Mitutoyo

ADVANCED CMM SOLUTIONS

ENHANCE YOUR MEASURING POSSIBILITIES

COORDINATE MEASURING MACHINES

PRE1456

Extend your CMM's capabilities

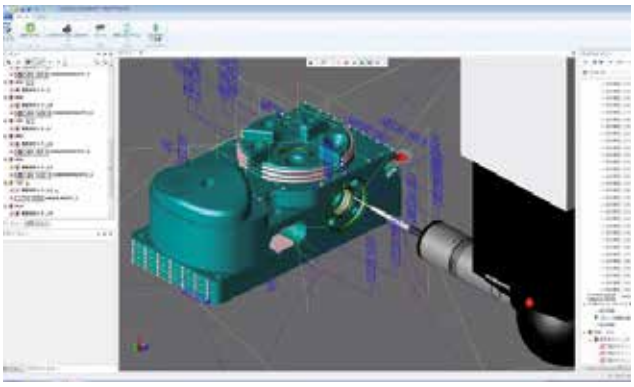
New industrial challenges increasingly demand higher accuracy for more and more complex workpieces, for higher throughput to reduce the production cycle and for a higher ROI to offer competitive manufacturing prices.

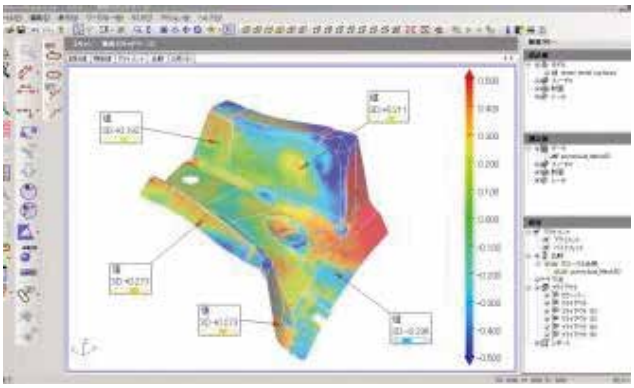
Mitutoyo, permanently researching and developing new methods and technologies to support efficient metrology, has a strong knowledge and experience of high-end technologies implemented in many kinds of instruments and systems over many years.

Nowadays, most of the dimensional metrology experts bear strong expertise about CNC CMM measurement capabilities when using a standard contact probe, either as in touch trigger or scanning mode.

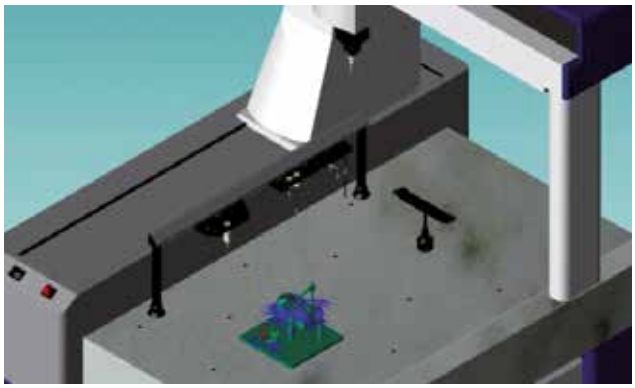
However, many new technologies have recently been implemented to CMMs like non-contact measurement, roughness inspection, 5 axis measurement or automatic part-programming software.

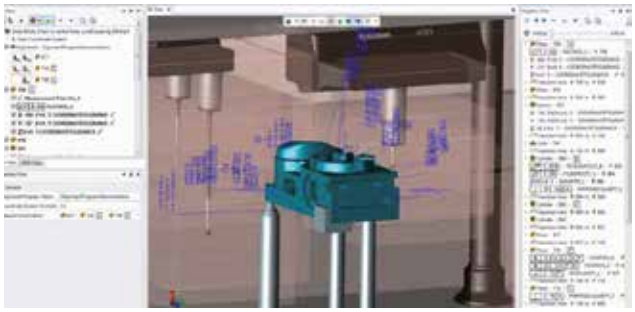
All these technologies expand the scope of your CMM ability and contribute to raise its performance level as well as your return on investment ratio.





