CATALOG No. E4248-191

Mitutoyo

Beyond-Crysta C

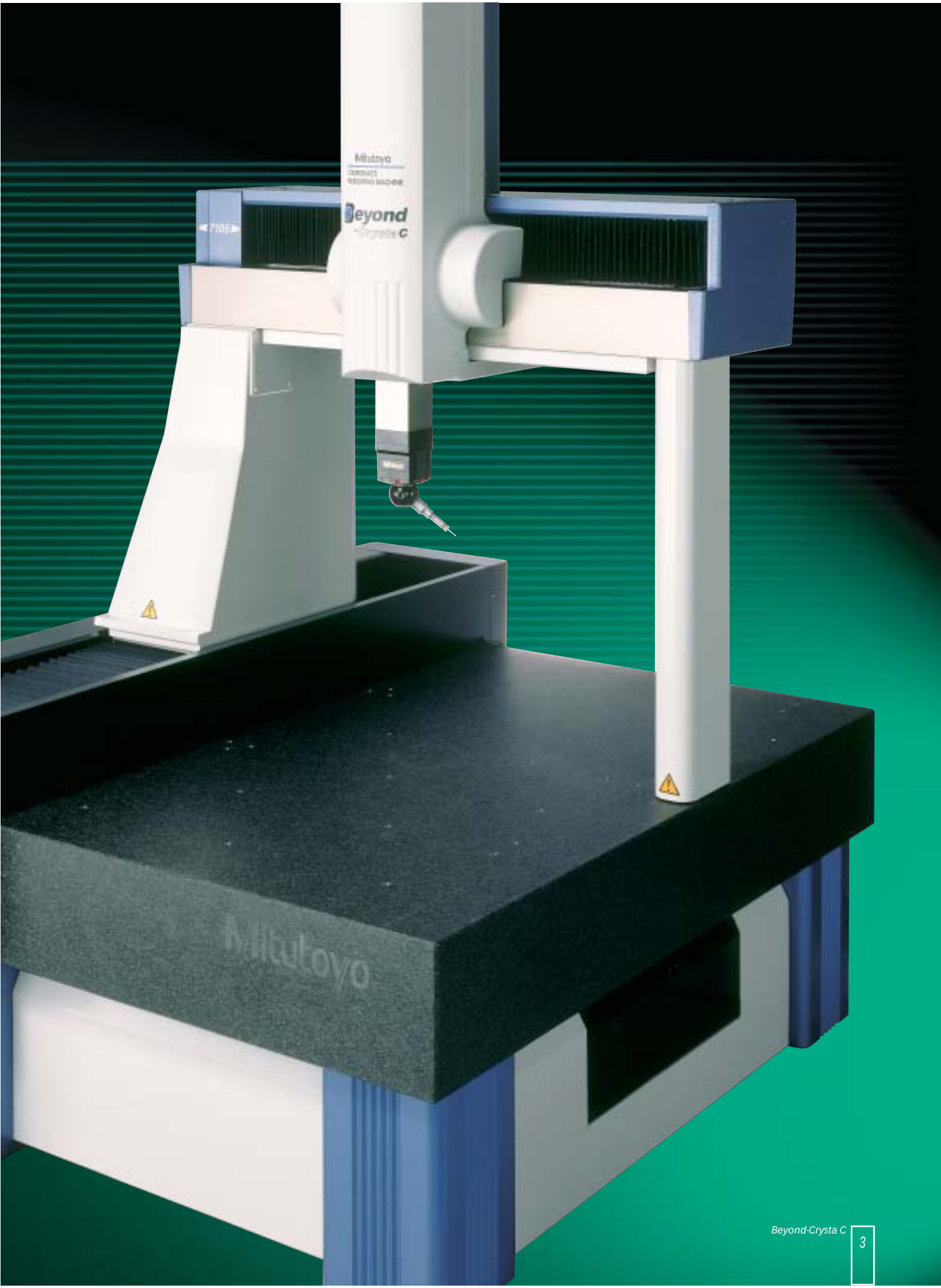
CNC Coordinate Measuring Machine

Beyond
Crysta C

New Standard of CNC CMM

Today's product life cycle is becoming increasingly shorter.
This means today's manufacturers are required to develop products that are lower-priced, and which possess higher functions and originality, within much shorter periods than before.
Also, as with the spread of ISO 9000 compliance, the importance of reliable measurements is receiving more and more focus.
Mitutoyo proposes its new CNC CMM, the Beyond-Crysta C Series, as an answer to current and future user needs.

- *High-accuracy, E=(1.7+3L/1000)µm**
  **Beyond-Crysta C500/700/900 (when using SP-600/MPP-100 probe)*
- *High-speed & high-acceleration, 520mm/s & 0.23G**
  **Beyond-Crysta C700/900 (when using SP-600/MPP-100 probe)*
- *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.


