Trimble's DTMLink Utility Tutorial

Trimble's DTMLink™ utility lets you import third-party surfaces and create new surfaces. You can then edit the surfaces if necessary and export them to a Trimble survey device for stakeout.

Get started with DTMLink by working through the following tutorial:

- Introduction to the DTMLink utility. (30 minutes)

The Trimble Geomatics Office™ software includes a project template that contains the sample data files that this tutorial requires, so you do not need to import data. The tutorial assumes that DTMLink is installed on your computer and that you are familiar with the Trimble Geomatics Office menu structure.

For more information on DTMLink, refer to the *Trimble Geomatics Office User Guide* or the Help. As you work, press F1 or click the **Help** button for detailed information about the dialog you are in.
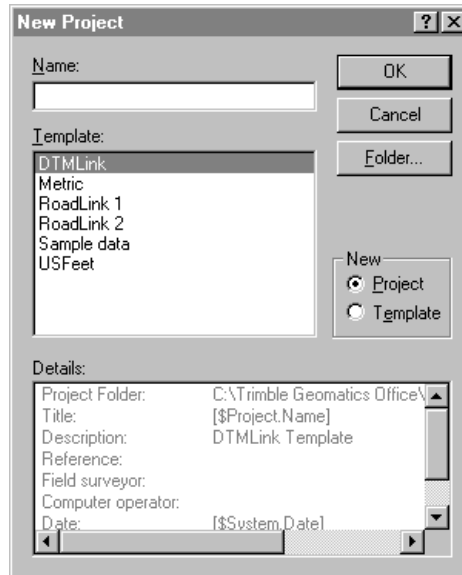
Setting Up a Project

In this section, you start Trimble Geomatics Office and create a new tutorial project using the DTMLink template.
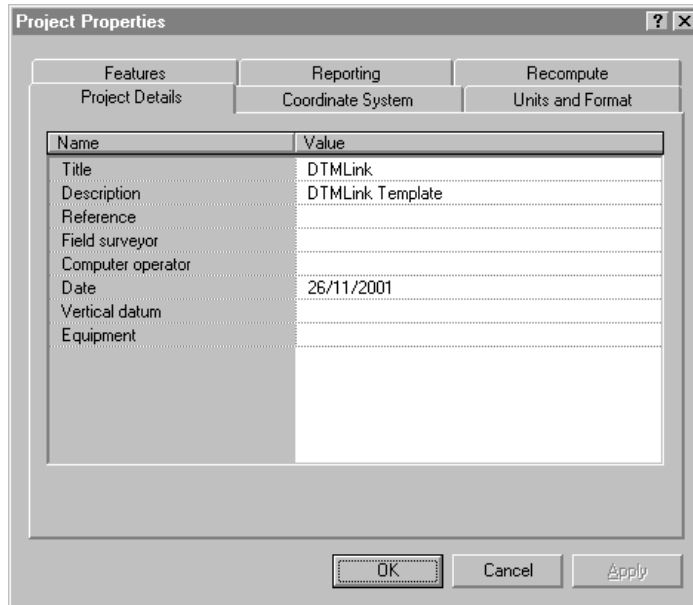
To set up a project:

1. Start Trimble Geomatics Office.

2. Do one of the following:

   – Select *File* / *New Project*.

   – Click the *New Project* tool ▯ on the *Standard* toolbar.

   The following dialog appears:

3. In the *Name* field, enter a project name.

4. Select the DTMLink template.

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5. Click **OK**. The following dialog appears:

The *Project Details* tab is selected.

6. In the *Computer operator* field, enter your name and complete any other relevant details.

   Note – Options in the other tabs are already set. You can view them, but do not change the coordinate system settings. Units in this tutorial are metric.
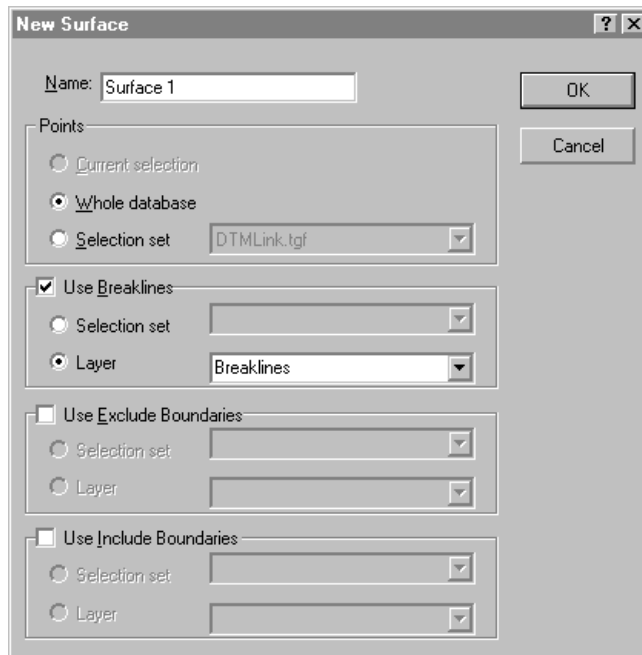
7. Click **OK**.

