

Cloud_v71

For SU (free and Pro) 6 and higher
D. Bur - June 2010

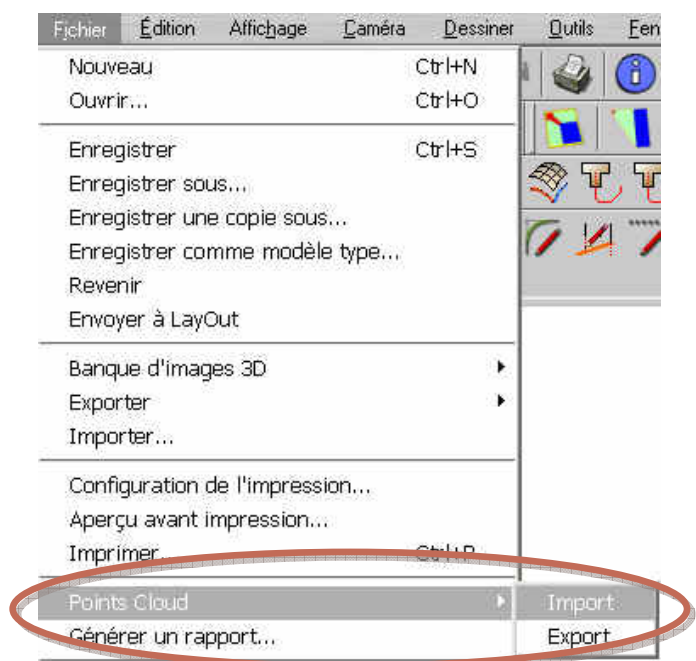
```
# Copyright Didier Bur - 2004
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#-----
# Import a points clouds in SU, assuming the format of the input file is:
# x delimiter y delimiter z
# for instance: 1.0,2.0,3.0 (a CSV file format in this case)
#-----
# Versions history:
# 30.07.04: first release, just reads the points
# 01.08.04: some delimiters added, layer selectable
# 18.06.07: better and single dialog box (more user-friendly).
#         better layer support
#         more delimiters, sample of file line for reference
#         invalid data file detection, more than 3 data per line detection
#         select XYZ locations option
#         flatten Z coordinate option
#         zoom extend at command end
#         ScriptOrganizer compatible
#         Triangulation option
# 09.11.07 Selectable new origin
# 08.21.08 Import unit added, point number and altitude added
# 12.17.08 Draw lines between points option added
# 20.06.10 OOL Programming, improved triangulation algorithm, multiple fields in CSV
#         taken into account, group points, group triangles
#-----
```

This script is intended to help SU users to import/export digital elevation model data saved as CSV-like formats. It can also triangulate the resulting 3D imported points cloud.

1. Installation:

Put the script in your "Plugins" folder of SketchUp, res-start SketchUp and you're ready. You should have a new menu item "Points Cloud", under the "File" menu:



2. Usage:

2.1. Import a points cloud:

Any CSV file can be read by this script, assumed it is an ASCII formatted file, and that it includes at least X,Y,Z coordinates of points, separated with a delimiter. No binary formats supported !

French information about CSV format can be found here:

http://fr.wikipedia.org/wiki/Comma-separated_values

English information about CSV format can be found here:

http://en.wikipedia.org/wiki/Comma-separated_values

Below is an example of such a file, containing three points, each coordinate separated with a semicolon (;) delimiter:

```
1019.5894730554;563.883616207758;38.758593673737
1119.5894730554;563.883616207758;42.4916615640272
1019.5894730554;663.883616207758;148.603669477738
```

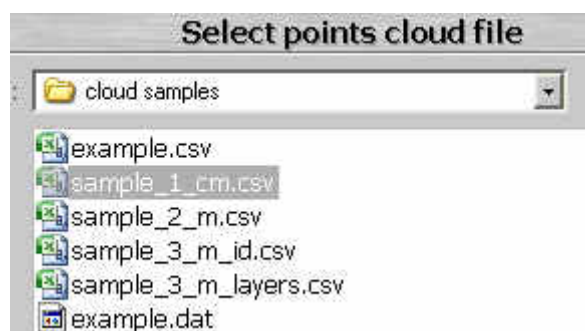
Depending on the source software, additional information can be included in the CSV file. Below is an example of such a file, containing three points, each coordinate separated with a semicolon (;) delimiter, and a number as the fourth datum:

```
1019.5894730554;563.883616207758;38.758593673737;1
1119.5894730554;563.883616207758;42.4916615640272;2
1019.5894730554;663.883616207758;148.603669477738;3
```

