INNOVATIVE MEASURING TECHNOLOGY INCREASES YOUR GEAR TOOTH QUALITY. THAT IS WHY WE HAVE MARGEAR.

The latest information about MARGEAR products is available on our website:
www.mahr.com, web code 157

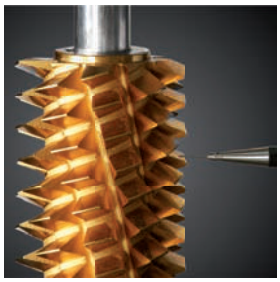
Maximum precision in manufacturing is an important basis for the success of a business. MarGear gear measuring technology allows you to carry out your measuring tasks on gears and gear cutting tools quickly, simply and accurately, in just one measuring process. The flexible systems — with or without mechanical alignment and reclamping, and with a combination of gear measuring technology and form and position evaluation — create the best possible conditions for gaining and retaining a competitive edge. By fully integrating measuring technology into production, you can achieve a closed quality control loop in gear manufacturing.

MarGear. Gear Measuring Instruments

MarGear. Gear Measuring Technology from Experienced Specialists

Modern Solutions for Gear Measurement

The flexible and extremely accurate GMX range of measuring instruments offers a perfect combination of gear measuring instrument and form tester in a single system. From highly specialized gear analyses to fully integrated series measurement, MarGear is the ideal solution at every level of modern gear manufacturing.



MarGear GMX 275 C. Universal Gear Measuring Center

Fully automatic precision testing of gears and gear cutting tools up to an outer diameter of 275 mm.

The ideal solution for both universal and specialist gear manufacturing.

System solutions provide the ultimate in flexibility and availability within a modern gear wheel component production facility. MarGear GMX, a networked variant for use close to the production area, offers fast and efficient analysis of possible gear deviations.

This allows for a direct assessment of the deviation and an automatically generated machine error correction. **Gear and form measurements** carried out on a single measuring instrument.

High precision 3D scanning sensor combined with directly driven C axis for accuracy and efficiency..

Control unit:
4 axis Power PC Control unit:

Options:
- Tailstock up to clamping length 700 mm
- Active damping system

Technical Data

Measuring path (mm), X axis	180
Measuring path (mm), Y axis	150
Measuring path (mm), Z axis	320
Diameter max.* [mm]	275
Length	1560
Width	600
Height	1787
Mass [kg]	700
Max. workpiece weight [kg]	60 (80 on request)
Accuracy	Accuracy class I for gear measurements in accordance with VDI/VDE 2612/2613 Group 1 at 20°C ± 2°C
Axial runout deviation (µm+µm/mm measuring radius)	0.11 µm + 0.0008 µm/mm
Radial runout deviation (µm in table height)	≤ 0.11 µm

*** max. diameter of cylindrical gears**

Accessories

- Probe arm changer (5 boxes)
- Active vibration damping system
- Revolving counter tip

Applications

Fully automatic testing of:
- Straight and helical toothed cylindrical gears
- Spiral and hypoid bevel gears
- Crown gears
- Cylindrical worms
- Conical and asymmetrical cylindrical gears
- Segment gears
- Shaving cutters
- Hobs
- Cutting wheels
- Synchronous gears
- Beveloid gears
- 3D geometries, form and position measurements, diameters, distances
- Special gear cutting tools on request

For more information, please visit our website: www.mahr.com

MarGear GMX 400 C. Universal Gear Measuring Center

Precision, fully automatic testing of gears and gear cutting tools up to an outer diameter of 400 mm.

The ideal solution for both universal and specialist gear manufacturing.

System solutions provide the ultimate in flexibility and availability within a modern gear wheel component production facility. MarGear GMX, a networked variant for use close to the production area, offers fast and efficient analysis of possible gear deviations.

This allows for a direct assessment of the deviation and an automatically generated machine error correction.

Gear and form measurements carried out on a single measuring instrument.

High precision 3D scanning sensor combined with directly driven C axis for accuracy and efficiency.

Control unit:
4 axis Power PC Control unit:

Options:
- Tailstock up to clamping length 700 mm
- Active damping system

Technical Data

Measuring path (mm), X axis	200
Measuring path (mm), Y axis	200
Measuring path (mm), Z axis	320
Diameter max.* [mm]	400
Length	1560
Width	600
Height	1787
Mass [kg]	700
Max. workpiece weight [kg]	60 (80 on request)
Accuracy	Accuracy class I for gear measurements in accordance with VDI/VDE 2612/2613 Group 1 at 20°C ± 2°C
Axial runout deviation (µm+µm/mm measuring radius)	0.11 µm + 0.0008 µm/mm
Radial runout deviation (µm in table height)	≤ 0.11 µm

*** max. diameter of cylindrical gears**

Accessories

- Probe arm changer (5 boxes)
- Active vibration damping system
- Revolving counter tip

Applications

Fully automatic testing of:
- Straight and helical toothed cylindrical gears
- Spiral and hypoid bevel gears
- Crown gears
- Cylindrical worms
- Conical and asymmetrical cylindrical gears
- Segment gears
- Shaving cutters
- Hobs
- Cutting wheels
- Synchronous gears
- Beveloid gears
- 3D geometries, form and position measurements, diameters, distances
- Special gear cutting tools on request

For more information, please visit our website: www.mahr.com

MarGear GMX 400 ZL. Universal Gear Measuring Center

Precision, fully automatic testing of gears and gear cutting tools up to an outer diameter of 400 mm.

The ideal solution for both universal and specialist gear manufacturing.

System solutions provide the ultimate in flexibility and availability within a modern gear wheel component production facility. MarGear GMX, a networked variant for use close to the production area, offers fast and efficient analysis of possible gear deviations.

This allows for a direct assessment of the deviation and an automatically generated machine error correction.

Gear and form measurements carried out on a single measuring instrument.

High precision 3D scanning sensor combined with directly driven C axis for accuracy and efficiency.

Control unit:
4 axis Power PC Control unit:

Extended Z measuring range for measuring long drive shafts up to 650 mm.

