Tutorial (Intermediate level): Volume Measurements with Agisoft PhotoScan Pro 1.1

This tutorial illustrates how to perform volume measurements for mining or construction sites models.

Build Model

Note: If you need guidance on how to build a 3D model with PhotoScan refer to *Tutorial (intermediate level): Orthophoto and DEM Generation with Agisoft PhotoScan* and follow all steps up to *Build Model*.

Build Model using the following settings:
Surface type: *Height-field*
Interpolation: *Enabled* or *Extrapolated*.
Other settings at *Align Photos* and *Build Dense Cloud* stages set according to the tutorial mentioned above.
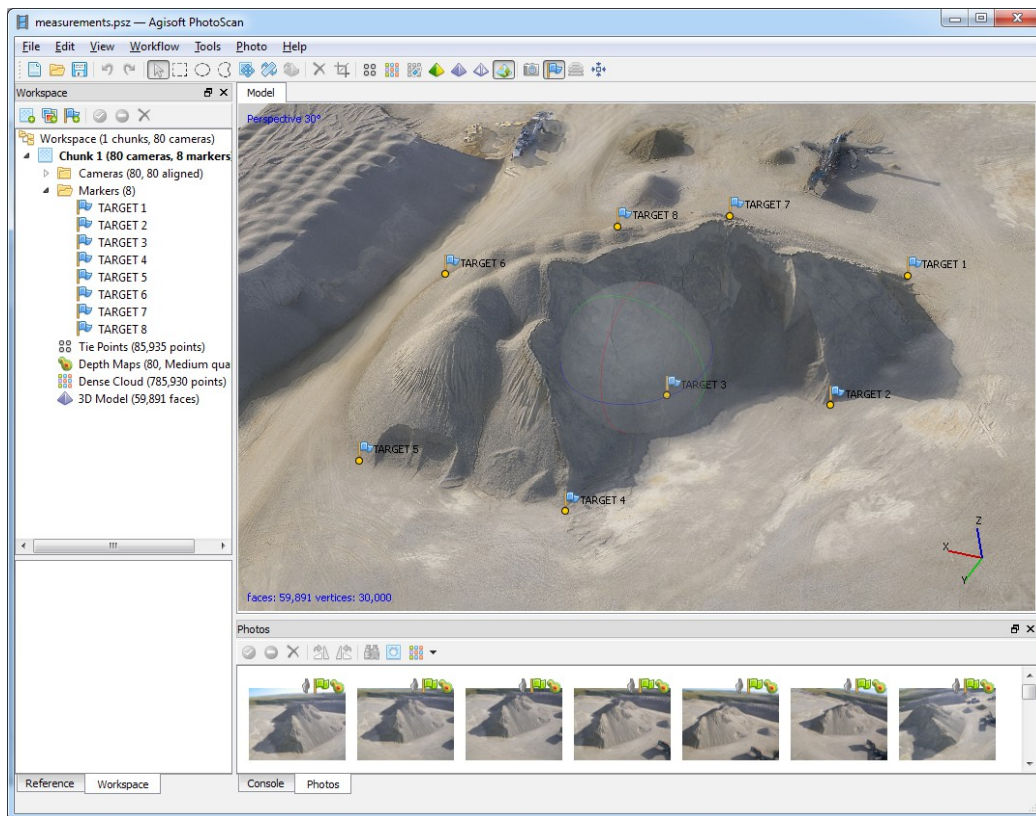

Georeference or Scale Model

In order to enable PhotoScan to operate in real scale it is necessary to georeference the model through loading markers and/or camera positions data into *Reference* pane.

Note: if you have followed the workflow described in *Tutorial (Intermediate level): Orthophoto and DEM Generation with Agisoft PhotoScan* up to *Build Mesh* step the model is already georeferenced.

Note: An alternative to georeferencing is setting reference distance(s). You can use it in case you lack Ground Control Points (GCPs) data. However, measurements made in a coordinate system defined with GCPs (markers) are usually more precise.

