6. Selecting objects within the viewport

This chapter explains how to select objects that appear within a viewport, such as nodes, elements, vertices, edges, faces, and cells. The following topics are covered:

- “Understanding selection within viewports,” Section 6.1
- “Selecting objects within the current viewport,” Section 6.2
- “Using the selection options,” Section 6.3

Selecting dialog box options is discussed in “Interacting with dialog boxes,” Section 3.2. Selecting viewports is discussed in “Selecting viewports,” Section 4.3.2, in the online HTML version of this manual.

6.1 Understanding selection within viewports

This section describes the objects that you can select in a viewport and explains what these objects represent.

6.1.1 What objects can you select from the viewport?

Selecting an object within the current viewport is one of the most common tasks you have to perform during the modeling process. In the course of various procedures you may need to select geometric objects (vertices, edges, faces, cells, and datums) or discrete objects (nodes and elements) by picking them directly from the viewport. Figure 6–1 shows these different object types.

You can select objects in the viewport during certain procedures, such as those listed below:

- Creating sets and surfaces
- Partitioning a part instance
- Editing a feature
- Seeding a part instance for meshing
- Creating or editing a display group composed of elements or nodes
- Color coding elements in your model
- Creating a node list path through your model

You can also select objects in the viewport in advance of selecting a procedure. If you make selections prior to selecting a procedure, Abaqus/CAE does not limit your selections. When you select a procedure, Abaqus/CAE filters any selections that you made and keeps only those selections that are appropriate for the procedure. For more information, see “Selecting objects before choosing a procedure,” Section 6.3.7.

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If you select objects as part of a procedure, in most circumstances Abaqus/CAE only allows you to select objects that are appropriate for the current procedure. For example, the first step in partitioning an edge is selecting the edge of interest. Therefore, at this point in the procedure you can select only an edge; you cannot select a cell, a face, or a vertex. Messages in the prompt area guide you through the steps of a procedure and indicate which types of objects are available for selection. You can select only objects that are part of the current display group.

In some circumstances Abaqus/CAE cannot determine which objects are appropriate for selection and does not limit your selection. For example, when you are creating a set, you can select from cells, faces, edges, and vertices to include in the set and Abaqus/CAE allows you to select any of these objects. If you make an ambiguous selection from the viewport during a procedure, Abaqus/CAE allows you to cycle through the available objects until the desired object is selected. This ambiguity is described in “Cycling through valid selections,” Section 6.2.9. You may find it easier to use the selection filters to limit the type of object you can select. For more information, see “Using the selection options,” Section 6.3.

6.1.2 What is a selection group?

You can copy entities (vertices, edges, faces, or cells) that are highlighted in the viewport into a temporary storage area called a selection group. Abaqus/CAE saves the selection group for the duration of a session. Rather than manually reselecting the same entities during a subsequent selection procedure, you can paste the selection group into your selection. For example, you can copy all of the small faces highlighted by the Geometry Diagnostics query tool into a selection group. You can then paste the same selection group into your selection when you are using the Geometry Edit toolset to repair small faces.
When you paste a group into your selection, you can choose from selection groups and from display groups. Selection groups are designed to be a temporary convenience for the user, and they do not appear with display groups in the Display Groups toolset. You can create any number of display groups. In contrast, Abaqus/CAE saves a maximum of five selection groups. Abaqus/CAE overwrites the existing selection groups if you create more than five selection groups.

After you have selected the desired entities, you create a selection group by clicking mouse button 3 in the viewport and selecting Copy from the menu that appears. Abaqus/CAE copies all of the highlighted entities into a selection group. You paste a selection group to your current selection by clicking mouse button 3 in the viewport and selecting Paste from the menu that appears. Abaqus/CAE displays the Paste to Selection dialog box, and you can select one or more of the existing selection groups to paste to your current selection. When you paste a group, Abaqus/CAE appends the entities in the group to any other entities that you have already selected.

Note: You cannot create or use selection groups if you are selecting objects in advance of selecting a procedure.

