

# **3D PCB Viewer (Legacy) User's Guide**

## **See "PADS 3D" in the PADS Layout User's Guide for Current 3D Functionality**

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# Chapter 1

## Introduction to 3D PCB Viewer

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The 3D PCB Viewer application from Mentor Graphics Corporation provides you with a three-dimensional view of printed circuit board (PCB) designs and their components. PCB layouts can be flipped and rotated to give you views from the top, bottom, and sides in either two- or three-dimensions. The view can also be filtered so as to show or hide the components and traces that are located on the top or bottom of the board or on specific board layers. Planes can be filtered on any layer. Also, Board, Contours, Mounting Holes and Other Holes can be filtered.

The 3D PCB Viewer can also import and align mechanical models or three-dimensional cells so that you can see how the parts will fit together when assembled.

The 3D PCB Viewer is strictly a passive viewer so that it cannot be used to make any changes to the design itself. It simply provides you with greatly expanded viewing capabilities, including dynamic view updates that show changes to the state of the design in the active layout tool. Some possible uses for the 3D PCB Viewer include:

- Getting a three-dimensional view of DRC violations to better visualize layout problems.
- Loading data for auxiliary parts and translating them so as to see how assemblies will fit together.
- Hiding specific components (as opposed to hiding an entire layer) so that you can see what is underneath (jumpers, for example).

## Licensing

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There are both licensed and unlicensed versions of the 3D PCB Viewer application. In the unlicensed version, the features that require a license are displayed dim to indicate that they are unavailable.

## Launching the 3D PCB Viewer

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### Note



The 3D PCB Viewer uses OpenGL to display 3D graphics. X servers that do not support remote OpenGL displays cannot render graphics generated by the 3D PCB Viewer. For Exceed, only recent versions with a 3D display option can remotely display OpenGL graphics. Even in this case, performance can be slow because of the lack of hardware graphics acceleration. Therefore, Mentor Graphics recommends always running 3D PCB Viewer on the local display rather than remotely through an X server.

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Select **View > 3D View > Snapshot View / Dynamic View** with a PCB or a panel design open in PADS Layout.

If you select **Snapshot View**, a new instance of 3D PCB Viewer window is opened and it displays the 3D image of the current snapshot of PADS Layout design. Changes made in PADS Layout are not passed to the open 3D Viewer window.

When you select **Dynamic View**, 3D PCB Viewer automatically reads physical design information from the PCB layout application. For this reason, the design displayed in 3D PCB Viewer is automatically updated with any changes made in layout.

## Display Characteristics

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The 3D PCB Viewer uses the following display conventions. By default, objects are displayed using symbolic colors instead of the real colors.

### 1. Board

- The outline of the PCB shows the shape of the board outline. The thickness is determined by the board's physical layer stackup.
- Mounting holes are displayed in the same color as the board.
- Contours in the board are displayed as voids within the board shape. Contours of type "internal" and "board" are modeled.

### 2. Components

- Components are modeled based on the placement outlines in the cell definition.
- RF components are treated as conductive shapes.
- When rendered symbolic, components are displayed using the same colors as are used in the design.
- When rendered real, components are displayed in charcoal grey to simulate the color of a typical IC package, and the colors used in the design.

### 3. Pins

- Pins are attached to the component that they are associated with.
- Pins are modeled as pad stacks.
- When rendered real, pins are copper colored.
- The default color for pads is copper.

### 4. Traces and Pads

- Traces and Pads are created for all PCB layers, and are displayed on their respective layers.
  - Traces appear as flat (two-dimensional) ribbons placed at their layer height. If Thick Trace is selected, then traces are displayed using the actual characteristics that are contained in the layout database, making them appear three-dimensional. Likewise, if Thick Pad is selected, then pads are displayed using the actual characteristics that are contained in the layout database.
  - When rendered symbolic, traces are displayed in their design layer color.
  - When rendered real, the traces and pads are a copper color.
5. Planes and conductive shapes are displayed as two-dimensional objects. Conductive shapes have a thickness that toggles with traces while planes thickness is not displayed.
  6. Placement obstructs are modeled as planar shapes placed at their height off the board.
  7. Route Border
    - All Route Border edges are rendered as a bright outline in the same color as its sides.
    - In top or bottom views a route border appears as a thin line.
  8. Route Obstruct
    - “Trace”, “TraceVia” and “Via” are types of Route Obstructs.
    - A Route Obstruct is displayed in red.
    - In top or bottom views a route obstruct appears as a thin line.
    - All Route Obstruct edges are rendered as a bright outline in the same color as its sides.





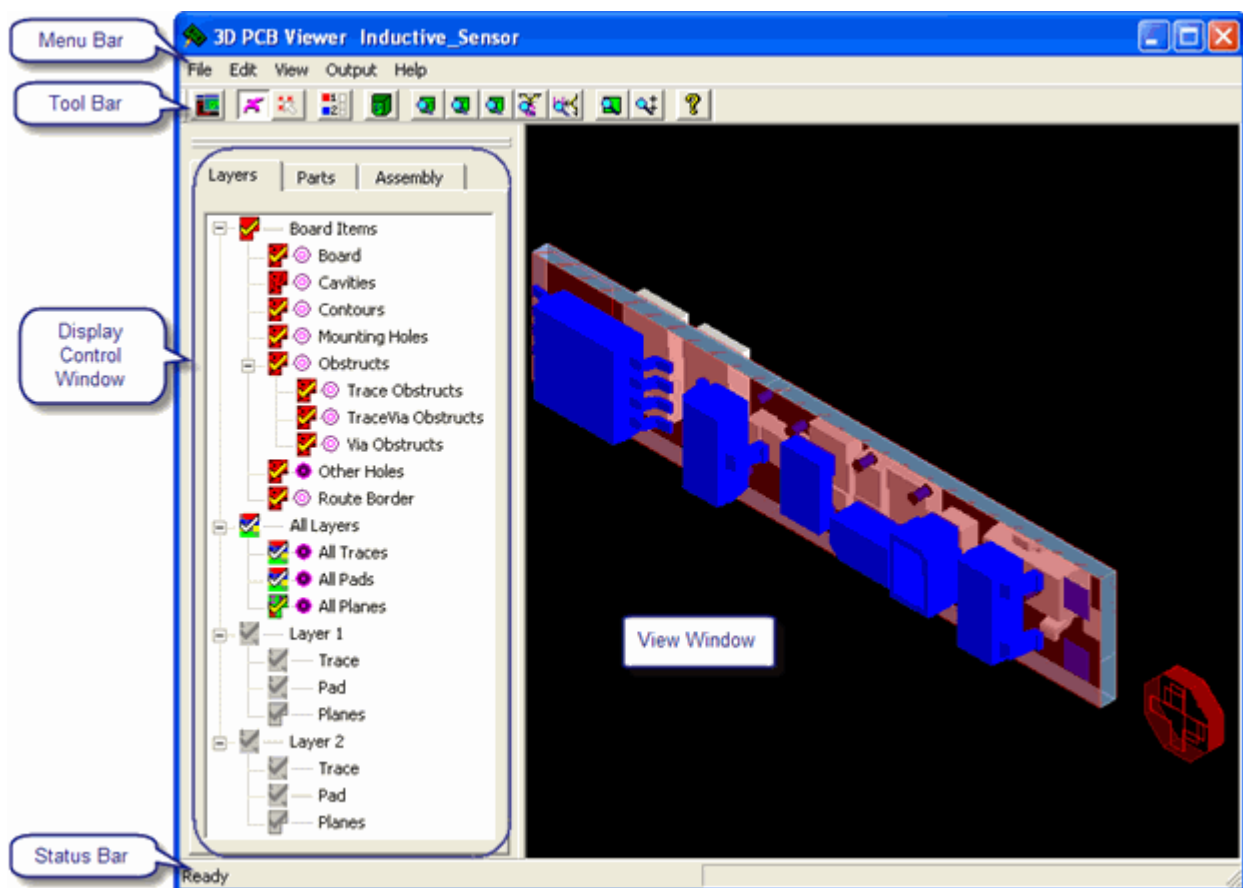
# Chapter 2

## 3D PCB Viewer Quick Reference

### 3D PCB Viewer Window Layout


Figure 2-1 illustrates the layout of the 3D PCB Viewer window. The controls available in the window are described in Table 2-1.

Figure 2-1. 3D PCB Viewer Window












# Command Summary




**Table 2-1. 3D PCB Viewer Commands**

Menu Command	Function	Icon
<b>File Menu</b>		
File> Auxiliary File Import	Opens the “ <i>Auxiliary File Import</i> ” dialog box from which you can import additional files. For example, you can import additional mechanical information that was created with other software applications. Refer to <a href="#">Importing Data from Auxiliary Files</a> for more information.	
File> 3D Cell Import	Opens the “ <i>3D Cell Import</i> ” dialog box from which you can import three-dimensional models to get a more accurate rendering of the components used in the design. Refer to <a href="#">Importing Three-Dimensional Cells</a> for more information.	
File> Batch Import 3D Cells	Opens a standard directory file browse dialog from which you can import all the three-dimensional models in the selected directory.	
File> Print Setup	Invokes the “ <i>Page Setup</i> ” dialog box through which you can set the Paper, Orientation and Margin options before printing.	
File> Print Preview	Allows you to view the shape of the printed page before printing.	
File> Print	Invokes the Print dialog box through which you can print the current active file in the text editor.	
File> Exit	Exits the 3D PCB Viewer tool.	
<b>Edit Menu</b>		
Edit> Copy	Copies the current view image to the windows clipboard.	
<b>View Menu</b>		
View> Display Control	Opens the Display Control window so that you can choose which elements in the design to display. Refer to <a href="#">Controlling the Display</a> for more information.	
View> Toolbar	Displays or hides the Toolbar icons.	

**Table 2-1. 3D PCB Viewer Commands (cont.)**

Menu Command	Function	Icon
View> Status Bar	Displays or hides the Status Bar at the bottom of the window. The Status Bar displays Help about whatever GUI element that the cursor is hovering over along with the current state of the 3D PCB Viewer software.	
View> Always On Top	Displays the 3D PCB Viewer window on top of any other open Microsoft Windows.	
View> Fly Around	<p>When selected, the design continues the rotate, pan, or zoom actions set in motion by the cursor even after the mouse button has been released. Movement continues as long as the cursor remains in the View window or until a mouse button is pressed.</p> <p>When <b>Fly Around</b> is not selected, the design image rotates, pans, and zooms only while a mouse button is being held down and the cursor is being moved.</p>	
View> View Follow	Synchronizes the 3D View with the view in the layout tool. For example, if you zoom in on a DRC Hazard in Xpedition xPCB Layout (or Board Station XE), the 3D PCB Viewer window also zooms in to give you a three-dimensional view of the hazard.	
View> Look at Mirror	Displays a mirror image of the current view.	
View> Look at Isometric	Displays the isometric view of the PCB.	
View> Look at Top	Displays the top view of the PCB.	
View> Look at Bottom	Displays the bottom view of the PCB.	
View> Look at North	Displays the design from the North (top) edge.	
View> Look at South	Displays the design from the South (bottom) edge.	
View> Look at East	Displays the design from the East (right) edge.	
View> Look at West	Displays the design from the West (left) edge.	
View> Fit to Board	Fits the view of the PCB Board in the current viewpoint.	

