



MDT Version 7.5

Summary of New Features

CAD versions supported

MDT 7.5 runs with different CAD versions, making easier information exchange among users through drawings in DWG format. They are:

- AutoCAD® 2007 to 2019 (32 and 64 bits)
- BricsCAD® Pro/Platinum. Versions V.14 to V.18 (32 and 64 bits)
- ZWCAD® Professional/Enterprise. Versions 2012+ to 2015+, Classic, 2017 and 2018



Operating systems supported

MDT 7.5 is compatible with the following operating systems, in 32 and 64 bits:

- Windows XP
- Windows 7
- Windows 8/8.1
- Windows 10



Points

Uncertainties in points

In MDT 7.5 every point can have related a field type to distinguish if it has been measured by GPS or total station, besides estimated uncertainties in X, Y, Z.

Type	Name	Level	X Coord.	Y Coord.	Z Coord.	Code	Description in C.Database	X Uncertainty	Y Uncertainty	Z Uncertainty
GPS	1	1 Fill	369096.344	4066531.595	0.000	754.473		0.016	0.016	0.019
GPS	2	1 Fill	369096.626	4066532.008	0.000	754.072		0.012	0.012	0.013
GPS	3	1 Fill	369096.908	4066532.421	0.000	753.870		0.012	0.012	0.014
GPS	4	1 Fill	369097.190	4066532.834	0.000	753.436		0.011	0.011	0.014
GPS	5	1 Fill	369097.471	4066533.248	0.000	753.253		0.015	0.015	0.015
GPS	6	1 Fill	369097.753	4066533.661	0.000	753.081		0.013	0.013	0.014
GPS	7	1 Fill	369098.035	4066534.074	0.000	752.995		0.013	0.013	0.015
GPS	8	1 Fill	369098.317	4066534.487	0.000	752.126		0.012	0.012	0.013
GPS	9	1 Fill	369098.599	4066534.900	0.000	752.572		0.014	0.014	0.016
GPS	10	1 Fill	369098.881	4066535.313	0.000	752.632		0.012	0.012	0.013
GPS	11	1 Fill	369099.162	4066535.726	0.000	752.348		0.012	0.012	0.013

These values are obtained from GPS raw data file, if they have been measured with TcpGPS application, or are computed from survey data and instrument features, if they have been observed with total station and calculated with Surveying module.

Codes database with RGB colors

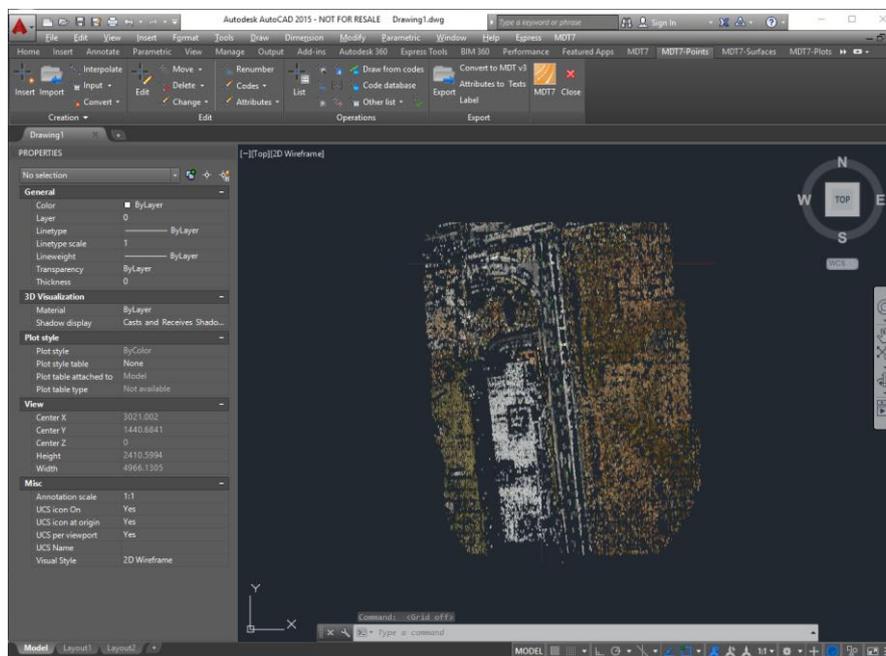
You can now specify to the point codes database not only standard CAD colors, but also RGB colors.

Import PLY format

You can now import point coordinates files in Polygon File Format (PLY), that can store for every point its color, intensity and normals. This type of file is used in 3D modeling and digital photogrammetry applications.

Color in point drawing

Every point can be represented with a different color, if they have been imported from a point cloud captured by laser scanner or generated by a photogrammetry application.



Conversion of entities without drawing points

The command convert point from drawing entities can extract points drawn by other applications as different CAD entities, such as: point, circle, cross, block, text...

In version 7.5 the drawing of points is optional, so that if you disable this option the points are created but the drawing is not overloaded, allowing better performance.

Selection by criteria combination

MDT allowed up to now to select points by number, height, code, level, layer ... Now you can also combine several criteria in order to perform more complex selections, such as having a code and a height range, or being located in a zone with a minimum accuracy...

Exchange of coordinate axes

It is increasingly common the need to get the digital model of a point cloud that is not in XY reference plan, for instance in projects for galleries, tunnels, slopes or facades.

This new command now it's possible to exchange coordinate axes allowing to process the points, for instance exchange X by -Z, Z by X, etc.

3D Rotation

This supplementary command lets you apply a 3D rotation to a point cloud giving a coordinate origin, choosing the reference axis (X, Y or Z) and angle. The operation can be repeated for complex transformations.

