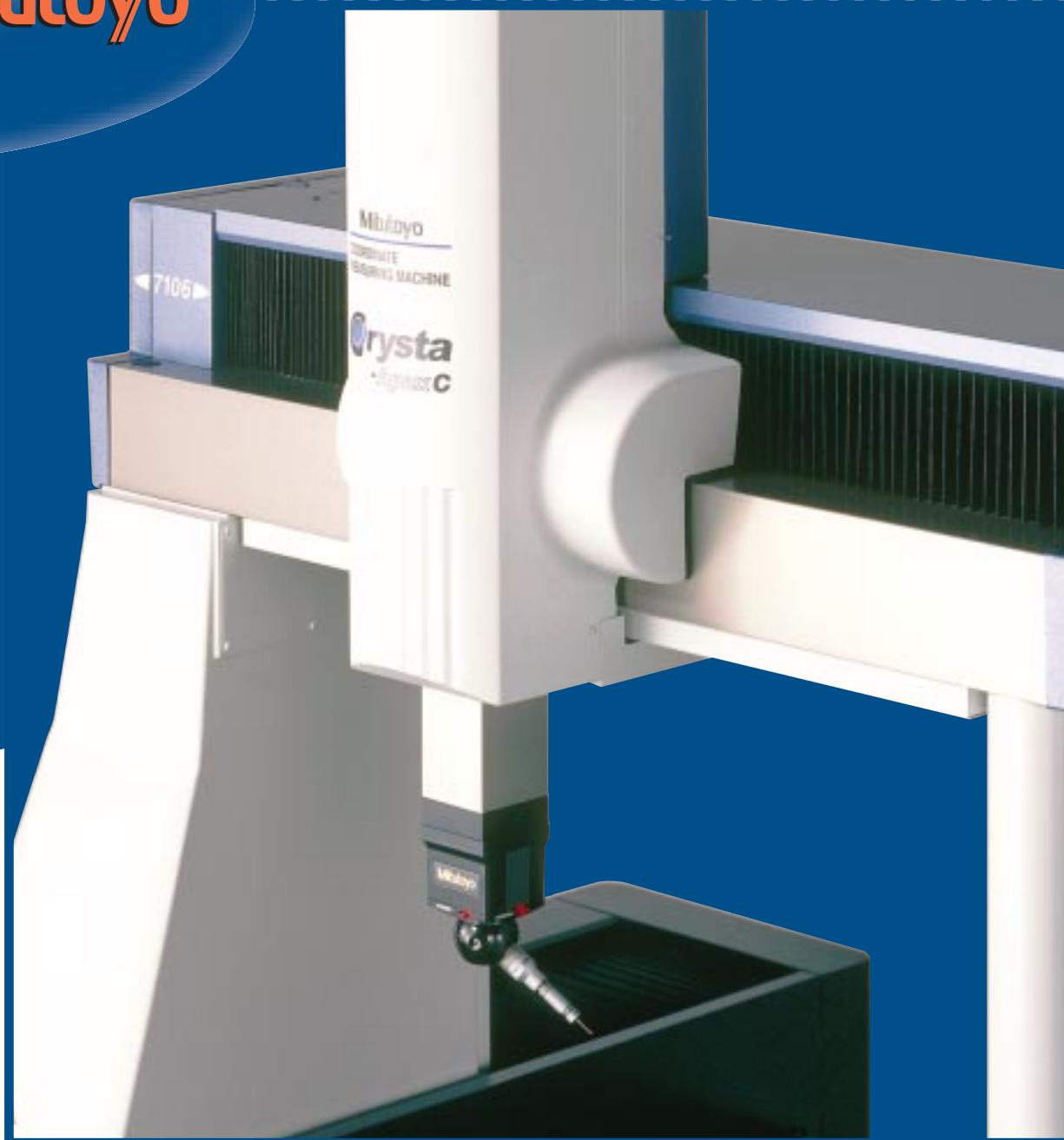


Crysta-Apex C

CNC Coordinate
Measuring Machine

Mitutoyo



Crysta
-Apex C

Creating a new standard in 3-D measuring

Today's manufacturing demands more accuracy, speed and functionality from 3-D coordinate measuring machines. Mitutoyo delivers all of this, and more, with the new Crysta Apex C shop-floor capable CMMs.

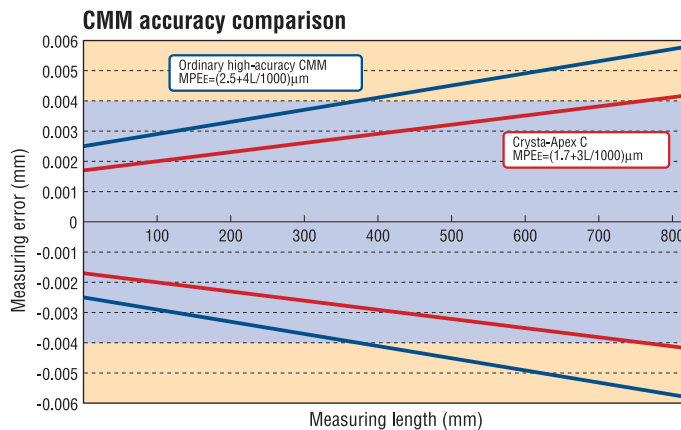
Their increased accuracy and measuring speed, and temperature compensation gives you a highly functional and productive tool to increase the quality of your processes and products.



Crysta -Apex C

- **High-accuracy, $MPE_E = (1.7+3L/1000)\mu m^*$**
*Crysta-Apex C500/C700/900 (when using SP-600/MPP-100 probe)
- **High-speed & high-acceleration, 520mm/s & 0.23G**
- **Ultra silent motion**
- **Workshop use design**
Optional 16°C to 26°C temperature compensation unit
- **Various choices of probe system**
Touch signal probe, high-speed scanning probe, vision probe, laser probe, screw depth measuring probe, etc.

Crysta-Apex C Features



More Accurate

The Crysta-Apex C Series is a high-accuracy CNC CMM offering the maximum permissible error of $MPE = (1.7 + 3L/1000) \mu m^*$. Most CMMs of the same size in the high-accuracy class provide the maximum performance error of $MPE = (2.5 + 4L/1000) \mu m$. If, for example; the required accuracy (design value tolerance) is $\pm 0.02mm$, then the measuring machine will require at least one-fifth (ideally one-tenth) of that as machine accuracy. This means that with an ordinary high-accuracy CMM, when the measuring length exceeds 375mm, machine accuracy exceeds one-fifth of the required accuracy. As can be seen in the figure above, with the Crysta-Apex C the machine-accuracy requirement stays under one-fifth of the required accuracy, up to 766mm. A difference of $0.8 \mu m$ between the two machines at the first term will make a difference of more than double in terms of accuracy guarantee capability.

