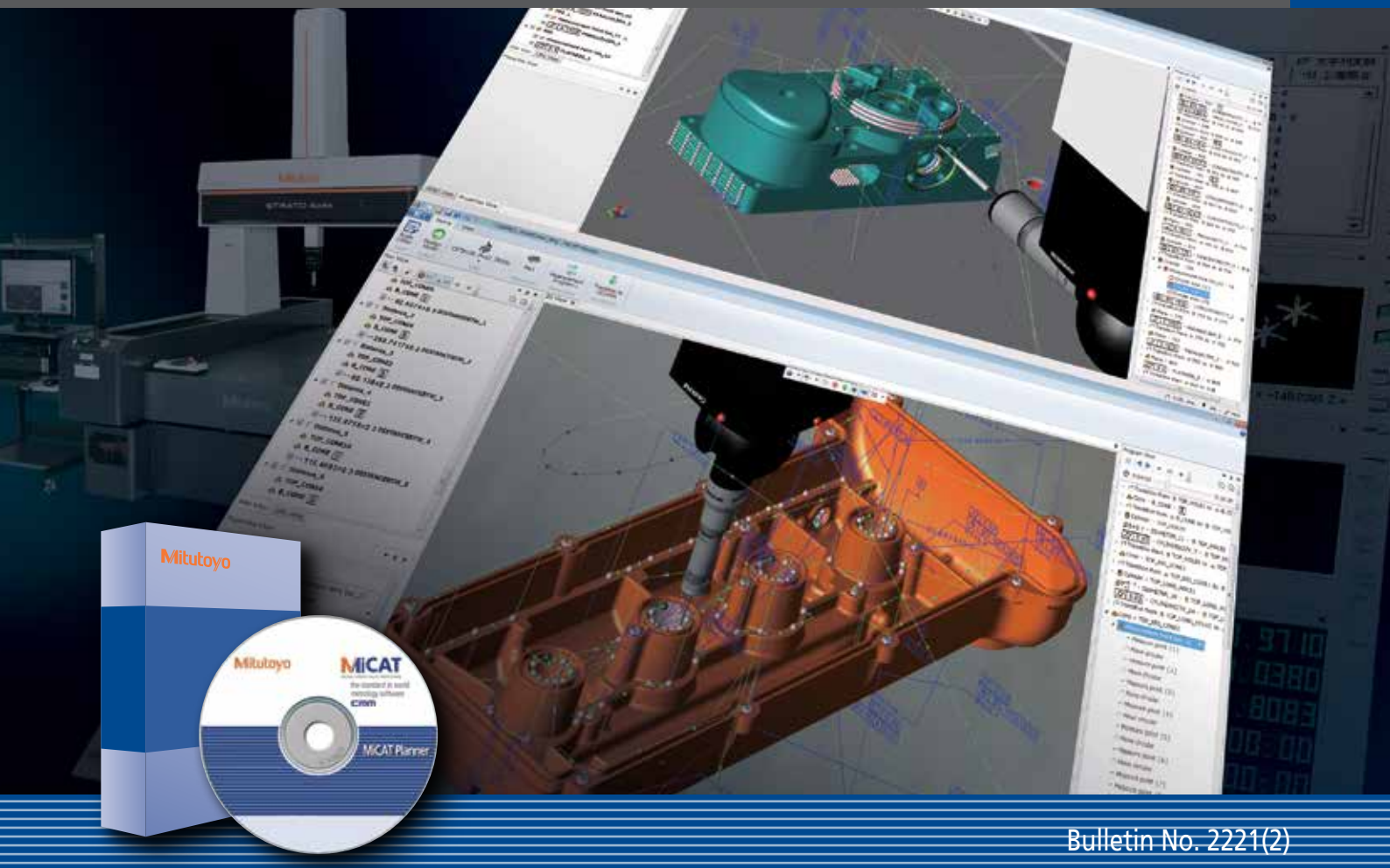
Mitutoyo

MiCAT PLANNER

EFFICIENT PART PROGRAM GENERATION

COORDINATE MEASURING MACHINES

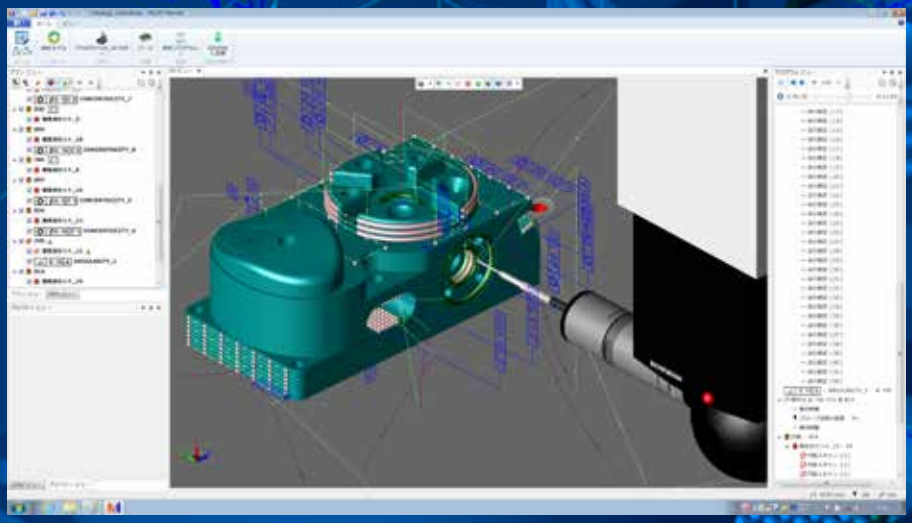


Bulletin No. 2221(2)

