Multi-axis Portable Coordinate Measuring System

SpinArm-Apex Series

Catalog No. E16006 (2)

Multi-axis Design Provides a Large Measuring Volume Combined with Compact Portability

Mitutoyo

Multi-axis Portable Coordinate Measuring System

SpinArm-Apex

NEW-STYLE
Coordinate Measuring Machines

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The high performance obtained with the SpinArm-Apex series makes it suitable for many manufacturing processes.

The ultra-compact body provides excellent portability. Combined with the software created with Mitutoyo-unique technologies, SpinArm-Apex achieves superior operability.

Multi-axis Portable Coordinate Measuring System

SpinArm-Apex

High Environmental Resistance

Carbon fiber tube with optimized length-ratios design, allows for wide operating temperature range. The system can be used in any environment due to the temperature compensation function.

Automatic Probe Recognition

This function prevents a measurement error due to users selecting the wrong probe. The system automatically knows the type and parameters of each probe once connected.

Counterbalancing System

Nimble operation is achieved with symmetrical balance springs.

Screw Mounting

Mounting plate design enables quick setup thereby minimizing downtime.

Optional Functions

Many options such as wireless (WiFi) communication of measurement data and main unit batteries are provided for improvement in user-friendliness.

FEATURES

Standard accessories

●Tool box

This is used to store various accessories.

●Fixture (Magnet)

Main unit securing plate
Magnetic stand (3 units)

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SpinArm-Apex 366S

SpinArm-Apex 367S

Specifications

6-axis model

Model No.	SpinArm-Apex 186S	SpinArm-Apex 246S	SpinArm-Apex 306S	SpinArm-Apex 366S
Measuring envelope*1	1800 mm	2400 mm	3000 mm	3600 mm
Repeatability*2,*3	± 0.040 mm	± 0.050 mm	± 0.080 mm	± 0.100 mm
Accuracy (Arm type)*2,*3	± 0.055 mm	± 0.065 mm	± 0.100 mm	± 0.135 mm
Mass (main unit)	15.6 kg	15.8 kg	16.3 kg	16.7 kg

7-axis model

Model No.	SpinArm-Apex 247S	SpinArm-Apex 307S	SpinArm-Apex 367S
Measuring envelope*1	2400 mm	3000 mm	3600 mm
Repeatability*2, *3	± 0.055 mm	± 0.090 mm	± 0.110 mm
Accuracy (Arm type)*2,*3	± 0.080 mm	± 0.135 mm	± 0.165 mm
Mass (main unit)	16.2kg	16.7 kg	17.1 kg

*1 Measurement range is expressed as a diameter value at the maximum reach using software with the Sø10 mm standard probe mounted.
*2 According to Mitutoyo's acceptance procedure. The accuracy guaranteed value above is determined when MS5-5R11G probe is mounted.
*3 Guaranteed accuracy temperature range: 16°C - 24°C (Temperature gradient: 1.5K per hour)

●Carrying Case

With casters
External dimensions of 1800mm/2400mm model: 620x1217x365mm
External dimensions of 3000/3600mm models: 590x1517x365mm

●Connection Cables
●Counterbalancing system

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CMM

MCOSMOS-1 MANUAL

General Dimension/Coordinate Measurement Software Applicable to Vehicle Bodies and Frames, Aircraft Parts, Processing Machine Bases, and Tools, etc.

Advanced Dimension Measurement/ Coordinate System Setup Function

This is a dimension measurement software program provided with the part program function, the graphical display function, and so on.

Graphical Display

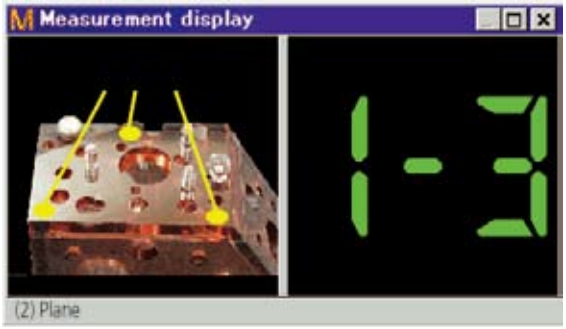
Measurement results will be presented as a real-time graphic display in the Element Drawing Window. A variety of processing functions including Change View Angle, Zoom-In, Zoom-Out, etc., provide extensive support for user inspections.

