



Handheld Probe Coordinate Measuring Machine

NEW XM-5000

Portable, Benchtop CMM

High-accuracy measurement over a large area; on or off the system



Overcome conventional limitations with a new kind of CMM

High-accuracy measurement for palm-sized parts to large applications

Benchtop measurement for small parts



Portable for large part measurement



Adaptable to your
workbench



In-machine measurement



Your Personal Coordinate Measuring Machine

Handheld Probe Coordinate
Measuring Machine

NEW XM-5000



Anyone

Built-in touch sensor for even greater ease-of-use

Easy-to-use free-angle probe

On-screen measurement guidance

Visual measurement overlay

Minimal training time

Simple interface

Anywhere

Measurement capability for any situation

Adaptable camera system

High-accuracy measurement in any environment

Ultra-robust camera and temperature compensation function

Hand tools



Advantages

- Easy to use by anyone
- Can be used anywhere

Disadvantages

- Unable to measure complex shapes
- Unable to measure GD&T
- Measurement results vary between operators

Bridge CMM



Advantages

- Measure complex shapes
- GD&T measurement
- High-accuracy

Disadvantages

- Difficult to operate
- Usable only in a specialized measuring room
- Ongoing costs

The XM-5000

Designed with advantages in mind

- As easy-to-use as calipers
- Can be used anywhere
- Can perform complex measurements anywhere
- High-accuracy measurement by anyone



Dual-camera probe marker tracking

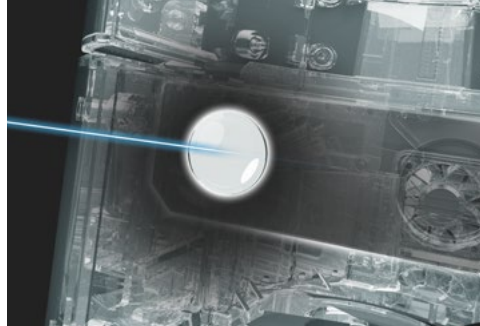
The XM-5000 adopts a new concept with a tracking camera that captures near-infrared light emitted by seven markers.

The probe search camera also enables measurement over a wide-area.

Probe position detection

Wide-area probe search camera

The probe search camera constantly tracks the light emitted by the probe to instantly detect the probe position anywhere within the wide measurement area.



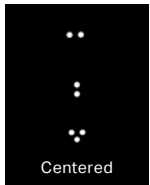
Probe position measurement

High-accuracy tracking camera

The tracking camera tracks the probe to identify its position and orientation with high accuracy.



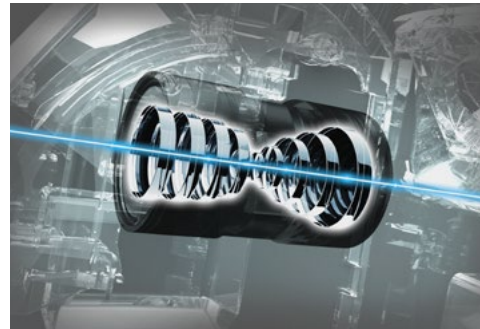
Tilted to the left



Centered



Tilted to the right



New measurement principle for high-accuracy over a wide-range

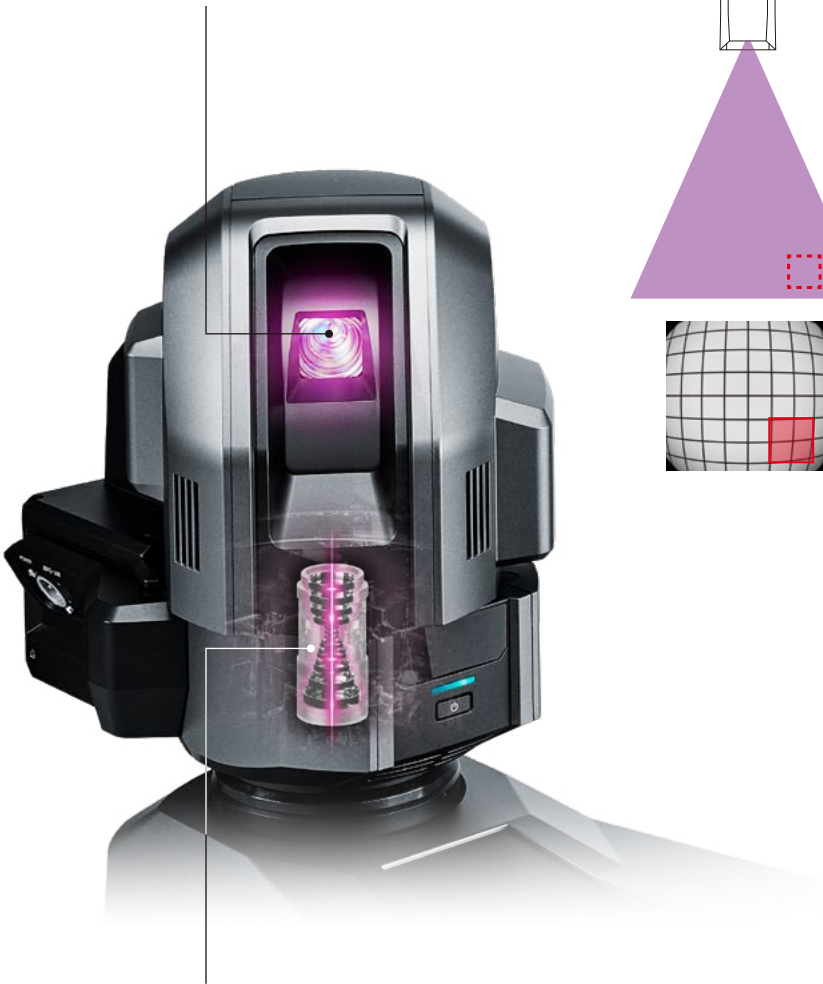
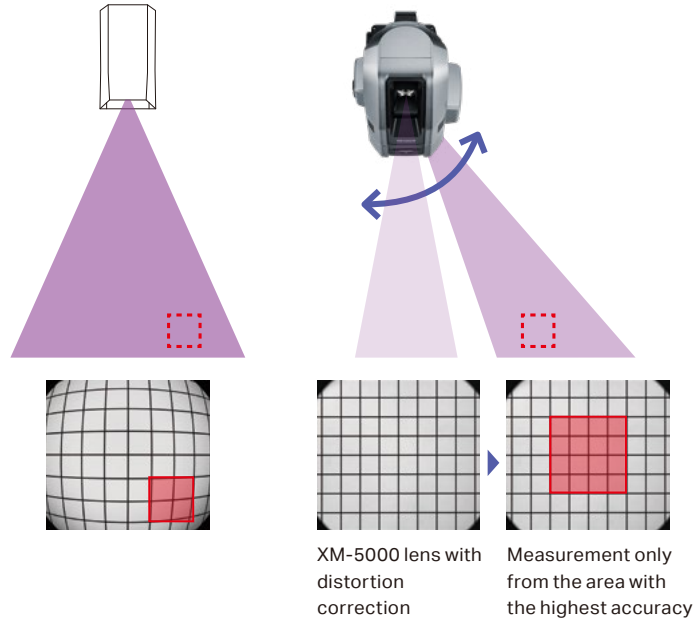
High-accuracy Repeatability: $\pm 3 \mu\text{m}$

Capturing from the lens center for the highest accuracy

The camera unit moves to ensure the marker is always captured from the center of the lens for measurement with the highest possible accuracy.

