Sales Bulletin

GEOSPATIAL

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PUBLIC

COMPARING TRIMBLE BUSINESS CENTER (TBC) + TRIMBLE REALWORKS (TRW) FOR SCANNING WORKFLOWS

Overview

Trimble Business Center (TBC) and Trimble RealWorks (TRW) are unique office software packages that offer targeted capabilities for specific types of customers and workflows. This document compares and contrasts the scanning functionality of TBC and TRW. By understanding the differences and strengths of each, Trimble's Geospatial Distribution Partners can better advise current and prospective customers and customers can make informed purchasing decisions to complete their laser scanning and point cloud projects and deliverables. This document evaluates the functionality included in TBC v5.30 and TRW v11.2.

Unique Selling Points for Scanning Workflows Between TBC + TRW

Trimble Business Center

- Data integration with mixed fleet survey equipment. For organizations with a mixed fleet of survey instruments like GNSS and total stations along with laser scanners, TBC is an ideal data hub to host multi-sensor data in one place.

Figure 1 - Different Sensors - All Supported in TBC

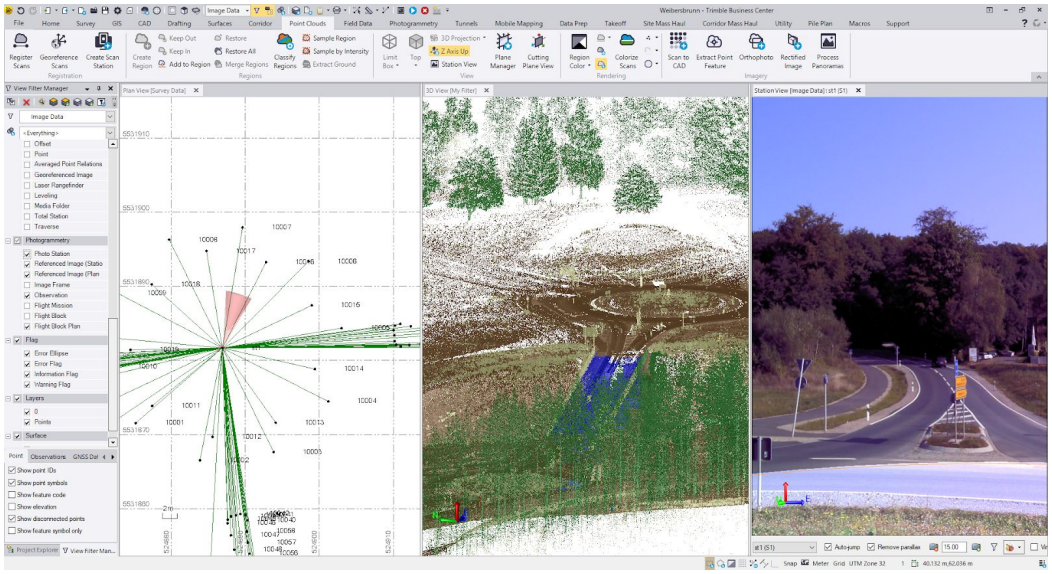

Figure 2 - Different Formats and Views

- Survey datums and projections. TBC provides a geodetic environment so all data can be georeferenced and aligned while working in known projections or local coordinate systems. TBC is a great tool when the data resides in a geodetic reference system, such as US State Plane or UTM, or local sites in ground, such as a construction site.

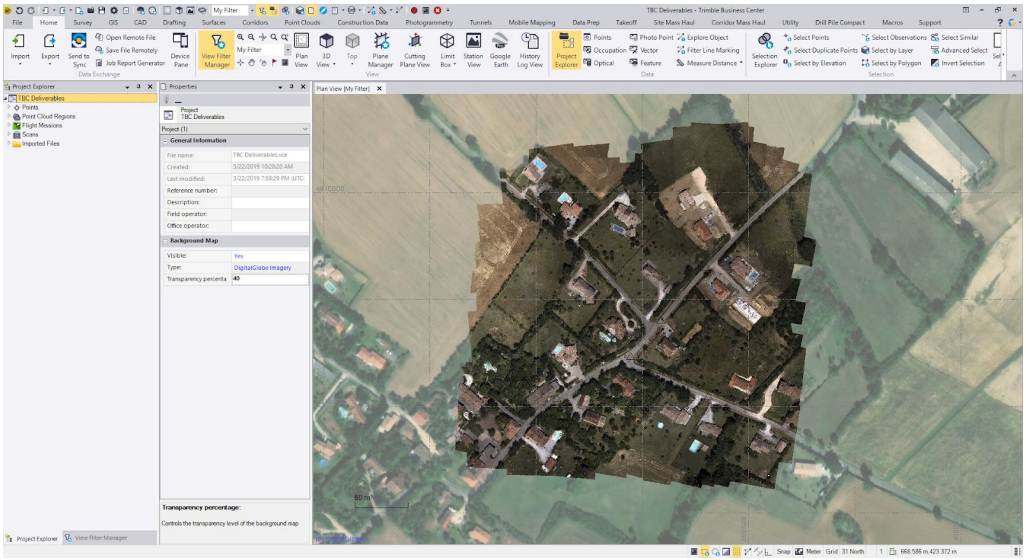

Figure 3 - UAS point cloud superimposed on georeferenced DigitalGlobe imagery

Figure 4 - TBC processed survey data and published georeferenced data to Trimble SiteVision

- Feature oriented workflows. Beside the geometry, TBC provides enhanced tools for object attributing, labeling, drafting, and plotting. When attributes, layers, symbols are equally important as geometry for a client, TBC shines.

