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ShapeMetriX FragMetriX

ModelEditor

User Manual
for Version 5.0

August 2025

Project ID: 6800 Author: 3GSM	*Subject to change without notice*

CONTENTS

1 Introduction

The automatic reconstruction of a generic 3D model may lead to unwanted surface measurements. The *ModelEditor* allows to trim and confine the 3D model to the area of interest. In addition the *ModelEditor* enables the import of existing 3D data in ".obj" and laser scanner data in ".E57" file format, and generates a 3D mesh (".jm3x" file) that allows the import of the 3D data in 3GSM´s software solutions.

This user manual addresses all topics related to the *ModelEditor* i.e. user interface, features and operations. Let us know if we can support you, and give us your valuable feedback. Only this way it remains possible to keep the systems both, flexible enough for broad usage and sufficiently specific for your applications.

We wish you success with the *ModelEditor.*

The Team of 3GSM

Graz, August 2025

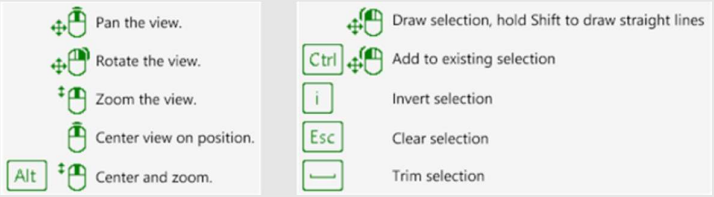
2 General

Attention:
ModelEditor generates and reads files exclusively in **".jm3x"** file format. Models from previous versions (".jm3") can be converted (see Chapter 4.1).

User interface

The user interface of the *ModelEditor* (Figure 1) comprises the menu bar, toolbar and the 3D viewer.

Attention:
By pressing F1 on the keyboard tooltips for navigation as well as for editing are available in the 3D viewer.

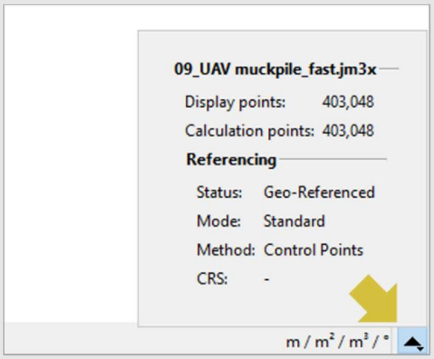


1 Menu bar
2 Toolbar
3 3D viewer with toolbar

Figure 1: Interface of the ModelEditor

Hint:

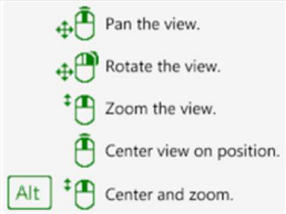
The unit of measurement is displayed on the right bottom of the user interface. The foldable dialog next to it displays information on the 3D model, i.e. geometry reproduction on the screen (adjustable via the Central Window Settings) and information on referencing and scaling.

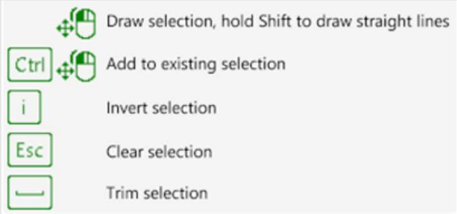


3 Features

This section describes the available functions of the *ModelEditor.*

Attention:
By pressing F1 on the keyboard tooltips for navigation as well as for editing are available in the 3D viewer. Examples:





3.1 Toolbar of the 3D viewer

3D View Options

Move to Home Position

Sets the viewer to its initial position

View All

Zooms out from the current view. Zooms to the previous view again

Top Down View

Orientates the 3D model from the camera view (top down)

Auto Rotate (fixed or view)

Rotates the 3D model from a fixed point (top down) or from the current point of view

Projection type

Toggles between perspective and orthographic projection

Fullscreen

Switches between the fullscreen display and the windowed display

Mesh Draw Mode

Draw as is

The 3D topography is completely overlaid by the digital photograph

Wireframe

A triangulated red coloured point cloud is forming the topography

Wireframe Overlay

The 3D model and a red coloured overlay of the wireframe is forming the topography

Points

The point cloud of the scene shown

Show Texture Displays the 3D model with texture in the viewer (shortcut key *"Ctrl" T*)

3D View Visibility

Show Axes Turns the co-ordinate axes on and off

Show Bounding Box Turns the bounding box surrounding of the 3D model on and off

3.2 Navigation

Mouse navigation

Pan View

The middle mouse button is used to pan the 3D model

Rotate View

The right mouse button rotates the 3D model. Just keep the right button pressed and move the mouse around to see the 3D model rotating.

