

TCP – MDT

Digital Terrain Model – V 5.3

Professional Version

Introduction

The Professional Version is designed to assist users in all the phases of carrying out a Surveying project. Its main users include the public administration, construction companies, engineering firms, architects, town planners, companies dedicated to earthworks, quarries, mining firms, environmental companies, etc., as well as independent professionals.

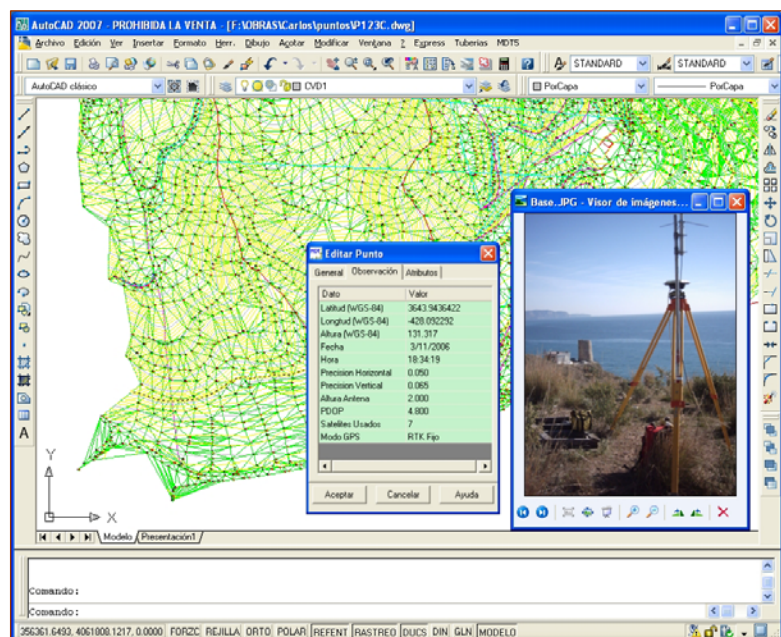
In addition to offering high performance, it is very easy to use. It runs with all versions of the AutoCAD family, ranging from 14 up to 2011, in addition to IntelliCAD, over Windows 2000, XP, Vista and Windows 7 in 32 and 64 bits operating systems.

Surveying Points

The program starts to run from the coordinates obtained at any total or GPS station by converting files from data-gathering stations or from any other application through a powerful format manager.

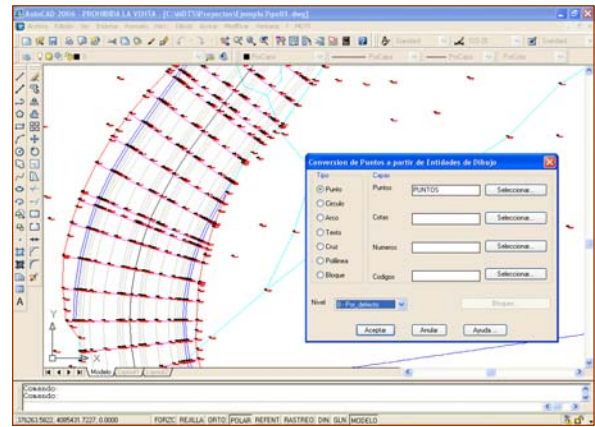
Points are intelligent CAD objects, which is why they can be deleted, moved, changed to another layer, etc. using conventional commands or blocks having attributes, thereby facilitating compatibility with other CAD applications or systems. Additionally, any kind of editing operation can be executed like: interpolating, changing heights, sorting by levels, filtering, assigning codes, labeling coordinates, grouping points, changing their visibility, etc. Coordinates can be changed using an editor similar to an electronic sheet. Selection can be done by number, level, height, group, code or graphically. It can be related to every point a document, drawing or picture as an hyperlink.

Points can have alphanumeric names and it is possible to display points with different shapes and colors within the same drawing.



