

Airborne Lidar Processing Software

This is the first ever Product Survey on Airborne Lidar Processing to appear in the pages of GIM International. No fewer than eight companies were willing to cooperate by filling in the questionnaire. Lidar is a tremendously flourishing technology!

The eight companies contributing to the present Product Survey are (1) Applied Imagery (see also Company's View on page 56) based in Washington DC US, (2) FPI Fuchs Ingenieure based in Konigsdörf near Köln, Germany, (3) Geolas Consulting based in Reichersbeuern, Germany, (4) Inpho based in Stuttgart, Germany, (5) Merrick & Company based in Aurora, Colorado, US (6) Prologic based in Fairmont, West Virginia US, (7) TopoSys based in Biberach near Ravensburg, Germany, and (8) Visual Learning Systems based in Missoula, US.

Thus, remarkably enough, exactly half the companies are based in the US and the other half in Germany. No other parts of the world are represented. The overrepresentation of Germany probably results from the considerable academic research carried out by this country on Lidar at an early stage in its development and still continuing today. As a spin-off and engine for economic expansion, companies here were facilitated in commercialising the valuable knowledge gained by those named 'researchers', who so strangely spend their days in weird, tedious and cumbersome labour. The US too is known for its well-established academic research culture within which intellectual efforts are, so to speak, converted in more or less real-time into commercial and beneficial products.

Also remarkable is the position of Toposys amongst these manufacturers. This company operates on three fronts in the Lidar arena: as Lidar sensor operator carrying out surveys, as Lidar sensor manufacturer and as a manufacturer of Lidar processing software. With this tripod of activities the company occupies a very unique position.

Prologic has announced its intention of releasing a completely new version (2.0) of Lidar Explorer for ArcGIS. Although the name will remain the same, the new version for launch at the ESRI Conference in San Diego in June 2007 will differ greatly from the present version.

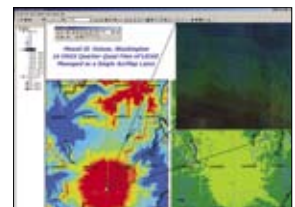
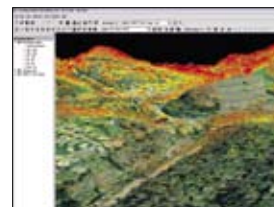
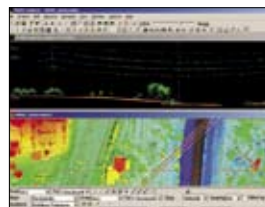
By Mathias Lemmens, editor-in-chief, GIM International

Manufacturer	Applied Imagery	fpi fuchs Ingenieure
- Type/name of software	QT Modeler	LasTools
- Names of modules	N/A	
- Date of Introduction	October 2004	mid 2007
General		
- Main type of users	Military, Airborne Surveyors, GIS Integrators, Emergency Planning/Response, Academia	Data-processing service providers
- Design philosophy	Powerful, fast, simple Lidar exploitation for experts and novices alike.	Integrated pointcloud + raster design full 3D data space
- Geo-referencing of raw data [1]	N	N
- Training support	Y, maintenance and training are optional	Y
Platform		
- Platform Requirements	Windows, min. 384MB RAM, min. Pentium III 850MHz, OpenGL support on video card	WinXP, 512 GB RAM, 250 GB HD
- Min. size of display (pixels)	N/A	1024 x 768 / 24 bit
- Additions to standard hardware [2]	None	Stereo optional
- Standalone [3]	Standalone (No GIS or CAD required)	Standalone
Point Cloud		
- Max. # points to be processed	100 Million	Unlimited
- TIN creation	N	Y
DEM Editing		
- Interactive removal/insertion of (groups of) points	Y	Y, no additional facilities required
- Automatic point thinning	Y	Y
- Automatic filtering [4]	Automatic filtering of classified LAS data, manual filtering of all other data.	Y
Analysis		
- Contour lines generation	Y	Y
- Cross-sections generation	Y	Y
- Break-line detection	N	in future versions
- Feature extraction	N	Buildings, trees
- Line of sight	Y, USA Version Only - not available for export due to US military restrictions	Y
- Slope analysis	Y	Y
- Volume analysis	Y	Y
- Simulations [5]	Flood	Flood
Visualisation		
- Reflected signal intensity	Y	Y
- Altitude colouration	Y	Y
- Diffuse lightening	Y	Y
- Multi-layering	Y	Y
- Hill shading	Y	Y
- Draping	Y	Y
File Formats		
- Airborne Lidar systems [6]	Optech ALTM Specific Formats: CSD, CMP	Optech, Leica, Toposys, LiteMapper
- Data Import Formats	ASCII XYZ, LAS, GeoTIFF DEM, ESRI Grid ASCII, Floating Point, DTED, Binary, batch functionality.	ASCII, LAS, Tscan, GeoTiff,...
- Data Export Formats	ASCII XYZ, Binary, GeoTIFF DEM, 2D GeoTIFF Imagery, ESRI Grid ASCII, ESRI Shape File	ASCII, LAS, Tscan, GeoTiff,...
Remarks	QT Modeler builds point clouds and/or gridded surface models and merges data such as photography, GIS, etc for enhanced analytical capability. Our QT Reader is a free companion software to enable distribution of models.	Project/Workflow management, QA/QC, line adjustment, full integration of waveform data, image orthorectification, flexible integration of additional data levels (RGB, hyperspectral, thermal, vector/map etc.)

