GenISys
Advancing the Standard

BEAMER

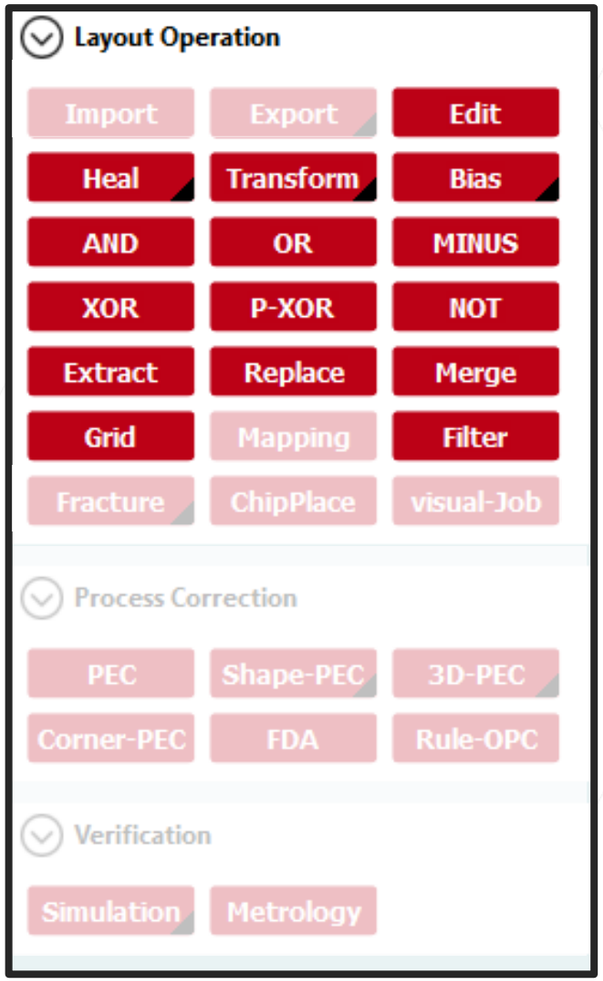
Training webinar

Part 3: Layout Operation

Agenda

- Basic Layout Operation
  - Bias / Size/Transform
  - Heal / Overlap Removal
  - Boolean Operations
  - Application Examples
- Advanced Layout Operation
- Summary
- Outlook

Layout Operation

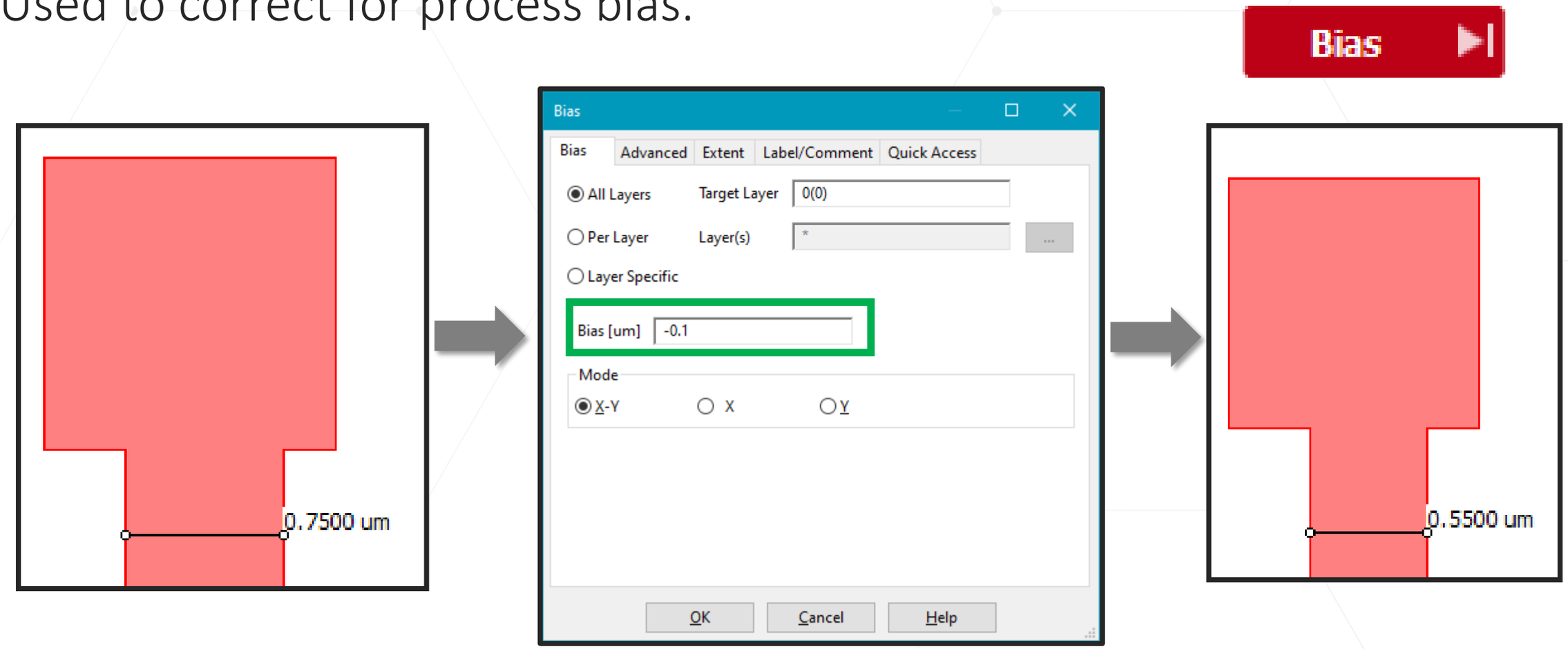


BEAMER offers a rich library of data preparation functionality

- Adjustment of existing patterns intelligently
- Layout vertex improvement for better fracturing
- Bias to compensate process effects, e.g. etch loss
- Remove overlaps to avoid overexposure
- Apply Boolean operations
- Extract layout elements
- Transform layouts
- Merge layouts