Mitutoyo
Beyond
Crysta C
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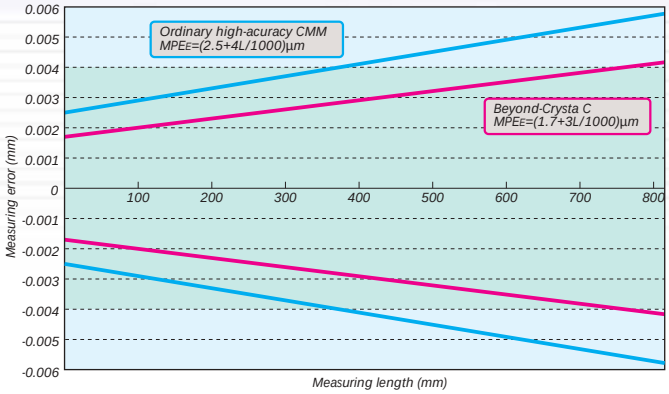
Kiyohara Linear Scale Factory

Underground facility

High-accuracy glass scale

CMM accuracy comparison



Power of 2.5µm for first term

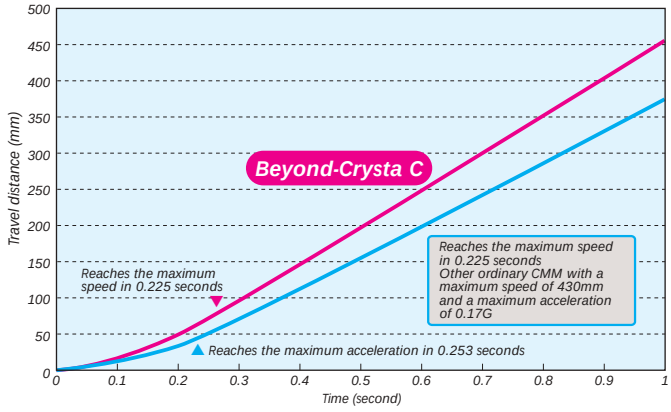
*The Beyond-Crysta C Series is a high-accuracy CNC CMM offering the maximum permissible error of $MPE_E=(1.7+3L/1000)\mu m$[*1]. Most CMMs of the same size in the high-accuracy class provide the maximum performance error of $MPE_E=(2.5+4L/1000)\mu m$. If, for example; the required accuracy (design value tolerance) is ±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 Beyond-Crysta C the machine-accuracy requirement stays under one-fifth of the required accuracy, up to 766mm. A difference of 0.8µm between the two machines at the first term will make a difference of more than double in terms of accuracy guarantee capability.*

**1: C500/700/900 (Z=605), conforming to JIS B 7440-2 (2003)*

High-speed, high-acceleration drive

The Beyond-Crysta 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 Beyond-Crysta 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 Beyond-Crysta C reduces measuring time drastically, and the difference between the Beyond-Crysta C and other ordinary CMMs only increases as the number of measuring points increases, resulting in a significant difference in measuring cost.

Comparison of speed and acceleration



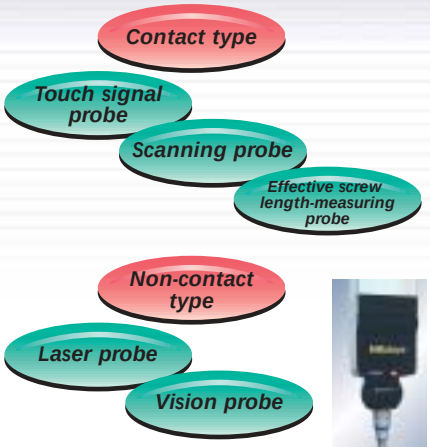
High-accuracy scale unit

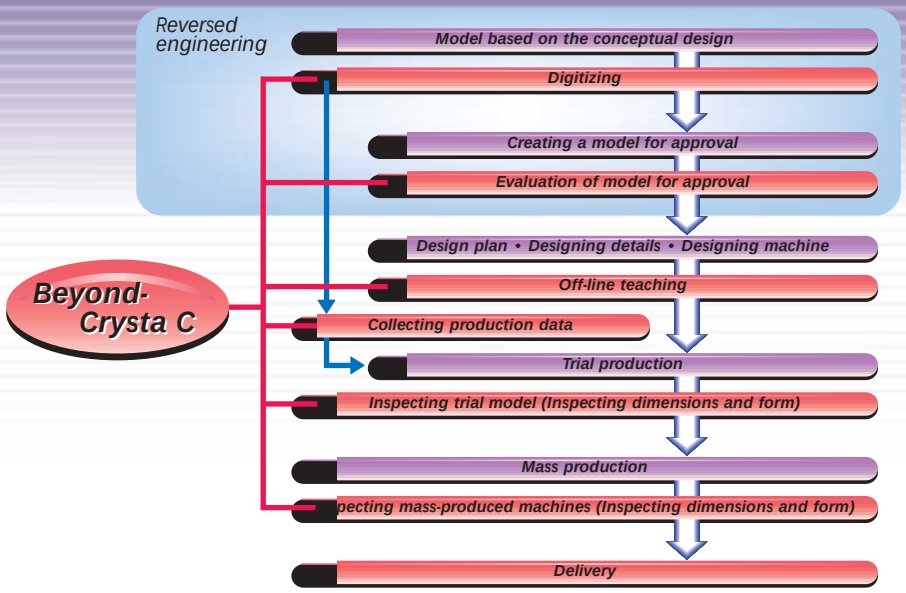
The Beyond-Crysta C is equipped with high-accuracy linear encoders and glass scales manufactured at Mitutoyo's own linear scale plant. Being more resistant against rust and corrosion than metal scales, Mitutoyo's glass scales guarantee high-accuracy for a long period of time.