- [1] Geo-referencing of raw Lidar data using on-board gathered GPS/INS data.
- [2] E.g. 3-wheel button, second screen, special video card.
- [3] If your software runs on top of other software systems, indicate.
- [4] I.e. removal of unwanted points, such as points reflected on vegetation.
- [5] E.g. flood, landslides, erosion.
- [6] List here the Lidar systems from which data can be imported.



GeoLas Consulting	Inpho	Merrick & Company	ProLogic	ProLogic
Geocode, GeocodeWF	LIDAR Box	Merrick Advanced Remote Sensing (MARS) software	LiDAR Explorer for ArcGIS, v1.1	LiDAR Explorer for ArcGIS, v2.0
	SCOP++, DTMaster	Analysis, Compilation, GeoCalc, Automate	N/A	Base Module
2004	2003, 2004	2003	August 2006	Expected release: June, 2007 (ESRI Users' Conference)
Lidar system operators, data processing service providers	Lidar service providers, users of Lidar data	Production, analysts, GIS professionals, CAD professionals, surveyors.	Researchers, Developers, Analysts, Engineers	All, Lidar Data Providers, Lidar Data Servers, Government, Engineers
	Available as components or as complete solution	Production-quality Windows application specifically designed for processing, analysing and managing terrain data.	Direct read of LAS files into ArcMap/ArcScene Full integration with ArcGIS	Project-scale data management, visualisation, analysis, and processing within ArcGIS
Y	N	N	N	N
Y	Y	Y	N	N
WinXP, 512 GB RAM, 250 GB HD	Windows XP/Vista, 2 Gbyte RAM	Microsoft Windows XP, Intel Pentium 4, 1.5 GHz Processor, 1 GB RAM, 40 GB.	Windows XP SP2 Recommend 2+GB RAM, 256+MB Graphics	"Windows XP SP2 Recommend 2+GB RAM, 256+MB Graphics"
1024 x 768	1280 x 1024	None	Any; Recommend 1280x1024 or higher	Any; Recommend 1280x1024 or higher
-	Stereo hardware, if stereo imagery is used for quality control	Optional	None required; Recommend high-performance graphics card if working in ArcScene (3D)	None required
Standalone	Standalone	Standalone	N, ArcGIS 9.x; 3D Analyst req'd.	N (ArcGIS 9.x, 3D Analyst req'd.)
Unlimited	50 Million per tile	Unlimited	ArcMap (2D): ~12 Million ArcScene (3D): dependent on graphics memory	Infinite
N	Y	Y	Y	N
N/A				
-	Y	Y	Y	Y
-	Y	Y	N	N
-	Y	Y	Y, other classification algorithms	N
N/A				
-	Y	Y	Y	N
-	Y	Y	Y	Y
-	N	Y	N	N
-	N	Y	N	N
-	Y	Y	Y	N
-	Y	Y	Y	N
-	N	-	N	N
N/A				
-	N	Y	Y	Y
-	Y	Y	Y	Y
-	N	Y	Y	N
-	Y	Y	Y	Y
-	Y	Y	Y	N
-	Y	Y	Y	N
LiteMapper, Riegl LMS-Q120/140/280, Riegl LMS-Q560	Any	All	Optech, Leica, any other systems that write LAS format	Optech, Leica, any other systems that write LAS format
LPO, POS, LRD, SDF	LAS, DXF, XYZ, ArcGIS Shapefile	ASCII, Terrascan .BIN, ESRI Float Grid .FLT, SOCET Set .DTH	LAS, ASCII	LAS, ASCII
ASCII, LAS, Tscan Binary	LAS, DXF, XYZ, ArcGIS Shapefile, SCOP DTM, DXF-TIN, STL, VRML, VRML-TIN	ASPRS .LAS, ASCII, ESRI Shapefile .SHP, Terrascan .BIN, ESRI Float Grid .FLT, SOCET Set .DTH, Microstation .DGN, ENVI Grid, TIFF Intensity Image	LAS, Shapefile, DBF, ASCII	LAS, ASCII, Shapefile
Geocoding software for Riegl-scanner-based Lidar systems GeocodeWF includes full waveform processing	Inpho's solution is able to combine Lidar data processing with photogrammetry. It is an autonomous solution, i.e. does not require a CAD or GIS system.	MARS features 18 data classification algorithms, advanced data analysis capabilities and 3-D coordinate transformation functionality (horizontal & vertical). Automated data classification capabilities utilising PERL scripting.	LAS-format Lidar data handled in ArcGIS as PointZ Feature Class. Custom spatial index for significantly improved performance. Extensible architecture for user algorithms.	Handles multiple tile or full swath files as single layer. Swath and point attribute filtering for display, analysis, and processing. Extensible architecture for user algorithms.



