

Triangulation

6.1 Overview

The triangulated model is the core of the DTM process. All subsequent merged models, lattice models and calculations are all derived from this core triangulated model. The GEOPAK triangulated model is created using state-of-the-art algorithms. Therefore, processing time is minimal. The presence of state-of-the-art algorithms will be apparent the first time you see the triangulated model display on the screen. Triangles appear from left-to-right in an ordered array; not in a randomized manner as is typical with standard Delauney based algorithms.



The resulting triangulated model is stored in a binary file that is portable across all GEOPAK platforms. The binary file stores the data for the triangulated model in a triangulated topological network format. This means that the interrelationships between individual points and individual triangles are all recorded in the binary file. This efficient binary database format permits rapid extrapolation of cross sections and other information derived from the triangulated model.

The triangulated model is generated from binary or ASCII input files created by the following methods:

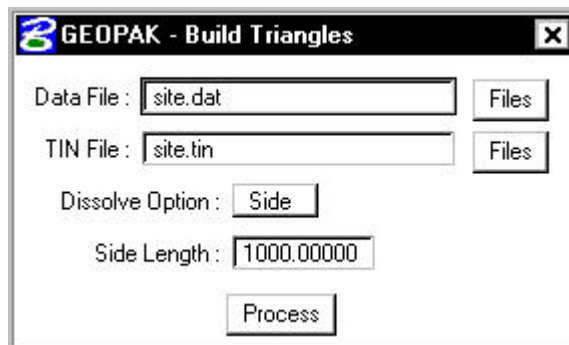
- DTM Extract utility
- Survey Project Manager
- Cross Section Reports within GEOPAK Road (DTM Input and DTM 3 Proposed)
- Collected in the raw ASCII DAT format

The binary format facilitates processing since the point and/or break line data can be read much faster from a binary file than from an ASCII file. However, other than reduced loading time, there are no functional differences between the ASCII and binary files.

6.2 Building the Triangulated Model

Feature / Function	Create a triangulated model.
Tool	 
DTM Menu Bar	Build > Triangles

The Build Triangles dialog, which creates a binary file containing the triangulated model, is depicted below.

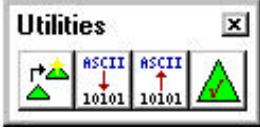


Data File	Name of the input (e.g., site.dat) file. In lieu of typing, pressing the Files button invokes the Data File dialog, wherein the desired file may be selected. You need not necessarily type the extension. A DAT extension is assumed for the input data file.
TIN File	File where the triangulated model is stored in binary format. A TIN extension is assumed for the binary file containing the triangulated model if no extension is typed.
Dissolve Options: None Sliver Side	At the completion of a triangulation process, the external edge of the triangulated model is convex. Many of the external edge triangles are thin and narrow and not representative of the surface. This is particularly evident where the edge of the data set is concave in nature. One approach to eliminate these triangles is the use of the Dissolve Option applied during the Build Triangles phase. <ul style="list-style-type: none"> • None - No external triangles are dissolved. • Sliver - Long, thin triangles are dissolved based on a formula hard coded within the software. There are no user defined parameters. • Side: External triangles whose external edge is longer in length than a user specified distance are dissolved. Note the side option does not apply to internal triangles, only those on the edge of the model.
Process	Commences the triangulation procedure. The status of the triangulation process is chronicled on the MicroStation command

	<p>window. Messages will include: "Reading Data File," "Triangulating," "Writing Triangulation File." Note during this process, no elements are drawn or displayed on the screen.</p>
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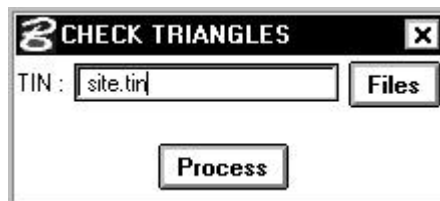
After a model has been generated, it can be utilized within a wide variety of GEOPAK tools. These include drawing contours, volume calculations, thematic analyses, and drainage applications. A post-triangulation, interactive editing tool (TIN Edit) can be utilized to delete unwanted external triangles. In addition, it can be utilized to add break lines, move vertices, add or delete triangles, until you have obtained the desired model. Another post-triangulation method is the Build Clip tool, which generates an additional TIN file internal to a specified polygon.