Patent pending (Japan)

Designed for high-rigidity

As is the case with Mitutoyo's conventional CMMs, various structures are employed in the Beyond-Crysta C in order to give the body higher rigidity. The Y-axis guide rail, which is attached to one side of 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.





Supporting the widest range of probes in the world

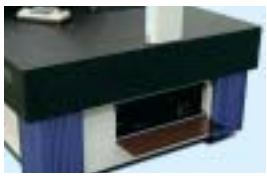
The Beyond-Crysta C supports an extremely large variety of probes, including the conventional contact-type probes, thereby facilitating the measurement of various workpieces. In fact, no other CMM in the world supports as many different types of probes as the Beyond-Crysta C. And the probes developed 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 Beyond-Crysta C.

Compact design and multi-functional controller

The Beyond-Crysta 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.

Patented (Japan)
Patent pending (Japan)

Custom LSI for CMM controller



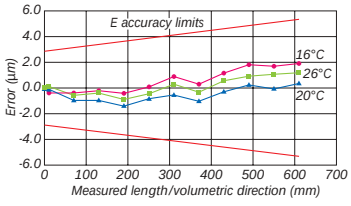
Three-dimensional manufacturing data

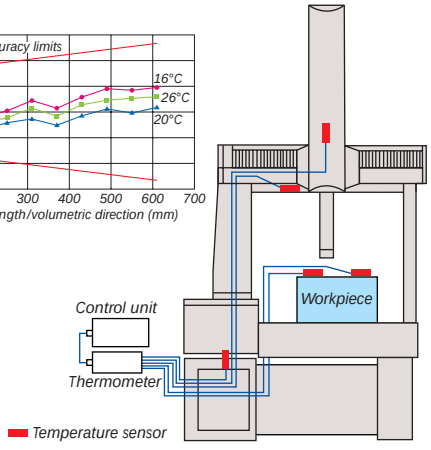
Manufacturing based on 3-D CAD is drawing attention. The biggest advantage of 3-D CAD is that it greatly reduces the lead-time needed for new-product development. Conceptual design data, when converted into 3-D data, can be used to design structures, details and mechanisms. By using 3-D data, the design-to-manufacturing process – from various analyses 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 Beyond-Crysta C are available. These devices can be helpful in the various situations found in this new type of manufacturing. Mitutoyo promises that the Beyond-Crysta C will establish a new standard of quality for its users.

Temperature Compensation System (Optional)

The Beyond-Crysta C's optional Temperature Compensation System guarantees the accuracy of the CMM main unit under temperature conditions of 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 20°C. This system requires that there be no volumetric deformation under the condition in which temperature is other than 20°C. The Beyond-Crysta 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)





Beyond-Crysta C
544
574

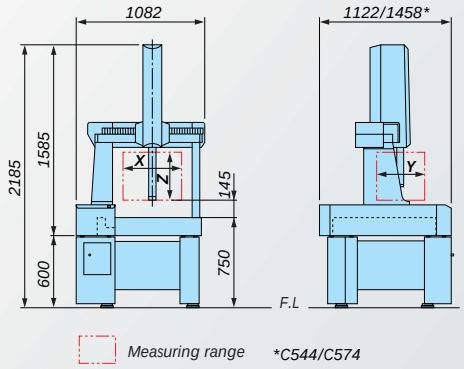
Model		BLN-C544	BLN-C574
Measuring range	X-axis	505mm (20")	
	Y-axis	405mm (16")	705mm (28")
	Z-axis	405mm (16")	
Length standard		Reflective linear encoder	
Resolution		0.0001mm (.000004")	
Guide method		Air bearing on each axis	
Accuracy (20°C±1°C)	ISO 10360-2	E= (1.9+3L/1000)µm (when using TP200) E= (1.7+3L/1000)µm (when using SP600) R= 1.9µm (when using TP200) R= 1.7µm (when using SP600)	
	ANSI/ASME B89.1.	Ball bar performance= 9µm (.00036") Repeatability= 3µm (.00012")	
Drive speed	CNC	8mm/s to 250mm/s (.31"/s to 9.84"/s) on each axis for positioning (Maximum drive speed 430mm/s (16.93"/s) available with tri-axial motion) 1mm/s to 3mm/s (.04"/s to .12"/s) for measuring	
	Joystick	0 to 80mm/s (3.15"/s) in high-speed mode 0 to 3mm/s (.12"/s) in low-speed mode 0.05mm/s (.002"/s) in fine-feed mode**	
Max. measuring speed		8mm/s	
Max. measuring acceleration		980mm/s² (38.58"/s²) on each axis (Maximum acceleration 1697mm/s² (66.81"/s²) available with tri-axial motion)	
Workpiece	Max. height	545mm (21.46")	
	Max. weight	180kg (396 lbs.)	
Mass		515kg(1133 lbs.)	
Air pressure		0.4Mpa	
Air consumption		50 liters per minute (in normal state) or 1.8 CFM	

Under 19 - 21°C temperature condition
E: Indication accuracy R: Probing error

Temperature for guaranteed accuracy, when the machine is equipped with the temperature compensation function (optional)

