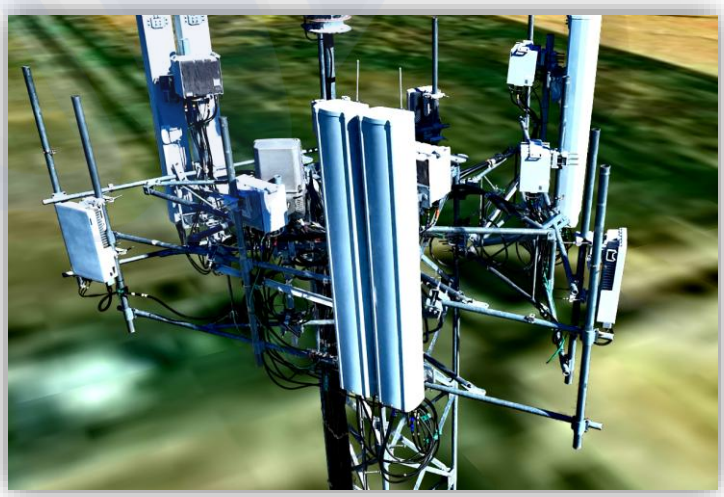
PhotoMesh

Release Notes

V 8.1



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OVERVIEW

Skyline's PhotoMesh application fully automates the building of high-resolution, textured, 3D mesh and Gaussian Splatting models, from oblique and nadir photographs and Lidar captured from street view, drones, UAV, and airplanes. PhotoMesh's breakthrough technology is based on the highest-performance photogrammetry, computer vision, AI, and computational geometry algorithms. PhotoMesh offers a range of output options including standard 3D model (3DML, 3D Tiles, SLPK, OBJ etc.), raster (Orthophoto, True-orthophoto, DSM, DTM) and point cloud (LAS) formats.

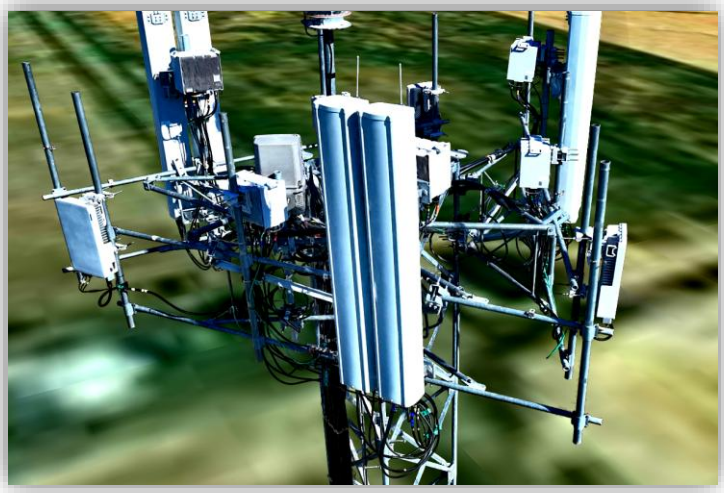
A core feature of PhotoMesh is its robust scalability and high performance, efficiently handling projects involving hundreds of thousands of photos using an elaborate tiling mechanism. To accelerate the build process for massive datasets, PhotoMesh can utilize multicore and multi-computer processing by running a single project simultaneously on hundreds of "fuser machines" (worker processes), allowing for the processing of tens of square kilometers per day.

Gaussian Splatting Reconstruction

PhotoMesh 8.1 introduces experimental support for 3D reconstruction using Gaussian Splatting, a cutting-edge technique that enables the creation of highly detailed, photorealistic 3D models from imagery. Unlike traditional mesh-based or neural network-driven methods, Gaussian Splatting uses millions of view-dependent 3D Gaussians as rendering primitives. These Gaussians are optimized to represent scene geometry and appearance, allowing for real-time rendering with exceptional visual fidelity and smooth transitions between viewpoints.