Part programs – easy, fast and reliable.

Creating part programs for coordinate measuring machines is a strategic and time-consuming task.

Programming in a conventional way can result in misinterpretation of design intent. Complex part programs require path Optimization in order to avoid a waste of time. In addition, different CMM programming styles between operators can result in discrepancies. Mitutoyo MiCAT Planner is the perfect answer!



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.

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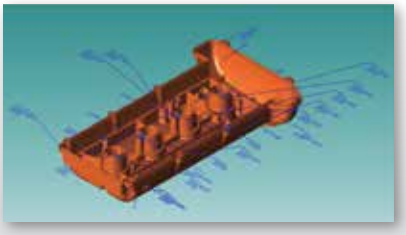
Generate your CMM part programs with unprecedented efficiency: Mitutoyo software MiCAT Planner

The enhanced and improved Mitutoyo MiCAT Planner drastically reduces programming efforts in developing highly efficient part programs for coordinate measuring machines. The software's automatic measuring program generator saves vast amounts of time and a significant reduction in cost.

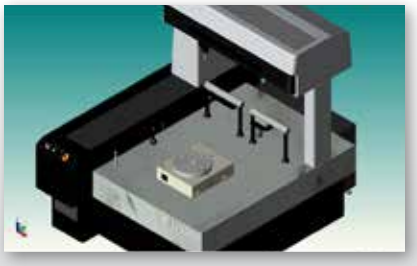
Features

- MiCAT Planner's GD&T Wizard can be used to define measurement features and tolerance characteristics to generate the full measurement program automatically in the case your 3D model may not have Product and Manufacturing Information (PMI) and tolerance information. This tool can provide up to 50%-time savings over CAT1000 part programming.
- MiCAT Planner can import 3D models that are already defined with PMI features and tolerance characteristics. This results in even quicker automatic generation of measurement programs, providing up to 90%-time savings over CAT1000 part programming.
- MiCAT Planner's Optimization provides the shortest route for obtaining measurement results using the minimum number of probe positions and tool changes. The generated program enables measurement in the shortest possible time maximizing cost savings in part programming and part measurement. This frees up machine capacity increasing the efficiency and use of your CMM.
- MiCAT Planner's Rule Editor allows for setting up the measurement rules to avoid measurement variation and quality results between different CMM programmers.

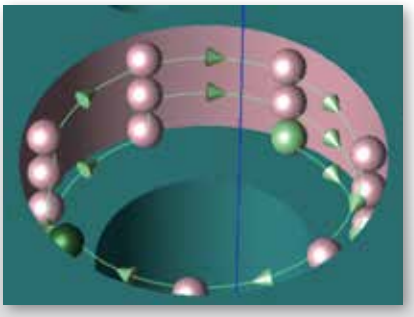
PMI: CAD file containing tolerance information.



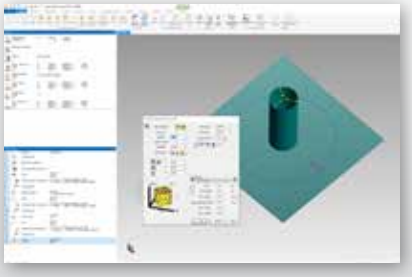
DME: Virtual model of the CMM incl. all probe configurations.



User-defined rules determine the measurement strategy automatically for each feature.



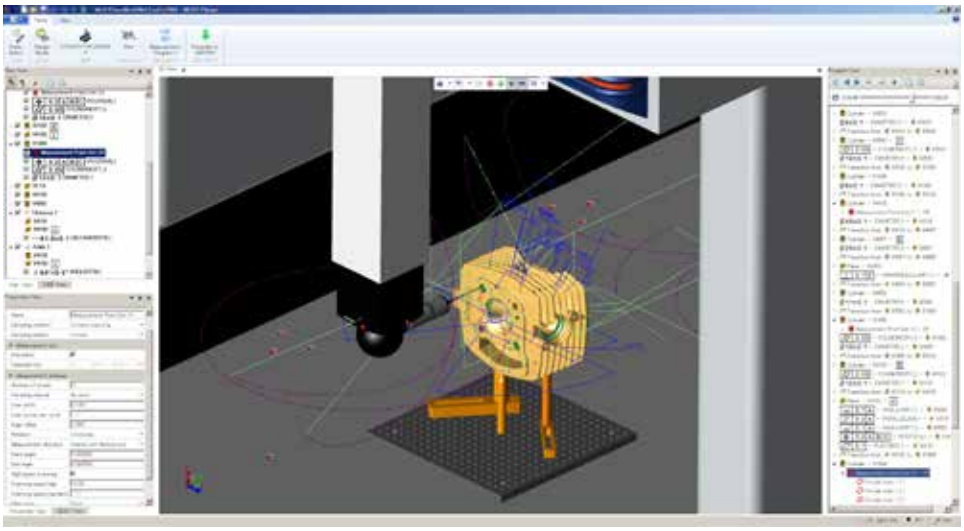
Instant and automatic generation of measurement programs.