Options:

- Tailstock up to clamping length 700 mm
- Active damping system

Technical Data

Measuring path (mm), X axis	200
Measuring path (mm), Y axis	200
Measuring path (mm), Z axis	650
Diameter max.* [mm]	400
Length	1560
Width	600
Height	2147
Mass [kg]	750
Max. workpiece weight [kg]	60 (80 on request)
Accuracy	Accuracy class I for gear measurements in accordance with VDI/VDE 2612/2613 Group 1 at 20°C ± 2°C
Axial runout deviation (µm+µm/mm measuring radius)	0.11 µm + 0.0008 µm/mm
Radial runout deviation (µm in table height)	≤ 0.11 µm

*** max. diameter of cylindrical gears**

Accessories

- Probe arm changer (5 boxes)
- Active vibration damping system
- Revolving counter tip

Applications

Fully automatic testing of:

- Straight and helical toothed cylindrical gears
- Spiral and hypoid bevel gears
- Crown gears
- Cylindrical worms
- Conical and asymmetrical cylindrical gears
- Segment gears
- Shaving cutters
- Hobs
- Cutting wheels
- Synchronous gears
- Beveloid gears
- 3D geometries, form and position measurements, diameters, distances
- Special gear cutting tools on request

For more information, please visit our website: www.mahr.com

MarGear GMX 600. Universal Measuring Center for Gear, Form and Dimension Testing

The successful combination of gear and form measurement in one clamping saves additional investment, maintenance costs and time.

Full functionality as a form tester up to an outer diameter of 600 mm.

The **MarGear GMX 600,** as a complete solution, can also be used for measuring crankshafts, camshafts and pistons.

High precision, fully automatic testing of gears and gear cutting tools. Also serves as an integrated formtester system solution.

High precision 3D scanning sensor combined with directly driven C axis for accuracy and efficiency.

Control unit:
5 axis Power PC Control unit: with fully automatic swivelling probe head.

Options:

- Active damping system
- Centering and tilting table (CNC)
- Centering and tilting table (CNC-XXL)

Technical Data

Measuring path (mm), X axis	300
Measuring path (mm), Y axis	600
Measuring path (mm), Z axis	700
Diameter max.* [mm]	600
Length	2314
Width	1671
Height	1865
Mass [kg]	2250
Max. workpiece weight [kg]	300 (with fixed support plate and tip) 100 (with automatic centering and tilting table)
Accuracy	Accuracy class I for gear measurements in accordance with VDI/VDE 2612/2613 Group 1 at 20°C ± 2°C
Axial runout deviation (µm+µm/mm measuring radius)	0.07 µm + 0.0008 µm/mm
Radial runout deviation (µm in table height)	≤ 0.1 µm

*** max. diameter of cylindrical gears**

Accessories

- Probe arm changer (4 boxes)
- Active vibration damping system

Applications

Fully automatic testing of:

- Straight and helical toothed cylindrical gears
- Spiral and hypoid bevel gears
- Crown gears
- Cylindrical worms
- Conical and asymmetrical cylindrical gears
- Segment gears
- Shaving cutters
- Hobs
- Cutting wheels
- Synchronous gears
- Beveloid gears
- 3D geometries, form and position measurements, diameters, distances
- Form measurement with centering and tilting table
- Optional: Camshafts, crankshafts and pistons
- Special gear cutting tools on request

For more information, please visit our website: www.mahr.com

MarGear. MarGear GMX W series

Opening up a new dimension

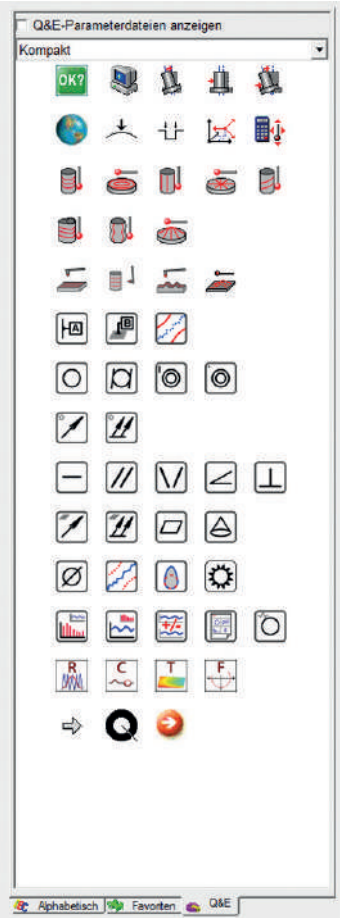
The W series extends the MarWin platform to Mahr gear measurement

- MarEcon Control unit: with tracking mode
- Gear testing software runs under MarWin
- Intuitive GDE interface for gear data
- MarForm Advanced and Professional
- Easy program creation in Teach-In mode
- Integration of data matrix code scanners
- Uninterrupted movements
- High precision target positioning
- 3D visualization of gear geometry

In addition to simple controls, the new software offers users a variety of interfaces to simplify automation of the measuring procedure. When you import gear data, in GDE format for example, the software creates a 3D model of the gear for visual inspection and checks the tooth geometry for plausibility. This further reduces the possibility of operator errors.

Software highlights

The intuitive 'QE Cylindrical Gea' user interface provides a number of interfaces for importing and exporting data.
Using the QEP interface (Quick&Easy profile), you can archive profile and results data relating to a gear measurement in MarWin format and then reload it subsequently for evaluation.
The new 'QE Cylindrical Gear' module is the latest measuring module to be added to the MarWin platform. Q&E modules from the MarWin system can be linked together quickly and easily to create a complete program for a transmission shaft, for example.



MarGear GMX 275 W. Universal Gear Measuring Center

Precision, fully automatic testing of gears and gear cutting tools up to an outer diameter of 275 mm.

The ideal solution for both universal and specialist gear manufacturing.

System solutions provide the ultimate in flexibility and availability within a modern gear wheel component production facility. MarGear GMX, a networked variant for use close to the production area, offers fast and efficient analysis of possible gear deviations.

This allows for a direct assessment of the deviation and an automatically generated machine error correction.
Gear and form measurements carried out on a single measuring instrument.

High precision 3D scanning sensor combined with directly driven C axis for accuracy and efficiency.

