Release 3.4

Release Notes

SCANTRA

Static, KINEMATIC, POLAR

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SCANTRA 3.4.1.495

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1 GENERAL DEVELOPMENTS

1.1 New Features

1.1.1 Real-time interface to OpenScanTools

We have continued the close cooperation with parts of the former TagLabs (ScanSap) team, which has led to a real-time interface with the successor programme OpenScanTools (OST). This enables the immediate visual inspection of point clouds in OST, e.g. after a block adjustment in SCANTRA or based on given pre-orientations.

The sectional view of planes in SCANTRA is synchronised with the sectional view of the point clouds. This means that the position of the sectional plane in OST is also synchronised. Furthermore, the stations are coloured uniformly in both programs. All import formats supported in SCANTRA can be used to create OST projects. Other functionalities include the display of scans in the 3D viewer. Deeper integration is planned for the next releases.

For beginners, Yan Koch, the founder and mastermind behind TagLabs and OpenScanTools, has created a tutorial series on YouTube that is well worth watching.

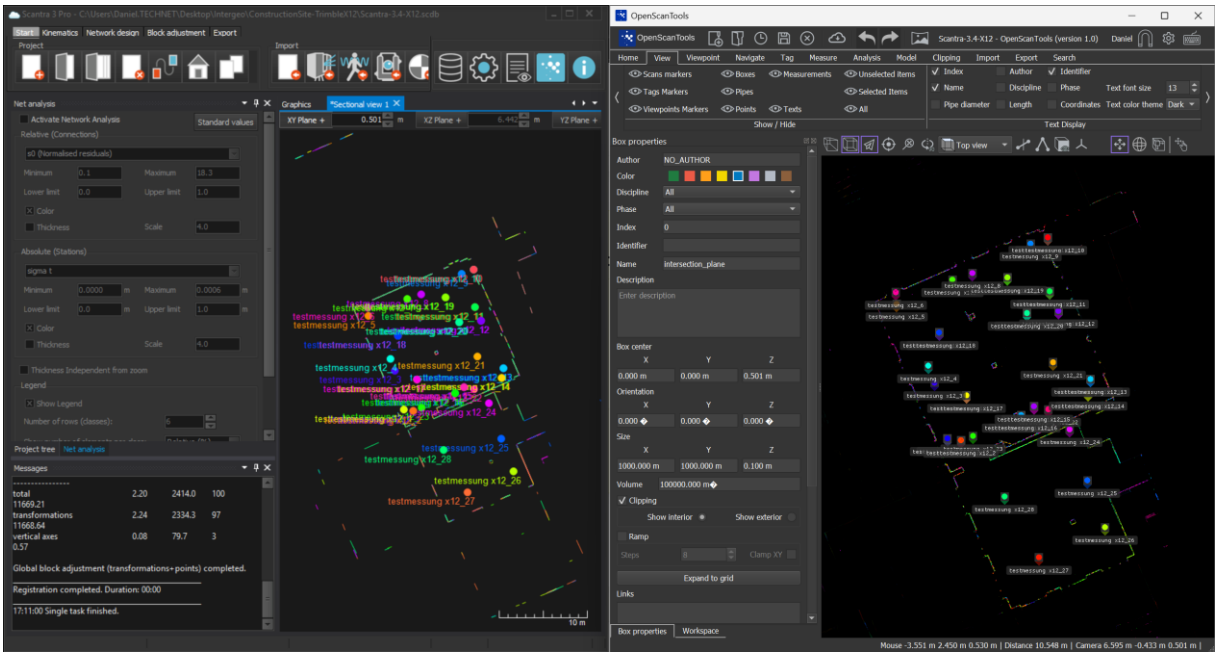

Figure 1: Real-time interface between SCANTRA (left) and OpenScanTools (right). Data courtesy of Julian Weber, City of Reutlingen, Germany

1.1.2 New licencing options

Up to now, SCANTRA LT and PRO differed in the number of processable scans. Historically, the processed data source were exclusively static scans until 2024. Since SCANTRA Release 3.3, it is possible to purchase the *Kinematic* add-on module, which required a PRO license.

