Mitutoyo

MiCAT

Mitutoyo Intelligent Computer Aided Technology

the standard in world
metrology software

cmm

MCOSMOS SOFTWARE

Coordinate measuring machine software for all levels
of users, from entry level to expert.

COORDINATE
MEASURING MACHINES

MCOSMOS—

Mitutoyo Controlled Open Systems for Modular Operation Support

MCOSMOS by Mitutoyo is a proprietary metrology suite of inter-related modules and dedicated expansion modules for Microsoft Windows 7, 8 and 8.1 operating systems (32 or 64-bit). Available in 37 countries and 12 different languages, MCOSMOS is the world's standard in metrology software.

Supported by MiCAT (Mitutoyo Intelligent Computer Aided Technology), your Mitutoyo CMM is streamlined with intuitive user interfaces that provide a familiar look and feel to operate multiple modules. They work together seamlessly to put reliable metrology at you fingertips throughout the entire production process.

MCOSMOS allows integration among a series of applications, improving the efficiency of your CMM and the productivity of your quality control functions. Specific expansion modules are available dedicated to GEOPAK or for specific applications such as GEAR measurement, airfoil analysis, reverse engineering and integrating CAD with metrology.

Mitutoyo is the world's largest provider of measurement and inspection solutions, with the most complete, capable line of machines, systems, sensors and software. With a presence in more than 100 countries, Mitutoyo is the international precision measurement technology leader.

MiCAT-MCOSMOS is based on expertise acquired from around the globe, providing the assurance that you are employing best practices for managing your dimensional metrology equipment (DME).
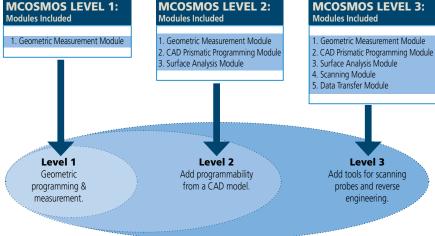
With computer technology laboratories in the United States, Europe and Asia, Mitutoyo employs highly qualified specialists who are devoted to the development of one common software platform.

Experience

Software packages and expansion modules to meet your metrology production requirements.

The modular system allows the capability to tailor the measuring software with only the specific modules needed to meet requirements. The measurement results may be displayed, printed and archived with numerous built-in and user-defined formats.

Software package features	MCOSMOS–1	MCOSMOS–2	MCOSMOS–3
GEOPAK (Geometry online/offline modules) Includes: support for high-speed nominal scanning (known path) with scanning probes (optional), user-defined dialogs, parametric programming with the use of variable substitution and user-defined reporting.	STD	STD	STD
CAT-1000P (Online/offline programming module) For the creation of measurement and evaluation routines of prismatic features (lines, planes, circles, cylinder, etc.), from a CAD model for nominal to actual comparison. Includes: MachineBuilder, automatic path generation (animated), collision checking and flexible reporting formats.	OPT	STD	STD
CAT-1000S (3D freeform evaluation module) For the creation of measurement and evaluation routines of surfaces from a CAD model for nominal to actual comparison. Includes: automatic path generation (animated), collision checking and flexible reporting formats.	OPT	STD	STD
SCANPAK (Scanning) For the scanning and evaluation of workpiece profiles. Includes: support for single-point/measuring probes, SP-25 continuous scanning probes, variable contour tolerances, best fit, patch scan (digitizing) and flexible reporting.	OPT	OPT	STD

MCOSMOS LEVEL 1:
Modules Included

1. Geometric Measurement Module

MCOSMOS LEVEL 2:
Modules Included

1. Geometric Measurement Module
2. CAD Prismatic Programming Module
3. Surface Analysis Module

MCOSMOS LEVEL 3:
Modules Included

1. Geometric Measurement Module
2. CAD Prismatic Programming Module
3. Surface Analysis Module
4. Scanning Module
5. Data Transfer Module

Level 1
Geometric programming & measurement.

Level 2
Add programmability from a CAD model.

Level 3
Add tools for scanning probes and reverse engineering.

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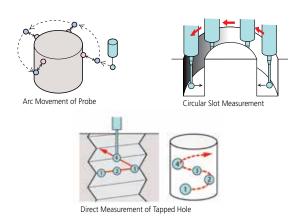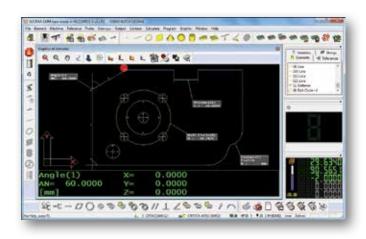
MCOSMOS–1

GEOPAK CNC

GEOPAK (basic geometry module) provides an easy graphical console with tool bars and windows, which can be personalized to the operator's preference.

