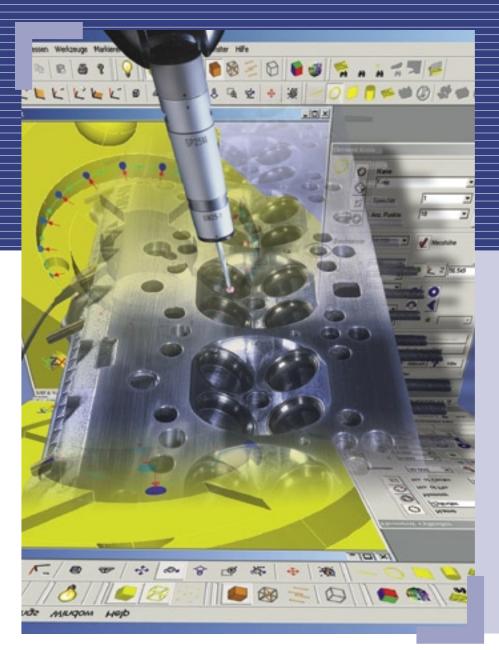
Coordinate Measuring Machines

MCOSMOS Software



Bulletin No. 1830

Highly functional, user-friendly software for Coordinate Measuring Machines.



Mitutoyo's Software Power gives 3D measurement an extra edge!

Mitutoyo Intelligent Computer Aided Technology the standard in world metrology software

When using Mitutoyo's MiCAT software platform, your coordinate measuring machine becomes a real workhorse - it will perform not only measurement tasks, but becomes an information center for design, production and quality control. You will find the measurement tasks extremely efficient and easy to use, and will obtain valuable data that can be used throughout the entire production process.

MCOSMOS stands for "Mitutoyo Controlled Open System for Modular Operation Support" and is a modular software system for professional control, measurement and evaluation for your coordinate measurement system that allows you to fit the software to your applications.

Powerful software from Mitutoyo will fully equip you for the future. MCOSMOS means that all your measurement and testing is accomplished in the minimum of time. Additionally, large amounts of data can be acquired and used in every link of the manufacturing chain, plus, they can easily and quickly be transmitted over the internet. The measuring process is streamlined, information flow is optimized, and rejects are minimized. The efficiency of the entire production is increased and costs are reduced. This is a major factor in shortening time between product concept and market launch.

Mitutoyo: Innovation for the Future.

A Modern, Modular Approach to 3D Measurement

MCOSMOS



Expansion modules

Real-time collection, analysis and display of SPC data. Networking and web sharing capabilities.

Statistics evaluation module

2D profile evaluation module

3D digitization of surfaces.



Expansion modules

Statistics evaluation module



MeasurLink

SCANPAK

3D-TOL

MAFIS

Real-time collection, analysis and display of SPC data. Networking and web sharing capabilities.



2D profile evaluation module Combines scanning and evaluation of workpiece contours and

CAD model based generation of freeform surface measurement points, and comparison of actual/nominal data, with graphical

3D digitization of surfaces.



3D-TOL

SCANPAK

MeasurLink

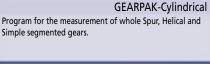
CAD model based generation of freeform surface measurement points, and comparison of actual/nominal data, with graphical

Combines scanning and evaluation of workpiece contours and

MAFIS

Mitutoyo Airfoil Inspection System Analysis of profile sections of Turbine Blades, from scanned data





GEARPAK-Worm

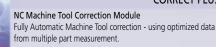
Program for the measurement of whole Worm gears and Worm Wheels.

GEARPAK-Bevel/Hypoid Program for the measurement of Bevel and Hypoid gears.



