

GenISys

Layout LAB

New:
LAB Pro
User
Interface

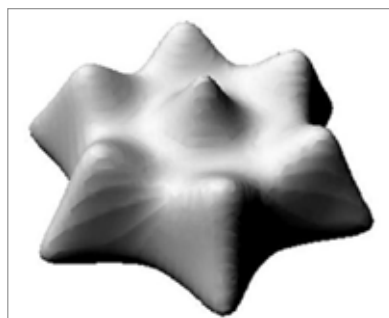
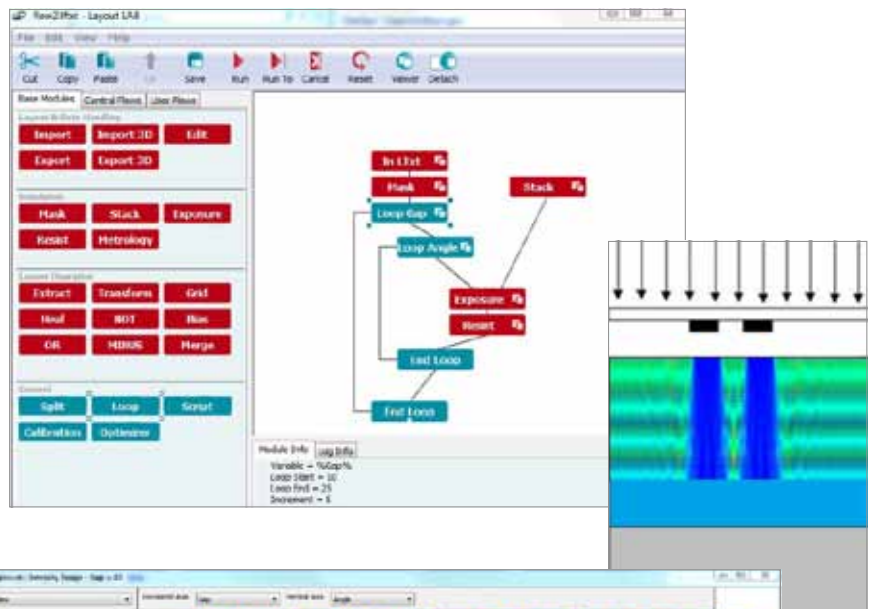
Optical Proximity Lithography Simulation

Layout LAB provides full 3D simulation for proximity lithography processes, with mask aligners or other proximity exposure tools that are widely used for Flat Panel Displays, MEMS, 3D integration and optical/electronic devices. Simulation shortens the development cycle, enables OPC and DFM, and saves cost on layout and process development before producing masks and running experiments.

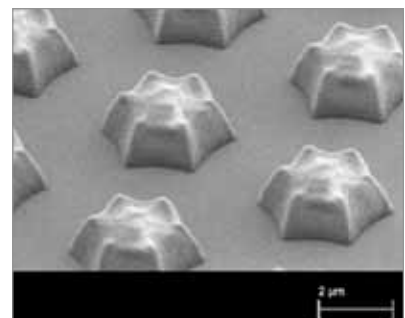
“VIRTUAL PLATFORM” for layout and process optimization

Layout LAB includes accurate modeling of proximity exposure tools, photomasks, wafer-stacks and resist processes.

- ▶ Models any proximity lithography equipment (mask-aligner, contact-printer, proximity-printer)
- ▶ Broadband spectrum, collimation angle and complex source shapes, large gaps
- ▶ Arbitrary mask layouts, including gray tone and phase shift
- ▶ Any substrate material, coatings, thick resist, topography
- ▶ Fast and accurate calculation of aerial image, bulk image in the resist, PAC concentrations, resist profiles based on threshold or 3D Mack development model
- ▶ Fast and flexible 1D, 2D and 3D visualization, metrology and matrix viewing
- ▶ **LAB Pro** environment optimized for fast and easy verification and optimization tasks