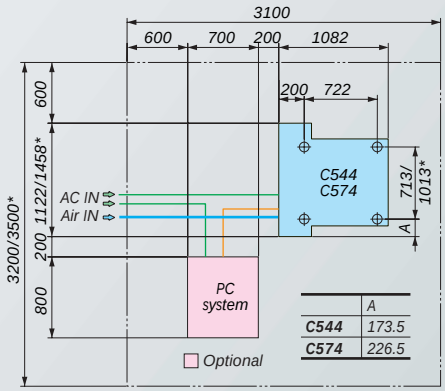
Temperature range		16 to 26°C
Temperature variation	Per hour	2.0K
	Per 24 hours	5.0K
Temperature distribution	Vertical direction	1.0K/°C
	Horizontal direction	1.0K/°C

Dimensions



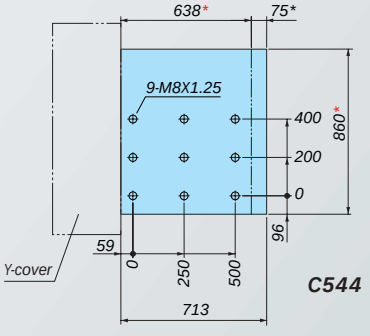
Example of installation

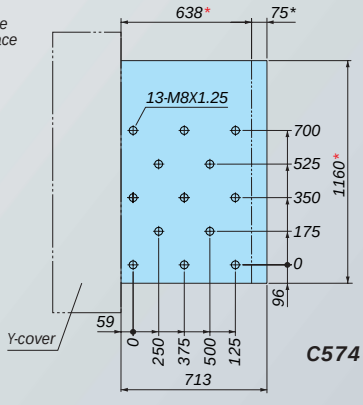
Unit: mm



Layout of clamping holes on surface plate

*Workpiece loading range
*Supporter-traveling sruface





Beyond-Crysta C
776
7106

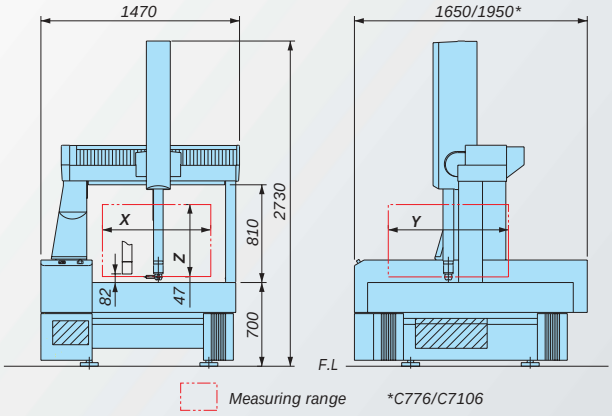
Model		BLN-C776	BLN-C7106
Measuring range	X-axis	705mm (28")	705mm (28")
	Y-axis	705mm (28")	1005mm (40")
	Z-axis	605mm (24")	605mm (24")
Measuring accuracy*		E= (1.9+3L/1000)µm (when using TP200) E= (1.7+3L/1000)µm (when using SP600/MPP-100) R= 1.9µm (when using TP200) R= 1.7µm (when using SP600/MPP-100)	
Resolution		0.0001mm (0.1µm)	
Guide method		Air bearing on each axis	
Drive speed	CNC mode	8 - 300mm, max. composite speed 520mm/s	
	Joystic mode	0 - 80mm/s (high speed), 0 - 3mm/s (low speed) 0.05mm/s (fine speed)	
Max. measuring speed		8mm/s	
Max. measuring acceleration		Each axis 0.13G, max. composite acceleration 0.23G	
Workpiece	Max. height	800mm (31.5")	
	Max. weight	800kg (1760 lbs.)	1000kg (2200 lbs.)
Mass		1675kg (3685 lbs.)	1951kg (4293 lbs.)
Air pressure		0.4Mpa	
Air consumption		60L/min (under normal condition), air source: 120L/min	

Under 19 - 21°C temperature condition
E: Indication accuracy R: Probing error

Temperature for guaranteed accuracy, when the machine is equipped with the temperature compensation function (optional)

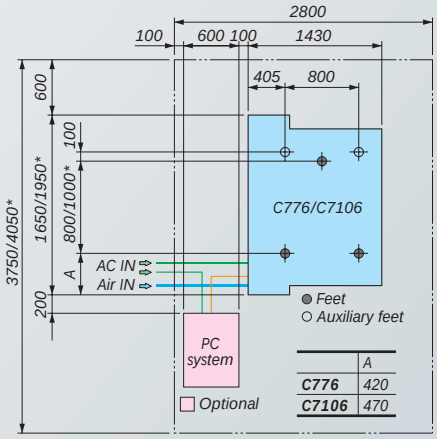
Temperature range		16 to 26°C
Temperature variation	Per hour	2.0K
	Per 24 hours	5.0K
Temperature distribution	Vertical direction	1.0K/°C
	Horizontal direction	1.0K/°C

