

Formline – Form Metrology

Innovative measuring systems  
for unequivocal measurement of  
form and positional tolerances.

# Your partner for measuring solutions

The Light & Production Division of Jenoptik is a global specialist in the optimization of manufacturing processes.

Our many years of experience and know-how in the field of industrial measurement technology and optical inspection, modern laser-based material processing and highly flexible robot-based automation enable us to develop tailor-made manufacturing solutions for our customers in automotive, aerospace, healthcare and other manufacturing industries.

As an experienced and reliable partner for high-precision, tactile and non-tactile production metrology, we support you with our global sales and services network.

Depending on the requirements, our tactile, pneumatic and optical measuring systems take on a wide range of tasks for the inspection of surface and form as well as the determination of dimensions, throughout every phase of the production process including final inspection or in the metrology lab. Our systems provide you with precise measured data within the shortest time frames.



We provide you with solutions for a wide range of tasks in form measurement: from the fully automatic CNC measuring station for all form and position tolerances to combined form and roughness measuring systems to solutions for special crankshaft and camshaft measurements or form measurements in cylinder bores.

## Typical applications

- Bearing rings
- Gear shafts
- Electro shafts
- Brake disks
- Hydraulic and pneumatic components
- Pistons
- Cylinder blocks
- Crankshafts
- Camshafts
- And many more

## Form tolerances

- Roundness
- Straightness
- Flatness
- Cylinder form

## Run-out tolerances

- Radial run-out
- Axial run-out
- Total radial run-out
- Total axial run-out

## Position tolerances

- Parallelism
- Perpendicularity
- Angularity
- Coaxiality, concentricity



Please scan for detailed Formline information

## Specific parameter

- Conicity
- Position deviation
- Length
- Thickness and thickness deviation
- Stroke radius
- Crowning
- Angle deviation
- Waviness analysis
- Twist
- Roughness
- Dominant roundness waviness
- Polar and line form
- Cam form

# Formline F435/F455. Fully automatic measuring of all form and positional tolerances



Formline F435, ergonomic measuring station



Formline F435, desktop device



Measurement of roughness and form with double-tipped probing system



Special measuring station for specific tasks in brake disk measurement



Motorized tilt and rotation module MDS for fully automatic measurement runs (option)

## Highlights

- Automatic centering and leveling of the workpiece and CNC controlled measuring axes for high degree of automation
- Easy CNC programming and workpiece-specific measurement documentation
- Capable evaluation software for determination of all form and positional tolerances
- For demanding measuring tasks in series production or for frequently changing tasks in the metrology lab
- Optional roughness, waviness and twist measurement with free probing system in Z-direction
- Optional evaluation of dominant roundness waviness

## System features

- Highly accurate air bearing rotary table ( $\varnothing$  250 mm) with automatic centering and leveling of the workpiece
- Three motorized measuring axes
- Vertical measuring axis with a measurement range of either 350 mm or 550 mm
- Motorized tilt and rotation module MDS or tilt arm FS1 for perfect probe positioning, even on complex workpieces
- Magnetic coupling for fast probe arm changes and collision protection
- Available as compact desktop device or integrated into an ergonomic measuring station with damping

Model	Workpiece weight	Distance C/Z axis	$\varnothing$ measurable	Measuring height	Centering/leveling	Measuring axes	Option Roughness
F435/F455 Form	40 kg	325 mm	430 mm	350/550 mm	automatic	C, Z, R	no
F435/F455 Roughness	40 kg	325 mm	430 mm	350/550 mm	automatic	C, Z, R	yes, Z axis



# Formline Roundscan. Highly efficient solution for combined form and roughness measurements



Formline Roundscan 555 with optional printer container



Height-adjustable evaluation unit



MDS4 with double-tipped probing system



Form measurement in deep, narrow bores



Integrated probe arm rest

## Highlights

- Time saving thanks to very fast, fully automatic centering and leveling and CNC controlled measuring axes
- Flexible use with free probing system in C, Z and R direction for form, roughness, waviness and twist measurement in a single clamping operation
- Ergonomically optimized design for convenient standing or sitting operation with height-adjustable, tiltable evaluation unit, lockable cabinets, integrated probe arm rest and control panel for key operations
- Flexible access to external/internal measurement positions:
  - + fully automatic probe positioning by CNC controlled tilt and rotation module
  - + fully automatic, freely adjustable probe force and reversible scanning direction

