

16

Triangulation Surfaces

Create a Surface

Any object data, such as points, lines, or polygons, may be used to create surface triangulation models.



Tip:

Load all data to triangulate, including limiting polygons, in *Envisage* before entering the triangulation creation option.

Click **Model > Triangle Surface > Create**.

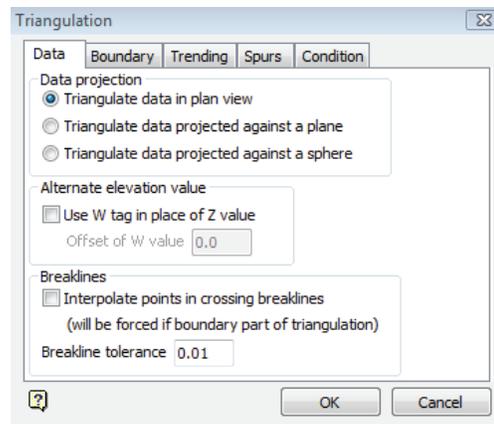


Figure 16-1 Create triangulation surface - Data Tab



For details see related help topic(s):
Envisage : Model : Triangle Surface : Create

Data Tab

- The *Data* tab controls how data is projected and where it is located after creation. **Triangulate data in plan view** creates horizontal and sub-horizontal surface triangulations. For triangulations in other orientations, use **Triangulate data projected against a plane** or **Triangulate data projected against a sphere**.
- Check **Use W tag in place of Z value** if a triangulation representing W tag values is desired.
- Use *Breaklines* if data being digitised crosses in Plan view. Points will be interpreted at crossing points in an attempt to respect all data. **Breakline tolerance** stops formation of long, narrow triangles.

Boundary Tab

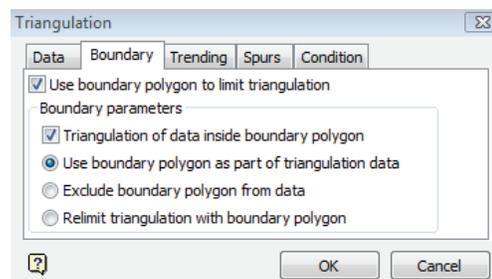


Figure 16-2 Create triangulation surface - Boundary Tab

Boundary options define how to use polygons which limit triangulation extents.

- **Use boundary polygon as part of triangulation data** includes data points from the polygon when creating the surface.

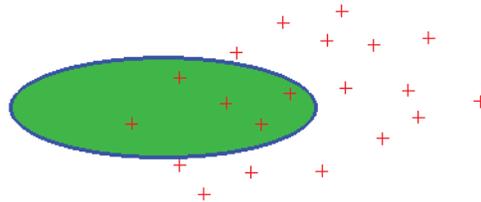


Figure 16-3 Include polygon points in triangulation

- **Exclude boundary polygon from data** uses the polygon to restrict data, but does not use polygon points during triangulation construction.

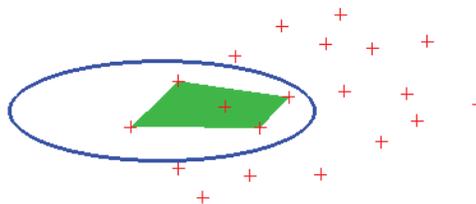


Figure 16-4 Exclude boundary polygon from triangulation

- **Relimit triangulation with boundary polygon** excludes polygon points when triangulating, and clips the resulting triangulation with the polygon.