6.1.3 Understanding the correspondence between geometric and physical objects

When you select geometric objects in a viewport, it is important to understand what physical structure each object represents. The geometric objects that make up a model—cells, faces, edges, and vertices—can represent different physical structures depending on the space in which they are embedded.

For example, beams and other wire parts are represented by edges in the geometric model (see Figure 6–2).

![Figure 6–2 Selecting wire parts.](image-url)
The end surfaces of these parts are represented by the vertices on either side of the edge, and the circumferential surface is represented by the line joining the vertices. To select a wire part, you can click the edge, and, if necessary, Abaqus/CAE prompts you to specify the surface of interest.

Likewise, axisymmetric shells are also represented by edges in the geometric model (see Figure 6–3).

You can select the axisymmetric shell by clicking the edge in the viewport, and, if necessary, Abaqus/CAE prompts you to specify either the inside surface or the outside surface of the shell. You must select either the inside or the outside surface if you are applying a prescribed condition or contact definition to the surface. For example, if you want to apply a pressure load to a shell, you must specify which side of the shell should receive the load.

For more information on selecting surfaces, see “Specifying a particular side or end of a region,” Section 73.2.5. For more information on modeling space, see “The relationship between parts and features,” Section 11.3.1, and “Part modeling space,” Section 11.4.1.

6.2 Selecting objects within the current viewport

This section describes techniques that you can use for selecting one or more objects in the current viewport.
6.2.1 Selecting and unselecting individual objects

Selecting and unselecting objects in the current viewport are straightforward operations that use standard methods. For more information on selecting viewports, see “Selecting viewports,” Section 4.3.2, in the online HTML version of this manual.

Preselection highlighting allows you to preview which object Abaqus/CAE will select if you click at the current cursor location. In addition, preselection in the Sketcher uses a secondary cursor to indicate the exact position and type of entity that will be selected. (For more information on Sketcher preselection, see “The Sketcher cursors and preselection,” Section 20.4.5.)

You will use the following three selection operations most frequently:

**Click to select an object**

To select a single object from the current viewport, move the cursor to the object and click mouse button 1.

- To select a point, click the corresponding point marker. The point marker changes color when selected. Vertices that you can select are marked by small, filled circles; and datum points are marked by small, unfilled circles. (See “Understanding the role of datum geometry,” Section 62.1, for information on datum points.) Edge midpoints and arc centers that you can select are marked by small diamonds.

**Note:** Some of the selection markers that appear when you are using the Sketch module are different from those described here. For information on selecting objects while using the Sketch module, see “The Sketcher cursors and preselection,” Section 20.4.5.

- To select an edge, click the edge while positioning the cursor away from any vertex. Selected edges are highlighted.
- To select a face, click the face while positioning the cursor away from any edge or vertex. Selected faces are highlighted with a grid pattern. (The grid pattern is unrelated to mesh element location.)
- To select a cell, click any of its faces. All edges of selected cells are highlighted.

If you are unable to select the desired objects, you can use the **Selection** toolbar to change the selection behavior. For more information, see “Using the selection options,” Section 6.3.

Once you select an object, any objects previously selected in the current viewport are unselected automatically.

If your current procedure, options, and cursor position do not clearly specify one object for preselection, Abaqus/CAE highlights all of the potential selections and adds ellipsis marks (...) next to the cursor arrow to indicate an ambiguous preselection. If you accept an ambiguous preselection or otherwise make an ambiguous selection, use the buttons in the prompt area to make your final selection. For more information, see “Cycling through valid selections,” Section 6.2.9.
[Shift]+Click to select additional objects

To select an additional object, move the cursor to the object and [Shift]+Click. Your original selection remains highlighted, and the newly selected object becomes highlighted.

An alternative method for selecting multiple objects is to drag a rectangle around the objects. For more information, see “Drag-selecting multiple objects,” Section 6.2.2.

[Ctrl]+Click to unselect objects

To unselect an object, move the cursor to the object and [Ctrl]+Click. To unselect all objects, click an unused region of the current viewport.

