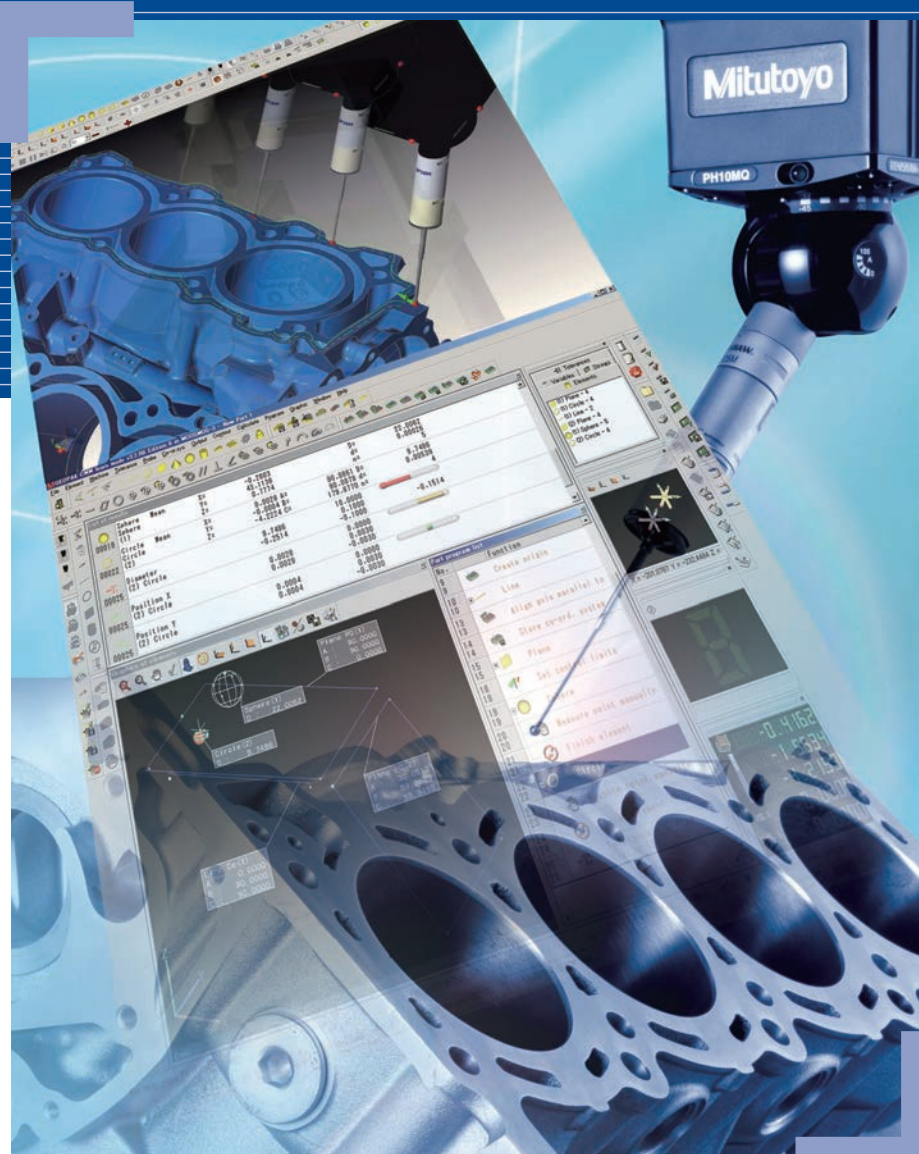# MCOSMOS
SOFTWARE

Bulletin No. 2020
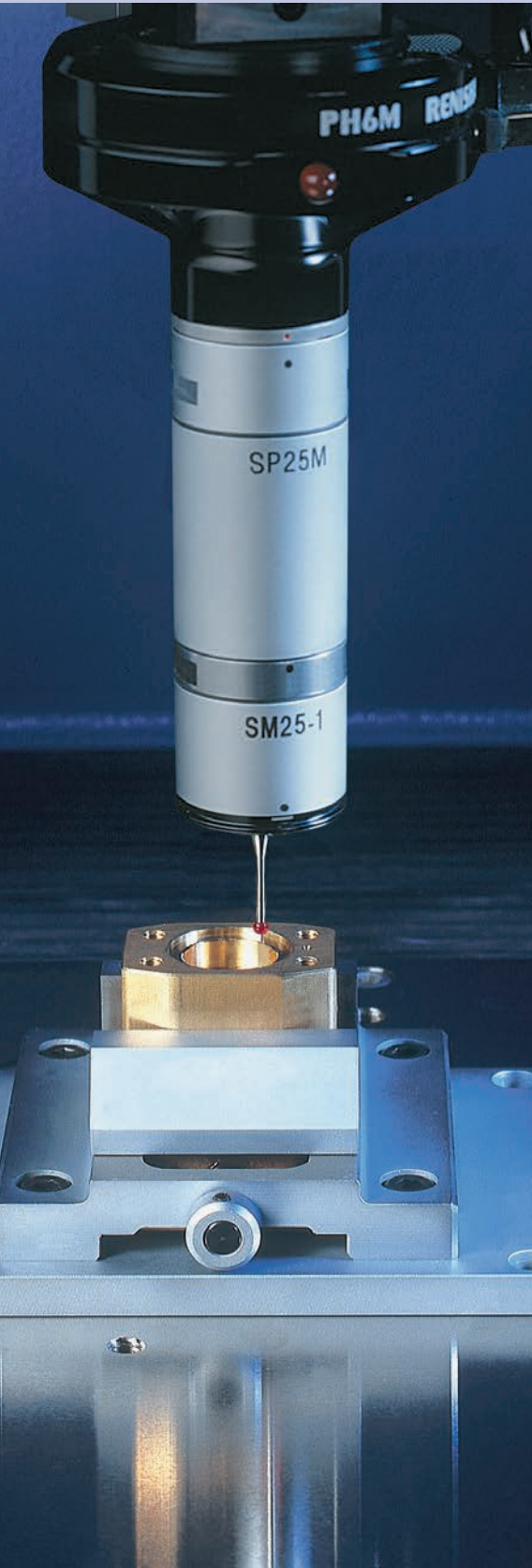

Coordinate Measuring Machine software for users from entry-level to expert.

MiCAT
Mitutoyo Intelligent Computer Aided Technology
the standard in world
metrology software
cmm

Mitutoyo

MCOSMOS

Mitutoyo **C**ontrolled **O**pen **S**ystems for **M**odular **O**peration **S**upport

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 you 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.

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

MiCAT-MCOSMOS is based on expertise acquired from around the globe, providing the assurance that you are employing best practices for managing your DME Dimensional Metrology Equipment.

