



# TcpMDT

Digital Terrain Model – V9

## Surveying

aplitop

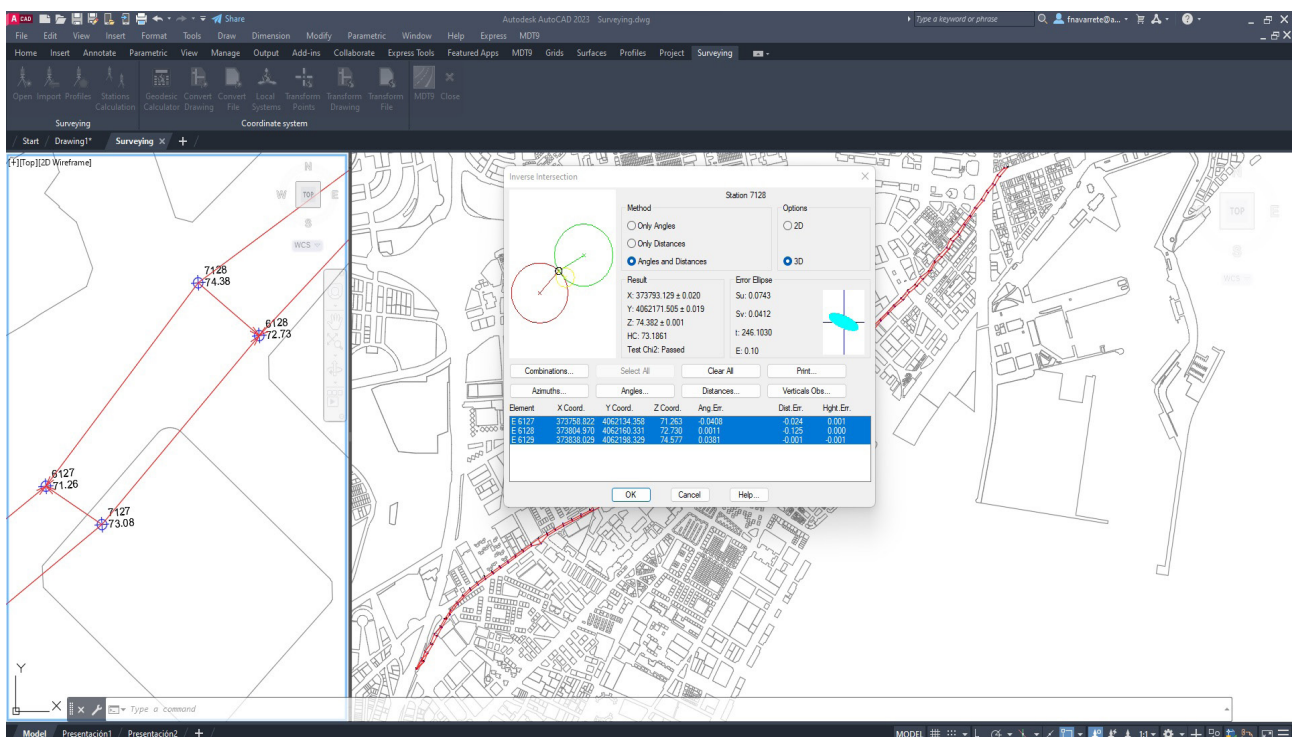
## Topography and Geodesy Module

### Calculation of Total Stations Observations

The surveying module allows the importing of files from total stations and the most usual data collectors on the market and also manual data entry. Based on this information, the program provides all the tools required for the processing, calculation and drawing of stations and topographic points. Stations calculation can be carried out by radiation procedures, inverse bisection, resection, direct intersection and levelling.

The program compensates the mean distances and slopes in the calculation of points and stations. Optionally, corrections may be considered by refraction and sphericity, reduction to ellipsoid and combined scale factor.

It also includes the automatic correction of disorientations of mutual observations and instrument angular errors in direct-inverse circle observations. Finally, for these calculations to be more precise, a table is included with the precisions and characteristics of the most usual instruments.



## Traverses and Networks

MDT includes the compensation of networks and traverses (closed, open and tied to one or more fixed points) by Least Squares, proportional to the distances, coordinates' increases, Crandall rule or rotation and dilation.

