

Opticline – Optical shaft metrology

Fast and precise quality assurance in the production environment thanks to optical measuring systems



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, DAKS-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.



Opticline solutions present a wide range of evaluation options and numerous areas of application for measuring shaft-type workpieces. Thanks to the fast, optical measuring principle, measurements are performed with an extremely high level of flexibility, repeatability and accuracy.

Successfully implemented solutions worldwide

- Turned and precision turned parts
- Components used in the automotive industry such as electric motors, drive trains, steering parts and turbochargers
- Blanks and pressed parts for metal processing
- High-precision workpieces used in medical technology such as implants, bone screws and tools
- Jets and injection technology
- Components used in the bearings industry
- Turbines and emergency power units
- Parts used in the textile and printing industries
- Applications in the aerospace industry
- Pneumatic and hydraulic parts, such as pumps
- Various electric motors, e.g. for fans, household appliances, positioning and drive systems

Dimensional measurement

- Length
- Diameter
- Radius
- Angle

Thread measurement

- Dimension
- Form

Form measurement

- Straightness
- Roundness
- Cylinder form
- Conicity
- Flatness

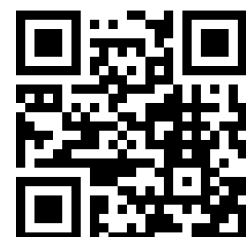
Profile form

- Free form
- Tolerance range

Position measurement

- Radial run-out/total radial run-out
- Axial run-out/total radial run-out
- Straightness
- Symmetry
- Parallelism
- Concentricity
- Coaxiality
- Perpendicularity

Please scan for detailed Opticline information



Rapid and precise quality assurance

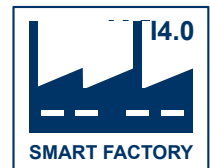
Opticline solutions are the result of Jenoptik's extensive expertise in optical shaft measuring technology, offering innovative and pioneering systems, impressing a broad range of users around the world.



Networked measuring systems to support flexible production: Smart Factory

For production that is largely self-organized, we offer integrated systems that can be seamlessly incorporated into the production process. Recorded measuring values are forwarded directly to the processing machine so that the production process can be corrected in real time.

- Automated processes
- Accurate measurements
- Reliable measurement processes
- Flexible use
- Fast measuring times



Precise and fast – Innovative measuring systems

- Complete measurements in seconds
- High-resolution and μm precise
- Automatic measurement runs
- Integrated tactile probing system (option)
- High-precision headstock for improved form measurement capability (option)

Safe and simple – Optimized for use in production

- Ergonomic design
- Optimized for operator-controlled inspections
- Light barriers for maximum safety
- Results display visible from a distance

Ideal for production – Robust hardware and software

- Camera with IP52 protection
- Enclosure with thermal insulation
- Intelligent functions for compensating negative environmental influences
- Integrated roller shutter (optional)
- Integrated measuring computer (optional)

Durable and reliable –

Long-term gaging component capability

- Intelligent, automatic monitoring of the measuring system
- Integrated, automatic temperature compensation
- No setting master needed for daily use

Flexible and versatile – Simple workpiece change

- Tailstock with convenient functions for quick vertical adjustment and engaging
- Flexible clamping device attachment via Morse taper
- Open enclosure for fast loading
- Minimum set-up times

Intuitive and easy to understand –

Operating and evaluation software

- Fast test plan generation
- Numerous tools and wizards
- Clear representation of results
- Easy mapping of complex test characteristics and tasks
- Quick and easy program change
- Very little training required

Opticline CS. Flexible, optical measuring systems for quality assurance on turned parts



Opticline CS305 for cost-effective measurement of turned parts



Fast worker self-control directly in the production environment



Door or light barrier protects the operator and ensures reliable measurements



Simple clamping of the workpiece between tips

Opticline CS series shaft measuring systems have been designed for production-related applications and offer a high degree of measuring performance and absolute precision from 2 μm in an extremely compact design. They are available at an attractive price and are ideal for operator-independent workpiece checking within the production environment.