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 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

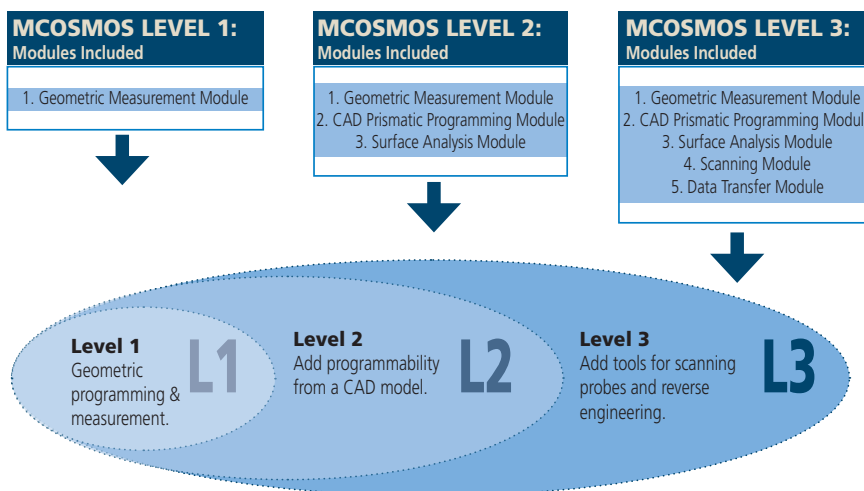|	MCOSMOS–1	MCOSMOS–2	MCOSMOS–3
GEOPAK (Geometry online/offline modules) Includes: support for high-speed nominal scanning (known path) with scanning probes (optional), user-definable dialogs, parametric programming with the use of variable substitution, and user-definable reporting.	STD	STD	STD
CAT1000P* (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.	OPT	STD	STD
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.	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), 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.
L1

