

## Release notes

Amberg Technologies AG  
Trockenloostrasse 21  
CH-8105 Regensdorf-Watt  
Switzerland  
Phone +41 44 870 92 22  
Fax +41 44 870 06 18

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From: Product Manager Amberg Tunnel Surveying

To: Amberg Tunnel Surveying distribution partners / customers

**Amberg Tunnel 2.7.0.0**  
**Amberg Navigator 1.6.0**  
**Amberg ScanControl 1.0.2**  
**Amberg Applications 7.1 / 6.3**

Dear Amberg Tunnel users,

We would like to inform you that new versions of the Amberg Tunnel Surveying software products were released. Please find details about new features, changes and their benefits below.

Customers can download the latest software release from  
<http://www.ambergtechnologies.ch/downloads/>.

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# 1. Amberg Tunnel – NEW Amberg Tunnelscan

## 1.1. New product: Amberg Tunnelscan Basic

With the Amberg Tunnel release 2.7.0.0 it is now possible to analyse point cloud generated from Amberg Navigator, Amberg ScanControl or any other point cloud source.

The module **Amberg Tunnelscan Basic** serves the management, analysis and reporting of measured point cloud data from a tunnel project. Measurement data from various sources can be imported, managed, analyzed and converted to reports. A tight integration with the field software Amberg Navigator Tablet allows an automated data synchronisation.

Amberg Tunnelscan will support you to manage and analyse your measured scans in a seamless workflow. Minimizing the time from measuring the scan data to handing out the reports to your customer improves your efficiency.

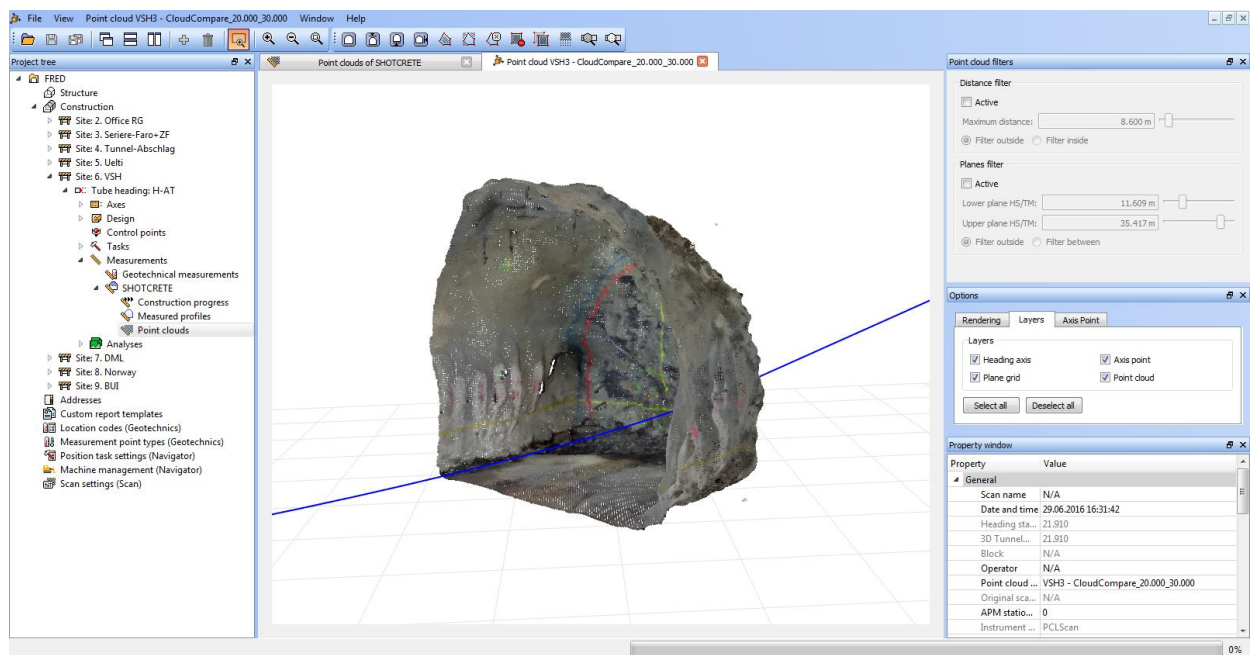
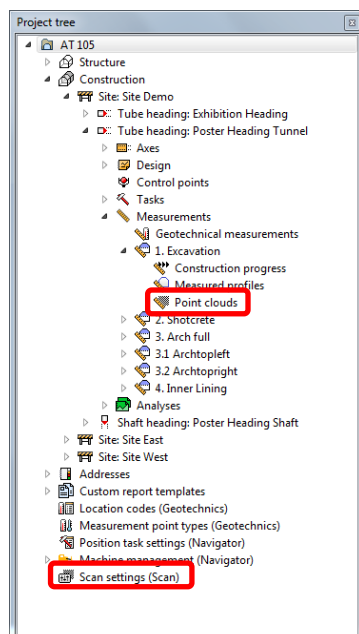


Figure 1 Point cloud editor which can visualise reflectivity and also true colour point clouds

### 1.1.1. Point Cloud Measurements



Point cloud measurements of a heading are stored as part of the project and managed with the Point clouds editor. To open the editor, go to the Measurements node in the project tree and double-click on Points clouds of a construction stage.