New points can also be obtained from AutoCAD objects drawn by other programs (points, circles, crosses, blocks with or without attributes, etc.). The program then automatically draws the planimetry and slope change lines using its codes database, in which layers, colors, types of lines, thickness and point code ranges can be defined.

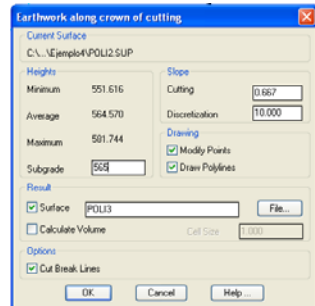
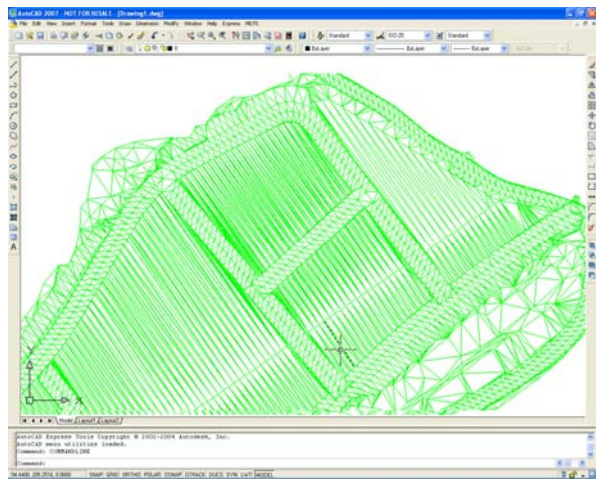
It is possible to assign each code to different blocks for ground plans, elevation drawings and 3D rendering for subsequent realistic viewing.



Surfaces

Break lines can be graphically defined through point sequences, codes or by importing files. Tools are available to detect loose vertices, points on a line, crosses and surface inconsistencies, and to repair and mark the errors.

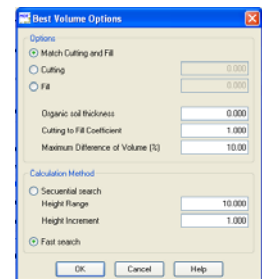
Automatic triangulation from points or taking into account break lines. Triangulation from curves with length and angle controls as well as the minimization of triangle planes. Drawing as lines, 3D faces or polyfaces. Quick View.



Creation of surfaces using multiple boundaries or selecting areas of action. Interactive triangulation editing, allowing one to insert, delete or invert joints. Boundary lines and islands. Including new points into the model. Multiple surfaces in a drawing.

Commands to create fixed or variable-height subgrades, earthworks by terrain or leveling heights, as well as calculating the modified terrain using an alignment and the cross-sections generated.

Earthworks along cutting crowns, fill feet, fill crowns, etc. Quick optimum height calculation to minimize volume. Automatic rounding of slope boundaries.



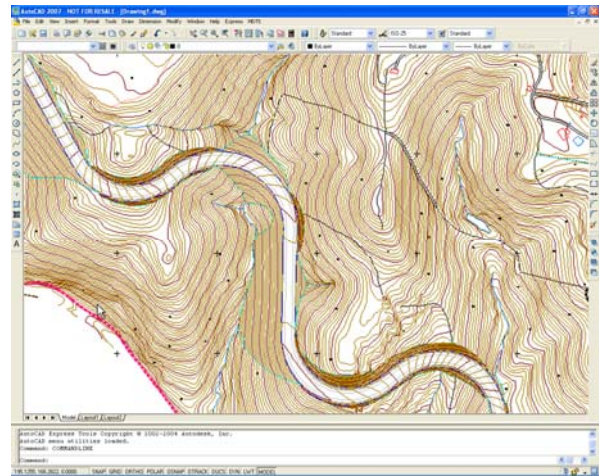
Generating Contour Lines

Generating contour lines as polylines or curved objects. Contours at special heights. Automatic contour line modifications after changes in triangulation.

Intelligent labeling without cutting contours, controlling style, size, layer, etc. in manual, automatic or by direction line mode. Additional height labeling.