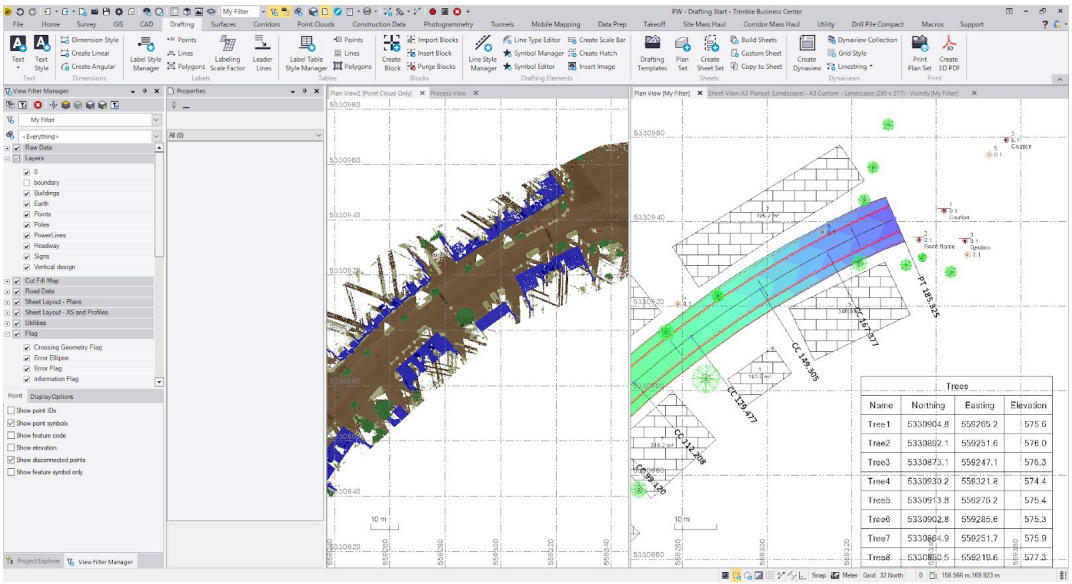

Figure 5 - Scan data is processed to get features, symbols, and labels

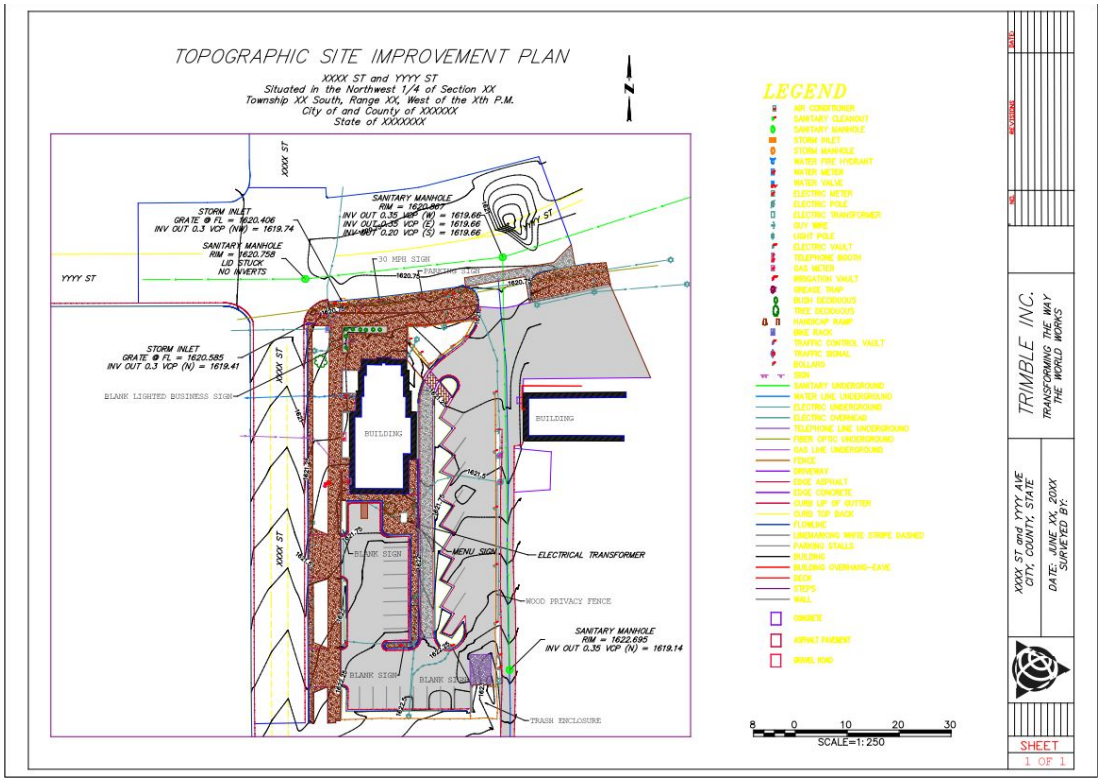

Figure 6 - Features from a scan dataset plotted in a sheet view

Trimble RealWorks

- Trimble RealWorks is specifically designed for point cloud data processing and analysis. The software provides a complete solution to efficiently register, analyze, model and create deliverables using point cloud data from virtually any source.