**Table 2-1. 3D PCB Viewer Commands (cont.)**

Menu Command	Function	Icon
View> Fit All	Fits the view to all non-hidden PCB parts and auxiliary files from the current viewpoint.	
View> View Orthographic	Displays an orthographic view, which lacks the distance distortion seen in a perspective view. This view is useful for visually checking the fit between parts because it renders distances accurately.	 <b>Note:</b> icon acts as a toggle switch.
View> View Perspective	Displays a perspective view. This view is useful for visualizing how the design will appear in the “real world.”	
View> Thick Trace	When selected, traces are displayed with their actual size and thickness. When not selected, traces are displayed as flat ribbons without thickness.	
View> Thick Pad	When selected, pads are displayed with their actual size and thickness. When not selected, pads are displayed as flat features without thickness.	
View> Render Symbolic	When selected, displays the PCB using the color palette from Xpedition xPCB Layout.	
View> Render Real	When selected, displays the PCB using typical fabrication colors: <ul style="list-style-type: none"> <li>• green for the board</li> <li>• silver for plated holes</li> <li>• charcoal grey for components</li> <li>• copper for conductors</li> </ul>	
<b>Output Menu</b>		
Output> Design Status	Generates and displays an ASCII formatted file that lists design details such as the size of the board, the number of layers, number of placed parts, and so on. The Design Status report is placed in the project’s ..\PCB\3D\LogFiles directory.	
<b>Help Menu</b>		
Help> Open 3D PCB Viewer Help	Launches a browser window containing the <i>3D PCB Viewer User’s Guide</i> (that is, this manual).	

**Table 2-1. 3D PCB Viewer Commands (cont.)**

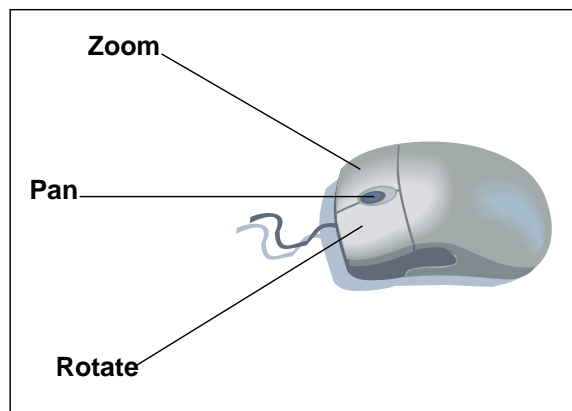
Menu Command	Function	Icon
Help> Help and Manuals	Launches a window containing the 3D PCB Viewer tool's InfoHub, which contains links to online documentation.	
Help> Support	Opens an Internet connection to Mentor Graphics Corporation's Support Center website.	
Help> About 3D PCB Viewer	Displays software release information about the 3D PCB Viewer application.	

## Mouse Controls

In the 3D PCB Viewer, the display is controlled through the following mouse actions when the cursor is in the view window:

- Dragging the mouse with the left button depressed causes the image to rotate.
- Dragging the mouse with the middle button depressed causes the image to pan.
- Dragging the mouse up with the right button depressed causes the image to zoom out, while dragging it down causes the image to zoom in.
- Simultaneously holding down the Shift key and the left mouse button while dragging the mouse lets you select a specific area.
- Simultaneously holding down the Shift key and the middle mouse button while dragging the mouse lets you select and zoom in on a specific area.

Figure 2-2 lists the mouse controls that are available when the cursor is in the View window.

**Figure 2-2. View Window Mouse Controls**

When the Fly Around feature is selected, the movement initiated by the mouse button continues after you release the mouse button.

Removing the cursor from the View window always stops the rotation, panning, or zooming of the image, as will pressing any of the mouse buttons.

When the cursor is in the Display Control window, the mouse controls are as follows:

- Clicking on a component icon in the Display Control Assembly tab selects and highlights the component in the 3D View window. Selecting another component unselects any previously selected component.
- Clicking where there is no component clears all selections.
- Holding down the left mouse button while dragging the cursor will select a range of components.
- Holding down the Shift while clicking on component selects it while retaining previous selections.
- Middle mouse button scrolling zooms in and out.

When the cursor is in a drop-down list box, the left mouse button opens the list so you can make a selection, whereas scrolling the middle mouse button cycles through the selections in the list.


## Controlling the Display

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The 3D PCB Viewer gives you quite a bit of control over which design elements are displayed and how they are rendered on the screen. Also, you can choose to display elements differently on different layers. The display options are available through the Display Control window, shown in [Figure 2-1](#).

The selections that you make in the Display Control window are saved with the design so they are persistent between sessions on a per-design basis.

## Opening and Closing the Display Control Window

There are two ways to open the Display Control window. You can choose **View> Display Control** from the menubar, or you can click the  icon on the toolbar.

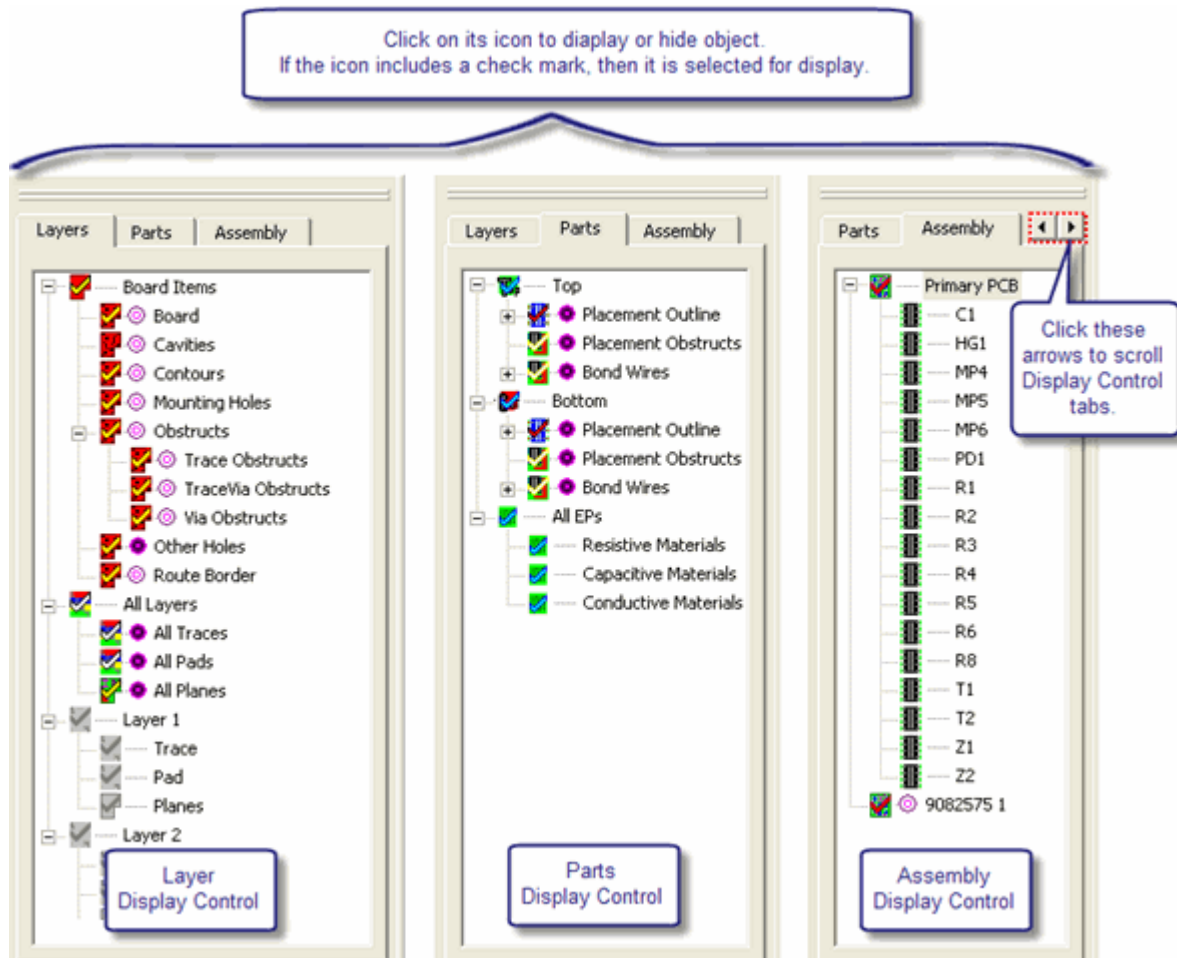
Conversely, if you choose **View> Display Control** or click the icon while the Display Control window is open, it closes.

## Selecting Which Objects to Display



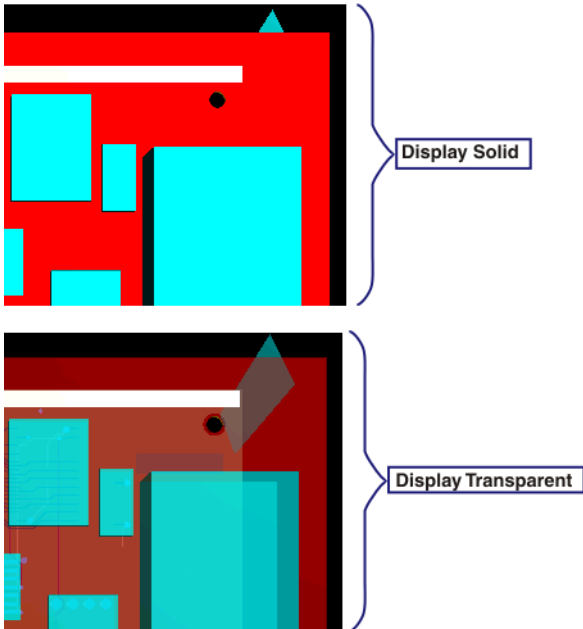






There are three tabs in the Display Control window; one each for Layers, Parts, and Assembly (see [Figure 2-3](#)). Within these tabs are hierarchal trees of objects that you select to display or

unselect to hide. In general, items are toggled on and off by clicking their icons. A context specific menu, if one exists, can be seen by right-clicking the item's name.

**Figure 2-3. Display Control Window Tabs**



















**Table 2-2. Icons Used in the Display Control Window**










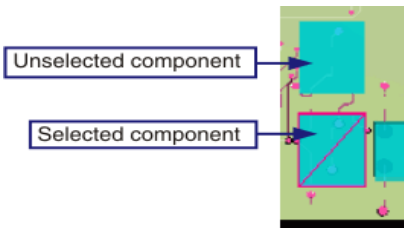
Icon	Represents	How to Change
	Object displayed as an opaque solid.	Right-click and select either Transparent or Solid from the popup menu.
	Object displayed transparently.	
		