GEOPAK provides visual tools and a graphically enhanced display providing step-by-step screen wizards. The design allows operators of all experience levels to easily and quickly create efficient measurement routines.

The basic level software includes the flexibility for advanced tools demanded by the most experienced operators, such as looping, formula calculations or expressions that use variables, libraries of day-to-day sub-routines and conditional statements which add logic for a variety of applications.

Arc Movement of Probe

Circular Slot Measurement
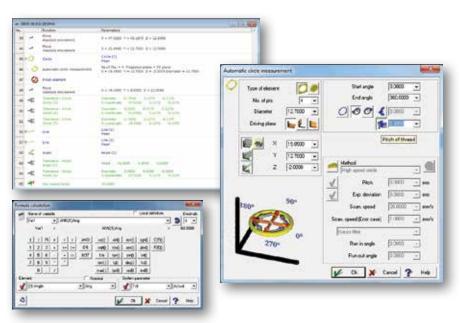

Direct Measurement of Tapped Hole

Ease of use for entry level to expert

GEOPAK's program tree is simple to read and edit.

The program tree can be expanded or collapsed to correspond with the operator's level or part application requirements.

With a double click on the function line, an easy dialog box will appear; for example, a hole that is threaded may not repeat if the probe path does not follow thread pitch.
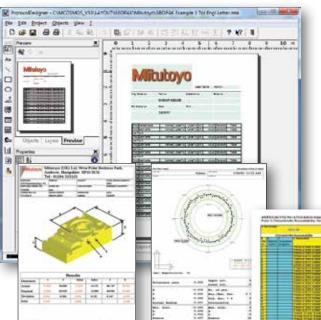
With CNC control, the dialog box allows a pitch value to program the probe path to follow the thread pitch.

GEOPAK-Flexible Reporting

In GEOPAK there is no limit to reporting capabilities. Included templates are ideal for most applications. If a custom report is required, Protocol Designer allows the operator to customize the output to a desired format.

Protocol Designer eliminates the need to transpose the GEOPAK results to a separate spreadsheet or document that may be required, for example, AS9102. Forms can be created and saved as templates so the data from GEOPAK auto fills the report after executing the part program.

When a template is used for output, the operator can choose a variety of formats such as Adobe PDF, Microsoft Excel and save or print the results.

User-defined reports

Included with GEOPAK is a built-in module that fully controls the machine and the access to your parts. The Part Manager displays the part list that may be stored locally on the DME computer or via the LAN to a company network drive.

Within the parts list the operator can attach the setup instruction documents, header information for part traceability and images for visual reference.

The Part Manager interface has complete control of GEOPAK. User profiles may be set to limit access to learn, edit or repeat, securing the system like no other package on the market.

Our security meets the **FDA 21 CFR Part 11** specification for electronic data storage and signatures with enhanced logon security, profiles and audit trails.
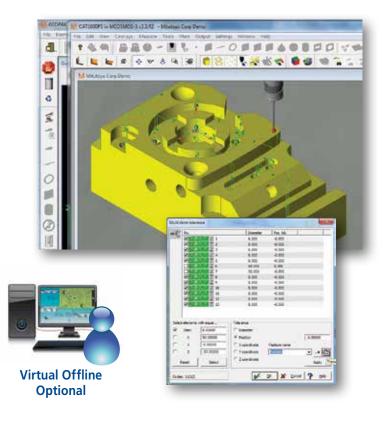
Part Security & Management

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MCOSMOS–2
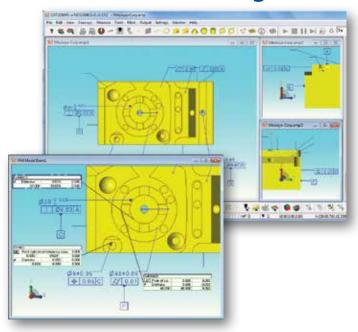
CAT-1000P CAD Interface

CAT-1000 facilitates the programming of measurement tasks during the GEOPAK learn mode. All data for measuring parts and tolerance evaluations are taken accurately from the CAD model via pointing device (mouse, trackball, etc.) selection. The same principles apply for programming probe paths (clearance and measurement), while at the same time, using the embedded nominal information from the CAD model for tolerance comparison.

Dual Screen Optional

Virtual Offline Optional

Product Manufacturing Information

CAT-1000 utilizes Spatial's prominent 3D ACIS® Modeler, which is used in more than 350 customer applications and 2 million seats worldwide.

