



ROTATION MEASURING SYSTEM SM70X | SM80X

Optical measuring system for fast quality assurance of screws, bolts, rivets and similar rotationally symmetrical products

FIELD OF APPLICATION: High-precision measurement of the external geometries of rotationally symmetrical parts, such as screws, bolts and rivets, as well as other turned or formed parts. Typically used in production, final inspection, incoming goods inspection and development in the following industries:

Automotive industry | Aerospace | Medical technology | Fasteners industry in general

FEATURES AND BENEFITS

- 360° scan and evaluation in seconds
- Integrated database and production control
- Customized inspection plans and measurement protocols
- Worker self-monitoring in production
- Visualization of trends of measured characteristics in control charts
- Over 30 years of specialization in this industry

MEASURING CAPACITY

Geometric sizes and shapes

- Diameters
- Lengths
- Radii
- Angles
- Cones
- Spheres
- Contours

Shape and position tolerances

- Straightness
- Roundness
- Coaxiality
- Concentricity
- Radial runout
- Total radial runout
- Axial runout
- Total axial runout
- Cylindershape
- Symmetry
- Parallelism
- Perpendicularity

Thread measurement

- Metric threads
- Inch threads
- Trilobular threads
- Taper threads

MEASUREMENT PRINCIPLE

- Fast optical measurement of the entire test part
- Precise, objective and reliable
- Simple loading, no exact positioning necessary
- Clear result display with measuring point position
- Automatic or manual measurement (manual operation)
- Robust, low-maintenance and durable measurement equipment

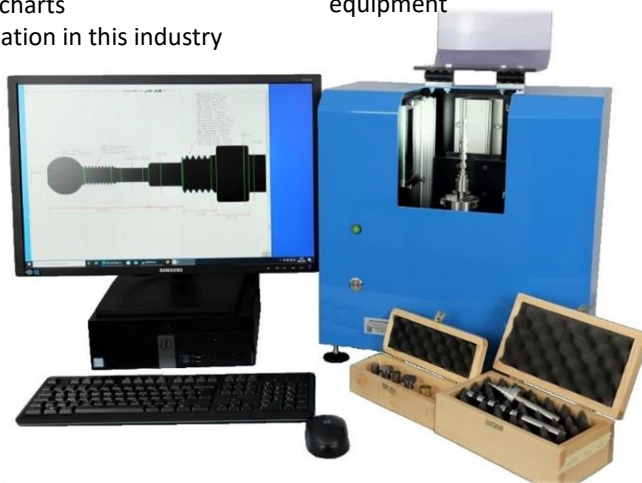


Figure above: SM801-32 | Figure below: Test part spectrum



Measuring functions

The software contains over 100 measuring functions (number constantly growing), which are specially designed for measuring features on screws and similar rotationally symmetrical machine parts. This solves many measuring tasks in the shortest possible time and speeds up the creation of measuring programmes considerably.

Software interfaces

The measurement data is stored in the integrated database and can be exported automatically.

- MS-Excel®
- Q-Das format
- ASCII format
- SAP
- JSON
- SQL
- QSYS
- Automation interface