#### Scan Settings

During the import from Amberg Navigator Tablet the imported scans are converted to internal format. To have also the original scan files in the original format for quality management available the scans can be stored additionally in the original format to the selected folder.

Figure 2 Project tree with new point clouds settings

### 1.1.2. Overview Editor

The graphical area displays an overview of the selected point clouds from the table in top view. The measured point clouds table holds all measured point clouds imported to a construction stage. In the table, each point cloud is listed with its attributes.

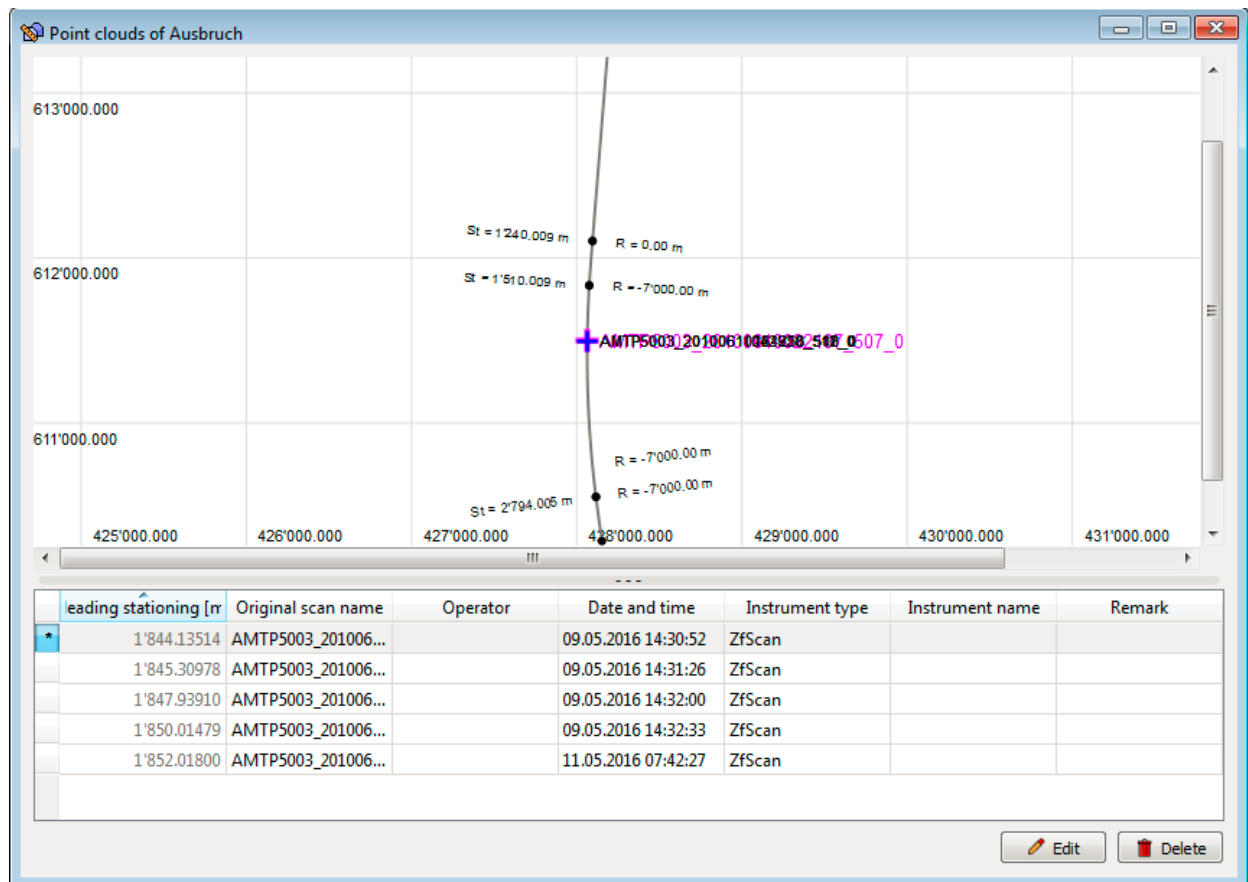


Figure 3 Point cloud editor

To open the selected measured point cloud in the Detail editor, press the Edit button at the bottom of the table or double-click on the point cloud in the table. To remove point clouds from the project, select one or multiple point clouds in the table and press the Delete button at the bottom of the table or in the toolbar.

### 1.1.3. Import measurement data

Open the Point cloud editor of the construction stage that the measured point clouds should be assigned to. Use the Import button from the menu, the toolbar or the context menu to start the Import point cloud data wizard. The wizard supports importing measurement data from point cloud measurements. Select the data source according to your measurement data.

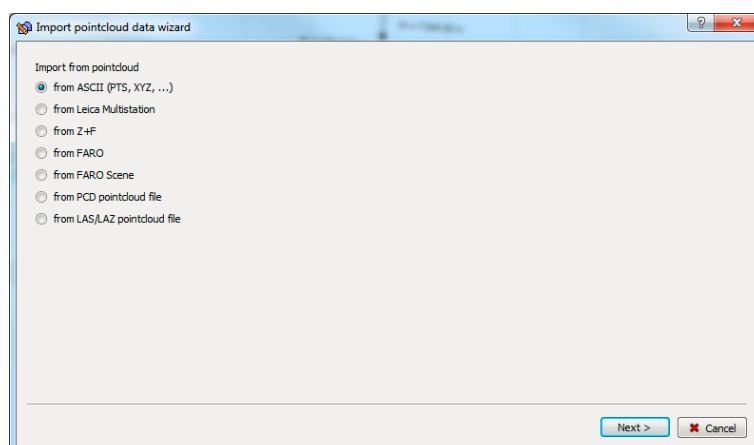


Figure 4 Import measurement data wizard

### 1.1.4. Reposition

The point cloud measurement methods listed in the table below store the positioning information of the instrument (measurements to control points) with the point cloud. If this positioning information is available, the coordinates of the point cloud points can be repositioned based on the control points stored in Amberg Tunnel 2.0.

