Метрологические приборы Tropel
Описание

По вопросам продаж и поддержки обращайтесь:

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Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
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Тверь (4822)63-31-35
Тольятти (8482)63-91-07
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Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
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Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
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CORNING

Tropel® FlatMaster® Surface Form Analysis System

Fast and Precise Measurement of Ground, Lapped, Honed, Polished and Super-finished Components

The Tropel® FlatMaster® offers industry leading performance for surface form measurements to precision component manufacturers. Our non-contact optical technique analyzes the entire surface of the part in seconds, regardless of its size or complexity. The FlatMaster provides five nanometer resolution and a standard accuracy of 50 nm (2.0 µ"). It rapidly and accurately measures flatness, line profile, radius and other surface parameters on a variety of materials and surface finishes.

A FlatMaster on the shop floor or in the QC lab will significantly improve processes, yields and productivity via full-form measurements with unprecedented speed and throughput.

Key Benefits

- Improves product quality, manufacturing yield and throughput
- Lowers manufacturing costs
- Increases process awareness and understanding
- Reduces time-to-market
- Increases customer satisfaction

Power

- High resolution and accuracy
- Large dynamic range
- Fast measurements -- complete surface analysis in seconds
- Excellent reproducibility results from operator to operator

Flexiblity

- Measures a variety of material types
- Measures a wide range of surface finishes

Easy to Use

- Place the part and measure, little or no fixturing required
- Intuitive recipe driven operation
- Suitable for production, quality control, or development environments

Tropel® FlatMaster® System Specifications

Performance

	FlatMaster 40	FlatMaster 100	FlatMaster 200
Part Size Range[1]	5 mm — 40 mm (0.2 in — 1.6 in)	25 mm — 100 mm (1.0 in — 4.0 in)	25 mm — 200 mm (1.0 in — 8.0 in)
Dynamic Range[2]	>50 µm	>100 µm	>100 µm
Measurement method	Grazing Incidence Interferometry		
Accuracy[3]	50 nanometers (2.0 µinches)		
Repeatability[3]	15 nanometers (0.6 µinches) (1 sigma)		
Resolution	5 nanometers (0.2 µinches)		
Measurement time	5 seconds typical		
Measured data points	up to 230,000 per measurement		
Measurement Datum	Least squares, minimum zone		
Filtering	ISO standard included		

Materials and Surfaces

Materials	Metals, glass, polymers, ceramics, and many others
Surfaces	Ground, lapped, polished, honed, super-finished and others
Reflectivity	Minimum of 10% at 85° incidence angle
Maximum roughness	1.0 µm (40 µinches) Ra (typical at 4 µm/fringe)

Environmental and Facility

Temperature	15 °C to 30°C (59 °F to 86 °F)
Rate of temperature change	<2° C, with no more than 0.5°C per half hour period
Humidity	35% - 75% non-electrostatic and non-condensing
Power	100-240 VAC, 50/60 Hz, 4 Amp
Air/Vacuum	n/a
FlatMaster 40 System dimensions/weight	103 cm x 57 cm x 26 cm / 60 Kg (41 in x 22 in x 10 in / 132 lb)
FlatMaster 100/200 System dimensions/weight	76 cm x 65 cm x 34 cm / 75 kg (30 in x 26 in x 13 in / 165 lb)

[1] Smaller parts may be measured at different performance characteristics.
[2] Typical, limited by surface slope.
[3] Refers to instrument limited accuracy as measured on NIST traceable artifact as measured at 2 µm / fringe sensitivity. See FlatMaster Acceptance Procedure for further details.

This product is covered by one or more U.S. patents.
All specifications are subject to change.
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FlatMaster® is a registered trademark of Corning Incorporated.

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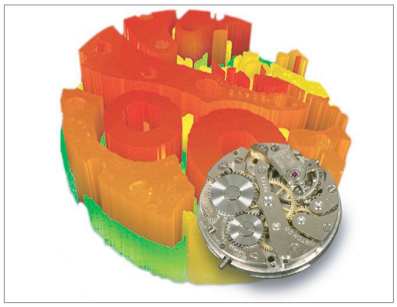
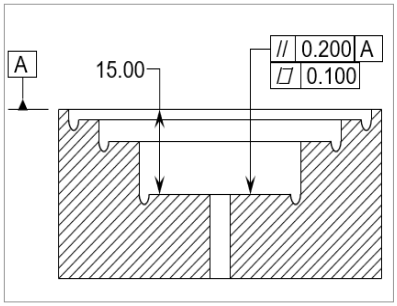
Tropel® FlatMaster® MSP Surface Metrology System

Advanced Optical Measurement System for Flatness, Parallelism and Height/Depth

Measuring complex, high- precision parts with multiple surfaces is usually done with contact profilers. Contact gages are slow, collect small amounts of data and typically require complicated programming. But now, with the FlatMaster MSP (Multi Surface Profile), a non-contact frequency scanning interferometer, multiple surfaces (with up to 300 millimeters of separation*) are simultaneously measured in just seconds. Hundreds of thousands of data points are collected and analyzed, providing complete surface characterization for flatness, parallelism, and height/depth with sub-micron accuracy. The FlatMaster MSP can measure parts up to 300 mm diameter, on a variety of materials and surface finishes.

