



Integrating the Geospatial Workplace

New Features in TerraScan

Terrasolid Workshop
ILMF 2013
Denver, CO
14 February 2013


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Integrating the Geospatial Workplace

Version 013.xxx

- Computer ID changes in licenses
- Send new computer ID to Terrasolid if using:
 - Server pool licenses (server ID and name)
 - Permanent licenses
- Versions 013.001 and 013.002 will be released this week
- Version 012.099 works with 012.xxx temporary licenses, with 013.xxx server licenses and 013.xxx permanent licenses
- Version 013.001 has identical functionality with last 012.xxx version



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Workshop Software

- Pre-release version 013.002 will be used in today's workshop
- Major new features which have not been properly tested yet

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Fast Binary Speed

- Software now writes attribute streams when using fast binary as project storage format
- Processes will now read only required attributes and write modified attributes
 - Faster read speed from disk
 - Faster write speed to disk
 - Reduced memory usage
- Faster speed in some processes in TerraScan, TerraMatch and TerraPhoto

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LAS Format

- Each record contains all the attributes of a point
- Software always has to read in whole file

XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class
Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time
XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class
Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time
XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class
Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time
XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class
Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time
XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class
Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time
XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class
Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time
XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class
Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time
XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class
Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time
XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class
Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time
XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class
Angle	Scanner	Line	Time	XYZ	Intensity	Echo	Class	Angle	Scanner	Line	Time

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Fast Binary Format

- Can contain attribute streams
- Software can decide to read in/write out only some attributes (ie some parts of the file)

XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ
XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ
Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time
Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time
Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity
Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity	Intensity
Line	Line	Line	Line	Line	Line	Line	Line	Line	Line	Line	Line
Line	Line	Line	Line	Line	Line	Line	Line	Line	Line	Line	Line
Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner
Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner	Scanner
Echo	Echo	Echo	Echo	Echo	Echo	Echo	Echo	Echo	Echo	Echo	Echo
Echo	Echo	Echo	Echo	Echo	Echo	Echo	Echo	Echo	Echo	Echo	Echo
Angle	Angle	Angle	Angle	Angle	Angle	Angle	Angle	Angle	Angle	Angle	Angle
Angle	Angle	Angle	Angle	Angle	Angle	Angle	Angle	Angle	Angle	Angle	Angle
Class	Class	Class	Class	Class	Class	Class	Class	Class	Class	Class	Class
Class	Class	Class	Class	Class	Class	Class	Class	Class	Class	Class	Class

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Fast Binary Speed Example

- Execute simple macro which classifies isolated points on a project:
 - Needs XYZ & class
 - Modifies class only
- Using LAS format and USB 3.0 disk, TerraScan will:
 - Read 28 bytes of data for each point
 - Write 28 bytes of data for each point
 - Take 33 seconds on example data set
- Using FBI format and USB 3.0 disk, TerraScan will:
 - Read 12+1 bytes of data for each point
 - Write 1 byte of data for each point
 - Take 13 seconds on same example

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Fast Binary Speed


- Fast Binary will give best speed gain when running a computationally fast process
- Fast Binary will give a minimal speed improvement when running a process where CPU computation takes a long time (for example ground classification)
- Fast Binary will not give any speed improvement when creating a new copy of a project data set

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Multiple Source Classes & Swap

- Multiple source classes and swapping of source and destination classes in:
 - Assign Point Class
 - Classify Using Brush
 - Classify Fence
 - Classify Above Line
 - Classify Below Line

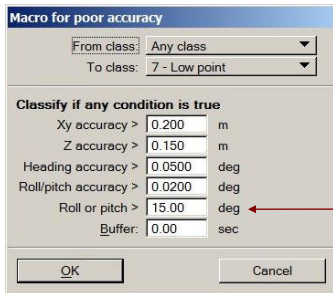


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Macro for High Tilt Angles

- **Tools / Create macro / For poor accuracy** menu command in trajectories can create a macro for classifying time intervals with large roll or pitch values

