

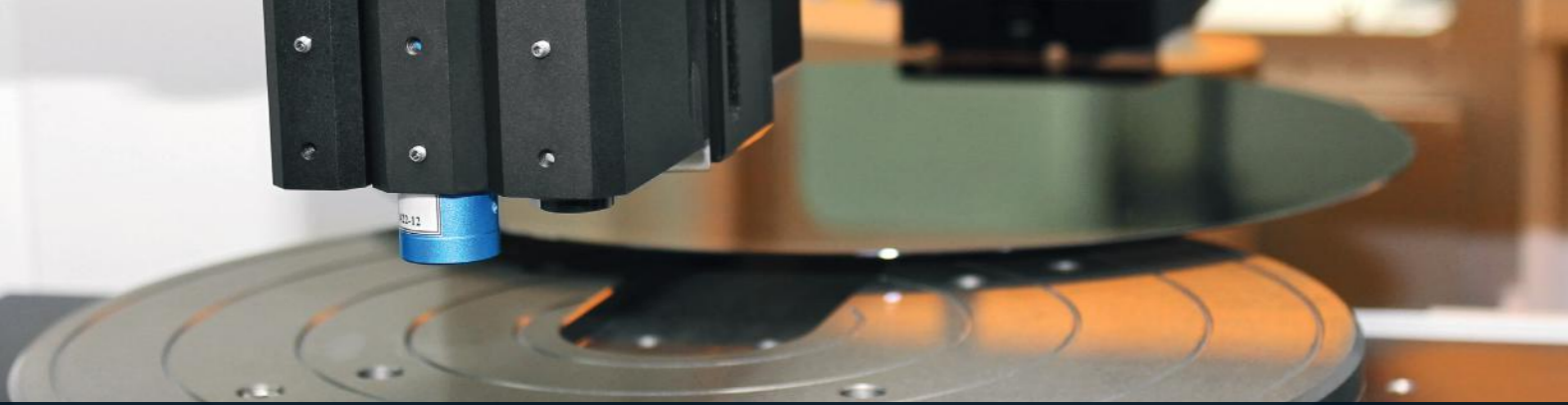
MULTI-SENSOR METROLOGY
FOR FRONT END

FRT THE ART OF METROLOGY™

MicroProf® FE

Standard metrology for wafer manufacturing





MEASURING TASKS

Roughness	Step Height	Film Thickness / Layer Stacks	Profile	Bow	3D Map
Roll-off Amount	TTV	Thickness	Warp	Waviness	Membrane Bow

Trenches	Defect Size	Topography	Flatness	Vias / TSV	Bumps
Co-planarity	Critical Dimension	Overlay	Geometry	Nanotopography	...



FULLY AUTOMATED WAFER METROLOGY FOR FRONT END USE

The **MicroProf® FE** is FRT's standard fully automated 2D/3D wafer metrology tool. It combines the capabilities of the worldwide established **MicroProf® 300** with a wafer handling system within an Equipment Front End Module (EFEM). With fully SEMI-compliant metrology solutions and almost maintenance-free hardware components, providing high throughput inspection, the **MicroProf® FE** is the perfect workhorse in any front end HVM fab.

Besides the standard configuration, the tool can be equipped with numerous additional features, which can also be retrofit at a later time. The **MicroProf® FE** enables you keeping pace with technologies progression fast and at reduced investment cost!

The tool can be used for measurements on bare and structured wafers for both front and back end.

Typical samples are:

- > Bare wafers: post grinding and post polishing
- > Coated wafers
- > Structured wafers: various lithographic process steps, measurement of conducting traces, bumps etc.
- > MEMS product wafers: acceleration sensors, pressure sensors, micro optics, etc.
- > 3D packaging: wafers at different 3D packaging process steps, e.g. with through silicon vias or trenches after etching

MicroProf® FE – FULLY AUTOMATED MULTI-SENSOR WAFER METROLOGY FOR SEMICONDUCTOR INDUSTRIES

RELIABLE WAFER METROLOGY TOOL WITH AUTOMATED HANDLING

The **MicroProf® FE** is designed for fully automated processing of 300 mm FOUPs/FOSBs. Moreover, the tool can be configured for processing 150 mm/200 mm open cassettes. The system can also be built up as either a 200 or 300 mm tool or as a 200/300 mm bridge tool. The handling part features a single arm robot with end-effector, two load ports including mapper and RFID reader, pre-aligner and if required an OCR reader. The system handles SEMI standard wafers but it can also be easily configured for highly warped wafers (e.g. eWLB) or even thinned wafers down to 50 µm thickness.