MiCAT Planner – For You!

The Mitutoyo MiCAT Planner boasts amazing performance, speed and usability. But is it suitable for your demands?

YES!



"We only work on short or midsize runs, is it really useful?".

✓ Yes, MiCAT Planner will dramatically shorten your programming time!

"I only inspect out-sourced parts and never evaluate the same characteristics: is MiCAT Planner appropriate in this case?"

✓ Yes, MiCAT Planner will enable you to rapidly create various part programs including different features.

"Our production is quite stable on long runs, we rarely need to create programs for new components on our CMM, are you sure MiCAT Planner may help? "

✓ Yes, MiCAT Planner will definitely help because not all CMM operators part-programming styles are alike, MiCAT Planner's GD&T Wizard, probe and path cycle time optimization features results in safe, consistent, and fully optimized part programs.

"We have many CMM programmers, why should we need MiCAT Planner?"

✓ MiCAT Planner will bring you a higher quality result in your measurement tasks: thanks to the unlimited measurement rules, you can trust the program will always be developed the same way, whoever creates it!

Regardless of your measuring tasks, MiCAT Planner adds an abundance of benefits to your CAD-based programming.

Real CMM Configuration

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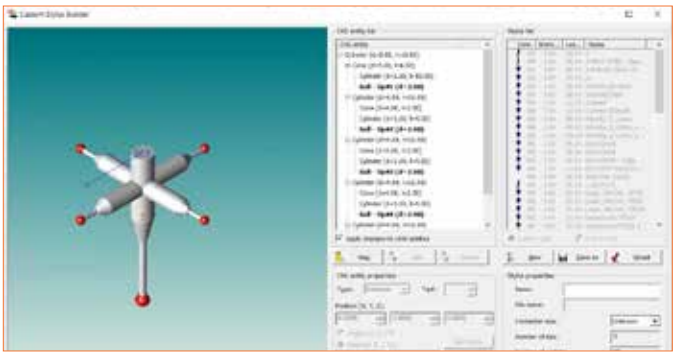
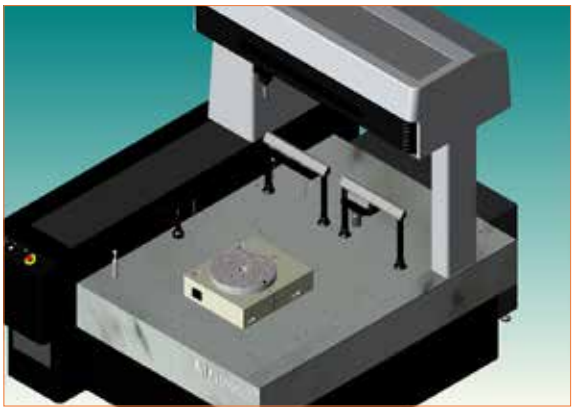
The program acquires the current actual CMM configuration from the CMM driving software MCOSMOS.

All racks and probes of the machine are exactly represented and taken into account, using MCOSMOS CMM System Manager rack definitions and probe configuration. Multiple CMM configurations can be supported to part program for multiple CMM's.

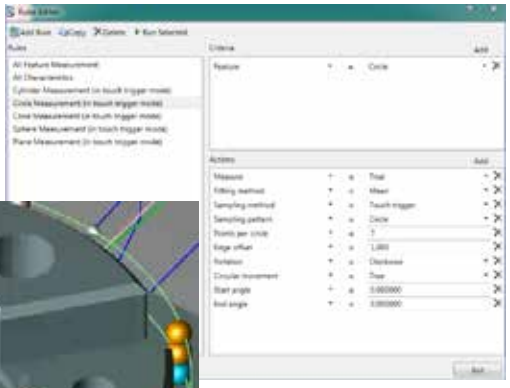




MiCAT Planner selects the best-suitable probe configuration for each feature under consideration of the customised measuring rules.