Staggered grid

Besides allowing creation of rectangular point grids, now it can create triangular ones, in staggered mode. Point numbering can be applied by rows or zigzagged, and elevation of points can be constant or inherited by surface.

Breaklines

Determine boundary

This new command allows you to determine the boundary of points, even if the surface is not created.

Prefixes for joining points

Breakline commands now allows to work with alphanumeric point names, such as join point GPS0001 to GPS0020.

Breaklines in LandXML files

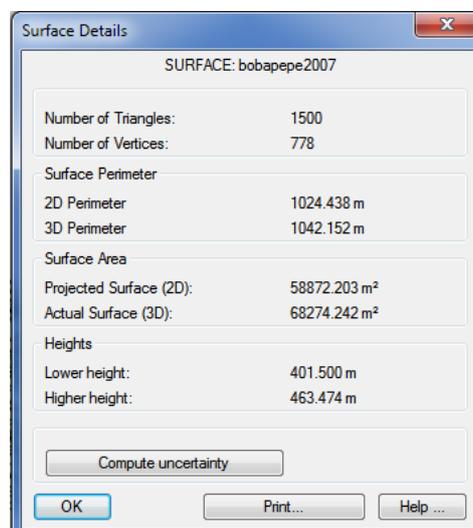
Importing LandXML files now also interprets breaklines of *PlanFeatures* section.

Surfaces

Uncertainties on areas

As important innovation that offers this version, MDT not only calculates topographic area (2D) and natural area (3D) and perimeters in 2D and 3D. It also can compute the uncertainties of these values from point data in a given confidence level.

Thus, the program does not show for example an area of 58925.716 m², but clearly indicates uncertainty: (58925.716 ± 2.501) m².



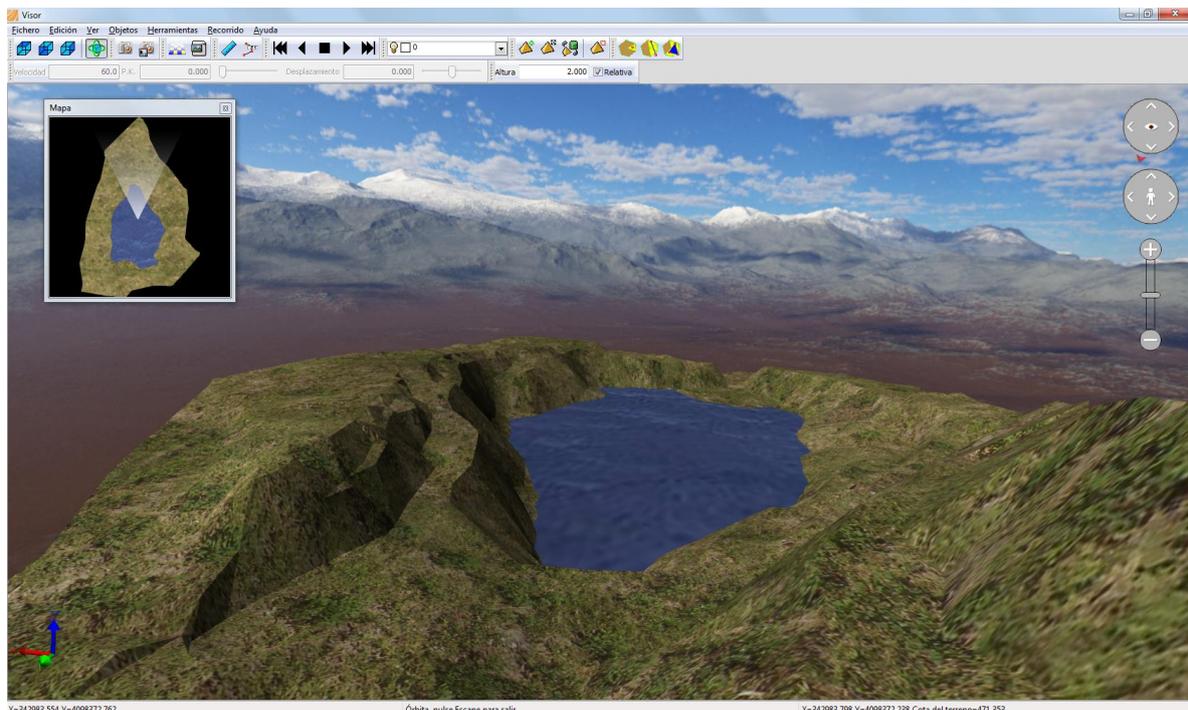
Conversion of surfaces

Surfaces managed by MDT can exchange with a wide variety of applications through the following formats:

Format	Extensions	Import	Export
3D Studio	3DS		■
Alias Wavefront Object	OBJ		■
ArcView ASCII Grid	ASC		■
Collada	DAE		■
ERDAS Imagine	IMG	■	
GeoTIFF	TIF	■	
Google SketchUp	SKP		■
LandXML	XML	■	■
Laser file format	LAS, LAZ	■	
Object File Format	OFF		■
Virtual Reality Modeling Language	WRL		■
Topcon	TN3	■	■

Water surfaces

The new command fill to height, in earthworks submenu from surfaces commands, allows you to create an esplanade giving origin point and a constant height, simulating a flood and calculating cut and fill volumes as well. It assigns also a water texture automatically to the working area.