MiCAT Planner:
Efficent Part Program Generation



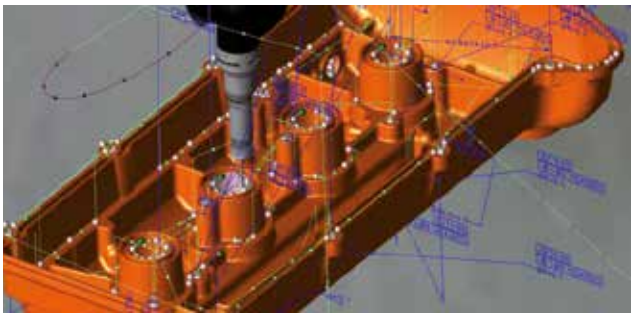


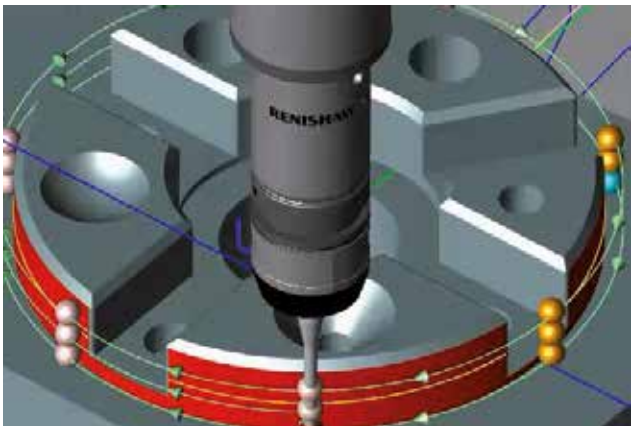
Programming in a conventional way can result in misinterpretation of design intent. Complex part programs require path optimisation in order to avoid a waste of time. Plus, the work of different programmers can result in discrepancies.

Shorter product lifecycles require rapid change to design revisions and fast programming capability. Increasing machine up-time requires more efficient programs and reduced set-up time. The Mitutoyo CMM programming software MiCAT Planner meets all these demands.

Features:

- ✓ Identifies tolerance information included in 3D models with Product and Manufacturing Information (PMI), defines measurement locations and creates a measurement program fully automatically.
- ✓ By help of its optimisation function, the software calculates the shortest route for measurement with minimum probe repositioning and tool changes, and creates a program that enables measurement in the minimum possible time.
- ✓ Utilising the rule editor function to set the measurement rules prevents variation in measurement quality between program authors.
- ✓ Animation of the measurement path and estimates the cycle time, before and after path optimisation.
- ✓ High Return On Investment: drastically reduces the programming time by saving more than 90% when all PMI data are available.