Creating a Contour Surface Model

Surface points and breaklines appear in the Trimble Geomatics Office graphics window.

The layer named *Breaklines* contains all of the breaklines.

To define the surface points and breaklines:

1. In the Plan view, select *Tools* / *DTMLink* / *New Surface*. The following dialog appears:


2. In the *Name* field, enter a name for the new contour surface (**Surface1**, for example).

3. From the *Points* group, select the *Whole database* option.

4. Select the *Use Breaklines* check box.

5. Select the *Layer* option. From the list, select the Breaklines Layer.

Tip – You can also define breaklines and boundaries using lines in a selection set. In the *Use Breaklines* group, choose the *Selection set* option.

6.   Click **OK**.

A detailed contour surface is formed, using all points in the database and all breaklines. This contour surface model appears in the following window:
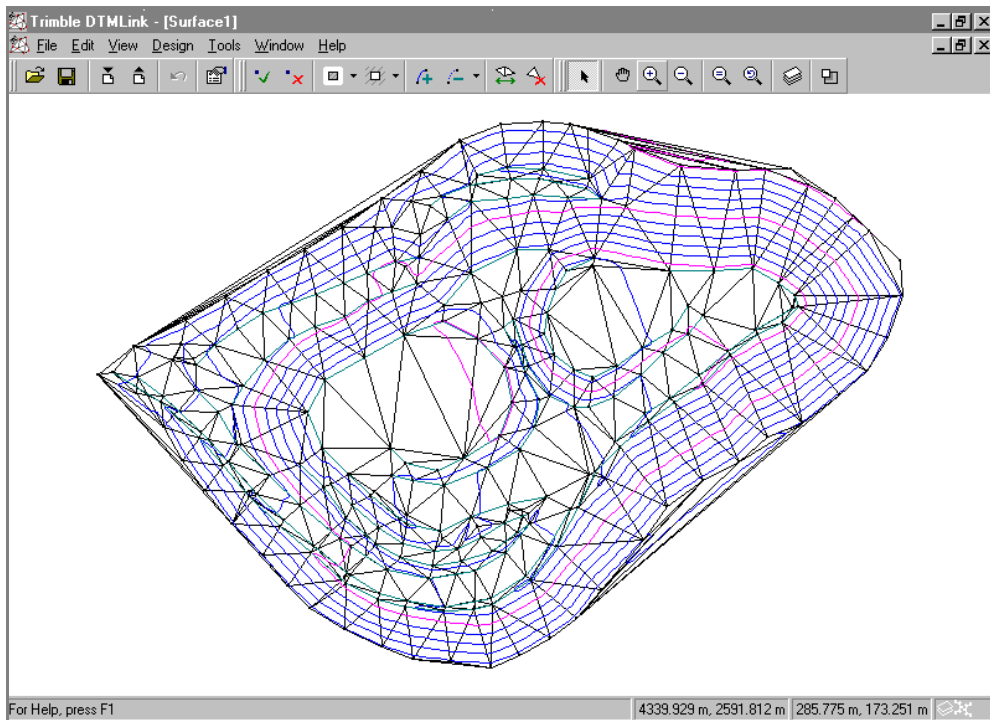

Tip – To change the graphical display of the contour surface model, select *View* / *Options*. Then select the *Line Options* tab.

Adding a Boundary

Now add a boundary to the contour surface model you created using the *Shrink Wrap* command.

To add an Include boundary using the *Shrink Wrap* command:

1. Click the arrow to the right of the *Include Boundary* tool on the Surface toolbar shown below:
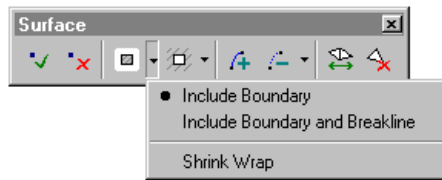

2. Select *Shrink Wrap* from the list.

   This automatically fits an Include boundary around the contour surface. A dark blue boundary line appears around all points in the contour surface.

