



SCENE

Apps

AREA MEASUREMENT 1.1 - USER MANUAL
FEBRUARY 2013

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1. Introduction

The Area Measurement is a helpful add-on for SCENE or SCENE LT that extends the standard measurement functionality by enabling the user to measure areas in the 3D view of scans, workspaces or project point clouds. Basis for such an area measurement is a selection of scan points made by the user in the 3D view or a user defined area on an already available plane.


The Area Measurement 1.1 works with version 5.1 of SCENE or SCENE LT.

This manual describes the Area Measurement, its functions and how you can use it to determine the size of areas in your scan data.



View online tutorials at <http://tutorial.faroeurope.com> to learn more about the use of SCENE and the SCENE apps.

2. Installation

- 1) Open SCENE or SCENE LT
- 2) If a previous version of the app is installed, remove this version first with the App Manager (available in SCENE or SCENE LT under **Tools ▶ Apps**).
- 3) Install the app by doing one of the following:
 - Drag & Drop the app file (.fpp file) into SCENE or SCENE LT.
 - Double click the app file in the Windows Explorer.
 - Use the App Manager to install the app (see the SCENE or SCENE LT manual for more information).
- 4) Once installed, you should have this icon in your toolbar: 



Please note: This app is available in English language only but also runs if SCENE or SCENE LT are operated in other languages.

3. Measuring an Area

There are three options to measure an area:

- based on a selection of scan points: a planar polygon will be calculated that matches best the selected scan points. The area of this polygon will then be determined. For more information, see chapter 3.1.
- based on a selected area in a pre-defined plane (limited or unlimited plane). For more information, see chapter 3.2.
- based on a selected area in a plane that the user has to create from the scan points first. For more information, see chapter 3.3.

Select one of these options from the drop-down menu of the [Area Measurement toolbar](#).

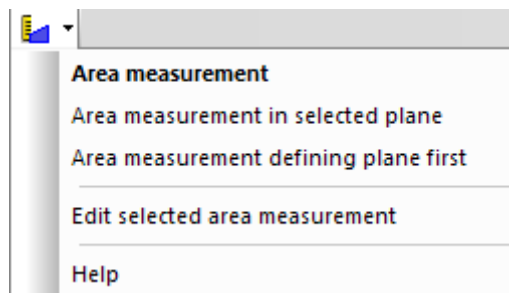



Figure 3-1: Area measurement options

3.1. Measuring an Area Based on a Selection of Scan Points

- 1) Open the 3D view of a scan, scan folder, workspace or the project point cloud.
- 2) Click the **Area Measurement icon**  in the [toolbar](#) or select **Area measurement** from its drop-down menu. A crosshair cursor in the 3D view shows you that the Area Measurement is enabled.
- 3) As known from the polygon selection tool of SCENE or SCENE LT, make a polygonal point selection of the area you would like to measure.

