Tutorial (Intermediate level):
3D Model Reconstruction of the building with Agisoft PhotoScan 1.1

Add Photos

To add photos select *Add Photos...* command from the *Workflow* menu or [icon] click *Add Photos* button located on *Workspace* toolbar.

In the *Add Photos* dialog browse the source folder and select files to be processed.
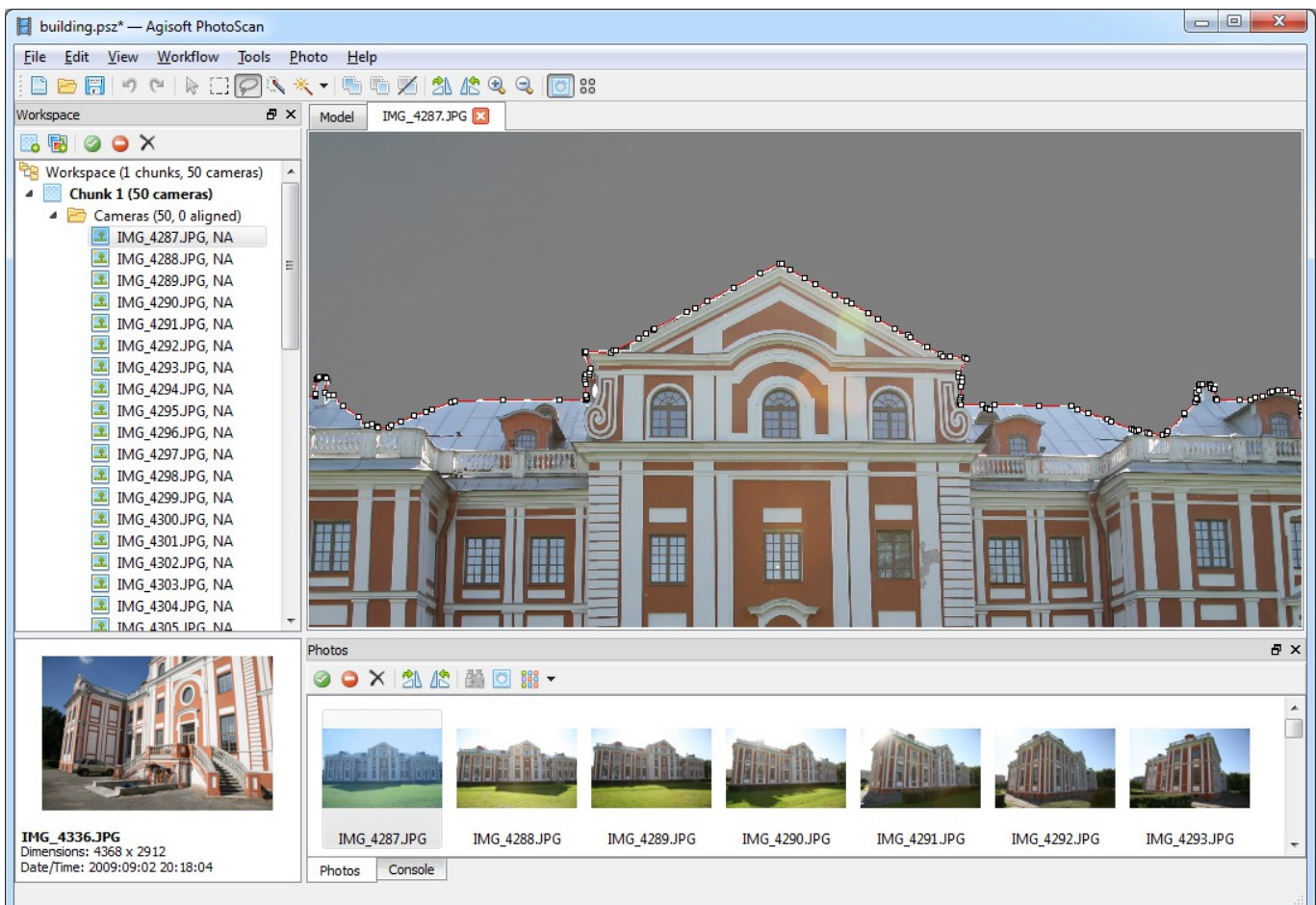Click *Open* button.

Mask Photos

It is recommended to mask all irrelevant elements on the source photos (background, accidental foreground, etc.).