Simulated 3D Resist Profile



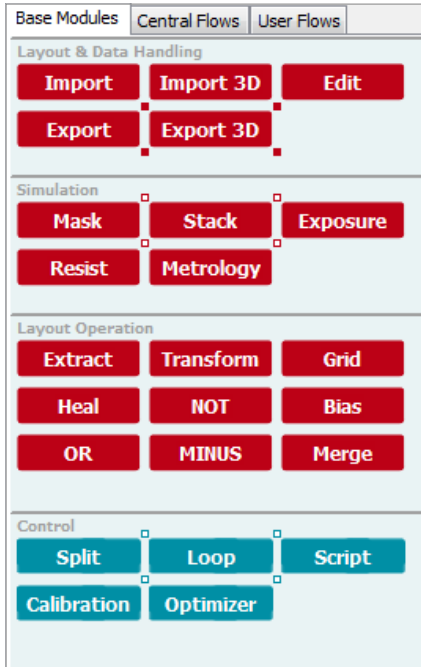
Printed Resist Structure

Dedicated Service

GenISys offers fast and flexible Support, with frequent updates, enhancements and new functions for our users.

Layout LAB

The VisualFLOW™ user interface combines rich functions for loading and modifying a mask layout, modeling exposure conditions (e.g. illumination spectrum/shape, dose, gap) and wafer stack, with strong tools for evaluation (3D visualization, metrology) and optimization. This unique combination enables layout optimization (OPC), mask layout verification, optimization of process conditions (e.g. illumination, stack) and optimization of the process window (e.g. gap / exposure dose variation).



Main library with functional modules

▶ IMPORT / EXPORT, IMPORT 3D / EXPORT 3D

- Support of layouts in major file formats (GDSII, CIF, DXF, LTXT)
- 3D simulation data (image intensities, concentration)

▶ LAYOUT EDITOR

- Creation of new layouts
- Layout modification within flows

▶ MASK DEFINITION

- Arbitrary layouts, regions of large mask data
- Gray-tone with wavelength specific transmission and phase definition

▶ STACK

- Any substrate and coating material
- Wavelength specific refractive index n and absorption coefficient k from material database
- Resist with wavelength dependent n/k , bleaching, Dill and Mack 4 parameter
- 3D Topography

▶ EXPOSURE

- Source spectrum (single line, broad-band), arbitrary source shape, X- and Y- tilt of illumination
- Fast and accurate simulation of 2D or 3D intensities based on Fresnel-Kirchoff diffraction and Transfer-Matrix -Method (TMM)
- Fast simulation for thick resist
- 1D, 2D and 3D visualization of aerial image, bulk image, Photo-Active-Compound (PAC) concentration
- Arbitrary gap from contact to large distance

▶ RESIST / METROLOGY / CALIBRATION

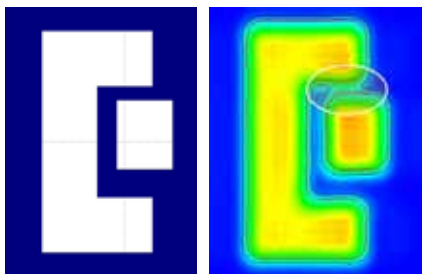
- Simple and fast threshold and diffused image model
- Full 3D Mack 4 resist development model
- Visualization of 1D, 2D and 3D resist profiles
- Extract 2D resist contours as layout data
- Automated CD measurement
- Calibration of resist parameters with experimental data

▶ LAYOUT OPERATION

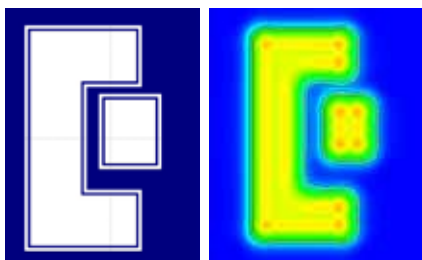
- Extraction (Region, Layer, Cell), Transformation (Scale, Shift, Mirror, Rotate), Heal, Bias, Boolean operations, Merge

▶ FLOW CONTROL and AUTOMATION

- Split layouts, run loops with variables
- Optimizer for parameter fitting
- Script module for starting command line applications within a flow



Mask layout optimization to improve process window for proximity gap and dose.