■ Conventional camera

■ XM-5000 camera



Reference camera for high-accuracy vertical and horizontal rotation measurement

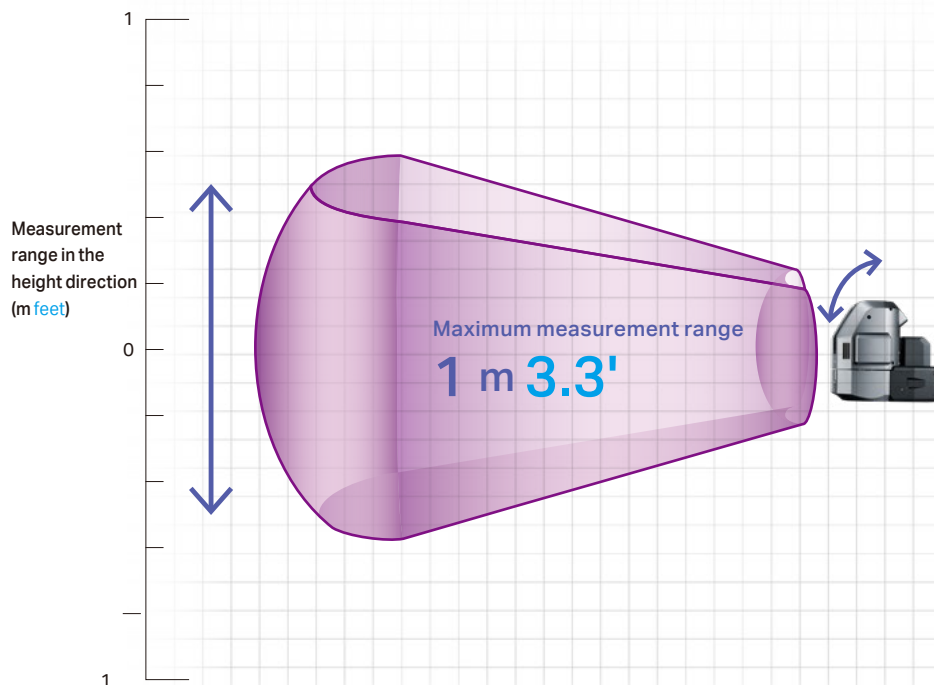
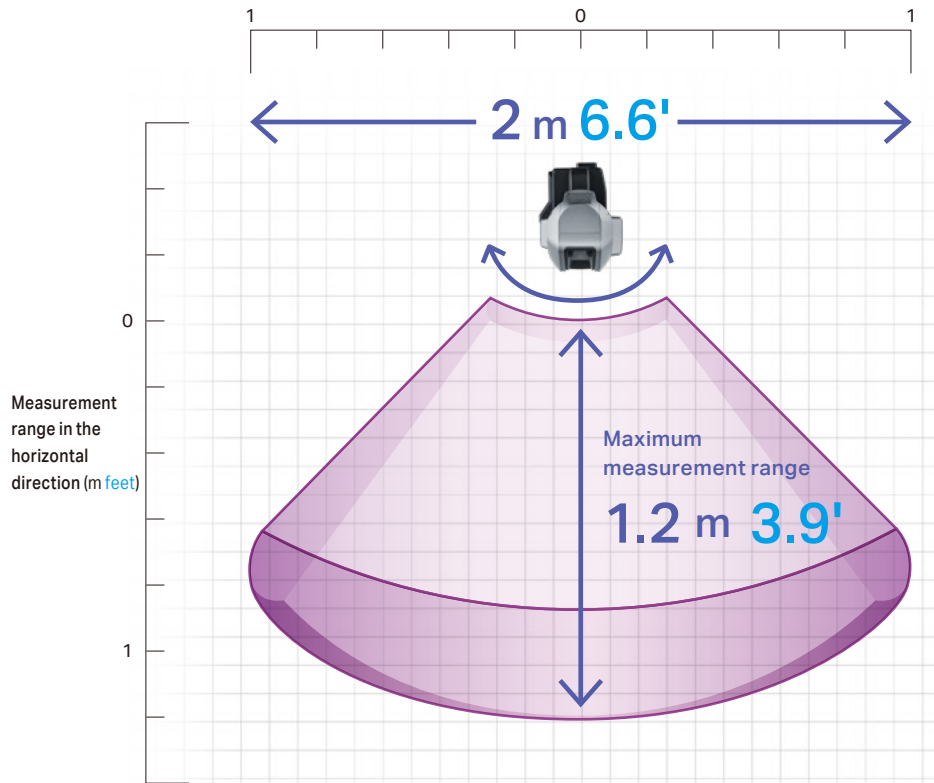
The internal chart and camera are used for detecting motion, allowing for high-accuracy measurement of the vertical and horizontal rotation of the tracking camera.



Wide-area Maximum measurement range: 2 m 6.6'

Movable camera for stable measurement even for large targets

The camera can move up to 40 degrees to the left or right and up to 25 degrees up or down, enabling measurement over a wide area.



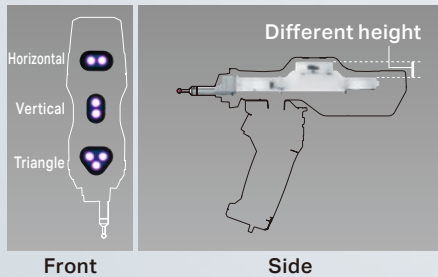
Anyone

Easy-to-Use Free-Angle Probe

Easy-to-use free-angle probe designed for improved usability and accuracy

Probe marker position

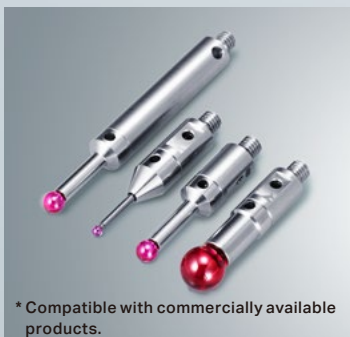
Placing markers horizontally, vertically, in a triangle, and at different heights allows for stable measurement accuracy.



OLED display



Wide-variety of stylus options



Operation buttons



Probe detection status confirmation LED

Flexible-grip wireless probe with touch sensor for intuitive, accurate measurement

NEW Touch sensor

The built-in touch sensor is specially designed to activate when a certain amount of contact pressure is applied. This prevents variations due to contact pressure.



NEW Wireless

Wireless LAN connectivity makes it possible to use the probe in any setting without fussing with cables.



NEW Adjustable grip

The handheld grip can be rotated 90 degrees to either side, allowing for a more comfortable hold while the angle of the markers can be adjusted to face the camera.

Free-angle probe for intuitive handling

As long as the probe is within the camera's field of view, measurement locations can be approached from any angle. The probe can be used to measure the top surface of parts, horizontal or angled holes, and the rear with no part adjustment.

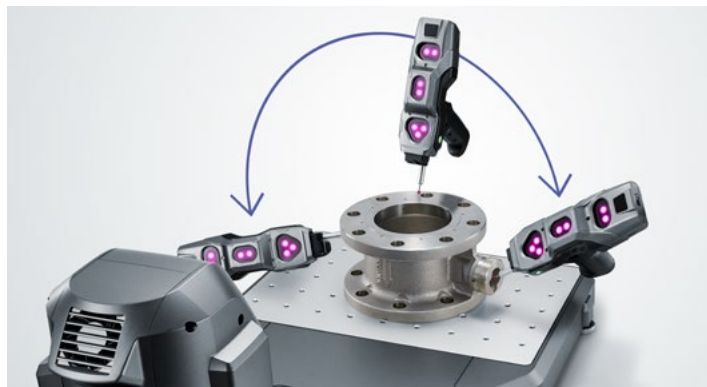


Image-based measurement results for easy visualization



Small probe camera

The camera captures images of the target.

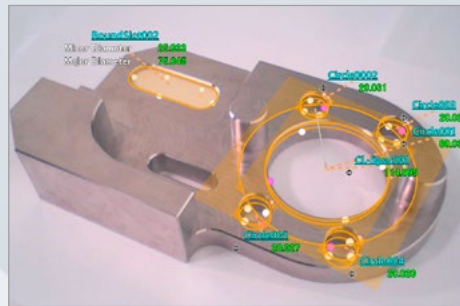


+

As measurement is performed...

Circle001/Dia... 80.047mm OK	Circle003/Dia... 20.027mm OK
Circle002/Dia... 20.036mm OK	Circle004/Dia... 20.023mm OK
Distance001/D... 57.513mm OK	Circle005/Dia... 20.031mm OK

...the measurement results are displayed in real-time on the captured image.