System features

- Universal measuring instrument for dimensions, form, position, etc.
- Simple, fast and precise
- Compact design and simple operation
- Traceable quality control
- Sophisticated technology at an attractive price
- Supports flexible production processes
- Simple operation and programming
- Numerous analysis functions
- Simple workpiece changes
- Flexible measuring instrument for a variety of parts
- Reliable measuring processes and clear measurement results
- Statistics-oriented, informative reporting

Measuring capacity	CS155	CS305	CS308	CS314	CS608	CS614
Max. diameter [mm]	50	50	80	140	80	140
Length [mm]	150	300	300	300	600	600

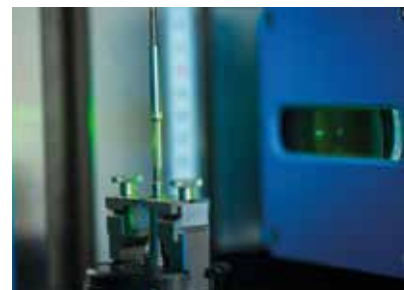
Opticline C. Compact and robust systems for long-term gage repeatability and reproducibility



Opticline C914 with optional, mobile gage enclosure for flexible use in production



Simple, convenient starting of measurements for fast and reproducible measuring results



Workpiece-specific clamping devices for measuring small and very small parts



Integrated light barrier to protect operators in accordance with international safety standards



Simple operation of the measuring machine thanks to fast tailstock adjustment

Opticline C series shaft measuring systems offer maximum gage repeatability and reproducibility from 1 μm . With different configurations, such as a high-precision C-axis or multi-sensor system, the performance capability can be customized to suit your requirements. The instruments thus offer the highest level of flexibility, accuracy and stability.

System features

- Optimum precision properties in μm delivering measurements within seconds
- An individual camera offers bidirectional measurement for workpiece diameters of up to 80 mm
- Scaling of the optical system for measuring diameters of up to 140 mm without loss of resolution or quality
- Special tailstock and headstock design for rapid workpiece changes and maximum precision
- Simple and automatic workpiece alignment
- Real-time processing and fastest possible data transfer
- Self-monitoring functions for reliable use in production
- Low-maintenance, robust measuring system including camera with IP52 protection

Product variants and options

- Tactile probing system T3D or TSP for measuring additional lengths and form test characteristics
- High-precision headstock for higher form gage repeatability and reproducibility and improved rotational measurements
- Integrated measuring and evaluation computer
- Roller shutter to protect against negative environmental influences
- Pneumatic clamping solutions for greater flexibility and workpiece variety
- Table racks for practical loading at working height and additional storage space

Measuring capacity	C203	C305	C308	C314	C605	C608	C614	C908	C914	C1214
Max. diameter [mm]	30	50	80	140	50	80	140	80	140	140
Length [mm]	250	300	300	300	600	600	600	900	900	1200

Opticline CA. Flexible and automated shaft measurement in production



Example integration of Opticline CA618 with robot and loading station



Opticline VMS305 for measuring engine valves; integrated in a production line

Thanks to their special open machine concept, the high-precision Opticline CA systems are ideal for PLC measuring stations with manual loading and automated production.

System features

- Outstanding precision characteristics and flexible in use, including for future workpieces and measuring tasks
- Ideal production suitability and reliability through long-term gaging component capability
- High-precision rotational axis with outstanding form measurement ability
- Automatic tailstock with a long stroke on precision guides
- Quick, easy and accurate workpiece clamping via a motorized tailstock
- Ideally suited for automated measuring of turned parts of different branches of industry and manufacturing
- Optional tactile measurement of length and axial run-out

Customized solutions for flexible use

- Horizontal or vertical system design
- Project-specific housing solutions
- Various options for automated loading and clamping
- Various interfaces for machine integration and control
- Flexible integration into automated production processes
- Ideal accessibility for manual and automatic loading
- Active temperature control and compensation
- Simultaneous control of several production systems by a single operator
- Free software interfaces safeguard results and allow tool compensation for upstream processing machines
- Special systems for fully automatic measurement of valves or crankshafts

Measuring capacity	CA305	CA310	CA314	CA605	CA610	CA614	CA614-AE	CA618	CA618-AE
Max. diameter [mm]	50	100	140	50	100	140	140	180	180
Length mm]	300	300	300	600	600	600	600	580	580

Opticline WMS. Precision for particularly large and heavy workpieces

The machine design of the optical measuring systems Opticline WMS enables them to handle above-average workpiece sizes weighing up to 120 kg.



