just contact three pre-qualified points on a workpiece with a ROMER INFINITE or STINGER portable arm probe, and TooLOK automatically recognizes and aligns the fixture, tool or part, and loads the CAD file and inspection routine.



With TooLOK you can

- Dramatically reduce set-up time. The operator simply touches the pre-qualified points on the workpiece and begins inspecting. There's no need to search through hundreds of files and routines just to prepare for inspection.
- Ensure consistency between operators via programmed inspection routines. A simple-to-use TooLOK wizard allows users to generate a "LOK" for a part, tool or fixture; this LOK serves as the reference between the part and its associated files. Once the LOK is established, a repeatable inspection routine is easily stored for recall.



ROMER

DOCS™ Tube Inspection

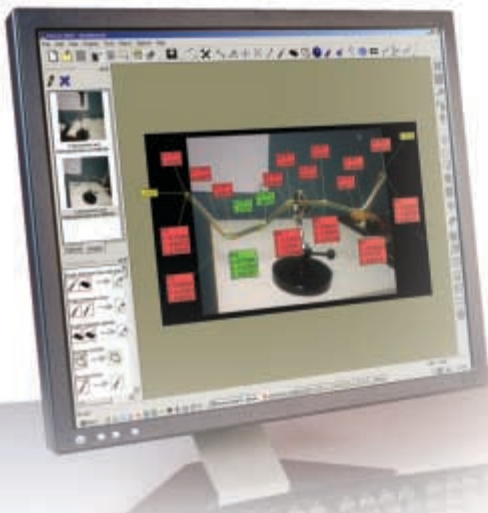
The DOCS (Data Overlay Camera System) software package allows inspection of a tube's surface features, providing true tube surface data – not a hypothetical reconstruction. DOCS combines tube and geometric measurement in a single software solution; there's no need to run multiple applications to measure with contact and non-contact probes. ROMER's exclusive line of non-contact tube probes are available in 6mm to 150mm sizes for measuring wire to large tubing.



With DOCS, you can

- Group multiple tubes in one part file. There's no need to have a separate file for every tube in an assembly.
- Inspect all the parts of a tube in real-time, including bends and fittings, as well as locate brackets, tabs, flanges, and fittings.
- Import CAD files and extract all tube geometry and bend data.
- Generate HTML-formatted, industry-standard reports, including complete graphics with wireframe, shaded views and other CAD graphics.
- Extract from a tube file the individual cylinders, inspection points and end planes with a single click.

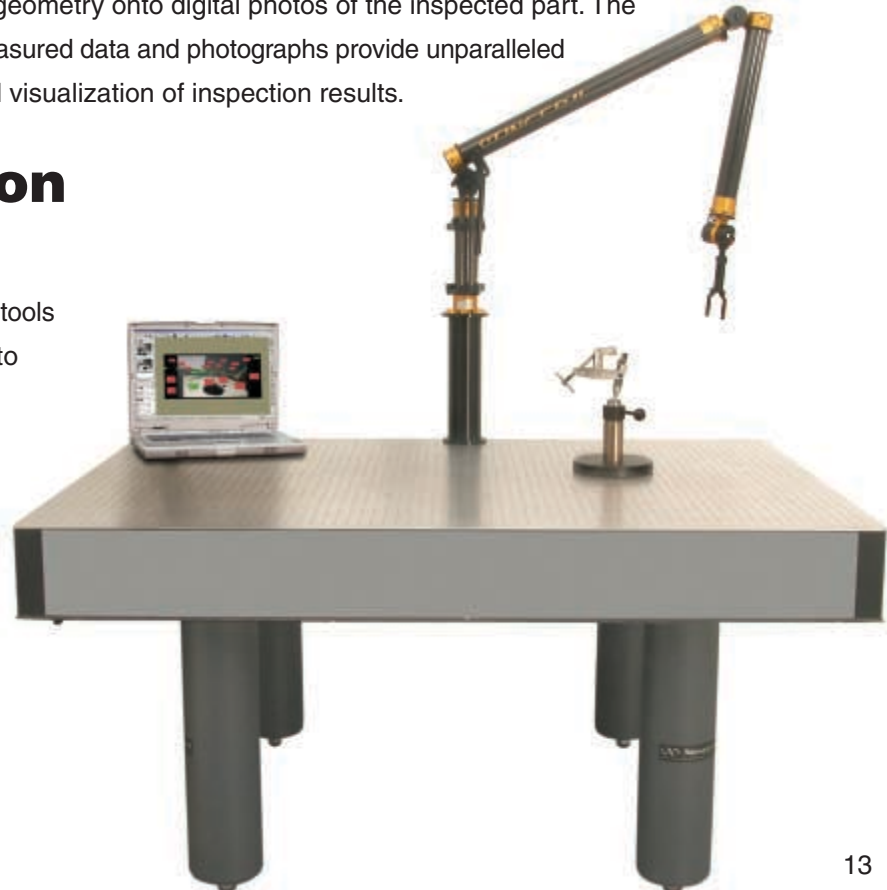
DOCS can communicate with CNC tube benders via Tube Shop Manager (required bender interface not included). Plus, you can use TransProjection™ and the digital camera built into ROMER's INFINITE portable CMM to overlay inspection geometry onto digital photos of the inspected part. The merged measured data and photographs provide unparalleled context and visualization of inspection results.