Pure DMISPAK DMIS Interface module For the bi-directional transfer of measurement programs in DMIS standard format, between MCOSMOS and various external systems

CORRECT PLUS



Mitutoyo Airfoil Inspection System

3D freeform surface evaluation module

output

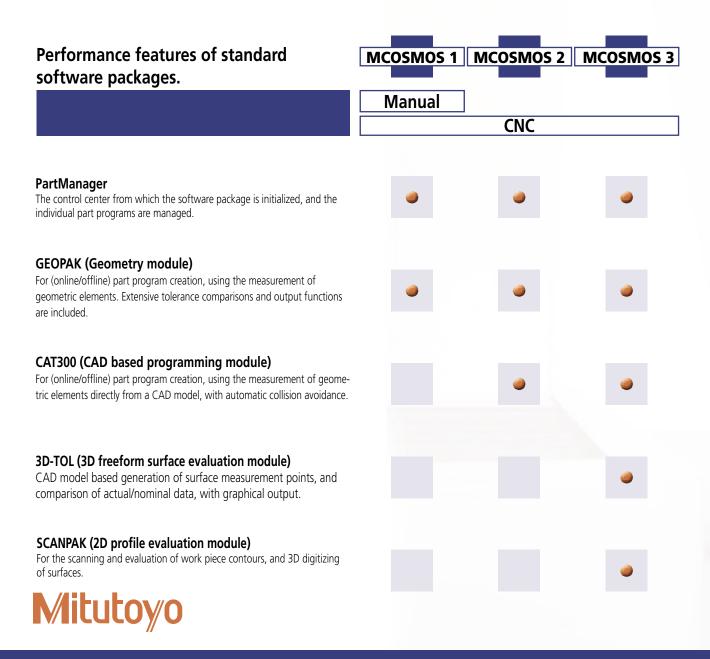
Analysis of profile sections of Turbine Blades, from scanned data



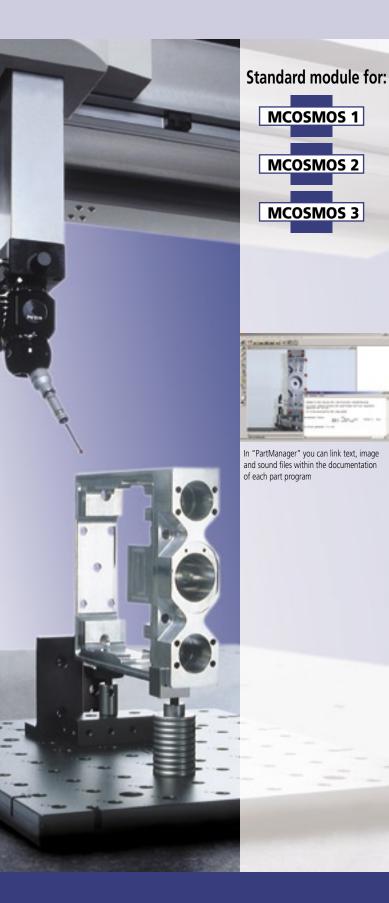


Software packages and expansion module combinations.

With this high-end modular software system developed by Mitutoyo, you can take advantage of the various packages and module capabilities, all of which are available at your fingertips. They can make comprehensive evaluations and present them in easily interpreted documents. Where appropriate, data can be archived for historical purposes, and of course, all measuring machines come with their own software package as standard.



PartManager Management and Control of Measurement



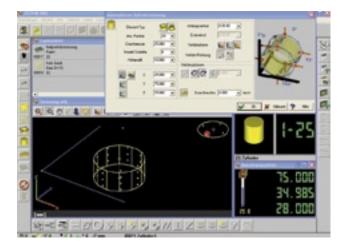


"PartManager" provides all the necessary tools to enable the user to manage a myriad of different parts with a wide variety of software modules, which can document results and systematically store extensive data records. "PartManager" has easy-to-use functions and performs its tasks with outstanding simplicity. "PartManager" is the versatile management package of the MCOSMOS software system and the control center for all measurement tasks.

It enables you to manage all your notes, records, statistics data and images for each individual part program. These are clearly listed and linked to each work-piece. An obvious example is the list of parts which is visible at first glance, together with a column of available data. The documents appear and the individual programs are easily started at the click of the mouse on the appropriate symbol, or icon.

"PartManager" has a built in user rights management system which allows detailed hierarchy to be established. This meets the security requirements stipulated in ISO 9000 and the FDA Directive 21CFR Part 11.

