



**TUTORIAL**  
**TRAVERSE CALCULATION**

# TRAVERSE CALCULATION

## DESCRIPTION

- Data import
- Survey Calculation
- Traverse adjustment

## GOAL

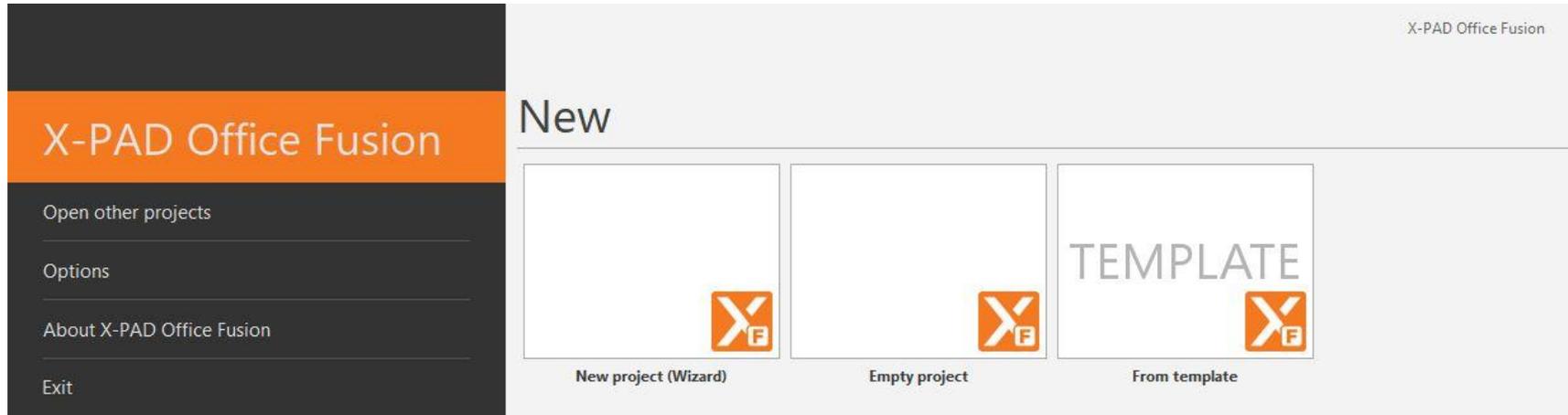
- How to use survey functions when operating with TPS
- TPS Survey calculation
- Traverse adjustment

## DATA

- Stadio Friuli.txt



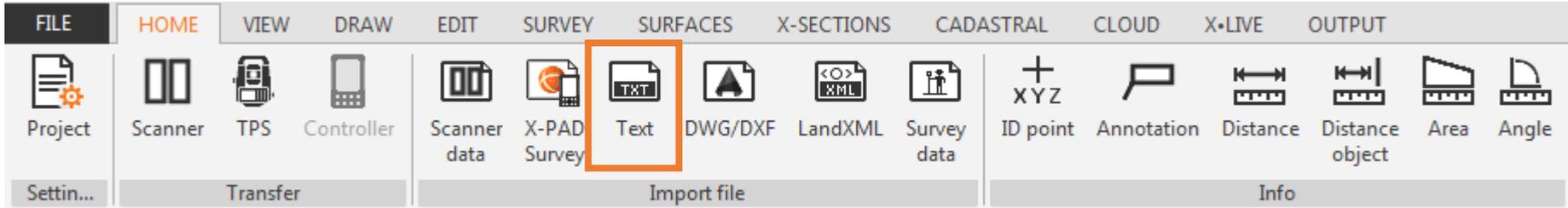
# New Project



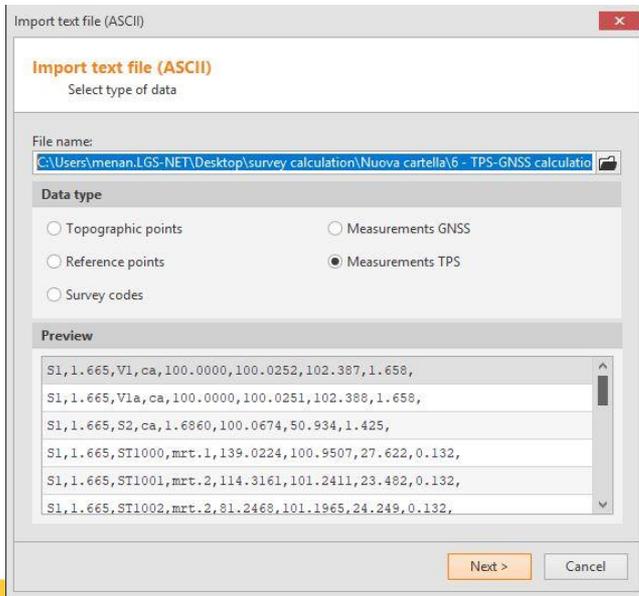
- Click on **Empty Project** to create a new empty project



# Data import



- From **HOME** menu select **TEXT** to import topographic data.

