

## Geomatica LidarEngine

### GEOMATICA LIDARENGINE

Geomatica LidarEngine is a high performance data management, analysis, and visualization tool for LiDAR (Light Detection and Ranging) data.

It allows for rapid, accurate Lidar data point handling and surface generation providing DEM information for ortho generation and other analytical processes. It offers a complete set of analysis tools that are leveraged by a next generation GIS with exceptional power, speed and ease-of-use.

### INTERFACE

#### Toolbars

Geomatica LidarEngine includes several toolbars, each containing a number of buttons that initiate common functions in the product.

#### Main Toolbar

- **Open Project** – Allows you to open a previously saved project from a directory of your choosing
- **New Project** - Opens the Project Set-Up wizard that will guide you through the necessary steps to create a new project
- **Close Project** - Closes the current project
- **Add Map** - Opens the Add Map dialog where you can select maps to add to your project
- **Remove Map** - Opens the Remove Map dialog where you can choose one or more maps to remove from the project

#### Output Toolbar

- **Print Preview** – Previews the contents of the current window to help you visualize what the final product will look like
- **Print** – Prints the current window to the default printer

- **Save as image** - Saves the view in the current map window to an image which can be used in other applications; can be saved as BMP, JPG, TIFF or PNG
- **Export to Google Earth** - Saves the current map window as a .KML file which can be viewed in Google Earth™

#### Window Toolbar

- **Cascade** - Arranges all open windows in overlapping and cascading fashion with the first one being located in the upper left corner of the application window
- **Tile Horizontally** - Arranges all open windows horizontally
- **Tile Vertically** – Arranges all open windows vertically

#### Map View Toolbar

- **Zoom-in** - Allows you to zoom in on the map
- **Zoom-out** - Allows you to zoom out on the map
- **Pan** - Allows you to click and drag the map to a new viewing location
- **Zoom to Active Layer** - Changes the map view so the extents of the current map layer fits into the map window
- **Zoom to Full Extent** - Changes the view of the map window so that the extents of all the layers in the window are visible
- **Zoom to Select** - Changes the view in the map window so that all selected objects are visible
- **Table Window** - Opens the table window of the current map layer
- **Info Tool** – Opens the Info tool window to inspect the attribute information of map objects located at selected locations around the map
- **Enable/Disable Snapping** - Forces the cursor to locate itself at the closest node; typically used in conjunction with the drawing tools
- **Measure** - A tool used for drawing a measure line on the map

# Technical Specifications

- **Clear Measure Line** - Clears the current measure line so that a new one can be created
- **Shading** - Turns on the relief shading for a grid layer
- **Theme** – Opens the Theme Editor for the current grid layer
- **Legend** - Opens a window adjacent to the map window containing the legend of the current map layer
- **Set Window Projection** - Allows you to manually set the projection of the current map window
- **Graticule Lines** - Turns on and off graticule lines inside the map window

## 3D Toolbar

- **3D View** - Places the map layers into a three dimensional view; most effective when an elevation grid is a layer in the map window
- **Accumulate Surface** - This enables 3D solid objects to be draped on the surface
- **Collapse Layers** - When in 3D mode, this feature collapses all layers so they are displayed at the same vertical location
- **Drape** - Captures a raster image of all map layers in the scene and applies them to the surface of the Master grid layer

## 3D Cursor Toolbar

- **X-axis** - Allows you to change the location of the x-axis cross sectional plane
- **Y-axis** - Allows you to change the location of the y-axis cross sectional plane
- **Z-axis** - Allows you to change the location of the z-axis cross sectional plane
- **XYZ axis** – Allows you to modify the location of the cross sectional plane for all three axis

## Drawing Toolbar

- **Select** - Allows you to select objects from the map

- **Edit** - Allows you to edit the nodes of the selected object
- **Add Point** - Allows you to enter a point object with the current point style
- **Add Multipoint** - Allows you to enter several points that are linked to the same record or row in the table
- **Add Polyline** - Allows you to enter a polyline object with the current line style
- **Add Region** - Allows you to enter a polygon with the current region style
- **Delete** - Deletes the selected object from the map layer
- **Save Layers** - Saves any changes made to the map

## Scale Toolbar

The Scale toolbar contains a dropdown list of several popular scale settings. By selecting one of the options the map is automatically changed to the desired scale.

