MARFORM | „THE UNIVERSAL FORMTESTER" MMQ 400-2

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MarForm MMQ 400-2 – Overview

The **MarForm MMQ 400-2** is a universally applicable form measuring machine for both shop floor and precision lab use. The MMQ 400-2 can be flexibly used for comprehensive workpiece assessment according to DIN ISO 1101. The high-precision **measuring axes in both vertical (Z) and horizontal (X) direction** make any type of form measurement possible.

MarForm MMQ 400-2 for:
• high precision workpieces
• extremely long workpieces
• big and heavy workpieces
• use on both the shop floor and in precision labs

The **MarForm MMQ 400-2** is avaiable in seven models. Each one is tailored to perfectly suit your specific requirements:
• with motor-driven or manual centering and tilting table,
• vertical (Z) axis with either 500 mm (19.7 in) or 900 mm (35.4 in) length with a horizontal (X) axis of 280 mm (11
• in) length or 350 mm (13.8 in) vertical (Z) axis with a 180 mm (7.1 in) horizontal (X) axis
• with digital path measuring system for reading out the linear scales in X and Z direction for highly reproducible measuring results
• tailstock for machines with vetical axis (Z) of 500 mm or 900 mm

Tailstock option
With the tailstock option, many shaft-like workpieces can now be clamped between two centers for measurement instead of being held just on one end in a rim chuck. The tailstock thus cuts down the alignment time for workpieces from several minutes to just a few simple steps.

The tailstock option for MMQ 400-2 is a further step in increasing the efficiency of your MarForm measuring machine.

The **T7W probe** enables **automatic measuring sequences.** It is equipped with a motor-driven rotational axis. This makes it possible to move the probe arm gradually to the required contacting position. As a result, measurements can be performed on cylindrical surfaces and end faces. As a zero position probe, the T7W can also switch automatically between internal and external measurements or between end face measurements from above and below without operator intervention. Fully automatic measurement processes on complex workpieces can be carried out without operator intervention.
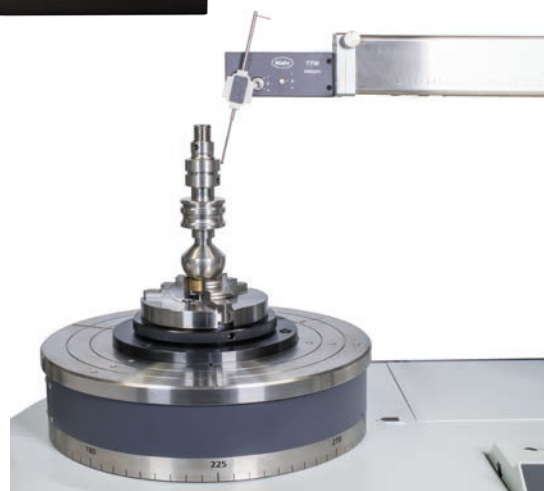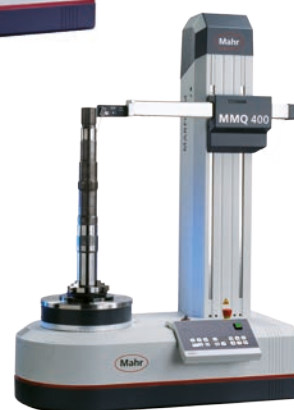
MarForm MMQ 400-2 – Overview
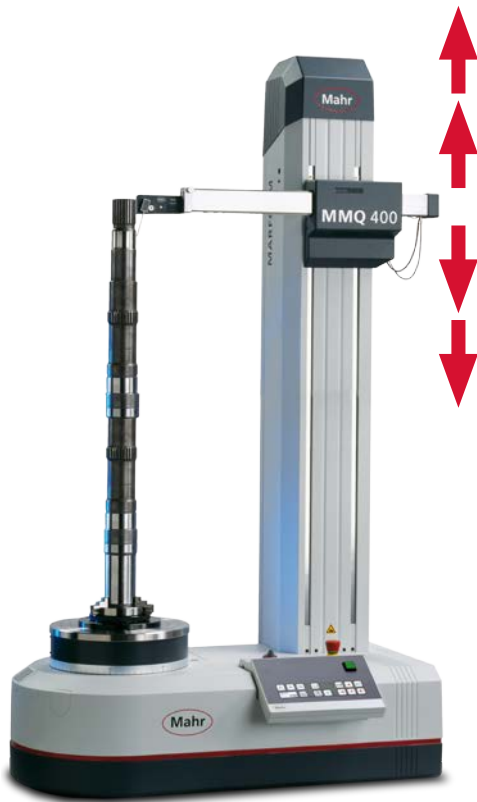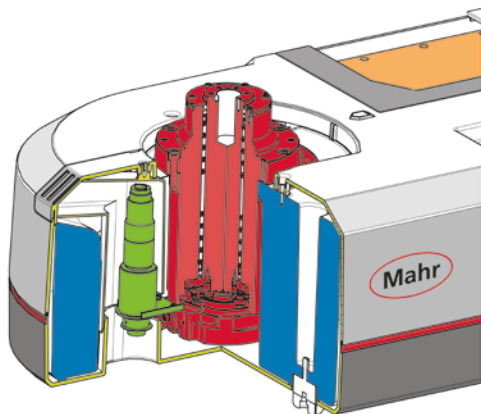
**Mechanical C-axis bearings:
up to 70x more rigid than air bearings**
Mahr s the leading manufacturer of ultra-precise bearings for rotating and lifting movements.

