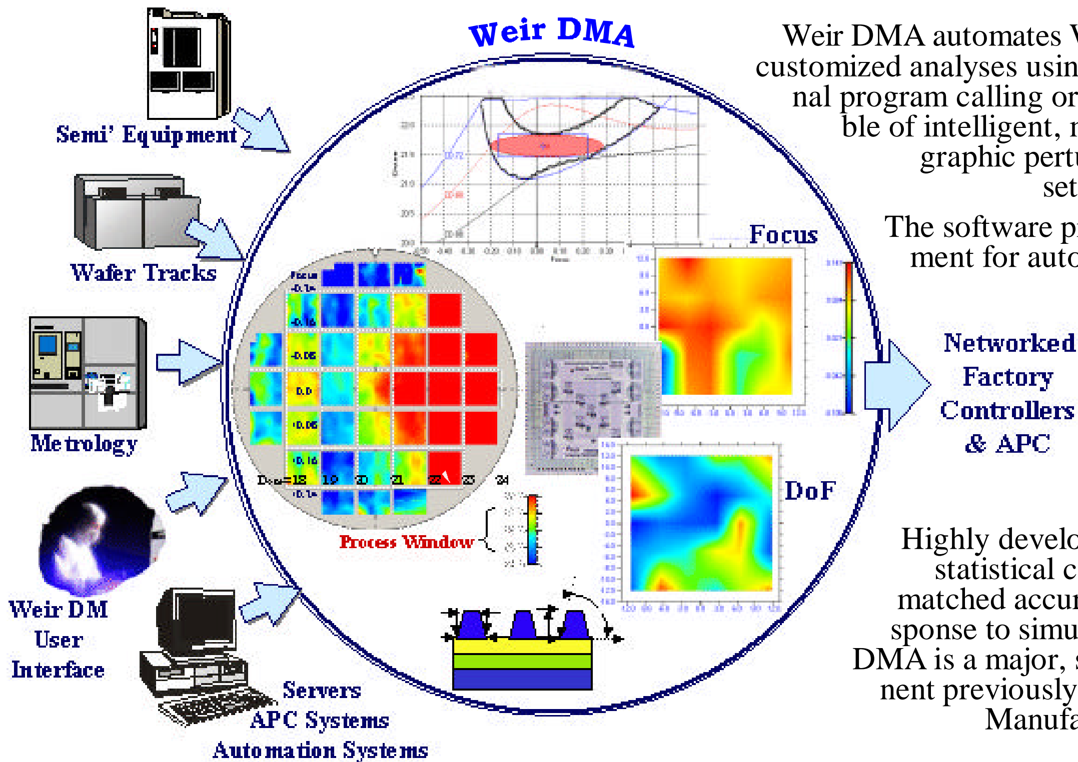
TEA Systems Corporation

Weir DMA

For Process Stability & Control

Automation for any metrology -- *Model based characterization & control for setup, qualification, validation and stability of the manufacturing process and its tools.*



Weir DMA automates Weir PW and Weir PSFM user-customized analyses using automated data gathering, external program calling or manual one-button macros capable of intelligent, model-based decoupling of lithographic perturbation sources and process setup/control elements.

The software provides a single-interface environment for automatic acceptance or gathering of data from any feature profile, film or log source of metrology. User-customized outputs are provided in ASCII or Spreadsheet summary. Analysis logging, current analysis displays and trend charts are all user-controlled.

Highly developed Weir perturbation models and statistical component analyses provide unmatched accuracy when correlating process response to simulation and design changes. Weir DMA is a major, single-solution validation component previously missing from the Design-for-Manufacture (DFM) cycle.

Applications

Controlled by user-created macros from the Weir PW & Weir PSFM products, the Weir DMA package provides qualification, setup, control and process-perturbation decoupling for advanced semiconductor lithography applications including:

Reticle Validation

Direct metrology of reticle features; SEM, Ellipsometer etc.

- Modeled process and feature uniformity
- Validation of pattern revisions & new designs.
- Reticle Signature library maintenance for process and tool component decoupling.