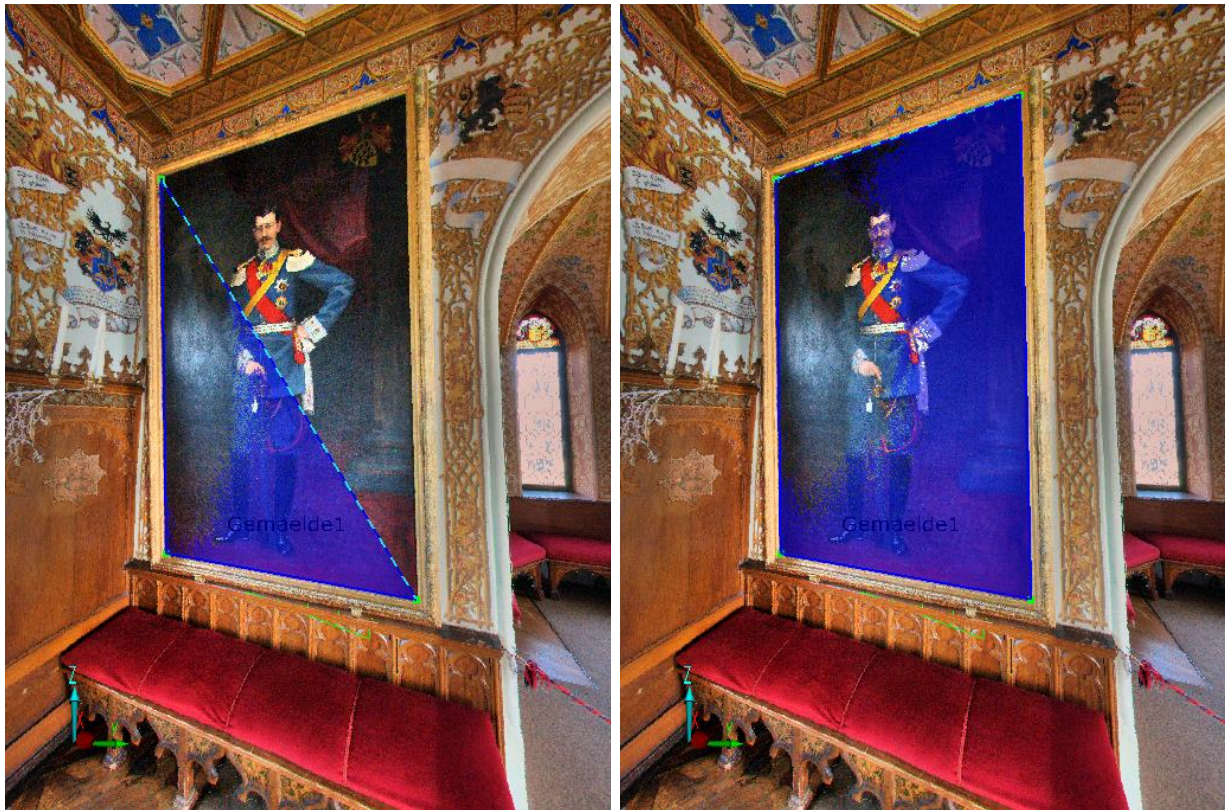


Figure 3-2: Creating a polygonal point selection



- The surface of the selected polygon will be marked in transparent blue. If there are scan points in front of the polygon, its surface will not appear as fully closed.
- While selecting the polygon, the edge between the first and the last added corner point is drawn as a dashed line and will be replaced by two new edges when the next corner point is being added to the polygonal selection. If you want another edge to be replaced, just select it with the mouse and add the new point as usual.



Figure 3-3: Edge drawn as a dashed line

- Corner points of the polygonal selection can be moved at any time during

measurement. Just select a corner point and drag it with the mouse to another position, then continue the measurement as normal. The corner point will be moved along the already available and fitted polygon.

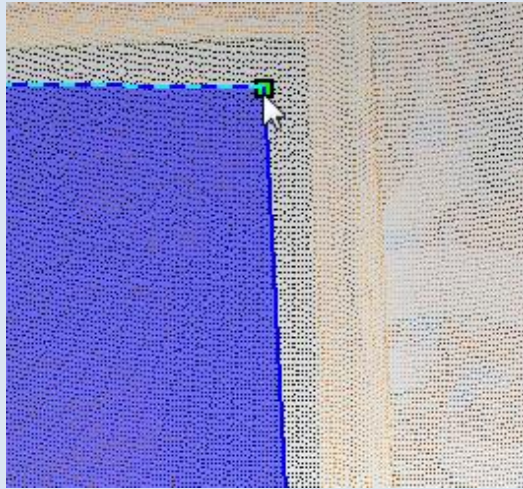


Figure 3-4: Moving a corner point

- The planar polygon that matches best the selected scan points lies on a calculated orthogonal regression plane. In case you selected more than three corner points to define the polygon, the calculated orthogonal regression plane might not always match all selected points exactly. For this, a preview of the fitted polygon will be displayed with the corner points of the polygonal point selection in different colors, depending on their perpendicular distance to the fitting polygon. This helps recognizing potential outlier points that might have been mistakenly selected. The colors are:
 - **Green:** distance $\leq 5\text{cm}$.
 - **Yellow:** distance $> 5\text{cm}$ and $< 20\text{cm}$.
 - **Red:** distance $\geq 20\text{cm}$.