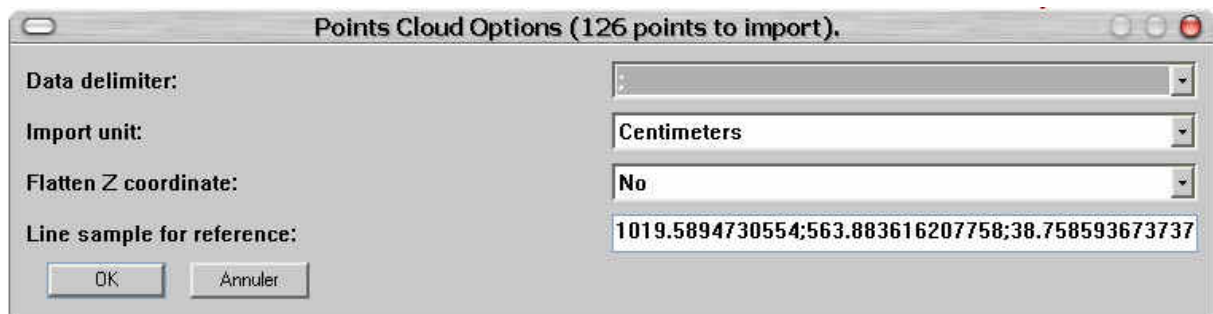
In the present archive are some samples of CSV files, see paragraph 3 for details.

Select File > Points Cloud > Import.

A file dialog box lets you select the file to import. You can select any file type (no matter its extension):



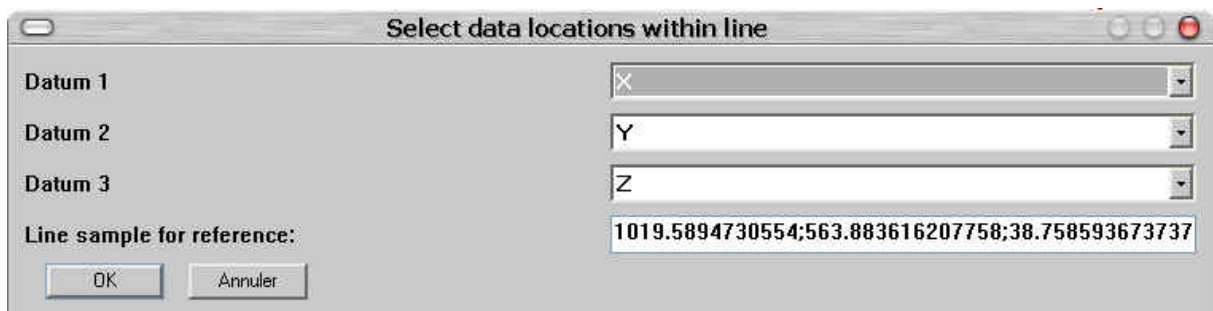
Click on the "Open" button. A dialog box is displayed:



The fourth item of the dialog box lets you read what a typical line of the input file looks like, to see what the delimiter is, in particular.

- Select the delimiter in the first dropdown list.
- Select the unit of the input file (you have to know what were the units used when the points cloud was exported as a CSV file). Default import unit is your current model unit.
- Select to either flatten the points cloud to zero or not.

A second dialog is displayed:



The fourth item of the dialog box lets you read what a typical line of the input file looks like, to see how data is organized within a line.

- Select the first, second and third datum type in the dropdown lists. Datum type can be: X, Y, Z, Layer, ID, Other.
- The number of selectable items (Datum X) in the dialog depends on the number of data per line.
- Click OK

The script imports the points and draws them as "construction points" (or guide points). A third dialog box is displayed:



Select either to ignore the Z (blue) coordinate information (this has nothing to do with the "Flatten" option), or to insert it as a text, or to store it as an attribute of the guide point.

N.B.: This dialog doesn't pop up if you choose to flatten the cloud.

A fourth dialog box is displayed:



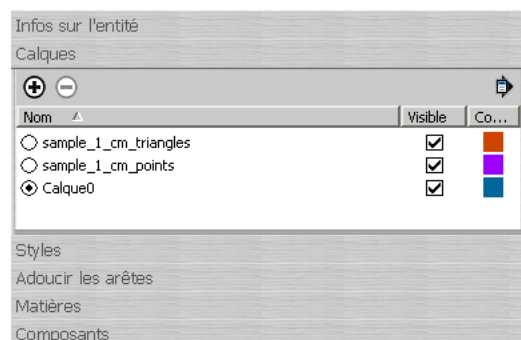
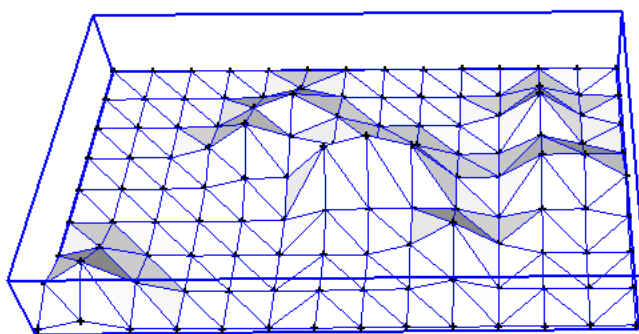
Select "Yes" to generate triangular faces between points, or select "No" to end.

Resulting geometry:

Two groups are created

The points group, on layer "InputFileName_points"

The triangles group (if triangulated cloud), on layer "InputFileName_triangles"



2.2. Export a points cloud:

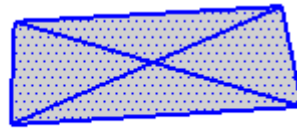
The script can create a CSV file, exported from the model, usable in other applications.