## Panel Windows

One of the main features of the Geomatica LidarEngine interface is the Panel Windows. Several are included with the product, each having a specific function to perform. These panels provide you with easy access to information about your project.

## Project Manager

The main purpose of the Project Manager is to display and organize all of the files you have in your project. As an added benefit the Project Manager has many other capabilities that make using Geomatica LidarEngine easy:

- Adding and removing maps
- Opening map windows
- Adding and removing folders
- Renaming files and folders
- Moving maps between directories
- Expanding and Collapsing folders
- File properties
- Exporting project files
- Launching wizards

# Technical Specifications

## Layer List

The Layer List panel window controls the view of the map window. With the Layer List, you can select which map layer is the active one, change the order in which layers are displayed, turn on or off the visibility of a map layer, and turn labels on or off. Also available are:

- Layer Settings
- Removing layers
- Map labels
- Master grid
- Theme editor
- Layer transparency
- Layer Order
- Scratchpad Layer

## Process Manager

A unique feature in Geomatica LidarEngine is the ability to monitor and control multiple processes at the same time. The multithreading capabilities of Geomatica LidarEngine allow several processes to be run simultaneously. The Process Manager panel displays all processes that are underway and reports their progress by providing a percent complete value. You can also:

- Pause a process
- Stop a process
- Get Additional Info

## Workbench

The Workbench panel window organizes all wizards that Geomatica LidarEngine offers into a convenient and logical folder structure making it easy to search for and launch an operation. It also includes a Favorites folder to organize the operations you use most often.

## Views Manager

The Views Manager is a panel window that lists all of the map window views that have been saved. This ability to save map window settings, allows you to freely close map windows without fear of losing work you have already done. You can:

- Save a map view
- Remove a map view
- Open a map view

## Table Window

The Table Window displays the attribute data of a map. The following tools are available on the Table Window toolbar:

- **Show/Hide Columns** - Switches the view of the window from the default viewing state to the one you have customized
- **View Attribute Columns** - Turns on and off the attribute columns
- **View Spatial Columns** - Turns on and off the architectural information about each object
- **View Style Columns** - Turns on and off the style columns for each object
- **Edit Mode** - Allows you to make edits to the data in the table
- **Save** - Saves any changes made to the data within the table.
- **Save selection As** - Saves the current selection to a new file
- **Simple Query** - Launches the Simple Query dialog that allows you to perform a mathematical query on the data
- **Map** - Opens the map objects of the currently selected rows into a map window

## SUPPORTED IMPORT FORMATS

Geomatica LidarEngine supports many popular spatial data formats:

### Vector Data Formats

- **LiDAR Data (LAS)**
- **LiDAR Device Point Data (XYZ)**
  - ASCII files having X, Y and Z coordinates in the first three columns
- **AmberCore Spatial Data (ISD)**
  - Native data format for Geomatica LidarEngine
  - Can be either vector or raster data format
- **MapInfo Feature (TAB, MIF/MID)**
  - A pointer to the actual data which can be raster, vector or a table. The MIF/MID format is an ASCII formatted data type specifically used for data exchange
- **ESRI Shape (SHP)**
- **ASCII Text (TXT)**

# Technical Specifications

- Typically used for point data

## Grid Data Formats

- **MapInfo Grid (MIG)**
  - Native grid format used by MapInfo Professional
- **ESRI Grid (ASC, FLT)**
  - Two formats are supported; the ASC format which is an ASCII grid format and the FLT binary floating point format. Importing FLT formatted grid is 2 to 3 times faster than ASC formatted
- **Northwood Grid (GRD, GRC)**
  - Used by Vertical Mapper, a raster analysis module for MapInfo Professional. Two format types are supported; GRD (numeric grid data) and GRC (character based data)
- **USGS Digital Terrain Elevation Data (DT0)**
- **USGS Spatial Data Transfer Standard (SDTS) (DDF)**
  - Only the surface or grid layer is imported
- **USGS Digital Elevation Model (DEM)**
- **CDED Canadian Digital Elevation Data (DEM)**
- **SRTM1 and SRTM3 (HGT)**