Commands to add vertices, edit contour lines, discretize polylines and splines, etc.

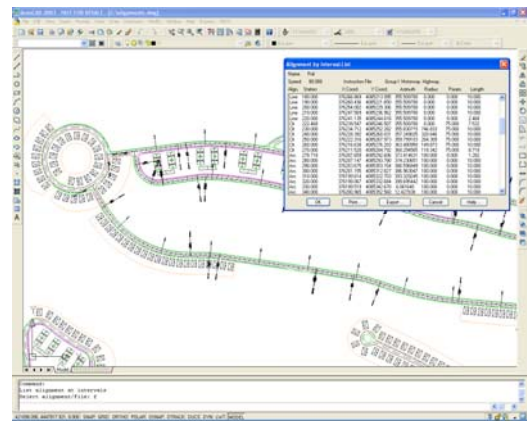
Generalization and smoothing using different algorithms. Tools to trim and join contour lines, carry out manual or automatic contour line interpolations, check contour line heights, etc.



Ground Plan Alignments

Tools to fit lines, curves and clothoids, allowing one to control radiuses and parameters, in addition to Highway Instruction recommendations.

Graphic and/or numerical definition of horizontal alignments and converting an alignment status to be used in the process of obtaining longitudinal and cross-section profiles. Fitting curves and clothoids. Interactive vertex editing. Automatic dimensioning. Point intervals list. Parallels. Converting alignments from other applications available in the market.

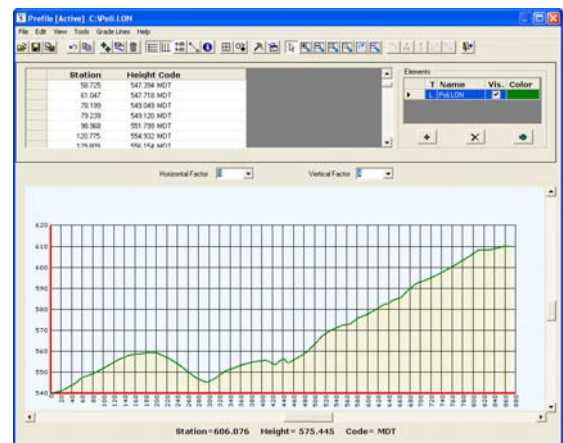


Intersection lists and distances between horizontal alignments. Commands to locate the position of a specific station on the horizontal alignment. Advanced segment definition with automatic profile calculation, terrain and cross-section error control, as well as interactive editing. Advanced block definition to insert blocks in profile drawings or 3D views. Advanced superelevation and additional width generation and editing. Checking of standard road regulations.

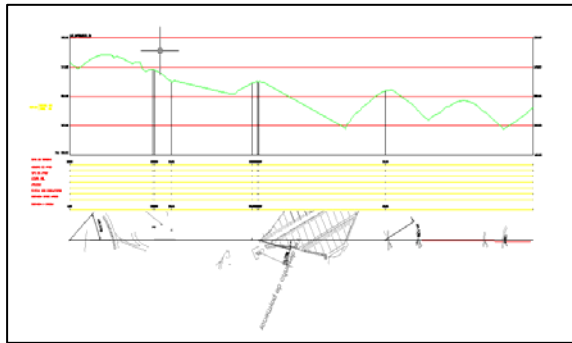
Longitudinal Profiles

Calculation and simple views of longitudinal and cross-section profiles from triangulation, digital 3D cartography or section files. Profiles by regression. Manual input. Quick profile from a surface.

AutoCAD-independent interactive editing of longitudinal profiles with the possibility of viewing multiple profiles at the same time.



Drawing of customizable profiles with the possibility of changing drawing order, text style and size, labels, justification, etc. Use of model and paper space. Projecting 3D polylines onto longitudinal profiles and cross-sections. Drawing customized blocks on the terrain or numerical data. Representing cartography as a numerical data element.