Dimensions



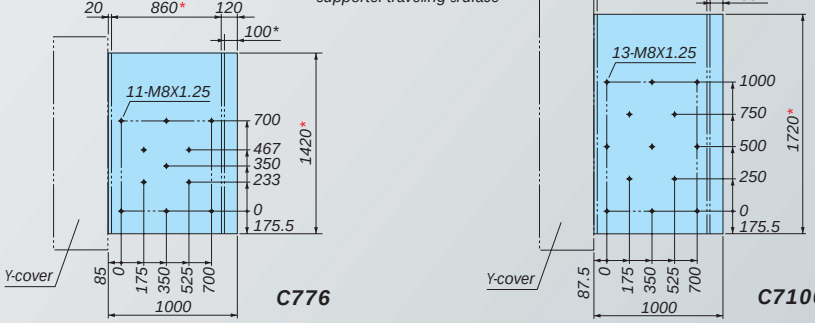
Example of installation

Unit: mm



Layout of clamping holes on surface plate

*Workpiece loading range
*Supporter-traveling sruface



Beyond-Crysta C
9106/8
9166/8
9206/8

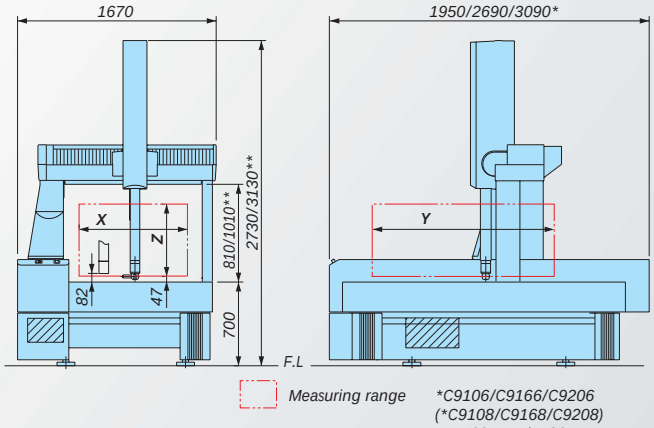
Model		BLN-C9106/8	BLN-C9166/8	BLN-C9206/8
Measuring range	X-axis	905mm (36")	905mm (36")	905mm (36")
	Y-axis	1005mm (40")	1605mm (64")	2005mm (80")
	Z-axis	605mm (24") 805mm (32")	605mm (24") 805mm (32")	605mm (24") 805mm (32")
Measuring accuracy*		E= (1.9+3L/1000)µm (when using TP200) E= (1.7+3L/1000)µm (when using SP600/MPP-100) R= 1.9µm (when using TP200) R= 1.7µm (when using SP600/MPP-100)		
Resolution		0.0001mm (0.1µm)		
Guide method		Air bearing on each axis		
Drive speed	CNC mode	8 - 300mm, max. composite speed 520mm/s		
	Joystic mode	0 - 80mm/s (high speed), 0 - 3mm/s (low speed) 0.05mm/s (fine speed)		
Max. measuring speed		8mm/s (3mm/s for Z=805mm)		
Max. measuring acceleration		Each axis 0.13G, max. composite acceleration 0.23G		
Workpiece	Max. height	800mm (31.5"): Z=605mm 1000mm (39.3"): Z=805mm		
	Max. weight	1200kg (2640 lbs.)	1500kg (3300 lbs.)	1800kg (3960 lbs.)
Mass	Z=605mm	2231kg (4908 lbs.)	2868kg (6309 lbs.)	3912kg (8606 lbs.)
	Z=805mm	2261kg (4974 lbs.)	2898kg (6375 lbs.)	3492kg (7682 lbs.)
Air pressure		0.4Mpa		
Air consumption		60L/min (under normal condition), air source: 120L/min		

Under 19 - 21°C temperature condition
E: Indication accuracy R: Probing error

Temperature for guaranteed accuracy, when the machine is equipped with the temperature compensation function (optional)

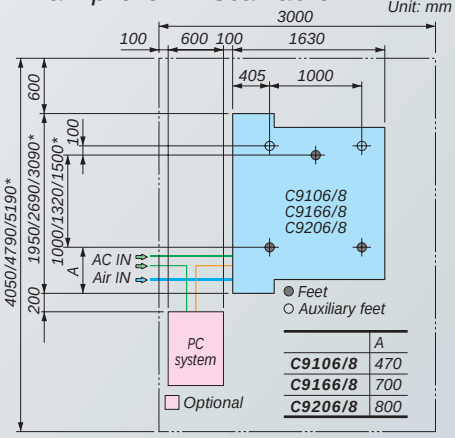
Temperature range		16 to 26°C
Temperature variation	Per hour	2.0K
	Per 24 hours	5.0K
Temperature distribution	Vertical direction	1.0K/°C
	Horizontal direction	1.0K/°C