When you have finished selecting and unselecting items in the viewport, click mouse button 2 to confirm your selection. You can use the selection option tools to adjust the shape of the drag-select region. You can also choose which objects are selected by the drag-select region. The selection option tools are located in the Selection toolbar. For more information, see “Modifying the shape of the drag-select region,” Section 6.3.5, and “Choosing which objects are selected by the drag-select region,” Section 6.3.6.

6.2.2 Drag-selecting multiple objects

Most prompts ask you to select just one object from the current viewport. However, some tasks allow you to select one or more objects; for example, the Set toolset allows you to select several objects of the same type and group them into sets. You can select multiple objects using the [Shift]+Click method described in “Selecting and unselecting individual objects,” Section 6.2.1. An additional method for selecting multiple objects is to drag a rectangle around those objects. You can use the selection option tools to adjust the shape of the drag-select region. You can also choose which objects are selected by the drag-select region. The selection option tools are located in the Selection toolbar. For more information, see “Modifying the shape of the drag-select region,” Section 6.3.5, and “Choosing which objects are selected by the drag-select region,” Section 6.3.6.

To drag-select multiple objects:

1. Imagine a rectangle that encloses only the objects you want to select.

2. Click at one corner of the rectangle and, while continuing to press the mouse button, drag until you have enclosed all the objects.

3. Release the mouse button.

   All the valid objects inside or crossing the rectangle are highlighted.

4. Click mouse button 2 to indicate that you have finished selecting objects.

   Sometimes it is convenient to use a combination of the [Shift]+Click and drag-select selection techniques. For more information, see “Combining selection techniques,” Section 6.2.7.
SELECTING OBJECTS WITHIN THE CURRENT VIEWPORT

**Tip:** If you select multiple objects and then want to unselect one or more of them, [Ctrl]+Click the objects you want to unselect. To unselect all the objects, click in an unused area of the viewport.

### 6.2.3 Using the angle and feature edge method to select multiple objects

In complicated models selecting individual faces or edges from a native part or selecting element faces or nodes from an orphan mesh can be time consuming and prone to error. For example, when creating a surface from an orphan mesh, you must select the individual element faces that make up the surface and append them to your selection. To speed up the selection process, Abaqus/CAE provides the angle and feature edge methods for selecting multiple faces, edges, elements, element faces, or nodes.

When you are performing a task in which you must pick more than one face or edge from a native part or more than one element, element face, or node from an orphan mesh, Abaqus/CAE displays a field in the prompt area. The field allows you to choose between three selection methods—individually, by angle, and by feature edge, as shown in Figure 6–4.

![Selection Methods](image)

**Figure 6–4** Choose the selection method from the field in the prompt area.

#### Individually

Selecting individual objects is described in “Selecting and unselecting individual objects,” Section 6.2.1.

#### By angle

Selecting objects using the angle method is a two-step process:

1. In the prompt area, you enter an angle (from 0° to 90°).
2. From the part or assembly, you select a face, edge, element face, or node.

The angle must be greater than the angle through which adjacent edges or faces must rotate to create the geometry as if it was being formed by bending a straight wire or folding a series of faces. Abaqus/CAE starts from the selected geometry and selects all adjacent geometry until the angle you entered is met or exceeded.
For example, to select the edges of a regular hexagon, enter an angle greater than 60° (since each adjacent edge must be rotated 60° to form the shape from a straight wire), and select one of the edges. Abaqus/CAE then selects every adjacent edge since none of the angles is equal to or exceeds the angle that you entered.

Figure 6–5 illustrates how the angle method allows you to select all the elements around the flange of an exhaust manifold represented by an orphan mesh.

![Figure 6–5](image)

**Figure 6–5** Enter an angle and select an element to select an entire face.

In the Sketch module, the angle method is available only when you are selecting objects from the underlying part or assembly. When you are selecting edges in the sketch, the chain method replaces the angle method. Use the chain method to select a group of edges that are connected end-to-end, like the links of a chain. For more information on the chain method, see “Using the chain method to select edges in the Sketcher,” Section 20.4.6.