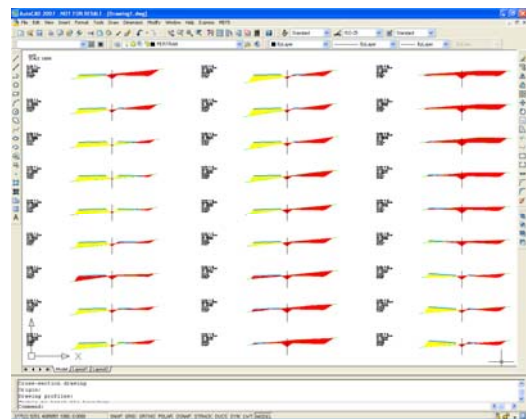


Dynamic viewing of section files with quick profile, longitudinal profile and obtaining a point's height.

Various terrains and grade lines can be represented in a single profile, along with their respective vertical transition curves and heights, height differences, partial distances, distances to origin, curvature and superelevation diagrams, numbering, inserted blocks, localization of road intersections, etc.

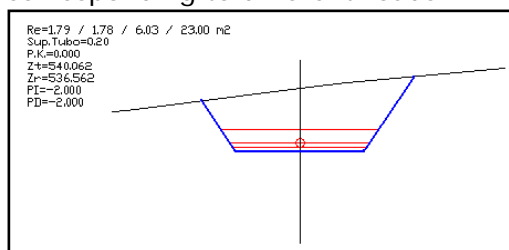
Cross-Section Profiles

Obtaining profiles taking into account platforms, ditches, slopes, roadbeds, walls, superelevations and additional widths. Advanced graphic and numerical editing of profiles, cross-section templates and grade lines. Simultaneous viewing of several profiles. Calculation and representation of surfaces, superelevations, heights, etc. Drawing on model and paper space.



Applying reinforcements and additional widths. Automatic terrain extension. Inserting cross-section profiles into a terrain's different phases of development.

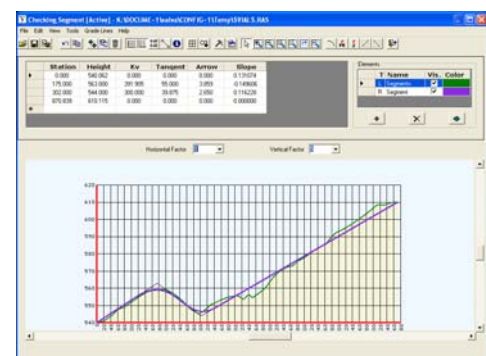
Generating modified terrain with preview and editing functions. Obtaining profiles from surveying points. Command to locate a profile in the drawing. Projecting 3D polylines onto cross-sections. Automatic conflict resolution for the intersection of profiles corresponding to different roads.



Drawing of templates of pipes in trenches, selecting different terrain layers, radius, vertical alignment origin and getting detailed listing of terrain and occupation volumes.

Definition of Vertical Alignment

Drawing of vertical alignments by graphics or numerical data: giving Station and height of vertices, distances and slopes, by polyline or importing filed. Automatic optimization by least-squares.



Editing vertical transition curves with radius or parameter fitting, tangent, maximum ordinate or

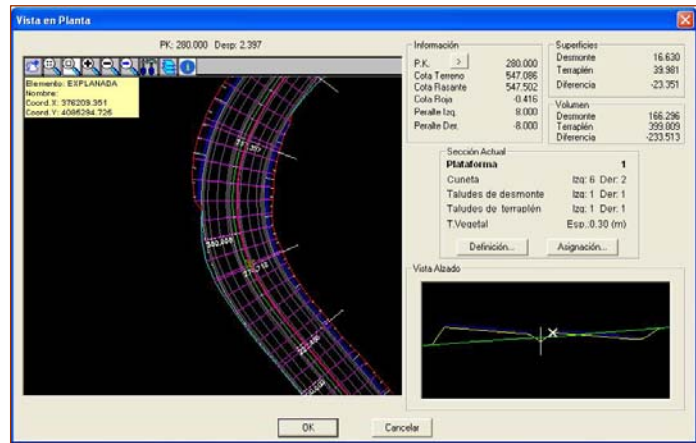
pass-through point, providing real-time information and with the possibility of setting previous and next slopes and overlap control.

