Mitutoyo

CNC Coordinate Measuring Machine
CRYSTA-Apex V Series

COORDINATE MEASURING MACHINES

PRE1521(3)

Mitutoyo

Go above and beyond.

CRYSTA-Apex V SERIES

500/700/900 Series

Focused on accuracy, speed, and versatility we introduce our new CNC coordinate measuring machine series.

Proud to unveil our CRYSTA-Apex V Series, we deliver faster measurements without compromising the measuring machine's inherent accuracy. It also supports the measurement of workpieces of many different shapes, such as castings or impellers. The CRYSTA-Apex V Series is a new generation of CNC coordinate measuring machines that utilize IoT for the advanced management of production and quality information, making any factory, a smart factory.


Mitutoyo
CRYSTA-Apex V
Mitutoyo
Mitutoyo

Mitutoyo

A brand new CMM design that provides cutting-edge capability in an extensive series of models that covers practically any measurement application in the small- to large sized part range.

The aesthetic design sports bold colours that befits a precision measuring instrument of the IoT age.
Offering a choice of models for measuring from small to large sized workpieces, the CRYSTA-Apex V Series delivers advances in accuracy, speed and versatility in this class of CMM.

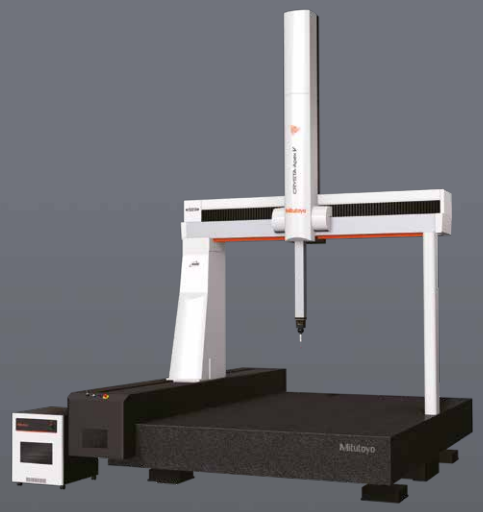
CRYSTA-Apex V544

Measuring range
X: 500 mm
Y: 400 mm
Z: 400 mm

CRYSTA-Apex V776

Measuring range
X: 700 mm
Y: 700 mm
Z: 600 mm