- Automated tools for point cloud registration with or without targets - TRW provides one of the industries most advanced sets of registration tools. This allows you to tackle any project efficiently and with confidence that it will come together accurately and on time.

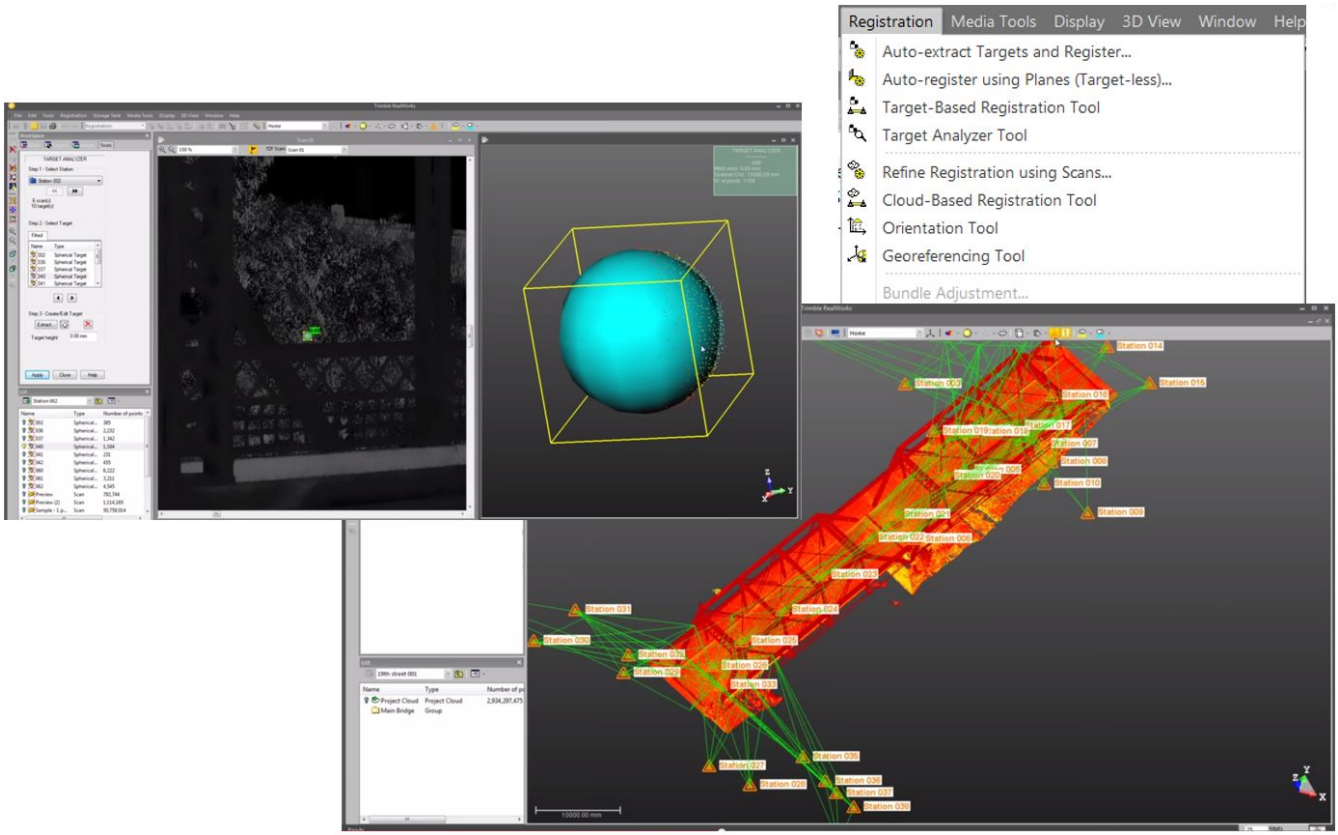

Figure 7 - Registration methods in Trimble RealWorks

- Surface creation and editing - Tools for creating and editing mesh surfaces increase capabilities for analyzing scenes and creating deliverables.

Figure 8 - Mesh creation and editing

- Automated feature extraction and modeling - TRW provides a complete set of tools specific to fitting models to point clouds, analyzing for accuracy and editing.