	Objects associated with the PCB board itself are selected and displayed.	Click the icon to enable or disable the display of board objects such as the board itself, contours, and holes.
	Objects associated with the board itself are hidden and cannot be individually selected or displayed.	
	Board object is selected for display.	Click the icon to display or hide the board object.
	Board object is not selected for display.	
	Board object is selected but the display of board items is disabled.	Click the Board Items icon to enable the display of board items. While represented by grey icons, these objects cannot be selected or unselected for display.
	Board object is neither selected nor enabled for display.	



**Table 2-2. Icons Used in the Display Control Window (cont.)**

Icon	Represents	How to Change
	Layer object is displayed.	Click the icon to display or hide the layer itself or the traces and pads on the layer.
	Layer object is hidden.	
	Layer object is neither selected nor enabled for display.	
	Layer object is selected but is not displayed because the display for the whole layer has been disabled.	
	Plane is selected and displayed.	Click the icon to display or hide the plane.
	Plane is hidden.	
	Plane cannot be selected for display because the display of objects for the layer is disabled.	
	Plane is selected but not displayed because the display of objects for the layer is disabled.	
	Parts on the top of the PCB are enabled for display.	Click the Top icon to enable or disable the display of objects on the top of the board.
	Parts on the top of the PCB are hidden.	
	Parts on the bottom of the PCB are enabled for display.	Click the Bottom icon to enable or disable the display of objects on the bottom of the board.
	Parts on the bottom of the PCB are hidden.	
	Parts are selected but not displayed because the display or parts or assemblies is disabled.	Click the higher-level icon to enable or disable the display of parts or assemblies.
	Parts are neither selected nor enabled for display.	
	Placement outline is displayed.	Click the Placement Outline icon to display or hide the objects.
	Placement outline is hidden	

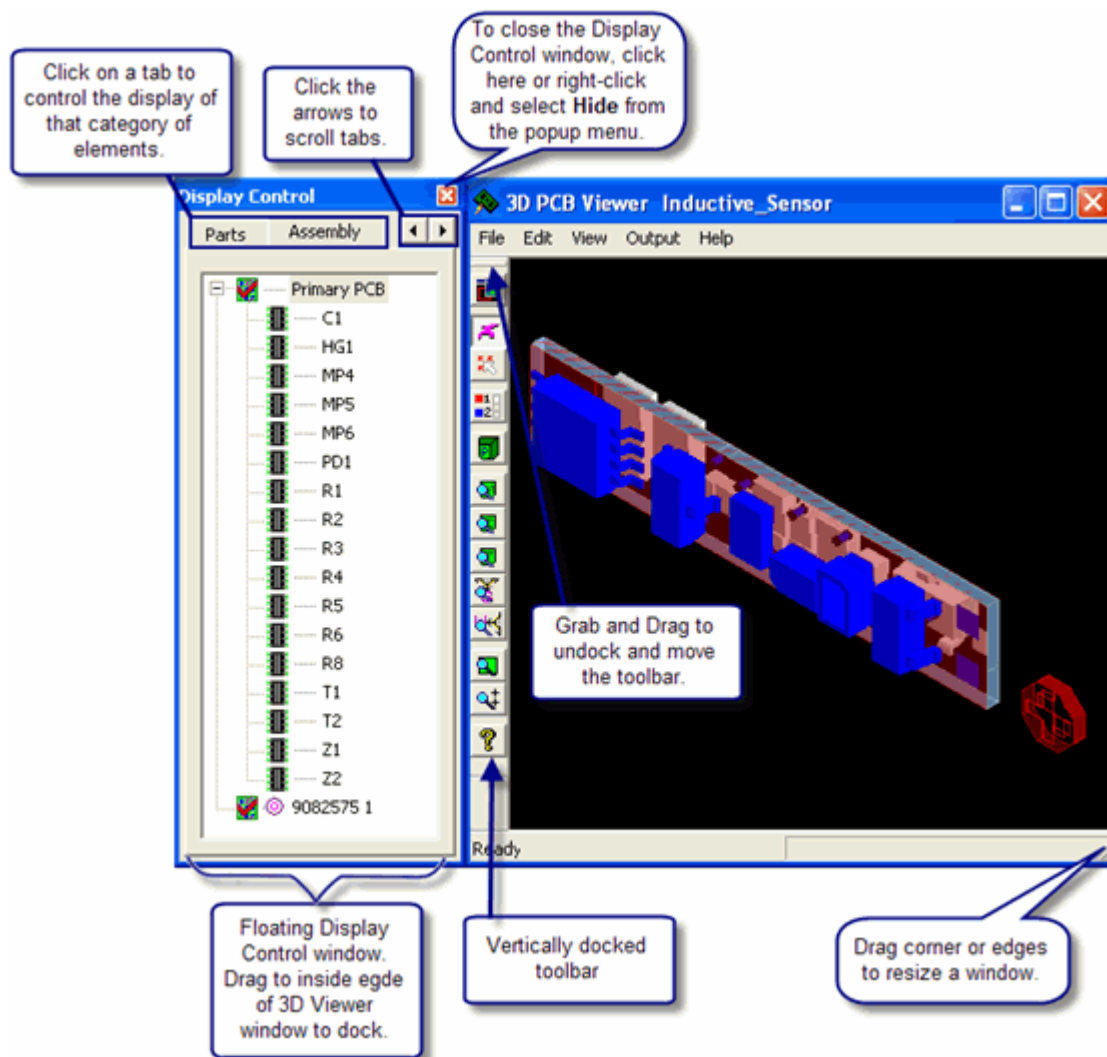
**Table 2-2. Icons Used in the Display Control Window (cont.)**

Icon	Represents	How to Change
	Placement obstruct, die pins and bond wires are displayed.	Click the Placement Obstruct, die pins and bond wires icons to display or hide the objects.
	Placement obstruct, die pins and bond wires are hidden.	
	Embedded parts are displayed.	Click the relevant EP icon to display or hide the objects.
	Embedded parts are hidden.	
	Assemblies on the PCB are enabled for display.	Click the PCB icon to display or hide all the component and assembly objects.
	The display of component assemblies on the PCB are disabled. Also, all display control items except auxiliary file import are disabled.	
	Component assembly is displayed.	Click the component icon to display or hide the object.
	Component assembly is hidden.	
	Component assembly is selected. When selected, these objects are outlined with a pink wireframe with a yellow icon appearing next to it.	Click the component's icon in the Display Control window or click the picture of it in the View window to select it. When selected, these objects are outlined with a pink wireframe. 

## Moving the Display Control Window or Toolbar

The Display Control window and the toolbar can be moved around as floating windows, or they can be docked inside the edges of the 3D PCB Viewer window. [Figure 2-1](#) shows the Display Control window docked whereas [Figure 2-4](#) shows the Display Control window as it appears when floating. Floating windows are not constrained to the 3D PCB Viewer window and can be dragged to any location on your monitor screen. Windows and toolbars can also be resized by dragging their edges or corners with the mouse.

Figure 2-4. Floating Display Control Window





## Chapter 3

# Importing Data from Auxiliary Files

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Importing data from auxiliary files enables you to develop a library of files and transformations that register objects to specific physical parts. Auxiliary files contain mechanical information about parts that you might want to view in relation to the PCB design. For example, you might want to add connecting cables, flexible circuits, other PCBs, or enclosures to see how the board and part assemblies fit together.

Auxiliary files come from a number of different sources. [Table 3-1](#) lists the types of files that you can import into 3D PCB Viewer.

**Table 3-1. Supported Auxiliary File Types**

File Type	Extension	Description
Printed circuit board layout file	.pcb	This is the PCB design file created by Mentor Graphics Xpedition xPCB Layout and BoardStation XE PCB. In addition the design file that was initially loaded for viewing, .pcb files can be imported as auxiliary files.
Virtual Reality Modeling Language (VRML) file	.wrl	VRML is a standard file format for representing 3-dimensional interactive vector graphics.
object file	.obj	Object files are mechanical models created by tools such as Autodesk's Alias Wavefront Computer Aided Design (CAD) software.
stereo lithography CAD file	.stl	STL is a file format (native to the stereo lithography CAD software created by 3D Systems) that is supported by many CAD software packages. STL files describe the surface geometry of 3-dimensional objects.

Auxiliary PCB imports display only components, padstacks, the pcb board, contours, mounting holes, and cavities. All Auxiliary imports can be individually scaled, rotated, etc.

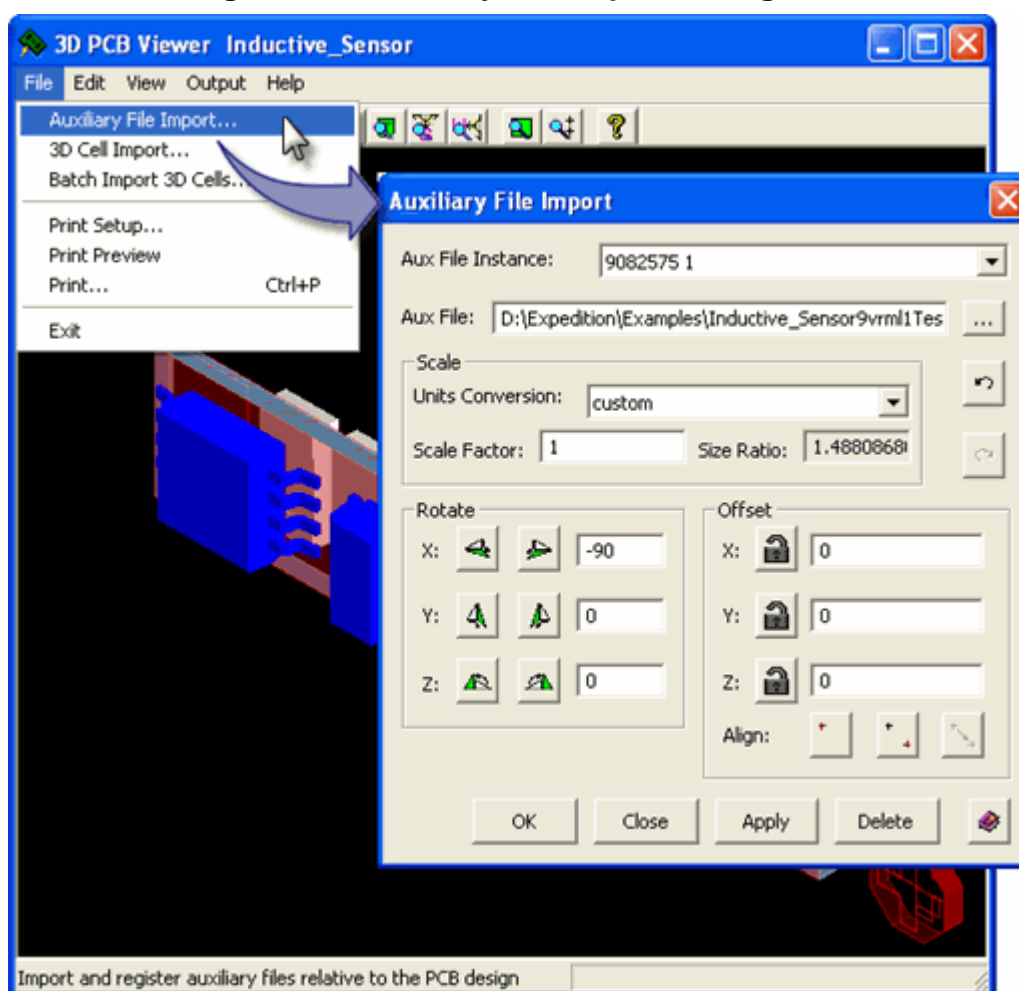
Each auxiliary file import can be toggled on/off from the assembly tab of the display control. Individual pieces of a auxiliary file import, the components, contours, etc., can not be toggled. The colors of an auxiliary file import follow the colors set in Xpedition xPCB Layout or BoardStation XE's display control in symbolic mode, or the render real colors in render real mode.