Customization of Layout

Users can optionally customize the layout of each window (Element Drawing, Measurement Result, Measurement Display, Counter Value, etc.). The size and position of each window can also be modified, stored and restored at any time.

Image/Sound Input

Image data (.bmp) and sound data (.wav) can be added during part programming. This greatly helps the user to improve the operating efficiency of repeat measurement by following the image or sound guidance inserted beforehand.

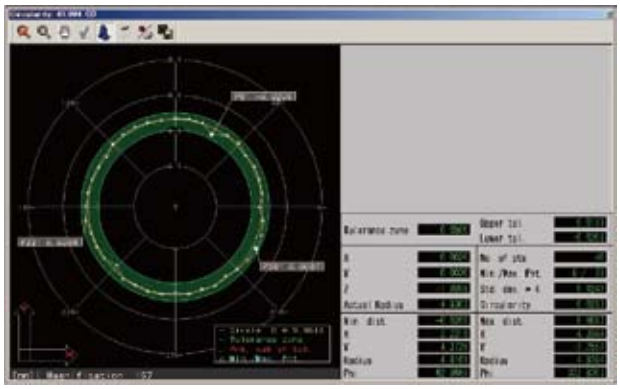


Memory Call Function

The element data of any point, line, plane, circle, ellipse, sphere, cylinder or cone currently displayed in icon form will be automatically stored in the memory. The stored element data can be called at any time for repeat calculations of angle, distance and tolerance zone, etc.

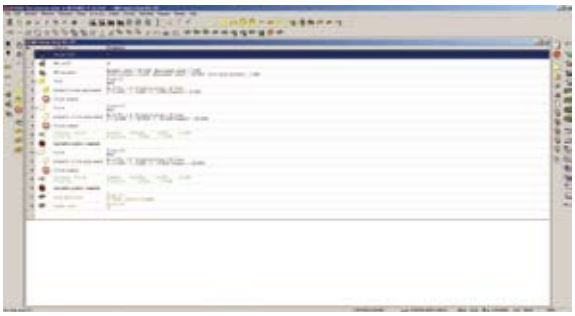
Rich Tolerance Zone Measurement Functions

A variety of measurement functions cover form tolerance zones such as straightness, flatness, roundness, etc., and other tolerance zones such as concentricity, coaxiality, positional deviation, etc.



Edit Part Program Function

Existing part programs can be edited. This function features a user-friendly interface to support the editing process with iconized menus.



Output Function

Measurement results can be output in text file format or to the printer. Print-out of the current Element Drawing Window is also possible.

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cmm

CAT1000S MANUAL

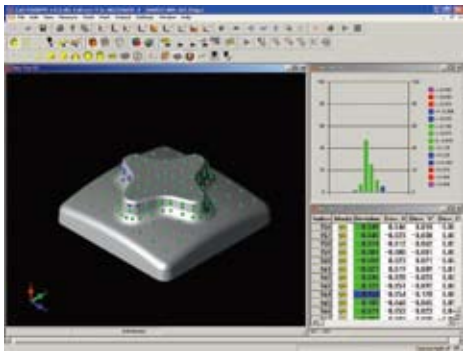
Free-form Surface Evaluation Software Applicable to Household Appliance Casings, Bottles, etc.

Free-form Surface Evaluation

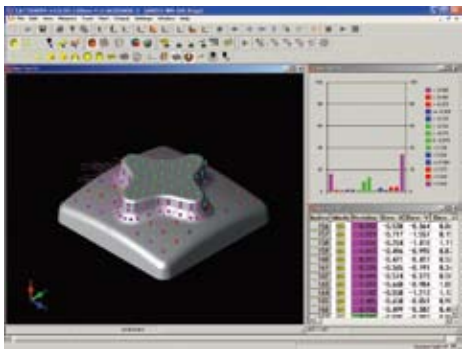
IGES-, VDAFS-formatted CAD data import is possible. This software is used to load the surface data of a workpiece and evaluate any error (deviation) relative to the CAD data.

Best-fit Function

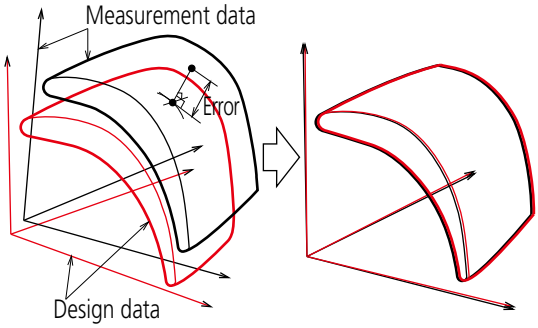
This function enables optimum alignment by rotating the coordinate system or shifting the origin position in order to minimize differences between measurement data and the corresponding CAD data.



