May 12th, 2020

Comparing TBC + TRW for Scanning Workflows

Agenda

- Trimble Business Center (TBC) + Trimble RealWorks (TRW) Overview
- TBC-TRW Comparisons through Common Scanning Applications
  - Topo Surveys - Point clouds with survey data
  - Georeferencing + Registration - Production scanning
  - CAD - Feature extraction + drafting
  - CAD - Modeling
  - Inspections - 2.5D
  - Inspections - 3D Scan-to-Design
  - Inspections - Floor Flatness
  - Tunneling
  - Aerial Photogrammetry
  - Tank Inspection
  - Video Animation
- Q + A

Trimble Business Center

Complete Survey and Construction Office Software Enabling Field to Finish Workflows with Confidence

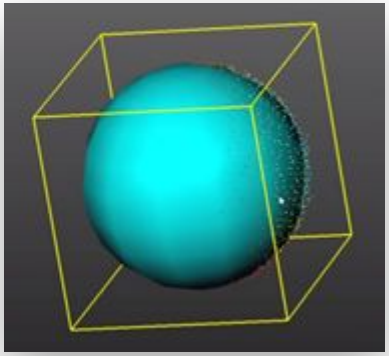
TBC as the surveyor's data hub

Trimble RealWorks

Dedicated processing software that turns point cloud data into answers

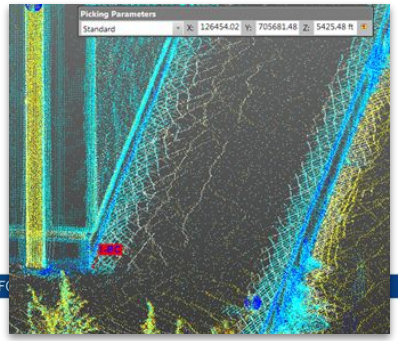
Trimble RealWorks

REGISTRATION

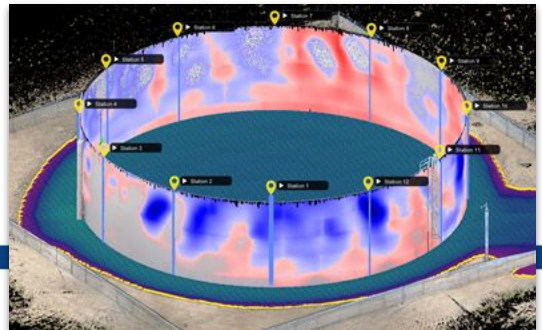


MODELING

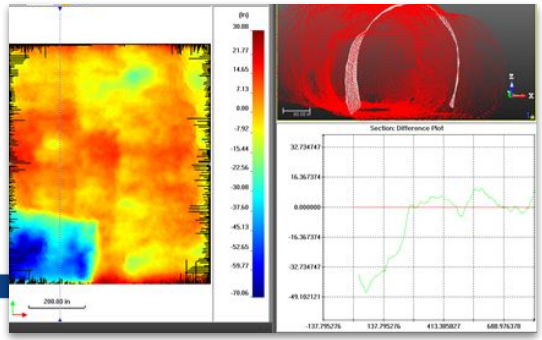
OFFICE SURVEY



SPECIALTY APPLICATIONS



INSPECTION



Common Scanning Applications

Introducing...

Surveyor Rui

- Trimble loyalist - been using Trimble Access since the Survey Controller + TBC since the TGO days
- Uses GNSS, total stations, + digital levels in everyday workflows
- Embracing new survey scanning technology like UAVs and Trimble SX10 + X7

Scanner Jason

- Uses Trimble + third-party terrestrial laser scanners
- Focused on production jobs mostly inside buildings, but interested in expanding to more outdoor applications

Topo Surveys - Point clouds with survey data

CAD Deliverables	Trimble RealWorks	Trimble Business Center
Integration with Survey Data	No	Yes

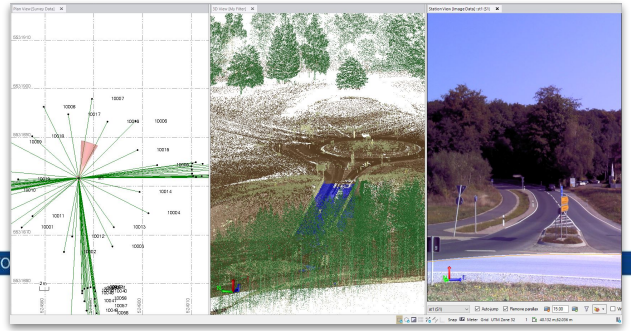
- Conclusion: TBC 5.10 and later supports scaling point clouds during the import. Based on the data source and destination projection or coordinate system, users can decide how the point cloud should be scaled.