Simulated 2D Resist Contour

Printed Resist Structure

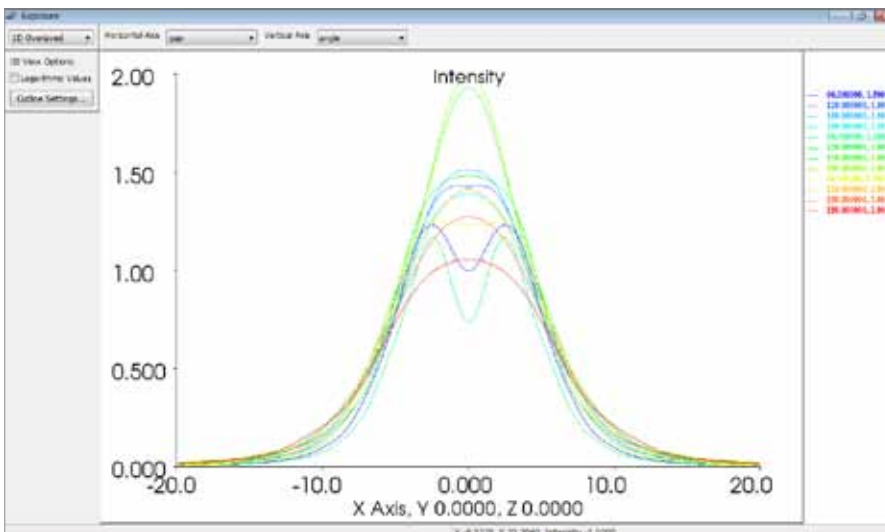
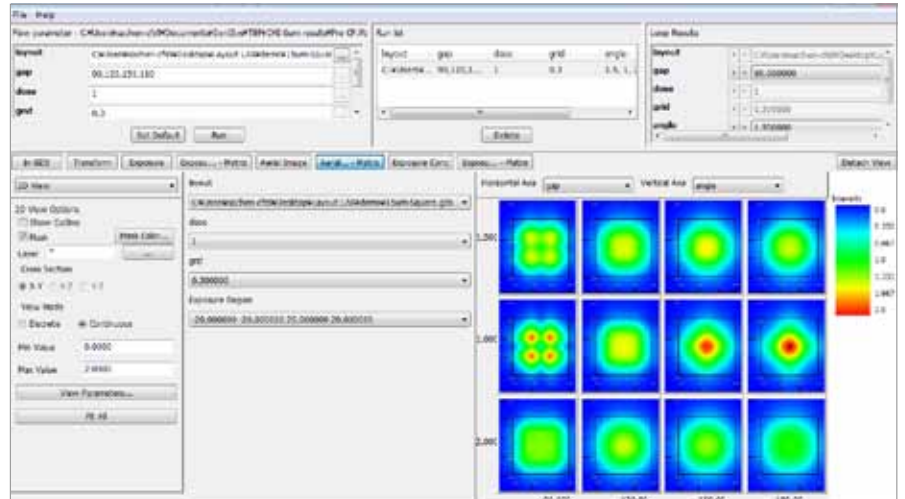
Source AMO GmbH

Fast & Easy Litho Verification and Optimization

LAB Pro provides a dedicated simulation environment for the verification and optimization of layout and process conditions. The user can focus on exploring selected process variables to identify and resolve critical areas (hot-spots). Use cases include mask and process verification, process window analysis, layout optimization (OPC), yield optimization and control in production.