CRYSTA-Apex V162012



CRYSTA-Apex V203016

CRYSTA-Apex V9106

Measuring range
X: 900 mm
Y: 1000 mm
Z: 600 mm

CRYSTA-Apex V122010

Measuring range
X: 1200 mm
Y: 2000 mm
Z: 1000 mm

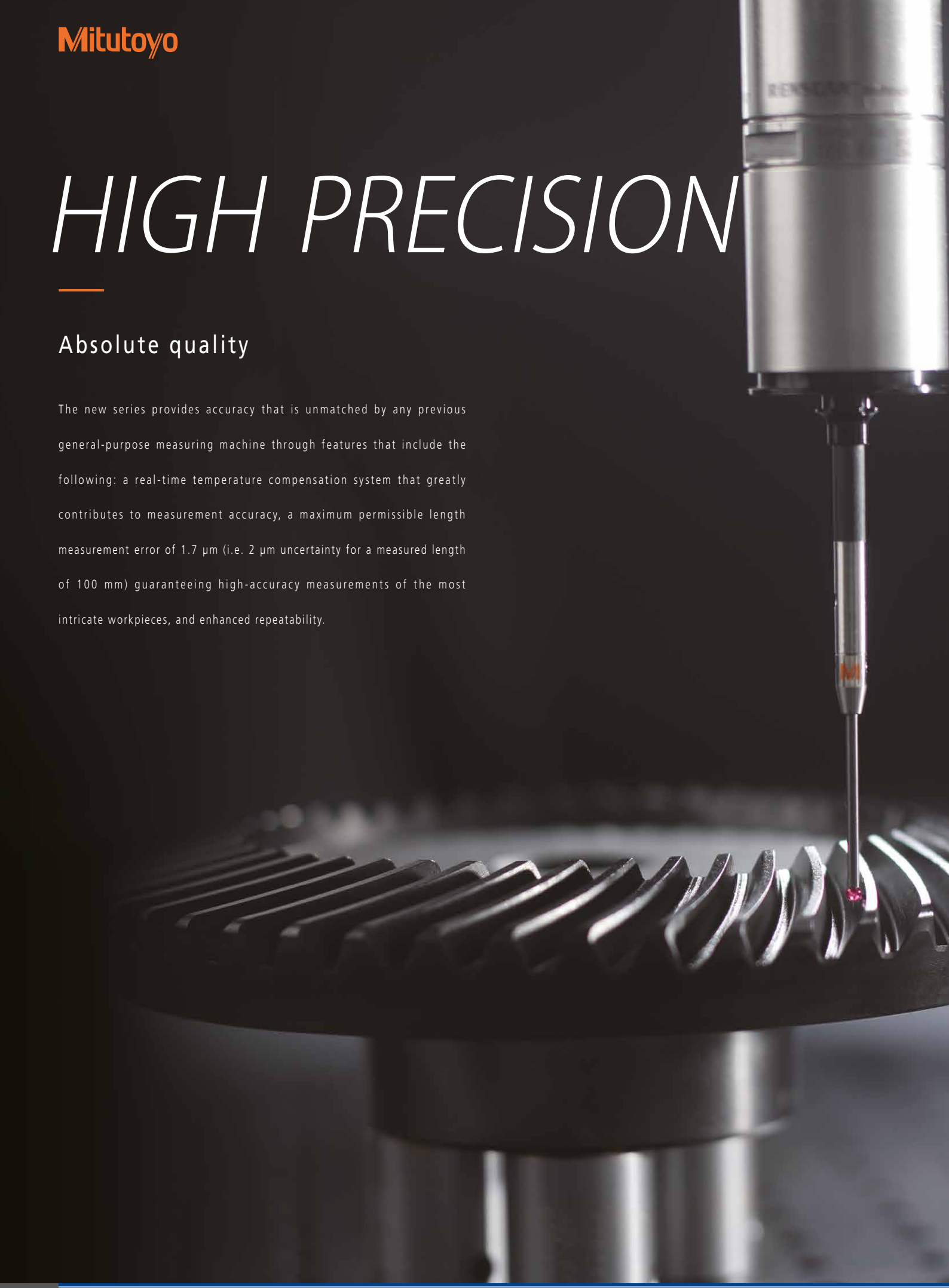
Note: All models incorporate a main unit Startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo Sales Office prior to relocating this machine after initial installation.

Mitutoyo

HIGH PRECISION

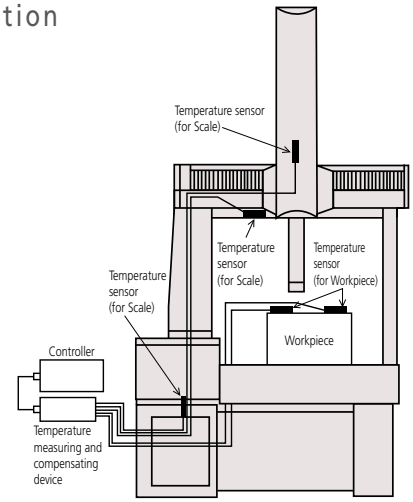
Absolute quality

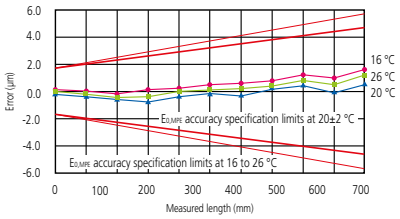
The new series provides accuracy that is unmatched by any previous general-purpose measuring machine through features that include the following: a real-time temperature compensation system that greatly contributes to measurement accuracy, a maximum permissible length measurement error of 1.7 µm (i.e. 2 µm uncertainty for a measured length of 100 mm) guaranteeing high-accuracy measurements of the most intricate workpieces, and enhanced repeatability.



Real-time temperature compensation

In the past, the accuracy of CMMs could not be guaranteed unless they were installed in constant temperature rooms. The temperature compensation feature guarantees accuracy under temperature conditions of 16-26 °C. This feature measures the temperature of the workpiece and that of the measuring machine, calculates what the measurement value would be at 20 °C, and outputs this value as the measurement result.