* C500/700/900 (Z=605), conforming to ISO 10360-2 (2001) JIS B 7440-2 (2003)

Glass scales are standard

The Crysta-Apex C is equipped with high-accuracy linear encoders and glass scales manufactured at Mitutoyo's own linear scale plant. Being more resistant against rust and corrosion than metal scales, Mitutoyo's glass scales guarantee high-accuracy for a long period of time.

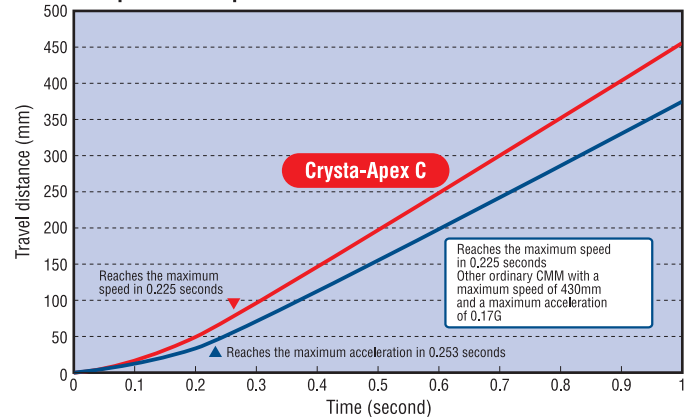
Patent pending (Japan)



Kiyohara Linear Scale Factory



Comparison of speed and acceleration



Faster

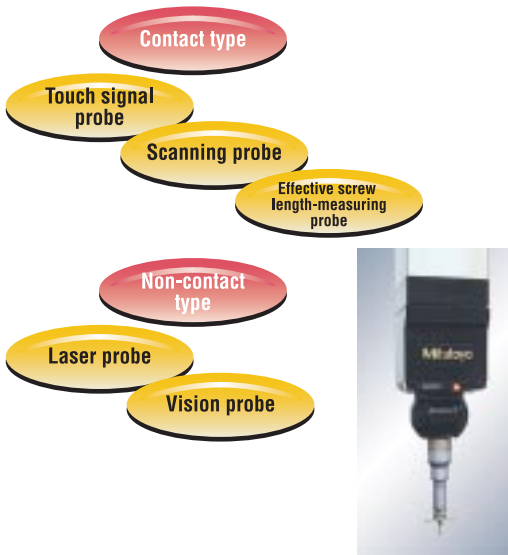
The Crysta-Apex C Series offers a maximum drive speed of 520mm/s and a maximum acceleration of 0.23G, resulting in a difference of approximately 100mm in travel distance in one second, when compared with a general-purpose CMM (with a maximum speed of 430mm/s and maximum acceleration of 0.17G). Furthermore, with a maximum measuring speed (i.e., the speed with which the stylus touches the workpiece) of 8mm/s, the Crysta-Apex C produces measurements much more quickly than other ordinary CMMs (with a maximum measuring speed of 5mm/s). Combining high speed and high acceleration, the Crysta-Apex C reduces measuring time drastically, and the difference between the Crysta-Apex and other ordinary CMMs only increases as the number of measuring points increases, resulting in a significant difference in measuring cost.

Integrated Y-axis increases rigidity

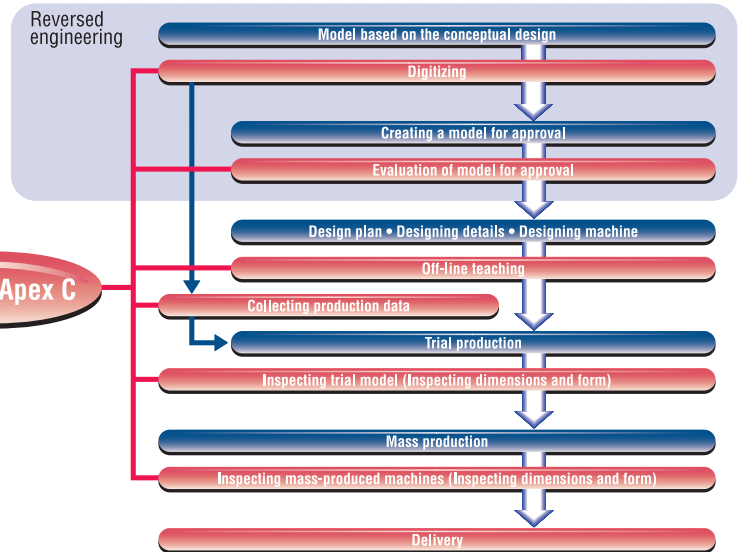
As is the case with Mitutoyo's conventional CMMs, various structures are employed in the Crysta-Apex C in order to give the body higher rigidity. The Y-axis guide rail, which is built into the granite surface plate, shows very little deterioration even over a long period of time, and thus promises to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



Crysta-Apex C Features



Crysta-Apex C



Supporting the widest range of probes in the world

The Crysta-Apex C supports an extremely large variety of probes, including the conventional contact-type probes, thereby facilitating the measurement of various workpieces. In fact, no other CMM in the world supports as many different types of probes as the Crysta-Apex C. And the probes developed by Mitutoyo – such as the scanning probe, the probe for measuring effective screw depth, and the vision probe – will dramatically expand the range of workpieces the CMM can measure. Moreover, the automatic probe or stylus exchanger can be installed on the Crysta-Apex C.

Compact design and multi-functional controller

The Crysta-Apex C employs the All-Digital Servo system, equipped with the special LSI developed by Mitutoyo. The All-Digital Servo is a system that processes digital signals of all the loupes that control position, speed, and power current, thus providing measurements with minimal drift and very little deterioration over time. Various control algorithms can be quickly installed to support various optional devices. Furthermore, the all-digital servo system allows the CMM to be so compact that it can be set up in even a small space.