To set reference distance PhotoScan provides Scale Bar instances. To create a scale bar consequently left-click on the markers in the Model view (with any selection tool active, while

holding the Ctrl key), that correspond to the scale bar ends (for guidance on marker placement refer to *Place markers* step in *Tutorial (Intermediate level): Orthophoto and DEM Generation with Agisoft PhotoScan*). A scale bar is added onto the *Reference* pane.
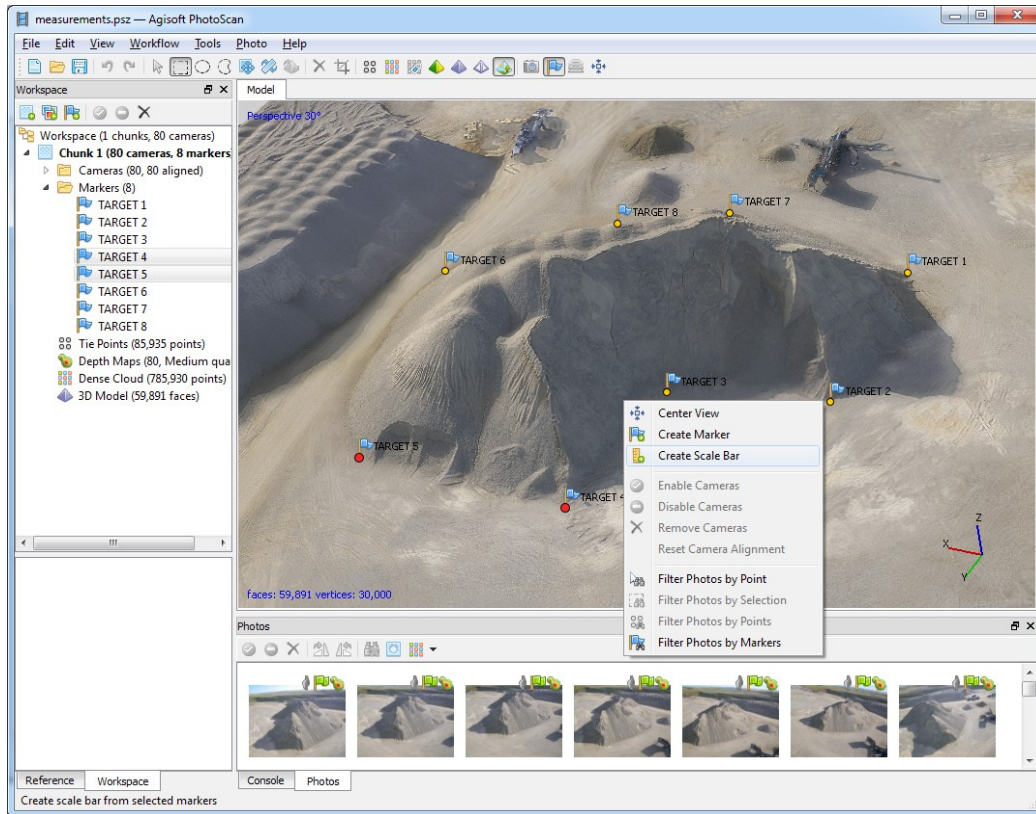
In the *Scale Bars* section of the *Reference* pane type in the known length of the scale bar created. Click *Update* button on the *Reference* pane toolbar, thus setting the reference distance for the model.