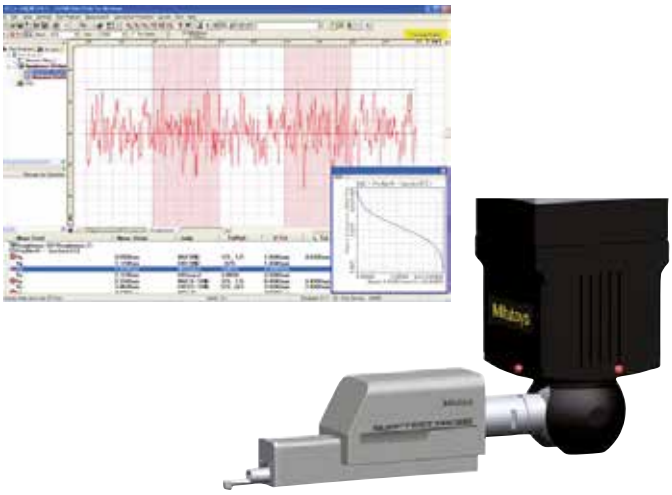


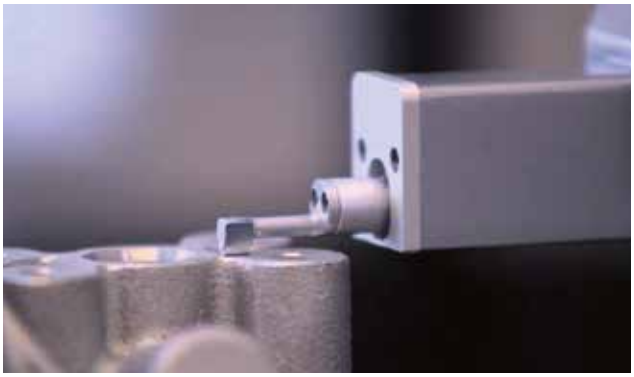
Dedicated leaflet available on request.

SURFTEST Probe:
Surface roughness measurement on your CMM

This vital type of measurement can be conducted within one normal CMM cycle, rendering transport of the workpiece to a another measuring machine unnecessary. This method particularly suitable for measuring complex components, shapes or heavy workpieces for which the transport to a dedicated roughness inspection station means high risk and cost.

Handled in exactly the same way as other probes installed in an automatic probe changer, this probe brings the proven technology of the SJ-310 Surftest series to the CMM It offers with the full high-performance range of detectors developed for handling specialist applications, such as roughness measurement on gear teeth and inside small holes or deep grooves, in addition to basic flat-surface measuring tasks.

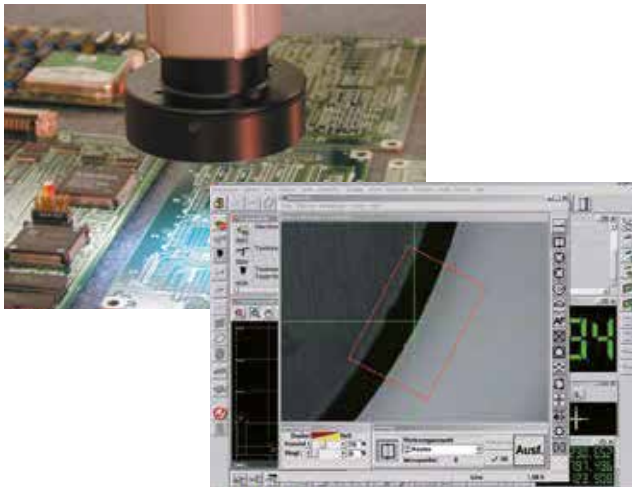




Features:

- ✓ Proven technology from Mitutoyo's SJ-310 Surftest
- ✓ Choose from five detector types for various applications
- ✓ Auto-joint connection compatible with PH10M head
- ✓ High accuracy – no CMM movement during measurement
- ✓ One CNC measurement cycle for all results
- ✓ SURFPAK-SP software compliant with up-to-date roughness standards
- ✓ Graphical and numerical output
- ✓ One measurement report for all GD&T requirements

QuickVision Probe:
Non-contact vision sensor with image processing software



The QVP efficiently measures microgeometric forms that cannot be measured using a contact measuring head, together with flexible forms that would easily deform upon application of the measuring force.

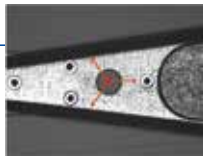
It is based on Mitutoyo's Vision System measuring technology and allows automated vision measurement via image processing software on a CNC CMM, thanks to the Auto-joint connection compatible with PH10M head. Edge detection tools are provided by the VISIONPAK software supplied with the QuickVisionProbe. VISIONPAK is a fully integrated MCOSMOS program module that makes the contact-free measuring points available for a centralised geometric evaluation gathering contact measurements with touch probe and non-contact measurements with QVP.

