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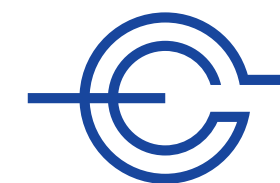
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CAIRNHILL METROLOGY

CAIRNHILL METROLOGY 2020

Portable Metrology Solutions
Quality Assurance Anywhere!



www.cairnhill.com

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Cairnhill Metrology is an industrial metrology solutions provider established on 16 August 1983. Working with a long-term view, we partner with principals who are global leaders in their fields, whose strengths in technology and innovation, we complement with up-to-date uniform high standards of service delivery through our network of offices in Singapore, Malaysia, Indonesia, the Philippines and Thailand.

Our **Vision** is to be our customers' trusted industrial metrology solutions provider of choice in the region.

Our **Mission** is to support our customers' quests for production efficiencies and quality via appropriate and reliable metrology solutions, supported throughout the solutions useful life.

Our **Values** are summed up in the Golden rule, "What you wish that others do to you, do so to them".

Our Solutions are focussed by groups: -

- **Food, Pharmaceutical Industrial Solutions (FPIS)**
- **Portable Metrology (PMT)**
- **Industrial Metrology (IMT)**
- **Industrial X-Ray Computed Tomography (XCT)**
- **Software for Visualization, Analysis, Metrology, Process Control and Reverse Engineering**

Portable Metrology

In dimensional metrology, portability and freedom, usually means increased error. The more rigid or the lesser the degree of freedoms, the more accurate a system is. Today's increasing need for quality and product safety however means that checks must to be deployed earlier, right at production if possible, and include the measuring of large parts and hard-to-access features. If only metrology systems can be **flexible** and **portable** and yet still **accurate**, they could be used on shop floors, aircraft hangars, refineries, etc.

Thankfully, exciting innovations and advances in optics, electronics and software have provided just these features, allowing portable metrology to be deployed in production and quality environments everywhere.

Quality Assurance Anywhere!

Today's portable metrology enable measurements anywhere for immediate productivity improvements. If your part is too big to bring to your CMM, bring your CMM to the part!

Check out our comprehensive range of Portable Arm CMMs, 3D Digitizers and Optical/Laser Trackers with touch probes, laser scanners and optical reflectors, which can be automated or robotized, as well as real-time high-density point cloud software for efficient metrology inspections and reverse engineering.

Fast installation, simple operations, improved reliability plus Cairnhill Metrology services near you!

Call us for a demonstration, applications support or calibration anytime!

Portable Metrology Now: At-site, on-site, in airfields, shipyards, refineries... Anywhere!

Portable Metrology

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Hexagon Absolute Arm Advantages & Usability!

Exclusive Absolute encoders within every articulated joint make the Absolute Arm the only portable measuring arm that has completely eliminated warm-up times and encoder referencing before use.

Unique Zero-G Counter-Balance system and low-friction rotating grips reduce user fatigue and maximise accuracy by minimising inertia.

The new **RS6 Laser Scanner** makes the Absolute Arm more powerful than any other portable measuring arm – Users get more done and they do it better; it's as simple as that.

- High-quality scan data at full speed without sacrificing data quality
- SHINE technology for scanning 99% of surface types with default exposure settings
- Extra-wide scan line for faster part coverage
- Horizontally oriented scan line for more comfortable measurement
- Projected laser range finder simplifies correct scanner positioning

Easy user interaction in even harsh industrial environments through visual, acoustic and haptic feedback functions, augmented with Bluetooth technology.

Multi-functional control buttons and a convenient LCD Wrist Display with Quick Access Menu put measurement control directly in the user's hand, while a range of probes and laser scanners deliver flexible measurement.

Unique modular wrist designed to make measurements flexible, fast and secure. Quickly switch between laser scanning and touch probing. Pistol grips in three sizes; and completely removable to measure hard-to-reach holes and cavities. Laser scanners are also removable, and quickly replaced later with no recalibration needed, for measurements in tight areas.

High-tech carbon-fibre tube construction ensures strength and thermal stability under any environmental conditions.

The HomeDock and SmartLock features allow the arm to be stowed and locked in place between measurements, for greater security during transport, set-up and station moves.

Interchangeable control packs deliver WiFi connectivity and battery power for completely portable measurement with no more messy cables on the shop floor.



Hexagon Absolute Arm All Models @ a Glance!

Measuring Range	1.2m	2.0m	2.5m	3.0m	3.5m	4.0m	4.5m
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Hexagon Absolute Arm 87 Series 6-Axis

EUNI ¹	N/A	0.026mm	0.039mm	0.052mm	0.063mm	0.074mm
P _{SIZE} ²		0.009mm	0.014mm	0.018mm	0.022mm	0.026mm
L _{DIA} ³		0.032mm	0.048mm	0.064mm	0.079mm	0.094mm
P _{FORM} ⁴		0.018mm	0.028mm	0.037mm	0.041mm	0.046mm
Weight		8.3kg	8.6kg	8.9kg	9.2kg	9.5kg
Max Reach		2.73m	3.23m	3.73m	4.23m	4.73m

Hexagon Absolute Arm 85 Series 6-Axis

EUNI ¹	0.019mm	0.023mm	0.028mm	0.042mm	0.055mm	0.067mm	0.080mm
P _{SIZE} ²	0.006mm	0.008mm	0.010mm	0.015mm	0.020mm	0.024mm	0.028mm
L _{DIA} ³	0.016mm	0.030mm	0.035mm	0.053mm	0.069mm	0.085mm	0.102mm
P _{FORM} ⁴	0.012mm	0.017mm	0.020mm	0.030mm	0.040mm	0.045mm	0.050mm
Weight	12.2kg	8.0kg	8.3kg	8.6kg	8.9kg	9.2kg	9.5kg
Max Reach	1.49m	2.23m	2.73m	3.23m	3.73m	4.23m	4.73m

Hexagon Absolute Arm 83 Series 6-Axis

EUNI ¹	0.024mm	0.040mm	0.046mm	0.067mm	0.085mm	0.100mm	0.120mm
P _{SIZE} ²	0.010mm	0.013mm	0.020mm	0.029mm	0.038mm	0.046mm	0.052mm
L _{DIA} ³	0.021mm	0.042mm	0.053mm	0.071mm	0.090mm	0.105mm	0.110mm
P _{FORM} ⁴	0.018mm	0.026mm	0.038mm	0.054mm	0.063mm	0.077mm	0.086mm
Weight	12.0kg	7.8kg	8.1kg	8.4kg	8.7kg	9.0kg	9.3kg
Max Reach	1.49m	2.23m	2.73m	3.23m	3.73m	4.23m	4.73m

Hexagon Absolute Arm 87 Series 7-Axis

EUNI ¹	N/A	0.029mm	0.053mm	0.064mm	0.078mm	0.104mm
P _{SIZE} ²		0.011mm	0.018mm	0.022mm	0.028mm	0.044mm
L _{DIA} ³		0.044mm	0.076mm	0.092mm	0.110mm	0.125mm
P _{FORM} ⁴		0.023mm	0.035mm	0.041mm	0.046mm	0.060mm
RS6 SSA ⁵		0.043mm	0.056mm	0.068mm	0.080mm	0.121mm
RS5 SSA ⁵		0.044mm	0.058mm	0.071mm	0.082mm	0.127mm
Weight ⁶		9.3kg	9.6kg	9.9kg	10.2kg	10.5kg
Max Reach		2.98m	3.48m	3.98m	4.48m	4.98m

Hexagon Absolute Arm 85 Series 7-Axis

EUNI ¹	N/A	0.029mm	0.031mm	0.057mm	0.069mm	0.084mm	0.113mm
P _{SIZE} ²		0.010mm	0.012mm	0.020mm	0.024mm	0.030mm	0.048mm
L _{DIA} ³		0.038mm	0.048mm	0.083mm	0.099mm	0.120mm	0.140mm
P _{FORM} ⁴		0.021mm	0.025mm	0.038mm	0.045mm	0.050mm	0.065mm
RS6 SSA ⁵		0.041mm	0.047mm	0.064mm	0.078mm	0.089mm	0.141mm
RS5 SSA ⁵		0.045mm	0.048mm	0.066mm	0.080mm	0.091mm	0.148mm
Weight ⁶		9.0kg	9.3kg	9.6kg	9.9kg	10.2kg	10.5kg
Max Reach		2.48m	2.98m	3.48m	3.98m	4.48m	4.98m

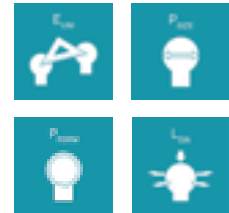
Hexagon Absolute Arm 83 Series 7-Axis

EUNI ¹	N/A	0.043mm	0.048mm	0.078mm	0.092mm	0.114mm	0.158mm
P _{SIZE} ²		0.016mm	0.023mm	0.034mm	0.042mm	0.051mm	0.078mm
L _{DIA} ³		0.054mm	0.060mm	0.090mm	0.115mm	0.140mm	0.168mm
P _{FORM} ⁴		0.033mm	0.043mm	0.058mm	0.067mm	0.084mm	0.106mm
RS6 SSA ⁵		0.059mm	0.065mm	0.082mm	0.099mm	0.118mm	0.163mm
RS5 SSA ⁵		0.062mm	0.068mm	0.092mm	0.105mm	0.122mm	0.172mm
Weight ⁶		8.8kg	9.1kg	9.4kg	9.7kg	10.0kg	10.3kg
Max Reach		2.48m	2.98m	3.48m	3.98m	4.48m	4.98m

Hexagon Absolute Arm All Models @ a Glance!

Hexagon Absolute Arm	
Operating Temperature	+5° to +40°C
Storage Temperature	-30° to +70°C
Operational Elevation	2000m
Relative Humidity	10–90% non-condensing
Marks of Conformity	CE – FCC – IC
Power Requirement	110–240V

- ¹ Maximum permissible longitudinal error of measurement – according to ISO 10360-12:2016
- ² Maximum permissible probe deviation, size – according to ISO 10360-12:2016
- ³ Maximum permissible probe deviation, position – according to ISO 10360-12:2016
- ⁴ Maximum permissible probe deviation, shape – according to ISO 10360-12:2016
- ⁵ Scanning System Accuracy: L_{DIA} according to ISO 10360-8 Annex D
- ⁶ Weight without scanner
- ⁷ According to ISO 10360-8:2013
- ⁸ Maximum permissible error, probing – according to ISO 10360-2
- ⁹ Maximum permissible error, length measurement – according to ISO 10360-2



RS6 Laser Scanner



RS5 Laser Scanner



RS-SQUARED



HP-L-8.9

	RS6	RS5	RS-SQUARED	HP-L-8.9
Scanner Type	Blue Laser Line	Red Laser Line	Structured Light	Red Laser Line
Accuracy	0.026mm (2σ)	0.028mm (2σ)	0.06mm (2σ)	0.04mm (2σ)
Point Acquisition Rate	Max 1.2 million pts/s	752,000 pts/s	4million pts/s *	45,000 pts/s
Points per Line	Max 4000	Max 7520	1 million	750
Line Rate	Max 300Hz	Max 100Hz	Max 4Hz	60Hz
Line Width (mid)	150mm	115mm	-	80mm
Frame Size (mid-range)	-	-	300x300mm	-
Standoff	165±50mm	165±50mm	300±50mm	135±45mm
Minimum Point Spacing	0.027mm	0.011mm	0.21mm	0.08mm
System Scanning Certification	Yes	Yes	Yes	No
Laser Class	2	2M	2	2
Operating Temperature	5–40°C			
Weight	0.4kg	0.4kg	1.4kg	0.32kg

* grid of raw points, no interpolation available

Applications



Hexagon Absolute Arm 6-axis



Hexagon Absolute Arm Compact



Hexagon Absolute Arm Tube Inspection

Hexagon Absolute Arm 6-Axis Infinite Rotation

For Accurate Probe Measurements!