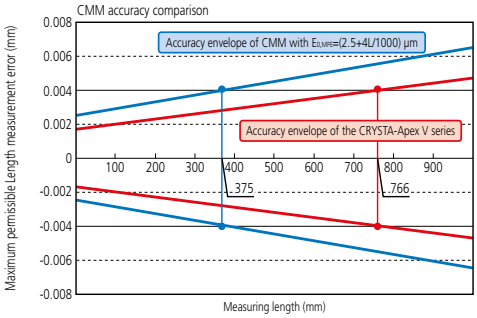




Graphs showing the effectiveness of temperature compensation

High accuracy of 1.7 µm

The CRYSTA-Apex V Series guarantees a maximum permissible length measurement error or $E_{0,MPE}$, of 1.7 3L/1000 µm. Let's consider a CMM offering $E_{0,MPE}$ of approximately 2.5 4L/1000 µm, which would generally be considered high-accuracy. If, for example, the required tolerance on a dimension is ±0.02 mm, the uncertainty of this machine would exceed 20% of this value* (±0.004 mm, as shown in the diagram to the right) for any measured length over 375 mm. In contrast, with the V Series, the measurement uncertainty remains within one-fifth of the required tolerance for measuring lengths up to 766 mm. Although the difference in the first term accuracy specification between the two machines may seem small (a mere 0.8 µm), the V Series actually offers guaranteed accuracy for more than double the measuring range.



* Assuming an acceptable working ratio between component tolerance and accuracy of measurement is 5:1 minimum.

Repetitive accuracy

In order to deliver high repeatability and eliminate causes of dynamic error, data from measurements using scanning probes are processed for stabilization. The probe is kept still for a few seconds when its tip first contacts the workpiece, thereby ensuring that causes of dynamic errors are eliminated as much as possible and making highly accurate measurement results obtainable.

HIGH SPEED

Rapid measurement regardless of shape

The V Series lets users freely set measurement paths along three-dimensional forms, enabling intricate workpieces to be measured along their curved surfaces and contours. It also allows for high-speed measurement unaffected by processing accuracy or misregistration through real-time correction of path errors caused by differences between the workpiece and design values. With its high drive speed and acceleration combined with a maximum measuring speed (the speed with which the stylus traces over the workpiece) of 8 mm/s, dramatically reduces the total measuring time.

Reduced measurement time

The CRYSTA-Apex V Series offers a maximum drive speed of 519 mm/s and a maximum acceleration of 2,309 mm/s2. Compared with conventional CNC CMMs (with a maximum speed of 430 mm/s and a maximum acceleration of 1,667 mm/s2), this amounts to about 100 mm more drive distance one second after starting movement. Unlike conventional CNC CMMs (with a maximum measuring speed of 5 mm/s), the V Series, with its high drive speed, acceleration, and maximum measuring speed cuts down on the total measuring time significantly. The margin of time saved only grows greater as the number of measuring locations increases, which in turn results in measurement cost savings.

High-speed optimal path scanning

The V Series is equipped with a measurement feature that allows users to specify scanning measurement paths (design values). This feature allows for high-speed, high-accuracy scanning by correcting dynamic errors that would otherwise be produced by acceleration and deceleration stresses. Measurement paths can be freely specified for three-dimensional forms as well, enabling intricate workpieces to be measured by tracking precisely along their curved surfaces and contours.