Reticle Qualification

Process-capability qualification of all reticle patterns direct from wafer measurements:

- Accurate, SEM traceable reticle estimation from in-process or focus-dose matrices.
- Automated evaluation of design for manufacture (DFM) capability that can be both process and tool-set specific.
- Re-qualification of in-use full-feature capability of all RET Reticle formats including scattering bars, serifs, model-based OPC, and phase-shift mask (PSM) reticles.

Process & Tool Characterization

Setup and qualification of exposure-cell toolsets; scanners/ tracks for newinstallations and postmaintenance.

- Precision of metrology, process, lens, scan, reticle and wafer stage contributed errors.
- Model-based wafer perturbations for bake, deposition, auto-focus and auto-leveling
- Model based field, lens-slit and reticle-scan perturbation decoupling.
- Intelligent focus-budget models from proprietary pattern such as the Phase-Shift-Focus-Monitor (PSFM), Z-spin constructs o common Bossung analyses.
- Automated and extended Mask Error Factor (MEF) Calculatior with full-field mapping.

Process & Tool Setup / Stability

Process Window formats:

- Full-field, multi-feature full-profile analysis using classic Bossung Plots and advanced control surface models/graphics.
- Post exposure bake, hot plate, develop and etch stability.
- Film deposition, uniformity and swing curve studies from ellipsometer, scatterometer etc. data.
- Decoupling of reticle, process, tool , lens , scan and metrology contributed perturbations to feature uniformity and focus.
- Full-Field Focus & Depth-of-Focus field mapping from reticle or Bossugn derived focus

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Weir DMA

Reticle Signature Library

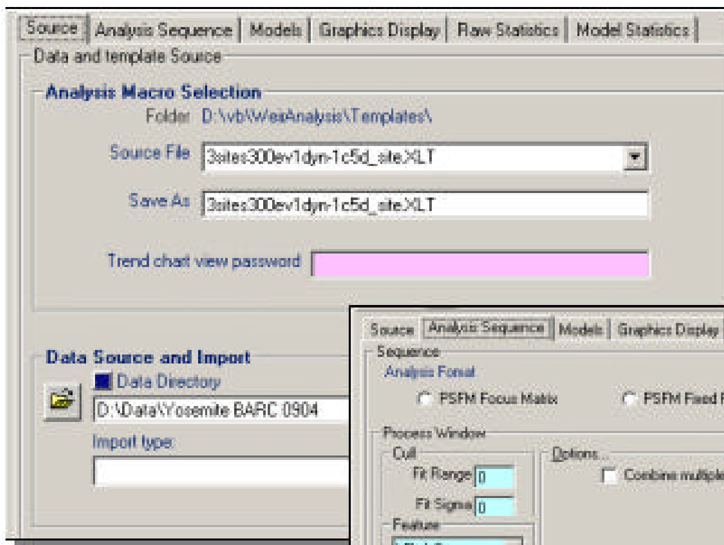
Full-profile, field reticle signatures containing process and uniformity information are stored in the Weir Reticle Library. The entries of this Library are then used to accurately remove reticle contributions from process and tool contributed wafer-level data. This means that process-window calculations, dose response, Depth-of-Focus calculations, Anti-Reflective Coating (ARC) response, reticle-platen distortions and lens/slit & scan characterizations can be derived without the influence of the reticle. The library elements also provide a historical basis for the re-qualification of reticles when tracking wear-and-tear during production use.

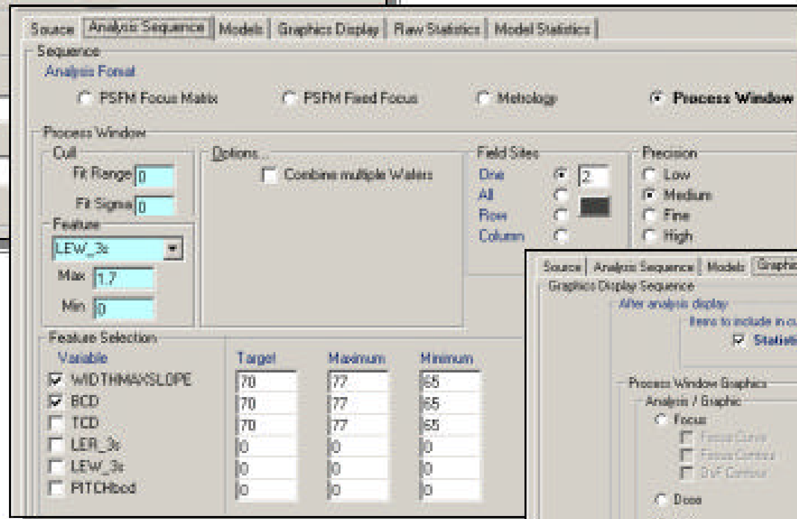
Design for Manufacture (DFM) and Simulator Validation