Zoom View

When turning the wheel of a mouse the 3D model is zoomed

Center View on Position

Centers to the current position

Center and Zoom

Pressing "*Alt*" and turn the mouse wheel centers the and zoom to the current position

Keyboard navigation

- Rotation of the 3D model in a desired direction is performed with the corresponding arrow key *"Left"*, *"Right"*, *"Up"* or *"Down"*
- Straight motion is performed by pressing "*Shift*" simultaneously with the corresponding arrow key *"Left"*, *"Right"*, *"Up"* or *"Down"*
- Zooming is performed by pressing *"Ctrl"* simultaneously with the arrow key *"Up"* for zooming in and the arrow key *"Down"* for zooming out

3.3 Menu bar

The menu bar comprises three menus. The menu commands are accessible using the mouse.

Menu File

Open 3D Model	Opens a 3D model (".jm3x" file)
Import 3D model	
Import from JM3	Imports ".jm3" files from former versions and generates a ".jm3x" file
Import from OBJ	Enables the import of ".obj" files
Import from E57	Enables the import of "e57" files

Convert multiple JM3 to JM3x	Converting multiple “.jm3” files into “.jm3x” files
Save 3D Model	Saves the 3D model to the current “.jm3x” file
Save 3D Model as	Saves the 3D model to a new “.jm3x” file
Exit	Closes the *ModelEditor*

Menu Edit

Undo	Revokes the previously executed commands step by step
Redo	Redoes the commands revoked by the “*Undo”* function step by step

Menu Help

User Manual	Opens the manual of the software component
Units	Displays the units used by the software
About	Displays versions and release information of the software component

3.4 Toolbar

Open 3D Model

Opens a 3D model (“.jm3x” file)

Save 3D Model

Saves the 3D model (“.jm3x” file)

Save 3D model as

Renames and saves the 3D model (“.jm3x” file)

Undo

Revokes the previously executed commands step by step

Redo

Redoes the commands revoked by the "*Undo"* function step by step

Trim Model with Polygon

Selects a point cloud by using a polygon

Trim Model with Sphere

Selects a group of points enclosed by a sphere

Invert Selection

Inverts the selection to delete

Import Trim History

Imports a trim process (".trim")

Export Trim History

Exports a trim process (".trim")

Flip Mesh Orientation

Flips the upward normal vector of the 3D model

Show Reference Plane

Shows/hides the *Reference Plane* as a semi-transparent green plane

Set Reference Plane

Opens the *Plane* dialog for adjusting the *Reference Plane*

Set Reference Plane from Selection

Set the position of the *Reference Plane* from a selected region

Flip Reference Plane Orientation

Flips the upward normal vector of the 3D model

Move Reference Plane

Defines/moves the *Reference Plane* by a mouse click on the 3D model

4 Import and conversion of 3D data

4.1 Conversion of JM3 Files

ModelEditor reads files exclusively in **".jm3x"** file format. Models from previous versions (".jm3") can be converted by following procedure:

1. Import the 3D data (".jm3" file) by using "*File* | *Import 3D model* | *Import from JM3"* from the menu bar.
2. The "*Import from JM3*" dialog (Figure 4) appears requiring the path and name of the input (.jm3") and output (.jm3x) file.