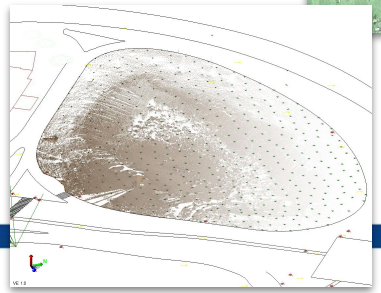
Convert Scans to CAD Points	No	Yes

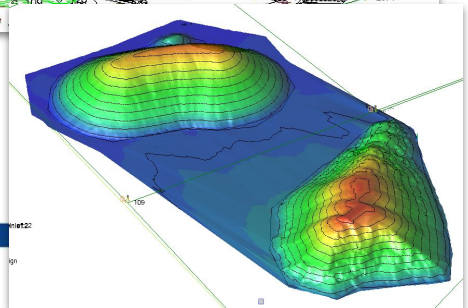
- Conclusion: TBC allows for users to create CAD points from point clouds. The CAD points can be handled individually and converted into points with Point IDs, feature codes, and attributes.

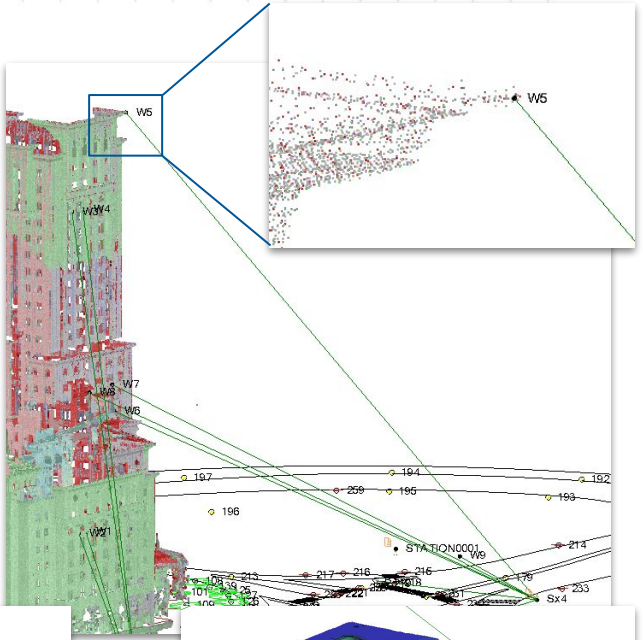
Topo Surfaces + Contours	Yes	Yes

- 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 Surveys - Point clouds with survey data

Resources

- TRW
  - YouTube Video: Removing fence points from rock surface
- TBC
  - YouTube Video: LAS/LAZ Scale Factor Improvements
  - Documentation: Product Bulletin - Working with Point Clouds
  - TBC Resources PDF Presentation
    - Page 24: Point Cloud - General
    - Page 27: Surfaces + Volumes

Georeferencing + Registration - Production Scanning

Georef + Registration	Trimble RealWorks	Trimble Business Center
Georeferencing	Yes	Yes

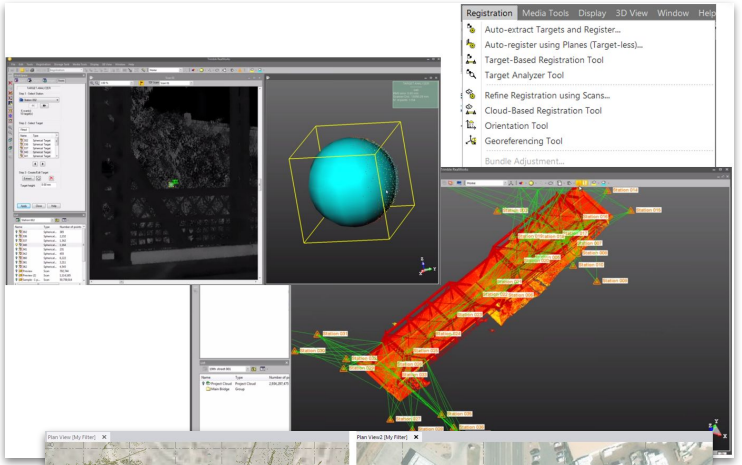
- Conclusion: Both applications can georeference a point cloud to a set of ground control points. TBC allows multiple view instances, so it is easier to zoom to control points and the point cloud separately in two views. It helps navigating when the point cloud is far from a real-world coordinate.

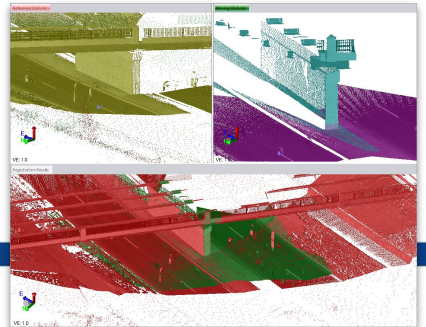
Registration Methods	Plane-based, Pairwise (Cloud-based),**Target-based**	Plane-based, Pairwise (Cloud-based)

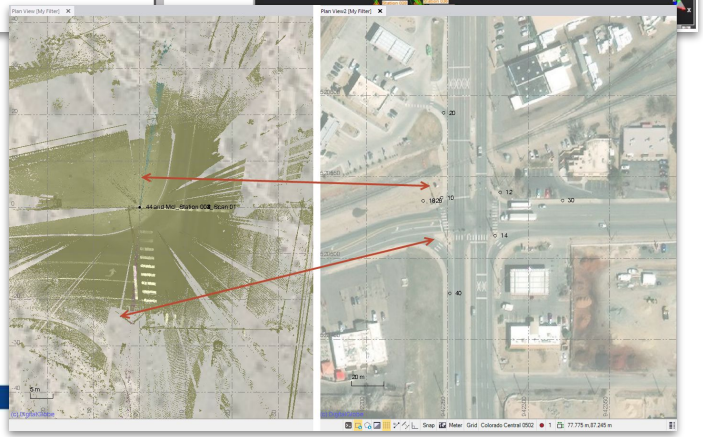
- Conclusion: TRW supports target-based registration where plane-based or cloud-based methods do not apply. For example, greenfield or rural areas with little artificial objects.