Table 1 Measurement methods providing positioning information

| Software                | Hardware   | Re-positioning type |
|-------------------------|--|---------------------|
| Amberg Navigator Tablet | Multistation Instrument                                      | Resection           |
| Amberg Navigator Tablet | Instrument with: Amberg Scanner, ZF Scanner and Faro Scanner | Resection and APM   |
| Amberg Scan Control     | Amberg Scanner, ZF Scanner and Faro Scanner                  | APM                 |
| Amberg TMS Office       | Amberg Scanner, ZF Scanner and Faro Scanner                  | APM                 |
| Faro Scene              | Faro Scan  | not available       |
| Z+F LaserControl        | ZF Scan  | not available       |
| Other                   | E.g PTS, ASCII ...   | not available       |

Open the Point cloud editor of the construction stage containing the point clouds that should be repositioned. Select the measured point cloud that you want to reposition (Multi selection with same point cloud type is possible). Use the function Reposition button from the toolbar or from the context menu. The Reposition point cloud data wizard will guide you through the process.

### Reposition of the instrument

The steps of the Reposition of the instrument for point cloud data wizard are described following.

1. Select the state (date and time) at which the control point coordinates should be used.
2. Check the recalculation of the resection.

| Use                                 | Control point Id | Easting [m] | Northing [m] | Height [m] | Date and time       | Δ E [m]  | Δ N [m]  | Δ H [m]  | Calculation status |
|-------------------------------------|------------------|-------------|--------------|------------|---------------------|----------|----------|----------|--------------------|
| <input checked="" type="checkbox"/> | F1               | 590.78000   | 180.95700    | 220.90500  | 09.02.2016 00:00:00 | 0.00049  | 0.00020  | 0.00045  | ID found           |
| <input checked="" type="checkbox"/> | F2               | 595.91900   | 181.04500    | 220.86700  | 09.02.2016 00:00:00 | -0.00012 | -0.00113 | -0.00056 | ID found           |
| <input checked="" type="checkbox"/> | F3               | 595.92100   | 183.75700    | 220.90000  | 09.02.2016 00:00:00 | -0.00037 | 0.00093  | -0.00079 | ID found           |

|             | Old value    | New value    | Delta       | Accuracy (1 sigma) | Calculation status |
|-------------|--------------|--------------|-------------|--------------------|--------------------|
| Eastings    | 592.91871 m  | 592.91871 m  | 0.00000 m   | 0.00066 m          | Ok                 |
| Northing    | 186.07646 m  | 186.07646 m  | 0.00000 m   | 0.00066 m          | Ok                 |
| Height      | 220.02657 m  | 220.02657 m  | -0.00000 m  | 0.00050 m          | Ok                 |
| Orientation | 50.45108 GON | 50.45108 GON | 0.00000 GON | 0.01519 GON        | Ok                 |
| Scale       | 1.00035      | 1.00035      | 0.00000     | 0.00024            | Ok                 |

Figure 5 Reposition point cloud data wizard, Instrument resection calculation

In the upper table of the window, the control points from the positioning information are listed. Switch on/off control points or edit control point IDs to adjust the resection calculation.

### APM reposition of point cloud

The steps of the Reposition point cloud data wizard are described following. (If measurement was done with Amberg Navigator Tablet the APM point cloud reposition wizard will start direct after the Reposition of Instrument wizard).

1. Select the corresponding file format (GSI, ASCII or DBX) which contains all positioning measurements.

2. The program now calculates the position of the rotation centre of the first scan file and an orientation (only based on the two prism measurements on the scanner). The sphere will be detected automatically and the cross should be adjusted to the centre. In case the sphere will not be found the sphere centre can be selected with a mouse click in the picture.

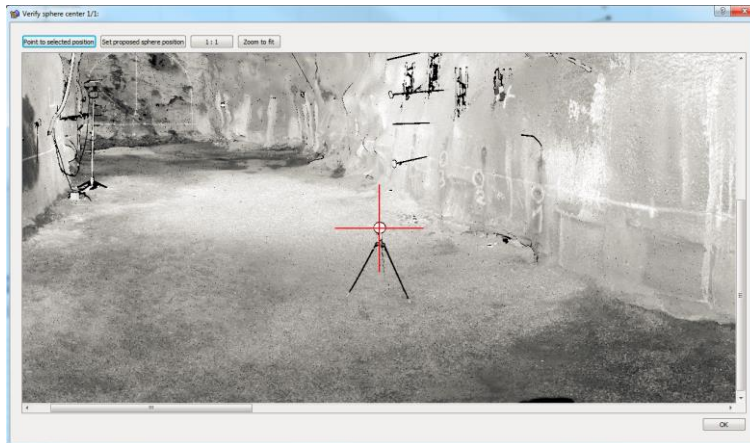


Figure 6 Reposition point cloud data wizard, APM reposition calculation

### 1.1.5. Detail Editor

The Detail editor is a 3D overview of all measured points of a point cloud.