Hexagon Absolute Arm 6-Axis

Features

- Designed for accurate tactile measurements
- Carbon Graphite tube, RDS, intelligent TKJ, acoustic/haptic feedback, Absolute Encoders, Infinite Rotation in all axes, SpinGrip and SpinKnob (75 and 77 series), Zero G Counterbalance, SmartLock, interchangeable Control Packs for high-speed WIFI and mobile battery pack...
- Optional HP-L-8.9 laser scanner
- Compatible with InnovMetric's PolyWorks® Metrology Suite



6-Axis Compact Arm

Hexagon Absolute Arm COMPACT

For Highest Accuracy. Table Top Manual CMM Functionality

Features

- 1.2m measuring range with MPE E up to $5+L/65 \leq 15\mu\text{m}$ and MPE P of $6\mu\text{m}$
- Just place on table top and measure! No clamping or warm up time required
- Carbon Graphite tube, RDS, intelligent TKJ, acoustic and haptic feedback, Absolute Encoders, Infinite Rotation in all axes, Zero G Counterbalance, interchangeable Control Packs and user aids
- Quick Measure tool: measures circle diameters, 2 planes distance...
- Low profile magnetic anchors / New Integrated Base Plate with 4 mounting options
- Available with ISO 10360-2 or B89.4.22 certification



Hexagon Absolute Arm Compact

Accessories for Hexagon Absolute Arm Compact	RA7312 Compact	RA7512 Compact
Calibration sphere, dust cover, TKJ probes (3, 6, 15mm), hard case, magnetic anchors, camera, work light, RDS, Quick Measure	Standard Included	
310mm Certified length bar, CP2 mobility pack, spin knob, magnetic block	Option	Yes
Weight (Arm only / Delivered Package)	10.2kg / 25kg	10.8kg / 30kg

Integrated Base Plate (4 Mounting Options)



Just put it on the table



Bolt to table



Magnetic anchor on steel surfaces/milling mc



Hexagon Absolute Arm 7-Axis Infinite Rotation Integrated Scanner

SI Series – The Standard for Laser Scanning and Probing!



Hexagon Absolute Arm 87 Series
with Integrated RS6 Scanner

Features

- 7-axis flexibility for versatile laser scanning
- Integrated scanner certified for total system accuracy
- New RS6 laser scanner fully integrated with no cables along tubes, to capture data from almost any object surface
- Carbon Graphite tube, RDS, intelligent TKJ, acoustic and haptic feedback, Absolute Encoders, Infinite Rotation in all axes, SpinGrip and SpinKnob (75 and 77 series), Zero G Counterbalance, SmartLock, interchangeable Control Packs for high-speed WIFI and mobile battery pack...
- Compatible with InnovMetric's PolyWorks® Metrology Suite
- Applications include Point cloud inspection, product benchmarking, reverse engineering, rapid prototyping, virtual assembly, etc.



RS6 with SHINE Technology



Scanning free form structures



Scanning complex parts with ease of use

Hexagon Tube Inspection System

Combine choice of Hexagon Absolute Arm, Tube Probe + TubeShaper Software



Hexagon Absolute Arm
Dedicated T-Model (Heavier Base)



Tube infrared sensor choices



Available Tube Probe Sizes

Tube Probe	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Tube Diameter mm	4 - 13	6 - 20	10 - 40	12 - 65	20 - 85	30 - 130

Software Features

- Advanced, intuitive tube measurement software with cutting-edge technology. Automatically create measurement plans on first-part inspection or define prior to measurement. Allows fast batch measurements with guaranteed repeatability
- Automatic probe recognition. Full accessories including additional tube probes, tube clamps, measurement tables and raisers
- Two access levels for users of different profiles. Multiple bending machines supported by a single Tube Inspection System
- Real-time CNC tube bending machine interface for intelligent tube bending corrections to reduce scrap and increase efficiency
- Spring-back and elongation library can be created for subsequent application. Auto report creation and customizable formats
- Import CAD models in IGES or STEP. Export tube and geometric data as IGES or SV file (tube only) for reverse engineering
- Dual-profile graphical user interface with touchscreen compatibility streamlines training as users learn only what they need

Specifications with Standard Hexagon Absolute Arm	
Measurement Volume	1.2 to 4.5m
Arm Volumetric Accuracy	±0.1mm
Tube Diameter	4 to 130mm
Work/Storage Temperature	0 to 50°C / -30 to 70°C
Relative Humidity	10 to 90% non-condensing
Power Requirement	Universal 110 to 240V

T-Model Specification		
Model	7325T	7330T
Measuring Range	2.5m	3.0m
Point Repeatability	±0.044mm	±0.068mm
Volumetric Accuracy	±0.059mm	±0.086mm
Arm Weight	7.7kg	8.0kg
Specs per B89.4.22. Also available to VDI/VDE 2617-9		

4 Tube/Pipe production and assemblies inspection, gauging and reverse engineering tasks

Reverse Engineering of Tube Assemblies: Non-contact infrared probes for rapid tube measurement. Touch probes for detailed geometric features. Creates accurate 3D model and save as 'golden part' for subsequent measurements.

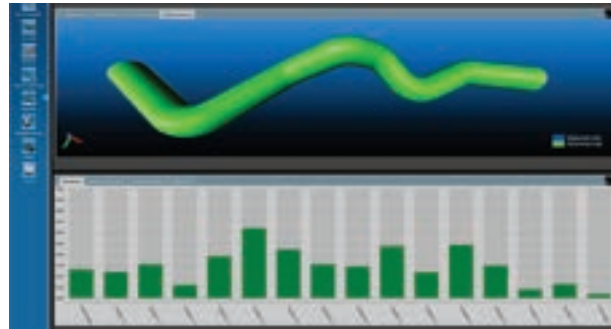
Tube Production: Shop-floor interface to navigate TubeShaper through the Hexagon Absolute Arm. Barcode scanner compatibility to find/load data. Compatible with legacy software (Supravision / DOCS) for continuity.

Tube and Pipe Inspection: Extract CAD nominals and compare with welded features probed after bending, for aligning to any part of a tube assembly. Compare results immediately against different alignment constraints.

Tube Gauging: Advanced CAD engine for rapid import of CAD models of a fixture. Easy measurement of saddles and gates. Feature constructions to build virtual tube to test the setup. Portability for large gauges to be measured.

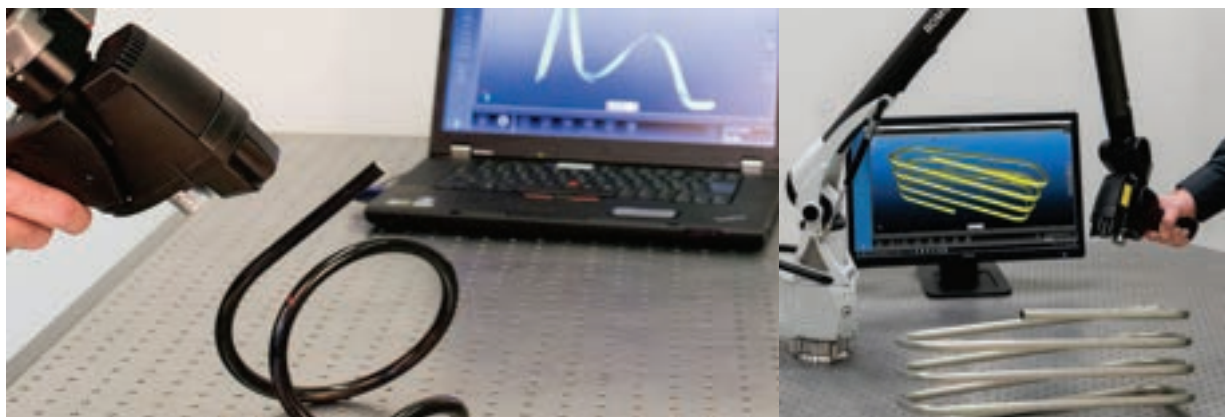
BendingStudio with Absolute Arm

Faster Tube and Wire Measurement Made Portable



Features

- Functional as an optical tube gauge for flexible, malleable tubes of any length and of diameter up to 300mm
- Accurate scanning on tubes of a wide variety of materials, colours and surfaces
- Open Bender Interface ensures easy compatibility with most CNC bender machines for direct production correction.
- Bending Simulation reduces correction loops by simulating proposed corrections within the software before physical application
- Tube Flexibility achieves accurate measurement from malleable freeform tubes to shiny or multi-coloured surfaces with leading RS4 laser scanner technology
- Fully Portable with WiFi, battery power and simple set-up
- Highly repeatable and user-independent measurement results
- Fully certified to B89.4.22 as standard, with additional VDI/VDE 2617-9 certification also available



Solution Specifications	
Measurement Range (Ø)	Up to 4.5m
Weight	8.3kg to 10.1kg
Measurable Tube Diameter	3.0mm to 300mm
Max Tube Length	Unlimited, with repositioning
Bending Angle	1° to 340°
Geometries	Standard angular, bend-in-bend or freeform
Measurement Accuracy	0.05mm sheath deviation (1σ)
Scanning Sensor Specifications: Integrated Scanner RS5	
Point Acquisition Rate	752,000 points/s
Line Rate	Max 100Hz
Line Width	80mm to 150mm
Stand Off	165 ± 50mm
Accuracy	0.028mm (2σ)
Minimum Point Spacing	0.011mm (line)



LASER SCANNER Upgrade for 6-Axis Portable CMMs

Retrofits existing ROMER/CIMCORE Absolute Arms with TKJ

Features

- Entry-level laser scanner for all 6-axis Absolute Arm with TKJ auto-joint
- Direct plug (no wiring) for 26-pin TKJ. External wiring supplied for older 13-pin TKJ
- Seamlessly integrated in minutes. Switch from laser scanning to tactile probing without re-calibration. 90mm stand-off for recesses or cavities
- Measures complex or delicate parts without reference targets or markers

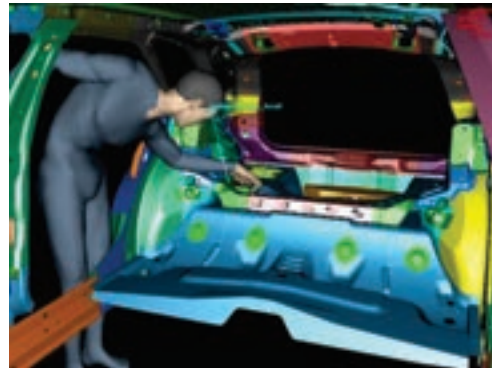
Now you can add laser scanning capabilities to enhance your old Hexagon Absolute Arm



HP-L-8.9 with 26-pin TKJ
cableless support for high density
laser scanned point clouds



Automotive Seats Inspection



Virtual Assembly

Extending Your Hexagon Absolute Arm Volume



GridLOK maintains a uniform error through the whole measurement volume

Leica Absolute Tracker AT960/AT930

Ultra-Compact High-Speed Large-Volume Measurements



Leica Absolute Tracker AT960



Leica Absolute Tracker AT930

Features

- Robust all-in-one Laser Tracker for Absolute Portability, Speed and Accuracy
- Measurement volumes of 12mØ (AT960-SR) to 160mØ (AT960-LR/-XR)
- Real-time architecture with dynamic performance at 1kHz data output
- Leica Absolute Interferometer (AIFM) ensures precise dynamic measurements to a moving target
- PowerLock instantly re-establishes interrupted beams for ultimate ease-of-use
- Complete 6DOF inspections with probes, scanners and reflectors and for automation
- Wireless communication and battery option. Intuitive touchscreen minimising potential for user error
- Check and compensation architecture supporting basic adjustments on the field
- Robust design guarantees in-specification operations with minimal calibration and servicing
- IP54 ingress protection against dust and contaminants - allows use in harsh environments
- Integrated environmental unit to compensate for external temperature, pressure and humidity factors
- High-resolution colour overview camera (OVC) to remotely view tracker's field of vision, locating targets to measure to fixed reflectors, ideal for static hidden point devices or documentation
- Orient to gravity (OTG) measures with Z-axis aligned to gravity for levelling/alignment tasks
- Fully supported by InnovMetric's PolyWorks® Metrology Suite

	Leica Absolute Tracker AT960				Leica Absolute Tracker AT930
Model	AT960-SR	AT960-MR	AT960-LR	AT960-XR	AT930
3D Measurement Volume (Ø)	12m	40m	160m	160m	160m
6DoF Measurement Volume (Ø)	10m	20m	40m	60m	-
Accuracy U_{xyz} ¹ MPE	±15µm+6µm per m				
Angle Accuracy	±15µm+6µm per m				
Distance Accuracy AIFM	±0.5µm per m				
Dynamic Lock On	±10µm				
Orient to Gravity U_z (OTG)	±15µm+8µm per m				
Dust/Water Protection	IP54 Protection for dust and water ingress				
Operating Temperature	0°C to +40°C				
Data Output Rate	1000points/sec				
Touch Probe Use	System Ready for T-Probe				Requires an upgrade to add a T-camera
Laser Scanner Use	System Ready for T-Scan 5, LAS-20-8 and LAS-XL				for both T-Probe and Laser scanner use

¹ Accuracies are Maximum Permissible Error per ASME B89.4.19-2006 and ISO10360-10 (draft) using precision Leica 1.5" Red Ring Reflectors up to 60m distance, unless otherwise noted.

