

# STONEX DATA MANAGER

User Guide

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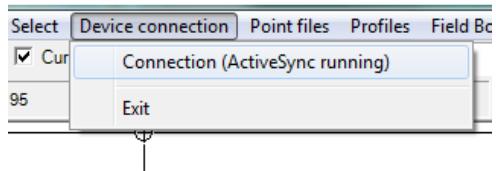
# 1 – HANDLING GPS DATA

## 1.1 Download GPS data

Open **Stonex Data Manager** and check that the GPS data recording device is connected. If the GPS data recording device is connected, the system presents the survey files contents. (\*.rw5).

Up left are listed the device files.

Up right are listed the survey files of the computer in the current job folder.



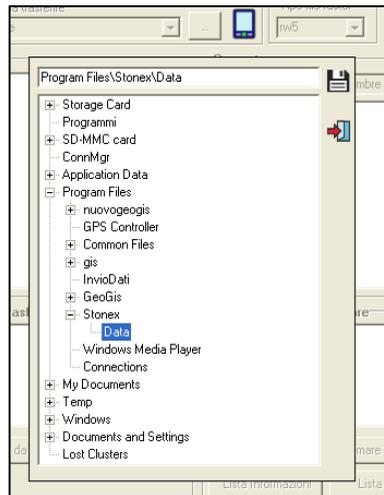
You can also access to the same function from the Menu **Device Connection / Connection**.

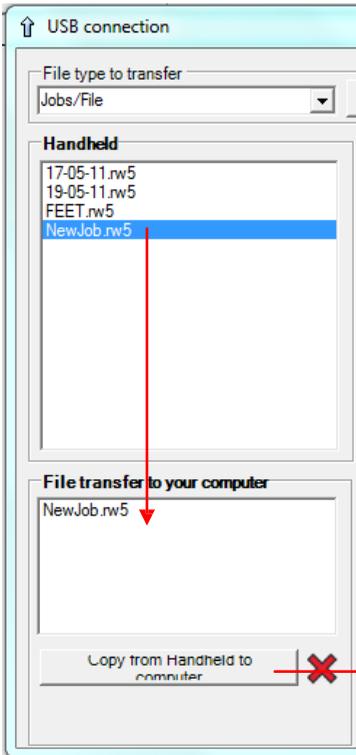
Select your job folder in the device with the  button. This set-up should be done at first connection.

You can find the files in the folder: **Program File / Stonex / Data**.

Select the survey file (or files) to download from the list.

Selected files will be transferred to the list below.

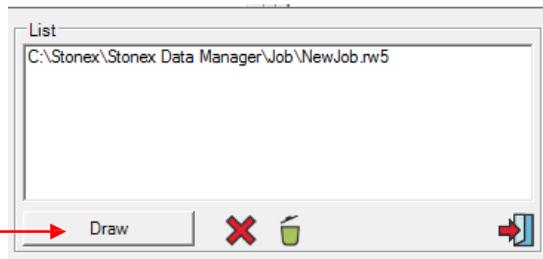




Press the **Copy from Handheld to computer** button to copy files in the job folder of the computer.

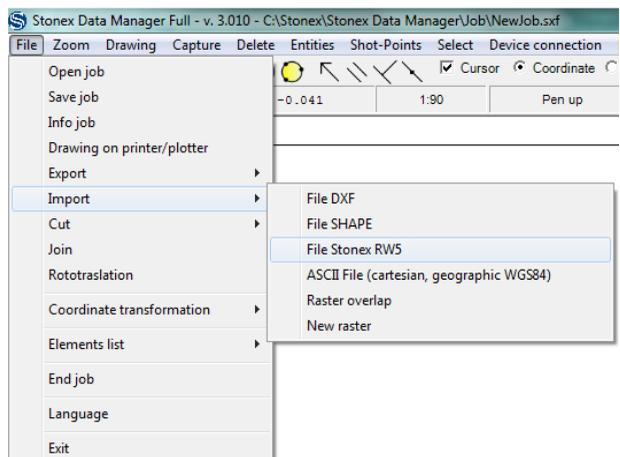
When the transfer ends, you can decide to represent your survey clicking on the **Draw** button.

Then choose the type of conversion you want to apply on WGS84 coordinates.



## 1.2 Import Stonex RW5 file

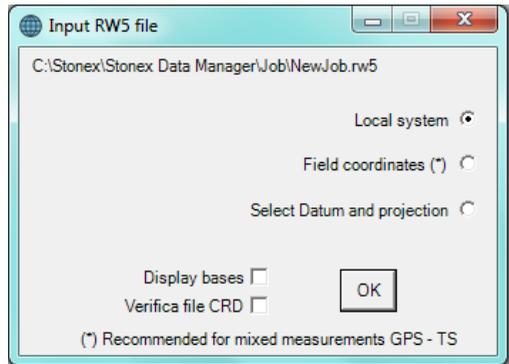
Download files with the previous procedure (or use copy/paste) from the device to the computer. Then they will be ready to be selected and processed. Choose and select the file and then decide the type of conversion.



### 1.3 Coordinate conversion

Choose the type of conversion from WGS84 coordinates.

Local system and Datum/projection will be described later.

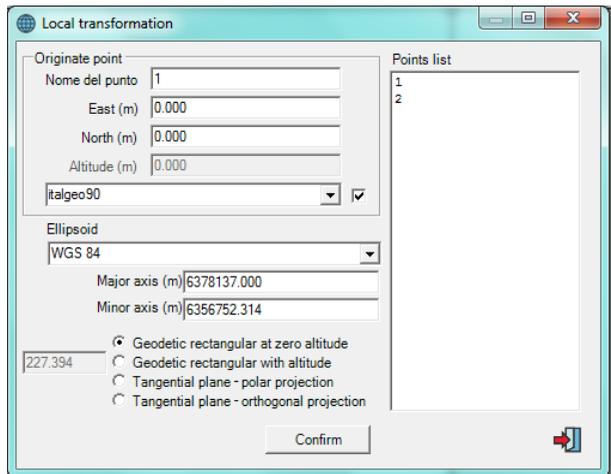


**Field coordinates:** it holds on the coordinates system chosen in field at the moment of the survey.

**Display bases:** it displays the points used as bases (not recommended in case of connection to VRS net, because bases can be too long way away from the survey field).

### 1.4 Local System

If you choose the local system, you have to select a originate point and assign to it planimetric coordinates and altitude. Then select the ellipsoid of the geographical coordinates. You can select also the file containing height differences between measured altitudes and



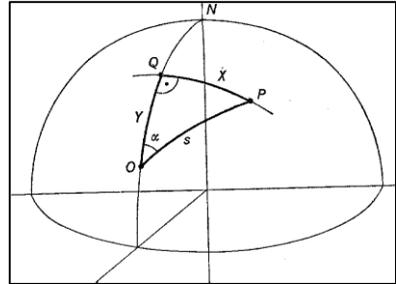
the geoid (in this case don't consider the following ways of altitude calculation).

You can select one of this ways of projection:

**Geodetic rectangular at zero altitude**

Defined O the originate point, rectangular coordinates of P point correspond to the measure of the geodetic as represented in the picture on the right (X,Y).

Altitudes are related to the ellipsoid surface.



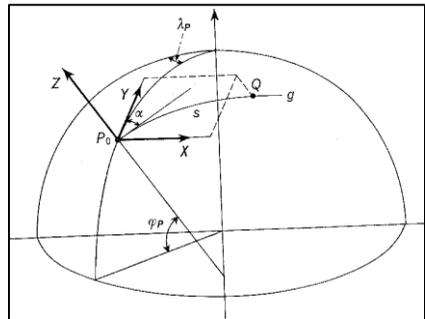
**Geodetic rectangular with altitude**

As before, but distances between points are carried on a plane at a landmarked altitude of originate point O.

**Tangential plane – polar projection**

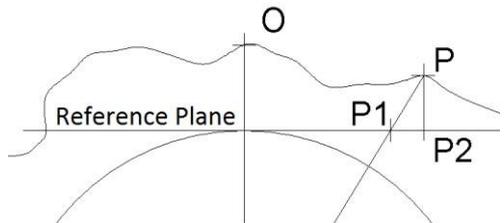
Cartesian coordinates are carried on a plane, which is tangent to the originate point (P<sub>0</sub> in the picture).

The altitude of the P point is defined by the P<sub>1</sub>-P segment.



**Tangential plane – orthogonal projection**

As before, but the altitude of the P point is related to the P<sub>2</sub>-P segment.



## 1.5 Datum and projection

On the left you can select all the options about datum and ellipsoid. Pressing the **Transform coordinates** button, the program will convert the coordinates.

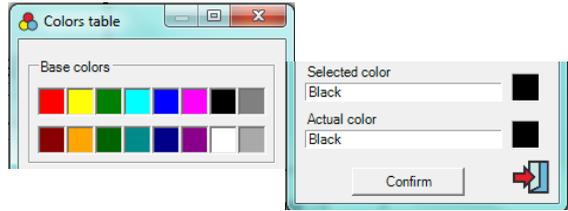
## 1.6 Points characteristics

These options allow you to set representation symbol, colour and layer of the points.

As initial setting, points are divided in:

- Points generic
- Multiples of 100
- Station/Base points

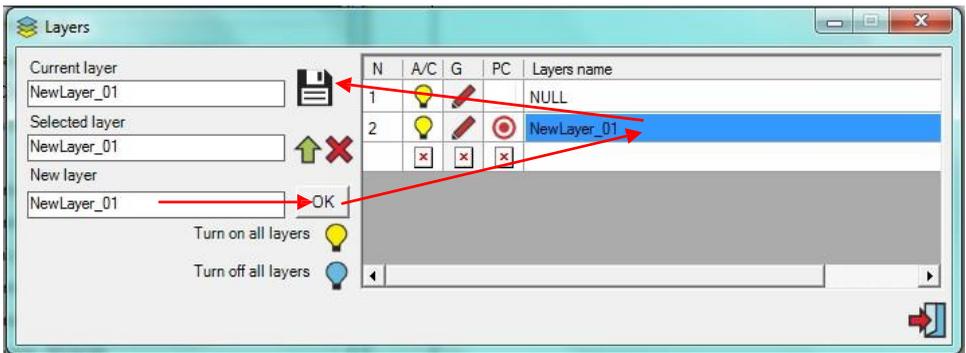
**Color selection:** click in the box *Color* or on the colored square. Choose the preferred color and confirm with the **Confirm** button.



**Symbol selection:** click in the box *Symbol name* and choose the symbol. Confirm with the **Confirm** button.

**Layer selection (plane):** click in the box *Layer* and choose the layer from the list or define a new one (box *New Layer* → OK).

Select the new layer from the window on the right and confirm with the  button.



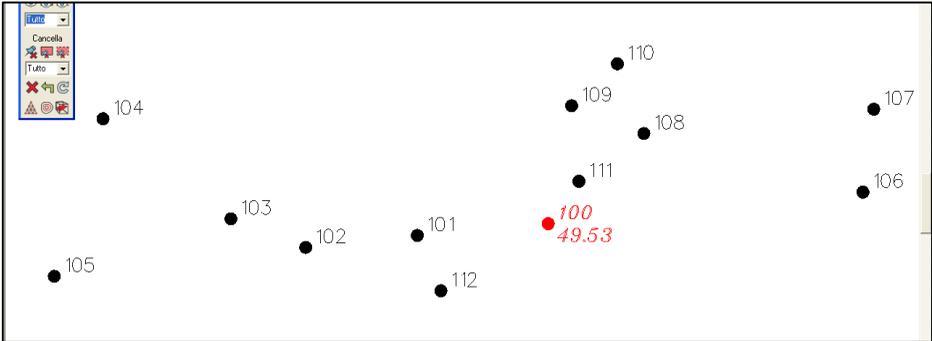
## Make drawing

Rename and save the draw of your job.

All following graphical elements you enter will be saved in this job, any other raster too.