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.







Georeferencing + Registration - Production scanning

Resources

- TRW
  - YouTube Video: Process, register and import scan points
  - Learning Guide Chapter 3: Data Registration
- TBC
  - TBC Resources PDF Presentation
    - Page 25: Point Cloud - Registration

CAD - Feature Extraction + Drafting

CAD - Feature Ex + Draft	Trimble RealWorks	Trimble Business Center
Point Feature Extraction from Point Cloud	No	Yes

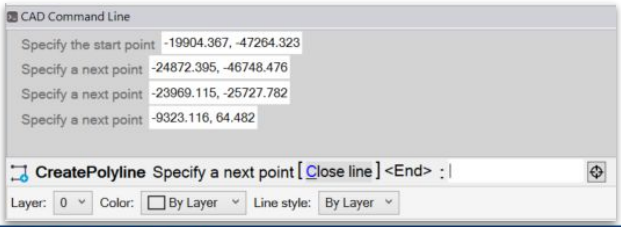
- Conclusion: TBC provides tools for automatic tree and pole/sign extraction. Both the 3D position and certain attributes (trunk diameter, height, spread) can be extracted for increased productivity turning scan data into usable information.

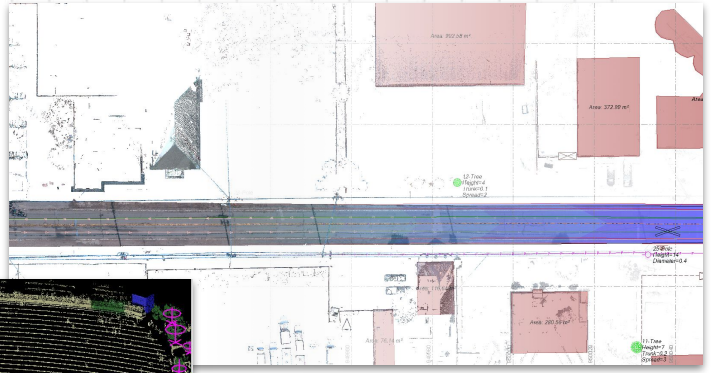
Feature Coding	Yes - Limited	Yes - Advanced

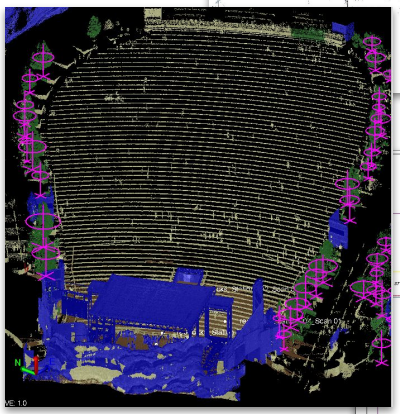
- Conclusion: TRW supports the creation of points with feature codes, but feature code processing is not available in TRW to create linework, assign symbols or attach attributes. TBC is a better choice for complete feature cording workflows.

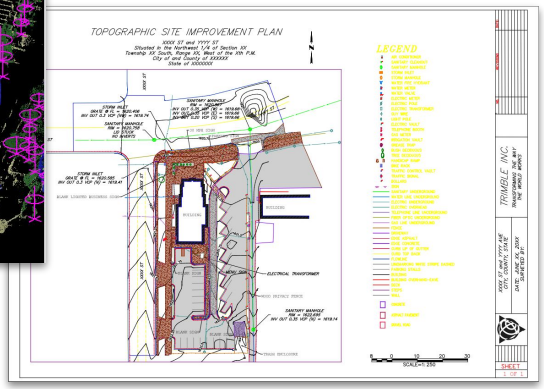
Basic CAD Linework Creation	Yes	Yes, **CAD Command Line**

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









Trimble

CAD - Feature Extraction + Drafting

Resources

- TRW
  - Learning Guide: CAD Workflows
- TBC
  - TBC Resources PDF Presentation
    - Page 22: Feature Coding
    - Page 26: Point Cloud - Feature Extraction
    - Page 30: CAD + Drafting

CAD - Modeling

CAD - Modeling	Trimble RealWorks	Trimble Business Center
Geometry Fitting	Yes	No

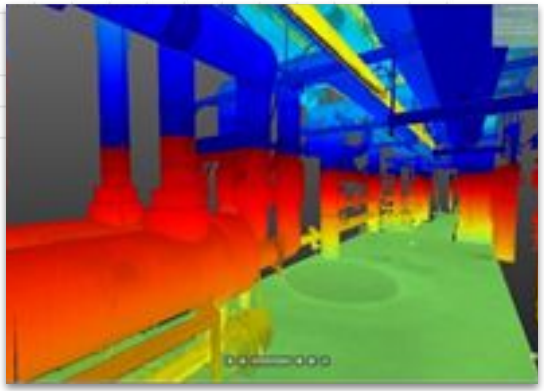
- Conclusion: TRW offers automatic fitting tools to quickly create a 2D/3D geometry shape from the selected point cloud. Fitting types include sphere, cylinder, vertical cylinder, plane, and horizontal plane. TBC does not offer geometry fitting.