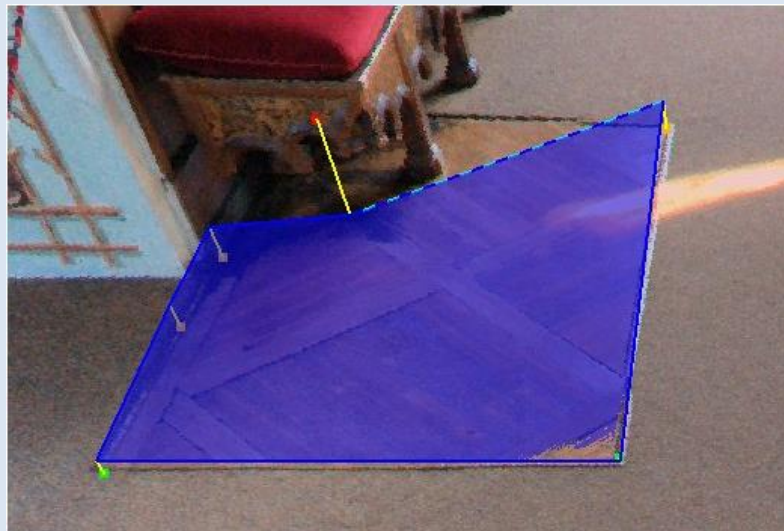


Figure 3-5: Fitted polygon with colored node points

- The app can only make an area measurement of non-intersecting polygons. If there are intersections, only the outline of the fitted polygon is drawn and intersecting edges will be drawn in **red**. In that case you may delete the last selected corner point(s) (with the **BACKSPACE** key) or move corner points until the intersections are resolved.
- Started point selections with intersections can be saved to the workspace with the **RETURN** key but their selected area cannot be determined until all intersections are resolved. You can always edit such point selections later to resolve intersections. For more information, see chapter 3.4.



Figure 3-6: Intersections



Available hot keys in this measurement mode are:

- **Backspace**: Removes the last selected corner point from the polygon
- **ESCAPE**: Disables the Area Measurement; an unfinished polygonal selection will be removed.
- Keeping **CTRL** pressed: Temporarily disables point selection, allows navigating in the view in examine mode.
- Keeping **SHIFT** pressed: Temporarily disables point selection, allows navigating in the view in the currently selected navigation mode.
- **W**, **A**, **S**, **D**, etc.: Movement in 3D view as usual.
- **I**: Defines a plane from the already selected scan points. This will exit this measuring option and project the selected points onto the plane. The area measurement will now be made based on an area in the created plane. This area has to be defined next. For more information, see chapter 3.2.
- **RETURN**: Complete the selection (and the measurement if there are no intersections) and save it to the workspace.

- 4) Complete the selection (if there are no intersections) with **RETURN** or double-click the last selected corner point. When completing, the line will be closed; in other words, the last

fixed corner point is connected to the starting corner. The selection comprises all the scan points that are enclosed within the outline. An orthogonal regression plane will then be calculated to match best all the selected scan points. The selected polygon will be fitted to this plane and the area of the fitted polygon will be determined. The measurement result will be shown in the 3D view. Completed measurements are stored to the workspace. They are available in a sub folder of the *Measurements* folder. This sub folder is called *Areas*.