CAT-1000 fully supports and reads PMI (Product & Manufacturing Information), which is embedded in the model for datum alignment, GD&T (Geometric Dimensioning and Tolerancing).

Spatial's 3D InterOp delivers the highest quality data exchange between CAD formats, enabling superior CAD file translation.
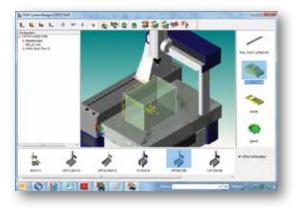
The comprehensive suite of translators provides import/export for all applications, including ACIS, CGM and Parasolid-based applications. 3D InterOp is embedded in many of today's leading design, engineering and manufacturing applications.

CATIA V5, SolidWorks, NX Siemens (Unigraphics), Parasolids, AutoDesk Inventor, Pro-Engineer and IGES or VDAFS exchange formats are available options.
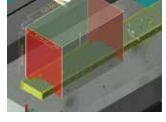
Standard with CAT-1000 is ACIS (*.sat) and STEP AP203, which are both licensed copies from Spatial InterOp.

CMM System Manager

CMM System Manager allows you to create a virtual representation of your CMM. New Mitutoyo models or legacy models, such as the FN series and BHN series, can be selected based on machine measuring size. If you have multiple machines, they can also be added for simulation or part placement purposes. CAD models can be placed and compared to the true working volume of the machine and indexing probe swivel access.
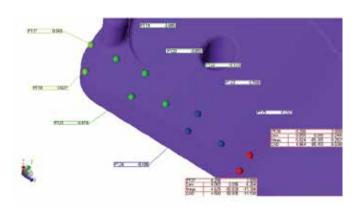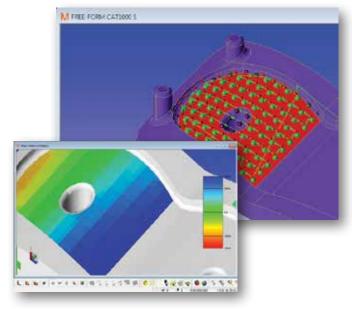

CAT-1000S

3D surface analysis creates grid patterns to verify a surface with a single-click tool that calculates a collision-free probe path to measure a grid of surface points.

Manual CMMs allow the operator to move the probe manually, and the point will appear in real-time. Probe compensation is determined from the center of the stylus and the shortest distance to the CAD model to eliminate cosine error.

Surface deviation can be displayed as spherical points or as a gradient surface.

Cone-shaped icons are used to show the surface vector direction of the material from the nominal and tolerance deviation.
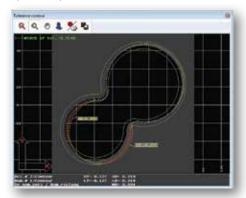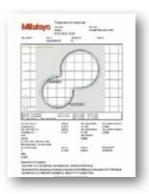
Mitutoyo

MCOSMOS–3

SCANPAK-CNC

SCANPAK reports the deviations from the nominal profile to determine if the measured contour is within the tolerance zone.

The SCANPAK Best-fit can provide the information required to correct the part. Best-fit is most effective when the reference alignment is not accurately defined to provide tool-setting information.

The graphical report template provided with SCANPAK allows the operator to make comments or notes and uses Protocol Designer for making special reports.
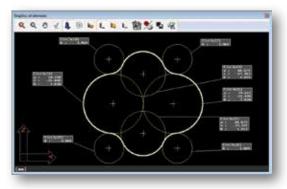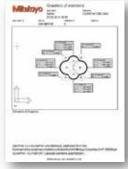

The contour compared to the nominal "AS IS." The areas shown in red fail to meet the profile requirement.

Calculate elements automatically

SCANPAK constructs from the measured contour circles and/or line elements based on the user-specified tolerance amount calculated from the elements form deviation.
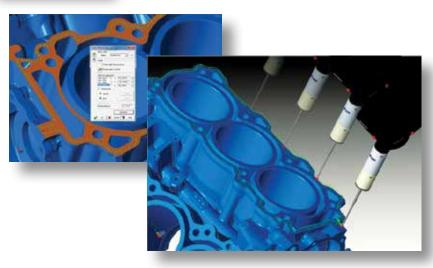
Calculate elements automatically construct best-fit geometry (lines/circles) from a contour. This information can be used as reference for the basic dimensions given for the profile call-out or even assist in reverse engineering for tool paths.

Known path scanning

CNC Gasket Scan provides an easy-to-use tool for complex planes requiring a specific measuring path on the gasket surface.

The measuring path can be created by nodes or offset from the CAD model.