- Select entities to export: valid objects are: guide points, lines (edges), curves (arcs, polygones, Bezier curves), and faces.

The following two lines will generate only 3 points in the CSV file, and the below 4 faces will generate only 5 points in the CSV file, because points that are at the same location are only exported once:

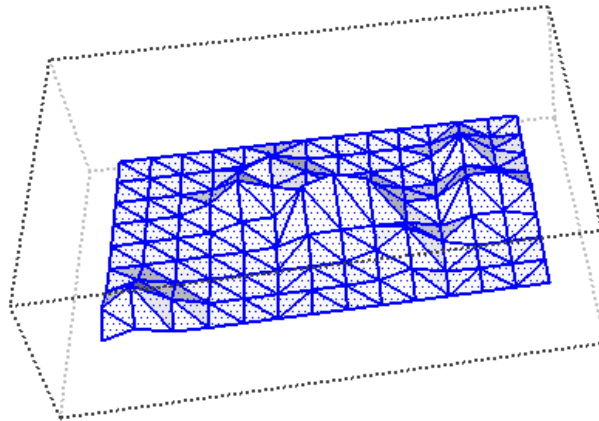


3 points exported

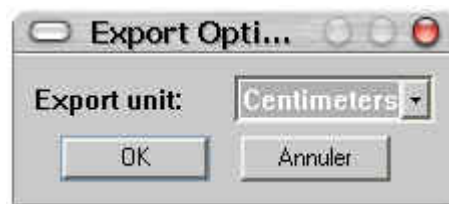


5 points exported

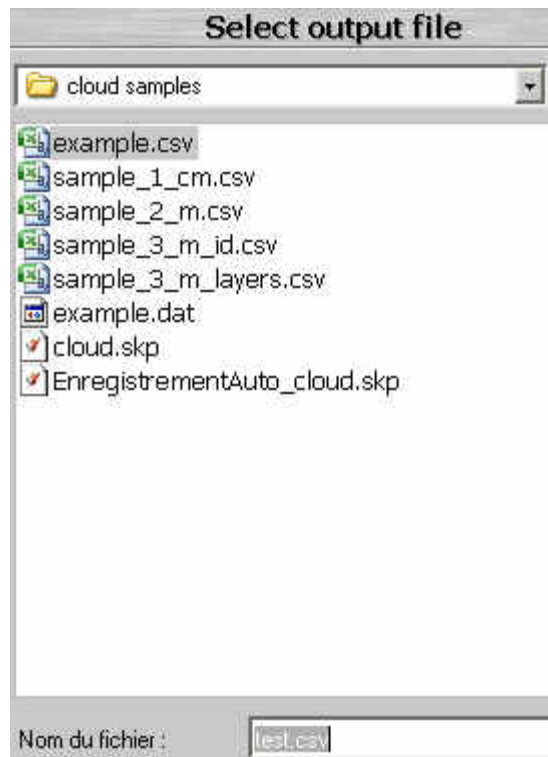
When the content of a group (such as a terrain) or component has to be exported, double-click on it to select entities:



- Select File > Points Cloud > Export
- Select the export unit (default export unit is the current model unit):



- Select a file to export to or type its name:



A message box will pop up, it includes the number of points exported and the output file name.

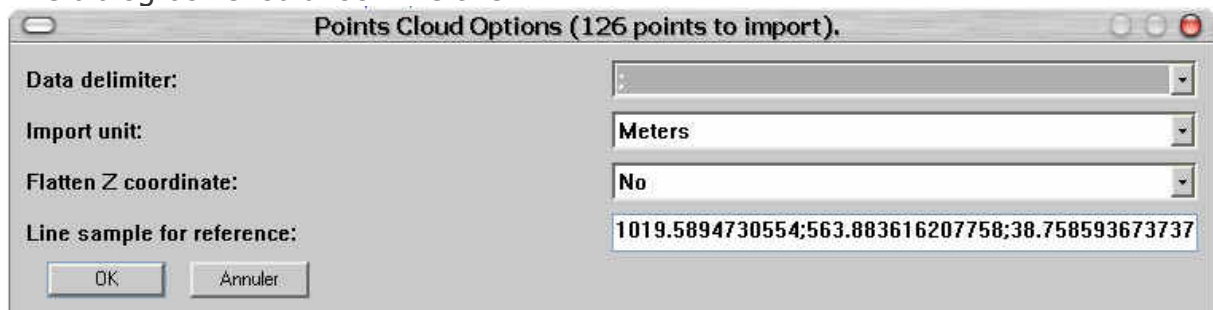
3. Tutorial:

Several samples of CSV files are included in the package. When unzipping it to your Plugins folder, they've been put there.