## Importing an Auxiliary File


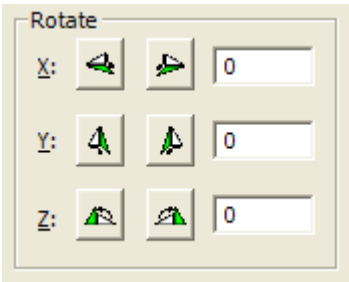
When you import an auxiliary file, you also need to translate (or align it) to the primary design in order to achieve a useful design view. To import an auxiliary data file and translate it, do the following:

1. In the 3D PCB Viewer window, select **File> Auxiliary File Import** from the menubar. This opens the Auxiliary File Import dialog box, shown in [Figure 3-1](#) and described in [Table 3-2](#).

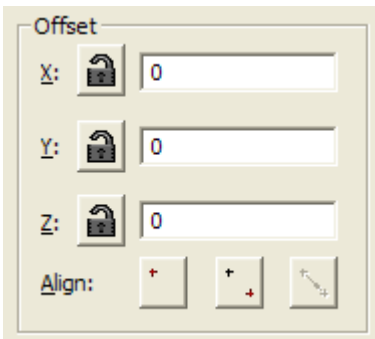

**Figure 3-1. Auxiliary File Import Dialog Box**




**Table 3-2. Auxiliary File Import Controls**

Area	Option	Description
Aux File Instance	<filename>	The Auxiliary File Instance field allows you to either select an existing name from the drop-down list or to select <new> to create a new instance name.
Aux File		The Auxiliary File field specifies the full path to the auxiliary file to be imported. You can either enter the file name, or you can click the  icon to use the browser to select the file path.
Scale		The fields in the Scale area allow you to change the relative size of the auxiliary file so that its size matches up with that of the primary design.
	Units Conversion	Use the Units Conversion field to select the units of measure that you want to convert between. For example, one of the selections is “in to mm”, which converts inches to millimeters.  Selections made in this field are reflected in the Scale Factor and Size Ratio fields.
	Scale Factor	Use the Scale Factor field to enter a numeric value by which to scale the auxiliary data. Applying a Scale Factor changes the selection in the Units Conversation to <b>custom</b> .
	Size Ratio	The Size Ratio field displays the current ratio between the auxiliary file and the primary design. To change this ratio, you can either type a number into the Scale Factor field or you can select a scaling factor from the Units Conversion drop-down list.
Rotate 		<p>The icons and fields in the Rotate area allow you to rotate the auxiliary file around the x-, y-, and z-axis so as to correctly orient the imported object to the primary design.</p> <p>To rotate by 90°, click one of the two icons located alongside the appropriate axis. To rotate by any other degree, enter the numeric value in the adjacent field.</p>

**Table 3-2. Auxiliary File Import Controls (cont.)**

Area	Option	Description
Offset		<p>The icons and fields in the Offset area allow you to align the auxiliary file to the primary design.</p> <p>To move the auxiliary file a specified distance along a particular axis, enter the distance in the adjacent field.</p> <p>If you want to constrain the movement of the auxiliary file so that it cannot move in a particular direction, then click the lock icon alongside the appropriate axis.</p> <p>The three Align icons enable you to pick a point on the auxiliary file and a point on the primary design, and then automatically align the two points.</p>
Redo and Undo		<p>Undo: Cancels the last action you have performed.</p> <p>Redo: Performs the last canceled action again.</p>

1. Click the  (Browse) icon to open the Select Import File dialog box, select the auxiliary file, then click **Open**. The Aux File field shows the full path to the auxiliary file.
2. In the Aux File Instance field, select an instance from the drop-down list, or select **<new>** to create a new auxiliary file instance.

When **<new>** is selected, a new instance of the auxiliary file is created. Each separate instance is given the same name as the original file with an instance count appended to it. For example, if you import a file named *My\_Cell.wrl*, the first instance is *My\_Cell 1*, the second instance is *My\_Cell 2*, and so on. While multiple instances of the same auxiliary file can be placed, only one copy of the file is stored and loaded.

The object being imported from the selected auxiliary file is displayed with a yellow, wireframe, bounding box.

#### Note



If the Aux File Instance is **<new>**, a keyed in file name will only load if enter or tab is used within the Aux File entry field. If an existing aux import is already loaded, and it's filename is altered it will attempt to load on any loss of focus in the Aux File entry field. In both cases an invalid filename will color the field red and delete the current aux file import if any.

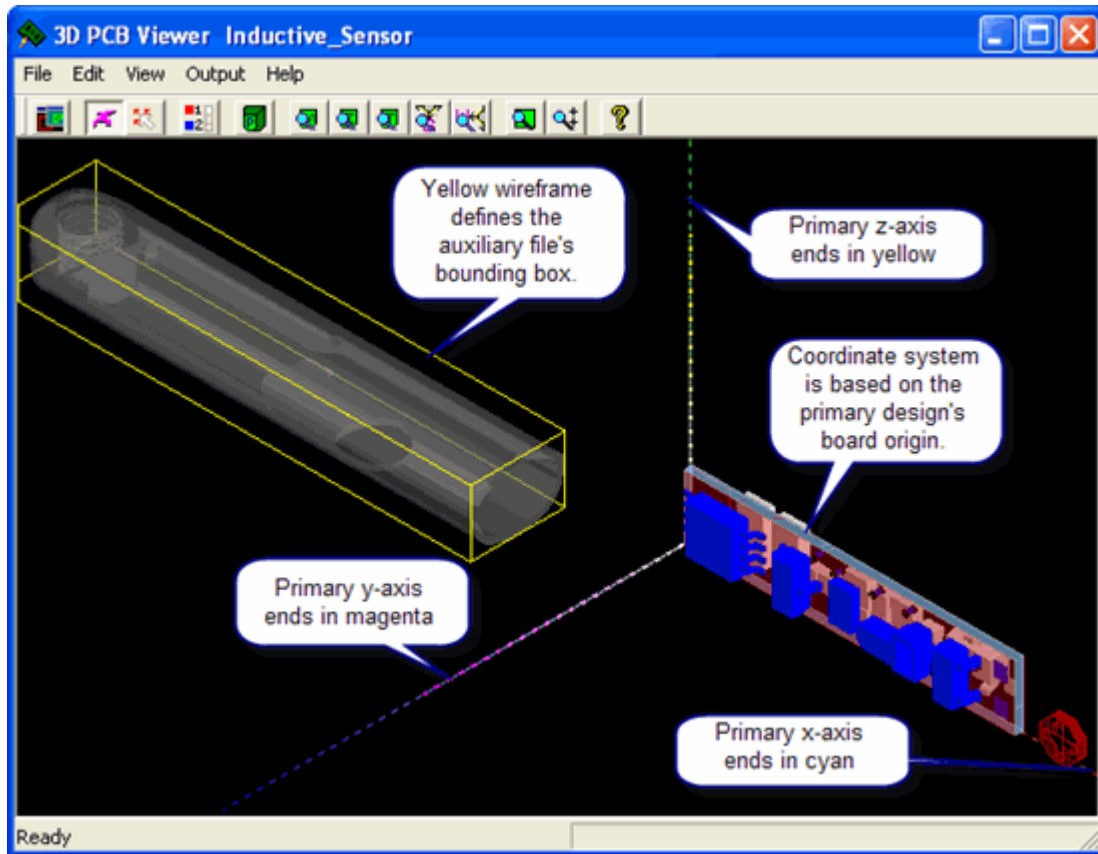


### Caution



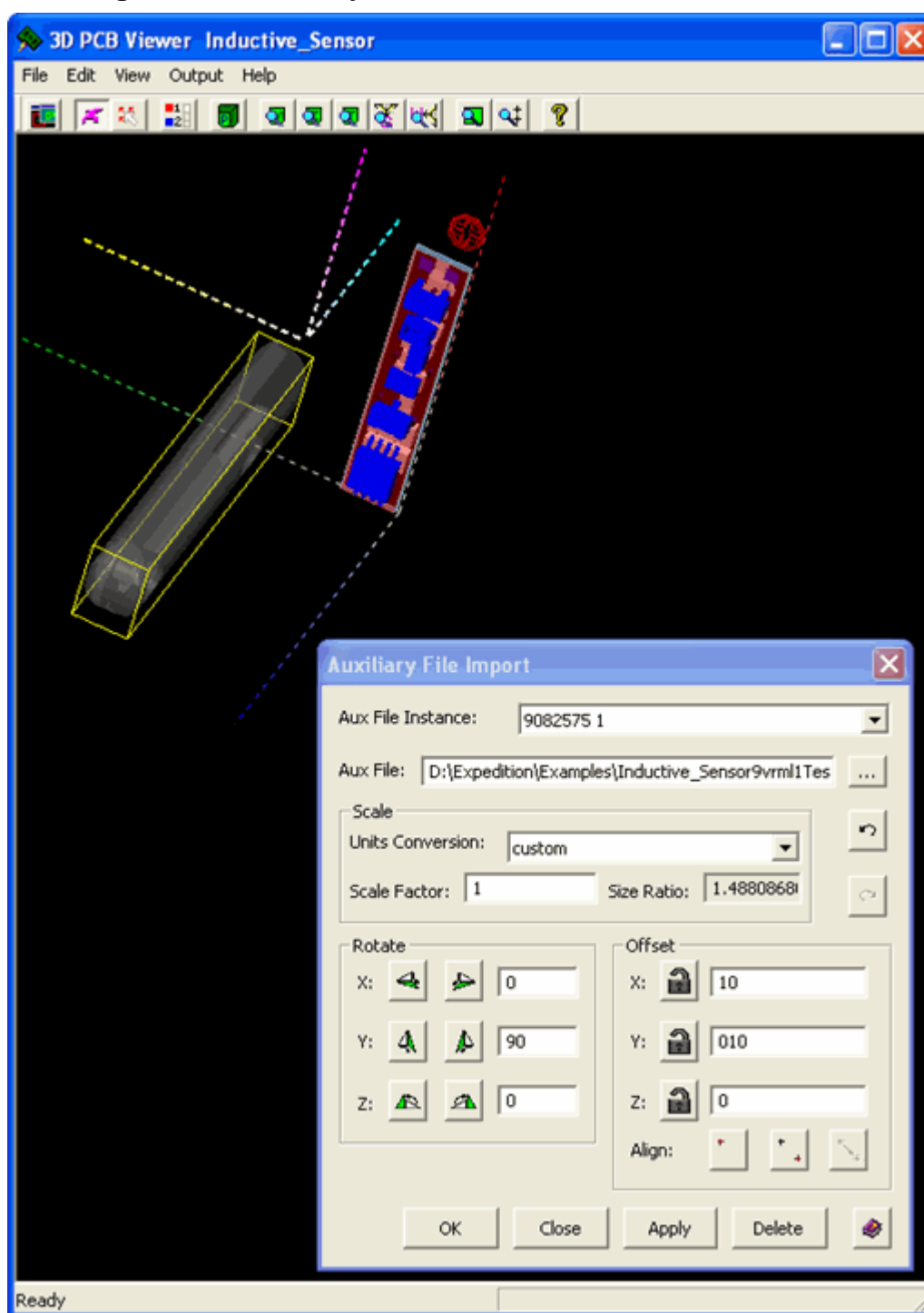
Auxiliary PCB files are referenced from their selected positions and so are only linked into the design. Other types of auxiliary files are copied into the design and so are embedded within it. Therefore, when a design is moved, all the non-pcb data remains connected but the links might need to be re-established.