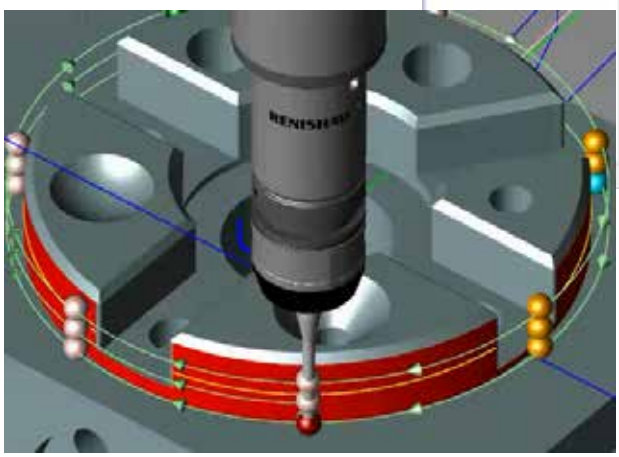
This virtual reality allows the automatic avoidance of each rack zone. Even long styli can be avoided when hanging in the rack, intruding in the measuring volume.

Measurement Strategy



One of the primary benefits you obtain from MiCAT Planner is the compliance to measuring rules you may set as required.

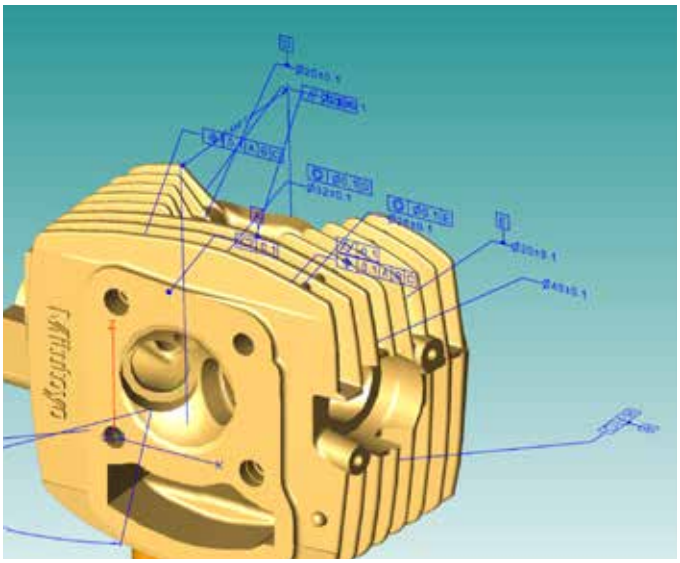
Depending on the feature type, size or other criteria, you may decide the number of measuring points, their distribution, and even the scanning speed when applicable.



Several sets of rules can be applied simultaneously, for example according to the component manufacturing method or the customer for which you produce it.

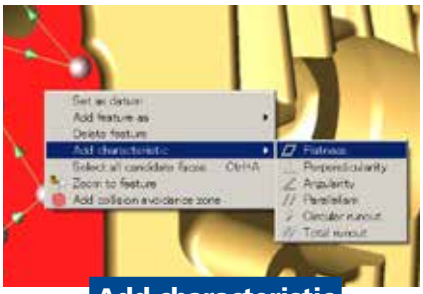
CAD Data Information: Automatic or Manual

After importing the CAD model, either all required features and GD&T are available from the PMI data (Product Manufacturing Information). Missing or incomplete PMI data is easily managed with MiCAT Planners GD&T wizard.

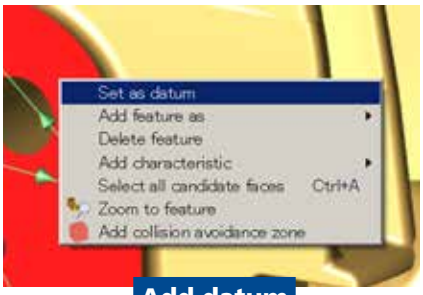


When using a CAD model including PMI Data, all required features and characteristics to be evaluated are instantly displayed and available: automatic part program generation can start immediately.

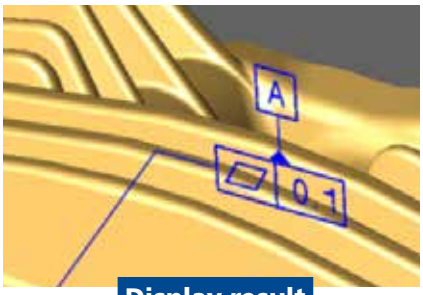
Add feature



Add characteristic



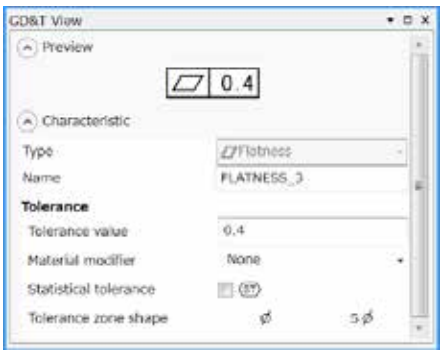
Add datum



Display result

In case the CAD model lacks features and characteristics, manual inputs are easy and quick thanks to the GD&T wizard.