The extension **.SFX** is related to the application **Stonex Data Manager**, so, when you open this job, the system will open automatically the **Stonex Data Manager** application with the representation of the job.

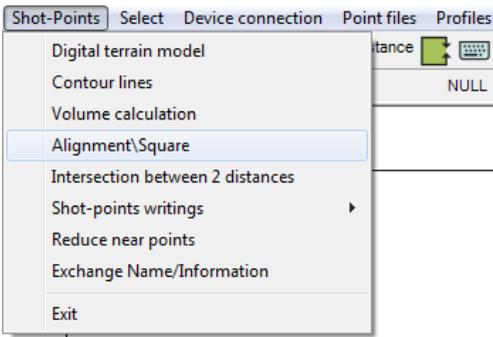
Then surveyed points will be represented on the screen.



## 1.7 Alignment\Square

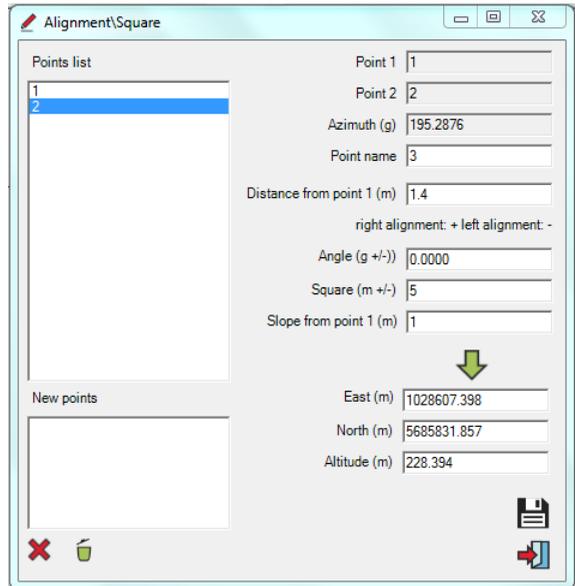
In Menu, go in **Shot-Points – Alignment\Square**.

This mask lets you calculate new points basing on the define direction of two surveyed points.

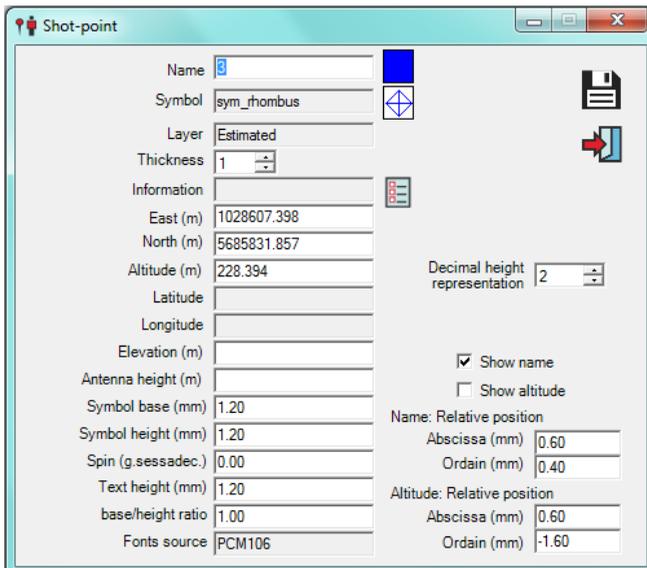


In this mask, must be selected from the list two new points on which realize the alignment (1-2 in the example), so must be defined:

- **Point name;**
- **Distance from point 1,** positive if in direction of point 2, or negative if it's the opposite;
- **Angle in centesimal grades** related to the alignment;
- **Square** from the alignment, positive if on the right, negative if on the left of the alignment;
- **Slop from point 1.**



The icon  calculates the point and the system shows a mask in which you can change the graphical characteristics.



The confirmed point () will be transferred to the end of the list on the left of the previous mask. The system prepares the mask for a new point calculus.

The last confirm will show you the new calculated points on the screen.

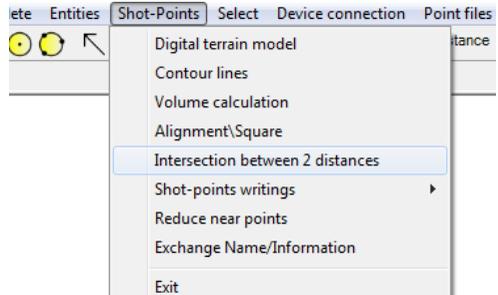
The screenshot displays a software interface with a menu bar at the top containing options like 'File', 'Zoom', 'Drawing', 'Capture', 'Oelcte', 'Entrt1', 'Sho Points', 'Sd<ct', 'Device connect1 On', 'Printf #', 'Profiles', 'FiddBook', 'Help', and 'Measure unit'. Below the menu bar, there is a large white area with a grid. On the left side of this area, there is a vertical list of symbols and characters, including '@', 'j)j)fi', '?', 't!<()!!!', '.{+F', 'Ca''''''', '®!i!\$', 'o.~te', 'X\*!i!@', and '&.®'. In the main grid area, there are four points labeled: '\$3' in blue text, '\$4' in blue text, '+1' in red text, and '+2' in red text. The labels '+1' and '+2' are positioned to the right of the '\$3' and '\$4' labels respectively.

## 1.8 Points estimate by intersection

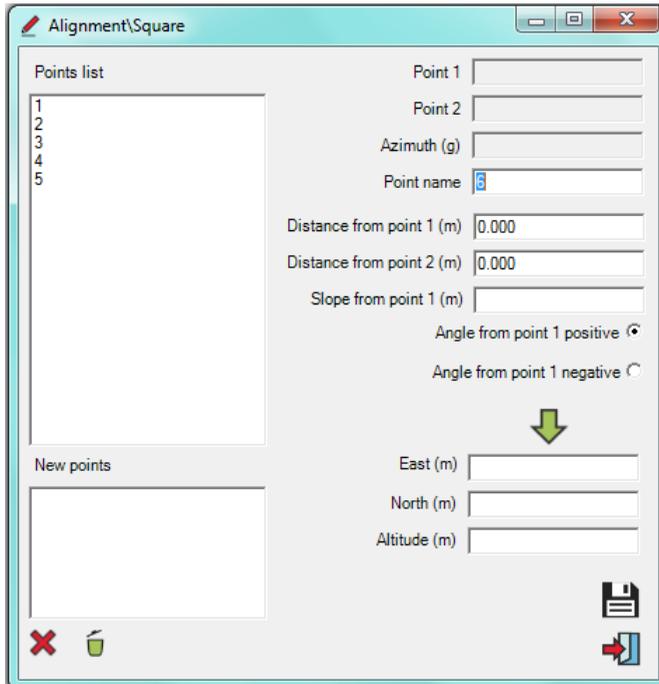
In Menu, go in **Shot-points – Intersection between 2 distances**.

This command lets you calculate new points starting from the distance of two surveyed points.

You have to decide if the new point must be on the left or on the right of the selected points alignment (Angle from point 1 positive/negative).



The point will be calculated in the same way of the previous paragraph.



## 1.9 Export file for GPS

### From the Menu **File – Export –File Stonex RW5/CRD**

This function creates files to use in field with *SurvCE*<sup>1</sup>, the control software which is equipped with the topographical GPS Stonex S9-GNSS.

Each export procedure creates two different type of file:

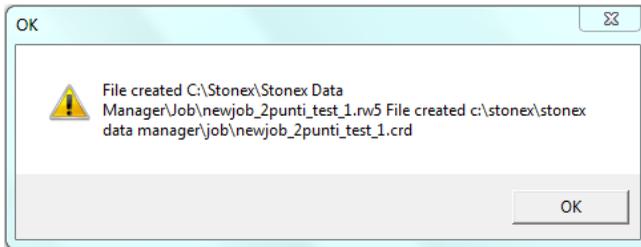
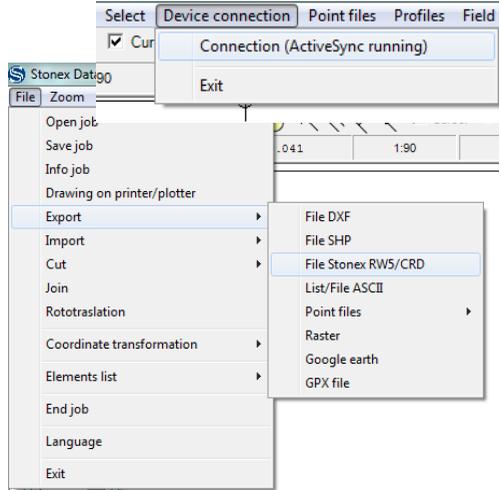
- *namejob.rw5*
- *namejob.crd*

It's important to assign a name to the files.

To avoid an overlap of files, the system assigns automatically a made-up name: the name of the current job followed by an order number.

However the user can enter a different name.

When the file is created, it will appear a notification.



To copy

these

<sup>1</sup> Carlson® Software - [www.carlsonsw.com](http://www.carlsonsw.com)

files in your palmtop, connect the hand-held computer by USB port and go in Menu **Device Connection** in the Stonex Data Manager program.

You must select files with **.rw5** extension in your computer.

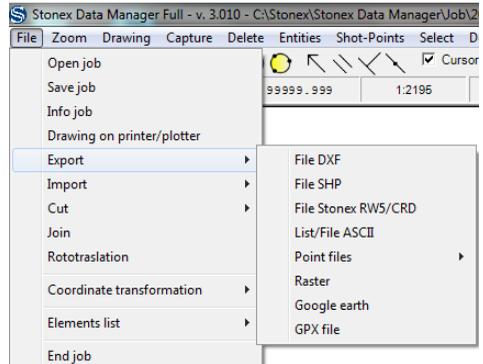
Press the **Copy from Handheld to computer** button to copy files in the job folder of the computer.

The system will provide for copy also the corresponding **.crd** files.

## 2 – EXPORT FILE

**Stonex Data Manager** lets you export files with the most widespread in GIS sector and CAD projection formats.

With **Stonex Data Manager** you can also create files of numerical cartography, georeferenced raster images, files for GPS Stonex, waypoints and tracks for the most common GPS systems in trade.

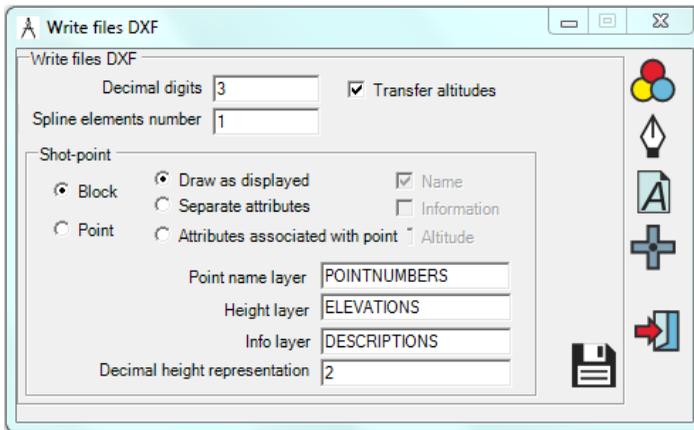


### 2.1 Export file CAD (dxf)

From the pull-down menu select **File DXF**.

Assign a name to the **DXF file** to create in the mask that appears.

Then choose all the characteristics of the file in the next mask.



### Transfer altitudes

If the flag is active the **file DXF** will be tridimensional, otherwise bidimensional.

**Decimal digits:** the file DXF is a file ASCII, so it's necessary to define the number of decimal digits of the graphical elements coordinates.

**Spline elements number:** the lines are made-up with short strokes. The number of points can be reduced in order to slim the finale file DXF. For example, if you set the value 3, the line in the file DXF will be described from a point every 3.