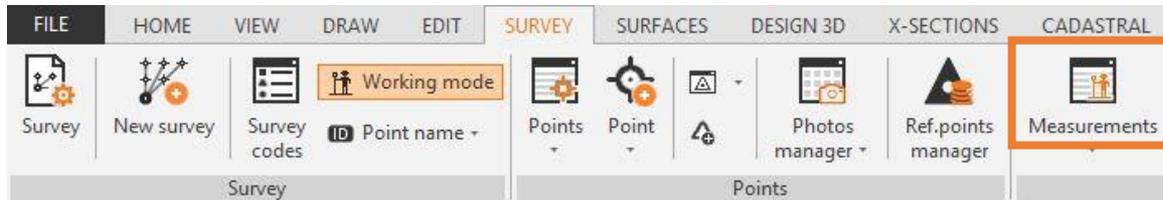


From **Import text file** menu select:

- **Measurement TPS**
- “,” as separator
- “Station, Instrument height, Point, Code, H angle, V angle, Sloped distance, Prism height” as data fields



# Measure table

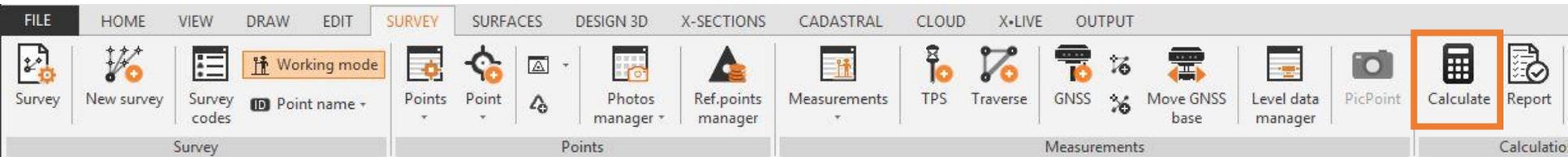


From **Survey** menu select **Measurements** table. Measures are divided by type, and by the reference BASE or TPS station, with a double click on a measure it is possible to review more information

Measurements [Main survey]												
Main survey												
Type	Date/Time	Station/Base	Height Instrum./...	Name	Code	Measurement data				Height Target/Ro...	Description	
1	05/11/2018 18:27	S1	1.665m	V1	CA	Horiz. Angle:	100.0000g				1.658m	
						Vert. Angle:	100.0252g					
						Slope dist.:	102.387m					
2	05/11/2018 18:27	S1	1.665m	V1A	CA	Horiz. Angle:	100.0000g				1.658m	
						Vert. Angle:	100.0251g					
						Slope dist.:	102.388m					
3	05/11/2018 18:27	S1	1.665m	S2	CA	Horiz. Angle:	1.6860g				1.425m	
						Vert. Angle:	100.0674g					
						Slope dist.:	50.934m					
4	05/11/2018 18:27	S1	1.665m	ST1000	MRT.1	Horiz. Angle:	139.0224g				0.132m	
						Vert. Angle:	100.9507g					
						Slope dist.:	27.622m					
5	05/11/2018 18:27	S1	1.665m	ST1001	MRT.2	Horiz. Angle:	114.3161g				0.132m	
						Vert. Angle:	101.2411g					
						Slope dist.:	23.482m					
6	05/11/2018 18:27	S1	1.665m	ST1002	MRT.2	Horiz. Angle:	81.2468g				0.132m	
						Vert. Angle:	101.1965g					
						Slope dist.:	24.249m					