Grids

Conversions of grids

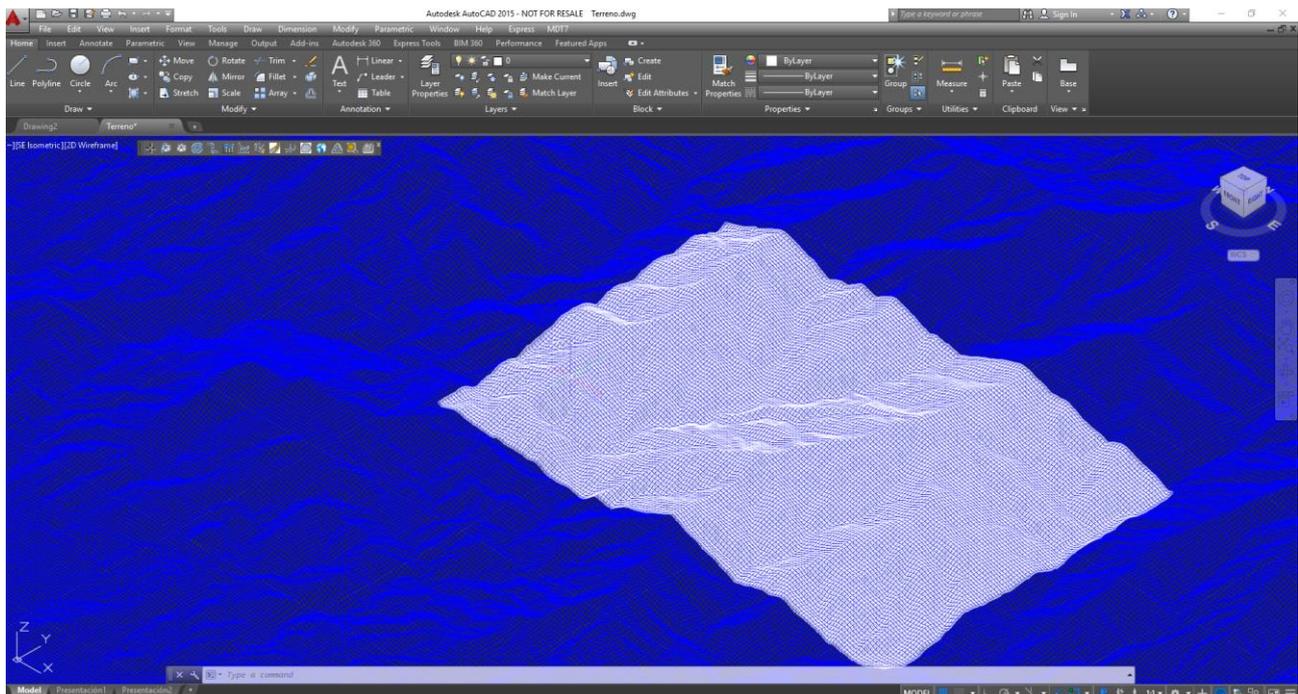
This version can import and export digital elevation models generated by other applications in the following formats:

Format	Extensions	Import	Export
3D Studio	3DS		■
Alias Wavefront Object	OBJ		■
ArcView ASCII Grid	ASC	■	■
Collada	DAE		■
ERDAS Imagine	IMG	■	
GeoTIFF	TIF	■	■
Google SketchUp	SKP		■
Laser file format	LAS, LAZ	■	
Object File Format	OFF		■
Virtual Reality Modeling Language	WRL		■

It is also possible to perform a partial extraction giving a coordinate range, and resample grid to reduce or increase the resolution.

Drawing of grids

MDT 7.0 and earlier only allowed to draw a grid as a polyface mesh if it had less than 32768 faces. Now the grids with bigger number of cells are decomposed into many polyface meshes as needed, allowing draw millions of vertices in a very efficient manner without loading the drawing.



Conversion of polyface meshes

Command convert grid from drawing can convert 3D faces and polyface meshes entities.

Resample grids

This command makes easier resampling changing the cell size of new grid using multiples (2, 4, 16, 64...) or submultiples (1/2, 1/4, 1/16, 1/64...).

This allows you to simplify DEM files generated with excessive resolution, as with some photogrammetry applications, and avoid precision problems.

Grid information

This version shows the following grid data:

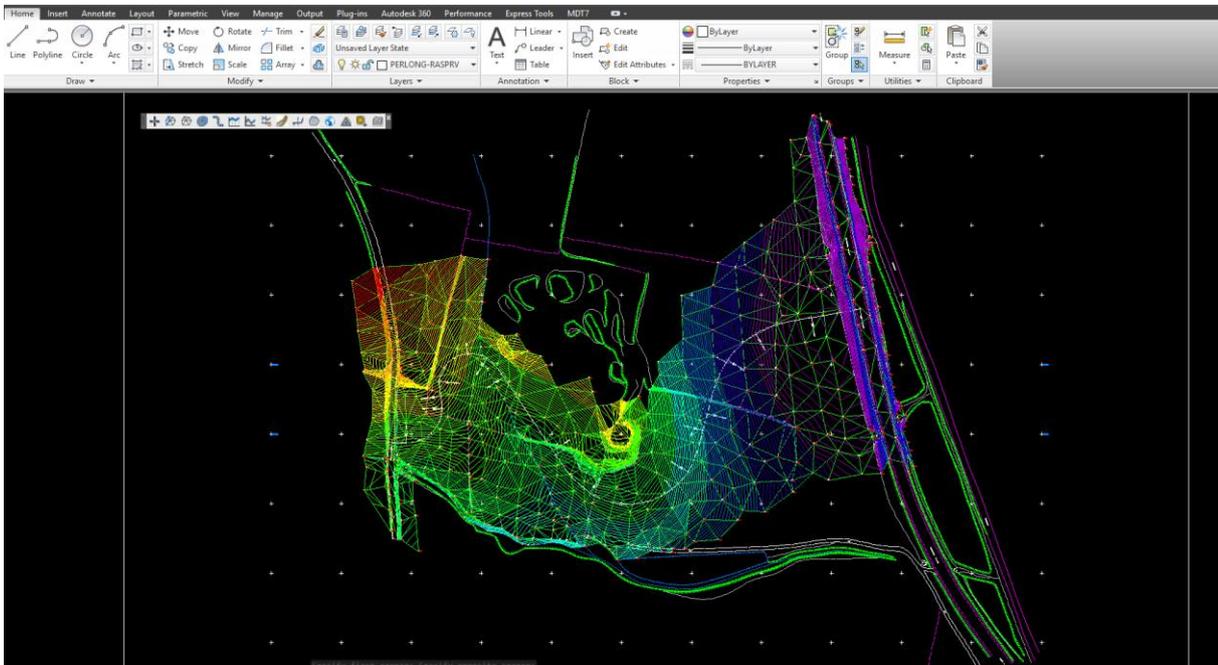
- Minimum and maximum X, Y, Z coordinates
- Global measurements X, Y, Z
- Topographic (2D) and natural (3D) areas
- Cell size
- Number and rows and cells
- Total number of cells