*FlatMaster MSP 150 and 300





Key Benefits

- Improves product quality, manufacturing yield and throughput
- Lowers manufacturing costs
- Increases process awareness and understanding
- Reduces time-to-market
- Increases customer satisfaction

Power

- High resolution and accuracy on multiple surfaces at multiple heights over the entire measurement range
- Large dynamic range
- Fast measurements, independent of measured range or number of surfaces
- Excellent reproducibility results from operator to operator

Flexiblity

- Measures multiple surfaces simultaneously
- Measures a variety of material types
- Measures a wide range of surface finishes

Easy to Use

- Place the part and measure, little or no fixturing required
- Intuitive recipe driven operation
- Suitable for production, quality control, or development environments

Tropel® FlatMaster® MSP System Specifications

Performance

	MSP 40	MSP 150	MSP 300
Field of view	43 mm (1.7 in)	150 mm (5.9 in)	305 mm (12.0 in)
Z-Resolution	1 nm (0.04 µin)	1 nm (0.04 µin)	1 nm (0.04 µin)
Lateral resolution	0.04 mm (0.0016 in)	0.15 mm (0.006 in)	0.17 mm (0.007 in)
Measurement range (Z-Axis)	Up to 40 mm (1.6 in)	Up to 150 mm (5.9 in)	Up to 300 mm (11.8 in)
Measurement method	Frequency scanning interferometry		
Measurement time	30 seconds typical		
Measured data points	up to 3.1 million per measurement		
Materials	Metals, glass, polymers, ceramics, and many others		
Surfaces	Fine-ground, lapped, polished, honed, super-finished and others		

Accuracy and Repeatability

	Accuracy*	Repeatability
Flatness	60 nm (2.4 µin)	20 nm (0.8 µin)
Parallelism	100 nm (4.0 µin)	20 nm (0.8 µin)
Depht/height	50 nm + 30 nm per mm step height	100 nm (4.0 µin)

Tropel Metrology Software (TMS™)

Standard parameters	15 °C to 25°C (59 °F to 77 °F)
User-defined report layouts	< 1.0 °C per hour
Data management	5% to 95% relative humidity, non-condensing

Environment and Facility

Temperature	15 °C to 25°C (59 °F to 77 °F)
Rate of temperature change	< 1.0 °C per hour
Vibration isolation	Passive isolation included
Humidity	5% to 95% relative humidity, non-condensing
Power	100-240 VAC, 50/60 Hz, 4 Amp
Air/vacuum	None required
System dimentions (W x D x H)	160 cm x 103 cm x 150 cm (63 in x 40 in x 59 in)
System weight	390 kg (860 lb)

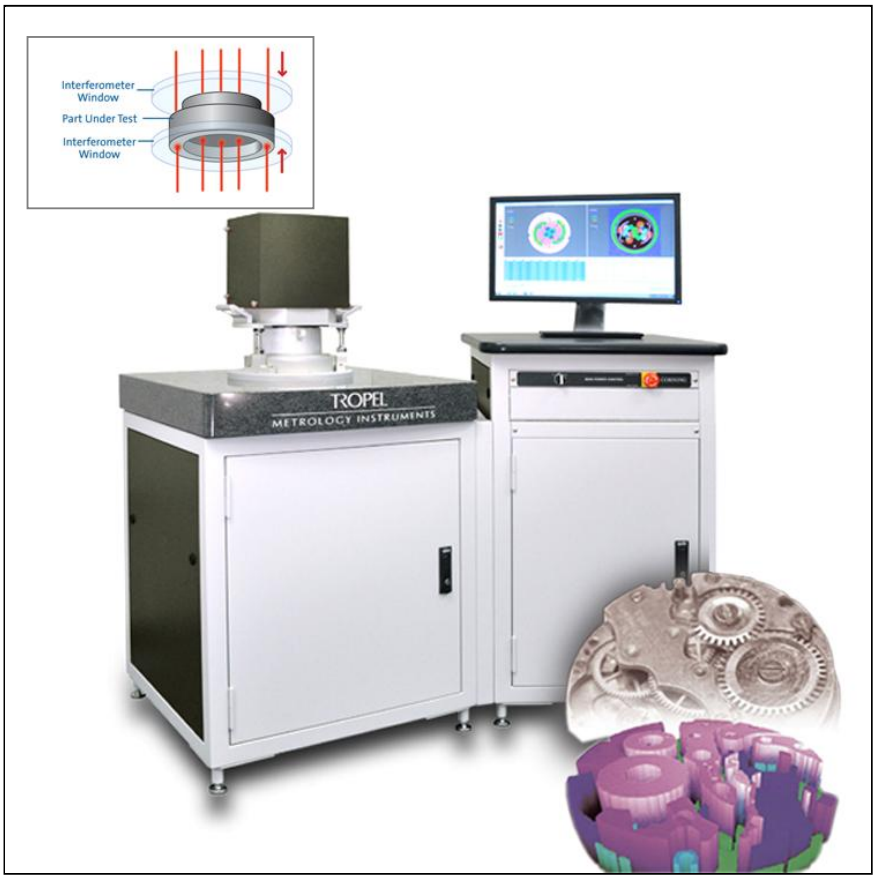
*Refers to instrument limited accuracy and repeatability (1σ) as based on measurement of traceable artifact

