Lattice Model

9.1 Overview

Lattice models are grid meshes that are draped over triangulated data. The triangulation model serves as input to the lattice process. The output of the Build Lattice procedure is a binary lattice file.

9.2 Build Lattice Dialog

Feature / Function	Utilizing a TIN model to create a lattice model.
Tool	Build
DTM Menu Bar	Build > Lattice

When invoked, the Build Lattice dialog is displayed as depicted below.

😤 GEOPAK - Build Lattice	×
TIN File : group/prjmgr/existing.	tin Files
LAT File : existing.lat	Files
Interpolation : Planar	-9.1 77e
Lattice Option : Auto	
Lattice Points	_
No. Lattice Points : 50000	7
Process	
Flocess	

At the top of the dialog, the **TIN File** and **LAT File** names must be specified. In lieu of typing, pressing the Files button invokes the files dialog, wherein the desired file may be selected.

Two Interpolation options are supported: Planar and Polynomial.

Four lattice options dictate the extent of the lattice model as well as the density of individual lattice points, as displayed in the exploded view below.

<mark>8</mark> GEOPAK - Bu	ild Lattice		×
TIN File : group	\prjmgr\existing.tin	Files	
LAT File : existing	g.lat	Files	
Interpolation :	Planar		
Lattice Option :	Auto Window Set Set Window		
	Process		

Each of the four Lattice Options will be the subject of the subsequent subsections.

9.2.1 Auto Lattice Option

The Auto method generates a lattice over the full extent of the triangulated model. The density of the lattice is dictated by the number of lattice points. For the Auto mode, both the **Lattice Intervals** as well as the **Lattice Window** settings are not applicable. Hence, they do not appear on the dialog box.

CEOPAK - Build Lattice	×
TIN File : group\primgr\existing.tin	Files
LAT File : existing.lat	Files
Interpolation : Planar	
Lattice Option : Auto	
Lattice Points	í
No. Lattice Points : 50000	
D	
Process	

With the **Auto Lattice** option, the distances between individual lattice points will invariably represent non-rounded values. Similarly, lattice grid points will not fall on rounded coordinate locations.

9.2.2 Auto Window Lattice Option

The Auto Window lattice option generates a lattice for a user defined window. This permits a lattice model for a portion of the triangulated model. The lattice density is determined by the number of lattice points. Hence, like the **Auto Lattice** option, the distances between individual lattice points will invariably represent non-rounded values and individual lattice grid points will not fall on rounded coordinate locations.

The image below represents the Build Lattice dialog for the Auto Window mode.

AT File : existing.lat	existing.tin	Files
Interpolation : Planar		58 B.
attice Option : Auto Wi	ndow	
Lattice Points		1
No. Lattice Points : 500)00	

The image below depicts the 50000 point lattice model for the window range specified in the Lattice Window group box. The full triangulation model is also shown for reference.



9.2.3 Set Lattice Option

The third method is **Set**, which generates a lattice over the full extent of the triangulation. The difference between the Set and Auto modes is

that you specify a specific number of lattice points for the Auto mode. For the Set mode, however, the density of the lattice is specified by the **X** and **Y Lattice Intervals**. Hence, the dialog for the Set mode appears as shown below.

isting.tin Files
Files
Y Interval : 30.000000
Y Register : 0.000000
8020

On the dialog above, the **X** and **Y** Lattice Intervals are set to **30.0**. Therefore, the distance between individual lattice points will be 30 master units. Furthermore, the coordinate value of lattice points will be a number evenly divisible by 30.0.

The **X Register** and **Y Register** entries on the Build Lattice dialog in conjunction with the **X** and **Y Intervals** dictate the coordinate values assigned to individual lattice points. The coordinate values of a lattice point are always a multiple of the **X** and **Y Intervals** plus the **X** and **Y Register** values. For example, a 30 meter **X** and **Y Interval** and a 0.0 **X** and **Y Register** would result in coordinates at 30, 60 and 90. Conversely, if the **X** and **Y Registers** were changed to 5.0, then the resulting coordinates would be at 35, 65, and 95.

The resulting lattice model is shown below. With a 5000 point model, the approximate spacing between lattice points was approximately 10 meters. Therefore, the density of the lattice points for the image depicted below is approximately 70% less.



9.2.4 Set Window Lattice Option

The final lattice generation option is the **Set Window** mode, which generates a lattice for a user nominated window. The density of the lattice is determined by the **X** and **Y Intervals**. The lattice dialog for the Set Window mode is shown below.