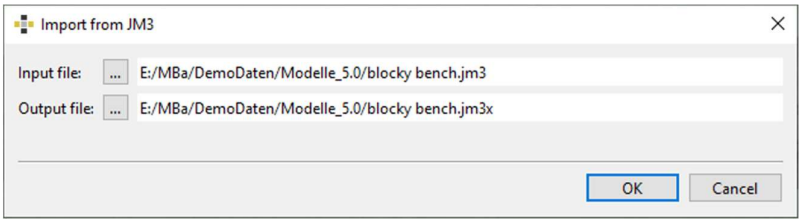


Figure 2: Import from JM3

Batch converter

The converter is a tool that automates the process of converting multiple ".jm3" files into ".jm3x" files. This allows to process numerous files efficiently without the need of manual interaction by following procedure (Figure 3):

1. Open the dialog for conversion by using "*File* | *Convert Multiple JM3 to JM3X Files"* from the menu bar.
2. Click the "*Add 3D Models*" button and select the 3D model to converts on the directory of your computer by multiple selection.
3. Start the conversion by clicking the "*Start*" button. The current status of processing is displayed in the lower part of the dialog.
4. After processing close the dialog by clicking the "*Close*" button. The jm3x files can be found in the source folder on the directory of your computer.

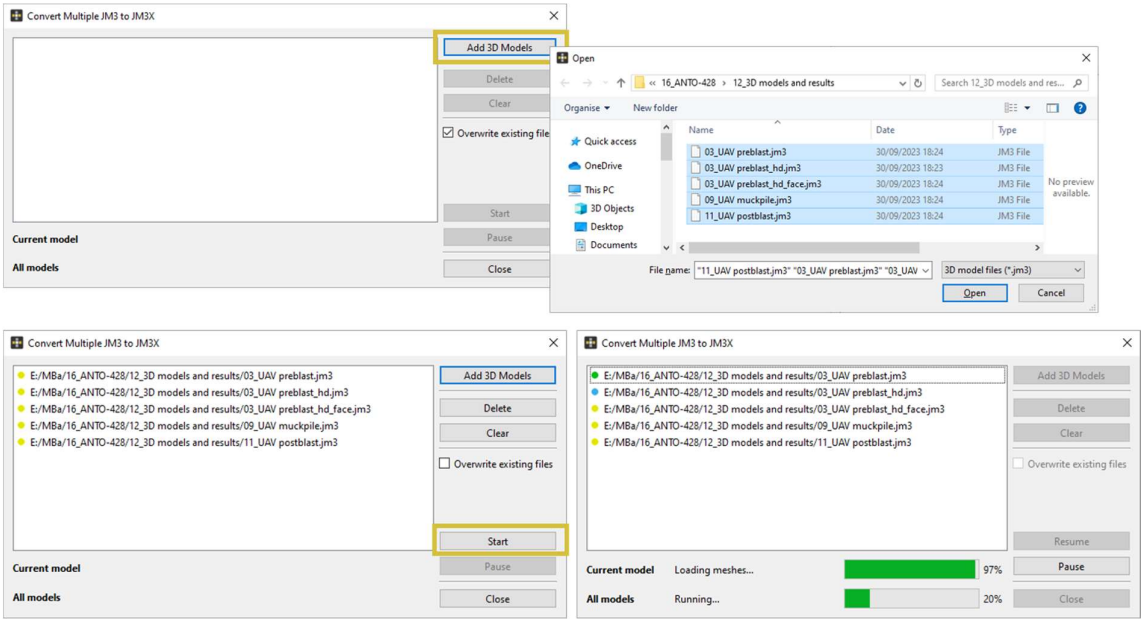


Figure 3: Convert multiple JM3 to JM3X files

The dialog features following functions:

- *Add 3D model* — *Adds 3D models to covert*
- *Delete* — *Deletes a 3D model from the list*
- *Clear* — *Clears the list of models to convert*
- *Overwrite existing files* — *Overwrites already converted 3D models*
- *Start* — *Starts the bath conversion*
- *Pause* — *Pauses the conversion process*
- *Close* — *Closes the batch converter dialog*

4.2 Import of OBJ data

Standard operating procedure

1. Import the 3D data (".obj" file) by using "*File* | "*File* | *Import 3D model* | *Import from OBJ"* from the menu bar
2. The "*Import from OBJ*" dialog (Figure 4) appears requiring the following input:
    - Input file(s): Opens a dialog to select the directory of the 3D data (".obj" file)
    - Output file: Opens a dialog for entering the directory and name of the final 3D model (".jm3x" file)

- Selection of the referencing mode from the pull-down menu. Following options are available:
  - Unreferenced (x, y, z)
  - Referenced (specific co-ordinate system)
  - Referenced (generic E, N, H)
  - Referenced (generic N, E, H)
- Selection of the co-ordinate system:
  - The referencing modes *Unreferenced (x, y, z), Referenced (generic E, N, H) and Referenced (generic N, E, H)* requires the selection of the unit from the pull-down menu. Millimetre, meter, inch, international food and US-survey foot are available.
  - *Referenced (specific co-ordinate system)* requires the selection of the specific co-ordinate system in the "*Select Co-ordinate Reference System*" dialog (Figure 5).