With the introduction of SCANTRA Release 3.4, we are now also addressing users who primarily serve the market with kinematic scanning services. In terms of quantity, there are still the LT and PRO expansion levels, but a functional distinction is now made between static and kinematic data sources. This means that SCANTRA beginners can also start with SCANTRA LT Kinematic, while functional or quantitative expansions are optional.

1.1.3 Hiding planes or plane identities in bitmaps or the Matchmaker

The optical medium of glass in particular causes problems in some projects, whether due to refraction or total reflection of an emitted signal. Our developers have therefore created the option of discarding planes or existing identities by selecting them in individual bitmaps or the matchmaker.

Figure 2: Masked planes on a window (Data courtesy by Terradata, Switzerland)

1.1.4 Project orientation

In construction projects, it is common to use a project coordinate system that runs parallel to the building axes. If these coordinates are not available, it is possible in the new Scantra version to carry out this alignment along long walls, for example. The function is called up via the button with the blue cube in the Block adjustment tab.

1.1.5 New tinting option for users with colour vision deficiency

Roughly 8.5% of all people have some form of colour vision deficiency (CVD). This genetic condition makes it hard or even impossible to distinguish certain colours, e.g. shades from green to yellow to red, that are commonly used in software. Hence, our team has added a new option under the tab “Colours” that deploys the OKABE-ITO colour palette which was specifically designed for people with CVD.

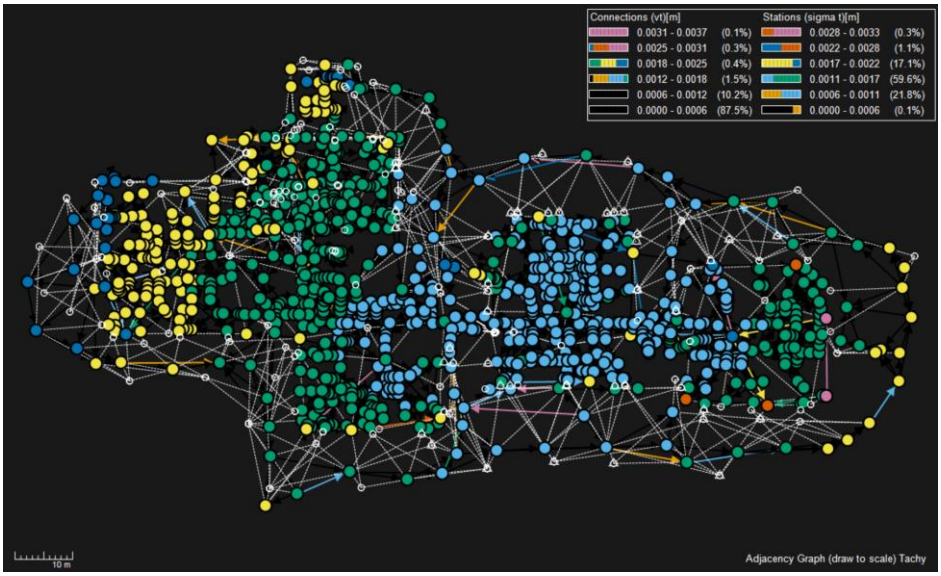

Figure 3: Network graph tinted by the Okabe-Ito-colour palette

1.1.6 New blunder detection

In cases where blunders yield in a diverging block adjustment, our blunder detection was a saviour in many cases. However, in particular cases the algorithm was not able to identify any blunders and their location. Hence, our team has developed an entirely new algorithm for this challenging task. It is comparable to the adjustment of height networks. Since it is formulated as a linear adjustment, it will always converge regardless of magnitude and amount of blunders.

A very helpful new feature is the selection and visualisation of the stations that form the loop that contains the largest blunder(s). Hence, users can immediately adjust the selection using the block adjustment button which will then converge and helps to resolve the issue.

