GEOSPATIAL SOLUTIONS

TRIMBLE INPHO SOFTWARE



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Trimble



ADVANCED SENSORS GATHER GEOSPATIAL DATA FROM ABOVE THE EARTH'S SURFACE 24 HOURS A DAY – EVERY DAY.

Trimble Inpho® software is designed to precisely transform raw aerial and satellite images into consistent and accurate point clouds and surface models, orthophoto mosaics and digitized 3D features using state-of-the-art photogrammetry techniques. These essential processes standardize and enhance geospatial data for national mapping, forestry, agriculture, mining, utility and energy, urban development, defense and disaster response geo-information workflows.

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INDUSTRY LEADING GEO-PRECISION SOFTWARE

With more than thirty years of development and thousands of global implementations, Inpho software is well known for pioneering digital photogrammetry techniques that are today regarded as the industry standard. This commitment to advancing the art and science of geo-precision lives on within the latest generation of Inpho software which is engineered to the exacting standards of digital photogrammetry and laser scanning data production. With Inpho, Trimble is committed to protecting our customers' investments by further developing cutting-edge technologies as well as offering highly qualified technical support and consultancy services.

inpho®

A MODULAR APPROACH

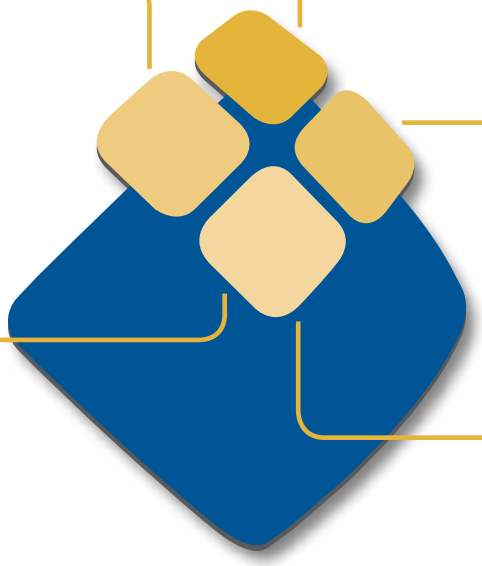
Using a modular approach, Inpho software can be deployed as a complete, perfectly tuned system, or as individual components that integrate into geospatial information production work flows, including 3rd party work flows.

Geo-Referencing

- Aerial Triangulation
- Bundle Block Adjustment
- Camera Calibration

Geo-Imaging

- Ortho-rectification
- Orthophoto Mosaicking



Geo-Capturing

- Point Clouds from Image Blocks
- Surface & Terrain Extraction
- Stereo Feature Collection

Geo-Modeling

- Point Cloud Filtering, Visualization & Editing
- DTM Extension
- LiDAR processing