Tropel® FlatMaster® MSP-DH Surface Metrology System

Advanced Optical Measurement System for Flatness, Parallelism and Height/Depth

CORNING

Corning introduces the dual-head Tropel® FlatMaster® MSP-DH Optical Metrology System; a non-contact frequency scanning interferometer that simultaneously measures both sides of precision parts. This system provides measurement results for absolute thickness, depth, height, parallelism and flatness. Complex parts are fully characterized with sub-micron accuracy in just seconds!



Key Benefits

- Improves product quality, manufacturing yield and throughput
- Lowers manufacturing costs
- Increases process understanding and reduces time to market
- Increases customer satisfaction

Powerful

- Measure two opposing surfaces of a single part simultaneously
- Full-surface characterization in seconds
- Absolute thickness, relative height, depth, flatness and parallelism of multiple regions on opposing sides

Flexible

- Fast and easy programming setup
- Measures a variety of surface types and finishes
- Suitable for production, quality control or R&D applications

Easy to Use

- Load parts with little or no fixturing
- Intuitive recipe-driven measurements

Tropel® FlatMaster® MSP-DH System Specifications

Performance

	FlatMaster MSP-DH 40	FlatMaster MSP-DH 150	FlatMaster MSP-DH 300
Field of view	43 mm (1.7 in)	150 mm (5.9 in)	305 mm (12.0 in)
Z-Resolution	1 nm (0.04 µin)	1 nm (0.04 µin)	1 nm (0.04 µin)
Lateral resolution	0.04 mm (0.0016 in)	0.15 mm (0.006 in)	0.17 mm (0.007)
Maximum Part Thickness	Up to 50 mm (2.0 in)	Up to 300 mm (11.8 in)	Up to 300 mm (11.8 in)
Measurement method	Frequency Scanning Interferometry		
Measurement time	30 seconds typical		
Measured data points	up to 3.0 million per measurement		
Materials	Metals, glass, polymers, ceramics, and many others		
Surfaces	Fine-ground, lapped, polished, super-finished and others		

Accuracy and Repeatability

	Accuracy*	Repeatability*
Flatness	60 nm (2.4 µin)	20 nm (0.8 µin)
Parallelism	100 nm (4.0 µin)	20 nm (0.8 µin)
Depth/Height/Thickness	50 nm + 30 nm per mm step height	100 nm (4.0 µin)

** Refers to instrument limited Accuracy and Repeatability (1σ) as based on measurement of traceable artifact*

Tropel Metrology Software (TMS™)

Standard Parameters	Flatness, depth/height, parallelism, line profile, surface profile
User-defined Report Layouts	User-configurable including: OpenGL® 3-D, 2-D, line trace (X/Y, radial, circular), color contour, isometric, histogram, user-defined tolerances, pass/fail criteria
Data Management	Available in report layouts, also MS Access® database, MS Excel®, CSV and serial port, optional export to industry standard database formats

Environmental and Facility

Temperature	15 °C to 25°C (59 °F to 77 °F)
Rate of temperature change	< 1.0 °C per hour
Vibration Isolation	Passive isolation included
Humidity	5% to 95% relative humidity, non-condensing
Power	100-240 VAC, 50/60 Hz, 4 Amp
Air/Vacuum	None required
System Dimensions (W x D x H)	160 cm x 103 cm x 150 cm (63 in x 40 in x 59 in)
System Weight	390 kg (860 lb)

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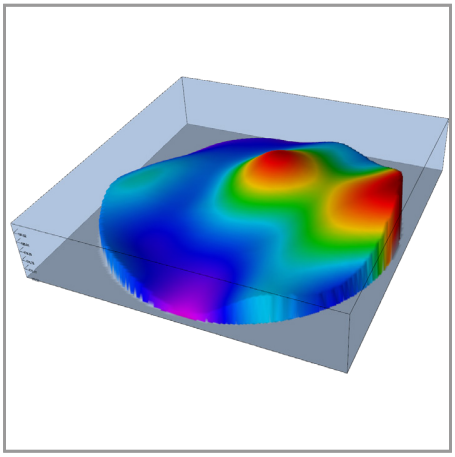