Control unit:
4 axis Power PC Control unit:

Technical Data

GMX 275 W	
Measuring path (mm), X axis	180
Measuring path (mm), Y axis	150
Measuring path (mm), Z axis	320
Diameter max.* [mm]	275
Length	1560
Width	600
Height	1787
Mass [kg]	700
Max. workpiece weight [kg]	60 (80 on request)
Accuracy	Accuracy class I for gear measurements in accordance with VDI/VDE 2612/2613 Group 1 at 20°C ± 2°C
Axial runout deviation (µm+µm/mm measuring radius)	0.11 µm + 0.0008 µm/mm
Radial runout deviation (µm in table height)	≤ 0.11 µm

*** max. diameter of cylindrical gears**

Accessories

- Active vibration damping system
- Revolving counter tip
- Data matrix scanner
- Chuck 70 mm
- Chuck 200 mm
- Drive pin set
- Tailstock 450 mm or 700 mm

Applications

- Basic measuring station with AdvancedForm software
- Suitable for use as a gear measuring station with QE Cylindrical Gear

For more information, please visit our website: www.mahr.com

MarGear GMX 400 W. Universal Gear Measuring Center

Precision, fully automatic testing of gears and gear cutting tools up to an outer diameter of 400 mm.

Combining gear measuring tasks with various form and position features has never been easier.

With over 6000 units sold, the MarWin environment is a clear and simple way of creating complete programs in Teach-In mode. This improves programming efficiency and reduces the possibility of incorrect use.

Proven GMX realtime machine error correction is also used for positioning movements with the new MarEcon Control unit:, guarantees maximum speed and precision throughout the entire measuring and movement sequence.

Gear, form and dimension measurements are performed on one measuring instrument.

High precision 3D scanning sensor combined with directly driven C-axis for accuracy and speed

Control unit:
4 axis Control unit:

Technical Data

GMX 400 W	
Measuring path (mm), X axis	200
Measuring path (mm), Y axis	200
Measuring path (mm), Z axis	320
Diameter max.* [mm]	400
Length	1560
Width	600
Height	1787
Mass [kg]	700
Max. workpiece weight [kg]	60 (80 on request)
Accuracy	Accuracy class I for gear measurements in accordance with VDI/VDE 2612/2613 Group 1 at 20°C ± 2°C
Axial runout deviation (µm+µm/mm measuring radius)	0.11 µm + 0.0008 µm/mm
Radial runout deviation (µm in table height)	≤ 0.11 µm

*** max. diameter of cylindrical gears**

Accessories

- Probe arm changer (5 boxes)
- Active vibration damping system
- Revolving counter tip

Applications

Fully automatic testing of:

- Straight and helical toothed cylindrical gears
- Conical and asymmetrical cylindrical gears
- Segment gears
- 3D surfaces, diameters, distances, cone angles
- Form and position measurements
- GDE
- Data export

For more information, please visit our website: www.mahr.com

MarGear GMX 400 ZLW. Universal Gear Measuring Center

Precision, fully automatic testing of gears and gear cutting tools up to an outer diameter of 400 mm.

The ideal solution for both universal and specialist gear manufacturing.

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This allows for a direct assessment of the deviation and an automatically generated machine error correction.

Gear and form measurements carried out on a single measuring instrument.

High precision 3D scanning sensor combined with directly driven C axis for accuracy and efficiency.

Control unit:
4 axis Power PC Control unit:

Extended Z measuring range for measuring long drive shafts up to 650 mm.

Technical Data

GMX 400 ZLW	
Measuring path (mm), X axis	200
Measuring path (mm), Y axis	200
Measuring path (mm), Z axis	650
Diameter max.* [mm]	400
Length	1560
Width	600
Height	2147
Mass [kg]	750
Max. workpiece weight [kg]	60 (80 on request)
Accuracy	Accuracy class I for gear measurements in accordance with VDI/VDE 2612/2613 Group 1 at 20°C ± 2°C
Axial runout deviation (µm+µm/mm measuring radius)	0.11 µm + 0.0008 µm/mm
Radial runout deviation (µm in table height)	≤ 0.11 µm

*** max. diameter of cylindrical gears**

Accessories

- Active vibration damping system
- Revolving counter tip
- Data matrix scanner
- Chuck 70 mm
- Chuck 200 mm
- Drive pin set

Applications

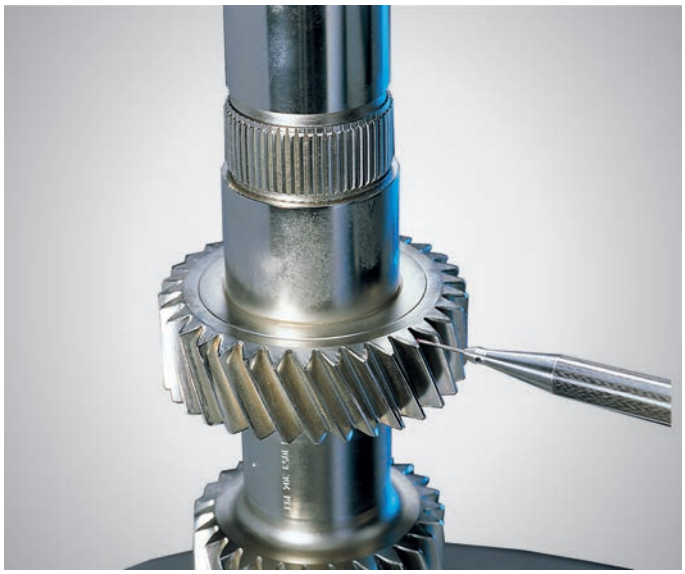
Fully automatic testing of:

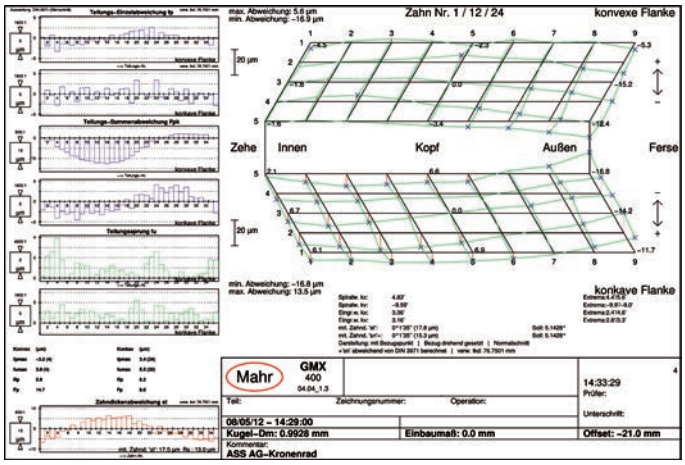
- Straight and helical toothed cylindrical gears
- Spiral and hypoid bevel gears
- Crown gears
- Cylindrical worms
- Conical and asymmetrical cylindrical gears
- Segment gears
- Shaving cutters
- Hobs
- Cutting wheels
- Synchronous gears
- Beveloid gears
- 3D geometries, form and position measurements, diameters, distances
- Special gear cutting tools on request