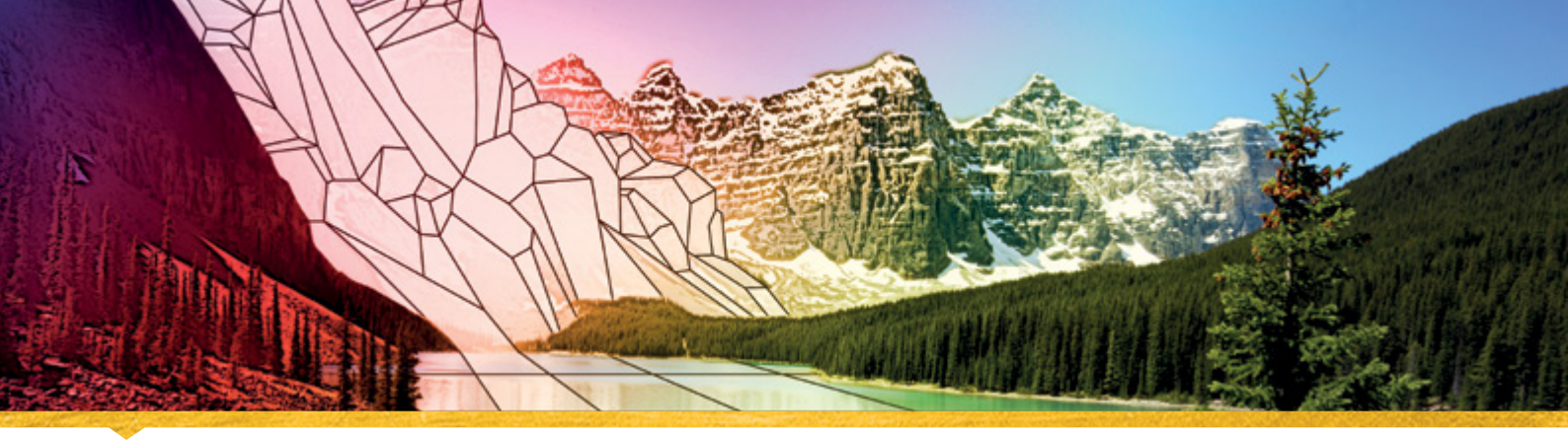
UAS Processing

- Complete photogrammetric workflow in one tool
- Georeferencing, point cloud matching, ortho mosaicking
- Highly effective analysis and editing capabilities

All software modules are delivered together with the ApplicationsMaster control center which includes basic sensor definition, image preprocessing and DTM tools.

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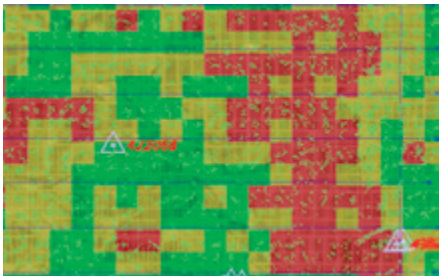
GEO-REFERENCING

State-of-the-art camera calibration, bundle block adjustment and automatic digital aerial triangulation for image blocks of any size, overlap or geometry.

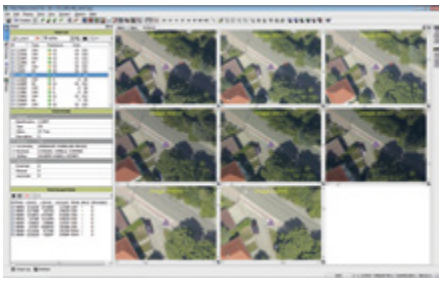
MATCH-AT (including inBLOCK)

PRECISE DIGITAL AERIAL TRIANGULATION WITH EXCEPTIONAL PERFORMANCE

- Geo-reference blocks of aerial imagery
- Automatically extract tie points at optimal locations using multi-ray image matching
- Measure or verify control and tie points mono- or stereoscopically, guided by graphical block analysis and troubleshooting tools
- Rigorous GNSS/IMU support with automatic sensor/data calibration
- Adjust aerial frame, pushbroom or satellite image blocks



Streamline quality control using MATCH-AT visual feedback tools



Precisely measure and control tie points using MATCH-AT

RECONSTRUCT THE IMAGE ORIENTATION FOR IMAGE BLOCKS EVEN FOR CHALLENGING PROJECTS

- Calibrate lens and image plane parameters for aerial frame cameras
- Control quality using mathematical modeling and adjustment combined with excellent graphical tools
- Thoroughly analyze image blocks using complete statistical information including variance components, precision, internal & external reliability measures, among others
- Complement standard views (such as vectors or ellipses) with new types of visualization (such as traffic lights) to simplify data inspection and quality control