Leica Absolute Tracker Scanning and Probing Solutions

T-Scan 5 Dynamic High-Speed Scanner / LAS-20-8/-XL Flying Dot Scanning



Leica Absolute Scanner LAS-20-8

Features

- Lightweight accurate handheld scanner for manual point-cloud measurement
- Flying dot technology for multi-surface scans – auto intensity adaptation to ambient light on shiny, metallic or dark objects, without surface preparation
- Auto-recognition for seamless shifts between reflector, probe and scanner
- Built-in guide-light and 3 line-of-sight indicators for best scanning positioning



Leica Absolute Scanner LAS-XL

Features

- Scan line of up to 600mm for faster and easier full digitization of large surfaces
- Up to 1m measurement stand-off for accessing hard to reach hidden areas
- Flying dot technology
- Accuracy of $\pm 150\mu\text{m}$
- Auto-recognition for seamless shifts between reflector, probe and scanner
- On-Scanner Profile Selection without software adjustments
- Visual, acoustic and haptic indicators



Leica T-Scan 5

Features

- High speed high stand-off distance for data capture in inaccessible areas
- Millions of accurate points on all surfaces from matte to highly reflective
- Ideal feature recognition, small detail detection and faster scanning at approved quality on all surfaces
- Dual colour guide light and acoustic feed-back
- Ideal for robot automation applications
- 160Hz or 320Hz refresh for fine details

	Leica Absolute Scanner LAS-20-8	Leica Absolute Scanner LAS-XL	Leica T-Scan 5
Scanner Size/Weight	300x201x140mm / 0.94kg	300x201x140mm / 0.96kg	380x210x138mm / 1.1kg
Controller Size/Weight	226x146x91mm / 1.9kg		316x235x142mm / 6kg
Stand Off	180mm	700mm	150mm
Working Range	$\pm 40\text{mm}$	$\pm 300\text{mm}$	$\pm 50\text{mm}$
Max Scan Width ¹	220mm	468mm	100mm
Min Point Density ¹	0.013mm ³	0.045mm	0.075mm
Max Sampling Rate	150,000 points/second ³	143 000 points/second	210,000 points/second
Max Line Frequency	100Hz ³		160-330Hz ²
Scanner/Controller IP ⁴	IP50 / IP30 Protection		IP40 Protection

¹. At standoff. ². Increase to 330Hz with reduction in scan width. ³. Depending on measurement mode. ⁴Per IEC 60529.

Leica T-Probe Dynamic High-Speed Probe



Leica T-Probe

Features

- Large armless measurement volume to 60m; Relocation volume 160m
- Light, user-friendly and more accurate than other hand-held probes
- Accuracy U_{xyz} 0.035mm¹
- Increased acceptance angle: Pitch $\pm 45^\circ$, Yaw $\pm 45^\circ$, Roll 360°
- Accepts Renishaw styli. Output 1,000 pts/s rate
- Precise quick auto-stylus change recognition without re-calibration
- Cable-less operation. Typical 12 hours runtime on 1 battery charge
- Multiple programmable buttons: instant visibility feedback, auto-stylus recognition, multiple styli mounting positions, acoustic feedback

¹. Additional T-Probe uncertainty to be added per ISO/IEC Guide 98-3:2008 to the existing Leica Absolute Tracker AT960 “ U_{xyz} ” uncertainty for a complete “ U_{xyz} ” uncertainty up to 25m distance.

Leica Absolute Tracker AT403 Most Portable Laser Tracker!



Leica Absolute Tracker AT403

Features

- From 0.8m to 320mØ ultra-large measurement volume
- All-in-one large-volume laser tracker system for portability, simplicity, robust construction and measurement efficiency
- Faster and more economical stationary and continuous measurement processes, along with a streamlined station change procedure
- Built-in WiFi with true access point functionality and hot-swappable batteries deliver unmatched measurement freedom
- 15°C to 45°C operating temperature with built-in environmental monitoring, orient-to-gravity function and IP54 compliance
- Paired with Leica B-Probe for portable probing applications
- Orient-to-Gravity aligns Z-axis to gravity for levelling and alignment tasks
- Fully supported by InnovMetric's PolyWorks® Metrology Suite



Outdoor alignment with RapidSight



Single lightweight carry-on case

		Leica Absolute Tracker AT403
Absolute Angular Performance	Resolution	0.07 arc seconds
	Repeatability	$\pm 7.5\mu\text{m} + 3\mu\text{m}/\text{m}$
Uxyz ¹ With Reflector / with B-Probe		$\pm 15\mu\text{m} + 6\mu\text{m}/\text{m} / \pm 0.2\text{mm}$
Absolute Distance Performance	Resolution	0.3 μm
	Accuracy / Repeatability	$\pm 10\mu\text{m} / \pm 5\mu\text{m}$
Infinite Horizontal/Vertical Rotation Range		$\pm 360^\circ / \pm 145^\circ$
Typical Reflector Meas. Vol Ø		320m
Minimum Measuring Distance with Reflector / B-Probe		<0.8m / 2.5m
Dust/Water/ Operating Temperature		IP54 Protection (IEC 60529) / -15°C to +45°C
Relative Humidity / Altitude		Max 95% (non-condensing) / -700 to 5500m
Motorization: Acceleration / Rotation Speed		360°/s ² / 180°/s
PowerLock		10° FOV
Length x Height / Weight		358x221x188mm / 7.3kg



Leica B-Probe

Features

- Portable probing for AT403
- Gather hidden 3D points in 20mØ measurement volume
- Cable-less operation, up to 6 hours on 1 battery charge

Leica B-Probe	
Meas. Vol Ø	20m
Relocation Vol Ø	Up to 320m
Battery Power	> 6 hours per charge
Dust/Water	IP50 Protection
Hidden Point Capability	150mm

¹. All accuracies for tracker and probe are Maximum Permissible Errors (MPE) per ASME B89.4.19-2006 & ISO10360-10 (draft) with precision Leica 1.5" Red Ring Reflectors, unless otherwise noted.

Leica Absolute Tracker ATS600 **NEW!** First Ever Direct Scanning!

Features

- Combines reflector, target accessories and DRO with Wave Form Digitiser (true submillimeter scanning from up to 60m away with accuracy within 300µm)
- Ultimate high-speed direct scanning inspection for large parts and surfaces, hitherto impractical to cover with handheld scanners
- Fast process opens up new applications for metrological quality control
- Measurement data delivered to metrology software at data rate of up to 1000Hz
- Familiar and easy to use like traditional laser tracker. Targets easily identified and results delivered and processed efficiently through established workflows
- Ideal for automated installations with minimal user intervention required
- Data point-density fully configurable. User may choose fast process rates to scan whole volume or choose higher density scans for certain specific segments for higher resolution and accuracy level per their application
- Fully supported by InnovMetric's PolyWorks® Metrology Suite



Leica Absolute Tracker ATS600



Aerospace



Energy



Transportation

	Leica Absolute Tracker ATS600
Reflector Measurement Absolute Angular Performance ¹	±15µm+6µm/m
Reflector Measurement Length Measurement (E _{Uni:0:LT,MPE}) ²	±100µm
Non-Contact Measurement Range Noise ³	< 80µm
Non-Contact Measurement Absolute Accuracy ⁴	<±300µm
Reflector Measurement Range	0.8 to 80m
Non-Contact Measurement	1.5 to 60m
Scanning Rate	1kHz
Scanning Speed ⁵	< 10sec/m ² in Fast Mode; < 135sec/m ² in Standard Mode
Dust/Water / Operating Temperature	IP54 (IEC 60529) / 0°C to 40°C
Relative Humidity	Max 95% (non-condensing)
Environmental Monitor	Temperature, pressure and humidity
Cable / Wireless Interface	TCP/IP (Cat5) / WLAN (IEEE 802.11n)
Overview Camera	4:3 IR enhanced image ≈ 10° FOV
Power	AC power supply, 8-hour Lithium-ion battery
Laser	Class 2 (IEC 60825-1 – Second Edition 2014-05)
Width x Height x Depth / Weight	Machine: 258x477x258mm / 14.2kg Controller: 148 x 249x59mm / 1.65kg

¹. Angular Performance Transverse e_r according to ISO 10360-10:2016, with respect to an MPE for the Location Error (L_{Dia.2x1:P&R:LT,MPE}) in accordance with chapter 6.3 of ISO 10360-10:2016 of ±30µm+12µm/m.

². In accordance with ISO 10360-10:2016 Chapter 6.4, Table 4, positions 1 to 35.

³. Standard deviation (1σ) of a best-fit plane (78% Albedo), distance 1.5 to 30m, standard measurement mode, target aligned.

⁴. Maximum Deviation (MPE) of the absolute position of a plane (78% Albedo), 1.5 to 30m, 0 to ± 45° incidence angle.

⁵. At default point-to-point and line-to-line distance (10m).