Manufacturer	TopoSys GmbH	Visual Learning Systems
- Type/name of software	TopPIT	LIDAR Analyst
- Names of modules	Point-Cloud; Gridding; True-Ortho Image; Tools	LIDAR Analyst
- Date of Introduction	2000 - 2006	2004
General		
- Main type of users	Lidar operators, data-processing centre	Military, Civil Engineers, Local Government, Forestry
- Design philosophy	Fast and automated batch-oriented Lidar and Image data processing	Extension for leading GIS and image processing systems
- Geo-referencing of raw data [1]	Y, user define and extendable	Y
- Training support	Y, basic and advanced	Y
Platform		
- Platform Requirements	OS:Linux running on standard PCs with big Harddisks or Linux Cluster	ArcGIS, Erdas Imagine
- Min. size of display (pixels)	1024 x 768	None
- Additions to standard hardware [2]	Tape drive for data backup	None
- Standalone [3]	Standalone	N, extension
Point Cloud		
- Max. # points to be processed	Unlimited	5 Million
- TIN creation	Y	Y
DEM Editing		
- Interactive removal/insertion of (groups of) points	Y	Y
- Automatic point thinning	Y	Y
- Automatic filtering [4]	Y	Y
Analysis		
- Contour lines generation	Elevation stratification, raster contour lines	Y
- Cross-sections generation	Y	N
- Break-line detection	Y	N
- Feature extraction	Power-lines, manmade objects, vegetation, several filters	Y
- Line of sight	Y	Y, with Urban Analyst
- Slope analysis	Y	Y
- Volume analysis	Y	Y
- Simulations [5]	Flood	Y, with Urban Analyst
Visualisation		
- Reflected signal intensity	Y	Y
- Altitude colouration	Y	Y
- Diffuse lightening	Y	Y
- Multi-layering	Y	Y
- Hill shading	Y	Y
- Draping	N/A	Y
File Formats		
- Airborne Lidar systems [6]	All	
- Data Import Formats	ASCII, several binary formats, optech realm data, ...	LAS, ASCII, GEOTIFF
- Data Export Formats	User defined ASCII, several binary formats, las-format, Erdas Lan, ArcView, Surfer Grid, PCI, ...	LAS, ASCII, GEOTIFF
Remarks	Additional: True-Ortho Image Software for Applanix DSS RGB data and TopoSys Line-Scanner RGB/IR data.	

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