**By feature edge**

The feature edge method is also a multistep process:
1. In the prompt area, you enter an angle (from 0° to 90°).
2. Abaqus/CAE identifies all the feature edges in your model by finding all the element edges where the angle between two adjacent element faces is greater than the angle specified.
3. From the native mesh or orphan mesh, you select an element edge or node.
4. Abaqus/CAE follows the feature edge that passes through the selected element edge or node. The feature edge is truncated if another feature edge intersects it at an angle greater than the angle specified in Step 1.
5. Abaqus/CAE selects all the elements or nodes along the feature edge.

Figure 6–6 illustrates how the feature edge method allows you to select all the nodes along the edges of a flange of an exhaust manifold represented by an orphan mesh.

![Figure 6–6](image)

**Figure 6–6** Enter an angle and select a segment of an edge to select adjacent nodes.

After you use the angle or feature edge methods, you can click the **individually** method in the prompt area and [Shift]+Click on individual faces, edges, elements, element faces, or nodes to append them to your selection. You can also [Ctrl]+Click on items to unselect them. In addition, you can continue to use the angle and feature edge methods and use [Shift]+Click to append faces, edges, elements, element faces.
faces, or nodes to your selection. You can keep the same angle, or you can change the angle while you continue to append items. For more information, see “Combining selection techniques,” Section 6.2.7.

6.2.4 Using the face curvature method to select multiple faces

In addition to selecting objects by the angle between them, you can select multiple faces from a native part based on the curvature of the faces. When you are performing a task that allows you to pick more than one geometric face, Abaqus/CAE displays a field in the prompt area. The field allows you to choose between the four selection methods—individually, by face angle, and by face curvature, as shown in Figure 6–7.

![Select the faces to partition](image)

Figure 6–7 Choose the selection method from the field in the prompt area.

The angle selection method is described in “Using the angle and feature edge method to select multiple objects,” Section 6.2.3.

The face curvature method is available during procedures that select faces. If a procedure accepts object types other than faces, you can change the object type in the Selection toolbar to Faces to access the face curvature method.

Select a face from the part or assembly. Abaqus/CAE selects all connected faces that have similar curvature along both principal directions and are joined at an angle of less than 20°. If you select a flat face, Abaqus/CAE adds any adjoining flat faces that lie in the same plane. Disconnected faces that share similar curvature are not selected, nor are faces that share similar curvature but have significantly different face normals at the edge where they meet. Figure 6–8 shows two rounded faces selected using the face curvature method.

After you use the face curvature method, you can click the individually method in the prompt area and [Shift]+Click on individual faces to append them to your selection. You can also [Ctrl]+Click on items to unselect them. In addition, you can continue to use the face curvature method and use [Shift]+Click to append faces to your selection. For more information, see “Combining selection techniques,” Section 6.2.7.

6.2.5 Using the topology method to select multiple elements

You can select multiple elements from a structured mesh based on the connection of a row or layer of elements. When you are performing a task that allows you to pick more than one element, Abaqus/CAE displays a field in the prompt area. The field allows you to choose between the three selection methods—individually, by angle, by feature edge, and by topology, as shown in Figure 6–9.
SELECTING OBJECTS WITHIN THE CURRENT VIEWPORT

**Figure 6–8** Select a single curved face to select adjoining faces with similar curvature.

![Selecting objects with similar curvature](image)

**Figure 6–9** Choose the selection method from the field in the prompt area.

The angle and feature edge selection methods are described in “Using the angle and feature edge method to select multiple objects,” Section 6.2.3.

The topology method is available during most procedures that select elements. If a procedure accepts object types other than elements, you can change the object type in the Selection toolbar to **Elements** to access the topology method.

