

Test-Drive  
Topoplan Module  
Lesson № 1. Data source and creating surfaces

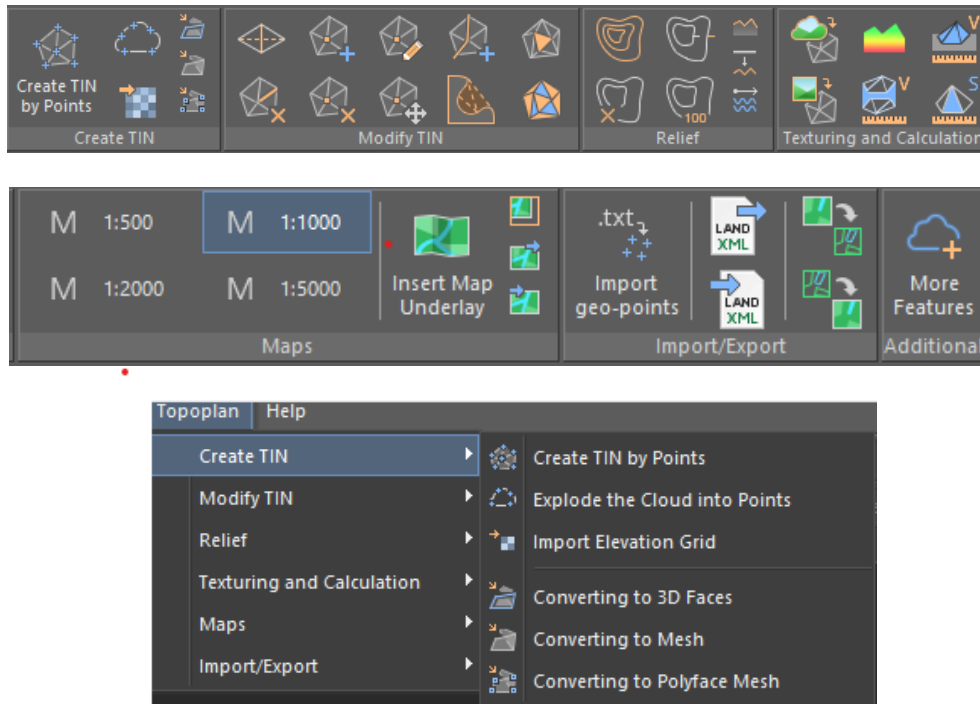
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# Introduction

The Topoplan module is an engineering solution that extends the capabilities of the nanoCAD platform in the field of creating a digital model of the terrain and preparing the drawing for the release of topographic plans, making the work of the surveyor engineer more comfortable and efficient. The received general-purpose topographic plans are used to solve the problems of industry, agriculture, construction, etc.

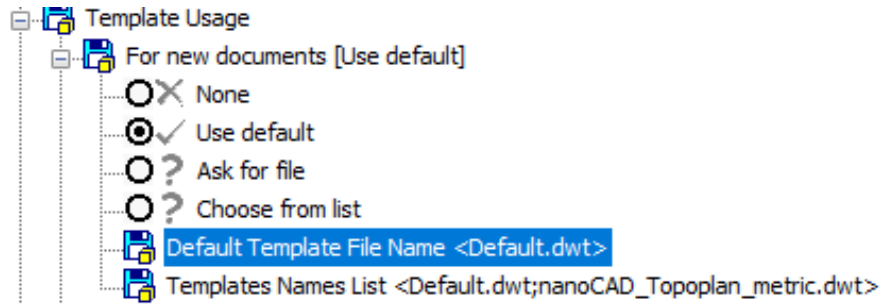
All functionality for working with the module is collected in the Topoplan ribbon tab (and the Topoplan menu of the classic interface).



*Note that the functionality of the module will be discussed using the example of the ribbon interface. But the menu items of the same name in the classic interface also contain a complete list of commands used.*

## Preparing for operation

1. To work with survey data, you must use a drawing template with the drawing units set to meters. To set the default meter template, open the Settings dialog (OPTIONS command), and in the Using Templates section for new documents, change the default template file Default.dwt to nanoCAD\_Topoplan\_metric.dwt from the Templates folder.