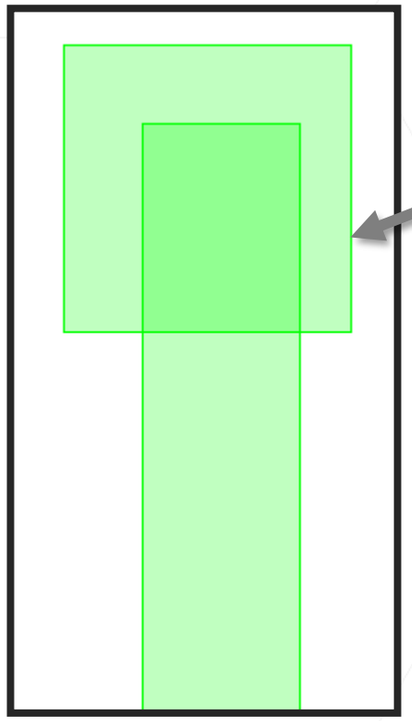
Bias

- Adds or subtracts the entered dimension to all sides of all polygons.
- Used to correct for process bias.



Heal

- Remove overlaps to avoid overexposure

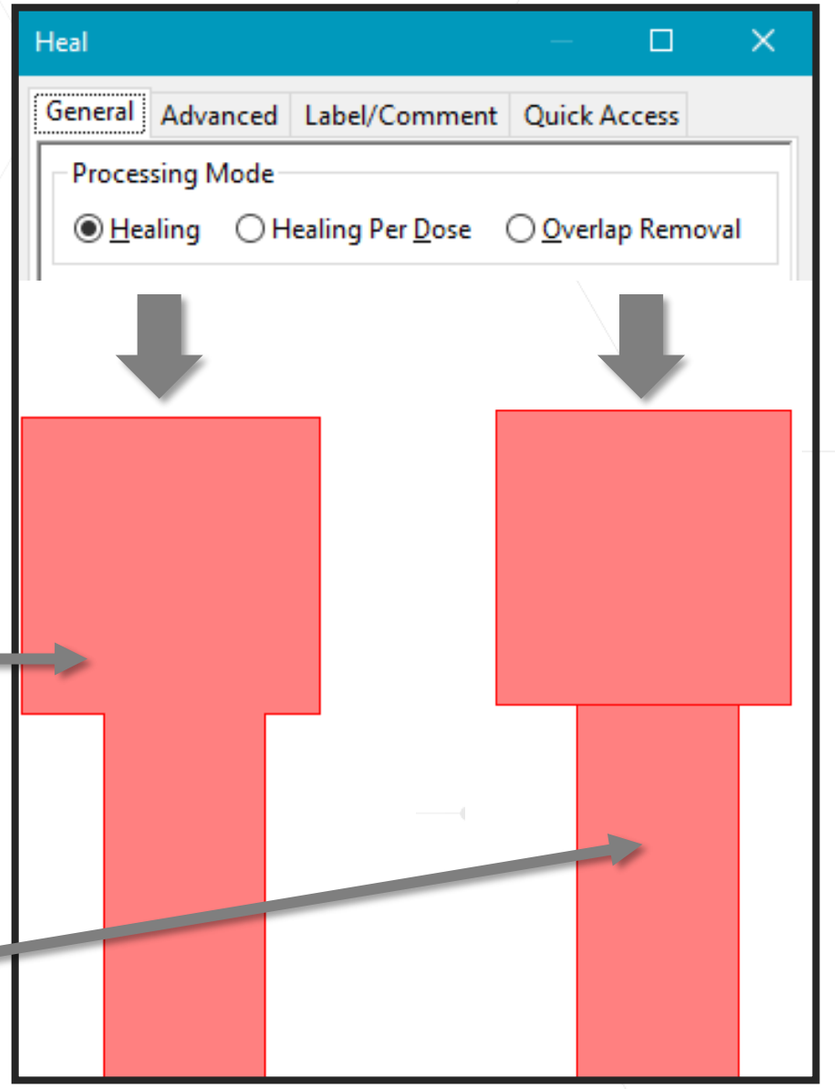


Overlaps can be removed using the Heal Module using 1 of 2 modes.

Heal

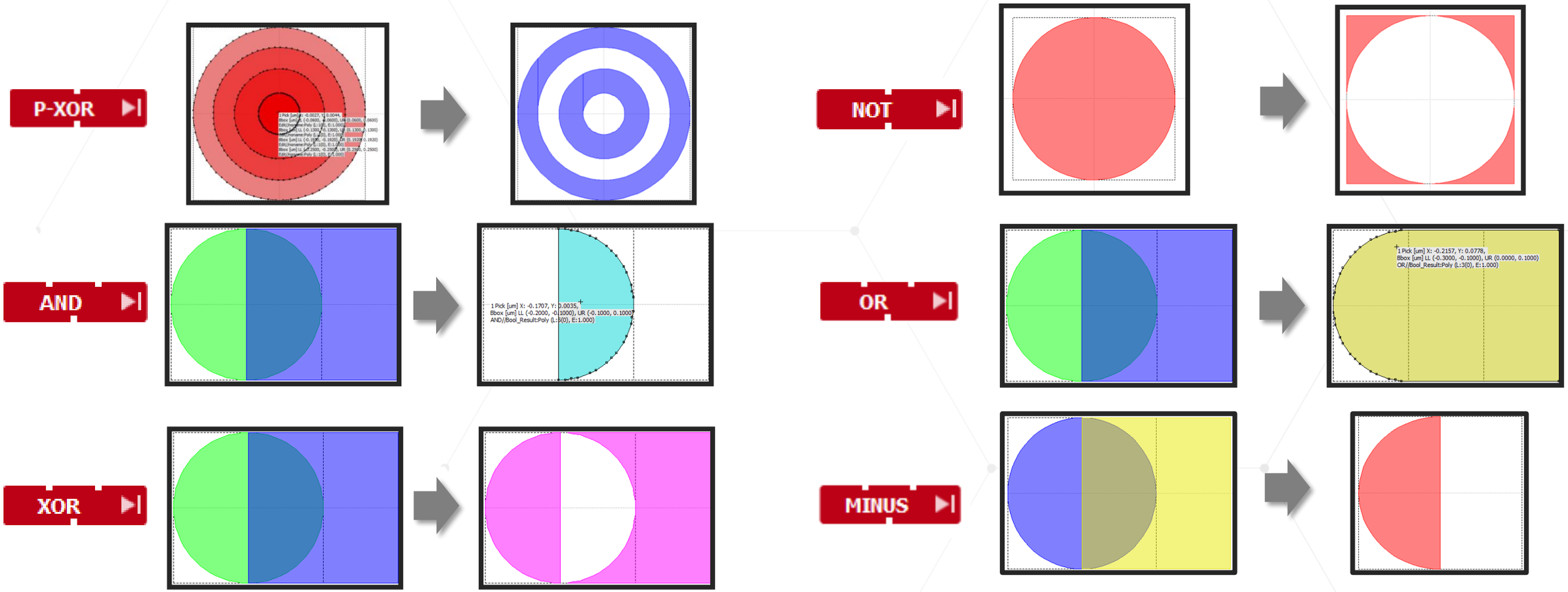
Shapes are merged into one polygon.