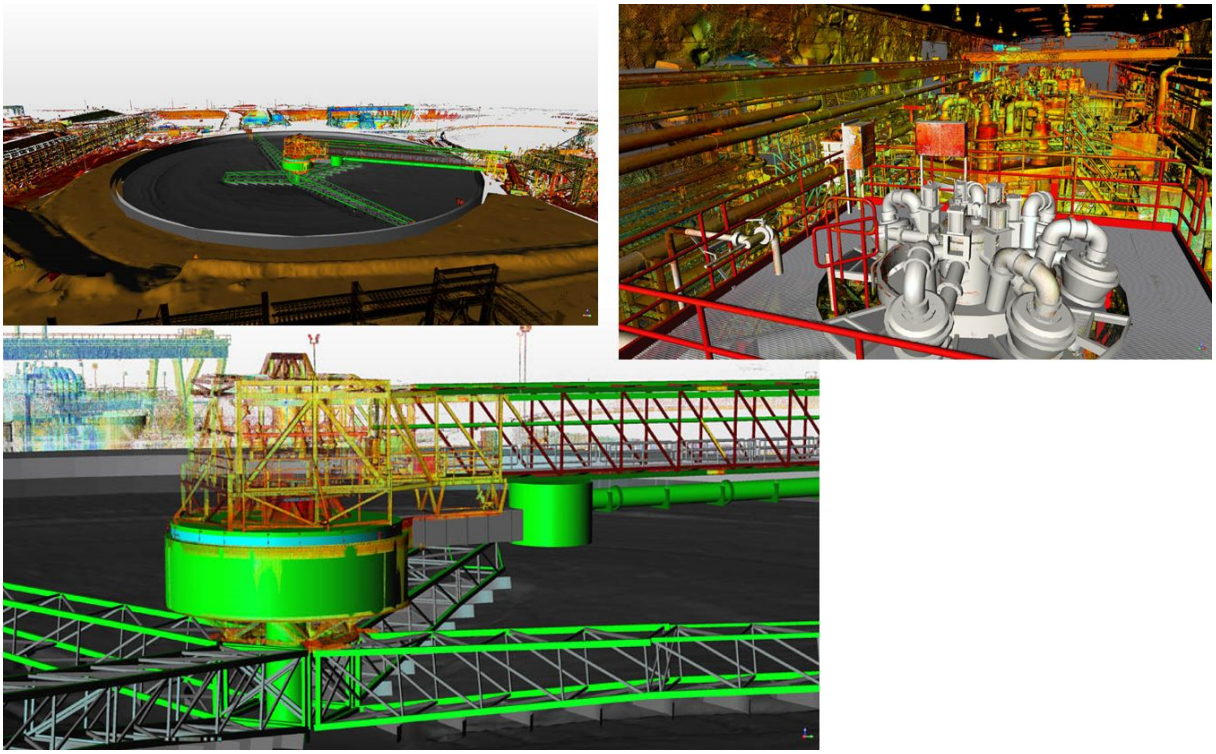

Figure 9 - Pipe and steel modeling from the point cloud

- Animations and fly throughs - TRW provides the ability to create basic and complex animations of projects including point clouds, meshes and models.

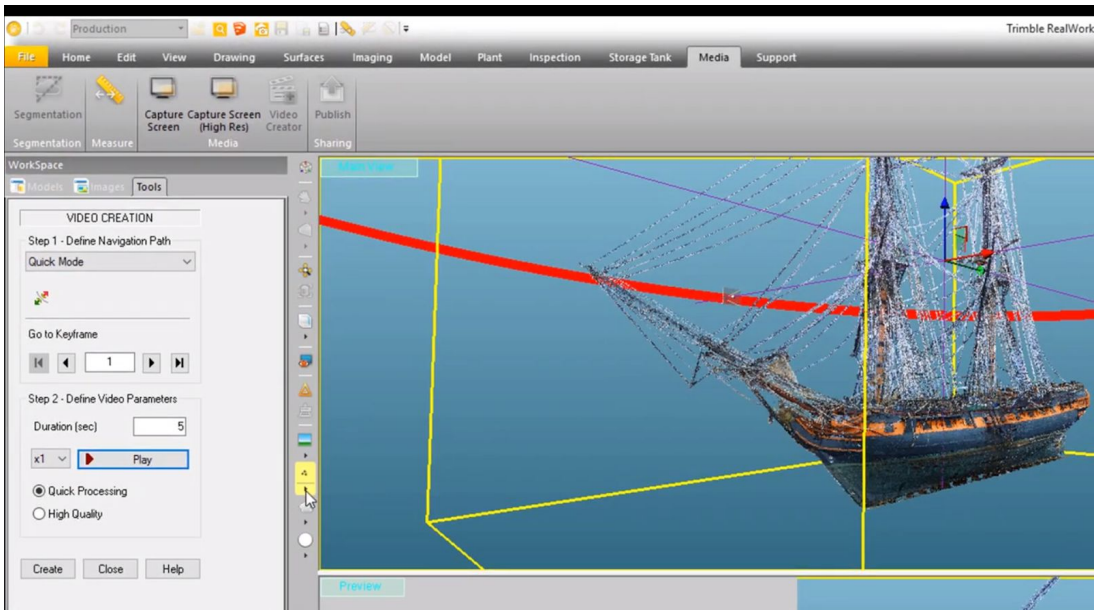

Figure 10 - Create keyframes and paths for fly-through videos in Trimble RealWorks

- 3D and projected inspections - TRW provides a wide selection of tools to analyze and compare point cloud data to surfaces in both 2D and 3D. These tools enable change detection and comparison over time or design vs as-built.

