



# UASMaster

INPHO SOFTWARE

## PHOTOGRAMMETRY-GRADE PROCESSING FOR UNMANNED AERIAL SYSTEMS (UAS) AND TERRESTRIAL CLOSE-RANGE IMAGERY

Generate imaging point clouds as a cost-effective alternative to laser scans, benefit from detailed images to acquire GIS data and transfer most of your survey work to the convenience of your office. UASMaster combines ease of use with the full power of a photogrammetric workstation.

The software bridges the gap between simple near black-box workflows for non-photogrammetrists and photogrammetry expert workflows. UASMaster includes advanced technology to provide high quality results. It easily integrates into the Inpho world of photogrammetry, into Trimble Business Center as well as into many 3rd party workflows.

With its open market concept, UASMaster is able to process data from almost every hardware vendor for UAS. It works with acquired data from fixed-wing vehicles as well as with multi-copters and even hand-held cameras. For 3D reconstruction projects, depending on project requirements, the only mandatory data is imagery - no need to know camera parameters, approximate image georeferences or ground control.

### Product Highlights

Modern computer-vision algorithms (e.g. SFM) combined with proven state-of-the-art photogrammetric techniques produce accurate results automatically, with minimal manual interaction.

- ▶ Open for any fixed-wing, multi-copter or hand-held frame camera.
- ▶ Special support for high-quality GNSS/IMU data for stable processing in challenging conditions or to eliminate need for ground control.
- ▶ Intuitive guided workflow concept for the photogrammetric novice.
- ▶ Streamlined workflow to automatic feature extraction with eCognition® and perfect integration into Trimble Business Center for classic survey applications.

### Area Mapping Projects

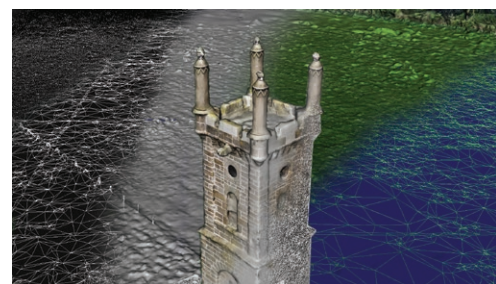
- ▶ Interactive context-driven and automated editing capabilities for georeferencing and point clouds including morphological data creation (e.g. breakline measurements), classification, filtering, and many more.
- ▶ UAS-specific local-area ortho editing tools
- ▶ Expert tools, simplified for non-photogrammetrists such as automatic correlation-based terrain following, enabling precise stereoscopic measurements without requiring stereo-experience
- ▶ Complete engineering workflows including CAD tools, contouring, gridding...

### 3D Reconstruction Projects

- ▶ No need for known camera parameters, approximate image orientations or reference points (optional constraints).
- ▶ Sparse point cloud generated from georeferencing tie points—perfectly suited for e.g. stockpile computations etc.
- ▶ Matching of dense point clouds by providing millions of points for visualization and further mapping.

## Key Features

- ▶ A complete photogrammetric workflow (georeferencing, dense point clouds, true orthophotos, 3D textured meshes, orthomosaics and digitized vectors) combined in one single product.
- ▶ Quick black-box or multi-step processing with quality-optimized or performance optimized parameter presets including full featured refinement and editing tools.
- ▶ Process data from any type of UAS and frame cameras - with or without additional data.
- ▶ Excellent results without requiring specialized photogrammetry knowledge or experience.
- ▶ Also available integrated into Trimble Business Center Photogrammetry Module including all survey tools combined with survey hardware and GNSS base-line processing.



## TECHNICAL SPECIFICATIONS

## FEATURES OVERVIEW

## Workflow

- Full automatic high-quality photogrammetry-grade deliverables (geo-referencing, sensor calibration, dense point clouds, orthomosaics and GIS vectors)
- Minimized user interaction for project set-up and data post processing
- Workflows for classical nadir and close range imagery
- Sub-area selection for editing and re-processing for georeference, point clouds and orthomosaics
- Task-tracking monitor
- Store camera calibration results for later reference
- Optional black-box one stop or multi-step processing
- Weighted high-quality GNSS/IMU and Ground Control Points (GCP) support
  - georeferencing and sensor calibration with minimum ground control, only
  - processing without any ground control points for rapid response projects
- Multi-flight and multi-camera capable
- UASMaster deliverables are the perfect input for eCognition automatic feature extraction and change detection

## Georeferencing

- Automatic blunder removal to ensure best quality
- Powerful datum transformations with predefined projections, thorough graphical analysis tools and detailed reports
- Automatic relative and absolute adjustment
- Effective tie point matching also in poorly textured, as well as mountainous areas
- Project-wide photo display with correct topology and auto image-selection for interactive, guided control point measurement
- Powerful intuitive aerial-mapping block analyzer:
  - easy visual checking of large data sets
  - point and photo connections
  - statistics (error vectors, ellipses etc.) linked to data tables
  - geometric sector analysis for points and images
  - binning cell analysis for point density/connectivity
  - useful display filters, for example multi-strip connections and more