Custom LSI for CMM controller



Patented (Japan) Patent pending (Japan)

Three-dimensional manufacturing data

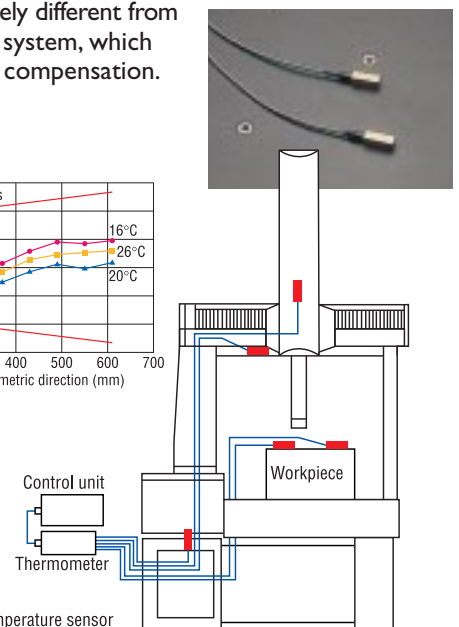
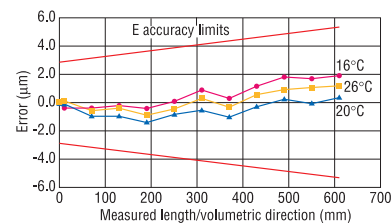
Manufacturing based on 3-D CAD is drawing attention. The biggest advantage of 3-D CAD is that it greatly reduces the lead-time needed for new-product development. Conceptual design data, when converted into 3-D data, can be used to design structures, details and mechanisms. By using 3-D data, the design-to-manufacturing process – from various analysis and simulations to making a product on an experimental basis, manufacturing and evaluations – can flow with consistency, which

greatly reduces man-hours, compared with the conventional manufacturing method based on two-dimensional design. Given the pervasiveness of low-priced, high-function computers, CAD, CAM, CAE, and CAT systems are spreading throughout the manufacturing world at an increasing rate. Many optional devices and programs for the Crysta-Apex C are available. These devices can be helpful in the various situations found in this new type of manufacturing. Mitutoyo promises that the Crysta-Apex C will establish a new standard of quality for its users.

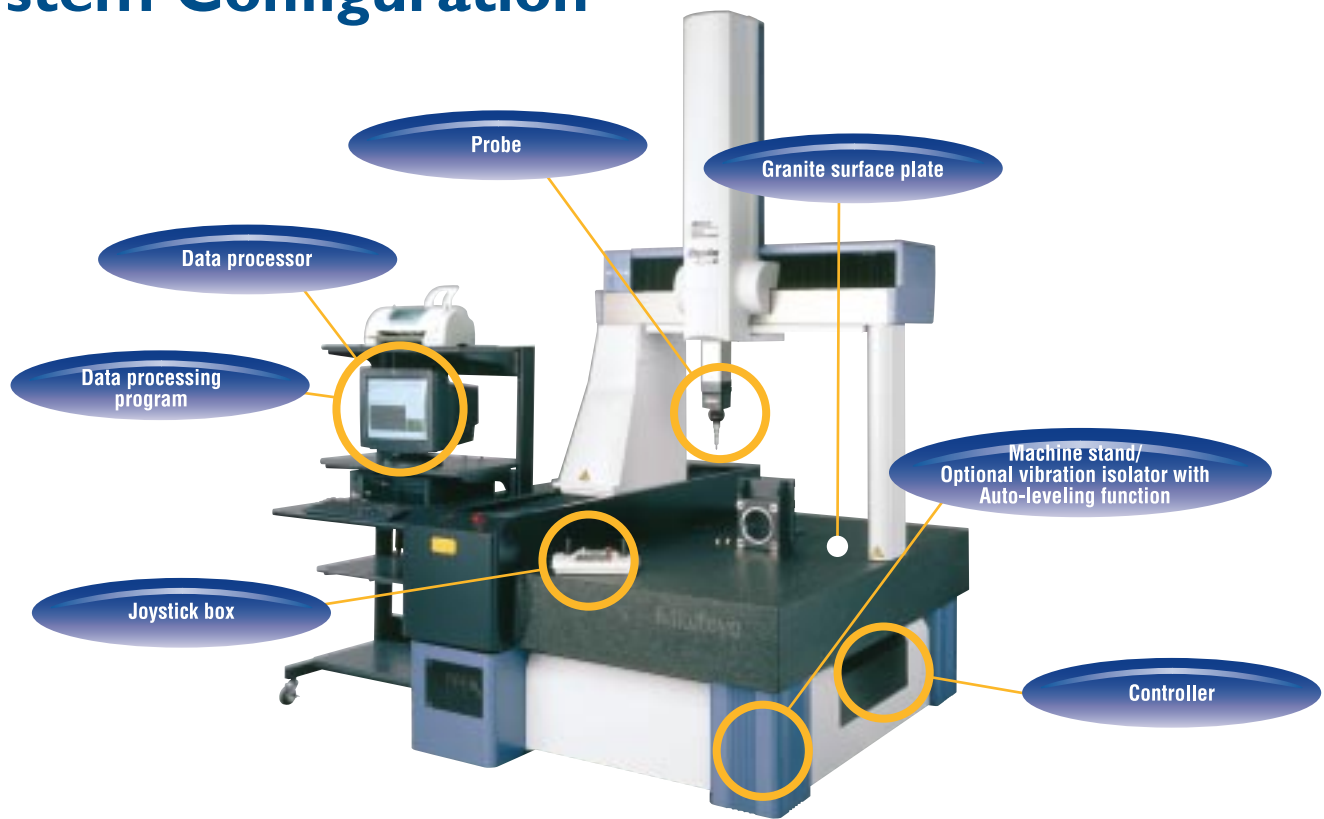
Temperature Compensation System

The Crysta-Apex C's optional Temperature Compensation System guarantees the accuracy of the CMM main unit under temperature conditions of 60.8° to 78.8°F (16 to 26°C). This system, consisting of a temperature sensor installed in the scale unit of each axis and workpiece temperature sensors (two pieces standard), monitors the temperature and before outputting it converts the measurement result to a value equivalent to that at 68°F (20°C). This system requires that there be no volumetric deformation under the condition in which temperature is other than 68°F (20°C). The Crysta-Apex C is designed to accommodate a temperature-compensation system that is distinctively different from a simple compensation system, which performs simple scale compensation.

Patent pending (Japan)



System Configuration



Probes

MPP-100

A scanning probe that collects coordinate data at high speed as it moves along the workpiece. It boasts the world's highest scanning speed, 120mm/s (nominal value scanning). The MPP-100 is a multi-functional probe that can be used for point measurements and for auto-centering probing. The Auto Stylus Exchanger is available as an option.



QVP

A vision probe for CNC CMM. It makes it possible to measure fine contours, thin and elastic workpieces with a CMM. The QVP can be installed in the Auto Probe Exchanger system for PH10MQ.



SP25M

Compact and versatile scanning probe system, it delivers exceptional dynamic performance.