2. Command parameters are configured using the Properties panel, so you must open it before you start (CTRL + 1 keyboard shortcut, INSPECTOR command).

## Source data for creating surfaces

The functionality of the Topoplan module allows you to use point clouds (obtained using the laser method as initial data or photogrammetric scanning), geodetic survey point data from text files, elevation grids of various exchange formats (\* .pgm, \* .grd, \* .asc, \* .dem). Consider sequentially using different types of source data to create a surface.

# Creating geopoints from point clouds

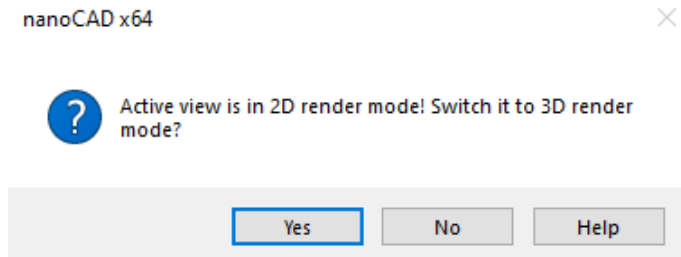
## Sequence of operations

1. To import scan data, click the Point Clouds tab.

Run Import Point Cloud:

Point Cloud → Import

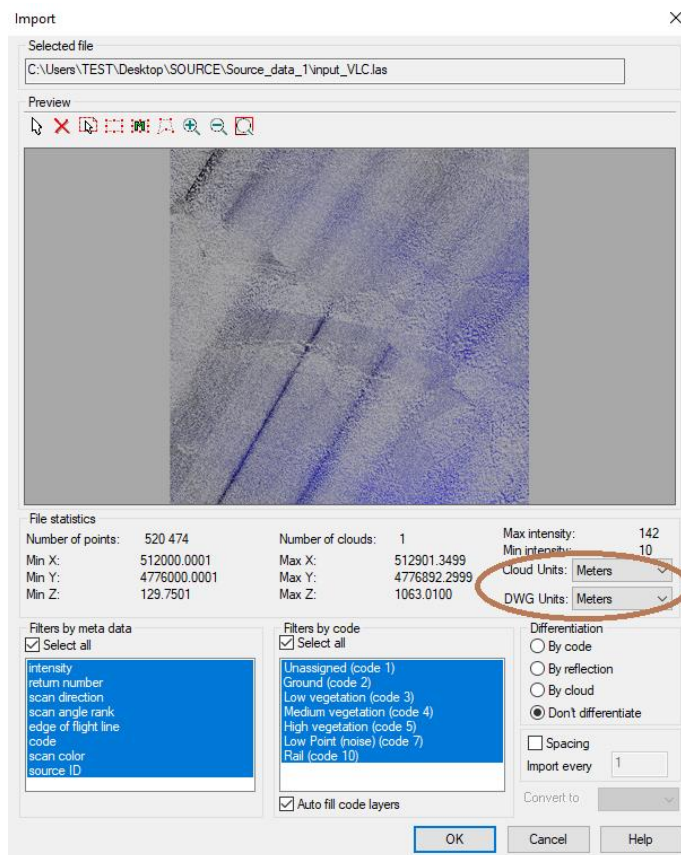
Confirm the use of the visual 3D style to correctly display the three-dimensional graphics of the point cloud:



Next, specify the path to the source file, "input\_VLC.las," and click Open

2. Configure import options.

In the Import dialog box, check the drawing units and point clouds (for the cloud to load at a scale of 1:1).