## Point Cloud and Surface Generation

- Colored point clouds and surface grids as well as bare earth DTM output
- Effective noise filtering for point clouds
- Sophisticated point cloud filtering and classification to e.g. separate ground from off ground
- 3D textured meshes

## Aerial Mapping Editor

- Stereoscopic and monoscopic editing and visualization
- Context driven editing tools with heads-up-display
- Rigid consideration and measurement of morphological data such as breaklines
- CAD-like multi-layer editing, visualization and basic mapping
- Automatic correlation-based and interpolation based terrain following for 3D digitizing
- High-performance 3D point cloud viewer for millions of points
- On-the-fly contours and height coding
- Automatic best-fit stereo model selection for stereoscopic visualization and editing
- Batch point cloud processing (tiling, contouring, gridding)

## Aerial Mapping Orthomosaics

- Automatic feature based seam-finding and color-balancing for orthomosaic based on Trimble-exclusive OrthoVista technology result in perfect seamless mosaics
- Adaptive blending of orthos into mosaics according to image texture analysis
- Rigid True-Ortho (surface-model-based) as well as classic ortho (bare earth DTM-based) strategy ready for use in GIS
- UAS-specific local-area ortho editing tools
- Support for pre-existing height models for quick processing
- Optional speed-optimized orthoimage generation directly from the colored point cloud without necessary rectification



## BENEFITS

- Accurate and reliable results in just a few seconds per image with maximum automation
- Perfectly designed matching strategies lead to maximum ray connections for tie points and highest quality point clouds or mosaics
- Minimized user interaction for project set-up and data postprocessing
- Ease of use combined with photogrammetric expert tools

## OPTIONS

- Maintenance (1st year included in software price) includes support and version updates
- Automatic feature extraction with Trimble eCognition
- Direct stereoscopic 3D mapping into CAD and GIS is available through the connection to Summit Evolution
- Network licensing
- Ask our sales team about special educational offerings

## SYSTEM REQUIREMENTS

- Multicore PC workstation (1 license supports up to 24 cores)
- Minimum 32 GB RAM, recommended 64 GB RAM
- High-capacity disk system (SSD preferred)
- NVIDIA graphics board to use GPU processing
- Windows 10 / 64 bit
- Special hardware for state of the art stereoscopic point measurement:
- Special hardware for state of the art stereoscopic point measurement:
  - stereo-capable graphics card supporting OpenGL quad-buffered stereo (recommended NVIDIA Quadro graphics boards)
  - stereo viewing system (e.g. PluraView)
  - optional color anaglyphs available for standard non-3D capable monitors and/or non-3D capable graphic cards
  - support for professional 3D hardware such as 3D cursors
- Support of 4K monitors

## SUPPORTED IMAGERY

- Open for any UAS hardware, multi-copter, fixed-wing or hand-held frame camera or fixed wing
- Supporting large size images (up to 102 MPixel)
- Close range 3D projects up to a project size of 300 GPixel

## SUPPORTED FORMATS

- Supported image formats:
  - Georeferenced orthos: GeoTIFF, TiffWorld (tfw)
  - Tiff, JPG, BigTiff (optional EXIF)
- Supported point-cloud / morphology formats:
  - LAS(1.2-1.4), LasZIP, XYZ, BXYZ, WNP, SHP, DXF

## MESH FORMATS

- Generated Mesh: Wavefront OBJ, Digital Asset Exchange (COLLADA) DAE
- LOD Mesh: Wavefront OBJ, Native OpenSceneGraph Binary OSGB, Cesium 3D Tiles CESIUM, IVE, i3S (SLPK ESRI) Digital Asset Exchange (COLLADA) DAE
- Textured meshes

Specifications subject to change without notice.



Zirn Consulting  
Volker Zirn  
Immenhäuser Str. 8  
72810 Gomaringen

Tel.: +49 7072 9216770  
Mobil: +49 173 3497709  
Fax: +49 7072 9216771

Volker@Zirn-Consulting.com  
<http://www.zirn-consulting.com>

Contact your local Trimble Authorized Distribution Partner for more information

**Zirn Consulting**  
Solutions  **in photogrammetry**

**NORTH AMERICA**  
Trimble Inc.  
10368 Westmoor Dr  
Westminster CO 80021  
USA

**EUROPE**  
Trimble Germany GmbH  
Am Prime Parc 11  
65479 Raunheim  
GERMANY

**ASIA-PACIFIC**  
Trimble Navigation  
Singapore PTE Limited  
3 HarbourFront Place  
#13-02 HarbourFront Tower Two  
Singapore 099254  
SINGAPORE