Test 1: simple cloud with XYZ coordinates only

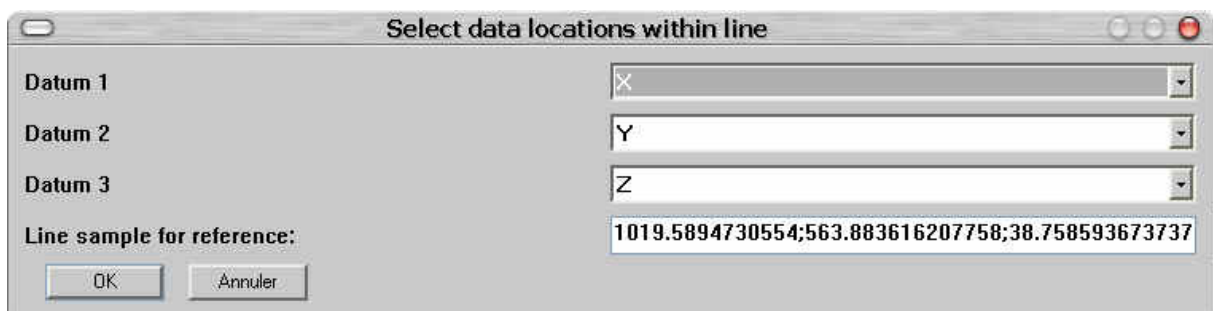
- Set your model units to meters
- Select File > Points Cloud > Import
- Browse your disk to the Plugins folder and select the file "sample_1_cm.csv"

The dialog box should look like this:



There are 126 points in the file, your current units are "meters" (set as default import units). Look at the reference line sample: delimiter is a semicolon.

- Don't select another delimiter, semicolon is default
- Select "Centimeters" import unit (the input file has been exported in cm)
- Click OK



Browse the line sample, you'll see that there are only 3 data X,Y,Z, so you can click OK. Points are drawn and a "zoom extents" on the points cloud is done.

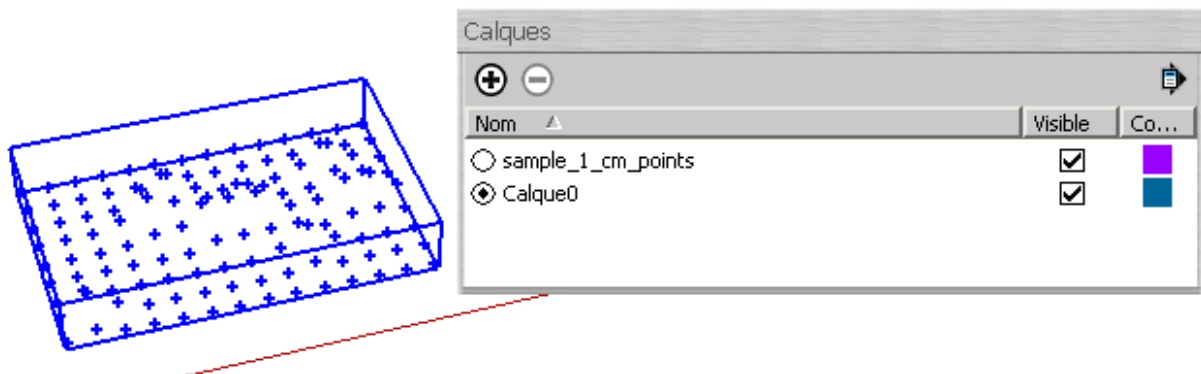


- Leave the altitude dropdown as it is and click OK.



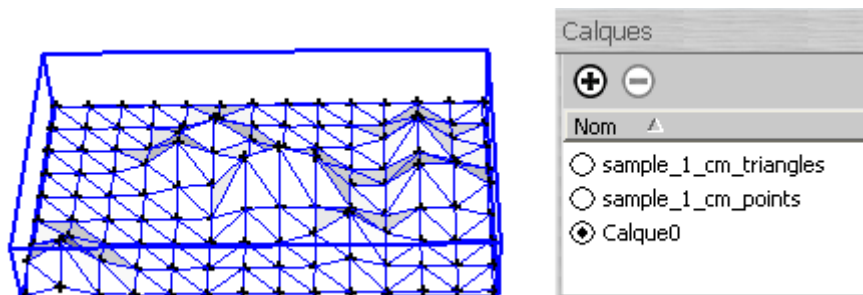
- Click on "No".

Resulting geometry:



All points are grouped in a group, on layer "sample_1_cm_points".

If you choose to triangulate the cloud, you will get the following:

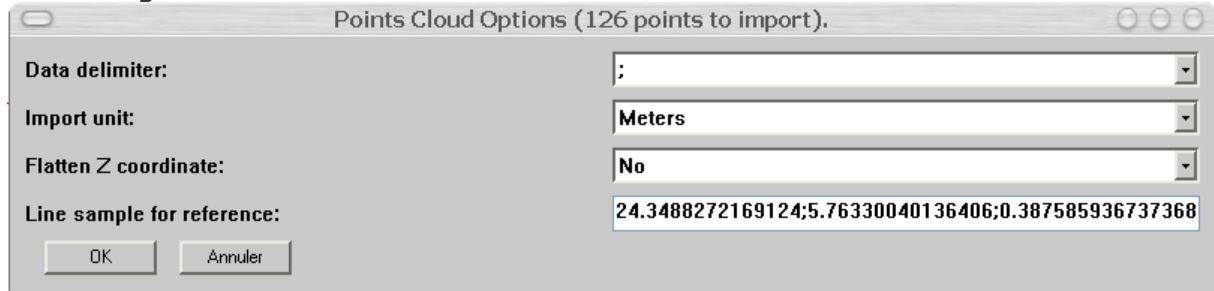


All points are grouped in a group, on layer "sample_1_cm_points", all triangles are grouped in a group on layer ""sample_1_cm_triangles".