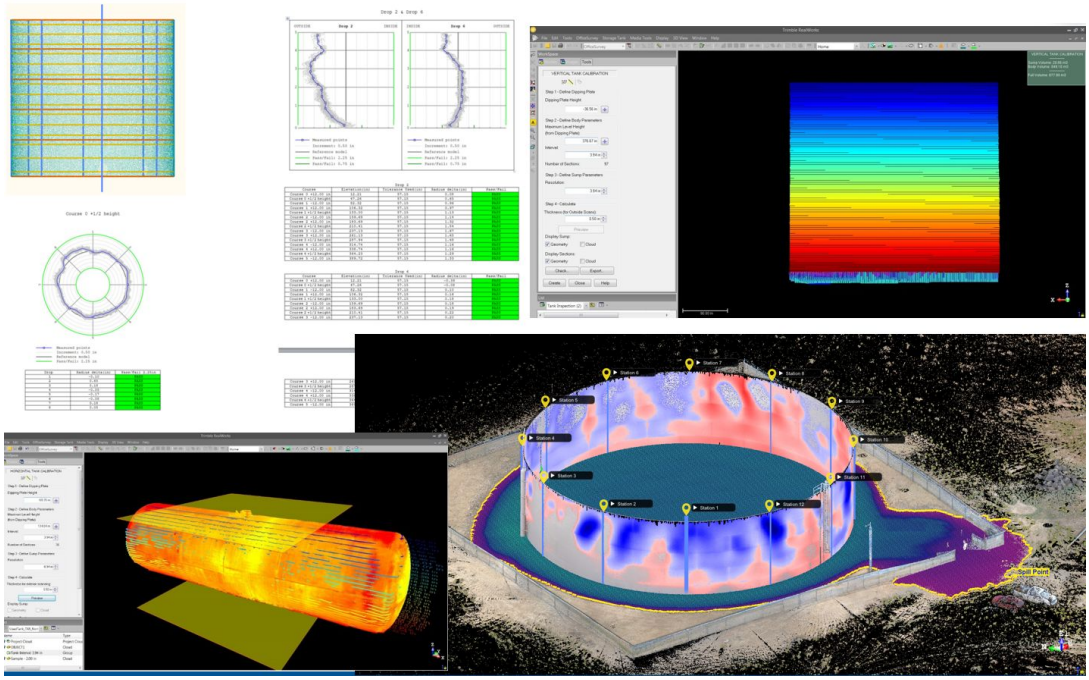

Figure 11 - Compare point clouds to surfaces

- Published project - Share and collaborate on your TRW projects with easy to understand station views and annotations.

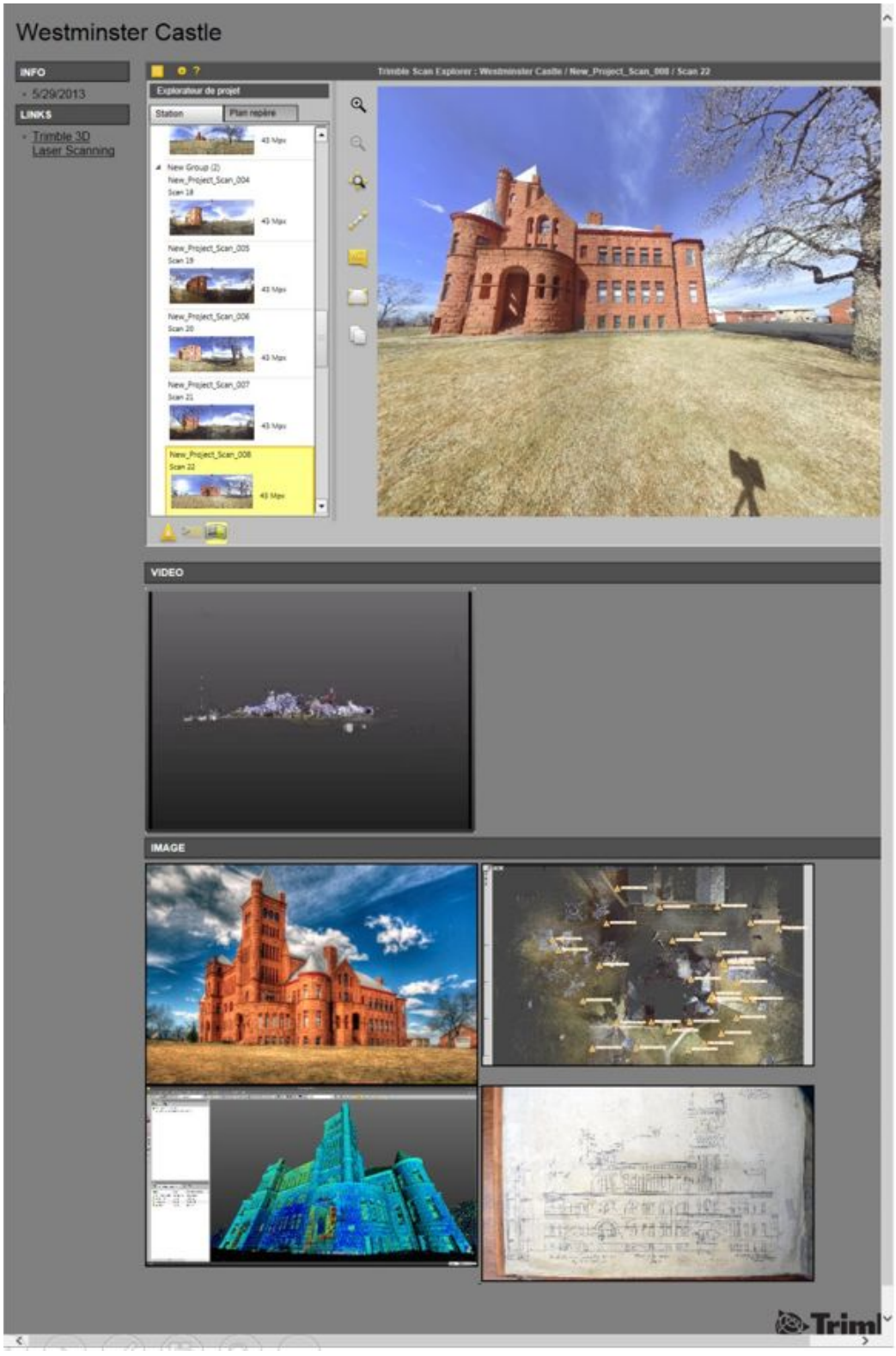

Figure 12 - Share point cloud and model views in the Trimble RealWorks Viewer

Supported Import Formats

Supported Import Formats	Trimble RealWorks	Trimble Business Center
Point Clouds Formats	*.tdx, *.tzf, *.las, *.laz, *.fls, *.ptx, *.e57, ***.tzs, *.rsp, *.zfs, *.iQscan**	*.tdx, *.tzf, *.las, *.laz, *.fls,*.ptx, *.e57

- Conclusion: TRW supports a wider range of point cloud file formats than TBC. It works with most point cloud formats from different vendors, but TBC supports the standard formats to meet the vast majority of surveyors' needs.