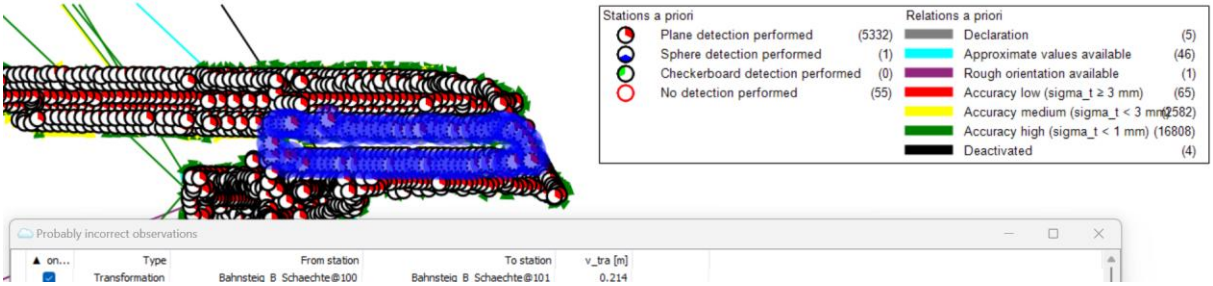

Figure 4: Selected stations that contain one or several blunders

1.1.7 Creating relations between groups only

In larger projects, many users usually process parts that belong together architecturally in a sequential manner within individual groups in SCANTRA. If algorithms are used to create relations across groups, it can happen that areas that have already been cleaned up are populated with new relations. To avoid extra work, it is now possible to create relations only between different groups.

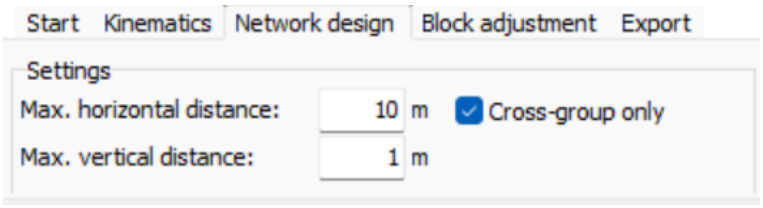

Figure 5: New checkbox that creates connections only between different groups

1.1.8 Options: Setting the mouse wheel zooming speed

The options window now allows to adjust the mouse wheel speed.

1.2 Improvements

1.2.1 Optimized performance of various dialogs and operations

While the computing core of SCANTRA is up to any challenge, no matter how big a project is, large amounts of data led to a delayed behaviour of some dialogs and operations. These include the browsers, the dialog for changing invalid file paths, moving stations in the unscaled view and moving scans to other groups.

	SCANTRA 3.3 [s]	SCANTRA 3.4 [s]
Change invalid file paths (example 1312 scans)	42	1
Opening a browser (example: 12993 scans)	15	1
Moving scans in the graphic (example: 1000 scans)	10	1
Moving scans to other groups (example: 1000 scans)	77	1

1.2.2 Options: New options for archiving projects

Up to now, the standard Windows compression solution has been used for archiving projects. However, this can crash for very large projects with several thousand scans. Additional options are therefore now available:

1. The project database (*.scdb) as well as the initialization file (*.ini) are saved WITHOUT compression with the addition of a date and time stamp.
2. 7-Zip or other installed compression algorithms can be used.

1.2.3 'Delete parameters' added to *Inspector* and *Blunder Detection* browser

Our development team has added the option "delete parameters" option to the Inspector as well as the blunder detection algorithm.

1.2.4 Symmetry point determination for checkerboard targets detection revised

The algorithm for detecting checkerboard target centres has been overworked to improve its performance in challenging scenarios.

1.2.5 3D graphics: Readability of station names

In the 3D graph, readability was not always guaranteed depending on the selected perspective. This problem has now been solved.

1.3 Bugfixes

1.3.1 Graphics window: Changing amount of entries of the legend

Changing the amount of entries of the legend yielded in no response of the GUI. This bug was fixed.

1.3.2 Graphics window: Missing update for unconnected scans

If a user switches off scans, the "not connected" field under the block adjustment tab was not updated. This issue has been fixed.

1.3.3 Missing plausibility check

A missing plausibility check lead to potentially misaligned scans during pairwise registrations. This bug has been fixed.

1.3.4 Graphics window: Background image is missing after switching from 2D to 3D

If a background image was stored in the 2D view, it was lost after switching from 2D mode to 3D and back. This bug has been fixed.

1.3.5 Matchmaker: Manual pre-orientation or plane matching lead to no results

In some cases manual pre-orientation lead to no results despite the fact that reasonable plane correspondences were picked. The same effect may occurred to pairwise registrations during plane matching. This issue was fixed.