StereoScan neo See What You Measure



Hexagon StereoScan neo

Features

- 3D scanning at the highest precision
- Adaptive full colour projection to visualise surface deviations from object scanned CAD immediately after measurement
- Colour back projection of measurement results
- Variable Light Projection technology visualizes measurement results directly on the object
- Short scanning times via fast digital projection
- Quick and easy exchange of measurement fields
- Maximum degree of feature accuracy thanks to highest resolution camera sensors
- Can be combined with a handheld probe
- Highest stability even in rough environments
- Compatible with InnovMetric's PolyWorks® Metrology Suite

	R8 8.0 MEGAPIXEL	R16 16.0 MEGAPIXEL
Camera Sensor	Monochrome, CCD progressive scan 4/3"	Monochrome, CDD progressive scan, full format 1.7
Camera Resolution	2 x 8 147 712 pixel (3296 x 2472)	2 x 15 720 448 pixel (4864 x 3232)
Projection Unit	Digital Projector	
Light Source	3 x 100W high-power LEDs (red + green + blue)	
Projection 'Multicolour'	Red/green/blue optionally combinable, also to white	
Projection 'Single Colour'	Red or green or blue, with appropriate colour filter on the cameras	
Back Projection Accuracy	1/10 000 of the screen size	
Acquisition Time	Min 1 second	
Sensor Weight	12kg ¹	
Power Supply / Control Unit	AC 110/230 V, 50-60 Hz, 600 W / Integrated, USB 3.0	
Operating System	Windows 10, 64 Bit	
Probing	Compatible with MI.Probe mini	

R8 8.0 MEGAPIXEL	<u>Outer camera</u> Triangulation Angle 30° / Base Length 450mm / Working Dist. 840mm				<u>Inner camera</u> Triangulation Angle 30° / Base Length 150mm / Working Dist. 350mm		
Field of View ²	L 350mm	L 550mm	L 850mm	L 1100mm	S 75mm	S 125mm	S 200mm
Field of View Size ³	280x210mm	420x320mm	700x560mm	850x700mm	65x50mm	100x75mm	160x125mm
Measuring Depth ⁴	176mm	270mm	430mm	550mm	36mm	60mm	100mm
X, Y Resolution ⁵	86µm	128µm	211µm	256µm	20µm	30µm	49µm
Sphere Spacing Error	10µm	16µm	30µm	42µm	5µm	6µm	8µm
Length Measuring Error	20µm	28µm	60µm	84µm	10µm	15µm	18µm
Probing Error Size	6µm	12µm	16µm	21µm	4µm	6µm	6µm
Probing Error Form	7µm	12µm	16µm	18µm	5µm	6µm	6µm

R16 16.0 MEGAPIXEL	<u>Outer camera</u> Triangulation Angle 30° / Base Length 450mm / Working Dist. 840mm				<u>Inner camera</u> Triangulation Angle 30° / Base Length 150mm / Working Dist. 350mm		
Field of View ²	L 350mm	L 550mm	L 850mm	L 1100mm	S 75mm	S 125mm	S 200mm
Field of View Size ³	285x190mm	460x310mm	710x500mm	940x700mm	70x50mm	90x60mm	160x110mm
Measuring Depth ⁴	176mm	280mm	430mm	550mm	20mm	54mm	100mm
X, Y Resolution ⁵	58µm	94µm	146µm	193µm	15µm	19µm	33µm
Sphere Spacing Error	10µm	16µm	30µm	32µm	5µm	6µm	8µm
Length Measuring Error	20µm	28µm	60µm	64µm	8µm	15µm	18µm
Probing Error Size	6µm	12µm	16µm	18µm	4µm	6µm	6µm
Probing Error Form	7µm	12µm	16µm	18µm	5µm	6µm	6µm

¹ Weight may vary depending on the measuring fields. ² Designation of the scanner bases (S, L) and the diagonal in the centre of the measuring volume. ³ Lateral expansion (X x Y) in the centre of the measuring volume; figures given in mm. ⁴ Depth of the measuring volume (Z). ⁵ The values for the lateral resolution have been calculated theoretically (ratio of the size of the FOV and number of pixels of the camera chip).

SmartSCAN Compact, Mobile 3D White Light Scanner



Probing with SmartSCAN and stereoSCAN

Features

- Highly accurate measurements for quality control and additive manufacturing
- Very fast data acquisition with high level of detail
- Compact, lightweight for portable mobility
- Affordable, modular and expandable
- Leading solution for large complex surface geometries and fragile or deformable parts
- Three triangulation angles (10°, 20°, 30°)
- Easy changeable measuring fields when combined with high-end photogrammetry
- Mechanically and thermally stable
- Compatible with InnovMetric's PolyWorks® Metrology Suite

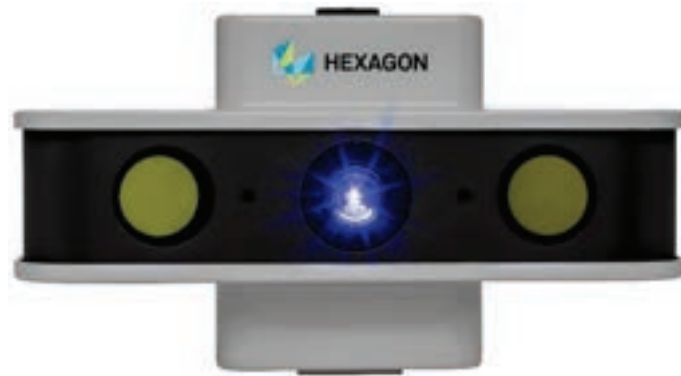
	R5 5.0 MEGAPIXEL	R12 12.0 MEGAPIXEL
Camera Sensor	Monochrome, CDD progressive scan, 2/3"	Monochrome, CMOS, 1.1"
Camera Resolution	2 x 5041312 pixels (2452 x 2056)	2 x 12368896 pixels (4112 x 3008)
Projection Unit	Miniaturized Projection Technique (MPT)	
Projection Resolution	28723200 pixels (6144 x 4675)	
Light Source	100W high-power LED ¹	
Acquisition Time	Min 1 second	
Sensor Weight	4kg	
Power Supply / Control Unit	AC 110/230V, 50-60Hz, external, 150W / External, USB 2.0	
Operating System	Windows 10, 64 Bit	
Probing	Compatible with MI.Probe mini	

R5 5.0 MEGAPIXEL	Triangulation Angle 30° / Base Length 470mm / Working Dist. 1000mm				Triangulation Angle 30° / Base Length 240mm / Working Dist. 370mm		Triangulation Angle 20° / Base Length 470mm / Working Dist. 1500mm	
Field of View ² (for M)	125mm	200mm	500mm	850mm	S 60mm	S 125mm	L 750mm	L 1550mm
Field of View size ³ in mm	105x85	160x130	380x310	650x565	50x40	100x80	560x470	1200x750
Measuring Depth ⁴	66mm	100mm	244mm	420mm	30mm	60mm	360mm	750mm
X, Y Resolution ⁵	43µm	64µm	153µm	266µm	20µm	40µm	230µm	485µm
Sphere Spacing Error	10µm	11µm	22µm	44µm	5µm	7µm	61µm	220µm
Length Measuring Error	20µm	22µm	44µm	88µm	10µm	14µm	122µm	440µm
Probing Error Size	7µm	9µm	11µm	22µm	6µm	7µm	31µm	110µm
Probing Error Form	7µm	8µm	11µm	22µm	5µm	7µm	31µm	110µm

R12 12.0 MEGAPIXEL	Triangulation Angle 27° / Base Length 470mm / Working Dist. 1000mm				Triangulation Angle 29° / Base Length 260mm / Working Dist. 500mm			
Field of View ²	350mm	450mm	750mm	1000mm	SL 90mm	SL 200mm	SL 300mm	SL 500mm
Field of View size ³ in mm	285x205	380x275	590x435	825x630	70x55	145x105	240x160	420x325
Measuring Depth ⁴	180mm	240mm	370mm	500mm	44mm	90mm	144mm	250mm
X, Y Resolution ⁵	69µm	92µm	143µm	201µm	17µm	35µm	57µm	102µm
Sphere Spacing Error	16µm	20µm	30µm	44µm	6µm	9µm	12µm	21µm
Length Measuring Error	36µm	40µm	60µm	88µm	15µm	18µm	24µm	42µm
Probing Error Size	9µm	10µm	15µm	22µm	6µm	6µm	8µm	15µm
Probing Error Form	9µm	10µm	15µm	22µm	6µm	6µm	8µm	15µm

¹ ANSI Lumen describes the value of the luminosity output of the light source adapted to the camera sensitivity. ² The camera positions are determined by using different CRP (carbon-fibre reinforced plastic) scanner bases, designated S, M, L and the diagonal in the centre of the measuring volume. ³ Lateral expansion (X x Y) in the centre of the measuring volume; figures given in mm. ⁴ Depth of the measuring volume (Z). ⁵ The values for the lateral resolution have been calculated theoretically (ratio of the size of the FOV and number of pixels of the camera chip).

PrimeScan For Simple, Precise Scanning



Hexagon PrimeScan

Features

- Compact, light, entry-level 3D scanner for highly precise 3D digitization in industrial environments
- Short working distance to access narrow and constricted parts and features
- 8 fixed configurations for diverse measuring tasks
- High-resolution sensor for maximum level of detail
- Scans glossy and dark surfaces without pre-treatment
- Applicable with photogrammetry
- Compatible with InnovMetric's PolyWorks® Metrology Suite

	R5 5.0 MEGAPIXEL	R8 8.0 MEGAPIXEL
Camera Sensor	Monochrome, CMOS 2/3"	Monochrome, CMOS 1"
Camera Resolution	2 x 5013504 pixels (2448 x 2048)	2 x 7990272 pixels (3264 x 2448)
Projection Unit	Miniaturized projection technique	
Projection Resolution	28723200 pixels (6144 x 4675)	
Light Source	Blue 100W high-power LED	
Acquisition Time	Min 1 second	
Sensor Weight	3.8kg ¹	
Power Supply / Control Unit	AC 110/230V, 50-60Hz, external, 150W / Integrated, USB 3.0	
Operating System	Windows 10, 64-Bit	

R5 5.0 MEGAPIXEL	Triangulation Angle 26° / Working Dist 370mm				Triangulation Angle 18° / Working Dist. 540mm
Field of View ²	50mm	125mm	200mm	400mm	700mm
Field of View Size ³	40x30mm	100x80mm	150x125mm	300x275mm	500x450mm
Measuring Depth ⁴	24mm	64mm	100mm	200mm	350mm
X, Y Resolution ⁵	16µm	40µm	63µm	125µm	208µm
Sphere Spacing Error	4	7	12	20	56
Length Measuring Error	10	16	24	40	112
Probing Error Size	6	6	6	10	28
Probing Error Form	4µm	6µm	7µm	10µm	28µm

R8 8.0 MEGAPIXEL	Triangulation Angle 26° / Working Dist. 370mm		Triangulation Angle 18° / Working Dist. 540mm
Field of View ²	100mm	450mm	650mm
Field of View Size ³	80x60mm	350x290mm	500x400mm
Measuring Depth ⁴	50mm	222mm	320mm
X, Y Resolution ⁵	27µm	109µm	155µm
Sphere Spacing Error	6	25	52
Length Measuring Error	14	50	104
Probing Error Size	8	13	26
Probing Error Form	6µm	13µm	26µm

¹ Weight may vary depending on the measuring fields.

² Each field of view (FOV) denotes a different scanner.

³ Lateral expansion (X x Y) in the centre of the measuring volume.

⁴ Depth of the measuring volume (Z).

⁵ The values for the lateral resolution have been calculated theoretically (ratio of the size of the FOV and number of pixels of the camera chip).