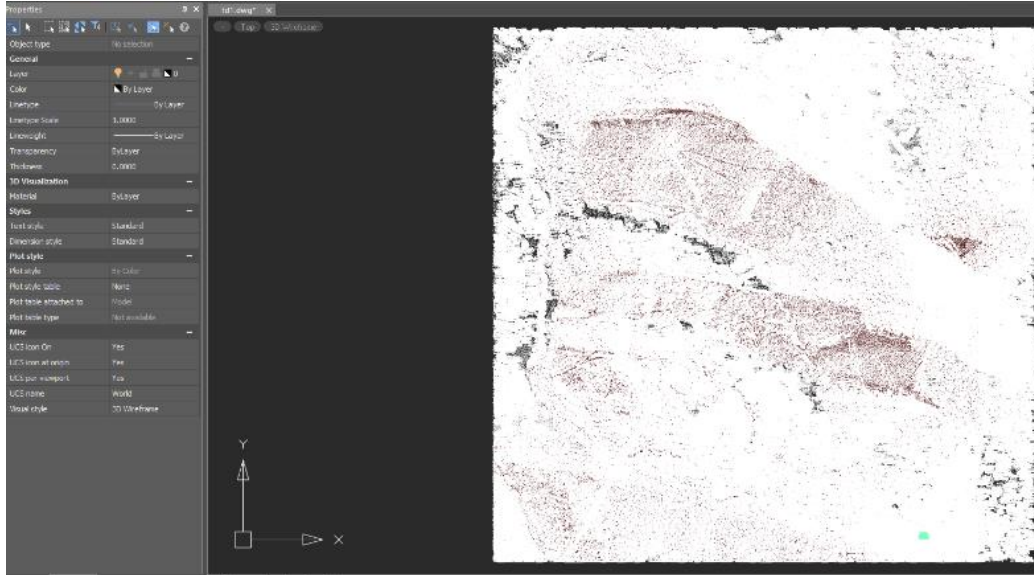


Start importing the point cloud by clicking OK.



*In the imported point cloud, you can define the classes of Earth, High, Low, and Medium vegetation, and so on. But you only need Earth-class points to build a surface. In this case, you must use the Select Class option and set it to 2 - Earth (code 2). On the Apply Settings prompt, specify Yes.*

## 6. Point Cloud Breakdown Result:



By default, the resulting points are placed on layer "0." For a more convenient and understandable distribution of drawing objects in the layer list, we create another one - Geopoints and move the created geopoints to it.

## 7. Save the drawing with the results.

## Import survey points from a text file

You can download data from a text file using the Import Survey Files wizard. First open the text file using any text editor to view the content. The text file "Survey.txt" will be used for this step. The file contains data in the following order:

- point number,
- X coordinate,
- Y coordinate,
- Z coordinate,
- point code.

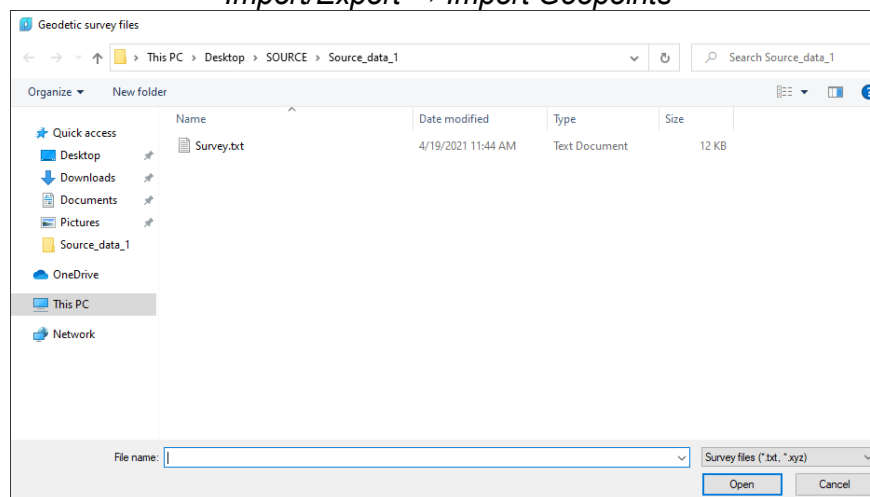
```
N17, 512060.7322, 4776751.3647, 145.1234, 2  
N18, 512100.6879, 4776101.3257, 199.7785, 2  
N19, 512087.6227, 4776154.0000, 201.4743, 2  
N20, 512095.2898, 4776195.7573, 185.4163, 2  
N21, 512098.0535, 4776244.6147, 175.3233, 2  
N22, 512103.7998, 4776283.2678, 169.2820, 2
```

*Attention! The Import Wizard allows you to exclude only comments and start lines that typically contain service information from a file. If necessary, edit the file in any text editor.*

### Sequence of operations

1. Run the GeoPoints Import command:

*Import/Export* → *Import Geopoints*



Specify the path to the source text file and click Open.