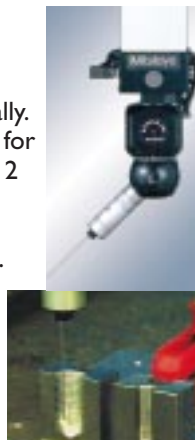
PM10MQ*

A motorized probe head that allows automatic probe position changes in 720 directions. It's indispensable in the auto-measurements of three-dimensional workpieces. Position repeatability is 0.5μm (with the use of TP200/PSIR: 2s). A probe extension with a length of up to 450mm can be installed. The Auto Probe Exchanger is available as an option.



MPP-10

The world's first probe that measures effective screw depth automatically. Two types are available: for M4 to M10, and for M-12 to M20). For measuring angled screws, it can be attached to the PH10M. It can also be installed in the Auto Probe Exchanger for PH10M.



SP80

High performance and ultra-high accuracy scanning probe with digital readheads for use with long styli.



TP200

A high-accuracy touch-signal probe with repeatability of 0.4μm (with use of PSIR: 2s). The Auto Stylus Exchanger is available as an option.



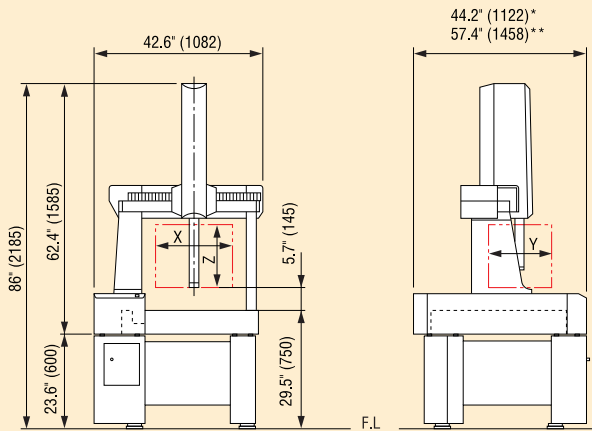
*PH10T is also available



Accuracy ISO10360-2: 2001		MPE _E	MPE _P
Temperature 1 64.4–71.6°F (18 to 22°C)	TP2/20	2.2 + 3L/1000µm	2.2µm
	TP200	1.9 + 3L/1000µm	1.9µm
	MPP100/SP600	1.7 + 3L/1000µm	1.7µm
Temperature 2 60.8–78.8°F (16 to 26°C)	TP2/20	2.2 + 4L/1000µm	2.2µm
	TP200	1.9 + 4L/1000µm	1.9µm
	MPP100/SP600	1.7 + 4L/1000µm	1.7µm

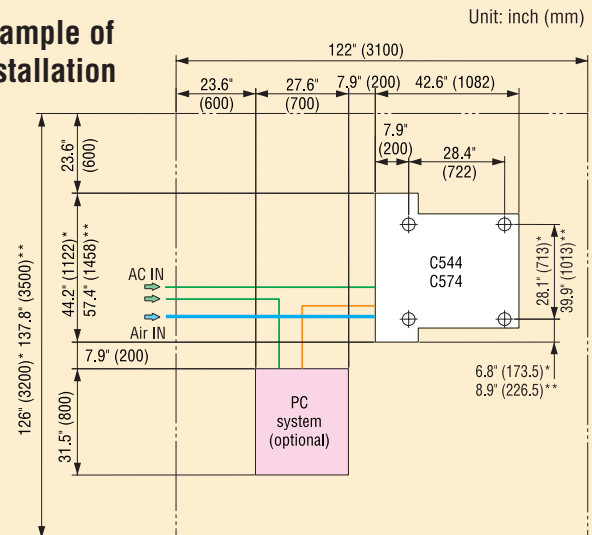
Model		CRT-Apex C 544	CRT-Apex C 574
Measuring range	X-axis	19.88" (505mm)	
	Y-axis	15.94" (405mm)	27.75" (705mm)
	Z-axis	15.94" (405mm)	
Resolution		.000004" (0.0001mm)	
Drive speed	CNC mode	Max. moving speed = 430mm/s (16.93"/s) (3D) Max. measuring speed = 8mm/s	
	Joystick mode	Moving speed = 0 – 80mm/s Measuring speed = 0 – 3mm/s	
Max. acceleration		0.17G (3D)	
Measuring table	Material	Granite stone	
	Size	25.12" x 33.86" (638mm x 860mm)	25.12" x 45.66" (638mm x 1160mm)
Workpiece	Max. height	21.46" (545mm)	
	Max. weight	220lbs. (100kg)	396lbs. (180kg)
Dimensions	Width	42.60" (1082mm)	
	Depth	43.46" (1104mm)	57.48" (1460mm)
	Height	86.02" (2185mm)	
Machine weight		1133lbs. (515kg)	1452lbs. (660kg)
Air consumption		50L/min or 1.8CFM (under normal condition)	
Air pressure		0.4Mpa (4kgf/cm ²) or 58 PSI	
Temperature	Range 1	64.4°F – 71.6°F (18°C – 22°C)	
	Range 2	60.8°F – 78.8°F (16°C – 26°C)	
	Variation/hour	1.8°F (1.0°C) / hour	
	Variation/day	Range 1=3.6°F (2.0°C) / day, Range 2=9.0°F (5.0°C) / day	
	Gradient	1.8°F (1.0°C) / m (Vertically), 1.8°F (1.0°C) / m (Horizontally)	

Dimensions

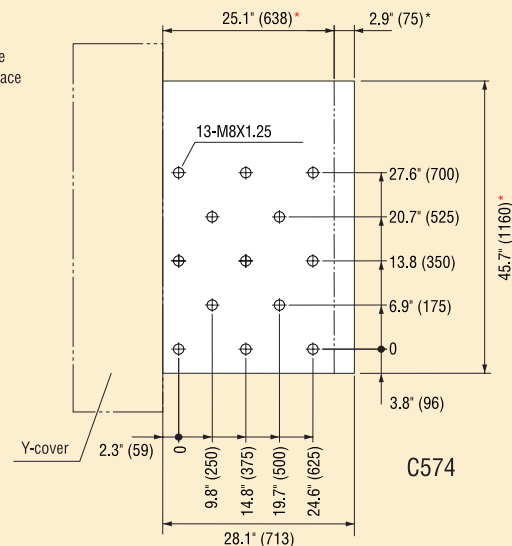
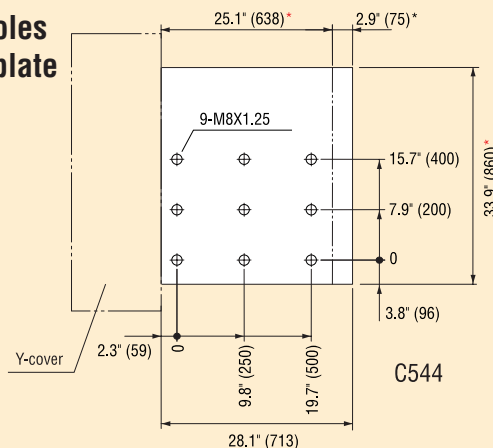