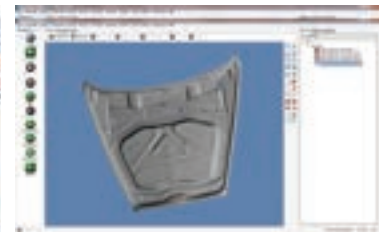
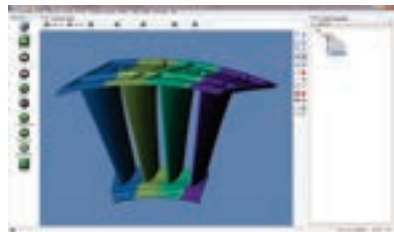
OptoCat Scanning Software Solution



OptoCat

Features

- Intuitive and easy to use interface with intelligent algorithms to evaluate the geometric and radiometric features of the scanned object, so it is not necessary to manually align the individual scans to each other
- Optional InnovMetric's PolyWorks® Metrology Suite software link for optimised, interactive and automatic evaluation
- Measurement results can be compared directly or to imported CAD data
- Various functions for data analysis, edge extraction and post-processing steps
- Texture Mapping module enables the capturing and mapping of the texture (colour and pattern) of a scanned object to its digital 3D representation
- For measurements taken with the Hexagon StereoScan neo, OptoCat enables the option of a back projection of the measurement results in full colour, directly onto the measurement object allowing the user to instantly identify where corrections need to be made
- Supports full and partial automated scanning processes



Applications



Automotive



General Manufacturing



Tooling, Mould and Die



Aerospace



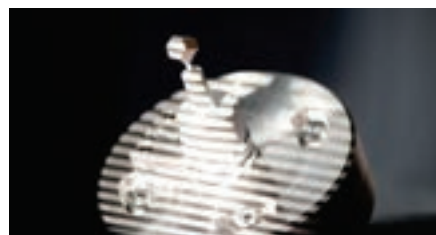
Heavy Industry



Power & Energy



Arts & Culture



Other Unique Applications

ScanTRAK II Shop-Floor 3D Laser Scanning

Blue Laser Scanning Technology

Features

- Scanner accuracy of 7 μ m allows every part feature and surface detail to be captured with exceptional precision and resolution
- Freeform, non-contact part scanning in all 6DOF without mechanical linkages or the risk of beam-breakages
- Scan complex 3D geometries—even dark or shiny surfaces—without having to pre-treat the part
- New balanced ergonomic design for extended scanning sessions with integrated FOV positioning laser optimizing data collection and real-time point-cloud visualization to provide instant scanning feedback
- Frame rate up to 450Hz and scanning speed up to 450,000 points per second increases operator productivity by almost 300%
- Compatible with InnovMetric's PolyWorks® Metrology Suite



ScanTRAK II

	ScanTRAK II	
Dimensions (LxWxH)	200x140x260mm	
Weight	1.2kg	
System Accuracy ¹	Up to 25 μ m	Up to 25 μ m
* Localizer Volume	Up to 35m ³	Up to 35m ³

Sensor	Field of View Mode	Field of View Mode
	100% Depth 100% Width	50% Depth 50% Width
Measurement Accuracy ²	7 μ m	7 μ m
Minimum Point Spacing	35 μ m	38 μ m
Max Field Width	120mm	51mm
Mid. Field Width	95mm	45mm
Min. Field Width	70mm	38mm
Stripe Width	120mm	51mm
Measuring Range	100mm	50mm
Stand-Off	80mm	93mm
Max Frame Rate	150Hz	450Hz
Points Per Stripe	2,000	1,000
Scanning Speed (points per second)	300,000	450,000
Laser Power Adjustment	ESP4 real-time per point	
Certifications	CE, IEC 60825-1	
Environmental	10°C to 40°C	

¹ Diameter of a sphere measured in Zone 1 (RMS in environmentally stable conditions).

² Typical values are 30% better than published values. Laser Scanning Accuracy is determined by scanning a plate from various directions, each time using the entire scanner field of view. The result is the maximum 1 σ deviation of the scan data to fitted plane features.

PRO CMM Optical Tracker for the Shop Floor

Touch Probing/Dynamic Reference Tracking for up to 6m long Parts



PRO CMM

Unique measurement solution for mid-size parts – A real-time shop-floor optical tracker based on high-speed Photogrammetry, that measures up to 6m long objects, such as motorcycles, cars, small trucks and machinery, in a single setup with micron level accuracy throughout the measurement volume. Having no moving parts, accuracy and reliability is assured. Supports fully articulated wireless handheld touch probes for flexible measurements combined with Dynamic Motion Tracking.

Real-Time Optical Tracker: Durable, solid state design with no moving parts for measurement accuracy up to $35\mu\text{m}$ over a measurement volume up to 35m^3 – the best portable, optical CMM in its class – providing reliable results on the shop floor

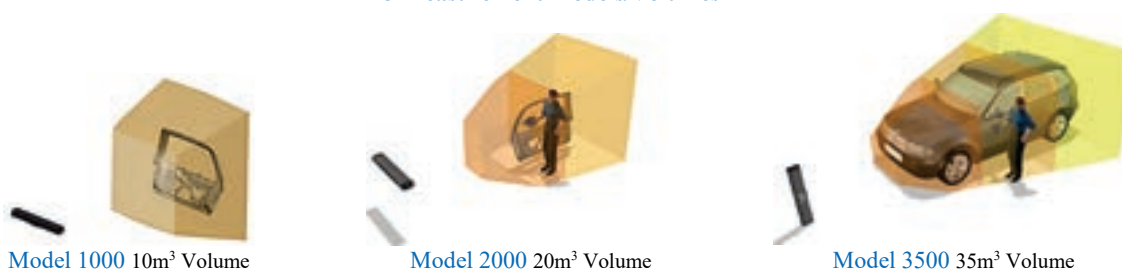
Dynamic Part Referencing: Continuously references the tracker to part coordinates and tracks and compensates movements or vibrations. If part, fixture or tracker is moved, the system will automatically compensate and maintain accurate alignment.

Multiple Target Tracking: Simultaneously measures multiple targets

	Model 1000	Model 2000	Model 3500
Measurement Volume ¹	1.5 to 4.5m (10m^3)	1.5 to 6m (20m^3)	1.5 to 7.5m (35m^3)
Accuracy: Single Point/Application	up to $20\mu\text{m}$ /up to $35\mu\text{m}$		
Volumetric Accuracy ²	$80+2.5\text{L}/100\mu\text{m}$	$95+2.5\text{L}/100\mu\text{m}$	$110+2.5\text{L}/100\mu\text{m}$
Real-Time Dynamic Motion	Up to 4500 measurements per sec		
Target Resolution (at 2.5m)	up to $2\mu\text{m}$		
Laser Tracking Special Features	Armless (no moving parts); Beamless (no beam breaks); Full Operator Freedom		
Sampling Speed (targets/sec)/Latency	up to 4500Hz/up to 5ms		
Recommended Software	InnovMetric's PolyWorks® Metrology Suite		
Dimensions/Weight	1157x230x175mm/24kg		
Power Supply/Operating Temperature	100 - 240 VAC, 50/60 Hz, 1.0A/10°C to 35°C		

¹. From centre of volume; extends in all depth. ² Per ISO 10360-2:2000 expressed at 95% confidence level

3 Measurement Models/Volumes



Model 1000 10m^3 Volume

Model 2000 20m^3 Volume

Model 3500 35m^3 Volume



Multi-Sided Probe (MSP) 360° viewing capability for easy inspection of visible or hidden part features. 185x185x105mm / 200g



Tripod Flexible, stable positioning. Comfortable height adjustment

PRO CMM Optical Tracker for the Shop Floor



MultiTRAK with Multiple Trackers

MultiTRAK creates a unified coordinate volume for operators to efficiently probe seamlessly around large parts and assemblies, with full coverage without moving the Optical Trackers.

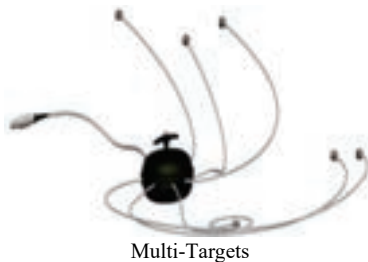
MultiTRAK cell uses fix mounted or portable Optical Trackers to create the optimal measurement volume for your application.

The portable option uses DPR to create and maintain common coordinates between Optical Trackers, providing operators with continual measurement even during movement. A fix mounted option supports cells where the parts inspected must have a consistent orientation within the volume, improving productivity while reducing leapfrogging and setup time for measuring.

Applications: Design studios, large parts and assemblies and multi-purpose measurement rooms.

Measurement Volume with Two 3500 Optical Trackers:	10.5m length; typically up to 55m ³
Measurement Volume with Four 3500 Optical Trackers:	typically up to 100m ³

PRO CMM Accessories



Multi-Targets



MSP Stylus Changing Kit



4mm Probe Tip



Brunson Stand



Stylus Extensions



DPR Pro



DPR Surround

DMM+ Dynamic Real-time Motion Tracking Option

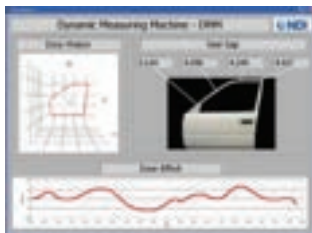
Add high-speed, real-time DMM capabilities to PRO CMM with unique targets to capture fast, complex motion of multiple objects over large volumes with exceptional precision for dynamic measurement and advanced motion tracking and analysis.

Dynamic Referencing: The Optical Tracker's most powerful feature is the unique ability to track 3D motion and 6DOF positions and changes over time. At up to 4,500 measurements per seconds, PRO CMM can track 512 3D targets or 170 6DOF objects simultaneously in real time. Displays data in text, 3D or digital readout. Measure vibrations, travelled paths, velocities, accelerations, positions, displacements, orientations, deformations, angles and transformations.



Door Closure Test

Kinematics such as closure dynamics (travel path, drop-off, lift, speed, acceleration, vibration and part deformation) are measured at high data rates for analysis of assembly variability and closure force. Specific features, coordinates, door side, dimensional measurements and body assembly can be defined and reported using digitizing probes



DMM Applications

- Dynamic Tracking, Guided assembly
- Door and Closure Testing
- Part deformation, Structural testing
- Boat Tank Tracking, Wind Tunnel Tests
- Tow Tank Testing
- Airfoil Deflection, Lift and Drag
- Suspension Testing, Earthquake Testing
- Robot Measurement & Guidance



Fixture Verification/Automatic Alignment

Fixtures are used to improve the accuracy of assembly, machining and parts inspection. Wear and tear can however move fixtures out of tolerances resulting in misalignments. Dynamic referencing enables rapid fixture verification on the shop floor via a handheld probe or laser scanner. The inspection software automatically compares measured data to CAD nominal and displays out-of-tolerance conditions in real-time colour error maps and labels. Customizable quality reports are automatically generated simplifying the entire verification.

Software to analyze 3DOF motion or 6DOF position of objects included for instant visual feedback and live data export, allowing users to easily track dynamic motion measurements such as displacement, acceleration, deformation and frequency response.

Robot Measurement Solutions

- Robot Measurement and Performance Analysis
- Robot Cell Calibration
- Robot Scanning and Measurement
- Robot Guidance and Control

Benefits:

- Reduced setup time with significantly higher accuracy
- Automated scanning and measurement tasks
- Control flexible and jiggles assembly

LaserGauge® DSP Handheld Sensors with Integral Processors



HS702

- Smallest most rugged DSP sensor
- High volume applications eg. automotive and aerospace gap and flush
- Automatic Gain Adjustment measures all colour surfaces. Image optimized through sophisticated gain algorithm
- Available in either Red or Blue laser



HS703

- Fastest, most versatile DSP sensors
- Horizontal scanning resolution of 1280 surface points within FOV; 2.5X better than most other profilers on the market
- Run complex inspections or use as GO/NO GO Gauge. Full range of aerospace applications
- Available in either Red or Blue laser



HS763

- Equipped with two blue lasers to scan transparent, translucent surfaces and opaque surfaces
- Plug a TS800 into the HS763 and use it as a controller
- Ideal for automotive body panels, headlamps, tail lamps, window glass, chrome, etc.