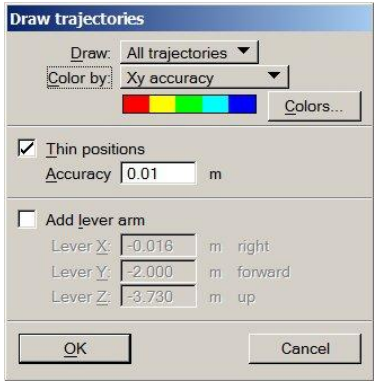


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Color Trajectories by Accuracy

- **Tools / Draw into design** menu command in trajectories can now color also by:
 - XY accuracy
 - H accuracy
 - RP accuracy

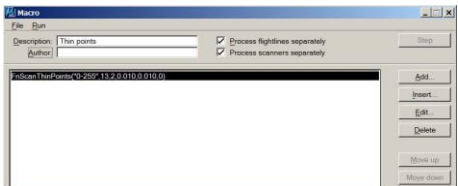


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Process Scanners Separately

- **Process scanners separately** makes software process points from each scanner as separate groups
- Example use: thin high density mobile data from slow driving places before scanner calibration/matching





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Draw Horizontal Section

- Creates a top view showing only selected elevation range
- Good for seeing XY locations of vertical features such as building walls
- Start with a top view and a section view open
- First mouse click specifies center elevation
- Second mouse click specifies depth (visible elevation range)
- Third mouse click selects target view

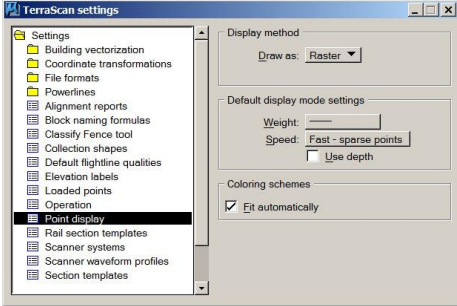



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Draw as a Raster in v8i

- **Points** draws points in 3D thru MicroStation engine
- **Raster** draws points as a background raster
 - vector elements visible on top of raster
 - may be faster on slow computer hardware

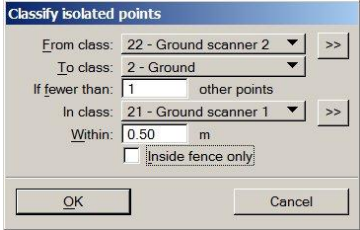


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Improvement in Isolated Points

- Separate setting for what classes to search closeby
- Makes it possible to classify points which have no points in some other class(es) within a given search radius
- Example use:
 - Classify ground separately for each scanner
 - Use scanner 1 ground every where scanner 1 has seen
 - Use scanner 2 ground in places not covered by scanner 1

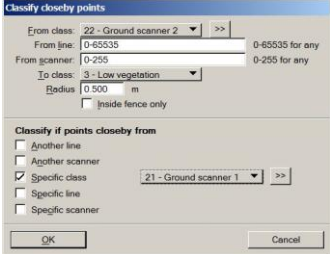


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Classify->Closeby Points

- Classifies points close to points from another class, from another line or from another scanner
- Example use:
 - Scanner 1 is better quality than scanner 2
 - Classify ground from each scanner into separate classes
 - Use scanner 2 ground only in places not seen by scanner 1

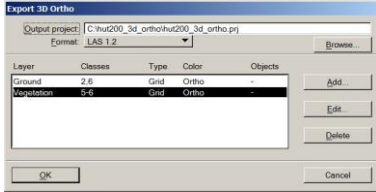



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Export 3D Ortho

- Combines ortho photo pixel colors and laser data XYZ to create a high density, colored point cloud
- Result has one point for each ortho pixel with:
 - XY at pixel center
 - Z computed from laser
 - Color from ortho pixel

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Various Improvements

- **Output control report** can compare against TerraModeler TIN model
 - Example use: compare laser points against airborne TIN model
- Support for depth maps when extracting color for laser points from airborne images
- Reduced memory usage in **Split at last gaps** in trajectories
- **Percentile** option for computing elevation in **Mouse Point Adjustment**
- Built-in support for Swedish SWEREF 99 projection systems

