

# Engineered Solutions



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# Product Line MarSolution

Based on Millimar Programm



Typical Measurement Tasks



# Air Gaging on Gear Housings

## Measurement Task

- Diameter measurement
- Set of 12 air gages to measure different dimensional features on gearbox housings

## The Solution

Applying the different plugs different diameters can be measured. Applying air gaging technology the system is very robust and the measurement results are very reliable even applied straight at the shop floor. High-precision measurements can be carried out by personnel not trained in metrology.

The software-based user guidance guides the operator through the various measuring tasks.



Automation:	manual
Main application:	gearbox
Reference No:	12



# Taper Measurement based on Air-Technology

## Measurement Task

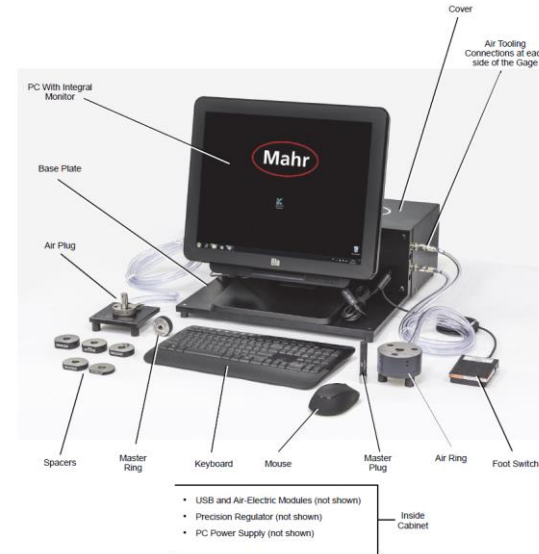
- High precision diameter measurement
- Taper measurement
- Medical prosthetic components, especially hip-components

## The Solution

The measuring unit uses special taper tooling that enable the measurement of diameters and tapers of medical prosthetic components. The workpiece must be inserted into the measuring ring. Then the measurement is performed automatically.

The pneumatic measuring system is based on a standard two-nozzle measuring system with low magnification for high-precision measurement.

The measuring unit is characterized by a very compact design. Applying air technology a quite sensitive measuring task comes down to a simple measuring method.



Automation:	manual
Main application:	medical; machine tool
Reference No:	13



# Diamar nk - Universal Measuring Unit for Shop Floor

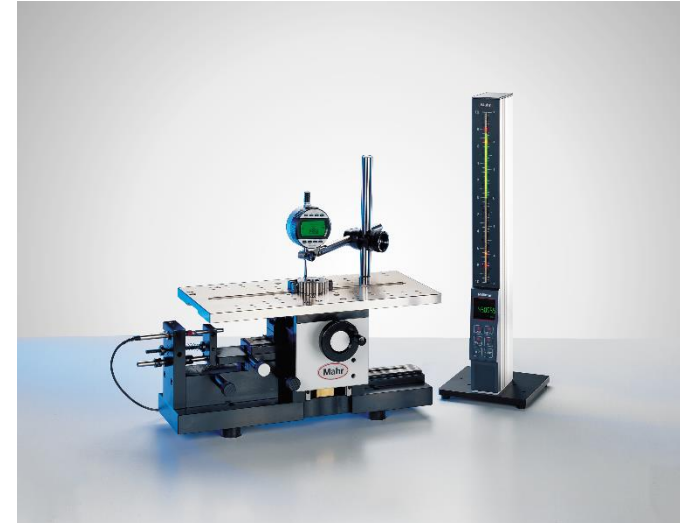
## Measurement Task

- Outside and inner diameters
- Testing the dimension over balls on internal and external gears
- Heights

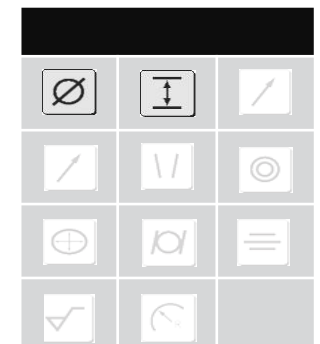
## The Solution

- Base with table top 350 mm x 180 mm (13.78 in x 7.09 in) and location holes for mounting accessories
- 1 mounting device for holding the fixed probe arm
- 1 spring-loaded retraction unit for holding the moveable probe arm
- Retraction range 25 mm (.9843 in), can be limited
- 1 probe holder/dial indicator holder
- 1 height adjustment facility for the table top, adjustment range 50 mm (1.969 in)

Part-specific accessories, such as stop rail, support plate, locating pin, measuring systems, etc., are available on request. Suitable evaluation units are all Millimar instruments with probes, also indicators and test indicators.



