# TerraScan

## Powerful Software to Process Laser Scanned Data

*TerraScan is a versatile software package for processing raw airborne or terrestrial scanned laser data (Lidar). Operators and other users read-in trajectories and raw data points and classify them into user-defined point classes like ground, vegetation and buildings.*

*Besides built–in formats, like LAS and TerraScan binary, the user can define his own formats for reading-in practically any ASCII-survey files.*

*All processing routines are optimised to reach the highest performance of the workstation. This performance will be easily exceeded, if the total data is hundreds or even billions of points. In such cases you can divide the data into smaller, geographical blocks by TerraScan and automate processing by user-defined macros.*

*Natural combinations to TerraScan in laser data processing are TerraSlave, TerraMatch, TerraModeler and TerraPhoto from Terrasolid.*



*With Terrasolid packages you can create photo realistic images and animations from airborne scanned laser data.*
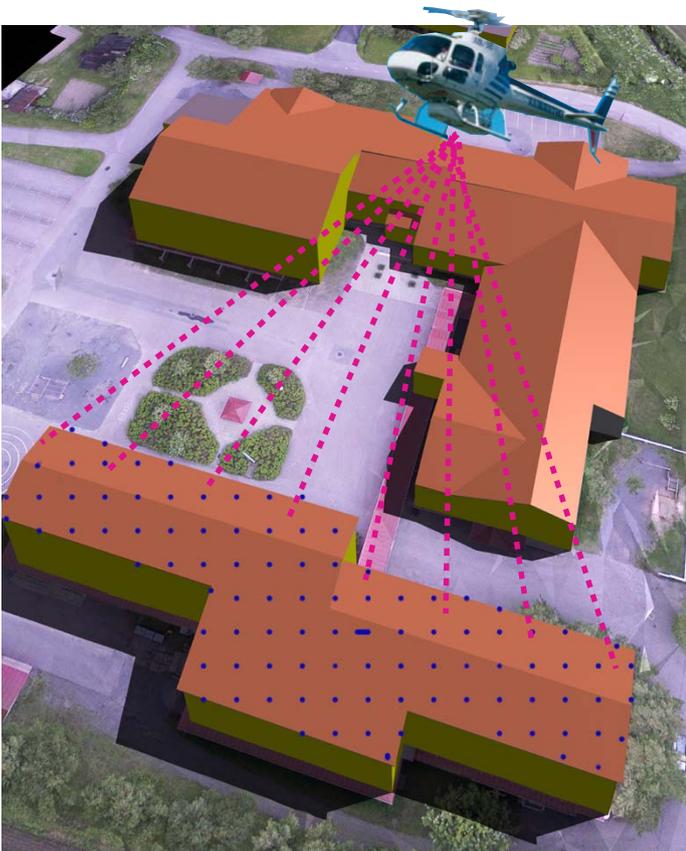
## Create 3D-City Models from Laser Data

With TerraScan you can create fully three-dimensional vectorized city models by using laser points and images, captured during the mission, as data source. In the model the true-orthophotos are draped over the TIN of ground. TerraScan goes through point clouds of high vegetation and places automatic a tree symbol (e.g. RPC cell), when it detects a tree formed cloud.
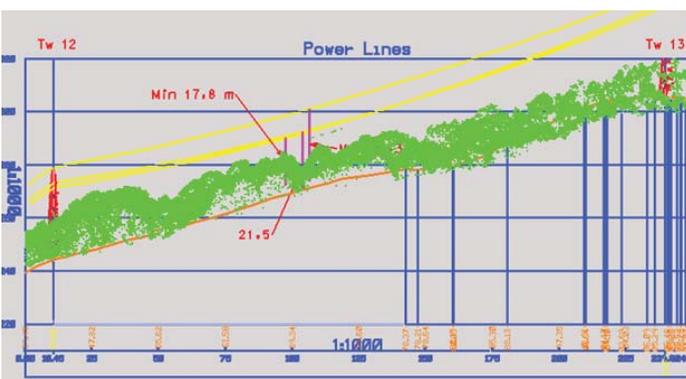
The buildings are vectorized shapes, which TerraScan finds semi-automatic from planar point areas. If raw images with their trajectories are available, the better one can edit the location of roof edges the smaller is the pixel size if images. Using TerraPhoto you can easily display separate images and fly-trough rendered animation from the model.