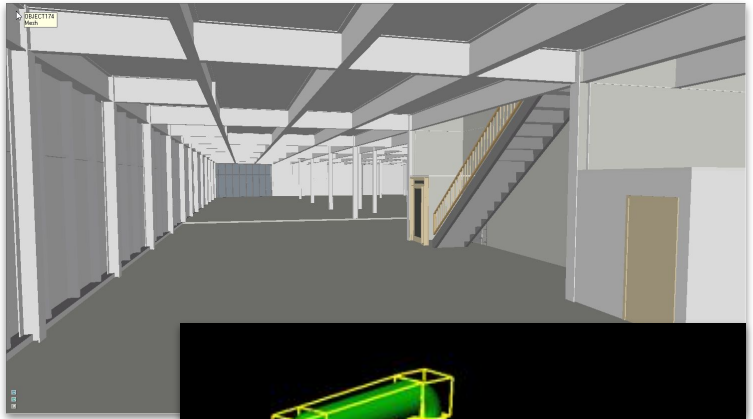
3D Modelling	Yes	No

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

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.





CAD - Modeling

Resources

- TRW
  - Learning Guide: Chapter 8 - Introduction to Modeling Tools
  - YouTube Videos
    - Modeling stairs; Handrail Modeling; Ladder Modeling

Inspections - 2.5D

Inspections - 2.5D	Trimble RealWorks	Trimble Business Center
Volumes	Yes	Surface to surface, stockpiles/depressions, corridor

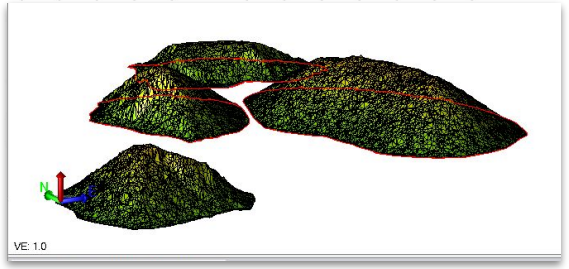
- Conclusion: Both TRW and TBC can calculate volumes. TBC offers precise volume computations that involve surfaces, including customized Microsoft Word-based reports.

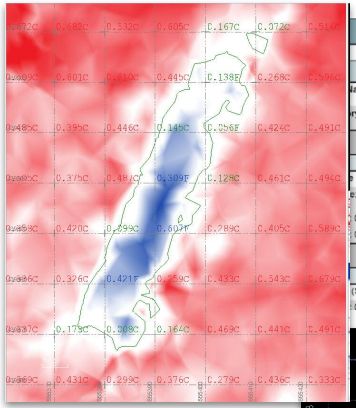
Topo Surface Editing	No	Yes

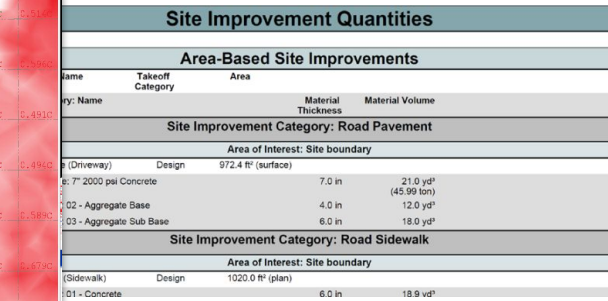
- Conclusion: TBC allows users to merge surfaces, create elevation grids, create surface intersection geometry, apply material properties, and edit surface members and vertices.

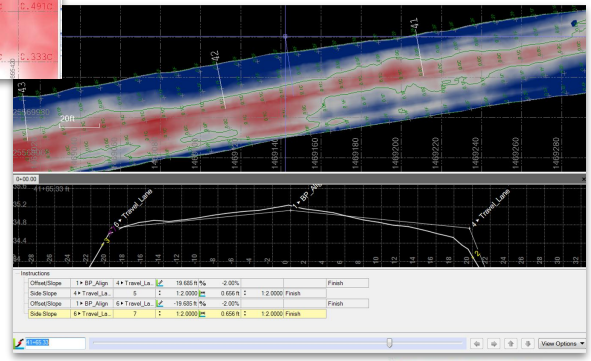
Cut/Fill Maps	Yes	Yes

- 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.