Dimensions



*C9106/C9166/C9206
(*C9108/C9168/C9208)
**Z=605mm/Z=805mm

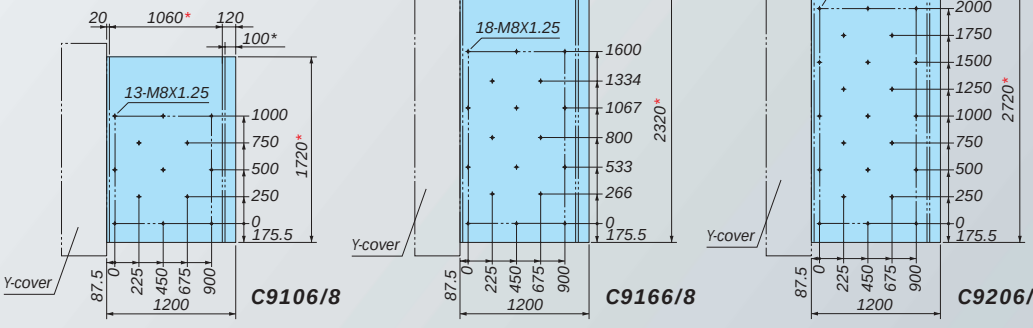
Example of installation



	A
C9106/8	470
C9166/8	700
C9206/8	800

Layout of clamping holes on surface plate

*Workpiece loading range
*Supporter-traveling sruface



Beyond-Crysta C
121210
122010
123010

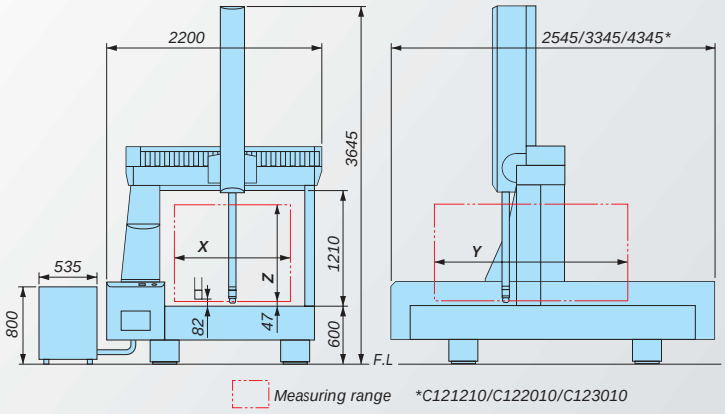
Model		BLN-C121210	BLN-C122010	BLN-C123010
Measuring range	X-axis	1205mm (48")	1205mm (48")	1205mm (48")
	Y-axis	1205mm (48")	2005mm (80")	3005mm (120")
	Z-axis	1005mm (40")	1005mm (40")	1005mm (40")
Measuring accuracy*		E= (2.5+3L/1000)µm (when using TP200) E= (2.3+3L/1000)µm (when using MPP-100) R= 2.2µm (when using TP200) R= 2.0µm (when using MPP-100)		
Resolution		0.0001mm (0.1µm)		
Guide method		Air bearing on each axis		
Drive speed	CNC mode	8 - 300mm, max. composite speed 520mm/s		
	Joystic mode	0 - 80mm/s (high speed), 0 - 3mm/s (low speed) 0.05mm/s (fine speed)		
Max. measuring speed		5mm/s		
Max. measuring acceleration		Each axis 0.1G, max. composite acceleration 0.17G		
Workpiece	Max. height	1200mm (4.7")		
	Max. weight	2000kg (4400 lbs.)	2500kg (5500 lbs.)	3000kg (6600 lbs.)
Mass		4050kg (8910 lbs.)	6150kg (13530 lbs.)	9110kg (20042 lbs.)
Air pressure		0.4Mpa		
Air consumption		60L/min (under normal condition), air source: 120L/min		

Under 19 - 21°C temperature condition
E: Indication accuracy R: Probing error

Temperature for guaranteed accuracy, when the machine is equipped with the temperature compensation function (optional)

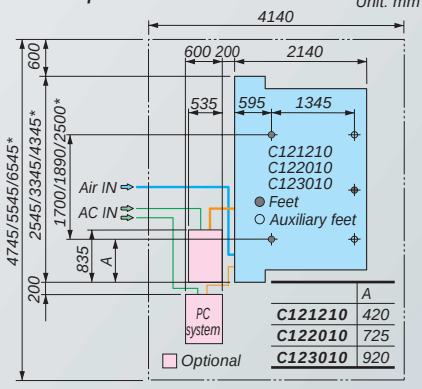
Temperature range		16 to 26°C
Temperature variation	Per hour	2.0K
	Per 24 hours	5.0K
Temperature distribution	Vertical direction	1.0K/°C
	Horizontal direction	1.0K/°C