GEOPAK (Geometry module) Total 3-dimensional control



"Geopak" is our universal multi-dimensional geometric measurement program, which allows you to control the measurement of your work-piece from drawing to completion, or simply to run existing measurement programs on a repeat basis. Its wide range of functions places it among the most powerful programs available, and meets the most stringent of requirements, while remaining extremely user-friendly. At the same time, easily integrated audio and visual support is also provided, which enables you to add sound and pictures into the part program for operator guidance. This unique facility allows the step by step guidance of a different operator to set up or measure subsequent workpieces, when not using the CNC repeat functionality.

While measurement in CNC repeat mode is taking place, the software is available for the virtual setup of new measuring programs (multitasking). In addition to the integrated facilities for the varied output of measurement results, using the inbuilt Protocol Designer functions, the program supports the output to external systems such as: QS-Stat, Word and Excel.

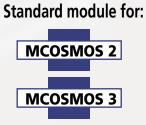
GEOPAK Highlights:

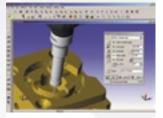
- > Icon & Pull Down Menus with Interactive Dialogs
- > Clear and easy user guidance with menus and graphics
- > Off-Line programming (in virtual machine or editor mode)
- > Interactive Editor for convenient program modification.
- > Macros for automatic measurement of all elements
- > Integration of text, images and sounds
- > Customer specific output formats (Protocol Designer)
- > PTB certified geometric element computation
- > Certified QS-Stat interface

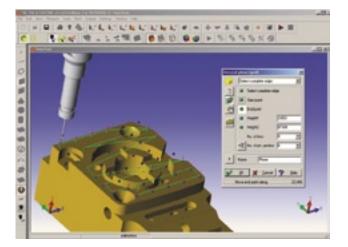




CAT 300 (On-line and Off-line programming module) CAD based, simple and fast program generation







Mitutoyo's Computer Aided Technology program -CAT 300eliminates the requirement for manual input of data. This allows the user to create the measuring program easily and efficiently.

The information required for the measurement elements and their nominal data is extracted directly from the CAD model, in just a few mouse clicks - simple and effective. This also applies to the programming of travel directions and using the measured data to create the tolerance comparison to the nominal data, including the orientation tolerances.

CAT 300 displays the complete probe path and measurement points in a clear and easy 3D graphic view. This can be rotated, zoomed or panned to any convenient viewpoint, again by a few simple clicks of the mouse. It also features a unique collision avoidance system which automatically creates a collision free path in advance, and so eliminates the need to run a simulation with collision check.

CAT 300 Highlights:

- > Full Off-Line programming to optimize machine usage.
- > Full CAD Model manipulation by mouse movement
- > Measuring commands by simple mouse clicks
- > Simple program datum setting from CAD data.
- > Clear display of probe path and measurement points
- > Automatic collision free program generation

3D-TOL (Freeform surface module) Measurement, evaluation and tolerance comparison



"3D-Tol" is the ideal program for comparing the measurement data from three dimensional surfaces, to the nominal data supplied in the form of a CAD model. Typically it is used for automotive body parts, but increases in 3D machining capabilities make it applicable to many applications in aerospace, marine and consumables engineering.

The generation of measurement points is derived from the CAD model by simple surface grid selections with graphic menus, and there are additional functions to handle the special requirements for the measurement of sheet metal edges. Comparison of measured data to the CAD model is simple and quick to carry out, and the deviations from nominal can be displayed by appropriate color marking of the points.

Part alignment to the CAD data can be by selection of discrete points, or the whole point grid can be used to achieve a "Best Fit", which displays the coordinate shift and rotation required to achieve the new alignment.