Editing a Boundary

In this section, you use the Edit Boundaries tools to edit the boundary you created with the *Shrink Wrap* command.

Irregular triangles were formed in three places around the perimeter of the contour surface. Edit the boundary to eliminate these. You need to delete these three boundary lines and add new lines to achieve a closer fit to the edge of the contour surface.

The irregular triangles are shown below:
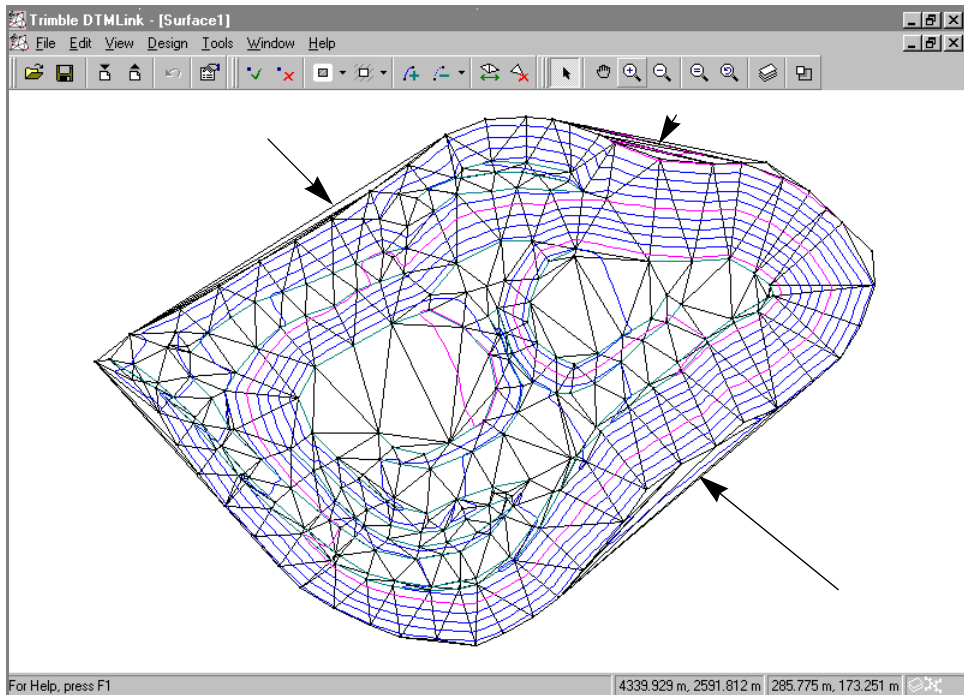
To edit a boundary:

1. Select the *Delete Breakline/Boundary* tool ⌇ ▾ on the *Surface* toolbar.

2. Select each of the three lines to delete them.

   Note – The Delete Breakline/Boundary tool lets you select the line type to delete. Only select the All option if you want to delete all line types. If boundary line types overlap and you want to delete one line type only, select that line type from the list. (By default, the line type to be deleted is the last line type you selected.)

3. Add a boundary that best represents the contour surface to eliminate the irregular triangles.

4. Select the *Include Boundary* tool ▣ ▾ on the Surface toolbar.

5. Click at the start point of one of the deleted lines and then at the apex of the next triangle. A boundary line is inserted.

6. Click on the points that follow the extent of the survey area until you join to the other end of the existing boundary.

