

DrawBeam – TESCAN Lithography Toolbox

The 3rd generation of TESCAN scanning electron microscopes is designed to fulfill all requirements of electron – and ion – beam lithography applications.

TESCAN's SEMs are equipped with a powerful internal digital pattern generator with 16-bit scanning ramp DACs (65,536 x 65,536 virtual write field).

The field emission electron column is also endowed with a powerful **In-Flight Beam Tracing™** with the possibility to directly control the spot size and probe current.

Available processing modes:

- Electron exposition (EBL)
- Electron etching (EBE)
- Electron Deposition (EBD)
- Ion etching (IBE)
- Ion deposition (IBD)

DrawBeam Basic

The optional DrawBeam Basic extension module is intended for standard lithographic processes one field ion or electron beam lithographic applications. Minimum pixel dwell time for all shapes is 80 ns/pixel.

The following scanning shapes and objects are available:

- Point/Line/Cross
- Rectangle (outline, filled, stairs, polishing)
- Circle (outline, filled)
- Annulus (filled, stairs, polishing)
- Polygon (outline, filled)
- Bitmap
- Text
- Void objects (rectangle, circle, polygon)
- Alignment marks

Objects are arranged in layers. Each layer can have a separate setting of processing mode with an adequate set of parameters (e.g. exposure setup, material of the sample/resist, serial/parallel processing etc.) Exposure conditions can be set from the actual beam parameters and according to the material of the sample from a user defined database.

Editing functions are:

- Undo/Redo
- Cut/Paste/Copy/Delete
- Clone/ Mesh object
- Group of the objects/Explode groups and mesh objects
- Rotate and Align objects
- Layers/Objects management

Available features and parameters in the lithographic process are the following (changing of some of the parameters during the exposure is also possible)

- UV coordinate system
- Z – leveling (only for EBL, EBE, EBD)
- Drift correction (only for IBE, IBD)
- Object overlap resolver (single or multiple exposure)
- Change depth of objects (only for EBE, EBD, IBE, IBD)
- Shift exposure in the time (only for EBE, EBD, IBE, IBD)

Real-time pattern visualization during the lithographic process is available. The project file with programmable exposure conditions is automatically generated from the graphical user interface. The project can be saved, loaded and exported to a bitmap.

DrawBeam Advanced

DrawBeam Advanced is designed for users who need to create much more complex structures in a faster and accurate way.

The optional extension "DrawBeam" upgrades the DrawBeam Basic version with the following extra features:

- Minimum dwell time 20 ns/pixel for all shapes
- Multiple write fields (stitching)
- Stage navigation
- Proximity effect correction
- GDSII and DXF import
- Fine polishing using the Rocking Stage (IB)

- FIB end-point detection
- Automatic Pattern alignment