## System features

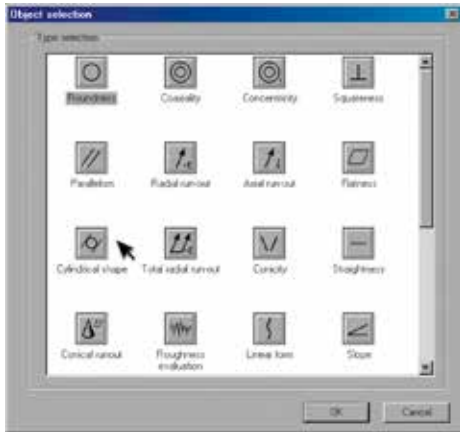
- Highly accurate air bearing rotary table with impressive rigidity for consistently high precision
- High resolution with 0.1  $\mu\text{m}$  in the R/Z axis and 720,000 points in the C axis
- Integrated linear scale and active level control
- Heights of vertical measuring axis: 350, 550 or 900 mm
- CNC controlled motorized tilt and rotation module MDS4 for fully automatic measurements
- Double-tipped probing system can be switched from form to roughness during the CNC run
- Magnetic probe arm coupling for fast changing of the probe arm and protection in case of collisions
- Only very low basic interference of the measuring axes, even at maximum resolution

Model	Workpiece weight	Distance C/Z axis	$\varnothing$ measurable	Measuring height	Centering/leveling	Measuring axes	Option roughness
Roundscan 535/555/590	60   100 <sup>1)</sup> kg	370   420 <sup>1)</sup> mm	430   530 <sup>1)</sup> mm	350/550/900 mm	automatic	C, Z, R, X, Y	yes, C, Z, R axes

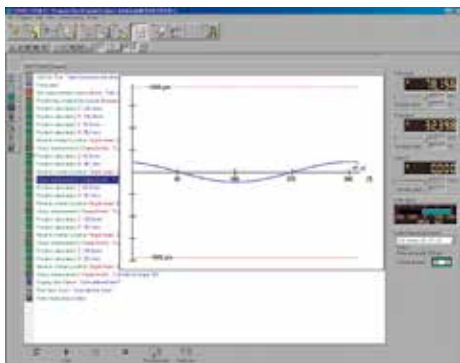


<sup>1)</sup> on request

# Turbo Form. Software with clear user guidance for reliable measurement evaluation



Test plan creation



Automated alignment and measuring run



Results report for form and roughness measurement



Twist measurement with a roughness stylus tip

The graphical, function-oriented Turbo Form user interface ensures simple operation, even when performing complex measurement tasks.

## System features

- User-friendly interface with clear icons
- Simple definition of measurement positions/axis references
- Direct transfer of positions via teach-in
- Simple CNC programming using pictograms
- Fully automatic alignment and measurement
- Comprehensive profile analysis and complete documentation of the measurement results
- Clear program flow
- Evaluation in accordance with standards
- Convenient test plan management
- Fast evaluation algorithms for prompt results
- Fourier analysis for detection of recurring profile parts
- Results display in 3D diagrams
- User-defined presentation of measuring reports
- Automatic saving of PDF reports

## Automatic measurement runs: CNC

- User-independent, reproducible results
- Aligned workpiece is automatically measured at the measuring positions defined in the test plan
- Created in the teach-in mode or via offline license

## Options for specific form measuring tasks

- Line form
- Angular sector
- Fourier synthesis
- Cone
- qs-STAT® interface
- ASCII export interface
- Piston measurement
- Brake disk measurements
- Dominant roundness waviness