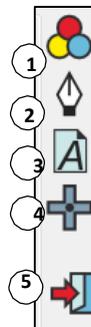
**Shot-point – Block/Point:** the shot-point is made-up with a symbol and possible associated writings (point name or point altitude). The transfer to **DXF** can be made through the copy of the representation of the original drawing: single point, symbol with name and altitude, symbol with name, symbol with altitude. The symbol can be represented by a **Block**, which draws the symbol as displayed or from a point.

**Writes always Point:** the **Block** can have a **Point** centered under the symbol to simplify the operations of capture with the system, which will read the file **DXF**.

**Separated attributes:** the writings of point name/altitude can be associated to the symbol or separated like single texts.

Lateral icons let you configure in details the following parameters:

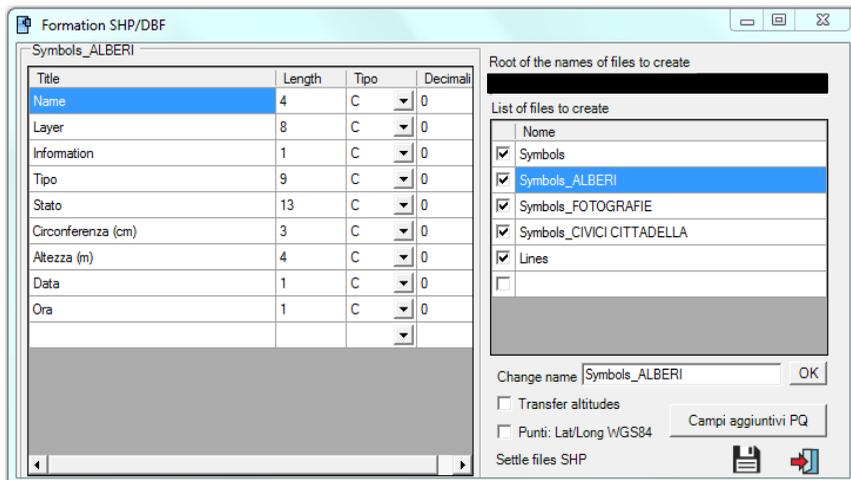
- (1) Color
- (2) Lines
- (3) Fonts of character
- (4) Symbol
- (5) Quit



## 2.2 Export ESRI Shapefile

In the first mask you will be required to enter the name of the SHAPE file to create and then its characteristics in a second one.

This command lets you export line, polyline, shot-points graphical elements; but more important it's the transfer of associated information corresponding to the file **DBF** in the package shape.



It's planned that graphical elements can be associated to different folders in the same job, but also that a single graphical element can be associated to more than one informative folder.

The second mask that appears shows the list of groups of files to create (folders of files **SHP**) on the right side.

The system will realize a number of file **SHP** groups as much are the folders; each group will contain graphical elements of the associated folder, represented in the related file **DBF** on the left side of the mask.

Furthermore it will create groups of file **SHP** containing elements without associated folders.

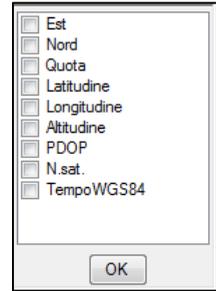
In the example above the mask responds that it will create groups of file **SHP** of symbols related to the folders ALBERI and FOTOGRAFIE.

The length of the information fields of the file **DBF** are defined automatically by the system: the reference length is the one of the longer information.

However the user can define the length and memorize them.

The command **Campi aggiuntivi PQ** allows you to add some extra records to the database (file **DBF**), which will be automatically filled in and entered in the exported file.

The extra records will be entered in the database of all the *point* elements (shot-point) composing the survey.

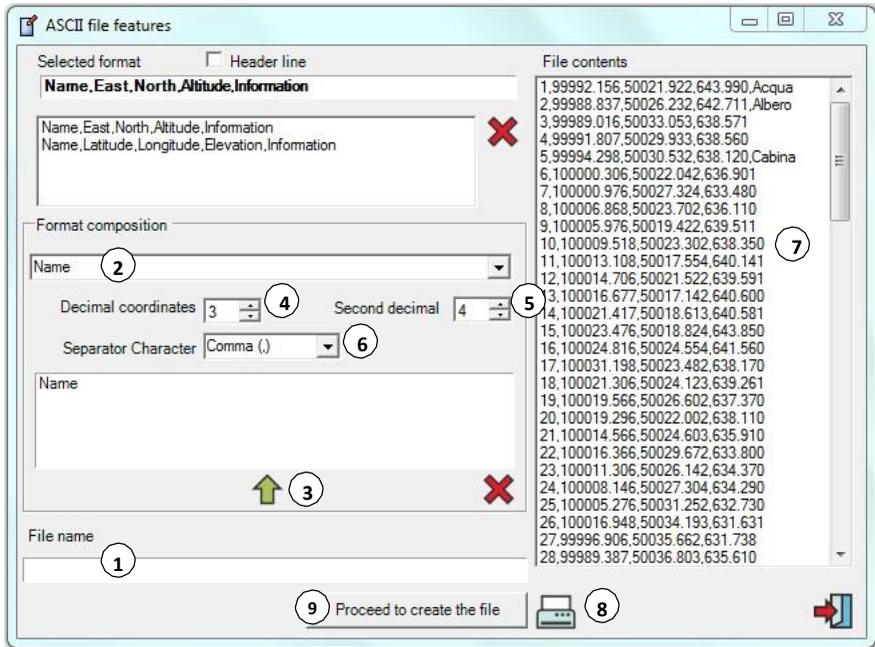


## 2.3 Export file Stonex RW5/CRD

Go to paragraph 1.10.

## 2.4 Export file ASCII of coordinates

This command let you create a file ASCII of coordinates or of numerical cartography.



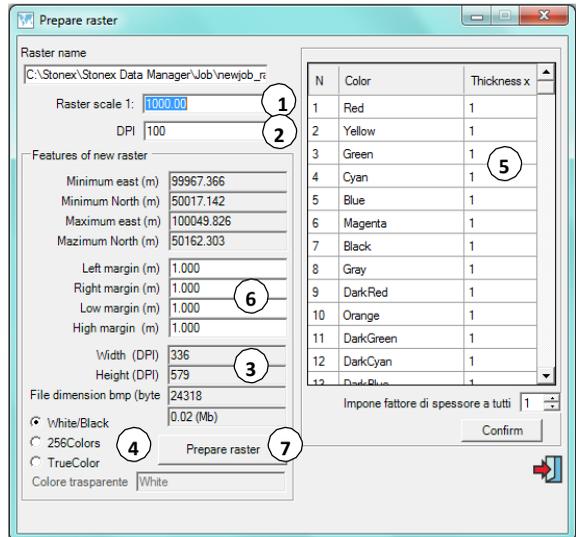
- (1) Enter **Name of file** to create.
- (2) Use commands in the box **Format composition** to fill in the fields of the file features.
- (3) Click the icon  to save the succession and add it to the list.
- (4) If the file is made by Cartesian coordinates, impost here the number of decimal digits.
- (5) If the file is made by geographical coordinates, impost here the number of decimal digits.
- (6) Choose the separator character between the file fields.
- (7) In **File contents** on the right, you will find the preview of the file composition.
- (8) You can print the created file through the  icon.
- (9) Click on **Proceed to create the file** to save it and quit from the procedure.

## 2.5 Export georeferenced raster base

This command turn your drawing displayed on the screen into raster. (this function is valid with both vectorial images and raster with vectorial elements)

After giving a name to the file raster to create, fill in the mask that appears:

- (1) Choose a scale; in
- (2) Choose the suitable resolution to make a right representation of the drawing.



Generally the denominator

of the scale to enter (**Raster scale 1: ...**) has to be congruent with the scale chosen for the printing with a plotter or a printer: it depends on the dimensions of the drawing and on the resolution (**DPI = dots per inch**).

- (3) The variation of scale and resolution causes the alteration of the values of **Width**, **Height** and of the **file dimension** in byte and Megabyte.
- (4) You can generate a raster in **White/black**, **256 colors** or **True color**.
- (5) On the right you can assign a different thickness to each color of the drawing.
- (6) You can also decide the width of the four white **margins**.
- (7) Click on **Prepare raster** to create your raster.

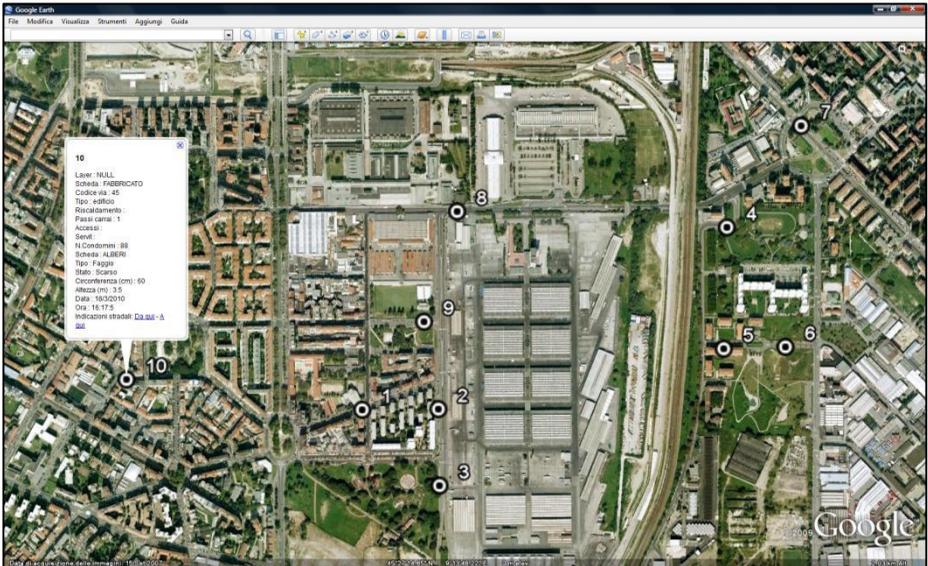
You can also create a raster from a raster with an overlapping vectorial.

In this case, the options (**Raster scale 1: ...**) and (**DPI = dots per inch**) will be disabled, because the initial image characteristics will be hold on.

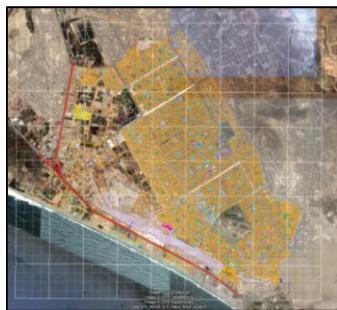
## 2.6 Export GPS Exchange Format and Google™ Earth

**Stonex Data Manager** lets you create waypoints and tracks for the most common GPS systems in business and also lets you export Google™Earth's jobs. This allows you fast and intuitive communication and diffusion of surveyed data.

In case of jobs with only GPS points the conversion (in Datum WGS84) occurs without further passages.



In case of a drawing more elaborate with some graphical elements (such as lines, polylines and polygons), it will be necessary specify the same **Datum**, **Projection** and **Originate Ellipsoid** of the job.





# 3 – IMPORT FILE

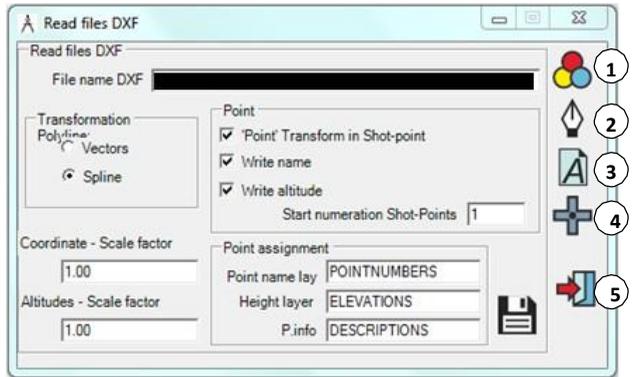
## 3.1 Import CAD (dxf) file

You can open this function from: **File / Import**

Enter the name of file dxt to import, in the mask that appears.

File dxf can contain sequences of vectors, defined polylines.

