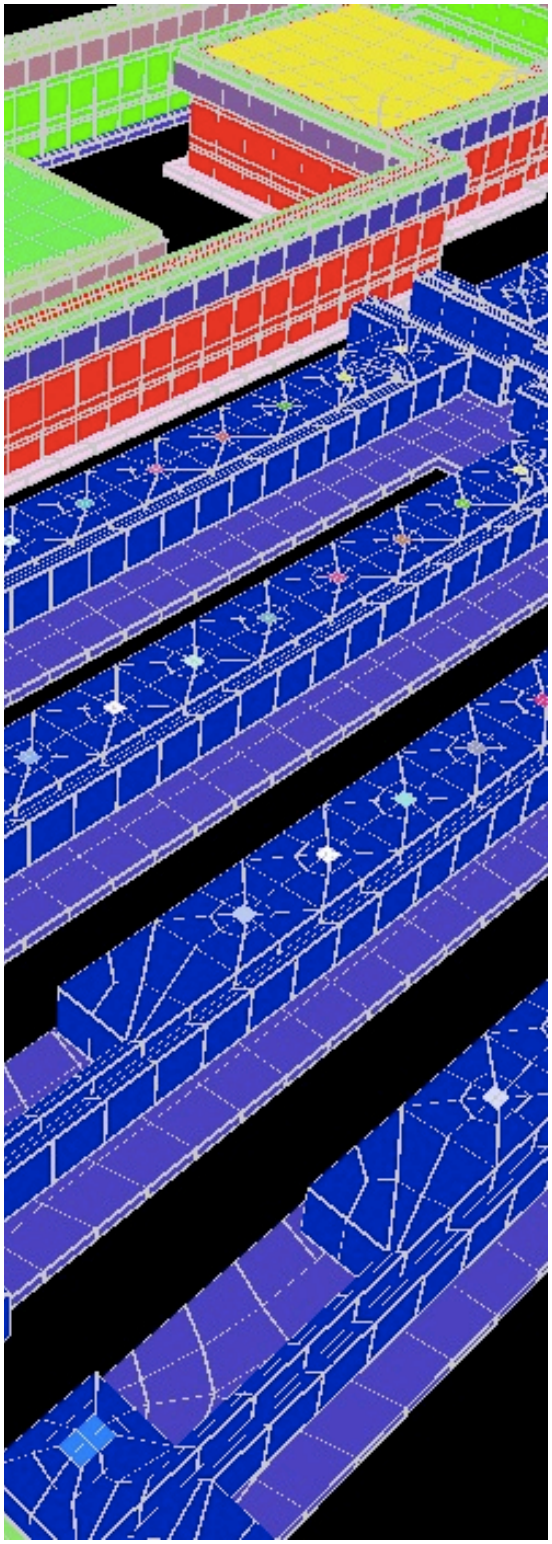
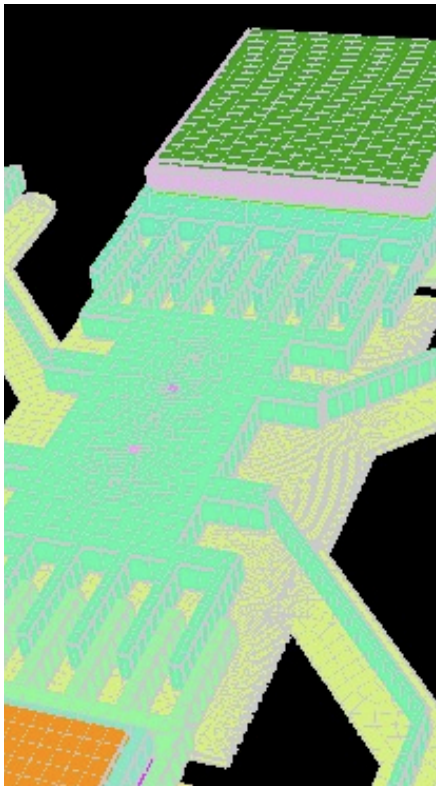
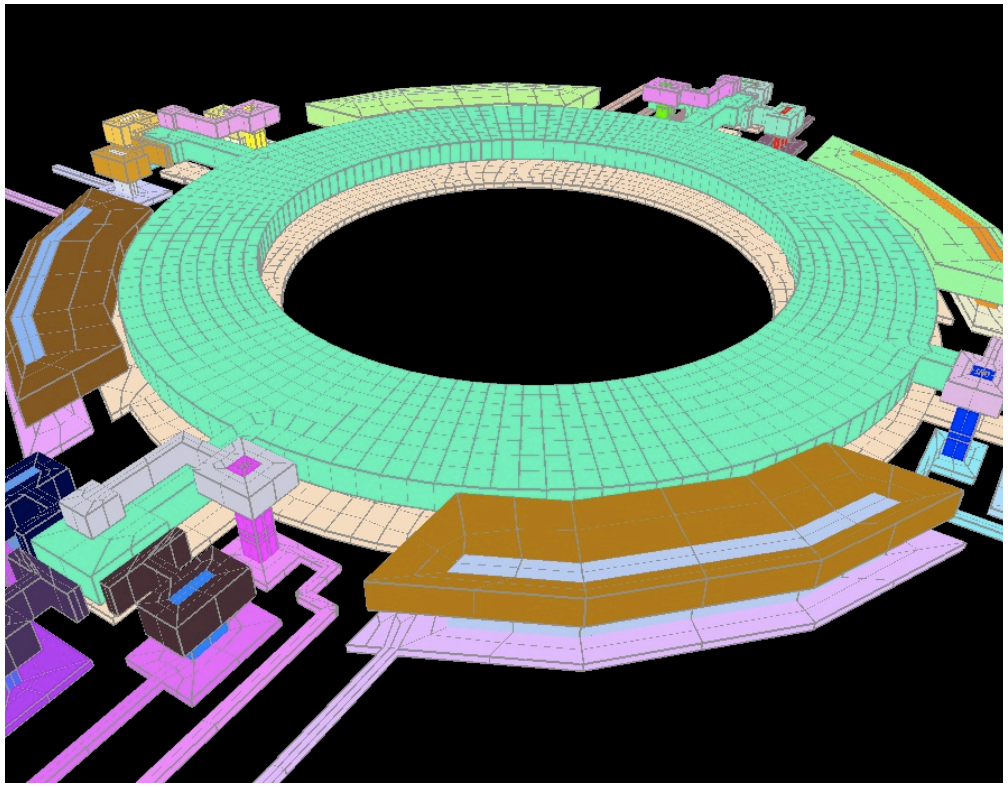