Level 2
Add programmability from a CAD model.
L2

Level 3
Add tools for scanning probes and reverse engineering.
**L3**

Mitutoyo

MCOSMOS–1

GEOPAK CNC

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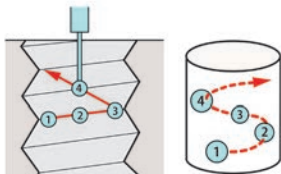
Our basic level software includes the flexibility for advanced tools demanded by the most experienced operators; e.g. looping, formula calculations or expressions that use variables, libraries of day to day sub-routines and conditional statements which add logic for wide variety of applications.
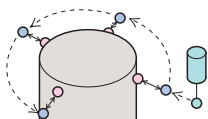
Arc Movement of Probe
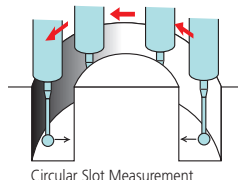
Circular Slot Measurement

Direct Measurement of Tapped Hole
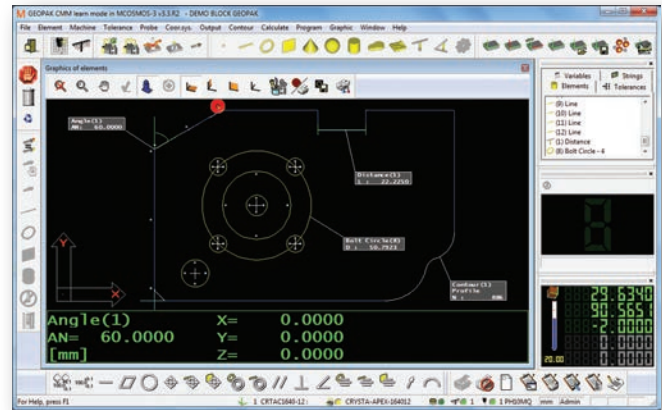


Ease-of-use for Entry-level to Expert

GEOPAK's program tree is 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.
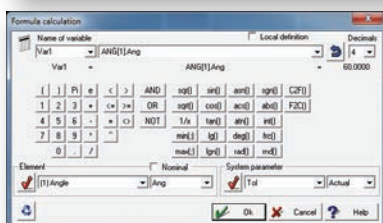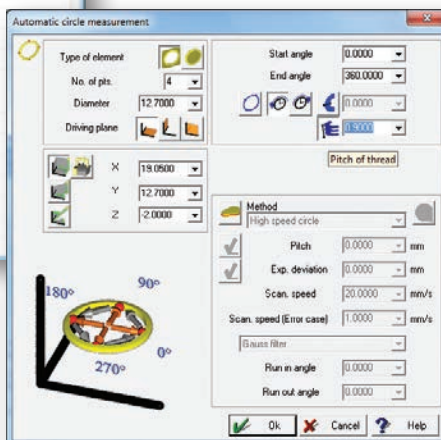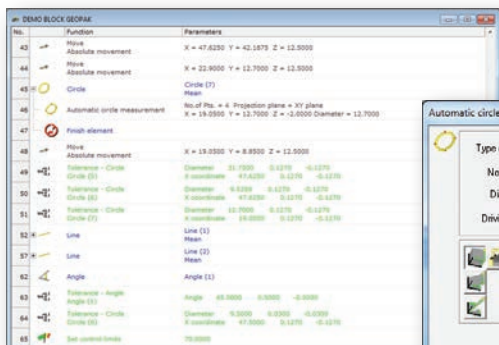
GEOPAK-Flexible Reporting
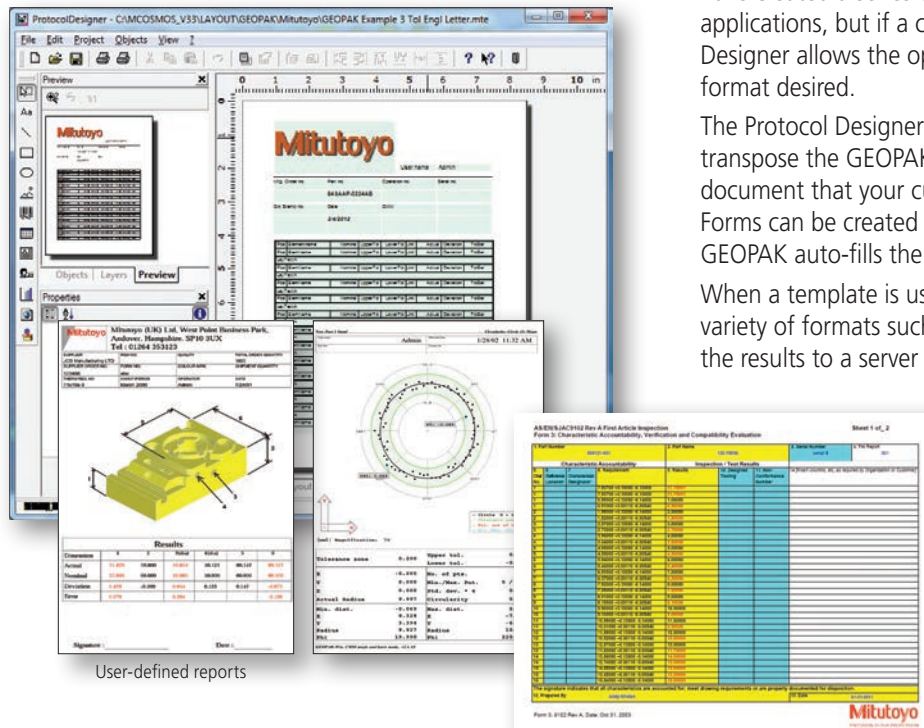
User-defined reports