Overlaps are removed but shapes are kept separate.



Live Demo: Boolean Operations

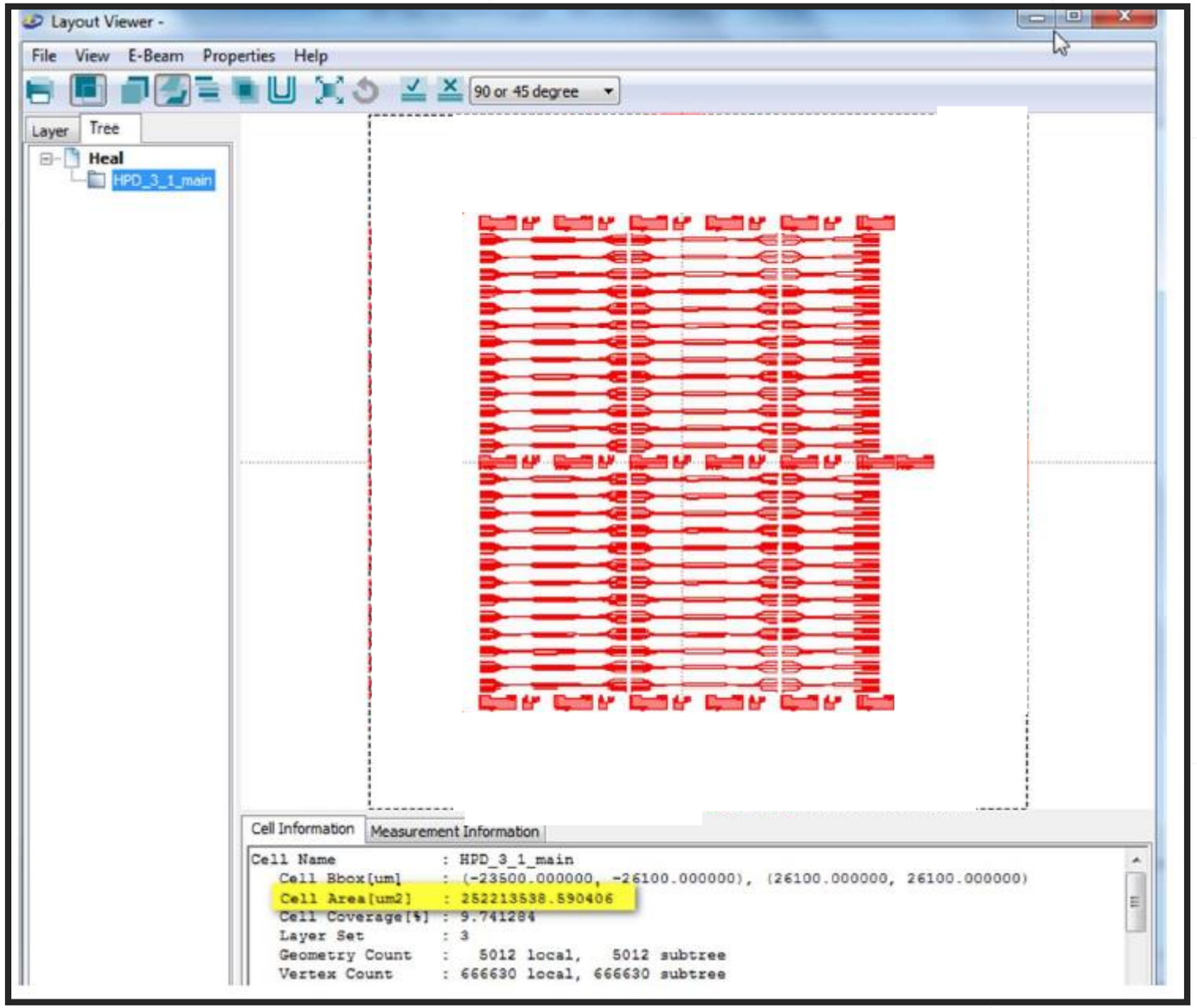
- Set of Boolean operations



Agenda

- Basic Layout Operation
  - Heal / Overlap Removal
  - Bias / Size/Transform
  - Boolean Operation
  - Application Examples
    - Bulk/Sleeve, Coarse/Fine
- Advanced Layout Operation
- Summary
- Outlook