Importable Survey File Types	**Coordinates** from survey jobs.	**Raw Data** from survey jobs.

- Conclusion: TBC imports not only the coordinates, but also the raw metadata of the field work. For example, a GNSS baseline, an optical traverse, and a UAS flight trajectory.

Importable CAD File Formats	*.dxf, *.dwg, *.ifc, ***.fbx**	*.dxf, *.dwg, *.ifc, *.dgn,*.icm.dgn

- Conclusion: TRW provides advanced CAD object display, especially for some BIM models.

Custom Import Formats	Limited	Yes

- Conclusion: TBC provides various customization to bring in 3rd party level data, point data, and surface data. TRW provides some flexibility to bring in control points in *.txt format.

Read from Trimble Connect	No	Yes

- Conclusion: TBC allows users to view projects and associated files from Trimble Connect. TBC downloads the files to a local location to open and read.

User Interface

User Interface	Trimble RealWorks	Trimble Business Center
Drag & Drop Import	Yes	Yes

- Conclusion: Both applications provide intuitive drag & drop data import with options to customize import formats.

Integration with Survey Data	No	Yes

- Conclusion: TBC 5.10 and later supports scaling point clouds during the import. Based on the data source and destination projection or coordinate system, users can decide how the point cloud should be scaled.

Predefined Project Template	No	Layer, coordinate system, units, symbols, display precisions

- Conclusion: TRW does not support project templates. Users need to configure the settings each time when a new project is created.

User Interface Modes	Registration, Production	Single

- Conclusion: TRW operates in two modes, Registration and Production. Registration mode allows the users to register and colorize while the production mode lets the users create their final deliverables. TBC however does NOT operate in dual modes and all functionality can be carried out without the need to switch between two modes.

Primary View Options	3D, Station, Cutting Plane	**Plan**, 3D, Station, Cutting Plane

- Conclusion: TBC has two main viewing options, planometric and 3D, most CAD related workflows can be done in the plan view with ease, while TRW only has a 3D view. Both softwares allows for the use of cutting plane views and limit boxes as well.

UI Customization	quick access toolbar, **change language with a restart**, command pane position	**ribbon**, quick access toolbar, **icon size**, command pane position

- Conclusion: Both applications provide good UI customization tools. TBC offers more options.

Rendering + Manipulation

Rendering and Manipulation	Trimble RealWorks	Trimble Business Center
Custom User-Defined Coordinate Systems	Yes	Through Cutting Plane View

- Conclusion: TRW offers options to create a user-defined coordinate system to view and interact with data. TBC and TRW both offer custom plane definitions to view and interact with data.

Point Cloud Viewing Mode	No Filter (See All), See Inside, See Outline, **Hide Background**	See All, See Inside, See Outline

- Conclusion: TRW offers the option of Hide Background to improve visualization in indoor environments, where points that are occluded by foreground objects will be hidden.

Shading Options	No Shading, Normal Shading, Ambient Shading and **Enhanced Ambient Shading**	No Shading, Normal Shading and Ambient Shading

- Conclusion: TRW's Enhanced Ambient Shading option is primarily used for video creation.

Point Cloud Rendering	Color by Scan, Intensity, Elevation, Pixel, **Station, Cloud, Classification**	Color by Scan, Intensity, Elevation, Pixel, **Region**

- Conclusion: Both applications offer various rendering methods for point cloud visualization. The TRW Station Color method renders points with one color per station. The TBC Region Color method represents a combination of TRW's Cloud Color and Classification color.

TZF Colorization	Yes	Yes - at import with Trimble X7

- Conclusion: TBC cannot colorize a Trimble X7 *.tzf scan after it is imported and cannot colorize *.tzf's from Trimble TX6 or TX8 laser scanners. Trimble Perspective can colorize the Trimble X7 *.tzf in field. TRW's RealColor tool can colorize Trimble X7 or Trimble TX6 or TX8 scans with their associated images at any time. TRW offers more flexibility around *.tzf colorization.

External Images for colorization	Yes	No

- Conclusion: TRW supports images from external cameras to match and colorize point clouds