Easy-to-understand measurement results



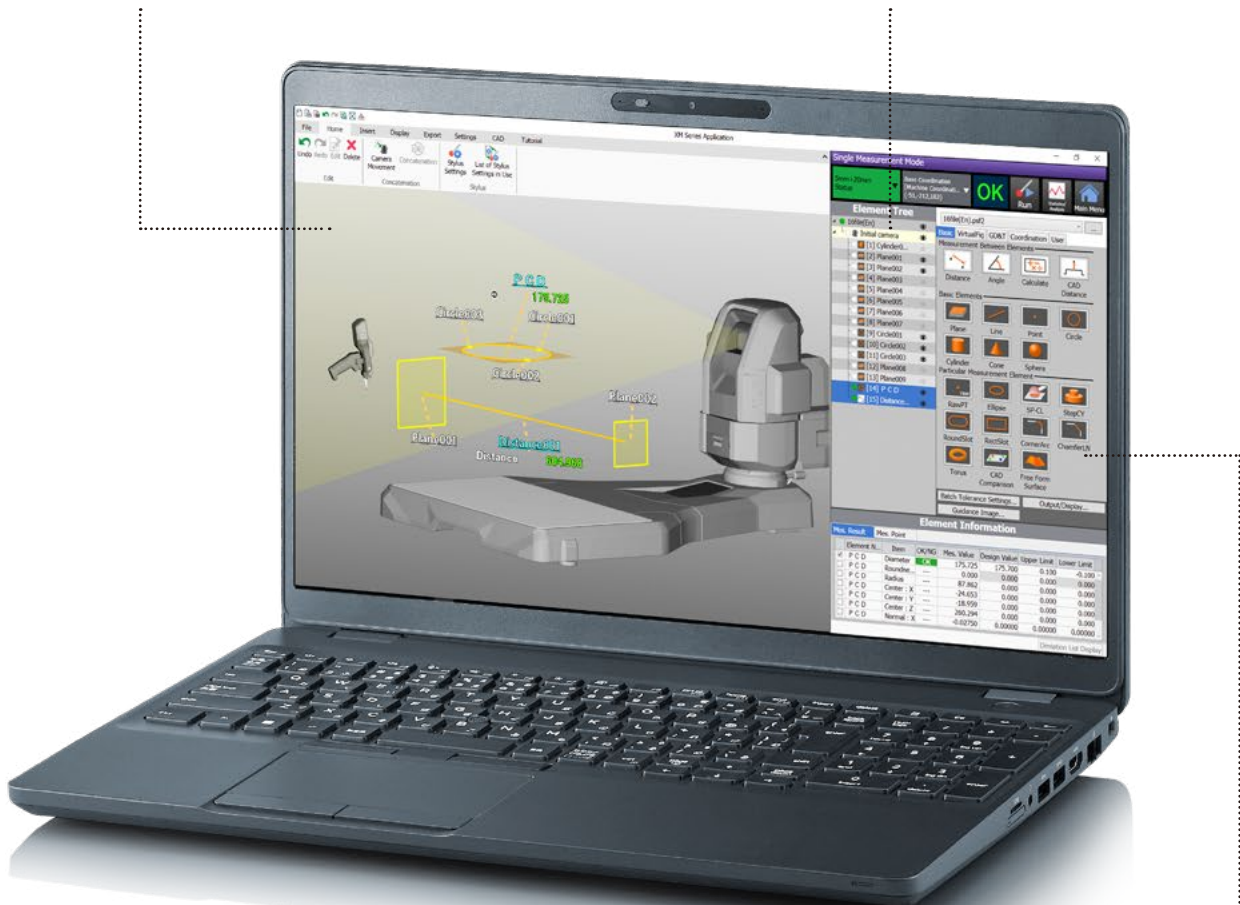
Easy-to-use and understand, even for first-time users

Coordinate measuring machine interfaces are often a mess of complex and unfamiliar commands. The XM-5000, however, uses images, icons, and other tools to ensure intuitive operation for any user.

Measurement results display

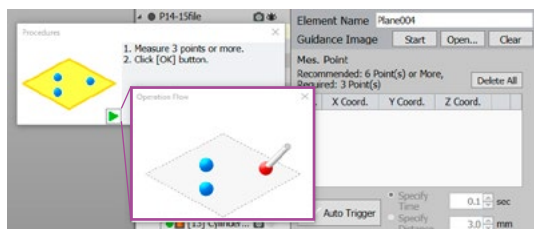
Sortable elements tree

Drag measured elements up or down to change the order.

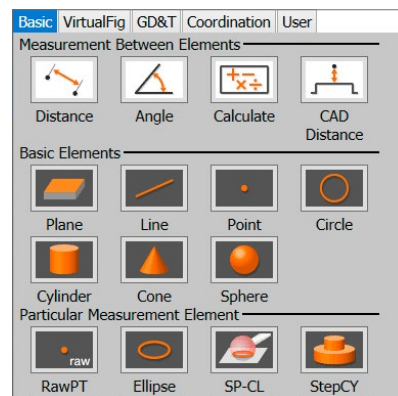


Easy-to-understand basic measurement menu

Frequently used basic measurement elements such as planes, lines, points, circles, cylinders, cones, and spheres are consolidated into a single tab. Each tool also comes with video instructions.



Clicking the ► button on the screen will bring up a window showing video instructions.



Simple interface for intuitive operation

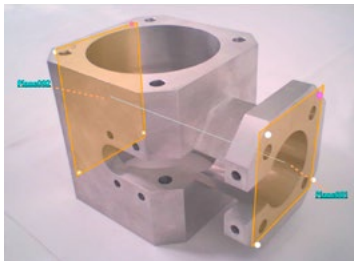
Measurement can be performed without any complicated programming or selecting multiple commands with just three simple steps.

The intuitive operation makes it possible even for those unfamiliar with measurement to obtain measurement results easily.

- 1** Select the elements to measure.
- 2** Touch the probe to the measurement location.



Click Plane from the Basic Elements in the measurement menu.



- 3** Simply the items to measure.



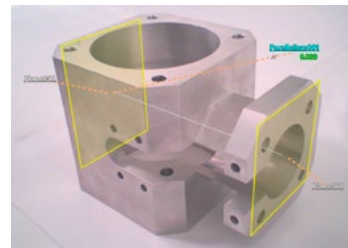
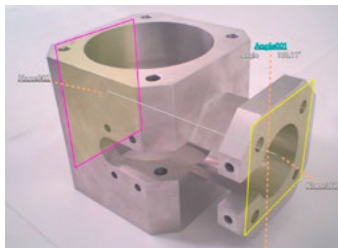
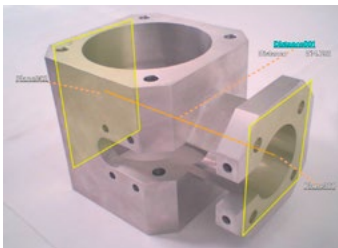
Distance measurement



Angle measurement



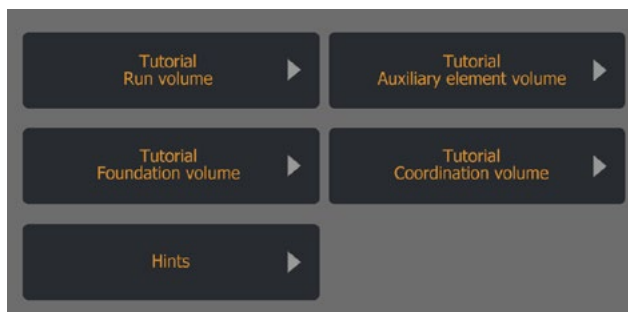
Parallelism measurement



Tutorial function

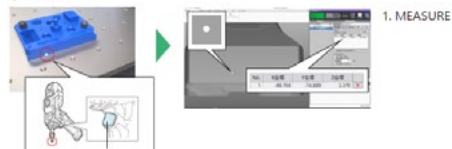
The tutorial function provides easy-to-understand measurement instructions with images.

This allows even first-time users to check measurement methods without having to look at the manual.

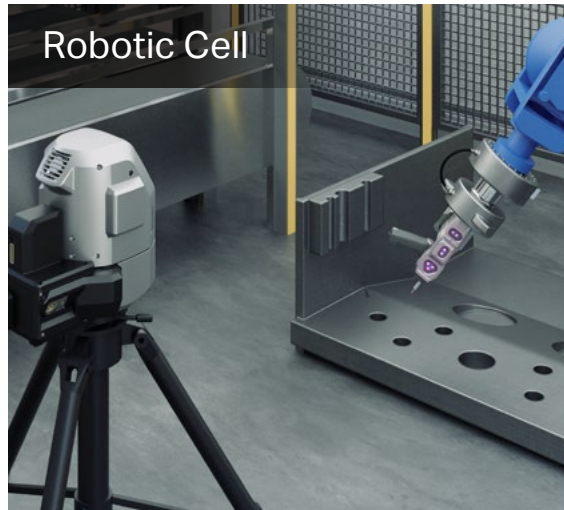
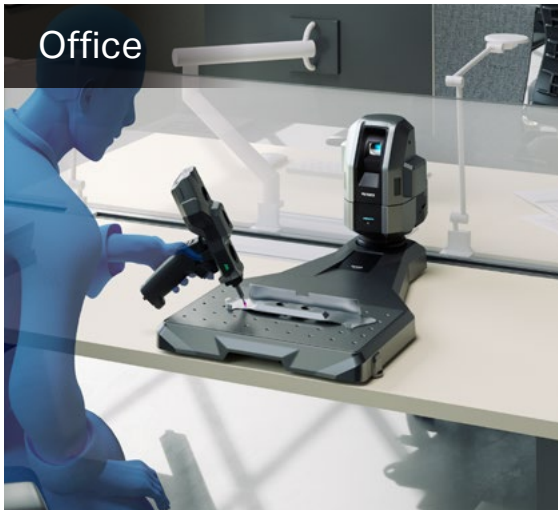
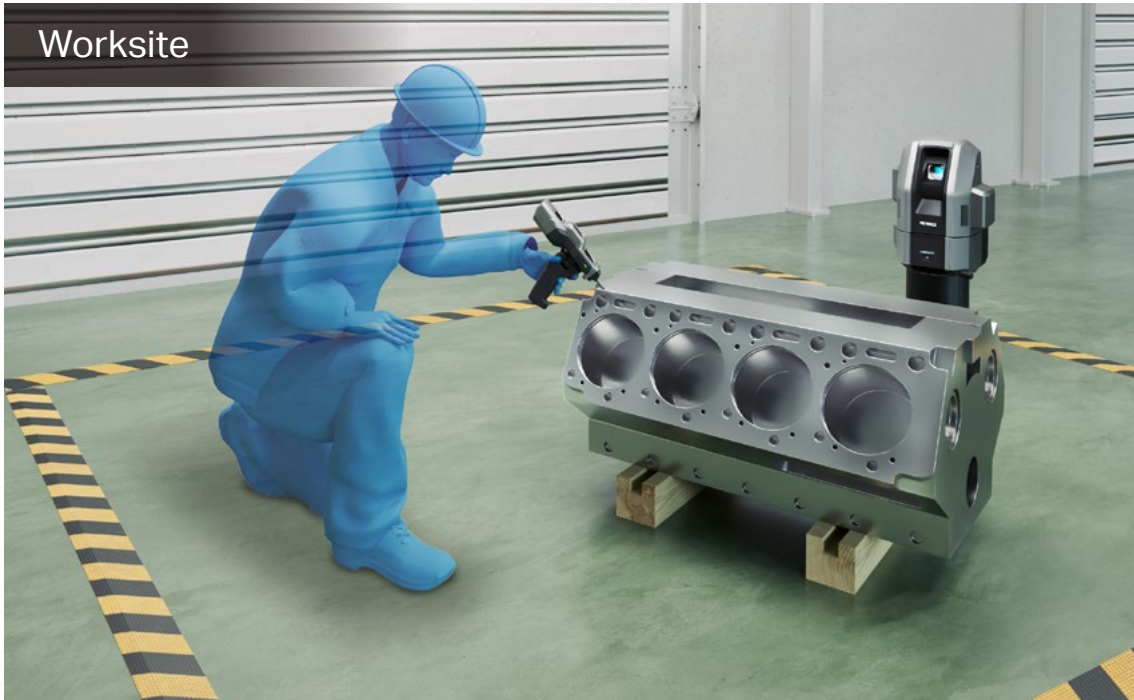