For over 60 years, Mahr has also been producing high-precision air bearings. Through its unique technology, Mahr has been able to combine the benefits of air bearings with the robustness of mechanical bearings.

The special mechanical bearings of the C-axis of the MMQ 400-2 are up to 70 times more robust, ensuring insensitivity to external influences such as vibration. Mahr's decades of experience has been combined with the use of special production techniques and materials to produce mechanical bearings of the same quality as an exceptionally good air bearing. This quality is maintained even under difficult environmental conditions!

Speed and cost-effectiveness
Speed is not an issue. But combining speed and accuracy has proved to be far trickier when it comes to axes control.

Through put time when measuring a workpiece is now more important than ever. The **Z-axis** of the MMQ 400 permits movements at up to **100 mm/s** - more than three times faster than any other form measuring instrument. The finely adjustable speed and acceleration, fewer alignment operations thanks to sophisticated algorithms, and simultaneous movement of up to three axes all combine to save valuable time. This reduces the costs per measurement significantly.

Serviceability
If a service issue does arise, all service-relevant assemblies can be accessed easily from the outside. This means short repair times and low repair costs even after many years of operation. But to ensure that repairs are not necessary in the first place, we can offer you maintenance services, maintenance agreements or extended warranties.

An MMQ 400-2 after all, is almost an investment for life...

MarForm MMQ 400-2 – MarWin

The software platform MarWin has stood for innovative solutions in measurement technology for years. MarWin is more than just a software. Behind MarWin is the philosophy that there is an optimal solution for every desired task and operating mode.