Getting Started with

3D Builder

Robust, One Click MEMS Mesher





Getting Started With 3D Builder
Getting Started Series
Version 8.5/PC

Part Number 30-090-101
Sep 2008

Main Features

Robust mesher

Create Manhattan, isotropic & adaptive meshes

All Hex element generation

High quality meshes for faster simulation

Mask to mesh

One click Mask to Mesh conversion

Parametric meshing

Change device parameters without re-meshing

Speed

Typical meshes in under 1 minute

Export to FEA

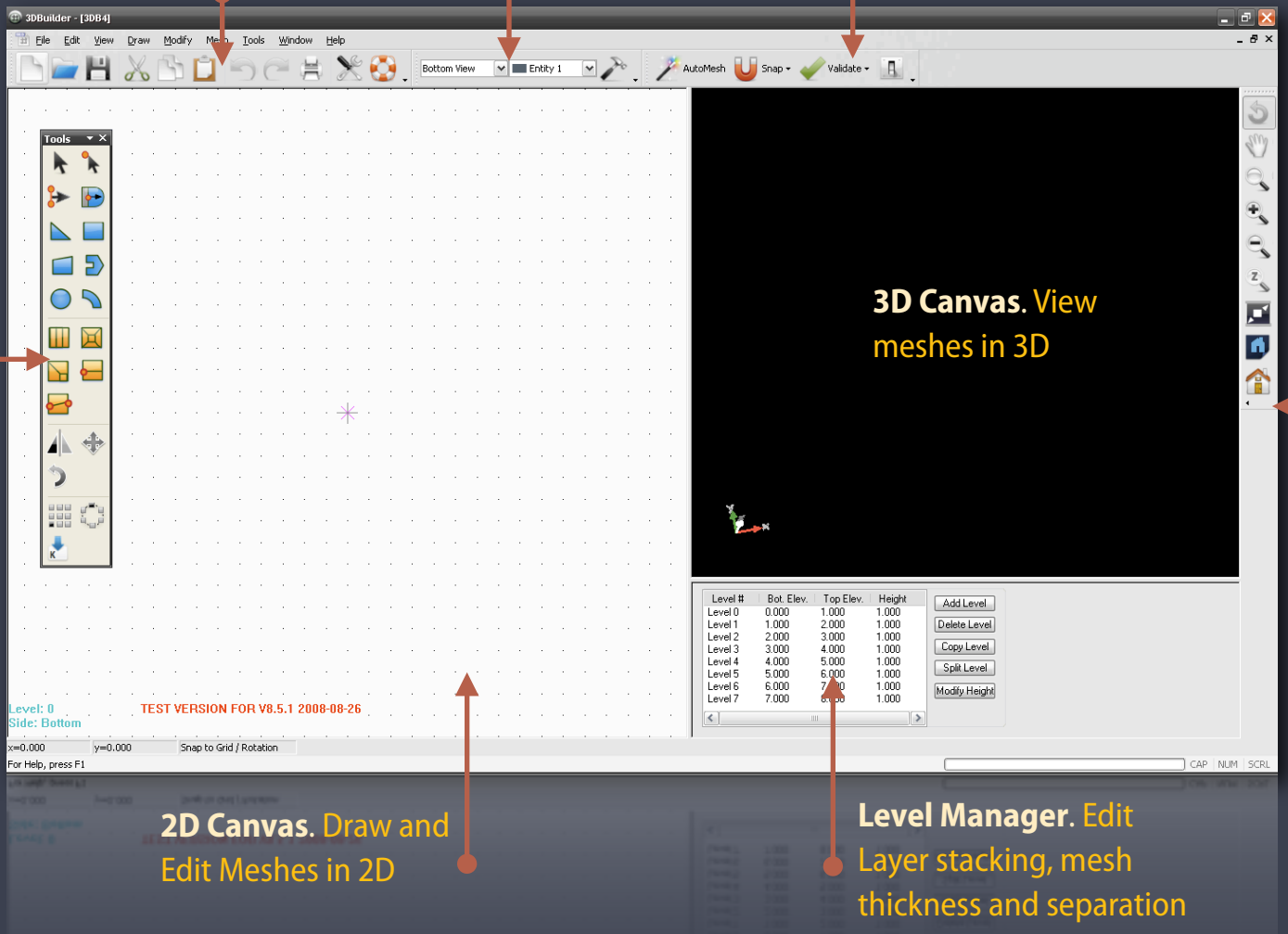
Export to IntelliSuite Multiphysics, ABAQUS, ANSYS, SIMULIA, PATRAN and I-DEAS (needs TEM module)

App Overview

Main Toolbar. Common file and edit functions

Entities Toolbar. Assign and edit entities

Mesh Controls. Automeshing, mesh validation and setup tools



Tools. Mesh creation and editing tools.