You can transform each vector of the polylines in vector **(polyline in vectors)** or leave them as they are **(polyline in spline)**.



File dxf can contain some **POINT** definitions: these can be transformed in shot-points **(‘Point’ Transform in Shot-point)**, in this case shot-point is transferred with a numeration from the define number **Start numeration Shot-points**.

Shot-point has always assigned a name and a height; they can be visible or hidden at first display of the drawing **(Point name lay – Height layer)**.

Coordinates described in **dxf** can be processed with a scale factor **(Coordinate – Scale factor)**; for example coordinates in **dxf** can be defined in millimeters, while in the system **Stonex Data manager** are defined in meters. In this case the scale factor must be **0.001**.

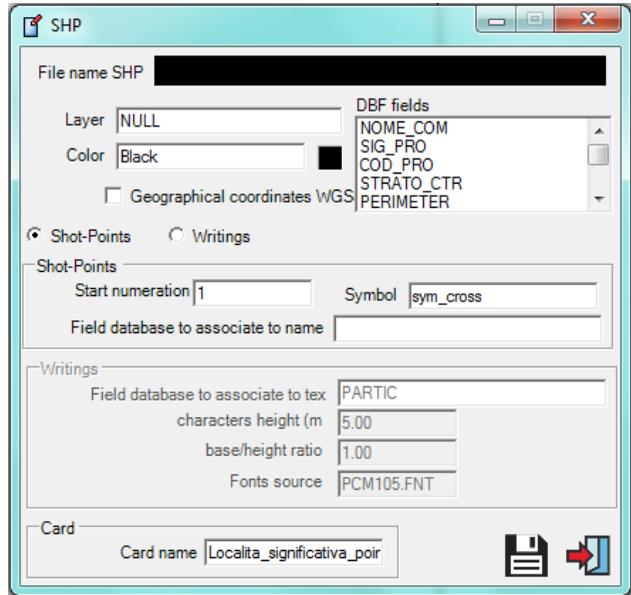
During the importation of file **dxf**, you have to choose **Colors (1), Lines (2), Fonts (3), Symbols (4)**.

The symbol  lets you quit from the procedure.

### 3.2 Import ESRI shapefile

A **Shape** is made up by tree files with the same name, but with different extension: **SHP, SHX, DBF**.

In the preparing mask you can choose colors, start of numeration of possible points (transformed in shot-points) and the database field to associate to the name of the imported elements. **Shape** elements defined from points can be transformed in writings.



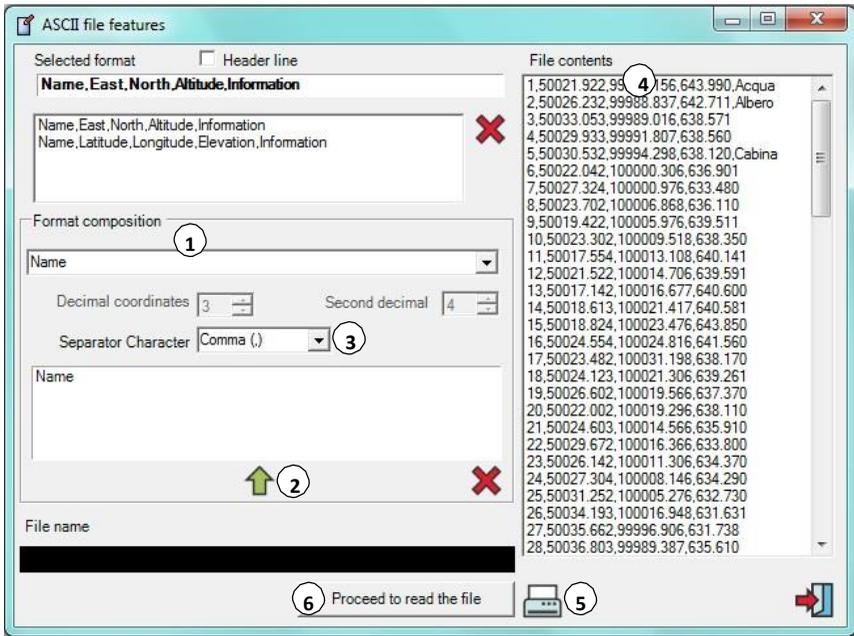
During the importation are transformed graphical elements such as lines, polylines, shot-points and writings.

### 3.3 Import file Stonex RW5

Go to paragraph 1.2.

### 3.4 Import file ASCII

When you start this function, a preparing mask appears on the screen. It's the same already described at paragraph 2.4.



Use the commands in the box **Format composition (1)** to define the fields of file, which are displayed in the blank box below.

Click on the (2) icon to memorize the succession and add it to the list.

Choose the separator character (3) of the file fields.

In the box **File contents(4)** you can see the preview of the file composition.

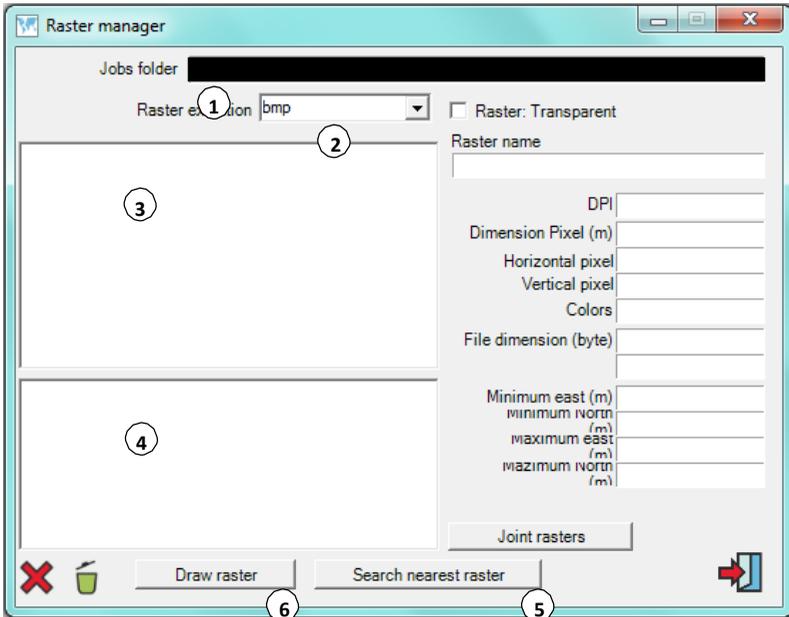
You can also print the created file thought the icon (5).

Click on **Proceed to read the file (6)** to memorize the set-up and to import the file.

### 3.5 Overlap raster image

You can add an image as overlap of the current job.

In this case the system takes for granted that the image is georeferenced and the reference system is the same of current job displayed on the screen.



Select:

(1) Jobs folder, where you can find maps to import.

(2) Extension of file raster (supported: bmp, tif, png, jpg, ecw, gif).

(3) Select one or more maps to import.

Selected a map, it is transferred to the box below **Selected raster** (4).

With the **Search nearest raster** function, the program looks for the nearest map (though the maps in the list) to the barycenter of the current job.

The found map is written out in the box **Selected raster**.

**Draw raster** (6): the system imports maps as background of the current job.

### 3.6 Import new raster

The system lets you import raster (formats bmp, tif, png, jpg, ecw, gif), which are displayed in the mask.

The system begins to create a new job, overwriting on the possible job displayed on the screen.

The new image can be georeferenced or to georeference.



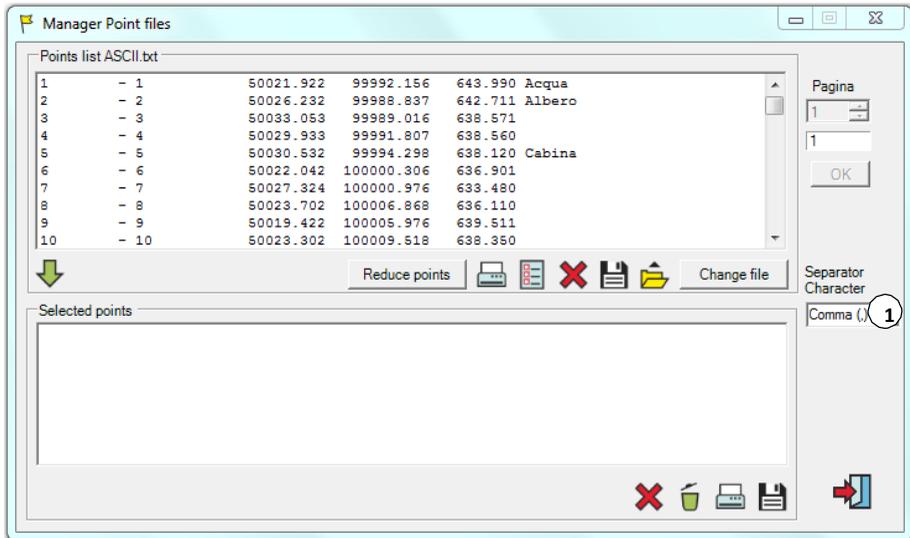
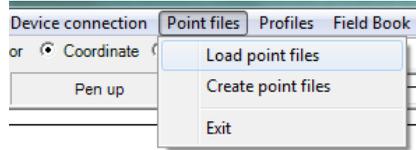
# 4 – POINT FILES

## 4.1 Load point files

With this function you can load a file ASCII of coordinates to process.

Supported formats are .txt, \*.asc, \*.csv

Immediately a mask appears on the screen: in the upper box there is the content of the file.



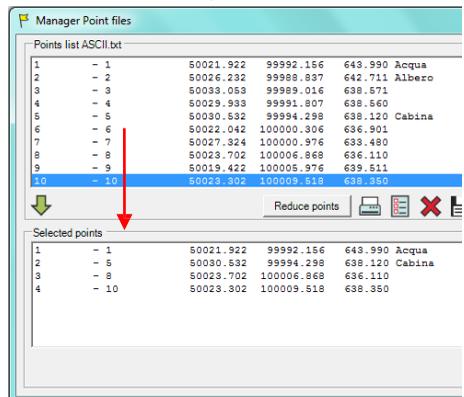
The commands below the box let you elaborate files and/or create a new one from the originate.

Clicking on the icon , selected points are transferred in the below box and they will define a new file.

Remember to select the separator character (1) to create a tabulated file.

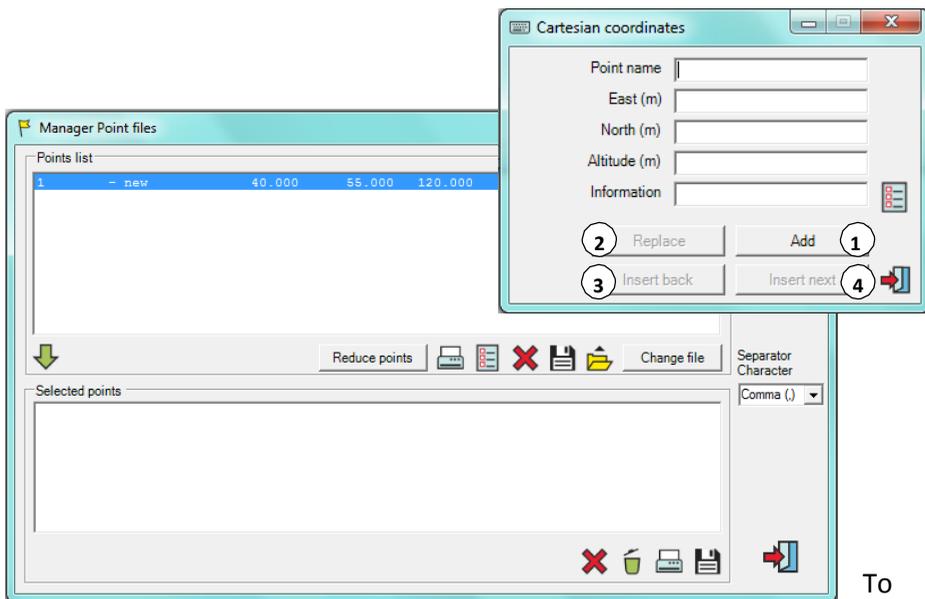
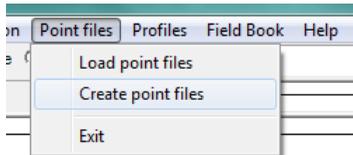
The command  lets you create a new file ASCII from the original one.