Tropel® UltraSort II Semi-Automated FlatMaster® MSP Wafer Surface Metrology System

Advanced Optical Measurement System for Wafter Flatness and Thickness Variation

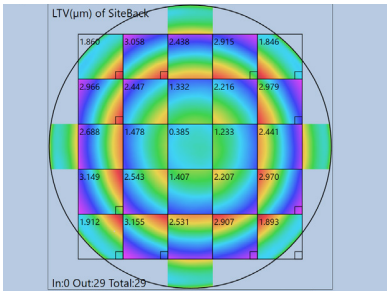
The ability to measure flatness, thickness, and thickness variation of semiconductor wafers is critical for wafer processing.

Traditional contact probes or conventional interferometry systems are too slow or do not have the necessary accuracy over the full wafer surface.

The Tropel FlatMaster® MSP-Wafer (Multi-Surface Profiler) is a frequency stepping interferometer that provides fast and accurate metrology for wafers up to 300mm. In seconds over 3 million data points are collected with sub-micron accuracy enabling total thickness and flatness characterization over the entire wafer surface.

Measurement Parameters

Global	Local (site)
Thickness	SBIR (LTV)
GBIR (TTV)	SBID (LDOF)
GF3R (TIR)	SF3R (LTIR)
GFLR (NTV)	SSF3D (LFPD)
GFLD (NTD)	SFLR (LTIR)
Bow, Warp, SORI	SFQR (LTIR
	SFQD (LFPD)



Key Benefits

- Improves product quality, manufacturing yield and throughput
- Lowers manufacturing costs
- Increases process awareness and understanding
- Reduces time-to-market
- Increases customer satisfaction

Power

- High resolution and accuracy on thickness across the entire wafer surface
- Capable of mapping submicron thickness changes in the wafer after processing (i.e. CMP, Epi)
- Large dynamic range
- Fast measurements
- Excellent reproducibility results from operator to operator

Flexiblity

- Measures a variety of material types
- Measures a wide range of surface finishes

Easy to Use

- Place the part and measure, little or no fixturing required
- Intuitive recipe driven operation
- Suitable for production, quality control, or development environments

Tropel® FlatMaster® MSP Wafer System Specifications

Performance

	FlatMaster MSP 150	FlatMaster MSP 300
Field of view	150 mm (5.9 in)	305 mm (12.0 in)
Z-Resolution	1 nm (0.04 µin)	1 nm (0.04 µin)
Lateral resolution	0.15 mm (0.006 in)	0.17 mm (0.007 in)
Measurement range (Z-Axis)	Up to 300 mm (11.8 in)	Up to 300 mm (11.8 in)
Measurement method	Frequency scanning interferometry	
Measurement time	30 seconds typical	
Measurement parameters	Flatness, depth/height, parallelism, line profile, surface profile	
Data analysis	3-D contour, slice: x, y circumferential and radial, and wafer analysis plots	

Materials and Surfaces

Materials	Metals, glass, polymers, ceramics, and many others
Surfaces	Fine-ground, lapped, polished, super-finished and others

Accuracy and Repeatability

	Accuracy*	Repeatability*
Bow, warp, SORI	500 nm (19.7 µin)**	200 nm (7.9 µin)
TTV	100 nm (3.9 µin)	20 nm (0.8 µin)
Thickness >2 mm	300 nm (11.8 µin)	100 nm (3.9 µin)
Thickness <2 mm	100 nm (3.9 µin)	40 nm (1.6 µin)

Environmental and Facility

Temperature	15 °C to 25°C (59 °F to 77 °F)
Rate of temperature change	< 1.0 °C per hour
Humidity	5% to 95% relative humidity, non-condensing
Power	100-240 VAC, 50/60 Hz, 4 Amp
Air/Vacuum	n/a
Semi-Automated MSP 40/150 system dimensions/weight	160 cm x 103 cm x 150 cm / 390 kg (63 in x 40 in x 59 in / 860 lb)

*Refers to instrument limited Accuracy and Repeatability (1σ) as based on measurement traceable artifact
**On wafers with less than 10 µm of bow
This product is covered by one or more U.S. patents.
All specifications are subject to change.
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Tropel® FlatMaster® MSP-300 Glass Wafer Analysis System

Fast and Precise Flatness and Thickness Variation Measurements of 300 mm Glass Wafers

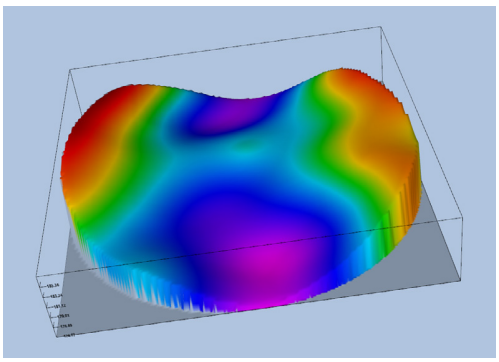
The ability to measure flatness, thickness, and thickness variation of 300 mm glass wafers is critical for successful integration of 3DIC assemblies. Traditional contact probes or conventional interferometry systems are too slow or do not have the necessary accuracy for larger fields of view.

