



Trimble Business Center



For Aerial Photogrammetry & LiDAR

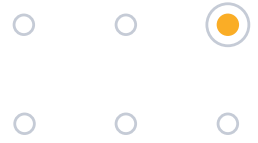
TRIMBLE BUSINESS CENTER OFFICE SOFTWARE
OCTOBER 2022

Aerial photogrammetry and LiDAR field to finish workflows for surveyors

Leverage the power of aerial photogrammetry and LiDAR data along with other geospatial and construction data in a single, robust software environment to confidently deliver project after project with Trimble® Business Center (TBC) office software. With streamlined, yet powerful adjustment and processing workflows designed for surveyors, by surveyors, take your unmanned aerial vehicle (UAV) data further with CAD, surface, corridor, and point cloud tools within TBC. With your professional reputation, financial well-being, and requirements on the line, use TBC's unique capabilities to aggregate your aerial data with other survey data and deliver superior results to your clients.

Find out more at:
www.trimble.com/tbc





Photogrammetry Capabilities

Import your data with a single click from DJI, senseFly, Wingtra, and other leading UAV manufacturers and perform high-quality photogrammetric adjustments with or without ground control points (GCPs). Then view adjustment reports for in-depth visual and statistical analysis before creating point clouds, orthomosaics, or raster digital surface models (DSMs). With multiple processing techniques and userdefined resolutions, TBC provides the flexibility you need to deliver the aerial photogrammetry results to match your project's needs.

Point Cloud Tools

Efficiently transform your photogrammetric or LiDAR point cloud data into client deliverables with TBC's growing collection of point cloud tools. Use TBC's automated region classification and sampling and segmentation routines to filter and focus on the necessary areas and objects in your project. Next, use the point, linear, and cross-section feature extraction tools to extract geometry and attributes from trees, curb and gutter, lane lines, and more. Then stay in TBC to make additional measurements and create further CAD objects, model surfaces, and contour lines. Once complete, take your work into Trimble Clarity, Trimble's web-based geospatial data viewer, to share with clients or use TBC's industry-standard point cloud and CAD exports to deliver rich, actionable information.

Geospatial Data Hub

With TBC's single project environment, combine your point clouds and orthomosaic images from your UAVs and add in data from your other survey sensors — GNSS, total stations and levels, mobile mapping systems, and terrestrial laser scanners — all of which is scaled and georeferenced together. There is no need to import and export between multiple software packages, which means you save on training, license renewals, and support across different applications from different providers. TBC is your one-stop office solution for your UAV survey and construction projects.



Confidence-inspiring results

- ▶ With adjustment reports, raw data spreadsheets, and measurement tools, deliver high-quality projects with confidence every time.
- ▶ Work with raw field data and properties — PDOPs, instrument heights, backsight prisms, and more — to optimize rich CAD, surface, corridor, and point cloud deliverables.
- ▶ Stay in TBC or move data across to other leading software packages from Autodesk®, Bentley®, ESRI, and more.



Licensing options for every customer

- ▶ With perpetual and subscription options, there's a TBC offering for every surveying and construction organization.
- ▶ Host your multi-seat license in the cloud or on-premise or use a singleseat USB dongle on your PC workstation.
- ▶ Utilize value-adds like Trimble Connect Business and Trimble Clarity™ Starter included in TBC's subscription offerings.



Survey tools you need

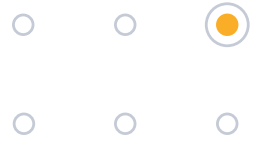
- ▶ From known projections, time-dependent datums, or locally calibrated sites, leverage TBC's unrivaled libraries to work in the coordinate system, datum, and geoid you need.
- ▶ The world isn't flat, and neither is TBC. TBC's geodetic platform incorporates scale factors to precisely represent your real-world data in 3D.
- ▶ Assure your network's accuracy with TBC's least-squares network, traverse, and level adjustment routines along with Trimble's latest GNSS baseline processor.



Use the cloud for real productivity

- ▶ Customize and store your settings, ribbon layouts, and templates to your Trimble Identity (TID) user profile to share across your organization or recall after version updates.
- ▶ Store your data — including large files, images, and raw data — in Trimble Connect, then download to use in your TBC projects.
- ▶ Engage your clients with visualizations and interactive tools in Trimble Clarity: <https://clarity.trimble.com>

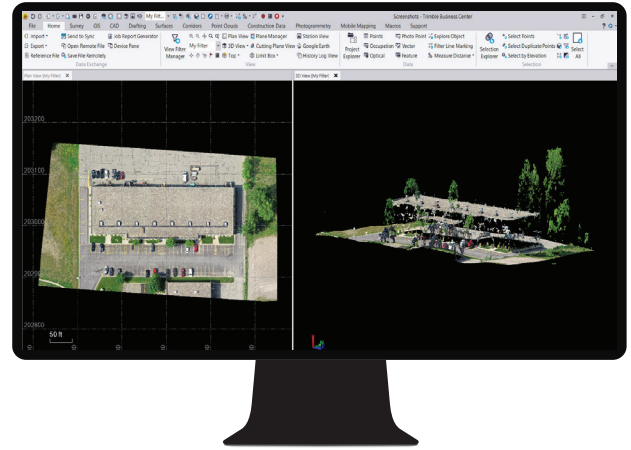
Highlight Features



Import and Setup

Import and interact with your aerial photogrammetry data from the field.