Advanced grade line editor with graphic and numerical input. Tools to adjust grade lines at station and height, and to invert and convert them from longitudinal profiles.

Cross-Sections Templates

Designing templates that can be applied to any section of an alignment in both urban (vector composition) and highway projects (road surface, shoulder, median, etc. compositions).

Identifying vectors in platform definitions: road surface, inner shoulder, outer shoulder, median, berm, fill berm, etc. Control over vectors that can be superelevated and their conditioning factors, as well as pivot points. Fixed subgrade slope, parallel, depending on superlevation or another different platform. Variable-size vectors.



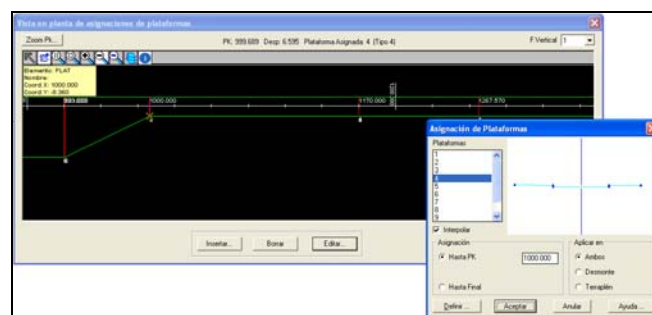
Automatic cross-section creation and assignments to horizontal alignment from ground plan drawing.

Possibility of defining vector elements and blocks to be located on median. Cutting and fill slopes with berms and variable number of vectors. Multiple roadbed layer definition with different thicknesses and materials. Highway Instruction roadbed catalogue library. Defining maximum and minimum reinforcement and additional width thicknesses. Defining the geology with organic soil, soil, transit and rock thickness. Structure and wall supports.

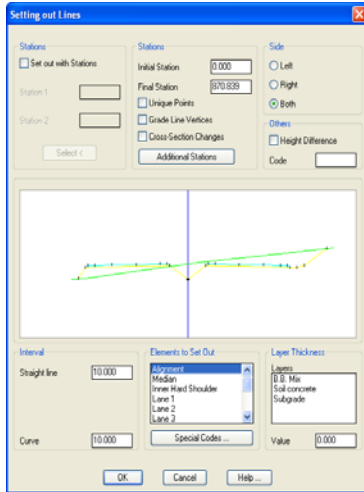
Ditches or slopes can be connected either at the roadbed crown or foot. Defining defense ditches.

Assigning cross-section templates with preview, taking into account terrain, section type on horizontal alignment, superelevations, etc. Assigning photo-realistic textures to each of the vertices.

Preliminary plan view of platform assignments, with edition capabilities in the same window.



Setting Out



Creating setting out stations using different methods. Calculating and setting out points on ground plan from base stations, points on horizontal alignment, station and adjustment, intervals, etc, using either coordinates or reciprocal zero. Points analysis from point coordinates.

Setting out various elements simultaneously in line and roadbed layers lists.

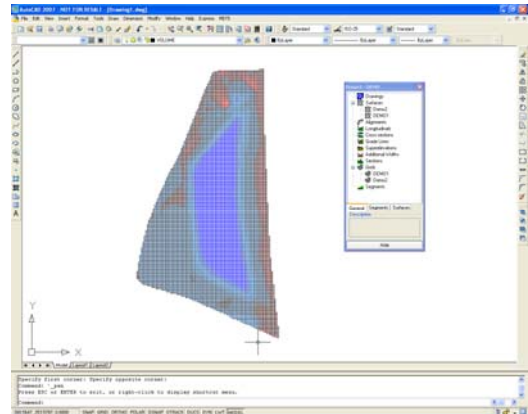
Survey analysis, control and report on a modified digital terrain model and/or on design profiles put together.