Active scanning feature

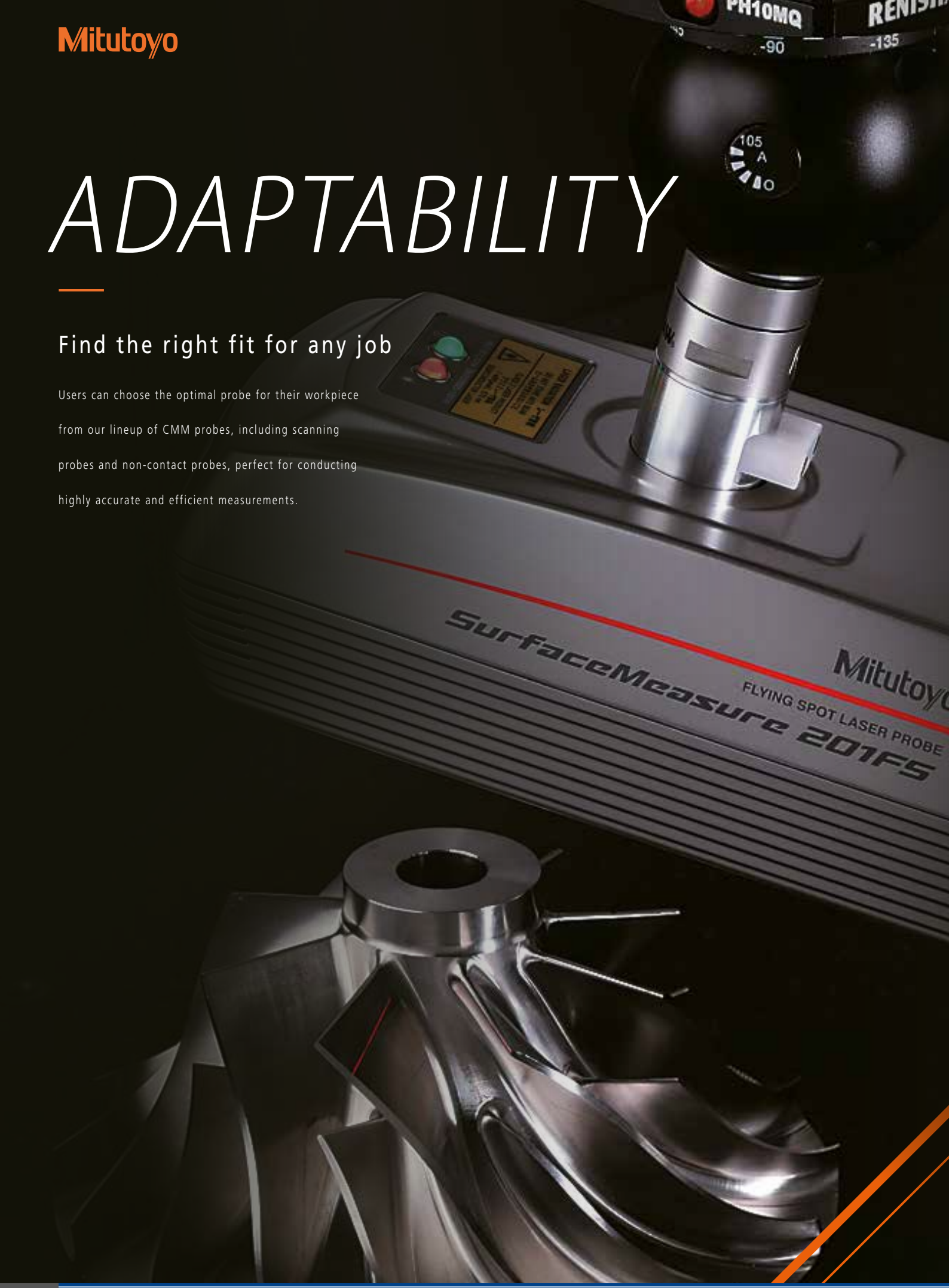
Enables high-speed measurement by accommodating discrepancies between design values and the actual workpiece. The 3D optimal path scanning advantages are retained whilst allowing for manufacturing or alignment deviations. The complexity of some workpieces. (e.g. turbine blades, fan blades and impellers) makes measurement difficult as their manufacturing variation fluctuates more than most machined parts. The V Series can tolerate these differences and still perform accurate measurement.

Mitutoyo

ADAPTABILITY

Find the right fit for any job

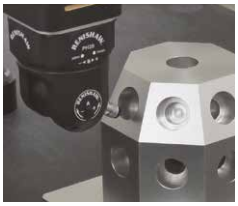
Users can choose the optimal probe for their workpiece from our lineup of CMM probes, including scanning probes and non-contact probes, perfect for conducting highly accurate and efficient measurements.



Probes for Coordinate Measuring Machines

5-axis Control touch-trigger probe system PH20

The PH20 head can position a touch-trigger probe at any angle, allowing unique "head touch" probing. This system has the advantage of measuring tilted surfaces and small, deep holes. There is no fear of interference from the stylus shank during measurement of a deep hole.
5-axis operation reduces the time required for probe rotational movements and supports "head touch" operation for quick point measurement.