Masks in PhotoScan are represented by contours bounding certain image regions. Modification of the current mask is performed in *Photo View* through adding or subtracting selections. To switch to the *Photo View* double-click on the corresponding photo in the *Workspace* or *Photo* pane.
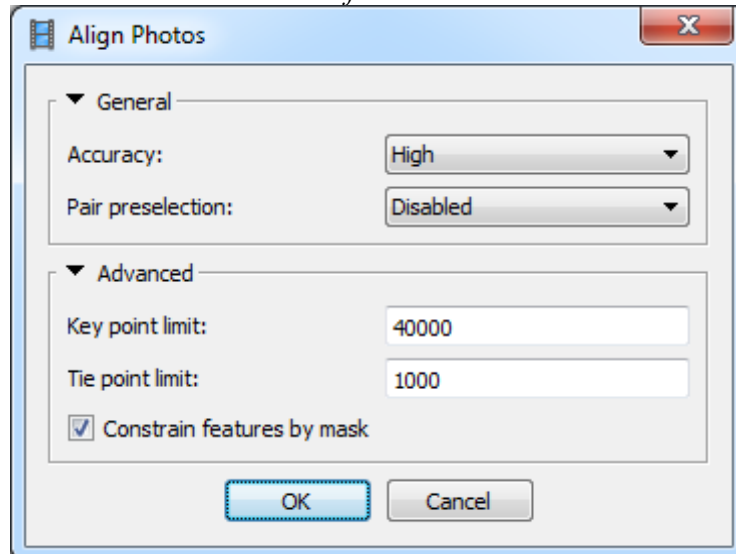
To create selection use one of the supported selection tools (available from the *Toolbar* or *Photo* menu). The selection wouldn't be incorporated in the current mask until it is merged with the mask using [icon] *Add Selection* or [icon] *Subtract Selection* buttons from the *Toolbar*.

Masked areas could be ignored at *Align Photos* processing stage (Check *Constrain features by mask* option in *Align Photos* dialog) and are always ignored at *Build Model* and *Build Texture* stages.

Align Photos

At this stage PhotoScan refines the camera position for each photo and builds the point cloud model. Select *Align Photos* command from the *Workflow* menu.

Set the following recommended values for the parameters in the *Align Photos* dialog:

Accuracy: *High* (higher accuracy setting helps to obtain more accurate camera position estimates. Lower accuracy setting can be used to get the rough camera positions in the shorter time)

Pair preselection: *Disabled* (for faster processing of the big number of photos *Generic* preselection can be used)

Constrain features by mask: *Enabled* (if the mask covers any moving objects including clouds) or *Disabled* (if all masked area was static during shooting)
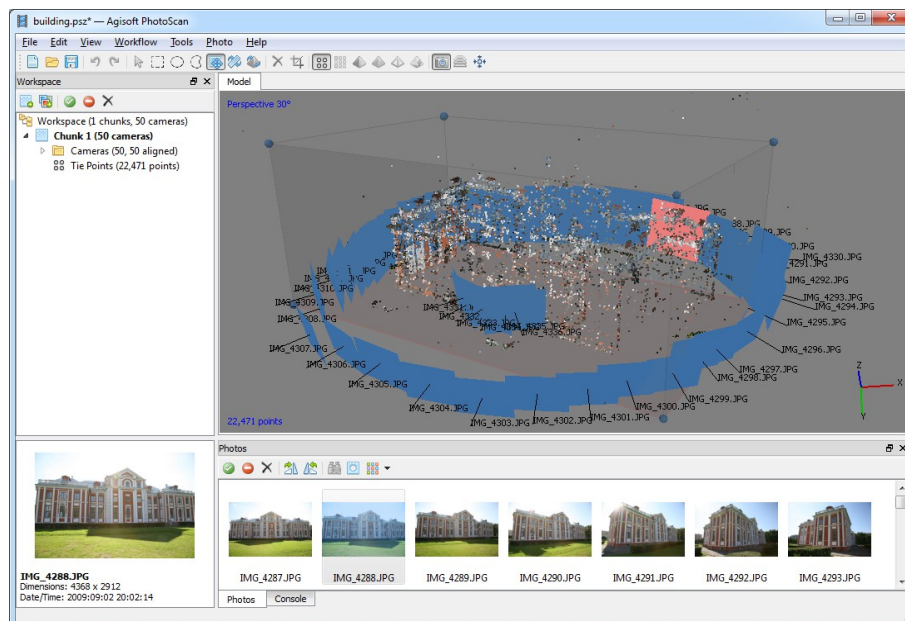
Key point limit: *40000*

Tie point limit: *1000*

Click *OK* button to start photo alignment.

Set Bounding Box

After photo alignment is finished, refine bounding box position and orientation to fit the object:
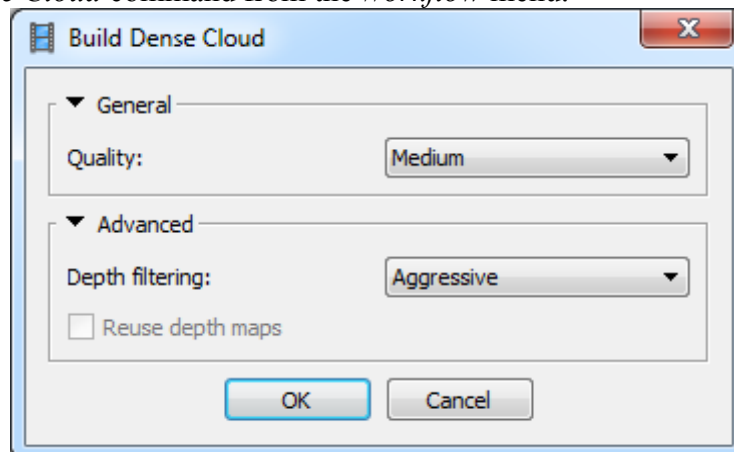

This step is optional since PhotoScan automatically calculates bounding box dimensions and location. But it is recommended to check if any correction is needed, because geometry reconstruction step deals only with the point cloud inside the volume.