Addition of tolerance characteristics is also available.



Automatic Part Program Generation!

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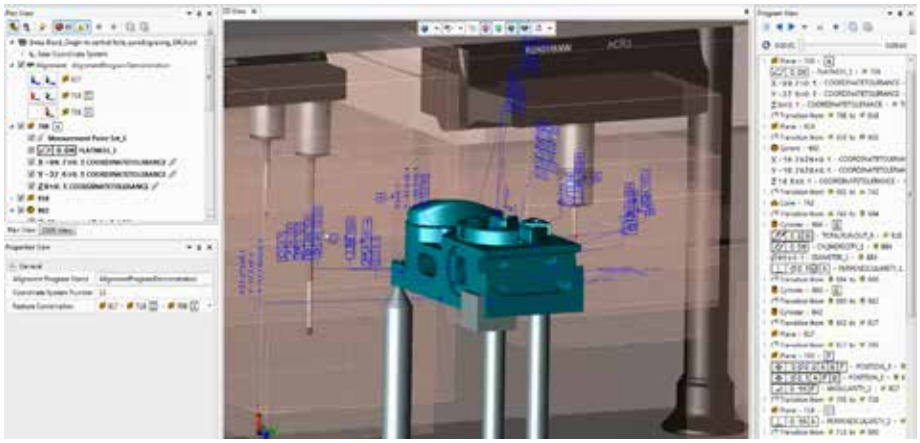
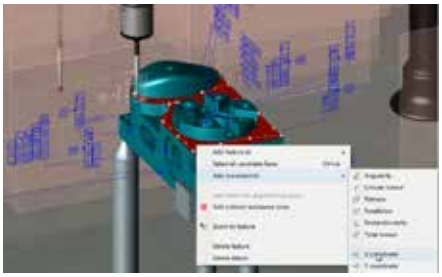
Once all features and characteristics to be evaluated are validated and approved by the CMM programmer, the part-program is generated automatically using any Rules Editor definitions and optimization settings.

The plan view (left) is detailed in the program view (right), and both are synchronized with the 3D view (center).

When you select a feature or characteristic in any of these views, MiCAT Planner clearly indicates where you are in the two other views.



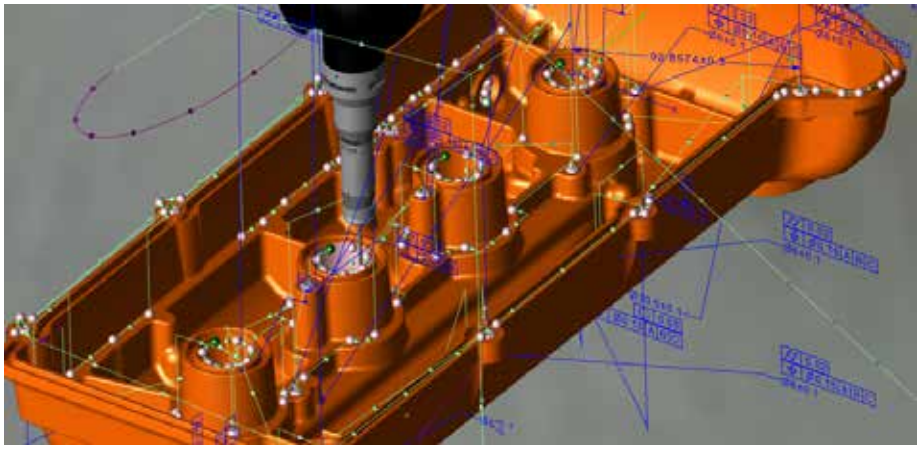


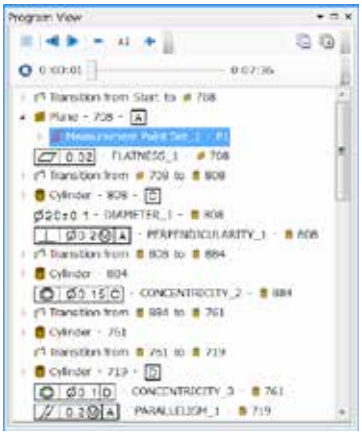
If required, a missing feature (not identified on the CAD model) or a missing characteristics to be evaluated can be manually added from the 3D view.

Safe GD&T Interpretation

CAD designed components are more and more defined by form and position symbols according to standards.

However, depending on the individual programmer skill level, it may lead to different or inconsistent interpretation in the part program strategy.





MiCAT Planner prevents from any misinterpretation risk: each GD&T symbol, tolerance and datum is automatically understood and converted in the corresponding required measurement points.