In addition, it shows a chart with the frequency histogram of cell values.

Cartography and Contours

Contours by colors

MDT Version 7.5 allows you to set up color ranges by elevation for drawing contours.



Importing and exporting GML files

The commands Import GIS and Export GIS, besides shape format, now can read and write points, lines and polygon files in Geographic Markup Language (GML) format, by Open Geospatial Consortium.

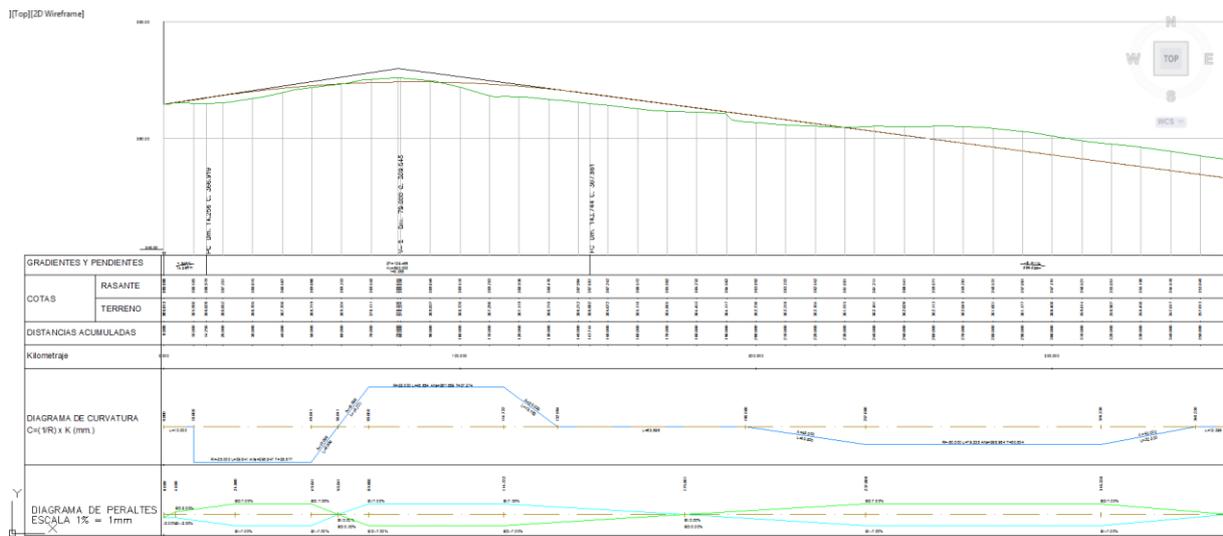
Enhancements of splines conversion

The command for converting splines to polylines distinguish between those entities which consider control points or not, as occurs in drawings coming from conversion of DGN files.

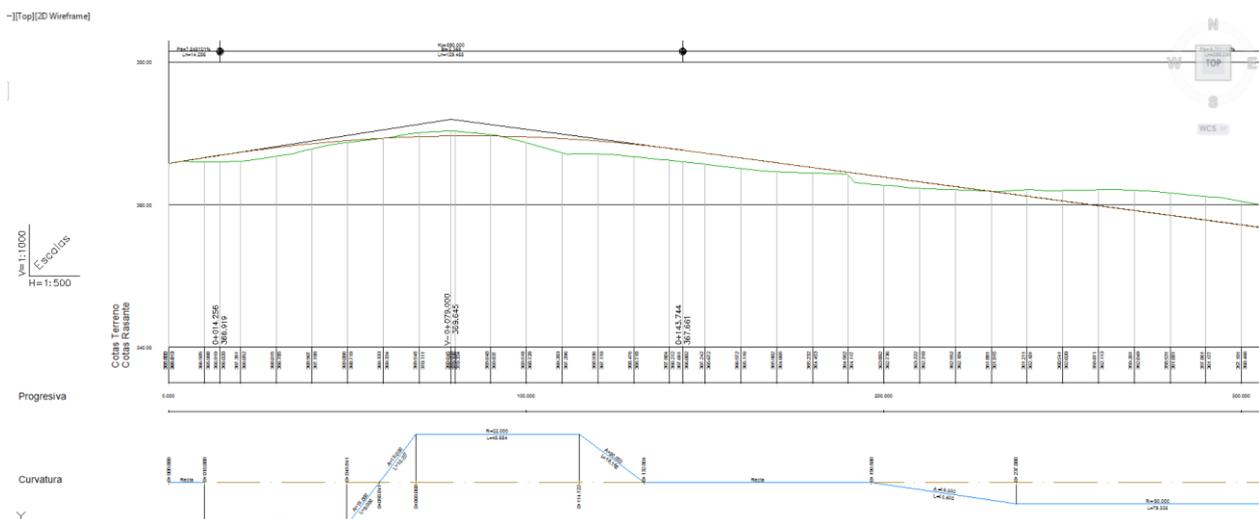
Profiles

Presentation styles

In this version we introduce the concept of presentation styles, allowing more flexibility in representation of profiles. Now it's possible to add new elements to the numerical data as well as more customization of labeling.