The Tropel® FlatMaster® MSP-300 (Multi-Surface Profile) is a frequency stepping interferometer that provides fast and accurate metrology for 300 mm glass wafers. In seconds, over three million data points are collected with sub-micron accuracy enabling total thickness and flatness characterization over the entire surface.

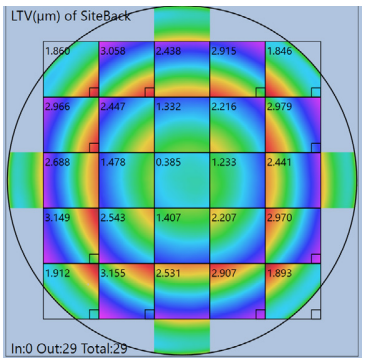
Measurement Parameters

Wafer	Site
GF3R (TIR)	SBIR (LTV)
GF3D (FPD)	SBID (LDOF)
GFLR (NTV)	SF3R (LTIR)
GFLD (NTD)	SF3D (LFPD)
GBIR (TTV)	SFLR (LTIR)
Bow, Warp, SORI	SFQR (LTIR)
	SFQD (LFPD)

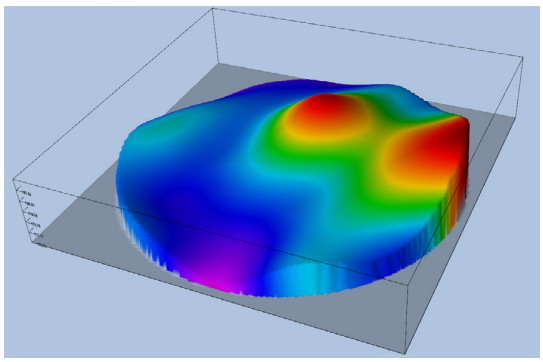
List of common SEMI standard parameters available. Contact Corning for additional measurement parameters.



Full surface 3D Total thickness Variation (GBIR/TTV) measurement of a 300 mm glass wafer with less than 2 µm total thickness variation.



Stepper simulation plot analyzing site flatness (SFQR/LTIR). Other stepper simulation parameters are available and site layouts can be customized for any configuration.



Full front surface 3D measurement of the 300 mm glass wafer enabling Bow/Warp, SORI, and other free state wafer parameters. The combination of front surface and TTV measurements provide complete characterization of the substrate.

Issued: September 2019

Tropel® FlatMaster® MSP-300 Glass Wafer System Specifications

Performance

Measurement Method	Frequency Stepping Interferometry
Field of view	< 305 nm
Z-Resolution	10 nm
Lateral resolution	0.15 mm
Measurement range (Z-Axis)	300 mm
Measurement time	< 60 seconds typical
Measured data points	3.1 million per measurement
Maximum Slope	Slope given by 0.5 mm of pure Bow error over 300 mm wafer

Materials and Surfaces

Materials	Glass and other transparent materials - see industrial specifications for other materials
Surfaces	Wire sawn, ground, lapped, polished, etched, and super-finished

Accuracy and Repeatability

	Accuracy	Repeatability
Bow/Warp/SORI	0.5 µm*	0.2 µm
Thickness >2mm	0.25 µm**	0.02 µm
Thickness <2mm	0.075 µm**	0.01 µm
TTV	0.05 µm**	0.01 µm

** on less than 10 µm Bow*
*** requires knowledge of index of refraction*

Environmental and Facility

Temperature	15 °C to 30°C (59 °F to 77 °F)
Rate of temperature change	≤ 0.5 °C per hour
Vibration Isolation	Passive isolation included
Humidity	5% to 95% relative humidity, non-condensing
Power	100-240 VAC, 50/60 Hz, 4 Amp
Air/Vacuum	None required
System Dimensions (W x D x H)	160 cm x 103 cm x 150 cm (63 in x 40 in x 59 in)
System Weight	390 kg (860 lb)

This product is covered by one or more U.S. patents.
All specifications are subject to change.
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Tropel® UltraFlat™ Photomask Form Analysis System