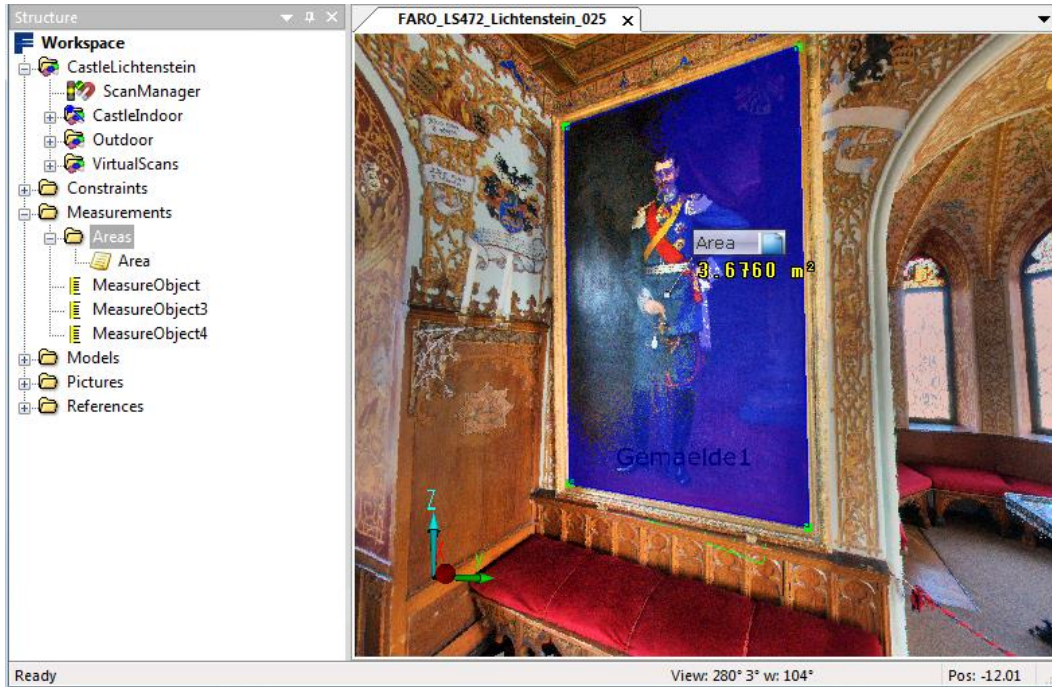


Figure 3-7: Completed area measurement



Selected area measurements will be displayed with dashed edges in the currently opened 3D view.

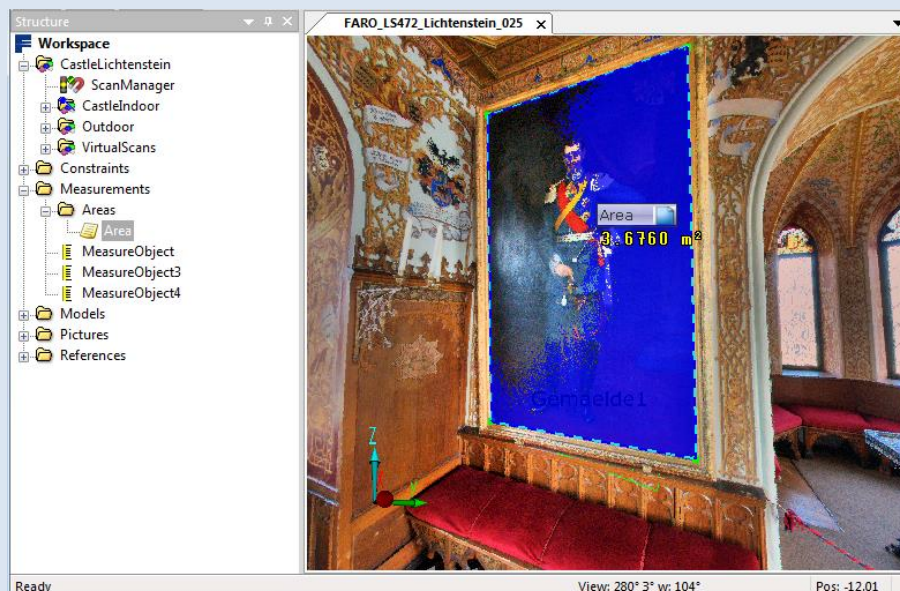


Figure 3-8: Selected area measurement

3.2. Measuring an Area in an Already Existing Plane

- 1) Open the 3D view of a scan, scan folder, workspace or the project point cloud.

- 2) Select an already available plane object in the structure view or the 3D view. This plane will be highlighted in the view.