Test 2: cloud with XYZ coordinates, altitude as text

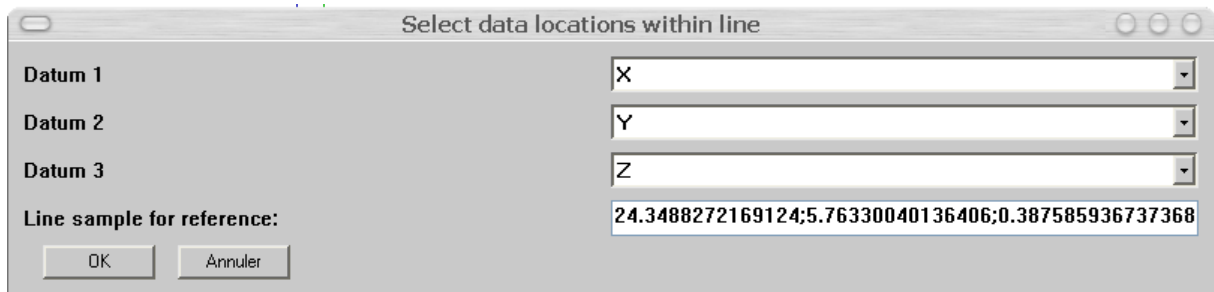
- Set your model units to meters (if not done before)
- Select File > Points Cloud > Import
- Browse your disk to the Plugins folder and select the file "sample_2_m.csv"

The dialog box should look like this:



There are 126 points in the file, your current units are "meters" (set as default import units). Look at the reference line sample: delimiter is a semicolon.

- Don't select another delimiter, semicolon is default
- Leave the import unit unchanged: "Meters" import unit (the input file has been exported in m)
- Click OK



Browse the line sample, you'll see that there are only 3 data X,Y,Z, so you can click OK. Points are drawn and a "zoom extents" on the points cloud is done.

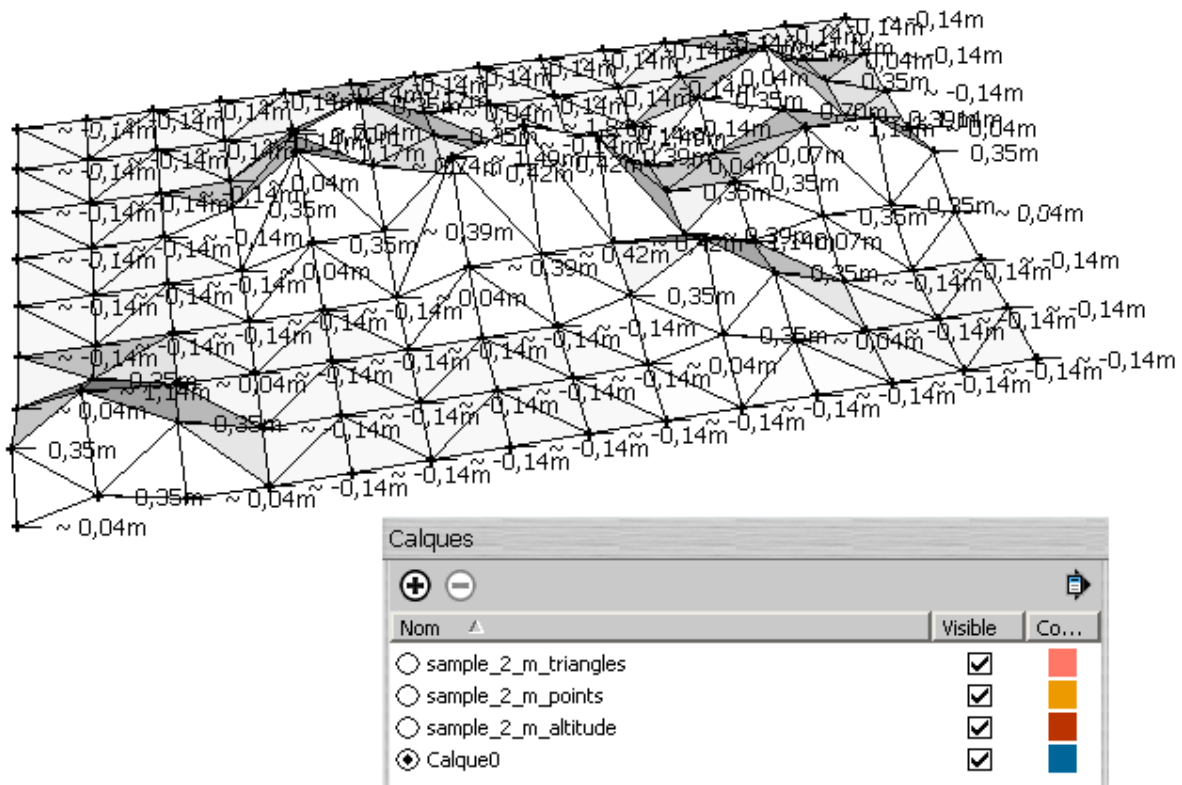


- Select "Insert as text" in the dropdown list and click OK.