3D Canvas. View meshes in 3D

View Toolbar. Zoom, Pan, Rotate, and other controls

2D Canvas. Draw and Edit Meshes in 2D

Level Manager. Edit Layer stacking, mesh thickness and separation

App overview

1. 3D Builder allows you to manually create **parametric meshes** or automatically convert a mask set into a parametric mesh.

2. 3D Builder allows you to build high fidelity **hexahedral** meshes in a jiffy. Use the drawing and mesh editing tools to create your meshes. Use mesh refinement techniques such as subdivision, zippering, spider-webbing and corner frames to intelligently refine your mesh.

3. **Mesh tracing** allows you to use your mesh as a template to trace elements one by one. Works great for optimal meshes!

4. **Automeshing** allows you to easily create manhattan, isotropic or adaptive meshes.

5. Use **mesh validation** tools to validate the mesh connectivity and compatibility.

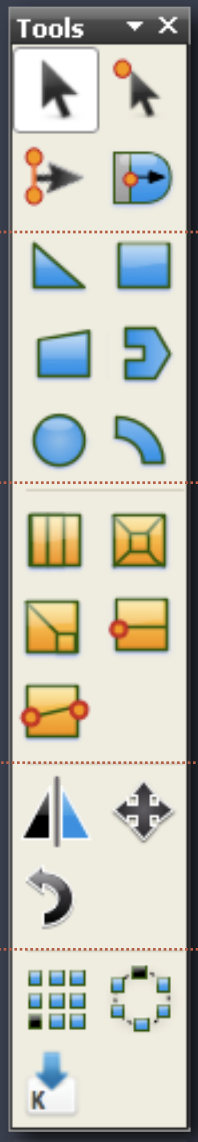
6. Finally, **export** your meshes to analysis modules. You can use any of the multiphysics modules to export the meshes to other FEA software such as I-DEAS, Simulia, Ansys or Ansoft.

Tools

Select Elements. Select by clicking or dragging around objects.

Modify Top/Bottom nodes. Move top and bottom nodes of an object.

Draw Elements. Elements are automatically converted into hexahedal elements.



Modify Nodes. Move selected node while maintaining connectivity.

Modify the edge of an element. Used in fluidic simulations only.

Mesh Refinement Tools. Refine mesh elements further using techniques such as sub-division, zippering, spider webbing and corner frames.

Edit Tools. Tools for mirror, rotate, rotating meshes.

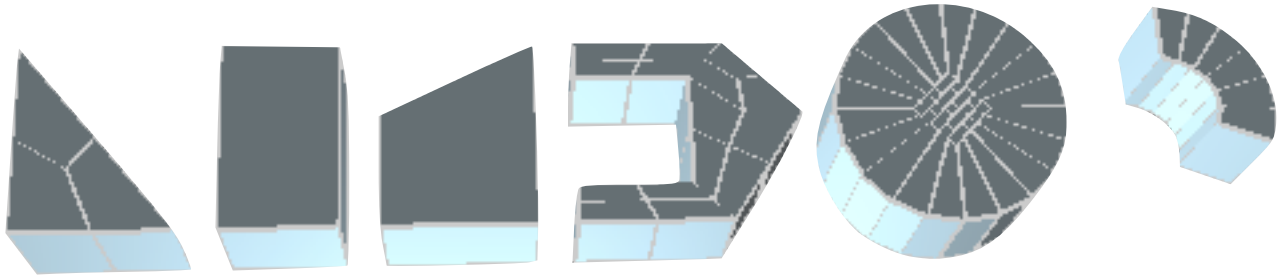
Misc. Tools for arraying and keyboard viewer.

Drawing tools

Icon

Top View

3D View



Draw objects as you would in any CAD tool. Objects are automatically meshed into hexagons as they are drawn!

Local mesh refinement tools: Slice & Dice

Icon

Before

After

Slice | Spider Web | Corner Frame | Zipper | Zipper 2

View

Rotate 3D View. Use mouse to freely rotate 3D view. Use scroll ball to zoom in and out .

Pan and Zoom. Work in either 2D canvas or the 3D canvas. Depending upon user focus.

Z-scale. Change 3D scaling to view low aspect ratio structures better.