3D-TOL Highlights:

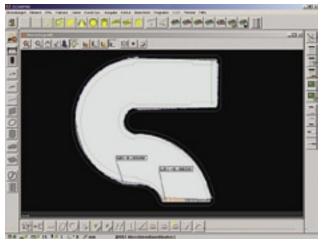
- > Simple and easy operation
- > Fast comparison of actual values to nominal CAD data
- > Representation of deviations using color shading
- > Display of results with labeling, when desired.
- > Best Fit of measured values to CAD model
- > Standard: IGES, STEP, SAT & VDAFS interfaces
- > Optional Direct CAD interfaces for: CATIA v4, CATIA v5, Pro/E and Parasolids
- > Common CAD interface to CAT300





SCANPAK (2D profile evaluation module) Scanning and evaluation of 2D contours, plus 3D digitizing



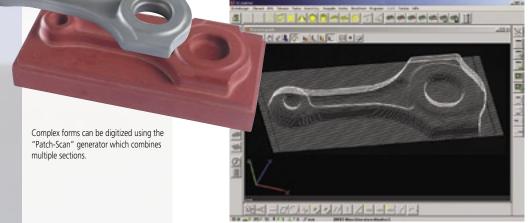


"Scanpak" allows the acquisition of sectional data by using the well known "scanning" technique. This data acquisition can be programmed for use with touch trigger or continuous contact probes such as our MPP series or the SP25. The resulting 2D section can be directly compared to a nominal from a CAD model, or the geometric elements Lines and Circles can be extracted. Distances and Angles can also be computed, and an extensive tool kit is provided for manipulating the contour (expand, contract, mirror etc).

In addition, "Patch" scanning is also supported to enable 3D digitizing, and data can be exported to many external systems via the "Transpak" interface program.

SCANPAK Highlights:

- > User Friendly graphic interface
- > Graphic display of Actual/Nominal comparison.
- > Best Fit capability
- > Extensive contour manipulation toolkit
- > Over 70 output formats in Transpak
- > Flexible output using "Protocol designer"



MeasurLink[®] (Statistics evaluation module) Real-time acquisition, analysis and process monitoring

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MeasurLink® Quality Management Software combines real-time data acquisition with on-line SPC analysis, integrated networking and quality information, to provide you with a comprehensive solution. The "real-time" package allows the user to analyze data in a multitasking environment, check variables and attributes and short run inspection to maximize production and reduce defects.

Results are clearly displayed as traditional SPC charts or they can be displayed as a graphical multi-variant display, in which the call outs are positioned against an image of the part. This image can be a drawing, digital photograph or CAD model. It makes the interpretation of results simple. Additional modules are also available for "Gage R&R" and "Gage Management" to provide a comprehensive suite to meet all your QA management requirements.

MeasurLink® means:

- > Enhanced screen customization (plot point color, shape & output, etc)
- > Pareto pie charts
- > Colored histogram charts
- > Multi variant charting
- > Report templates with logo, bitmap & free text support.
- > Multi-media aids (video, sound, images etc)
- > Mixed variable/attribute routines
- > FDA 21CFR Part 11 support.

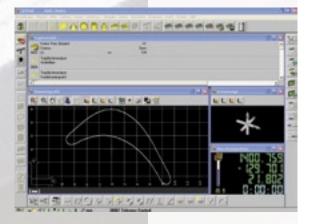


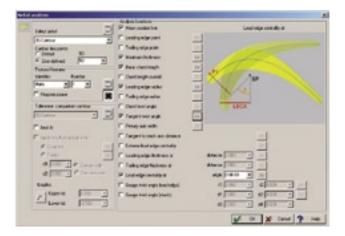


MAFIS (Mitutoyo Airfoil Inspection System) Evaluation and analysis of airfoil shape

Expansion module







Airfoil shapes such as Turbine Blades require special calculations according to the particular design specifications. The "MAFIS" system uses cross sectional data of the shape obtained by "SCANPAK" to perform these calculations, and output the result via the standard geometry program.

The software is configured to present an easy to use check box system for the various calculations such as "leading" and "trailing edge thickness" which are derived from the "mid camber line".

Many different calculations are possible, which can on request be tailored to meet your particular company standards, together with a Best Fit computation and tolerance comparison facility. In addition to the output the results are automatically stored for use in further calculations if required.

MAFIS Highlights:

- > Easy operation by self explanatory pictograms
- > Full integration to the Geopak module
- > Suitable for Aerospace, Marine or Power Generation industries.
- > Optional output to MeasurLink and Protocol Designer
- > Special computations can be incorporated.

GEARPAK (Gear measurement and analysis modules) Automatic programming and precise evaluation

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GEARPAK brings sophisticated gear measurement capabilities to Mitutoyo CMMs, enabling inspection of both standard dimensional geometry and gear parameters on a single machine.