Ultra-precise flatness measurements of substrates, mask blanks and photomasks

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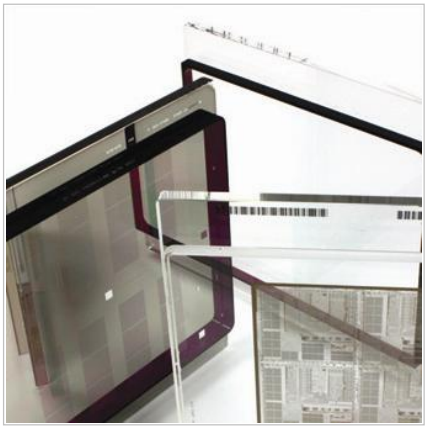
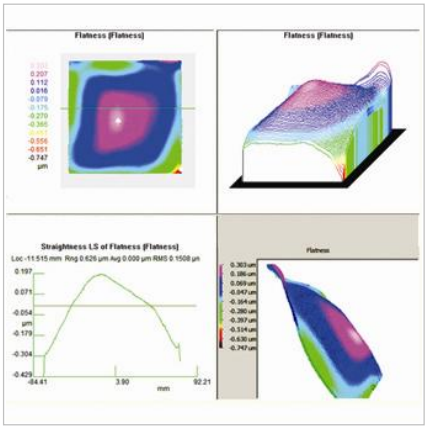
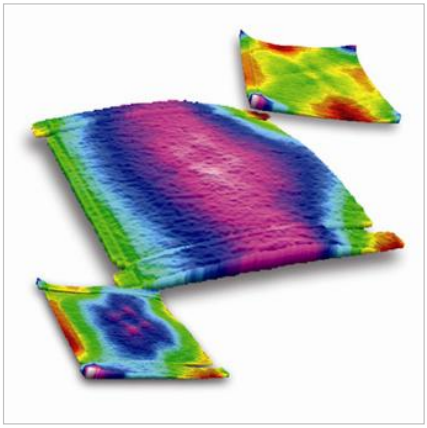


The Tropel® UltraFlat™ 200 Mask System, manufactured by Corning Tropel Corporation, is designed specifically for the photomask industry. Its low measurement uncertainty makes the UltraFlat System the perfect tool for today's ever-tightening mask flatness specifications. The push for smaller device features requires that photomasks be extremely flat. The UltraFlat System is used to measure flatness of photoblanks and photomasks throughout every stage of the manufacturing process, including, polishing, coating, patterning, pellicle mounting and analyzing the effects film stress.

The UltraFlat system utilizes near-normal incidence interferometry, rock solid structural design, state-of-the-art optics and Corning Tropel's renowned phase shifting analysis software; delivering up to 6 nm measurement uncertainty. The system is NIST traceable and provides measurements that conform to SEMI standards. An automated photomask handling and measurement configuration and clean room option are also available.





The Tropel® UltraFlat™ 200 Mask System provides unprecedented flatness measurements of photomasks. Manual handling, fully automated robotic handling, and Class 1 clean room environment options are available.

Tropel® UltraFlat™ 200 Mask System Specifications

Measurement method	Near Normal-Incidence Interferometry

Performance

Uncertainty[1]	6 nanometers
Dynamic range[2]	10 micrometers
Mask sizes	≤ 6 inches (6025, 5009 and other available upon request)
Measured data points	≤ 1,000,000 per measurement
Measurement time	≤ 30 seconds
Standard measurements	Front referenced flatness, local slope, stress, microwaviness, x-y polyfit
Data analysis	3-D, contour, isometric, histogram and site plots, site analysis

Data Management

Data storage	80 Gb hard drive
Communications	10/100-BaseT Ethernet
Operating system	Windows® XP

Dimensions

Interferometer housing and base	89 cm x 117 cm x 132 cm (35 in x 46 in x 52 in)
Computer workstation	66 cm x 66 cm x 168 cm (26 in x 26 in x 66 in)

Weights

Interferometer housing and base	400 kg (880 lb)
Computer workstation	34 kg (75 lb)

Options

Fully automated Class 1 chamber
Robotic mask handling and sorting

[1] Refers to instrument limited uncertainty as measured on NIST traceable artifact and λ/100 reference flat. (See Corning Tropel Acceptance Procedure for details)
[2]Typical, limited by surface slope.
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All specifications are subject to change.
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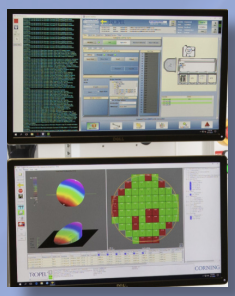
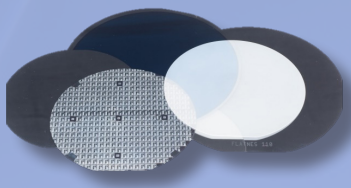
Tropel® UltraSort™ II

The UltraSort II is a flexible, high-throughput, fully automated platform that incorporates any Tropel wafer flatness measurement system, providing full surface bow, warp, TTV, and stepper simulation parameters as described in SEMI M1. The UltraSort II can also accept additional modules including additional cassettes, another interferometer, OCR, ROA, and many more. The system modularity allows you to get more value out of your automated wafer flatness inspection system. The UltraSort II platform is designed to enable full factory automation including SECS/GEM, GEM 300 host systems, along with other custom data export systems.