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Various Improvements

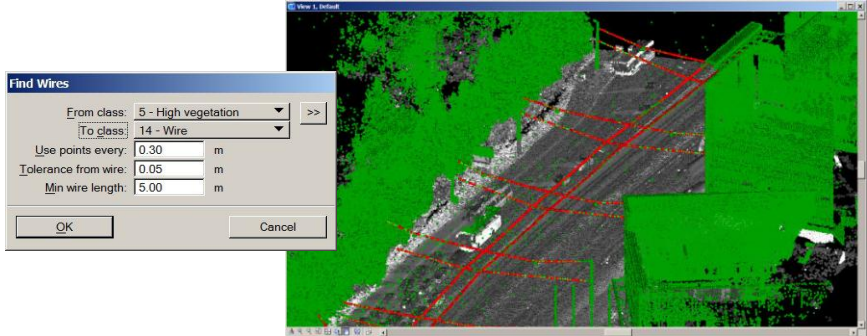
- Tower tip section view in **View Tower Spans**
- Compatibility with PowerCivil country versions 08.11.07.428 and 08.11.07.494

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Find Wires

- Automatic tool for vectorizing overhead wires
- Start with high vegetation class



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Check Wire Ends

- Tool for checking each wire end point
- User views every point, modifies if necessary and approves

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Find Rails

- Automatic vectorization of rails
- Software looks at consecutive cross sections of laser data and finds position where best number of laser points match user defined cross section shape
- Starts with an approximate centerline:
 - Lever arm corrected trajectory
 - Manually placed approximate centerline

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Find Rails

View 1, Default - Zoom Scale = 1:2

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Draw Slope Arrows

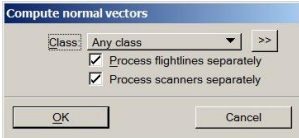
- Draws slope arrows and labels angle
 - Side slope along alignment
 - Longitudinal slope along alignment
- Can run on project using:
 - **Compute slope arrows** macro action
 - **Tools / Read / Slope arrows** menu command

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Normal Vectors and Dimension

- Software determines dimension of each point by analyzing point and its closest neighbours
 - Linear – points form a line in space
 - Planar – points form a planar surface
 - Complex – random group of points
- Dimension and normal vector stored as 32 bits
- Fast binary file format can store
- **Display Mode** supports coloring by dimension or by slope

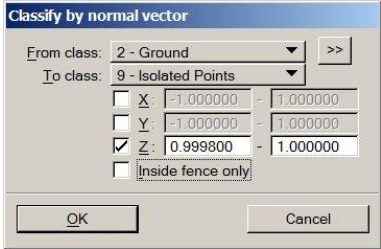


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Classify by Normal Vector

- Classifies points based on normal vector
- Can classify:
 - Points on horizontal surface
 - Points on vertical surface
 - Points on east facing vertical surface
 - ...

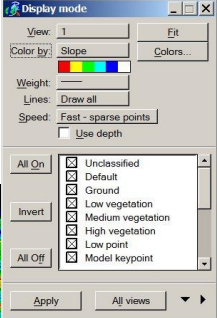
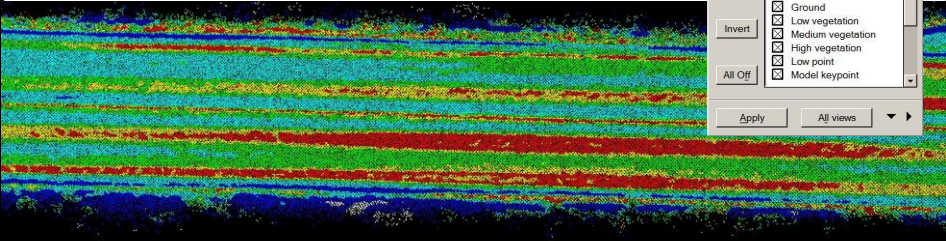