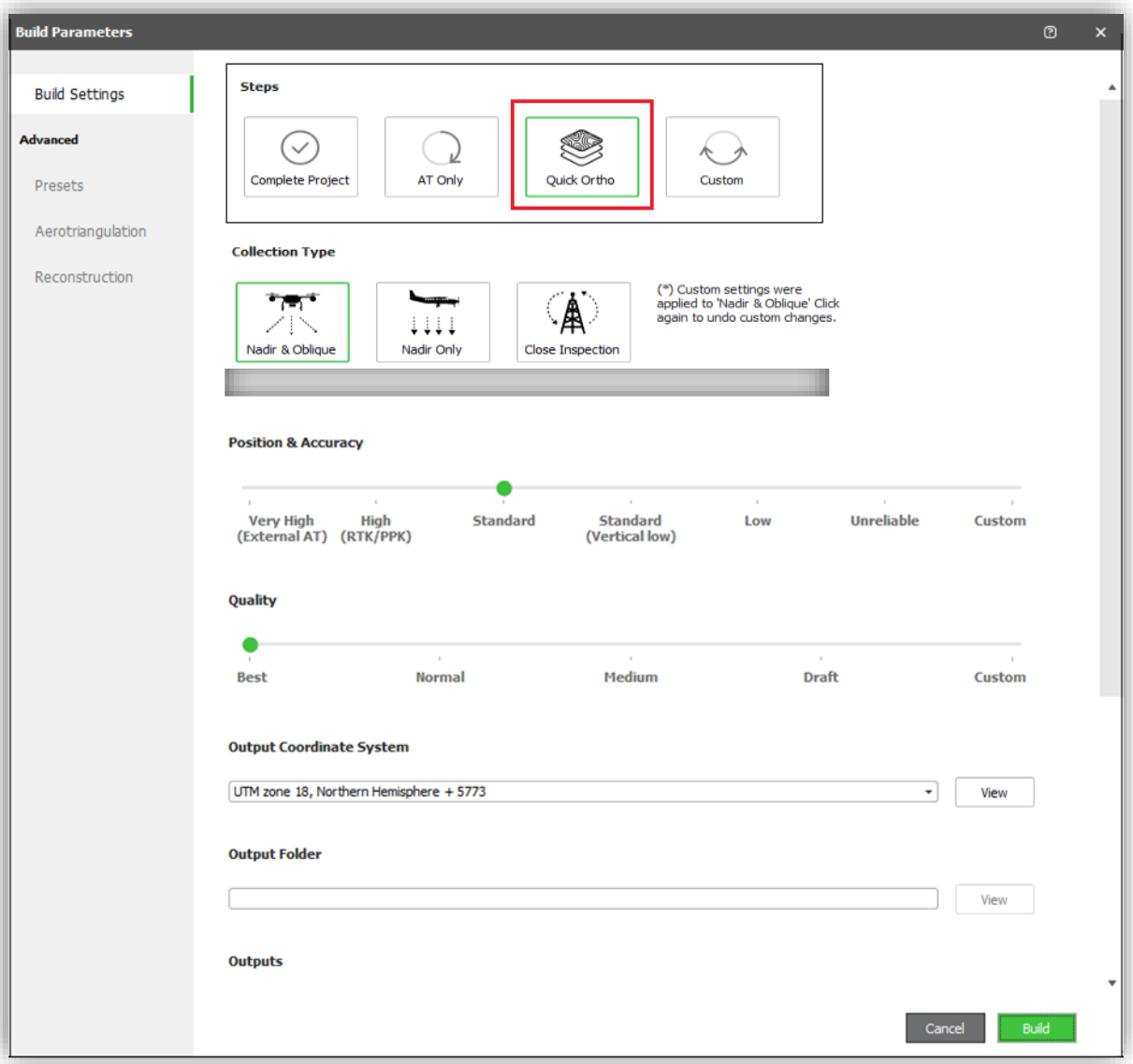
This new capability is integrated into PhotoMesh's reconstruction pipeline and outputs models in the o3DML format, which can be streamed and viewed using the latest versions of TerraExplorer Desktop v8.1, TerraExplorer Fusion v8.5, and SkylineGlobe Server v8.5. The result is a seamless experience for exploring complex 3D environments with high performance and visual realism, even in large-scale scenes.

In version 8.1, Gaussian Splatting reconstruction is offered as a service, providing customers with early access to this innovative capability. This phase enables users to explore and benefit from the technology while Skyline continues to enhance its integration and performance. Customers interested in taking advantage of this service are welcome to contact Skyline to learn more about availability and engagement options.



Quick Ortho Generation

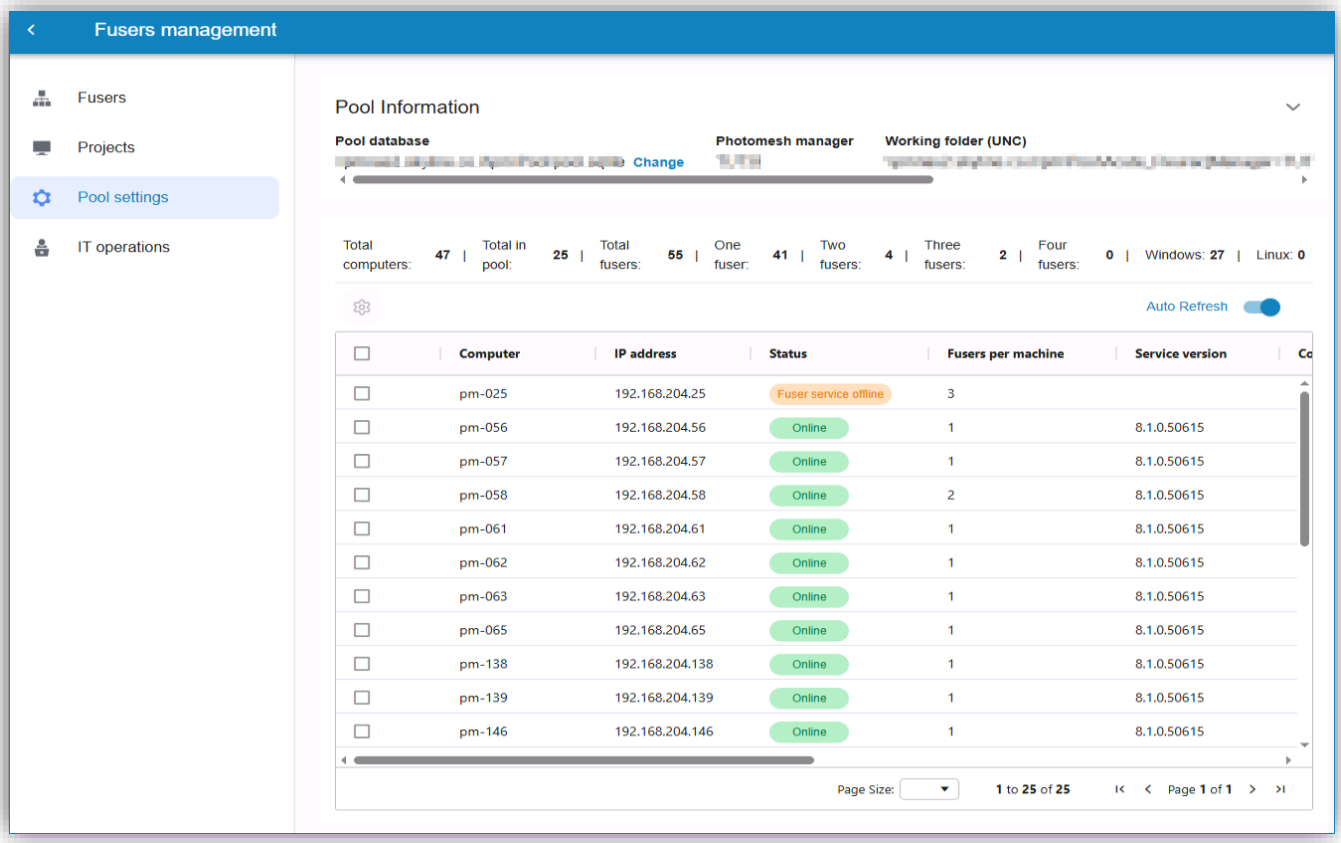
PhotoMesh 8.1 introduces a new Quick Ortho build configuration in the Build Wizard. Designed for rapid orthophoto production, Quick Ortho uses terrain data extracted from aerotriangulation results to generate an optimized 2D terrain-based composite—up to 15 times faster than traditional workflows. Selecting this option streamlines the wizard interface by removing unnecessary settings and automatically activating the "Reconstruction Quick Ortho Composite" preset.