This is why MarWin for MarForm is divided into three different performance levels:
• EasyForm
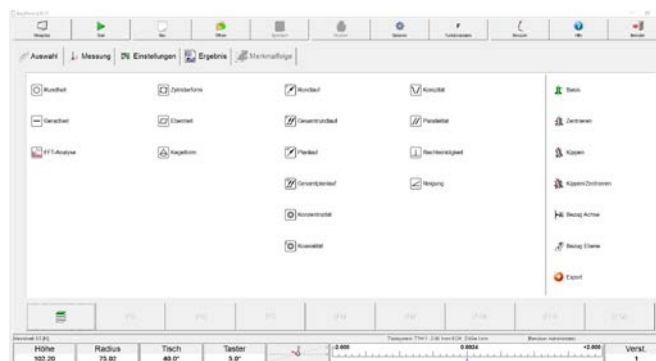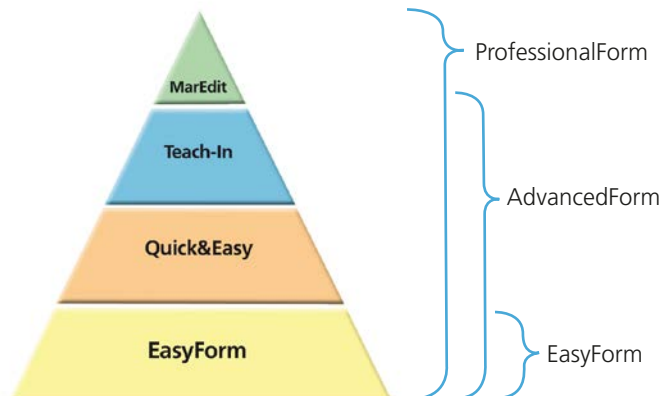• AdvancedForm
• ProfessionalForm

The **EasyForm measuring and operating software** is very simple and does not require any programming skills. Your personnel costs and then your operating costs benefit from the fact that the number of steps to the measuring record is reduced to a minimum. You can perform a roundness measurement in two simple steps. The software guides you through any setting you want to perform. In the end, you have reached a complete test report with just a few clicks. The EasyForm software remembers every step of your measurements. Whether you want to repeat the last measurements or decide to combine different measurements and evaluations of a workpiece into a feature sequence.

**The EasyForm each-in mode will learn the steps you want to perform**
Just click on the "Add to feature sequence" button after the measurement and create your own measuring program. You can store your measurement programs under one of the 32 programmable function keys.

**EasyForm – part of the proven MarWin software platform from Mahr**
EasyForm is based on highly optimized MarWin measurement and evaluation routines and can be combined with other MarWin modules. It operates under the Windows® operating system and includes user management, network support, electronic storage of measuring ecords, and is expandable for future options.