Let the stylus of the probe contact the object and stage surface near the red circle shown in the diagram below and press the [MEASURE] button.

The measurement point will be displayed in the graphic display area and the coordinates of the measurement point will be displayed in the measurement point list.



Measurement capability for any situation



Flexible installation

A wide-variety of available attachments to suit the installation needs of the actual worksite. Whether in an office or on shop floors, the XM-5000 enables measurement in any setting.

■ Stage



Various measurement styles

■ Extension pole



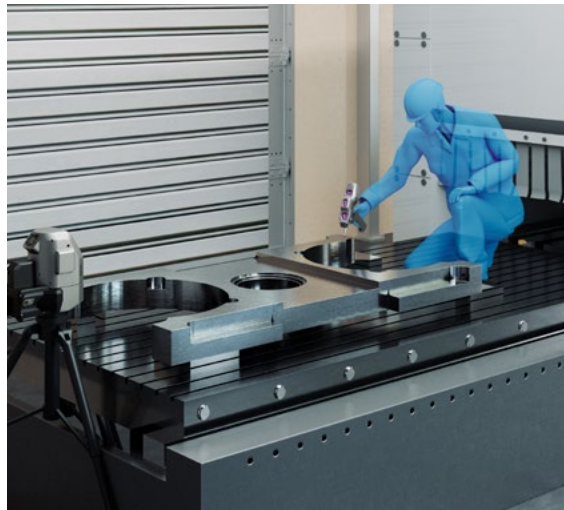
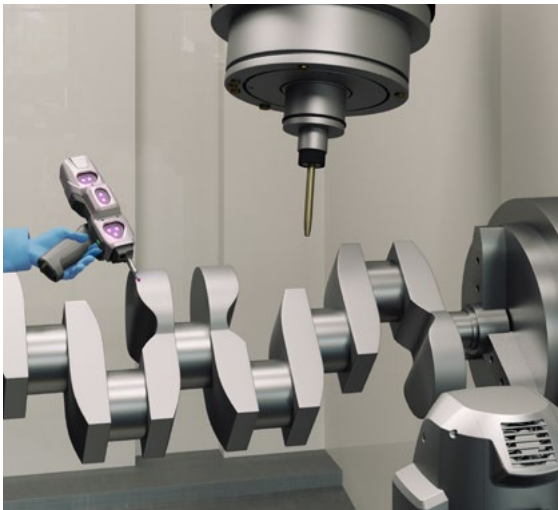
■ Tripod



■ Probe mounting attachment



In-machine measurement



Advantages of in-machine measurement with the XM-5000

Hand tools

- Unable to measure complex shapes
- Unable to measure GD&T
- Measurement results vary between operators

On-device measurement touch probes

- Measurement limited to machining axis
- Difficult to configure measurement settings
- Measurement takes time, so processing takes longer

XM-5000

- High-accuracy measurement by anyone
- Complex measurements and GD&T measurements
- Measurement with a calibrated measuring instrument
- Faster measurement of target locations with less processing stop loss

Anywhere
Environmental Resistance

Install wherever
measurements are needed



On-site usability with no need for a quality lab

Paying close attention to the measurement unit materials and device design, KEYENCE wanted to make a CMM that can be used anywhere. With no need for an environmentally controlled measuring room, the XM-5000 can be installed wherever necessary.



Probe internals (quartz glass)



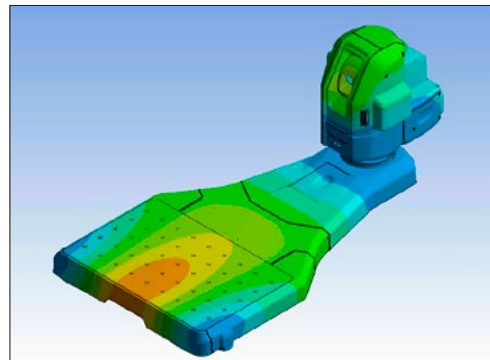
Specially designed ultra-robust camera

Robust design for use in adverse environments

The XM-5000 is designed to be durable and rigid for use even in harsh environments like manufacturing sites.

Built-in environment diagnosis function

A high-accuracy sensor in the camera unit diagnoses whether ambient vibrations will adversely affect measurement.



Accurate measurement even with temperature changes

The XM-5000 includes a temperature compensation function that ensures measurement targets are measured under the same conditions, just like a climate-controlled measuring room, even if the ambient temperature is not constant. Simply select the current temperature and the material, and the device will automatically compensate for the standard temperature dimensions.

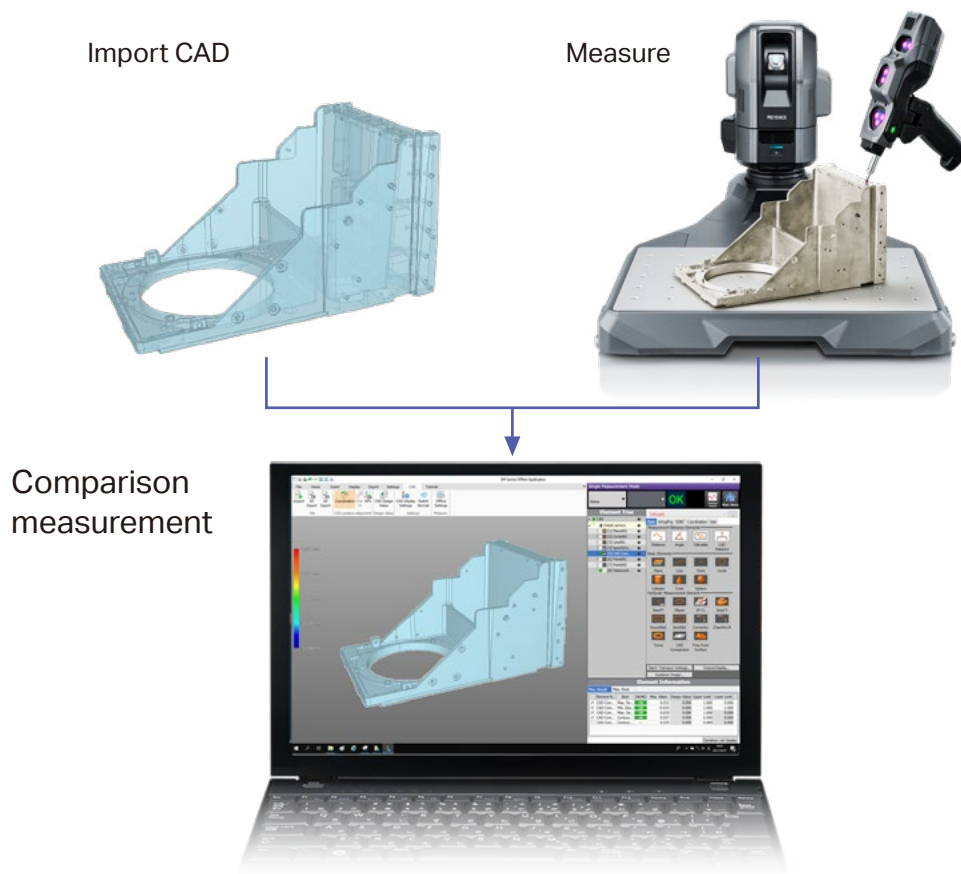
Material	Linear Expansion Coefficient
Iron	11.7
Aluminum	23.1
Copper	16.6
Niobium	26.0
Zinc	33.0
Titanium	8.5
SiC/SiN	17.2
SiC/SiO	10.4
Carbon steel	10.8
Polyethylene	180.0
Polyvinyl chloride	80.0
Polystyrene	80.0
Polycarbonate	70.0
Polyacetal	100.0
Epoxy	62.0
Silica glass	0.6
Soda glass	8.5
Zirconia	10.0
Alumina	7.0
Silicon	2.6