Bounding box is resizable and rotatable with the help of *Resize Region* and *Rotate Region* tools.

Build Dense Point Cloud

Based on the estimated camera positions the program calculates depth information for each camera to be combined into a single dense point cloud.

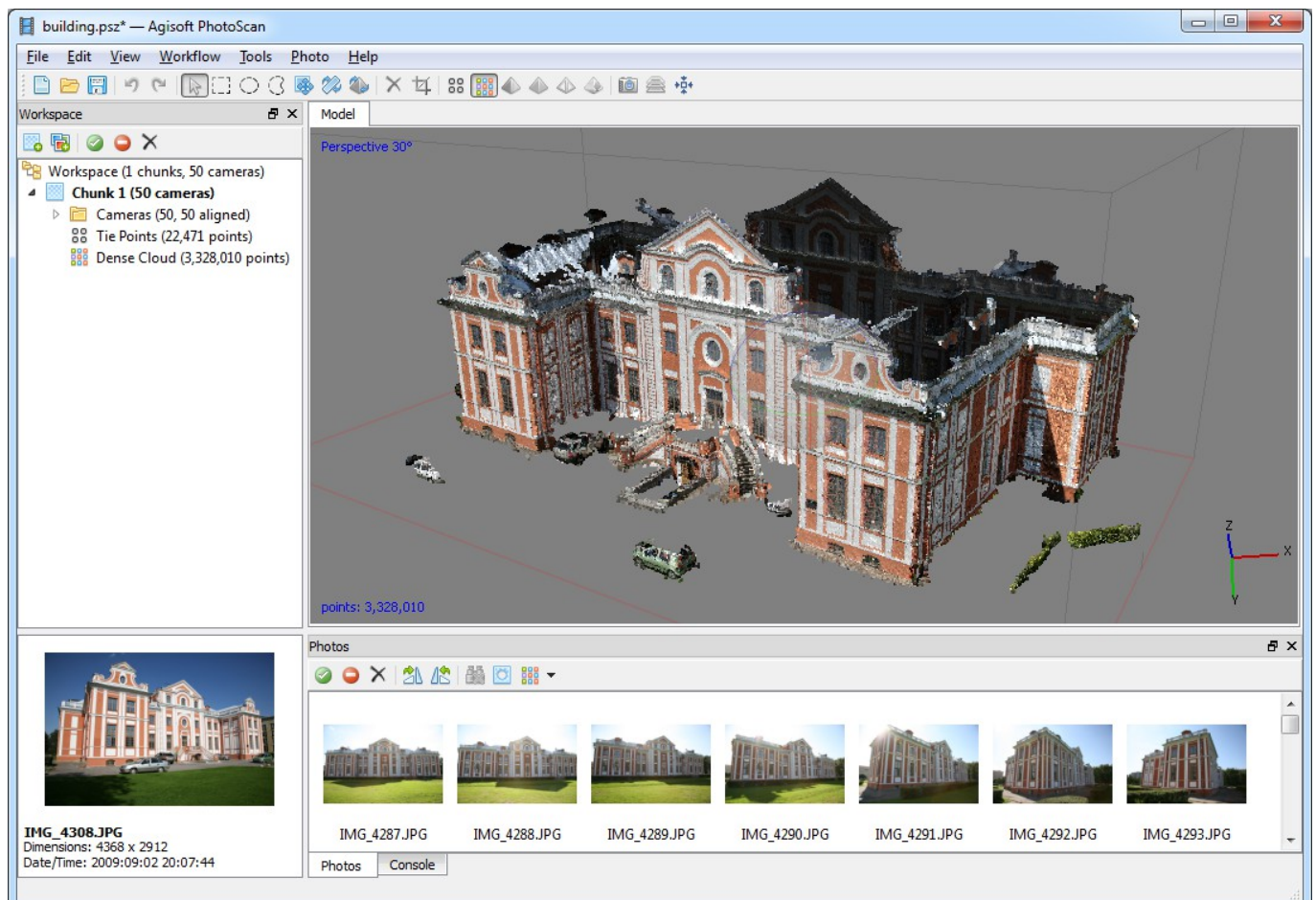Select *Build Dense Cloud* command from the *Workflow* menu.