Automation:	manual
Main application:	gear, ring
Reference No:	54



# KMW - Modularized Shaft Measuring Device

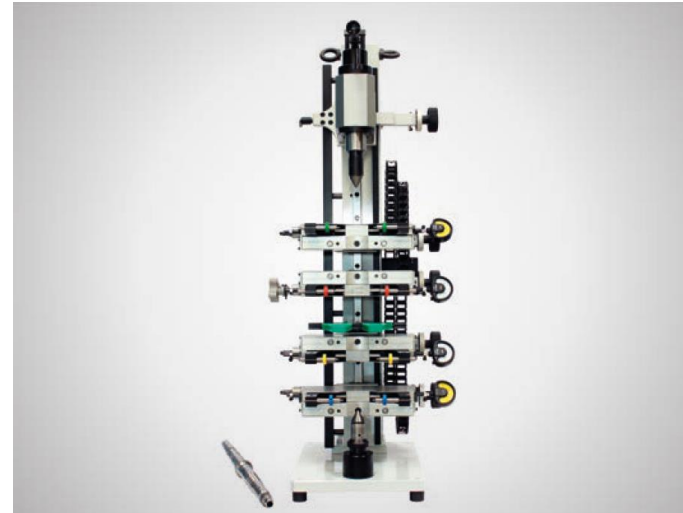
## Measurement Task

- Measurement of diameter and runout in production environment
- Dimensional testing of shafts
- Using dimension over balls, measurement of diameter and runouts repeatability: +/- 0.001 mm
- Allows immediate reaction and identification of faulty parts

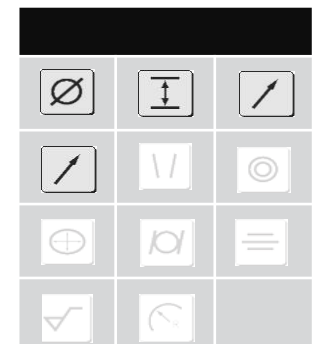
## The Solution

The workpiece is clamped with centering tips. Optionally, the probes can be applied pneumatically to protect the tips from wear. Then the measurement takes place. The measurement results can be displayed by reading out the dial gauges or, if probes are used, on an evaluation computer.

The fixture is suitable for use directly in production. The modular design of the fixture allows quick and easy changeover to other workpiece types and measuring tasks. Workpieces up to max. Ø 120 mm and a length of 600 mm can be measured. Other dimensions are available on request.



Automation:	manual
Main application:	shaft, gear
Reference No:	57



# WMV - Modularized Shaft Measuring Device

## Measurement Task

- Diameter and length measurement on shafts in the production environment
- Dimensional inspection of workpieces, gears, concentricity in the tooth flank
- Repeatability +/- 0.001 mm

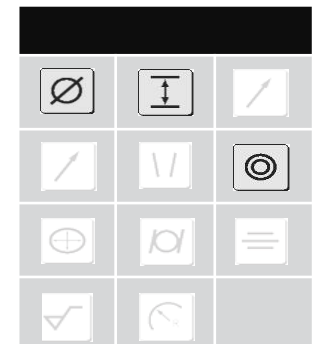
## The Solution

Workpiece is clamped by center-tips. Workpiece can be shifted by pulling to right or left direction into two measuring positions.

