Wireframing Geological Interpretations in 3D

Once you have digitized a geological feature on at least two section maps, you can create a wireframe from the interpretations. This document provides a description of the workflow to join polylines or polygons in a geostring file to form open surfaces or closed bodies that will be stored in a geosurface file. After saving the wireframe to a geosurface file, total surface area is reported for open surfaces and total volume is reported for closed bodies. Many open and closed surfaces can be saved to the same geosurface file. This single file solution makes it easy to manage the wireframed results and to share your work with others.

This document will guide you through:

- Starting a wireframing session
- Joining polylines to form an open surface
- Joining polygons to form a closed surface
- Viewing information for surfaces in a geosurface file

To start a wireframing session:

1. In the 3D Viewer, from the *Wireframe* menu, select **Start Wireframing**.
2. Select the **Geostring to wireframe** and the **Feature to wireframe**.
3. Click **OK** on the *Start Wireframing* dialog.

   The *Wireframing Tools* will display along the side of the 3D Viewer.

   If the Wireframing Tools are not pinned, they will be hidden when the cursor moves into the 3D model.

⚠️ *Note:*

*The wireframing sequence you build is stored in the geostring file. To return to a partially completed wireframe for a feature, you can either use the "start a wireframing session" steps listed above, or, select the feature below the geostring name in the 3D Objects tree and click **Continue Wireframing** in the Attributes tab. If the feature does not contain a saved wireframe sequence, the option will be **Start Wireframing** instead of*

Continue Wireframing.
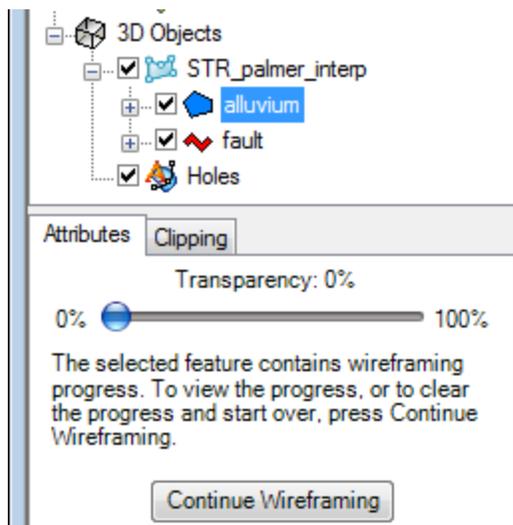
To join polylines into an open surface wireframe:

1. In the *Wireframing Tools*, change the **Active Feature** to a polyline feature if you previously chose a polygon feature in the *Start Wireframing* dialog.
   The polylines will be bounded in yellow.

2. Click on a polyline interpretation in the 3D model.

   The selected polyline will be bounded in cyan.

3. Click an adjacent polyline to wireframe to the first polyline you selected.

   You now have the beginning of a wireframe surface.

4. Continue selecting adjacent polylines in the 3D model to add to the wireframe surface.

   ⚠️   *Note:*

   While wireframing, you can use the Undo/Redo options (/), or use the Ctrl+Z or Ctrl+Y shortcut keys, respectively.

Geosurface Files

Geosurfaces are 3D vector files that store the results of wireframing polygon or polyline interpretations to form a closed body or an open surface, respectively.

Geosurfaces store the following information:

> XYZ locations

> Coordinate system

> Attributes including feature names and colours

⚠️ *Note:*

The coordinate system for the geosurface is automatically set based on the geostring's coordinate system used to create the wireframe.

Closed surfaces are the result of wireframing polygons. Closed surfaces can be used in voxel math expressions. Open surfaces are the result of wireframing polylines. Many closed and open surfaces from a wireframing session can be saved to the same geosurface. Additionally, the surface names in a geosurface are set based on the feature names from the geostring used in the wireframing session.

To save the wireframe to a geosurface:

1. Under the *Wireframing Tools*, click **Save Wireframes as Geosurface File** 🔴.
2. Enter a **File name** and click **Save**.

⚠️ *Note:*

Once you have saved wireframes for an active feature, you can add other wireframes for different active features to the same geosurface file.

To join polygons into a closed body wireframe:

1. In the *Wireframing Tools*, change the **Active Feature** to a polygon feature.
   The interpretations for the Active Feature will be highlighted in yellow.
2. Click on a polygon interpretation in the 3D model.

   The selected polygon will be bounded by a cyan border.
3. Click an adjacent polygon to wireframe to the first polygon you selected.

   You now have the beginning of a wireframe body. Both ends are bounded in cyan meaning you could continue adding to the wireframe from either side.
4. Continue selecting polygons in the 3D model to define a larger wireframe body.

Wireframing Options

Number of triangles

Select **Auto** to automatically determine the optimum number of triangles to join two shapes together while maintaining an even distribution of triangle edge sizes.

This option can be overridden by selecting the **radio button** below *Auto*. Then specify the number of triangles to create for each shape edge. You can type in a number or use the up/down arrows to set the number.

Extrude off-section vertices

Specify the Extrude off-section vertices option if this error message is returned while wireframing:

"Wireframing caused an invalid surface due to self-intersection. This can be caused by the angle between the sections being too large or by the use of snapped vertices.

If the latter is true, this may be resolved by checking the 'Extrude off-section vertices' checkbox during wireframing."