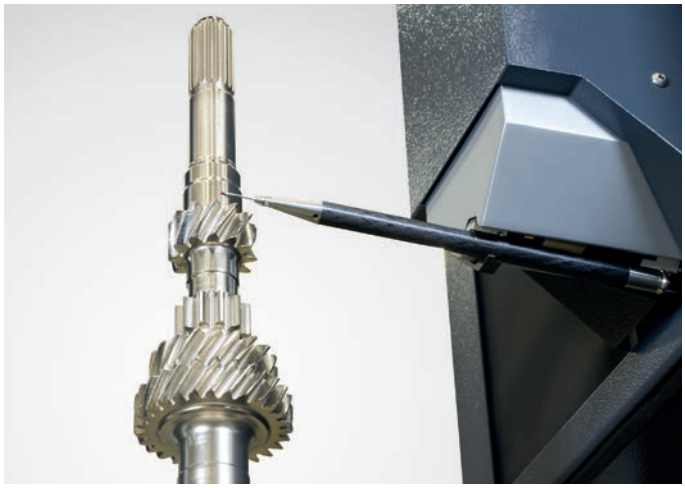
For more information, please visit our website: www.mahr.com

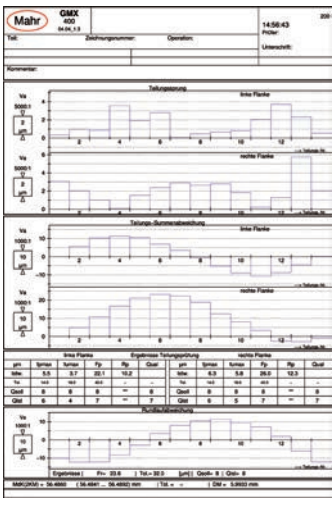
MarGear. Software Solutions

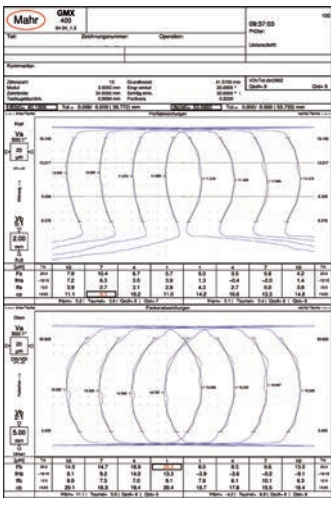
MarGear software solutions for the following measuring tasks:
- Form, position and dimension
- Cylindrical gear
- Bevel gear
- Gear cutting tools
- Synchronous gears
- Polar contours

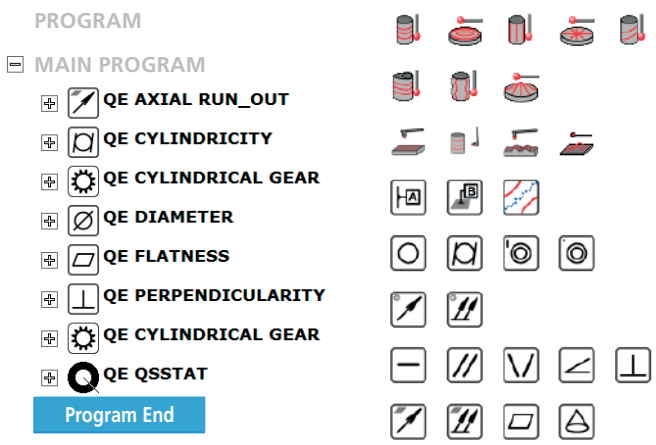












For more information, please visit our website: www.mahr.com

MAXIMUM MEASUREMENT ACCURACY IN MANUFACTURING.
MAHR SHAFT MEASURING TECHNOLOGY

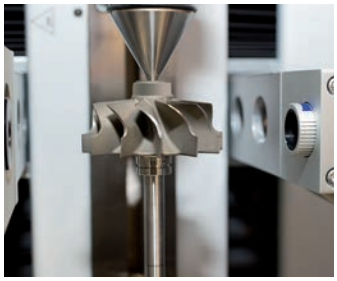
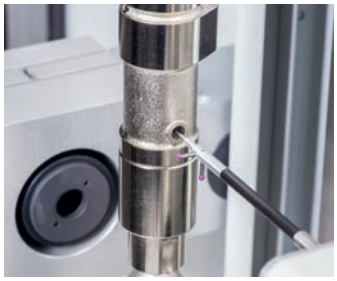
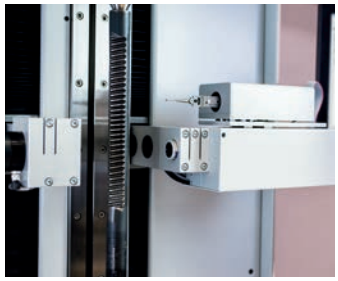
The latest information about MARSHAFT products is available on our website:
www.mahr.com, WebCode 11935