- Modularized design of the measuring device enables quick conversion for other work piece types and measurement tasks
- Work piece size: max. Ø 150 x 400 mm
- Measuring visualization: measuring computer, Millimar display column, Millimar dial gage



Automation:	manual
Main application:	shaft, camshaft, gear
Reference No:	60



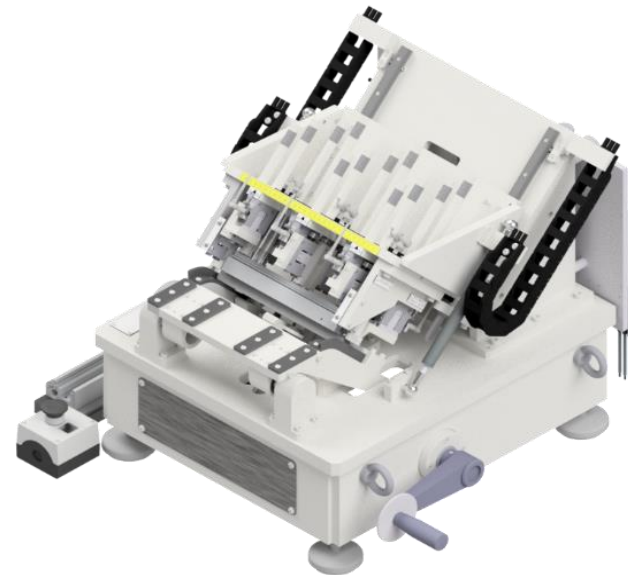
# Measuring of Various Distances on the Housing of Linear Guides

## Measurement Task

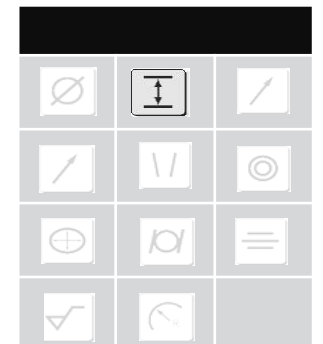
- Measurement of distances after the grinding process
- Height in relation to the base plate
- Is applied at shop floor
- The dimension to be measured has a tolerance of  $\pm 0.01$  mm to  $\pm 0.03$  mm.

## The Solution

The workpiece is placed by hand on a measuring table, which lowers the component to three support points with the actuation of the hand crank and brings the measuring slide into measuring position. The measurement is recorded after pressing a "start button". The measuring points are scanned by specially made measuring inserts, which are controlled electro-pneumatically by ME05 measuring units on the guideway of the component. Parts of one size in different lengths can be tested, which are clamped on a carrier plate. The retrofitting or positioning of the three measuring levels is done by hand by loosening and tightening the clamping screws. A scale is integrated on the measuring slide for support.



Automation:	manual
Main application:	0
Reference No:	73





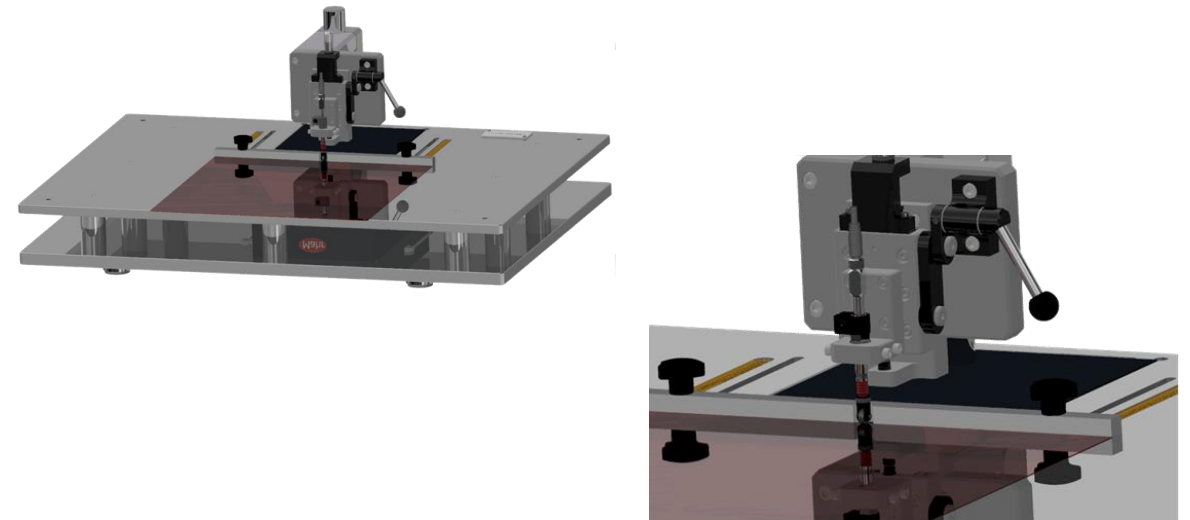
# Measuring Device for Battery Cell Film Thickness