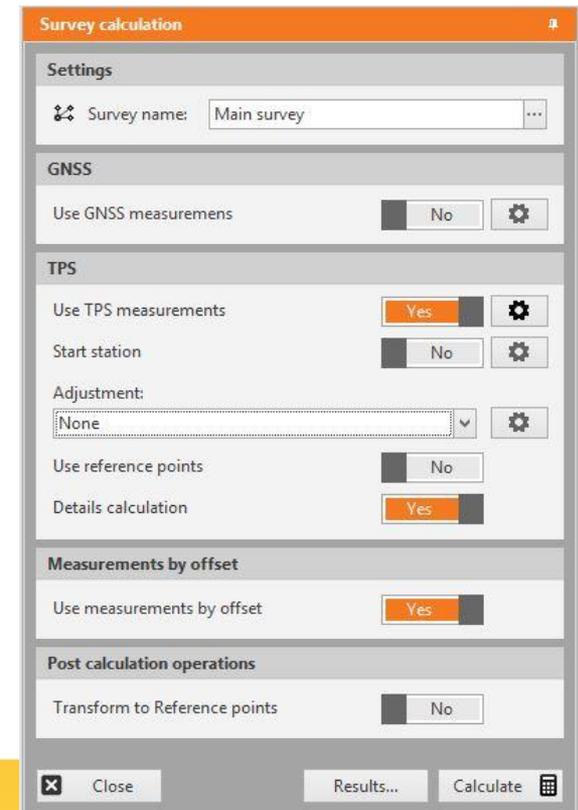
# Calculate survey



From Survey menu select **Calculate**, this function allows to use survey calculation and define parameters



- TPS measure are used in the calculation, to calculate final TPS coordinates
- Click on the Setting to change the calculation tolerance and apply atmospheric corrections



# Calculate survey –TPS Settings

TPS

Use TPS measure  Yes 

Start station  No 

## START STATION

- Used to define the coordinate and the orientation of the starting station

TPS start station

Start station:  ...

X:  0.000m

Y:  0.000m

Z:  0.000m

Start azimuth:  Off

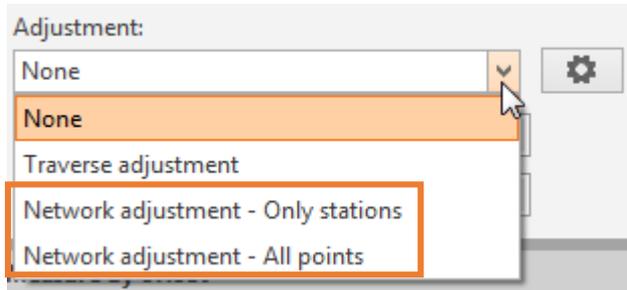
Backsight point:  ...

Azimuth:  0.0000g

- Click on the Setting to select the start station with its coordinates, and define the backsight point or azimuth

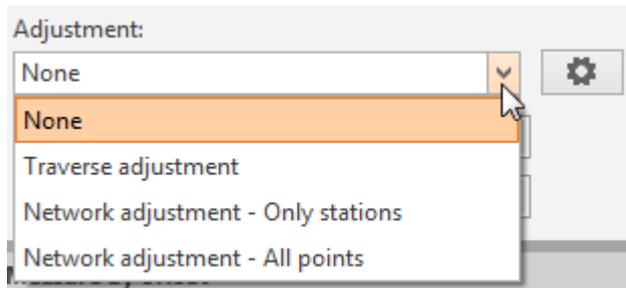


# Calculate survey –TPS Settings



## NETWORK ADJUSTMENT

- If a network has been defined, using Adjustment function is possible to calculate the adjusted coordinates of the stations (*Only stations*) or of all points (*All points*)



## TRAVERSE ADJUSTMENT

- Used to calculate a traverse
- Traverse can be defined using the dedicated function in the Measures menu
- Traverse is defined selecting the stations used in the traverse



# Calculate survey –TPS Settings

Details calculation  Yes

## DETAILS CALCULATION

- All points coordinates are recalculated

Measure by offset

Use measure by offset  Yes

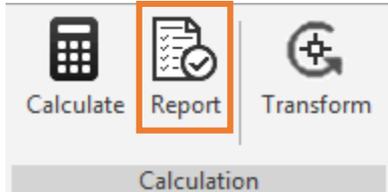
## USE MEASURE BY OFFSET

- Measures done by offset are recalculated (for example hidden points)





# Survey Calculation Report



- At the end of each survey calculation, the detailed report is created.
- It is possible to check the results after each single step

**Results**

- TPS Calculation
  - TPS Calculated points
    - S1
      - V1
      - V1A
      - ST1000
      - ST1001
      - ST1002
      - ST1003
      - ST1004
      - ST1005
      - ST1006
      - ST1007
      - ST1008
      - ST1009
      - ST1010
      - ST1011
      - ST1012
      - ST1013

**Details**

**Point data**

Name	ST1006
Code	MRT.2
Description	

**Coordinate**

X	12.548m
Y	13.193m
Z	1.179m

**Measure data**

Measure type	Standard
Station name	S1
Instrument Height	1.665m
Horizontal angle	48.4063g
Vertical angle	101.2381g
Sloped distance	18.211m
Target Height	0.132m
Target type	Prism

