MCOSMOS SOFTWARE

Coordinate Measuring Machine software for users from entry-level to expert.
MCOSMOS by Mitutoyo is a proprietary metrology suite of inter-related modules and dedicated expansion modules for the Microsoft Windows 7 operating system. Since the first deployment of GEOPAK in the 1980’s, on the MS-DOS platform; then migrated in the 1990’s to Windows NT, 2000, XP; and today, supported world-wide in 37 locations around the globe supporting 12 different languages; MCOSMOS is the world’s standard in metrology software. (A proud Microsoft Gold Partner)

Developed 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 your fingertips – for application throughout the entire production process.

MCOSMOS allows integration among a whole series of applications, improving the efficiency of your CMM and the productivity of your Quality Control functions. Specific expansion modules dedicated to GEOPAK or for specific applications such as GEAR measurement, Airfoil analysis, Reverse Engineering and integrating CAD with metrology.
Experience

Software packages and expansion modules to meet your metrology production requirements

The modular system developed by Mitutoyo allows you the capability of tailoring your measuring software with only the specific modules needed to meet your requirements. The measurement results may be displayed, printed, and archived with numerous built-in and user-definable formats.

**Software package features**

**GEOPAK (Geometry online/offline modules)**
Includes: support for high-speed nominal scanning (known path) with scanning probes (optional), user-definable dialogs, parametric programming with the use of variable substitution, and user-definable reporting.

**CAT1000P* (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.

**CAT1000S* (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.

**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), flexible reporting.

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**MCOSMOS LEVEL 1:**
- 1. Geometric Measurement Module

**MCOSMOS LEVEL 2:**
- 1. Geometric Measurement Module
- 2. CAD Prismatic Programming Module
- 3. Surface Analysis Module

**MCOSMOS LEVEL 3:**
- 1. Geometric Measurement Module
- 2. CAD Prismatic Programming Module
- 3. Surface Analysis Module
- 4. Scanning Module
- 5. Data Transfer Module
GEOPAK (Basic Geometry module) provides an easy graphical console to the operator by the use of tool bars and windows which can be personalized to the operator’s preference.

GEOPAK provides visual tools, completely eliminating the use of difficult codes or abbreviated commands as other packages use. Its graphically enhanced display provides step-by-step, on-screen wizards that prompt the operator, allowing even inexperienced users to create routines to measure parts.

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

GEOPAK CNC

GENERAL

GEOPAK’s program tree is a very simple easy to read and edit. The program tree can be collapsed or expanded to see more details.

Simply double click on the function line and a easy dialog box will appear, e.g. a hole that is threaded may not repeat if the machine does not follow the pitch.

With CNC control the dialog box allows a pitch value to program the machine to follow the pitch of the thread.

Ease-of-use for Entry-level to Expert
In GEOPAK there is no limit to your reporting capabilities, we have created a series of templates that are ideal for typical applications, but if a custom report is needed, our Protocol-Designer allows the operator to customize the output to any format desired.

The Protocol Designer can be used to eliminate the need to transpose the GEOPAK results to a separate spreadsheet, document that your customer may require, e.g. 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 chose a variety of formats such as Adobe PDF, Microsoft Excel and save the results to a server or the local printer.

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 thumbnails 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.
CAT-1000 CAD Interface

CAT1000 significantly 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 nominal directly off the CAD model for tolerance comparison.

CAT-1000 CAD Interface

CAT-1000 utilizes Spatial’s prominent 3D ACIS® Modeler modeling component that is used in over 350 customer applications with more than 2 million seats worldwide.

CAT-1000 fully supports and reads PMI (Product & Manufacturing Information) which is imbedded 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 as options.

Standard with CAT-1000 is ACIS (*.sat) and STEP AP203 which are both licensed copies from Spatial InterOp.

Product Manufacturing Information

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CMM System Manager

The CMM System Manager allows you to create a virtual representation of your CMM for simulation. New Mitutoyo models or legacy models such as FN series and BHN series machines 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-1000 3D Surface Analysis

CAT-1000 CNC can create grid patterns to verify the surface. Simple one click tool 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 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. Cones can be used to show what direction the surface vector of material from the nominal and given tolerance.
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.