## Measurement Task

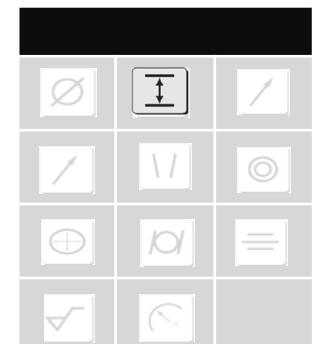
- Measurement of film thickness of  $0.245\text{mm} \pm 0.003$
- Dimension of the film is  $360\text{mm} \times 360\text{mm}$

## The Solution

Manual measuring station for measuring various thicknesses of coated foils, which are used, for example, for batteries in electric vehicles. The position for measuring the film thickness can be changed flexibly in just a few simple steps. A measuring probe moves to the workpiece by operating a lever on the measuring head. The measurement of the film is used to test coating on the actual film. In order to achieve the best possible accuracy, measurements are made on a granite slab that is sunk into the device. The measurement data are recorded by the compact length measuring device Millimar C1200.



Automation:	manual
Main application:	battery, e-mobility
Reference No:	78



# Measuring Device for Crankshaft

## Measurement Task

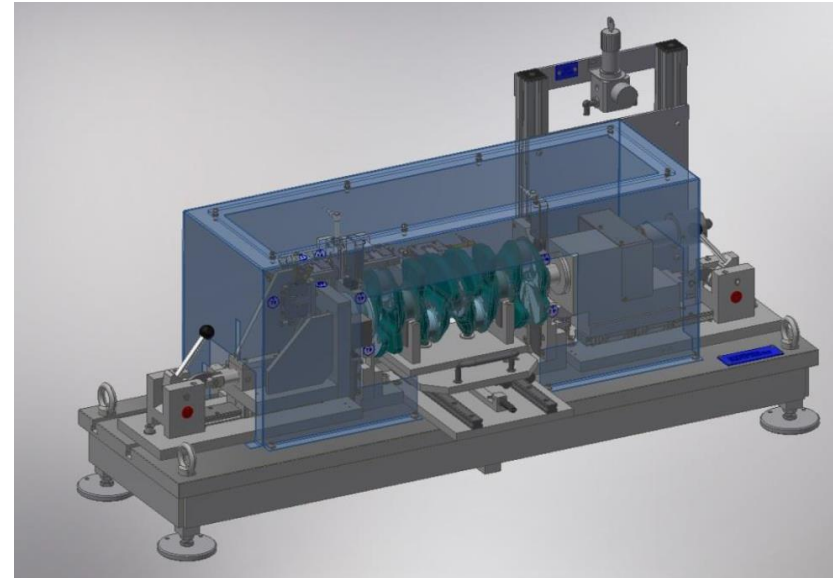
- Main Bearing: Diameters , Roundness, Runout, Width
- Flange: Diameter, Runout

## The Solution

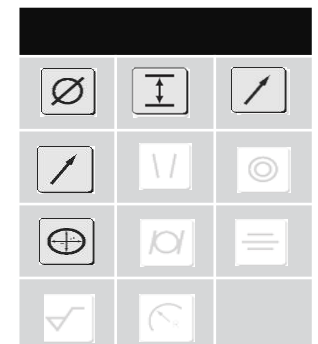
This measuring station is designed for manual loading by workshop personnel. The workpiece is placed on a slide in pre-storage prisms. The workpiece is then transported into the device. In this position the workpiece is lifted out of the prisms and clamped between centres. The measurement is started. All static and dynamic measuring tasks are performed automatically.

Finally, the results are displayed and transferred to a QA database. The workpiece is moved out of the measuring device by means of the loading slide and can be removed.

The measuring station concept can generally be adapted to different measuring tasks and shaft types.



