

CRYSTA-Apex S Series

Bulletin No. 2024



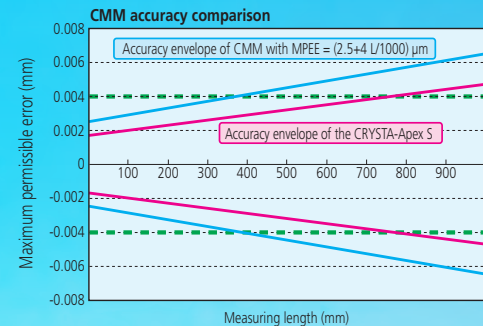
High-performance, low-price CNC Coordinate Measuring Machine that meets global standards

Mitutoyo

CNC Coordinate Measuring Machine CR

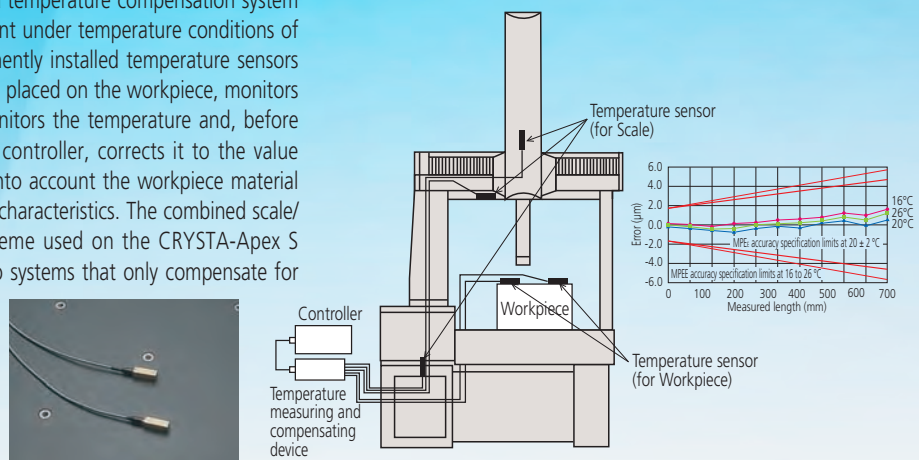
High Accuracy in the 1.7 μm class

The CRYSTA-Apex S is a high-accuracy CNC coordinate measuring machine that guarantees a maximum permissible error of $\text{MPE}_E = (1.7 + 3L/1000) \mu\text{m}$ [500/700/900 Series]. Let's compare the CRYSTA-Apex S with CMMs offering MPE_E of approximately $(2.5 + 4L/1000) \mu\text{m}$. If, for example, the required tolerance on a dimension is $\pm 0.02 \text{ mm}$, then the measuring machine uncertainty should be no more than one-fifth (ideally one-tenth) of that, i.e. $4 \mu\text{m}$. This means that with a general-purpose CMM, when the measured length exceeds 14.8" (375mm), machine uncertainty exceeds one-fifth of the dimension tolerance in this case. In contrast, as shown in the figure on the right, with the CRYSTA-Apex S the measurement uncertainty remains within one-fifth of the dimension tolerance up to 30.2" (766mm). The higher accuracy specification of the CRYSTA-Apex S therefore gives it more than double the effective measuring range in terms of accuracy-guarantee capability in this case.



Temperature Compensation System

The CRYSTA-Apex S comes equipped with a temperature compensation system that guarantees the accuracy of measurement under temperature conditions of 16 to 26 °C. This system, based on permanently installed temperature sensors on each scale working together with sensors placed on the workpiece, monitors scale and workpiece temperatures and, monitors the temperature and, before outputting the measurement result to the controller, corrects it to the value that would be measured at 20 °C, taking into account the workpiece material expansion coefficient as well as the CMM's characteristics. The combined scale/workpiece temperature compensation scheme used on the CRYSTA-Apex S gives markedly superior results compared to systems that only compensate for scale temperature.