[Temperature Correction]	
Element Name	Temperature Correction001
Guidance Image	Start Open... Clear
Settings	
Current Temperature	23.0 °C
Reference Temperature	15.0 °C
Linear Expansion Coefficient	23.8 ×10 ⁻⁶ /°C
Use the coefficient of the main material...	
Expansion Center Base Coordination Origin	
<input checked="" type="checkbox"/> Enter the temperature during navigation measurement	



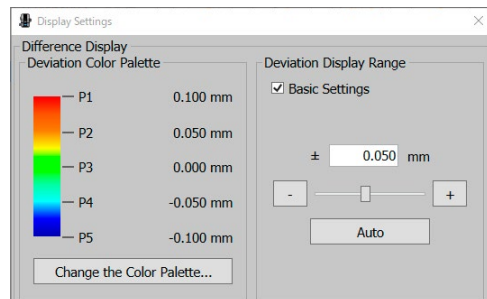
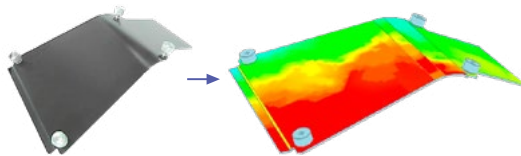
Compare with 3D CAD data

Optional accessory: XM-H5C



Comparison / color map function

Comparative measurement of parts is possible using the shapes from imported 3D CAD files. The points of difference between the target and the 3D CAD data can also be displayed as a color map.



Profile measurement

A surface profile tool has been added to GD&T measurement elements. This tool makes it possible to measure curved surface shapes.



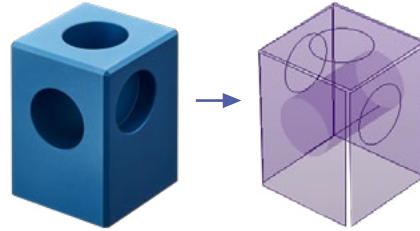
Contour profile

Item	OK/NG	Mes. Value	Design Value
Max. Deviation	OK	0.015	0.000
Min. Deviation	OK	-0.019	0.000
Max. Deviation...	OK	0.019	0.000
Contour Profile	OK	0.037	0.000
Contour Profile...	---	0.034	0.000

CAD data export

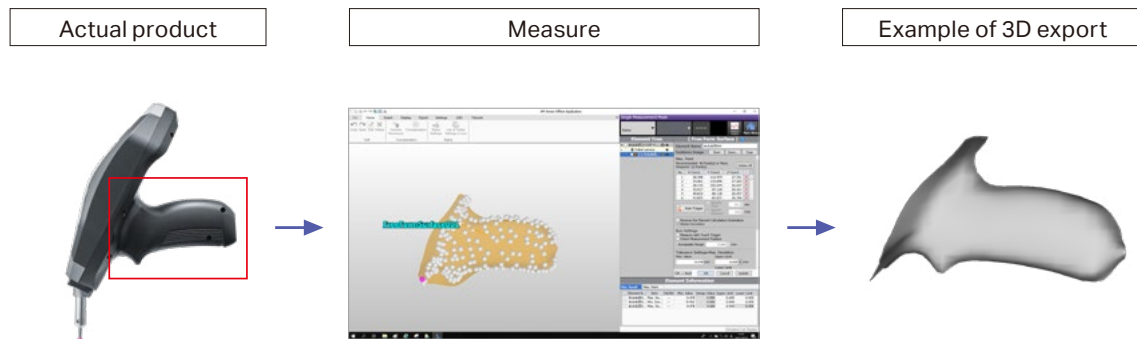
3D CAD export of measured elements

Measured elements such as planes, circles, and cylinders can be output accurately to 3D CAD files.



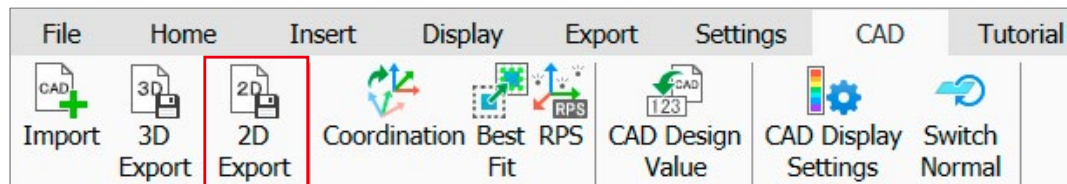
3D CAD export of free-form surfaces

The XM-5000 can measure and output 3D CAD data even with curved objects simply by touching the probe to the part.



CAD export of 2D elements

Circles and straight lines projected on a flat plane and their dimensions can be output as 2D CAD data (DXF files).



Statistical analysis function for summarizing data

Run mode measurement results will be saved automatically to the control PC storage. Saved data can also be extracted for use with various statistical analyses.

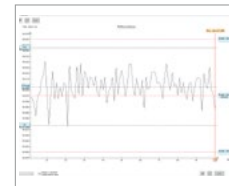
Verification of statistics values

Key statistics values such as pass/fail count, max. value, min. value, average, σ , 3σ , 6σ , and Cpk for selected measurement items can be calculated automatically and displayed.

Item	Type	Max	Min	Average	Standard Deviation	Cpk
1.000	Position	10.000	9.999	9.9995	0.0005	0.999
1.001	Position	10.000	9.999	9.9995	0.0005	0.999
1.002	Position	10.000	9.999	9.9995	0.0005	0.999
1.003	Position	10.000	9.999	9.9995	0.0005	0.999
1.004	Position	10.000	9.999	9.9995	0.0005	0.999
1.005	Position	10.000	9.999	9.9995	0.0005	0.999
1.006	Position	10.000	9.999	9.9995	0.0005	0.999
1.007	Position	10.000	9.999	9.9995	0.0005	0.999
1.008	Position	10.000	9.999	9.9995	0.0005	0.999
1.009	Position	10.000	9.999	9.9995	0.0005	0.999
1.010	Position	10.000	9.999	9.9995	0.0005	0.999

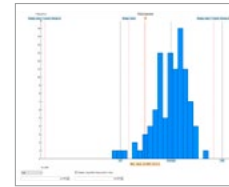
Trend graph

The trends for selected measurement items can be viewed in a graph. This allows for visualization of such trends as increased variation, upward/downward measurement trends, and periodic fluctuations.



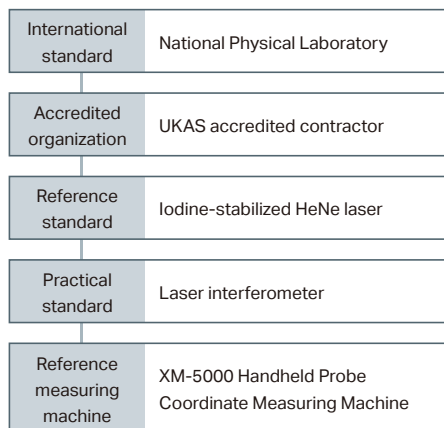
Histogram

The variations for each selected measurement item can be viewed in a graph. The graph, which shows the range of measurements as the horizontal axis and the frequency as the vertical axis, allows users to see whether the measurements are centering on any values in particular and how the measurements vary.



Traceability system diagram

The laser interferometer used for inspection and calibration has been calibrated by a UKAS accredited company for a traceability system that meets international standards.



Calibration certificate

Follow up support

Delivery

After the product arrives, your local system specialist will provide training and assist with system implementation.



Practice material

Improve proficiency by using the practice materials included with the system.



Practice material

Technical support

KEYENCE employs dedicated staff who provide coordinate measuring machine support by phone or email.



Calibration

With the XM-5000, there is no need to worry about periodic calibration. Simply place the probe and camera in the dedicated case and send them to KEYENCE. KEYENCE will provide temporary replacement units (probe, camera) while the original machine is being calibrated.