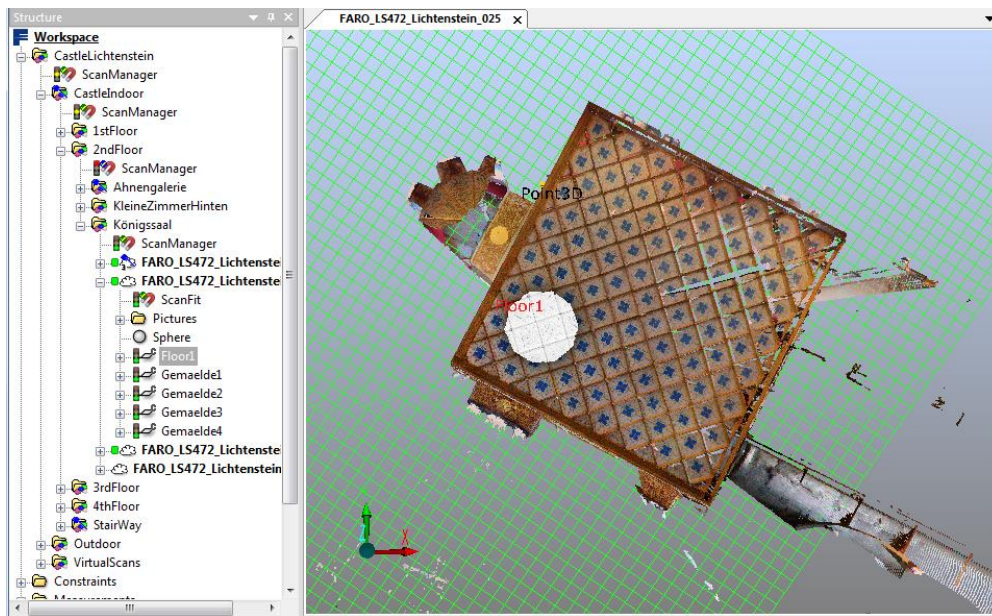


Figure 3-9: Selected plane

- 3) Select **Area measurement in selected plane** from the drop-down menu of the **Area Measurement toolbar**. A crosshair cursor in the 3D view shows you that the Area Measurement is enabled.
- 4) Make a (non-intersecting) polygonal selection to define the area to be measured by selecting points in the selected plane. These points don't have to be scan points. As described in chapter 3.1, you can [change the position of already selected points](#) at any time during the measurement by dragging them with the mouse.

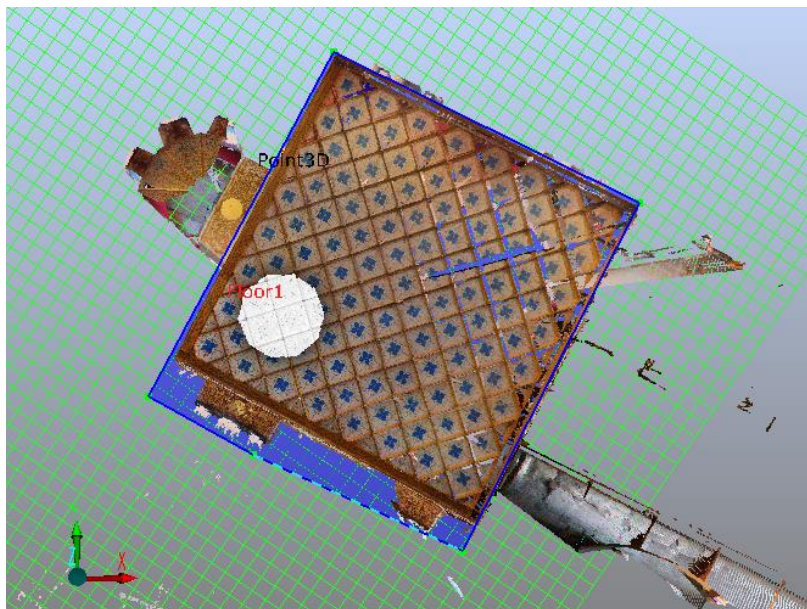


Figure 3-10: Selected area on a plane

- 5) Complete the selection and the measurement with **RETURN** or double click on the last corner point of the selection. The completed measurement will be added to the **Areas** folder as described in 3.1.