Waveguide Chip



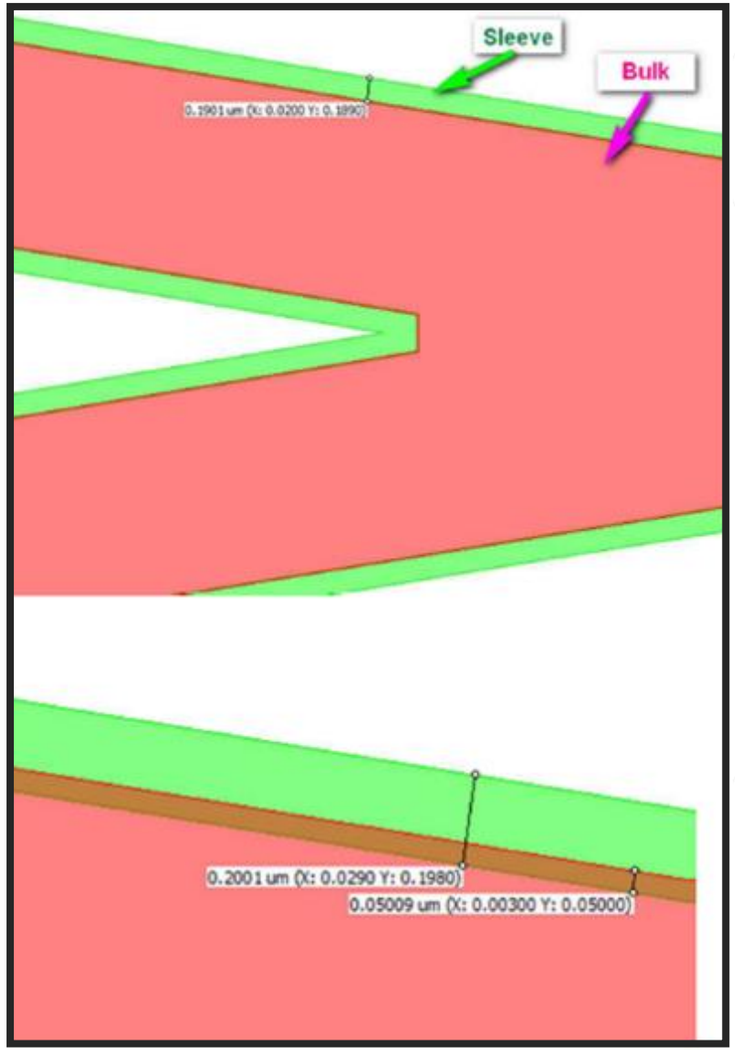
Exposure Area: 252213538.590406 µm² (~ 2.5 cm²)

Assume Dose required: 200 µC/cm²

Using 1nA for all Esposure results in ~ 6 days writing time!

Industrial case from: HHI – Berlin

Exposure Time Optimization



Bulk Area:

251376605.1 µm² (~ 2.5 cm²)

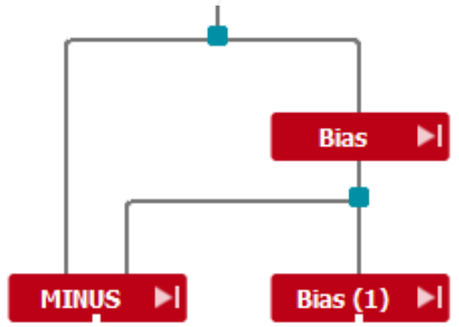
Bulk Write Time: ~ 3 hours
for I = 50 nA, D = 200 µC/cm²

Sleeve Area:

1115968.4 µm² (~ 0.01cm²)

Sleeve Write Time: ~ 0.5 hours
for I = 1 nA, D = 200 µC/cm²

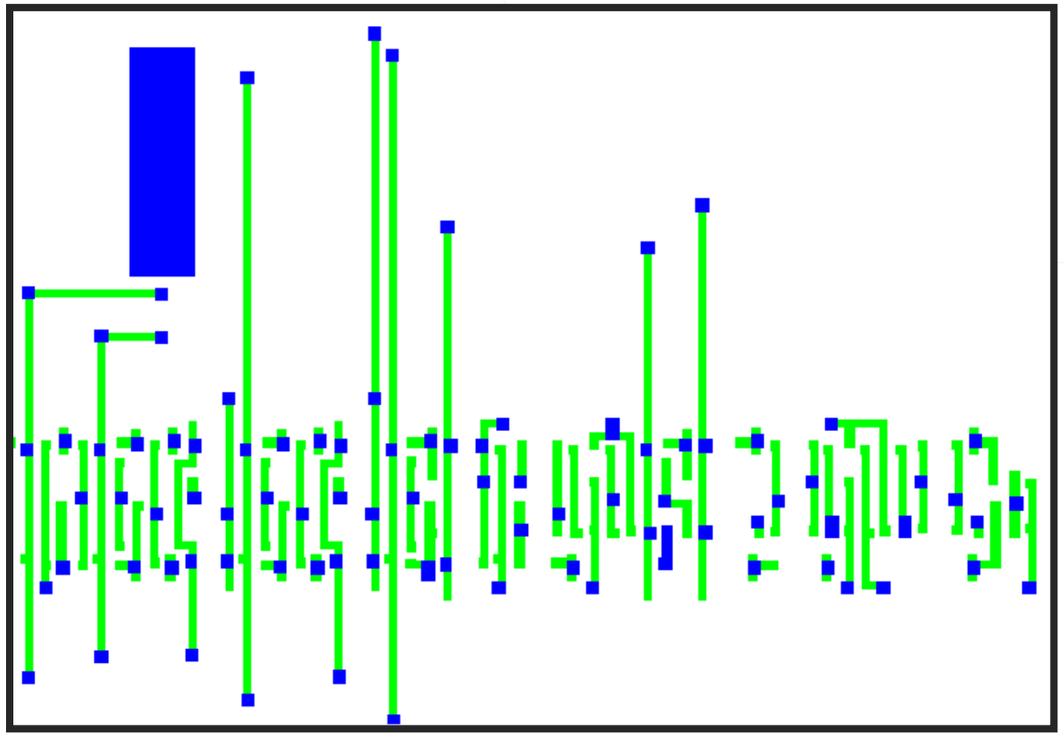
Total write time: ~ 4 hours (35x faster)