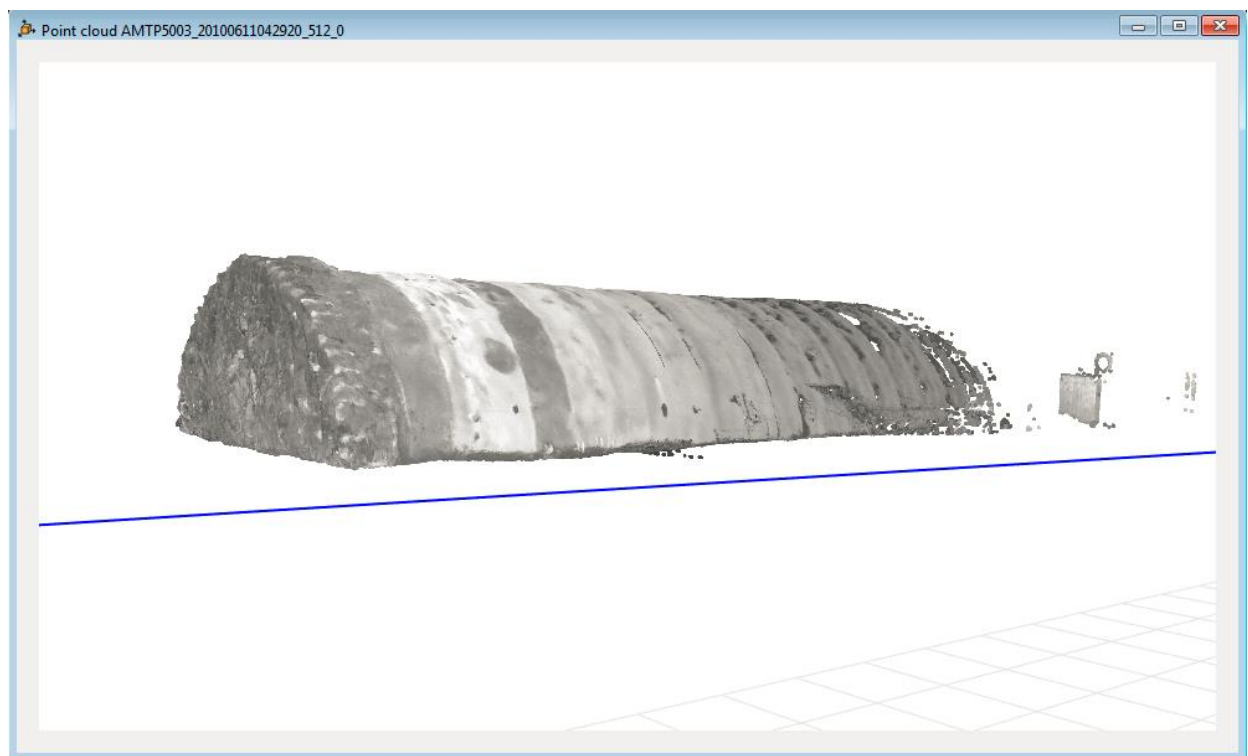


Figure 7 Measured point clouds detail editor

The graphical area displays the measured point cloud in 3D. To remove or edit points from a point cloud, select one or multiple points in the graphic with the different selection tools in the toolbar and press the different tool buttons in the toolbar or in the context menu.

### Point Cloud Filter

To filter a point cloud manually in the detail editor use the filter tools in the point cloud filter dialog. Normally only points in a defined distance around the scanner should be used for the analyses. The accuracy of closer points around the scanner centre will have a higher absolute coordinate accuracy than the points far away. More than 80 percent of the scan points will be in overlapping areas (e.g. Available in other scans). These points can be also filtered to increase the performance of the analyses significantly.

To use the analyses later in a full automatic way it is recommended to have only two different CS measurements in one scan (E.g. excavation and shotcrete layer 1 or shotcrete layer 1 and shotcrete layer 2). Other CS in the same scan can be copied to another CS point cloud measurement folder.

There are two different filter types available.

**Distance filter** The distance filter selects all measured points from the center of the scanner up to a defined range. Input the distance value or move the slider to the distance that should be used for filtering. Select if points inside or outside of the defined sphere should be filtered.

**Plane Filter** The plane filter selects points on defined HS/TM values. Input the distance value or move the slider to the distance that should be used for filtering. Select if points inside or outside of the defined planes should be filtered.