Dimensions



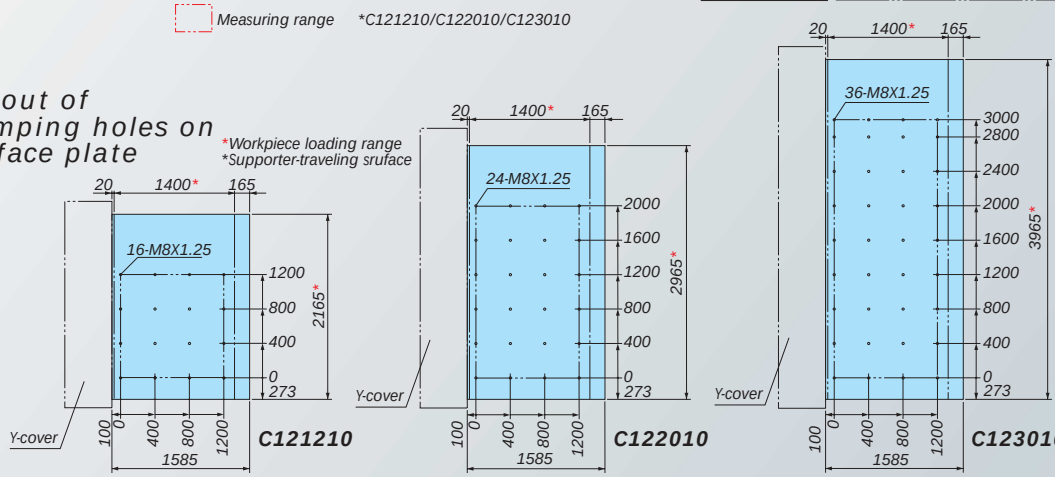
Example of installation

Unit: mm

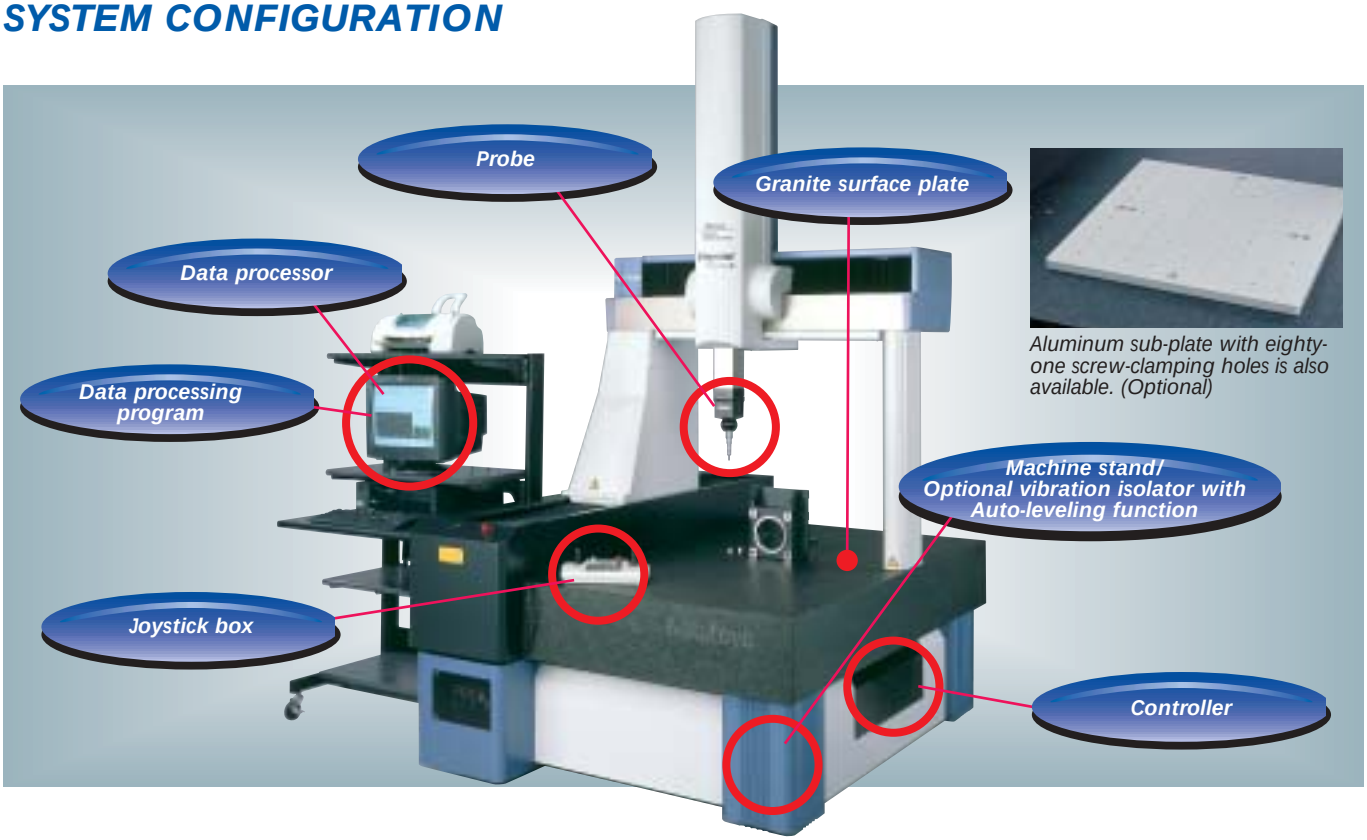


Layout of clamping holes on surface plate

*Workpiece loading range
*Supporter-traveling sruface



SYSTEM CONFIGURATION



Aluminum sub-plate with eighty-one screw-clamping holes is also available. (Optional)

PROBES

MPP-100

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

PM10MQ*

A motorized probe head that allows automatic probe posture changes in 720 directions. It's indispensable in the auto-measurements of three-dimensional workpieces. Posture repeatability is 0.5µm (with the use of TP200/PS1R: 2s). A probe extension with a length of up to 450mm can be installed. The Auto Probe Exchanger is available as an option.

**PH10T is also available*

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.

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.