This option will extrude the off-plane section points of a shape to include all the digitized points in a body segment so that the ends of the segment will form flat planes. This will reduce the chance of generating a self-intersecting surface when joining shapes. Self-intersecting surfaces have triangles that "cut into each other". They cannot be used to form closed bodies suitable for wireframing and geosurface generation.

New Segments

If you have interpretations that belong to the same active feature that need to be connected as separate wireframes, you can add new segments to the wireframe body. For instance, the same rock type may occur in two separate areas and may or may not be joined.

Two distinct bodies	Body with bifurcation
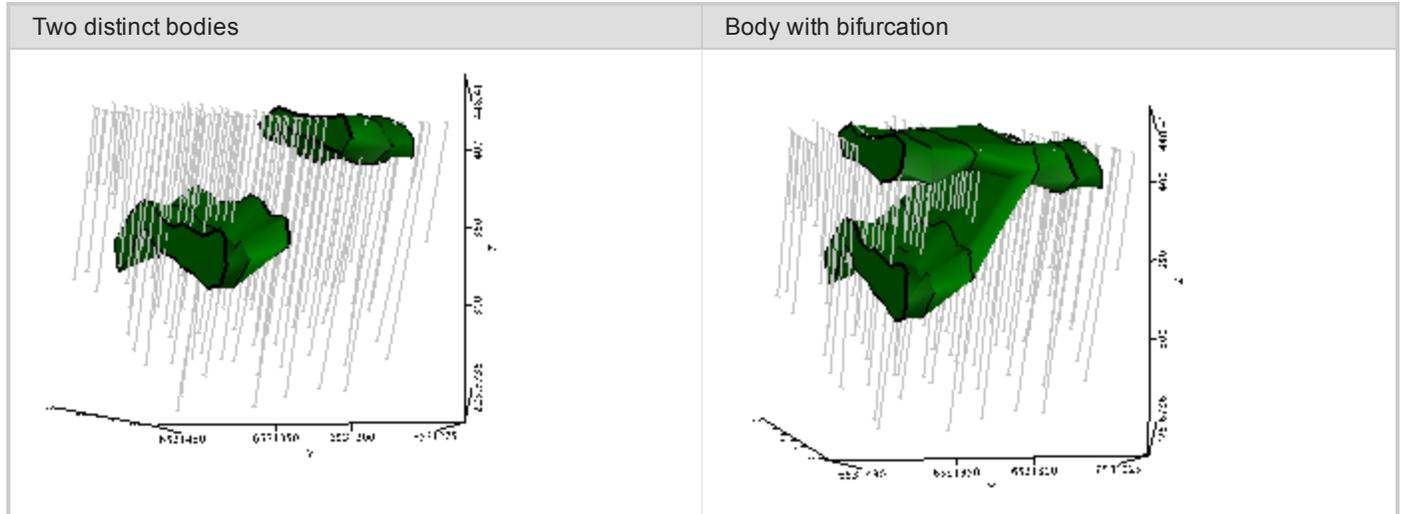
To add a new segment to the wireframe body:

1. From the *Wireframing Tools*, click **Add New Wireframe Body** .

   All of the interpretations for the Active Feature are bounded in yellow.

2. Click on an interpretation in the 3D model.

   The selected interpretations will be bounded by a cyan border.

3. Click an adjacent interpretation to wireframe to the first shape you selected.

4. Continue clicking interpretations to add to the wireframe.

Remove Wireframes for Active Feature

If you simply want to start over for the Active Feature, you can remove all wireframing steps and begin again.

To remove all wireframes for active feature:

1. From the *Wireframing Tools*, click **Remove All Wireframes for Active Feature** .

   This only removes the wireframes for the active feature, not for all the features in the geostring.

2. Click **Yes** to clear the current wireframe.

   Wireframing Mode is active and all the interpretations for the active feature are bounded in yellow again

Wireframe Ends for Closed Surfaces

Polygons that have been joined into a wireframe must have closed end to be saved as a geosurface. If you do not add ends to the wireframe before saving, you will be asked if you would like to auto-close the wireframe with flat ends

To add ends to the wireframe body:

1. In the *Wireframing Tools*, click **Add Ends** .

   The open areas of the wireframe are bounded in yellow.

2. Select a radio button (**Flat**, **Conical** or **Rounded**) under *Ends Options*.

3. Click one of the yellow open areas to create an end for it using the selected option.

4. Continue adding ends to the open areas of the body until no yellow areas remain.

To save the wireframe to a geosurface:

1. Under *Wireframing Tools*, click **Save Wireframes as Geosurface File** .

2. Browse to and select an existing geosurface or enter a **File name** to create a new geosurface.

⚠️ *Remember that the wireframe sequence is saved in the geostring file. You can Start Wireframing again to revisit a wireframing session undoing and redoing segments and then saving the changes to a new or existing geosurface.*

Viewing Total Volume and Total Surface Area

Total Volume can be seen for closed surfaces in a geosurface file.

To view the Total Volume for a closed surface:

1. In the *3D Objects tree*, select a closed surface.

   Information about this surface, including *Total Volume* is given under the Attributes tab.
   The Transparency, rendering and colour can be changed to alter how the surface displays.

Total Surface Area can be seen for open surfaces in a geosurface file.

To view the Total Surface Area for an open surface:

1. In the *3D Objects tree*, select an open surface.

   Information about this surface, including *Total Surface Area* is given under the Attributes tab.
   The Transparency, rendering and colour can be changed to alter how the surface displays.

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