If the distance between several more markers is known, you can create several more scale bars to provide for more accurate scaling of the model.
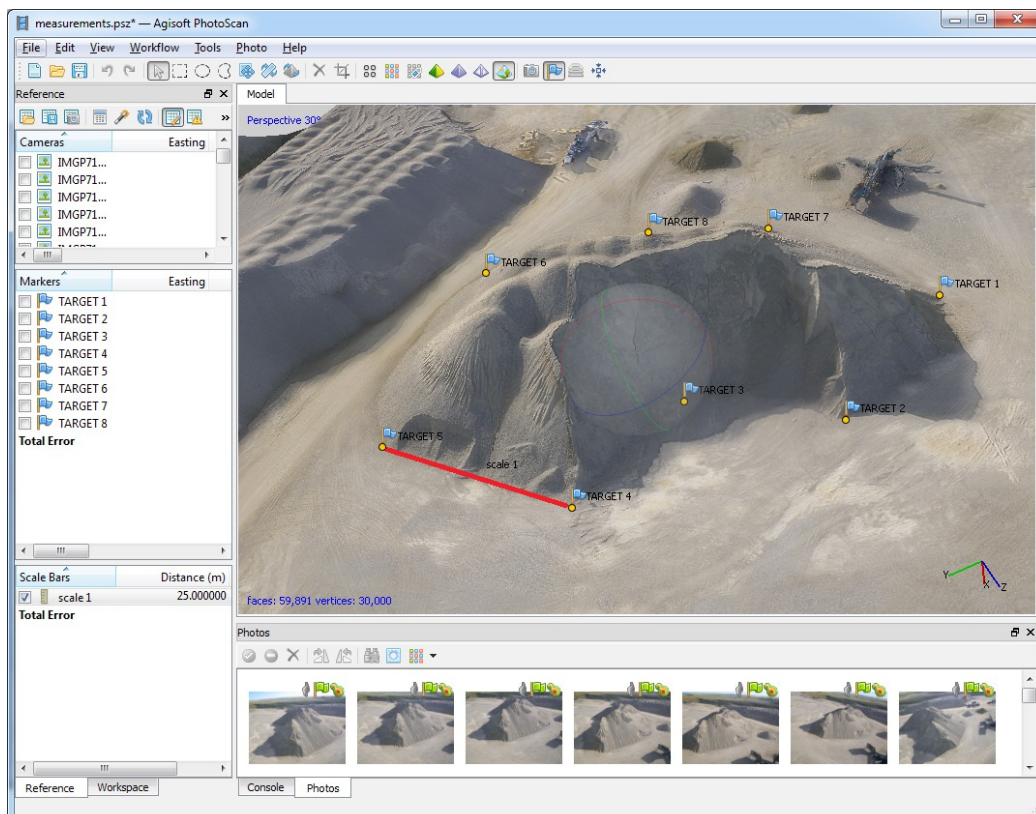
Note: if the object/area of interest accounts for a small part of the whole scene, it is reasonable to build mesh only for the object/area, while for the whole scene only a dense point cloud model could be generated. Thus, you would reconstruct the targeted object/area in high quality (Q*uality* parameter at *Build Dense Cloud* step) while optimizing processing time. To realize this opportunity, firstly, follow all the steps up to *Build Dense Cloud*, setting dense cloud quality parameter to *High* value. Secondly, after having georeferenced the point cloud model, build mesh based on dense point cloud for the targeted object/area only, adjusting bounding box properly.

Remove Secondary Faces

After the model is georeferenced it is necessary to remove all secondary faces leaving only the area to be calculated.

Face removal could be performed using *Rectangle Selection, Circle Selection* or *Free Form Selection* tools and *Delete Selection* button on the *Toolbar*. To delete all but selected faces use *Crop Selection* button on the *Toolbar*.
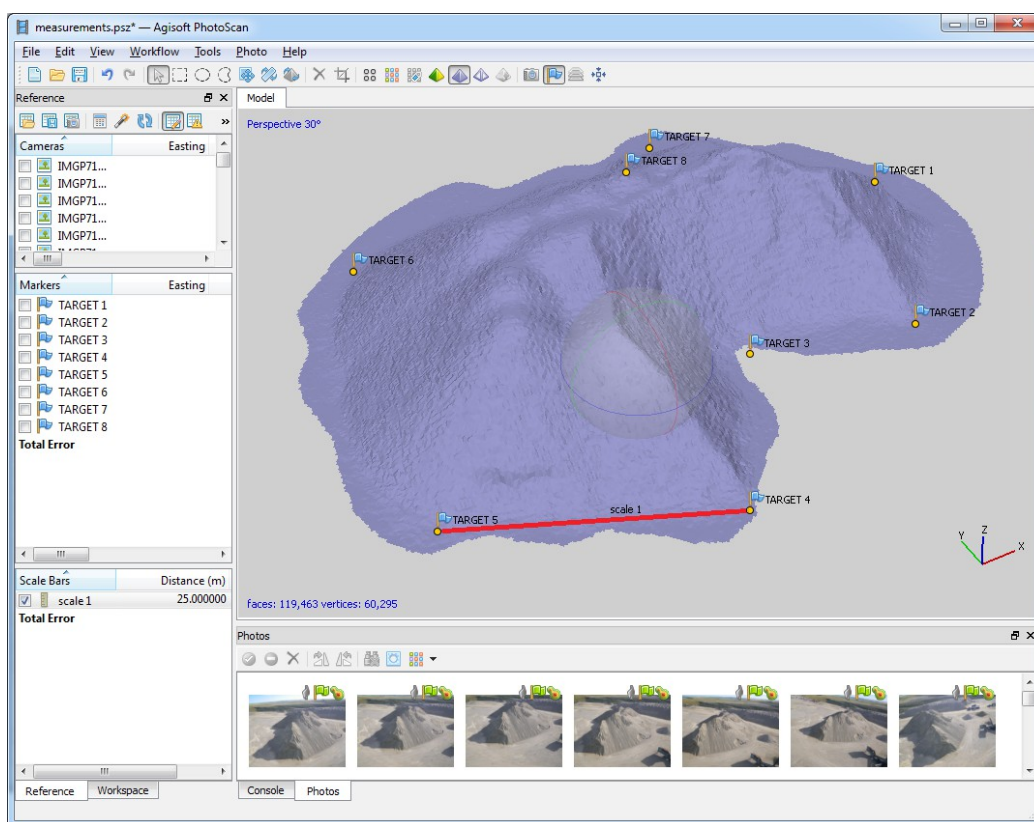
Close Holes