SP25M

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

SP80

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

TP200

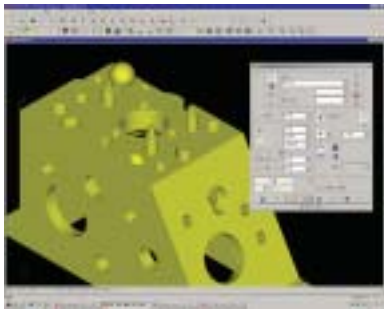
A high-accuracy touch-signal probe with repeatability of 0.4µm (with use of PS1R: 2s). The Auto Stylus Exchanger is available as an option.

DATA PROCESSING PROGRAMS

A wide variety of programs for each manufacturing step, from design to production to evaluation, are available for the Beyond-Crysta C Series. Not to mention a quality assurance program, they also include programs that support various types of CAD data processing, in-line measurement, data feedback system, and process managing system.

- *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*

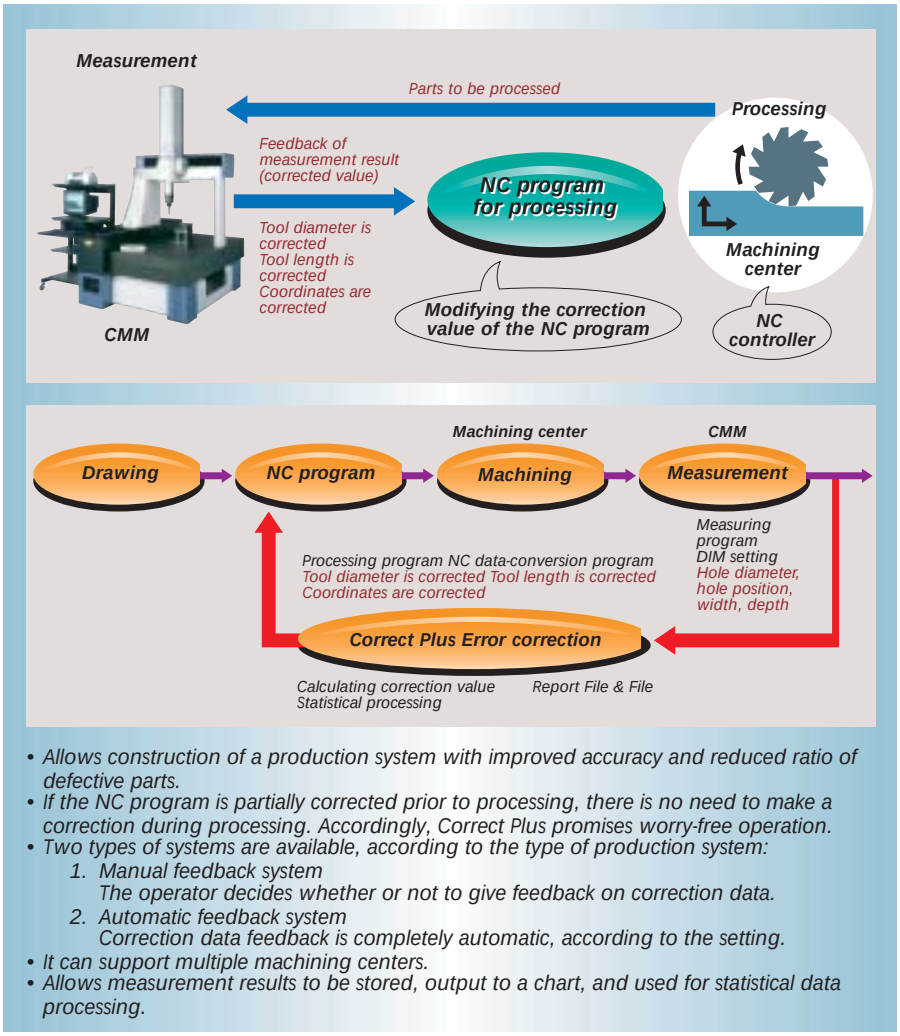
Geopak-Win



MCAT300

Correct Plus® (Data Feedback System)

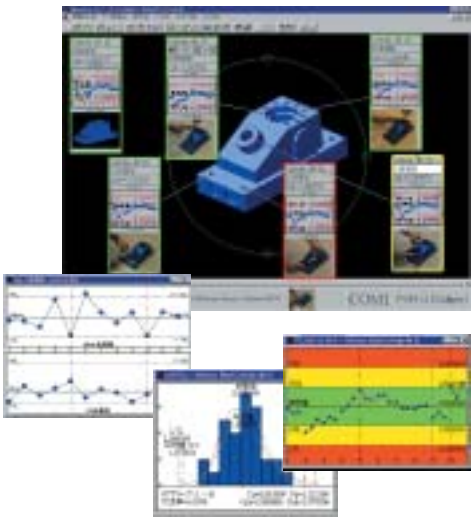
After measuring the components mass-produced by a machining center, the Correct Plus system feeds the compensation data calculated from the measurement result and nominal value back to the machining center. This data feedback system maintains and improves the accuracy of processing.



- *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.*

MeasureLink® Family Optional program for statistical processing control

MeasureLink 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 Measure Lonk, 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 SSPC-Super Statistical Process Control Program

MeasurLink SSPC-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.

Beyond -Crysta C

Mitutoyo

PRECISION IS OUR PROFESSION

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