## Options for surface measurement

- Evaluation of common roughness, waviness and profile parameters in accordance with standards
- Twist measurement according to Daimler standard MBN 31007-07 with TwistLive® quick analysis method

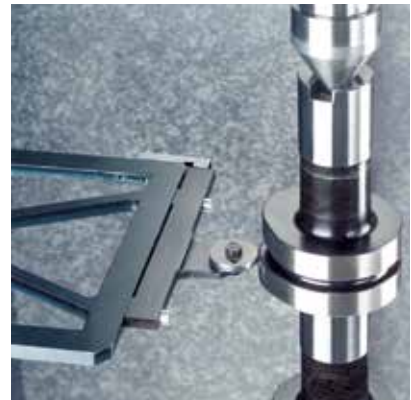
# Formline CFM3010. Comprehensive competence for crankshafts, gear shafts and camshafts



Formline CFM3010



Flat measuring follower for crankshafts



Round measuring follower for camshafts

## Highlights

- Secure measurement results, as there are no mechanical transverse forces
- Excellent basic accuracy thanks to high-resolution measurement systems
- Robust construction with vibration decoupling for use in the measuring room or in the laboratory
- Optimized CNC runs in conjunction with high measurement and travel speeds
- Can be used flexibly for a variety of workpieces

## System features

- Gauging component capability: measuring accuracy with repeatability of up to 0.3  $\mu\text{m}$
- Distance between tips: 1250 or 1500 mm
- Fast measurement value recording
- Wear-free air bearing measuring slides
- Capable evaluation software Tolaris Shaft for camshafts and crankshafts
- Extensive range of accessories such as followers and drivers for different measuring tasks

Model	Workpiece weight	Test diameter	Measuring height
CFM3010	150 kg	300 mm	1250   1500 <sup>1)</sup> mm

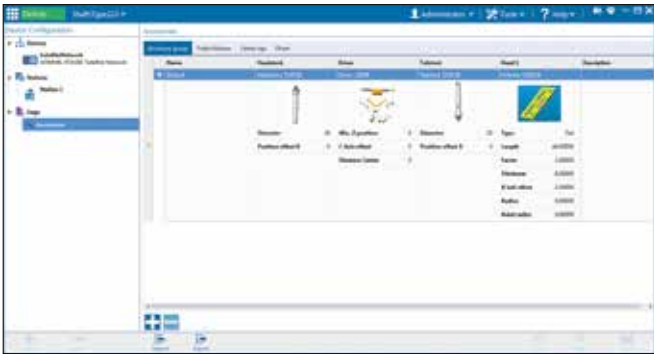


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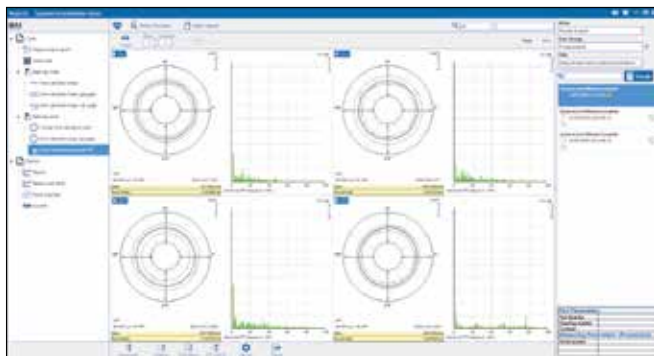
# Tolaris Shaft. Modern evaluation software for reliable process control



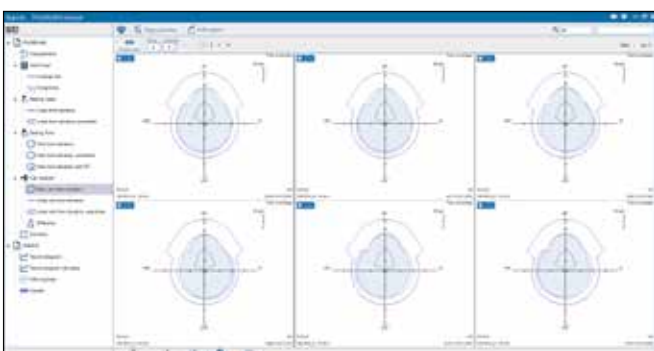
Workpiece displays together with characteristics



Management of workpiece-specific accessories



Polar diagram bearing with FFT



Polar diagram cam form

The Tolaris Shaft evaluation software for the CFM3010 crankshaft and camshaft measuring machine is easy to use and takes all key aspects for controlling and optimizing modern production processes for crankshafts and camshafts into account.