Evaluation before best-fitting



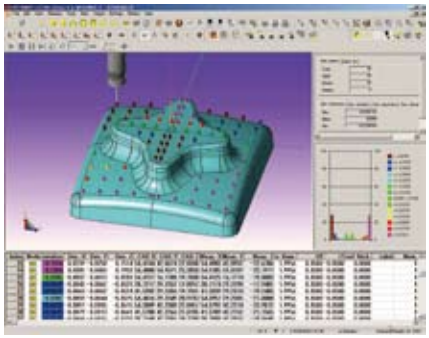
After using the Best-fit Function



Graphical illustration of Best-fit Function

A Variety of Graphical Displays

For the measurement data, the user can choose whether the error line, error values (deviation values) or the measurement number, etc., is displayed on the screen. Furthermore, the user can view the error situation intuitively, since the error distribution can be represented in histogram form.



Output Format

(1) .txt data output: Outputs in a form readable by a text editor such as MS Notepad.
(2) DMIS output: Outputs in a DMIS-compatible format.
(3) VDA-FS output: Saves the data into a file using the VDAFS-format.
(4) IGES output: Saves the data into a file using the IGES106 format.

Example of text file output

Loading CAD Data

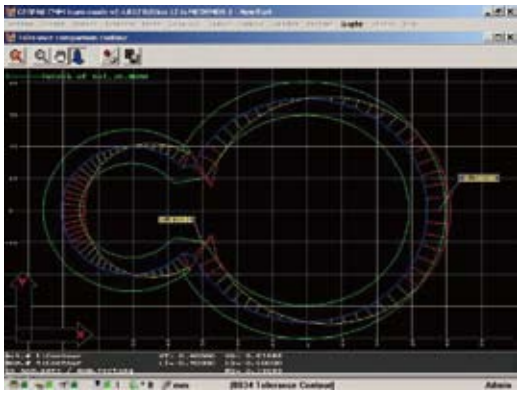
Format	Extension	Supported version
IGES	.igs/.ige/.iges	V4.0/V5.2/V5.3
SAT	.sat	Up to V16.0
VDAFS	.vda/.vdafs	V1.0/V2.0
STEP	.stp/.step	AP203/AP214
CATIA V4	.exp	V4.1.x – V4.2.4
CATIA V5	.CATPart/.CATProduct	R2 – R16
PRO/E	.prt.1/.prt	V16 – Wildfire2, Wildfire3
Palasolid Part	.x_t/.xmt/.x_b	10.0 – 18
Unigraphics	.prt	11 – 18/NX1/NX2/NX3/NX4
SolidWorks	.sldprt/.prt	98 – 2006

Note: Some CAD Data above are options. Please contact us for details.

SCANPAK MANUAL

2D-profile Data Acquisition/Evaluation Software

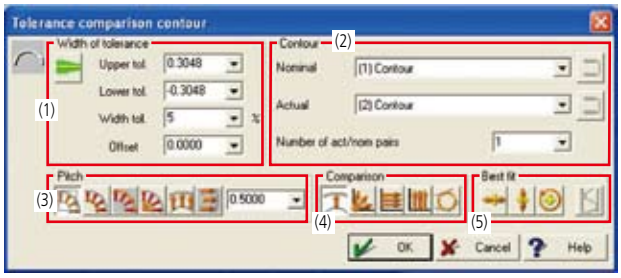
Tolerance zone measurement and best-fit of any profile data obtained can be performed. This covers workpieces such as cams or shafts that have geometrical features hard to evaluate normally.



Contour Tolerance Zone Measurement

This function performs tolerancing by comparing measured values with the corresponding design values.

[Contour Tolerance Zone Measurement Setup Window]



①Tolerance limit
Sets the upper and lower limit tolerances of a feature and specifies the width of the magnified error zone.

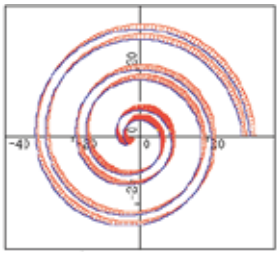
②Contour data specification
Specifies design data and measurement data.
Design data can be provided with point sequence (X, Y, Z) data on a contour.