DOCS provides color coding for easy visualization of a tube's surface geometry, with call-outs of measured data points for quick reference.

DOCS Tube Inspection Station™

The Tube Inspection Station (TIS) lets you choose the tools you need to inspect everything from hydraulic tubing to exhaust pipe. Typical equipment needed for accurate, affordable tube inspection includes a STINGER or INFINITE portable CMM, inspection table, desktop computer with monitor, keyboard and printer, non-contact infrared tube probes, DOCS software and various accessories. An optional portable arm magnetic base allows the operator to bring tube inspection capability to where it is required.

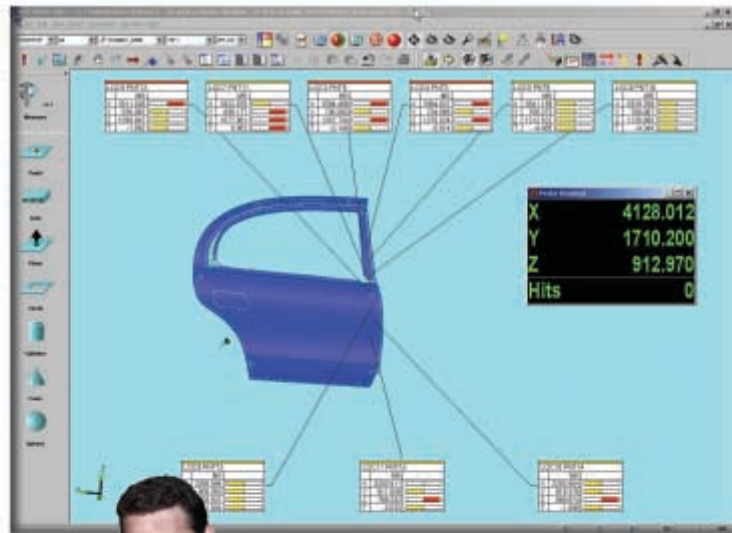


PC-DMIS® Portable

With the world's largest installed base of any measurement and inspection software, PC-DMIS is the ideal match for ROMER portable CMMs. PC-DMIS Portable makes it easy for operators to inspect parts in real-time, generate new inspection programs and produce clear, concise CAD-to-part reports.

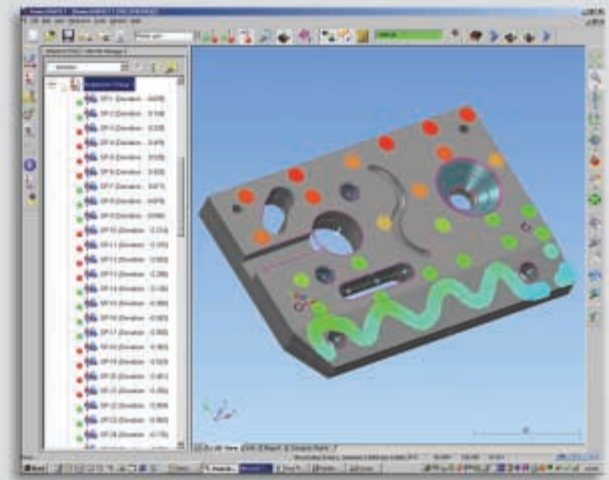


- **Quick Start GUI** – Operators can make full use of frequently used capabilities without being overwhelmed with detail. When they are needed, PC-DMIS's full capabilities are only a couple of mouse clicks away.
- **Any-Order Measure™** – Lets operators probe parts in the most convenient and efficient order without having to follow the steps of an inspection routine. The software keeps track of what is measured and only evaluates dimensions when all of the necessary information is available.
- **Aligning contoured parts** – PC-DMIS Portable quickly aligns even the most complex parts. An optional CAD++ configuration includes a range of algorithms for best fit and iterative alignments.
- **Sheetmetal measurements** — PC-DMIS Portable offers an optional library of sheetmetal measurement routines. During probing, the software automatically switches between using the probe tip and shank measurement as necessary.
- **Free interactive portable tutorials** – PC-DMIS Portable includes a complete, interactive tutorial to reinforce concepts learned during software training.
- **Compatibility with numerous file types and CAD systems** – PC-DMIS has translators for nearly any CAD format. Also available are optional direct CAD interfaces, so that files do not need to be translated for use in PC-DMIS. This reduces programming time and improves accuracy.
- **Customizable reporting tools** – Interface with commonly-used standards such as Microsoft Excel™, PDF and RTF files.