Family of Products





Key Specifications

CE Compliance
Semi S2/S8 Compliance
ISO 9001:2015, 9014:2015, 14001
NIST traceability on all Tropel® metrology systems

Available Wafer Configurations

2”-6” Open Cassettes
4”-8” Open Cassettes
300mm FOUP

Throughput

FlatMaster clamped/ unclamped	150 wph
FlatMaster clamped/ unclamped/thickness	120 wph
FlatMaster MSP clamped/ unclamped/ thickness	60 wph

Wafer Thickness

The FlatMaster product lines can measure the absolute wafer thickness as well as thickness variation, and free state flatness parameters. This technology enables you to control more measurement parameters with a single metrology tool. Requires tight environmental control for best results.

OCR

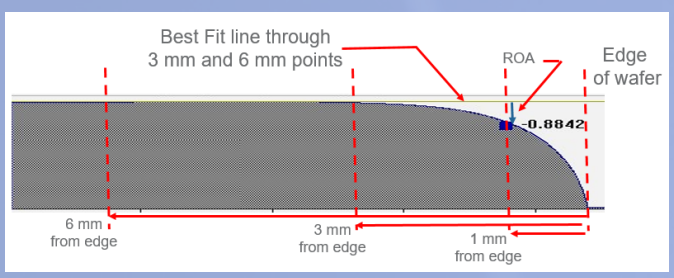
The OCR option fully integrates a Cognex OCR system into the UltraSort II. This allows the user to automatically store the wafer ID with every measurement in the measurement database and all data export formats, ensuring proper wafer measurement results tracking.

Custom Exports

Measurements in and of themselves are not useful unless the information is available where and when it is needed. Custom reports and exports allow the data to be shared throughout your company and enable process improvement and tracking. Export options include visual reports, database output, Microsoft Excel, and others.

Roll-Off/ROA

Roll-Off/ROA gives direct polishing process feedback for improved near edge flatness, which is critical to edge site yield. Roll-Off measurements are defined by SEMI M69-0307 (preliminary).



SECS/GEM

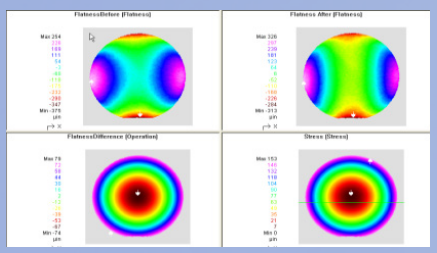
Available with full factory automation that is SECS/GEM compatible and GEM300 compatible. Integrates your measurement system right into your factory host system to ensure perfect tracking of everything.

Universal Chuck

Identical in principle to a stepper chuck, but with zones to allow measurements of all wafer sizes from 2”-8” on the same chuck. Both clamped and unclamped measurements are possible with the same recipe – no unloading/changing chuck required.

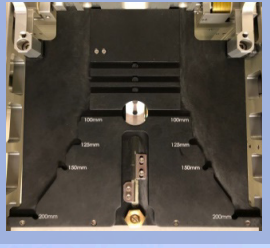
Film Stress

Film stress can be calculated from the change in wafer curvature before and after a coating process, and is proportional to the wafer sag. Measuring the change of sag leads to an indirect measurement of the film stress. Material properties for the wafer and the film thickness must be known.



Flexible Cassette station

Flexible number of cassette stations (4-16), configured for 2-6 in. or 4-8 in. cassettes. Auto-detects cassette sizes, then scans for number of wafers per cassette and ensures no cross-slotted wafers.



Tropel® FlatMaster® MSP Wafer Surface Metrology System

Advanced Optical Measurement System for Wafer Flatness, and Thickness Variation

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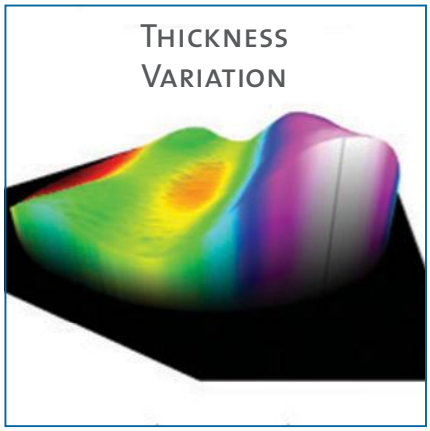