TIN File : group\primgr\existing.tin Files LAT File : existing.lat Files Interpolation : Planar Planar Lattice Option : Set Window Set Window Lattice Intervals Y Interval : 30.000000 X Interval : 30.000000 Y Register : 0.000000 Lattice Window Y Register : 0.000000 Y Register : 0.000000	TIN File : group\primgr\existing.tin Files LAT File : existing.lat Files Interpolation : Planar Planar Lattice Option : Set Window Set Window Lattice Intervals Y Interval : 30.000000 X Interval : 30.000000 Y Interval : 30.000000 X Register : 0.000000 Y Register : 0.000000 Lattice Window X Maximum : 19465.0000	5 GEOPAK - Build Lattic	ce X
LAT File : existing.lat Interpolation : Planar Lattice Option : Set Window Lattice Intervals X Interval : 30.000000 Y Interval : 30.000000 X Register : 0.000000 Y Register : 0.000000	LAT File : existing.lat Interpolation : Planar Lattice Option : Set Window Lattice Intervals X Interval : 30.000000 Y Interval : 30.000000 X Register : 0.000000 Y Register : 0.000000 Lattice Window X Minimum : 18415.0000 X Maximum : 19465.0000	TIN File : group\prjmgr\e:	xisting.tin Files
Interpolation : Planar Lattice Option : Set Window Lattice Intervals X Interval : 30.000000 Y Interval : 30.000000 X Register : 0.000000 Y Register : 0.000000 Lattice Window	Interpolation : Planar Lattice Option : Set Window Lattice Intervals X Interval : 30.000000 Y Interval : 30.000000 X Register : 0.000000 Y Register : 0.000000 Lattice Window X Minimum : 18415.0000 X Maximum : 19465.0000	LAT File : existing.lat	Files
Lattice Option : Set Window Lattice Intervals XInterval : 30.000000 XRegister : 0.000000 Lattice Window	Lattice Option : Set Window Lattice Intervals X Interval : 30.000000 X Register : 0.000000 Lattice Window X Minimum : 18415.0000 X Maximum : 19465.0000	Interpolation : Planar	
Lattice Intervals X Interval : 30.000000 Y Interval : 30.000000 X Register : 0.0000000 Y Register : 0.0000000 Lattice Window	Lattice Intervals X Interval : 30.000000 Y Interval : 30.000000 X Register : 0.0000000 Y Register : 0.0000000 Lattice Window X Maximum : 19465.0000	Lattice Option : Set Windo	w
X Register : [0.000000 Y Register : [0.000000	X Register : [0.000000 Y Register : [0.000000 Lattice Window X Minimum : [18415.0000 X Maximum : [19465.0000]		
Lattice Window	X Minimum : 18415 0000 X Maximum : 19465 0000	X Interval : 30.000000	Y Interval : 30.000000
V Minimum - 10415 0000 V Minum - 10405 0000	A WIGHLIGHT I 16413 UTUEL A MAXIMUM 113463 UTUEL	X Interval: 30.000000 X Register: 0.000000	Y Interval : 30.000000 Y Register : 0.000000
A Minimum : [10415.0000] A Maximum : [19465.0000]	Minimum 100 00000 Maximum 1000 00000	Lattice Intervals X Interval: 30.000000 X Register: 0.000000 Lattice Window 2000000	Y Interval : 30.000000 Y Register : 0.000000
Lattice Window	Lattice Window	Lattice Intervals	n secondar man
1 Minimum . [1100.00000] 1 Maximum . [1000.00000		Lattice Intervals × Interval: 30.000000 × Register: 0.000000 Lattice Window × Minimum: 18415.0000 Y Minimum: -100.00000	Y Interval : 30.000000 Y Register : 0.000000 X Maximum : 19465.0000 Y Maximum : 1000.00000

Like the Set mode, the X and Y Lattice Intervals for the Set Window mode equal **30.0**. Therefore, the distance between individual lattice points will be 30 master units. Furthermore, the coordinate value of lattice points will be a number evenly divisible by 30.0.

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Although not utilized in this example, X and Y Registers are supported and function identically to the Set Mode usage. The resulting lattice is shown below. Again, the triangulation model is also shown for reference purposes.



9.3 **Producing the Lattice Model**

Once all entries on the Build Lattice dialog have been established, press the **Process** push button. The process is very quick. A lattice model in the 50000 point range will consume less than five seconds to produce on a Pentium PC. Even a 1,000,000 point lattice consumes less that 20 seconds of processing time.

9.4 Lattice Statistics

Feature / Function	Generate lattice statistics
Tool	Reports I
DTM Menu Bar	Reports > Lattice Statistics

The Lattice Statistics tool displays the coordinate ranges of data points in a lattice model, the total number of points comprising the model as well as other statistics such as the distance between lattice points. The dialog is depicted below. Simply type the name of the lattice file (if not supplied, a "LAT" extension is assumed) and press the **Process** push button. Lattice statistics are then displayed. The Lattice Statistics dialog below corresponds to the lattice that was built for the Auto mode with a **No. Lattice Points** setting equal to **50000** points. Take note of the non-rounded **X** and **Y Intervals**.

Lat File : existin	ig.lat	Files
Decimal Points	: 3	
- Lattice Statis	ics —	2
Number of Lat	tice Points : 49	9320
Number of Act	ive Points : 41	089
No.X-Lines 68	5 No.Y-Lin	es 72
X Interval :	3.993 Y Interva	al : 3.899
Lattice Cell Ar	ea :	15.569
Interpolation M	l ode : Linear	
Minimum	Maximum	Range
× 152535.961	152819.453	283.492
Y 30638.882	33305.909	2667.027
	286.318	31.184
Z 255.135		

By contrast, the Lattice Statistics dialog below corresponds to the lattice that was built for the Set mode with an **X** and **Y** Intervals of **5.0**. For this model, the number of lattice points is reduced. However, the **X** and **Y** Intervals are rounded to **5**. The Interpolation Mode during the Build Lattice procedure was set to **Polynomial**, which is displayed in the statistics report.

Lat File : existi	ng.lat	Files
Decimal Point:	s : 🛐	2
-Lattice Statis	tics ———	
Number of Lat	tice Points : 31	088
Number of Act	ive Points : 25	586
No.X-Lines 53	36 No.Y-Lin	es 58
X Interval :	5.000 Y Interva	al : 5.000
Lattice Cell Ar	ea :	25.000
Interpolation M	dode : Polynomial	
Minimum	Maximum	Range
× 152535.000	152820.000	285.000
Y 30635.000	33310.000	2675.000
Z 0.000	286.246	286.246