6.3 Check Validity of the Triangulated Model

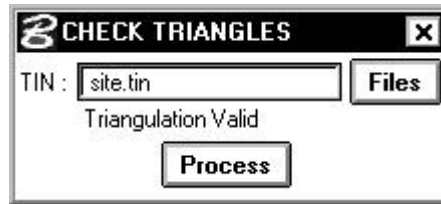
Feature / Function	Check the validity of a triangulated model.
Tool	
DTM Menu Bar	Utilities > Check Triangulation

GEOPAK provides a tool that reviews the binary triangulation file and determines if the binary file is a valid triangulation model by checking its topology and producing precision. This is typically used if your triangulation file is producing error messages within various DTM procedures or if you are confused to whether a given file is a triangulation file.



When invoked, the dialog shown below appears. Simply type the name of the triangulation file (if not supplied, a "TIN" extension is assumed) and press the **Process** push button. In lieu of typing the TIN File name, pressing the **Files** button invokes the TIN File dialog, wherein the desired TIN file may be selected.



If the triangulation model is valid, a "Triangulation Valid" will appear in the dialog as depicted below.

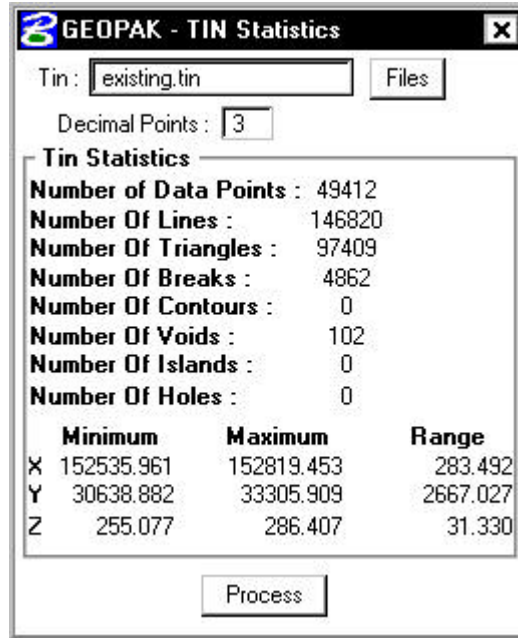


6.4 Triangulation Statistics


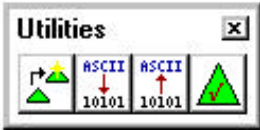
Feature / Function	Review the statistics of the specified TIN model.
Tool 	
DTM Menu Bar	Reports > Triangle Statistics

The Triangle Statistics tool displays the coordinate ranges of data points in a triangulation model as well as the total number of points, lines, triangles, along with a plethora of other information about the model.

When invoked, the dialog depicted below is displayed. Simply type the name of the triangulation file (if not supplied, a "TIN" extension is assumed) and press the **Process** push button. In lieu of typing the TIN File name, pressing the **Files** button invokes the TIN File dialog, wherein the desired TIN file may be selected. Triangle statistics for the triangulation model are displayed on the Triangle Statistics dialog as shown below.



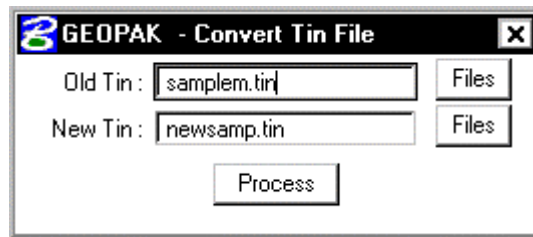
6.5 Convert Triangulated Model

Feature / Function	Convert from earlier GEOPAK Tin versions (pre-GEOPAK 98) to DTM 98 TIN model.
Tool 	
DTM Menu Bar	Utilities > Convert TIN file

GEOPAK provides a tool that converts earlier versions of GEOPAK Tin models to the current format. This is in response to additional features added to GEOPAK 98 models that were not supported in earlier versions. The conversion must be done on TIN files created prior to GEOPAK 98 if they are to be utilized prior to any application that modifies the TIN file. These include:

- Clip TIN
- Merging
- Volumes
- Drainage (Refining Only)
- TIN Editing

When invoked, the dialog shown below appears.



A new TIN file name is supported, to maintain the integrity of the original TIN file. Simply type the name of the old triangulation file (if not supplied, a "TIN" extension is assumed), the new TIN File name and press the **Process** push button. In lieu of typing the TIN File name, pressing the **Files** button invokes the TIN File dialog, wherein the desired TIN file may be selected.