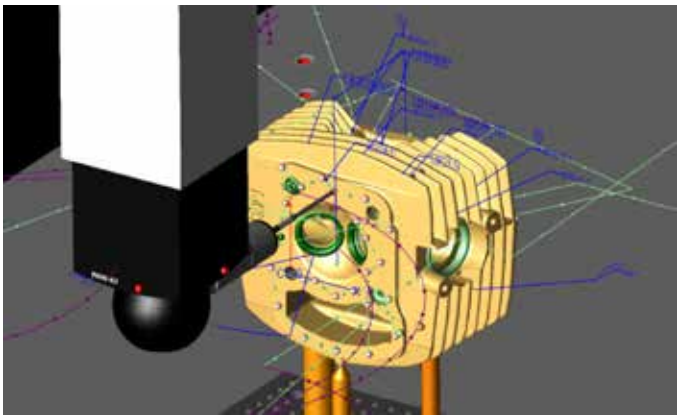
In the program view, all GD&T are shown in regards to the feature to be measured for calculating the result.

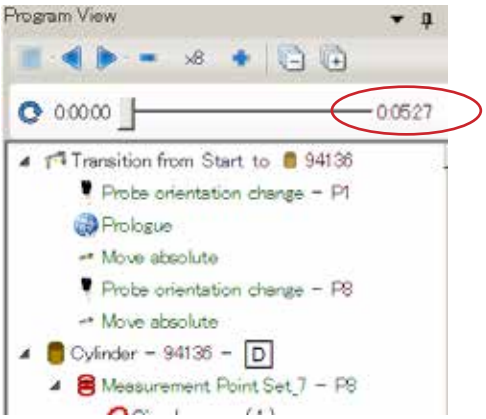
Cycle Time Optimization

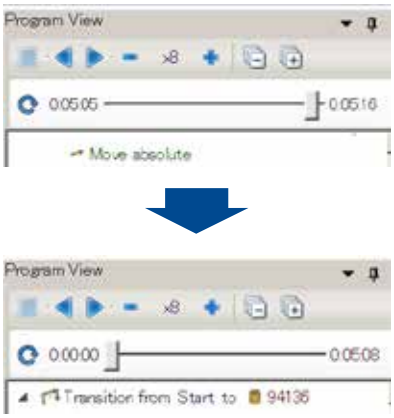
When programming manually, the programmer creates a sequence following the required features for calculating the expected results.

Very frequently, this results in unnecessary CMM movements and inappropriate probing paths. Consequently, it may waste valuable time better used for effective measuring tasks.

MiCAT Planner begins by generating the probing path according to the feature's list order, then optimizes it according to best strategy, avoiding redundant probe changes or unnecessary probe movements.







Furthermore, MiCAT Planner automatically estimates the measuring cycle time according to the actual CMM configuration and settings. For example, the required time for exchanging a probe in the rack, or the specified scanning speed in your measurement rules are considered for this time estimation. Immediately after the cycle optimization calculated, the estimated new cycle time is displayed.

... and much more!

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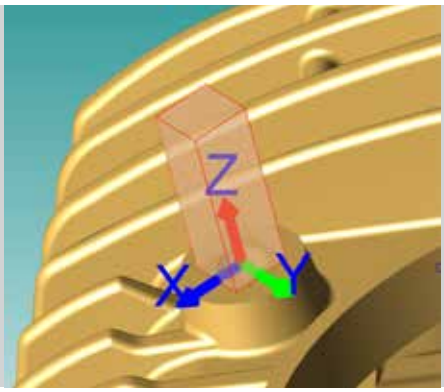
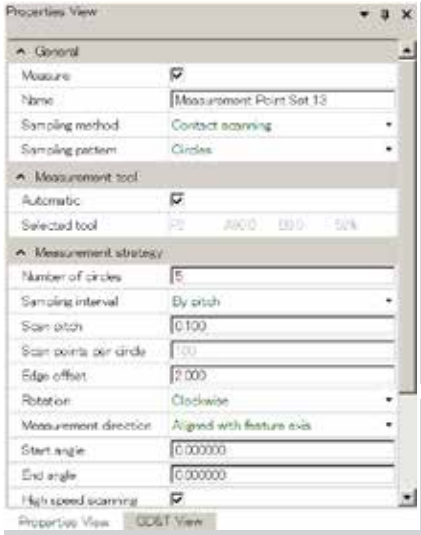
Avoidance zone

Several avoidance zones can be created to simulate the presence of fixture components such as clamp, bracket or column simulating a fixture. MiCAT Planner will automatically calculate probing points and path to avoid all these areas, thus minimizing the risk of costly probe collisions to near zero.

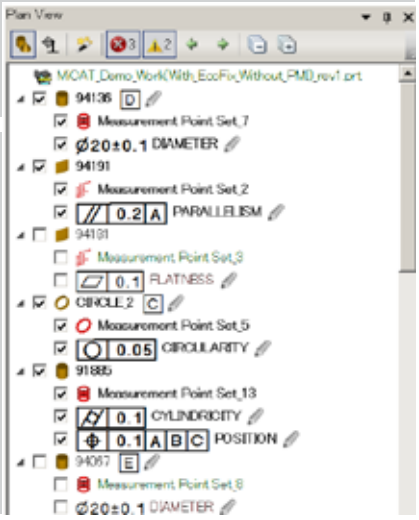




Individual measurement edition

If for any reason a feature can't be measured correctly because no rule is planned for this particular case, every detail of the probing strategy can be edited.

