UPMC Series »»

World's Highest Precision. High-Precision CNC 3D Coordinate Measuring Machine Pushes the Measuring Technology Envelope.

UPMC Series

Our uncompromising approach to precision technology has resulted in the birth of the UPMC series that responds to the most demanding requirements for measurement precision. In addition to outstanding precision, the system features an optimum balance of high speed, rigidity, operating ease and cost. The latest material research in the space-engineering field guarantees stability and reliability. The result is a three-dimensional coordinate measuring machine with the world's highest accuracy that serves as a "Mother" machine.

- World's highest precision: MPE_E=0.4+L/1000 µm (UPMC 850 Ultra ACC)
- High guide precision maintained by new CARAT technology.
- Bridge-center drive system (ZEISS patent) provides superior dynamic rigidity.
- HSS high-speed scanning probe head has wide application range.
- Comprehensive measures to eliminate influence of temperature changes.
- Extremely high precision makes the UPMC ideal for measurement and calibration options for reference gages, and inspection/measurement of prototypes and checking tools in gage rooms.

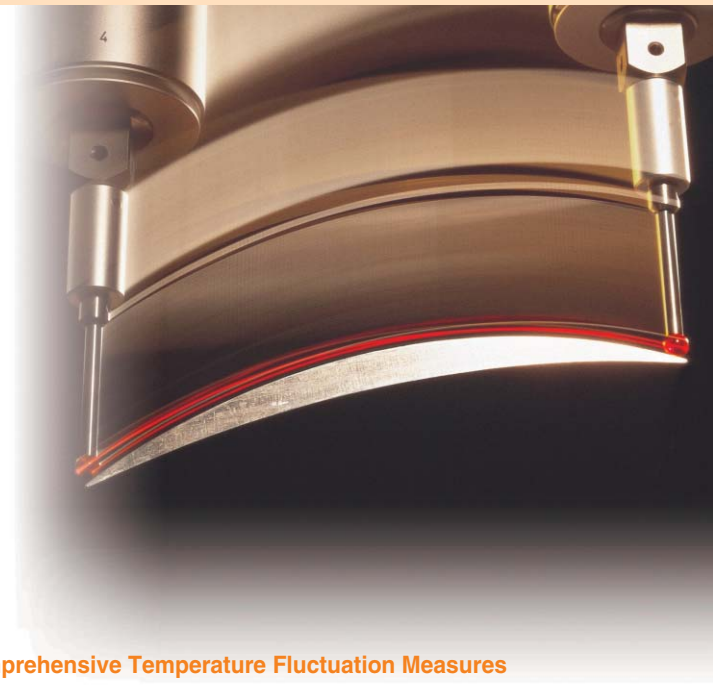
UPMC 850 CARAT

UPMC 1200 CARAT

ACCRETECH TOKYO SEIMITSU

World's Highest Measuring Precision MPE_E=0.4+L/1000 µm (UPMC 850 Ultra ACC) New CARAT Technology Guarantees Consistently High Accuracy

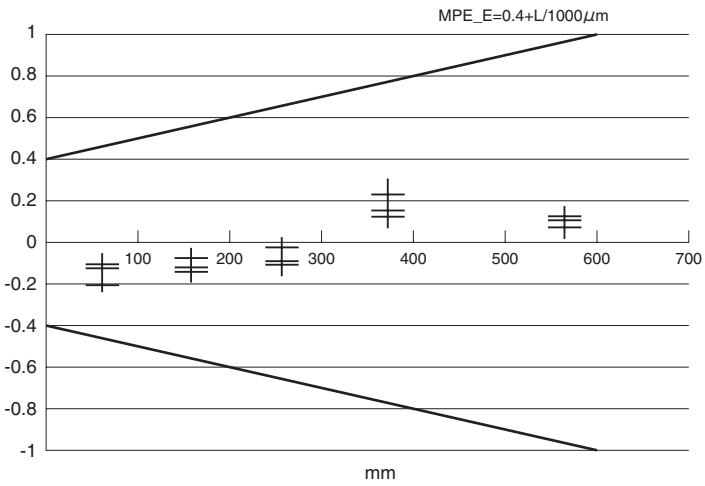
A wide variety of problems must be solved to achieve high precision, including the influence of ambient temperature and floor vibration. The UPMC series provides consistently high precision measurement through effective measures to deal with ambient conditions. In particular, new CARAT technology maintains high stability. We are using these and other cutting-edge ZEISS technologies and expertise to achieve unparalleled measuring performance.