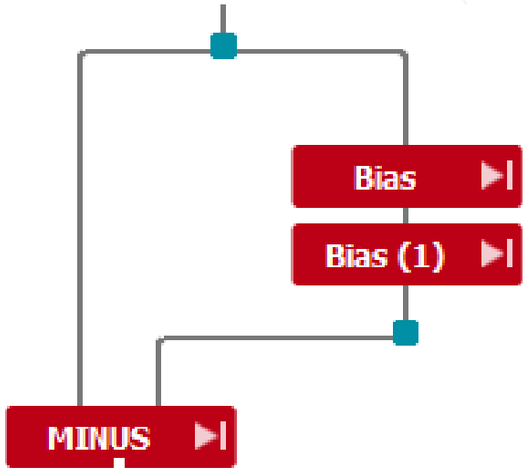


Industrial case from: HHI – Berlin

Live Demo: Coarse/Fine Split

Shrink/Grow method used to separate large features from fine features.



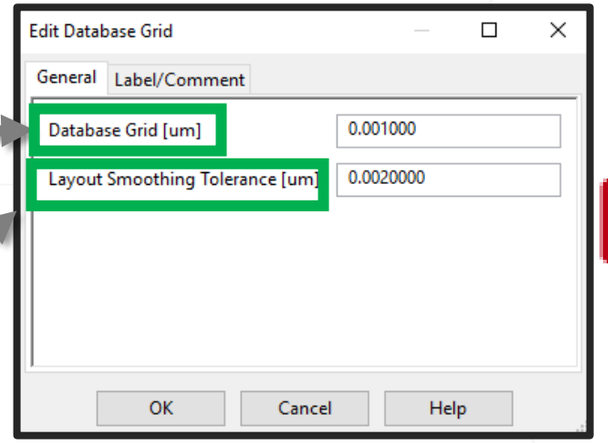


Agenda

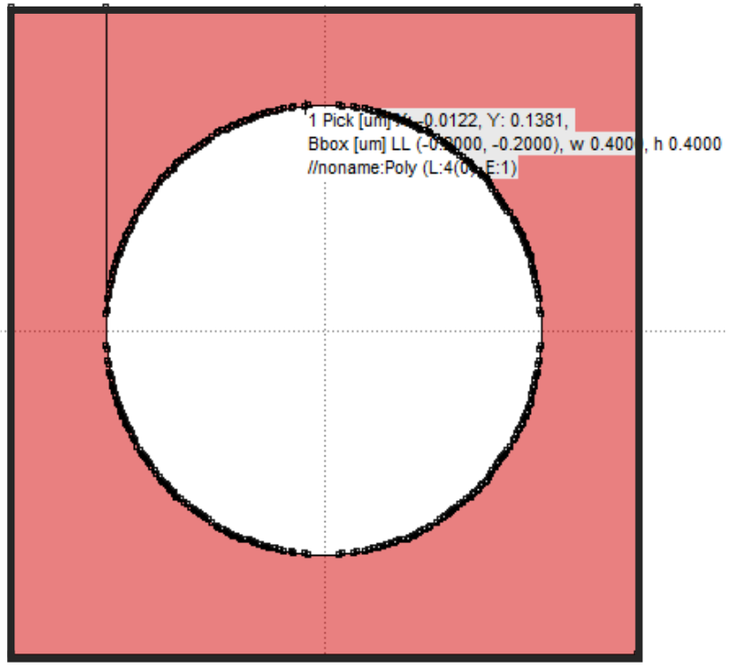
- Basic Layout Operation
- Advanced Layout Operation
  - Grid module
  - Extract Module
  - Filter
  - Replace
  - Merge
  - Edit
- Summary
- Outlook

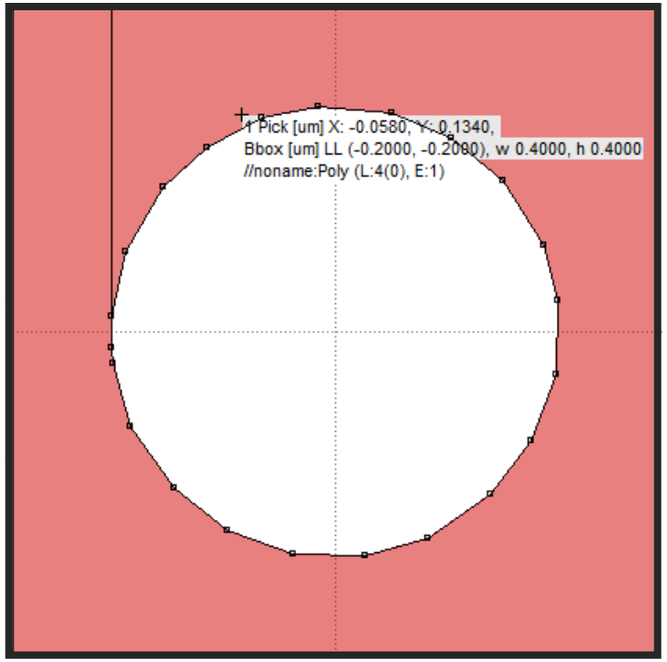
Grid

- Grid modifies the database unit of a pattern by Database Grid
- Grid provides the capability to reduce the number of vertices for curved structure by Layout Smoothing Tolerance.