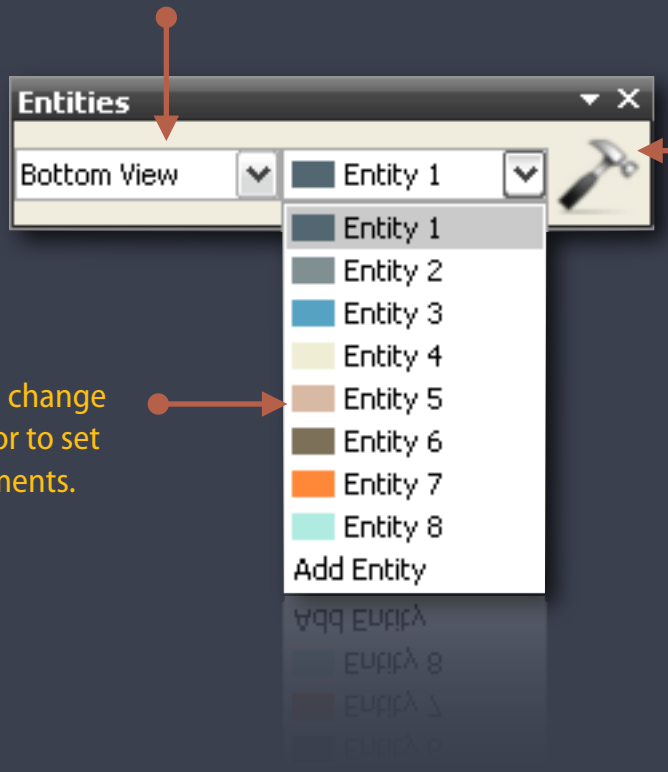
Zoom to fit. Zoom to extents works in 2D or 3D canvas.

Set Home. Commits current 2D view to memory.

Go Home. Switches 2D view to saved view.

Entities

View. Toggle between top and bottom views of a level. Nodes on the top and bottom of a level can be edited independently.



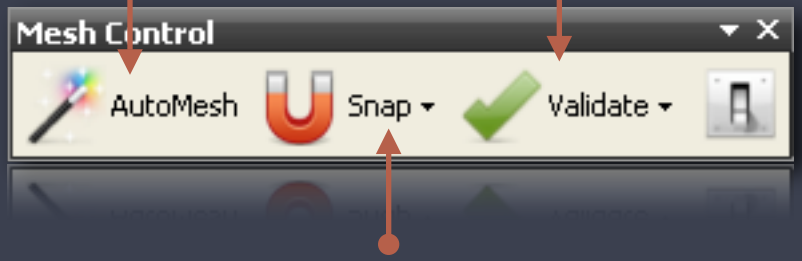
Modify entities. Modify entity description and color.

Set Entity. User drop down to change the entity of selected objects or to set the default entity for new elements.

Mesh controls

AutoMesh. Automatically create a mesh from a mask set.

Validate (drop down). Validate mesh connectivity and compatibility.



Snap (drop down). Allow user to turn on and off snaps

Setup. Setup viewports, grid sizes etc

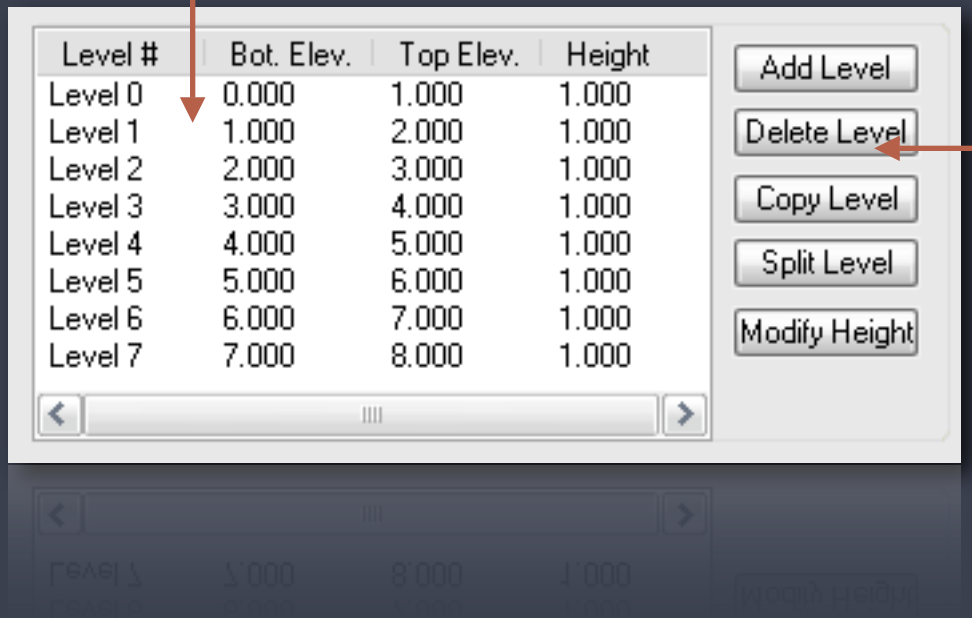
Side note

Application Icon

Document Icon.
Extension .solid

Level controls

Level Manager. Set the thickness and elevation of the current drawing level — this sets the extrusion height and position of the entities in the level. User can parametrically vary mesh thockness and elevation of each level.



Manipulate levels. Modify level settings, add, remove and split a level into multiple levels.