1.3.6 Multi-threading: avoiding dead-locks

So called thread-pools are the engines of multi-threading software. In rare cases dead-locks occurred, where a process is initiated but the thread-pool cannot decide which thread should carry out the task. The consequence is a “sleeping” software that pretends to process data but actually is not doing anything. We have overworked the thread-pool so that dead-locks cannot occur anymore.

1.3.7 Import / Export: False message “reduction active”

If a user has set a reduction within the process of transforming to a superior coordinate system, e.g. UTM, a warning message is shown under the block adjustment and export tabs. The same message falsely appeared, even if no reduction was set. This bug has been fixed.

1.3.8 Import / Export: Intensity images from Z+F scanner too bright

Intensity images from Z+F scanner appeared too bright in the bitmaps generated by SCANTRA. This issue has been solved.

1.3.9 Network analysis: GUI no longer responds after increasing the number of classes

If the number of classes of the network analysis was increased or decreased while a network graph was shown, the GUI has not responded anymore. This bug has been fixed.

1.3.10 Project tree: Access violation after shifting scans to different groups

If scans were shifted to another group an access violation popped up if users tried to access the relation triangle in the project tree. This issue is fixed.

1.3.11 Deleting connections from legend: Non-active connections are deleted

The new *a priori* legend allows to delete relations based on their status, e.g. erase all red relations. If users have turned off certain groups or stations that were connected by relations that fall into a selected group, they were mistakenly deleted despite being inactive. The status of a relation (active / inactive) is now considered in the selection process.

1.3.12 Reactivation of a point identity: Graphic is not updated from the browser

If a user has deactivated a point identity and later on activated it again, its status was not updated in the graphics. This issue is now fixed.

1.3.13 Mouse wheel lost focus when reference stations were changed

The reference station can be set by in several ways. One being the selection from the dropdown menu. If the mouse position was still in the scope of the horizontal toolbar, a rotation of the mouse wheel caused the ribbons to change and not the entry of the dropdown menu. This issue has been fixed.

1.3.14 Missing “Zoom all” after importing stations

After import a “zoom all” call was not called. As a consequence, the imported scans were not shown. This issue has been fixed.

2 SCANTRA STATIC

2.1 New Features

2.1.1 Processing of detail scans

As of now, SCANTRA assumed that complete panoramic scans would be processed. A new function now enables the assignment of 1 to *n* detail scans with respect to a "mother scan". All associated scans are then given identical transformation parameters. This feature is a particularly helpful for partial scans that feature artificial targets or regions of interest at greater distances that require a high spatial resolution. All associated scans are sorted into an identical data structure so that all points are inherently considered during processing.

For known or documented data structures from other vendors, SCANTRA will automatically associate child-scans to the their mother-scans. In all other cases the *Detail Scans Management* dialogue can be either called in the graphics windows or in the project tree.