## 4.2 Create point file



It's possible made up a file ASCII of coordinates filling in the fields of the mask and then clicking on the button **Add** (1).

The point will be add in the upper box of the mask **Points list**. (par. 10.1).



other new points, use the command  in the main mask **Manager point files**.

The function **Replace** (2) lets you replace a point with another new one.

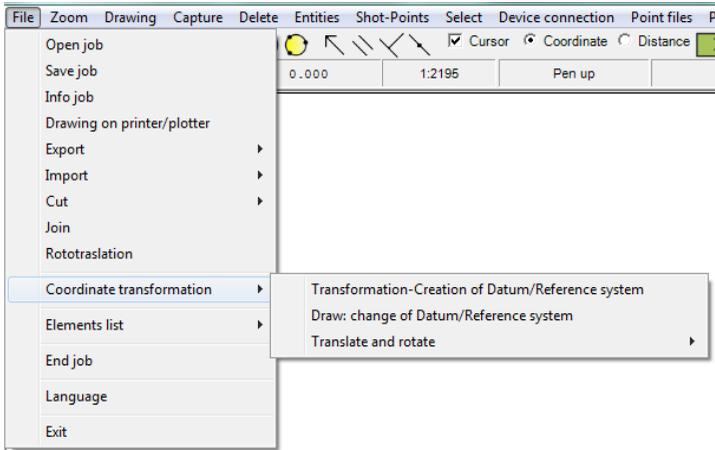
The function **Insert back** (3) lets you insert a point before the selected record.

The function **Insert next** (4) lets you insert a point after the selected record.

## 5 – COORDINATES TRANSFORMATION

You can find the function **Coordinates transformation** in the Menu: **File / Coordinates transformation**.

It allows different operations on coordinates systems.



### **Transformation-Creation of Datum/Reference system:**

This function lets you make transformations on existing Datum and/or create new Datum.

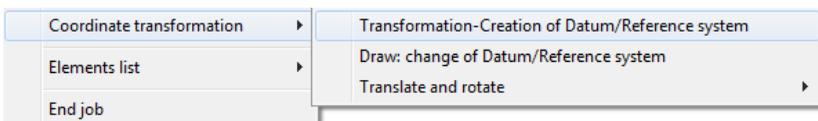
### **Draw: change of Datum/Reference system:**

This function lets you change Datum or reference system during current job.

### **Shift and rotate:**

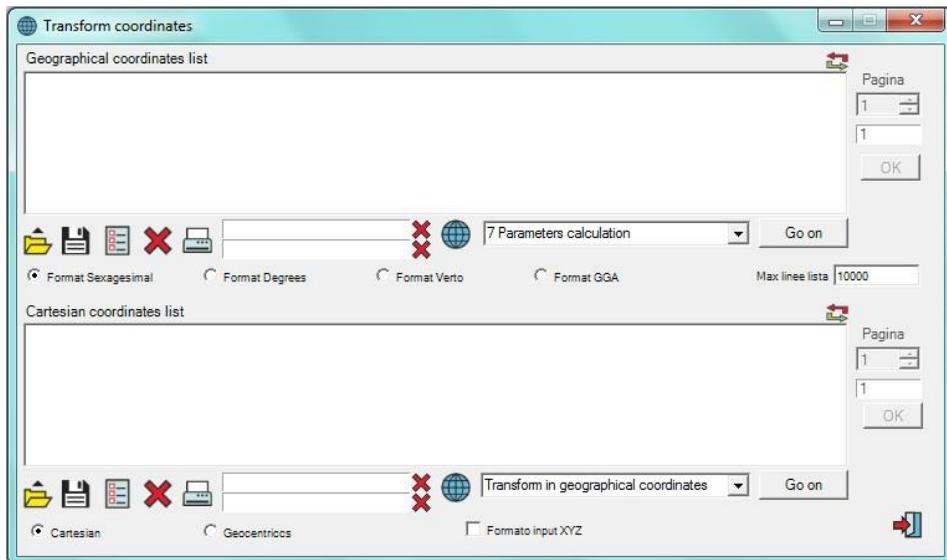
This function lets you make changes into survey geometry.

### 5.1 Transformation-Creation of Datum/Reference system

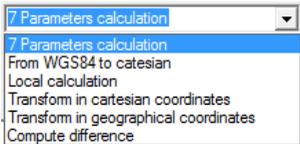


The main mask has two windows of coordinates representation: the upper manages geographical coordinates, the lower manages Cartesian coordinates.

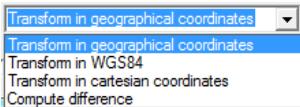
Both have different commands (icons) to manage their content. Each function acts in the box above.



-  Open an existing file of geographical/cartesian coordinates
-  Save file of geographical/cartesian coordinates
-  Edit manually a point
-  Delete coordinate
-  Print file Coordinates list
-  Activate functions of geodetic calculus (par. 5.5)
-  Invert abscissa/ordain



Choose operations with geographical coordinates (upper box).



Choose operations with cartesian coordinates (lower box).

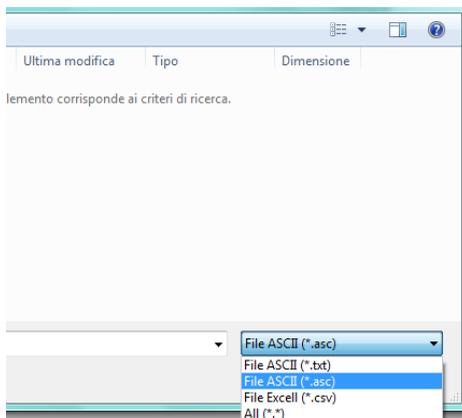
### 5.1.1 Open an existing file of geographical/cartesian coordinates

#### - Geographical coordinates -

This function lets you choose from different extensions.

In the common file ASCII (for example: extension “.asc”), each record must have:

- > Point Name
- > Latitude
- > Longitude
- > Height
- > Information (optional)



Separator character between elements can be made up by one or more spaces (character ASCII 32), by comma (character ASCII 44), or by tabulator (character ASCII 9).

Example1:

*P1001 45°25'02.5243069"N  
8°38'00.0075661"E 199.629 nail*

Example2:

*DVS,45°25'02.7080774"N,8°38'00.04  
66976"E,199.565*

## - Cartesian coordinates -

This function lets you choose from different extensions.

In the common file ASCII (for example: extension “.asc”), each record must have:

- > **Point Name**
- > **East**
- > **North**
- > **Height**
- > **Information (optional)**

Also in this case, separator character between elements can be made up by one or more spaces (character ASCII 32), by comma (character ASCII 44), or by tabulator (character ASCII 9).

Example3:

*T118 1471517.190 5029619.300 150.495*

Example4:

*TDUE,1470815.450,5027478.430,140.610, pole*

However, data don't have to be necessary tabulated (valid for geographical and cartesian coordinates).

### 5.1.2 Save file of geographical/cartesian coordinates

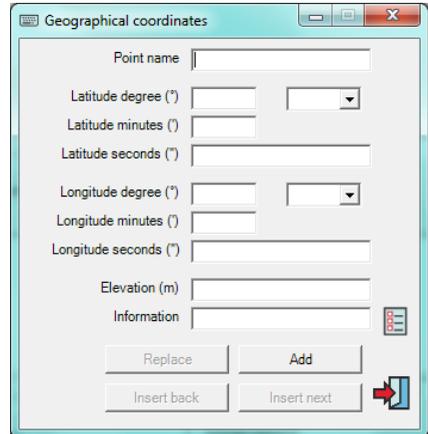
This function allows you to memorize the coordinates contented in the relative boxes. Available formats are of type ASCII (txt e asc) o csv.

### 5.1.3 Edit manually a point

#### - Geographical coordinates -

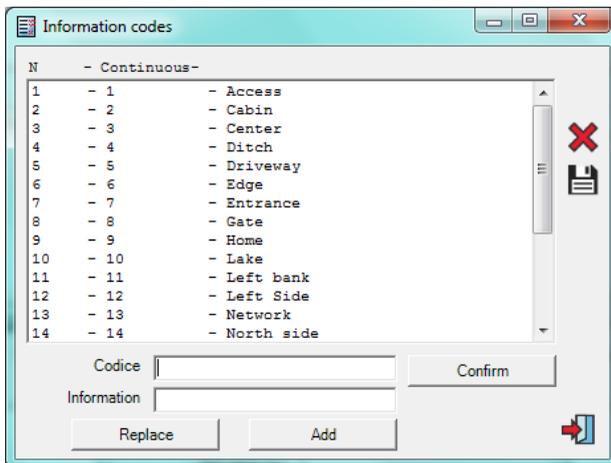
This function lets you edit or insert a line of geographical coordinates.

The icon  **Information list** allows you to insert extra information, creating a new one or selecting it from a dedicated list.



Geographical coordinates dialog box. It contains the following fields and controls:

- Point name:
- Latitude degree (°):
- Latitude minutes ('):
- Latitude seconds ("):
- Longitude degree (°):
- Longitude minutes ('):
- Longitude seconds ("):
- Elevation (m):
- Information:  
- Buttons: Replace, Add, Insert back, Insert next, and a right arrow icon.



Information codes dialog box. It contains the following elements:

- Title: Information codes
- Table with columns N, -, and Continuous-:

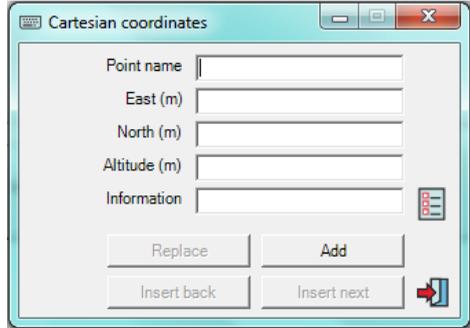
N	-	Continuous-
1	- 1	- Access
2	- 2	- Cabin
3	- 3	- Center
4	- 4	- Ditch
5	- 5	- Driveway
6	- 6	- Edge
7	- 7	- Entrance
8	- 8	- Gate
9	- 9	- Home
10	- 10	- Lake
11	- 11	- Left bank
12	- 12	- Left Side
13	- 13	- Network
14	- 14	- North side

- Buttons: X, list icon, Confirm, Replace, Add, and a right arrow icon.
- Fields: Codice  and Information

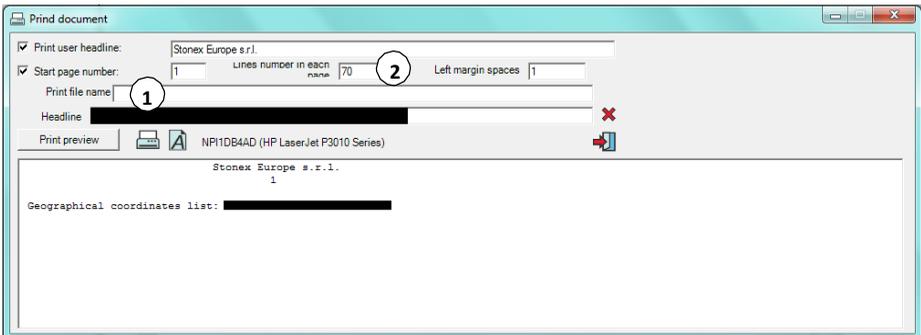
## - Cartesian coordinates -

This function lets you edit or insert a line of cartesian coordinates.

The icon  **Information list** allows you to insert extra information, creating a new one or selecting it from a dedicated list.