Dedicated case

Simple stylus calibration

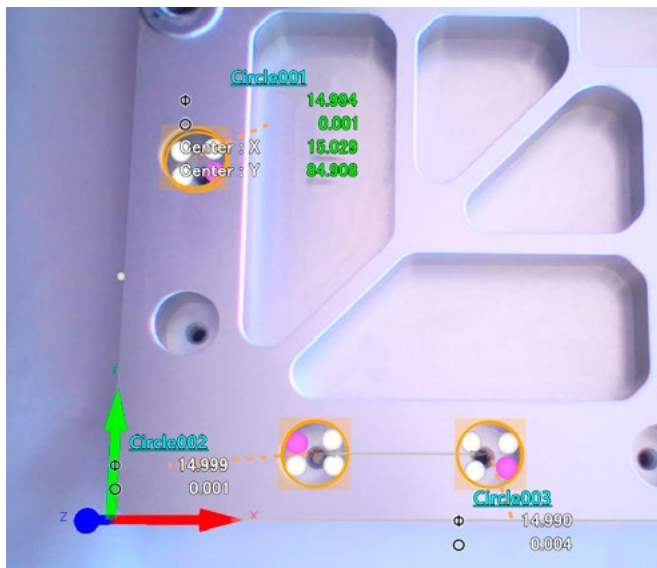
Simply place the stylus ball tip in the cone of the dedicated jig and measure at least 13 different orientations to complete calibration.



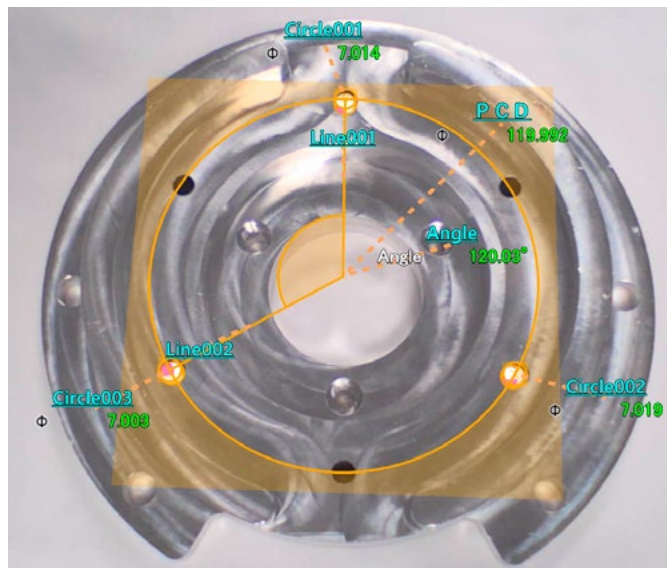
Easy calibration using the dedicated calibration jig

Application Examples

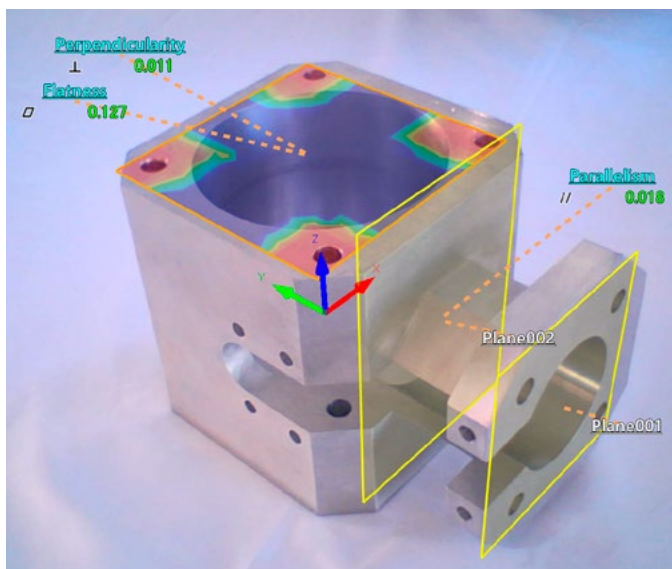
Machined and turned parts



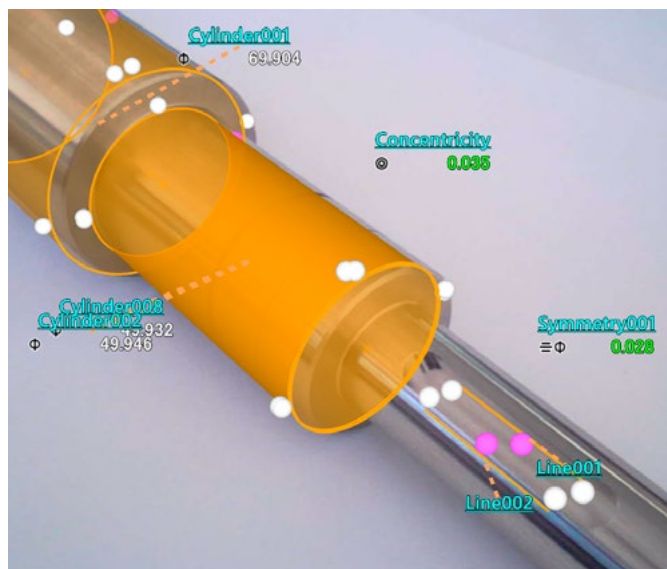
Hole distance, circularity, XY coordinates



