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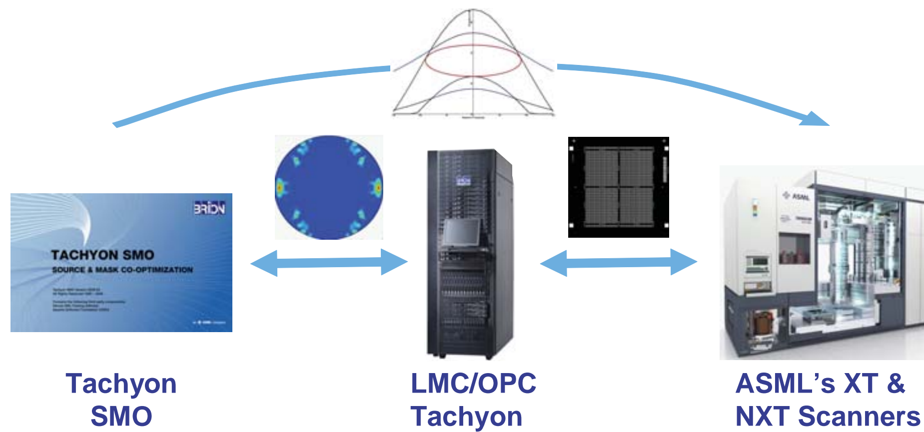
Tachyon™ SMO

SOURCE AND MASK CO-OPTIMIZATION

Extending ArF for low k_1 imaging.

Tachyon SMO co-optimizes and analyzes scanner source and mask design simultaneously, ensuring an optimized process window from R&D through production while minimizing pitch and number of exposures per layer.



Maintaining optimized process window from R&D to production

Complete Low-k_1 Enabling Solution Path

Tachyon SMO is tightly integrated with ASML's leading-edge scanners and Brion's computational lithography solutions, enabling relevant information such as modeled illumination profiles to be used in the optimization of wafer imaging performance. Tachyon SMO is targeted for use by lithography technology development organizations of semiconductor manufacturers. It can be easily used to develop new lithography processes and optimize existing processes at the design, photomask and imaging levels. Use cases include design rule validation and production illumination optimization.

ASML Scanner Database

Tachyon SMO's database includes the available illumination conditions for ASML's advanced scanner platforms, as well as Jones Pupil and Diffractive Optical Element (DOE) data files. It also uses the most advanced illumination predictive models for custom and freeform sources to ensure that manufacturable solutions are found with the most accurate analysis available.

Tachyon SMO Product Features

Optimization

- Enables imaging optimization and analysis using ASML scanner database, predictive models and parameters
- Simultaneously optimizes the illumination shape, scattering bars and model-based optical proximity correction (OPC) mask enhancements to improve the contrast and resolution of low k_1 critical features

Process Analysis

- Generates focus-exposure matrix data and overlapping process window results across multiple designated features
- Includes user specified MEEF analysis
- Analyzes individual and overall critical dimension process window performance
- Provides contour-based process variation (PV) for focus and dose analysis

User-Interface

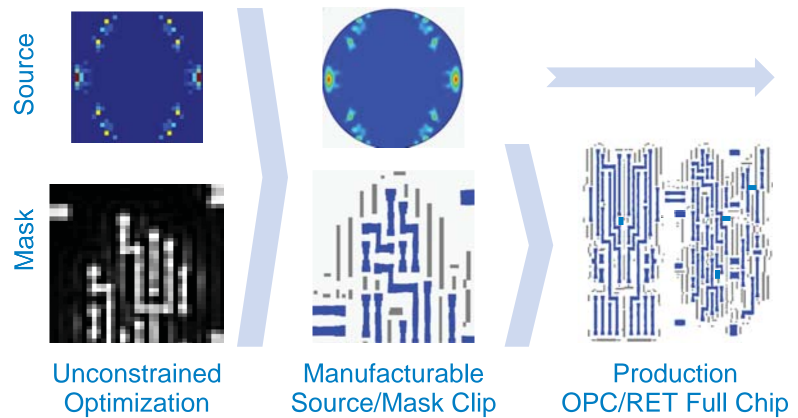
- User-friendly graphical user-interface (GUI) for easy entry of design, mask, scanner and imaging data
- Illumination editor for creating standard and custom illumination profiles
- Global scaling feature for creating next generation lithography processes using current designs

Tachyon SMO

Tachyon SMO Advantages

- Enables ArF extension for low k_1 imaging
  - Validate next generation design rules
  - Minimize pitch and number of exposures per layer
- Leverages ASML's unique capabilities
  - ASML advanced scanner illumination (i.e. custom DOE)
  - Tachyon advanced mask, inverse and RET capabilities

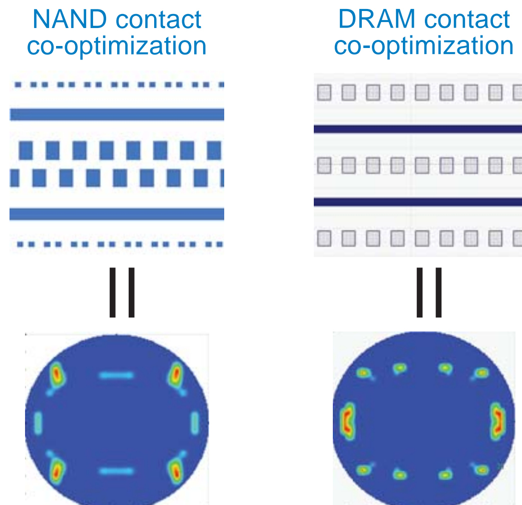
Tachyon SMO Flow - Optimized, manufacturable solutions



Source-Mask Co-Optimization

Tachyon SMO Features

- Customized simulation and optimization engines
- Edge placement error (EPE) metric optimization
- ASML's most advanced custom and freeform DOE models
- Recommends manufacturable sources and masks



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