Registration + Georeferencing

Registration and Georeferencing	Trimble RealWorks	Trimble Business Center
Import and Register Option	Yes	No
● Conclusion: TRW streamlines multi-file import and auto registration in one command. It offers higher productivity for organizations with large projects.		
Registration Methods	Plane-based, Pairwise (Cloud-based),**Target-based**	Plane-based, Pairwise (Cloud-based)
● Conclusion: TRW supports target-based registration where plane-based or cloud-based methods do not apply. For example, greenfield or rural areas with little artificial objects.		
Target Auto-Detection	**Spherical target, black and white flat target**	No
● Conclusion: TRW allows users to input target diameters and then auto-detects targets from scans.		
Registration Visual Check	Yes - with more options	Yes
● Conclusion: Both applications provide basic visual check tools for QA/QC. TRW provides further options to inspect the result by defining slices, isolating areas of interest, creating a limit box, and so on.		
Registration Report	Yes	Yes
● Conclusion: Both applications provide reports on plane-based and cloud-based registration. TRW also provides a report on target-based registration.		
Save Registration Parameters	Yes	No
● Conclusion: TRW allows saving registration parameters to an *.rmx file. Instead of passing the large registered scan files, sharing the *.rmx file will ensure the same registration results on colleagues' data copies and allow everyone to work on the same data version.		
Georeferencing	Yes	Yes
● Conclusion: Both applications can georeference a point cloud to a set of ground control points. TBC allows multiple view instances, so it is easier to zoom to control points and the point cloud separately in two views. It helps navigating when the point cloud is far from a real-world coordinate.		

Classification + Segmentation

Classification and Segmentation	Trimble RealWorks	Trimble Business Center
Auto-Classify Outdoor	Yes	Yes

- Conclusion: Both applications provide the same automatic classification function for common outdoor features, including Ground, Building, Poles and Signs, Power Lines, and High Vegetation. TBC provides a separate Extract Ground option with equivalent functionality as the Ground extraction included in the command with the other outdoor options.

Auto-Classify Indoor	Yes	No

- Conclusion: TRW provides the automatic classification function for common indoor features, including Floor, Grated Floor, Ceiling, and Walls.

Point Cloud Sampling	Spatial Sampling, **Sampling by Step, Spatial Sampling (Keep Details)**	Spatial Sampling, **Random Sampling, Sample by Intensity**

- Conclusion: TBC and TRW have slightly different options for point cloud sampling. TBC's Random option asks the user for the total number of points to extract and Sample by Intensity option extracts points within intensity ranges. TRW's Sampling by Step option keeps points following a defined point density, such as keeping one point per every five points and Spatial Sampling (Keep Details) option maintains point density for areas of edges and corners, but lower the resolution on flat areas. This option is only available in Registration mode. Both TBC and TRW's Spatial option prompts for the distance between the sampled points.

CAD Deliverables

CAD Deliverables	Trimble RealWorks	Trimble Business Center
Basic CAD Linework Creation	Yes	Yes, **CAD Command Line**

- Conclusion: Both TRW and TBC allow users to create 2D/3D linework, such as polylines, arcs, circles, and polygons. TBC has the CAD Command Line for production-level CAD drafting.

Point Feature Extraction from Point Cloud	No	**Yes**

- Conclusion: TBC provides tools for automatic tree and pole/sign extraction. Both the 3D position and certain attributes (trunk diameter, height, spread) can be extracted for increased productivity turning scan data into usable information.

Smart Picking Options	Face of curb, Gutter, Roadmark Edge, Highest + Lowest Point	Face of curb, Gutter, Roadmark Edge, Highest + Lowest Point

- Conclusion: Both TRW and TBC provide smart picking options that assist with feature extraction from point cloud data. TBC offers user verification whereas TRW automatically fits to the data. The highest and lowest point feature in TRW uses a customizable picking window.

Best-fit Linework	Polyline	Straight line, Polynomial Curve

- Conclusion: Both applications provide tools to extract linework from a point cloud slice. TRW creates polylines. Sample applications can be building floor plan extraction and corridor cross-section extraction. TBC creates straight lines and polynomial curves. Sample applications include power line extraction using the Cutting Plane View and running slope extraction.

Feature Coding	Yes - Limited	Yes - Advanced

- Conclusion: TRW supports the creation of points with feature codes, but feature code processing is not available in TRW to create linework, assign symbols or attach attributes. TBC is a better choice for complete feature cording workflows.

Convert Scans to CAD Points	No	Yes

- Conclusion: TBC allows for users to create CAD points from point clouds. The CAD points can be handled individually and converted into points with PointIDs, feature codes, and attributes.

Drafting and Plan Sets	Label, Dimension	Label, Dimension, **3D PDF, Tables, Plan Sets**

- Conclusion: Both applications provide tools to label objects with measurements. TBC offers more label and text styles and the ability to create data tables dynamically linked to the data. TBC also supports plotting objects in sheet views, creating 2D prints and 3D PDFs.

Modelling Deliverables

Modelling Deliverables	Trimble RealWorks	Trimble Business Center
Geometry Fitting	Yes	No

- Conclusion: TRW offers automatic fitting tools to quickly create a 2D/3D geometry shape from the selected point cloud. Fitting types include sphere, cylinder, vertical cylinder, plane, and horizontal plane. TBC does not offer geometry fitting.

3D Modelling	Yes	No

- Conclusion: TRW allows for the modelling of basic and complex geometries, such as (semi-)automated extraction of cylinders, pipes, and steel beams.

Survey Deliverables

TRW and TBC use the terms mesh and surfaces interchangeably. For example, a surface in TBC - whether it is a topographical, projected, or radial surface - is equivalent to a mesh in TRW.

Survey Deliverables	Trimble RealWorks	Trimble Business Center
Topo Surfaces + Contours	Yes	Yes

- Conclusion: Both TRW and TBC create surfaces and contour lines. In addition to 2.5D triangulated topographical surfaces, TBC and TRW can create a projected or radial surface relative to a user-defined plane.

Topo Surface Editing	No	Yes

- Conclusion: TBC allows users to merge surfaces, create elevation grids, create surface intersection geometry, apply material properties, and edit surface members and vertices.