500 Series



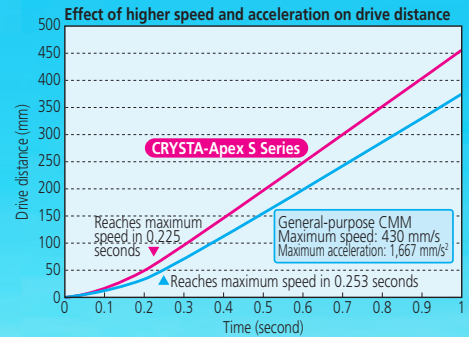
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CRYSTA-Apex S544

CRYSTA-Apex S Series

High-speed, high-acceleration drive

The CRYSTA-Apex S Series offers a maximum drive speed of 519 mm/s and a maximum acceleration of 2,309 mm/s², resulting in an increase of almost 100 mm in drive distance in one second, when compared with general-purpose CNC coordinate measuring machines (with a maximum speed of 430 mm/s and a maximum acceleration of 1,667 mm/s²). Furthermore, with a maximum measuring speed (i.e., the speed with which the stylus traces over the workpiece) of 8 mm/s, the CRYSTA-Apex S produces measurements much more quickly than ordinary CMMs (with a maximum measuring speed of 5 mm/s). Combining high speed and high acceleration, the CRYSTA-Apex S dramatically reduces measuring time, with the difference between the CRYSTA-Apex S and ordinary CMMs only increasing as the number of measuring points increases, resulting in a significant reduction in measuring cost.

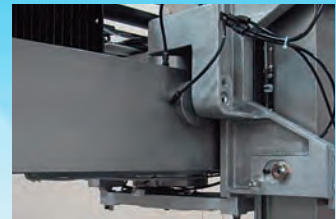


Designed for high rigidity

As is the case with Mitutoyo's conventional CMMs, various structures are employed in the CRYSTA-Apex S in order to give the body higher rigidity. The Y-axis guide rail, which is integrated into one side of the granite surface plate, shows very little deterioration with use, and thus promises to maintain high accuracy for a long time. The air bearings located on the bottom face, in addition to those at the front, rear, and upper surfaces of the slider unit of the X-axis, minimize vibration even during high-speed, high-acceleration movement, thus ensuring stable linear motion.



Integrated Y-Axis in Granite Table



700 Series



CRYSTA-Apex S776

900 Series



CRYSTA-Apex S9106

Specifications



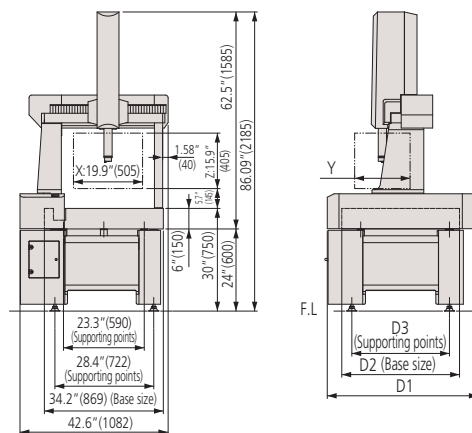
Model No.		CRYSTA-Apex S544	CRYSTA-Apex S574
Measuring range	X axis	19.9" (505mm)	
	Y axis	15.9" (405mm)	27.7" (705mm)
	Z axis	15.9" (405mm)	
Resolution		0.0001mm (0.1 μm)	
Guide method		Air bearings on each axis	
Drive speed		8-300 mm/s (CNC mode), max. speed: 519 mm/s 0 - 80 mm/s (J/S Mode: High Speed) 0 - 3 mm/s (J/S Mode: Low Speed) 0.05 mm/s (J/S Mode: Fine Speed)	
Max. measuring speed		8mm/s	
Max. drive acceleration		Each axis: 1,333 mm/s ² , max. combined acceleration: 2,309 mm/s ²	
Workpiece	Maximum height	21" (545mm)	
	Maximum mass	396lb (180kg)	
Mass (including the control device and installation platform)		1133lb (515kg)	1375lb (625kg)
Air supply	Pressure	0.4 MPa	
	Consumption	50 L/min under normal conditions (air source: 100 L/min)	

CRYSTA-Apex S500/700/900 Series Accuracy ISO 10360-2 unit: μm

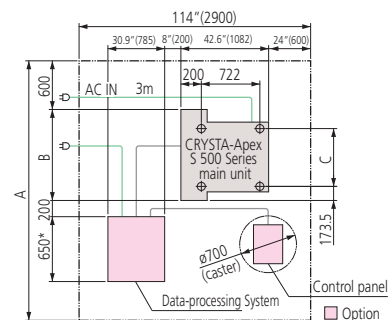
Probe used	Maximum permissible error (MPE) [*]	Maximum permissible probing error (MPE _P)
SP25M (Stylus: ø4 X 50mm)	1.7+3 L/1000 (temperature environment 1) 1.7+4 L/1000 (temperature environment 2)	1.7
TP200 (Stylus: ø4 X 10mm)	1.9+3 L/1000 (temperature environment 1) 1.9+4 L/1000 (temperature environment 2)	1.9
TP20 (Stylus: ø4 X 10mm)	2.2+3 L/1000 (temperature environment 1) 2.2+4 L/1000 (temperature environment 2)	2.2

* L = Selected measuring length inch(mm). Table on opposite page describes temperature environments 1 and 2.