- ▶ Import DJI, senseFly, Wingtra, and other leading manufacturer field data into TBC with a single click.
- ▶ Review your receiver information in the Receiver Raw Data Check-In window.
- ▶ Review and troubleshoot statistics before processing begins in the Import Summary.
- ▶ Import the local base station and control points to increase the accuracy of your field data.

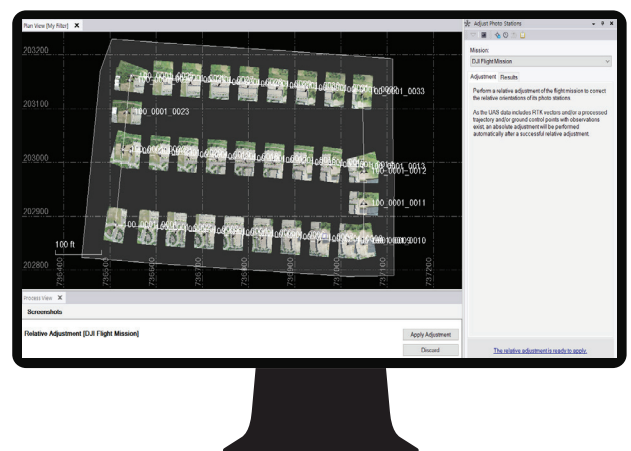


Review aerial photogrammetry data and statistics upon import in TBC

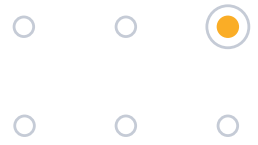
Adjustment Options

Efficiently adjust your photo stations to the highest precision.

- ▶ Automatically extract tie points and perform a relative adjustment of your aerial photo stations to each other.
- ▶ Automatically perform a more precise ground-based absolute adjustment after a successful relative adjustment if a trajectory is included.
- ▶ Optionally, make observations to GCP targets in images to perform a ground-based absolute adjustment.
- ▶ Optionally, after import, select to process the data in UASMaster for additional options and settings.



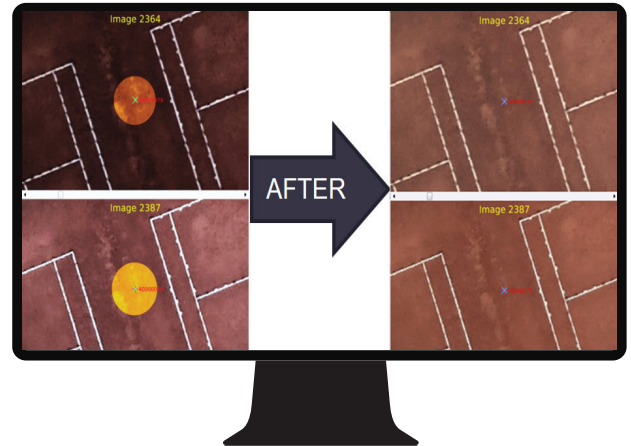
Adjust aerial photo stations relative to each other and to the ground



Photogrammetric Features

Choose additional options to improve raw UAV imagery and tailor the deliverables to your project's requirements.

- ▶ Apply radiometric corrections for more even lighting and discernible fine detail and use vignetting corrections to lessen the appearance of dark edges in photos.
- ▶ Choose between elevation adjustment types, depending on your focal areas of buildings and vegetation or terrain.
- ▶ Automatically extract point clouds with a variety of matching techniques to generate many different types of deliverables including:
 - ▶ Rapid terrain models for orthophoto production using well-established feature-based matching techniques.
 - ▶ High-density point clouds for precise terrain inspection using the fast pixel-based matching (i.e., cost-based matching) technique.
 - ▶ True orthophotos to render "true-ortho" compatible man-made objects (e.g., eliminating building tilting) using a more robust and highend dense pixel-based matching (semi-global matching) technique.



Apply radiometric and vignetting corrections to improve the interpretability and quality of images

Quality Deliverables

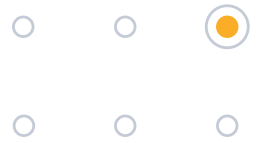
Create 2D and 3D deliverables with confidence.