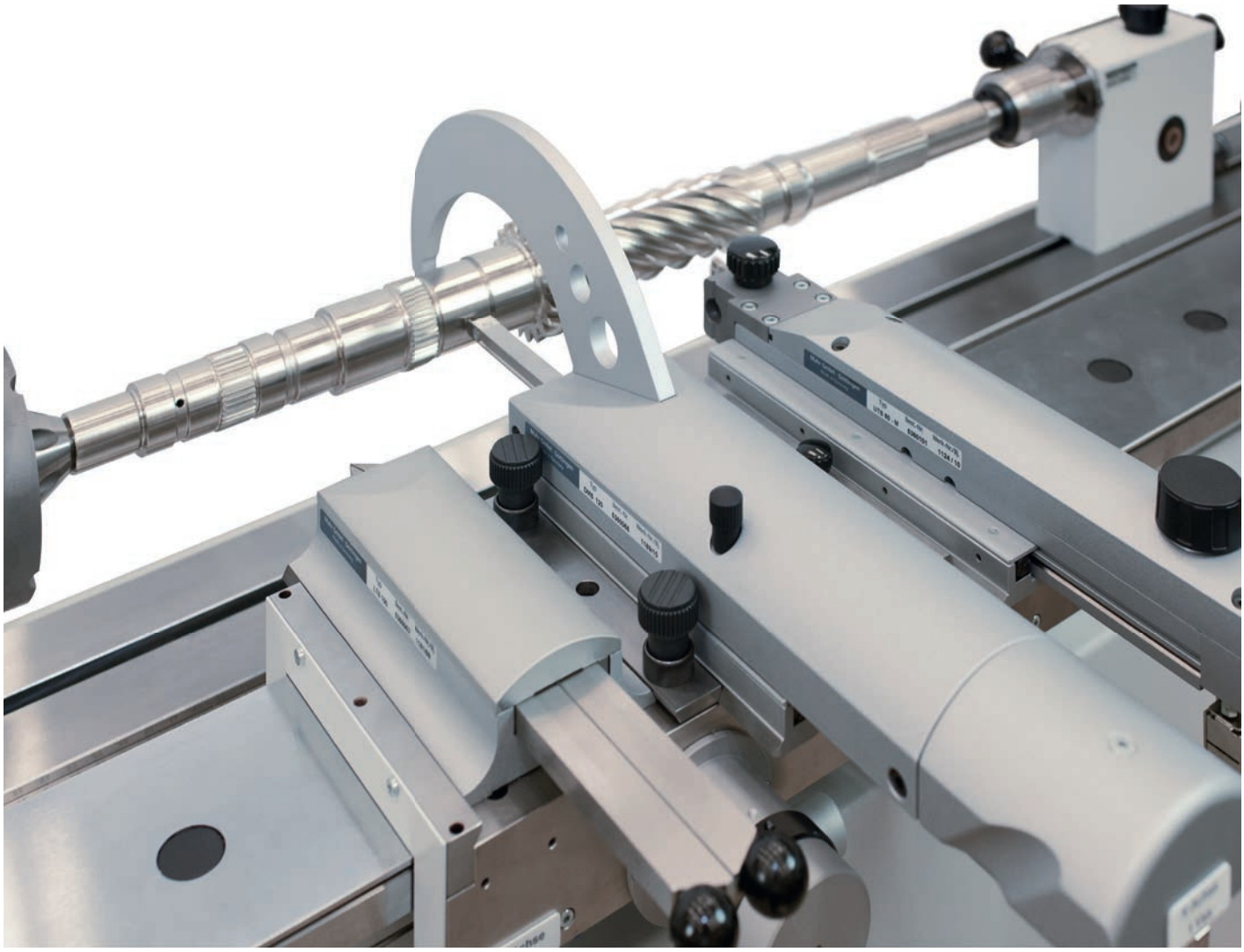
The role of dimensional metrology is expanding at a dramatic rate, in parallel with innovations in manufacturing processes. Given the ever more stringent accuracy requirements and falling cycle times in production (turning, milling, grinding, etc.), rapid measurement directly at the manufacturing machine is absolutely essential. Measurement at the point of origin of the product, with rapid feedback to the manufacturing process to avoid waste. Flexible MarShaft shaft measuring technology from Mahr is the right solution for quick and accurate measurement in production.

MarShaft. Shaft Measuring Instruments

MarShaft. Measurement of Shaft-Type Parts in Production.

MarShaft shaft measuring instruments are mostly used in production. However, with their high measuring accuracy they can also be used in measuring laboratories. The instruments are available in various sizes, and their modular design allows them to be optimized to individual measuring tasks. Inline measurement directly in the manufacturing process saves the time and expense of measurements in the measuring room and increases productivity.



MarShaft MAN. Manual Tactile Shaft Measuring Machine

MarShaft MAN is a universal, modular shaft measuring instrument for the fast and flexible measurement of shaft-type testpieces.
Precision workpieces can be produced cost-effectively and to a high level of quality across all manufacturing stages — from cutting to length through to hard finishing — if the individual process steps are kept consistently stable. That is exactly where production-floor characteristics testing with MarShaft MAN comes in. Short feedback times on reaching the tolerance limits and seamless documentation of all functional data relating to the component soon pay off.
The MarShaft MAN shaft measuring center is the right solution for your quality control.
The MarShaft MAN shaft measuring center is available in a number of different instrument sizes (workpiece lengths up to 400 mm / 800 mm / 1200 mm / 1600 mm / 2000 mm / 2400 mm, diameters from 120 mm to 220 mm) and its modular design allows it to be adapted to individual measuring tasks. The measuring modules (e.g. diameter, length, roundness module) can be arranged in any order or can easily be added at a later date.

Advantages at a glance:

- No operator influence
- Highly accurate measuring results
- Excellent repeatability
- Measuring system for all typical measuring tasks, including: Length, diameter, radial run-out, axial run-out, recess width, cone angle, roundness, coaxiality, concentricity and much more
- Automatic measuring force application to avoid operator influence
- Good workshop compatibility for direct use in production
- User-friendly MarCheck evaluation computer (2 models)

Technical Data

MarShaft MAN, length and diameter measurement, MarCheck II measuring computer	
Measuring range length (Z) (mm)	400 / 800 / 1200 / 1600 / 2000 / 2400
Measuring range diameter (X) (mm)	120 or 220
Workpiece weight (max.) in kg	20 / 60
Length/diameter resolution (mm)	0,0001
Angle resolution (°)	0,001
Length error limit (Z) (µm)	(3 + L/100) µm, L (length) in mm
Diameter error limit (X) (µm)	(0.8 + L/100) µm, L (length) in mm
Drive	manual
Lens	Optical measuring system (OMS) with matrix camera and software

Applications

Typical workpieces:
Crankshaft, camshaft, gear shaft, rack, axle journal, hollow shaft, drive shaft, piston

Typical measuring tasks:
Length, diameter, radial run-out/axial run-out

Other measuring tasks:
Distance, recess width, depth, increment, recess diameter, roundness, taper, angle, radius, intersection point, position of cross-holes, and much more

For more information, please visit our website: www.mahr.com

MarShaft MAN with MarCheck.
Measuring Value Display for MAN Shaft Measuring Machines

MarCheck is a new compact measuring and evaluating unit for the manual mesauring machine MarShaft MAN and is characterized by its ease of handling and high performance scope. The user requires only very little training, thus the unit can be immediately impelemented, saving time and costs.
The large, clear, LCD monochrome display (240 x 160 dots) can display up to three measuring chanals simultaneously. Activation of the individual measuring canals on the display takes place automatically when measuring with the corresponding measuring axis. The measuring direction is shown. The MarCheck has three measuring chanals for two linear measuring axes (Z and X) and one rotary measuring axis (C), which can be reconfigured to a linear measuring axis (R) if needed. For runout and roundness measurements, the precision measuring spindle (C axsis) is controlled by MarCheck and automatically switched on an off.