7. Select the *Include Boundary* tool again to insert a new boundary line.

8. Repeat Step 4 through Step 6 for each of the deleted lines.

9. Press F4 to update the contour surface model as in the following window:
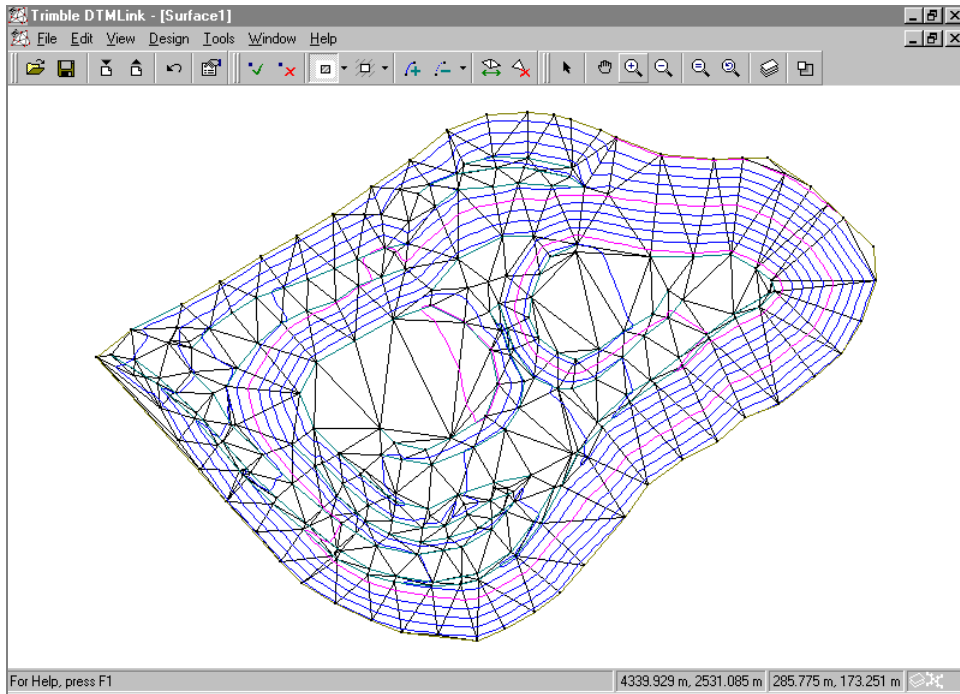
Note – You can also select Design / Add Line to add boundaries. Use the Field fill-in to select the start and end points of the boundary line.

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Note – You can add or delete a breakline using the same processes as outlined above for boundaries. Use the breakline tools instead of the boundary tools.

To remove an incorrect boundary, do one of the following:

- Select *Edit* / *Undo Add Boundary.*

- Select the *Delete Breakline/Boundary* tool from the *Standard* toolbar and select the line.

The incorrect line disappears.

Editing the Contour Surface Model by Swapping the Formed Triangles

This section shows how to swap triangles.

When you swap triangles, the height gradient between points forms along the sides of the new triangles. The contour line that is produced can be slightly different, and can result in a closer representation.

Sometimes swapping triangles does not improve the contour surface, for example, if the contour surface is irregular.

Note – To remove unrealistically shaped triangles from around the edge of the contour surface, click the Delete triangles tool on the Surface toolbar. Then click the center of the triangle in the DTMLink window.

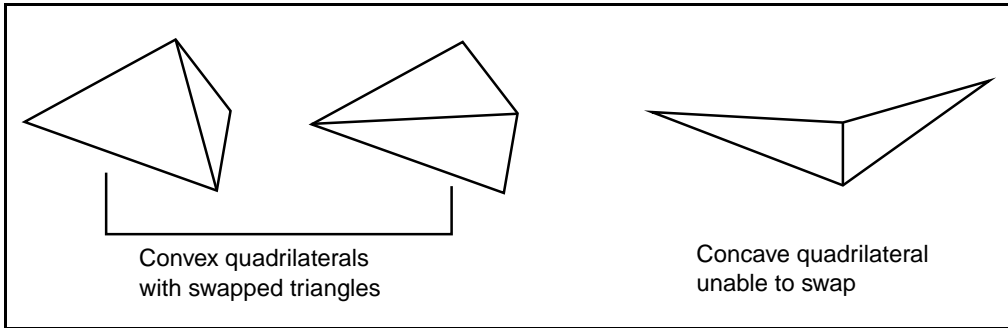The Swap triangles function only works on convex quadrilaterals, as shown in Figure 1.

Figure 1   Swapping triangles

If you choose a concave quadrilateral, an error message appears.

To swap triangles:

1. Select *View* / *Pan To* to move to the area where two triangles need to be swapped. Swapping triangles eliminates irregular contours. The *Pan To* dialog appears.