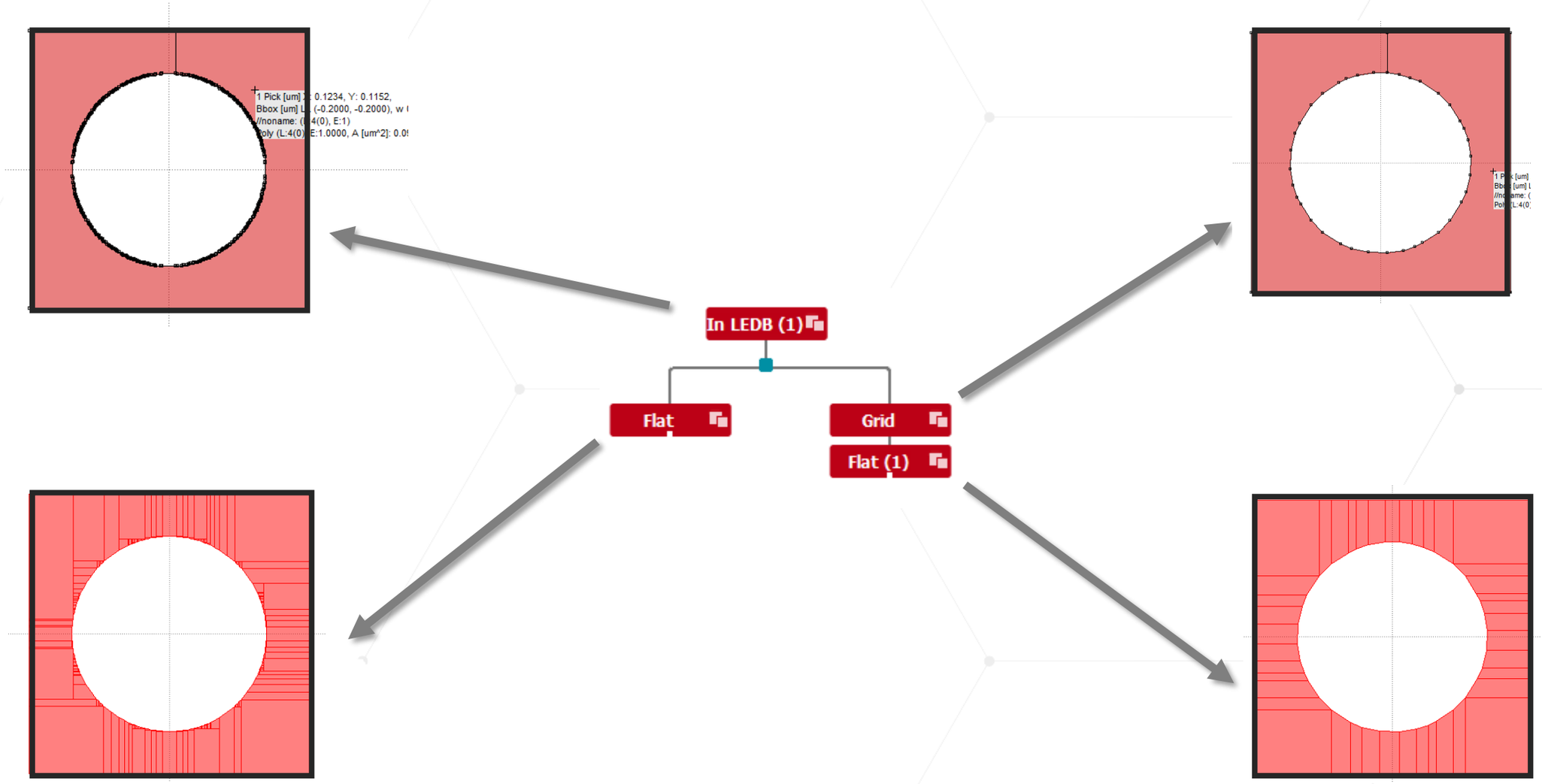


Layout smoothing





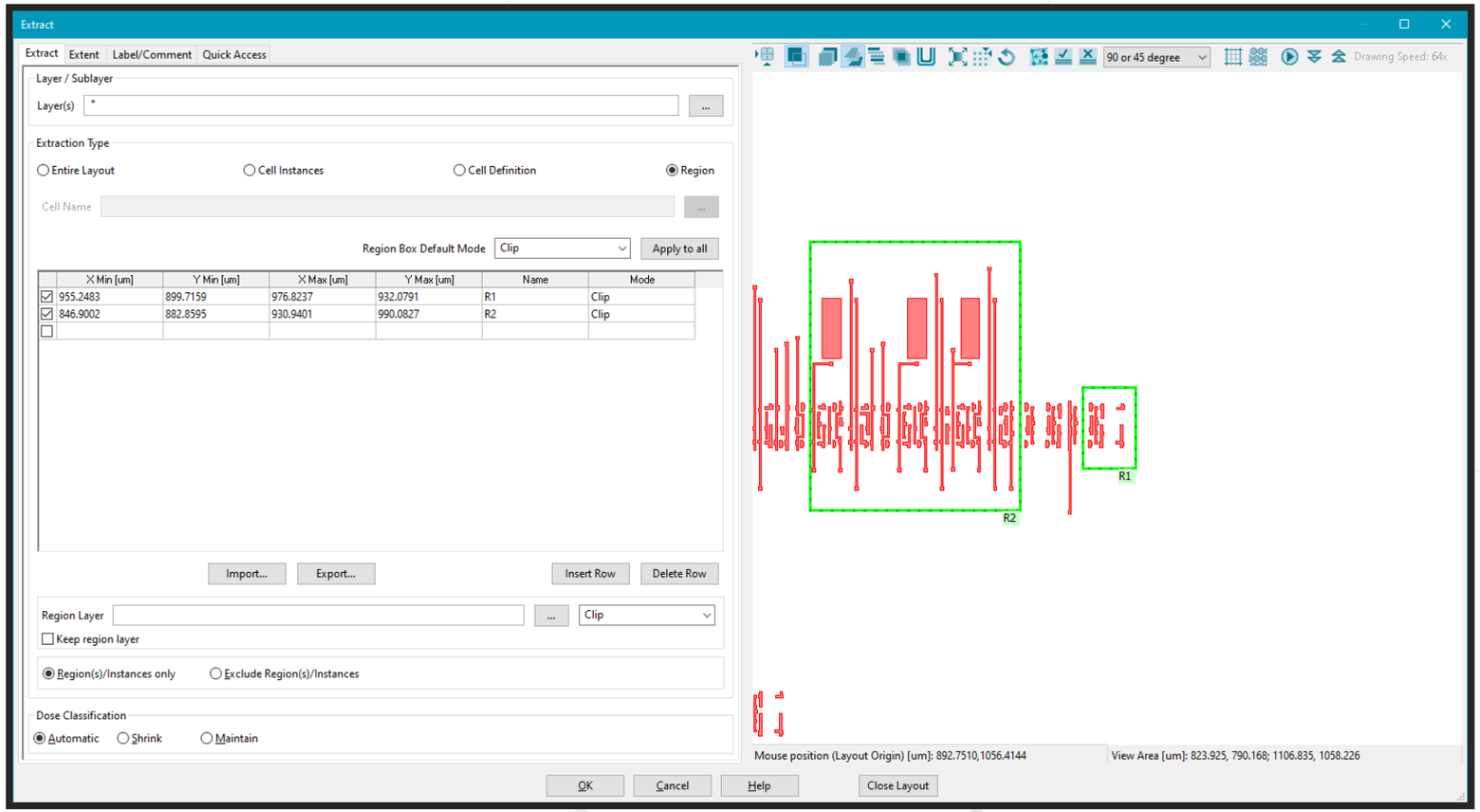
Grid



Extract

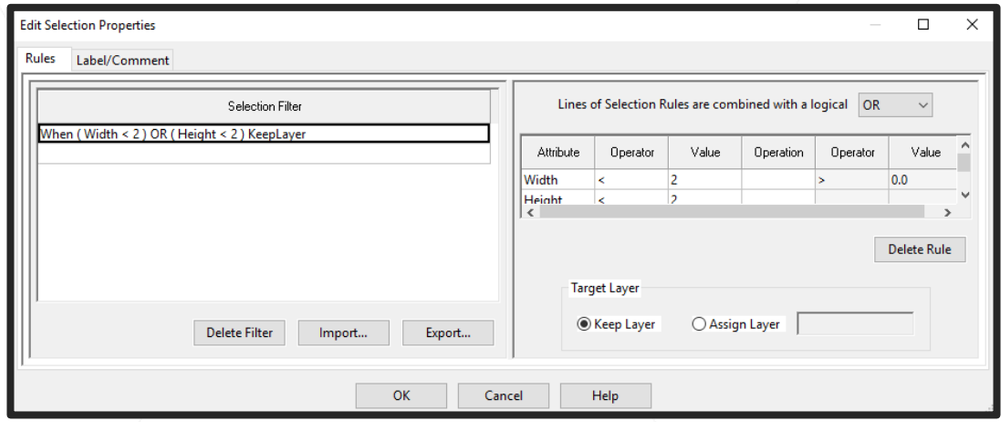
Preserves hierarchy

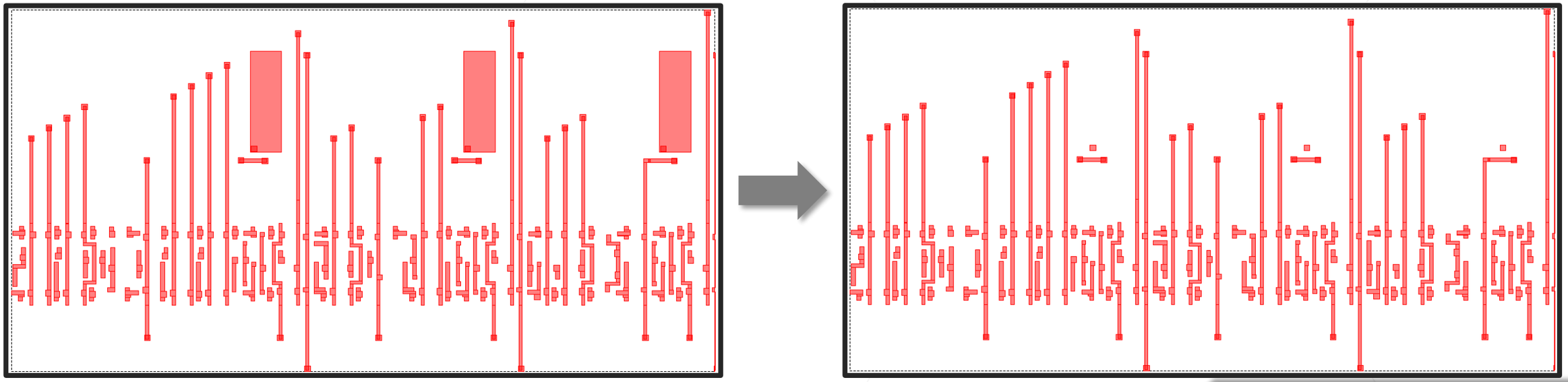
- Cell Extraction
  - Instances
  - Definitions
- Layer Extraction
- Region Extraction
  - By Region Layer
  - Visually
    - Start/End Region Selection: Shift + Left Mouse Click
    - Region coordinates are placed in the table to the left