ProfessionalForm

AdvancedForm

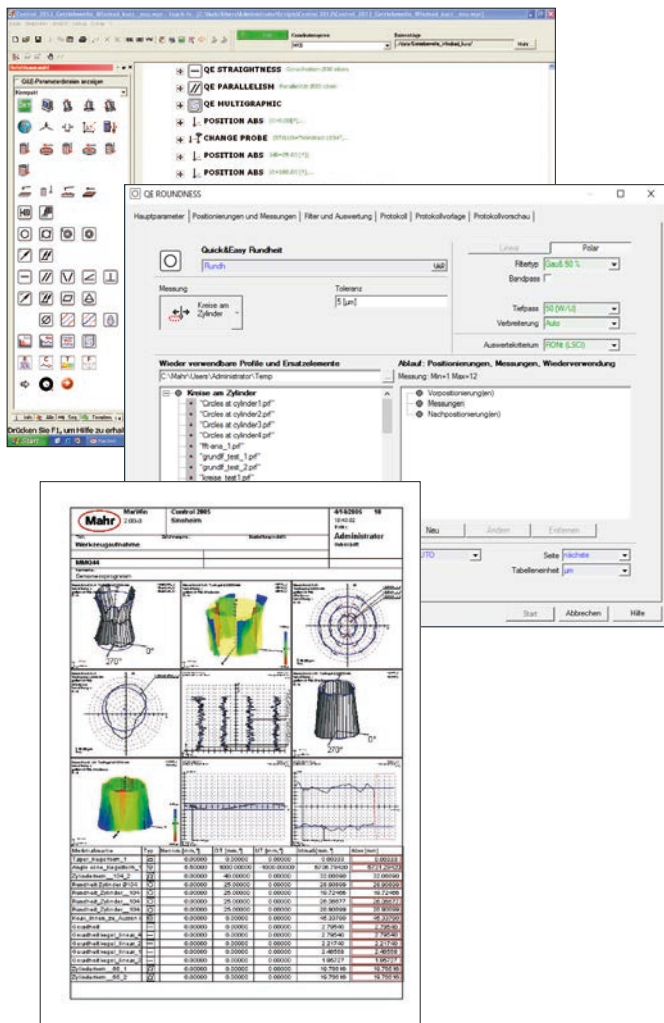EasyForm

EasyForm: *Select measuring task*
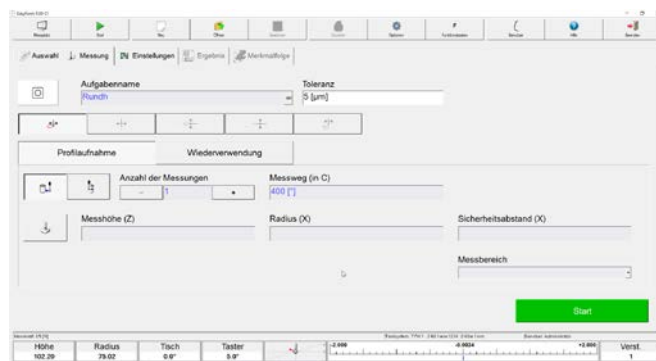
Specify measuring parameters and begin measurement
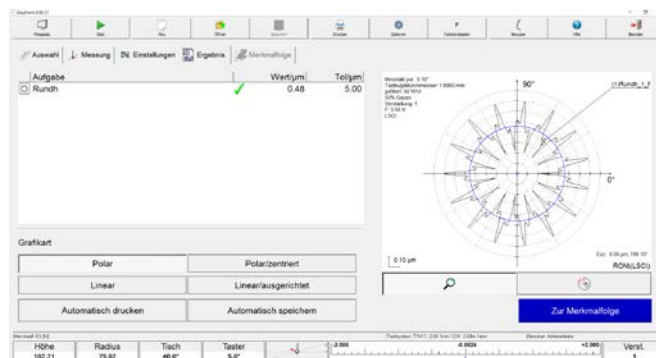
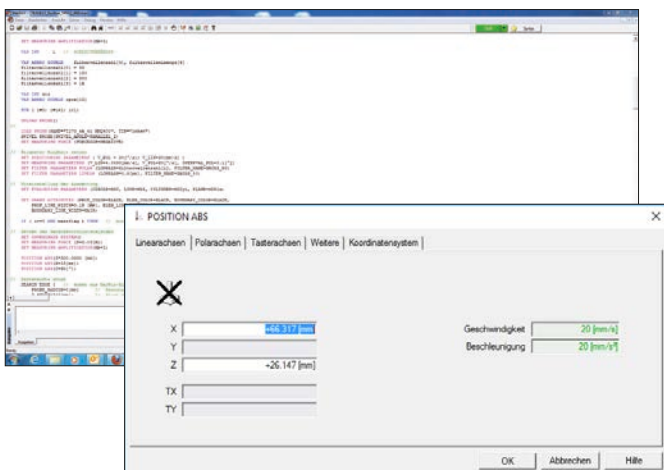
Select type of depiction and done!

MarForm MMQ 400-2 – MarWin

AdvancedForm: Powerful and easy-to-operate teach-in programming

ProfessionalForm: Almost unlimited progamming possibilities with proven metrology routines

AdvancedForm provides a clear overview of all the required measuring and evaluation parameters. Many of these parameters have default settings which simply have to be confirmed for the majority of measurement tasks. It is, of course, also possible to adapt individual parameters to the relevant task.

AdvancedForm has a powerful **teach-in programming** function to create measuring programs for workpieces that are to be measured repeatedly. With teach-in programming, as soon as you click an icon with the mouse – e.g. for a run-out measurement and evaluation – a window opens where you can describe the feature in more detail if necessary (e.g. radial or axial run-out, datum, brief designation, tolerance, etc.). The number of measurements and their type (measurement or re-evaluation of profiles already measured) are also specified in this window.