*TerraScan detects and shows the minimum distances between ground, trees or buildings and power lines.*

## Terrasolid

## Fast and Reliable Ground Point Classification

Filtering of ground points may be one of the most important routines of TerraScan. Many other classification routines of TerraScan compare then the elevation of rest of the points to the ground surface.

The classification of ground points consists of two phases. At first TerraScan searches the initial points and builds an initial, temporary TIN model between those points. Triangles in this initial model are mostly below the ground with only the vertices touching ground. Before starting this process the real low points are must be filtered out from the data by TerraScan.

In the second phase of classifying ground points TerraScan lifts the model upwards. A new point will be added to the TIN, if the angle and distance parameters between the point and TIN after settings are acceptable. Each added point makes the model to follow the real ground surface more and more closely.
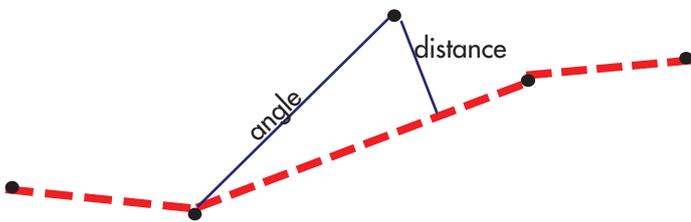
*During a ground point iteration parameters entered by user determine if a point belongs to ground or not.*

## Key Features:

- Transforms points from WGS 84 to local co-ordinate systems.
- Adjust the elevation of points to geoid.
- Let view point clouds in 3D.
- Displays points in different colored modes: class, echo, flight line, intensity, height, point color.
- Offers many manual and automated point classification routines.
- Let manage trajectories to match (by TerraMatch) and cut overlapping strips from different flight lines.
- Filters out erroneous (low and high) points
- Creates and displays (by TerraModeler) an editable 'Shaded surface', which let visual validation of ground points.
- Thins and smoothens ground points.
- Exports points as raster images and grids.
- Projects points into profiles.
- Displays distances between points and design objects.
- Drapes linear element (e.g. street curbs) along the elevation of laser points.
- Detects power lines using least squares fitting.
- Outputs ground points for surface modelling by TerraModeler.
- Supports all generally used point formats. User can define his own ASCII formats.
- Generates control reports.

## Automated Processes Help but Strategy of Project Defines Time Consumption

Laser data processing means numerous different working steps. Typical steps in their working order are as follows:

*Working with trajectories; Dividing data into smaller geographical regions (blocks); Classifying points by echo; Deducing line numbers to points; Classifying ground points separately after each flightline; Measuring match of overlapping strips (by TerraMatch); Solving heading, roll and pitch for whole data set; Verify corrections visually; Cutting overlapping point strips; Classifying ground points back to default; Starting final classification to ground, vegetation, building etc. classes.*

Due to the limits of operating systems the data should be divided into smaller blocks of around 5- 10 million points. The processing tasks can be atomised by user-defined macros, which run the blocks one by one. If the task locks your TerraScan and MicroStation for a long time, you can move such task over LAN to another PC and let TerraSlave to execute it.

In general between each step the results must be controlled and re-computed if necessary. 3D-viewing and different display modes offer an easy way for quick visible data control. To produce control reports about the difference of known points and TIN of ground points is important during the data processing as well as when you deliver the data to the final user.

Before any project one must decide goals of the project – e.g. the requirements for accuracy of TIN or objects to be detected. These goals define the strategy of the whole survey and thereby the number of working steps, extend of manual working, level of quality control and finally the total processing time.

*Planar surfaces of roofs can be detected from laser points. Their edges can be edited only manual by using 'bird-eye view' and raw images as reference.*