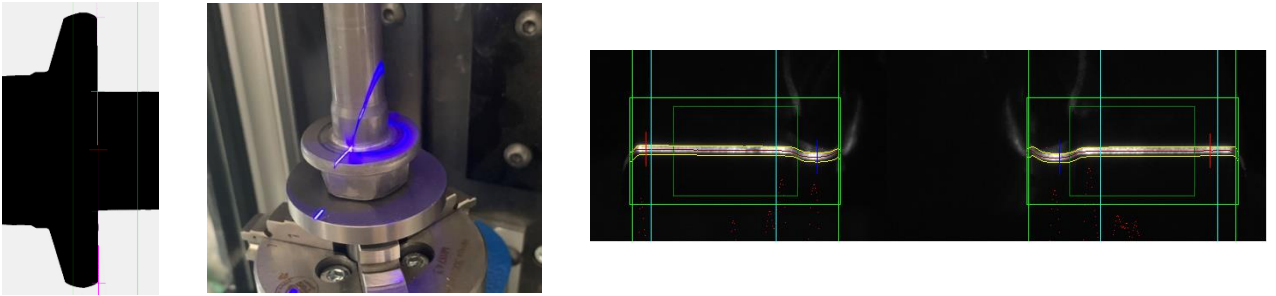


TECHNICAL SPECIFICATIONS						Electrical energy supply			
Environmental conditions						Rated voltage:	220-240	V	
Protection:	IP20	Installation location:		Production, laboratory, office		Rated current:	2	A	
Temperature:	5 ... 40 °C	Relative humidity:		5 ... 95% (non condensing)		Rated power:	480	W	
General specifications									
Delivery scope	Measuring machine, computer with pre-installed software, monitor, peripherals, set of measuring supports and magnets, power cable								
Software	The measurement and analysis software is constantly being adapted and further developed to meet current industry requirements.								
Sprachen	German, English, Chinese, French, Spanish, Turkish, Czech, Indian, ...					Warranty	2 years		
Optionen	<ul style="list-style-type: none"> • DAKKS-certified calibration standards with certificate • Power supply: 110 V / 60 Hz Configuration 				<ul style="list-style-type: none"> • Combine (optimize) the best optics to suit customer requirements • Longer travel for test part lengths of up to 550 mm 				
Standard machines (other versions on request)									
Model	Type / Optics	Max. part dimensions		No. of cameras & sensor resolution [MP]	External dimensions [cm] WxHxD	Weight [kg]	Description		
		Ø [mm]	Length [mm]						
SM701	-17	17	200	1 Camera 2,3 MP	43 x 54 x 25 46 x 55 x 25 55 x 70 x 25	26 29 35	Low-cost measuring machines for specific applications with fixed part sizes		
	-33	33	250						
	-45	45	350						
SM702	-26-08	26	250	2 Camera 2,3 MP	65 x 50 x 25 70 x 51 x 25 82 x 60 x 25 72 x 101 x 25	34 37 42 45	Versatile measuring machines for accurate and fast measurements on parts of different sizes		
	-33-11	33	250						
	-45-17	45	350						
	-56-26	56	350						
SM702tr	-33-11-17	33	250	3 Camera 2,3 MP	70 x 81 x 25 67 x 90 x 25 72 x 101 x 25 78 x 105 x 25	44 49 57 61	Versatile measuring machines with additional overhead geometry measurement using triangulation		
	-45-17-26	45	350						
	-56-26-45	56	450						
	-68-33-65	68	450						
SM703	-45-17-08	45	350	3 Camera 2,3 MP	82 x 60 x 25 77 x 74 x 25 83 x 89 x 25	46 48 55	Universal, accurate and fast measuring machines for a wide range of parts		
	-56-26-10	56	350						
	-68-33-11	68	450						
SM801	-25	25	230	1 Camera 12,0 MP	46 x 55 x 25 46 x 55 x 25 55 x 70 x 25 62 x 82 x 25	30 31 38 47	Latest generation / Higher camera sensor resolution saves costs and significantly increases accuracy		
	-32	32	240						
	-43	43	340						
	-54	54	440						
Accuracy (1)		Measuring field size (camera image size) Length x diam. [mm]	Magnification (on 24" monitor)	[y] Accuracy Diameter (in the measuring field)		[x] Accuracy Length (in the measuring field) (2)		Recommended minimum characteristic values that can be measured with the corresponding optic (3)	
Optics part number				Accuracy [µm]	Precision [µm]	Accuracy [µm]	Precision [µm]	Thread size [mm] (4)	Radii, chamfers, taper length, groove width & similar details [mm]
SM70X	-08	12 x 8,5	42.0	± 0.5	± 0.5	± 2.5	± 1.0	M0.8	0.08
	-10	14 x 10	35.0	± 0.5	± 0.5	± 3.0	± 1.0	M1	0.10
	-11	17 x 11,5	29.0	± 0.5	± 0.5	± 3.5	± 1.0	M1.2	0.12
	-17	27 x 17	15.0	± 0.8	± 0.5	± 5.0	± 1.5	M1.8	0.20
	-26	37 x 26	10.0	± 0.8	± 0.5	± 5.0	± 1.5	M2.5	0.25
	-33	48 x 33	8.0	± 1.0	± 0.8	± 8.0	± 2.0	M3	0.30
	-39	62 x 39	7.0	± 1.5	± 1.0	± 8.0	± 2.0	M3.5	0.35
	-45	70 x 45	6.0	± 2.0	± 1.5	± 10.0	± 3.0	M4	0.40
	-56	87 x 56	5.0	± 2.0	± 1.5	± 10.0	± 3.0	M5	0.50
	-68	106 x 68	4.0	± 3.0	± 2.0	± 10.0	± 3.0	M6.5	0.55
SM80X	-85	132 x 85	3.0	± 4.0	± 2.0	± 15.0	± 5.0	M8	0.60
	-93	145 x 93	3.0	± 5.0	± 2.5	± 18.0	± 6.0	M9	0.70
	-104	158 x 104	2.5	± 6.0	± 3.0	± 22.0	± 7.0	M10	0.80
	-25	36 x 25	11.0	± 0.8	± 0.5	± 4.0	± 1.5	M1	0.10
	-32	47 x 32	8.0	± 1.0	± 0.7	± 6.0	± 2.0	M1.5	0.15
	-43	62 x 43	6.0	± 1.5	± 1.0	± 8.0	± 3.0	M2	0.20
-54	83 x 54	5.0	± 2.0	± 1.4	± 10.0	± 4.0	M2.5	0.25	

1) The information is based on the mean deviation and standard deviation of measurement results from long-term studies (> 1 year) with DAKKS-calibrated reference standards at 20 ± 5 °C.
2) When measuring distances in the x-direction (lengths) where the linear unit moves the test part, the values for accuracy and precision increase by ± ([L[mm]/100 * 3) µm
3) The smallest measurable features on the workpieces (depending on the optics used) for precise and repeatable measurements. Depending on, for example, the production method or surface finish, smaller or larger values are possible. Procedures for determining measuring equipment capabilities for specific measuring tasks are integrated into the software. This ensures that all characteristics on a test part are measured with sufficient accuracy for the production processes.
4) The above specifications for minimum measurable thread sizes for the respective optics only apply if the thread measurement has been calibrated via the software. Otherwise the following applies to the specifications in the table above: For accurate, reliable thread measurements, the specifications for minimum thread sizes for the optics must be doubled.