CRYSTA-Apex S500 Series Dimensions unit: inch (mm)



Installation floor space unit: inch (mm)



* When a mouse table is used: 33.5" (850mm)
When a 2-monitor dedicated rack is used: 39.4" (1,000mm)

Model No.	A	B	C	D1	D2	D3	Y
CRYSTA-Apex S544	126" (3200)	44.2" (1122)	28.1" (713)	44.2" (1122)	33.9" (860)	28.1" (713)	16.1" (405)
CRYSTA-Apex S574	138" (3500)	57.5" (1458)	39.9" (1013)	57.5" (1458)	45.7" (1160)	39.9" (1013)	27.8" (705)

	CRYSTA-Apex S776	CRYSTA-Apex S7106	CRYSTA-Apex S 9106 (Z600) / 9108 (Z800)	CRYSTA-Apex S 9166 (Z600) / 9168 (Z800)	CRYSTA-Apex S 9206 (Z600) / 9208 (Z800)
	27.8" (705mm)			35.7" (905mm)	
	27.8" (705mm)	39.6" (1005mm)	39.6" (1005mm)	63.2" (1605mm)	78.9" (2005mm)
	23.8" (605mm)			23.8" (605mm) / 31.7" (805mm)	
	0.0001mm (0.1µm)			0.0001mm (0.1 µm)	
	Air bearings on each axis			Air bearings on each axis	
	8 - 300 mm/s (CNC mode), max. speed: 519mm/s - 80mm/s (I/S Mode: High Speed) 0 - 3mm/s (I/S Mode: Low Speed) 0.05mm/s (I/S Mode: Fine Speed)			8 - 300mm/s (CNC mode), max. speed: 519mm/s 0 - 80mm/s (I/S Mode: High Speed) 0 - 3mm/s (I/S Mode: Low Speed) 0.05mm/s (I/S Mode: Fine Speed)	
	8 mm/s			8mm/s (3mm/s for Type Z800)	
	Each axis: 1,333mm/s ² , max. combined acceleration: 2,309mm/s ²		Each axis: 1,333 mm/s ² (1,000 mm/s ² Type Z800), max. combined acceleration 2,309 mm/s ² (1,732 mm/s ² Type Z800)		
	32" (800mm)			800 mm (Z=605 mm) / 1000 mm (Z=805 mm)	
	1760lb(800kg)	2200lb(1000kg)	2640lb(1200 kg)	3300lb(1500 kg)	3960lb(1800 kg)
	3685lb(1675kg)	4292lb(1951kg)	2231 kg (Z=600 mm)	2868 kg (Z=600 mm)	3912 kg (Z=600 mm)
			2261 kg (Z=800 mm)	2898 kg (Z=800 mm)	3942 kg (Z=800 mm)
	0.4 MPa			0.4 MPa	
	60 L/min under normal conditions (air source: 120 L/min)			60 L/min under normal conditions (air source: 120 L/min)	

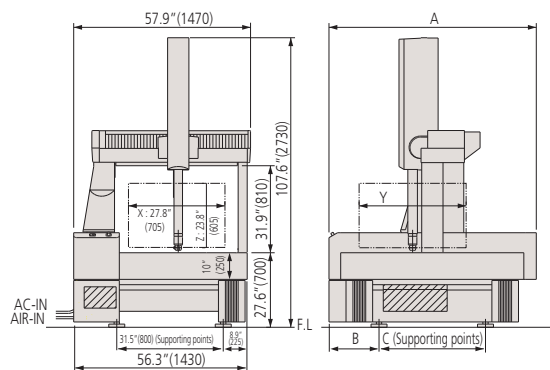
CRYSTA-Apex S500/700/900 Series Accuracy ISO 10360-4 unit: µm

Probe used	Max. permissible scanning error (MPE _{THP})
SP25M (Stylus: ø4 X 50 mm)	2.3