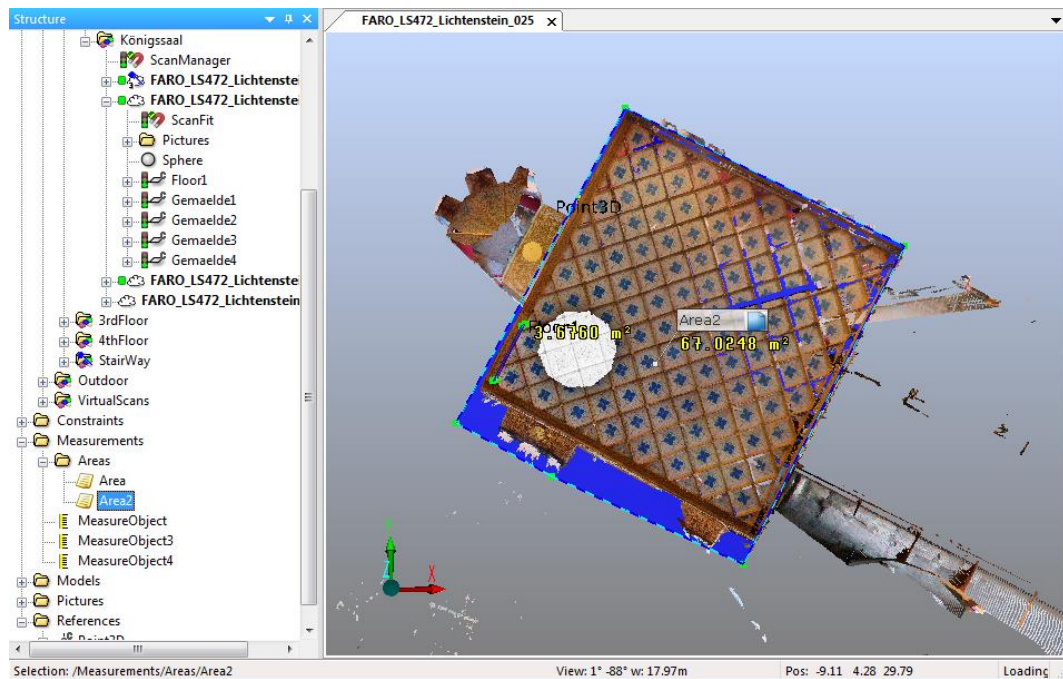


Figure 3-11: Completed area measurement



The available hot keys are identical to the [hot keys](#) described in chapter 3.1. Hot key **I** has no function in this measuring mode.

3.3. Defining a Plane and Measuring an Area in this Plane

- 1) Open the 3D view of a scan, scan folder, workspace or the project point cloud.
- 2) Select **Area measurement defining plane first** from the drop-down menu of the [Area Measurement toolbar](#). A crosshair cursor in the 3D view shows you that the Area Measurement is enabled.
- 3) Make a polygonal point selection in the 3D view to define the plane.



Figure 3-12: Points selection to define the plane

- 4) Create the plane from the selected scan points with **Return**, **I** or double click on the last corner point of the selection. The points selected to define the plane will be kept

and projected onto the plane. This selection will then be the starting point for the next step, the measurement.

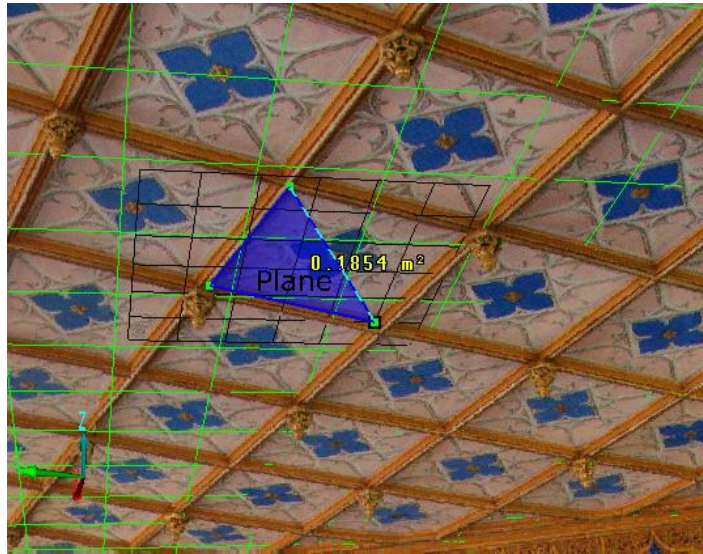


Figure 3-13: Plane

- 5) Continue creating a (non-intersecting) polygonal selection (by moving points, adding new points or removing existing points from the selection made in the previous step) to define the area to be measured by selecting corner points in the plane. These points don't have to be scan points. As described in chapter 3.1, you can [change the position of already selected points](#) at any time during the measurement by dragging them with the mouse