## Image Data Format

- **Tagged Image File Format (TIF)**
  - Two format types with this extension are supported; regular unregistered TIF images and georeferenced GeoTIFF images

## SUPPORTED EXPORT FORMATS

The following list outlines the export file formats supported in Geomatica LidarEngine:

### Vector Data Formats

- **MapInfo Table (TAB, MIF/MID)**
- **ESRI Shape (SHP)**
- **ASCII Text (TXT)**
  - Table information only

### Grid Data Formats

- **ESRI Grid (ASC, FLT)**
- **Northwood Grid (GRD, GRC)**

- **ASCII Text (TXT)**
  - Table information only

### Image Data Formats

- **ESRI Grid (ASC, FLT)**
- **ASCII Text (TXT)**
  - Table information only

## LIDAR TOOLS

- **LIDAR Processor**
  - A wizard that allows the operator to load one or more input point data layers and build them into a Digital Elevation Model surface
- **Feature Merger**
  - A wizard used to merge several vector layers into one layer

## DATA VISUALIZATION

Geomatica LidarEngine provides a number of ways to visualize information on a map.

### 3D Viewing

The 3D Viewing component in Geomatica LidarEngine provides you with a number of sophisticated ways to visualize and manipulate map layers in a three dimensional view. There are tools for:

- Rotating
- Zooming
- Panning
- Vertical exaggeration
- Layer spreading
- Draping

### Contouring

The Contouring procedure in Geomatica LidarEngine analyzes raster grid formatted data and generates a vector representation of it. Two types of representations can be specified, either contour lines or contour regions.

### Labeling

Labeling is the process of annotating features on a map layer with information contained in the map's table. The Label Options dialog controls which information is used for the labels, how they look on the map and where they are located.

# Technical Specifications

## Theme Editor

The Theme Editor is designed to modify the colors used to depict the values in a numeric grid. It consists of a Legend area to display the color and value of each inflection point, a Preview window and the ability to create and save different themes.

## Map Projections

Geomatica LidarEngine employs an On-the-Fly projection feature that eliminates the need for manually transforming all map layers to the same projection system prior to viewing them together. The Reproject dialog also provides the ability to make modifications to existing projections or to create new ones.

## DATA PROCESSING

The Geomatica LidarEngine Data Processing tools allow you to manipulate map layers, or the data within them, in order to make a layer more suitable for display or to prepare it for further analysis.

- Point Aggregation
  - Reduces the number of points contained within a map in a mathematically and spatially appropriate manner
- Point Collocation
  - Aggregation technique that simply deletes one or more points that are considered to be coincident
- Contouring
  - Analyzes raster grid formatted data and generates a vector representation of it.
- Grid Splicer
  - Combines multiple grid tiles into one contiguous grid
- Grid to Grid
  - A masking tool to define an area that will be processed
- Georeferencing Raster
  - Assigning x,y coordinates of several known locations on the image (control points) using an affine transformation method

- Gap Filler
  - Identifies all Null valued cells in an input grid and calculates an appropriate value for each using the values from the surrounding cells
- Grid Resizer
  - Increases or decreases the size of the grid cell used to portray the values in the grid
- Grid Smoothing
  - A filter to reduce the variability in a grid by averaging cell values contained in a specified area
- Grid Trimmer
  - A tool for cutting out a smaller area of a larger grid

## TERRAIN ANALYSIS

Geomatica LidarEngine contains a number of analytical techniques that are designed to quantify or describe characteristics of the Earth's terrain.

- Slope
  - Analyzes an elevation grid and calculates the slope of each cell
- Aspect
  - Analyzes an elevation grid and calculates the direction that each cell is facing
- Viewshed Analysis
  - Evaluates all grid cells surrounding a viewing location and evaluates whether they are visually connected
- Terrain Variability
  - Calculates the volume of material needed to be moved in order to make a user defined area flat

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