Automation:	semi-automatic
Main application:	crankshaft; shaft
Reference No:	81



# Measuring Device for Camshaft

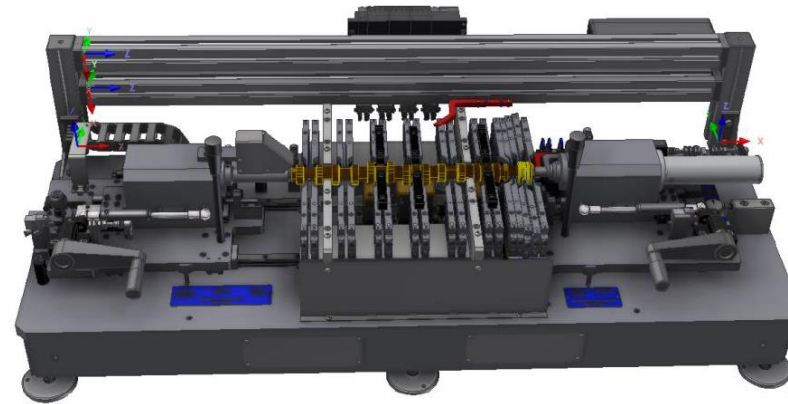
## Measurement Task

- Diameter
- Roundness
- Runout
- Cylindricity
- Distances

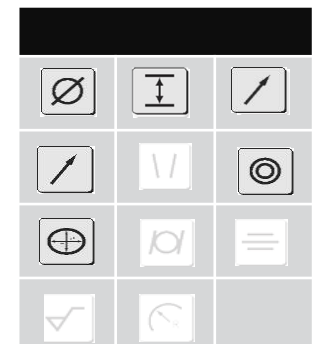
## The Solution

This measuring station is designed for manual loading by workshop personnel. For this purpose, the workpiece is placed in pre-storage prisms. After loading, the workpiece is picked up between centres by means of manual operated tail-stocks on both sides and the measurement is started. All static and dynamic measuring tasks are performed automatically. Finally, the results are displayed and transferred to a QA database.

The measuring station concept can generally be adapted to different measuring tasks and shaft types.



Automation:	semi-automatic
Main application:	camshaft; shaft
Reference No:	82



# Shaft / Commutator / Armature Measuring Gauge

## Measurement Task

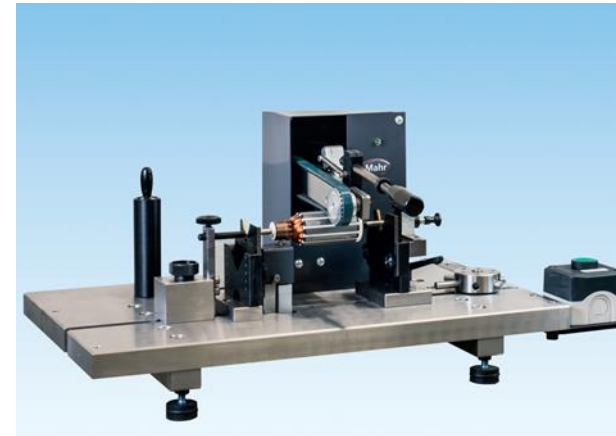
- Shaft Diameter
- Runout
- Roundness
- Bar-to-Bar Height (commutator)
- Segment gap
- Segment pitch
- Segment form deviation etc

## The Solution

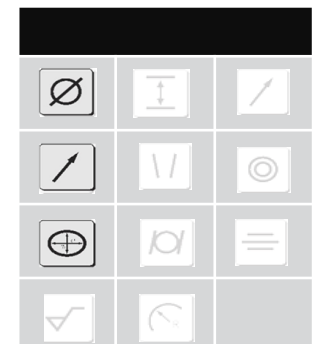
This measuring device is designed for the measurement of typical dimensional parameters on shafts.

The workpiece is inserted and then clamped between centres by actuating a lever. To enable dynamic measurements, a drive is applied to rotate the shaft.

The standard version is designed for shaft lengths from 130 mm to 300 mm and diameters from 25 mm to 80 mm. Special versions are available on request.



Automation:	semi-automatic
Main application:	shaft; e-mobility; turbo-charger
Reference No:	90



# Inline Shaft Measurement

## Measurement Task

- Diameter on bearing carrier
- Axial runout on shaft

## The Solution

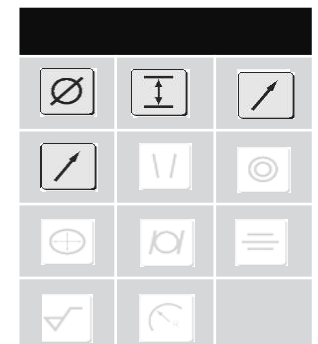
This measurement station is designed for both manual and automatic loading by applying a robot.