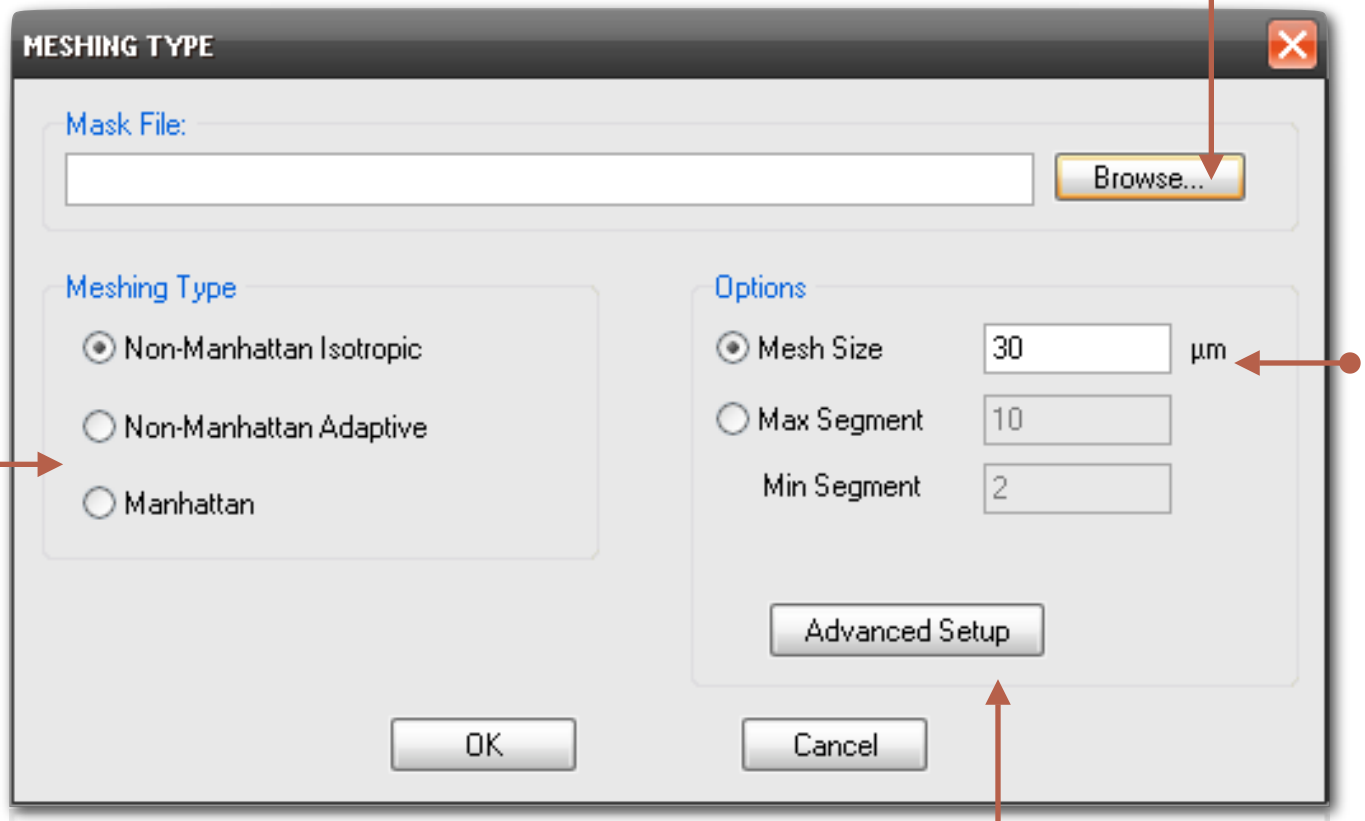
Important Keyboard Shortcuts

Function	Keyboard Shortcuts
Manipulate View	
Zoom In	Ctrl+↓
Zoom Out	Ctrl + ↑
Zoom Window	Z
Fit All	F
Pan	P
Rotate	R
Lighting On/Off	Ctrl+L
Draw	
Triangle	T
Rectangle (Box)	B
Quadrangle	Q
Polygon	G
Circle	C
Arc	A
Snap to Grid	Shift+G
Snap to Object	Shift+V
No snap	Shift+N

Function	Keyboard Shortcuts
Mesh	
Auto Mesh	Ctrl +M
Multiple slices	Ctrl + Shift + L
Spider Web	Ctrl +Shift + W
Corner Frame	Ctrl +Shift + F
Zipper	Ctrl +Shift + Z
Modify	R
Node	N
Edge	E
Move	M
Reflect	/
Rotate	Ctrl+R
Sidewall Angle	W
Other	C
Undo	Ctrl + Z
Redo	Ctrl + Y
Keyboard Entry	Ctrl + K
Setup	Alt + ;

Working with the Auto Mesher

Choose mask file. Browse hierarchy to choose mask file.



Mesh type. Choose mesh type depending upon mask type and intent. Use Manhattan meshing for rectilinear masks, non-manhattan isotropic for complex mask shapes.

Mesh size. Choose average size of the hexahedral mesh.

Advanced Setup. Select advanced setup to enter the mask layer stack up information.

Working with the Auto Mesher (2)

Advanced Setup for Layers

Mesh Details

- ☑ Simplify polygons (arcs, circles etc) whose edges exceed: 32
- ☑ Meshing tolerance: 0.1 um
- ☑ Ignore polygons with areas smaller than: 0.01 sq.um
- ☑ Automatically assign entities

Mesh Simplification. Setup for simplifying meshes.