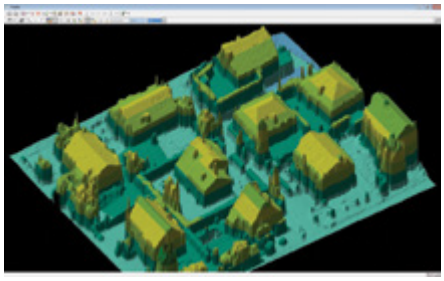
GEO-CAPTURING

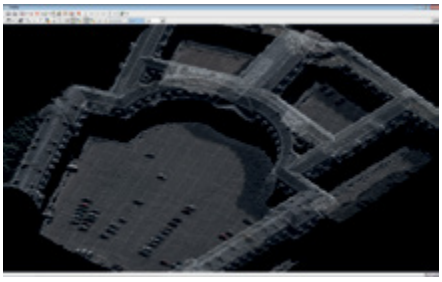
Create dense point clouds and surface models from aerial and satellite photo blocks.
Use interactive stereo data capture to collect geospatial data directly into CAD or GIS.

MATCH-T DSM

AUTOMATICALLY CREATE DIGITAL TERRAIN AND SURFACE MODELS FROM AERIAL OR SATELLITE IMAGE BLOCKS

- Acquire accurate dense point clouds (1 pixel) and detailed high quality surface models directly from blocks of stereo scenes (aerial frames, satellites, pushbroom)
- Use advanced "SGM-based" multi-image matching to create point clouds as a lower cost alternative to aerial laser scanning, particularly for applications such as city modeling and orthophoto generation
- With automatic best-geometry selection, take into account all locally overlapping images in order to create real RGB colored point clouds
- With at least 60/60 percent image overlaps, even narrow urban streets are detected
- Automatically remove non-ground objects or outliers and achieve bare earth digital terrain models (DTMs) using robust filter methods
- Expand production capabilities using state-of-the-art multi-threading and distributed processing along with automatic optimization of matching parameters and strategies and sensor noise filtering
- Rigorous weighted consideration of pre-measured morphological data such as break-lines, form-lines, spot-heights etc.
- Direct output into tiled LAS structures for compatibility with 3rd party applications





Create dense point clouds from stereo imagery using MATCH-T DSM

SUMMIT EVOLUTION

COLLECT 3D FEATURES DIRECTLY INTO ARCGIS, AUTOCAD OR MICROSTATION

- Digital photogrammetric stereo workstation
- Roam seamlessly through projects of any size using a project-based environment for oriented image blocks
- Improve result quality with routines for data generalization, checking and automatic line editing
- Ensure best mapping performance using automatic batch map editing
- Superimpose collected or imported vector data directly onto stereo models for effective and efficient interactive mapping, change detection and GIS updates
- Aerial frame and pushbroom imagery, close-range, satellite, IFSAR, LiDAR intensity and orthophoto imagery are all supported

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GEO-MODELING

Comprehensive surface and terrain modeling including filtering, visualization, editing and analysis of unlimited DSM/DTM points generated by laser scanning or image matching techniques.

DTMaster Stereo

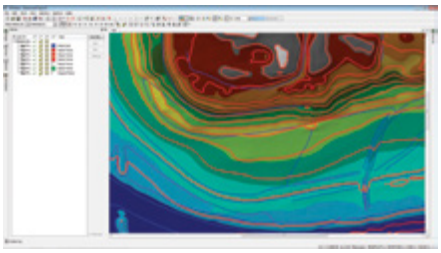
EDIT DIGITAL TERRAIN AND SURFACE MODELS QUICKLY AND PRECISELY

- Visualize, quality control, edit and digitize point clouds, DSMs/DTMs or GIS layers using excellent monoscopic or stereoscopic tools
- Easily handle huge DTM projects consisting of billions of points using a tiled data structure
- Underlay DTM data with thousands of orthophotos or complete blocks of aerial frames, pushbroom or satellite scenes in mono or stereo
- Expanded batch processing using Inpho's DTM Extension for fast point cloud filtering, gap filling and mapping-grade contour output
- Use brush operations or or project-wide processes for editing and classification
- Visualize data according to layer definitions, shadings, height coding, RGB, on-the-fly contouring and much more
- Simultaneously work with multiple files and multiple feature layers
- Interactively work with automated and semi-automated CAD tools
- Simplified easy to use automatic editing and mapping tools usable without requiring photogrammetric expertise
- Export and Convert data into a variety of formats supported in 3rd party applications