New Fuser Pool Manager

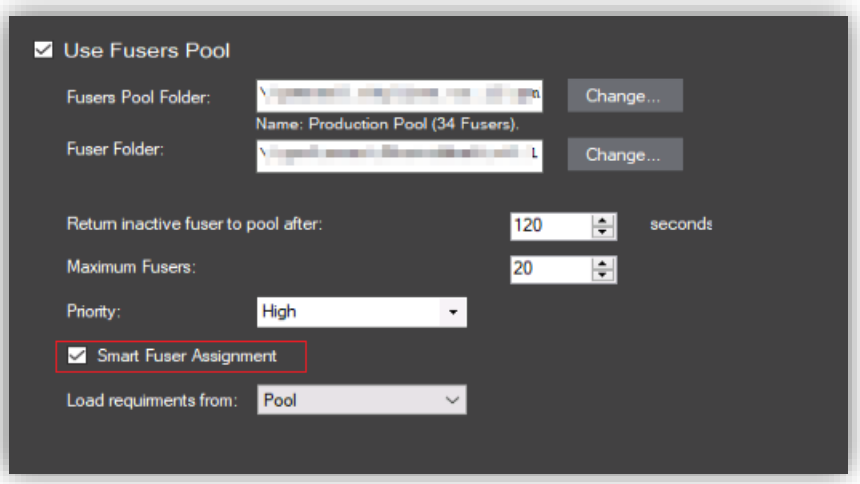
PhotoMesh 8.1 features a newly designed interface for managing the fuser pool that streamlines pool management tasks and makes it easier to operate and scale large fuser environments. While the core functionality—such as assigning fusers, monitoring project activity, and configuring hardware—remains consistent with previous versions, the updated interface provides a significantly improved user experience. Enhancements include:

- Clean, structured layout with side panel navigation
- Real-time views of fuser, project, and machine status
- Simplified assignment workflows and bulk editing tools
- Greater visibility and control over resource allocation and project priorities
- Integrated IT tools for IP-based machine scanning and remote script execution



Smart Fuser Assignment

A new Smart Fuser Assignment mechanism ensures efficient resource utilization across distributed builds. Using a configurable JSON (FusersHWRequirements.json), PhotoMesh matches build tasks to fuser machines based on their hardware capabilities, such as CPU cores, memory, GPU RAM, and network availability. Each job type (e.g., AT, Reconstruction) can define minimum and optimal hardware requirements. A scoring system ranks machines, prioritizing those best suited to the job. High-priority tasks such as AT are given special handling to ensure exclusivity. This intelligent assignment system improves performance, avoids bottlenecks, and ensures optimal use of available hardware.



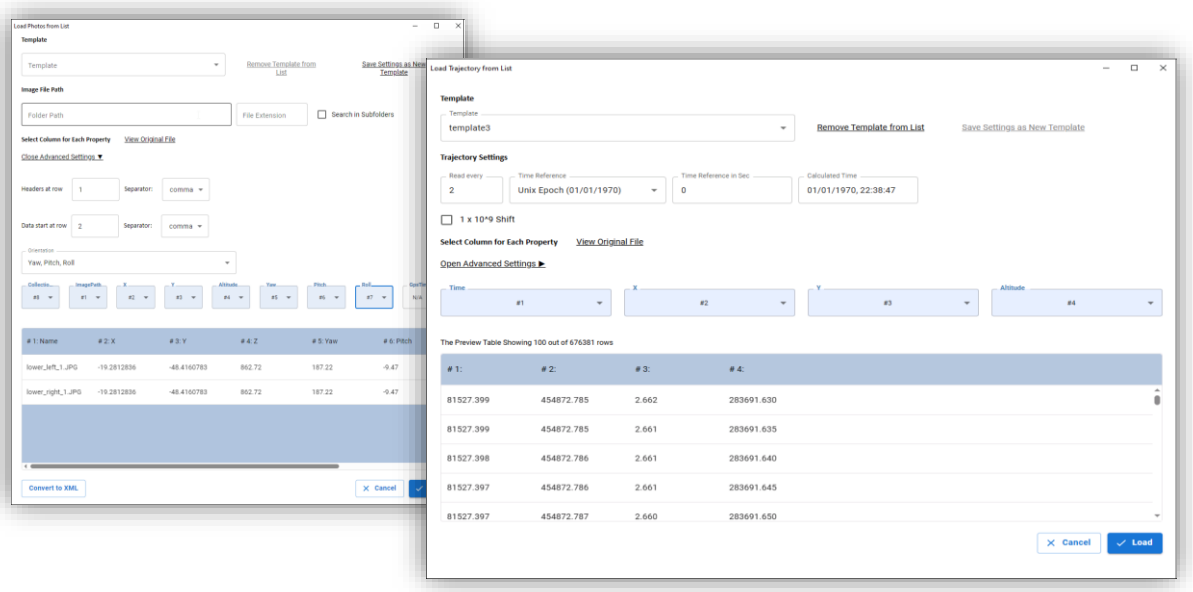
Importing External and Internal Orientation

Enhanced External Orientation Importer

PhotoMesh 8.1 includes significant improvements to the External Orientation (CSV) Importer, making it easier and more flexible to manage photo lists from **CSV or TXT** files. The updated importer introduces new capabilities such as template saving and reuse, advanced file path handling, and support for various file structures and separators. Users can now define column mappings, set orientation formats, preview data, and convert lists to XML for direct loading into PhotoMesh. The tool also supports automation via API, enabling integration into custom workflows without using the UI.