Model Details

◉ Process Modeling ○ 3D Modeling

	Layer # in Mask	Layer Name	Processing	Thickness	Bottom Elevation
☑	0	HOLE1	Hole	2	3.1
☑	13	POLY0	Ground Plane	0.5	0.6
☑	43	ANCHOR1	Anchor	2	1.1
☑	45	POLY1	Structural(Conformal)	2	3.1
☑	47	POLY1_POLY2_VIA	Structural Via	0.75	5.1
☑	49	POLY2	Structural(Conformal)	1.5	5.85
☑	50	DIMPLE	Dimple	0.75	2.35
☑	51	METAL	Structural(Conformal)	0.5	7.35

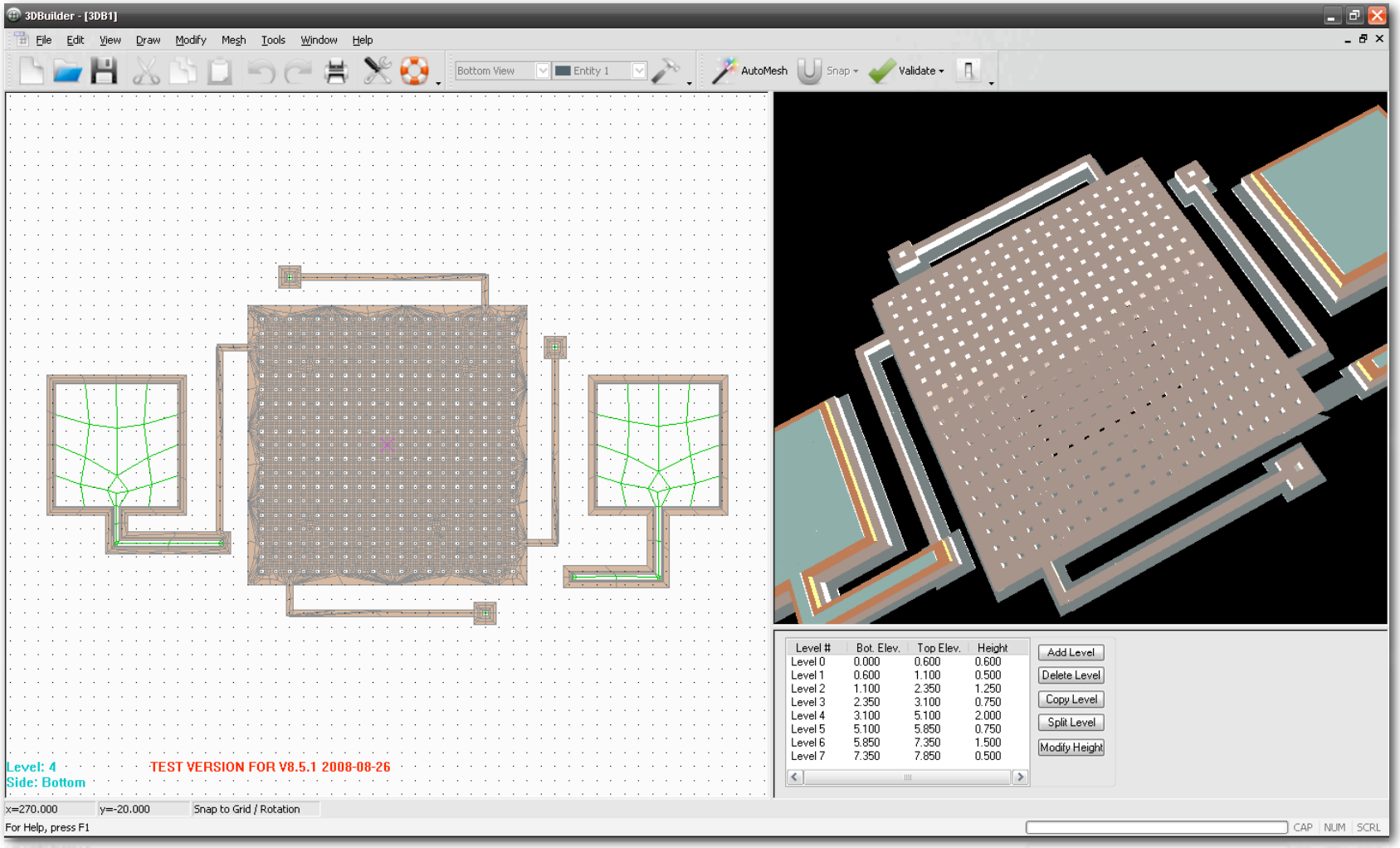
Mask layer stack up and design intent. Set thickness and elevation for each layer along with processing intent.

Load Settings... Save Settings...

Load and Save Settings. Saves layer stack up as either a ".spro" or ".sopt" file depending upon process modeling or 3D modleing intent