The QVP is fitted with 2 standard high-performance white LED light sources. A coaxial and a ring light source. These can be optimally adjusted in 100 stages by the software to the relevant measuring tasks and stored for serial measurements. Four different objective lenses are available to adapt the required magnification to each application.

VISIONPAK Image Processing Tool

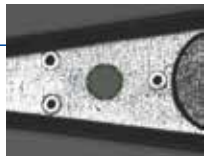
Simple Tool

Used for detecting a single point on the edge pointed to by the arrow.



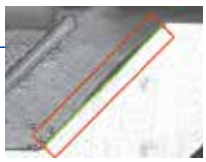
Manual tool

Used for detecting an optional position pointed to (clicked on) by the mouse.



Box tool

Used for multiple-point line measurement of an edge caught in the box.

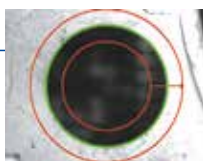


Centroid tool

Used for detecting the center of gravity of an optional form.

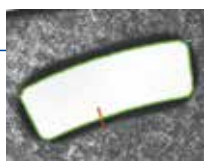
Circle tool

Used for multiple-point measurement of a circle for the objective circular edge. As with the box tool, it can collect data that is free from the effect of burrs and dust.



Edge self-tracing tool

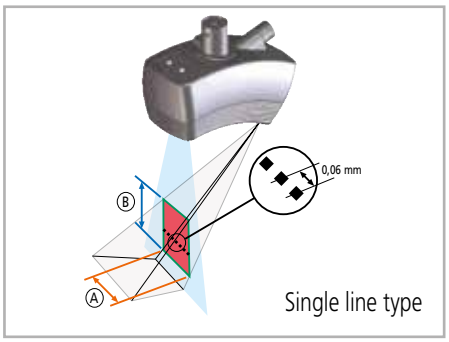
By simply specifying the start point and measurement interval, the objectives edge can be detected while automatically tracing an unknown geometry.



SurfaceMeasure:
High speed non-contact laser probes

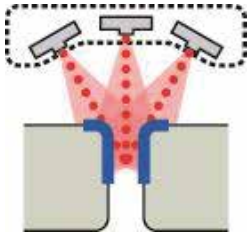
SurfaceMeasure Probe series are non-contact laser probe systems for CNC CMM, with auto-joint connection compatible with PH10M head. Several types are available offering different features that perfectly suit your application.

SurfaceMeasure can capture 3D shapes of workpiece surfaces by line laser scanning with CMM movement. This enables the gathering of a huge amount of point cloud data, which would be extremely time-consuming to acquire with a contact probe measurement method. Collected point clouds data can be used for many purposes such as editing, plane creation, comparison inspection against CAD data and CAD data creation.

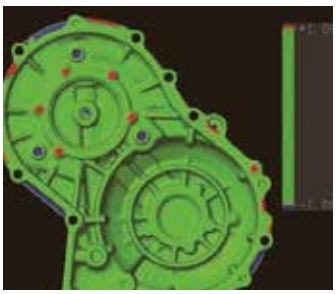


Single line type


Crossed line type


3 lines at 120° capture internal shapes in a single run.


Crossed line type (left): only 1 probe posture



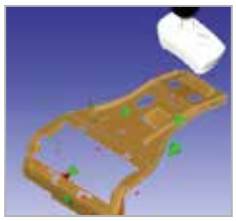
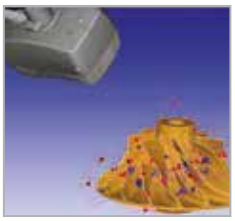
SurfaceMeasure Series integrate Laser intensity and camera sensitivity automatic adjustment to the environment and the workpiece material.

