SAP 3D Visual Enterprise 9.0: Snap Tool
Updating Authoring by Snapping
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Snapping is a useful feature that allows quick and precise alignment of objects without creating gaps.

You can snap to the Vertex, Face, Edge, Circles and Arcs, face centers, and other options.

Snapping makes it easier for you to perform common tasks, such as positioning of tools, and parts.
Overview

The *Snap Tool* allows a user to position a specific object (Source) precisely in relation to another object (Target).

The snapping feature in SAP 3D Visual Enterprise Author 9 is almost automatic, and this whitepaper addresses some of the ways in which it can make your work easier and faster.

Example

The following example shows placing a hex tool into the bolt head to illustrate the disassembly process.
Working with the Snap Tool

Enabling the Snap Tool

The Snap Tool is enabled by pressing the Snap Tool button on the 3D Editor Toolbar:

![3D Editor Toolbar](image)

*Figure 1: 3D Editor Toolbar*

The Snap Tool panel displays in the Tool Assistant:

![Snap Tool in the Tool Assistant](image)

*Figure 2: Snap Tool in the Tool Assistant*

**Note**

This tool is automatically activated when opened. To turn it off, click the *On/Off* button in the top right corner.
Selecting Source and Target Objects

When the tool is active, it expects the user to select Source then Target objects.

- The **Source Object** is the object to be positioned; highlighted with blue when selected.
- The **Target Object** is the object position to be used as a reference; highlighted with green when selected.

Names of selected objects are displayed:

![Diagram showing Source and Target Objects](image)

*Figure 3: Source and Target Objects*

To reset selection of Source and Target, click the cross button after the name. You can then select another object.
Selecting Snapping Features

When Source and Target objects are selected, the Snap Tool expects selection of features on Source and Target.

To select a feature, click the Source object and the currently enabled features are highlighted under the mouse cursor: points, edges, faces, arcs, or circles. Click the required feature to select it, and perform the same action for the Target object.

When both features are selected, the Snap Tool automatically shows a preview of the new Source object position; shown as a transparent blue object in the below diagram:

![Figure 4: Snap Preview](image-url)
Previewing and Finalizing

You can check the new position of source and adjust it by changing the following:

- feature (select object and then select another feature)
- Snap mode
- Alignment settings

The Source object preview updates accordingly.

The Confirm button finalizes the snap by updating the Source object position.

The Reset button undoes the snap by clearing all selections. The tool once again becomes active and waits for Source and Target objects selection.

It may take two or three snaps before the Source object is moved into the required position.

Isolate Option

The Isolate option allows a better view of the Source and Target object.

When enabled, all other objects become temporarily hidden.

Temporary Hide of Source or Target Option

These buttons enable a temporary hide of the Source or Target to allow better access to select features.
Snap Type

These options enable or disable selection of various snap features.

Points

This option enables selection of points, and is based on 3D mesh vertices.

Figure 5: Snap Type Points
Edges

This option enables selection of edges, and is based on 3D mesh edges.

![Figure 6: Snap Type Edges](image)

Faces

This option enables selection of faces, and is based on 3D mesh faces.

![Figure 7: Snap Type Faces](image)
Arcs/Circles

This option enables selection of faces, and is based on 3D mesh edges.

Detection of Arcs and Circles could potentially fail if the mesh is very low; for example, because of the Polyreduce tool, or a low-quality tessellation setting in the CAD import.

In this case, switch off the High Accuracy Arc/Circles Detection setting. This increases tool tolerance and assists in detecting degenerated circles or arcs.

Another option is to manually select the point to define the circle by using the Create Circle by Three Points feature.

Figure 8: Snap Type Arcs/Circles
Create Edge by Two Points

Some objects require snapping by two points simultaneously to allow precise alignment.

The following example shows the process of connecting an intake to the cover so that all holes are in the correct position:

![Example Model](image)

**Figure 9: Example Model**

The *Create Edges* command allows creation of a temporary edge between two points or centers of arcs and using it for the snap.

For this example:

1. Select the intake as the source object and the cover as the snap target.
2. Select *Snap Type: Arcs*.
3. Choose *Create Edge by Two Points* and select the first then second bolt hole circles on the intake:
Choose `Create Edge by Two Points` and select the first then second bolt hole circles on the cover:

Set the `Snap Mode` to `Center` to so that the Snap Tool matches the edges exactly:
6. Click **Confirm** to finalize the snap. The model displays as illustrated in the following diagram.
Create Circle by Three Points

This command allows the construction of a temporary circle so that it can be used for a snap.

For this example, we show snapping the spanner to the bolt head:

Figure 14: Original Model

1. Select **Spanner** as the **Source** object and bolt as the **Target** object.
2. Select **Snap Type**: **Points**.
3. Choose **Create Circle by Three Points** and select the points on the spanner that will form a circle:
4. Choose *Create Circle by Three Points* and select the points on the bolt that will form a circle:
5. Ensure the *Snap Mode* is set to **Center** and preview the result.