- Click on "Yes".

Resulting geometry:

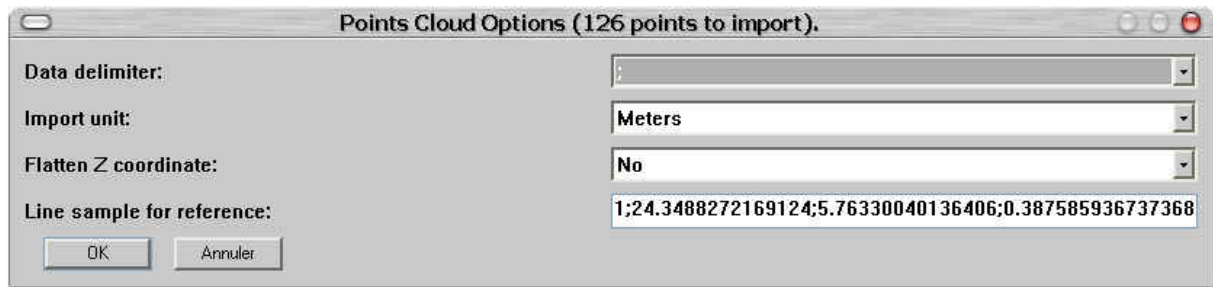


All points are grouped in a group, on layer "sample_2_m_points", all triangles are grouped in a group on layer "sample_2_m_triangles", altitudes texts are on layer "sample_2_m_altitudes".

Test 3: cloud with ID and XYZ coordinates, altitude as text, ID as attribute

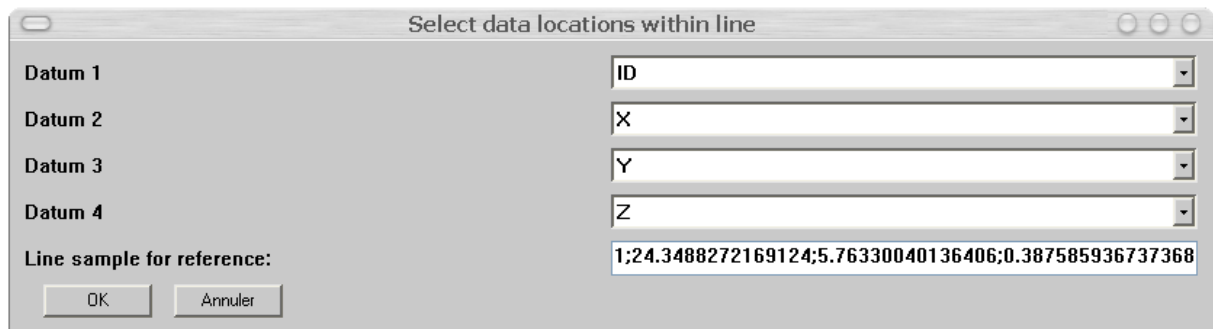
- Set your model units to meters (if not done before)
- Select File > Points Cloud > Import
- Browse your disk to the Plugins folder and select the file "sample_3_m_id.csv"

The dialog box should look like this:



There are 126 points in the file, your current units are "meters" (set as default import units). Look at the reference line sample: delimiter is a semicolon and the first value is a number that identifies the point.

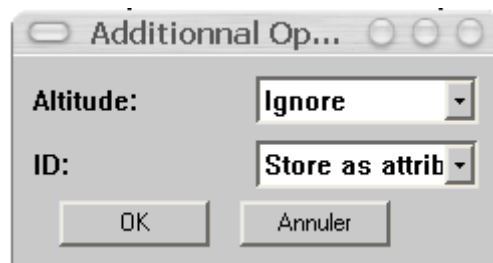
- Don't select another delimiter, semicolon is default
- Leave the import unit unchanged: "Meters" import unit (the input file has been exported in m)
- Click OK



Browse the line sample, you'll see that there are 4 data: identifier, X, Y, Z.

- Select ID in the first dropdown list
- Select X in the second dropdown list
- Select Y in the third dropdown list
- Select Z in the fourth dropdown list
- Click OK.

Points are drawn and a "zoom extents" on the points cloud is done.