The topology method is designed for use with two- and three-dimensional structured meshes. Select an element face from the mesh, and Abaqus/CAE selects all the elements connected to it in a row through the mesh. Select an element edge from the mesh, and Abaqus/CAE selects all the elements in a layer starting with the element faces that share the selected edge. Figure 6–10 shows selection of an interior row on the left and an interior layer on the right. You can use the topology method to select elements from other mesh types, but without the clearly defined rows or layers of a structured mesh, the selections may be unpredictable. In some cases, such as with a tetrahedral mesh, topology selection may be limited to only the elements that share the face or edge you select.
After you use the topology method, you can select other methods in the prompt area and [Shift]+Click to append more elements to your selection. You can also [Ctrl]+Click on items to unselect them. In addition, you can continue to use the topology method and use [Shift]+Click to append elements to your selection. For more information, see “Combining selection techniques,” Section 6.2.7.

6.2.6 Adding adjacent objects to a selection

If you have already selected one or more objects, you can expand your selection to include all adjacent objects of the same type. Adding adjacent objects is an alternative to using drag-select or the angle method (see “Drag-selecting multiple objects,” Section 6.2.2, and “Using the angle and feature edge method to select multiple objects,” Section 6.2.3, respectively) to quickly select multiple objects. Selecting adjacent objects allows you to expand your selection in all directions, regardless of the shape of surrounding features or the angle at which objects are joined. It also allows you to pick multiple areas of interest in a model and expand the selection set in each area at the same time.

To add adjacent objects to the current selection, click mouse button 3 over an existing selected object and select **Add Adjacent Entities**. Abaqus/CAE expands your selections to all adjacent objects of the same type, including objects that are not included in the current display. If necessary, Abaqus/CAE adds the newly selected objects to the current display group to make them visible. Adjacent objects are defined in terms of the currently selected entities as follows:

- Edges that share a common vertex with one or more selected edges
- Vertices that share a common edge with one or more selected vertices
- Faces that share a common vertex or edge with one or more selected faces
• Orphan mesh nodes that share a common edge with one or more selected nodes
• Orphan mesh elements that share a common element edge or node with a selected element

6.2.7 Combining selection techniques

There are times when it is convenient to use a combination of the methods for selecting and unselecting objects. For example, you can drag-select a group of nodes while creating a node set using the Set toolset. You can then [Ctrl]+Click individual nodes to unselect them and [Shift]+Click additional nodes to add them to your selection. A combination of the three techniques is illustrated below:

1. First, you use drag-select to select a group of nodes.

2. Then, you use [Ctrl]+Click to unselect individual nodes.

3. Finally, you use [Shift]+Click to add nodes to your set and then click mouse button 2 to indicate you have finished selecting.

You may find it useful to adjust the view orientation to make particular items in the viewport more accessible. You can adjust the view orientation at any point during the selection process. For information on the view manipulation tools, see Chapter 5, “Manipulating the view and controlling perspective.”

**Tip:** To unselect all the objects, click an unused part of the current viewport.

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6.2.8 Excluding objects from your selection

When you select an object from the viewport, your selection includes all the entities of lower dimensionality that are associated with the object. For example, if you select a cell, your selection includes all the faces, edges, and vertices associated with the cell. Similarly, if you select an edge, your selection includes all the vertices associated with the edge. In some circumstances you may want to exclude the entities of lower dimensionality from your selection. For example, if you select an edge to include in a set, you may not want the set to contain the vertices at each end of the edge. Excluding entities of lower dimensionality from your selection may solve any problems that you encounter with overconstraints.

To exclude objects from your selection:

1. Select all the objects using a combination of select, drag-select, [Ctrl]+Click, and [Shift]+Click.
   Abaqus/CAE highlights the selected objects in red.
2. [Ctrl]+Click an object to exclude it from your selection.
   Abaqus/CAE highlights the excluded objects in purple.