### 5.1.4 Print file Coordinates list

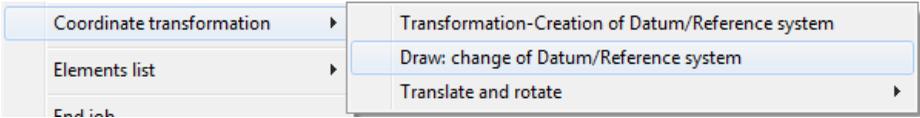


This function activates print procedure with the system printer.

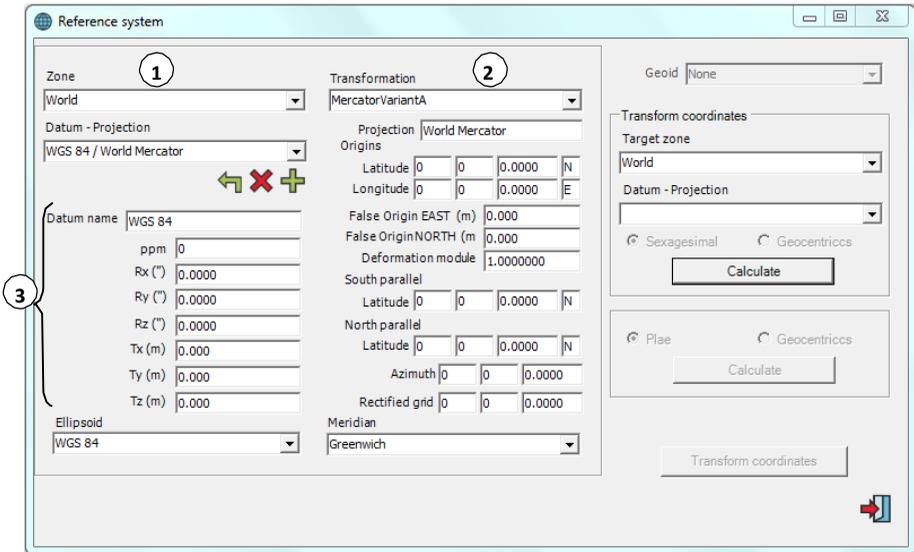
If you want to change the printer, select a different one clicking on the printer name (1).

The printing will be done with the number of lines per page defined by the user (2).

## 5.2 Draw: change of Datum/Reference system



This function allows you to edit the Datum of the current job.



**Originate data** (1) are uploaded automatically in relation to the job characteristics, but they can be changed by the user.

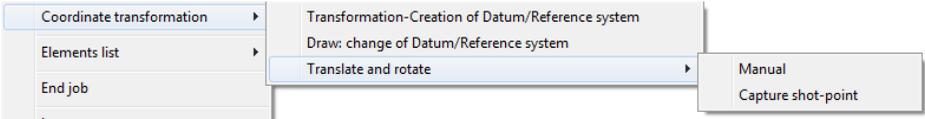
**Destination data** (2) must be defined by the user, selecting them from the dedicated pull-down menu.

The functions **New Datum** (3) let you define:

- a new Datum (4) with the set-up of seven parameters of rototranslation;
- a new cartographical reference system;

You can also transfer new Datum/Reference system on your GPS hand holder.

## 5.3 Shift and rotate



With this function you can choose operations to edit coordinates of a job and also cartesian axis.

A typical example is the inversion from ordain to height when you have to survey a frontage of a building: **abscissa – height – ordain**.

### 5.3.1 Manual input

Coordinates can be totally edit assigning them:

- **Spin** (centesimal degrees)
- **Transfer** (East, North, Altitude)
- **Scale factor** (East, North, Altitude)

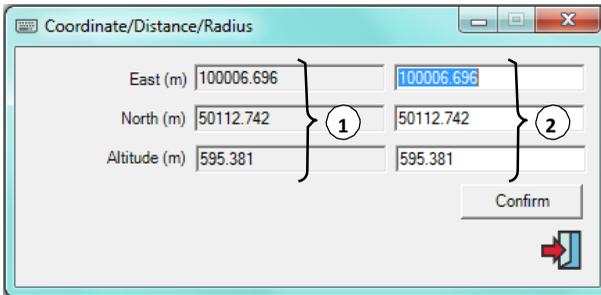
It can be changed also only one parameters: for example you can assign only the spin or only the transfer in altitude to totally edit altitudes of the job.

**Change (1):** after confirm of the user, the system will proceed to the rototranslation.

### 5.3.2 Capture shot-point

This function lets you capture a shot-point.

When you click on a point of the drawing, a mask appears.



You can see **Captured coordinates** (1) on the left and editable boxes on the right: here the user can enter **New coordinates** (2).

## 5.4 Geodetic calculus

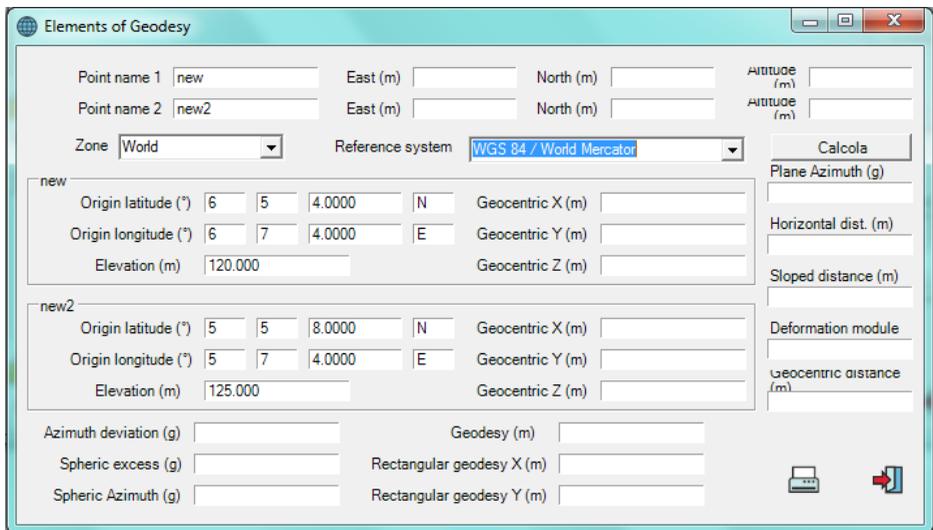
This function is valid for both points in geographical and cartesian coordinates.

Select two points from the **Coordinates list** and then click on the command  (par. 5.1).

You can see your selection in two dedicated boxes.



It's displayed a table containing geodetic parameters between selected points.



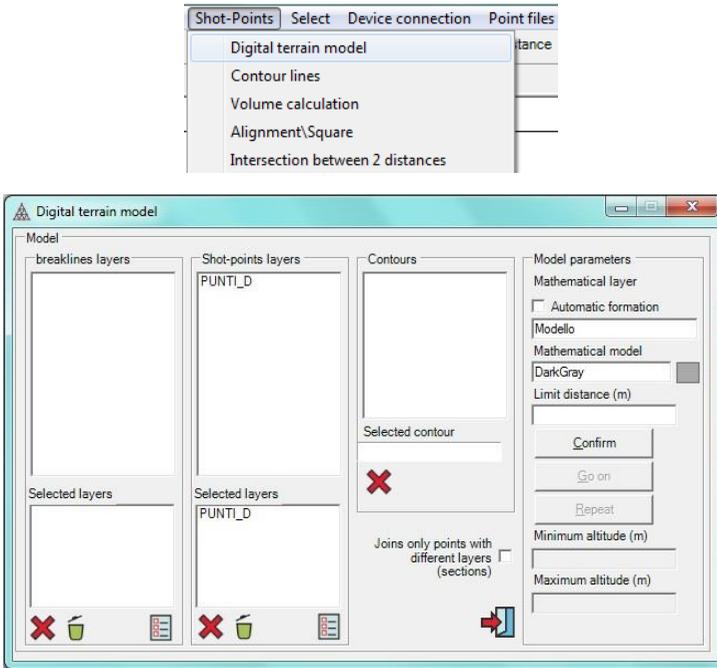
Point	Origin latitude (°)	Origin longitude (°)	Elevation (m)	Geocentric X (m)	Geocentric Y (m)	Geocentric Z (m)
new	6 5	6 7	120.000			
new2	5 5	5 7	125.000			

Obviously displayed parameters are different, related to the type of coordinates of the originate file and the selected ellipsoid.

## 6 – SHOT-POINTS

### 6.1 Digital Terrain Model

You can make the mathematical model of a terrain through a shot-points distribution. It consists in a mesh made up of triangular networks (TIN).



To build the model, we have to set up some preparing parameters.

#### 6.1.1 Breaklines layers

The user can select the plane or planes assigned to graphical elements, which represent **breaklines layers**.

**Breaklines layers** are lines of restriction in mathematical model building. For example they can be lines of gap's ridge or foot, or else the side of a street.



name, this will be transferred in the box **Selected contour**.

The contour can contain internal closed contours.

**The mathematical model will be performed only inside the defined contour and it will contain some *holes* related to possible internal contour.**

In the *holes* of the model, contour lines won't be performed.

The contour can be disabled with the button **Delete contour**.

The contour can be traced out with the vertexes coinciding with shot-points or not.

In the first case, contour lines will coincide with the lines of the model and the model border will coincide with assigned contour.

In the second case, the contour will have the function of contain the model, but the system will create automatically the border and this can't be controlled by the user.

#### 6.1.4 Model parameters

**Mathematical layer** and **Mathematical model** (colour) are selected by clicking on related text box. From the following masks you can choose your parameters.

#### 6.1.5 Limit distance

It's an empirical value that the system calculates after confirm of the user.

It represents the maximum distance that the layers of the model can assume and it's a value that can be changed by the user before leaving model building.

For example, if the shot-points distribution isn't homogeneous (too thick in an area and too thin in another), the automatically calculated value can be unsuitable. So, the mathematical model could contain *holes* (opened triangles). If the user thinks that this is his case, he can change the **limit distance** in order to make it suitable.



### 6.1.6 Confirm – Go on - Repeat

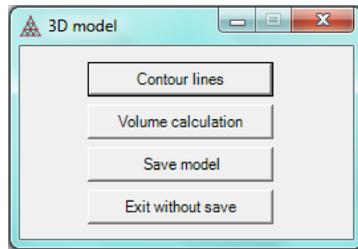
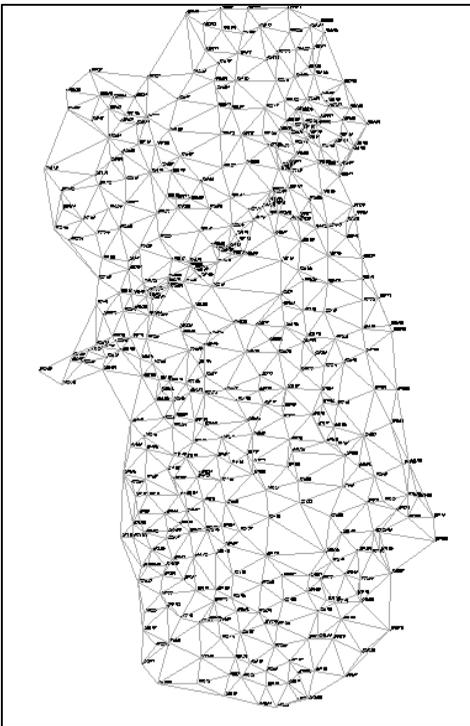
These functions do a first data analysis: determinate **limit distance** (editable by the user) and individuate shot-points to consider for the mathematical model calculus.

The command **Confirm** disables the possibilities of layers choice.