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.

Part Security & Management

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.

Mitutoyo

MCOSMOS–2

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.

Dual Screen Optional

Virtual Offline Optional
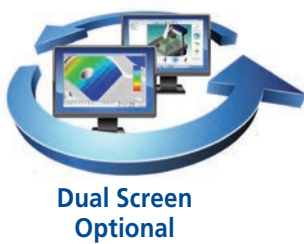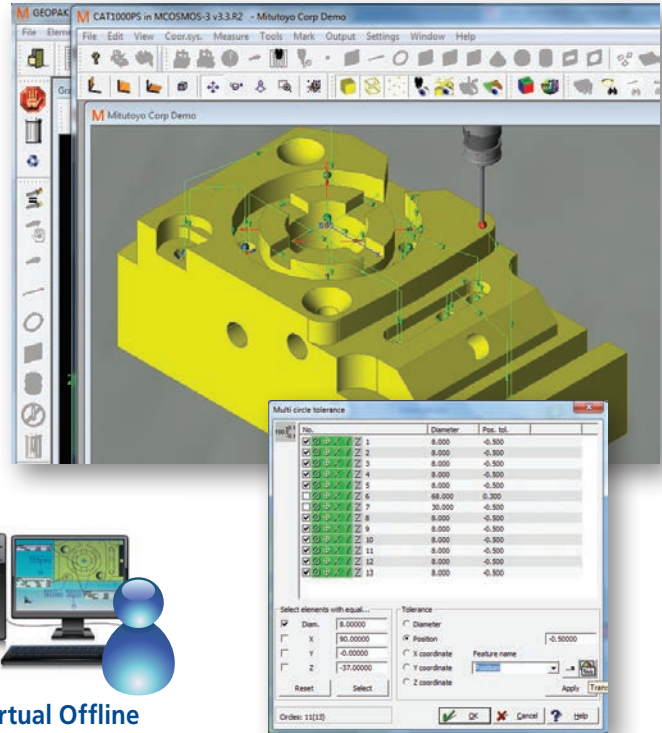
Product Manufacturing Information
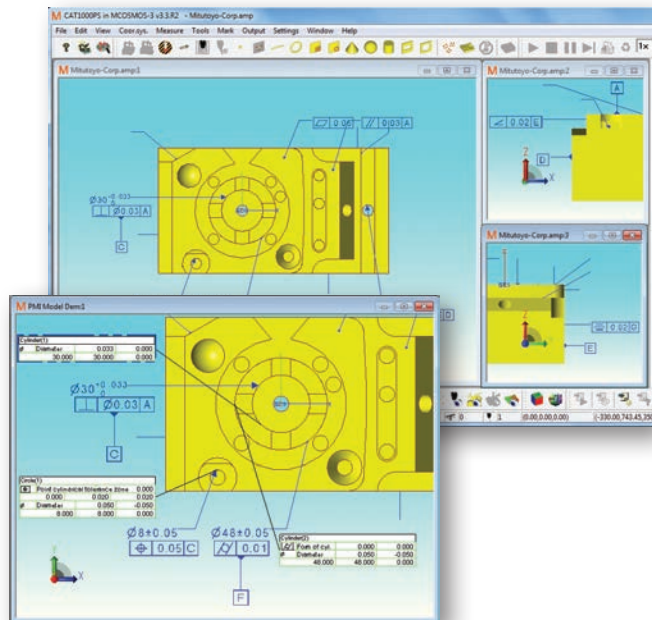
CAT-1000 uses 3D ACIS® Modeler is Spatial's prominent modeling component used in over 350 customer applications with more than 2 million seats worldwide.