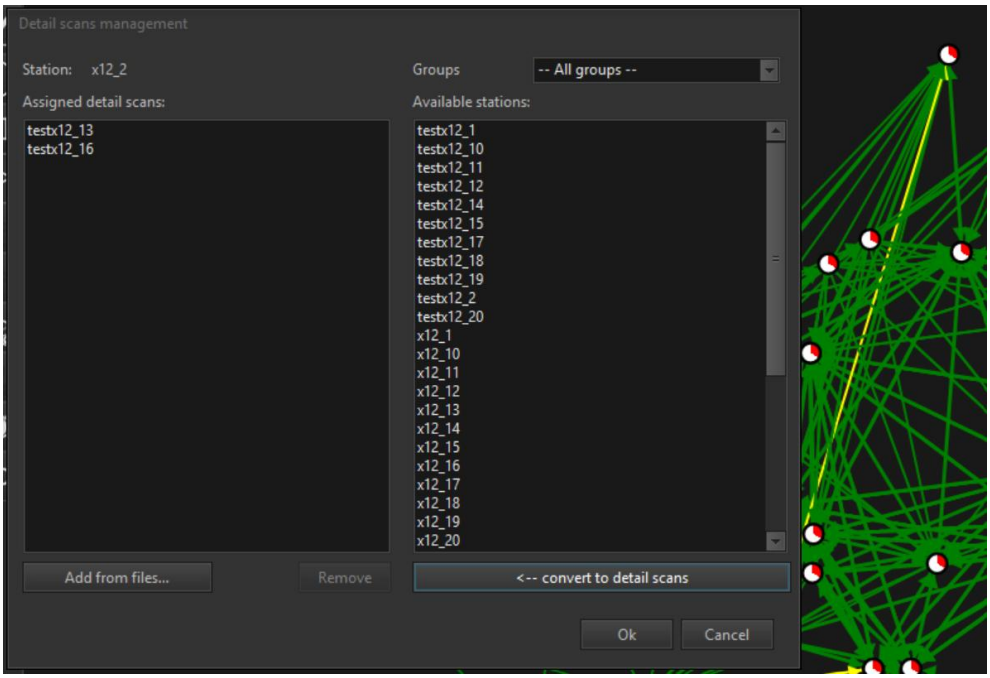

Figure 6: Dialogue for manual association of detail scans

2.1.2 Updating transformations of embedded panoramic images in E57 files

E57 files are capable to embed panoramic images within point clouds. Yet, point clouds as well as images have their own coordinate systems which means that both need to be updated once scans are transformed into another coordinate system. Our team has now added this functionality under the existing entry "Export → Export Selection → into Scan header".

2.1.3 Import / Export: Processing of several Faro projects in one SCANTRA project

Up till now the new Faro Scene API could only be used to connect to exactly one project. For clients who want to combine several Faro Scene projects our team has implemented a solution that allows exactly this. During processing or exporting, SCANTRA recognises that a scan belongs to a different project and automatically establishes a connection to it in a sequential fashion.

2.1.4 Import / Export: Z+F interface StationID T4x4

For clients who purchased a Z+F scanner after they have purchased SCANTRA, we have implemented an export option which allows you to update existing Z+F LaserControl projects. This is achieved by exporting 4x4 orientation matrices in SCANTRA and to import them into LaserControl which updates locations and orientations of individual scans.

2.2 Improvements

2.2.1 Import / Export: Update flag is transferred to Riegl RiScanPro

SCANTRA now passes a flag after updating RiScanPro project files (*.rsp), which should automatically initiate the update of the metadata. This functionality will be implemented from the next version of RiScanPro. Until then, the metadata must be updated manually so that the transformation parameters from SCANTRA are applied.

2.3 Bugfixes

2.3.1 Import / Export: Faro Core import issues

Some clients experienced issues while importing raw scans from Faro Core scanners. We have revised some functions and hence addressed this bug.

2.3.2 Import / Export: Import of vertical axes from Faro Scene projects

Depending on how raw data was imported into Faro Scene, the outcome was different. The worst case yielded in a project without vertical axes. We have analysed the Faro Scene project structure and rewrote the critical lines of code. This bug is fixed.

2.3.3 Import / Export: Faro project import falsely created registration objects

Users can define if pre-orientations should be used or not. Regardless which option was chosen, SCANTRA always created registration objects which may lead to unexpected behaviour since all scans are located at the same spot in the case that no pre-orientations were available. This issue has been addressed.

2.3.4 Import / Export: Update of Riegl *.rsp files

During the update of Riegl RiScanPro projects, the updated transformation parameters were transferred from SCANTRA to an incorrect function. As a result, the parameters were not applied to the project. This bug has been fixed.

3 SCANTRA KINEMATIC

3.1 New Features

3.1.1 Introducing vertical readings as observations

Several kinematic scanners record vertical readings despite their “un-static” characteristics. This information can now be imported and thus considered within block adjustments. It is obvious that the accuracy of this information is not as high as for static scanners. Hence, we have introduced a separate setting under the Kinematic tab that allows users to weigh vertical readings appropriately.

3.1.2 Separating trajectories based on travelled distance

The first release of SCANTRA Kinematic allows sub-divide kinematic laser scans based on time stamps to create semi-static laser scans. In cases where the speed of motion notably varies, for instance due to pauses, the geometrical length of trajectory subsections also varies. Hence, our team has added another option to subdivide kinematic point clouds based on the travelled distance along the trajectory. Note that this option can also be combined with the existing strategies.