Front End Metrology Solutions

The **MicroProf® FE** is equipped with filter fan units (FFU) providing ISO class 3 clean room conditions. The metrology station is a standard **MicroProf® 300** granite base setup with a three point sample fixture or vacuum chuck. A high-resolution FRT CWL sensor allows for easy and reliable measurement of topography, roughness, and contour. With a wide range of additional sensors it is also possible to adapt the **MicroProf® FE** dedicated and individually to your measuring application.



STANDARD CONFIGURATION

Metrology Unit

- > MicroProf® 300
- > FRT CWL topography sensor
- > positioning camera
- > 3 point wafer fixture
- > user interface (keyboard, mouse, monitor)

Wafer Handling Unit

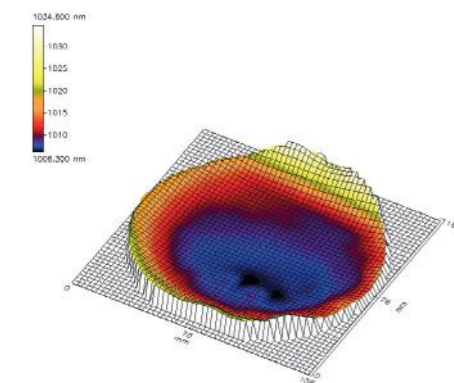
- > single-arm robot unit for handling of 300 mm (SEMI standard wafers)
- > vacuum end-effector handling
- > 2 load ports for 300 mm
- > FOUP (SEMI standard)
- > pre-aligner
- > RFID reader

EFEM Enclosure

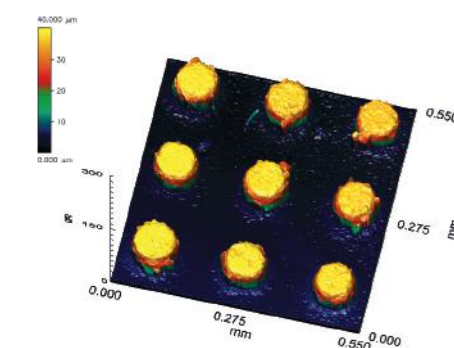
- > ISO class 3 clean room
- > conformal housing
- > 2 filter fan units (FFU), one for handling and one for metrology area

Software

- > FRT Acquire Automation XT
- > FRT Mark III
- > SECS/GEM interface



Wafer – thin films and multi layers
> Single layer thickness



Bumps
> Height, diameter, pitch

AUTOMATED MEASUREMENT AND EVALUATION – FRT ACQUIRE AUTOMATION XT

The tool is driven by the SEMI-compliant **FRT Acquire Automation XT** software. This modular recipe based software enables the measurement and data analysis of structured and unstructured wafers. Choose the suitable measurement and evaluation routines for your measuring task from a variety of packages. For recurring structures, a layout wizard with a graphical user interface (GUI) supports you in teaching the step-and-repeat measuring locations. In addition, sample fine alignment via pattern recognition is available.

This software provides comprehensive capabilities, from manual measurement on the tool to fully automated

measurement with one-button operation and integration into production control systems, e.g. via a SECS/GEM interface.

You can easily configure various measurement tasks using different sensors to run consecutively as a measurement sequence. This includes the execution of measurements, processing and analysis using intelligent algorithms, output and visualization of results in form of reports and the export of results in various data formats.

UPGRADE AND RETROFIT

As for all the tools of the **MicroProf®** family, **MicroProf® FE** can be equipped with a multi-sensor configuration to individually combine different measurement applications within one metrology unit. Typical setups feature chromatic point sensors for both single side and dual side inspection (TTV), field of view sensors (confocal or white light interferometry), film thickness sensors and even AFM.

OPTIONS

METROLOGY UNIT

- > high-resolution camera
- > pattern recognition software
- > TTV-setup
- > film thickness sensor IRT
- > thin film sensor FTR
- > field of view sensor CFM, CFM DT, WLI FL, WLI PL
- > chromatic line sensor SLS
- > brightfield IR illumination + IR camera for inspection
- > 3 point wafer fixture for two wafer sizes
- > fully supported wafer fixture with vacuum for one or two wafer sizes
- > thermo unit (controlled hot & cold chuck)
- > AFM

WAFER HANDLING UNIT

- > load ports for open cassette handling (150 or 200 mm wafers)
- > bridge tool option (two wafer sizes in one tool)
- > edge grip handling option
- > warped wafer handling option for thin wafers
- > Bernoulli (non-contact) handling option for thin wafers
- > frame cassette handling
- > OCR reader (front/back)
- > ionizer bar

SOFTWARE

- > additional AA XT software packages:
 - > step height and width
 - > film thickness
 - > TTV, bow, warp
 - > stress
 - > vias/trenches/bumps
 - > wafer geometry
 - > roughness and waviness
 - > saw marks
 - > nanotopography
 - > customized evaluation package
 - > customized SECS/GEM interface

Talk to an expert!

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