Set out polylines with regard to horizontal alignment command.

Possibility of setting out with or without base and reference stations in all commands. Multiple lists.

Volumes

Calculating volumes from grid, surface or cross-section profile comparisons. Graphic representation of cutting and fill areas with color-coded gradients. Possibility of applying curvature correction depending on project's horizontal alignment.



Roadbed layer volume calculation. Detailed breakdown of each of the volumes calculated, cutting, fill, organic soil in cutting, organic soil in fill, etc.



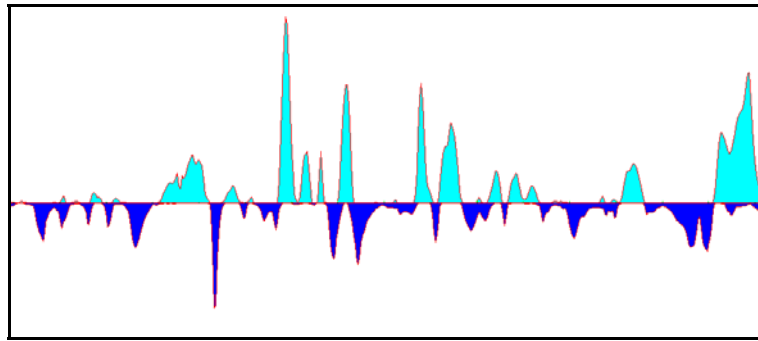
Curvature correction of volumes by cross-section profile differences.

Quick volume measurement to find percentage of the works executed from an X, Y and Z points file, or stations and heights. Different reports for each of the methods, including maximum error estimate.

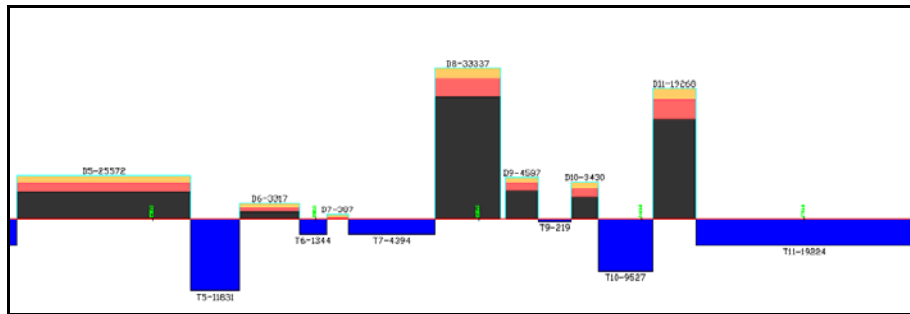
Lists of areas, volumes, cross-section measurements, roadbed layer measurements and roadbed measurements. Mass diagrams. Volumes by simple templates. Selecting of cross-sections intervals to delimit areas of interest por volume calculations.



Drawing of mass diagrams with different graphics types, earthworks calculations, definition of landfills and material collections, etc. Reports of displaced volumes, transport distances, costs ...