The program allows the configuration of admissible errors and for calculation methods which use Least Squares, the tests can be activated which assess the reliability of the observations and of the adjustment made.

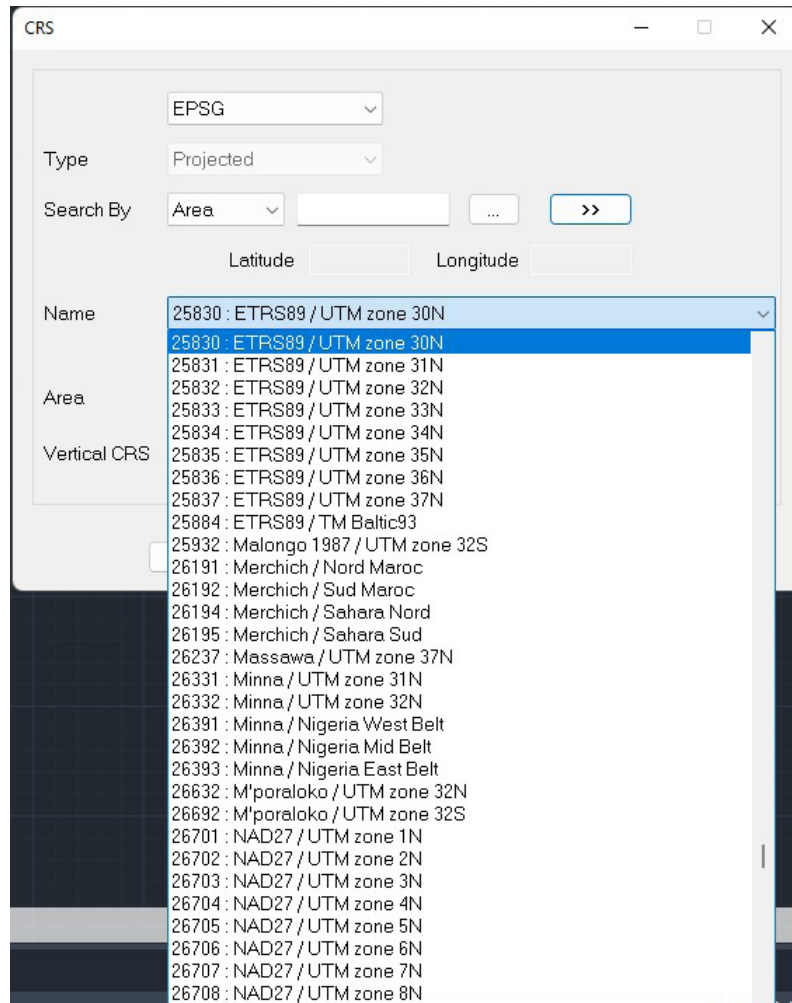
The screenshot shows the 'Traverse Compensation' dialog box. It is divided into several sections:

- Method of Calculation:** Radio buttons for Least Squares (selected), Proportional Distance, Proportional Increments, Rotation and Homothety, and Crandall.
- Fit Options:** Radio buttons for Planimetric, Altimetric, and Both (selected). A checkbox for 'Fix compensated stations' is present.
- Closure:** A text area showing values: L: 418.694, eD: 0.310 \*, eH: 1/1351 \*, eV: 1/19457, eX: -0.162, eY: -0.264, eZ: 0.022 \*, eA: -0.1600.
- Buttons:** 'Compensate', 'Print...', and 'Restore'.
- Table:** A table with columns: Station, HC, X Coord., Y Coord., Z Coord., Vx, Vy, Vz. It contains 7 rows of data.
- Test Chi2:** A label 'Test Chi2: Passed'.
- Stations:** Buttons for 'Fixed...', 'Mobile...', and 'Error Ellipse...'. Below are radio buttons for 'Original' (selected) and 'Adjusted'.
- Observations:** Buttons for 'Distances...', 'Azimuths...', 'Angles...', and 'Verticals Obs...'. Below are radio buttons for 'Original' (selected) and 'Adjusted'.
- Bottom Buttons:** 'OK', 'Cancel', and 'Help...'.