After loading the workpiece a housing will close the station automatically. Center tips will close to fix the workpiece. Static and dynamic measurements are being performed fully automatic.

Afterwards results being displayed and transferred to QS-Data-Base of the customer and housing is opened for unloading and loading of next workpiece.



Automation:	full-automatic
Main application:	shaft; gear
Reference No:	66



# Measurement of Diameters on Gear-Shaft

## Measurement Task

Measurement of different diameters on different sections statically.

Cycle time realized is 30 sec..

## The Solution

This automatic gage is for 100% measurement of diameter of gear secondary axis. The station is integrated in the production line. The procedure of measurement is:

- Auto loading
- Part type detection (data-matrix-camera)
- Removal on Vé + referencing
- Includes pneumatic measurement
- Auto unloading

The machine is design to measure different type of parts (flex plant approach). The adjustment of probes to serve the different geometries is done automatically depending on the information of data matrix information.



Automation:	inline
Main application:	shaft, gear
Reference No:	47



Engineered Solutions

# Product Line MarSurf Engineered

Based on MarSurf Sensors



Typical Measurement Tasks



# Manual Measuring Station for Shafts

## Measurement Task

This measuring station is available with different configurations regarding drive units, such as the PCV, GD120 (side-cranked) or LD130. Depending on the drive unit applied the station enables contour and/or roughness measurement.

The design is to measure flexible features like radii, straightness, roughness on bearing surfaces etc.. of larger turned parts e.g. crankshafts.

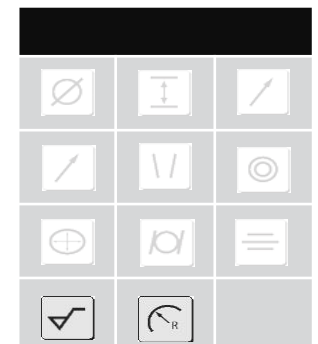
## The Solution

This measuring station has been designed for measurement of large shafts up to 1.600mm (larger versions are available on request).

The workpiece is loaded and positioned manually. The measuring position is approached by manually moving the measuring column. The column is mounted on a manual HX-axis aligned parallel to the work piece axis. A additional HY-axis at right angle aligned to the workpiece axis is used for fine adjustment and zenith search. The crankshaft can be turned within the POM-coated supports manually. This enables maximum accessibility to the features which needs to be measured, especially to the surface of crank bearings.



Automation:	manual
Main application:	shaft; crankshaft
Reference No:	5





# Flexible Manual Measurement Station

## Measurement Task

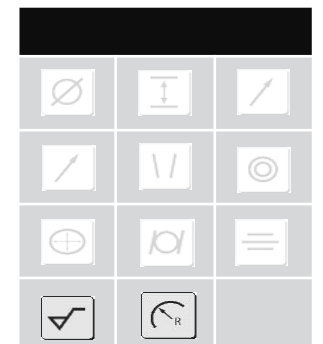
- General contour and roughness measurement tasks
- Roughness measurement on main and journal bearings
- Radii at bearing joints

## The Solution

Basic setup of this measurement station is a standard XCR20 LD260 measurement station in combination with a 1500mm x 1000mm granite. The HZ-column is fixed at the granite. The workpiec support system is carried by an air plate to enable easy movement of quite heavy workpieces. On top of the airplate system a fixture with a mechanical TB swivelling axis is installed. Therefore the granite has been surrounded by a safety boundry.



Automation:	manual
Main application:	shaft, crankshaft
Reference No:	26



# High Precision Measurement of Spindel-Profiles

## Measurement Task

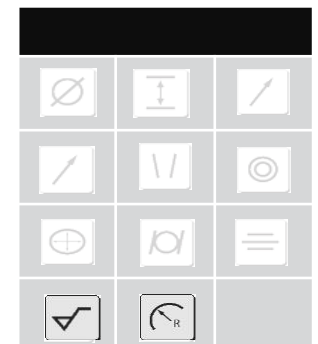
- Contour and/or roughness measurement
- High precision measurement of profile (e.g. gothic profile) on spindles
- Specific designed to measure the contour perpendicular to the pressure angle of spindle contour

## The Solution

This measuring station is based on the MarSurf 4.0 family B. The basic measuring station is extended by a special granite and a manual X-Y-C positioning system. The linear axes in X and Y direction are equipped with a fine adjustment. The rotary axis is a high-precision adjustable C axis ( $\pm 0.5$  angular minutes) and is equipped with a digital display for the position of the axis. The measuring station concept includes a specific base frame as well as a monitor and PC holder.