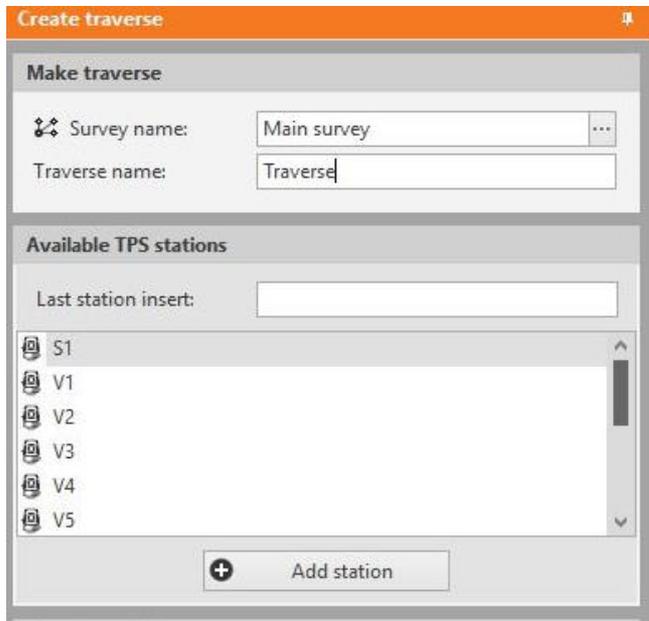
TPS calculated point.



# Traverse adjustment



- X-PAD Fusion allows to create and calculate traverses
- The first step is to create a traverse using observations



The screenshot shows the 'Create traverse' window with the following fields and options:

- Make traverse:**
  - Survey name: Main survey
  - Traverse name: Traverse
- Available TPS stations:**
  - Last station insert: (empty text box)
  - Station list: S1, V1, V2, V3, V4, V5
  - Buttons: + Add station

- Select the Traverse function to start to define the traverse
- The software automatically recognizes the stations in the project. Select the starting and following stations, and the traverse will be automatically completed



# Traverse adjustment

The screenshot shows a software interface for surveying data management. The main workspace displays a network of stations and traverse lines. A vertical list of stations on the right side of the workspace includes S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S17, S18, S19, S20, S21, S22, S23, S24, S25, S26, S27, S28, S29, S30, S31, S32, S33, S34, S35, S36, S37, S38, S39, S40, S41, S42, S43, S44, S45, S46, S47, S48, S49, S50, S51, S52, S53, S54, S55, S56, S57, S58, S59, S60, S61, S62, S63, S64, S65, S66, S67, S68, S69, S70, S71, S72, S73, S74, S75, S76, S77, S78, S79, S80, S81, S82, S83, S84, S85, S86, S87, S88, S89, S90, S91, S92, S93, S94, S95, S96, S97, S98, S99, S100, S101, S102, S103, S104, S105, S106, S107, S108, S109, S110, S111, S112, S113, S114, S115, S116, S117, S118, S119, S120, S121, S122, S123, S124, S125, S126, S127, S128, S129, S130, S131, S132, S133, S134, S135, S136, S137, S138, S139, S140, S141, S142, S143, S144, S145, S146, S147, S148, S149, S150, S151, S152, S153, S154, S155, S156, S157, S158, S159, S160, S161, S162, S163, S164, S165, S166, S167, S168, S169, S170, S171, S172, 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**Make traverse**

Survey name: Main survey  
Traverse name: Traverse

**Available TPS stations**

Last station insert: S1

V1  
S2

+ Add station

**Stations used**

S1

Remove last station

Close Create



# Traverse adjustment

- After that a traverse has been created, it is possible to calculate it using the CALCULATE function
- Select Traverse Adjustment as Adjustment method in the calculation

**Results**

- 6 Traverse Adjustment
  - chiusa
    - S1
    - V1
    - V2
    - V3
    - V4
    - V5
    - V6
    - S8
    - S2
  - TPS Calculated points
    - S1
      - Orientation
        - V1A
        - ST1000
        - ST1001
        - ST1002
        - ST1003

**Details**

**Traverse details**

Name	chiusa
Type	Closed-loop
Vertices	9
Length	733.800m
Angular error	-0.0201g
Linear error	0.010m
Linear error X	0.010m
Linear error Y	0.000m
Elevation error	0.000m

**Traverse tolerances**

Angular error	1.9099g
Linear error	0.271m
Elevation error	0.020m

Traverse adjustment results.

**Survey calculation**

**Settings**

Survey name:

**GNSS**

Use GNSS measurements  No

**TPS**

Use TPS measurements  Yes

Start station  No

**Adjustment:**

Use reference points  No

Details calculation  Yes

**Measurements by offset**

Use measurements by offset  Yes

**Post calculation operations**

Transform to Reference points  No

Close Results... Calculate