3.2 Improvements

3.2.1 Origins of semi static scans are shifted to the spatial centre

During subdivision and the subsequent creation of semi static scans, the origin was shifted to the temporal centre. Now the origin is shifted to the geometric centre of the trajectory section.

4 SCANTRA Polar

Our new Polar module was designed for clients who either do not perform an adjustment of their polar observations in the scope of quality assurance and error estimation as well as for users who want to perform an integrated adjustment that considers all data sources in one optimisation.

4.1 New Features

4.1.1 Importing polar observations

Our new module allows importing raw polar observations from a total station in the following formats:

- Leica HEXML
- Trimble JXL
- technet Betan Neptan
- A vendor neutral polar format

4.1.2 Altering station or target heights, station and target IDs and prism constants

Should a file contain false station or target heights, then a dialogue after import can be used to correct certain entries. The correction process can also be performed after an initial import has already been completed.

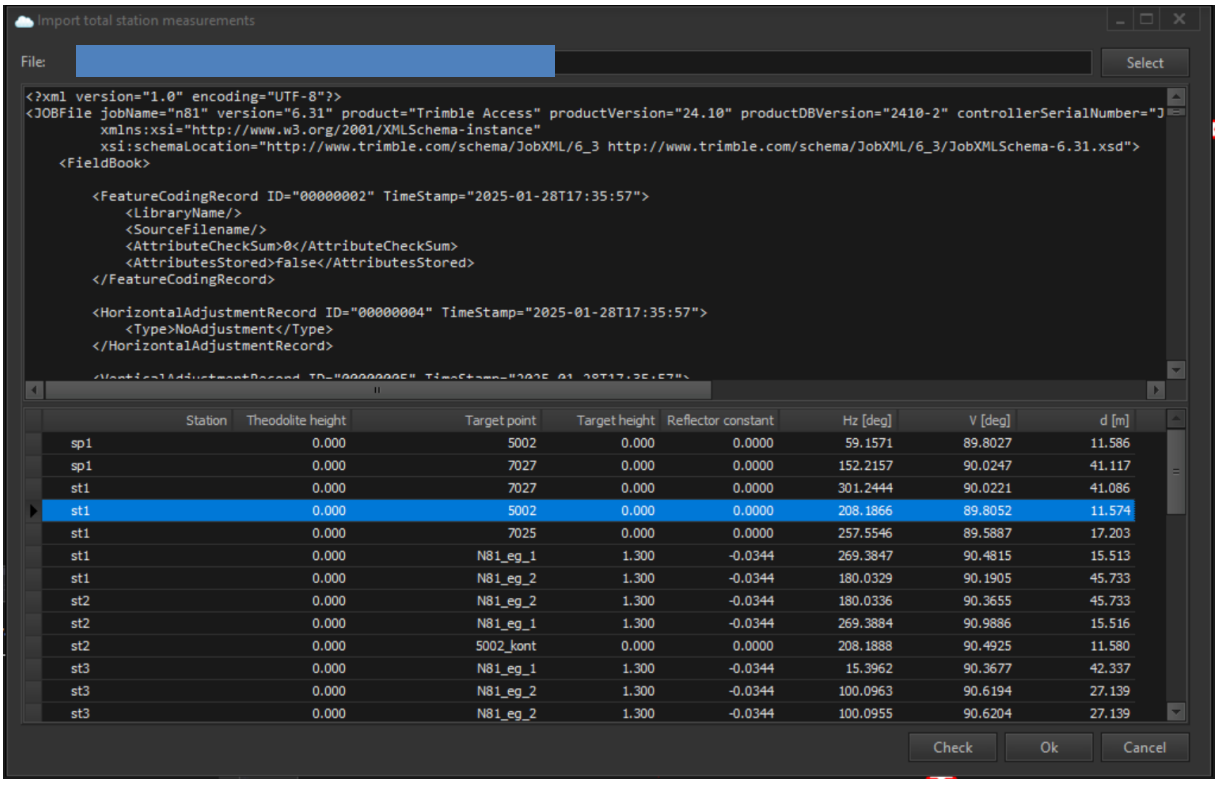

Figure 7: *Import total station measurements* dialogue

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