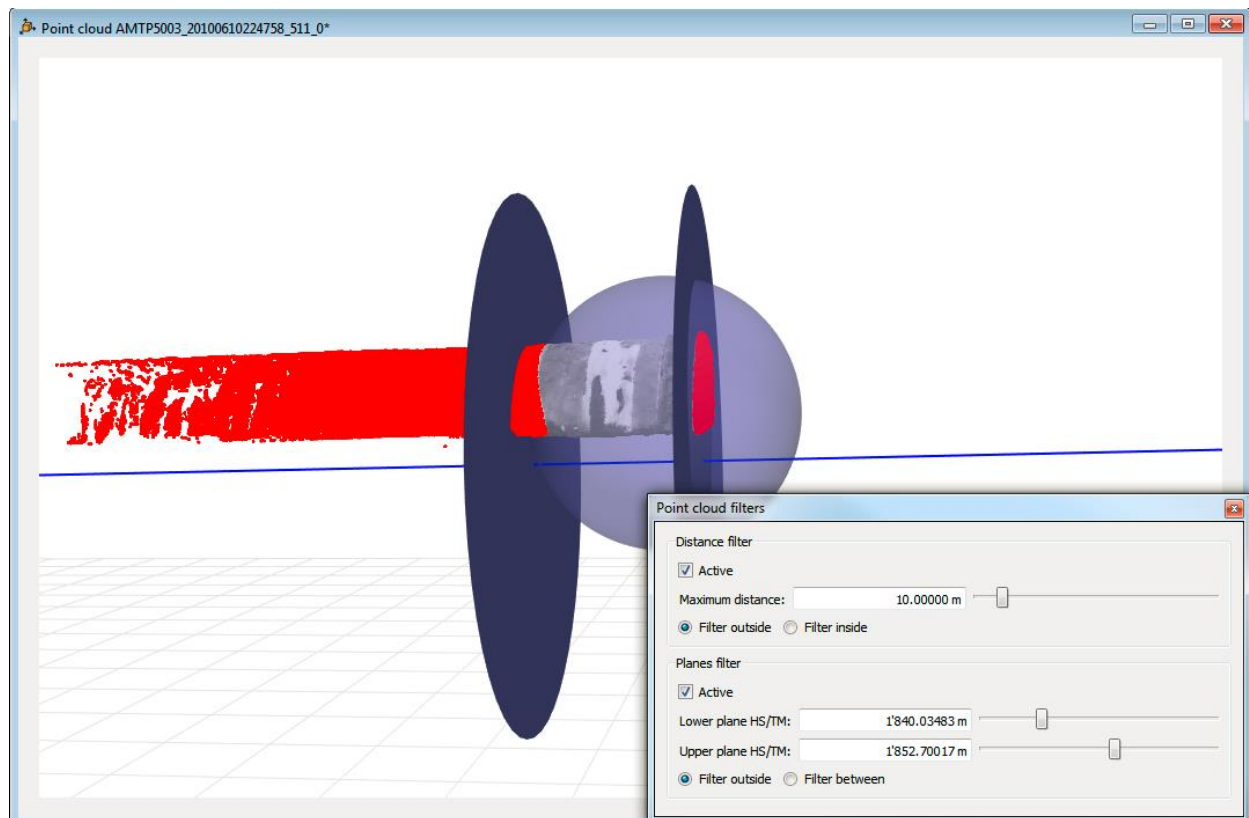


Figure 8 Measured point cloud detail filter

## 1.2. Benefits

With the new Amberg Tunnelscan product, you can:

- control your entire tunnel project with Amberg Tunnel incl. also tunnel scan data.
- filter your point clouds with intelligent algorithm.
- visualise your point clouds with reflectivity layer or with true colour information.
- reposition your point clouds based on new control point coordinates.
- reposition your point clouds with an automatic target detection algorithm.
- efficient data synchronisation from the Amberg Navigator tablet to the Amberg Tunnelscan module.



## 2. Amberg Tunnel – General

### 2.1. General Support Windows 10 Operating System

With the Amberg Tunnel Release 2.7.0.0 we're supporting from now on also Windows 10 operating system.

### 2.2. New tasks: Area Scan & Geotechnical 3D points

With the newest Amberg Tunnel Version it is now possible to generate Amberg Navigator task for Area Scan and also Geotechnical 3D points. These two tasks can be used in tunnel headings. To learn more about the new task see also chapter 4.2 and 4.3.

### 2.3. Additional improvements

- Optimisation in the data storage of the project elements

### 2.4. Benefits

With the new features, you can:

- faster export of your project data to Amberg Navigator and also faster loading of your project data on the Amberg Navigator tablet.
- acquire efficiently a surface with the Area scan and Leica MultiStation in a tunnel heading.

## 3. Amberg Tunnel – Control module

### 3.1. Improvements

- Copy/Paste of measured profiles without the term "Copy from"
- Better connection of measurement points in profile analyses. More accurate volume calculations
- Bug fix: Correct graphical representation for measured vs. measured analyses with slope in construction stage

### 3.2. Benefits

With the new features, you can:

- more accurate volume calculation based on better connection algorithm of profile corners.
- more efficiency when copy/paste of measured profiles.



## 4. Amberg Navigator Tablet

### 4.1. General Support Windows 10 Operating System

With the Amberg Navigator Release 1.6.0 we're supporting from now on also Windows 10 operating system.

### 4.2. New task: Area Scan

The task allows collecting point clouds of areas defined by the four area corner points in the tunnel. The collected point clouds are stored on the tablet and the data are available for analyses in the office. No preview is available after the task execution.

The Area scan task generally consists of three steps: setting the scan directory, measure the area corner points and the scanner measurement. This task supports only Leica MultiStations instruments.

