Formline – Form metrology

Innovative measuring systems
for unequivocal measurement of form and positional tolerances

HOMMEL ETAMIC

A member of the JENOPTIK Group

www.hommel-etamic.com

Precise metrology for efficient quality control

As a leading manufacturer of metrology systems, HOMMEL-ETAMIC offers a broad portfolio of measurement solutions for industrial manufacturing processes. Our technologies include pneumatic measurement, tactile or optical measurement of roughness, contour, form and dimensional features, as well as optical inspection of machined surfaces.

Comprehensive services such as consulting, training, DAkks-DKD calibration and service, including long-term maintenance contracts, round off our worldwide range of metrology services for quality assurance in industrial manufacturing.

Our measuring systems ensure the quality of the workpiece throughout the entire production process and provide precise measurement data in the shortest possible time. Automatic measuring technologies enhance overall productivity during production through efficiently designed inspection solutions – whether inline or offline, or using spot checks through 100 % inspection of all manufactured workpieces.

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 positional tolerances to combined form and roughness measuring systems to solutions for special crankshaft and camshaft measurements.

Typical applications

- Bearing rings
- Gear shafts
- Electro shafts
- Brake disks
- Hydraulic and pneumatic components
- Pistons
- 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 parameters

- 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

Ergonomic measuring station Formline F435

Desktop device Formline F435

Measurement of roughness and form with double-tipped probe 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 probe system in Z-direction
- Optional evaluation of dominant roundness waviness

System features

- Highly accurate air bearing rotary table (Ø 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	ø 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 probe 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 probe 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

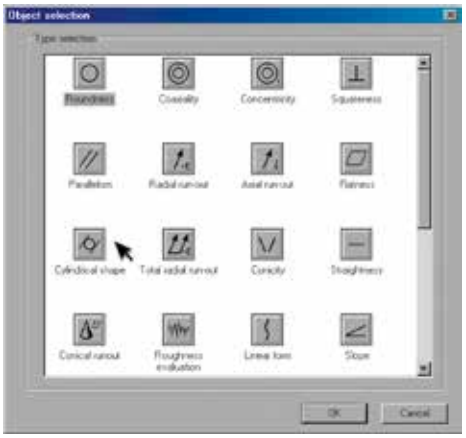
System features

- Highly accurate air bearing rotary table with outstanding rigidity for consistently high precision
- High resolution with 0.1 µm 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 probe 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

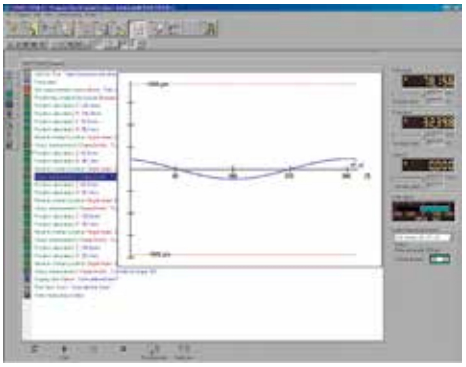
Model	Workpiece weight	Distance C/Z axis	ø measurable	Measuring height	Centering/leveling	Measuring axes	Option Roughness
Roundscan 535/555/590	60 | 100[1)] kg	370 | 420[1)] mm	430 | 530[1)] mm	350/550/900 mm	automatic	C, Z, R, X, Y	yes, C, Z, R axes

[1)] 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 user interface of Turbo Form 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

Software 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

For roughness 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 with evaluation unit

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

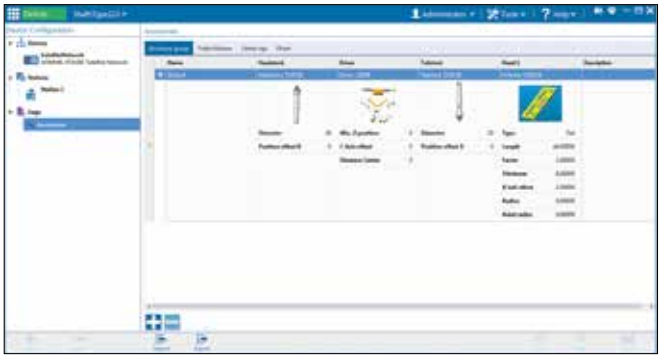
- Gaging component capability: measuring accuracy with repeatability of up to 0.3 µm
- Distance between tips: 1250 or 1500 mm
- Fast measurement value recording
- Wear-free air bearing measuring slides
- Capable evaluation software Tolaris Shaft for camshafts and crankshafts
- Extensive range of accessories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

Model	Workpiece weight	Test diameter	Measuring height
CFM3010	150 kg	300 mm	1250 | 1500[1)] mm

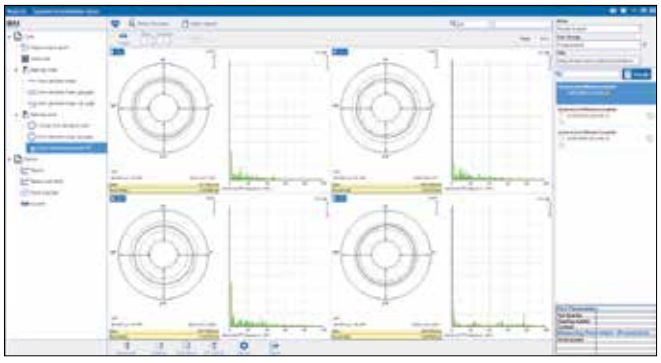
[1)] on request

Tolaris Shaft. Modern evaluation software for reliable process control

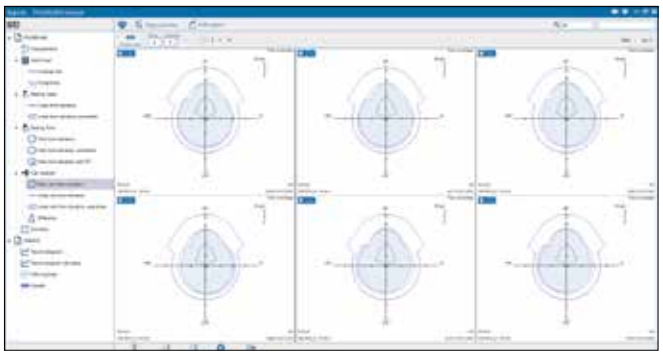
Workpiece displays together with characteristics



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-insulated 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 your standards. 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 simple factory calibration certificates 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, form deviation, contour, contact stylus instruments and shaft measuring systems. Within this scope we issue DAkkS-DKD calibration certificates for e.g.:

- form standards
- contour standards
- 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.

Worldwide availability

Our expert teams are available to assist you wherever you are located. We have subsidiaries and distribution partners in key national nations, in order to assist our customers as a reliable production partner.

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