| Station | HC       | X Coord. | Y Coord. | Z Coord. | Vx     | Vy     | Vz     |
|---------|----------|----------|----------|----------|--------|--------|--------|
| 1       | 0.0000   | 1000.000 | 1000.000 | 100.000  | -      | -      | -      |
| 5       | 181.5171 | 989.313  | 1035.768 | 100.746  | -0.013 | -0.015 | 0.000  |
| 8       | 142.7063 | 962.782  | 1056.835 | 97.740   | -0.022 | -0.018 | -0.007 |
| 11      | 136.3686 | 896.368  | 1099.487 | 94.348   | -0.041 | -0.060 | 0.000  |
| 12      | 230.9729 | 909.651  | 1124.627 | 96.158   | -0.048 | -0.073 | 0.001  |
| 13      | 230.5649 | 927.373  | 1158.692 | 97.743   | -0.045 | -0.103 | 0.018  |
| 6       | 207.8095 | 1011.829 | 1095.461 | 102.279  | -0.154 | -0.251 | 0.001  |

## Geodesy

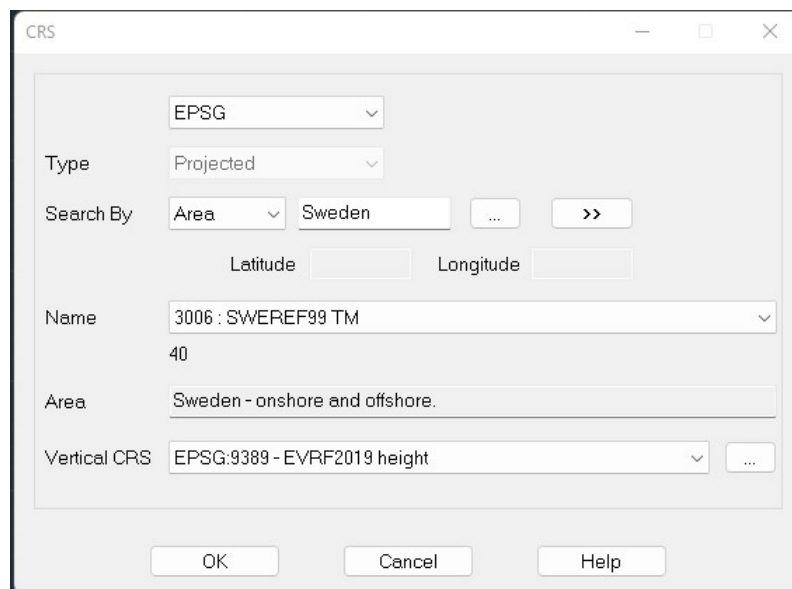
MDT 9's coordinate system transformation engine uses the powerful PROJ library, which transforms geospatial coordinates from one CRS to another. In practice, this allows the use of more than 8,000 reference systems used throughout the planet, including the most recent ones.



These can be projected, geographic 2D, geographic 3D and geocentric. In addition to the EPSG, other authorities such as ESRI and France's IGN have been included. The installation also contains multiple grids and geoids from different countries.

Also, if there are multiple conversion alternatives, the most accurate option is automatically chosen, without the need to manually select the transformation.

The selection of the origin or destination CRS can be made by name, region, code or latitude and longitude.