**Repeat** lets you re-establish the procedure.

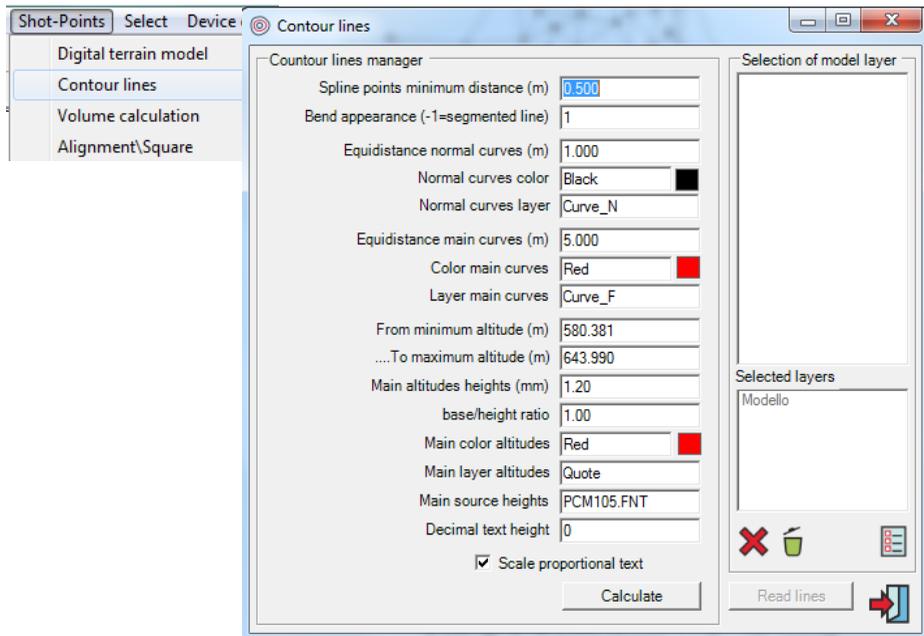
The command **Go on** creates the mathematical model according to the set-up parameters.

When the procedure is finished, the program will show the following options:



- **Contour lines:** save the model and go on with the creation of contour lines.
- **Volume calculation:** save the model and activate the procedure for the volume calculation.
- **Save model:** memorize the model and then go back to the drawing.
- **Exit without save:** come back to the drawing without save the new created model.

## 6.2 Contour lines



You can access to this function from Menu: **Shot-points / Contour lines** or directly after mathematical model creation (as described in the previous paragraph).

In the last case, in the mask **Contour lines**, the box **Selection of model layer** on the right is disabled: model layer is automatically selected by procedure.

Otherwise, the user must select layers of graphical elements, which describe the model, from the list above.



**Delete selected layer:** selected layer will be deleted



**Delete all layers:** the list of layers in the box below will be deleted.



**Select all layers:** all layers of the list **Selection of model layers** will be transferred to the list below.

## 6.2.1 Contour lines manager

This section of the mask contains the characteristics of lines that the system is going to create. Lines will be '**spline**', that are lines of third grade described at **chap. 2 par. 10**.

Related to this paragraph, **Spline points minimum distance** corresponds to **Size of the stretch of interpolation (m)**, while the parameter **Bend appearance** corresponds to **Curvature degree**.

In case of not very rugged terrains, the value of **Bend appearance** can be correct in "0"; for medium-rugged terrains "1" and for very rugged terrains "2" or more.

Contour lines manager

Spline points minimum distance (m)	0.500
Bend appearance (-1=segmented line)	1
Equidistance normal curves (m)	1.000
Normal curves color	Black
Normal curves layer	Curve_N
Equidistance main curves (m)	5.000
Color main curves	Red
Layer main curves	Curve_F
From minimum altitude (m)	580.381
...To maximum altitude (m)	643.990
Main altitudes heights (mm)	1.20
base/height ratio	1.00
Main color altitudes	Red
Main layer altitudes	Quote
Main source heights	PCM105.FNT
Decimal text height	0

Scale proportional text

Calculate

### - Normal curves and main curves

The system identifies two kind of curves and the user can assign them a different layer and a different colour.

### - Equidistance main curves

Main curves, not closed, will have traced at the extremes the height of the contour line.

## 6.2.2 Read lines

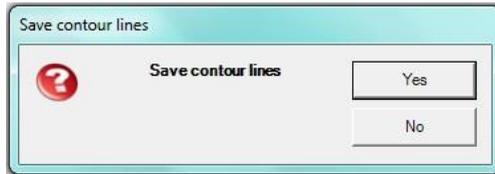
**Read lines:** this command is active if only the function **Contour lines** is activated from the main menu or from the icon in the tools bar. It loads the lines of the model belonging to selected layers.

### 6.2.3 Calculate

This command starts building of contour lines.

During the creation of contour lines, the procedure is controlled by a progress bar.

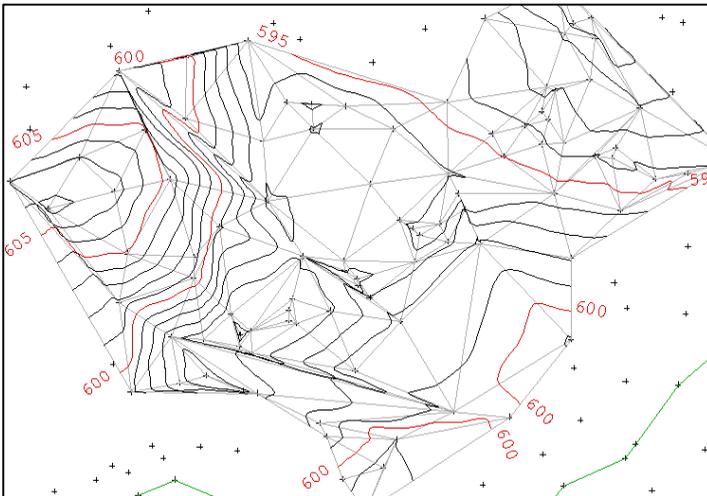
At the end of the procedure, the system asks for the saving of the calculated contour lines.



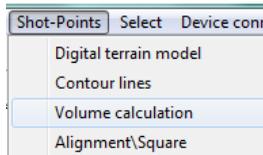
#### **Yes: Save contour lines**

The system comes back to the drawing, saving contour lines.

#### **No: Exit without save**



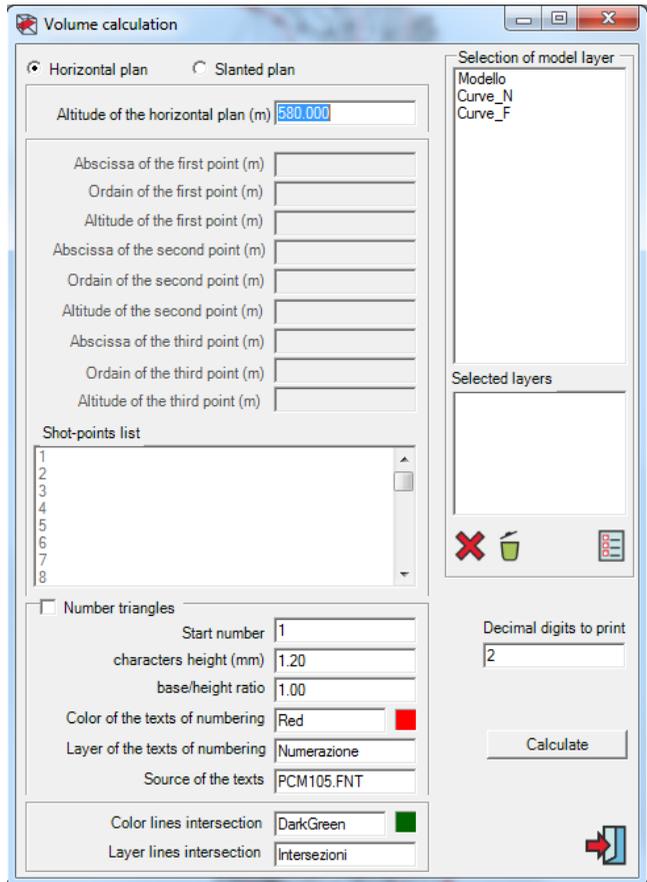
## 6.3 Volume calculation



**Volume calculation** is made on terrain mathematical model. So you can access to this function immediately after the model building or from the commands in the menu.

In the first case, in the mask that appears (here on the right), the box on the right **Selection of model layer** is disabled because model layer is automatically transferred from the model building procedure.

The command **Read lines** is replaced with **Go on**.



In other cases, the user has to select which layers made up the model, before proceed with the calculus.

For a right calculus execution, mathematical model is usually calculated inside a contour line.

The calculus can be enveloped in two ways:

### 6.3.1 Horizontal plan

Horizontal plan     Slanted plan

Volume is calculated related to a horizontal plan.

In this case it's activated only the box of plan height input.

The system suggests the minimum height rounded down to the integer.

### 6.3.2 Slanted plan (three points)

In this case it's disabled the text box of the horizontal height and the other boxes are abled.

You can enter coordinates of three points manually or selecting them from the **shot-points list**: clicking on the name of the point, the system selects the coordinates and transfers them in the boxes above.

Horizontal plan     Slanted plan

Altitude of the horizontal plan (m)	580.000
Abscissa of the first point (m)	99989.016
Ordain of the first point (m)	50033.053
Altitude of the first point (m)	638.571
Abscissa of the second point (m)	99994.298
Ordain of the second point (m)	50030.532
Altitude of the second point (m)	638.120
Abscissa of the third point (m)	99992.156
Ordain of the third point (m)	50021.922
Altitude of the third point (m)	643.990

Shot-points list

1
2
3
4
5
6
7
8

### 6.3.3 Number triangles

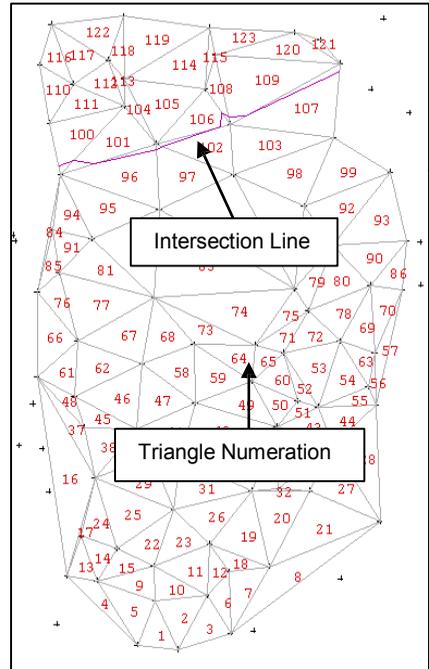
Each triangle of the model can be numerated with the same number that will appear in the survey report.

The user can decide the characteristics of numeration.

The number will be placed in the barycenter of the triangle.

### 6.3.4 Intersection Line

The layer related to the volume calculus can intersect model lines (this don't happen only when the layer height is lower than the minimum height or when it is higher than the maximum height).



You can also select color and layer of the intersection lines.

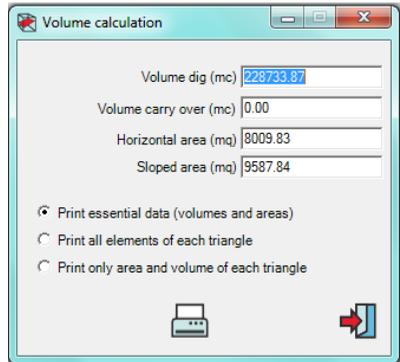


### 6.3.5 Volume Calculus

**Go on:** the system proceeds with volume calculus.

According to the reference plan position it will indicate a **volume dig and/or a volume carry over**.

**Sloped area** is represented as the sum of the sloped surfaces of each triangle and it is transferred in the following printings.

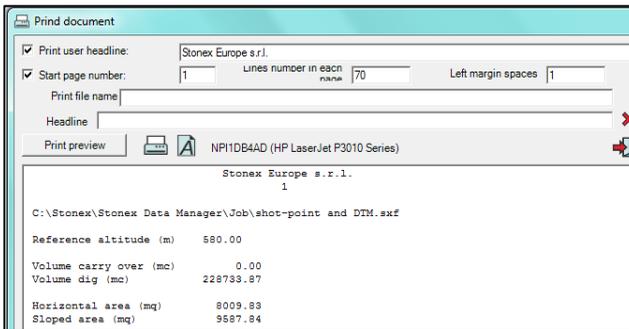


**Quit:** come back to precedent menu.

The system will come back to the drawing.