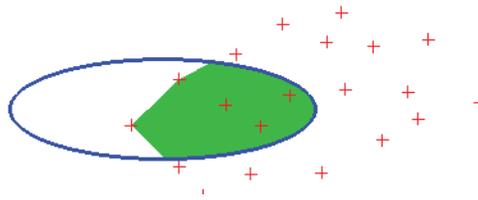


Figure 16-5 Polygon relimits triangulation

Trending Tab

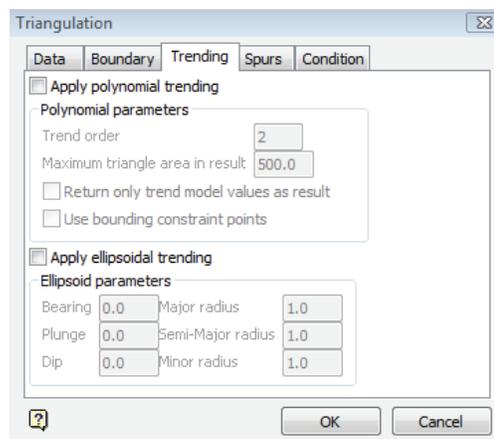


Figure 16-6 Create triangulation surface - Trending Tab

Trending options apply a geological trend to the surface upon creation. *Trending* uses a best-fit mathematical model to estimate the surface shape between data points.

- **Apply polynomial trending** applies a regional trend to the surface. Specify a trend order which relates to the complexity of the surface to be modelled.

Table 16-1 Surface Variations

Order	Surface
1	Plane surface
2	Dome or simple syncline (parabolic)
3	Folded surface (anticline and syncline)

- Check **Return only trend model values as results** to generate the trend surface as the triangulation without including raw data.

Spurs Tab

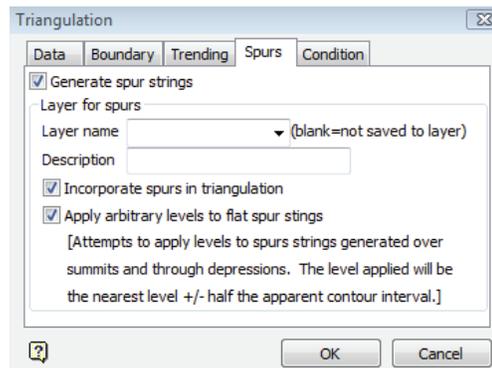


Figure 16-7 Create triangulation surface - Spurs Tab

The **Generate spur strings** on the *Spurs* tab generates lines which control flat ridge crests and valleys when triangulating between contour lines of the same elevation.

- Select or enter a **Layer name** to save strings to an existing or new layer.
- Check **Incorporate spurs in triangulation** to use spur strings during surface generation.



Tip:

If the layer name is blank, spur strings are created as an underlay.



Note:

Do not use the spur creation options if triangulating a pit design as crest/bench definition may be lost.

Condition Tab

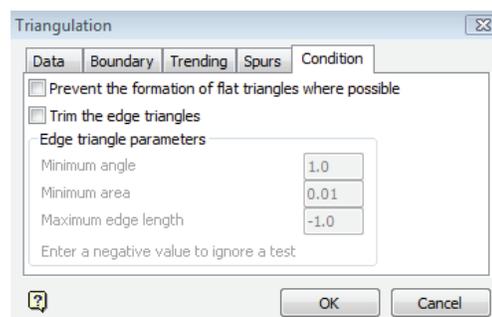


Figure 16-8 Create triangulation surface - Condition Tab

The *Condition* tab provides control on individual triangles.

- **Prevent the formation of flat triangles where possible** distorts triangles that have all vertices on the same contour.
- **Trim the edge triangles** restricts triangle size around triangulation edges.

Click **OK** to create a surface. If a boundary polygon is used, select the polygon when prompted. If the wrong polygon is selected, choose **Pick again** and select the correct polygon.

When prompted, use the best selection option to choose data to triangulate; selected data turns gray. When all data is chosen, right-click to exit the selection command.

Enter a name for the new triangulation. Set properties for the triangulation now, or return later to change attributes.

For details see related help topic(s):

Envisage : Model : Triangle Surface : Create



Note:

Do not use spaces or special characters in the triangulation name. Vulcan automatically adds the file extension `.00t` to the name entered in the panel.