## System features

- Optimized for the measurement and evaluation of crankshafts and camshafts
- Standardized displays to make it easy to familiarize yourself with the software and use it reliably
- Extensive toleration functions
- Clear profile graphics
- Simple print form creation
- Control charts
- Extensive data exports to correct machine tools
- Measuring process and accessories management
- User management
- FFT tolerance zone management
- Offline programming
- Scope for expansion to include specific evaluation functions

## Simple and comfortable use

- Self-explanatory dialogues to support recurring tasks
- Feature-oriented programming with schematic representation of the workpiece with measuring positions
- Simple machine control and CNC programming for automated measuring sequences
- Accessories management for easy organization of clamping equipment and measuring elements for specific workpieces

## Options for specific measuring tasks

- qs-STAT® interface
- Wavinesses such as chatter marks or dominant roundness waviness
- Cam form
- Classification (for final inspection systems)

# Permanent measurement accuracy.



## DKD calibration laboratory

Due to the constant use of measuring equipment and the associated wear and tear, the measuring accuracy can change unnoticed. Regular calibration of the device with the help of traceable standards is required, because only calibrated measuring devices ensure that meaningful and correct results are generated.

Our vibration-free and air-conditioned calibration laboratory (D-K-15030-01-00) is accredited by the Deutsche Akkreditierungsstelle GmbH (DAkkS) according to DIN EN ISO / IEC 17025. Here we calibrate the standards you send us. This ensures direct tracing of the measuring equipment to the Physikalisch-Technische Bundesanstalt (PTB) and guarantees measurements and calibrations at the highest metrological level.

If a standard cannot be calibrated, a new one can be obtained from any of our facilities. For non-accredited parameters we deliver a simple factory calibration certi-

ficates or test reports. We also carry out capability tests for demanding measurement tasks.

## Our range of calibration services

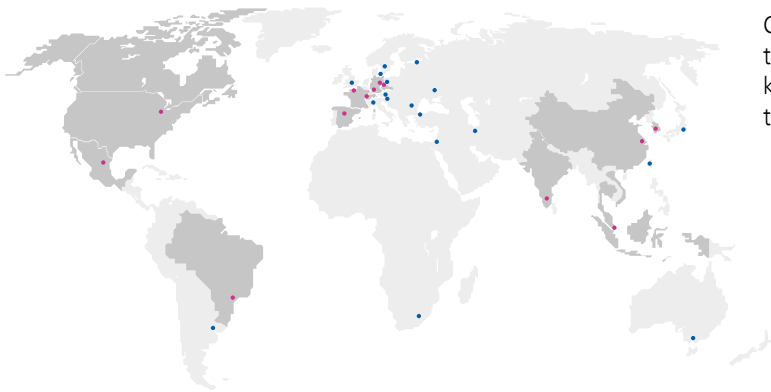
Our DAkkS accreditation includes the measurement of variables such as roughness, profile depth, roughness measurement instruments as well as roundness, straightness, parallelism and contour standards. Within this scope we offer DAkkS-DKD calibration certificates:

- for form standards
- for contour standards
- for roughness standards

## DAkkS-DKD calibration certificate for form standards

Calibration is carried out on our DKD measuring station in an air-conditioned, vibration-insulated measuring room with a rotating spindle system with measuring Z axis. All common form characteristic values can be determined.

## We assist you worldwide.



Our qualified employees are available to assist you across the globe. We have subsidiaries and distribution partners in key industrial nations, meaning that we are always close by to offer you optimum support as a reliable partner.

Visit us on  
YouTube.



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