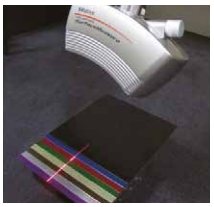


Compact high-accuracy scanning probe SP25M

The SP25M is a compact, high-accuracy scanning probe with a 25-mm outside diameter. It is a multi-function CNC CMM probe that can collect data not only from scanning measurements, where the probe moves while in contact with the workpiece to collect a point-cloud of coordinate values, but from high-accuracy single-point measurements as well.

Non-contact laser probe SurfaceMeasure

SurfaceMeasure is a non-contact probe that collects coordinate values of the surface of a workpiece by using laser light. It can quickly obtain a point-cloud of 3D surface data.



Measuring color sample boards

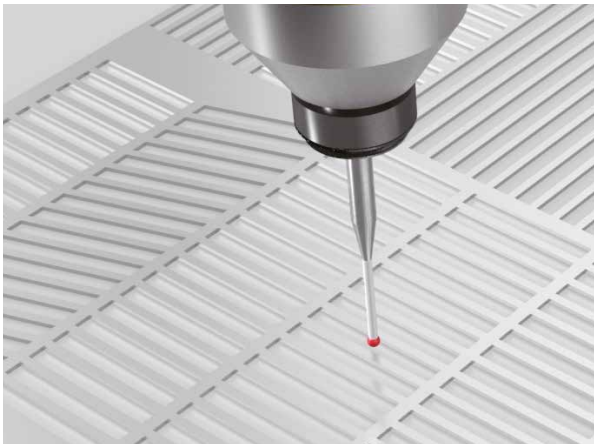
Measuring glossy workpieces

Efficient and high-accuracy measurements for a wide variety of workpieces

Suited to the many applications of the CRYSTA-Apex V Series is a large selection of measuring attachments such as scanning probes and non-contact probes, enabling measurement of a wide variety of workpieces.

Separator molds

Electric vehicles



Surface and cross-section measurements of precision molds for separators can be conducted using a low measuring force, high-accuracy scanning probe. Three-dimensional error analysis and cross-sectional form analysis may be performed based on the obtained measurement points.

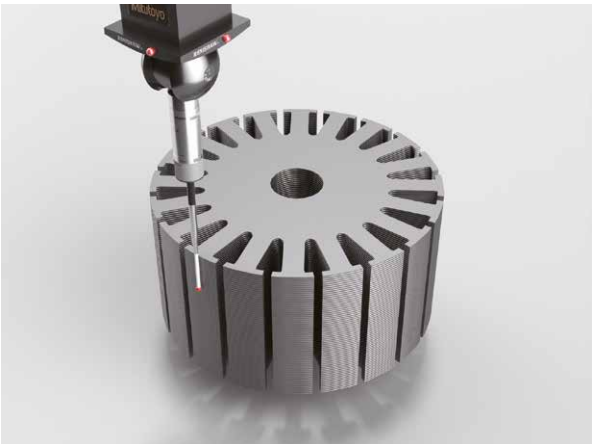
Impellers

Automobiles

Impellers can be measured using a highly robust non-contact laser probe that reduces multiple reflections. Just as accurate as contact probes, this laser scanner offers high geometric reproducibility.

Motor cores

Electric vehicles



The V Series can measure many sections of laminated motor cores such as straightness or cross-sectional form. It can also conduct measurements of three-dimensional structures, including measurements of side faces and dimensions at arbitrary heights.

Blades

Aircraft

The cross-section of an aircraft engine turbine blade can be measured using a compact, high-accuracy scanning probe that can measure workpieces usually susceptible to large errors, such as castings, quickly and reliably.

Artificial joints

Medical care

Freeform surface measurement of prosthetic joints can be conducted using a compact, high-accuracy scanning probe with the possibility of performing a three-dimensional error analysis based on the obtained measurement points.