Import and Reuse Camera and Collection Properties

PhotoMesh 8.1 introduces a new feature that allows users to import, load, and save camera model and collection properties, streamlining project setup and ensuring consistency across multiple projects. This capability enables users to predefine camera parameters and reuse them as needed, significantly reducing configuration time. The installation kit includes a set of predefined camera models with basic values, and users can also save and reload custom collection properties for future use.



Control Points and Trajectory Import Wizards

Enhanced Control Point Importer

PhotoMesh 8.1 includes an improved Control Point Importer that streamlines the process of importing and managing control point lists from CSV or TXT files. The updated tool features a modern, intuitive interface with support for templates, flexible column mapping, and advanced file structure handling. Users can define point types, configure headers and data rows, preview records, and convert lists into PhotoMesh-compatible control point format. The importer also supports API-based automation, enabling seamless integration into scripted workflows without relying on the user interface.

Improved Trajectory Importer

PhotoMesh 8.1 includes an enhanced Trajectory Importer that simplifies the creation and management of .trjt files from CSV, TXT, or LAS/LAZ data. Users can now generate trajectory files directly from photo collections or external files, with flexible options for mapping columns, setting time bases, and previewing data. The updated interface supports template saving, advanced file structure handling, and multiple import methods—including drag-and-drop, context menu, and API-based workflows. These improvements streamline the process of aligning trajectory data with imagery, improving accuracy and efficiency in project setup.

Improved Water Polygons and Manual Retouch

New Smart Water and Flat Water Modes

PhotoMesh v8.1 introduces two enhanced water processing modes. Smart Water automatically detects and flattens water surfaces while preserving features like boats and bridges. Flat Water builds on this by ensuring a completely flat surface and more thorough artifact cleanup. Additionally, water texturing has been improved to provide smoother color transitions and better blending between tiles, resulting in more visually consistent water areas.

Water Polygon Integration into Manual Retouch

Water polygons are now fully integrated into the Manual Retouch system, allowing users to manage them alongside other retouch elements using the same tools and interface. This unification simplifies workflows and ensures a more streamlined editing experience.

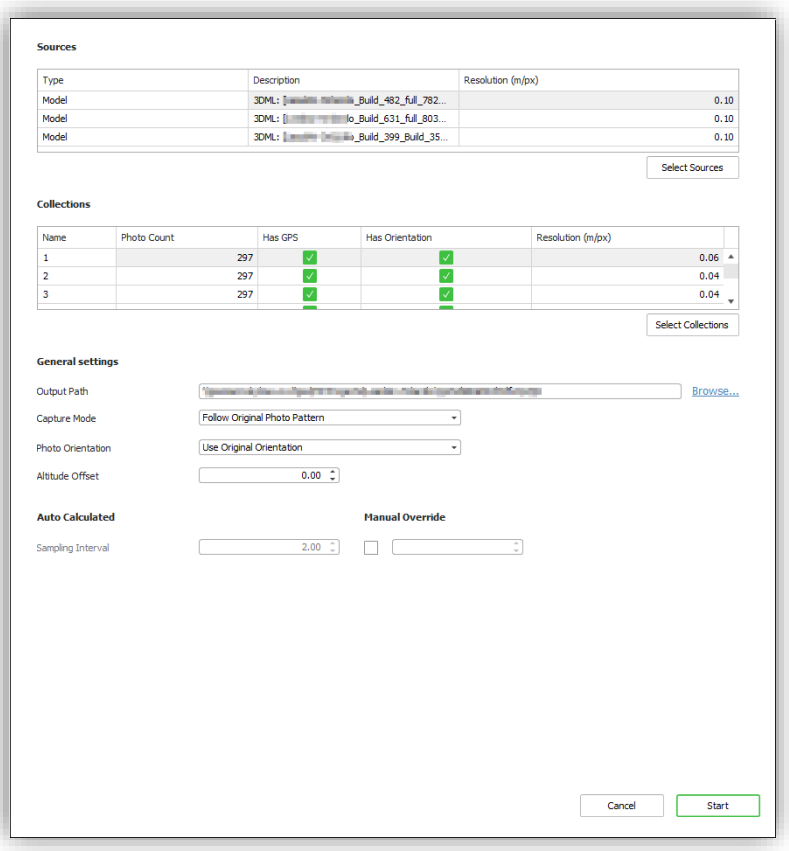
Enhanced Import Layer Support

The updated import feature supports Shape, SQLite, and GeoPackage formats, with options to override coordinate systems and apply retouch actions like Smart Water, Flat Water, and more.

Align Photos to 3D Layers and LiDAR

PhotoMesh 8.1 introduces a new tool that allows users to generate reference photos aligned directly to existing 3D datasets—such as LiDAR, mesh models, or orthophoto+DSM—without needing access to the original imagery. This capability is especially valuable for projects with no GPS data, poor GPS accuracy, or those captured in GPS-denied environments, as it enables accurate photo alignment based solely on external 3D layers.

In addition, PhotoMesh now supports direct alignment between the project's photos and the project's LiDAR datasets, ensuring precise georeferencing and optimized mesh reconstruction—without the need for manual control points. This streamlines the workflow and improves the quality of the final 3D model, especially in complex or large-scale projects.

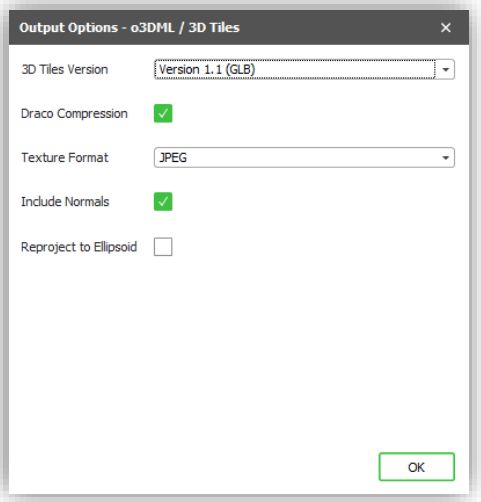


New 3D Tiles and Model Format Output Options

PhotoMesh 8.1 introduces enhanced support for 3D model output formats, including 3D Tiles v1.1, o3DML v1.1, and DAE/OBJ with center pivot, offering greater flexibility and control in the 3D reconstruction process. These formats now include advanced configuration options accessible directly through the redesigned Output section in the UI, allowing users to tailor output to specific project needs.