Set the following recommended values for the parameters in the *Build Dense Cloud* dialog:

> **Quality:** *Medium* (higher quality takes quite a long time and demands more computational resources)
>
> **Depth filtering:** *Aggressive* (if the geometry of the scene to be reconstructed is complex with numerous small details on the foreground, then it is recommended to set *Mild* depth filtering mode, for important features not to be sorted out.)
>
> **Reuse depth maps** flag is available only if you have previously generated dense cloud and Keep depth maps option was turned on in the PhotoScan Preferences window.
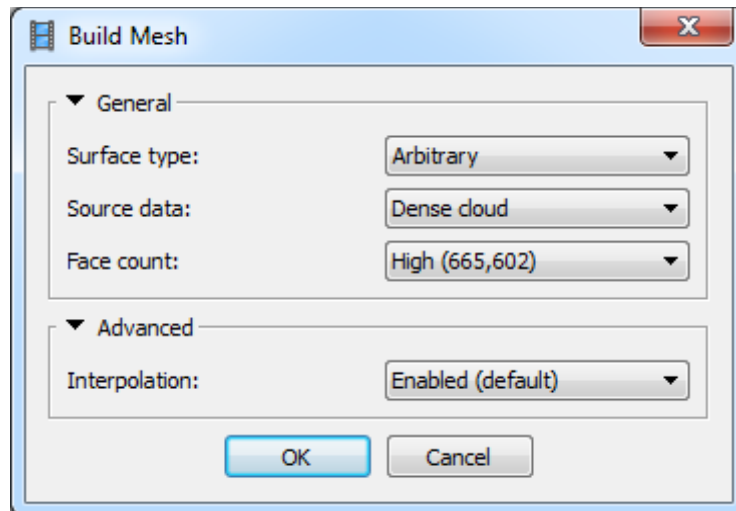

Points from the dense cloud can be removed with the help of selection tools and *Delete/Crop* instruments located on the Toolbar.

Build Mesh

After dense point cloud has been reconstructed it is possible to generate polygonal mesh model based on the dense cloud data.

Select *Build Mesh* command from the *Workflow* menu.

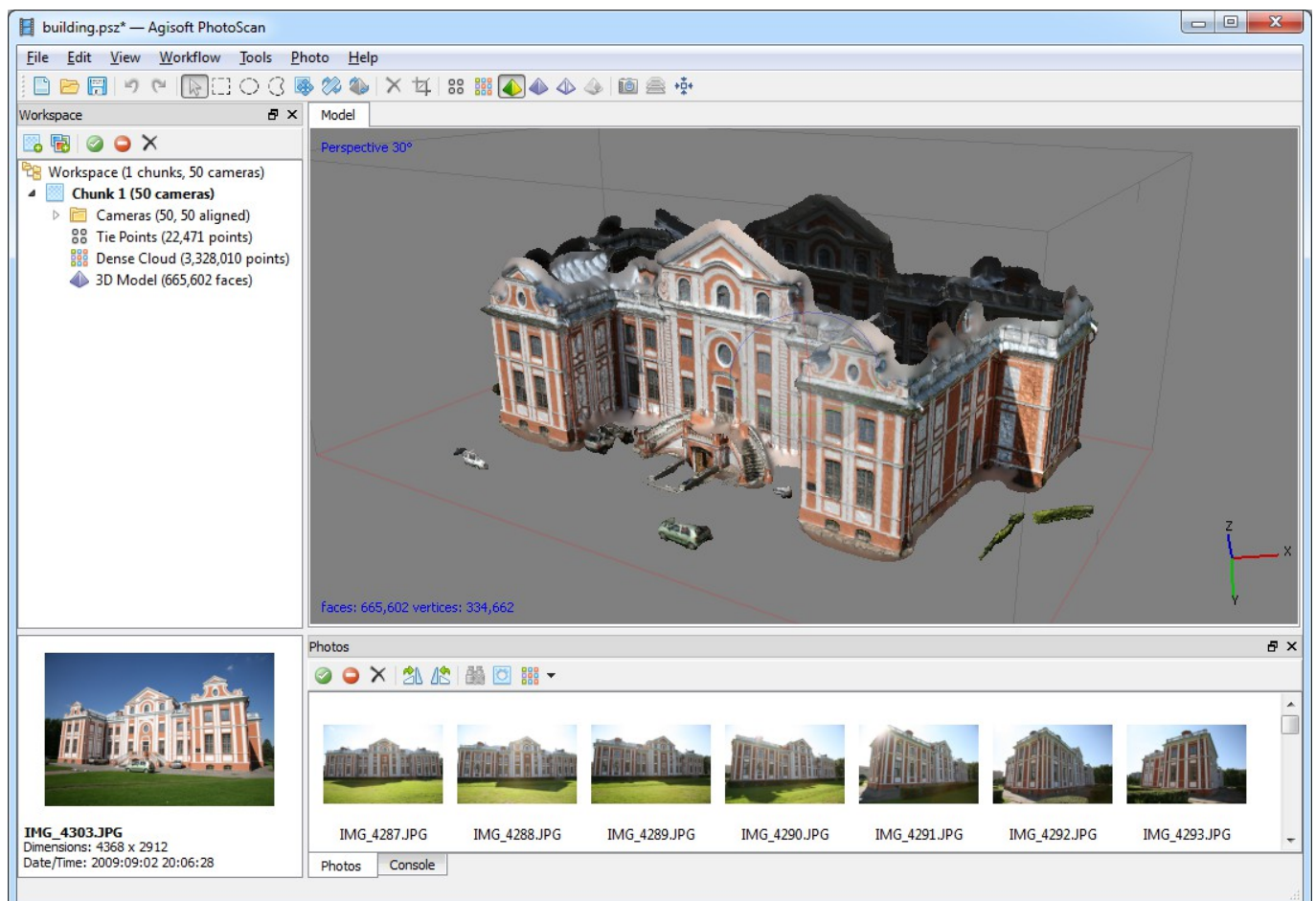Set the following recommended values for the parameters in the *Build Mesh* dialog:

Surface type: *Arbitrary*

Source data: *Dense cloud*

Polygon count: *High* (The values indicated next to *High/Medium/Low* preset labels are based on the number of points in the dense cloud. Custom face count can be input manually.)

Interpolation: *Enabled*

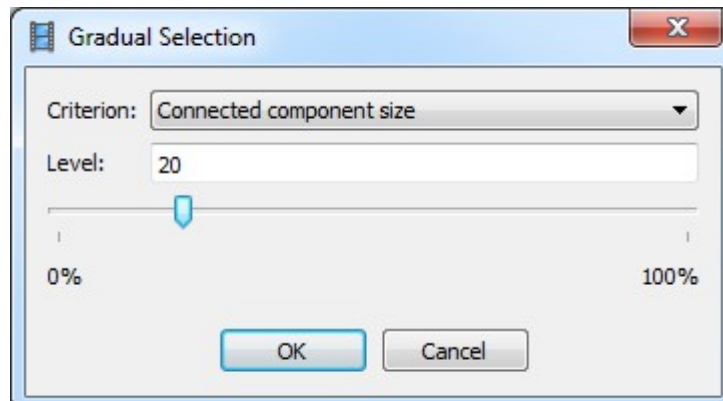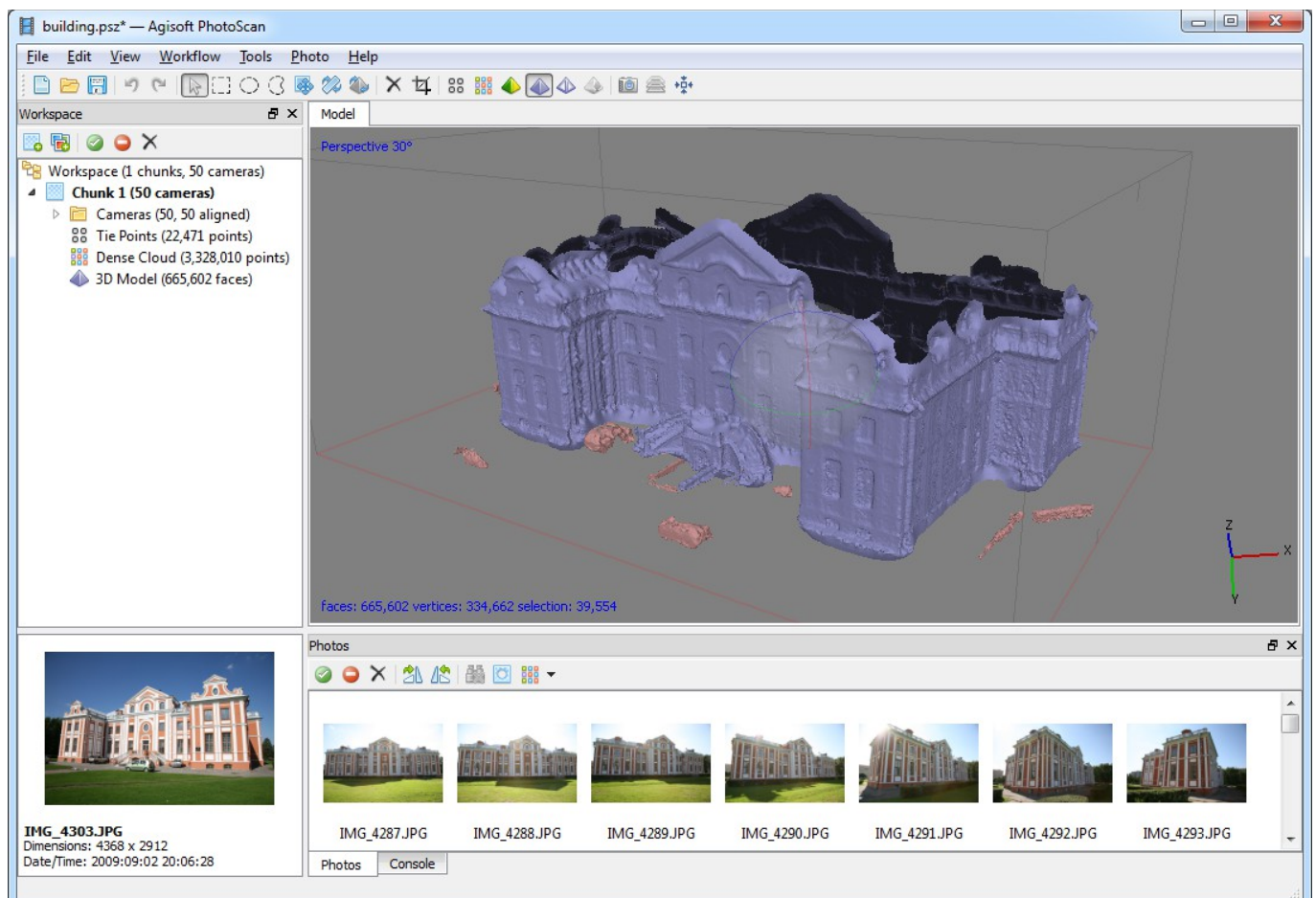Click *OK* button to start building geometry.