MCOSMOS-3 maximizes your throughput when using a scanning probe such as the SP25 or MPP.

MiCAT Planner

Mitutoyo

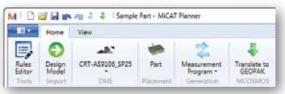## Automatic measurement program generation software

MiCAT Planner is Mitutoyo's latest software development for fast and efficient CMM part programming. Operation of MiCAT Planner is easy and intuitive. Programs are made with a few mouse clicks in minutes instead of hours or days.

WORKFLOW:

1) Load design model

2) Select target CMM

3) Part placement via virtual alignment

4) Measurement program creation
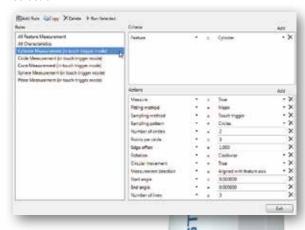
5) Translate to Geopak MCOSMOS

Design Model Support:

• Siemens NX w/PMI

• CATIA v5 w/PMI

• PRO/E w/PMI

• ACIS (SAT)

MiCAT Planner toolbar is workflow based.

Rules Editor

The Rules Editor allows users to create rules to define measurement approaches, such as number of points per feature, sensor type, fitting method and automatic sensor selection.

Measurement Plan

The measurement plan is synchronized with the 3D view and the program view. This allows you to select a feature in any of the views (plan view, 3D view, program view) and the feature is highlighted in the other views simultaneously. Reordering the feature measurements is possible by dragging and dropping of the features in the plan view. Users can select a feature, characteristic, or a point set in the plan view, to modify the corresponding properties in the property view as needed.

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MiCAT

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CMM

Expansion Modules for
MCOSMOS

Pure DMISPAK

The Pure DMISPAK module is a powerful bi-directional program exchange for legacy DMIS-based software.

This module converts the native DMIS file (*.dmi) to GEOPAK. New programs from MCOSMOS also can be exported to a DMI format so non-Mitutoyo brand CMMs can read and execute on their legacy DMIS-based software.

DME 3

DMIS

DME 2

mcosmos

MeasurLink®

MeasurLink® acquires the measurements real-time as the CMM runs the GEOPAK Part Program.

Data storage can be local or networked to a SQL Server.

The software manages data from all types of devices from handheld tools to CMM and supports non-Mitutoyo products.

MiCAT
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MeasurLink

SurfaceDeveloper

3D surface generation software is used with Patch Scanning Generator to easily create high-accuracy surface design, using common B-Rep entities or STL file output, which are ideal for reverse engineering.

Piston Head – Reverse Engineered

Points   STL Mesh   Meshed 3D Surface
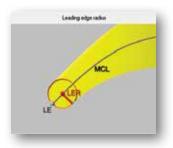
Expansion Modules for
MCOSMOS

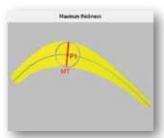**Mitutoyo**

MAFIS (Mitutoyo Airfoil Inspection Software)
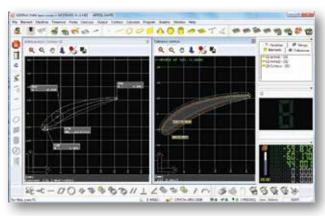### (Requires SCANPAK)

With MCOSMOS-3, MAFIS analyzes the SCANPAK profile that is measured and outputs the evaluation results of the desired parameters.
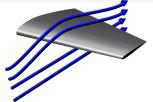
Unlike other airfoil analysis modules, which operate outside of the CMM software as a separate package, MAFIS works by combining GEOPAK and SCANPAK to generate airfoil measurements.

MAFIS calculates the camber line, leading/trailing edge, twist and much more. Blade analysis is easy for beginner operation and does not require an expert to implement.

GEARPAK

Gear type		Touch-trigger measurement	Scanning measurement	Required software package/Remarks
Cylindrical spur gear		●	●	**GEARPAK Cylindrical**
Cylindrical helical gear		●	● *1	**GEARPAK Cylindrical** *1 : Does not support a cross-stylus
Worm gear (cylindrical)		●	● *2	**GEARPAK Worm** *2 : MRT and MPP310 (Q) are required.
Worm wheel (cylindrical)		●	●	**GEARPAK Cylindrical** Cylindrical gears only
Bevel gear		●	—	**GEARPAK Bevel** Supports Gleason gears. Note: Some gears are not supported.
Hypoid gear		●	—	**GEARPAK Hypoid** Supports Gleason gears. Note: Some gears are not supported.

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

**Whatever your challenges are,
Mitutoyo supports you from start to finish.**

Mitutoyo is not only a manufacturer of top-quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

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