

Lidar Mapping Suite-Professional

Lidar and Photogrammetric Processing Software

Lidar and Photogrammetric Processing Software

Geospatial data production of high resolution lidar and imagery products requires a high-performance workflow to support best in class sensor technology. Critical to the success of geospatial data collection projects is an efficient, intuitive, performative, and flexible workflow. Teledyne Geospatial's Optech Lidar Mapping Suite Pro (LMS Pro) solves these critical challenges for users and enables you to produce high accuracy data for all Teledyne Optech sensor in one platform. Optech LMS Pro is a comprehensive data processing platform for the calibration, boresight and accuracy quantification of lidar and imaging sensors. Designed to serve as a single central processing hub of raw lidar and image data, LMS combines powerful least-squares algorithms with batch processing methods and the latest in distributed and multi-threaded processing routines to automate sensor calibration, compute project-wide accuracies, and maximize data throughput. Embedded data quality assurance and control tools enable the user to comprehensively optimize and validate the accuracy of their data, without the need for external toolsets.

KEY FEATURES

- Designed for commercial production processing
- Integrated processing for lidar/camera sensors
- Quality assurance processes for optimal accuracy
- Quality control tools for efficient and robust project validation



Optech LMS integrates both lidar and image sensor processing methods into a single workflow platform, enabling comprehensive sensor calibration and accuracy quantification

TELEDYNE

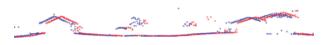
LMS for Sensor Calibration

Proper sensor calibration is a pre-requisite for maximizing the accuracy of data and map products, as well as ensuring proper multi-sensor integration. LMS leverages several key principles in its fundamental approach to sensor calibration and quality assurance, including planar surface extraction from redundant features, rigorous, industry-accepted methods for automatic sensor calibration, and the generation of reliable and repeatable sensor corrections:

- Data redundancy
- Rigorous methodology
- Reproducible results

Lidar System Calibration

The self-calibration engine available in LMS incorporates complex sensor optical models and advanced least-squares algorithms that estimate reliable and repeatable corrections to the lidar system calibration parameters (e.g., sensor and boresight parameters) and measurements (e.g., trajectory position and orientation)



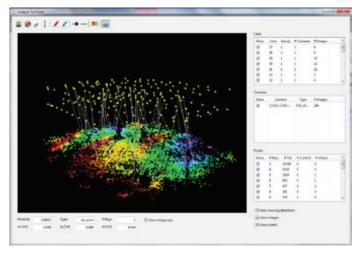
Before self-calibration



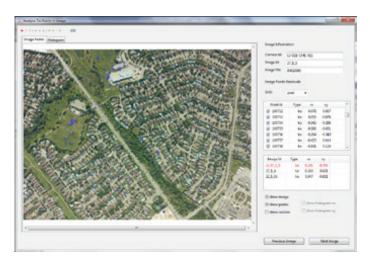
After self-calibration

Photogrammetric System Calibration

The LMS workflow provides tools for photogrammetric bundle block adjustment using GNSS/INS position and orientation information, and incorporates methodologies for photogrammetric quality assurance. With automated tie-point measurement and several 3D graphical analysis tools, the QA process lets users calibrate their photogrammetric system by estimating corrections for their camera's interior orientation, boresight parameters, and trajectory position. The outcome from the bundle block adjustment consists of accurate camera interior and exterior orientation parameters, along with the coordinates of the estimated tie points.



3D graphical analysis tools



Automated tie-point determination

Teledyne Geospatial Airborne Applications

TELEDYNE

LMS for Productivity

Processing productivity and efficiency are critical to reducing project costs and completing project deliverables on time. LMS incorporates many standard techniques for maximizing processing productivity.

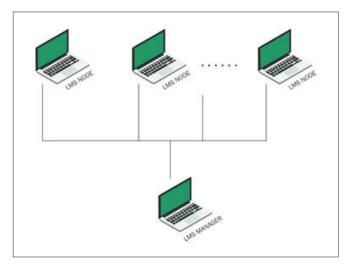
Batch/Multithread Processing

Key production utilities help process large projects cost effectively by minimizing the user interaction required:

- Batch processing for large, multi-site projects
- Parallel and distributed processing for minimizing processing time
- Cloud processing compatibility



Batch processing



Distributed processing

On-the-Fly Coordinate Transformation

The Blue Marble GeoCalc SDK is fully integrated in LMS, letting the user output their lidar data and imagery in the desired output reference frame. The user has access to an extensive database of geodetic conversions and geoid models that are updated regularly.

type filter test	Geodetic Raference Frames						
Geodetic Reference Frames	Reference Frames settings						
	CORD Annual Party Control of Cont	Nene No261/1					
	UTM Zana UTM WES 84 / UTM good UTM		Vietical Reference Datam Shifts Text	64			
	1003-84 / UTM going 2014	Name	NADED / Terresone (M/G)				
		Point Dyle Horizontal Datum Dilgeoid Poine Meridian	USA - Tanvessee				
			Cartesian 30 CS. Associations and hing (1,1). Orientations and, north. Unlift RUS.				
			GIS 1960				
			General A				
			Lambat Conformal Const				
				nil.			
			time Delay	heely			