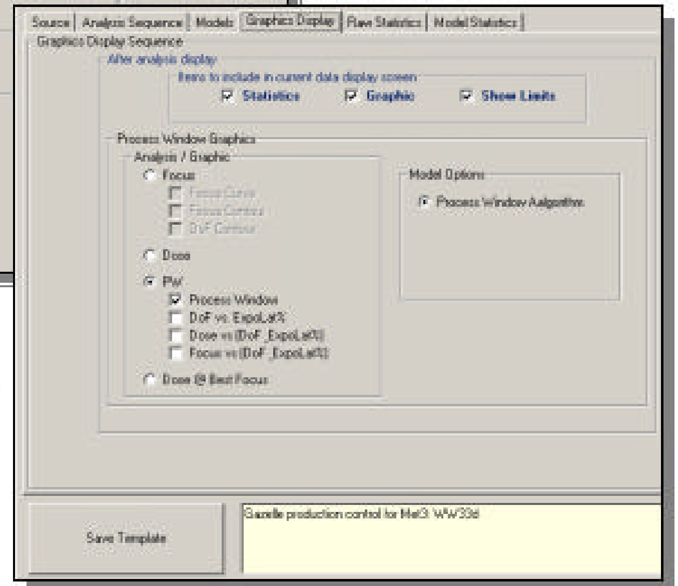
- Direct or manual entry of pattern data from the device design or process simulator.
- Removal of Weir Reticle Library signatures from data-modeled process measurements results in the most accurate validation of simulator calculations, DFM efficiency, MEF and process setup factors in the industry.
- Automated Process Control modeling engine for any APC system.

Features

- Interactive, object-oriented graphics with drill-down capability.
- Open and published standard formats.
- Automatic trend-charts for user-selected variables & modeled coefficients.
- Automatic data gatherin;g from any ASCII source and metrology.
- User-defined variable names.
- X-Y Plots, Histograms, Wafer Contours, Field contours, slit-profile plots, vector plots etc.
- Input/output data or mouse selected graphic portions, are easily displayed on spreadsheets.
- Graphs can be user-modified using point-and-click mouse commands.







Macro Creation

Weir Macro's are created from Weir Analysis spreadsheets using the point-and-click mouse interface - shown here - of Weir PW and Weir PSFM.

Input/ Output

Spreadsheet and ASCII based data files from any source can be input. Data is converted into the Weir standard format. Output formats are published and can be save on any network destination using ASCII or spreadsheet format.

Running Weir DMA

Fully-Automated with script calling or automated data acquisition.

Manually using 3-mouse clicks from within the Weir DM interface.

Software & Hardware Requirements

Weir DMA© requires a minimum of a 1.8 Ghz, Pentium 3 computer or equivalent with 80 Mbyte program storage and 1 Gbyte data storage. Weir Macros and trend chart data are stored in Microsoft Excel Spreadsheets.

A license for TEA Systems Weir PW© and/or Weir PSFM© is needed for Weir MACRO template A Network interface for simple data access and automation of data gather is recommended.

Weir PW© provides intelligent film, feature profile and metrology modeling. Weir PSFM provides ASML FOCAL©, Benchmark Technologies PSFM Reticle© and CANON Z-Spin© focus metrology calibration and intelligent modeling.

The Weir Dm© software is an interactive interface for Weir DMA©. This interface is provided with the software and provides interactive macro, trendchart and log file maintenance.

Functional on Windows NT and Windows 2000, XP etc.. Microsoft Excel is required.

License Basis

Weir DMA products can be purchased on a fixed-node or multi-node basis. Licenses and releases are web maintained.

FOCAL© is a trademark of ASM Lithography (http://www.asml.com). PSFM Reticle is a trademark of Benchmark Technologies (http://www.benchmarktech.com). Z-Spin© is a trademark of CANON Inc. (Http://www.usa.canon.com).

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