Measuring range *C544 **C574

Example of installation



Layout of clamping holes on surface plate



Crysta

-Apex C

776

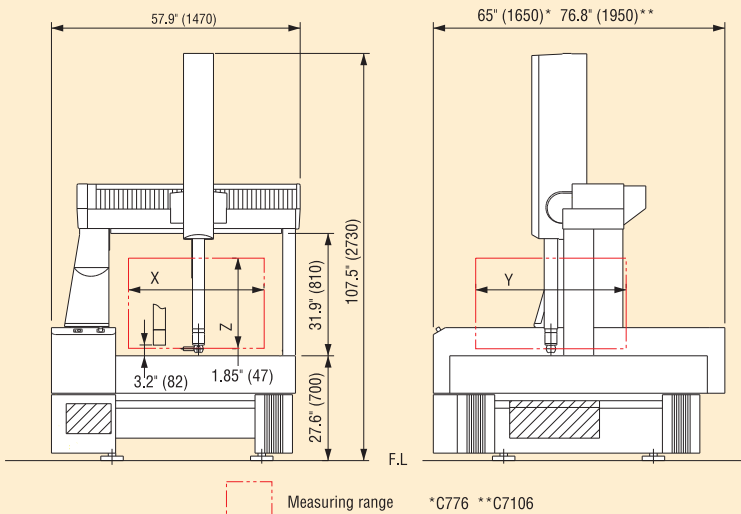
7106



Model	CRT-Apex C 776	CRT-Apex C 7106
Measuring range	X-axis	27.75" (705mm)
	Y-axis	27.75" (705mm)
	Z-axis	23.81" (605mm)
Resolution	.000004" (0.0001mm)	
Drive speed	CNC mode	Max. moving speed = 520mm/s (20.47"/s) (3D) Max. measuring speed = 8mm/s
	Joystick mode	Moving speed = 0 – 80mm/s Measuring speed = 0 – 3mm/s
Max. acceleration	0.23G (3D)	
Measuring table	Material	Granite stone
	Size	33.85" x 55.90" (860mm x 1420mm)
Workpiece	Max. height	31.49" (800mm)
	Max. weight	1760lbs. (800kg)
Dimensions	Width	57.87" (1470mm)
	Depth	64.95" (1650mm)
	Height	107.48" (2730mm)
Machine weight	3885lbs. (1675kg)	4293lbs. (1951kg)
Air consumption	60L/min or 2.16CFM (under normal condition)	
Air pressure	0.4Mpa (4kgf/cm ²) or 58 PSI	
Temperature	Range 1	64.4°F – 71.6°F (18°C – 22°C)
	Range 2	60.8°F – 78.8°F (16°C – 26°C)
	Variation/hour	1.8°F (1.0°C) / hour
	Variation/day	Range 1=3.6°F (2.0°C) / day, Range 2=9.0°F (5.0°C) / day
	Gradient	1.8°F (1.0°C) / m (Vertically), 1.8°F (1.0°C) / m (Horizontally)

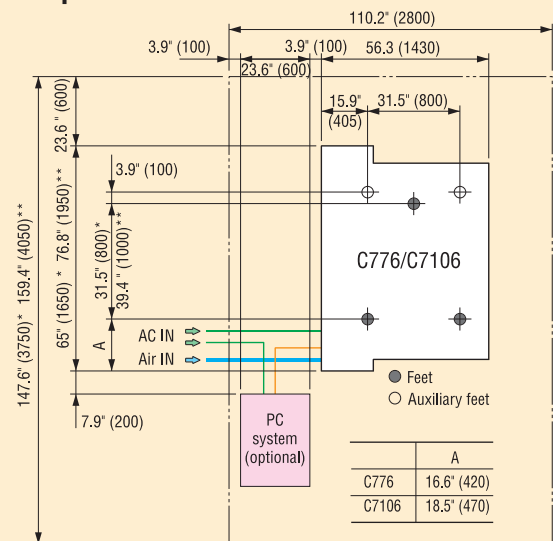
Accuracy ISO10360-2: 2001		MPE _E	MPE _P
Temperature 1 64.4–71.6°F (18 to 22°C)	TP2/20	2.2 + 3L/1000μm	2.2μm
	TP200	1.9 + 3L/1000μm	1.9μm
	MPP100/SP600	1.7 + 3L/1000μm	1.7μm
Temperature 2 60.8–78.8°F (16 to 26°C)	TP2/20	2.2 + 4L/1000μm	2.2μm
	TP200	1.9 + 4L/1000μm	1.9μm
	MPP100/SP600	1.7 + 4L/1000μm	1.7μm

Dimensions

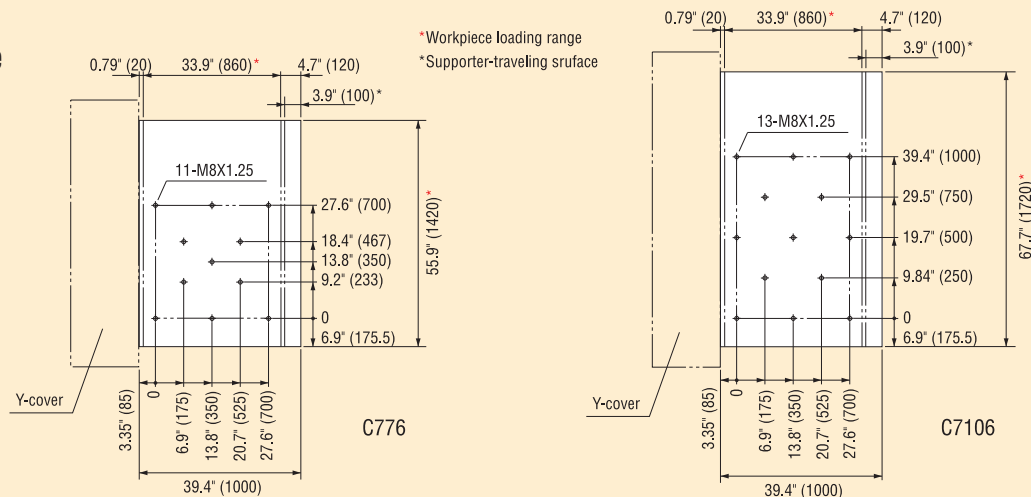


Example of installation

Unit: Inch (mm)