**Figure 3-2. Auxiliary File Display**



The 3D PCB Viewer displays the coordinate axes of both the primary (xPCB) design and the auxiliary (MCAD) design. The xPCB design axes are an RGB triad where positive X is red, positive Y is green, and positive Z is blue. The MCAD design axes are a CYM triad where positive X is cyan, positive Y is yellow, and positive Z is magenta. If the auxiliary file's origin does not coincide with that of the primary design, then the 3D PCB Viewer displays both sets of axes. When the axes are coincident, they are dithered so as to display both sets of dashes.

Figure 3-3. Auxiliary File Axes When Offset and Rotated



**i** **Tip:** If desired, you can use the Display Control window to render the auxiliary file as a solid object. The auxiliary file is listed on the Assembly tab.

3. Set the scale so that the size of the imported data is correct relative to the size of the primary PCB.

VRML files and PCB designs can have defined units that are read and applied when the files are opened. If these units are undefined or are defined incorrectly, you must change the scale.

The Size Ratio field gives the ratio between the primary PCB and the auxiliary file. To change the ratio, you can either enter a custom scaling factor in the Scale Factor field, or you can select a standard factor from the Units Conversion drop-down list.

---

**i** **Tip:** Use the **View> Fit All** command in the 3D PCB Viewer to make sure that the whole design is displayed. The other Fit commands are based on the primary PCB design and therefore might not display the entire content of the auxiliary file.

---

4. Now that the imported object is the correct size relative to the PCB design, it needs to be rotated so as to be correctly aligned with the primary PCB.

There are three axes around which you can rotate the auxiliary design. The x- and y-axis are in the same plane as the PCB design. The z-axis is in the direction of the layer stackup.

Clicking the Rotate icons rotates the auxiliary design by  $\pm 90^\circ$  about the associated axis. You can also enter the number of degrees of rotation, but non-orthogonal rotations are rarely needed.



5. The final step in placing an auxiliary file is to translate it so that it is correctly aligned with the primary design. The primary PCB design is anchored at its board origin, and all the auxiliary files are placed relative to it.


---

**i** **Tip:** It is possible for an auxiliary file to be placed relative to another auxiliary file. The best process for handling this scenario is to place the files that connect to the primary PCB design first, and work outward from there.

---

The 3D PCB Viewer includes an alignment tool that allows you to pick a *from* point on the imported object and a *to* point on the primary design, and then automatically align the two points.

- a. Click the **Look at Top** button in the Toolbar.
- b. In the Auxiliary File Import dialog box, click the  (From) icon, then click the from point on the auxiliary file. The point is marked with a yellow X, as shown in [Figure 3-4](#).
- c. Click the  (To) icon, then click the to point on the primary design. The point is marked by a yellow X and arrow extending between the picked points.

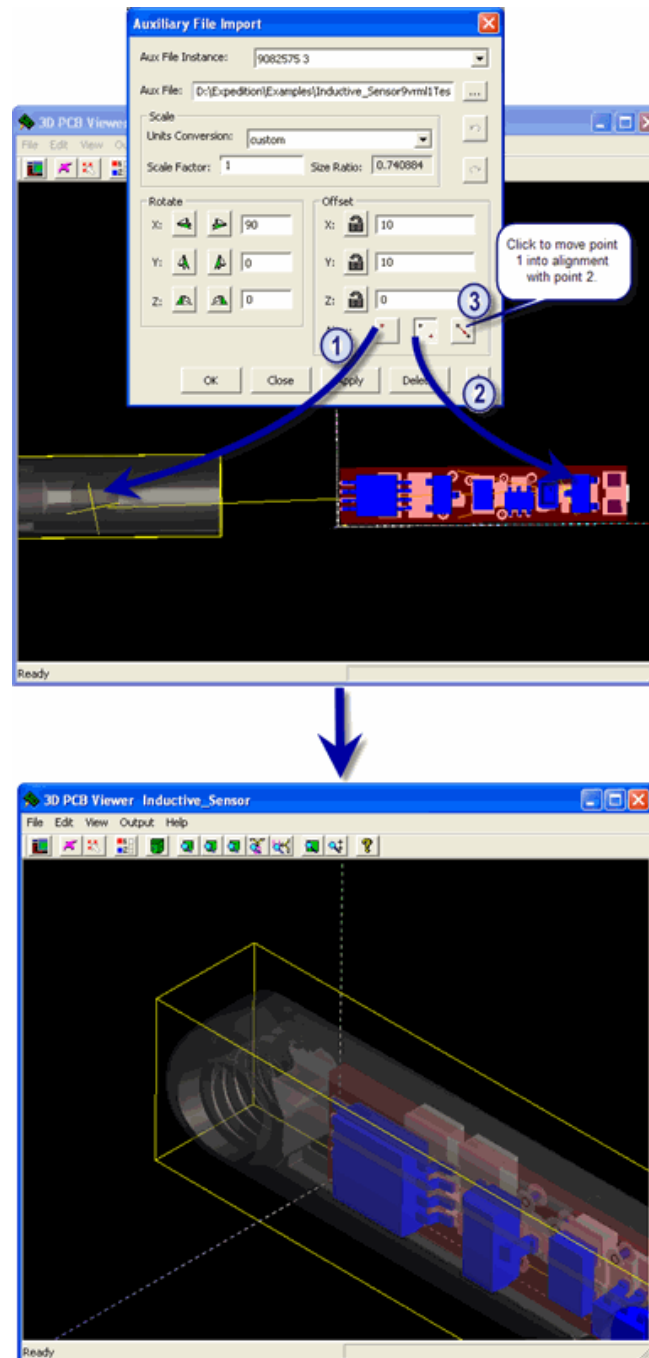
- d. Click the  (Align) icon to translate the auxiliary file so that the *from* point is on the *to* point.

---

**i** **Tip:** If the auxiliary file is rotated and positioned correctly, you can lock one or two of the axes to constrain the movement. This allows you to be less precise in your point selections.

---

**Figure 3-4. Aligning the Auxiliary File with the Primary Design**



6. When you are finished, click either **Apply** or **OK** to make the change permanent.

---

**Caution**



You must click either **Apply** or **OK** to save an auxiliary file instance edit. When you select another instance without doing so, the edits on that current instance are discarded.

---

Whenever an auxiliary file instance is selected, its position can be edited. So, if you want to re-translate the auxiliary file, select it in the Aux File Instance field and make whatever changes are needed.

## Deleting an Auxiliary File

---

To delete a previously imported auxiliary file, do the following:

1. Select **File> Auxiliary File Import** to open the Auxiliary File Import dialog box.
2. Select the auxiliary file instance from the drop-down list in the Aux. File Instance field.
3. Click the **Delete** button.
4. Click **Yes** in the message box asking if you would like to delete the Aux File.

The selected auxiliary file instance is deleted from the 3D PCB Viewer. However, the file itself remains in the design's database. If you have imported more than one instance of an auxiliary file, you must delete them individually.



## Chapter 4

# Importing Three-Dimensional Cells

---

Importing 3-dimensional (3D) cells enables you to view all the component packages that are included in the design.

Once a 3D model has been registered to a package, the .e3d file and the MCAD file can be stored in a common location. Thereafter, loading the .e3d file provides a 3D model that has already been registered to the cell.

## Importing a 3D Cell

---

When you import a 3D cell, you also need to translate (or align it) to the primary design in order to achieve a useful design view. To import a 3D cell file, do the following:

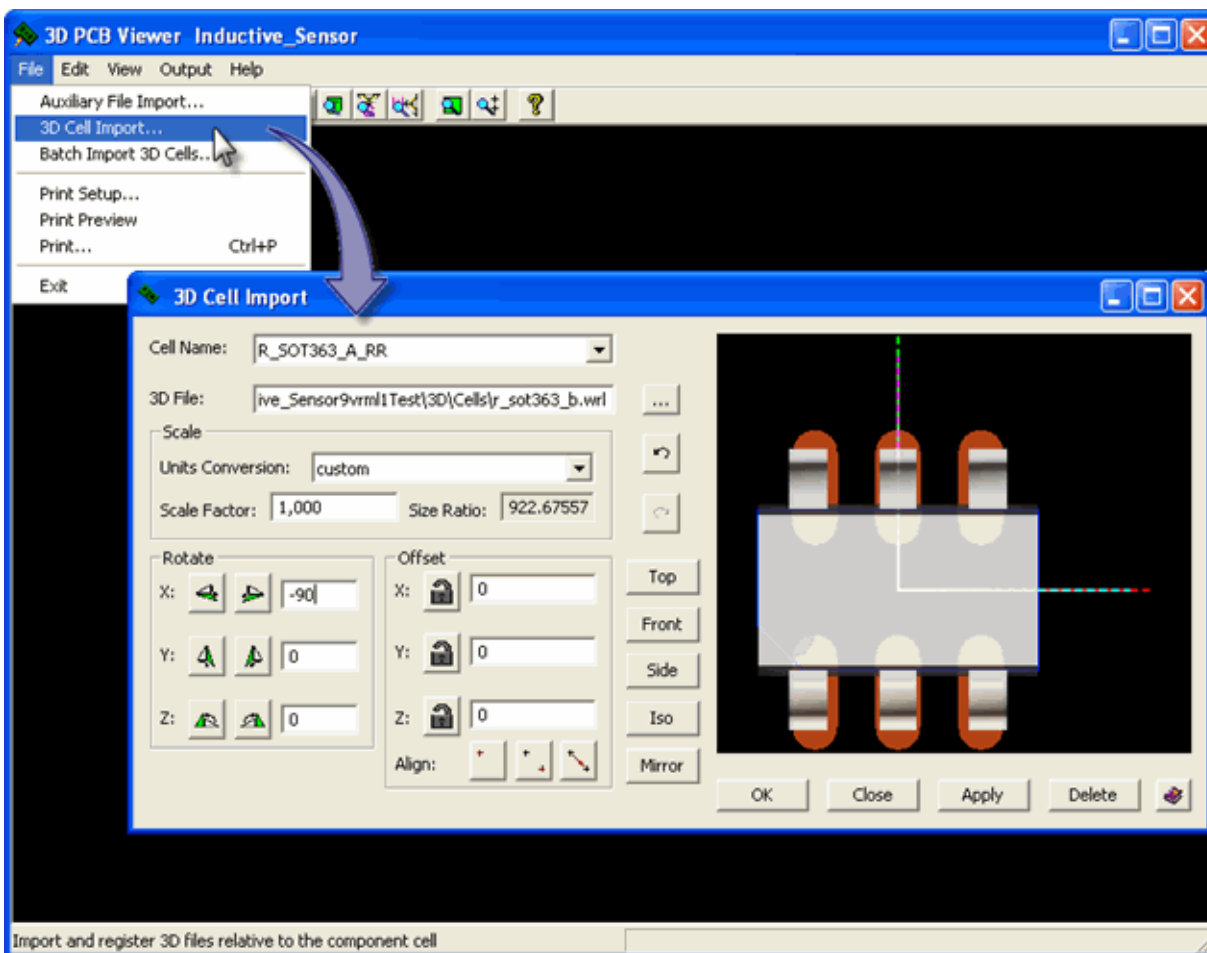
1. In the 3D PCB Viewer window, select **File> 3D Cell Import** from the menubar. This opens the 3D Cell Import dialog box, shown in [Figure 4-1](#) and described in [Table 4-1](#).