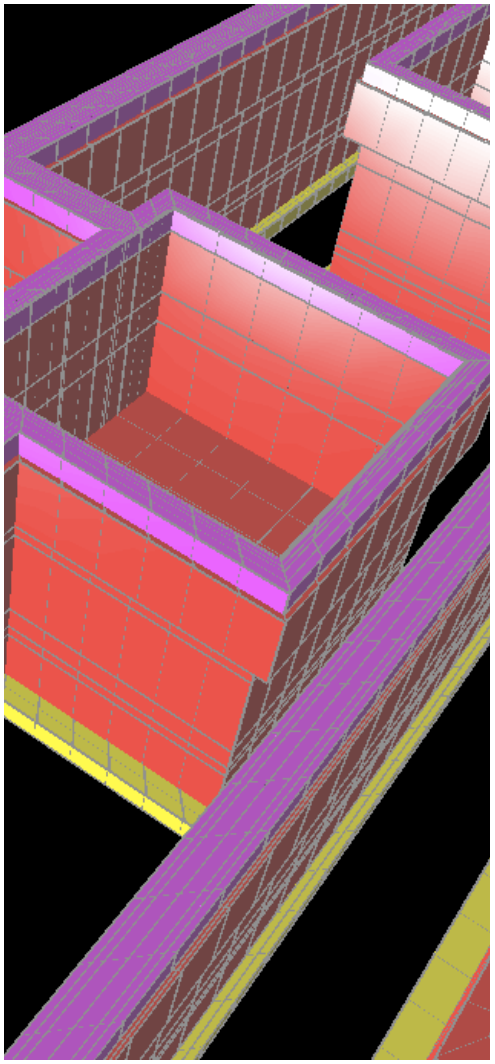
Cancel OK

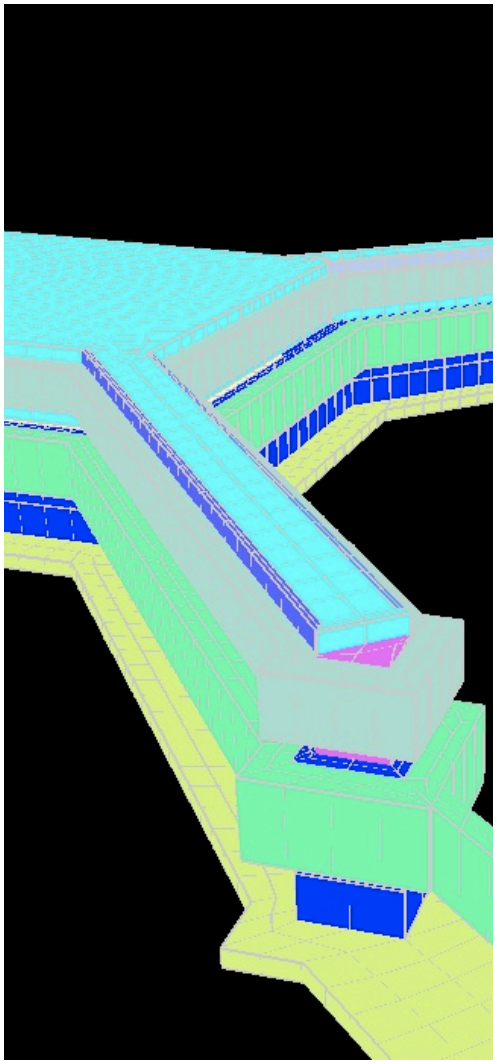
Working with the Auto Mesher (3)