Tutorial 16-1

1. Load the `CONTOURS` and `BOUND` layers.
2. Click **Model > Triangle Surface > Create**.
3. Leave *Data*, *Trending* and *Condition* tabs set to default.
4. Triangulate data inside the boundary polygon. Use the polygon to relimit the resulting triangulation.
5. **Generate spur strings**, and save them to a layer named `SPURS`. Ensure that the spurs are not flat, and choose to use them when creating the surface.
6. When prompted, select the boundary polygon and confirm the correct object.
7. Select data to triangulate by **Layer**, click any object in the `CONTOURS` layer, and confirm the layer was chosen correctly. Right-click to exit data-selection mode.
8. Name the triangulation `topo_contours`. Click **OK**.
9. Rotate and zoom in on the triangulation to inspect the spur strings. Change the triangulation translucency to see the spur strings more clearly. Remove the `CONTOURS` layer if desired.

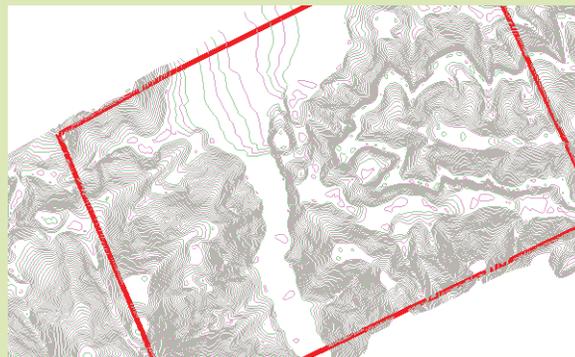


Figure 16-9 `BOUND` and `CONTOURS` layers

Two Polygons

Model > Triangle Surface > Two Polygons creates a surface triangulation between two polygons which define internal and external boundaries. The boundary polygon is used as part of the triangulation. An example of this is to triangulate between contour lines to create contour rings.

Grid Mesh

Model > Triangle Surface > Grid Mesh creates a simple grid over an existing triangulated surface. Extents are determined interactively.

Image Registration

Model > Image Registration options drape images onto triangulations.

Select **Model > Image Registration > Create Or Open** to access an existing `.ireg` file or create a new file. An `.ireg` file stores registration specifications such as correlations between image coordinates and real world coordinates or the path to a registered image.

Choose an `.ireg` file or enter a name for a new one, then choose an **Image file name** on the Image Registration Properties dialog box. The following files are compatible with image registration:

- JPEG (`.jpg` or `.jpeg`)
- tagged image file format (`.tif` or `.tiff`)
- CompuServe GIF (`.gif`) files
- ER Mapped ECW images (`.ecw`)

Use automatically generated triangulation creates an underlay which covers mapping extents. This option works best if only two or three control points are used. To specify an existing triangulation on which to overlay the image, select **Use specified triangulation**, and choose the desired triangulation from the drop down list.

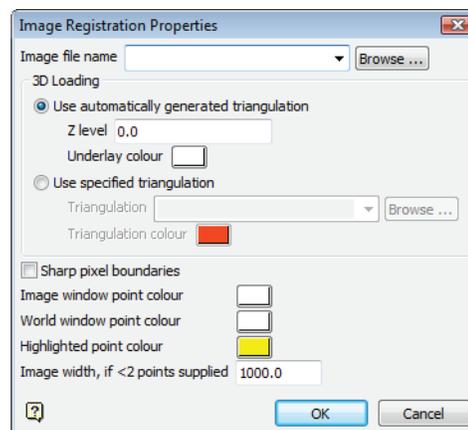


Figure 16-10 Image Registration Properties

The check box for **Sharp pixel boundaries** makes pixels larger instead of smoothed under strong magnification.



Tip:

Choose bright, contrasting and unique colours for the points.

Specify an *Image Width* in real world units if one control point is used.

Click **OK** to open a new **Image Registration** window. Click **Window > Tile Vertically** to see both windows simultaneously. This makes point correlation easier.