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 optional.

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

CMM System Manager

The CMM System Manager allows you 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 selecting based on machine stroke. 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.
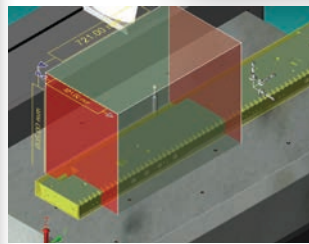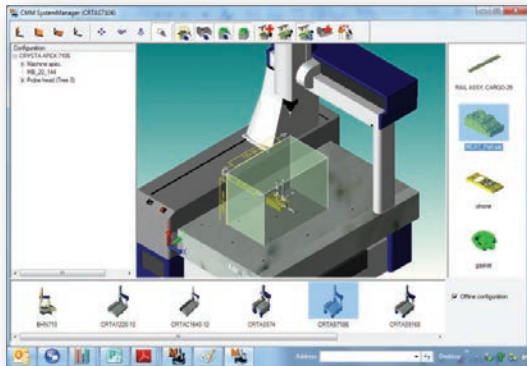
CAT-1000 3D Surface Analysis

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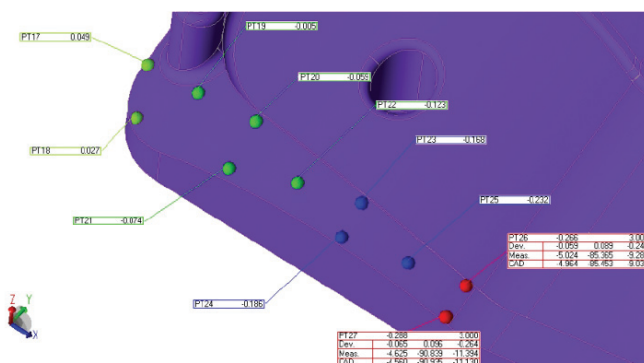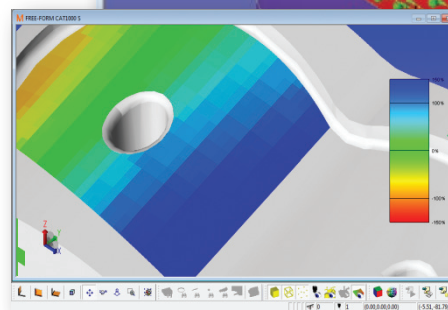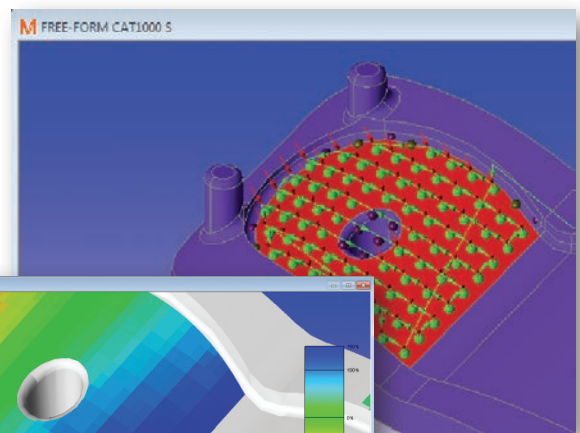
Surface deviation can be displayed as spherical points or as a gradient surface.

Cones can be used to show what direction the surface vector of material from the nominal and given tolerance.

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.