PCD, dividing angle

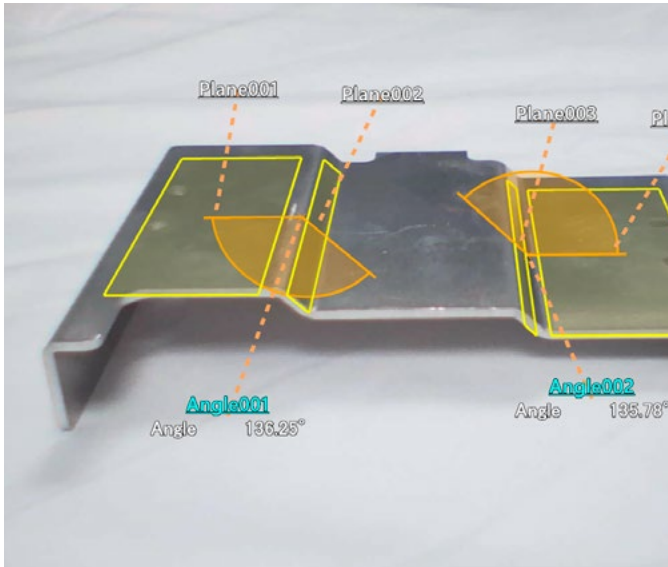


Flatness, perpendicularity, parallelism

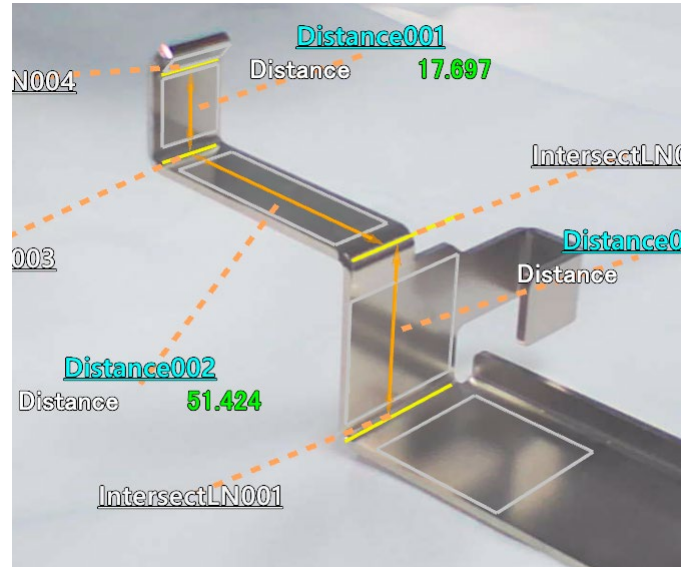


Coaxiality, symmetry

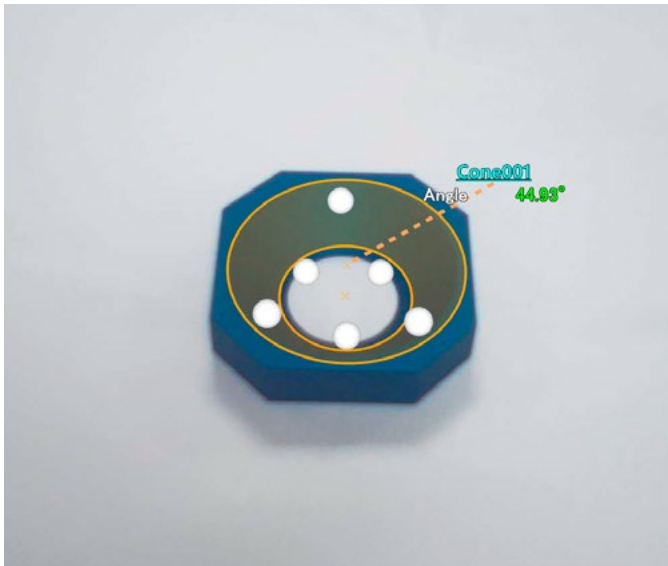
Stamped and plastic parts



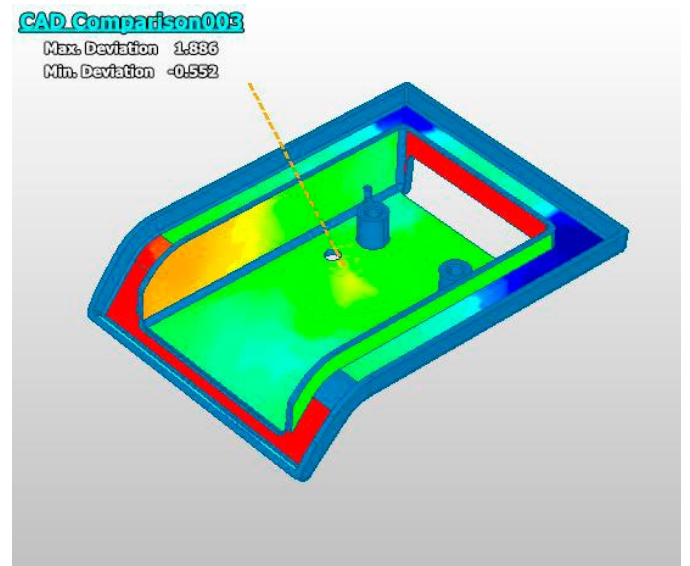
Bending angle



Distance between curved virtual lines



Taper



3D CAD comparison

A small coordinate measuring machine with the power to bring about big changes

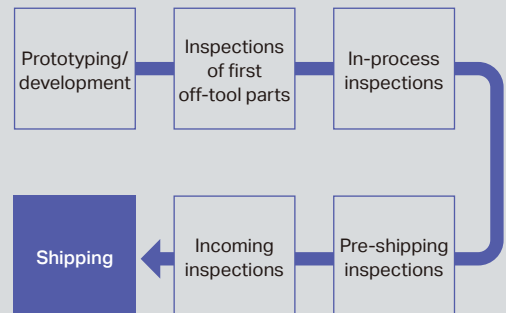
Improved efficiency through quick and accurate inspections

Significantly reduce inspection time by empowering any employee to measure anywhere. This allows for more time dedicated to other critical tasks, enabling shorter delivery times and overall improved work efficiency.



Reduced costs through inspection process improvements

The ability to perform in-house inspection can help improve initial yield rates and reduce costs. Delays before shipping and inspection can also be eliminated by performing prompt inspections and quality evaluations during each process.



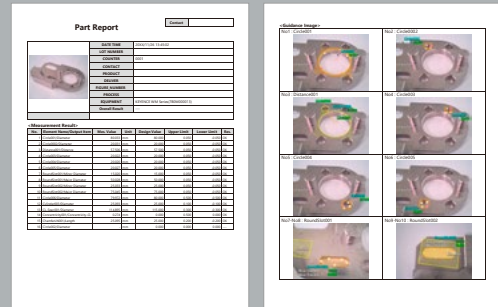
Acquisition of new customers

The more advanced a manufacturing request is, the more important access to a coordinate measuring machine is. Being able to tell customers that you have access to a coordinate measuring machine makes it possible to ensure greater quality and to increase the number of handled projects without having to send work to other companies.



Improved reliability

Manufacturing instructions are becoming more strict every year, and being able to inspect complicated drawing locations can improve reliability with business partners. Moreover, inspection results issued by suppliers can also be reviewed through in-house inspections for greater clarity of process responsibility.



Enjoy even more advantages with the XM-5000



System Configuration

| XM-5000



| XM-5000A



Main unit accessories

ø5 mm ø0.20"
standard stylus
OP-88421



Stylus extension



Star stylus attachment
OP-88658



Probe stand



Stylus
calibration jig



Camera unit
USB cable
OP-88420



Camera unit
AC adapter
OP-88369



Probe cable
OP-88667



Mouse



Training part



External devices

Control
laptop PC



Control
desktop PC



Optional accessories

Probe
battery
XM-B1



Battery
charger
XM-BC1



Camera unit tripod
XM-S1



Camera mounting
attachment
XM-AT



Camera unit
extension pole
XM-EX1



Probe mounting
attachment
XM-RB



ø2.5 mm ø0.10"
small stylus
OP-88701



Auxiliary
measurement tools
OP-88233



Small-diameter
stylus jig
OP-88550



Data transfer
software
XM-H5T



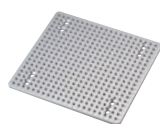
3D CAD import
software license
XM-H5C



Magnetic plate
XM-MP



M6 base plate
OP-88080



Sticky plate
OP-87946



Clamp set
972352



Specifications

I Camera unit

Model		XM-5000	XM-5000A
Maximum measurement length	W × D × H	2000 × 1200 × 1000 mm 78.74" × 47.24" × 39.37"	500 × 300 × 200 mm 19.69" × 11.81" × 7.87"
Indication error accuracy		±(7 + 9L/1000) μm* ¹	±(7 + 9L/1000) μm* ²
Repeatability		±3 μm	
Minimum display unit	Distance	0.0001 mm 0.000004"	
	Angle	0.0001 degrees	
Camera unit rotation angle	Theta rotation	±40°	±25°
	Tilt rotation	±25°	±20°
Weight		Approx. 8 kg 17.64 lb	
External input	2 inputs	Maximum applied voltage: 26.4 V, ON voltage: 19 V or more, OFF current: 0.1 mA or less	
External output	7 outputs (OK/NG/FAIL/MEASURE/ ERROR/TOUCH/STROBE)	Maximum applied voltage: 30 V, Maximum sink current: 50 mA, Leakage current: 0.1 mA or less, Residual voltage: 1.4 V or less (50 mA) / 1.0 V or less (20 mA)	
Probe	Number of possible connections	1	
Communication unit	WLAN communication	IEEE 802.11b/g/n	-
	USB communication	USB 3.0	
	Infrared communication	945 nm	
Power supply		Supplied from dedicated AC adapter	
Rating	Rated voltage	24 VDC	
	Current consumption	1.7 A	
Environmental resistance	Operating ambient temperature	10 to 35°C 50 to 95°F	
	Operating ambient humidity	20 to 80% RH (no condensation)	

*1 Refer to ISO 10360-2 (in the range of 800 × 400 × 500 mm 31.50" × 15.75" × 19.69" and when the ambient temperature is 23°C ±1°C 73.4 ±33.8°F; "L" represents the measurement length (Unit: mm inch))

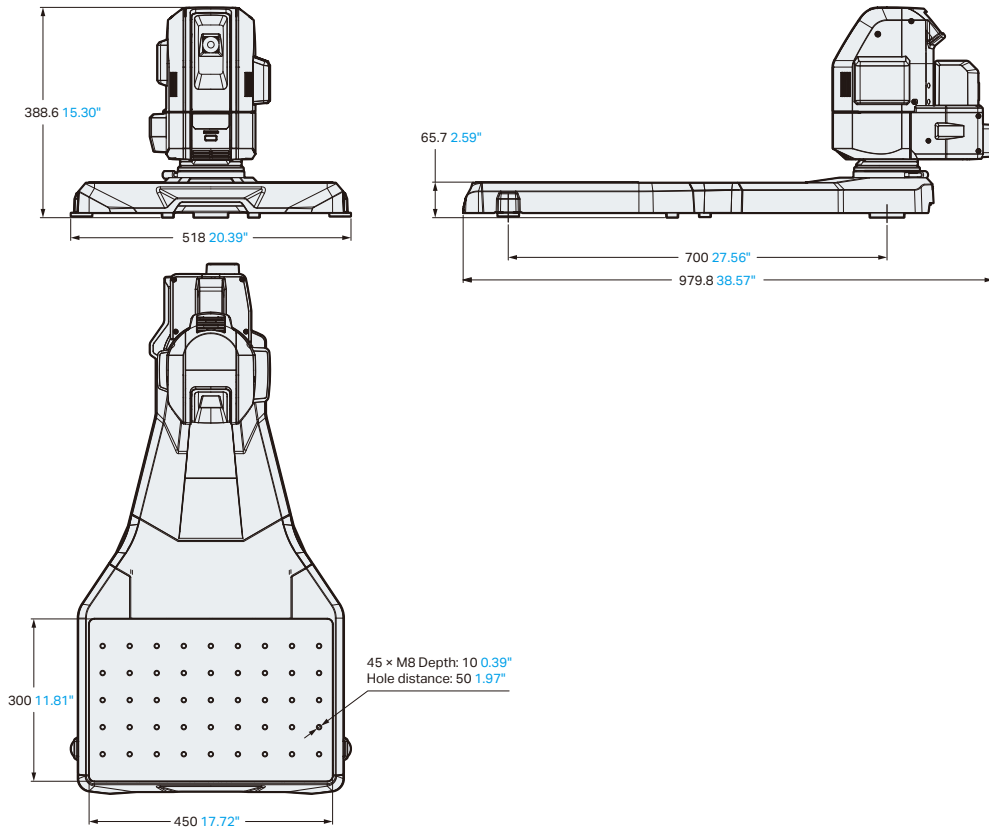
*2 Refer to ISO 10360-2 (in the range of 200 × 200 × 150 mm 7.87" × 7.87" × 5.91" and when the ambient temperature is 23°C ±1°C 73.4 ±33.8°F; "L" represents the measurement length (Unit: mm inch))