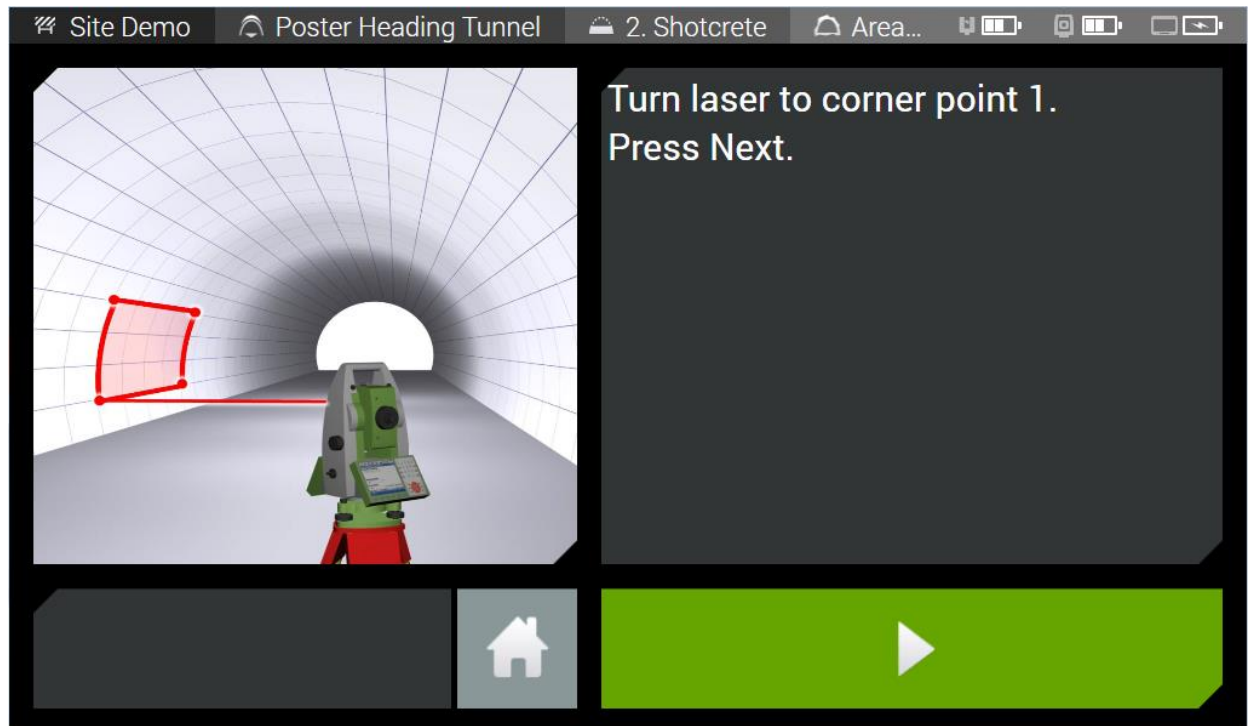


Figure 9 Area Scan task for Leica MultiStation

### Measurements

Manually aim to the corner points of the area that should be used as definition for the scan area. To trigger the measurement of a corner point, press the Next button. Repeat this step until all corner points are measured. Press the Next button to start the measurement.

### 4.3. New task: Geotechnical 3D point

This task allows to measure predefined geotechnical 3D sections and 3D points in a tube heading. Zero measurements of newly installed points can be done in a different mode without geotechnical design data. Measurements can be done with different prism types and in one or two faces. The geotechnical 3D points measurement task consists two steps: Geotechnical 3D section selection and measurement.

The measurement workflow of this task depends on the selected prism type.