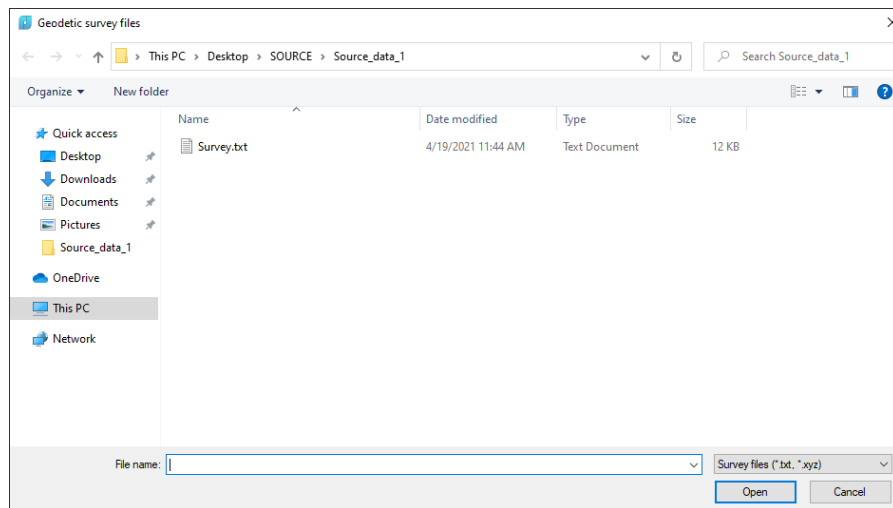
2. In the Import Survey Files dialog box, make the settings.

Specify which character delimits the information in the text file and which line of the text file begins the content you want (points with coordinates). In our case, the separator is a comma. The example file does not contain any overhead information or comments, and therefore we will select 1 for the Content Start Line.

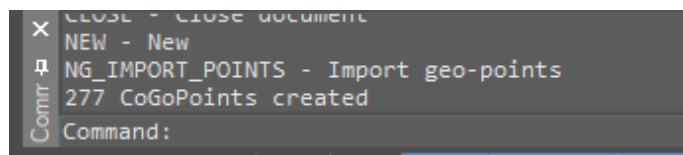
Next, you must configure the text file fields to match the data you are loading.

Field coding data will fall into the Description column, in our example, all points have a code value of 2:

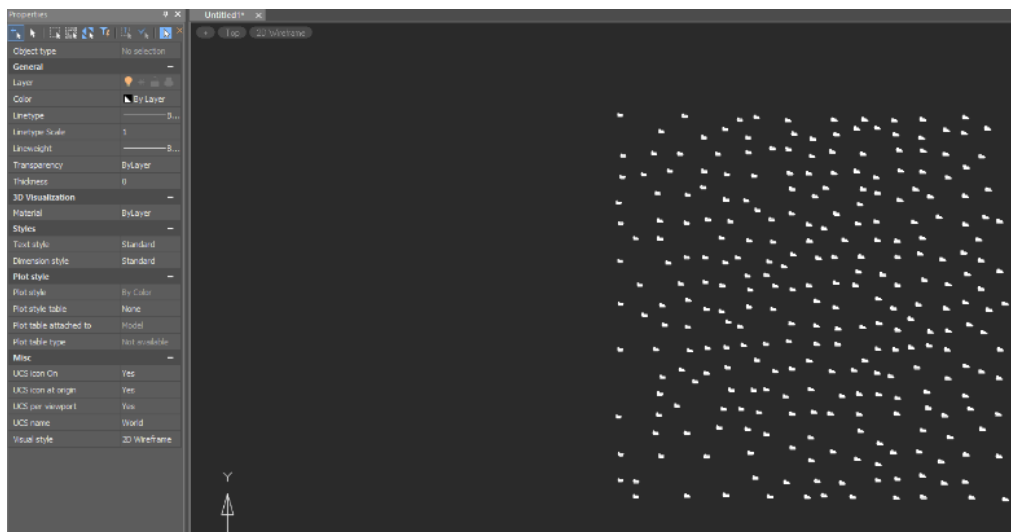




When you click OK, the points are imported, and the result appears on the command line:



3. The objects are displayed in the drawing:



By default, points are imported to layer "0." For a more convenient and understandable distribution of drawing objects in the layer list, we create a new layer - Geopoints and place the created elements on it.