Opticline WMS1023 in a vertical design

System features

- Top resolution and measurement accuracy across the entire range thanks to a unique, cascaded camera system for workpieces with diameters of up to 320 mm
- Adaptation to your integration requirements: horizontal or vertical design
- Split-second measurements, even with very large workpieces
- Available for operator self-inspection and fully-automated use



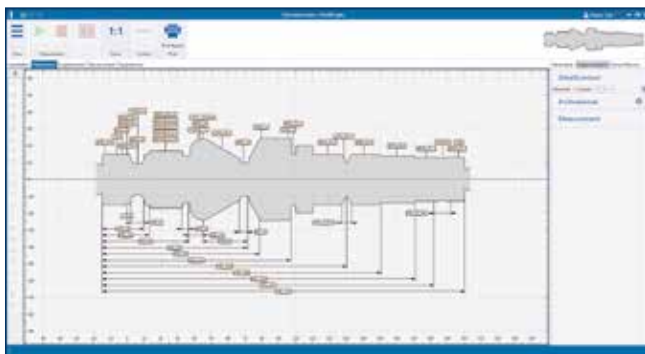
Use in production, loading a crank shaft with operator self-inspection



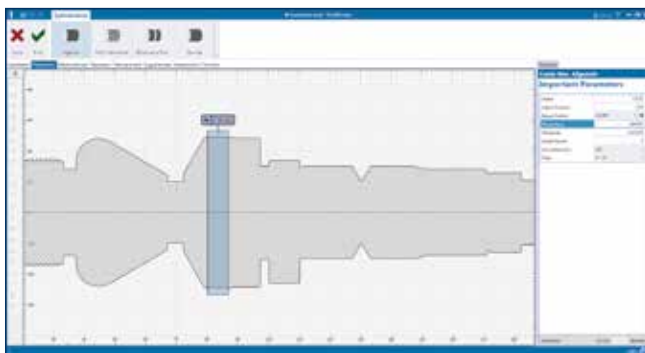
Opticline WMS1332 in a horizontal design

Measuring capacity	WMS1023	WMS1332
Max. diameter [mm]	230	320
Length [mm]	1000	1300

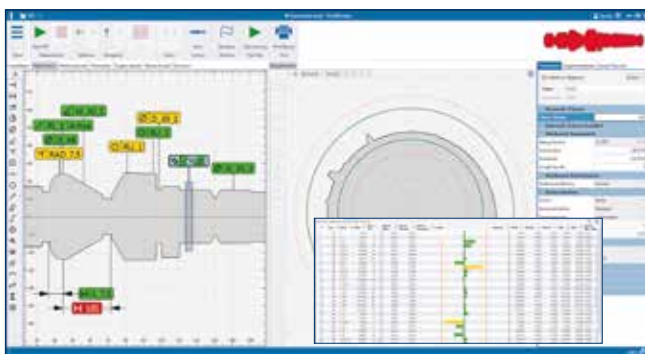
Tolaris Optic. Operating and evaluation software for precise results in seconds



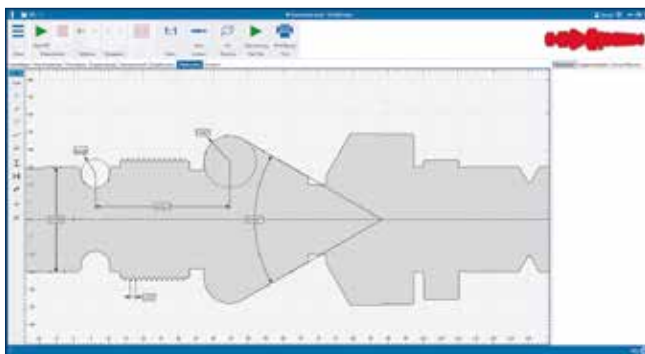
User interface: optimized view for operators



Setting of test characteristics



Results display with detailed contour, results list



Report and template editor

Intuitive operation

- User-friendly, clearly structured graphical user interface
- Wizards for easy creation of test plans and setting of test characteristics
- Clear presentation and subsequent processing of measurement results
- "Live" mode for direct feedback when creating test plans
- Scan of the part contour in different views