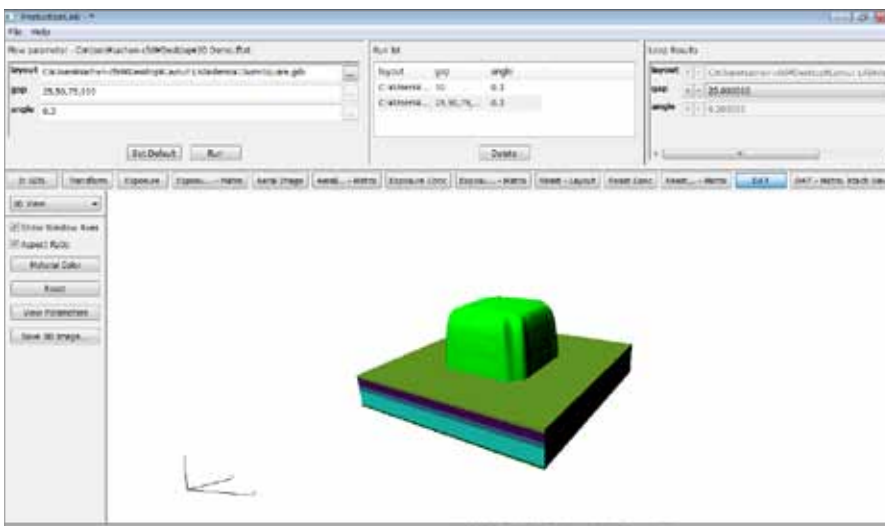


LAB Pro with the powerful definition of parameter ranges and multi-dimensional visualization provides a simple yet powerful push button solution for advanced verification and optimization. Simulation runs using multiple parameter variables such as gap, bias, dose allow comprehensive evaluations, for example in a multi dimensional matrix view. Simulation results can be saved as projects and loaded later for continued analysis.



LAB Pro has been optimized for production environments (e.g. Flat Panel Display) where interdisciplinary teams can effectively work in multiple fab locations to optimize layouts and processes, trouble shoot exposure result variations. Predefined simulation flows with user definable parameter ranges allow to focus on selected aspects of the litho process. Run hundreds of simulations with different parameter combinations to quickly calculate aerial image, bulk image in the resist at different z-positions, photo-active compound concentrations and resist contour simulation results in 1D, 2D and 3D in a matrix view.

LAB Pro is an indispensable tool for design and process engineers who require an advanced analysis simulation platform.



Layout LAB

About GenISys

Based in Munich, Germany, and with offices in Tokyo-Japan and Santa Clara-USA, **GenISys** develops, markets and supports flexible, high-performance software solutions for optimization of micro- and nano fabrication processes. Addressing the market for lithography and inspection, **GenISys** combines deep technical expertise in layout data processing, process modeling, correction and optimization with high caliber software engineering and a focus on ease of use.

GenISys products give researchers, manufacturers and system suppliers unparalleled efficiency, ease of use and optimal value in research, development and production of new nano-patterning technologies.

As a company focused on customer service, **GenISys** delivers fast, highly dedicated support for application and development of needed functionality to meet demanding customer needs .

Partners
in
Proficiency



GenISys

DFM and OPC Technology for Proximity Lithography

Experimental process development and design optimization is highly time consuming and thereby expensive. Lithography simulation enables virtual exploration of a huge parameter space in little time. **Layout LAB** is introducing this capability for proximity lithography process / design development and verification for industrial applications such as Flat Panel Display, LED manufacturing, MEMS devices and 3D-Packaging. In analogy to projection lithography where simulation became essential in the development of OPC and DFM technologies, simulation for proximity lithography is becoming an enabler for many applications.

Layout LAB Packaging

- ▶ Layout LAB Basic Package includes all basic functions for layout modification and simulation of aerial images and 3D image intensities inside the resist
- ▶ Layout LAB Full Package extends the Basic Package with 3D resist development modeling and parameter calibration.
- ▶ LAB Pro Package extends the Full Package with an advanced analysis and simulation platform for fast and comprehensive evaluation of multiple simulation runs

Flexible licensing and platform support

- ▶ Models any proximity lithography tool (mask-aligner, contact-printer, proximity-printer), e.g. Süss, EVG, Ushio and large area FPD exposure tools.
- ▶ Layout formats: GDSII, DXF, CIF, LTXT, BMP
- ▶ Open format for data-exchange with other software

Flexible licensing and platform support

- ▶ Flexible License for PC, Workstations and Network sharing
- ▶ Minimum PC requirement (>2GB RAM recommended)
- ▶ Windows XP, Vista, 7
- ▶ Linux 64 on request
- ▶ Parallel processing: Multithreading, optional cluster support

Maintenance and Support

- ▶ Hot-line technical support (e-mail, Skype, phone)
- ▶ Frequent updates with enhancements, new functions, performance tuning and bug fixes
- ▶ Regional trainings, technical workshops, user meetings
- ▶ 12 month maintenance service included in license price

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