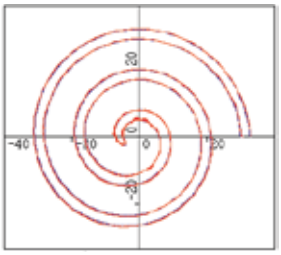
84.95687	0.01006	-6.99845
84.95563	0.36494	-6.99960
84.77160	3.28886	-6.99966
84.30990	6.17095	-6.99932
83.57109	8.99483	-6.99938
82.56004	11.73262	-6.99962
81.29150	14.36238	-6.99945
79.77063	16.85551	-6.99925
78.01538	19.18613	-6.99964
76.04346	21.33798	-6.99961
73.86841	23.28751	-6.99916
71.51881	25.01633	-6.99991
69.01574	26.50986	-6.99986
66.37367	27.74854	-6.99921
63.62563	28.72	6.99959

③Tolerancing pitch
This field specifies a tolerancing point pitch and direction.

④Tolerancing direction
This toolbar specifies whether to perform tolerancing in the axial or the normal direction.

⑤Best-fit
This toolbar optimizes the correlation between the reference coordinates of measurement data and design data to minimize the amount of error.


Before applying Best-Fit


After applying Best-Fit

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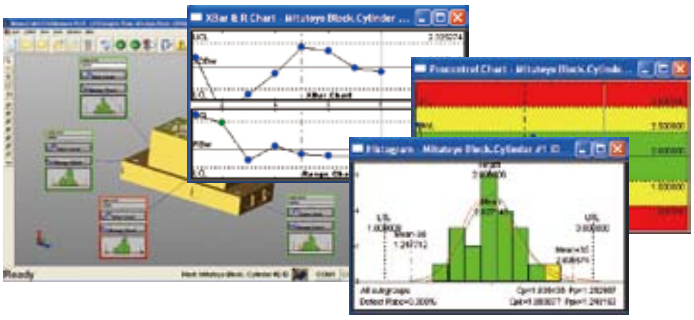
STATMeasure PLUS

Statistical-processing and process-controlling 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., wear or damage to 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.



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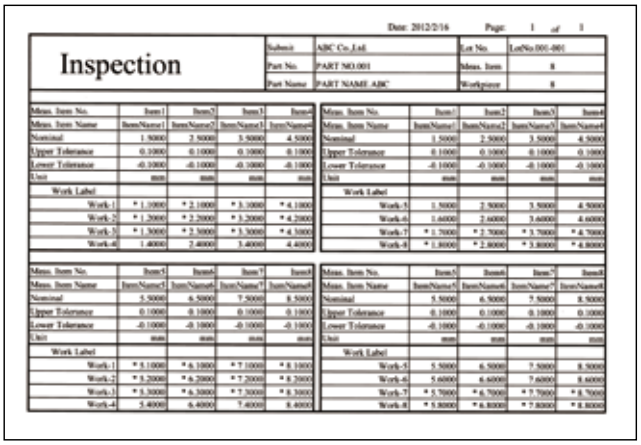
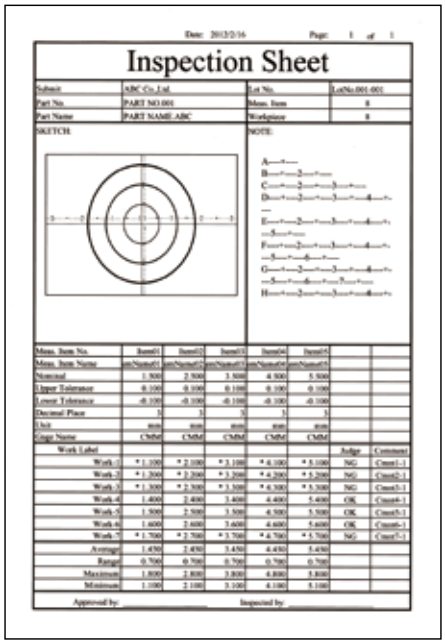
MeasureReport®

Inspection Table Generation Software

This is a convenient software program for creating user-original inspection tables by exporting the data obtained with MCOSMOS1 MANUAL and CAT-1000S MANUAL in a statistical processing format, which has been defined in advance.