The program consists of three modules; the Involute module for internal and external straight sided gears (spur or helically cut), the Bevel/Hypoid module for bevel and hypoid gears and the Worm module for worm gears and worm wheels.

Simply enter the gear design parameters, and Gearpak automatically creates a complete part program. Both single point (touch trigger) probes and continuous path scanning probes are supported.

The inspection results displayed include standard parameters including pitch, involute profile, flank line and concentricity. A simulated rolling test, using the nominal data of a mating gear, is also included. The inspection report is customizable by the operator for text, numeric results, and graphical charts.

GEARPAK Highlights:

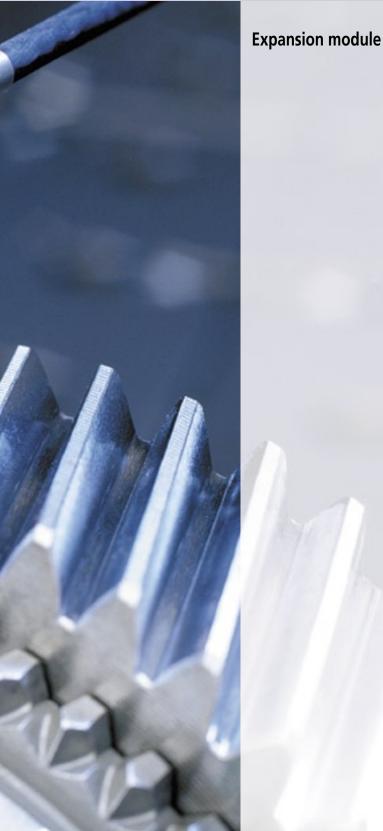
- > Automatic and fast generation of measurement program
- > Automatic calculation of all Probe position data
- > PTB Certified algorithms
- > Clearly structured dialogs and functions
- > Simple menu inputs with pictogram guidance
- > Tolerance comparison to International standards
- > Easy interpreted graphic outputs
- > Reports in HTML format.

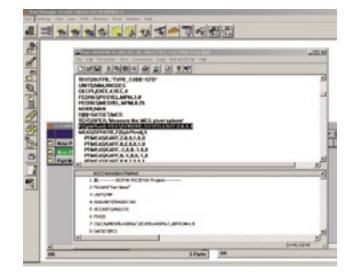






Pure DMISPAK (Program translation module)





Support for the international standard DMIS (Dimensional Measurement Interface Specification) is provided by "Pure DMISPAK".

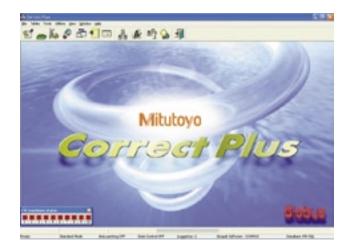
It provides a means to translate measurement programs created by external systems in (pure) DMIS format, which is an open text file, into the secure environment provided by the MCOSMOS part program structure. Conversely existing part programs can be output to the DMIS format, allowing them to be used by other systems.

This module is operated from the "PartManager" and performs syntax checking as well as highlighting commands not included in the configuration file of MCOSMOS. Editing of the DMIS program can also be carried out before translation, if required.

Pure DMISPAK Highlights:

- > Bi-directional transfer of DMIS format programs
- > Automatic syntax checking
- > Editing facility for quick modification.
- > Fully DMIS V4.0 Compliant (Within MCOSMOS configuration file)

Correct Plus (NC Machine Tool Correction Module) Machining correction by optimized data feedback



"Correct Plus" software is the world leading program for automatic correction of machine tool processes, utilizing the optimized measurement data obtained from the CMM with MCOSMOS software.