6.2.9 Cycling through valid selections

In some cases Abaqus/CAE is unable to differentiate between the object you have selected and other nearby or related objects. This ambiguity can arise as follows:

- Imagine a small square surrounding the cursor. When you click an object, any other valid objects of the same type that fall inside this square are also considered to be possible selections. For example, if you select an edge that is positioned very close to another edge, Abaqus/CAE may consider both edges to be possible selections.
  The size of the square is independent of the monitor size, the viewport size, and the dimensions of the model. It also remains constant when you zoom in and out on your model. Therefore, you can select a specific object in the viewport more precisely by zooming in on your model to increase the distance between objects.
- If your model is three-dimensional, imagine a line that is perpendicular to the screen and that passes through the cursor and into the model. When you select an object, any valid objects of the same type that intersect this line are considered to be possible selections. (Rotating your model may remove some of the ambiguity.)

Abaqus/CAE reduces the potential for ambiguity by filtering your selection against the current procedure whenever possible. For example, if you are partitioning a cell, Abaqus/CAE prompts you to select the cell to partition. When you make a selection, Abaqus/CAE considers only cells to be a valid selection. Conversely, if you are creating a geometry set, Abaqus/CAE considers cells, faces, edges, and vertices to be a valid selection and the potential for ambiguity is increased. In addition, preselection highlighting allows you to see exactly which object would be selected before you make the
selection. Moving the cursor around the viewport may remove the ambiguity in the selection and result in Abaqus/CAE highlighting the object of your choice. If the ambiguity remains, Abaqus/CAE changes the cursor, adding ellipsis marks (...) to the right of the arrow, and highlights all the possible selections.

When your selection is ambiguous, Abaqus/CAE displays buttons in the prompt area that allow you to cycle through all of the possible selections, as shown here:

![Ambiguous selection, please choose one: Next Previous OK]

Use the **Next** and **Previous** buttons to cycle forward and backward through all of the objects in the viewport that are possible selections; each object becomes highlighted in turn. When the object of your choice is highlighted, click **OK** or click mouse button 2 to confirm your selection. (You can also click mouse button 3 in the current viewport to reveal a menu of the options in the prompt area.)

### 6.2.10 Using groups while selecting entities

You can append groups of entities to your selection to speed up the process of selecting many entities from the viewport. The group can be a display group, or it can be a temporary selection group. You can click mouse button 3 on the viewport and do the following:

- Create a selection group by copying entities (vertices, edges, faces, or cells) that are highlighted in the viewport into a selection group.
- Append to your selected entities by pasting the entities stored in a selection group or a display group into your current selection.

### 6.2.11 Selecting interior surfaces

You can use the selection tools to select an interior surface of a model; for example, when you create a surface or when you select a region using the solid offset mesh tool.

**To select an interior surface:**

1. In the **Selection** toolbar, toggle on the **Select From Interior Entities** tool.

   ![Select From Interior Entities tool]

   **Note:** The **Select From Interior Entities** tool is hidden by default. For more information, see “Using toolboxes and toolbars that contain hidden icons,” Section 3.3.2.

2. Select the interior surface from the viewport.
6.3 Using the selection options

Abaqus/CAE provides a set of tools that can make it easier and more efficient for you to select entities from the viewport. The selection tools are located in the Selection toolbar. The available options depend on the current selection procedure; some options can be used to preselect entities outside of a procedure.

6.3.1 Overview of the selection options

When you are prompted to select an object from the viewport, Abaqus/CAE provides selection tools that can make it easier and more efficient for you to make the desired selection.

Use the Selection toolbar to configure the selection options. Figure 6–11 shows the layout of the selection tools. Selection tools appear dimmed if they are not valid for the current procedure.

![Selection toolbar](image)

**Figure 6–11** The Selection toolbar.

6.3.2 Filtering your selection based on the type of object

To help you select the desired entities (vertices, edges, faces, cells, nodes, and elements) from the current viewport, Abaqus/CAE provides a set of filters that you can use to limit your selection based on the type of object. For example, if you are creating a set that contains only surfaces, you can limit your selection to only faces—vertices, edges, and cells will not be selected.