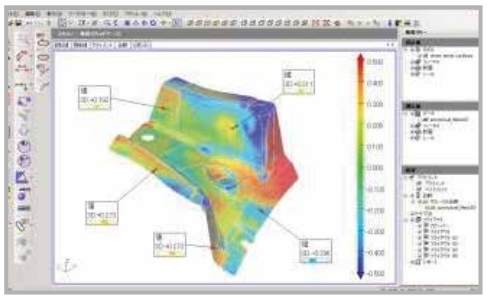
It enables simpler and more comfortable laser scanning. SurfaceMeasure series includes 4 laser scanners, and 2 types of architecture:

- ✓ Single line (3 models depending on line width and stand-off distance)
- ✓ Three Crossed Lines (best for high speed features extraction)

Specifications	SM606	SM610	SM1010	SM606T
Laser Type	Single line	Single line	Single line	Crossed lines
Working distance	123 mm	165 mm	165 mm	203,5 mm
Measuring Range	60 mm	100 mm	100 mm	65 mm
Scan Width	60 mm	60 mm	100 mm	3 x 65 mm
Scanning error	12 µm	15 µm	18 µm	17 µm
Acquisition rate	75.000 pts / sec	75.000 pts / sec	75.000 pts / sec	76.500 pts / sec

MSURF:
High performance software for laser scanners

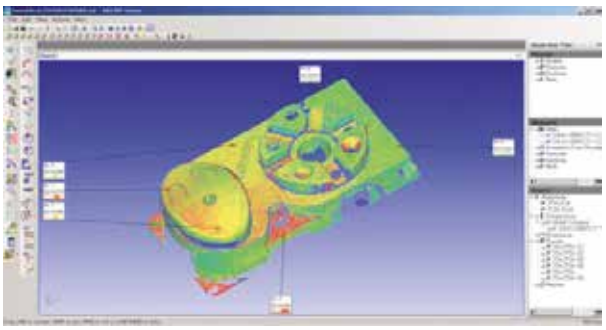



MSURF is the powerful software suite developed by Mitutoyo to manage Point Cloud data acquisition and analysis.
MSURF-S, the main scanning module, is in charge of point cloud acquisition for further analysis, or export as STL format to be used with third party software like for reverse engineering applications. Measuring macros can be created from the joystick and executed as many time as required.
MSURF-G is the offline teaching macro module from the CAD model. It optimises the path based on the user's requirement and automatically avoids collisions with the workpiece.
MSURF-PLANNER is an advanced high performance module for automatic macro generation from a CAD model. It can either acquire free form surfaces or automatically detect & extract geometric features.
MSURF-I is the inspection module for CAD comparison and feature measurement and reporting. Other modules for professional meshing or Airfoil inspection are also available.
Other modules for professional meshing or airfoil inspection are also available.

MSURF Free Viewer is also included to allow any of your customers to visualise the measurement result from MSURF-I without any additional cost.

With the Free Viewer the 3D view can be rotate, pan, zoom for a better analysis of complex point clouds.