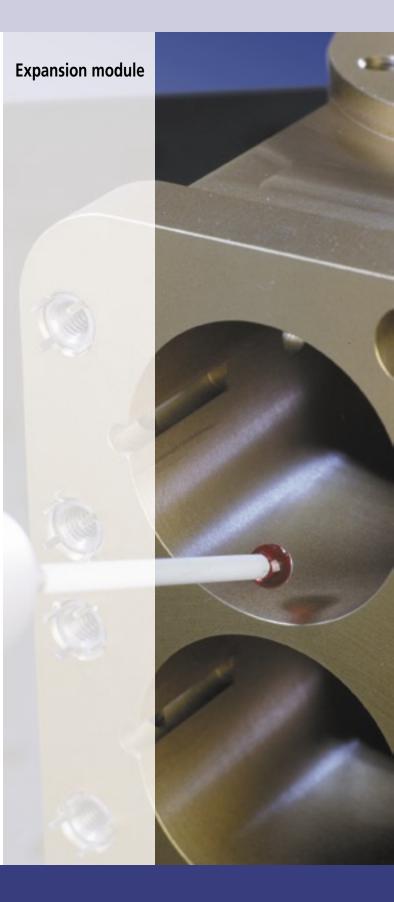
Measured data of individual features is analyzed statistically and then optimized to create correction values. The use of statistical information means that tool wear can be predicted and corrections applied before the machining reaches an "out of tolerance" situation. The machine tool program is then automatically updated when specific pre-set values for that feature are reached, without any operator intervention.

Unlike other systems which are based entirely on machine tool parameters for correction, this feature based process ensures that production quality is maintained at the highest level, defective parts are virtually eliminated, and profit is maximized.

Correct Plus Highlights:

- > Fully automatic correction system
- > Individual feature based
- > Fast machine tool update without operator intervention
- > Rapid transition from 100% inspection to random sampling due to early stabilization of the machining process
- > Significant improvement in product quality due to process being centered on mid tolerance
- > All current ISO controllers supported



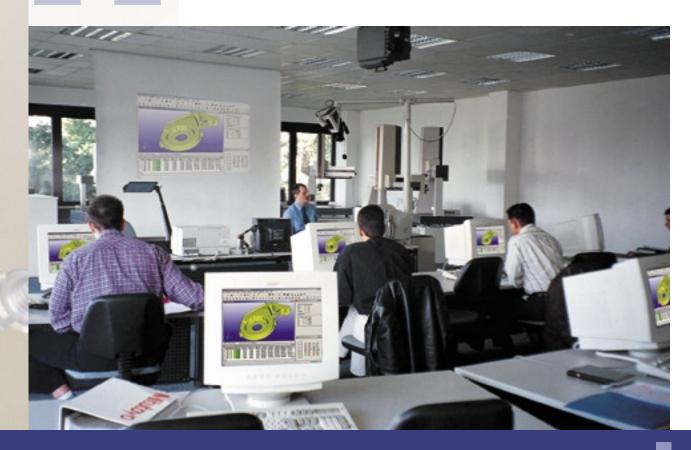


Measuring technology for the global market

Market Response Mitutoyo focuses on the needs of its customers, who need to secure a competitive edge with the latest developments in measuring technology.

With over 70 years' experience, Mitutoyo is a pioneer and pace setter in the field of precision measurement technology throughout the world. From the headquarters and production facilities in Japan, the business has spread to over 230 countries, including local offices, production sites and sales networks. There are also Mitutoyo representatives in over 60 countries.

The development of software is also carried out on a global basis, and Mitutoyo has established Computer Technology Laboratories (CTL) in Japan, USA and Europe. These CTL teams jointly produce the MCOSMOS software for CMMs and are well placed to satisfy customer needs, while meeting all world standards for computation requirements.



MiCAT CMM, the standard in world metrology software, for professional measurement and evaluation.



Note: All our product details, in particular the illustrations, drawings, dimensional and performance details and other technical specifications contained in this publication are to be considered to be approximate average values. To this extent, we reserve the right to make changes in design, technical data, dimensions and weight. Our specified standards, similar technical rules and technical specifications, descriptions and illustrations of the products are correct at the time of printing. The current version of our general terms and conditions also apply. Only offers which we have submitted can considered to be definitive.

Coordinate Measuring Machines
Vision Measuring Systems
Surface, Form and Contour Measurement
Optical Measuring
Sensor Systems
Hardness Measuring
Digital Scale and DRO Systems
Small Tool Instruments and Data Management

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