Inspections - 2.5D

Resources

- TRW
  - Learning Guide: Inspection, Working with Volumes
  - YouTube Videos
    - Volume Calculations
- TBC
  - TBC Resources PDF Presentation
    - Page 27: Surfaces + Volumes
    - Page 39: Construction

Inspections - 3D Scan-to-Design

Inspections - 3D	Trimble RealWorks	Trimble Business Center
Object Inspection	Yes	No

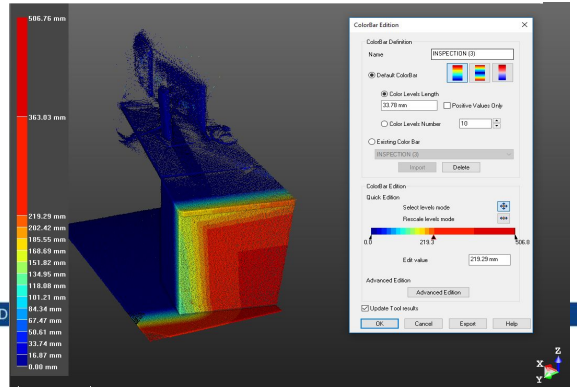
- Conclusion: TRW can compare two objects in both 2D and 3D. The objects can be surfaces, meshes, point clouds, or complex geometries. This can be useful for comparing changes to objects or differences between designed versus as-built models.

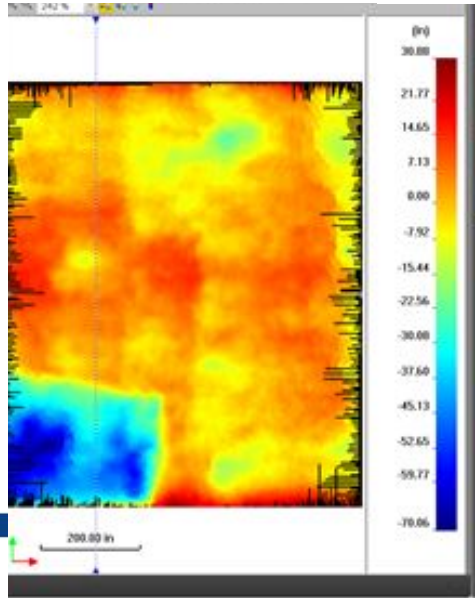
Cloud-to-Surface Inspection	Yes	No

- 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.

Meshes	Yes	No

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





Inspections - 3D Scan-to-Design

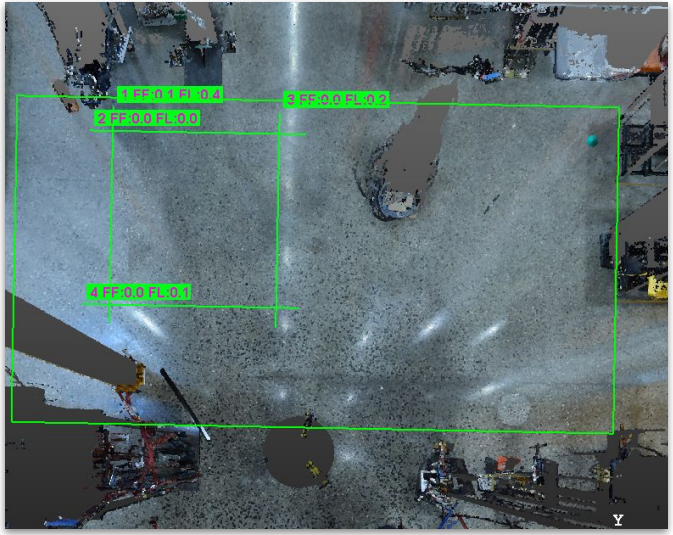
Resources

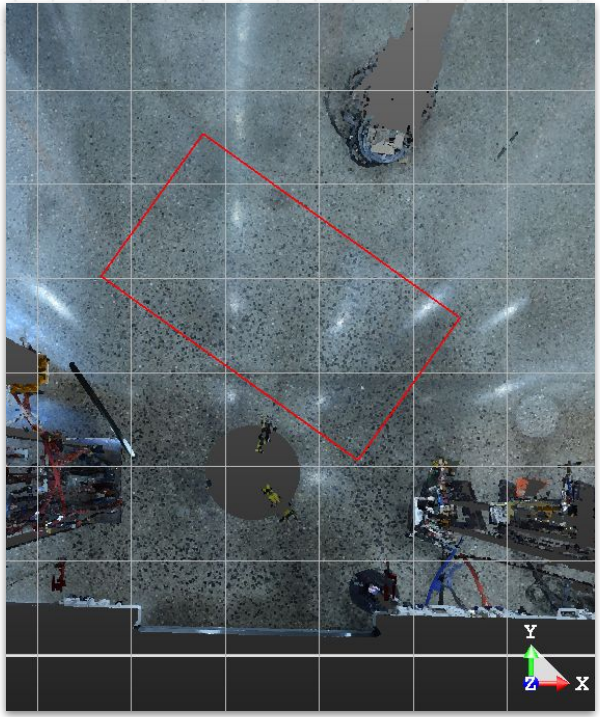
- TRW
  - Learning Guide: Mesh Creation Tool
  - YouTube Video: Wall Flatness and Verticality

Inspections - Floor Flatness

Inspections - Floor	Trimble RealWorks	Trimble Business Center
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.