Figure 17: Preview

6. Confirm the snap.

Figure 18: Confirmed Snap
Alignment

These settings allow a switch of snapping alignment; either by normal direction or by inversed normal direction:

Figure 19: Example - Aligned

Figure 20: Example - Anti-Aligned
Snap Mode

Parallel

The result depends on the selected Snap Type:

Points

The Source object rotates so that its axis matches the direction of the Target object axis (in local coordinates systems).

Figure 21: Before Point Selection
Figure 22: Points Selected

Figure 23: Result
Edges

The **Source** object rotates so that the selected edge is parallel to the selected edge on the **Target** object.

*Figure 24: Before Edge Selection*

*Figure 25: Edges Selected*
Figure 26: Result
Faces and Arcs/Circles

The **Source** object rotates so that its selected face, arc or circle is parallel to the selected face, arc or circle on the **Target** object.

*Figure 27: Before Selection*

*Figure 28: Faces/Arcs Selected*
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Figure 29: Result
Coincident

Points

The Source object rotates so that its axis matches the direction of the Target object axis (in local coordinates systems).

The Source object position is then set to match the point position selected on the Target object.

Figure 30: Before Coincident Selection
Figure 31: Two Points Selected

Figure 32: Result
Edges

The **Source** object rotates so that its selected edge is parallel to the selected edge on the **Target** object.

The **Source** object is then moved the shortest possible distance so that the selected edge shares the same infinite line with the selected edge on the **Target** object.

*Figure 33: Before Selection*
Figure 34: Edges Selected

Figure 35: Result
Faces and Arcs/Circles

The **Source** object rotates so that the selected face, arc or circle is parallel to the selected face, arc or circle on the **Target** object.

The **Source** object is moved the shortest possible distance so that the selected face, arc or circle shares the same infinite plane with the selected face, arc or circle on the **Target** object.

*Figure 36: Before Selection*

*Figure 37: Faces Selected*
Figure 38: Result
Center

Points

The **Source** object position is set to match the position of the point selected on the **Target** object.

Figure 39: Before Selection - Center

Figure 40: Two Points Selected
Figure 41: Result
Edges

The **Source** object rotates so that the selected edge is parallel to the selected edge on the **Target** object.

The Source object is then positioned so that the center of the selected edge matches the center of the selected edge on the **Target** object.

![Figure 42: Before Selection - Edges](image)

![Figure 43: Edges Selected](image)
Figure 44: Result
Faces and Arcs/Circles

The **Source** object rotates so that the selected face, arc or circle is parallel to the selected face, arc, or circle on the **Target** object.

The **Source** object is then positioned so that the center of the selected face, arc, or circle matches the center of the selected face, arc, or circle on the **Target** object.

*Figure 45: Before Selection*

*Figure 46: Faces Selected*
Figure 47: Result
Options

High Accuracy Arc /Circles Detection

When this option is enabled, tolerance of arcs and circles detection is increased.

Highlight Face Contour

When this option is enabled, contours of features are also highlighted on mouse over.

Snap Preview Animation

When this option is enabled, the Snap Tool animates movement of the Source object to the new position.
Group Snapping

The Snap Tool supports snapping of assemblies (groups) by their pivot point (Point “0,0,0” in local coordinates).

For example, this is a standard hex tool with additional symbols represented as a group:

![Image of a hex tool with additional symbols as a group]

*Figure 48: Example - Group Snapping*

The pivot point of this group is at the center of the hex tool end. To view the pivot of the selected object or group, go to Edit | Preferences | 3D View and select Show object axes in Selected Object Draw Method.

1. Add the tool to the scene by using drag and drop or File | Add:
2. Open the Snap Tool and select the group as the Source. To do this, switch to the Scene Tree panel and select the group (HexKey in this example):
Figure 50: Select Group as Source

3. Switch back to the Snap Tool and select the center of the screw as a Target:

Figure 51: Select Target
4. Choose **Confirm** and ensure that the tools are in the correct position:

*Figure 52: Confirm*
Snapping Pivot Points

Pivot Point

The Object Pivot Point equals a point in zero coordinates in the local coordinate space, (Point “0,0,0” in local coordinates). As an example, rotation is always relative to the pivot point:

The correct pivot point is required for the following:

- Animations when rotation is being used
- Groups (assemblies) when they are to be snapped to other objects
- Parts when they are merged to assemblies
Pivot Point Snap Mode

The **Snap Pivot Point** setting enables object Pivot Point snap mode:

![Snap Tool](image)

**Figure 53: Pivot Point Snap Mode**

When this mode enabled, instead of changing the Source Object position, the Snap Tool moves the Source Object Pivot Point position.

Snapping in this mode is a similar concept to other snap modes, except that in this instance the pivot point is moved.

**Note**

The Source Object could also be selected as a target for Pivot Point Snap.

Align Axis Buttons

When snapping pivot points, additional buttons are available in the Alignment group. These buttons allow you to align the pivot point orientation with the normal of the feature to which this pivot point has been snapped:

![Align Axis Buttons](image)

**Figure 54: Additional Align Axis Buttons**
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