HS761

- Complete surface profile
- Unique cross-vector scanning with multiple lasers/views at crossing angles, to see around edges of radii to the vertical tangent and beyond
- Integral barcode reader scans a VIN/identifying number for traceability of part or inspected assembly



Cross-Vector Scanning (HS761)



Fully portable (HS703)

	HS702	HS761	HS703	HS763
Processor	Digital Signal Processor, 1GHz Speed; measures in < 1 second			
Size (WxHxL)mm	58x97x257mm	91x114x257mm	91x97x257mm	91x150x257mm
Weight / (with battery)	595g / (709g)	907g / (992g)	737g / (822g)	964g / (1077g)
Colour Display	2.4"	3.5" touchscreen	3.5" touchscreen	3.5" touchscreen
User Interface	2 sets of 3 LED's, 5-Way Joystick and 2 Buttons			
Communications	Wireless – 2.4GHz with USB Stick; Cable – USB 2.0A to Mini 5-pin USB, 6' length			
Operating Modes	Gauge uses one algorithm per scan to calculate multiple measurements and display values. Routine designed with LG Works to measure different features on an assembly with files sent to the sensor.			
Memory / Battery	8GB of data/scans/routines / Rechargeable lithium-ion			
FOV Options	30mm	38mm	30mm	38mm
Horizontal Scanning Res	20µm	30µm	25µm	30µm
Depth Accuracy	±20µm	±25µm	±20µm	±25µm
Shock Protection	Cast urethane housing			
Environment	0° – 70°C			



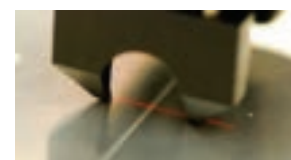
Pop-Top/Burst Disc Score Depth



Contour



Scratches



LaserGauge® USB Sensors **Ultra-Fast, Hi-Resolution 2D Scanning**



TS800

- Blue laser inspects and measures small features in hard-to-access areas even on shiny or opaque surfaces
- Unique removable standoff provides guidance for correct alignment to ensure accurate measurement
- Small and light, narrow tapered stem for access to highly restricted areas
- Measurements: Edge Radius, Break Angles, Chamfer Angles, etc.
- Available in either Red or Blue laser



HS730LE

- Inspects leading edge of aircraft and power system engine blades/vanes
- Scans both sides of blade simultaneously and plots whole profile around blade radius for comparison to nominals. Blade thickness and edge radius can also be analysed
- Real-time raw video and plotted profile display
- Measurements recorded when trigger is released
- Out-of-spec conditions flagged in colour
- Measurements: Blade Thickness, Profile Deviation, Edge Radius



HS733LE

- High-res profiling for on-line, robotic and remote customer applications with LG algorithms
- Rugged, compact, with mounting ports for positioning sensor. Single USB power and data cable
- Multiple sensors can be calibrated, synchronized to capture scans from every angle simultaneously to view 360° around a complex part



RS750

	TS800			HS730LE	HS733LE	RS750			
Sensor Type	USB – Handheld			USB 2.0, Windows		USB - Remote Mounted			
Size (WxHxL)	44x66x165mm			46x79x239mm	44x114x191mm	41x64x89mm			
Weight	184g			425g	340g	227g			
User Interface	2 sets of 3 feedback LED's (Red Laser), 3 Pitch/Yaw feedback LED's (Blue Laser)			3 LED's, 2 tactile buttons, finger trigger		-			
Communications	USB 2.0A to Mini 5-Pin USB, 6' straight cable (can be increased with power cable or hub)								
FOV	13mm	25mm	51mm	6mm	4mm	13mm	30mm	50mm	65mm
Horizontal Scanning Res	10µm	20µm	41µm	10µm	5µm	10µm	20µm	38µm	50µm
Depth Accuracy	6µm	10µm	25µm	12µm	12µm	20µm	20µm	37µm	51µm
Shock Protection	Cast urethane housing								
Environment	0° – 70°C								

Applications

Aerospace Applications



Fasteners



Blade Leading Edge

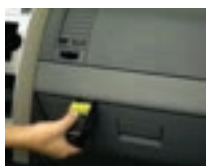


Corrosion



Welds

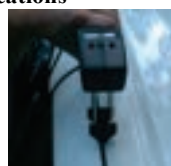
Automotive Applications



Interior Gap & Flush



LMI Seal Blocks



Door to Roof Gap



Curved Hood

LaserGauge® Controllers **Powerful User Functionality**



LG7000



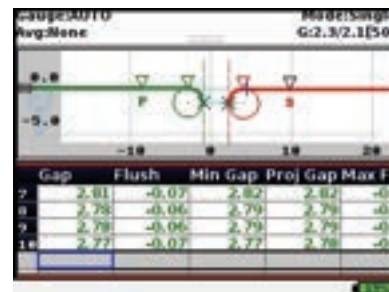
LG5000

- Used with all LaserGauge® controller-based and USB sensors
- 7-inch graphical touchscreen display
- Supports maximum functionality of the sensor and is rugged and portable for measurements to be made anywhere
- Measurement data and scan images saved to on-board memory for analysis on the controller or transferred to a computer using a USB cable or a wireless ZigBee connection
- Integrated barcode scanner and reader
- Used with all LaserGauge® controller-based and USB sensors
- Smallest, lightest LG controller 539g
- 3.5" colour touchscreen and joystick
- USB, null modem cable or wired/wireless Ethernet comms
- 4-way rotational screen; High contrast scanning on dissimilar surface colours
- Integrated barcode scanner and reader

Routine Mode and Gauge Mode – Automatic Data Saving



Routine Mode



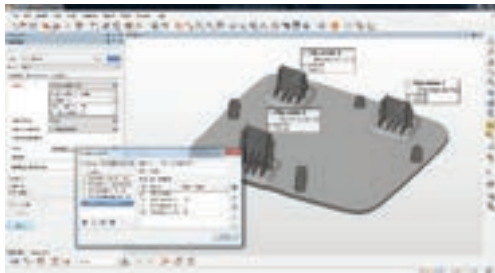
Gauge Mode

	LG7000	LG5000
Operating Use	Algorithm only or Algorithm and Routine modes	
Processor	1GHz ARM	
Memory	8GB of data/scans/routines	
Sample Rate	Up to 10 processed samples per second for many applications	
Display	800x480 / 256 colours, 7" display with touchscreen	320x240 / 256 colours
User Interface	2 multi-function buttons, 5-way joy stick	
Interface Port	USB 2.0 ports (2 Type A, 1 Mini-B) and 13pin circular DIN	USB 2.0 (1 Type A, 2 Mini-B)
Power Requirements	7.2VDC @ <2.5Amps	12VDC @ <2.5 amps
Power Supply	Lithium-ion (non-metal) rechargeable battery, 7.2VDC	Worldwide 60W A/C adapter (optional 12V rechargeable battery)
Environment	0° – 70°C	
PC Software Interface	LGWorks, Windows 10	LGWorks, Windows 10
Log File Output	User-defined, ASCII text format	
Size (WxHxL)	213x159x44mm	165x92x60mm
Weight	0.82kg without battery	0.45kg without battery
Housing	Cast urethane case with reinforced mounts. Nylon carrying case with shoulder strap.	

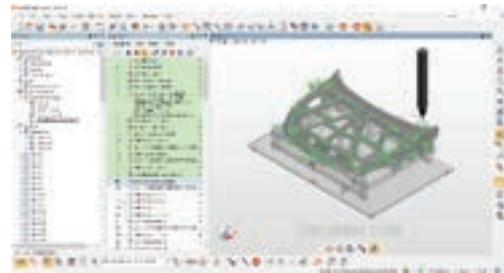
PolyWorks® Metrology Suite **Universal 3D Metrology Workflow** *NEW!*

Smart 3D Metrology Digital Ecosystem

- Supports all your industrial manufacturing organization's 3D measurement processes, from measurement planning by the design and manufacturing teams, to the measurement execution by the quality control team, and the enterprisewide sharing of 3D measurement data and results
- Facilitates Deployment of PolyWorks|Inspector™ in Production and Accelerates CNC CMM Measurement Sequences



Deploy PolyWorks|Inspector™ in any production environment thanks to powerful object measurement scripts



Create complete CMM measurement sequences in minutes while staying in control



Inspect to GD&T requirements



Analyze feature deviations thoroughly

POLYWORKS|AR™ **Mixed Reality Software Solution** *NEW!*

Superimposes 3D Measurement Results and Guidance Graphics on Inspected Parts

- Connects Microsoft HoloLens devices to live PolyWorks|Inspector™ sessions, allows users to see and interact in real time with 3D measurement results and guidance graphics superimposed on the inspected parts
- Automatically visualize part-to-CAD deviation color maps and point annotations superimposed over the inspected part

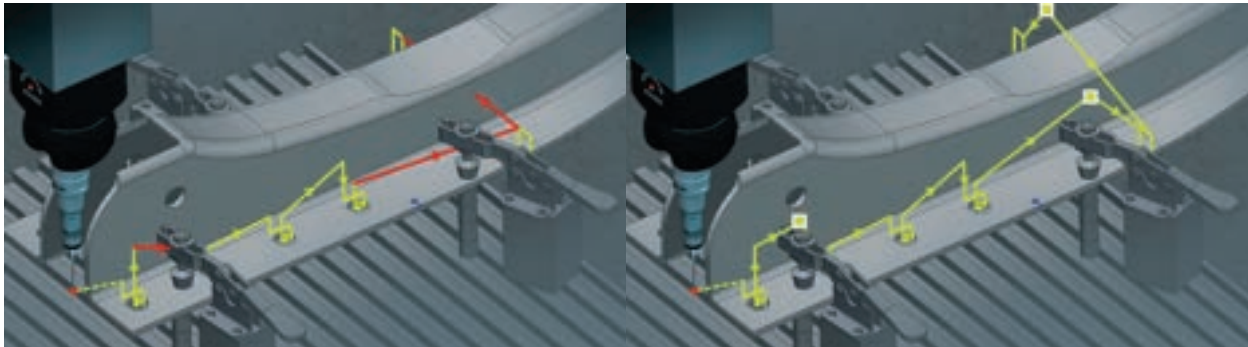


Live connection to PolyWorks|Inspector™: Network your HoloLens mixed reality device to the computer running your PolyWorks|Inspector session, and open the inspection project to display the CAD model before your eyes.

Targetless localization process: Move your head to bring the projected CAD model in correspondence with the part and let the model-based tracking localize the mixed reality device with respect to the part's coordinate system.

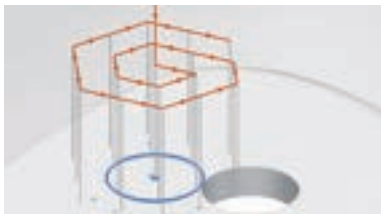
Natural 3D interactions: Interact naturally with your 3D environment by gazing and using a gesture to select items, such as PolyWorks|AR toolbar buttons or 3D positions on the part.

PolyWorks® Metrology Suite Universal 3D Metrology Workflow

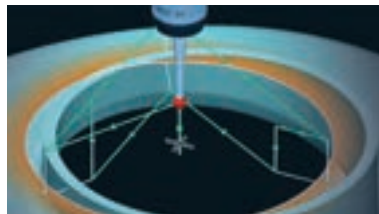


Three collisions avoided by the automatically computed Go to Position locations

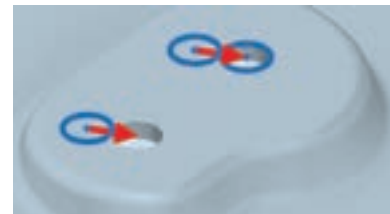
- Powerful real-time collision analysis technology allows inserting automatically computed Go to Position locations that modify the CMM measurement path in an optimal way as to prevent detected potential collisions



Search hole

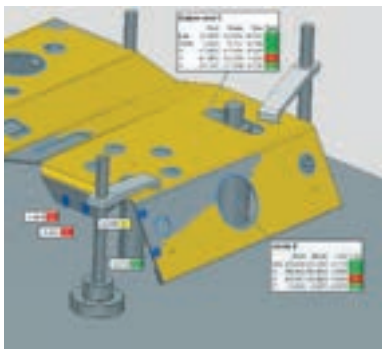


Locate hole center



Measure relative to other objects

- Triggers a spiral search when a hole is not located at its nominal position to estimate the actual location and restarts measurement from this actual location
- Measures 3 points to estimate actual hole location, translates the measurement to the center of the actual hole and launches hole measurement
- Adjusts the position of the measurement zone based on the deviations of objects already measured



Colours to focus attention and better communicate results

circle 1				
	Nom	Meas	Dev	Test
Dia	12.700	12.708	0.008	○
X	86.000	85.999	-0.001	○
Y	25.400	25.469	0.069	✗
Z	97.112	97.107	-0.005	○

Intuitive annotation positioning and editing tools directly in the 3D Scene



Single-click geometry transfer between products

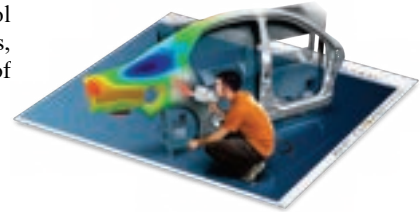


Simplified icons

POLYWORKS|INSPECTOR™

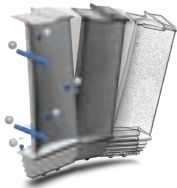
Complete Dimensional Analysis and Quality Control Toolbox

- Universal 3D dimensional analysis and quality control software solution to control tool or part dimensions, diagnose and prevent manufacturing and assembly issues, guide assembly building through real-time measurements, and oversee the quality of assembled products by using portable metrology devices and CNC CMMs
- Interface with all 3D measurement devices thanks to a universal digitizing hub
- Perform all inspection tasks using a universal 3D metrology workflow
- Deploy universal inspection projects playable on any 3D measurement device



From Engineering to Manufacturing - a 3D Metrology Solution to Control the Process

PolyWorks|Inspector is an effective industry-leading metrology software to control tool and part dimensions, diagnose and prevent manufacturing and assembly issues, guide assembly building through real-time measurements and oversee the quality of assemblies, using non-contact point cloud digitizers and contact-probing devices.