CRYSTA-Apex S500/700/900 Series Installation Temperature

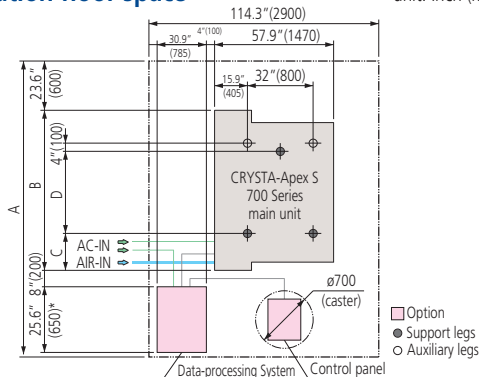
		Temperature environment 1	Temperature environment 1
Limits within which accuracy is guaranteed	Temperature Range	20±2 °C	16 - 26 °C
	Rate of change	1 °C per hour or less 2 °C in 24 hours or less	1 °C per hour or less 5 °C in 24 hours or less
	Gradient	1 °C or less per meter	1 °C or less per meter

CRYSTA-Apex S700 Series Dimensions unit: Inch (mm)



Model No.	A	B	C	Y
CRYSTA-Apex S776	65" (1650)	16.5" (420)	32" (800)	27.8" (705)
CRYSTA-Apex S7106	76.8" (1950)	18.5" (470)	39.4" (1000)	39.6" (1005)

Installation floor space unit: Inch (mm)

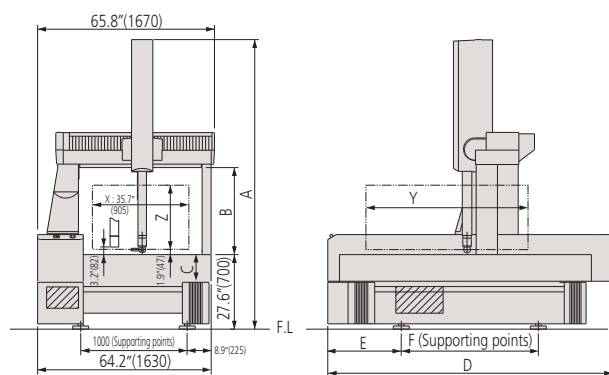


* When a mouse table is used: 33.5" (850mm)
When a 2-monitor dedicated rack is used: 39.4" (1,000mm)

Model No.	A	B	C	D
CRYSTA-Apex S776	130" (3300)	65" (1650)	16.5" (420)	32" (800)
CRYSTA-Apex S7106	142" (3600)	76.8" (1950)	18.5" (470)	39.4" (1000)

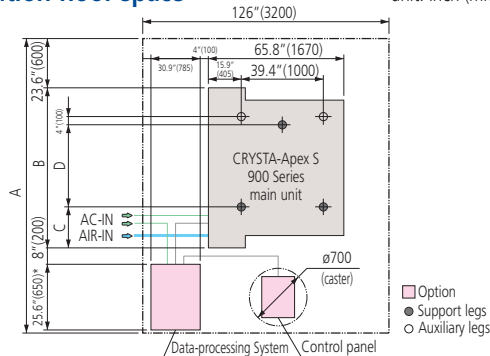
Note: This machine incorporates a main unit Startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo Sales Office prior to relocating this machine after initial installation.

CRYSTA-Apex S900 Series Dimensions unit: Inch (mm)



Model No.	A	B	C	D	E	F	Y	Z
CRYSTA-Apex S9106			10" (250)	76.8" (1950)	18.5" (470)	39.4" (1000)	39.6" (1005)	
CRYSTA-Apex S9166	107.5" (2730)	32" (800)	10" (250)	106" (2690)	27.6" (700)	52" (1320)	63.2" (1605)	23.8" (605)
CRYSTA-Apex S9206			11.8" (300)	121.7" (3090)	32" (800)	59.1" (1500)	79" (2005)	
CRYSTA-Apex S9108			10" (250)	76.8" (1950)	18.5" (470)	39.4" (1000)	39.6" (1005)	
CRYSTA-Apex S9168	123.3" (3130)	39.4" (1000)	10" (250)	106" (2690)	27.6" (700)	52" (1320)	63.2" (1605)	32.1" (805)
CRYSTA-Apex S9208			11.8" (300)	121.7" (3090)	32" (800)	59.1" (1500)	79" (2005)	

Installation floor space unit: Inch (mm)



* When a mouse table is used: 33.5" (850mm)
When a 2-monitor dedicated rack is used: 39.4" (1,000mm)