**Tip:** If a component is selected when the 3D Cell Import dialog box opens, that cell's name and path are automatically filled in.

---

**Figure 4-1. 3D Cell Import Dialog Box**

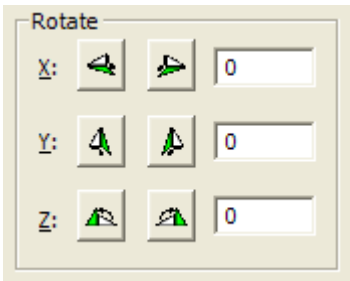


**Table 4-1. 3D Cell Import Controls**

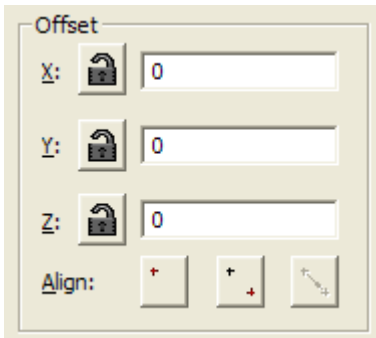


Area	Option	Description
Cell Name	<filename>	The Cell Name field allows you to choose a 3D cell from a list of all the 3D cells in the design.
3D File	<path>	<p>The 3D File field specifies the full path to the cell to be imported. You can either enter the file name, or you can click the  icon to use the browser to select the file path.</p> <p><b>Note:</b> You cannot import PCB design files.</p>




**Table 4-1. 3D Cell Import Controls (cont.)**

Area	Option	Description
Scale	<n>	The fields in the Scale area allow you to change the relative size of the cell so that its size matches up with that of the primary design.
	Units Conversion	Use the Units Conversion field to select the units of measure that you want to convert between. For example, one of the selections is “in to mm”, which converts inches to millimeters.  Selections made in this field are reflected in the Scale Factor and Size Ratio fields.
	Scale Factor	Use the Scale Factor field to enter a numeric value by which to scale the cell data. Applying a Scale Factor changes the selection in the Units Conversation to <b>custom</b> .
	Size Ratio	The Size Ratio field displays the current ratio between the cell file and the primary design. To change this ratio, you can either type a number into the Scale Factor field or you can select a scaling factor from the Units Conversion drop-down list.
Rotate	 <p>The icons and fields in the Rotate area allow you to rotate the cell around the x-, y-, and z-axis so as to correctly orient the imported cell to the primary design.</p> <p>To rotate by 90°, click one of the two icons located alongside the appropriate axis. To rotate by any other degree, enter the numeric value in the adjacent field.</p>	

**Table 4-1. 3D Cell Import Controls (cont.)**

Area	Option	Description
Offset		<p>The icons and fields in the Offset area allow you to align the cell to the primary design.</p> <p>To move the cell a specified distance along a particular axis, enter the distance in the adjacent field.</p> <p>If you want to constrain the movement of the cell during alignment so that it cannot move in a particular direction, then click the lock icon alongside the appropriate axis.</p> <p>The three Align icons enable you to pick a point on the cell and a point on the primary design, and then automatically align the two points.</p>
Redo and Undo buttons		<p>Undo: Cancels the last action you have performed.</p> <p>Redo: Performs the last canceled action again.</p>
View buttons		<p>Alongside the display of the cell is a row of buttons that you can use to quickly change the angle of view. You can view the cell from the top, front, or side.</p> <p>Click the Iso button to change to an isometric view.</p> <p>Click the Mirror button to view a mirror image of the cell.</p>

1. Select the 3D cell to import by selecting a cell name from the drop-down list in the Cell Name field.
2. Click the  (Browse) icon to open the Select Import File dialog box, select the 3D file, then click **Open**. The full path to the 3D cell's file is displayed and an image of the cell is rendered.

**Note**



If an existing 3d import is already loaded, and it's filename is altered, it will attempt to load on any loss of focus in the Aux File entry field. An invalid filename will color the field red and delete the current 3d file import if any.

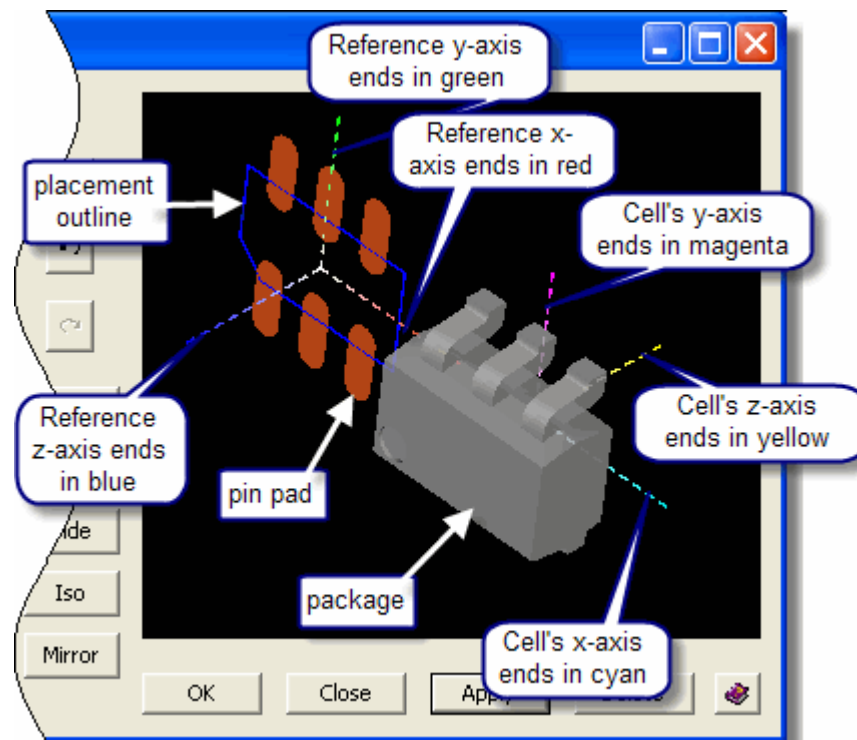
In addition to the 3D cell, the cell view window displays a two-dimensional (2D) cell from the PCB design for reference. The 2D cell shows pins and placement outlines (see [Figure 4-2](#)).

The 3D PCB Viewer displays the coordinate axes of both the primary (xPCB) design and the 3D cell (MCAD) design. The xPCB design axes are an RGB triad where positive X is red, positive Y is green, and positive Z is blue. The MCAD design axes are a CYM triad where positive X is cyan, positive Y is yellow, and positive Z is magenta. If the cell origin does not coincide with that of the primary design, then the 3D PCB Viewer displays both sets of axes. When the axes are coincident, they are dithered so as to display both sets of dashes.

**i** **Tip:** When the cursor is in the cell display window, use the mouse to rotate, zoom, and pan just like in the main 3D PCB Viewer window (see [Mouse Controls](#)).

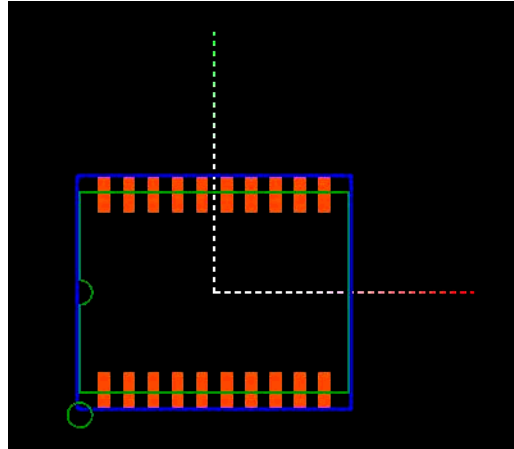
You can also drag the edges and corners of the 3D Cell Import window to resize it so that you can enlarge the view as needed.

**Figure 4-2. View of Imported 3D Cell Offset from 2D Reference Cell**



The assembly outline identification of a registry pin will carry through into the 3D PCB Viewer. For example, note the circle in [Figure 4-3](#) and the notch on the left of the part.

**Figure 4-3. Registry Identification from the Assembly Outline**






3. Set the scale so that the size of the imported cell is correct relative to the size of the primary PCB.

The Size Ratio field gives the ratio between the primary PCB and the imported cell. To change the ratio, you can either enter a custom scaling factor in the Scale Factor field or select a standard factor from the Units Conversion drop-down list.

4. Now that the imported object is the correct size relative to the PCB design, it needs to be rotated so as to be correctly aligned with the primary PCB.

There are three axes around which you can rotate the cell. The x- and y-axis are in the same plane as the PCB design. The z-axis is in the direction of the layer stackup.

Clicking the Rotate icons rotates the cell by  $\pm 90^\circ$  degrees about the associated axis. You can also enter the number of degrees of rotation, but non-orthogonal rotations are rarely needed.


5. The final step in placing the 3D cell is to translate it so that it is correctly aligned.
  - a. Click the  (From) icon, then click the *from* point on the 3D cell. The point is marked with a yellow X.
  - b. Click the  (To) icon, then click the *to* point on the reference cell. This point is also marked by a yellow X.
  - c. Click the  (Align) icon to translate the design so that the *from* point on the 3D cell is placed over the *to* point on the reference cell.