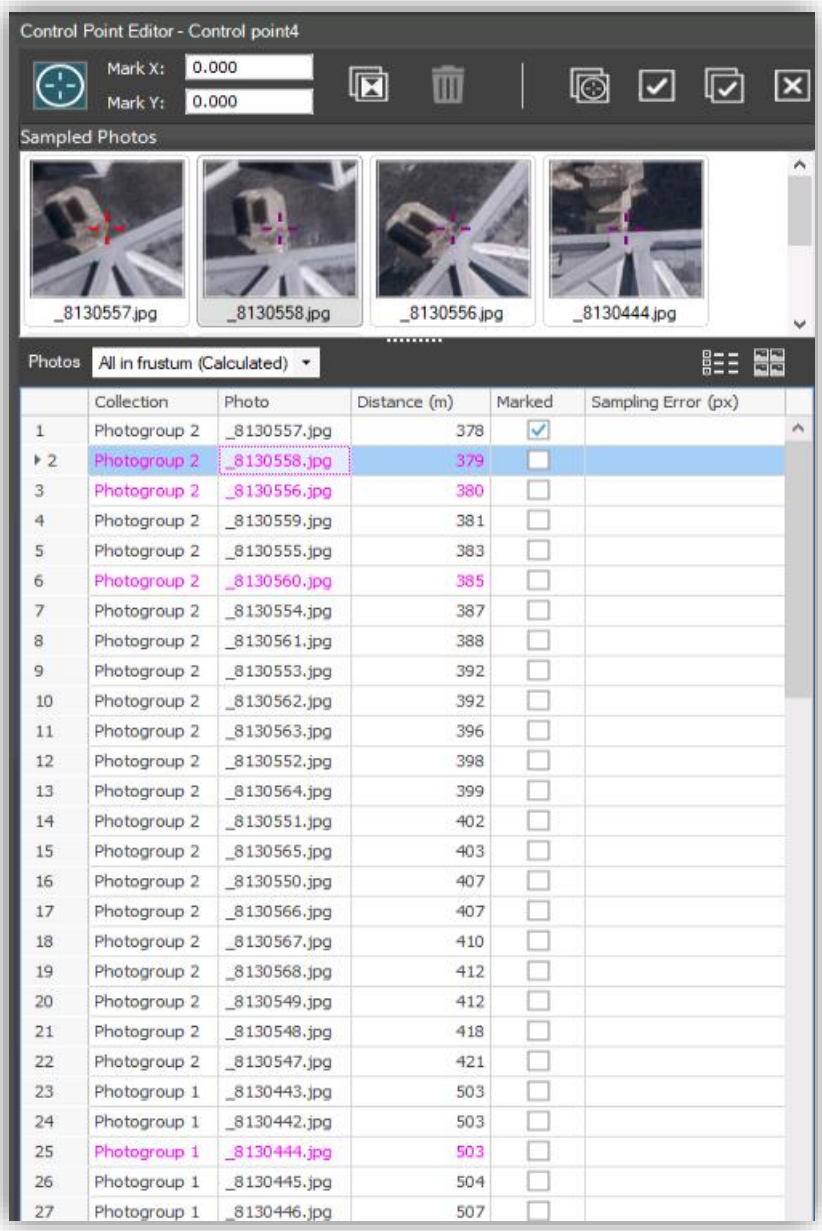
For 3D Tiles, users can select between versions 1.0 and 1.1, choose internal formats (B3dm or glb), enable Draco compression, select texture formats (JPEG , **WebP** or **KTX**), and toggle options like normals inclusion and ellipsoid reprojection. For DAE/OBJ, users can define pivot behavior - centered to project, full coordinate system, or custom pivot - without limiting other output types. The system ensures all selected options are passed accurately to the build engine, and separate output folders are generated when center pivot logic is applied.

This update also includes a modernized, user-friendly interface built with Windows Forms, and a responsive backend developed in C# (.NET Framework 4.8), ensuring smooth performance even during complex builds. The feature has passed internal quality and performance testing, with no known bugs reported.