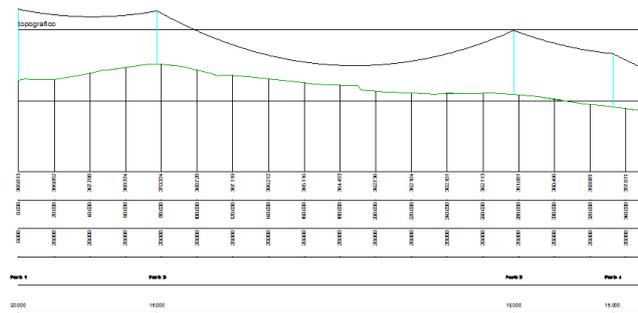
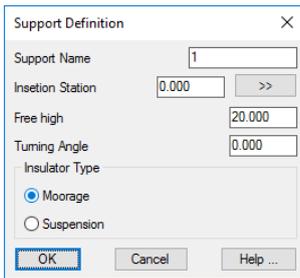
Profile drawn with Chile presentation style



Profile drawn with Colombia presentation style

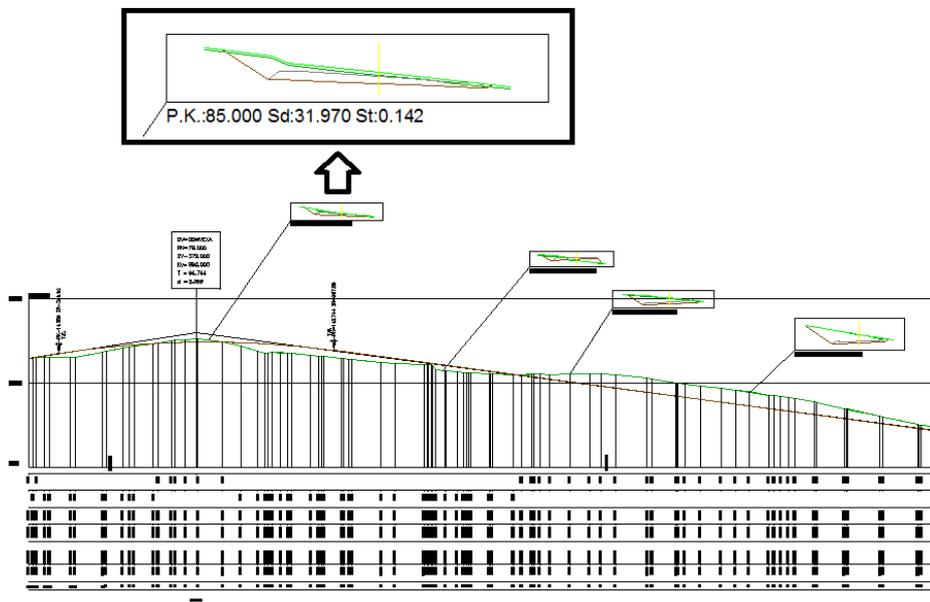
Electrical lines profiles

This new command set allow us to define the representation of a catenary related to a profile. You can define parameters such as: catenary constant, minimum distance to terrain, insulator string length, support types...



Drawing of template over profile

Now it's possible to draw over profile the project template in the stations designed graphically by user.



Labelling of minimum and maximum heights

Utility to mark in the drawing of the composite profile or report, the minimum and maximum elevations of vertical alignment automatically.

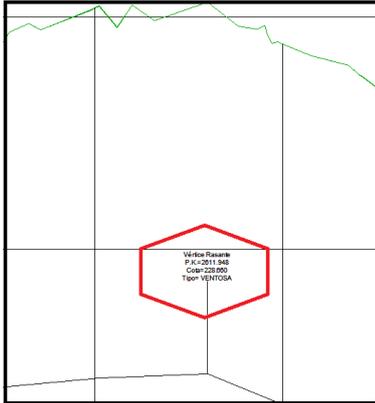
Vertical alignments

Grade line by elevation difference

Tool to define automatically a grade line between minimum and maximum elevation differences regarding original profile.

Suction cups and drainages

This new tool will allow us to calculate, for a pipe grade line, the points where to place the suction cups and drainages.

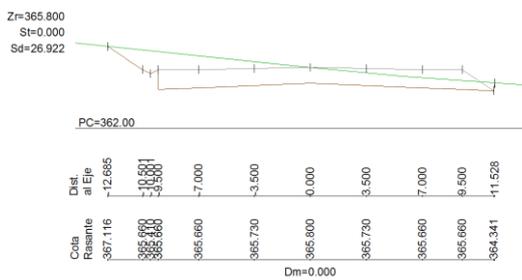


Station	Height	Slope	Length	Actual length	Angle (Sexag.)	S/O
0.000	357.915	0.176057	69.068	70.130		
69.068	370.075	-0.054464	70.932	71.037	13.102	Sucker
140.000	366.212	0.059596	71.339	71.465	6.528	Drainage
211.339	370.463	-0.965190	8.661	12.037	47.396	Sucker
220.000	362.104	0.139540	39.704	40.089	51.929	Drainage
259.704	367.644	-0.293802	20.296	21.154	24.317	Sucker
280.000	361.681	0.146294	36.633	37.023	24.695	Drainage
316.633	367.040	-0.394693	23.367	25.121	29.861	Sucker
340.000	357.817	0.206356	28.021	28.615	33.231	Drainage
368.021	363.616	-0.777281	11.979	15.172	49.550	Sucker
380.000	354.306	0.072069	25.806	25.873	41.979	Drainage
405.806	356.165	-1.138919	14.194	21.512	52.838	Sucker
420.000	340.000	0.488082	30.645	34.100	74.732	Drainage
450.645	354.957	-0.387311	19.355	20.756	47.188	Sucker
470.000	347.461	0.328321	17.926	18.867	39.348	Drainage
487.926	353.346	-0.296565	19.141	19.965	34.695	Sucker