Technical Data

MarShaft MAN with MarCheck, measured value display for MAN shaft measuring instruments	
Resolution per measuring channel can be independently set	0.0001 mm; 0.001 mm; 0.01 mm 0.00001 inch; 0.0001 inch; 0.001 inch 0.001° decimal; ° min, sec
Incremental inputs	T1; T2; T3 (sin/cos 1 Vss) 15 pin. Sub D
Interface data	1x RS 232; 1x USB 2.0 type A, 1x USB 2.0 type B
Grating constant	selectable; 2 µm; 4 µm; 10 µm; 20 µm; 40 µm
Max. permissible travel speed	0.2 m/s when G = 2 µm 0.4 m/s when G = 4 µm 1 m/s when G = 10 µm 2 m/s when G = 20 µm for MarShaft MAN 4 m/s when G = 40 µm
Input signal - cutoff frequency	<100 kHz at sin/cos 1 Vss
Frequency check response threshold	100
Measuring units	mm / inch selectable in MENU
Standard languages	German; English; French Additonal langages can be installed via USB interface and an external PC

Measuring and programming functions

- Evaluation of diameter, length dimensions, distances, taper, symmetry, distance between centers, roundness, axia runout, radial runout, concentricity, workpiece axis reference calcluation, maximum/ minimum function, preset function for reference points outside of the workpiece.
- Teach-in programming, data can be saved in MarCheck, external PC or USB stick, printing with external printer, up to 40 measuring programs can be saved.
- Q-DAS interface for the evaluation of machine capability testing in Q-DAS Software®

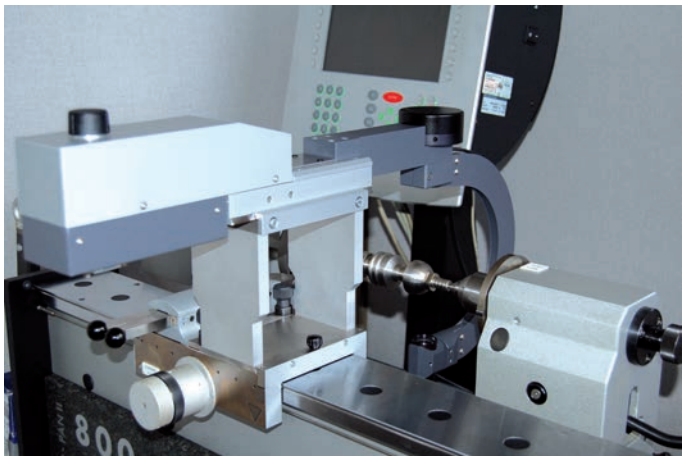
Performance features

- Large, clear, backlit LCD monochrome display (240 x 160 points)
- 3 measuring canals (Z axis, X axis, and C/R axis)
- Digit size approx. 13 mm
- 1 USB interface max. 3GB USB stick
- 1 USB interface for PC (selectable RS232 interface, evaluation of data in Excel or MarCom software) or software installation (update)
- Connection of a ink jet printer possible
- Measurement of roungness and runout takes place with the DMS 120,
  no additional R axis required
- Automatic acquisition of measuring values after having reach the
  measuring force the user has set
- Automatic acquisition of the calibration values from the individual
  measuring modules

For more information, please visit our website: www.mahr.com

MarShaft MAN Shaft Measuring Instruments.
OMS 120 Optical Measuring System

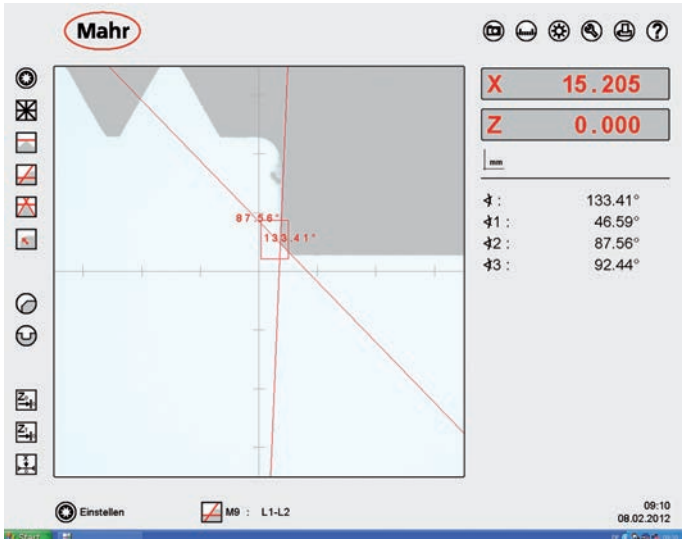
In conjunction with the evaluation software, the optical measuring system OMS 120 can be used to measure geometry elements which cannot be contacted or evaluated with the available contacting measuring probes of MarShaft MAN. The operating concept is optimized for use directly on the production line and can be used without any knowledge of metrology whatsoever. The testpiece contour is mapped on the camera chip using the shadow image method and displayed on the monitor. High-quality, telecentric optical components are used for precision mapping. To this end the corresponding testpiece contour is positioned only roughly in the camera's image field. There is no need for precision adjustment in the Z or X direction. The software has quick measuring functions which automatically evaluate the relevant feature results for the current measuring task.



Quick measuring functions

- Recess
- Chamfer
- Radius
- Straight line
- Intersection point line-line A quick measuring function analyses multiple feature results at the same time. The relevant results can be selected for recording or for data transfer. Most shaft measuring tasks can be performed in a quick and user-friendly manner using these functions.

A whole range of manual analysis functions are available for measuring tasks which are not covered by the quick measuring functions.