World's Highest Measuring Precision MPE_E=0.4+L/1000 µm

(UPMC 850 Ultra ACC)

The UPMC provides the top level of precision required for the measurement/ calibration of reference gages in gage rooms, and the inspection of products. This means it can serve as the reference machine for 3D coordinate measurements.



New CARAT Technology Maintains Guide Accuracy

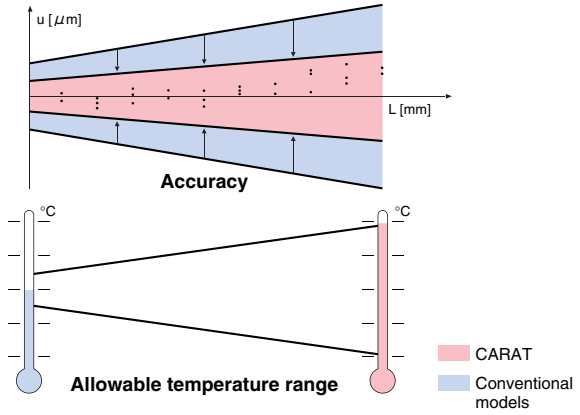
Cast-iron guides are often subject to a drop in the stability of accuracy over an extended period. The UPMC series has adopted a special alloy and CARAT (Coated Aging Resistant Alloy Technology) to solve this problem. CARAT surface treatment technology was perfected through space engineering. This provides a thermal conductivity 80 times that of gabbro, resulting in no temperature gradient for the guides (difference between external and internal surfaces), and no distortion due to temperature changes. CARAT technology provides extremely high stability for many years.

CARAT guides keep influence due to ambient temperature changes to the absolute minimum.

Comprehensive Temperature Fluctuation Measures

The reference scale incorporates ZERODUR on each axis, with a thermal expansion coefficient of ±0.05 · 10^{-6} K^{-1}. In practice, this virtually eliminates the influence of temperature changes, guaranteeing the ideal thermal characteristics.

Achieves high measuring precision under temperature conditions that are not ideal.



Temperature Compensation by Machine

The UPMC integrates our concept of error removal and compensation throughout the machine. This consists of efficiently removing the influence of the external temperature and computer-compensation of the influence due to any remaining heat radiation. Any system error in the guides, scales or squareness is addressed by using CAA (Computer Aided Accuracy). At this time, compensation is performed for the center of the probe ball. The result is extremely high precision even when temperature conditions are not ideal.

Compensation of Table Temperature Gradient

In the event there is a temperature gradient on the table made from gabbro even when heat radiation is blocked, compensation can be performed for the measured values. The table temperature is detected by multiple temperature sensors installed above and beneath the table, and an expanded CAA compensation method is used to compensate for any distortion due to temperature changes.

Automatic Leveling Air Damper Efficiently Removes External Vibration

This air damper efficiently attenuates mechanical vibration from the building or surrounding sources that may have an adverse influence on measurements.

High Speed and Flexibility Enhance Measurement Efficiency

High speed and high efficiency are essential elements of superior probing technology. For example, the machine does not really shine unless setup can be completed in a minimum of time, part changes are easy and it can evolve to meet future requirements. In addition to outstanding precision, the UPMC offers a diverse range of scanning methods and other characteristics that anticipate future trends.

HSS High Speed Scanning Probe Head

The HSS High Speed Scanning probe head consists of a parallel plate spring, displacement measuring system using a differential transformer and an independent clamp mechanism. The head maintains superior accuracy, reproducibility and functionality. In addition, the wide variety of methods to retrieve measured values on the UPMC provide a virtually unlimited number of measuring applications.

Static Measurement for Extra High Precision

Static retrieval of measured values is ideal when the ultimate in precision is required. Measured values are not retrieved until the machine movement axes are stopped at the probe system zero point, eliminating any dynamic influence on the measured values. Reproducibility of multi-processing/probing and average value is high, which indirectly leads to higher resolution.