If you have add some graphical elements to the drawing (**intersection lines, number triangles**), the system will ask you to confirm the adding of these graphical elements in the drawing.

### 6.3.6 Print report Volume calculus

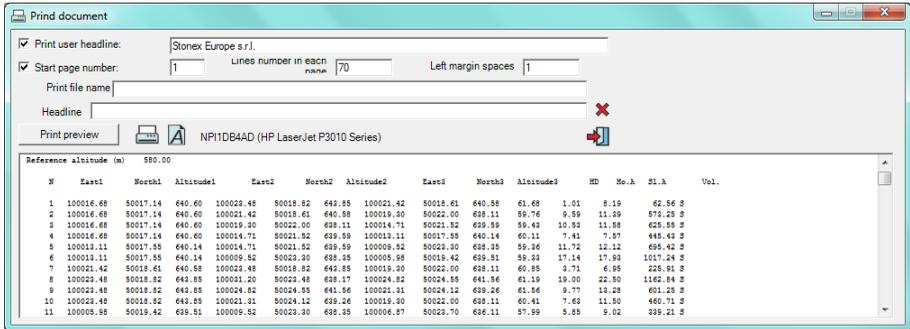


You can also print report of volume calculus.

At the beginning the printing is guided on the screen, in different ways depending on what the user wants.

**- Print essential data (volumes and areas)**

It's the easier and simpler way of printing.



357	99994.69	50084.80	603.340	99991.06	50088.44	602.040	99992.47	50085.22	604.850	3.410	3.28	6.11	11.18
358a	99992.47	50085.22	604.850	99991.06	50088.44	602.040	99988.85	50085.76	602.050	2.980	5.44	7.31	16.22
359a	99989.47	50089.12	600.000	99988.67	50089.36	600.000	99988.43	50089.46	599.790	-0.070	0.04	0.05	0.00
359b	99988.47	50089.12	600.000	99988.67	50089.36	600.000	99988.85	50085.76	602.050	-200.023	0.39	0.51	-78.73
359c	99988.47	50089.12	600.000	99988.67	50089.36	600.000	99991.06	50088.44	602.040	-266.674	0.39	0.51	-104.45
360a	99988.47	50089.12	600.000	99986.31	50088.86	600.000	99988.43	50089.46	599.790	-0.507	0.38	0.44	-0.19
360b	99988.47	50089.12	600.000	99986.31	50088.86	600.000	99988.85	50085.76	602.050	-200.169	3.69	4.30	-736.39
360c	99989.47	50089.12	600.000	99986.31	50088.86	600.000	99991.06	50088.44	602.040	-266.723	1.06	2.46	-293.24
361a	99986.31	50088.86	600.000	99983.15	50089.86	600.000	99984.42	50091.16	599.480	1.010	2.69	3.69	2.72
361b	99986.31	50088.86	600.000	99983.15	50089.86	600.000	99988.85	50085.76	602.050	-199.663	3.63	4.97	-725.03
361c	99986.31	50088.86	600.000	99983.15	50089.86	600.000	99980.61	50087.26	603.030	-266.554	5.37	7.35	-1430.64
362	100001.89	50086.92	601.770	100010.36	50090.71	600.530	100001.97	50092.20	601.460	1.253	26.40	26.62	38.09

You can find values of reference height or coordinates of three points, which define reference layer, and values of area and volume.

### - Print all elements of each triangle

The system creates a table in which you can find per line:

- number of triangle (verifiable with the drawing if you chose **triangle numeration**)
- coordinates of its three vertices
- difference between triangle barycenter height and reference plan height
- horizontal area
- sloped triangle area
- volume.

Triangles intersected by intersection lines, are divided in three parts. The system assigns a letter after the triangle number (in the example above you can find 359a, 369b, 359c).

### - Print only area and volume of each triangle

It's a form of printing narrowed to only areas and volumes of triangles.

C:\Stonex\

Reference altitude (m) 580.00

N	Ho.A	Sl.A	Vol.
1	1.01	8.19	62.56 S
2	9.59	11.39	573.25 S
3	10.53	11.58	625.55 S
4	7.41	7.57	445.43 S
5	11.72	12.12	695.42 S
6	17.14	17.93	1017.24 S

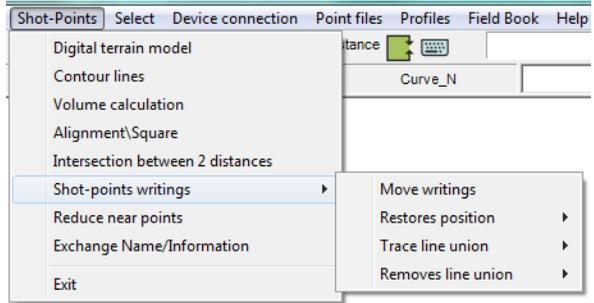
---

## 6.4 Shot-points writings

Shot-points writings are:

**Name of point**  
**Height of point**

They can appear together or also only one of two.



Their position is usually fixed related to symbol dimensions and to associated writings.

### 6.4.1 Move writings

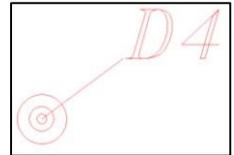
This function lets you capture the writing of single shot-point clicking on it. Then you can move it in a better position.

### 6.4.2 Restores position

Restore writings of shot-points in their originate position. You can choose to restore **all writings** or only **selected one**.

### 6.4.3 Trace line union

It associate the writing (name or height) to its shot-point through a line. You can choose to associate **all writings** or only **one selected**.



### 6.4.4 Remove line union

It removes the line, which associate writing to the symbol centre. You can choose to remove **all associations** or only **one of the selected writing**.

## 6.4.5 Reduce near points

This function allows you to delete near points, averaging out planimetric coordinates and height in a single point, into an entered tolerance (planimetric tolerance (m)), or choosing the nearest point to the planimetric average.

Points into the entered tolerance are displayed in a table with coordinates, difference between points, average, standard deviation.

Reduce near points

This function provide to eliminate near points and to create a mean point with planimetrics coordinates and elevations.

Are selected points having common name or having coordinates and altitudes within tolerances provided for.

The mean point may take the coordinates of the closest point to the average or coordinates corresponding to the average itself.

Planimetric tolerance (m)

Altitude tolerance (m)

Search for points with the same

Mean type

Mean coordinates

Coordinates of the closest point to the average

Visualizza medie

1	99992.156	50021.922	643.990	-1.325	-4.210	3.934	Acqua
2	99988.837	50026.232	642.711	-4.644	0.100	2.655	Albero
4	99991.807	50029.933	638.560	-1.674	3.801	-1.496	
5	99994.298	50030.532	638.120	0.817	4.400	-1.936	Cabina
6	100000.306	50022.042	636.901	6.825	-4.090	-3.155	
MEDIA							
*1	99993.481	50026.132	640.056				
3	99989.016	50033.053	638.571	-3.579	-1.879	3.534	
4	99991.807	50029.933	638.560	-0.788	-4.999	3.523	
5	99994.298	50030.532	638.120	1.703	-4.400	3.083	Cabina
27	99996.906	50035.662	631.738	4.311	0.730	-3.299	
28	99989.387	50036.803	635.610	-3.208	1.871	0.573	
29	99994.086	50038.052	631.500	1.491	3.120	-3.537	



## STONEX DATA MANAGER FEATURE TABLE (v.3.072)

File		
Open job		
Save job		
Info Job		SDM Lite
Drawing on printer/plotter		(free version)
Export		
File DXF		
File Shape		SDM Full
File Stonex RW5/CRD		
List/File ASCII		SDM Lite
Point files		
Raster files		
Google Earth		SDM Full
File GPX		
Pregeo (Italian cadastral format)		
Import		SDM Lite
File DXF		
File Shape		SDM Full
File Stonex RW5		
File Stonex Cube		SDM Lite
File ASCII		
Raster overlap		
New raster		
Cut		
Join		SDM Full
Rototraslation		
Coordinate transformation		
Elements list		SDM Lite
Zoom		
Redraw		
Cursor zoom		SDM Lite

Zoom x		
Coordinate zoom		
Last zoom		
All		
Scale		
Discard raster		SDM Full
Delete raster		
<b>Drawing</b>		
Graphic settings		
Layers		
Lines		
Colors		
Draw writings		SDM Lite
Draw symbols		
Draw shot-points		
Background		
<b>Capture</b>		
Capture single graphical element		
Capture inside frame		
Capture inside frame and intersection		
Capture chain of graphical elements		
Move knot		
Capture distance		
Capture altitude		
		SDM Lite
<b>Delete</b>		
Delete single element		
Delete inside frame		
Delete frame-intersected elements		
Delete last element		
Recover last element		
Recover all		
		SDM Lite

<b>Entities</b>		
Create closed figure Load closed figure		SDM Full
<b>Shot-points</b>		
Digital terrain model Contour lines Volume calculation		SDM Full
Alignment/Square Intersection between 2 distances Shot-points writings Move writings Restores positions Trace line union Removes line union Reduce near points Exchange Name/Information		SDM Lite
<b>Select</b>		
Vectors Writings Symbols Shot-points Points Fillings All		SDM Lite
<b>Device connection</b>		
Connection		SDM Lite
<b>Point files</b>		
Load point files Create point files		SDM Lite

Profiles		
<ul style="list-style-type: none"> <li>Creation of profile               <ul style="list-style-type: none"> <li>Capture single graphical element</li> <li>Capture chain of graphical elements</li> </ul> </li> <li>Load existing profile</li> <li>Input of new profile</li> </ul>		SDM Full
Field Book		
<ul style="list-style-type: none"> <li>Read/Write serial port</li> <li>Read file               <ul style="list-style-type: none"> <li>Survey Pro</li> <li>GSI format</li> <li>Nikon</li> <li>Format R5/R6</li> <li>Format R2</li> <li>Format R2 Plus</li> <li>Format R2W Plus</li> <li>Format R1 e R1 Plus</li> <li>Format D4</li> </ul> </li> <li>Open fieldbook</li> <li>Information codes</li> </ul>		SDM Lite

## SUPPORTED INSTRUMENTS

Instrument	File extension
S9, S8, S7-G	rw5, crd, cts
R1 Total Station	dat
R1 Plus Total station	dat
R2 Total station	txt (gsi)
R2 Plus Total Station	dat
R2W Plus Total Station	raw
R5 Total station	asc (gsi)
R6 Total station	asc (gsi)
R9 Total station	rw5, crd
Nivo (5C, 5M) Total station	txt, nrw, raw
Focus30 Total station	raw, txt
STS Total station	txt (gsi)
D4 Digital level	dat

## FEATURE IN COMPARISON

Feature	SDM Lite	SDM Full
Transfer data from supported Stonex devices	X	X
Create and save jobs from data	X	X
Use graphic functions to display, inspect and manage data	X	X
Load/read field books from Stonex total stations	X	X
Import DXF, RW5, ASCII files (txt, csv, asc)	X	X
Export DXF, RW5/CRD, Pregeo, ASCII files, Point files (STS, R2, R5, R6)	X	X
Import/Export ESRI shape files		X
Import raster files (bmp, tif, jpg, png, gif, ecw)		X
Export raster files (bmp, tif, jpg, png, gif, wmf)		X
Export data to Google Earth		X
Export GPX files		X
Elaborate digital terrain models		X
Elaborate contour lines		X
Elaborate volume calculations		X
Manage a large worldwide coordinate system database		X
Georeference your data and raster map files		X
Extract and manage profiles from your field data		X
Merge jobs into single file		X
Load raster images to projects		X
Create tiles and selections of a raster map		X



For more information, please refer to

**STONEX EUROPE SRL**

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