MicroProf® MHU

Material Handling Unit - and you know who puts it on

The **MicroProf® MHU**, metrology tool with Material Handling Unit is specially designed for semiconductor, MEMS, sapphire and LED industries. Typical applications are measurement of bare and coated wafers, or structured wafers at various lithographic process steps. Due to a robot arm with two vacuum end effectors, the tool has very high throughput rates up to 220 wafers per hour. It is capable of processing wafer sizes from 2 to 12 inches. Up to 4 open cassettes can be processed and additionally there is the option to integrate a pre-aligner and an OCR reader. The option for two-sided sample measurement allows the simultaneous measurement of the top and bottom surface with determination of the sample thickness, total thickness variation (TTV) and various surface parameters such as roughness, waviness and flatness of both sides. A complete wafer shape measurement is also possible with analysis of the global and local wafer parameters. A wafer sorting function is available, which is adjustable according to customer requirements. Based on the multi-sensor concept, additional sensors can be retrofitted at a later date. A further domain of the **MicroProf® MHU** is the layer thickness determination of thin films, as well as layer stacks, measurement of step heights, bumps, vias (TSVs), trenches, etc. Due to its fully SEMI-compliant design, almost maintenance-free hardware components and its high throughput, the **MicroProf® MHU** is the perfect solution for use in production.

MicroProf® MHU

MEASURING TASKS

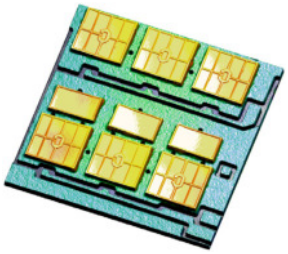
Wafer Thickness ***TTV*** *Bow* ***Warp*** *Roughness* *Stress* ***Flatness***
Global and Local Wafer Parameters **Step Height and Width** ***Defect Inspection***
Bumps *Vias* ***Trenches*** *Film Thickness* ***Geometry*** *Roll-off Amount ...*

SYSTEM CHARACTERISTICS

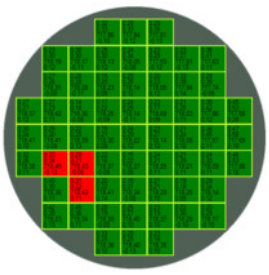
- Material Handling Unit with dual arm vacuum grabber
- Optional edge handling / non-contact handling
- Different wafer sizes (from 2 up to 12 inches) in the same tool
- Optional OCR reader / pre-aligner
- Maximum flexibility thanks to multi-sensor capability
- Simultaneous measurement on both wafer sides
- Fully automated recipe operation with FRT Acquire Automation XT software
- Optional SECS/GEM interface
- Sample sorting function, set up according to customer requirements
- Optional filter fan units, ISO class 4 clean room condition

BENEFITS

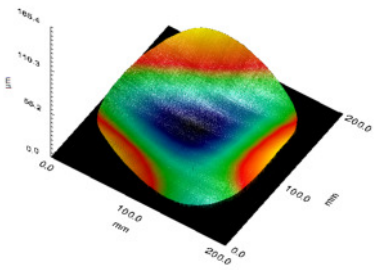
- High throughput, up to 220 w/h
- Very high accuracy and reproducibility
- Fast 3D measurements, profiles and points
- Down to (sub)-nanometer resolution
- Full integration in the production workflow
- User can easily create new recipes according to his requirements
- Compliant to DIN/ISO and SEMI standards
- Optical, non-contact and non-destructive
- Durable, minimal servicing and low maintenance



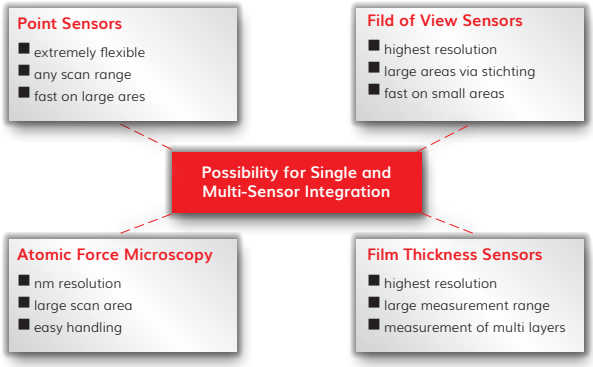
3D topography of a leadframe module
(reference: Danfoss Silicon Power GmbH)



Wafer map with local parameters (LTIR, LTV, LFPD, etc.). Outside of spec - marked in red



Topography of a bowed 8-inch wafer



MEASURING PRINCIPLE

A variety of measurement tasks require variable solutions – the **MicroProf® MHU** performs measurements fully automatically and can be equipped with various sensors for measuring topography, film thickness and sample thickness. FRT multi-sensor technology offers a wide range of optical point and field of view sensors and even an atomic force microscope. Depending on your requirements, these can be combined in the **MicroProf® MHU** or retrofitted at any time. Use both, the flexibility of point sensors with individually adjustable measuring field sizes and the speed of the field of view sensors for your measurements. A variety of measurement tasks can be performed within a large measurement range (from millimeters down to the sub-nanometer range) using a flexible and cost-effective tool which can be expanded at any time.

System	
assembly	gantry design
sensor	multi-sensor
clean room class	optional filter fan units, ISO class 4
throughput	200 w/h (6“, full wafer inspection 4 profiles SEMI MF657)
wafer sizes	2“ to 12“
uptime	> 99%; $MTBF_p$ > 800h
wafer materials	silicon, sapphire, compound semiconductors, glass, quartz etc.
Scanning Stage	
travel	up to 440 mm x 305 mm
drive type	direct drive
bearing type	crossed roller bearing
encoder resolution	50 nm
flatness	< 2 µm / 100 mm
max. speed	300 mm / s
load capacity	5 kg
z-axis	motorized axis
z-axis travel	50 mm (100 mm optional)
Facility Requirements	
environmental requirements	clean, vibration-free and constant room temperature
power supply	110 / 230 V AC, 50-60 Hz, 1 Phase
vacuum	~65 kPa, 5 m^3/h
CDA	6 bar
footprint (LxWxH)	1642 x 1267 x 1900 mm[1] / 1680 x 1500 x 1900 mm[2]
weight	~800 kg[1] / ~1200 kg[2]

[1] MicroProf® 200 MHU with filter fan units
[2] MicroProf® 300 MHU with filter fan units

additional specifications on request