Edit Geometry

Sometimes it is necessary to edit geometry before building texture atlas and exporting the model.

Unwanted faces could be removed from the model. Firstly, you need to indicate the faces to be deleted using selection tools from the toolbar. Selected areas are highlighted with red color in the *Model View*. Then, to remove the selection use *Delete Selection* button on the *Toolbar* (or *DEL* key) or use *Crop Selection* button on the *Toolbar* to remove all but selected faces.

In some cases building geometry without interpolation may result in small non-connected with the main model components generation. To ease the selection and removal of such components you can use *Gradual Selection* command from the *Edit* menu.

Drag the slider in the *Gradual Selection* dialog to adapt the selected components size. You can observe the selection result in the *Model View*.
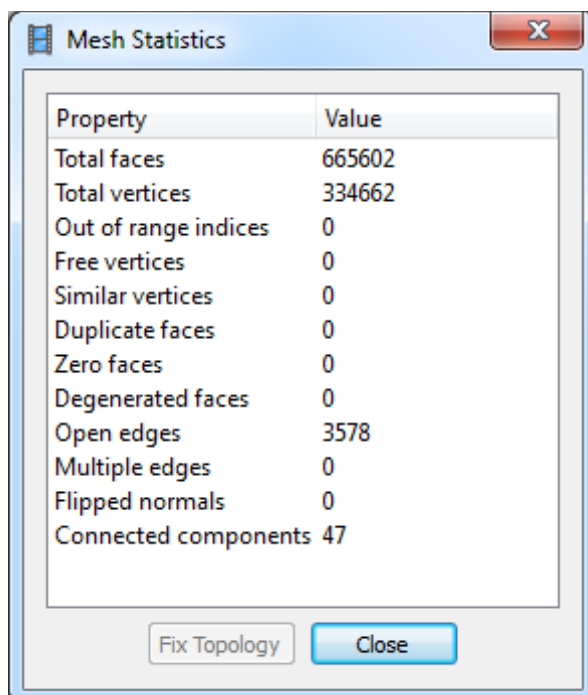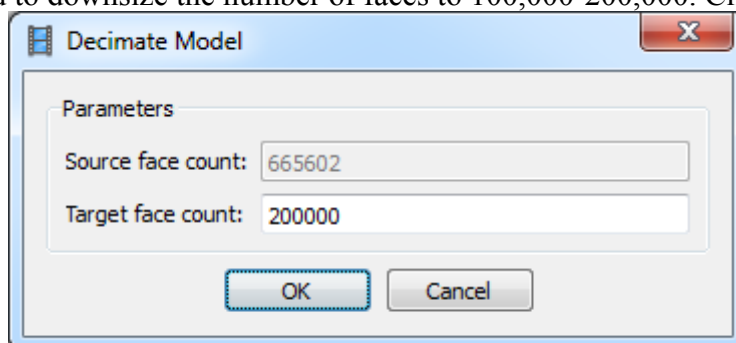

Click *OK* button to finalize selection.

Then remove selected components if needed.

If your task requires regular topology result, you can check whether the mesh has any irregularities in *Mesh Statistics* dialog available through *View Mesh Statistics...* command from *Tools* menu. If the mesh contains any irregularities, click *Fix Topology* button to eliminate them.
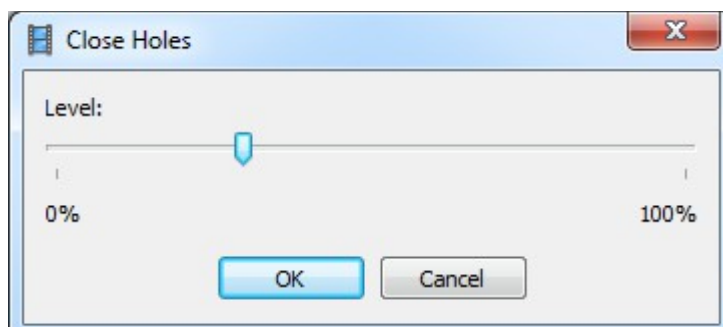

PhotoScan tends to produce 3D models with excessive geometry resolution. That's why it is recommended to decimate mesh before exporting it to a different editing tool to avoid performance decrease of the external program.