Transmission cases

Power trains

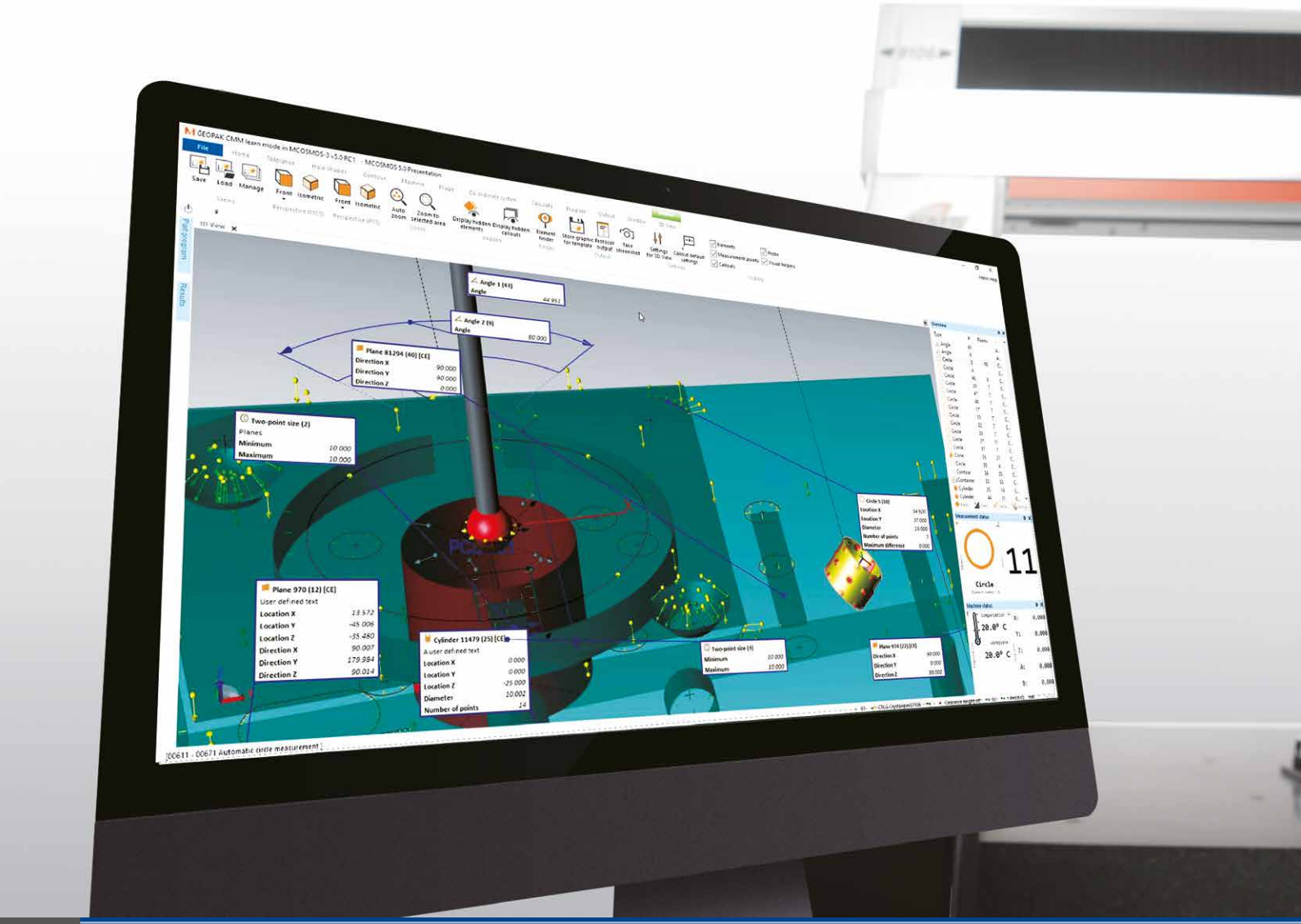
Non-contact laser probes require dramatically less measurement time compared to contact (scanning) probes. Scanning from three directions at once enables simultaneous measurement of the top and side faces, which means less repositioning is required for efficient measurement of even the most intricate workpieces.