Inspections - Floor Flatness

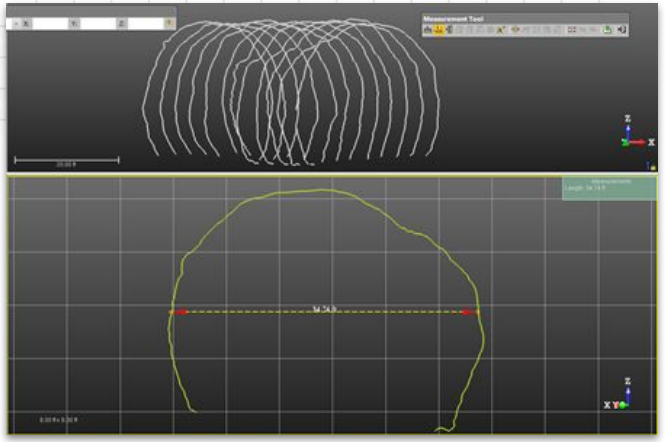
Resources

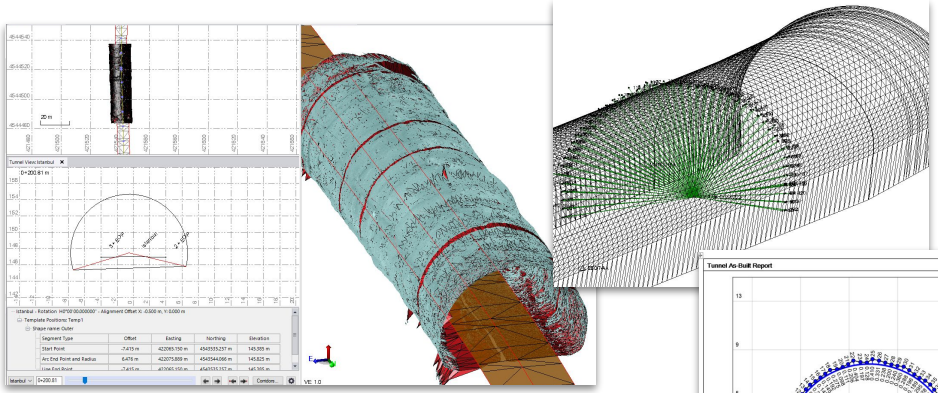
- TRW
  - Learning Guide: Inspection
  - YouTube Videos
    - Floor Flatness and Levelness

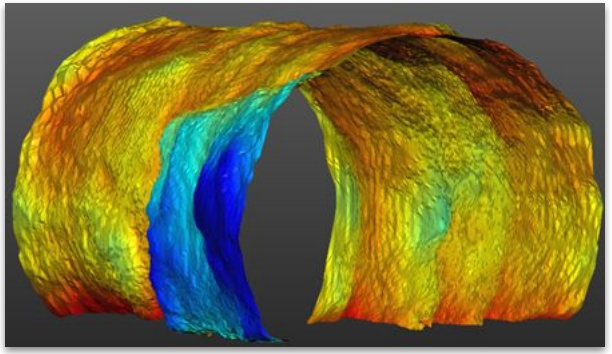
Tunneling

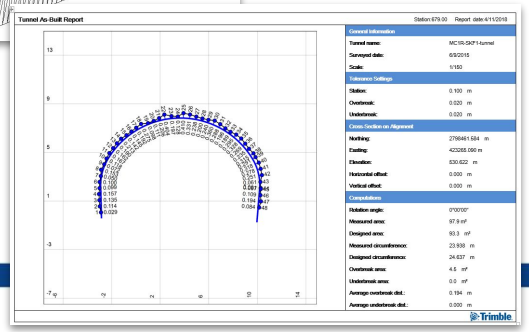
Tunneling	Trimble RealWorks	Trimble Business Center
Tunneling	Yes	Yes

- 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.