---

**i** **Tip:** If the 3D cell is rotated and positioned correctly, you can lock one or two of the axes to constrain the movement. This allows you to be less precise in your point selections.

---

6. When you are finished, click either **Apply** or **OK** to make the change permanent.

 **Caution** You must click either **Apply** or **OK** to save a cell instance edit. When you select another instance without doing so, the edits on that current instance are discarded.

---

## Deleting an Imported 3D Cell

---

To delete a previously imported 3D cell, do the following:

1. Select **File> 3D Cell Import** to open the 3D Cell Import dialog box.
2. Select the cell name from the drop-down list. The 3D File field displays the path to the 3D file.
3. Click the **Delete** button.
4. Click **Yes** in the message box asking if you would like to delete the 3D cell.

The selected 3D cell is deleted from the 3D PCB Viewer. However, the file itself remains in the design's database. The 3D PCB Viewer cannot delete cells from the design's library.



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- 1.2. Amounts invoiced will be paid, in the currency specified on the applicable invoice, within 30 days from the date of such invoice. Any past due invoices will be subject to the imposition of interest charges in the amount of one and one-half percent per month or the applicable legal rate currently in effect, whichever is lower. Prices do not include freight, insurance, customs duties, taxes or other similar charges, which Mentor Graphics will state separately in the applicable invoice. Unless timely provided with a valid certificate of exemption or other evidence that items are not taxable, Mentor Graphics will invoice Customer for all applicable taxes including, but not limited to, VAT, GST, sales tax, consumption tax and service tax. Customer will make all payments free and clear of, and without reduction for, any withholding or other taxes; any such taxes imposed on payments by Customer hereunder will be Customer's sole responsibility. If Customer appoints a third party to place purchase orders and/or make payments on Customer's behalf, Customer shall be liable for payment under Orders placed by such third party in the event of default.
- 1.3. All Products are delivered FCA factory (Incoterms 2010), freight prepaid and invoiced to Customer, except Software delivered electronically, which shall be deemed delivered when made available to Customer for download. Mentor Graphics retains a security interest in all Products delivered under this Agreement, to secure payment of the purchase price of such Products, and Customer agrees to sign any documents that Mentor Graphics determines to be necessary or convenient for use in filing or perfecting such security interest. Mentor Graphics' delivery of Software by electronic means is subject to Customer's provision of both a primary and an alternate e-mail address.

2. **GRANT OF LICENSE.** The software installed, downloaded, or otherwise acquired by Customer under this Agreement, including any updates, modifications, revisions, copies, documentation, setup files and design data ("Software") are copyrighted, trade secret and confidential information of Mentor Graphics or its licensors, who maintain exclusive title to all Software and retain all rights not expressly granted by this Agreement. Except for Software that is embeddable ("Embedded Software"), which is licensed pursuant to separate embedded software terms or an embedded software supplement, Mentor Graphics grants to Customer, subject to payment of applicable license fees, a nontransferable, nonexclusive license to use Software solely: (a) in machine-readable, object-code form (except as provided in Subsection 4.2); (b) for Customer's internal business purposes; (c) for the term of the license; and (d) on the computer hardware and at the site authorized by Mentor Graphics. A site is restricted to a one-half mile (800 meter) radius. Customer may have Software temporarily used by an employee for telecommuting purposes from locations other than a Customer office, such as the employee's residence, an airport or hotel, provided that such employee's primary place of employment is the site where the Software is authorized for use. Mentor Graphics' standard policies and programs, which vary depending on Software, license fees paid or services purchased, apply to the following: (a) relocation of Software; (b) use of Software, which may be limited, for example, to execution of a single session by a single user on the authorized hardware or for a restricted period of time (such limitations may be technically implemented through the use of authorization codes or similar devices); and (c) support services provided, including eligibility to receive telephone support, updates, modifications, and revisions. For the avoidance of doubt, if Customer provides any feedback or requests any change or enhancement to Products, whether in the course of receiving support or consulting services, evaluating Products, performing beta testing or otherwise, any inventions, product improvements, modifications or developments made by Mentor Graphics (at Mentor Graphics' sole discretion) will be the exclusive property of Mentor Graphics.

### 3. BETA CODE.

- 3.1. Portions or all of certain Software may contain code for experimental testing and evaluation (which may be either alpha or beta, collectively "Beta Code"), which may not be used without Mentor Graphics' explicit authorization. Upon Mentor Graphics' authorization, Mentor Graphics grants to Customer a temporary, nontransferable, nonexclusive license for experimental use to test and evaluate the Beta Code without charge for a limited period of time specified by Mentor Graphics. Mentor Graphics may choose, at its sole discretion, not to release Beta Code commercially in any form.
- 3.2. If Mentor Graphics authorizes Customer to use the Beta Code, Customer agrees to evaluate and test the Beta Code under normal conditions as directed by Mentor Graphics. Customer will contact Mentor Graphics periodically during Customer's use of the Beta Code to discuss any malfunctions or suggested improvements. Upon completion of Customer's evaluation and testing, Customer will send to Mentor Graphics a written evaluation of the Beta Code, including its strengths, weaknesses and recommended improvements.
- 3.3. Customer agrees to maintain Beta Code in confidence and shall restrict access to the Beta Code, including the methods and concepts utilized therein, solely to those employees and Customer location(s) authorized by Mentor Graphics to perform beta testing. Customer agrees that any written evaluations and all inventions, product improvements, modifications or developments that Mentor Graphics conceived or made during or subsequent to this Agreement, including those based partly or wholly on Customer's feedback, will be the exclusive property of Mentor Graphics. Mentor Graphics will have exclusive rights, title and interest in all such property. The provisions of this Subsection 3.3 shall survive termination of this Agreement.

### 4. RESTRICTIONS ON USE.

- 4.1. Customer may copy Software only as reasonably necessary to support the authorized use. Each copy must include all notices and legends embedded in Software and affixed to its medium and container as received from Mentor Graphics. All copies shall remain the property of Mentor Graphics or its licensors. Except for Embedded Software that has been embedded in executable code form in Customer's product(s), Customer shall maintain a record of the number and primary location of all copies of Software, including copies merged with other software, and shall make those records available to Mentor Graphics upon request. Customer shall not make Products available in any form to any person other than Customer's employees and on-site contractors, excluding Mentor Graphics competitors, whose job performance requires access and who are under obligations of confidentiality. Customer shall take appropriate action to protect the confidentiality of Products and ensure that any person permitted access does not disclose or use Products except as permitted by this Agreement. Customer shall give Mentor Graphics written notice of any unauthorized disclosure or use of the Products as soon as Customer becomes aware of such unauthorized disclosure or use. Customer acknowledges that Software provided hereunder may contain source code which is proprietary and its confidentiality is of the highest importance and value to Mentor Graphics. Customer acknowledges that Mentor Graphics may be seriously harmed if such source code is disclosed in violation of this Agreement. Except as otherwise permitted for purposes of interoperability as specified by applicable and mandatory local law, Customer shall not reverse-assemble, disassemble, reverse-compile, or reverse-engineer any Product, or in any way derive any source code from Software that is not provided to Customer in source code form. Log files, data files, rule files and script files generated by or for the Software (collectively "Files"), including without limitation files containing Standard Verification Rule Format ("SVRF") and Tcl Verification Format ("TVF") which are Mentor Graphics' trade secret and proprietary syntaxes for expressing process rules, constitute or include confidential information of Mentor Graphics. Customer may share Files with third parties, excluding Mentor Graphics competitors, provided that the confidentiality of such Files is protected by written agreement at least as well as Customer protects other information of a similar nature or importance, but in any case with at least reasonable care. Customer may use Files containing SVRF or TVF only with Mentor Graphics products. Under no circumstances shall Customer use Products or Files or allow their use for the purpose of developing, enhancing or marketing any product that is in any way competitive with Products, or disclose to any third party the results of, or information pertaining to, any benchmark.
  - 4.2. If any Software or portions thereof are provided in source code form, Customer will use the source code only to correct software errors and enhance or modify the Software for the authorized use, or as permitted for Embedded Software under separate embedded software terms or an embedded software supplement. Customer shall not disclose or permit disclosure of source code, in whole or in part, including any of its methods or concepts, to anyone except Customer's employees or on-site contractors, excluding Mentor Graphics competitors, with a need to know. Customer shall not copy or compile source code in any manner except to support this authorized use.
  - 4.3. Customer agrees that it will not subject any Product to any open source software ("OSS") license that conflicts with this Agreement or that does not otherwise apply to such Product.
  - 4.4. Customer may not assign this Agreement or the rights and duties under it, or relocate, sublicense, or otherwise transfer the Products, whether by operation of law or otherwise ("Attempted Transfer"), without Mentor Graphics' prior written consent and payment of Mentor Graphics' then-current applicable relocation and/or transfer fees. Any Attempted Transfer without Mentor Graphics' prior written consent shall be a material breach of this Agreement and may, at Mentor Graphics' option, result in the immediate termination of the Agreement and/or the licenses granted under this Agreement. The terms of this Agreement, including without limitation the licensing and assignment provisions, shall be binding upon Customer's permitted successors in interest and assigns.
  - 4.5. The provisions of this Section 4 shall survive the termination of this Agreement.
5. **SUPPORT SERVICES.** To the extent Customer purchases support services, Mentor Graphics will provide Customer with updates and technical support for the Products, at the Customer site(s) for which support is purchased, in accordance with Mentor Graphics' then current End-User Support Terms located at <http://supportnet.mentor.com/supportterms>.
6. **OPEN SOURCE SOFTWARE.** Products may contain OSS or code distributed under a proprietary third party license agreement, to which additional rights or obligations ("Third Party Terms") may apply. Please see the applicable Product documentation (including license files, header files, read-me files or source code) for details. In the event of conflict between the terms of this Agreement

(including any addenda) and the Third Party Terms, the Third Party Terms will control solely with respect to the OSS or third party code. The provisions of this Section 6 shall survive the termination of this Agreement.

## **7. LIMITED WARRANTY.**

- 7.1. Mentor Graphics warrants that during the warranty period its standard, generally supported Products, when properly installed, will substantially conform to the functional specifications set forth in the applicable user manual. Mentor Graphics does not warrant that Products will meet Customer's requirements or that operation of Products will be uninterrupted or error free. The warranty period is 90 days starting on the 15th day after delivery or upon installation, whichever first occurs. Customer must notify Mentor Graphics in writing of any nonconformity within the warranty period. For the avoidance of doubt, this warranty applies only to the initial shipment of Software under an Order and does not renew or reset, for example, with the delivery of (a) Software updates or (b) authorization codes or alternate Software under a transaction involving Software re-mix. This warranty shall not be valid if Products have been subject to misuse, unauthorized modification, improper installation or Customer is not in compliance with this Agreement. MENTOR GRAPHICS' ENTIRE LIABILITY AND CUSTOMER'S EXCLUSIVE REMEDY SHALL BE, AT MENTOR GRAPHICS' OPTION, EITHER (A) REFUND OF THE PRICE PAID UPON RETURN OF THE PRODUCTS TO MENTOR GRAPHICS OR (B) MODIFICATION OR REPLACEMENT OF THE PRODUCTS THAT DO NOT MEET THIS LIMITED WARRANTY. MENTOR GRAPHICS MAKES NO WARRANTIES WITH RESPECT TO: (A) SERVICES; (B) PRODUCTS PROVIDED AT NO CHARGE; OR (C) BETA CODE; ALL OF WHICH ARE PROVIDED "AS IS."
- 7.2. THE WARRANTIES SET FORTH IN THIS SECTION 7 ARE EXCLUSIVE. NEITHER MENTOR GRAPHICS NOR ITS LICENSORS MAKE ANY OTHER WARRANTIES EXPRESS, IMPLIED OR STATUTORY, WITH RESPECT TO PRODUCTS PROVIDED UNDER THIS AGREEMENT. MENTOR GRAPHICS AND ITS LICENSORS SPECIFICALLY DISCLAIM ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF INTELLECTUAL PROPERTY.