Technical data

Traverse path in X-direction: 120 mm
Measurement resolution: 0.001 mm

For more information, please visit our website: www.mahr.com

MarShaft SCOPE 350 / 700 / 1000 *plus*

Tactile measuring unit with y-measuring axis 60 mm

The MarShaft SCOPE plus is a universal, fully automatic optical shaft measuring system for testing rotationally symmetrical workpieces.

The MarShaft SCOPE plus has a highly accurate roundness measuring axis (C), a vertical measuring axis (Z) and a horizontal measuring axis (X).

A tactile measuring system with an inductive measuring probe is available as an option, for measuring radial and axial run-out or straightness, for example. The measuring device is calibrated to the optical measuring system, so it can perform tactile and optical measuring tasks in combination.

The new MarWin EasyShaft software provides a high level of flexibility and exceptionally user-friendly operation.

The measuring sequences are carried out fully automatically, free from operator influences.

The MarShaft SCOPE plus is suitable for use in both the harsh workshop environment and in the inspection room. Zoom functions allow the smallest details to be measured, which with conventional measuring methods are difficult if not impossible to test.

- Automatic measuring procedure
- Matrix camera, 1280 x 1024 pixels
- User-friendly touchscreen operation
- One measuring instrument for multiple measuring tasks
- Good workshop compatibility
- MarWin EasyShaft software provides a high level of flexibility and user-friendly operation

Options:

- Tactile measuring unit for measuring radial run-out and axial run-out
- Temperature compensation
- Thread measurement
- Turbocharger shaft measurement
- Camshaft measurement
- Piston measurement
- Manual control panel
- MarWin Professional Shaft - software

Technical Data

Freestanding model	
Measuring range length (Z) (mm)	350 / 750 / 1000
Measuring range diameter (X) (mm)	80 or 120
Workpiece weight (max.) in kg	15 (optional 30)
Length/diameter resolution (mm)	0.01 to 0.0001
Angle resolution (°)	0.01 to 0.0001
Length error limit (Z) (µm)	(2 + L/125) L in mm (2 σ at 20 °C ± 1 °C on reference standard)
Diameter error limit (X) (µm)	(1,0 + L/125) L in mm (2 σ at 20 °C ± 1 °C on reference standard)
Drive	Servo motors
Lens	Telecentric precision lens High-resolution CCD array

Applications

Typical workpieces

- Turned parts
- Tripods
- Transmission shaft
- Rack
- Axle journal
- Hollow shaft
- Drive shaft
- Piston
- Camshaft
- Turbocharger shafts
- Bone screws
- Worm gears
- Balance shafts
- Hydraulic parts
- Valves (diesel engine)
- Injection valves and much more

For more information, please visit our website: www.mahr.com

MarShaft. Scope 600 *plus* 3D

Mahr is pleased to provide a new measurement method for the special camshaft application using the new MarShaft SCOPE 600 plus 3D: A combination of optical and touch sensors allow for a first ever functionally complete 3D Inspection of the workpiece. Due to this market need Mahr further developed our highly anticipated and received MarShaft SCOPE 750 plus System. The advanced System now utilizes a new 2D Touch Probe, a motorized tailstock and a calibration for the linear axes. A Matrix camera optically measures characteristics such as diameters, lengths, radii, geometries, location characteristics, cam angle or cam lift in seconds. The additional 2D Sensor detects features that are not optically measurable: concave cam shapes, axial run out on large shoulders, reference elements in the axial direction such as blind holes. For this system, the tactile and optical systems are aligned/ adjusted to exist within one measuring coordinate system. This unit operates in conjunction with the MarWin software platform, thus providing full 3D functionality. Features:

- Complete measuring of camshafts, including cam angle and all cam profiles
- Measurement of conturs
- No use of radial drivers
- Direct measurement of reference (2 flat,, blind borehole or keyway)
- Measurement of keyway grooves
- Measurement of blind boreholes
- 100% 3D function with the new 2D probesystem 1320–2
- Additional Y- measuring axis
- Special calibration of the linear axis (Z-X-Y)
- MarShaf Professional Software
- Manual panel

Options:

- Barcode-Scanner
- Signal light (red, yellow, green)
- Coated tip (no driver required)
- Vibration isolation system
- Temperature compensation
- Thread Measurement
- Turbocharger shaft measurement

Technical Data

MarShaft SCOPE 600 plus 3D	
Measuring range length (Z) (mm)	600
Measuring range diameter (X) (mm)	120
Workpiece weight (max.) in kg	15
Length/diameter resolution (mm)	0.01 to 0.0001
Angle resolution (°)	0.01 to 0.0001
Length error limit (Z) (µm)	(2,0 + L/125) L in mm (at 20 °C ± 1 °C on reference standard)
Diameter error limit (X) (µm)	(1,0 + L/125) L in mm (at 20 °C ± 1 °C on reference standard)
Drive	Servo motors
Lens	Telecentric precision lensHigh-resolution CCD array

Applications
- Complete measurement of camshafts

Typical workpieces
- Camshaft
- Eccentric shafts
- Shafts with keyways or blind boreholes

For more information, please visit our website: www.mahr.com

MarShaft SCOPE 250 *plus*

The role of dimensional metrology is expanding at a dramatic rate, in parallel with innovations in manufacturing processes. Given the ever more stringent accuracy requirements and falling cycle times in production (turning, milling, grinding, etc.), rapid measurement directly at the manufacturing machine is absolutely essential. Measurement at the point of origin of the product, with rapid feedback to the manufacturing process to avoid waste. Mahr's flexible MarShaft SCOPE 250 *plus* shaft measuring machine offers the right measuring solution for the fast, precise and fully automatic measurement of rotationally symmetrical workpieces in production.

The MarShaft SCOPE 250 *plus* has a high precision roundness measuring axis (C) and a vertical measuring axis (Z) with a measuring range of 250 mm. At its heart is the state-of-the-art, high-resolution CMOS matrix camera (live image) with an image field of 1088 x 2048 mm. The extremely high image acquisition rate of over 120 images per second keeps measuring times to a minimum. Zoom functions allow the smallest details to be measured, which with conventional measuring methods are difficult if not impossible to test.