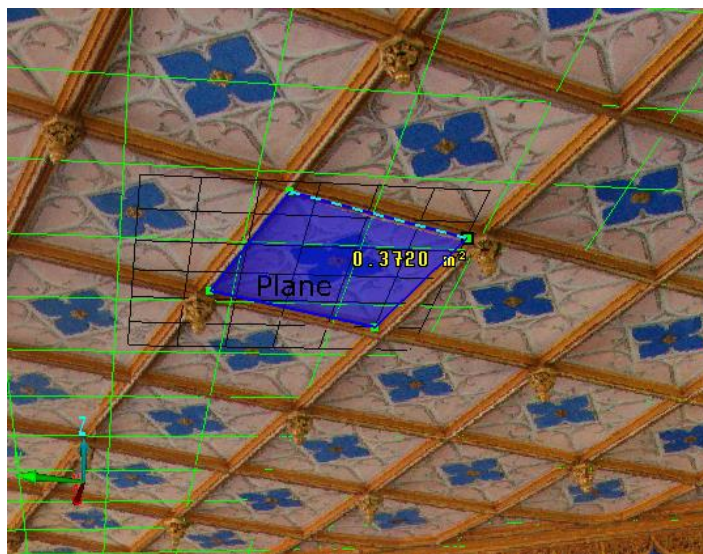


Figure 3-14: Selected area on the plane

- 6) Complete the selection and the measurement with **RETURN** or double click on the last selected corner point. The completed measurement and the plane will be added to the *Areas* folder as described in 3.1.



Figure 3-15: Completed area measurement



The available hot keys are identical to the [hot keys](#) described in chapter 3.1

3.4. Editing Area Measurements

You can edit completed or saved but (due to intersections) unfinished measurements at any time:

- 1) Select the measurement in the structure view or in the 3D view.
- 2) Select **Edit selected area measurement** from the drop down menu in the area measurement tool bar or from the [context menu](#) of the area measurement in the 3D view (see also chapter 4.4).
- 3) Edit the measurement as usual by adding new points, deleting or moving existing points.
- 4) Complete the changed measurement with **RETURN**



Pressing **ESC** cancels editing the measurement and restores it to its initial state.

4. Reference Handbook

4.1. Toolbar

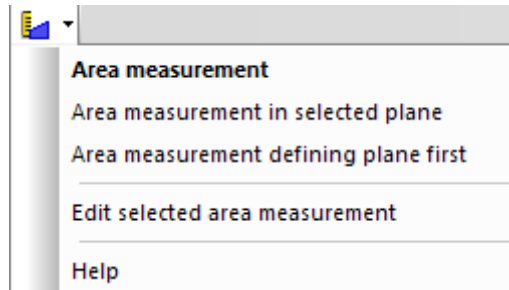




Figure 4-1: Area measurement tool bar

Clicking the  icon - Start an area measurement based on a selection of scan points. For more information, see chapter 3.1.

Drop-down menu:

Area measurement - Same effect as clicking the  icon (see above).

Area measurement in selected plane - Start an area measurement in a selected plane. For more information, see chapter 3.2.

Area measurement defining plane first - Define a plane and measure an area on this plane. For more information, see chapter 3.3.

Edit selected area measurement - Edit a completed or saved but (due to intersections) unfinished measurement, see chapter 3.4.

Help - Open this user manual.

4.2. Context Menu in 3D View during an Area Measurement

Context menu, accessible when you right-click in the 3D view while [creating an area measurement](#):

Area Measurement	
Add scan point	Left mouse button
Remove selected point	Backspace
Define plane from selected points	I
Cancel	Escape
Complete measurement	Return

Figure 4-2: Context menu – during area measurement

Add scan point - Add another scan point to the measurement.

Remove selected point - Removes the selected point from the polygon.

Define plane from selected points - Defines a plane from the selected scan points. Select an area which you would like to measure on this plane. For more information, see chapter 3.2.

Cancel - Disables the Area Measurement; an unfinished polygonal selection will be removed.