To decimate 3D model select *Decimate Mesh...* command from the *Tools* menu. In the *Decimate Mesh* dialog specify the target number of faces that should remain in the final model. For PDF export task or web-viewer upload it is recommended to downsize the number of faces to 100,000-200,000. Click *OK* button.

If the geometry was built without interpolation, to export close model at the final stage it is necessary to use *Close Holes...* command from the *Tools* menu at geometry editing stage. In *Close Holes* dialog select the size of the largest hole to be closed (in percentage of the total model size).
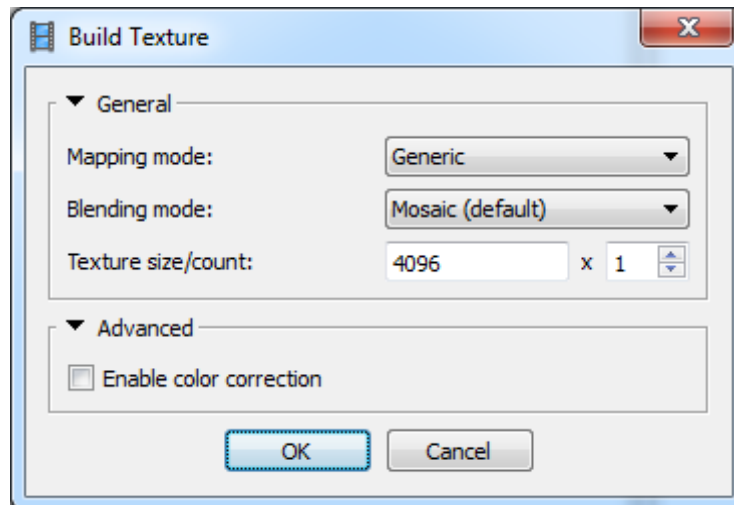

Click *OK* button to start holes closing procedure.

Build Texture

This step could be skipped if untextured model is sufficient as the final result.

Select *Build Texture* command from the *Workflow* menu.

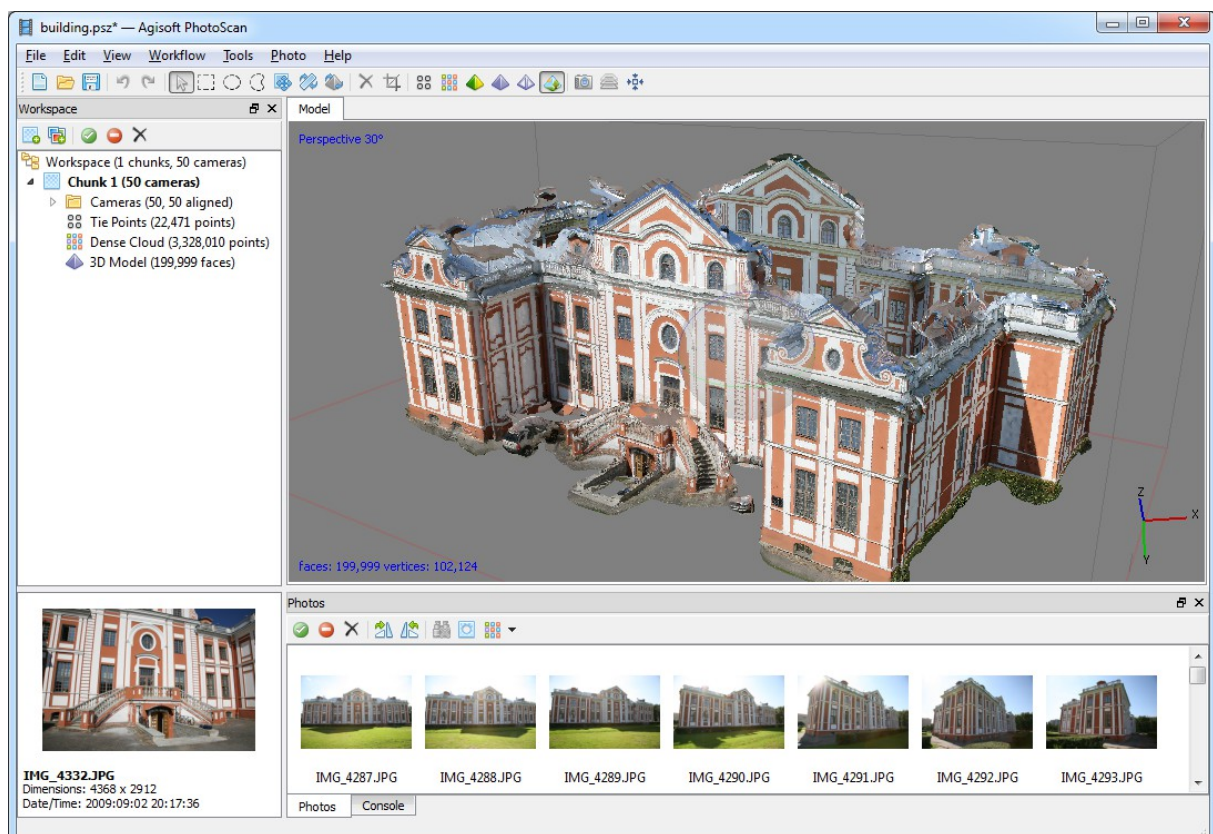Set the following recommended values for the parameters in the *Build Texture* dialog:

Mapping mode: *Generic*
Blending mode: *Mosaic*
Texture size/count: *4096 x 1* (width & height of the texture atlas in pixels and determines the number of files for texture to be exported to. Exporting texture to several files allows to archive greater resolution of the final model texture, while export of high resolution texture to a single file can fail due to RAM limitations)
Enable color correction: *disabled* (the feature is useful for processing of data sets with extreme brightness variation, but for general case it could be left unchecked to save the processing time)

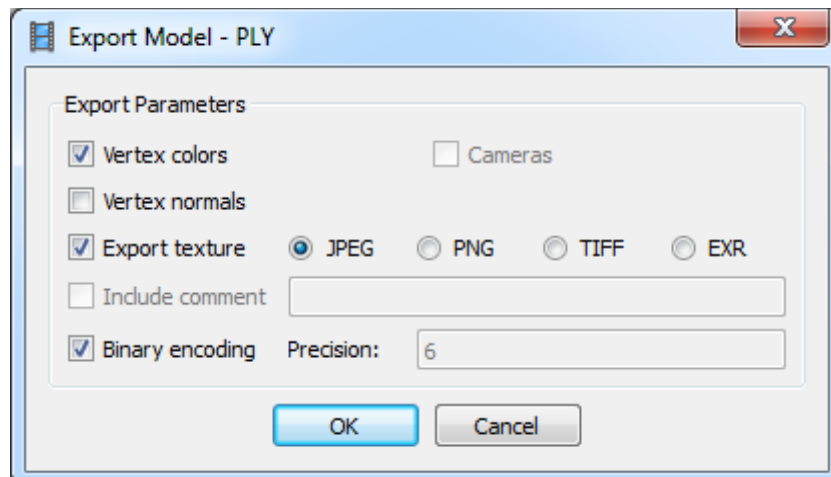Click *OK* button to start texture generation.

Export Model

In case the model should be exported to the file, select *Export Model...* command from the *File* menu.

In the *Save As...* dialog select the folder for the model to be saved in, print in the file name and choose preferred file type from the list.
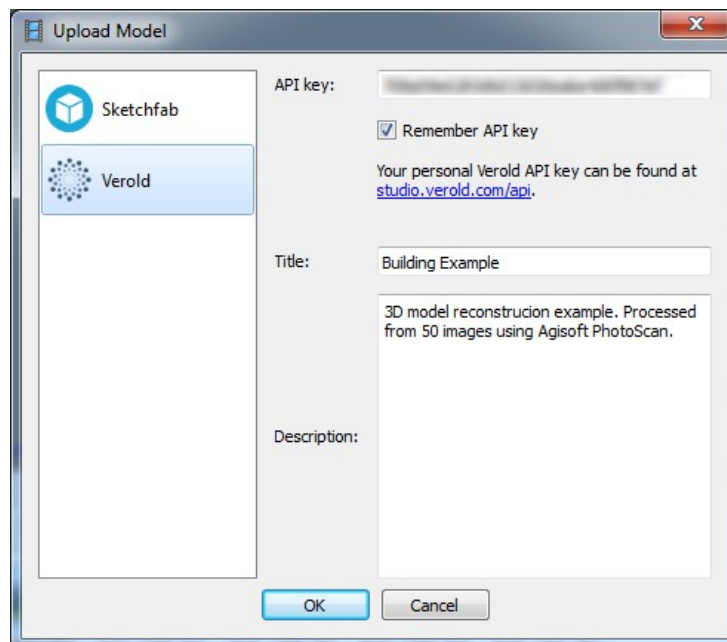Click *Save* button.

In the *Export Model* dialog indicate the desired export parameters. Note that the list of available exporting parameters depends on the selected file format.

Note: Exported texture will be stored in the same folder as the 3D-model with the same file name (file type is selected by user).

PhotoScan supports direct uploading of the models to the Sketchfab and Verold resources. To publish your model online use Upload Model... command from the File menu.

Note: To apply correct model orientation in space use 🔄 Rotate Object tool prior to model upload.