For Graphical Reports our template inside GEOPAK allows the operator to make comments or notes to describe the condition etc
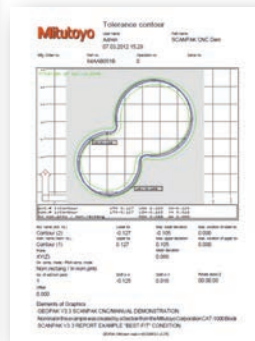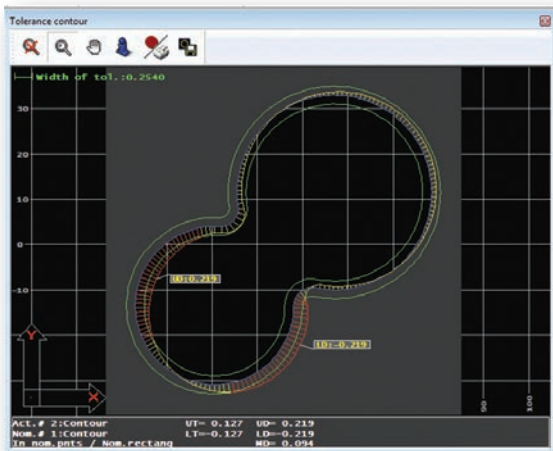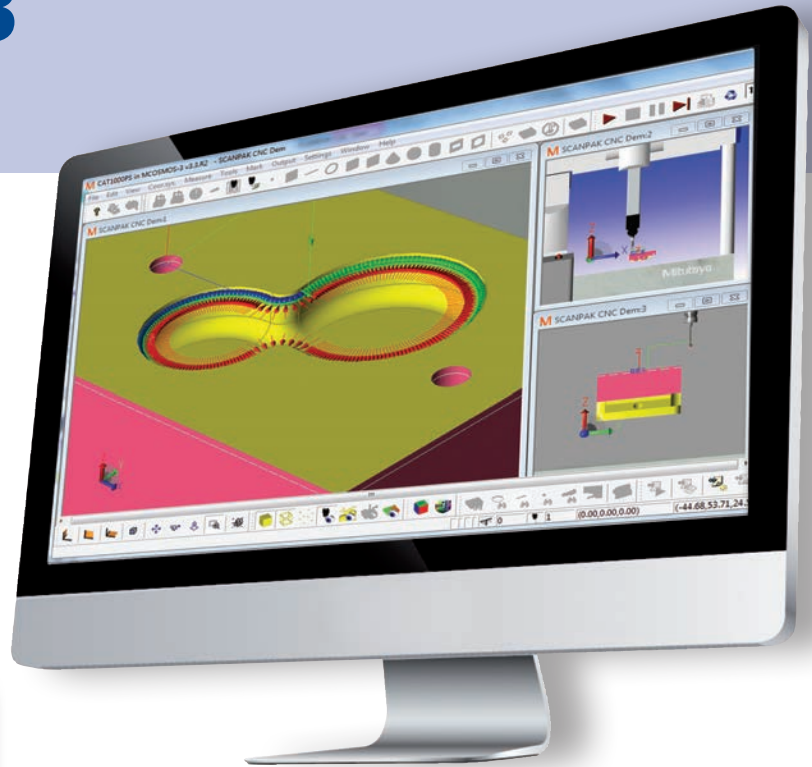
The contour compared to the nominal "AS IS" the areas shown in red fail to meet the profile requirement.

Calculate elements automatically
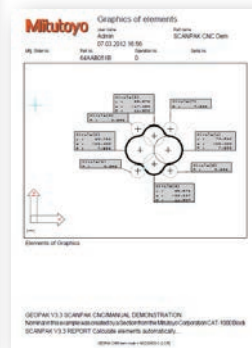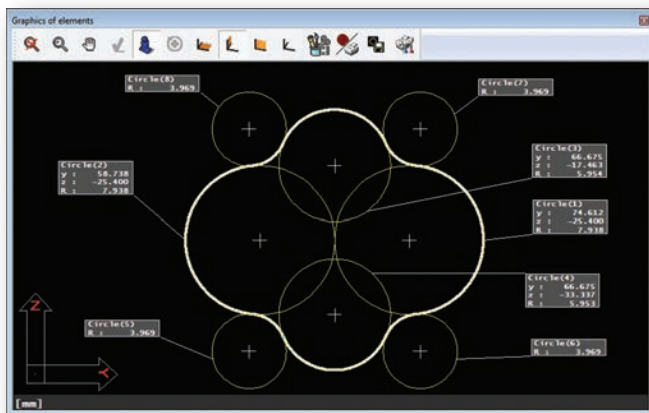
Calculate elements automatically constructs best-fit geometry (lines/circles) from a contour. This information can be used as reference for the basic dimensions given for the Profile call-out or even assist in Reverse Engineering for tool-paths.

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

SCANPAK-CNC
Patch Scanning Generator

SCANPAK Patch Scanning Generator allows stitch scanning routines to help define a surface for Reverse Engineering.