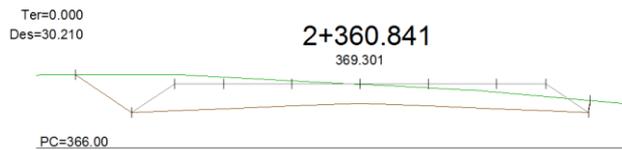
Cross Sections

Presentation styles

Likewise, to that described for profiles, you can apply different presentation styles to cross sections according to the needs of the project.



Chile



Colombia

Label customization

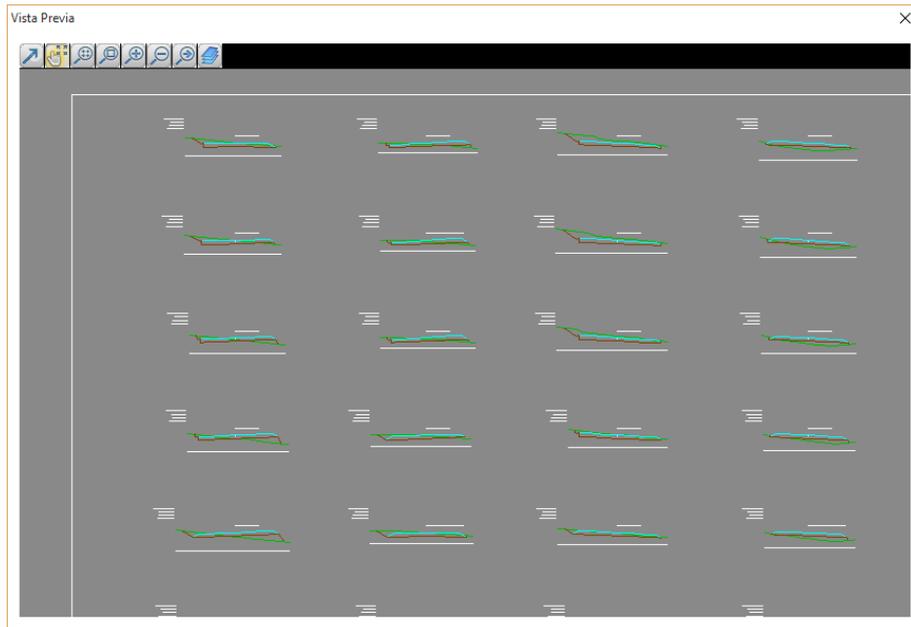
New feature in cross-sections drawing, so that the user can specify if label or not each element, as well as the text to apply for each one.

Element	Label	Description
Profile Numbering	YES	Profile #
Station	YES	Station=
Terrain Heights	YES	Zr=
Grade Line Heights	YES	Zg=
Subgrade Line Height	NO	Zsub=
Cut area	YES	Sc=
Fill area	YES	Sf=
Topsoil area	YES	Sv=
Cut volume	YES	Vc=
Fill volume	YES	Vf=
Topsoil volume	YES	Vv=
Superelevations	NO	N
Partial distance	NO	DP=

Buttons: Edit..., Elements to Draw, Comparison Plane, Distances on Profile, Heights on Profile, Slopes on Profile, Decimal Numbers (2), Clear default description

Drawing preview

Before drawing the profile it's possible to preview cross-sections according to the drawing parameters selected.



Convert cross-sections from drawing

New features in command to convert cross-sections from drawing, making easier process automation.

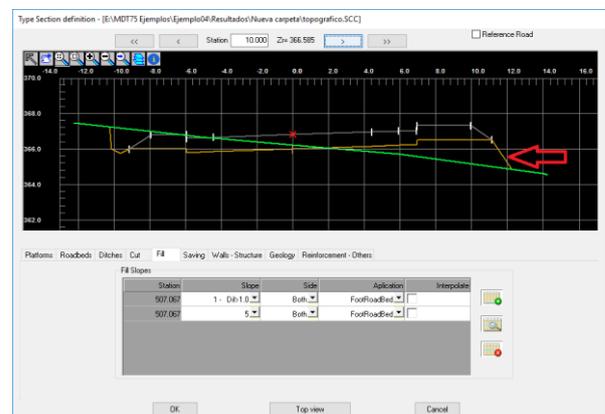
Templates

Ditch conditioned by vertical alignment height

New option in ditch definition so that we can condition the final vertex of the ditch regarding the grade line elevation. In this way we can define ditches which the bottom is defined by a vertical alignment.

Assignment of slopes by elevation

Option of setting the assignment of either slope according to the height difference between the starting point of slope and terrain elevation.



Behavior with different slopes according to the elevation difference

Assignment of ditches by elevation

New option by which you can condition the assignment of a ditch according to the elevation difference between the starting point of the ditch and the terrain elevation.

Enhancements in roadbed layers

Tools to ease the treatment of roadbed layers, both to assign the same properties to multiple and to copy their properties to different chainage ranges.

Enhancements in simple template

Ability to select graphically polylines for defining the platform width in template definition.