Automation:	manual
Main application:	steering, shaft
Reference No:	72



# Drive Shaft Measuring Station

## Measurement Task

- Roughness
- Micro-contour like radii, distances, angles, etc.
- Serves a number of different operation steps during production process

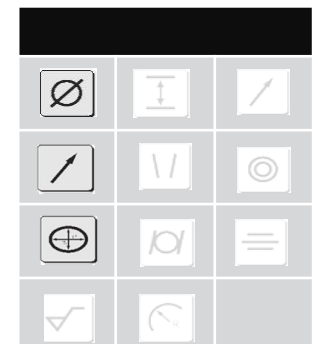
## The Solution

This measuring station consists of a LD130 drive unit in combination with a Mahr Modular axis system. The CNC axis system allows automatic positioning of the workpiece, so that a number of measuring tasks can be processed without operator intervention.

The measuring station is also equipped with a larger granite and a customer-specific cabin. A height-adjustable monitor, keyboard and mouse are also available. When not in use, the measuring station can be closed by means of a rolling door. All in all, the measuring station is designed for use directly in production.



Automation:	semi-automatic
Main application:	shaft
Reference No:	91



# Output Shaft Measuring Station

## Measurement Task

- Roughness
- Micro-contour like radii, distances, angles, etc.
- Bevels / edge break
- Serves a number of different operation steps during production process

## The Solution

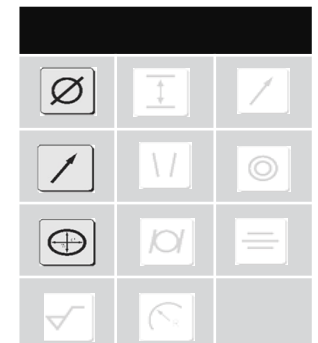
This measuring station consists of a UD130 drive unit in combination with a Mahr Modular axis system. The CNC axis system allows automatic positioning of the workpiece, so that a number of measuring tasks can be processed without operator intervention.

The Y-axis is used to search the zenith of the output shaft. Bores that are eccentrically positioned can also be approached and measured using this axis. The workpiece is tilted into various positions by means of the TB axis of rotation. Rotations of up to 180° are possible. This saves reclamping operations and ensures an uninterrupted, fully automatic process.

When not in use, the measuring station can be closed by means of a roller door. All in all, the measuring station is designed for use directly in production.



Automation:	semi-automatic
Main application:	shaft, gearbox
Reference No:	92



# Automatic Measuring Station for Crank- and Camshaft

## Measurement Task

- Roughness and contour measurement on big camshafts and Crankshafts e.g. truck industry
- Measurement of main and pin bearings
- Roughness of the cheeks
- Contour and roughness of undercuts or radii on main and pin bearings
- Center hole on the front sides

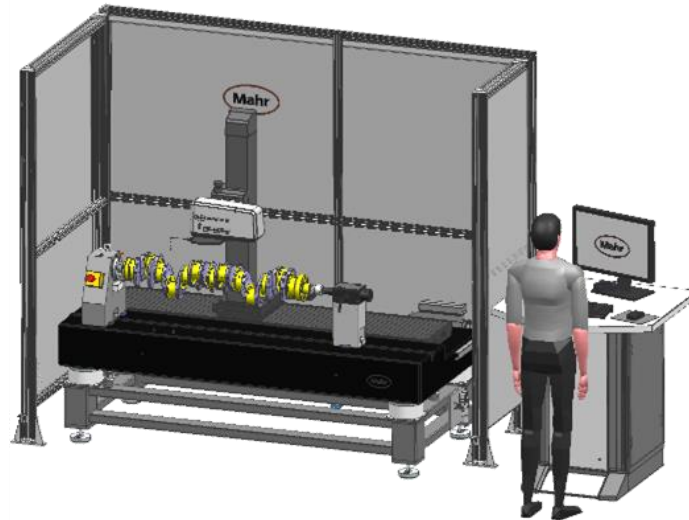
## The Solution

This measuring station is specially designed for the full automatic measurement of roughness and contour features on crankshafts and camshafts. The full automatic process enables reliable and reproducible measurement results of complex and demanding measuring tasks without any operator influence. Thus the daily use of the measuring station by trained but not metrologically trained personnel is possible.