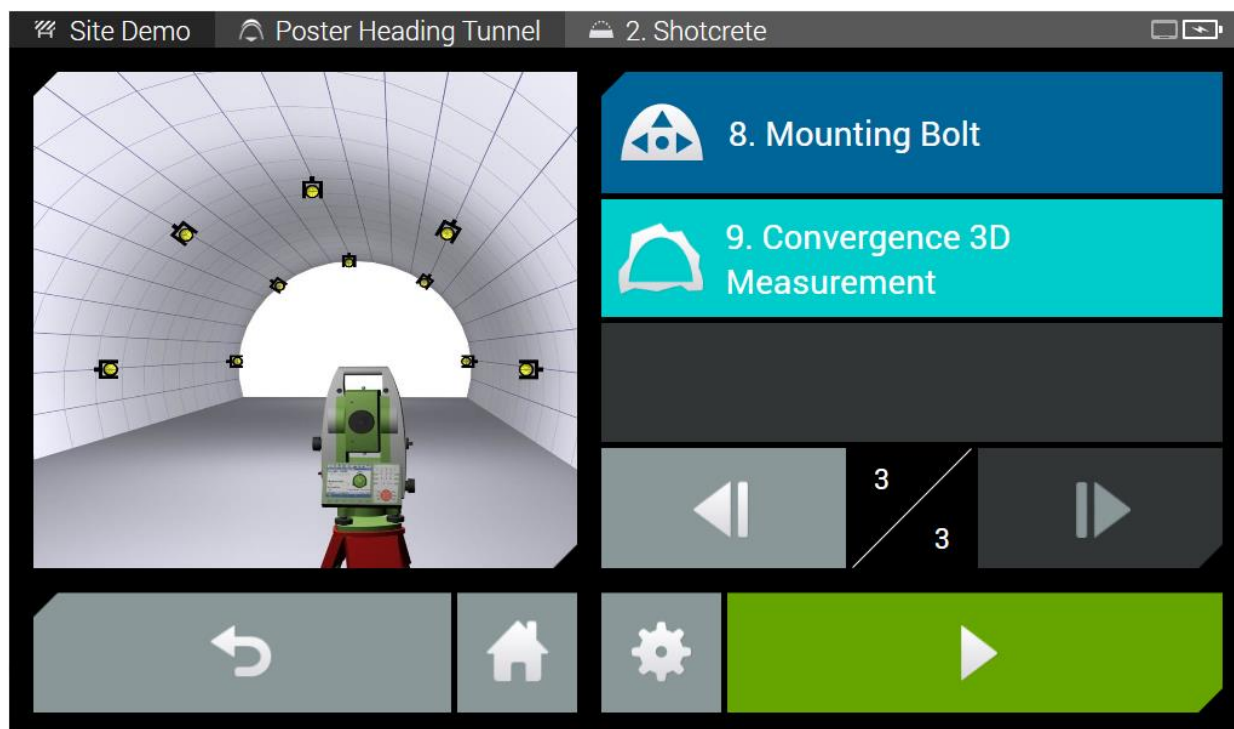


Figure 10 Selection of Geotechnical 3D points task

#### 4.3.1. Measurement Page

The following measurement modes and functions are available. To toggle between the measurement mode and the zero measurement mode, use the according buttons. All measurements will be executed in one or two telescope faces depending on the task settings.

##### Measurement mode

To measure a geotechnical 3D point, select a point by pressing it in the graphics or use the Previous point, Next point buttons. If a prism (with ATR) is selected the measurement will start automatically after the measure button was pressed once. Tape prisms must be aimed at precisely manually with the telescope and the measurement button must be pressed for every measurement.



Figure 11 Geotechnical 3D points measurement mode

This measurement page contains the following buttons:

|   |  |
|---|--|
| <b>Measure</b>                          | Starts measurement of the selected point.  |
| <b>Previous geotechnical 3D Section</b> | Switches to the previous geotechnical 3D section of the heading                    |
| <b>Next geotechnical 3D section</b>     | Switches to the next geotechnical 3D section of the heading.                       |
| <b>Previous point</b>                   | Selects the previous 3D point of the section and turns the telescope to the point. |
| <b>Next point</b>                       | Selects the next 3D point of the section and turns the telescope to the point.     |
| <b>Switch to zero measurement mode</b>  | Switch to the zero measurement mode page.  |
| <b>Back</b>                             | Finishes the measurement and returns to the geotechnical 3D section selection.     |

### Zero measurement mode

Newly installed 3D points without known position (and destroyed points) can be measured with the zero measurement mode. Manually turn the instrument telescope to the new installed points and press the measure button.

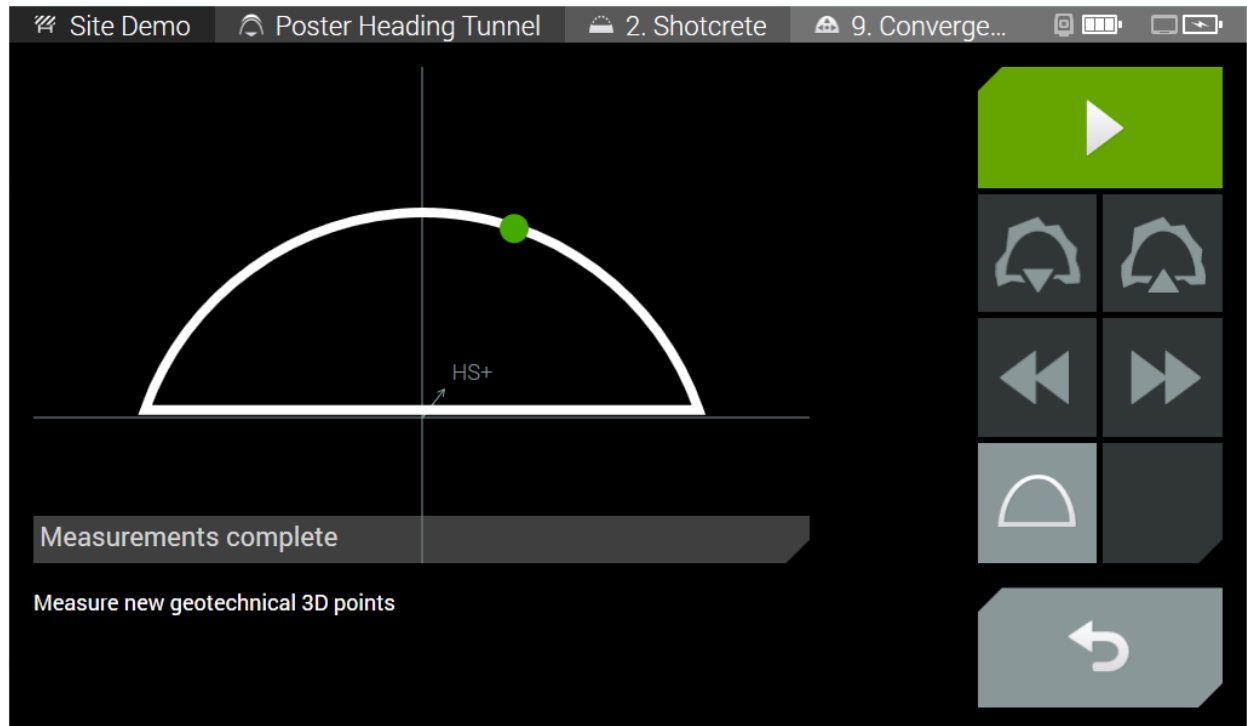


Figure 12 Geotechnical 3D points zero measurement mode

In this mode, the measurement page contains the following buttons:

|                                   |  |
|-----------------------------------|--|
| <b>Measure</b>                    | Starts measurement of the new geotechnical 3D point.                           |
| <b>Switch to measurement mode</b> | Switch to the measurement mode.  |
| <b>Back</b>                       | Finishes the measurement and returns to the geotechnical 3D section selection. |

#### 4.3.2. Export of measurements

Measurements can be exported with the Export measurement function in the Administration area. Different file formats are created for network calculations (Cremer, GSI16) or .txt files for direct imports in the Amberg Tunnel Geotechnics module.