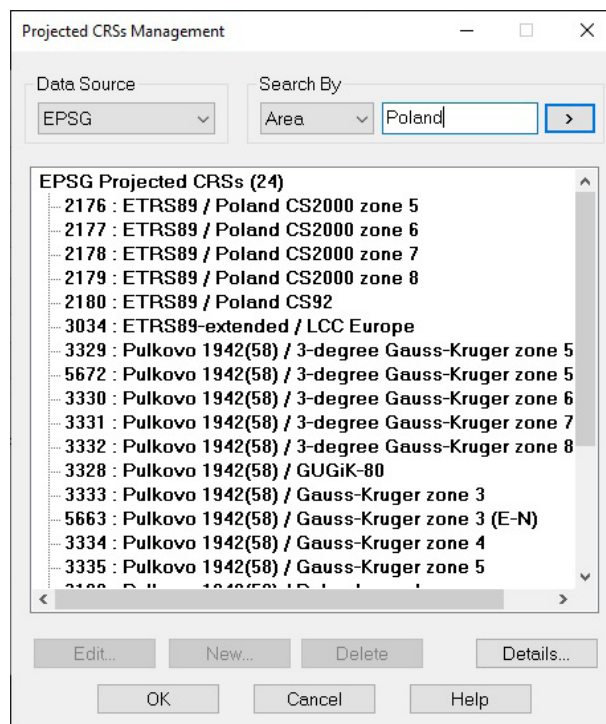
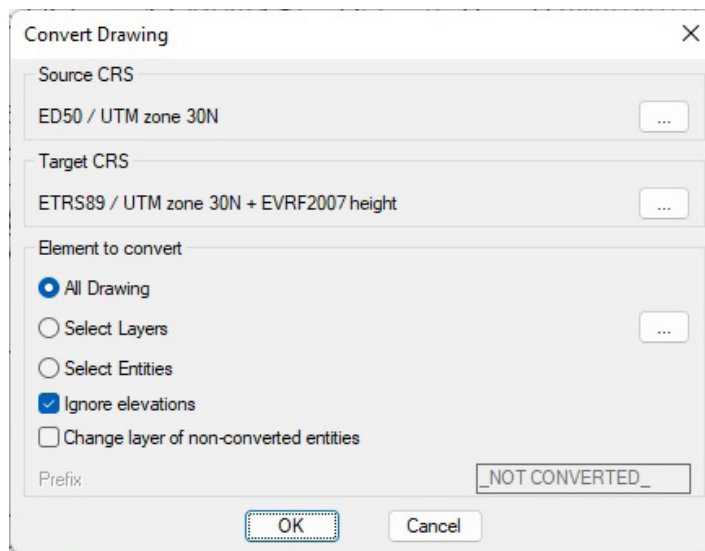


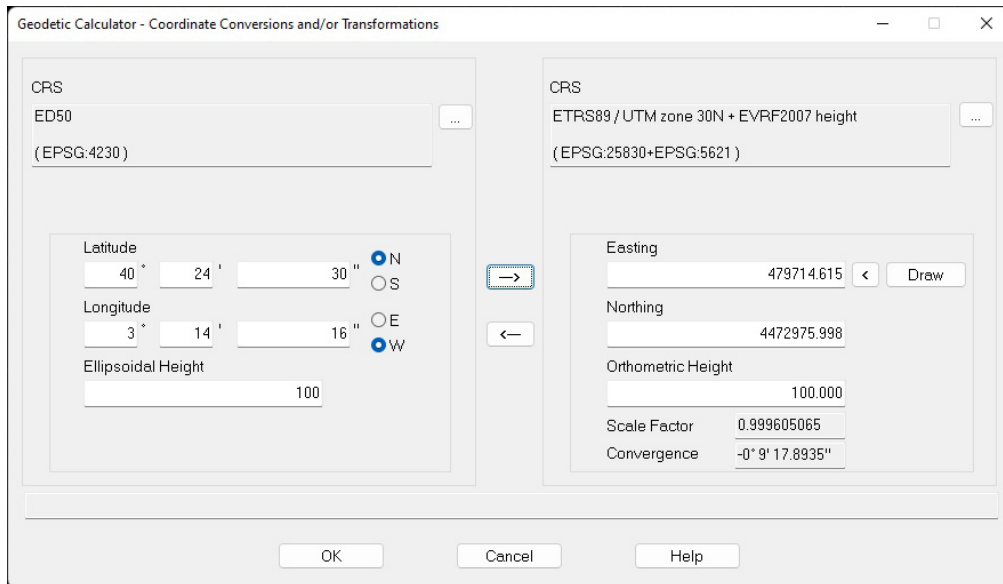
Furthermore, this module includes options for converting projected coordinates' files into generic format X, Y, Z and geographic coordinates into KML formats from Google Earth, GPS exchange Format (GPX) and TcpGPS among others.

Finally, another command allows the projection of drawings opened in CAD, applying the transformations to the complete drawing, a list of layers or a selection of objects and being able to decide whether the elevations will be included in the calculations.

The selected transformation applies to all drawing entities (vertices of lines, arcs and polylines, text insertion points and blocks etc.).