Patterns are saved for repeat jobs and can be used with a Touch Probe Sensor or a continuous Scan Probe (SP25 or MPP).
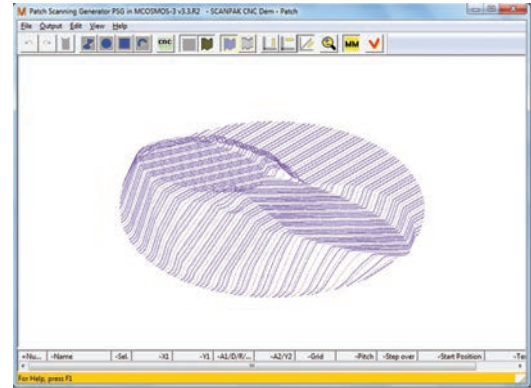
Scans from GEOPAK can be converted to point clouds or STL files.

SCANPAK-CNC
Know Path Scanning
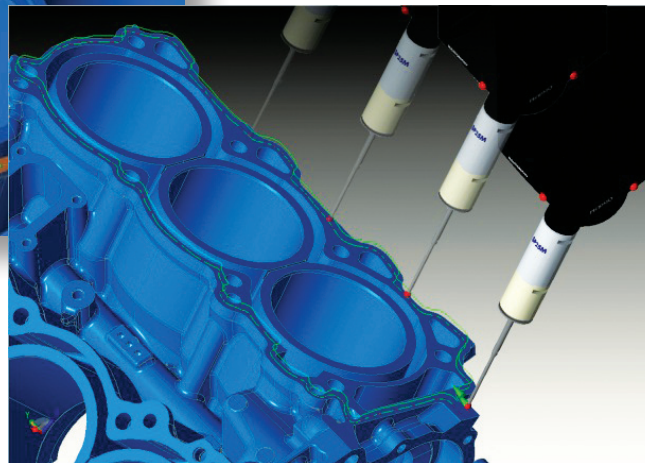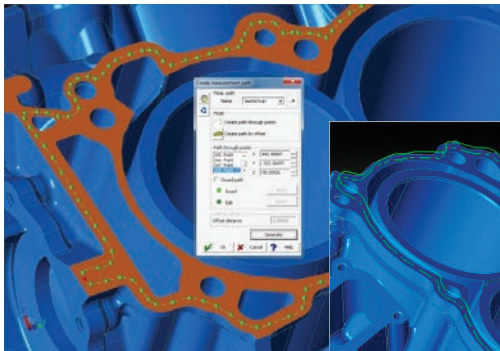
CNC Gasket Scan is extremely helpful with complex planes which require a measuring path.

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.

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.
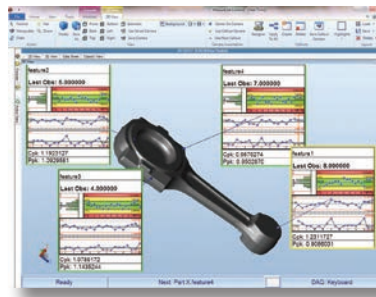
DME 3

DMIS

DME 2

MCOSMOS
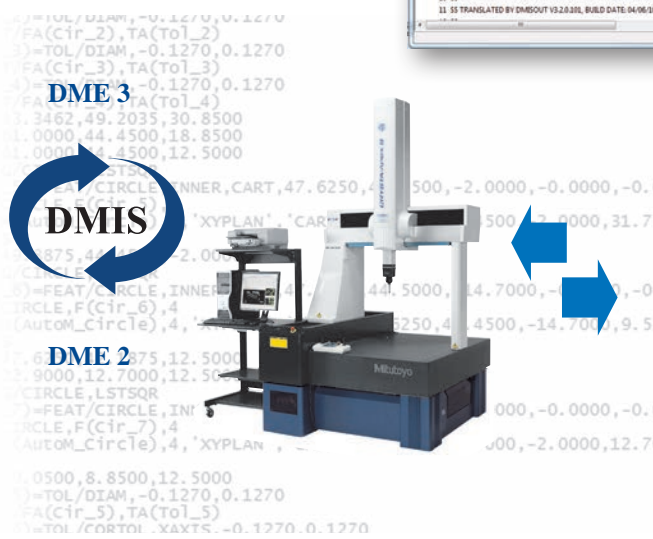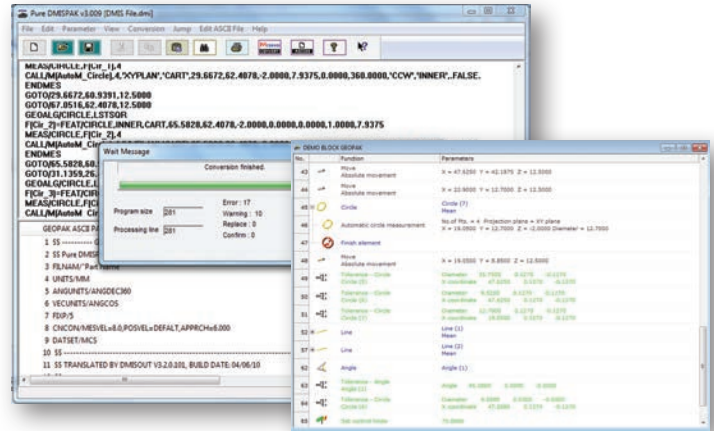
MeasurLink®