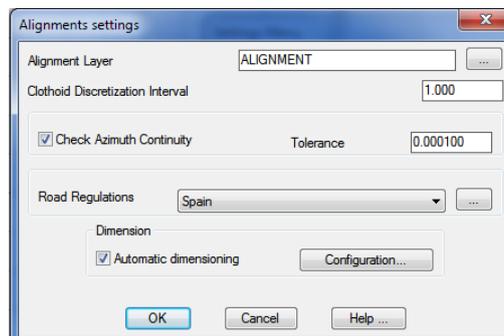
Alignments and Segments

Enhancements in roads intersection

No need to select both segments or roads to calculate the intersection. Now you have only to choose the segment to be calculated and select the reference polyline or breakline of the intersection and it will run automatically.

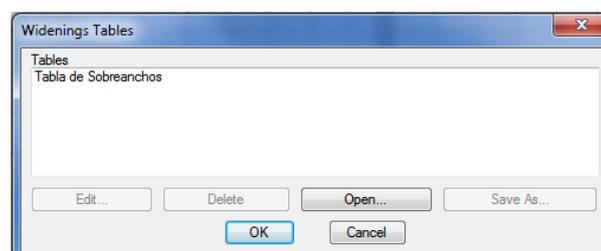
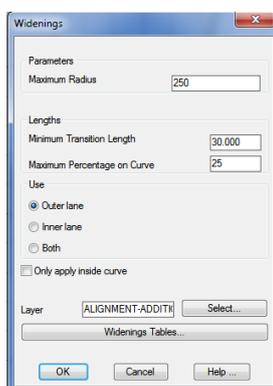
Superelevations

We have implemented a number of improvements aimed at increasing MDT compatibility with different standards and regulations. In the settings you can choose the country and then edit superelevation tables organized in categories, change default values and other parameters.



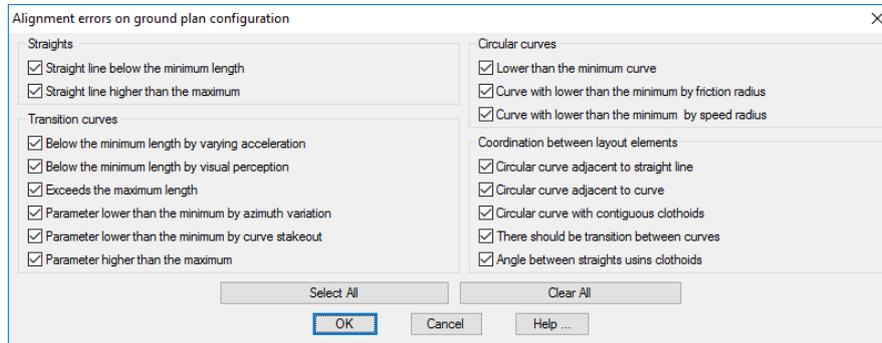
Widenings

New generation of widenings from tables. This new feature will ease the generation of them according to the rules of different countries. User can customize these tables and apply them automatically.



Checking of road regulations

This enhanced version expands the possibilities of checking the road regulations of different countries, generating a report showing any breaches of horizontal and vertical alignments.



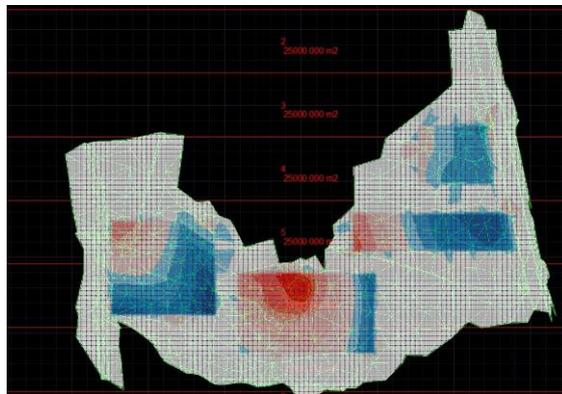
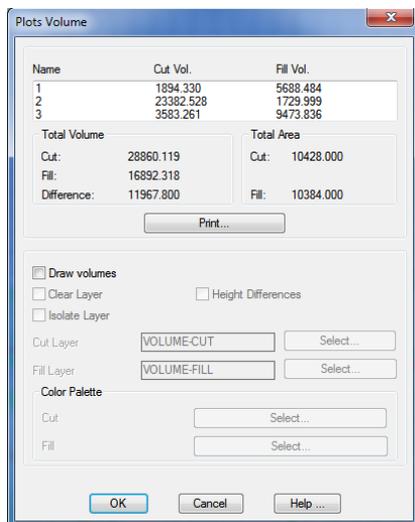
Visibility report

Instead of applying a static formula, you can use tables for visibility stop distance for each country, depending on the speed and slope.

Volumes

Volumes by parcel

With this new command we can calculate the volumes of a set of plots from two surfaces. The result will be grouped by parcel.



Cut line change to fill

This new option in calculating volumes will allow us to represent some polyline changes cut to fill and vice versa.

Islands in volumes by cross-sections differences

In calculating volumes by cross-sections differences, now islands in surfaces are considered.

Layer separation

Ability to draw in user configurable layers the final result of volume calculation, separating the cut and fill areas.

Improved accuracy in volume by difference of meshes

This version performs a post-process of volume calculations, refining the edges so that the final precision of result is improved.

Setting out

Platform vertices report

Supplementing report, adding now the terrain elevation, height difference and slope of platform vector.