The object filters are listed in the Selection toolbar. Abaqus/CAE configures the filter list based on the current procedure. If you have not started a selection procedure, Abaqus/CAE lists some commonly used filters (for more information on selecting objects outside of a procedure, see “Selecting objects before choosing a procedure,” Section 6.3.7).

If the current viewport contains an Abaqus/CAE part or part instance, you can select one of the following filters:

**All**

All objects except skins and stringers.

**Vertices**

All point objects, such as vertices, datum points, and nodes.

**Edges**

All edge objects, such as edges, datum axes, and element edges.
Faces
All planar objects, such as faces, datum planes, and element faces.

Cells
All volumes, such as cells and elements.

Skins
All skin reinforcements.

Stringers
All stringer reinforcements.

Reference Points
All reference points.

By default, Abaqus/CAE selects from all vertices, edges, faces, cells, and reference points but excludes skins and stringers. You can select a skin or stringer from the viewport only after you select the appropriate filter. The list of available filters is updated as you change modules or selection procedures. Similarly, if you are selecting elements from an orphan mesh in the current viewport (to assign an element type, for example), you can select one of the following filters:
- All
- Zero-dimensional elements
- One-dimensional elements
- Two-dimensional elements
- Three-dimensional elements
- Skins
- Stringers

By default, Abaqus/CAE selects from all elements except skins and stringers.

6.3.3 Filtering your selection based on the position of the object

The selection tools allow you to choose from which objects to select, based on their positions in the viewport. The Selection toolbar contains all of the selection tools. The following position-based selection tools are available only after you start a procedure that requires object selection (position-based selection is not available outside of a procedure):

Objects closest to the screen

Toggle on this tool to select only the objects closest to the front of the screen. This tool is toggled on by default.
USING THE SELECTION OPTIONS

If you toggle off this tool, Abaqus/CAE allows you to cycle through all of the possible selections. Use the Next and Previous buttons in the prompt area to cycle forward and backward through all of the objects in the viewport that are possible selections; each object becomes highlighted in turn. For more information, see “Cycling through valid selections,” Section 6.2.9.

This filter applies to vertices, edges, faces, and cells of an Abaqus/CAE native part and to nodes and elements of an orphan mesh.

**Interior and exterior objects**

Choose one of the following filters:

- Select objects located both outside and inside a part.
- Select only objects located on the outside of a part. In most cases this tool is selected by default.
- Select only objects located on the inside of a part.

**6.3.4 Highlighting objects prior to selection**

When you are selecting objects from the viewport and you stop moving the cursor, Abaqus/CAE highlights the object that would be selected at the cursor position. This behavior, called “preselection,” allows you to see exactly which object would be selected before you make the selection. If the current selection options make more than one object available, Abaqus/CAE changes the cursor, adding ellipsis marks (...) to the right of the arrow, and highlights all the possible selections. The position and type filtering that you choose for selection also applies to preselection.

Toggle off the Allow Preselection During Picking tool in the Selection toolbar to turn off preselection highlighting for procedures in the current session. This tool is toggled on by default.

**Note:** Preselection highlighting may be delayed for large models; toggling off preselection may improve the display speed.

**6.3.5 Modifying the shape of the drag-select region**

The selection tools allow you to change the shape of the drag-select region. From the Selection toolbar, choose one of the following:

- **Rectangle**
  
  Click to indicate one corner of the rectangle, and drag the cursor to the second corner. This tool is selected by default.
USING THE SELECTION OPTIONS

Circle

Click to indicate the center of the circle, and drag the cursor to a point on the circumference.

Polygon

Click to indicate one vertex of the polygon, and drag the cursor to the second vertex. You then continue to click on each vertex of the polygon. Click mouse button 2 to indicate you have finished entering vertices. There is no limit to the number of vertices in the polygon.

6.3.6 Choosing which objects are selected by the drag-select region

The selection tools allow you to choose which objects are selected by the drag-select region. From the Selection toolbar, choose one of the following:

Inside

Select only the objects that fall inside the drag-select region.

Inside and crossing

Select only the objects that fall inside or cross the drag-select region. This tool is selected by default.