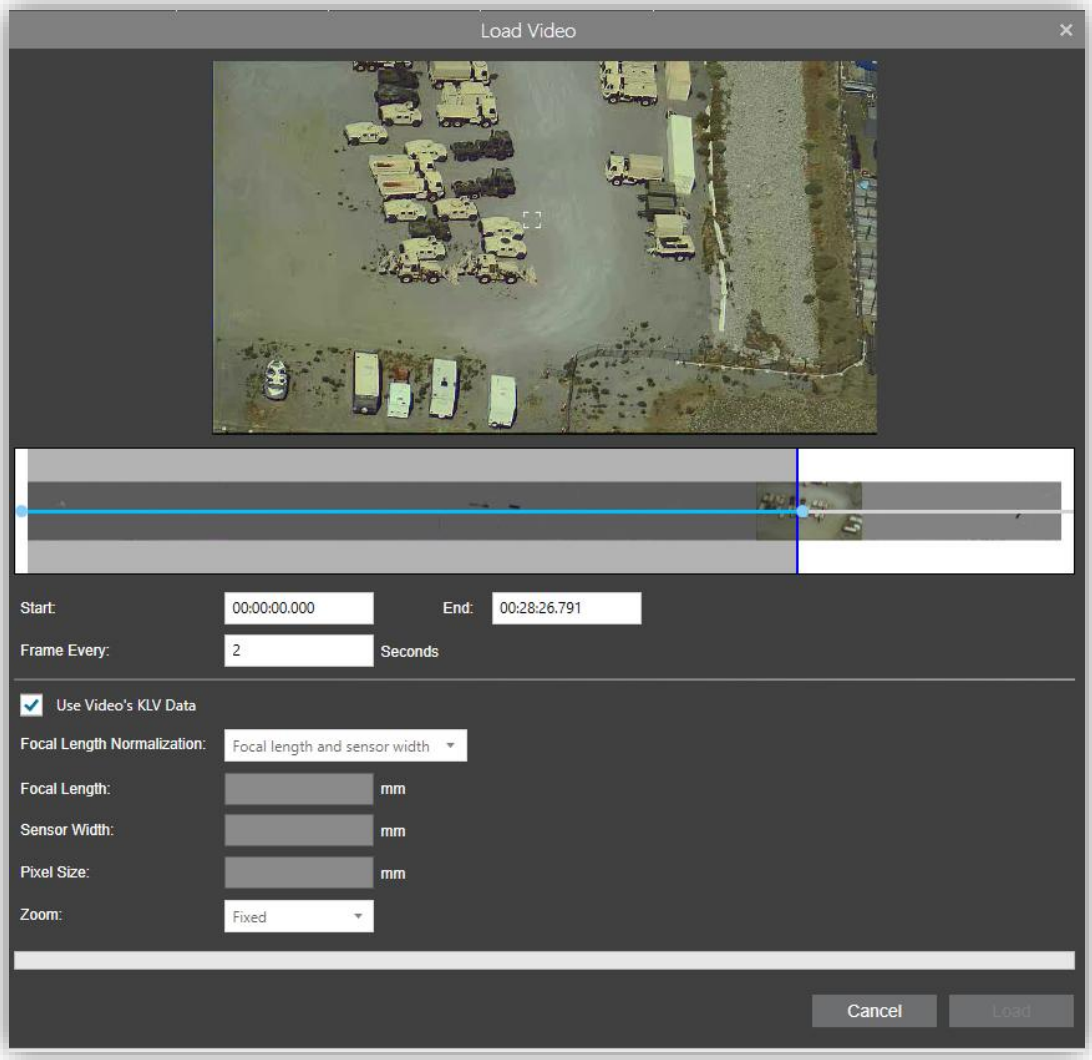
Control Point Auto-Detection

The auto-detection of control points has been improved for faster and more accurate results. After manually marking a control point in one photo, PhotoMesh can scan up to 100 photos from various collections to detect photos with matching points—prioritized by their proximity and filtered by a minimum confidence score of 98%. Previously marked photos are skipped to avoid duplication. This feature can be enabled globally or activated manually from the Control Point Editor.



Enhanced Video Frame Extraction with KLV Data Support

PhotoMesh 8.1 features enhanced support for video frame extraction, with support for KLV (Key-Length-Value) metadata, enabling automatic extraction of embedded camera parameters directly from the video stream. These camera parameters include the geolocation position of each frame, allowing the frames to be accurately positioned in their correct geographic location, as well as other essential camera properties such as focal length and sensor width, and even camera rotation (when available). This provides a faster and more accurate setup when working with drone footage or other georeferenced video sources.



Enhanced Matching and Aerotriangulation

PhotoMesh 8.1 introduces a series of improvements that strengthen both matching and Aerotriangulation (AT), giving users more control while also improving results in challenging collections.

Greater Control in AT

- **Skew** and **Affinity** Corrections can now be calculated globally or per collection, providing finer control over camera geometry and accuracy.
- A new "**Lock to previous run values**" option allows AT to reuse accuracy and orientation parameters from the last run—saving time and ensuring consistency across similar projects.

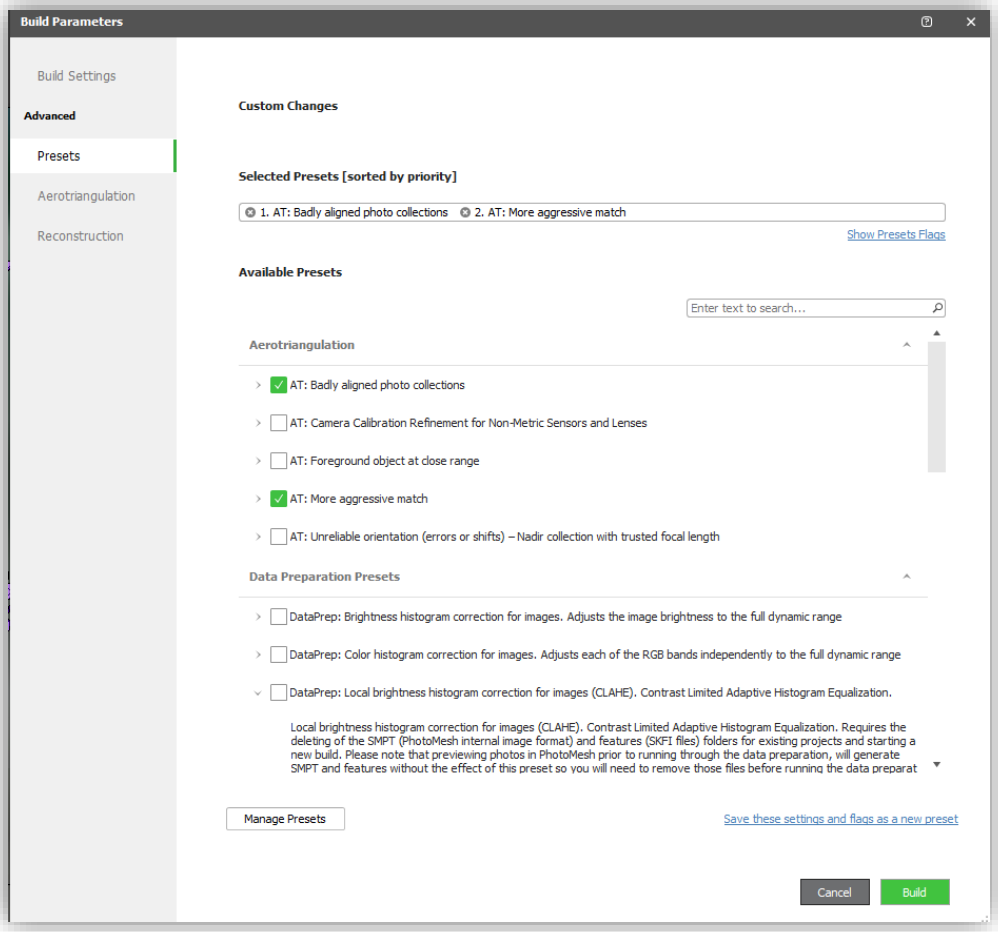
AI-Assisted Matching for Difficult Collections