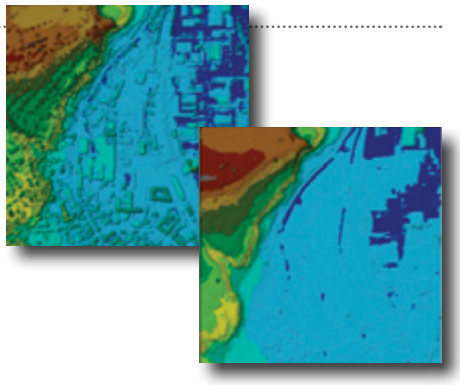
SCOP++

MANAGE VERY LARGE DTM PROJECTS WITH BILLIONS OF POINTS

- Work with points from LiDAR, photogrammetry or other sources
- Filter airborne laser scanning to automatically classify a raw point cloud into terrain and off-terrain points (up to 255 class layers supported)
- Effectively extract true ground points for further DTM processing
- Address contouring, hill-shading, profiling, volume calculations, or slope analysis
- Work with an efficient hybrid DTM data structure and integrated database system
- Flexible interpolation methods and powerful visualization
- Manage Country-Wide DTM data and LiDAR point clouds with TopDM providing transformations, classified exports and much more



Effectively visualize and edit point clouds, digital terrain models and morphological data



Accurate automatic point cloud classification and filtering

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GEO-IMAGING

Master orthophoto creation and mosaicking of digital aerial or satellite imagery with automatic block-wide operation, rigorous true-ortho capabilities, unsurpassed color balancing and fully automatic seam detection. A variety of formats for deliverables guarantees easy integration into 3rd party workflows.

OrthoMaster

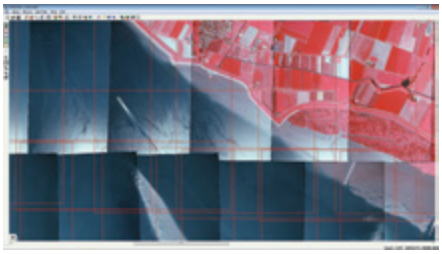
PROFESSIONAL SOFTWARE FOR HIGH-QUALITY ORTHOPHOTO GENERATION

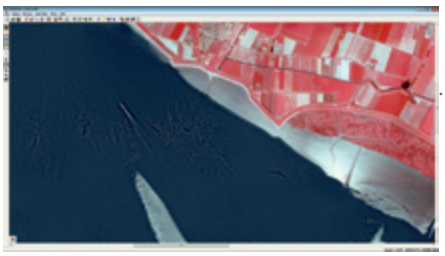
- Ensure complete blocks of digital aerial frame, pushbroom or multichannel satellite imagery with constant scale using orientation and digital terrain models as source data
- Batch-generate true orthophotos for both single images and complete image blocks using advanced computational algorithms in combination with OrthoVista
- Derive the height reference for rectifiaction directly from point clouds and morphological CAD data with advanced modelling of bridges, buildings etc. for true ortho generation
- Optimized for automated, high-performance orthophoto production with automated best geometry ortho area generation to cut-off distorted image edges or fiducials
- Expand production capabilities using state-of-the-art multi-threading and distributed processing

OrthoVista

EFFICIENTLY PROCESS THOUSANDS OF ORTHOPHOTOS INTO PERFECT ORTHOMOSAICS

- Create seamless, color balanced and geometrically correct orthomosaics
- Automate key ortho-mosaicking functions such as image intensity, color, and radiometric adjustments as well as multi-resolution resampling and mapsheet tiling
- Automatically correct visual effects such as hot spots, lens vignetting, brightness or color variations and sun reflections on water
- Detect seam lines fully automatically with feature detection technology and merge adjacent images with adaptive blending for perfectly hidden seams
- Recognize man-made objects without manual intervention to generate high quality results even in urban areas
- Also includes a seam editor for interactive mosaic editing and interactive image enhancement tools
- Step-by-step or one-stop processing and simultaneous generation of multi-channel variations of the final mosaic (e.g. RGB+CIR+RGBI)





Create perfect orthophoto mosaics using OrthoVista

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UAS-PROCESSING

Photogrammetry-Grade Processing For Remotely-Piloted Aircraft Systems (RPAS) / Unmanned Aircraft Systems (UAS) bridging the gap between simple near-black-box workflows for non-photogrammetrists and photogrammetry expert workflows.