Crossing

Select only the objects that cross the drag-select region.

Outside and crossing

Select only the objects that fall outside or cross the drag-select region.

Outside

Select only the objects that fall outside the drag-select region.

6.3.7 Selecting objects before choosing a procedure

You can select objects from the current viewport before choosing a procedure to work with them. You can use the Selection toolbar to toggle selection and to limit viewport selections based on the type of object. The Selection tool is the first tool in the toolbar; it is available only when there are no active procedures running in a viewport. By default, selection is active and viewport object types are not limited. You can select multiple objects using any of the

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methods described in “Combining selection techniques,” Section 6.2.7. Toggle off object selection to prevent selecting objects when you are not in a procedure.

**Note:** Preselection highlighting may be delayed for large models; toggling off selection may improve the display speed by preventing preselection and selection unless you first choose a procedure that requires object selection.

When you select a procedure after selecting objects from the viewport, Abaqus/CAE applies the selection filters for the procedure. For example, if you selected a vertex, a face, and an edge, then started a procedure that can accept only vertices, Abaqus/CAE accepts the selected vertex, cancels the selection of the face and edge, and begins the procedure with the second step. Similarly, if you select a procedure that requires a single object selection and you have already selected multiple valid objects, Abaqus/CAE accepts the first valid selection and cancels the remaining selections. If Abaqus/CAE cannot determine which object you selected first, it will cancel all selections and begin the procedure at the first step.

If a procedure includes multiple selection steps, objects that you select before the procedure can be used only to complete the first selection step. Any subsequent selection steps require you to select new objects interactively from the viewport or, if applicable, use saved selection groups. You cannot save selections made prior to the start of a procedure.
7. Configuring graphics display options

This chapter explains how you can configure the graphics display options in Abaqus/CAE. The following topic is covered:

- “Overview of graphics display options,” Section 7.1

In addition, the following sections are available in the online HTML version of this manual. (For information on displaying the online documentation, see “Getting help,” Section 2.6.)

- “Using display lists,” Section 7.2
- “Using anti-aliasing,” Section 7.3
- “Choosing a highlight method,” Section 7.4
- “Choosing a translucency mode,” Section 7.5
- “Controlling drag mode,” Section 7.6
- “Choosing background colors,” Section 7.7

7.1 Overview of graphics display options

When you start a session, Abaqus detects the graphics hardware installed on your system and sets the graphics options accordingly. If your graphics hardware is not supported by Abaqus/CAE or if you wish to override the default graphics options, you can use the Graphics Options dialog box to tune display performance. Abaqus/CAE applies the settings to all viewports and saves the settings for the duration of the session. To use the customized settings each time you start an Abaqus/CAE session, modify the environment file (*abaqus_v6.env*). For additional information on the environment file, see the Abaqus Installation and Licensing Guide.

Note: Recommended settings for recently introduced graphics adapters are available from the Support page at www.simulia.com.

You can also use the Graphics Options dialog box to do the following:

- Choose the appearance of your model during rotation, pan, or zoom view manipulations. The appearance is related to the render style and can be set to Fast (wireframe) or As is.
- Choose whether Abaqus/CAE will auto-fit the image to the current viewport after you rotate the view. Automatically fitting the image to the viewport is equivalent to clicking the auto-fit tool in the View Manipulation toolbar. Auto-fit adjusts your view of the model so that the model fills the viewport and is centered within it. The orientation remains fixed, as indicated by the view triad.
- Choose whether Abaqus/CAE will optimize the display of translucent objects for performance, for accuracy, or for a level in between.
• Choose the viewport background color. Your selected color will be applied to all viewports in the current session of Abaqus/CAE.

To specify graphics display options:

From the main menu bar, select View → Graphics Options.

The Graphics Options dialog box appears with the following options:

• Tune performance using options for display lists, highlight method, and translucency mode.
• Choose the display mode while you drag objects in the viewport.
• Enable or disable the automatic fitting of your view to the viewport after rotations.
• Choose the background color of the viewports.