Probe

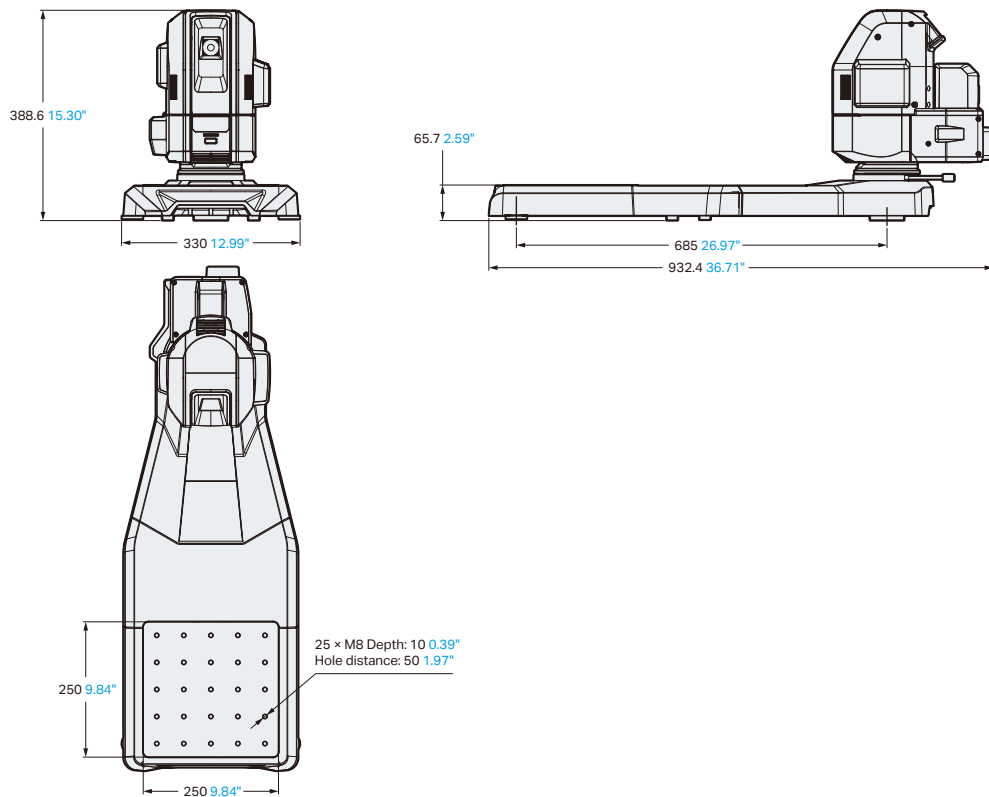
Model		XM-5000	XM-5000A	
Marker	Number of markers	7		
Light source		870 nm		
Applicable stylus		M5		
Display	Display method	OLED		
	Resolution	96 × 39 pixels		
Hardware keys		MEASURE, OK, CANCEL, CAMERA, Trigger, Power		
Communication unit	WLAN communication	IEEE 802.11b/g/n	-	
	USB communication	USB 2.0		
	Infrared communication	945 nm		
Power supply	Battery	Dedicated lithium-ion battery pack	-	
	Capacity	3250 mAh	-	
	Charging time	Approx. 6 hours	-	
	Continuous usage time	Approx. 8 hours	-	
Rating	USB connection	Rated voltage	5 VDC	
		Current consumption	1 A	
	Battery	Rated voltage	3.6 VDC	-
		Current consumption	1.25 A	-
Environmental resistance	Operating ambient temperature	10 to 35°C 50 to 95°F		
	Operating ambient humidity	20 to 80% RH (no condensation)		
Weight		Approx. 630 g 22.24 oz		

Dimensions

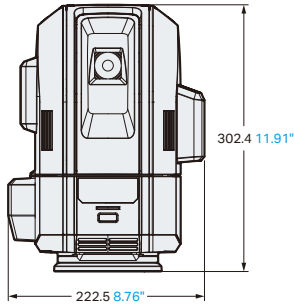
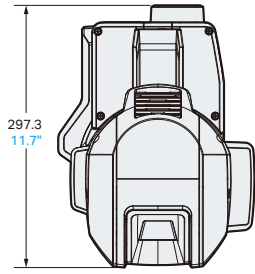
Measuring unit XM-5000/XM-H5000



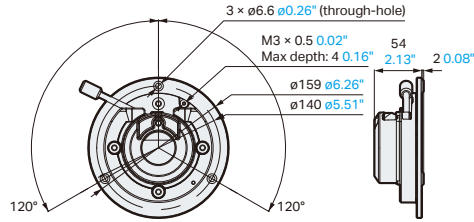
Measuring unit XM-5000A/XM-H5000A



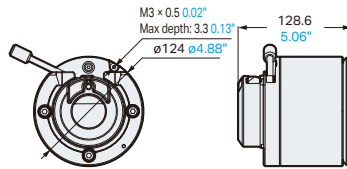
Camera unit



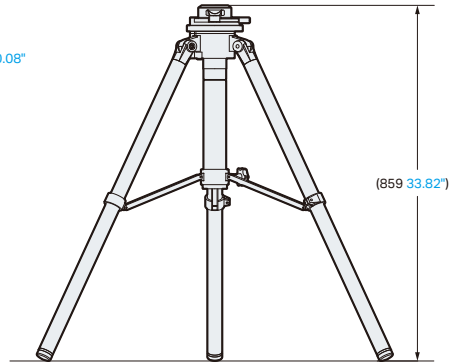
Camera mounting attachment
XM-AT



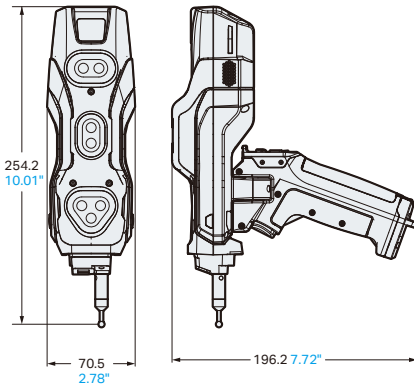
Camera unit extension pole
XM-EX1



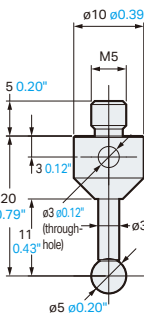
Camera unit tripod
XM-S1



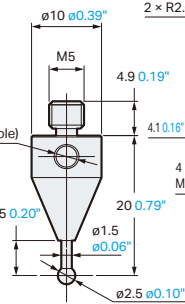
Probe



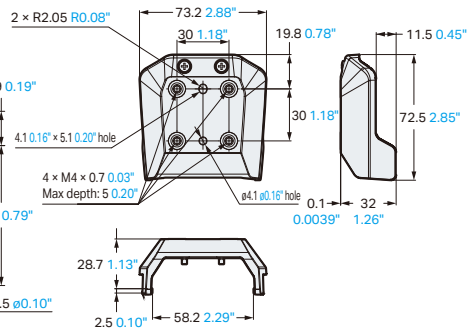
Stylus
OP-88421



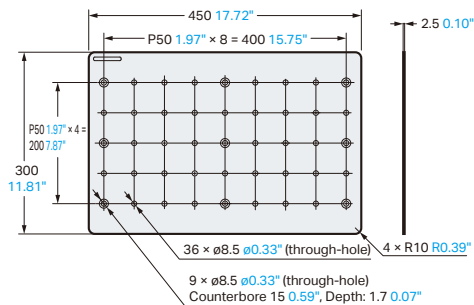
OP-88701



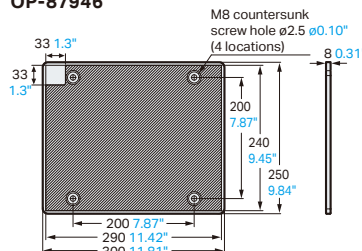
Probe mounting attachment
XM-RB



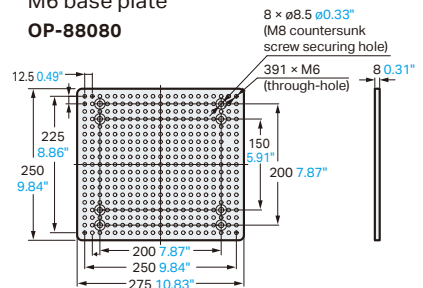
Magnetic plate
XM-MP



Sticky plate
OP-87946



M6 base plate
OP-88080





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