Meshes	Yes	No

- Conclusion: TRW allows its users to create meshes by using both projection and non-projection based methods using vertices, edges, and faces.

Mesh Editing	Yes	No

- Conclusion: TRW allows users to remove mesh vertices, fill holes, and smooth outliers. In addition, users can move meshes in TRW.

Draping to surfaces / meshes	To Meshes	To Surfaces

- Conclusion: TBC allows its users to drape CAD linework to elevate linework or imagery upon surfaces to give better texture for visualization purposes. Meshes can be texturized with station or external images.

Volumes	Yes	**Surface to surface, stockpiles/depressions, corridor**

- Conclusion: Both TRW and TBC can calculate volumes. TBC offers precise volume computations that involve surfaces, including customized Microsoft Word-based reports.

Ortho-Images	Yes	Yes

- Conclusion: Both softwares allow for the creation of ortho-images from point clouds by projecting point clouds from a single Station View.

Rectified Image	Yes	Yes

- Conclusion: Both softwares can create rectified images from station-based images.

Inspections

Inspections	Trimble RealWorks	Trimble Business Center
Cut/Fill Maps	Yes	Yes

- Conclusion: Both TBC and TRW create Cut/Fill Maps to inspect differences between two objects. TBC supports surface-to-surface inspection. TRW supports inspections involving point clouds, models, and meshes.

Floor Flatness / Levelness	Yes	No

- Conclusion: TRW allows its users to inspect the flatness or levelness of the floor and create reports according to ASTM E1155 standards.

Object Inspection	Yes	No

- Conclusion: TRW can compare two objects in both 2D and 3D. The objects can be surfaces, meshes, point clouds, or complex geometries. This can be useful for comparing changes to objects or differences between designed versus as-built models.

Cloud-to-Surface Inspection	Yes	No

- Conclusion: TRW allows its users to create an inspection map between a cloud and surface to see the difference between the cloud and the surface.

Specialty Solutions

Specialty Solutions	Trimble RealWorks	Trimble Business Center
Mobile Mapping Processing	No	Yes

- Conclusion: TBC's Mobile Mapping module allows users to import MX9 mobile mapping data to generate scans, register scans to control points and create deliverables.

Aerial Photogrammetry	No	Yes

- Conclusion: TBC's Aerial Photogrammetry module allows users to import UAV data either in TBC directly with a *.jxl file or generic third-party formats with the included UASMaster. TBC can process UAV flights with or without ground control points (GCPs) and integrate deliverables like point clouds, raster DSMs, and orthomosaic deliverables with survey data.

Storage Tank Inspection	Yes	No

- Conclusion: TRW allows users to set up, measure, inspect, and calibrate vertical or horizontal tanks. The software also creates industry standard reports.

Tunneling	Yes	Yes

- Conclusion: With different workflows, both applications allow users to create alignments, define tunnel shapes, create design and as-built meshes, and generate comparisons between as-built tunnels to a design. TRW offers advanced cloud-to-cloud inspection maps compared to TBC. TBC's Tunneling module offers a streamlined design workflow and unique functions such as editing setout (stakeout) points and creating tunnel plan sets.

Collaborate + Share

Collaborate and Share	Trimble RealWorks	Trimble Business Center
Point Cloud Export Formats	*.e57, *.las, *.laz, *.pod, *.pts, *.rcp, *.tdx	*.e57, *.las, *.laz, *.pod, *.pts, *.rcp, *.tdx, ***.ptx**

- Conclusion: Both products support industry-standard exports to export user data to desired third-party software.

CAD Export Formats	*.dwg, *.dxf, *.ifc,*.xml, *.kmz, ***.fbx, *.pdmsmac, *.obj, *.dgn, *.asc**	*.dwg, *.dxf, *.xml, *.kmz, ***.kml, *.shp, *.gdb,** *.ifc,***.vcl, *.ttm, machine control**

- Conclusion: Both products support industry-standard exports to 3rd party CAD applications. TRW supports exporting geometries into DGN format for Microstation users. TBC supports exporting objects into common GIS formats and machine control system formats.

Send Geometries to SketchUp	Yes	Yes

- Conclusion: TRW allows users to sync geometries to an open SketchUp project in real time. TBC will export geometries to SketchUp but it is not in real time.

Send Point Clouds to AutoCAD	Yes	No

- Conclusion: TRW allows users to sync point clouds to an open AutoCAD project in real time. TBC will export point clouds to AutoCAD but it is not in real time.

Export to TopoDOT	No	Yes

- Conclusion: TBC includes a point cloud and station-based image export to seamlessly integrate into the TopoDOT plug-in for Bentley Microstation.

Video Creation	Yes	No

- Conclusion: TRW provides a video creation tool to generate fly-through videos which helps clients to vividly visualize the project.

Share via Trimble Clarity	No	Yes

- Conclusion: TBC allows users to publish data (point clouds, station images, CAD objects) directly to the cloud-based platform Clarity. Data will be georeferenced automatically and ready for viewing. Data from TRW must be uploaded within Clarity directly and users need to georeference the point cloud manually.

Publish to Trimble Connect	No	Yes

- Conclusion: TBC allows users to publish projects and associated files to Trimble Connect.

For more information

For more information, please contact your local Trimble Geospatial Distribution Partner or visit the Trimble Business Center homepage - https://www.trimble.com/tbc and Trimble RealWorks homepage - https://www.trimble.com/trw.