Scanning Achieves High-Speed Measurement

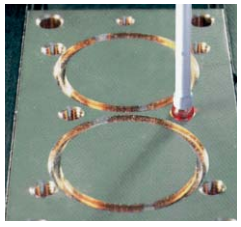
Probing technology has been adopted that features high measuring point interval density and is effective in boosting the speed of scanning measurement (profile measurement). The probe head follows the profile of the designated surface, and the measured values are continuously acquired.

Multi-Point Measurement Reduces Measuring Time

As with copy control, the probe moves from one point to another while remaining in contact with the workpiece. The measured value is acquired during the short interval the probe is stopped, enhancing measuring efficiency.

Effective Centripetal Probing for Thread/Hole/Groove Measurements

The ability to perform positioning control simultaneously for multiple axes during probing enables centripetal probing measurements of grooves, gear grooves, small holes and other such shapes. The appropriate axis is clamped, and loop control is performed to enable probing to the proper position.



Interchangeable Probe with High Reproducibility

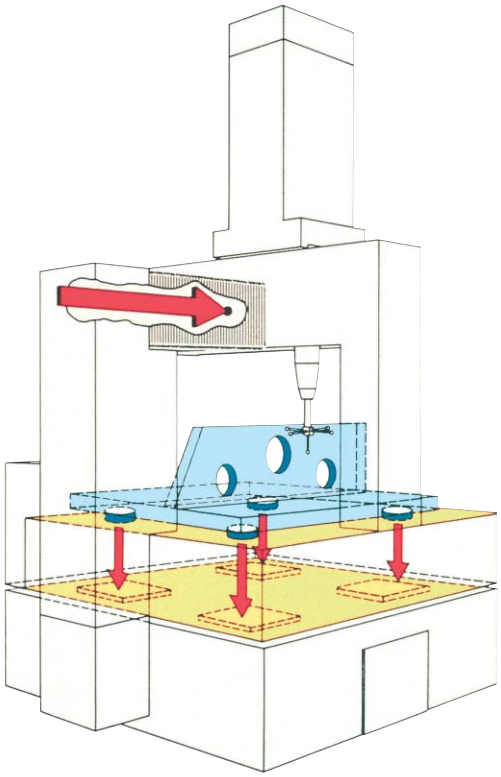
The HSS high-speed scanning probe head on the UPMC features a built-in probe change mechanism to ensure easy setup. The reproducibility after each probe change is extremely high, eliminating the necessity of calibration each time the probe is changed. This enables the current measuring process to be interrupted to accommodate rush measurement jobs. An optional automatic probe changing system is also available.

Culmination of Mature Technologies

High rigidity enhances the quality of measurements. Productivity cannot be increased unless quality is maintained, no matter how high the original precision or speed may be. A number of technological features were incorporated on the UPMC to provide a structure with superior rigidity and resistance to corrosion. These include air bearings, the bridge-center drive system (static table) and the use of gabbro. The well-balanced provision of a full line of functions give birth to outstanding measurement reliability.

Bridge-Center Drive System with Superior Dynamic Rigidity

This ZEISS patented drive system that was designed to achieve ultra-high precision also features extra high drive power due to the location the bridge drive near the center of gravity. Furthermore, since there is no torsion due to mass moment of inertia, pitching and yawing are kept to an absolute minimum during bridge movement. This drive system has no adverse influence on measuring accuracy, and enables high-speed measurements in the manual or CNC mode.



Static Table Enhances Ease of Work

The adoption of bridge drive (static table) makes it easy to provide an inlay rotary table (optional) and provides a large area for the mounting of workpieces, even though the machine is compact. In particular, the measuring table can be directly used as the supporting point to receive heavy workpieces, eliminating any influence on the straightness of the guides due to the workpiece weight. The structure also simplifies the securing of workpieces.

Table Material Enhances Stability

Gabbro is used for the machine table. This type of stone was selected because of its high hardness, freedom from the influence of corrosive elements and ability to be cut in a dimension that is large enough for the table in a single piece. In addition, this material was chosen due to the high level of plane production technology required for the machine guides.