ALIGN measured part to CAD via surface, features, cross-sections, reference points, lines ... constructions. "Virtually" assemble measured parts to check interference, flush and gap...



MEASURE points/point clouds, built polygonal models; or probe and compare to CAD nominals. Feature and advanced dimensions, GD&T and guidance to build and inspect fixtures and jigs.



Automatic REPORTS updates if project or parameters altered, or if measured data points of current piece are replaced with new piece. Accelerates multi inspection.

Multiple Piece Inspection and SPC

Create an inspection project and report. DirectReplay™ automatically replays inspections on subsequent pieces so you can focus on your measurements. Works with point cloud digitizer, single-point measurement device or both. Inspector can automatically compute and update SPC databases of multipiece statistics for object dimensions and surface deviations for powerful quality diagnostics for manufacturing or assembly pre- and post-production.

Quick and Efficient Part Inspection Report Workflows

PolyWorks accelerates part inspection reports with enhanced, optimized workflows and user interfaces that adds, configures and reviews geometry controls for measurement objects. Intuitive editors to customize display, report contents, tables and annotations. Automatic transfer of new report tables and 3D Scene snapshots to a formatted inspection report.



POLYWORKS|INSPECTOR™ Packages

	Probing	Probing++	Standard	Premium
Standard for all Packages	Portable Single Point Measuring Support, IGES/STEP Neutral CAD translator, Part Alignment, Dimensional Control, Smart GD&T, Reporting toolset, Simulation mode for offline project setup, Repeatable multipiece measurement workflows, SPC, and 1-year support			
CNC CMM Single Point Measuring Support		√		√
Portable Point Cloud Digitizer Support			√	√
CNC CMM Point Cloud Digitizer Support				√
Real-time Quality Meshing / Offline Point Cloud Meshing			√	√
PolyWorks Modeler Light / PolyWorks AR plug-in				
Options	Native CAD file translators, Airfoil Gauge Module			

Airfoil Gauge for POLYWORKS|INSPECTOR™

Comprehensive dimensional analysis of fan, compressor, and turbine blades

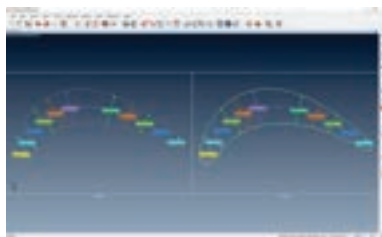


- Most robust camber line fitter in the industry
- Process datasets from any 3D measurement principle
- Flexible reverse engineering/adaptive manufacturing
- Extract key features and dimensions on a blade to create a model in your corporate CAD
- Fully customizable/programmable for specific needs



Geometric Primitives

- Camber line
- Leading edge point
- Trailing edge point
- Center of gravity
- Maximum thickness point
- Smallest enclosing circle
 - Tangent vector
- Leading edge tangent point
- Trailing edge tangent point



Dimensional Measurements

- Leading and trailing edge radii
 - Camber line length
 - Maximum thickness
 - Chord length
- Maximum width (aerodynamic / tangential)
 - Twist and stagger angles
 - Smallest enclosing circle
 - Inlet and exit angles
- Unlimited thickness measurements along camber line from leading or trailing edge points
- Distance between airfoils in a ring or blisk
 - Area



Data-to-CAD Deviations

- Leading edge point deviation
- Trailing edge point deviation
- Center of gravity deviation
- Maximum thickness point deviation
- Leading edge tangent point deviation
- Trailing edge tangent point deviation

POLYWORKS|INSPECTOR™ Probing Package

Universal 3D Metrology Platform for Single-Point Probing Devices

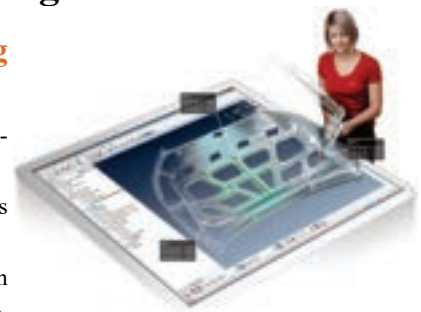
Operate all your probing devices from a common software platform. Supports arm-based, hand-held probing, digitizers, trackers and manual/CNC CMMs.

Multiple Device Positions automatic probed target matching, complete target analysis toolbox, temp compensation and large volume metrology bundle.

Universal workflow for performing all inspection tasks. Integrated Play Inspection measurement tool to automatically measure a new piece without teaching or scripting.

Widest range of dimensional control tools for a complete analysis of surface, boundary, cross-sectional deviations, flush and gap, profile radius, airfoil and other feature dimensions.

Extended report capabilities including customizable report layouts, automatic report generation, and export to Adobe PDF Integrated Statistical Process Control. User-friendly macro-programming language for advanced process customization



Repeatable operator-driven measurement workflows



Offers a complete toolset for large-volume metrology

POLYWORKS|MODELER™ Point Cloud Reverse Engineering

True Interoperability between Digitized Polygonal Models and CAD/CAM Applications



Leverage on your Professional CAD/CAM Software

Comprehensive tools for extracting optimal CAD entities – curves, surfaces, parametric sketches and prismatic features – from polygonal models of digitized parts as starting point in your professional CAD modeling solution.

Supports all high-density point cloud digitizers with complete alignment toolbox. World's best adaptive-meshing with distributed processing capability. Total polygon-editing toolbox. Rapid NURBS surfacing. Parametric 2D sketching. Advanced interoperability with CAD/CAM applications. Extreme graphical user interface. Fully customizable menus and toolbars. Free PolyWorks Viewer™ for information sharing with PolyWorks|Inspector projects.



POLYGON MODELING

Transforming digitized point clouds into surface-based polygonal models, also called meshes. Polygonal models are more compact, more accurate, and less noisy than raw point clouds and are directly handled by industrial applications such as milling, 3D printing, and aerodynamic simulation.



SURFACE MODELING

NURBS surfaces are lightweight representations of simple geometric features and complex organic shapes commonly used to replicate and transfer surfaces of polygonal models built from digitized point clouds to CAD/CAM software. Offers intuitive curvature-driven NURBS surfacing approach that generates superior surface continuity, smoothness, and accuracy.



SOLID MODELING

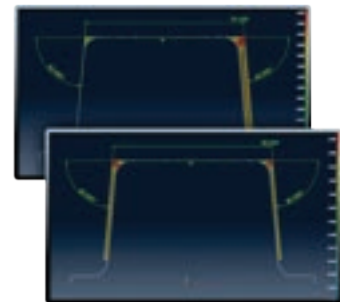
A fundamental building block in a solid modeling workflow is the parametric 2D sketch. Optimizes extraction of geometric entities on digitized polygonal models to create parametric 2D sketches that serve as the starting point in your CAD solution for generating parametric, associative, and fully editable solid 3D CAD models.

Design Intent Capture from Reverse-Engineered Dimensions

Dimension creation on parametric 2D sketches. Automatically sketch optimization via imposing dimensions to minimize part deviations. Import native sketches to CATIA, NX, Creo, SolidWorks, Inventor Pro CAD, etc



Sketch import to professional CAD solutions



Minimization of part-to-sketch deviations

POLYWORKS|MODELER™ Package

	Premium
Standard for Premium Packages	Portable Point cloud digitizer support, Portable Single-point measuring device support, Real-time quality meshing and offline point cloud meshing, Polygonal editing, Parametric sketching, NURBS surfacing, and 1-year support

POLYWORKS|REVIEWER™ 3D Inspection Projects Review

Brings 3D Measurement Results in the Hands of Engineering and Manufacturing Teams

Sharing 3D inspection projects within your organization and network of suppliers! Project reviewing solution that empowers manufacturing specialists to analyze 3D measurement results and investigate dimensional issues, sharing dimensional analysis conclusions to provide invaluable feedback on manufactured parts and performance of the manufacturing process directly in 3D.



Free PolyWorks|Reviewer for sharing results and measurement database information with team

Review inspection projects in a few clicks: Identify the source of dimensional issues by reviewing controlled dimensions and color maps in 3D, first-article inspection reports, multipiece statistics, and more.

Investigate dimensional issues: Search, sort, and filter controls to highlight issues and analyze deviations by changing alignments, magnifying 3D vectors, editing color scales, and more.

Communicate findings enterprisewide: Create additional dimensions and controls, 3D views, snapshots, tables, and reports. Then share the value-added inspection project with decision makers.

POLYWORKS|TALISMAN™ Shop floor productivity in your palm

Smart Remote Control that Boosts Measurement Efficiency on the Shop Floor.

Secure remote control application with real-time audiovisual feedback: Allows measurement specialists to operate PolyWorks|Inspector™ from mobile computing devices, through a secure Wi-Fi connection. Work more efficiently by eliminating those back-and-forth trips to the computer. Just take your smart phone or tablet and your 3D measurement device to the parts to be inspected, and control your measurement session from beginning to end.



Control PolyWorks® remotely: Connect to your probing or laser-scanning device, configure measurement modes and parameters, and launch probing and scanning operations, while staying next to the inspected part.

Get live feedback anywhere: See the 3D Scene display during your scanning and probing measurement session and hear guidance cues in real time, while reading messages and answering questions directly.

Enjoy peace of mind: Experience total confidentiality thanks to encrypted communications, no connection to Internet or any other computer, and no proprietary information stored on the mobile device.

KinAiry Interim Field Check for Laser and Optical Trackers

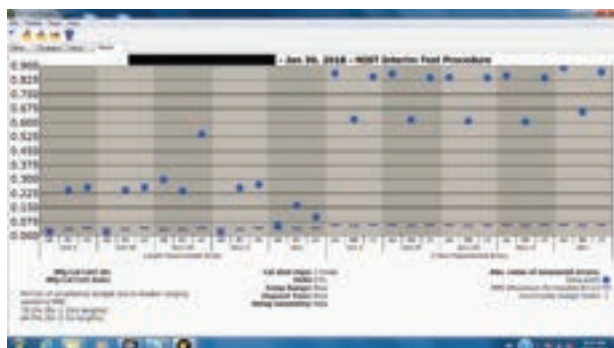
How is Your Tracker Performing Right Now?



Why IR-8016?