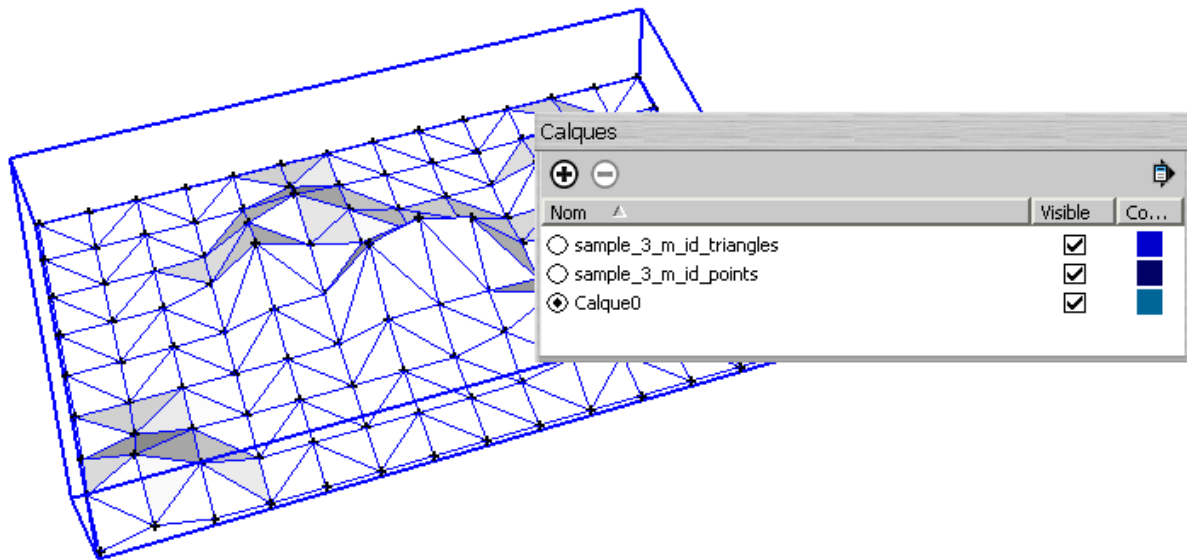


- Select "Ignore" in the altitude dropdown list
- Select "Insert as text" in the id dropdown list
- Click OK.



- Click on "Yes".

Resulting geometry:



All points are grouped in a group, on layer "sample_3_m_id_points", all triangles are grouped in a group on layer "sample_3_m_id_triangles".
Double-click on the points group, select a guide point and right-click to check its attribute:

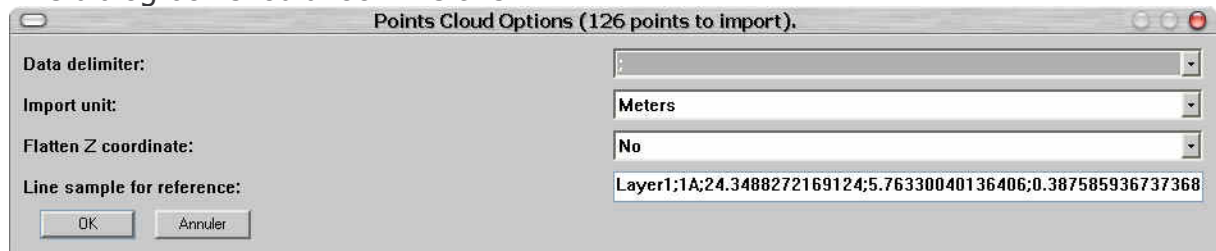


Each guide point has an attribute "id", the value being the number of the corresponding line in the input file, the dictionary of attributes is named "CloudPoint".

Test 4: cloud with layer, ID and XYZ coordinates, altitude as attribute and ID as text

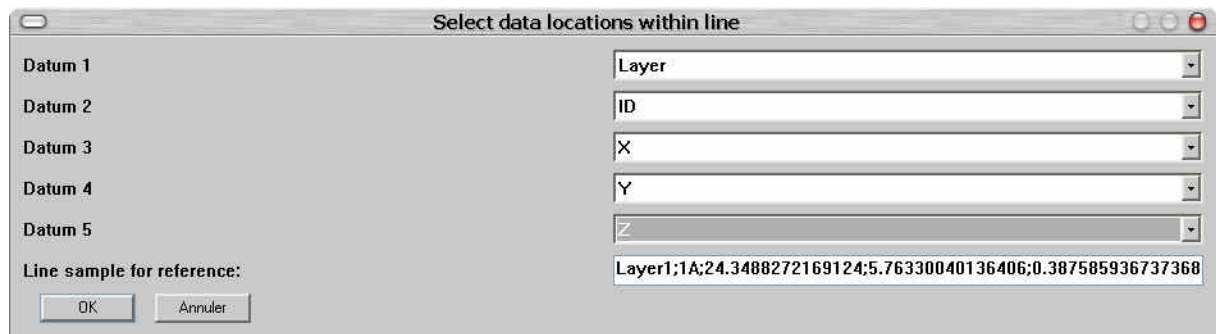
- Set your model units to meters (if not done before)
- Select File > Points Cloud > Import
- Browse your disk to the Plugins folder and select the file "sample_3_m_layers.csv"

The dialog box should look like this:



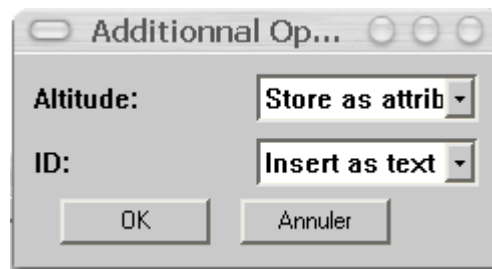
There are 126 points in the file, your current units are "meters" (set as default import units). Look at the reference line sample: delimiter is a semicolon, the first value is a string that seems to be a layer name, then an unidentified string, then 3 values X;Y;Z.