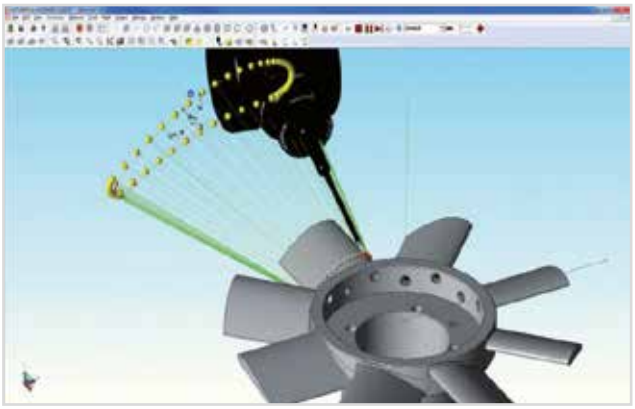


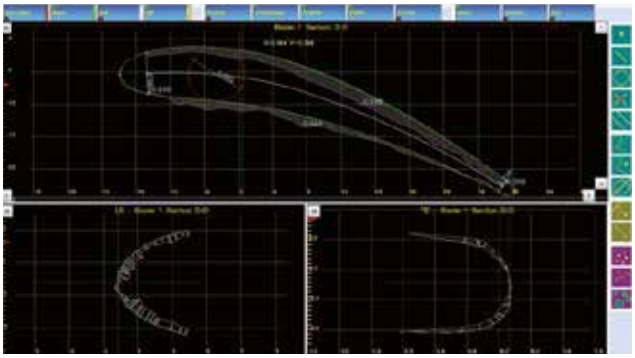
MAFIS-Express: High throughput measurement solution for blade and blisks

Engine manufacturers are increasingly turning to the blisk (bladed disk) concept where the blades are formed as an integral part of the rotor, and away from discrete blade designs for aero engine compressors and fans.

MAFIS-Express, a dedicated companion module of Mitutoyo's software suite, is the fastest way to measure and analyse turbine and compressor blade form. Characterisation of individual blades, or complete blisks, is performed in just one measurement cycle with any number of scans on each blade, using simple routines and within a very short time.

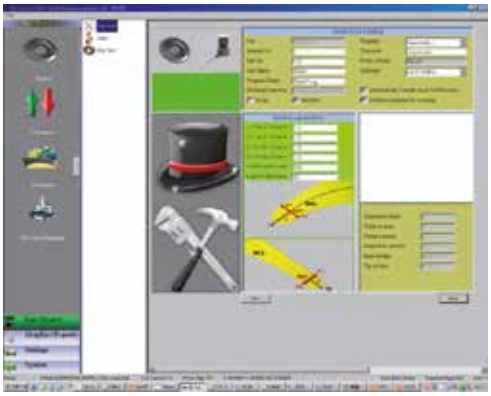
MAFIS-Express support a large variety of CMM hardware and turbine manufacturers specifications as listed in the below table.





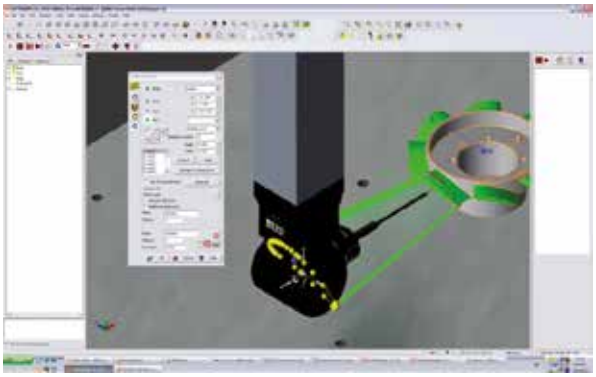
Specifications

Manufacturers design specification compliance for aerofoils and blisks	Rolls-Royce, Pratt & Whitney, PWC, GE, SNECMA, Honeywell, MTU, Turbomeca, Siemens
Functions	• Automatic measurment-program generation • Real time section-plane curve evaluation • Evaluated result display with graphs and tables • Measurement result storage
Supported probe systems	REVO, PH10M, SP25M and TP7 probes and probe heads
PC operating systems	Microsoft® Windows® 7



Programming is intuitive and easy to use, so that the process of creating the inspection routine, performing the measurement and then evaluating the results can be up to 10 times faster than with typical aerofoil measurement software, including real-time evaluated results displayed graphically and numerically, with staggered pitch blisks handled as easily as constant pitch designs.

5 axis scanning with REVO:
Dynamic & high accuracy touch scanning



The **Renishaw REVO head with Renscan5™ technology** clearly offers benefits for blisk measurement due to the infinitely indexing head which improves access.

Also, the ability to continuously scan while the probe head angle changes drastically improves measurement cycle time.