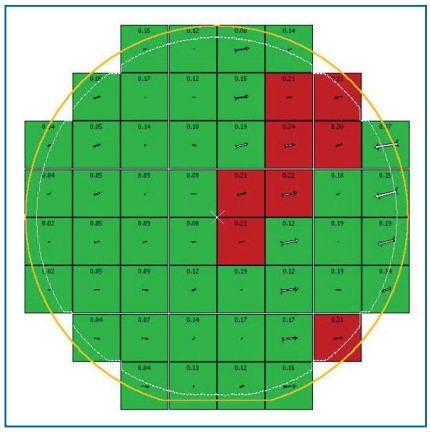
The ability to measure flatness, thickness, and thickness variation of semiconductor wafers is critical for wafer processing. Traditional contact probes and conventional interferometry systems are too slow or do not have the necessary accuracy over the full wafer surface area.

The Tropel FlatMaster® MSP Wafer (Multi-Surface Profiler) is a frequency stepping interferometer that provides fast and accurate metrology for wafers up to 300 mm. In seconds over 3 million data points are collected with sub-micron accuracy enabling total thickness and flatness characterization over the entire wafer surface.

Measurement Parameters

Local (Site)
- SBIR (LTV)
- SBID (LDOF)
- SF3R (LTIR)
- SF3D (LFPD)
- SFLR (LTIR)
- SFQR (LTIR)
- SFQD (LFPD)

Global
- Thickness
- GBIR (TTV)
- GF3R (TIR)
- GFLR (NTV)
- GFLD (NTD)
- Bow, Warp, SORI



Key Benefits:

- Improves product quality, manufacturing yield and throughput
- Lowers manufacturing costs
- Increases process awareness and understanding
- Reduces time-to-market
- Increases customer satisfaction

Powerful:

- High resolution and accuracy for thickness across the entire wafer surface
- Capable of mapping sub-micron thickness changes in the wafer after processing (i.e. CMP, Epi)
- Large dynamic range
- Excellent reproducibility from operator to operator

Flexible:

- Measures a broad variety of material types and surface finishes

Easy to Use:

- Simply place the part on the system and measure
- Little or no fixturing required
- Intuitive recipe driven operation
- Suitable for production, quality control, or development

Tropel® FlatMaster® MSP Wafer Surface Metrology System Specifications

	FlatMaster MSP-150	FlatMaster MSP-200	FlatMaster MSP-300
Field of View	150 mm (5.9 in)	225 mm (8.9 in)	305 mm (12.0 in)
Z-Resolution	1 nm (0.04 µin)	1 nm (0.04 µin)	1 nm (0.04 µin)
Lateral Resolution	0.15 mm (0.006 in)	0.1 mm (0.004 in)	0.17 mm (0.007 in)
Measurement Range (Z-axis)	Up to 300 mm (11.8 in)	Up to 300 mm (11.8 in)	Up to 300 mm (11.8 in)
Measurement Time	30 seconds typical		
Measurement Method	Frequency Scanning Interferometry		
Measurement Data Points	Up to 3.1 million points per measurement		
Materials	Metals, polymers, ceramics, glass, and many other materials		
Surface Finishes	Fine-ground, lapped, polished, super-finished, and others		

Accuracy & Repeatability

	Accuracy*	Repeatability*
Flatness	60 nm (2.4 µin)	20 nm (0.8 µin)
Parallelism	75 nm (3.0 µin)	20 nm (0.8 µin)
Depth/Height**	100 nm (4.0 µin)	20 nm (0.8 µin)

* Refers to instrument limited accuracy and repeatability (1 sigma) as based on measurement of traceable artifact.
** Height/depth accuracy and repeatability are dependent on part geometry; consult Corning Tropel for more details.

Tropel Metrology Software (TMS™)

Standard Parameters	Flatness, depth/height, parallelism, line profile, surface profile
Report Layouts	User-configurable including: open GL, 3-D, 2-D, line trace (X/Y, radial, diameter, circular), color contour, isometric, histogram, user-defined tolerances, pass/fail criteria
Data Management	Available in report layouts, also database, CSV and serial port, optional export to industry standard database formats

Environmental and Facility

Temperature	15 °C to 25 °C (59 °F to 77 °F)
Rate of Temperature Change	< 0.5 °C per 4 hours (A change of ± 0.5 C (± 3.6 F) requires recalibration)
Vibration Isolation	Passive isolation included
Humidity	5% to 95% relative humidity, non-condensing
Power	100-240 VAC, 50/60 Hz, 4 Amp
Air/Vacuum	See facilities document
System Dimensions (W x D x H)	160 cm x 103 cm x 150 cm (63 in x 40 in x 59 in)
System Weight	390 kg (860 lb)

Standard System Configuration

Computer	Windows® based PC
Software	TMS™ Analysis Software
Traceable Artifact	Included

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