SM70Xtr - Measurement of concave underhead geometries by triangulation



Figures 3 - Side view | Figure 4 - Projector line on the workpiece | Figure 5 - Oblique axial camera view

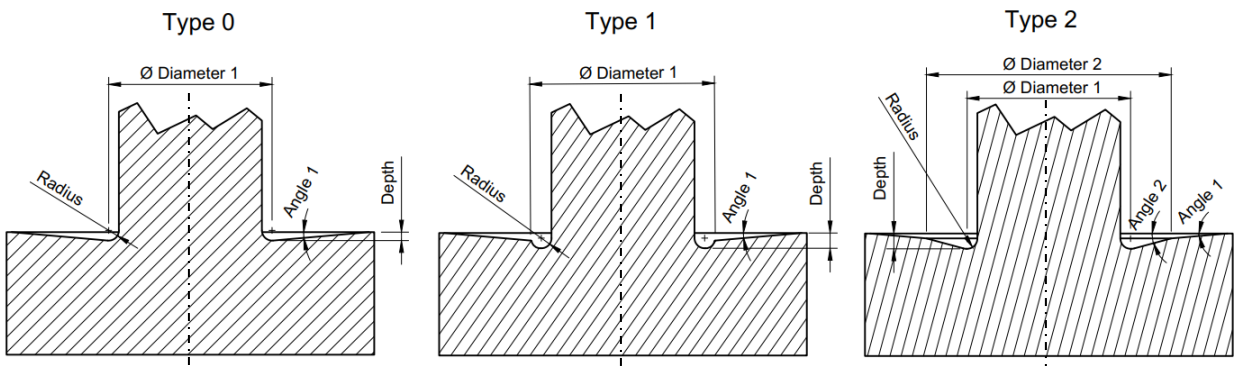


Figure 6 - Currently implemented head geometries. Other screw head geometries on request.

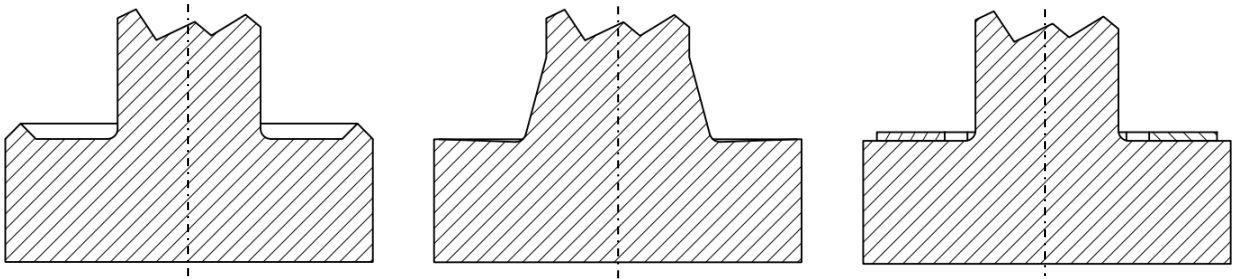


Figure 7 - Other measurable head shapes (on request)

Triangulation accuracy	Recommended minimum head \varnothing	Expanded measurement uncertainty [U95] *			
		Concave angle	Radius	Diameter	Depth
tr-XX-XX-17	$\varnothing 6$	$\pm 0.03^\circ$	$\pm 0.05\text{mm}$	$\pm 0.05\text{mm}$	$\pm 0.02\text{mm}$
tr-XX-XX-26	$\varnothing 10$	$\pm 0.04^\circ$	$\pm 0.05\text{mm}$	$\pm 0.05\text{mm}$	$\pm 0.02\text{mm}$
tr-XX-XX-45	$\varnothing 15$	$\pm 0.05^\circ$	$\pm 0.05\text{mm}$	$\pm 0.05\text{mm}$	$\pm 0.02\text{mm}$
tr-XX-XX-65	$\varnothing 24$	$\pm 0.06^\circ$	$\pm 0.06\text{mm}$	$\pm 0.06\text{mm}$	$\pm 0.03\text{mm}$

Determined in accordance with DIN 1319 Part 3 on a DAkkS-calibrated reference standard. After the machine has been calibrated with the calibration tools provided. Ambient temperature = $(20 \pm 5)^\circ\text{C}$