Layout of clamping holes on surface plate



9106/8

9166/8

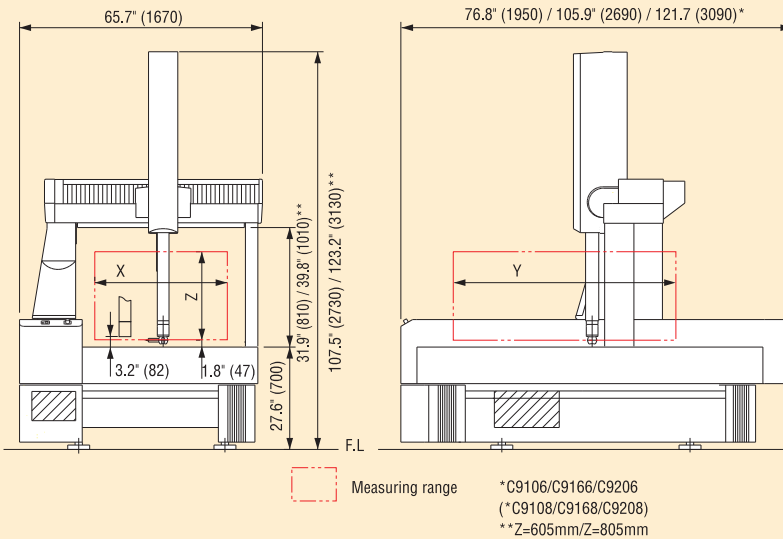
9206/8



Accuracy ISO10360-2: 2001		MPE _E	MPE _P
Temperature 1 64.4–71.6°F (18 to 22°C)	TP2/20	2.2 + 3L/1000µm	2.2µm
	TP200	1.9 + 3L/1000µm	1.9µm
	MPP100/SP600	1.7 + 3L/1000µm	1.7µm
Temperature 2 60.8–78.8°F (16 to 26°C)	TP2/20	2.2 + 4L/1000µm	2.2µm
	TP200	1.9 + 4L/1000µm	1.9µm
	MPP100/SP600	1.7 + 4L/1000µm	1.7µm

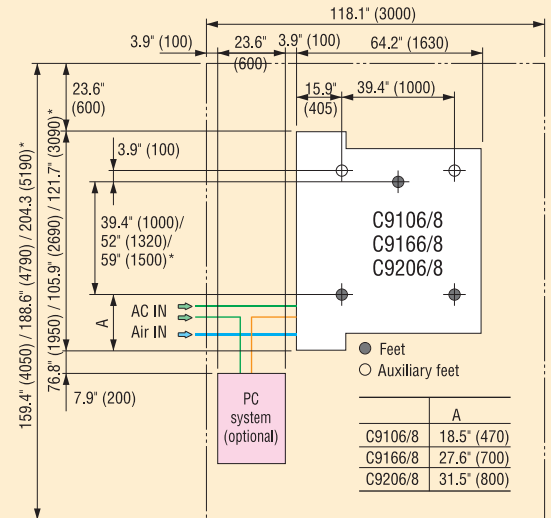
Model	CRT-Apex C 9106	CRT-Apex C 9166	CRT-Apex C 9206	CRT-Apex C 9108	CRT-Apex C 9168	CRT-Apex C 9208
Measuring range	X-axis	35.62" (905mm)			35.62" (905)	
	Y-axis	39.56" (1005mm)	63.19" (1605mm)	78.93" (2005mm)	39.56" (1005mm)	63.19" (1605mm) 78.93" (2005mm)
	Z-axis	23.81" (605mm)			31.69" (805mm)	
Resolution		.000004" (0.0001mm)			.000004" (0.0001mm)	
Drive speed	CNC mode	Max. moving speed = 520mm/s (20.47"/s) (3D) Max. measuring speed = 8mm/s			Max. moving speed = 520mm/s (20.47"/s) (3D) Max. measuring speed = 3mm/s	
	Joystick mode	Moving speed = 0 – 80mm/s Measuring speed = 0 – 3mm/s			Moving speed = 0 – 80mm/s Measuring speed = 0 – 3mm/s	
Max. acceleration		0.23G (3D)			0.17G (3D)	
Measuring table	Material	Granite Stone			Granite Stone	
	Size	41.73" x 67.71" (1060 x 1720mm)	41.73" x 91.33" (1060 x 2320mm)	41.73" x 107.08" (1060 x 2720mm)	41.73" x 67.71" (1060 x 1720mm)	41.73" x 91.33" (1060 x 2320mm) 41.73" x 107.08" (1060 x 2720mm)
Workpiece	Max. height	31.49" (800mm)			39.37" (1000mm)	
	Max. weight	2640lbs. (1200kg)	3300lbs. (1500kg)	3960lbs. (1800kg)	2640lbs. (1200kg)	3300lbs. (1500kg) 3960lbs. (1800kg)
	Width	65.74" (1670mm)			65.74" (1670mm)	
	Depth	76.77" (1950mm)	105.90" (2690mm)	121.65" (3090mm)	76.77" (1950mm)	105.90" (2690mm) 121.65" (3090mm)
	Height	107.48" (2730mm)			123.22" (3130mm)	
Machine weight		4908lbs. (2231kg)	6309lbs. (2868kg)	8606lbs. (3912kg)	4974lbs. (2261kg)	6375lbs. (2898kg) 8672lbs. (3942kg)
Air consumption		60L/min or 2.16CFM (under normal condition)				
Air pressure		0.4Mpa (4kgf/cm ²) or 58PSI				
Temperature	Range 1	64.4°F – 71.6°F (18°C – 22°C)				
	Range 2	60.8°F – 78.8°F (16°C – 26°C)				
	Variation/hour	1.8°F (1.0°C)/hour				
	Variation/day	Range 1 = 3.6°F (2.0°C) / day, Range 2 = 9.0°F (5.0°C) / day				
	Gradient	1.8°F (1.0°C) / m (Vertically), 1.8°F (1.0°C) / m (Horizontally)				