For Graphical Reports our template inside GEOPAK allows the operator to make comments or notes to describe the condition etc.

SCANPAK constructs from the measured contour circles and/or line elements based on the tolerance amount to use the best-fit the curvature.

Calculate elements automatically constructs 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.

CNC Gasket Scan is extremely helpful with complex planes which require a measuring path. 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 is Mitutoyo’s latest software development for fast and efficient CMM part programming. Operation of MiCAT Planner is very easy and intuitive. Programs are made with just a few mouse clicks in just a few minutes instead of hours or days.

**WORKFLOW:**
1) Load design mod
2) Select target C
3) Part placement via virtual alignme
4) Measurement program creati
5) Translate to Geopak MCOSM

**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.

**Design Model Support:**
- Siemens NX w/PMI
- CATIA v5 w/PMI
- PRO/E w/PMI
- ACIS (SAT)

**Measurement Plan**
The measurement plan is synchronized with the 3D view and the program view. For example a feature can be selected in any of the views (Plan view, 3D view, program view) and the feature is highlighted in the other views. Manual reordering of the feature measurement order is possible by drag and drop of the features in the plan view. Users can select a feature, a characteristic, or a point set, in the Plan View, to modify the corresponding properties in the Property View, as needed.

**MiCAT Planner toolbar is workflow based!**

**www.mitutoyo.com/MiCAT**
Expansion Modules for
MCOSMOS-1 and -2

Pure DMISPAK
The Pure DMISPAK module is a powerful bi-directional program exchange for legacy DMIS based software. DMIS (Dimensional Measuring Interface Standard) was established in 1983 but is still used by some manufacturers. This module converts the native DMIS file (*.dmi) to GEOPAK. New programs from MCOSMOS can also be exported to a DMI format so non-Mitutoyo brand CMMs can read and execute on their legacy DMIS based software.

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. Manages data from all types of devices from handheld tools to CMM and it supports non-Mitutoyo products.

SurfaceDeveloper
3D surface generation with Patch Scanning Generator. Easy to create, high-accuracy surface design. Common B-Rep or STL file output ideal for Reverse Engineering.
Expansion Modules for
MCOSMOS-3

MAFIS (Mitutoyo Airfoil Inspection Software)

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/Trialing edge, Twist and much more. Blade Analysis is easy for beginner operation and does not require an expert to implement.

GEARPAK

<table>
<thead>
<tr>
<th>Gear type</th>
<th>Touch trigger measurement</th>
<th>Scanning measurement</th>
<th>Required software package/Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylindrical spur gear</td>
<td>●</td>
<td>●</td>
<td>GEARPAK Cylindrical</td>
</tr>
<tr>
<td>Cylindrical helical gear</td>
<td>●</td>
<td>● *1</td>
<td>GEARPAK Cylindrical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*1: Does not support a cross-stylus</td>
</tr>
<tr>
<td>Worm gear (cylindrical)</td>
<td>●</td>
<td>● *2</td>
<td>GEARPAK Worm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*2: MRT and MPY310 (Q) are required.</td>
</tr>
<tr>
<td>Worm gear (hourglass shape)</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Worm wheel (cylindrical)</td>
<td>●</td>
<td>●</td>
<td>GEARPAK Cylindrical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cylindrical gears only</td>
</tr>
<tr>
<td>Worm wheel (hourglass shape)</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Bevel gear</td>
<td>●</td>
<td>×</td>
<td>GEARPAK Bevel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Supports Gleason gears. Note: Some gears are not supported.</td>
</tr>
<tr>
<td>Hypoid gear</td>
<td>●</td>
<td>×</td>
<td>GEARPAK Hypoid</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Supports Gleason gears. Note: Some gears are not supported.</td>
</tr>
</tbody>
</table>
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 up 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.

Find additional product literature and our product catalog

www.mitutoyo.com

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