2. Enter the values shown in the following dialog:
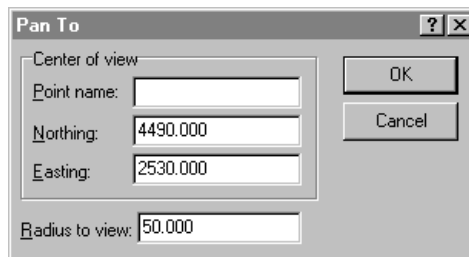
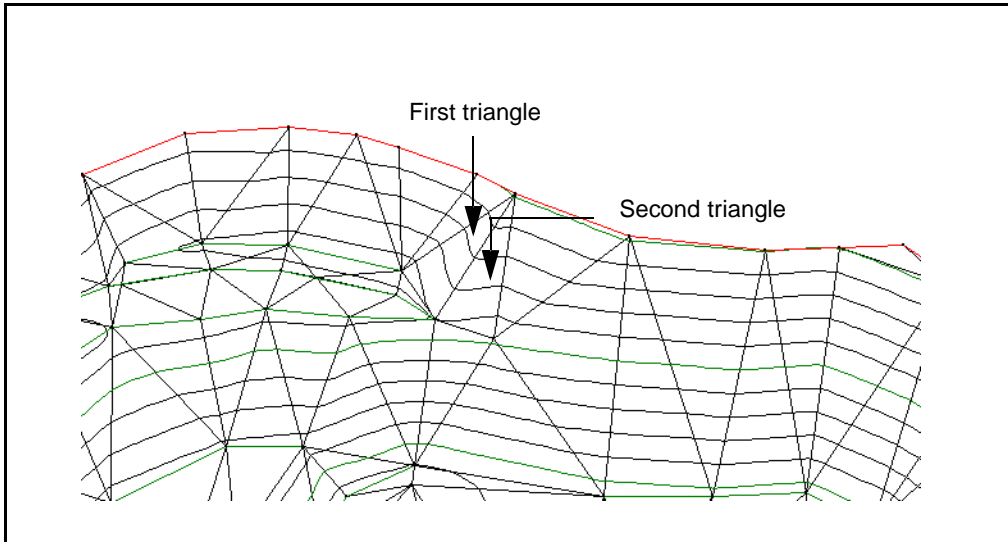The two triangles to be swapped now appear in the center of the screen. See Figure 2.

Figure 2   Graphical display of contour surface model showing triangles

3.   Click the *Swap Triangles* tool on the *Surface* toolbar. The cursor changes to .

4.   Click one of the triangles to be swapped. The triangle appears green.

5.   Select the other triangle to be swapped. The contours update immediately.

6.   Use the *Zoom To Extent* tool to show the extents of the project in the graphical display window.

Calculating a Volume

In this section you calculate a volume for the stockpile.

DTMLink automatically generates volume reports using one of the following methods:

- Above an elevation

- Between two elevations

- Void volume

To calculate the volume of the stock pile using the Above an elevation method:

1. Select *Tools / Volume Report*. The following dialog appears:

2. Click **OK** to accept the default settings.

   For more information about the methods of calculating the volumes, refer to the topic Volumes in the Help.

   The report appears immediately. Figure 3 is an example of a Volume report.

```
               Volume Above an elevation
                    Project DTMLink tutorial


  Project name        DTMLink tutorial
  Surface             Surface1
  Units               Meters
  Date printed        22/07/99 10:30am

                    Surface: Surface1
  Base elevation                              99.203 meters
  Plan area above base elevation              21688.8 Sq. meters
  Surface area above base elevation           24711.3 Sq. meters



  Volume above base elevation                 281343.394 Cu Meters


  Centroid of model above base elevation      4431.307 Northing
                                              2495.725 Easting
```

Figure 3   Example of a Volume report

This example report shows a raw volume of 281343.394 cubic meters.

To view the report later:

1.   Open Windows Explorer.

2.   Navigate to the C:\Trimble Geomatics Office\Projects\XX\ Reports\RoadLink-DTMLink\YY folder where *XX* represents the project name and *YY* the contour Surface Model.

3.   Double-click the name of the report. The report opens.

Note – To refine the stockpile volume results, take the slope of the stockpile base into account. Form a contour surface model of the base points, create a boundary around the surface area, and then compute the volume. This volume is subtracted from the stockpile volume.

Creating a TIN DTM

In this section, you form a triangulated Digital Terrain Model (DTM).

To create a TIN DTM:

1. Select *File* / *Export*. The *Export* dialog appears.

2. Select the *TIN DTM to Trimble Survey Controller file (*.ttm)* option and then click **OK**.

    Note – You would normally export a DTM directly to a Trimble survey device.

    The *TIN Extents* dialog appears. In the graphical display window, there is now a rectangular boundary defining the extents of the contour surface. For this tutorial, accept the default extents.

    Note – To reduce the area of the contour surface used to create the TIN DTM, drag the rectangular boundary to define the area. DTMLink automatically updates the TIN boundary coordinates in the TIN Extents dialog.

3. Click **OK**.

4. You are asked to name the TIN DTM. In the *File name* field, enter a name and then click **Save**.

    The file is saved in C:\Trimble Geomatics Office\Projects*XX*\Export folder where *XX* represents the project name.

This completes the DTMLink tutorial.

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