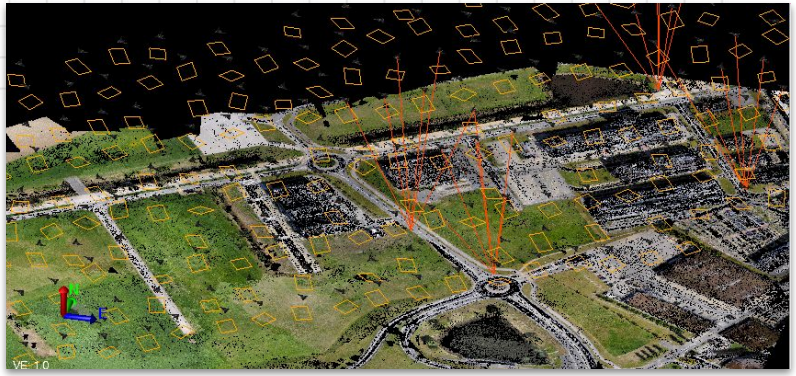


Tunneling

Resources

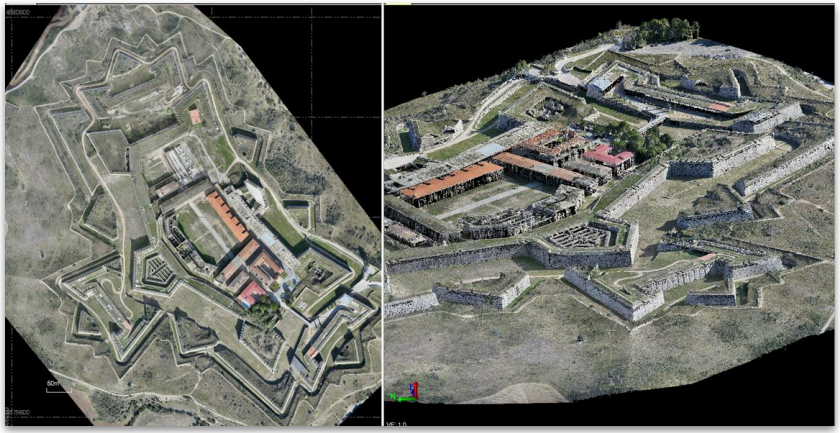
- TRW
  - YouTube Videos
    - Tunnel Inspection - Geocom - Chile
- TBC
  - TBC Resources PDF Presentation
    - Page 37: Tunneling

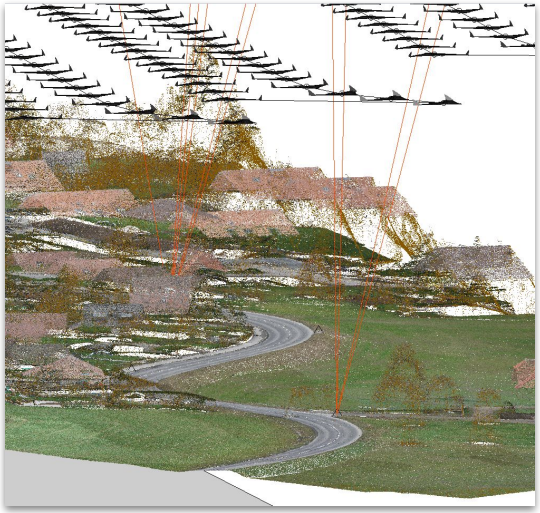
Aerial Photogrammetry



Aerial Photogrammetry	Trimble RealWorks	Trimble Business Center
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.





Aerial Photogrammetry

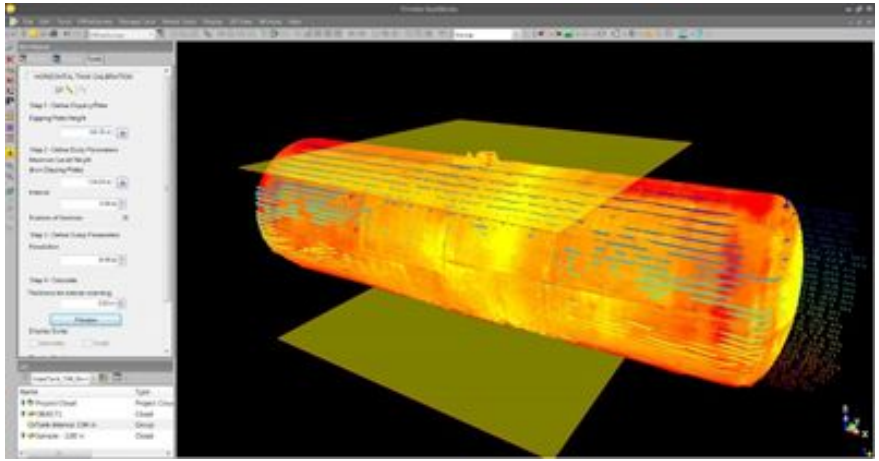
Resources

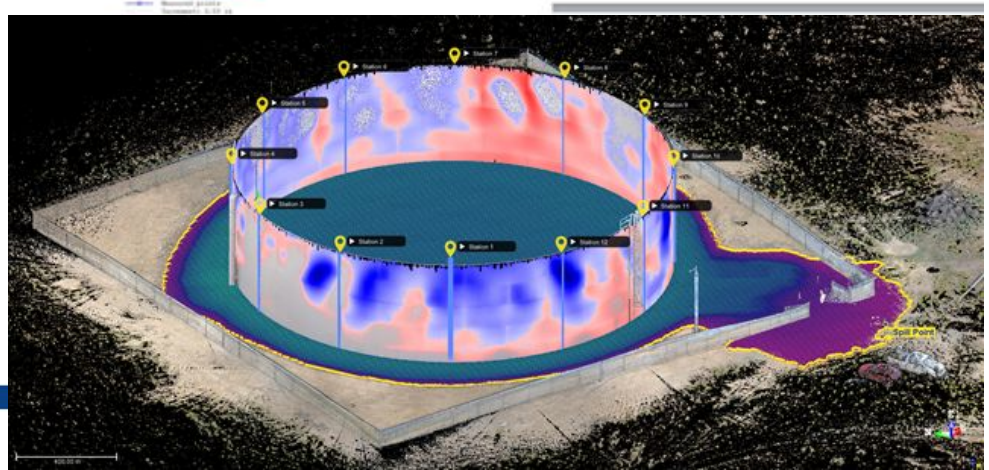
- TBC
  - TBC Resources PDF Presentation
    - Page 31: Aerial Photogrammetry + UASMaster

Tank Inspection

Storage Tank	Trimble RealWorks	Trimble Business Center
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.