PowerINSPECT™ is a powerful inspection and reverse-engineering software package.

PowerINSPECT compares a part or tool against a 3D CAD model, highlighting discrepancies using color-coded graphics for immediate validation of each data point. Operators can visualize a part with shaded view rendering and colored data points showing tolerance values. Reports are output in easily customizable HTML format. For applications that don't require CAD-to-part comparison, PowerINSPECT Lite™ is a low-cost solution offering much of PowerINSPECT's functionality.



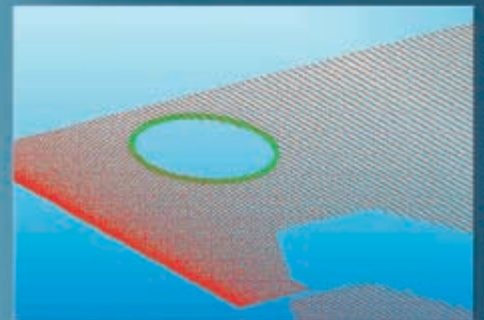
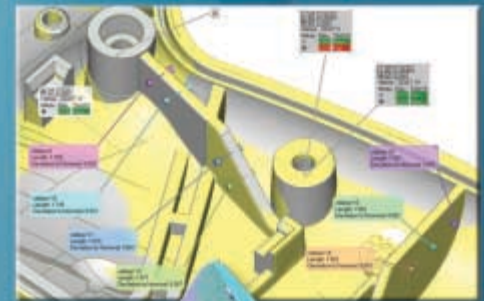
ScanShark devours digital data with PolyWorks® and PC-DMIS software packages

PolyWorks®/Inspector™ uses high-density point clouds and contact-probe datasets to control the quality of parts and tools at every phase of your manufacturing process. The illustration at right shows a PolyWorks/Inspector high-density “weathermap” of point-cloud tolerances and GD&T callouts.

PolyWorks®/Modeler™ is a comprehensive software solution for creating accurate, smooth polygonal models and NURBS surfaces from high-density point clouds. Preferred by automotive design studios worldwide, PolyWorks Modeler is the only software solution that has demonstrated the capability of creating Class A polygonal models for stringent polygonal manufacturing applications such as 3- and 5-axis milling, aerodynamic simulation, and digital review. It also offers a powerful, rapid surfacing methodology that delivers the most usable NURBS surfaces in CAD software such as CATIA and UG.

PC-DMIS® CAD++ incorporates scanning and digitizing functions for fast and efficient measurement of complex shapes. Point clouds (*bottom illustration*) from PC-DMIS can be imported into PolyWorks/Modeler and processed independently on an offline station to reduce interruption on the CMM. Features include:

- Link to CAD bi-directionally using built-in DES, DMIS, DWG, DXF, IGES, STEP, STL, VDAFS and XYZIJK translators.
- Direct CAD Interface (DCI) option to create part programs directly from CAD models utilizing the native CAD system algorithms and tools. Connect to many popular CAD systems, including Unigraphics, Solidworks, Pro-E, CATIA, V5, IDEAs and ACIS.





Responding to needs throughout industry for portable, flexible solutions to measurement and inspection applications, ROMER's co-founder patented and marketed the first multi-axis articulated arm for tube inspection in 1973. Today's ROMER® arms are direct descendants of that first innovation.

Since then, ROMER has continued to lead the field with technological innovations such as our infinite rotation arm design (patented in 1998), Wi-Fi wireless connectivity, integrated USB camera and battery operation. Advanced dimensional inspection products have included the 1000 Series portable CMM, Linear Rail System, 3000i™ portable CMM, GridLOK® 3D large volume measurement system, STINGER II™ and INFINITE® series CMMs.

Factory authorized Service Centers throughout the world support ROMER portable CMMs with complete training, maintenance, repair, applications assistance and other dimensional measurement services.

Hexagon Metrology™

The Hexagon Metrology group of Hexagon AB (Sweden) is the world's largest manufacturer of precision dimensional measurement equipment and software, with ten manufacturing facilities on four continents and more than fifty sales and support locations worldwide. The group consists of metrology brands Brown & Sharpe®, CogniTens, DEA®, Leica Geosystems, Leitz™, PC-DMIS®, ROMER®, Sheffield Measurement®, and TESA®. Together, the group is the world market share leader in coordinate measurement systems.

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17025 certified**



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SERVICE • INTEGRITY • VALUE



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