Supported by MAFIS-Express, this combination of high performance scanning head and fast programming software provides the best possible throughput to measure either blades or blisks.

- ✓ Increased CMM measurement throughput
  - ✓ reduced measurement cycle times
  - ✓ high speed head and sensor calibration
  - ✓ no compromise on accuracy
- ✓ Increased CMM measurement capability
  - ✓ flexible access to features (infinite angle posture)
  - ✓ up to 500 mm stylus length

REVO 5 axis scanning head does not only boast outstanding performance when measuring blades and blisk but also to many mechanical parts requiring large features scanning, or deep hole measurement in any angle orientation. For example, engine cylinder head measurement cycle time can be reduced by 90 per cent when using the 5 axis scanning REVO head compared to the conventional 3 axis scanning method.

Specification of REVO Scanning Probe

Rotation angle (Pitch angle)	Vertical (A-axis)	-5° to +120° (0.08 sec)
	Horizontal (B-axis)	~ (0.08 sec)
Maximum stylus length		500 mm (Distance from probe rotation center to stylus tip)

PH20: The 5 axis touch trigger solution

PH20's unique 'head touches' allow measurement points to be taken by moving only the head rather than the CMM structure. Using only the rapid rotary motion of the head, points can be taken faster, and with improved accuracy and repeatability. Furthermore, 5-axis motion eliminates time spent indexing the head.
These speed increases typically result in a 3-fold improvement in throughput over conventional systems.

Improved touch-trigger measuring performance:

- ✓ Repeatability – improved with 'head touch' method
- ✓ Accuracy – improved by using feature orientation based calibration and 'head touches'
- ✓ Pre-travel variation – automatic compensation
- ✓ Module changing – automatic tip offset correction

Specification of PH20

Rotation angle (Pitch angle)	Vertical (A-axis)	-115° to +115° (0.08 sec)
	Horizontal (B-axis)	~ (0.08 sec)
Maximum stylus length		50 mm

PH20's infinite positioning capability guarantees optimum feature access, minimising stylus changes. 5-axis simultaneous motion allows larger parts to be measured on the CMM by minimising the space required around the part for head rotation. PH20 automatically aligns itself with the part coordinate system, avoiding stylus collisions and the requirement for accurate fixtures.

MITUTOYO CMMS
THE CORE OF YOUR ADVANCED MEASUREMENT SOLUTIONS

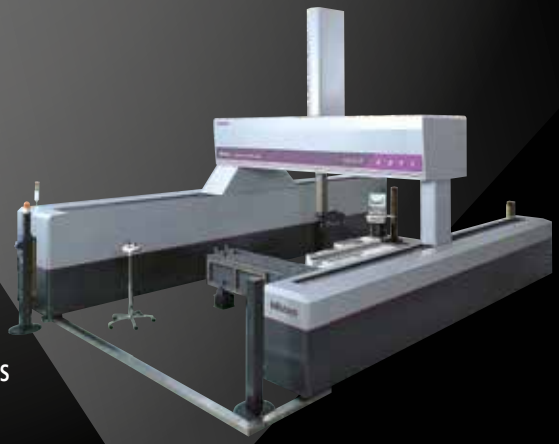
All these enhanced measuring solutions can't be implemented without a powerful, reliable and accurate CMM to support them. With several thousand CNC CMMs installed since 1980, Mitutoyo's offers you outstanding expertise in the design and manufacturing of your next CNC CMM. Feel free to ask for our dedicated brochures for more information.

CRYSTA-Apex-S series

STRATO-Apex series

LEGEX series

MACH series



FALCIO-Apex series

Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

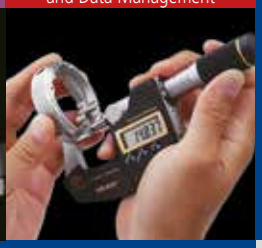
Optical Measuring

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 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 bespoke 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 catalogue

www.mitutoyo.eu

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