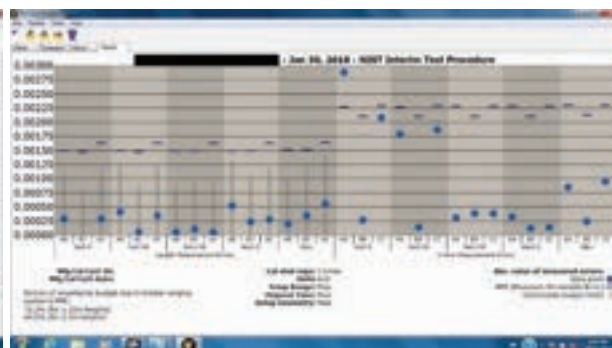
- Evaluate Tracker before & after calibration
- Labor hours saved by reducing field errors via 30 minute NIST test on every tracker, every month?
- Rework hours saved by not having to retake incorrect measurements?
- Hours saved by producing monthly interim NIST tests, if failure is noticed in between calibration
- Best Practice Procedure to determine Cal cycle based on independent solution controlled by you!

KinAiry – before running compensation routine



Example: Data values ran out on high side. To capture all data points, the scaling plot vertical axis is compressed, dropping the MPE line

KinAiry – AFTER running compensation routine



Interim Field Testing of a Laser Tracker's 3-D Length Measurement Capability based on B89.4.19

KinAiry is an independent laser tracker evaluation solution based on NIST's Interim Field Test Procedure IR-8016. Comprehensive testing with measurement sets taken on a 2.3m calibrated scale bar used as a traceable reference artefact per B89.4.19 in strategic orientations located to fully exercise both the ranging and angular measurement components of a tracker. Volumetric performance results are presented in colour graphical analysis above, showing the overall health of your tracker.



- 1 Positioner
- 2 Mirror and Gimbal Mount
- 3 Software Flashdrive
- 4 Spanner Wrench
- 5 EasyConnect Base
- 6 Retroreflector Counterweights (2)
- 7 Position and Accessories Case
- 8 Length Artefact Case

KinAiry	
Artefact Length 2.43m	Artefact Rotation: 360° with 45° stops
Positioner / Length Artefact weight	11.2kg / 12.8kg
Packed Small Case / Long Case weight	21.2kg / 42.7kg

TetraLock™ Industrial Stand

Ultimate stability via pre-stressed tetrahedron structure with no possible joint movement when locked in open position.

Light 9.6kg. Check in as luggage, store in car trunk and use on tables/platforms. 119cm adjustable height via quick-action levers. Extend/retract each telescoping leg with handy index guide.

Cross-braces rotate down and “snap” in place for easy set-up.

TetraLock Lite provides the same ease of use and portability without the ultimate rigidity - only 7.3kg with 119cm max height. Deploys rapidly by tightening a locking plate under its mounting ring.



TetraLock

TetraLock Lite



EasyConnect™



Point Feet



Wheels



Laptop Shelf

M-Series Lightweight Portable Stands

Available in aluminium or graphite (lower weight and better thermal stability) double upper legs; with an adjustable instrument column or an adapter fixed directly to the tribrach at the top of the stand (increase lateral stability when fine vertical adjustment is not necessary). The stand height is adjustable by extending and locking the lower legs.

The M-series is also available in short or tall (longer double upper leg section and adjustable instrument column to provide the additional height) versions.

The lower legs are equipped with interchangeable trivet point or swivel pad feet (with thin, textured bottom rubber pad). The points work well on uneven surfaces; the pads on smooth or soft surfaces to resist sliding. Pads are outfitted with a hole for semi-permanent mounting.



M-Series Stand



Fixed Instrument Mount



Adjustable Height Collar



Trivet Point Feet



Swivel Pad Feet

231 Series Heavy Duty Stands **Short Mobile Stand**

The classic 231 series general use stand comes in 71cm to 107cm height configurations. A “hollow” version with unobstructed vertical path through the centre of the stand is available.

Use for Portable-CMMs, laser trackers, scanners and laser alignment devices, particularly when working with surface plates, machine tables, way checking and assembly operations. Stability is very well maintained. Drop-down casters are located under the heavy-duty tribrach base, engaged or released by a foot pedal for shop floor mobility. An air-check mechanism provides backup protection to prevent sudden drops of the instrument column in case the collar lock and main handle are released simultaneously while disengaging the ratchet pawl.



STASIS **Scanning Instrument Positioner**

STASIS is the only gimbal-style instrument mount that allows you to directly reposition your scanner point-to-point, adjusting the roll, pitch and yaw of your shot, within a 10ft horizontal range and a maximum 8ft height.

Typical industry stands require mounting your scanner in a fixed position. With STASIS, you could have already taken at least three shots within the same time, without moving the base!



Max Instrument Weight	15.5kg
Horizontal Reach	3,048mm
Max Height	2,438mm
Min Height	356mm
Axes of Movement	6 rotations / Base (azimuth) – 360° / Hand (roll, pitch, yaw) – 360°
Weight excluding Base	45kg

Thermally Stable Invar Scale Bars

Invar material provides a thermally stable reference length during laser tracker or scanner jobs. A low thermal expansion (LTE) scale bar is also available as an option.



1.5LRB Length Reference Bar for laser tracker or scanner jobs. NIST-traceable certification to $\pm 0.003\text{mm}$; length of bar within $\pm 0.79\text{mm}$ of length. Max Length: 2.3m



1.5LTE-1000MM low thermal expansion Length Reference Bar. Length within 1.5mm of 1 meter with expanded uncertainty of $\pm 0.007\text{mm}$ at 95% confidence interval

Target Holder Kits

Laser tracker target holder kits fitting 0.5” and 1.5” reflectors to measure the position of holes, edges, corners, surfaces, diameters, etc. Made of hardened stainless steel, certified and serialized. In English (THK-CE) and Metric (THK-CM) units.

Approx. weight of Case and contents: 3.2kg; Case: Foam-lined, injection molded, waterproof.



THK-.5E or THK-.5M
for 0.5” Reflectors



THK-1.5E or THK-1.5M
for 1.5” Reflectors

In-Line Check Weighing



Anritsu KWS6412BF12 High Accuracy Checkweigher



Anritsu KW9314AW3G Side-Belt Checkweigher

In-Line X-Ray Inspection



Anritsu KXE7534AWHZE Dual Energy Sensor Technology



Anritsu KXE7514BWELE Side-View X-Ray Inspection

In-Line Metal Detection



Anritsu M6 Series Metal Detector for metal contaminants



Anritsu M6-h Large Metal Detector

Advanced and Precision Metrology



GE Phoenix v|tome|x m with robot 3D X-Ray CT for Analysis and Metrology



Alicona InfiniteFocus G5
Optical 3D Micro-CMM



Accretech Surfcom NEX
2-in-1 Roughness/Contour Tester



Accretech XYZAX AXCEL CMM



Accretech Rondcom NEX
Roundness Measuring Machine



Nikon NEXIV VMZ-R Series
CNC Video Measuring System



Starrett HDV300
Telecentric Projector



OSK CLP -35DDS
Gear Tester

Software Solutions



Volume Graphics VGStudio



GE Phoenix data|x

Pre- and Post-Sales Support includes: -

- Software Applications & Measuring Related Services
- Preventive Maintenance and Repairs
- Retrofits and Upgrades of Pre-Owned Machines
- Performance Verification and Calibration

ISO/IEC 17025 CALIBRATION LABORATORY ACCREDITATION

We are certified to ISO/IEC 17025:2005 Laboratory Accreditation in Singapore, Malaysia, Thailand and Philippines by SAC-Singlas and in Indonesia by Komite Akreditasi Nasional for the calibration in general of CMMs (contact and non-contact), Surface Roughness, Contour and Roundness Testers, Profile Projectors and Universal Length Microscopes.

For Thailand and the Philippines, portable coordinate measuring machines are also included in our accredited scope. Additional measurement equipment and procedures will be further added with time to the accredited scope.



OUR MANAGEMENT COMMITMENT

Our **Vision** is to be your trusted metrology solutions partner of choice via our **Mission** to support your quality quests with appropriate metrology solutions and competent pre- and post-sales technical support throughout the solutions' useful lives.



Our Group Managers, Malaysia, November 2019

The International System of Units (SI)

Length – metre (m): the path length travelled by light in vacuum during a time interval of $1/299792458$ of a second; commonly realised through the wavelength of the 633nm radiation from a helium-neon laser stabilised against a spectral line of iodine molecules, based on the formula $\lambda o = c/v$ where c is the speed of light in vacuum defined at 299792458 m/s and v is the measured frequency of the radiation used.

Mass – kilogram (kg): the unit of mass, equal to the international prototype of the kilogram, made of platinum-iridium and kept at the International Bureau of Weights and Measures (BIPM) in Paris. International standardisation is carried out using precision comparators, combinations and sub-multiples of the 1kg masses of similar materials.

Time – seconds (s): the duration of 9192631770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium-133 atom; realized using caesium atomic clocks, where quantized caesium energy levels provide a source of resonance frequency, which is then phase-locked to a quartz oscillator to produce a very precise frequency (with a good long-term stability) to define the second.

Thermodynamic temperature – Kelvin (K): the unit of thermodynamic temperature (symbol T), is the fraction of $1/273.16$ of the thermodynamic temperature of the triple point of water. T at 273.16 K, also defined as 0.01°C in Celsius temperature (symbol t), is realised by the use of the water triple point cells, from which other temperatures are related through the International Temperature Scale of 1990 (ITS-90).

Electric current – ampere (A): that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 metre apart in vacuum, would produce between these conductors a force equal to 2×10^{-7} Newton per metre of length; realised through the *volt* and the *ohm* representations determined using the Josephson effects of super-conductivity and the quantised Hall resistance (von Klitzing constant) respectively.

Amount of substance – mole (mol): the amount of substance which contains as many elementary entities as there are atoms in 0.012kg of carbon 12. The elementary entities must be specified and may be atoms, molecules, ions, electrons, other particles, or specified groups of such particles. The mole is most accurately realised through the determination of the Avogadro Constant by primary methods such as isotope dilution mass spectrometry.

Luminous intensity – candela (cd): the luminous intensity in a given direction of a source that emits monochromatic radiation of frequency 540×10^{12} hertz and has a radiant intensity in that direction of $1/683$ watt per steradian; realised using a cryogenic radiometer that measures optical radiant power based on the thermo-equivalence of the heating effect of optical radiant power with that of electrical power. A solid-state photometer with a relative spectral responsivity simulating the spectral efficiency function $V(\lambda)$ of the human eye, calibrated directly against the cryogenic radiometer, is used to evaluate light of other frequencies in the visible spectral region.

20 May 2019 Redefinition of the SI Units

From 20 May 2019, the SI units will be revised in terms of 7 defining constants that describe the natural world:

Base Unit	Defining Constant	Constant Values	Unit
Kilogram kg	Planck Constant	h	$6.62607015 \times 10^{-34}$ J s
Meter m	Speed of Light in Vacuum	c	299 792 458 m/s
Seconds s	Unperturbed ground state hyperfine transition freq. of Cs133 atoms	$\Delta\nu_{\text{Cs}}$	9 919 263 177 Hz
Ampere A	Elementary Charge	e	$1.602176634 \times 10^{-19}$ C
Kelvin K	Boltzmann Constant	K	1.380649×10^{-23} J/K
Mole mol	Avogadro Constant	N^{A}	$6.02214076 \times 10^{23}$ mol ⁻¹
Candela cd	Luminous efficacy of monochromatic radiation of freq. 540×10^{12} Hz	K_{cd}	683 lm/W

The SI base units will then be derived from the defining constants or from 22 important derived units derived from the constants and maintained for consistency per the ISO/IEC 80000 International System of Quantities (ISQ).

The highest-level experimental methods used for the realization of units by the equations of physics are now known as primary methods. The new definitions allow freedom to choose equations of physics for the realization with the defined constants of unit quantities to be measured for limitless improvements in measurement accuracies.