4. Save the drawing with the results.

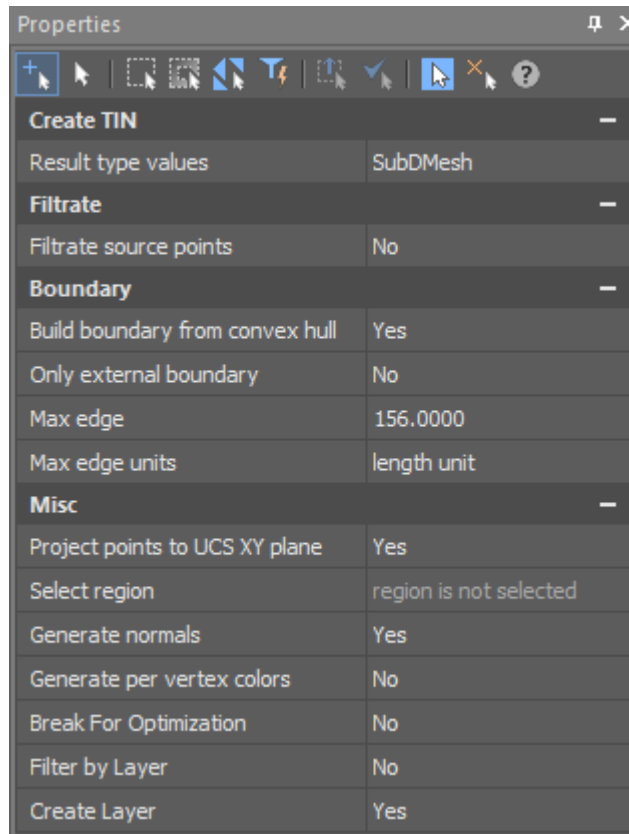
## Creating a TIN surface from points

### Sequence of operations

1. Draw a surface based on the resulting geo-references. Start the Create TIN → Create TIN from Points command.

When you start the command, you are prompted to select objects. Geopoints can be fetched in any convenient way. For example, before running the command, use the Quick Select dialog box, or select the desired objects with a frame.

2. Configure the surface creation options in the Properties bar:



The result of creating a surface can be: submesh, polyface mesh, solids and faces. Set to Network.

You can only use part of a geopoints to create a surface by enabling Filter Original points. The function is relevant in the volume if the drawing contains an excessive number of points. In this case, no filtering is required.

At the same time when you create a surface, you can enable the Draw Boundary from Convex Shell option to control the creation of triangles along the mesh boundary. Triangles whose edges are longer than the Maximum Edge field will be deleted. The dimension is specified by the Maximum Edge Units parameter, which is recommended to be set to Length Units.

If you enable Split for Optimization, the surface you create is divided into smaller sections. When you draw surfaces with more triangles, this option allows you to speed up navigation in the drawing. For our example, such a separation is not required.