Anter Children I	0.0	Castar Nere	Rate	Canada Sec.	Heritardal Datum	Part Balarines	Popular Taxe	Busine (*)	Gene
Constrain Same	1 1	Ander 197 - Terlinet	Autor 107-1	Autor 1987	August 1967	Finite	Taxante Real	In the lot	
2		Ander 1927, UTM are 201	Ander 1977-10	Andre 1927	Anian 1987	(marrow)	Torongelo Revis.		100
"feast"		Autor 1907, 1274 and 181	Ander 1987 ris.		Augur, 1067	-	Taxana Barra		
"Search Teleny"		Annual Others National Stat	Anim Citate It.		ALC: N	Gambare has	frances and		
- Georgette		Aurora - TWI 1988	Acces / TH 1 (89)	Acces.	Real Property lies	Terrar I.	Toposepher Marcin		
1 Caucitate		Asses Courts WHICHI	Adapter County, 191		Noth Interior D.	the state	Topographic Herris		
+ frankel		Address of College and Public	Advates / 1778 v.		No. or	Taxa .	Parameter Barrow		
W. Same		Advides (1)790 area 1070	Advice / 17W x		ingenine.	Table .	Transvense Married		
"Seed Hear"		Admin (1079) and 176	Adviser / UTW x		(Marcian)	face -	Taxana Reval		
- Rea		Administrative Contraction of the	Advator / UPW a		the sec	the state	Transverse Renne		
Interition .		Appare (1)78 are 101	Raise / 1778 a.		-April 1	fam.	Francesson Barrier.		
Inde		Name / 1/76 are 781	Harran / UTW a		Partie .	Texture 1	Taxane Real		
- Inter		Address of the International Control of the I	ALCOHOL: NOT THE		Autobar Gaudet	the state	Transmission Name		
> Buttom		Address / seed users 100	ADDEL 1 MEET IN	A10.00	Automation Conception	Taxa .	Francesco Reco.	Automotive Terrat	
V Name Investory			ADDRE / HIRD at		Automation Conception	fine .	Topinster Herin.		
r frees		ACCHE / WHICH HAR THE	ADDEL 1 HERE IN		Autority Cambrid		Transmiss News		
Summit Depresated		Address - used users 100	ADDER / KING as	1000	Automation Providers	Taxa .	Paraverse Name	Automa ha	
1 South America		ADD88 (1890) area 761	ADDER / HERD on		Autobal Geodeli	Tinter .	Toposepter Marcia		
1 1/10		ADDRE / VINC Inco 10	ADDEL 1 MAD IN			finter .	Toronte News		
Ret		Address - meetings and	minimum - mentio and	10000	Automation Concerning	Terrar 1	Francisco Reco.	Automa Lines	
		ADDER / HEED care (21	ADDER / 4983 44	1000	Automatical Conception	Finite .	Frankrader Blocks	Automa 1071	
		ADDRE/ WHO upon WI	ADDEL 1 MAD IN		Autober Geolet		Taxana Real		
		ACCESS / MINE AND AND	ACCORD / MARK IN.	March 1	Autority Cautori	Name of Concession, Name o	Frankright Barris	Augusta 10012	
		A0046 / 100 mm 40	ADDER / MIRE on	4008	Autobar Candida	Fisher	Department Process	Augusta 1071	
		ACCHL/INSIGHT	ADDR./ Incelling		Autobar Decisi		Lordoni Carllong.		
						_			

Extensive database of geodetic conversions and geoid models

Integration with 3rd-Party Workflows

The primary objective of LMS is to produce the most accurate lidar point clouds and imagery data possible with quantifiable accuracy measurements, enabling direct ingestion into valueadded 3rd-party software. For users interested in making the transition to userdefined post-processing workflows even more seamless, LMS includes the ability to launch 3rd-party executables via a user-specified command file (CMD or BAT). Similarly, LMS outputs to several standard industry formats, including LAS (1.1-1.4), and LAZ.

LMS for Quality Control

LMS makes project validation easy with integrated quality control tools to verify the absolute and relative accuracy of the data collected by lidar and photogrammetric systems, including reports, plots, graphs and visual analysis tools.

Quality Control of Lidar Data

LMS has several tools for the validation of lidar data accuracy.

Relative data accuracy:

- Detailed reports and plots enable thorough quantitative analysis
- Qualitative analysis tools let users visually inspect overlapping lidar data (e.g., roof plane/ roof line analysis)



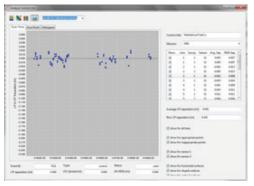


Before self-calibration

After self-calibration

Absolute data accuracy:

• Charts and reports enable overall project assessment and comparison to ground control before and after selfcalibration, either over time, over point, or as a histogram

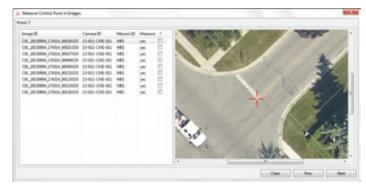


Control site analysis over time after self-calibration

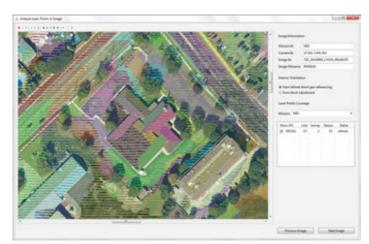
• 3D and 1D views assess the separation between individual control points and the lidar data before and after self-calibration

Quality Control of Photogrammetric Data

Comprehensive reporting tools assess the outcome of the photogrammetric bundle adjustment (observation residuals, estimated parameters and their precision, and check-point analysis). Tools for evaluating lidar/imagery alignment are also available.



Ground control points are used for absolute photogrammetric data adjustment or as check points for quality control



Quality control of multi-sensor data integration

Teledyne reserves the right to make changes at any time without notice. Copyright © Teledyne. All rights reserved. 2024 09 19.