Separate windows can be opened to change measuring, evaluation and display parameters but in many cases this is not necessary because logical defaults that apply to a large number of measurement tasks have already been entered. If different settings are required for specific measurement tasks, the clearly structured window helps you to quickly find what you are looking for and optimize the settings in no time at all.Measuring programs for series parts to be measured repeatedly can be saved and called up at any time to start a measuring run.

ProfessionalForm contains the powerful programming language MarScript with which the highly complex measuring tasks can be reliably, quickly and accurately solved. The measuring programs are either produced by the Mahr application engineers or trained technicians of the respective customer.

The so-called MarTomes (measuring subprograms) facilitate the programming, making it is possible to create comprehensive measurement programs quickly and efficiently. In addition, specific evaluations can be programmed by the customer or powerful family programs can be created. A family program is a parameterizable program with the help of which part families can be measured without having to write new programs again and again. As a result, family programs save programming time and enable reproducible measurement of similar parts.

MarForm MMQ 400-2 – Software Options

Roughness measurement

Combine the testing of form and position tolerances with the monitoring of the roughness characteristics. Document the typical roughness characteristics, such as Ra and Rz during the form measurement of your workpieces with a MarForm MMQ 400-2 without re-clamping the workpiece to another measuring position. The motorized, program-controlled swtich from form probe with ruby ball to roughness probe PHT 6-350 (skidded tracing) or diamond tip (free tracing) makes it possible. No user intervention is required thanks to the motor-driven positioning of the respective probe from vertical tracing to horizontal. The evaluation is carried out with the same module known from Mahr surface metrology.

Contour measurement

Thanks to high-resolution axes and the MarWin software, contour measurement and evaluation is also possible with the MMQ 400-2. The advantages of this unique combition of form and contour measurement are:

- Time and cost savings, with just one clamping operation and one measuring procedure
- Easy to operate, with one common software program for form, position, contour and roughness
- Detailed and meaningful measuring records
- Tried-and-tested form metrology combined with tried-and-tested roughness metrology

Lead measurement

The surface structure of the sealing surface of a shaft influences the flow behaviour of the fluid that is to be sealed and therefore greatly influences the sealing function. MarForm MMQ 400-2 can perform the so-called macro-drive standard according to te Mercedes Benz standard 31007-7. To acquire the measuring values, a probe arm for the T7W is used hat is equipped with two probe elements:

- Element # 1 with 3 mm hard metal ball for form measurement
- Element # 2 with diamond tip stylus for measuring lead and surface roughness parameters
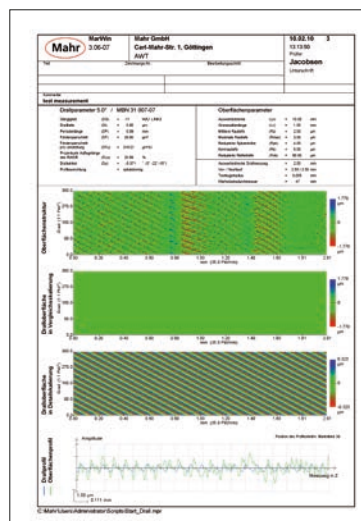
Additional available options