Options

RT05-400 Inlay Type Rotary Table

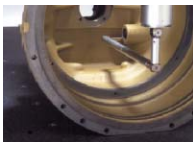
A 4th axis can be added to the UPMC to enhance the range of applications as a CNC measuring machine.

- Efficient measurement of rotary symmetric workpieces
- Enhances ease of probing
- Reduces measuring time
- Simplifies probe configuration
- Expands effective measuring range
- Improves viewing conditions
- Reduces causes of error during straightness and other such measurements

Resolution: 0.2 sec.
Angle error (PW): 2 sec.
Positioning accuracy: 1 sec.
Axial direction run-out: 0.3 μm

Radial direction run-out: 0.3 μm
Wobble ft: 0.5 sec.
Allowable load: 3000 N
Allowable moment: 50 Nm

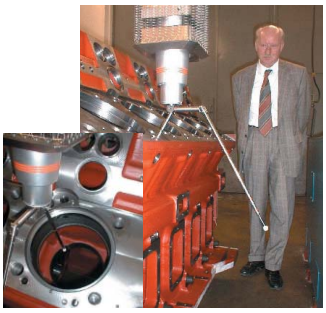
Scanning Measurement Examples



Combination probe
(600mm overall length)

φ0.3mm probe

Measurement of large workpiece



Specifications

Model			UPMC 850 CARAT		UPMC 1200 CARAT
			SuperACC	Ultra ACC	SuperACC
Measuring range	X axis (mm)		850		1150
	Y axis (mm)		1150		1500
	Z axis (mm)		600		1000
Measuring accuracy*1	Standard probe (115mm)	MPE_E (μm)	0.7+L/600	0.4+L/1000	1.4+L/400
		MPE_P (μm)	0.6	0.5	1.5
	200mm long probe	MPE_E (μm)	0.7+L/600	0.7+L/600	1.4+L/400
		MPE_P (μm)	0.6	0.6	1.5
	MPT_THP (μm)		1.8		2.1
Temperature conditions	Ambient temperature		20°C±1°C	20°C±0.5°C	20°C±1°C
	Temp. change	Per hour (°C/h)	0.5	0.5	1.0
		Per day (°C/d)	0.5	0.5	1.0
	Material	Height direction	0.5	0.5	1.0
Measuring scale			Optical type: ZEISS PHOCOSIN, ZERODUR scale		
Resolution (μm)			0.08	0.08	0.08
Table	Material		Gabbro		
	Usable width (mm)		1000		1500
	Usable depth (mm)		1970		2650
	Height from floor (mm)		850		600
	No. of workpiece securing bolts (M12)		40		48
Workpiece measured	Max. height (mm)		640		1050
	Max. weight (kg)		1500		2000
Guide system			Air bearings		
Drive Speed (mm/s)	Joy stick mode		Max. 65		Max. 65
	CNC mode		Max. 110		Max. 260
	Scanning mode		Max. 20	Max. 20	Max. 20
Drive acceleration (mm/s²)			Max. 130		Max. 430
Probing method			Point-to-point method and scanning method		
Measuring force			0.2 N (0.1 – 1.0 N: Can be changed in 1 mN steps)		
Probe head movement range (mm)			±2.5		
No. of scanning points per second			100		
Probe mount	Max. weight (g)		600 (including automatic weight balance and change plate)		
	Max. length (mm)		600		
Air source	Supply air pressure (MPa)		0.6 – 1.0		
	Air pressure used (MPa)		0.5		
	Air consumption (Nℓ/min)		60		90
Power source	Power supply		Single phase 100 V ±10%, 50 or 60 Hz		
	Power consumption (VA)		Max. 2000		Max. 3300
Unit dimensions	Width (mm)		1590		2330
	Depth (mm)		2935		4330
	Height (mm)		3025		4050
Unit weight (kg)			4000		7100

*1 E and R are in accordance with ISO 10360-2. L is an arbitrary length. The ambient environment (temperature gradient, etc.) needs to be taken into consideration when selecting the location for the machine.
Note: MPE_E: maximum permissible indication error; MPE_P: maximum permissible probing error; MPE_THP: maximum permissible scanning error