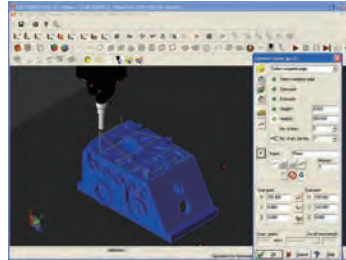
Model No.	A	B	C	D
CRYSTA-Apex S9106/9108	142" (3600)	76.8" (1950)	18.5" (470)	39.4" (1000)
CRYSTA-Apex S9166/9168	169" (4300)	106" (2690)	27.6" (700)	52" (1320)
CRYSTA-Apex S9206/9208	185" (4700)	121.7" (3090)	32" (800)	59.1" (1500)

Group of options that enable various kinds of



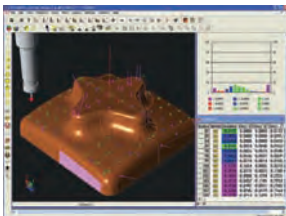
GEOPAK (High-functionality general-purpose Measurement Program)

This module is the heart of the MCOSMOS software system and is used to measure and analyze geometric elements. All the functions are provided by icons or pull-down menus, so even novices can promptly select desired functions. Its main features include easier viewing of measuring procedures and results such as real-time graphic display of measurement results and a function for direct call-up of elements from results graphics.



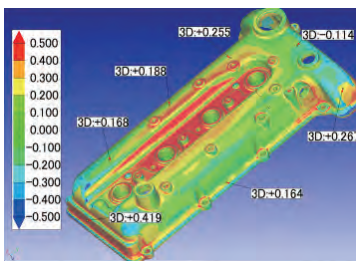
CAT1000P (Programming from a CAD model)

This module enables the user to use CAD data and on-screen simulation to create parts programs for making automated measurements (off-line teaching). This module allows the user to begin creating a parts program as soon as the design data has been finalized, shortening the entire process.



CAT1000S (Freeform Surface Evaluation Program)

Checks and compares the workpiece with the CAD data containing freeform surfaces and directly outputs the results in the form of CAD data in various formats. Software to directly convert from/to various types of CAD data is available as an option.



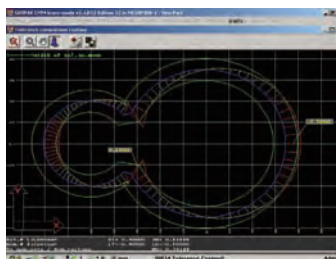
MSURF (Non-Contact Laser Measurement and Evaluation Program)

MSURF-S is used for obtaining measured point cloud data with the SurfaceMeasure (non-contact laser probe), while MSURF-I is used for comparing this data with the master model data, and for making dimensional measurements. Furthermore, MSURF-G for offline teaching allows the user to create a measurement macro even without the actual workpiece, improving the measuring machine's uptime.



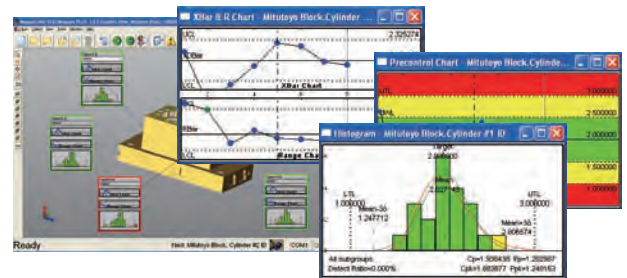
SurfaceMeasure606 (Non-Contact Laser Probe)

Lightweight, high-performance, non-contact probe developed for CNC coordinate measuring machines. Simplified measurement has been achieved through automatic setting of appropriate laser intensity and camera sensitivity according to environment or material, providing a simpler and more comfortable laser scanning environment.



SCANPAK (Contour Measurement Program)

Software for scanning and evaluating workpiece contours (2D). Evaluates contour tolerance between measurement data and design data, and performs various types of element and inter-element calculations based on a desired range of measurement data specified by the user.



MeasurLink® STATMeasure Plus (Statistical Processing and Process-Control Program)

Performs various types of statistical computations using measurement results. In addition, by displaying a control diagram on a real-time basis, this program allows defects that may occur in the future (e.g., wearing or damaging of cutting tools) to be discovered early on. This program can also be linked to a higher-level network environment to build a central control system.

measurements



GEARPAK (Gear Evaluation Program)

For evaluating the most types of involute gears.