(Enabled only when selecting specific flags or presets)

Provides enhanced robustness for challenging or irregular photo sets by incorporating advanced AI models, such as the **LightGlue** matcher, to strengthen feature detection, increase the number of reliable correspondences, and improve alignment in cases of low overlap, vertical imagery collection, or sparse captures. These AI-driven enhancements help stabilize and improve both matching and AT performance, especially when working with partial, constrained, or hard-to-overlap collections.

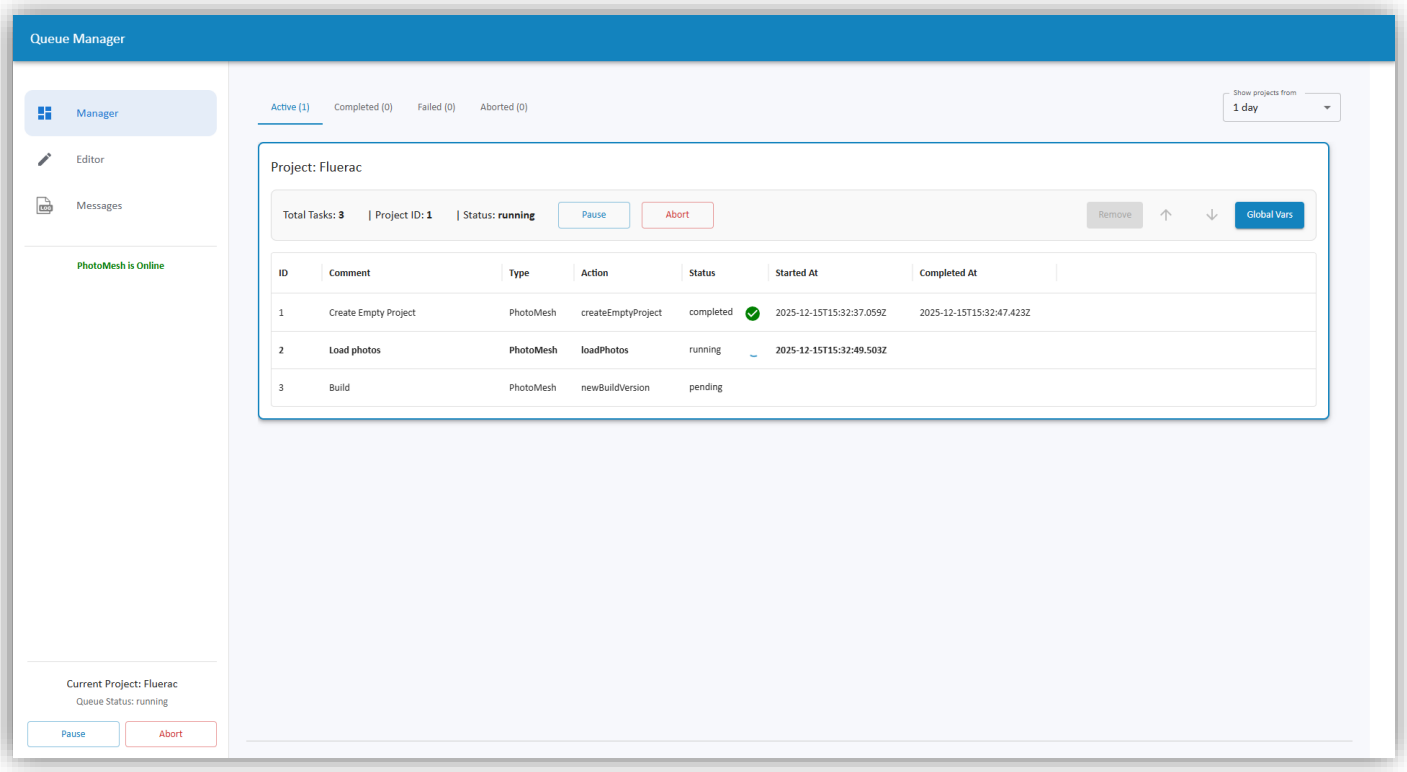
Redesigned Presets Page

For improved user experience, the **Presets** tab within the Build Parameters dialog has been completely overhauled to offer a more intuitive and easy-to-view interface. This redesign includes a new search and filter capability for quickly locating the desired presets. Additionally, PhotoMesh 8.1 introduces new presets, which include options for more aggressive photo matching and Aerotriangulation specifically designed to handle collections with limited overlap and coverage.