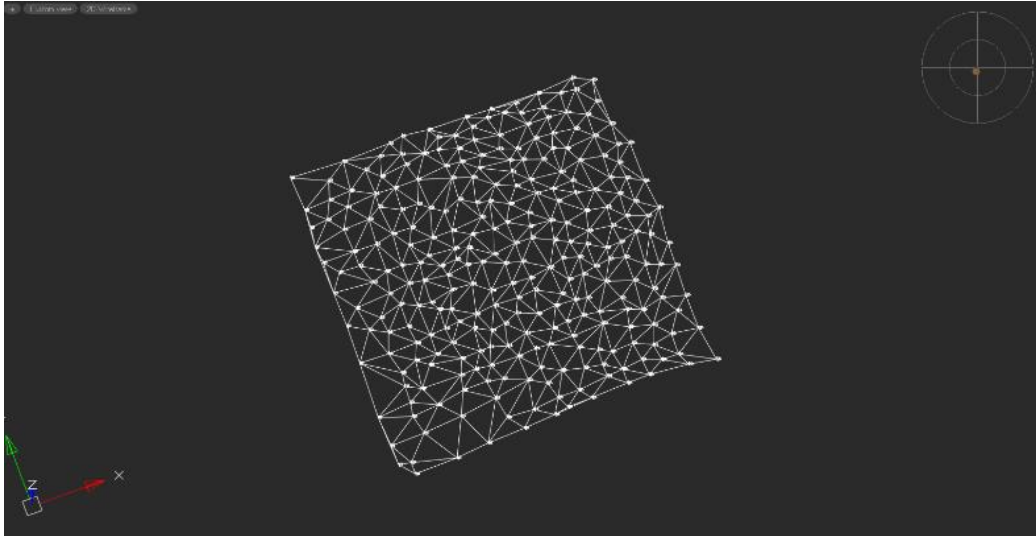
Also enable Create Layer. This places the new surface on the TIN Surface layer. If the surface is successfully created, the command line displays a message with the build results:

```

Command:
Triangulation: 277 vertexes (277 added, 0 singular, 0 fault vertexes), 517 triangles, elapsed time 0.0366454 seconds
AutoSaving: C:\Users\urin\AppData\Local\Temp\TD1-2.dwg(C:_Users_urin_Desktop_SOURCE)(13-57-34_11.11.2021).autosave
Command:

```

3. The network you created appears in the drawing:



4. Save the drawing with the results

## Importing Elevation Grid to create surfaces

*Elevation Grid* is a three-dimensional terrain model that has a regular structure. Each element of the matrix corresponds to a square area, the size of the side of which is called the accuracy of the matrix. The altitude matrix can be used in such problems as terrain analysis, the construction of profiles and visibility zones, the calculation of the length and area of objects taking into account the relief, the calculation of the volume of earthworks, the modeling of flood zones, the determination of the directions of the slopes, the formation of a three-dimensional map of the terrain and others. Elevation Grid can be loaded in the following formats: PGM, GRD, ASC, DEM. For training purposes, we will use the file Survey.dem.

### Sequence of operations

1. Run the Import Elevation Grid command:

Creates a TIN → Imports Elevation Grid.

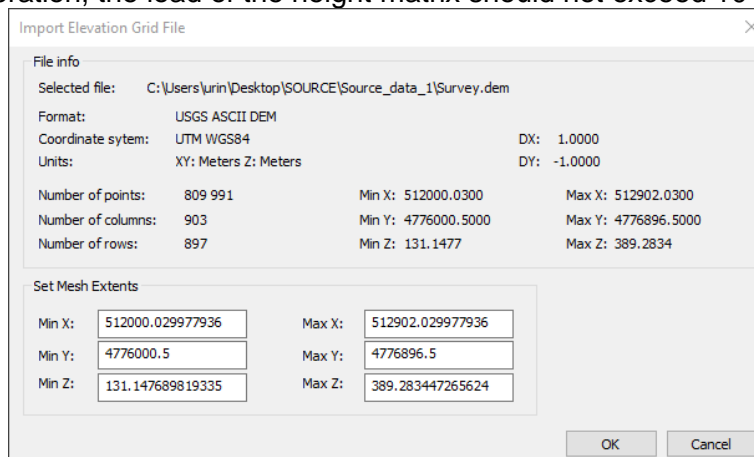
Specify the path to the height matrix file. In our case, we will use a DEM file.

In the file selection window, click Open.

Confirm that you want to use the visual 3D style for correct mapping of three-dimensional data.

2. In the Import Elevation Grid File dialog box, the program displays the parameters of the source file: format, coordinate system, units, and others.

For comfortable operation, the load of the height matrix should not exceed 10 million points.



In the import settings, we can also reduce the size of the downloaded data by changing the network size (Minimum and Maximum values of X, Y, Z). Confirm the download by clicking OK.

3. Result of elevation grid import:



The loaded height matrix is represented in the drawing as a surface (SubMesh object).

4. Save the drawing with the results.

## Conclusion

**In this lesson, you learned how to import data from different formats and how to create surfaces.**

**In the following lessons, we will continue to explore the main features of the Topoplan module and its additional tools. Consider surface editing and complete the process of creating a topographic plan.**