Inspection

[Inspection Table sample]

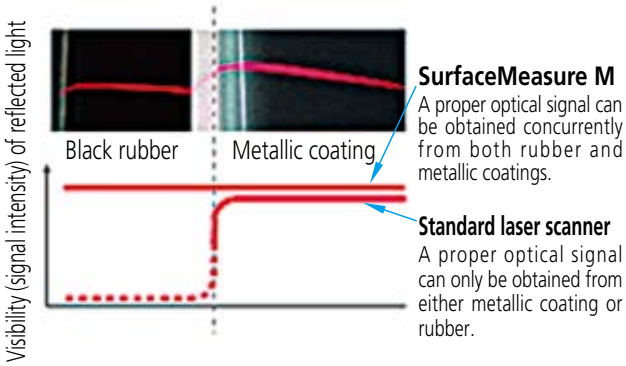

Inspection Sheet

Line Laser Measurement Solution

SurfaceMeasure M series – Line laser probe dedicated for Non-contact digitizing

SurfaceMeasure M series can automatically adjust its performance as it scans an object.
This line laser probe can effectively measure the following objects, in contrast to conventional laser probes or white-light system scanner:

- Glossy objects or objects with different reflectance parts
- Objects painted in multiple colors
- Objects exposed to direct sunlight
- Objects with an acute reflection angle



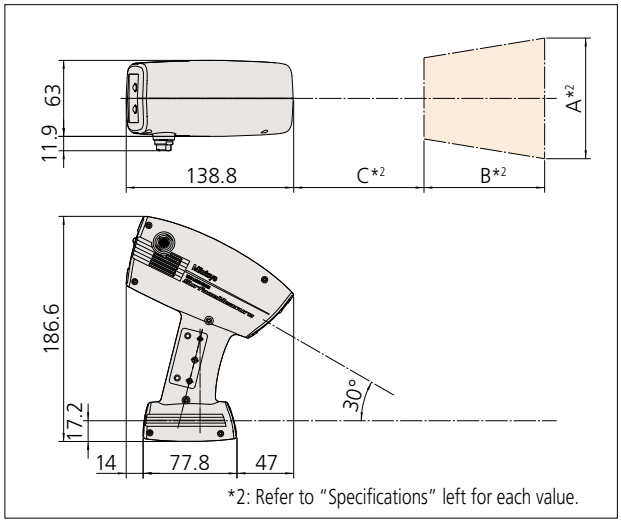
Specifications

Item \ Model			1010M
Max. line width [A]			100mm
Measurement range [B]			100mm
Working distance [C]			93mm
Accuracy [1σ]*1			15μm [Middle position of the measuring depth direction.]
Scanning speed			81,920 points/sec
Resolution			0.050mm or more
Laser Class		EN / IEC	Class 2 [EN/IEC60825-1 (2007)]
		JIS	Class 2M [JIS C 6802:2005]
	Line Laser	Laser type	Semiconductor
		Wavelength	660nm [Visible]
	Point laser	Laser type	Semiconductor
		Wavelength	635nm [Visible]
Mass			430g
Operational environment		Temperature	0°C - 30°C
		Humidity	20%RH - 80%RH without condensation

*1: Target: Specific reference ball (30mm diameter) (According to Mitutoyo's acceptance procedure)

Dimensions

Unit : mm



*2: Refer to "Specifications" left for each value.

• Note: Safety precautions regarding laser beam

A low-power visible laser is used in this line laser scanning probe. The CLASS 2 warning/ description label as shown at right is attached to the measuring unit.

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MSURF-M

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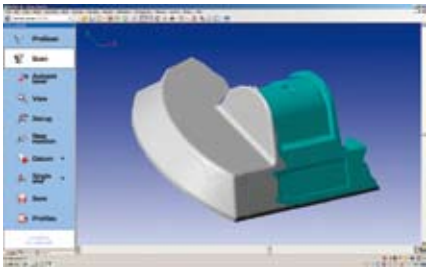
cmm

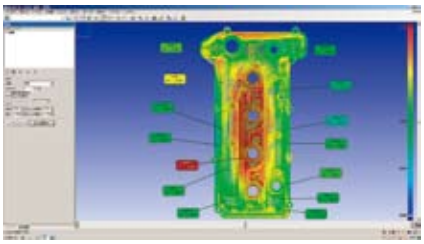
MSURF-M was designed for the purpose of acquiring the highest-accuracy data from SurfaceMeasure-M. This is a software package that consists of multiple modules integrated seamlessly.