It is also endowed with specific options for transforming a flat and projected coordinates' drawing and vice versa.





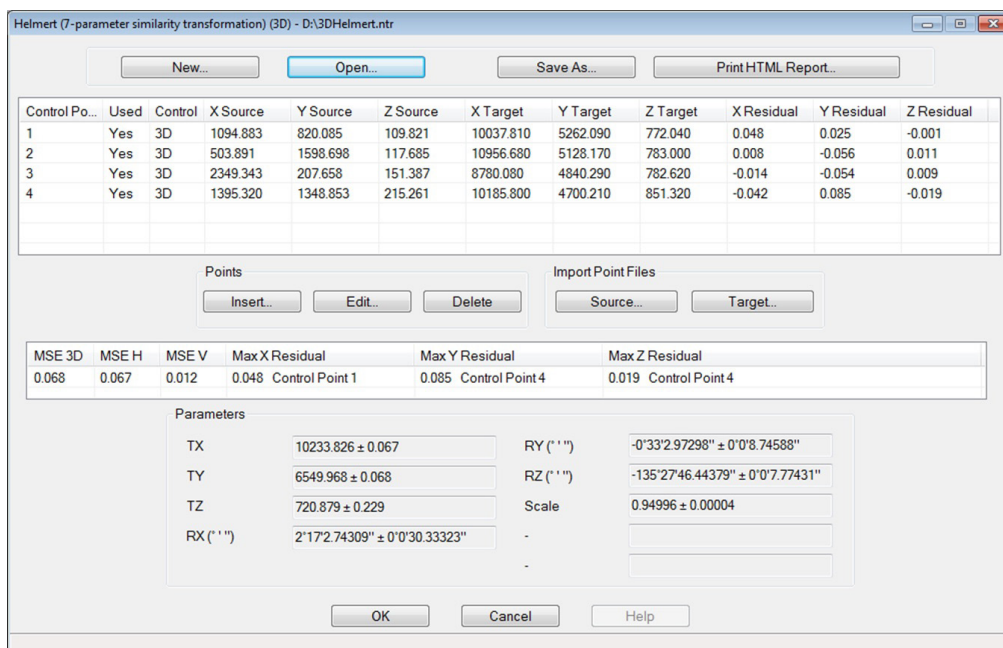
## Local Coordinate Systems

This module also has options for local coordinate systems application and management with the following methods being available:

- 2D: XY Translations, Helmert 4 parameters, Similar and Projective.
- 3D: XY Translations and Helmert 7 parameters.
- 2D+1D: Helmert 4 parameters + Z Displacement and Helmert 4 parameters + Z Displacement and Slopes at XY.

To create a local coordinate system there are various possibilities: enter the value of the transformation parameters directly (rotations, translations etc.), establish the pairs of source and target points involved or by importing a predefined file. The program generates a detailed report in which the parameters calculated, various statistics and the coordinates of the checkpoints involved are provided.

Once the local system has been created, recording can be carried out to subsequently carry out transformations of drawings and files of coordinates and it may also be used in the TcpGPS application for mobile devices.



## Requirements <sup>(1)</sup>

|                  |                                                                                                                                                                                                      |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CAD              | AutoCAD® versions 2007 to 2025 and compatible versions<br>BricsCAD® BIM/Pro/Ultimate versions 16 to 24<br>GstarCAD® Professional versions 2021 to 2025<br>ZWCAD® Professional versions 2012+ to 2025 |
| Operating System | Windows 8 / 10 / 11 in x64 architecture <sup>(2)</sup>                                                                                                                                               |
| Peripherals      | Mouse or pointing device                                                                                                                                                                             |
| Graphic Card     | CD-ROM Reader<br>1280x720 pixels, compatible with OpenGL 3.3 or better<br>Nvidia or ATI chipset recommended                                                                                          |
| Drive            | 10 Gb free space                                                                                                                                                                                     |
| Memory           | Minimum 4 Gb                                                                                                                                                                                         |

*(1) Consult the website for further details*

*(2) Operation via a remote desktop and similar services are not guaranteed, nor on virtualization platforms. Write to [soporte@aplitop.com](mailto:soporte@aplitop.com) to ask about these special cases.*

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