- Don't select another delimiter, semicolon is default
- Leave the import unit unchanged: "Meters" import unit (the input file has been exported in m)
- Click OK



- Select Layer in the first dropdown list
- Select ID in the second dropdown list
- Select X in the third dropdown list
- Select Y in the fourth dropdown list
- Select Z in the fifth dropdown list
- Click OK.

Points are drawn and a "zoom extents" on the points cloud is done.

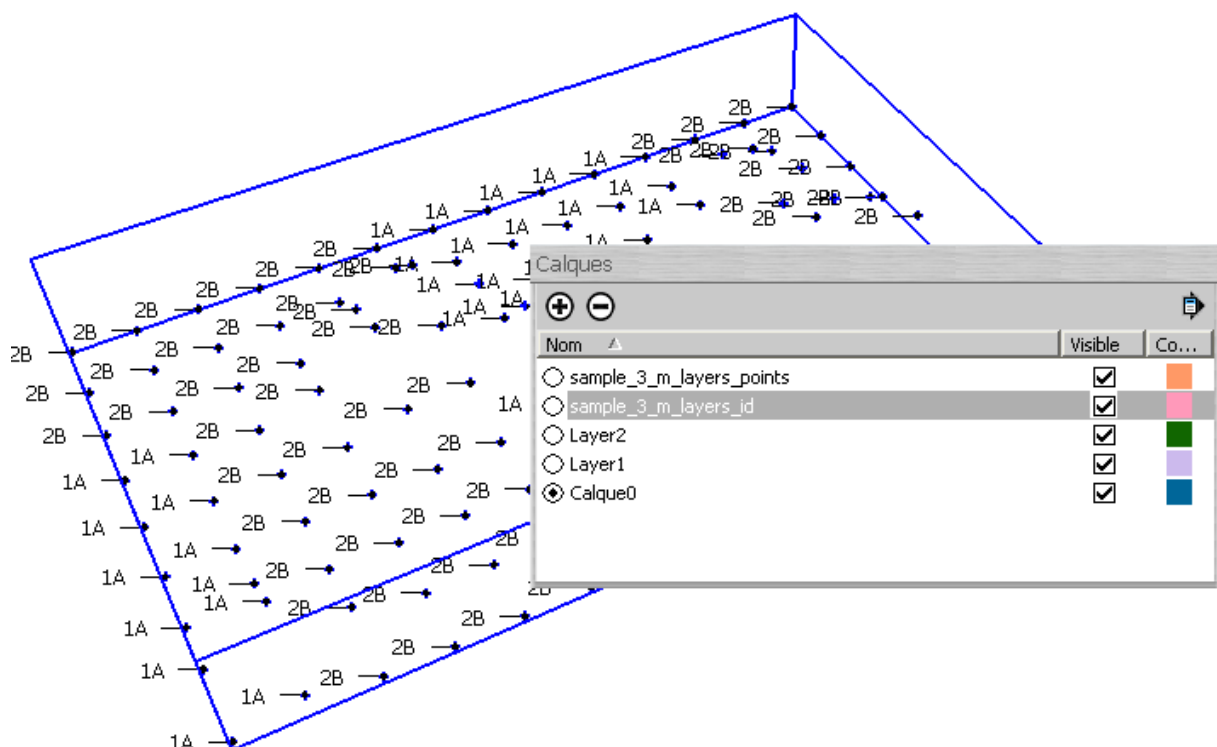


- Select "Store as attribute" in the altitude dropdown list
- Select "Insert as text" in the id dropdown list
- Click OK.



- Click on "No".

Resulting geometry:



All points are grouped in a group on layer "sample_3_m_layers_points", but every single guide points is put on its own layer as it is set in the CSV file. That's why Layer1 and Layer2 have been created.

All triangles are grouped in a group on layer "sample_3_m_layers_triangles".

All ID texts are on the layer ""sample_3_m_layers_id".

Double-click on the points group, select a guide point and right-click to check its attribute:



The screenshot shows a window titled "Attribute Manager" with a pencil icon. Inside, there is a tab labeled "CloudPoint" and a button "Add Category...". Below this is a table with two columns: "Name" and "Value". The table contains one row with the value "altitude" in the "Name" column and "72.29" in the "Value" column.

Name	Value
altitude	72.29

Each guide point has an attribute "altitude", the value being its Z value of the corresponding line in the input file, the dictionary of attributes is named "CloudPoint".