Optimized measuring runs

- Easy selection of new characteristics by clicking with the cursor; workpiece contour definition in accordance with drawing specifications
- Scanning and evaluation of workpiece contours in the shortest possible time
- Fast combination of any measurement functions in one test plan
- Fully automated measurement process with results displayed within seconds

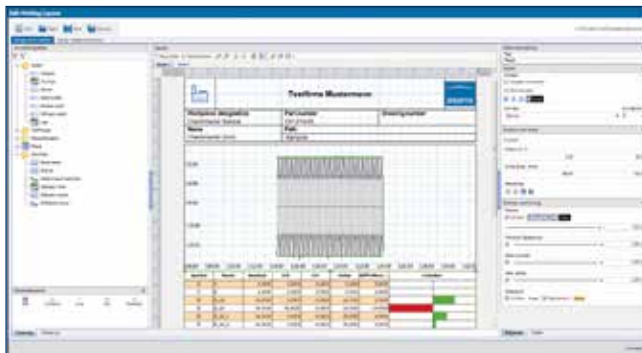
Clear presentation and reliable analysis of measurement results

- Various views for displaying measurement values on screen
- Extensive analysis functions
- Customizable documentation of measurement values
- Various export options for subsequent data processing or documentation
- Database tool for convenient saving and managing of measurement results
- Fast and reliable analysis and interpretation of measurement results by the operator
- Comprehensible and practice-oriented result tracing

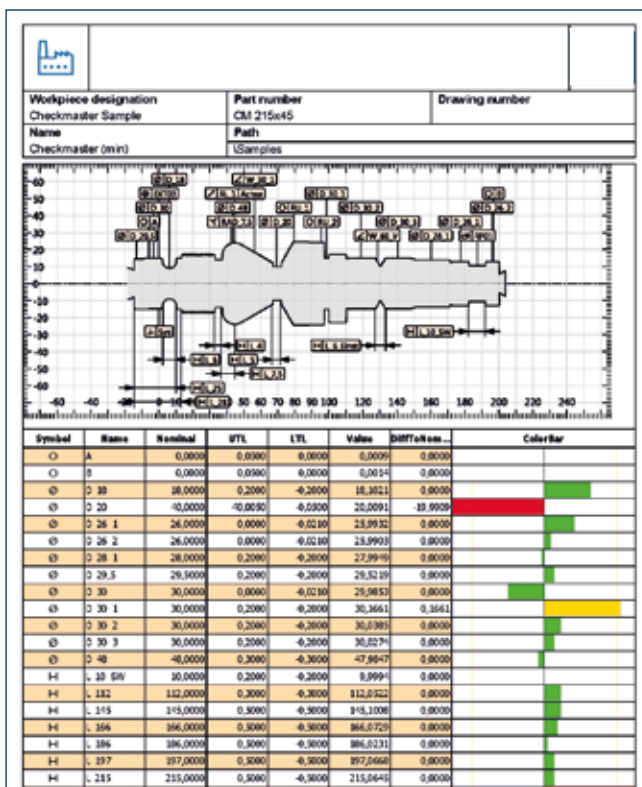
Tolaris Optic. Numerous functions enable convenient evaluation

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Work	NV	Art./Nr./Prod.	NN	Bezeichnung	MN	Art. Dat.	04.10.2012		
Teil									
Teilbez.		HORMEL Checkmaster		Werkst.Bez.		Prüfer (bei)			
Teilnummer		1504001		Hst.Name		HORMEL-ETAMIC OPTICLINE			
Bem.				Prüfgrnd.					
Marken.1	Marken.Bez.	R_{max}	R_z	R_q	$R_{\text{max},2}$	$R_{\text{max},1}$	Index	Index	Gesamt
3	D_18	25	18,10000	0,0015	18,1029	18,1044	$C_q = 40,53$	$C_{pk} = 54,78$	
4	D_20	25	20,01052	0,0003	20,0108	20,0111	$C_q = 259,0$	$C_{pk} = 188,5$	
5	D_26.1	25	25,991310	0,0002	25,9912	25,9914	$C_q = 9,45$	$C_{pk} = 4,48$	
6	D_26.2	25	25,987788	0,0003	25,9877	25,9879	$C_q = 7,81$	$C_{pk} = 6,55$	