Scanning Function



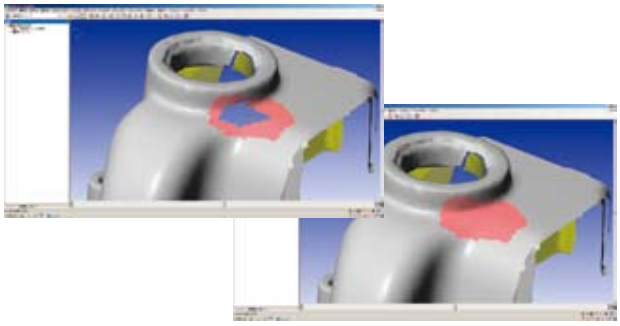
A dedicated graphical user-interface enables this software to run with minimum intervention via the PC mouse and keyboard. Large icons help make arm mouse/button operation easy.

Real-time Tolerance Zone Measurement



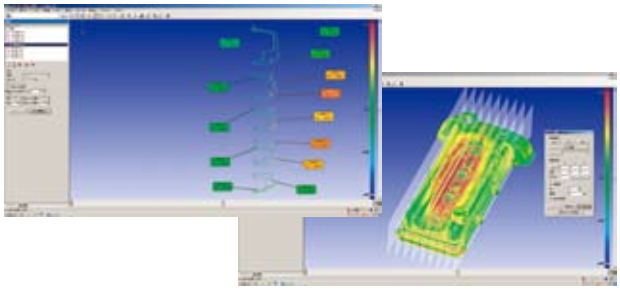
This module facilitates real-time comparative evaluation against a design value by setting a part coordinate system with the contact probe after reading the design value data. This allows the operator to quickly obtain the inspection result for a workpiece.

Polygon Editing Function



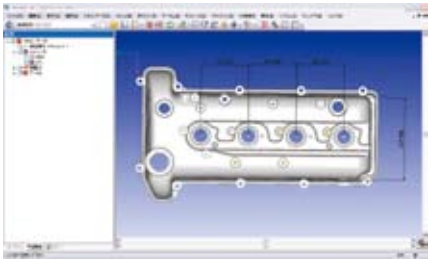
MSURF-M is provided with the polygon editing function. If any missing part exists in the data, this function can compensate for the deficiency, allowing quick data export to the software for reverse engineering, etc.

Comparative Evaluation of a Cross-section



This module enables comparative evaluation of an arbitrary cross-section by extracting it from the measurement data.

Various Dimensional Analyses



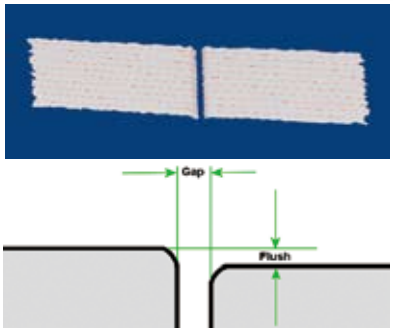
This module allows various features such as a circle, plane, or point to be created from the measurement data, and various dimensional analyses such as width measurement to be executed.

CAD Import

IGES (standard)	VDA (option)
STEP (option)	UGNX (option)
CATIA V4 (option)	PRO-E (option)
CATIA V5 (option)	

GAP&FLUSH

This module allows analysis of GAP&FLUSH for performing sheet-metal gap management.
This analysis can be made seamlessly from the data measured with SurfaceMeasure-M.



System Configuration

Main Unit

- SpinArm-Apex Series
- Notebook PC/Desktop PC

Software

- For position measurement
  MCOSMOS-1 MANUAL
  SpinArm-Utility
- For line laser probe control
  Software for evaluation of pointclouds
  MSURF-M
- For acquisition/evaluation of 2D profile data
  SCANPAK MANUAL
- For the statistical processing of measurement data
  STATMeasure PLUS
- For evaluation of free-form surfaces
  CAT1000S MANUAL
- Inspection Table Generation Software
  MeasureReport®

Optional accessories

- Line laser probe
  SurfaceMeasure M Series
- Hard probe body
- Touch probe (LP2 probe)
- WiFi kit
- Various styli

- Stand

- Portable stand

Essential equipment | Option

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- Coordinate Measuring Machines
- Vision Measuring Systems
- Form Measurement
- Optical Measuring
- Sensor Systems
- Test Equipment and Seismometers
- Digital Scale and DRO Systems
- Small Tool Instruments and Data Management

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