Filter

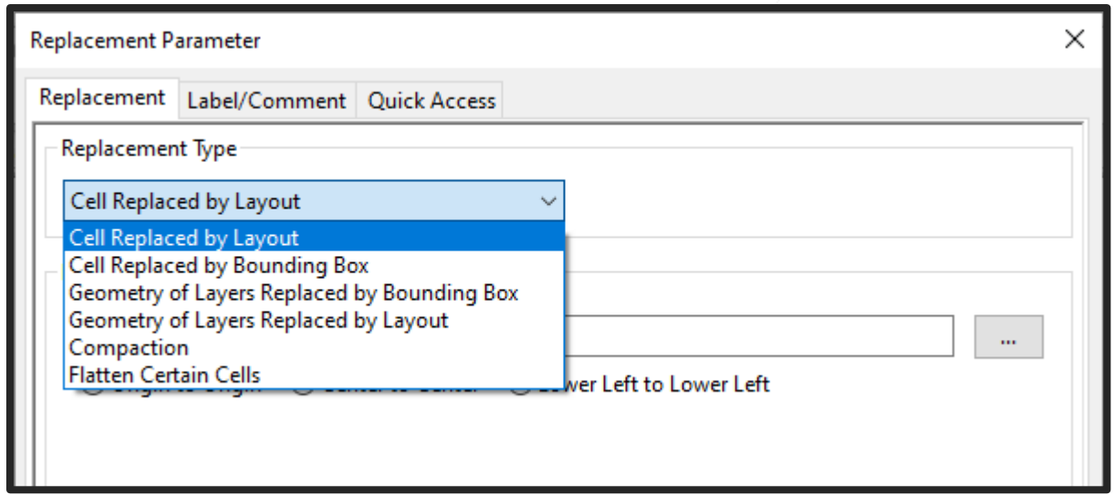
- The Filter module allows the selection of shapes via a filtering criteria.
- The example selects the small elements with one dimension smaller than 2 µm.

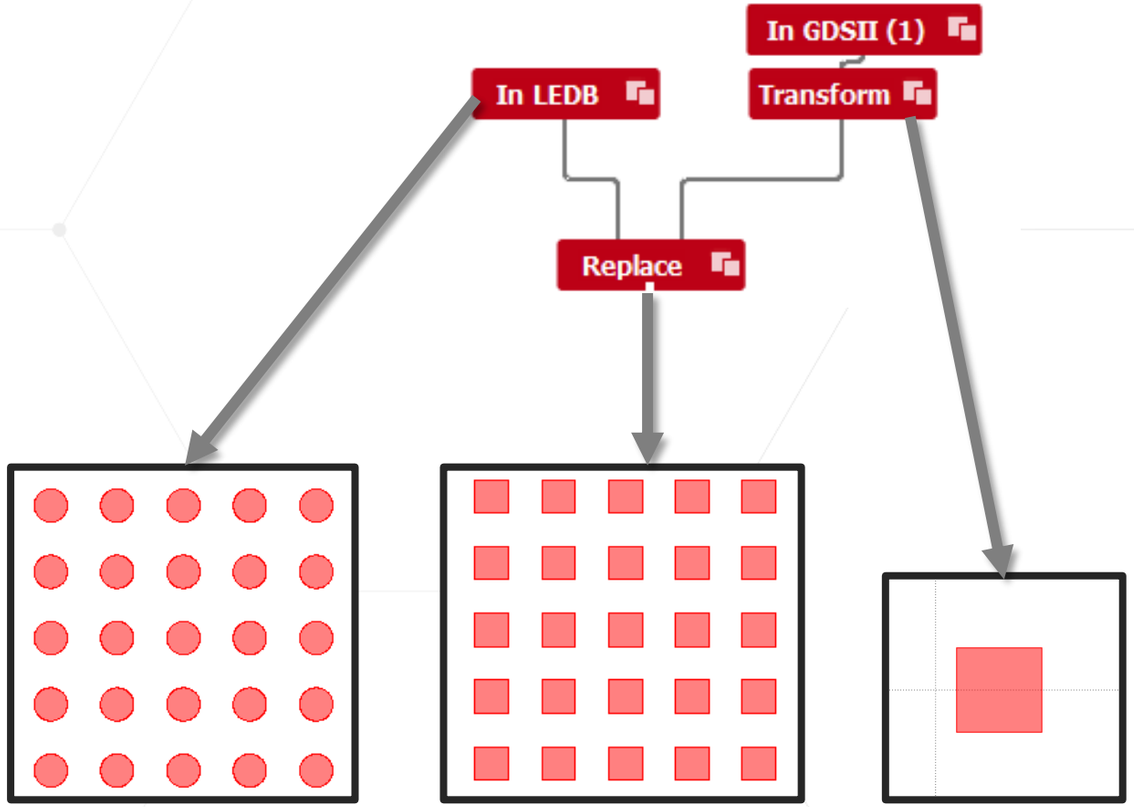




Replace

- The Replace module allows replacing cells wthin a layout with another layout or bouding boxes, or replacing the geometry of layers by bounding boxes.
- Possibilites are listed.





Live Demo: Edit Module

- Fully Functional Layout Editor
  - Edit a pattern in a workflow
  - Create a new pattern

- Things to remember:
  - Saving the Edit module in the flow does not save your pattern.
  - Use the Export module to save any modifications or newly created patterns.

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- Basic Layout Operation
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Summary

BEAMER offers a rich library of data preparation functionality:

- Basic layout operations
  - Boolean operations
  - Heal layout elements or remove overlaps, to avoid over-exposure
  - Bias or resize intelligently
  - Transform layouts: scale, mirror, rotate, shift
- Advanced layout operations
  - Grid optimization control
  - Extract layout elements, layers, cells, regions
  - Filter layout elements by width, height, area
  - Element replacement
  - Merge layouts
  - Small modification of existing layouts

Outlook

BEAMER training webinar part 4: Standard Dose PEC – Introduction

- Proximity Effect
  - Principle
  - Monte Carlo Simulation in TRACER
- Proximity Effect Correction by Dose modulation
  - Edge Equalization algorithm
  - Basic parameter
- Short Range correction
  - Effective Blur
  - Fracturing
- Application example

Thank You!

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