Statistical evaluation via optional statistic software



Report and template editor



Result printing

Practice-oriented evaluation software

- Display and operating controls adapted to the requirement profiles of test plan designers and operators
- Simple and comprehensible evaluation software with numerous help functions and error-free workpiece control, even by untrained operators
- Quick and easy software adaptation to specified work processes

Convincing performance features

- Intuitive user guide
- Individual arrangement of software windows on one or more monitors
- Storage and management of measurement results
- Analysis tools for result tracing
- Certified interfaces (Q-DAS, AQDEF)
- Software interfaces via CSV and Script
- Connection of additional, external gaging components via interface box
- Simple generation of individual measurement logs
- Clear presentation of measurement results for comprehensive analysis and quality assurance

Documented quality

- Automated reporting
- Result reports customizable via an Editor function
- Output of graphic contour details
- Sampling reports
- Simultaneous single or multiple value pattern display for individual test characteristics

Multi-sensor technology. For additional evaluation possibilities

Optionally, the shaft measuring systems of the Opticline product family can be extended with a tactile probing system. Tactile measurements can be seamlessly integrated into the optical measurement run and, depending on the design, are suitable for specific applications, such as measurements of axial run-out, grooves or bores. These additional evaluation possibilities add to the quality information within one single measurement run and offer higher flexibility.



Probing system T3D for Opticline C series

Probing system T3D

- Tactile probing system for 3D measurements
- Allows the measurement of grooves, bore and blind holes, run-outs and total run-outs, cam forms, internal measurements on hollow shafts and wheels as well as gear measurement for splines and helical gears
- Multi-sensor solution for increased efficiency and cost reduction with just one measuring system



Probing system BTS for Opticline WMS



Probing system TSP for Opticline C and CA series

Data and temperature acquisition with external sensors

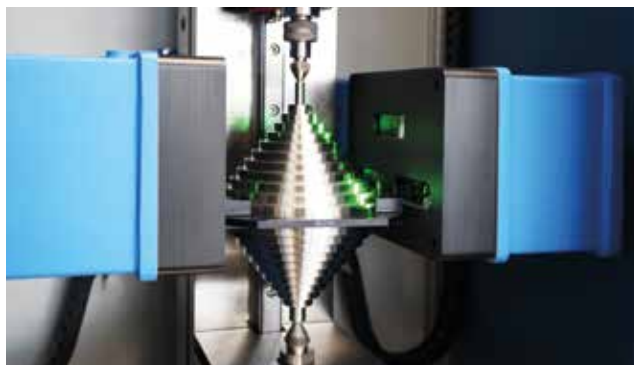


Barcode scanner for test plan selection and data input



Workpiece temperature detection

Calibration. Ensure permanent measurement accuracy



DAkkS-DKD calibrated standards for testing the Opticline measuring systems



DKD calibration laboratory

Manufactured components must always meet geometric requirements equally well, regardless of the production location.

To ensure that the systems used for measurement deliver correct and consistent results, it is important to have them regularly checked by an accredited calibration laboratory and thus trace them back to national standards. This is confirmed by an internationally recognized DAkkS-DKD calibration certificate within the framework of the ILAC agreement.

Our calibration laboratory D-K-15030-01-00 is accredited by the Deutsche Akkreditierungsstelle GmbH (DAkkS) according to DIN EN ISO/IEC 17025. This not only guarantees independent results, but also ensures the traceability of the measuring equipment to the Physikalisch-Technische Bundesanstalt (PTB) for measurements or calibrations at the highest metrological level.

Our range of calibration services

Our 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
- contact stylus instruments
- shaft measuring systems

DAkkS-DKD calibration certificate for Opticline systems

The Opticline systems are calibrated at our customers' sites according to precisely defined test instructions – ideally after the system has been serviced.

After careful cleaning, certified inspectors from our calibration laboratory use two DAkkS-DKD-calibrated standards to measure diameter and length, which cover at least two thirds of the measuring range.



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.