UASMaster

MODERN COMPUTER-VISION ALGORITHMS COMBINED WITH PROVEN STATE-OF-THE-ART PHOTOGRAMMETRIC TECHNIQUES

- Accurate and reliable results in just a few seconds per image with a high degree of process automation combined with intuitive guided workflow concept and thorough graphical QA/QC tools
- Perfectly designed matching strategies lead to maximum ray connections for tie points and highest quality point clouds, contour lines or mosaics that integrate into any photogrammetric workflow as well as into eCognition automatic feature analysis
- Minimized user interaction for project set-up and data post-processing for any fixed-wing or rotary platform UAS with up to 51Mpix
- Ease-of-use combined with photogrammetric expert tools from Inpho core technology
- Integrated extensive sensor calibration for camera and high-quality GNSS (for reduction of required ground control data)
- Multi-flight and multi sensor capable
- Simplified interactive editing tools with a high degree of automation for maximum georeferencing precision, point cloud editing, classification and filtering; as well as stereoscopic CAD/GIS mapping workflows and orthomosaic editing



Automated feature mapping in stereo or mono



LIDAR-PROCESSING

Powerful airborne LiDAR processing and quality assurance designed for use with Trimble AX Aerial Mapping System. With a focus on ease-of-use and productivity. LPMaster is fully integrated into the Inpho software line offering a true end-to-end LIDAR workflow.

LPMaster

SEAMLESS LIDAR PROCESSING SOLUTION PROVIDING ACCURACY AND PRECISION DATA

- Intuitive Interface to reduce production team ramp-up time to offer fast and efficient production workflows
- Automatic data assembly and selection for project setup
- Full-automatic LiDAR strip adjustment for homogeneous quality, fast coverage checks and quality control
- Seamless workflow integration into other Inpho modules such as DTMaster, OrthoMaster and OrthoVista for an end-to-end LiDAR workflow
- USGS compliant reporting

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	GEO-REFERENCING	GEO-CAPTURING		GEO-MODELING		GEO-IMAGING		UAS-PROCESSING	LIDAR-PROCESSING
	MATCH-AT	MATCH-T DSM	SUMMIT EVOLUTION	DTMASTER STEREO	SCOP++	ORTHO MASTER	ORTHO VISTA	UASMASTER	LPMASTER
Digital Photogrammetry	X	X	X	X		X	X	X	X
Support Scanned Analogue Imagery	X	X	X	X		X	X		
Pushbroom	OPTION	X	X	X		X	X		
Satellite	X	X	X	X		X	X		
Laser Scanning Data			X	X	X	X			X
Aerial Triangulation	X							X	
Camera Calibration	X							X	
Surface / Terrain Extraction		X		X				X	
Mapping /Mono/ Stereo			X	X				X	
DTM Processing and Management		X		X	X				
Data for City Modeling		X		X	X				
Lite Version	OPTION	OPTION	OPTION			OPTION	OPTION	OPTION	
Extra Research version			X					X	
Rental option	X	X	X	X	X	X	X	X	X
Network license	X	X	X	X	X	X	X	X	X
INPHO BUNDLES									
OrthoBox						X	X		
DTMBox		X		X					
LiDAR Box				X	X				
EDU/Research	X	X		X		X	X	X	



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INCREASED PRODUCTIVITY BY DISTRIBUTED PROCESSING

Meet the challenge to process tens of thousands of images within hours using a cluster of computers in a network. Currently distributed processing is supported for MATCH-T DSM as well as OrthoMaster. In order to run the software in a distributed process, one standard license of the module is required. Per computation node an additional lower-priced DPL license of the module must be acquired.