MiCAT Planner will consider this as an exception for a given feature, but will keep on applying existing rules to all other features of this kind.



Flexible Measurement Selection

While MiCAT Planner always selects the maximum number of features to measure, the user may decide to disable / enable unnecessary features by unchecking / checking the corresponding boxes. Drag and drop functionality is also available here for manual reorganization of the measurement order.

Modifiable Part-Program

Once generated from MiCAT Planner, a part-program can be managed and edited the same as any other part program in MCOSMOS.

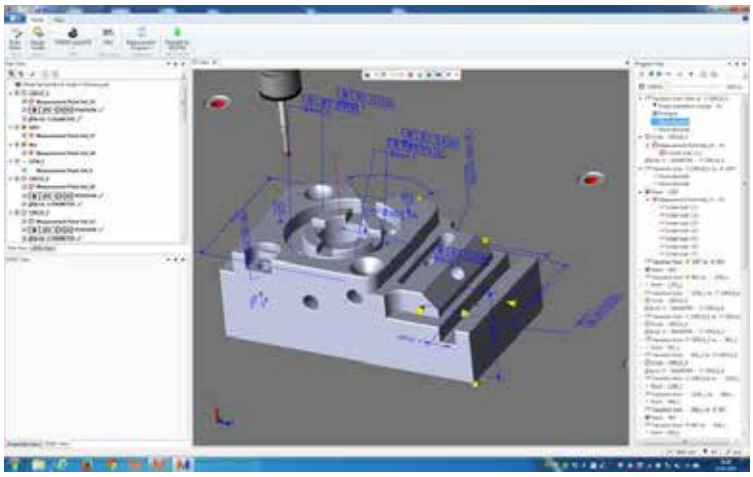
Return On Investment

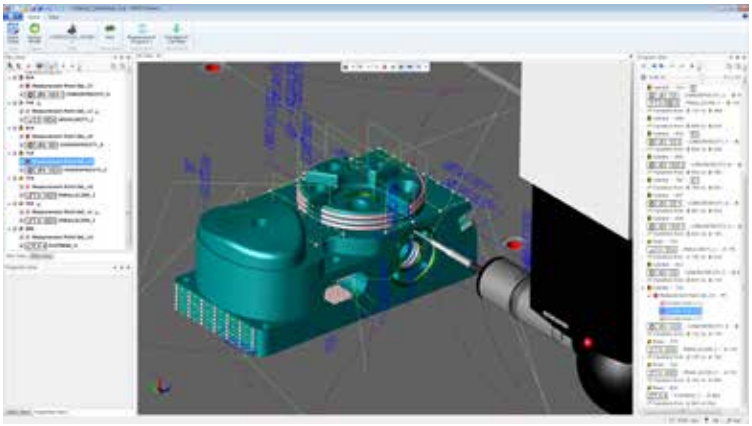
Using MiCAT Planner means saving you programming time, and time is money. But how much savings can you expect? Two different scenarios display your savings potential.

CAD model without PMI Data

Number of measured features	= 17
Number of evaluated characteristics	= 22
Programming time with MCOSMOS	= 51 minutes
Programming time with MiCAT Planner	= 23 minutes

Time savings = **28 minutes**
➔ **55%**





CAD model with PMI Data

When PMI data (GD&T) is included with the CAD model, the number of features and characteristics has a very low impact on the part-program generation time.

In this example:

with MCOSMOS	= 43 minutes
with MiCAT Planner	= 3 minutes

Time savings = **40 minutes**
➔ **93%**

Screen setups and features

MiCAT Planner screen setups offer simple interfaces such as 3D, Plan, and Properties view thereby enabling intuitive operation. Placement and sizing of the window interfaces are User customizable.

3D view

Full-color graphics show:
- Measuring machine details
- CAD model with tolerance information
- Measurement points and measurement paths
- Measurement animations