Complete measurement - Complete the selection (and the measurement)

4.3. Context Menu of an Area Measurement Object (in Structure View)

Context menu, accessible when you right-click the area measurement object in the structure view:

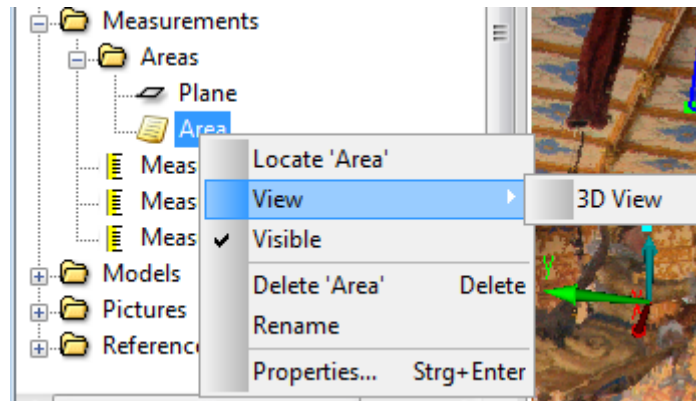


Figure 4-3: Context menu – area measurement object in structure view

Locate - Find the area measurement in the currently opened and active 3D view of the workspace. The area measurement will be displayed in the center of this view.

View ▶ 3D View - Open a 3D view of the area measurement object.

Visible -Toggle visibility of the area measurement.



*Toggle the visibility of all measurement objects in the view by enabling or disabling the layer for **Measurements** in the **Visibility Settings**.*

Delete - Deletes the area measurement object.

Rename - Renames the area measurement object.

Properties -Opens the properties dialog of the area measurement object.

4.4. Context Menu of an Area Measurement Object (in 3D View)

Context menu, accessible when you right-click the label of an area measurement in 3D view:

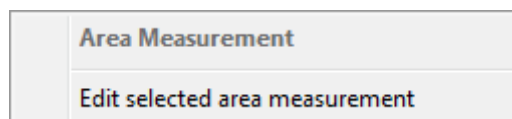


Figure 4-4: Context menu – area measurement object in 3D view

Edit selected area measurement - Edit the selected area measurement, see chapter 3.4.

4.5. Properties

Access the properties of a volume measurement object from its [context menu](#).

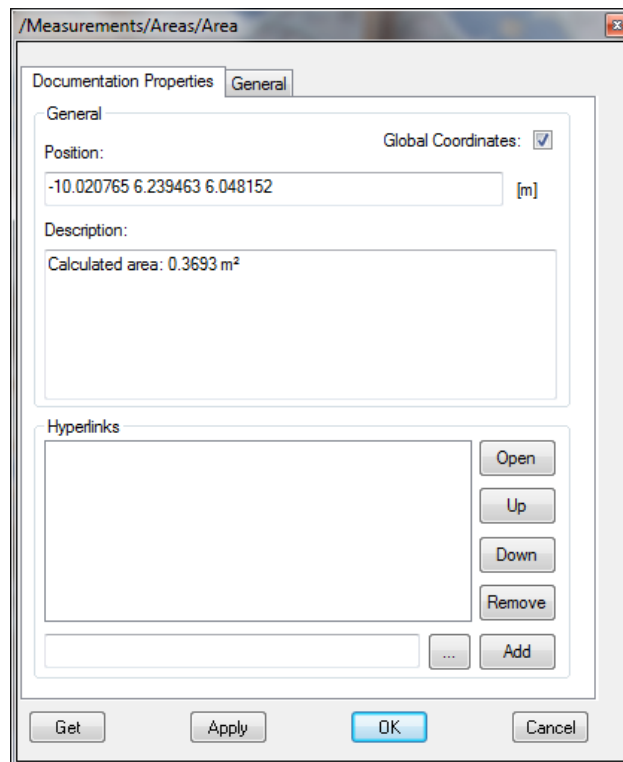


Figure 4-5: Properties

This properties dialog is similar to the properties dialog of a documentation object.

Position - The position of the center of the area.

Description - Information about the calculated area. You may edit this information.

Hyperlinks – Add hyperlinks to web sites, local or shared documents.

For more information, see the properties dialog of the documentation object in the SCENE or SCENE LT manual.

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Implementation Notes

Poly2Tri

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