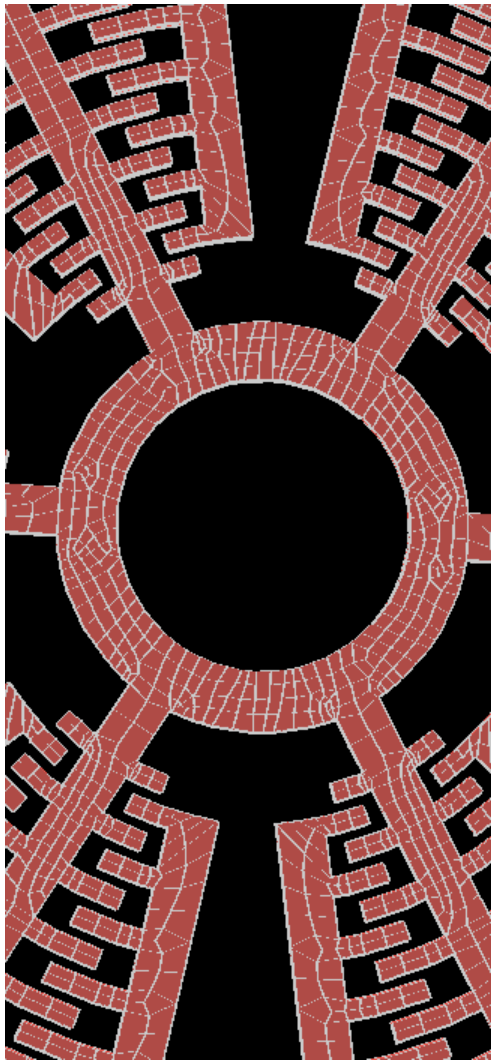


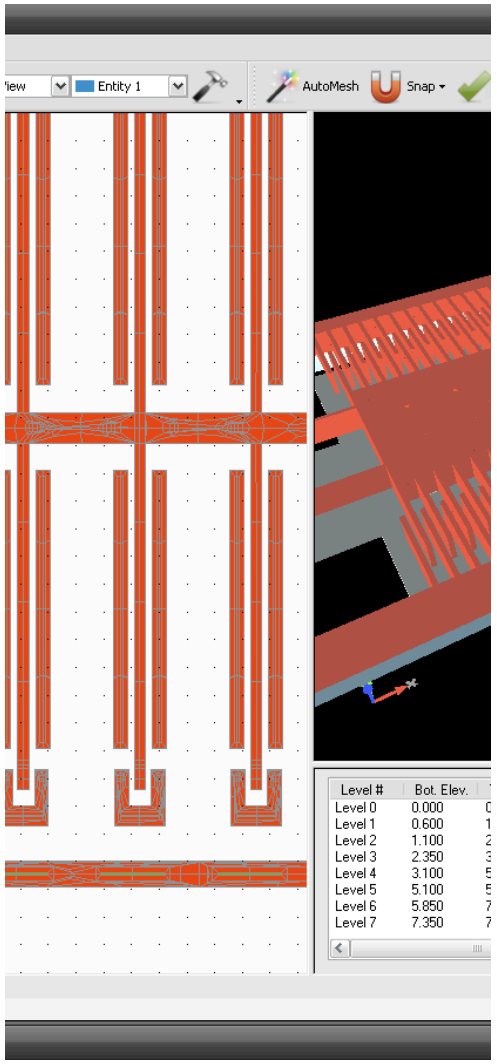
Meshed structure

Auto Mesher: Convert Mask Set into 3D Mesh



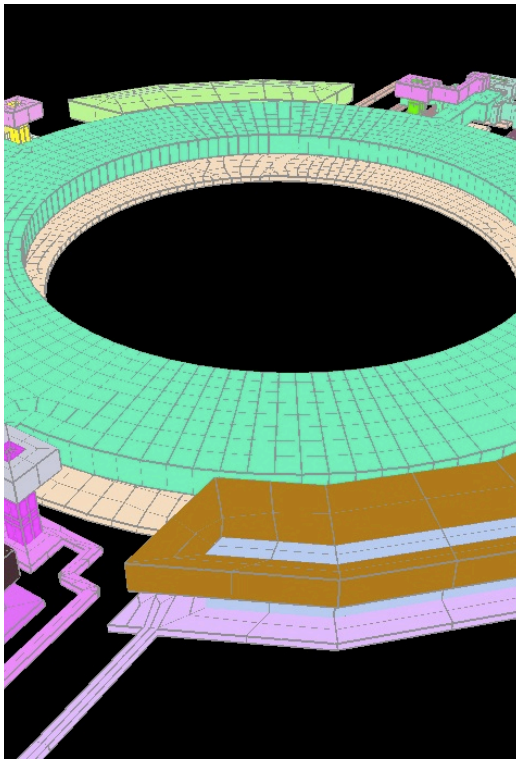


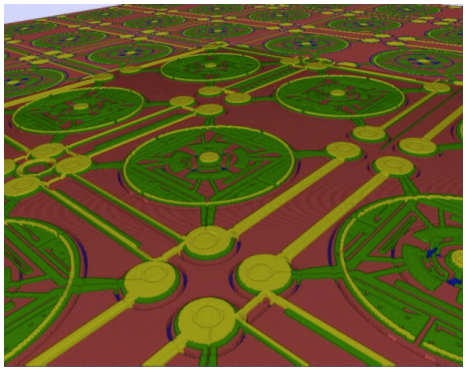


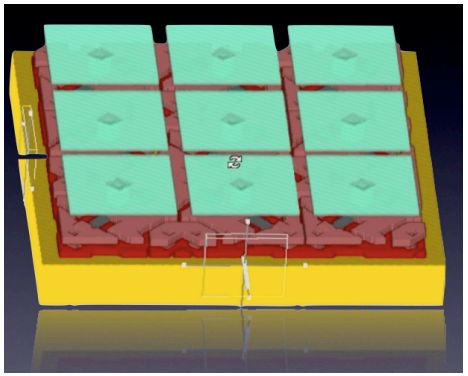


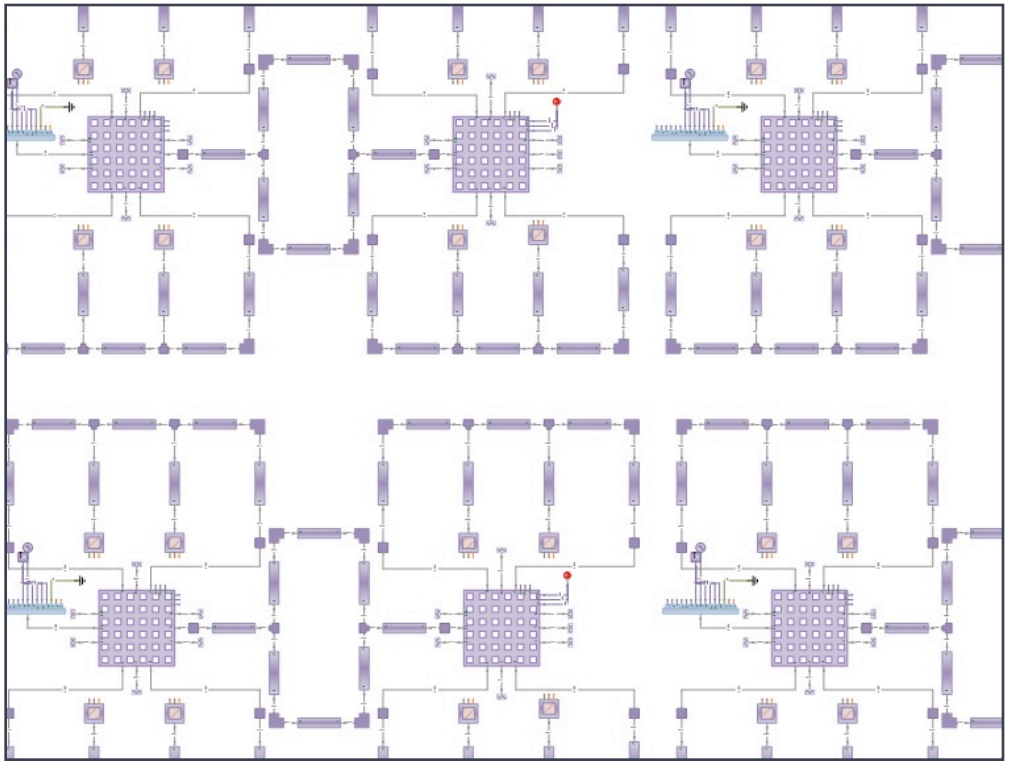
3D Builder

Robust All Hexahedral Meshing •Auto and Manual Meshing Modes • One click mask to mesh conversion • Handle conformal and planarized devices• Create parametric meshes









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