Plan view

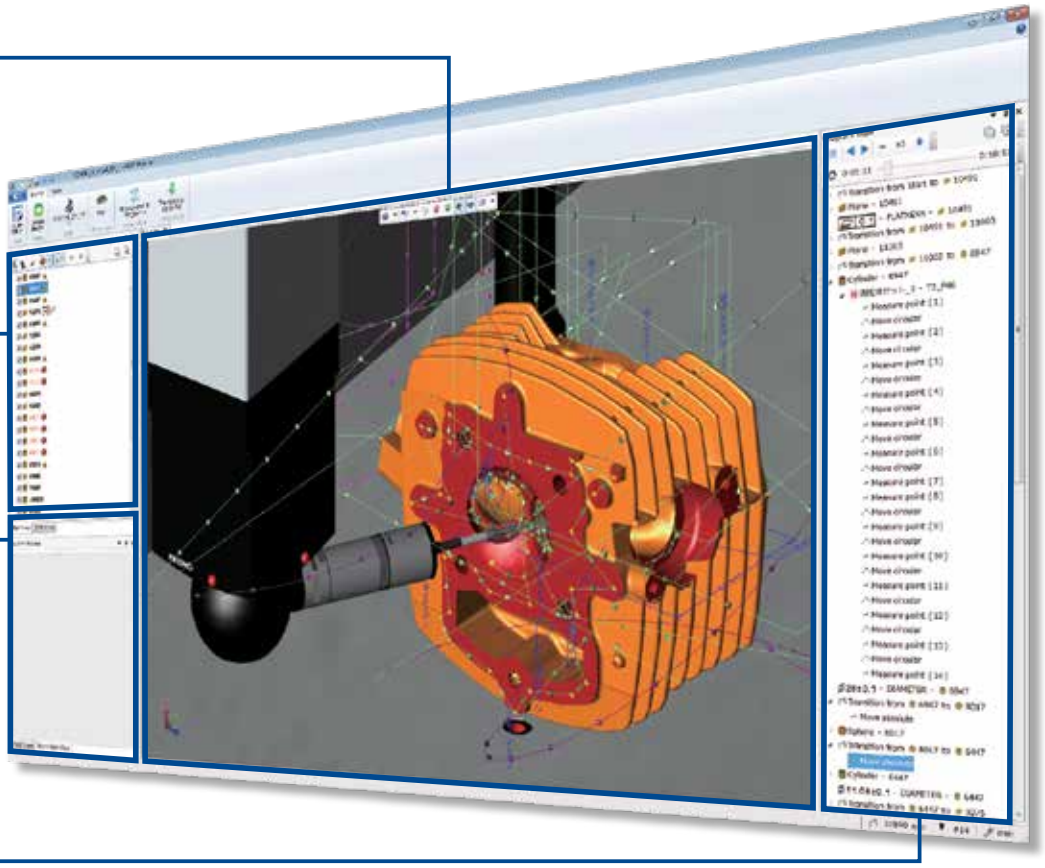
- Shows lists such as measurement parameters and tolerances.
- Lets you flag measurements and assessments using check boxes.

Properties view

You can change the names of parameters, tolerance items and measurement points, and edit measurement points for individual parameters.

Program view

- Shows measurement details and measurement estimation times.
- Enables animation of measurement programs in 3D view.



Case study

1. Conventional method

Compare the measurement part-programming time for a test piece.

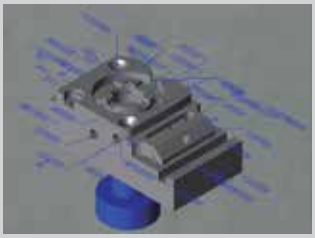
1-1) Programming in 2D drawing: **approx. 45 to 60 minutes**

1-2) Programming using 2D drawing + 3D CAD:
approx. 15 to 20 minutes

2. With MiCAT Planner

Create with **MiCAT Planner** (using 3D CAD model + PMI):
approx. 3 minutes!

Note: The measurement rules are defined in advance.



Part-programming time
Reduced by up to 95%!!

Guarantee a **dramatically reduced development phase** and at the same time improve product quality.

CAD formats currently supported:

MiCAT Planner supports 3D CAD files of closed solid models and GD&T informations when available

CAD file Formats	File Extension	Supported Versions
Siemens PLM NX/Unigraphics	*.prt	NX 1 – NX 1953
PTC Pro/Engineer/Creo	*.prt or *.prt.*	16 – Creo 7.0
Dassault Systems CATIA V5	*.CATPART	V5R8 – V5–6R2021
ACIS*	*.sat	R1-2021 1.0.0.16
SolidWorks	*.sldprt	2003-2021 without PMI 2014-2021 with PMI
STEP	*.stp or *step	AP203 without PMI AP214 without PMI AP242 with PMI

*PMI contained in ACIS files is supported if the model was saved from CAT1000 (MCOSMOS). PMI created in CAT1000's "Define GD&T wizard" is not supported. PMI contained in ACIS files that were genrated from other software applications is not guaranteed to be imported.

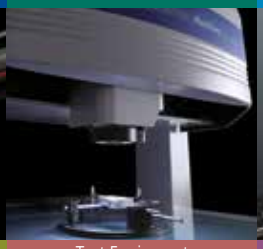
Note: ACIS and STEP CAD formats are standard, other CAD file formats are optional.

Supported languages

Japanese, English (US/UK), German, French, Spanish, Portuguese, Italian, simplified Chinese, traditional Chinese, Korean, Polish, Czech, Dutch, Turkish, and Russian

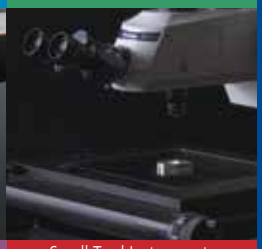
Coordinate Measuring Machines

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 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

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