- ▶ Create colorized dense point clouds with extremely detailed and accurate results at a speed of about 3 seconds per image with about 1-2 pixels height accuracy.
- ▶ Produce raster DSMs that capture rich natural and built features on the Earth's surface.
- ▶ Produce ortho-rectified, georeferenced mosaics that have perfect homogeneous colors and intensity, ready for measurements, background maps, GIS systems, and more.
- ▶ Create orthomosaics with transparent background pixels for areas and edges not covered by any UAV imagery.



Create orthomosaic and point cloud deliverables

Highlight Features



Quality Control

Run import and export reports, perform manual checks, and adjust results to ensure your deliverables are accurate.

- ▶ Quickly view image counts, errors, RTK status, and camera properties in the Import Summary.
- ▶ View and save adjustment reports that show tie point statistics, GCP matching, and mean errors.
- ▶ Perform in-depth visual and statistical analysis with the adjustment report and measurement and spreadsheet tools.
- ▶ Perform manual checks to measure between photo points and inverse between point clouds.



Review the flight overview, tie point distribution, residuals, and more

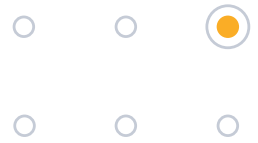
Single Software Productivity

Take your UAV data further with CAD, surface, alignment, corridor, point cloud tools, and more within TBC.

- ▶ Quickly draft and edit points, 2D or 3D linework, and CAD geometry with the keystroke-based CAD Command Line.
- ▶ Create 2.5D and projected surfaces that dynamically update when surface members are modified, ensuring precise volumetric computations.
- ▶ Define alignments from scratch or existing CAD linework to use in parametrically defined road corridor, interchange, ramp, and intersection models.
- ▶ Automatically classify regions and extract point, linear, and cross-section features from point clouds.



Extract point, linear, and cross-section features from point clouds



System Requirements

Operating system

- Microsoft® Windows® 11 (64-bit version)
- Microsoft® Windows® 10 (64-bit version)

Processor

- Quad-core Intel 2.80 GHz or better recommended (additional cores with hyper-threading support highly recommended)
- AMD Ryzen processors are not supported

Random-access memory (RAM)

- 32 GB or more recommended

Hard Drive

- 10 GB free or more recommended
- 100 GB free or more on solid-state drive (SSD)
- Overall capacity of 1 TB solid-state drive (SSD) or more recommended for multiple projects

Graphics

- DirectX 11 compatible graphics card with 512 MB memory or more
- OpenGL version 3.2 or later required when working with point cloud data (latest version recommended)
- 8 GB graphics card or higher (NVIDIA Quadro P4000 or similar) required

Monitor

- 1280 x 1024 or higher resolution with 256 or more colors (at 96 DPI)

Supported Languages

- | | | |
|------------------------|------------|--------------|
| • Chinese (Simplified) | • Finnish | • Norwegian |
| • Czech | • French | • Polish |
| • Danish | • German | • Portuguese |
| • Dutch | • Italian | • Russian |
| • English US | • Japanese | • Spanish |
| • English UK | • Korean | • Swedish |

Learning Resources

Interested in TBC but wondering where to start? Want to learn more? We offer a variety of helpful resources to make you productive quickly. Learning TBC has never been easier.

Website:

Your home for everything TBC — downloads, support information and bulletins, as well as customer testimonials and videos:

www.trimble.com/tbc

Learn Platform:

Complete free self-paced workflow-based courses with hands-on guided software experiences:

learn.trimble.com/pages/422/trimble-business-center-tbc

Trimble Community Page:

Join your fellow TBC users and ask questions, showcase a project, and learn from peers in this open online forum:

community.trimble.com/groups/tbc-group

Power Hours:

A live monthly session where a Trimble or industry expert showcases a workflow in TBC. All sessions available afterwards and on-demand, for free:

geospatial.trimble.com/webinars/trimble-business-center

Tutorials:

Follow along with sample data and PDF instructions as we explain and illustrate specific workflows and introductions to TBC:

geospatial.trimble.com/trimble-business-center-tutorials

YouTube Channel:

Watch and learn as our team explains how a specific function works or what's new in our latest release:

www.youtube.com/user/TBCSurvey

Watch Aerial Photogrammetry videos and tutorials:

www.youtube.com/TBCAerialPhotogrammetry

NEXT STEPS?

Contact your local Trimble Authorized Distribution Partner or visit www.trimble.com/tbc

Precision Laser & Instrument, Inc.

85 11th Street | Ambridge, PA 15003

724-266-1600 | PLI@laserinst.com

Contact your local Trimble Authorized Distribution Partner for more information

NORTH AMERICA

Trimble Inc.
10368 Westmoor Drive
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