Dimensions

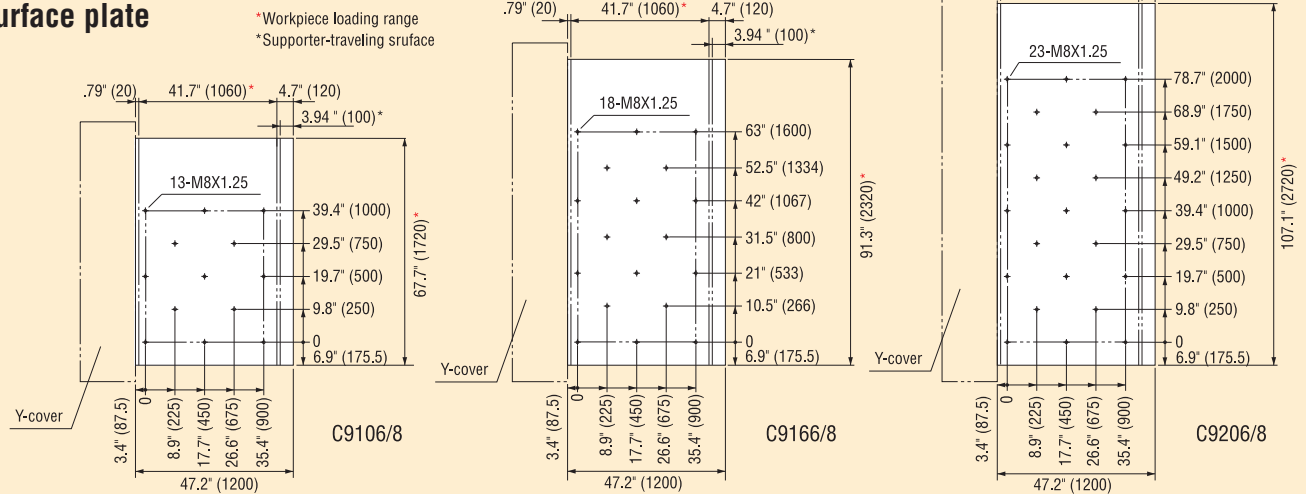


Example of installation

Unit: inch (mm)



Layout of clamping holes on surface plate



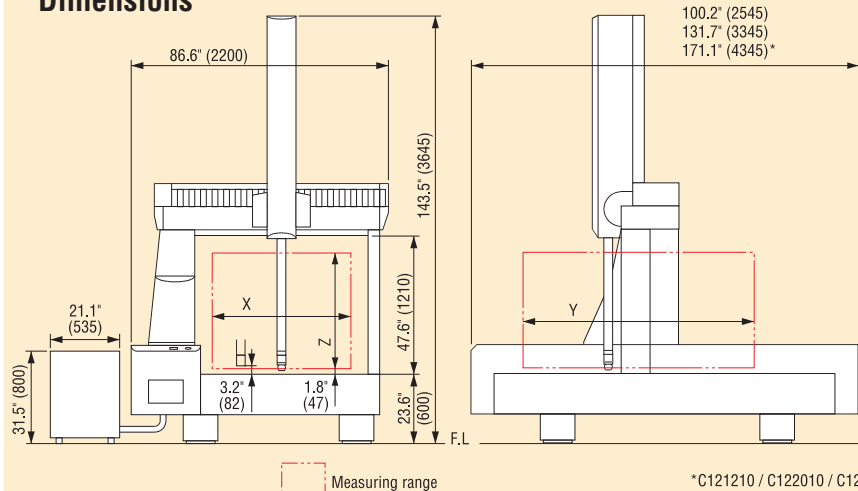
121210
122010
123010



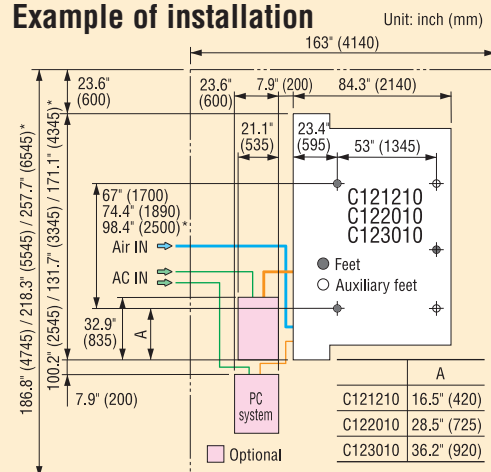
Accuracy ISO10360-2: 2001		MPE _E	MPE _P
Temperature 1 64.4–71.6°F (18 to 22°C)	TP2/20	2.8 + 3L/1000µm	2.6µm
	TP200	2.5 + 3L/1000µm	2.2µm
	MPP100/SP600	2.3 + 3L/1000µm	2.0µm
Temperature 2 60.8–78.8°F (16 to 26°C)	TP2/20	2.8 + 4L/1000µm	2.6µm
	TP200	2.5 + 4L/1000µm	2.2µm
	MPP100/SP600	2.3 + 4L/1000µm	2.0µm

Model		CRT-Apex C 121210	CRT-Apex C 122010	CRT-Apex C 123010
Measuring range	X-axis	47.44" (1205mm)		
	Y-axis	47.44" (1205mm)	78.93" (2005mm)	118.30" (3005mm)
	Z-axis	39.56" (1005mm)		
Resolution		.000004" (0.0001mm)		
Drive speed	CNC mode	Max. moving speed = 520mm/s (20.47"/s) (3D) Max. measuring speed = 5mm/s		
	Joystick mode	Moving speed = 0 – 80mm/s Measuring speed = 0 – 3mm/s		
Max. acceleration		0.17G (3D)		
Measuring table	Material	Granite stone		
	Size	55.11 x 85.23" (1400 x 2165mm)	55.11 x 116.73" (1400 x 2965mm)	55.11 x 156.10" (1400 x 3965mm)
Workpiece	Max. height	47.25" (1200mm)		
	Max. weight	4400 lbs.(2000kg)	5500 lbs.(2500kg)	6600 lbs.(3000kg)
Dimensions	Width	86.61" (2200mm)		
	Depth	100.19" (2545mm)	131.69" (3345mm)	171.06" (4345mm)
	Height	143.50" (3645mm)		
Machine weight		8910 lbs.(4050kg)	13530 lbs.(6150kg)	20042 lbs.(9110kg)
Air Consumption		100L/min or 3.6CFM (under normal condition)		
Air Pressure		0.4Mpa (4kgf/cm ²) or 58PSI		
Temperature	Range 1	64.4°F – 71.6°F (18°C – 22°C)		
	Range 2	60.8°F – 78.8°F (16°C – 26°C)		
	Variation/hour	1.8°F (1.0°C) / hour		
	Variation/day	Range 1=3.6°F (2.0°C) / day, Range 2=9.0°F (5.0°C) / day		
Gradient		1.8°F (1.0°C) / m (Vertically), 1.8°F (1.0°C) / m (Horizontally)		