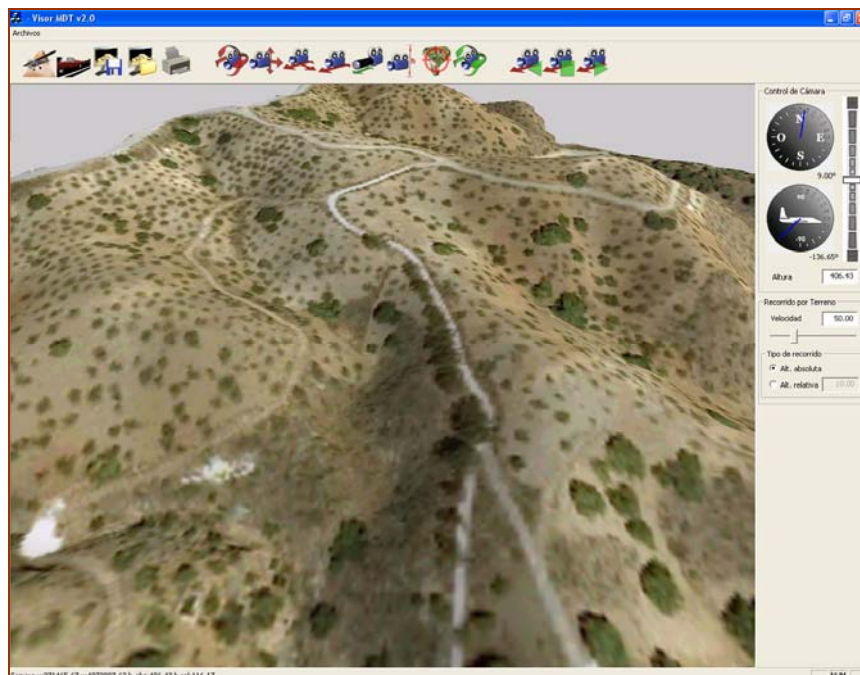
Accumulated mass diagram



Cut and fill block diagram

Maps - Rendering

Three-dimensional terrain grid from a surface or contour lines. Slope map, directions, height map and visibility. Drawing of solids.



Terrain viewing and road route simulation commands, along with the generation of high-quality video presentations in AVI format.

Libraries containing different realistic textures. 3D objects in 3DStudio format are also included that can be incorporated into the presentations. Possibility of defining new textures, including the possibility of using orthophotos as another texture.

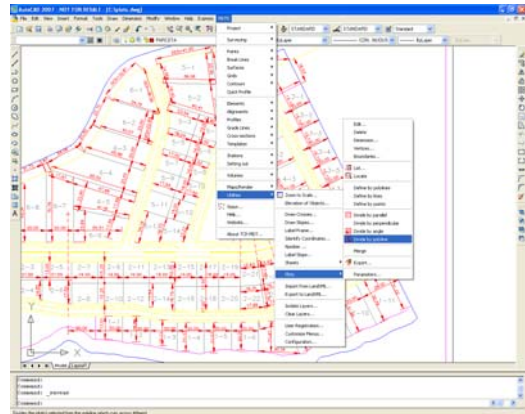
Multiple insertion of geo-referenced images and image geo-referencing tool.

Drawings of solids with assignment of materials. Drawing of anaglyphs to view relief.

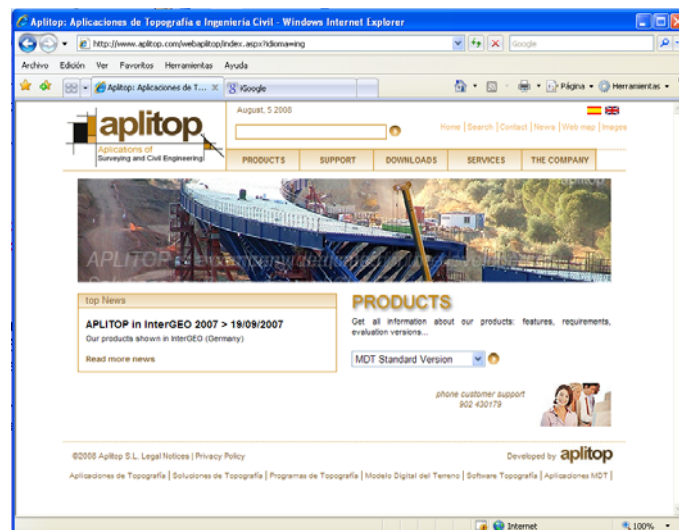
Utilities

Plan finalization tools: drawing of crosses, slopes, division of sheets, etc. Layer control tools. Elevation of objects.

Plot delimitation options to assign surfaces parallel or perpendicular to a side, vertex, rotation, etc. Dimensioning. Identification, lists and exporting to databases.



Other commands for coordinate labelling, object numbering, support web access, downloading of updates, sending of drawing and related files, etc.



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