Station	PCT	X Coord	Y Coord	Z Elevation	Z Terrain	Height Difference	Slope	Code
0.000	11.359	335006.395	4084603.523	364.933	366.982	2.289	4.0%	80
0.000	-8.500	335006.322	4084603.625	364.669	366.795	2.116	4.0%	45
0.000	-7.000	335006.226	4084601.127	364.763	366.524	1.795	4.0%	33
0.000	-3.500	335006.092	4084597.630	364.909	366.160	1.251	4.0%	30
0.000	0.000	335005.959	4084594.132	365.049	365.813	0.764	-	0
0.000	3.500	335005.824	4084590.635	364.909	365.477	0.568	4.0%	30
0.000	7.000	335005.689	4084587.137	364.763	365.166	0.397	4.0%	33
0.000	9.500	335005.553	4084584.639	364.669	364.880	0.311	4.0%	45
0.000	11.359	335005.521	4084582.742	364.933	364.840	0.247	4.0%	80
10.000	-11.902	335006.407	4084605.642	364.793	367.215	2.422	4.0%	80
10.000	-8.987	335006.333	4084603.739	364.869	366.987	2.128	4.0%	45
10.000	-7.487	335006.238	4084601.230	364.969	366.712	1.743	4.0%	33
10.000	-3.500	335006.095	4084597.246	365.123	366.302	1.179	4.0%	30
10.000	0.000	335005.950	4084593.749	365.269	365.988	0.729	-	0
10.000	3.500	335005.816	4084590.251	365.493	365.694	0.295	4.0%	30
10.000	7.487	335005.663	4084586.267	365.568	365.210	0.286	4.0%	33
10.000	9.987	335005.567	4084583.759	365.668	364.930	0.738	4.0%	45
10.000	11.014	335005.528	4084582.743	365.799	364.790	0.919	4.0%	80
18.994	-12.054	335105.402	4084605.489	364.982	367.271	2.289	4.0%	80
18.994	-10.426	335105.338	4084603.822	365.049	367.070	2.021	4.0%	45
18.994	-7.526	335105.242	4084601.324	365.149	366.769	1.620	4.0%	33
18.994	-3.500	335105.073	4084598.301	365.326	366.236	0.910	4.0%	30
18.994	0.000	335104.938	4084593.404	365.456	365.888	0.422	-	0
18.994	3.500	335104.804	4084589.906	365.606	365.436	0.170	4.0%	30
18.994	7.526	335104.634	4084585.484	365.793	364.941	0.842	4.0%	33
18.994	10.426	335104.538	4084582.395	365.881	364.671	1.212	4.0%	45
18.994	11.776	335104.487	4084581.636	365.937	364.625	1.411	4.0%	80
20.000	-12.100	335106.000	4084605.481	365.004	367.273	2.269	4.0%	80

Maps/Render

Material library improvements

Dialogues have been redesigned for this command, and now it's very easy to use multiple textures in a folder, such as Autodesk Material Library.

Improvements in material assignment

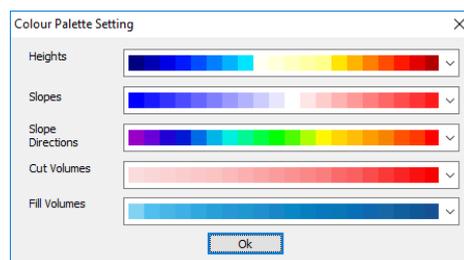
This process is more intuitive and can assign materials to different regions of the surface by selecting entities, boundary, crossing by polyline...

You can also assign an orthophoto and image from a web map service as a surface material.

Customizable color palettes

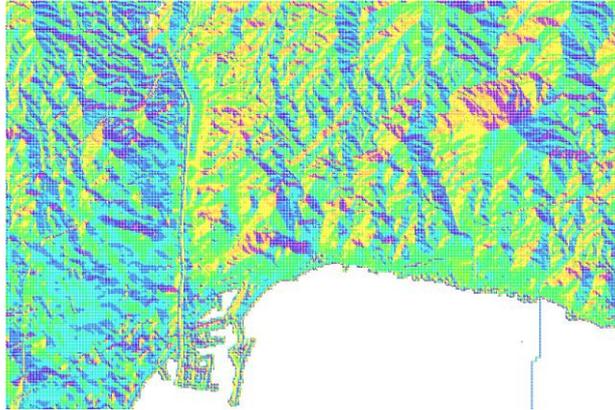
Now you can customize color palettes used in drawing commands such as slope map, elevation map, slope direction, visibility and volume by mesh difference.

You can also change the number of intervals, range values and description for each one.



Slope direction map from meshes

MDT 7.5 can calculate and draw slope direction maps not only from surfaces, but from meshes, so that the color of each cell is different depending on its orientation (N, NE, E, SE, S, SW, W, NW).



Importing of KMZ files

You can now import files not only from Google Earth Keyhole Markup Language (KML), but also in compressed version (KMZ extension).

Web map services

Several improvements have been implemented in importing images of WMS services:

- Ability to specify date for WMS-T services, so that an image can be obtained with the selected date on the services supporting this standard
- Web services with user and password

Utilities

Parcels in LandXML format

In addition to import and export shape files, MDT now interprets the *Parcels* section of LandXML standard format.

Drag and drop

Version 7.5 lets you drag files from Window explorer to CAD. For example, point files, surfaces, KML files, etc. can be imported in a simpler and intuitive way.

Surveying

Enhancements in Helmert 3D transformation

We have implemented changes in calculation of the initial approximation, so that the system converges even when the axes X, Y, Z of the source and target systems are completely different.

Transformation report now includes the rotation matrix applied for the conversion of coordinates.

Collimation error in instrument table

In addition to the data on the angular and distance accuracies that were contemplated in the previous version, we have added the accuracy of the collimator.

With this information you can calculate the uncertainties of the points measured with total station.

Calculation of uncertainty in points measured by radiation

As mentioned, MDT 7.5 determines uncertainty in coordinates X, Y, Z of each point based on the instrument properties and the measured distance.