8. **LIMITATION OF LIABILITY.** TO THE EXTENT PERMITTED UNDER APPLICABLE LAW, IN NO EVENT SHALL MENTOR GRAPHICS OR ITS LICENSORS BE LIABLE FOR INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS) WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY, EVEN IF MENTOR GRAPHICS OR ITS LICENSORS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL MENTOR GRAPHICS' OR ITS LICENSORS' LIABILITY UNDER THIS AGREEMENT EXCEED THE AMOUNT RECEIVED FROM CUSTOMER FOR THE HARDWARE, SOFTWARE LICENSE OR SERVICE GIVING RISE TO THE CLAIM. IN THE CASE WHERE NO AMOUNT WAS PAID, MENTOR GRAPHICS AND ITS LICENSORS SHALL HAVE NO LIABILITY FOR ANY DAMAGES WHATSOEVER. THE PROVISIONS OF THIS SECTION 8 SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT.

## **9. THIRD PARTY CLAIMS.**

- 9.1. Customer acknowledges that Mentor Graphics has no control over the testing of Customer's products, or the specific applications and use of Products. Mentor Graphics and its licensors shall not be liable for any claim or demand made against Customer by any third party, except to the extent such claim is covered under Section 10.
- 9.2. In the event that a third party makes a claim against Mentor Graphics arising out of the use of Customer's products, Mentor Graphics will give Customer prompt notice of such claim. At Customer's option and expense, Customer may take sole control of the defense and any settlement of such claim. Customer WILL reimburse and hold harmless Mentor Graphics for any LIABILITY, damages, settlement amounts, costs and expenses, including reasonable attorney's fees, incurred by or awarded against Mentor Graphics or its licensors in connection with such claims.
- 9.3. The provisions of this Section 9 shall survive any expiration or termination of this Agreement.

## **10. INFRINGEMENT.**

- 10.1. Mentor Graphics will defend or settle, at its option and expense, any action brought against Customer in the United States, Canada, Japan, or member state of the European Union which alleges that any standard, generally supported Product acquired by Customer hereunder infringes a patent or copyright or misappropriates a trade secret in such jurisdiction. Mentor Graphics will pay costs and damages finally awarded against Customer that are attributable to such action. Customer understands and agrees that as conditions to Mentor Graphics' obligations under this section Customer must: (a) notify Mentor Graphics promptly in writing of the action; (b) provide Mentor Graphics all reasonable information and assistance to settle or defend the action; and (c) grant Mentor Graphics sole authority and control of the defense or settlement of the action.
- 10.2. If a claim is made under Subsection 10.1 Mentor Graphics may, at its option and expense: (a) replace or modify the Product so that it becomes noninfringing; (b) procure for Customer the right to continue using the Product; or (c) require the return of the Product and refund to Customer any purchase price or license fee paid, less a reasonable allowance for use.
- 10.3. Mentor Graphics has no liability to Customer if the action is based upon: (a) the combination of Software or hardware with any product not furnished by Mentor Graphics; (b) the modification of the Product other than by Mentor Graphics; (c) the use of other than a current unaltered release of Software; (d) the use of the Product as part of an infringing process; (e) a product that Customer makes, uses, or sells; (f) any Beta Code or Product provided at no charge; (g) any software provided by Mentor Graphics' licensors who do not provide such indemnification to Mentor Graphics' customers; (h) OSS, except to the extent that the infringement is directly caused by Mentor Graphics' modifications to such OSS; or (i) infringement by Customer that is deemed willful. In the case of (i), Customer shall reimburse Mentor Graphics for its reasonable attorney fees and other costs related to the action.
- 10.4. THIS SECTION 10 IS SUBJECT TO SECTION 8 ABOVE AND STATES THE ENTIRE LIABILITY OF MENTOR GRAPHICS AND ITS LICENSORS, AND CUSTOMER'S SOLE AND EXCLUSIVE REMEDY, FOR DEFENSE, SETTLEMENT AND DAMAGES, WITH RESPECT TO ANY ALLEGED PATENT OR COPYRIGHT INFRINGEMENT OR TRADE SECRET MISAPPROPRIATION BY ANY PRODUCT PROVIDED UNDER THIS AGREEMENT.

## 11. TERMINATION AND EFFECT OF TERMINATION.

- 11.1. If a Software license was provided for limited term use, such license will automatically terminate at the end of the authorized term. Mentor Graphics may terminate this Agreement and/or any license granted under this Agreement immediately upon written notice if Customer: (a) exceeds the scope of the license or otherwise fails to comply with the licensing or confidentiality provisions of this Agreement, or (b) becomes insolvent, files a bankruptcy petition, institutes proceedings for liquidation or winding up or enters into an agreement to assign its assets for the benefit of creditors. For any other material breach of any provision of this Agreement, Mentor Graphics may terminate this Agreement and/or any license granted under this Agreement upon 30 days written notice if Customer fails to cure the breach within the 30 day notice period. Termination of this Agreement or any license granted hereunder will not affect Customer's obligation to pay for Products shipped or licenses granted prior to the termination, which amounts shall be payable immediately upon the date of termination.
- 11.2. Upon termination of this Agreement, the rights and obligations of the parties shall cease except as expressly set forth in this Agreement. Upon termination of this Agreement and/or any license granted under this Agreement, Customer shall ensure that all use of the affected Products ceases, and shall return hardware and either return to Mentor Graphics or destroy Software in Customer's possession, including all copies and documentation, and certify in writing to Mentor Graphics within ten business days of the termination date that Customer no longer possesses any of the affected Products or copies of Software in any form.
12. **EXPORT.** The Products provided hereunder are subject to regulation by local laws and European Union ("E.U.") and United States ("U.S.") government agencies, which prohibit export, re-export or diversion of certain products, information about the products, and direct or indirect products thereof, to certain countries and certain persons. Customer agrees that it will not export or re-export Products in any manner without first obtaining all necessary approval from appropriate local, E.U. and U.S. government agencies. If Customer wishes to disclose any information to Mentor Graphics that is subject to any E.U., U.S. or other applicable export restrictions, including without limitation the U.S. International Traffic in Arms Regulations (ITAR) or special controls under the Export Administration Regulations (EAR), Customer will notify Mentor Graphics personnel, in advance of each instance of disclosure, that such information is subject to such export restrictions.
13. **U.S. GOVERNMENT LICENSE RIGHTS.** Software was developed entirely at private expense. The parties agree that all Software is commercial computer software within the meaning of the applicable acquisition regulations. Accordingly, pursuant to U.S. FAR 48 CFR 12.212 and DFAR 48 CFR 227.7202, use, duplication and disclosure of the Software by or for the U.S. government or a U.S. government subcontractor is subject solely to the terms and conditions set forth in this Agreement, which shall supersede any conflicting terms or conditions in any government order document, except for provisions which are contrary to applicable mandatory federal laws.
14. **THIRD PARTY BENEFICIARY.** Mentor Graphics Corporation, Mentor Graphics (Ireland) Limited, Microsoft Corporation and other licensors may be third party beneficiaries of this Agreement with the right to enforce the obligations set forth herein.
15. **REVIEW OF LICENSE USAGE.** Customer will monitor the access to and use of Software. With prior written notice and during Customer's normal business hours, Mentor Graphics may engage an internationally recognized accounting firm to review Customer's software monitoring system and records deemed relevant by the internationally recognized accounting firm to confirm Customer's compliance with the terms of this Agreement or U.S. or other local export laws. Such review may include FlexNet (or successor product) report log files that Customer shall capture and provide at Mentor Graphics' request. Customer shall make records available in electronic format and shall fully cooperate with data gathering to support the license review. Mentor Graphics shall bear the expense of any such review unless a material non-compliance is revealed. Mentor Graphics shall treat as confidential information all information gained as a result of any request or review and shall only use or disclose such information as required by law or to enforce its rights under this Agreement. The provisions of this Section 15 shall survive the termination of this Agreement.
16. **CONTROLLING LAW, JURISDICTION AND DISPUTE RESOLUTION.** The owners of certain Mentor Graphics intellectual property licensed under this Agreement are located in Ireland and the U.S. To promote consistency around the world, disputes shall be resolved as follows: excluding conflict of laws rules, this Agreement shall be governed by and construed under the laws of the State of Oregon, U.S., if Customer is located in North or South America, and the laws of Ireland if Customer is located outside of North or South America or Japan, and the laws of Japan if Customer is located in Japan. All disputes arising out of or in relation to this Agreement shall be submitted to the exclusive jurisdiction of the courts of Portland, Oregon when the laws of Oregon apply, or Dublin, Ireland when the laws of Ireland apply, or the Tokyo District Court when the laws of Japan apply. Notwithstanding the foregoing, all disputes in Asia (excluding Japan) arising out of or in relation to this Agreement shall be resolved by arbitration in Singapore before a single arbitrator to be appointed by the chairman of the Singapore International Arbitration Centre ("SIAC") to be conducted in the English language, in accordance with the Arbitration Rules of the SIAC in effect at the time of the dispute, which rules are deemed to be incorporated by reference in this section. Nothing in this section shall restrict Mentor Graphics' right to bring an action (including for example a motion for injunctive relief) against Customer in the jurisdiction where Customer's place of business is located. The United Nations Convention on Contracts for the International Sale of Goods does not apply to this Agreement.
17. **SEVERABILITY.** If any provision of this Agreement is held by a court of competent jurisdiction to be void, invalid, unenforceable or illegal, such provision shall be severed from this Agreement and the remaining provisions will remain in full force and effect.
18. **MISCELLANEOUS.** This Agreement contains the parties' entire understanding relating to its subject matter and supersedes all prior or contemporaneous agreements. Any translation of this Agreement is provided to comply with local legal requirements only. In the event of a dispute between the English and any non-English versions, the English version of this Agreement shall govern to the extent not prohibited by local law in the applicable jurisdiction. This Agreement may only be modified in writing, signed by an authorized representative of each party. Waiver of terms or excuse of breach must be in writing and shall not constitute subsequent consent, waiver or excuse.