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.

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

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MeasurLink
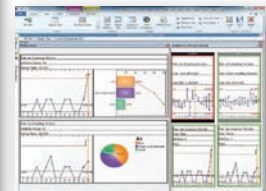
SurfaceDeveloper

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.

Piston Head – Reverse Engineered

Points   STL Mesh   Meshed 3D Surface

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.
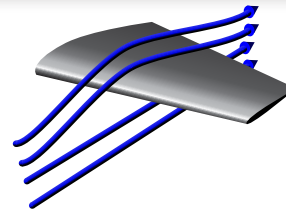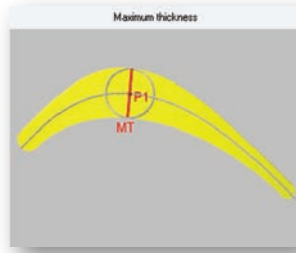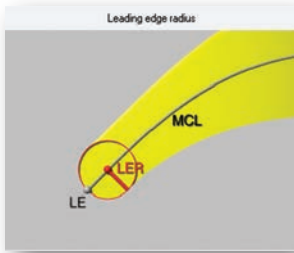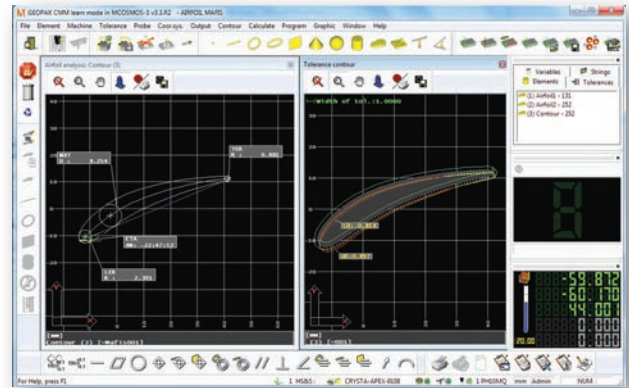
GEARPAK

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 gear (hourglass shape)		✕	✕	
Worm wheel (cylindrical)		●	●	**GEARPAK Cylindrical** Cylindrical gears only
Worm wheel (hourglass shape)		✕	✕	
Bevel gear		●	✕	**GEARPAK Bevel** Supports Gleason gears. Note: Some gears are not supported.
Hypoid gear		●	✕	**GEARPAK Hypoild** Supports Gleason gears. Note: Some gears are not supported.
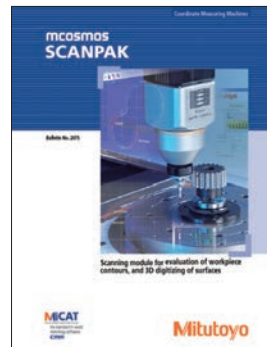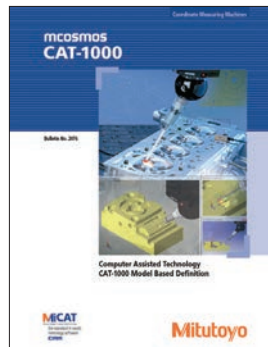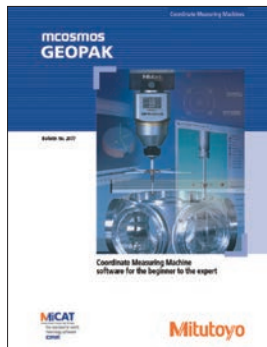
Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

Optical Measuring

Sensor Systems

Testing Equipment and Seismometer

Digital Scale and DRO Systems

Small Tool Instruments and Data Management

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