Tank Inspection

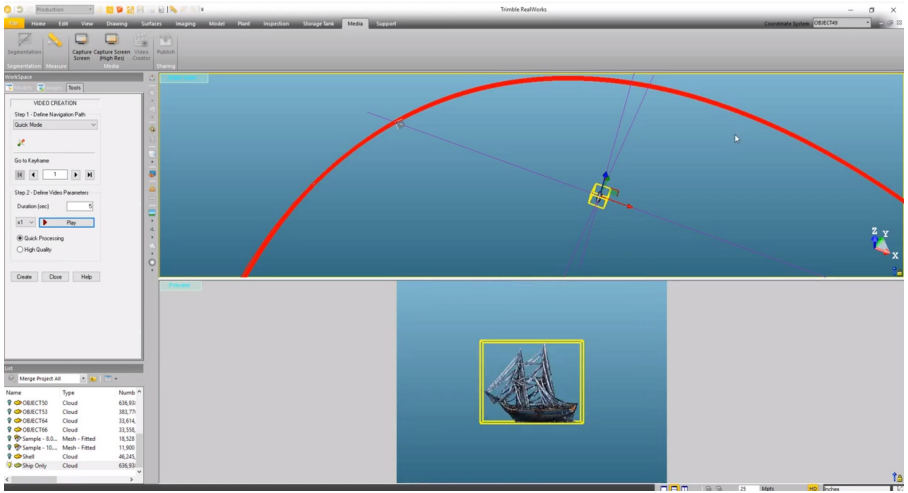
RESOURCES

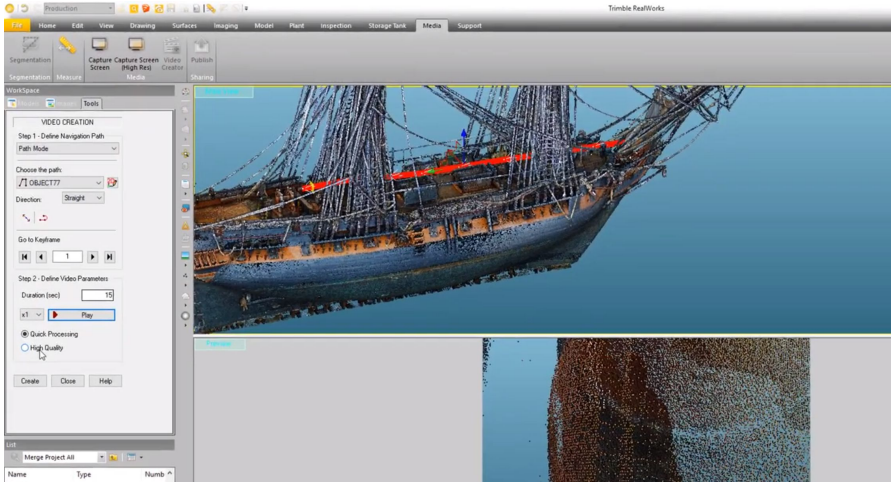
- TRW
  - Learning Guide: Tank Inspection
  - YouTube Videos
    - Storage Tanks

Video Animation

Video Creator	Trimble RealWorks	Trimble Business Center
Animation Creation	Yes	No

- Conclusion: TRW allows users to create video fly-through animations using objects within the RealWorks projects such as point cloud, inspection maps, and models.





Video Animation

RESOURCES

- TRW
  - Learning Guide:
  - YouTube Videos
    - TRW Video Creator; Video Creation for Forensics - Seiler Solutions

Q + A

Sales Bulletin Release Announcement

COMPARING TBC + TRW FOR SCANNING WORKFLOWS - DOWNLOAD HERE

Sales Bulletin

GEOSPATIAL
MAY 2020
PUBLIC

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

- 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.

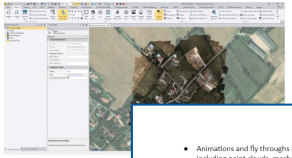
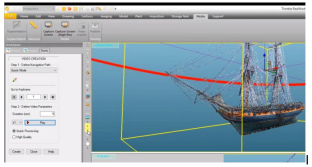


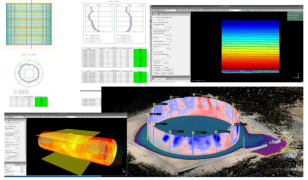
Figure 3 - UAS point cloud superimp

Figure 4 - TBC processed survey data and

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



- 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.



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.		

https://drive.google.com/file/d/16x5-c5f
OrwdbF10ioya-pgQlu7PFpEAb/view

Trimble

Thank you for attending!

May 12th, 2020

Comparing TBC + TRW for Scanning Workflows