Mitutoyo

SOFTWARE

Application software that offers both functionality and usability

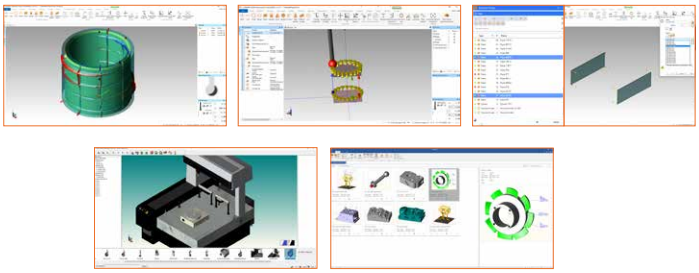
We offer an extensive lineup of application software for generating measurement programs automatically, conducting gear analysis, performing evaluations using CAD, and so on. Applicable to any measurements, simple or complex, they can resolve any possible measurement issues that our customers may encounter.



MCOSMOS

<Data Processing Sysem for CMMs>

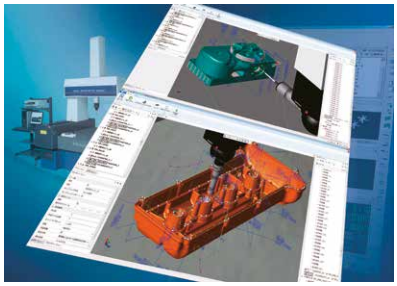
MCOSMOS is a family of Windows-based processing programs for CMMs. It includes an extensive lineup of optional software applications that support a wide range of probes, enabling fully automated measurement of all kinds of workpieces.



MiCAT Planner

<Automatic Measurement Program Generation Software>

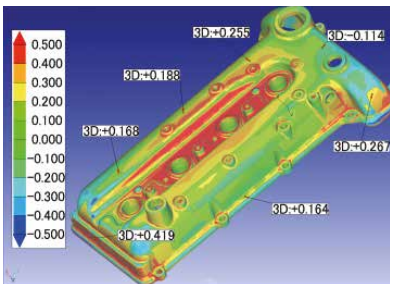
This software automatically generates measurement programs from nominal 3D CAD files, the software then determines which part of the workpiece should be measured, also working with CAD files containing PMI data. Compared to conventional methods ("teaching" or "learning"), this method can create measurement programs much more efficiently and up to 95% times quicker.



MSURF

<Non-contact Laser Measurement and Evaluation Program>

Used for the laser probes, MSURF is a multipurpose software made up of a variety of features necessary to transfer CAD data, optimize measurement paths, and conduct analysis or comparison verification of measured point cloud data with nominal CAD files.



Mitutoyo

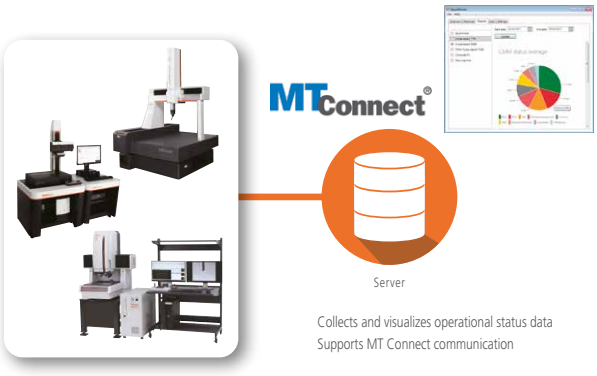
SMART FACTORY

From status management to preventive maintenance. Kickstart your smart factory through visualization.

Mitutoyo has developed new features that use a network to centrally manage manufacturing process information. MeasurLink predicts defects by collecting and analyzing measuring machine data in real-time. The Status Monitor (Smart Measuring System, or SMS), which indicates the operational status of the measuring machine, and the Condition Monitor, which indicates the condition of the machine itself, help maintain measurement accuracy, increase productivity, and improve maintenance management.

