Polytec

The TMS-350 TopMap In.Line is well suited for the measurement of both rough and smooth surfaces. Even workpieces that have wide variations in local surface reflectivity can be measured thanks to Polytec's Smart Surface Scanning Technology. TopMap offers a wide dynamic range, allowing easy measurement of surfaces with large steps or waviness. Even structures and regions deep inside drilled holes can be accessed. Flatness and parallelism parameters are calculated from single and multiple surfaces.

Highlights

- Fast results with high vertical resolution over large fields-of-view
- Measurement of surfaces with high aspect-ratio (e.g. drilled holes) using telecentric optics
- Compact and flexible design (easy integration into production line)
- Easy to use software with ISO compliant parameters makes it possible for automatable applications in production lines

TMS-350 TopMap In.Line

Precise, quick and easy measurement of flatness, step height and parallelism

Preliminary Datasheet

Technical Specifications

Hardware	TMS-E-350 Controller	TMS-I-350 Interferometer
Dimensions [L x W x H]	240 mm x 140 mm x 420 mm	376 mm x 199 mm x 112.5 mm
Weight	5.5 kg	10 kg
Power	100 ... 240 VAC ± 10%, 50/60 Hz; max. 30 W	
Operating temperature	+5 °C... +40 °C	
Storage temperature	-10 °C... +65 °C	
Relative humidity	max. 80 %, non-condensing	
Photobiological safety	DIN EN 62471:2009-3	
Protection type	IP 64	
Electrical Safety	IEC/EN 61010-1:2011-07; EMV: IEC/EN 61326:2006-10	
Scope of delivery	Interferometer, controller, industiral PC with TFT-monitor, connection cable, 1 reference filter, TMS software with hardlock (Dongle), dryer cartridge	
Optional accessories	More reference filters, λ/20-plate, calibration kit, tripod, sample positioner, complete workstation	

Optical specifications	
Measurement method	Scanning white-light interferometry
Imaging system	Telecentric
Light source	long lifetime LED, λ = 525 nm
Camera	CCD camera
Maximum number of points in single measurement	X: 648, Y: 488
Vertical dynamic range	500 µm
Working distance	ca. 40 mm

System options				
Model	Field of view	Sampling interval	Optical resolution (measured)	Calculated maximum slope angle [1]
TMS-350 L	Ø 21 mm (excluding top and bottom)	X: 40.2 µm; Y: 40.2 µm	72 µm	0.94°
TMS-350 M	13.68 x 10.31 mm^2	X: 21.15 µm; Y: 21.15 µm	40 µm	1.82°
TMS-350 S	6.43 x 4.84 mm^2	X: 9.92 µm; Y: 9.92 µm	17.9 µm	3.80°

1 Calculated based on numerical aperture

Z-Performance parameters [1]					
Measurement conditions [2]		Nominal sampling increment (18.4 µm/s)		Fast sampling (134 µm/s)	
Evaluation process		Smooth surfaces [3]	Rough surfaces [4]	Smooth surface [3]	Rough surfaces [4]
Measurement noise (single measurement)	nm	0.35	11	0.5	13.5

Representative flatness measurement results [5]					
Measurement conditions [2]		Nominal sampling increment (18.4 µm/s)		Fast sampling (134 µm/s)	
Evaluation process		Smooth surfaces [3]	Rough surfaces [4]	Smooth surface [3]	Rough surfaces [4]
Average flatness deviation	nm	10.3	50	20	255
Repeatability of a flatness measurement	nm	0.72	15.7	0.75	100

1 Empirically measured, typical specification parameters for the Z-performance of the TMS-350. Measuring on a flat mirror (95% of the maximum measuring field, interference contrast ≈ 1).

2 Nominal sampling increment: correlogram sampling according to Nyquist. Fast sampling: correlogram sampling according to sub-Nyquist. Difference in measuring time is a factor of 2.

3 Evaluation of the correlogram phase.

4 Evaluation of the correlogram envelope.

5 Rounded values derived by empirical measurement data and a statistical evaluation of the measured flatness for several TMS-350 at different sample increments and for both correlogram evaluation procedures. Measurements on a plane mirror (95% of the maximum field of view used, interference contrast ≈ 1).

Representative step height measurements on a PTB calibrated depth setting standard [1]				
Nominal groove depth	**µm**	**5**	**50**	**450**
Repeatability [2] (Standard deviation)	µm	0.01	0.01	0.02
Relative repeatabilty	%	0.166	0.023	0.005
Reproducibility [3] (Standard deviation)	µm	0.01	0.01	0.02
Relative reproducibility	%	0.166	0.023	0.005
Expanded measurement uncertainty [4]	µm	0.05	0.05	0.23
Relative expanded measurement uncertainty	%	1.0	0.1	0.05

1 Empirically determined representative performance for measurements on a calibrated PTB depth setting standard type A1 (ISO 5436-1), sample increment “Nominal” or “Fast Sampling”.

2 Variation of the measurement values for a series of measurements under repeatability conditions, averaged for several measurement devices.

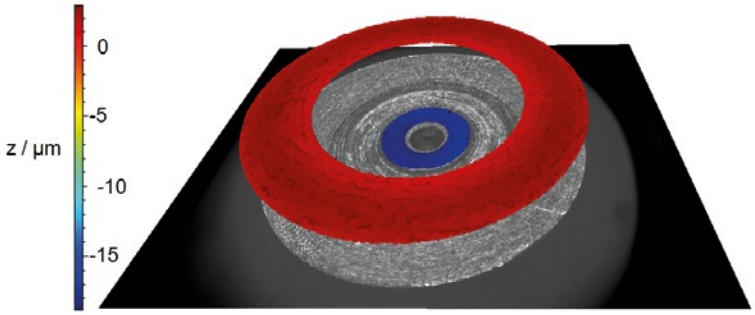
3 Variation of the measured deviation on every step for a series of measurements under reproducible conditions with several measurement devices.

4 Margin of the confidence interval with a probability of 95.4% (2 σ), determined by the standard deviation from the calibrated value of a single step (several devices under reproducible conditions).

Application Examples

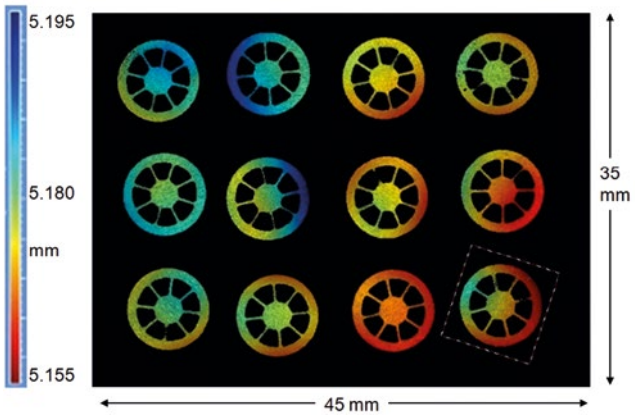
Measurement of large surfaces

Even larger surfaces with different step heights can be acquired with a single measurement (without stitching). Thanks to high working distance (40 mm), such objects can be easily measured in production conditions. Easy to use Polytec software makes it possible to evaluate surface data in different ways such as areal parameters. For process qualifications, a Qs-STAT interface is already implemented and customization for specific applications is also possible.



Pattern recognition

Integrated pattern recognition algorithms locate the positions of different objects and each sample is evaluated individually. Therefore special fixtures are not required and many samples can be measured simultaneously.



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