WORKLOAD MANAGEMENT

THE CLUSTER IS MANAGED BY DP MASTER, A WORKFLOW-BALANCING SYSTEM WHICH IS INCLUDED WITH EVERY INPHO MODULE

- Defines the computers / CPUs / Cores involved for a process
- Partitions the project data and distributes to the nodes
- Controls the computation and creates status reports

SERVICES

Training

Highly-skilled support engineers provide knowledgeable operators for a smooth and efficient production. Basic photogrammetry trainings as well as expert trainings are available. Trainings are available as trainer-led online classroom trainings, as well as online personal trainings. Or, let us train your staff directly in your office, or here at Trimble. No problem if you have a tight schedule, we also offer self-paced learning courses with regular, online Q&A sessions.

Software Maintenance

With the software update service we guarantee that your production environment stays up-to-date. Software maintenance agreements are free for the first 12 months after a new license has been purchased, after that, maintenance contracts can be renewed on an annual basis. Maintenance includes the update service, as well as access to our technical support.



Consulting

Let us help you optimize your photogrammetric production workflow. Our engineers are prepared to analyze current bottlenecks in order to improve quality, efficiency and productivity for your projects.

LICENSING FLEXIBILITY FOR MAXIMUM SCALABILITY

Lite Versions

Inpho modules are also available as restricted Lite versions.

MODULE	NUMBER OF IMAGES	SUB-BLOCK HANDLING	MULTI-THREADING	OTHER RESTRICTIONS
MATCH-AT Lite (no restriction for the inBLOCK adjustment routine!)	250 frames, no pushbroom, 12 satellite scenes	No	No	
MATCH-T DSM Lite	250 frames, 12 line images	No	No	Only one output area
OrthoMaster Lite	250 frames, 12 line images, 12 satellite images	No	No	No batch processing
OrthoVista Lite (includes the full unrestricted version of the SeamEditor)	250 frames, 12 line images, 12 satellite images	No	No	
Summit Evolution Lite	-	Yes	Yes	Stereo viewer only, simple measurement and basic editing
UASMaster Lite	800 frame images	Yes	Yes	No point cloud editing, no stereo

Licensing

Inpho software is dongle protected. The dongle is network capable so any number of licenses within a company can be distributed on one dongle, alone or with, a multifold of dongles.

Educational / Research Offering

For educational institutes such as universities or similar, Inpho modules are offered in educational or research packages. A proof for the non-commercial use is required. The packages are available as time limited rentals as well, which might apply best for research licensing.

Educational Licenses are available on a network dongle only, therefore cannot be loaned to students for home-use. Research licenses also must be purchased through a university but may be loaned to students as well.

The educational package includes Lite versions of MATCH-AT, MATCH-T DSM, DTMaster Stereo, OrthoMaster and OrthoVista. One base package must be purchased, which can be expanded by any additional number of add-on seats. The educational version of UASMaster Lite is offered free of charge for universities or similar.

The research package includes unrestricted full versions of MATCH-AT, MATCH-T DSM, DTMaster Stereo, OrthoMaster, OrthoVista and UASMaster. It is available seat-by-seat. Additional special pricing for research licenses of Summit Evolution and UASMaster are also offered.

Time Limited Rentals

We also offer our modules as time-limited rentals. Minimum rental period is 3 months, which can be extended on a monthly basis.



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ABOUT TRIMBLE

Trimble's solutions combine the latest in GPS/GNSS technologies with customized software and wireless communications enabling users to quickly and accurately capture the data needed to provide clients with actionable deliverables. Trimble's solutions use integrated processes and workflows for complete life cycle management—from the planning and design to maintenance phases. The solutions can streamline operations to keep projects on time and costs on target.

For more information: www.trimble.com/inpho

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