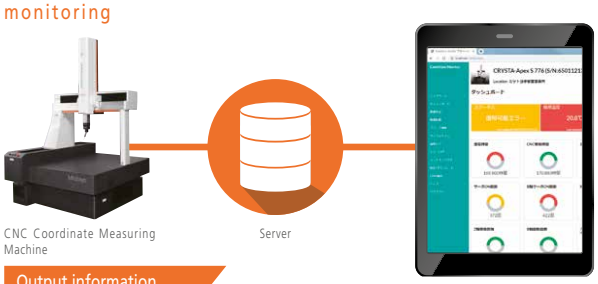
Status Monitor

Monitor measuring machines remotely



Condition Monitor

Conduct preventive maintenance through CMM status monitoring



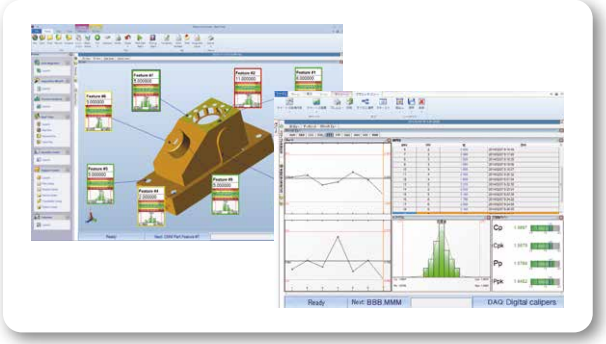
Output information

Traveled distance
Temperature log
Number of probe inputs

→ **Preventive maintenance through status monitoring**

MeasurLink

Reduces defective products by visualizing quality



USABILITY

Reduce operation and measurement times

Equipped with the Quick Launcher and a joystick box, operability is improved drastically. These enhancements work to streamline the workflow by improving operability and reducing overall measurement time.

Part program execution

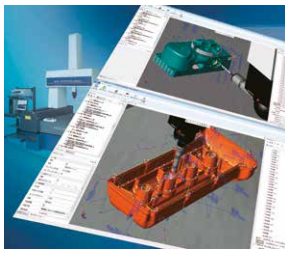
Equipped with the Quick Launcher as Standard, the CRYSTA Apex series enables simple and intuitive operation for easy part program execution. The touch panel monitor further improves operability, making tasks effortless for anyone. Also possible with new series, part programs can be executed via barcodes and QR codes to improve throughput even more.

Joystick box

The joystick box allows users to easily operate their CRYSTA-Apex V Series CMM manually. It comes with control buttons marked with user-friendly icons and an override knob for changing speed.

MiCAT Planner

Powerful software for reducing CMM programming time by up to 95%, MiCAT Planner generates measurement programs from nominal 3D CAD files as well as files containing PMI data.



OPTIONS

Expand your measurement capabilities

Suitable for many setups, the CRYSTA-Apex V series supports fully automated measurements that capitalize on the advantages of CNC CMMs. Some of the other possible options include a variety of precision clamping tools to fix workpieces of any size or shape with ease.

Automation example

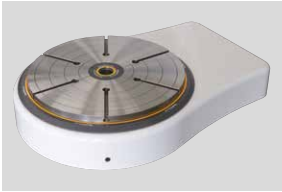
With the ability to deliver high-accuracy measurements across a wide temperature range, the need for a dedicated measuring room is eliminated. This allows for the automation of in-line and near-line measurements within the manufacturing process, significantly reducing measurement time and streamlining the workflow.

Eco-Fix clamping system

Mitutoyo clamping tools comprise a clamping system where elements can be put together with ease in order to fix various workpieces.

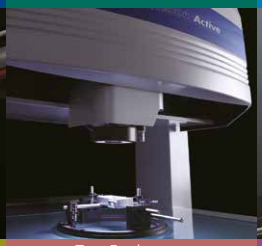
Rotary table

An optional measuring device for CNC CMMs developed for efficient and high-accuracy measurement of mainly rotational workpieces (gears, impellers, screw rotors, cylindrical cams, etc.), that can be used together with a scanning probe for synchronized scanning measurement. This enables a wide range of contour measurements and thus broadening the range of applied measurements.



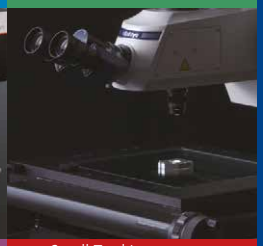
Coordinate Measuring Machines

Vision Measuring Systems



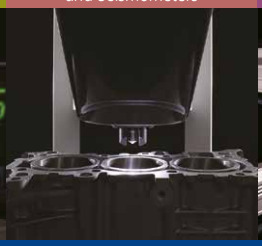
Form Measurement

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, ensuring 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 complete catalogue here.

www.mitutoyo.eu

Mitutoyo Europe GmbH

Borsigstraße 8-10
41469 Neuss

Tel. +49 (0) 2137-102-0

info@mitutoyo.eu
www.mitutoyo.eu