Dimensions

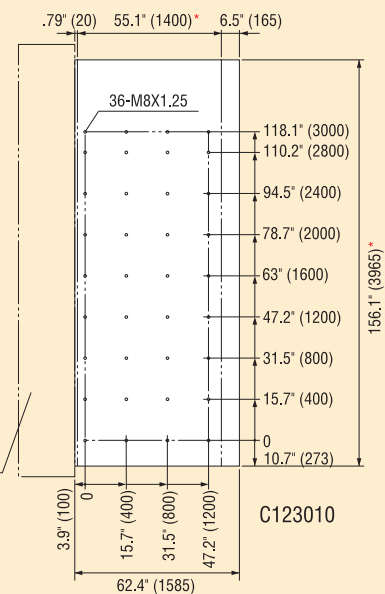
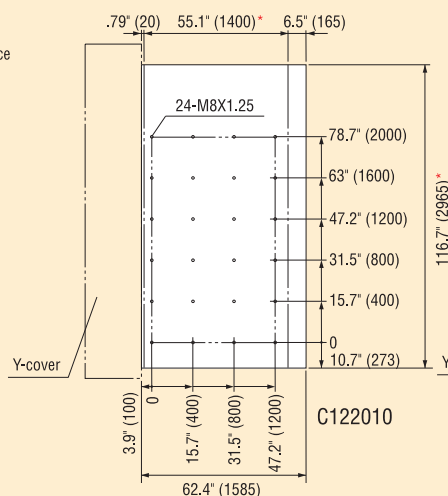
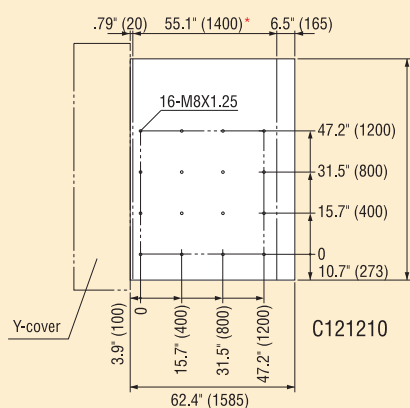


Example of installation



Layout of clamping holes on surface plate

*Workpiece loading range
*Supporter-traveling surface



Software

MeasurLink® Family Optional program for statistical processing control

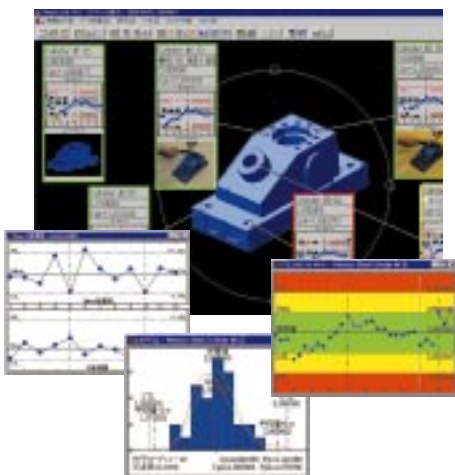
MeasurLink supports a variety of statistical process functions based on the statistical method described in QS-9000, which defines standards for quality control in the U.S. automobile industry. It is a tool used to identify problems in manufacturing processes and to analyze them efficiently in order to improve the manufacturing process or to resolve problems. With MeasurLink, the user can construct a measuring system by which to increase reliability, thereby establishing an excellent quality-assurance system on behalf of the customers.

MeasurLink SPC-Super Statistical Process Control Program

MeasurLink SPC-Super performs the real-time statistical processing of data collected by a CMM in the inspection room or on the manufacturing site, and graphically outputs control charts, GO/NG judgments, process capabilities and such to make them more comprehensible to the operator. The statistical method using control charts makes it possible to detect abnormalities on the manufacturing line at an early stage, thereby preventing the occurrence of product defects.

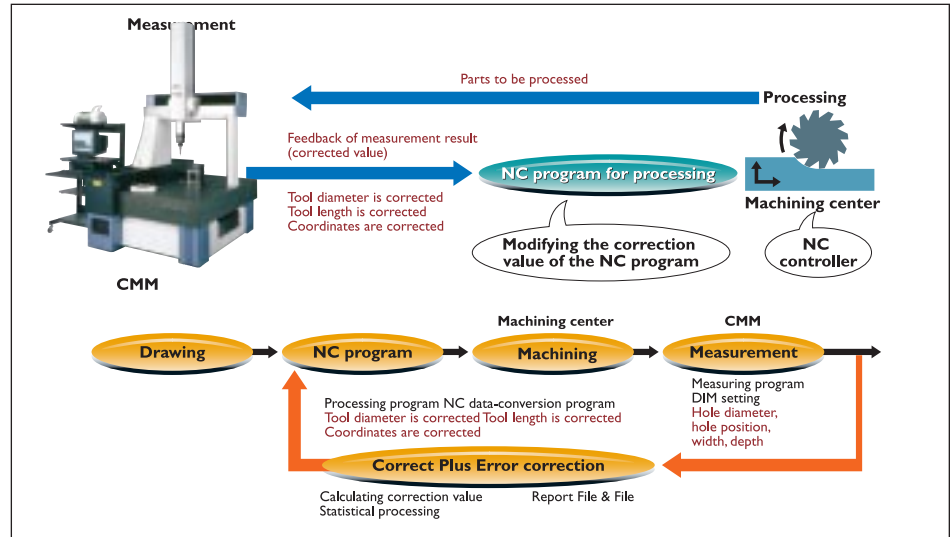
Combined with MeasurLink Analyzer/MeasurLink Manager to expand to a measuring network system

Supports Windows®-based networks. Data from various measuring equipment that are placed at different locations in the factory can be integrated and unified to share quality control data in the network.



Correct Plus® (Data Feedback System)

After measuring the components mass-produced by a machining center, the Correct Plus system feeds the compensation data calculated from the measurement result and nominal value back to the machining center. This data feedback system maintains and improves the accuracy of processing.



- Allows construction of a production system with improved accuracy and reduced ratio of defective parts.
- If the NC program is partially corrected prior to processing, there is no need to make a correction during processing. Accordingly, Correct Plus promises worry-free operation.
- Two types of systems are available, according to the type of production system:
 1. **Manual feedback system**
The operator decides whether or not to give feedback on correction data.
 2. **Automatic feedback system**
Correction data feedback is completely automatic, according to the setting.
- It can support multiple machining centers.
- Allows measurement results to be stored, output to a chart, and used for statistical data processing.

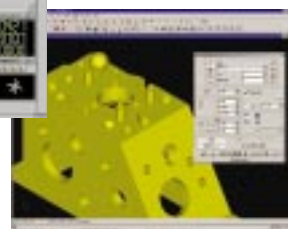
MCAT CMM Software System

MCAT is a suite of CMM software modules that allows users to perform any 3-D measurement analysis by using specific modules.

- General purpose program
- Off-line teaching program
- 3-D surface analysis program
- Profile data analysis program
- Gear analysis program
- Statistical data processing program
- Data conversion program



General Purpose



Off-line Teaching



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