#### 4.4. New feature: Joystick functionality for Point check task

For a remote control of the total station we implemented on the Point check task a joystick functionality. With the joystick it is possible to turn the total station roughly in the area of interested and still use the continuous measurements.

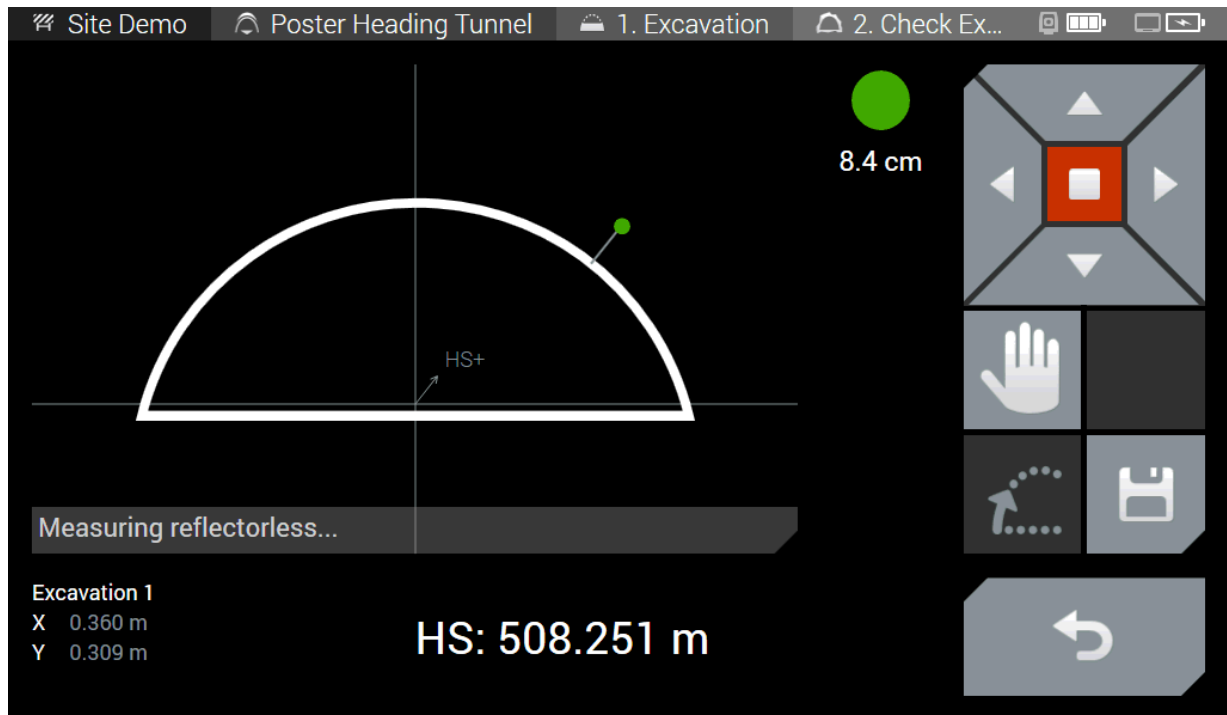


Figure 13 Point check task with joystick functionality

#### 4.5. Additional improvements

- Support of Korean language
- Better visibility of point clouds for blast round scan task
- Automatic scan data transfer to Amberg Tunnel
- Faster project import from Amberg Tunnel

#### 4.6. Bug fixes

- Defined Users has been sometimes lost

#### 4.7. Benefits

With the new features, you can:

- efficient data collection of geotechnical 3d points.
- measuring geotechnical 3D points by the tunnel crew themselves.
- acquire efficiently a surface with the Area scan and Leica MultiStation in a tunnel heading.
- remote control the point check task with the joystick functionality in case the instrument stands in a dangerous zone or when you're using it with one person operation.

## **5. Amberg Applications 7.1 (Captive) / 6.3 (Viva)**

### **5.1. Amberg Applications Captivate supports Firmware 2.0**

With the release of Amberg Applications Captivate 7.1, we support now the Leica Captivate Firmware 2.0.

### **5.2. Amberg Applications Viva support Firmware 6.0**

With the release of Amberg Applications Viva 6.3, we support now the Leica Viva Firmware 6.0.

## **6. Amberg ScanControl**

### **6.1. Supporting Chinese language**

With the release of Amberg ScanControl 1.0.2, we support now also Chinese language.

### **6.2. Support Windows 10 Operating System**

With the Amberg ScanControl release 1.0.2 we're supporting from now on also Windows 10 operating system.

Yours sincerely,

Oliver Schneider  
Product Manager  
Tunnel Surveying Systems