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Slope Coloring

- Display mode for coloring points based on slope angle

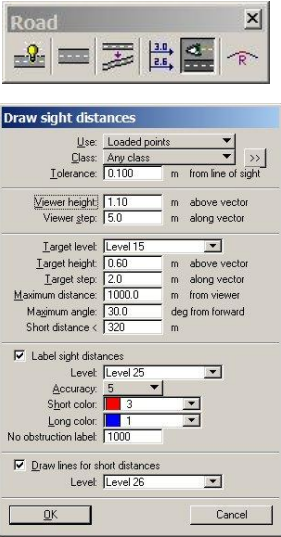



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Draw Sight Distances

- Computes how far viewer sees along a road and produces labeling for sight distances
- You specify viewer traveling path as a vector and viewer height
- You specify target positions as a vector
- Target point is not seen if there is any laser point close to a straight line from viewer position to target point
- Can run on loaded points or on active project



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Recommendations in Finland


- For stopping sight distance
 - Viewer travels along lane centerline at 1.10 m above road
 - Target is 0.40 m above road
 - Required sight distance for 80 km/h road is 120 m
- For passing sight distance
 - Viewer travels along lane centerline at 1.10 m above road
 - Target is 0.60 m above road (car headlights)
 - Required sight distance for 80 km/h road is 320 m

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Draw Sight Distances

- Workflow:
 - Draw vector along lane centerline or use trajectories
 - Drape centerline vectors to ground
 - Set active text size to be 0.5 – 1.0 m
 - Select centerline vector(s) as viewer traveling path
 - Start **Draw Sight Distances**



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Various Improvements

- **Read points** can read GeoTIFF files created by exporting lattice models from TerraScan
- Maximum thread count increased to 16 (used to be 8)
- **Close AccuDraw** setting in **Operation** category
 - Closes AccuDraw when TerraScan starts
- **Draw polygons** creates group hole elements if point group has a hole in it
- **Remove Vegetation** display technique fixed to work with different display modes
- Point classes have a code – feature code like text string which can be written to user defined point file formats
 - Example: write GRD for ground, BLD for building points

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Various Improvements


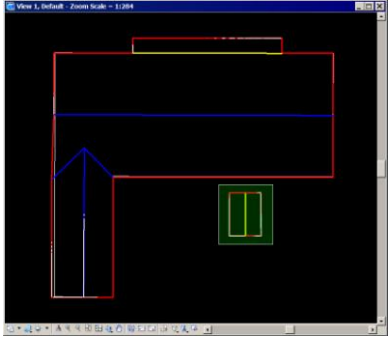
- **Vectorize Buildings** removes unnecessary parts of inner walls
- You can choose number of decimals when writing text lattice file formats
- **Average intensity** option in exporting lattice models
- **Export lattice models** supports selected non-rectangle polygons (writes rectangle area but invalidates outside polygon)
- **Export raster images** supports selected non-rectangle polygons
- **Export lattice model** macro action supports writing out data only inside active block boundary
- **Close AccuDraw** setting in **Settings / Operation**

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Split Building

- Cuts out a part of a building complex to be treated as its own separate building
- Workflow:
 - Draw fence around building to cut out
 - Start **Split Building** tool and accept
 - Area outside fence stays as active building
 - Area inside fence becomes a building at the end of the list





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Fit Geometry Components

- Finds design geometry built from lines, arcs and clothoids which best match surveyed alignment of a road or a railroad
- Fitting for both horizontal and vertical geometry
- Goals:
 - View current geometry of road/railroad/pipeline in design software such as Bentley InRoads, Bentley Track etc passing geometry in LandXML or Tekla 11/12 format
 - Find long span deformations
 - Compare components with design recommendations



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64-bit Development

- Development focus will move to 64-bit MicroStation during this year (March or later)
- There is no release date for 64-bit MicroStation yet
- Fewer updates this year to 32-bit versions of software
 - Critical bug fixes
 - Some selected new features

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