Redesigned Project Queue automation

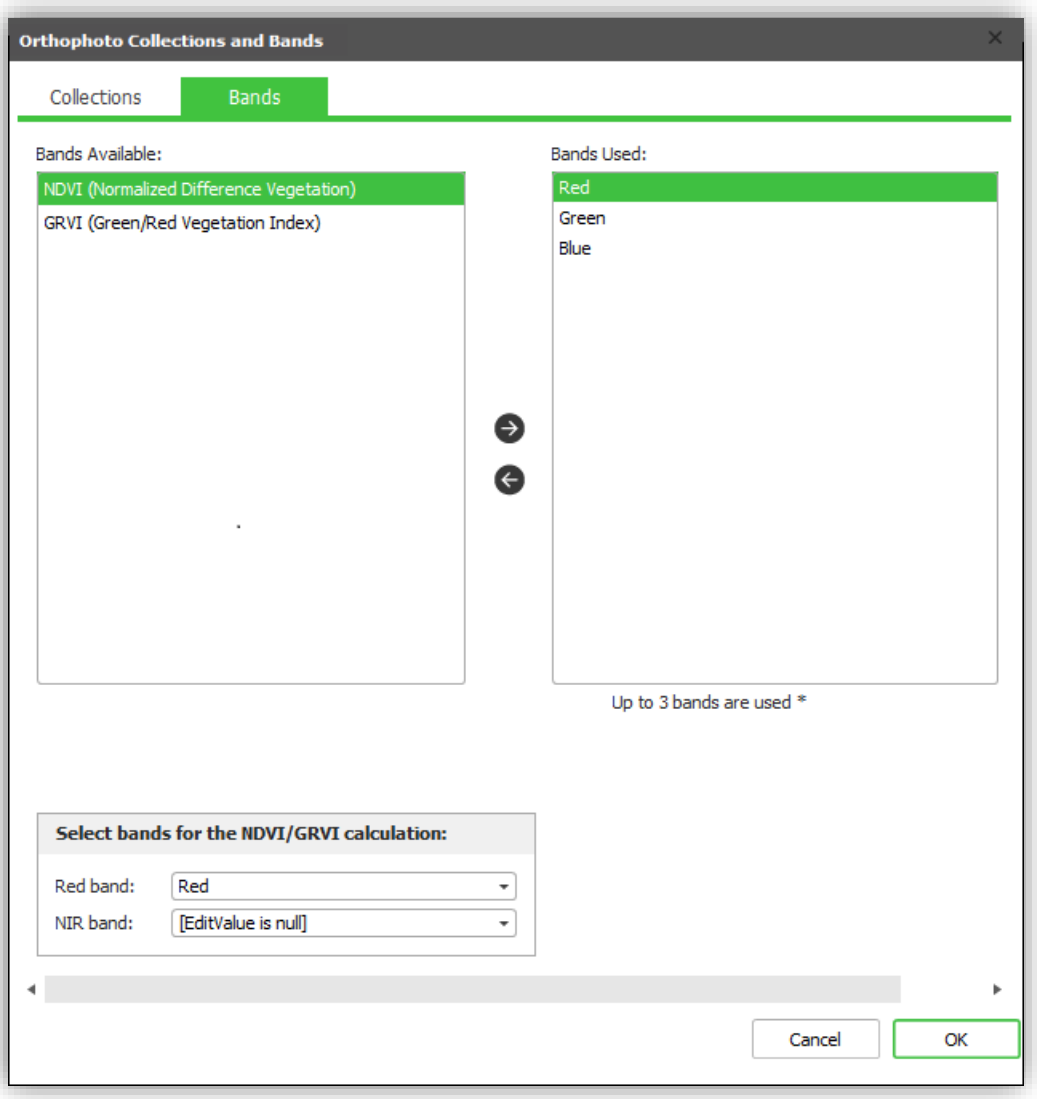
A powerful new Project Queue mechanism enables full control over project execution outside the main PhotoMesh UI. Designed for automation and batch processing, the Queue supports the addition, removal, prioritization, and tracking of projects, all via a JSON-driven interface. Projects added to the queue begin running automatically, and users can monitor progress, modify global variables, and track logs in a new user-friendly interface. The interface is built in ReactJS with Material UI, while the backend services are implemented in Node.js, enabling seamless integration for advanced users via direct API access.



NDVI/GRVI Index Support for Orthophotos

Expanded multispectral processing capabilities in PhotoMesh 8.1 now include support for NDVI (Normalized Difference Vegetation Index) and GRVI (Green-Red Vegetation Index). These indices can be generated as part of orthophoto output (excluding Quick Ortho). Band selection for NDVI/GRVI is defined in the Build Parameters, providing powerful tools for vegetation analysis and environmental monitoring.

- **NDVI** is ideal for broad vegetation health assessments using NIR and red bands.
- **GRVI** offers improved surface-level detail using green and red bands.



Stability Improvements and Bug Fixes

- **New Graphics Engine Mode:** Introduced support for DirectX 11 modes, resolving an issue where PhotoMesh would freeze after reconnecting to a remote computer using Windows 11 Remote Desktop Protocol (RDP).
- Fixed an issue where resuming a build caused already completed tiles to be reset and rebuilt.
- Resolved a problem where PhotoMesh.js.exe was missing from some v8.0 builds.
- Fixed incorrect AT XML export format in PM 8.1, ensuring compliance with the Block Exchange specification.
- Addressed cases where DSM generation produced holes due to mesh or tile stitching issues.
- Fixed incorrect application of Gigapixel credits when rebuilding projects.
- Resolved an issue where the Production Report failed to function correctly on systems without Internet Explorer.
- Fixed a bug causing local fuser working folders to revert to the temp directory after disabling the fuser.
- Corrected snapping behavior during manual retouch when the mesh was located below the terrain.
- Fixed video frame extraction so multiple images are correctly extracted from video sources.
- Resolved export failures for 3DML models using vertical datums when grid shift files were only available on the server.

REQUIREMENTS – PHOTOMESH

Operating System

Windows® 11, Windows® Server 2022 / 2025.

Ubuntu 24.04 – amd64 required (Only for PhotoMesh fusers)

Processor

4 logical processors (8 recommended). In the latest PhotoMesh performance tests on an i7 14th generation processor with 32 GB RAM and 28 logical cores that was running two fusers, output was between 75–80 gigapixels per day.

System Memory (per fuser)

16 GB RAM (32 GB recommended). On a computer with 16 or more logical processors, 25 GB RAM is required per fuser.

Graphics Processing Unit (GPU)

Dedicated or onboard GPU (dedicated recommended, especially when running multiple fusers on a single machine).

Additional Software

.Net Framework 4.8 required

For additional information, check out the PhotoMesh section of our knowledge base.

www.skylinesoft.com