Technical Data

MarShaft SCOPE 250 plus	
Measuring range length (Z) (mm)	250
Measuring range diameter (X) (mm)	40
Length/diameter resolution (mm)	0.01...0.0001
Angle resolution (°)	0.01...0.0001
Length error limit (Z) (µm)	≤ (3.0+l/125) l in mm
Diameter error limit (X) (µm)	≤ (1.5+l/40) l in mm
Lens	Telecentric precision optics High-resolution CMOS camera

Applications

Typical workpieces

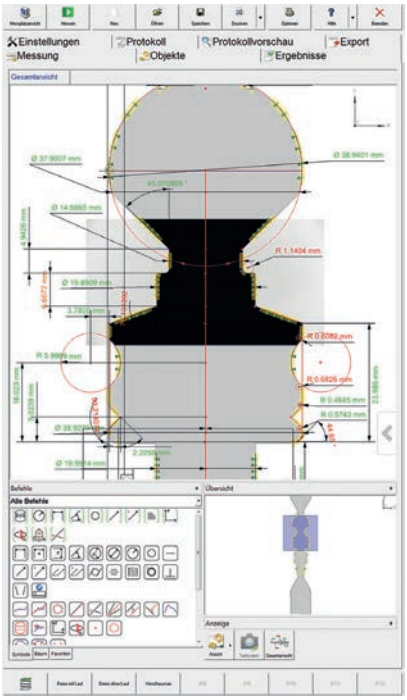
- Turned parts
- Journals
- Hollow shafts
- Drive shafts
- Turbocharger shafts
- Bone screws
- Balance shafts
- Hydraulic parts
- Valves (gasoline engine)
- Injection valves and many more

Performance features at a glance:

- New, high-resolution CMOS matrix camera with a 40 mm live image field allows fast scanning with over 120 images per second
- High accuracy for diameter and length measurement
- Extremely fast measuring times thanks to high measuring speeds of up to 200 mm/s
- By using Mahr's MarWin software platform, you can benefit from our decades of experience in length, shape, position and contour measurement
- Affordable entry-level price into the small optical shaft measuring machine segment

For more information, please visit our website: www.mahr.com

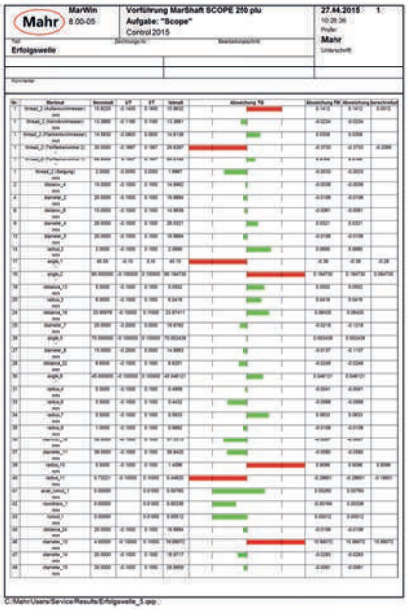
MarWin Software EasyShaft



MarWin EasyShaft software is the measuring, control and evaluation system for the MarShaft SCOPE plus. It offers precision measurement of diameters, lengths, contour features and form and position tolerances in accordance with standards, along with many new evaluation and documentation options, all with a well-laid-out, intuitive user interface. The software runs entirely under the familiar Windows® operating system. The user interface is compatible with other Windows® applications, reducing the familiarization time substantially. All Windows®-compatible printers can be used for record output.

Performance features at a glance:

- The familiar Windows® user interface makes for a short learning curve
- The user interface is used as standard across all Mahr products (e.g. EasyForm or Contour 1)
- Clear, windows-based layout
- User-friendly, 100% touchscreen functionality
- Predefined macros for easy programming (e.g. diameter measurement at a mouse click)
- Many functions can be selected directly via meaningful icons
- Touchscreen-controllable machine axes
- The live image from the matrix camera is permanently displayed during measurement, i.e. direct visual assessment of the workpiece condition (e.g. soiling) even during measurement
- For individual and series measurements: the ideal operating strategy for every task
- User-friendly, state-of-the-art measuring program management
- Time-optimized measuring program sequence (shortest measuring times)
- Meaningful measuring records — in black-and-white or color — output to all Windows® printers
- Future-proof investment, runs under Windows 7 Ultimate
- Optional data export to statistics programs extends the range of functions of the EasyShaft software



EasyShaft program window

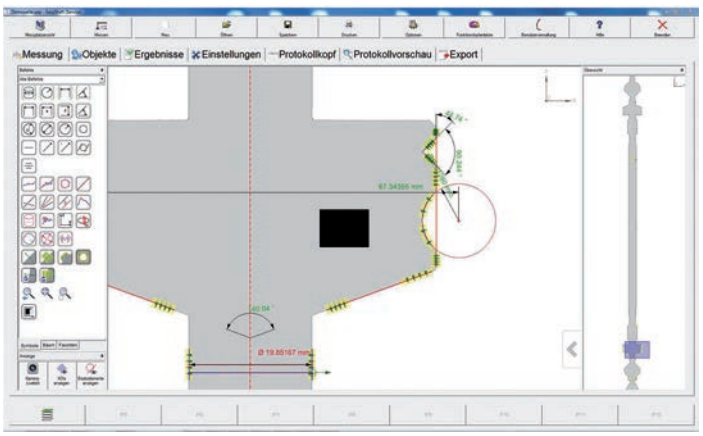
The EasyShaft software gives you full control over the MarShaft SCOPE. The touchscreen gives you direct access to positioning, programming, measurement and documentation. The excellent, simple user interface helps you keep track of everything you need to know.

Many functions, such as loading measuring results or adding feature measurements, can be selected simply by clicking an icon.

EasyShaft commands

The clearly laid-out command bar contains all the commands required for measuring and evaluating features.

- Macros (composed sequences of evaluation actions, e.g. diameter, radius, distance or angle)
- Features which can be calculated (e.g. direct distance, distance in X and Z, angle, angle sector, radius, roundness, straightness, radial run-out, axial run-out, cylindricity, symmetry)
- Substitute elements which can be calculated (e.g. point, line, circle, point on straight line, intersection point, symmetry straight line, parallel straight line, extreme point, C-reference)



Display palette (touchscreen control of machine axes)

- Used to show or hide the display palette
- Used to select the zoom range
- Joystick for the C-axis
- Joystick for the X- and Z-axis
- Zoom in incrementally
- Zoom in or out continuously
- Zoom out incrementally

For more information, please visit our website: www.mahr.com