- Camshape and freeform measurement with path control
- Velocity analysis
- Measurement of pistons of a combustion engine
- Dominant roundness waviness
- Diameter
- Distance measurement
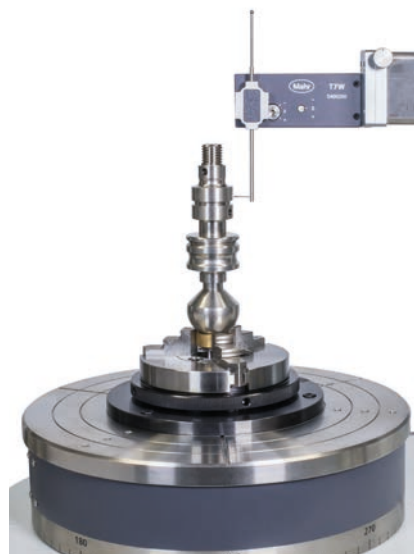
Contour and roughness measurement
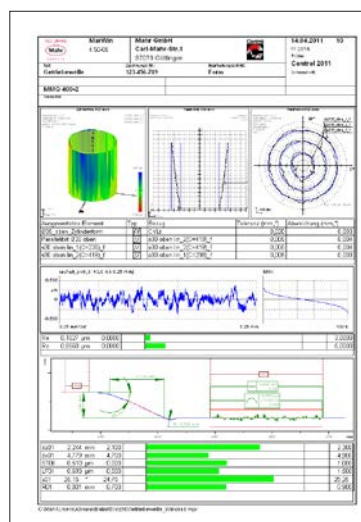
Measuring record of contour and roughness measurement

Measuring record of lead measurement

MarForm MMQ 400-2 – Summary

The MarForm MMQ 400-2 series offers the suitable solutions for every application. Thanks to a highly-optimized machine construction and high-performance software, the MarForm MMQ 400-2 can be expanded with various software options. That makes the macine universal and enables optimal utilization.

The following gives a clear summary of the advantages of the MarForm MMQ 400-2:

MarWin – the software platform from Mahr makes it possible: Change between and combine the progamming levels „Easy, Advanced, Professional" as needed
➡ Always equipped for new measurement tasks and flexible for a fast measurement between!
➡ **New releases yearly** ensure that you always work according to the latest standards. This allows you to react to new customer requirements
• **Future-proof new control**: Can also be used with newer operating systems such as **Windows 7 or Windows 10**
➡ USB connection to PC allsows fast PC exchange and **minimizes downtime**
• **Numerous software options** e.g: roughness, contour or lead measurement...and MarWin is constantly being further developed
➡ **Optimal use of the formtester!**
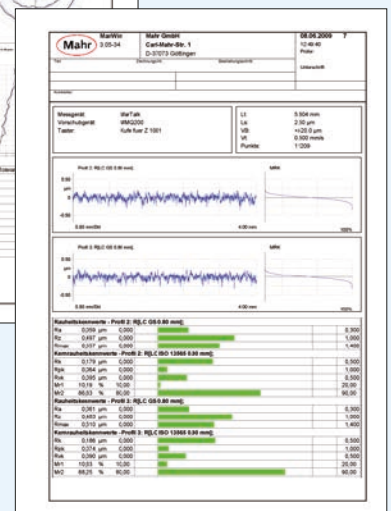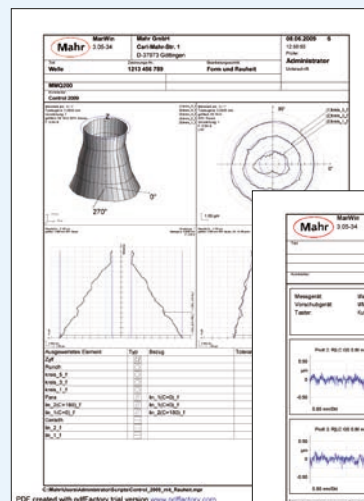• Positioning speed up to v_{pos} = 100 mm/s
➡ **More than 3x more capacity on the measuring machine**
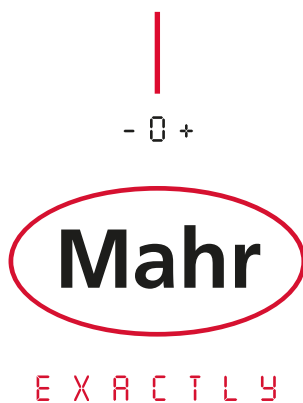• **High accuracies of all axes, e.g.:**
Roundness deviation.: 0.02 µm
Straightness deviation.: 0.15 µm
➡ **Optimally equipped for closer tolerances from your customers**

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