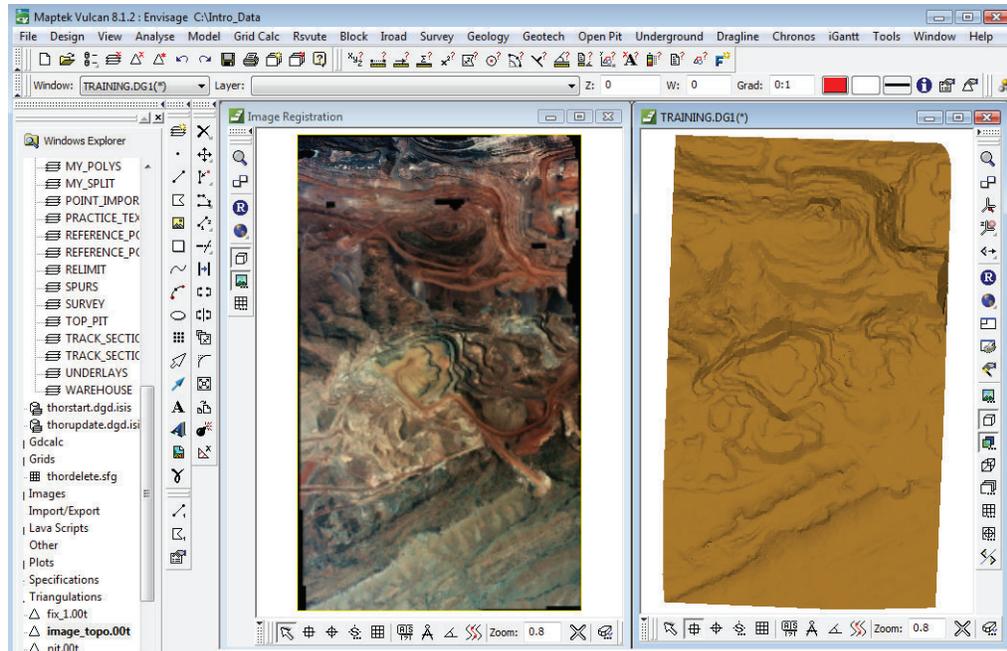


Figure 16-11 Tile windows to make correlation easier

Click **Model > Image Registration > Add Point** to define points which associate points on the image (*image coordinates*) to points on the existing triangulation (*real world coordinates*). Vulcan prompts for an image coordinate, followed by a real world coordinate. Right-click to exit the command.



Tip:

The more points added to correlate the image with the triangulation, the more accurate the registration is. Use **Indicate** mode to select image coordinates and **Snap to Objects** mode to select real world coordinates. Note that each window has a unique set of snapping tools.

If a point is in the wrong place, use **Model > Image Registration > Move Point**. However, it is typically easier to use **Model > Image Registration > Delete Point**, and then add points again. **Model > Image Registration > Clear All Points** deletes all added points.



Tip:

Click **Model > Image Registration > Properties** to alter properties of an existing image registration.

After adding all points, click **Model > Image Registration > Close** to close the **Image Registration** window and save an `.ireg` file.

To apply the `.ireg` to an existing triangulation, load the triangulation into Envisage. Right click on the triangulation and choose **Properties**. Click **Advanced**, and check **Texture resource**. Choose the `.ireg` file as the *Texture name*. Click **OK** to display the image on the triangulation.

**Tip:**

If the image is distorted, click **Model > Image Registration > Create or Open** to modify the `.ireg`. Replace existing points, or add more points to clarify the image.

Tutorial 16-2

1. Load `image_topo.00t`.
2. Create an `.ireg` file to associate `topoThor.jpg` to `image_topo.00t`.
3. Display `topoThor.jpg` on `image_topo.00t` via the `.ireg` file created.
4. Remove the `.ireg` from `image_topo.00t`.
5. Apply `topo.poxel` to this triangulation instead of the `.ireg` file.



Figure 16-12 Image registration