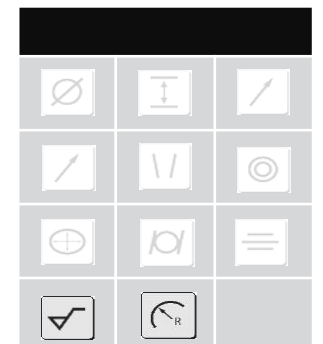
The possibility of swiveling the drive unit +/- 45 ° enables operation with a minimized number of different clamping positions.

The 2 storage prisms are axially displaceable. Means, the workpieces can be inserted and then stretched between tips. Typically measuring tasks are:

- Roughness and contour on main and pin bearings
- Roughness of the cheeks
- Contour and roughness of undercuts or radii on main and pin bearings
- Center hole on the front sides



Automation:	full-automatic
Main application:	shaft, crankshaft, camshaft
Reference No:	50



# Automatic Measuring of Transmission Plates - Series 9020

## Measurement Task

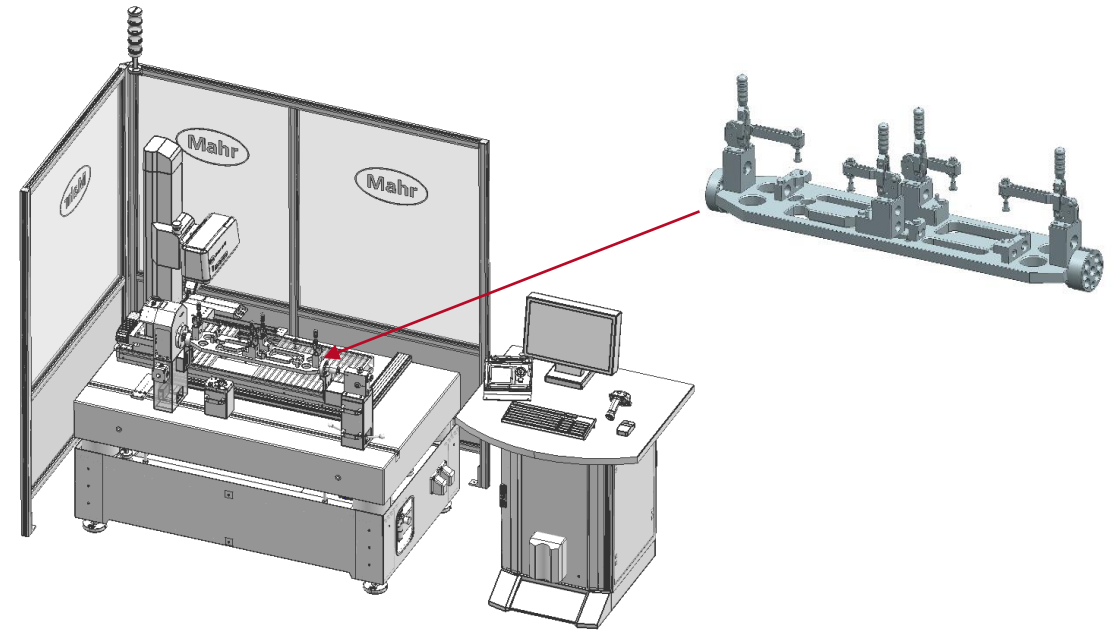
Contour and roughness measurement of transmission plates and rotationally symmetric parts e.g. shafts. Also further cubic geometries can be applied.

## The Solution

This measuring station is designed for the full automatic measurement of roughness and contour characteristics. The measuring direction is transverse to the workpiece axis. The clamping of the workpiece is either directly between tips (shafts) or clamping devices supporting cubic workpieces are been clamped between tips.

The measuring station concept is characterised by its outstanding features:

- Individual clamping options
- Very high degree of automation
- Measurement without influence even of non-trained operator
- Very easy handling even on complex and demanding measuring tasks



Automation:	full-automatic
Main application:	gear; shaft
Reference No:	51