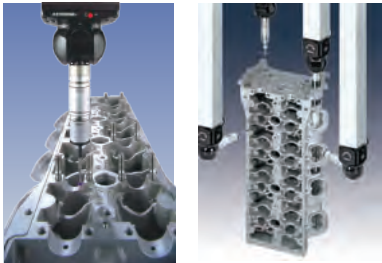
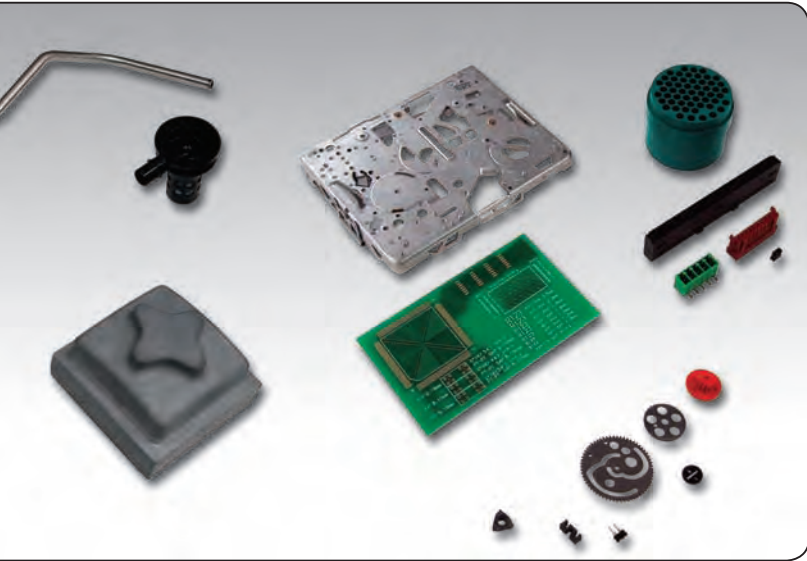
MPP-310Q (Scanning Probe)

Probe that collects coordinate values (point cloud data) at high accuracy by moving at speeds of up to 120 mm/s while in contact with the workpiece. Because MPP-310Q can also be used with the rotary table (MRT320) for synchronous scanning, it is effective for measuring gears, blades, ball screws, cylindrical cams, etc.



MPP-10 (Probe for effective screw depth measurement)

The probe that made it possible for a coordinate measuring machine to measure effective screw depth for the first time in the world. The introduction of the auto probe changing system allows normal dimensional measurements as well as effective screw depth measurements to be made automatically.



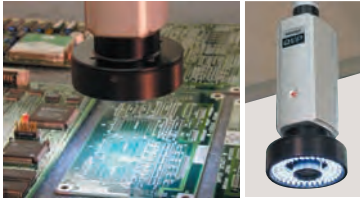
SP25M (Compact high-accuracy scanning probe)

This is a compact, high-accuracy, multi-function scanning probe with a 1"(25mm) outside diameter that makes scanning measurements, high-accuracy point measurements, and centripetal point measurements (optional function). The SP25M is used with the PH10MQ/10M auto probe head to provide a high degree of measurement freedom.



UMAP-CMM

This head makes it possible to use an ultra-small diameter stylus (0.1- or 0.3-mm diameter). It can be installed on PH10MQ to measure the shape and dimensions of microfabricated products from multiple directions.



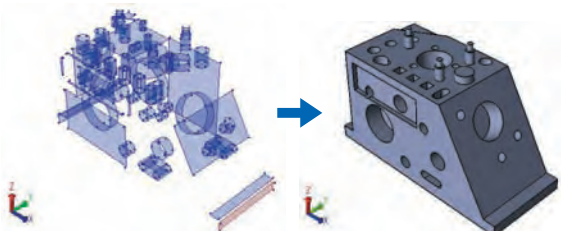
QVP (Vision Probe)

This probe automatically detects edges from image data of the workpiece magnified by a CCD camera. It is extremely useful for measuring microfabricated products that cannot be measured using a contact-type probe and soft objects that cannot be subjected to any measurement force. The QVP can also be used for measuring height based on autofocusing.



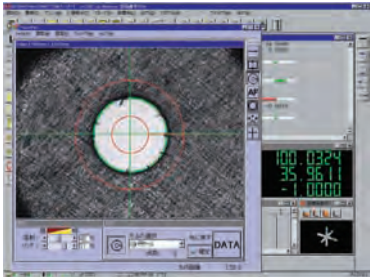
NC-Auto measure

This program generates CAD data from NC data.



Solid Model Developer

This program generates CAD data from data measured using MCOSMOS.



VISIONPAK (Vision Measurement Program)

This program controls QVP and performs various computational analyses on captured images.



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Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

Optical Measuring

Sensor Systems

Testing Equipment and
Seismometer

Digital Scale and DRO Systems

Small Tool Instruments and
Data Management

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