PhotoScan can calculate volume of a closed model only. So it is necessary to make the model closed using *Close Holes* command from *Tools* menu.
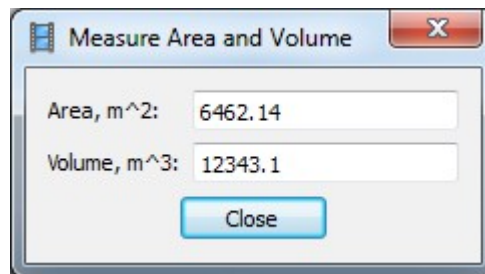
In the *Close Holes* dialog drag slider to the right end position. The bottom plain of the model will be closed with additional faces colored in red (like selected faces). Click *OK* button.
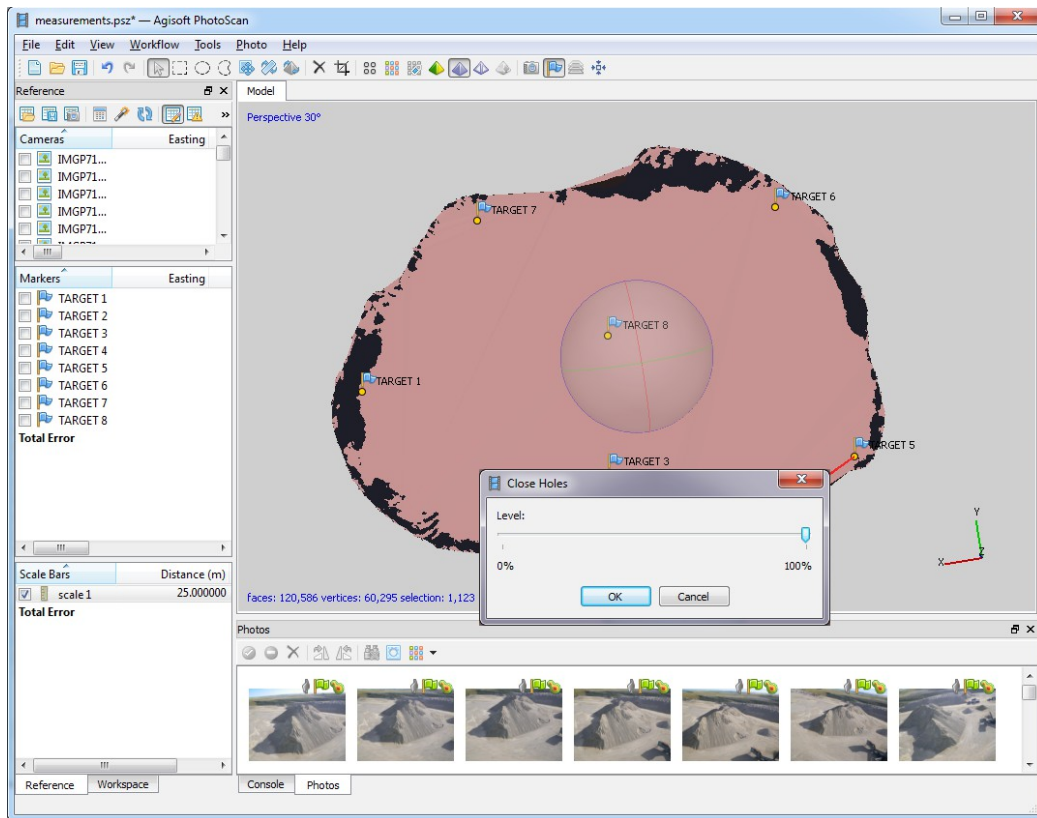
Measure Volume

After all preparations have been done, model volume measuring is just a single-click operation.

Select *Measure Area and Volume...* command from *Tools → Mesh* menu:

The result will be displayed in *Measure Area and Volume* dialog in cubic meters for volume and in square meters for area.

Note: in the described workflow calculated area includes additional bottom faces.