3. Confirm the import by clicking in the "*Ok*" button
4. A detailed view (*Log View* dialog; see Figure 6) on the import can be called up in the appearing dialog

Note:
The *ModelEditor* supports the import of several related 3D data (".obj") files at once by multiple selection in the import dialog.

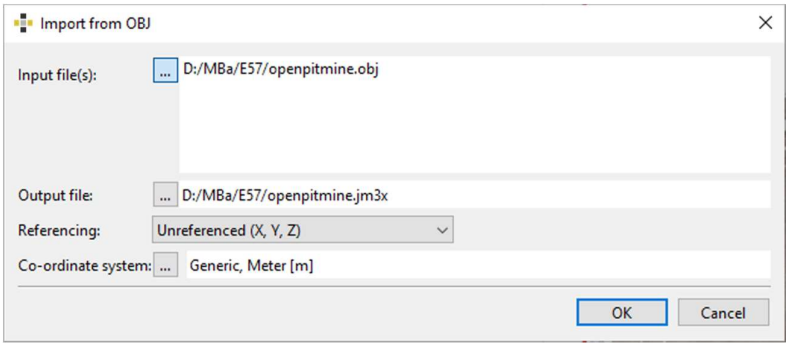


Figure 4: Import from OBJ

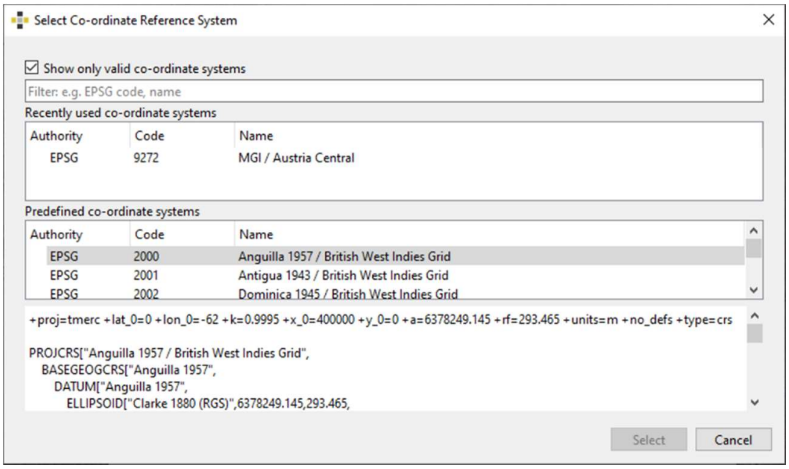


Figure 5: Select Co-ordinate Reference System

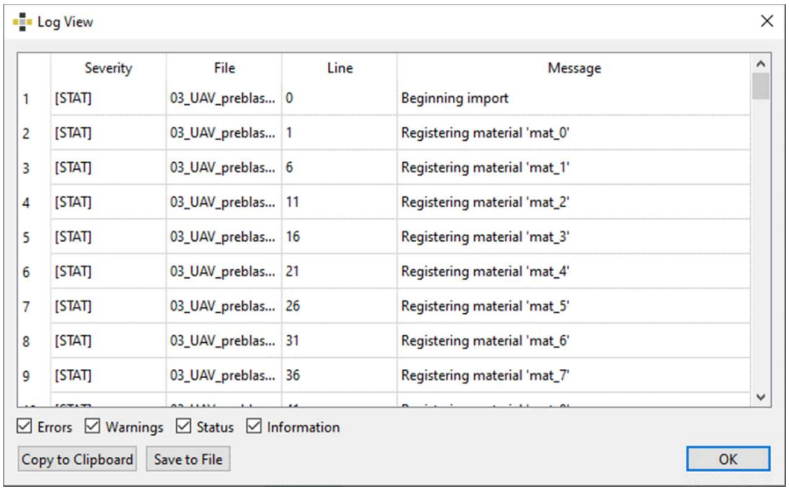


Figure 6: Log View dialog

4.3 Import of laser scanner data / E57

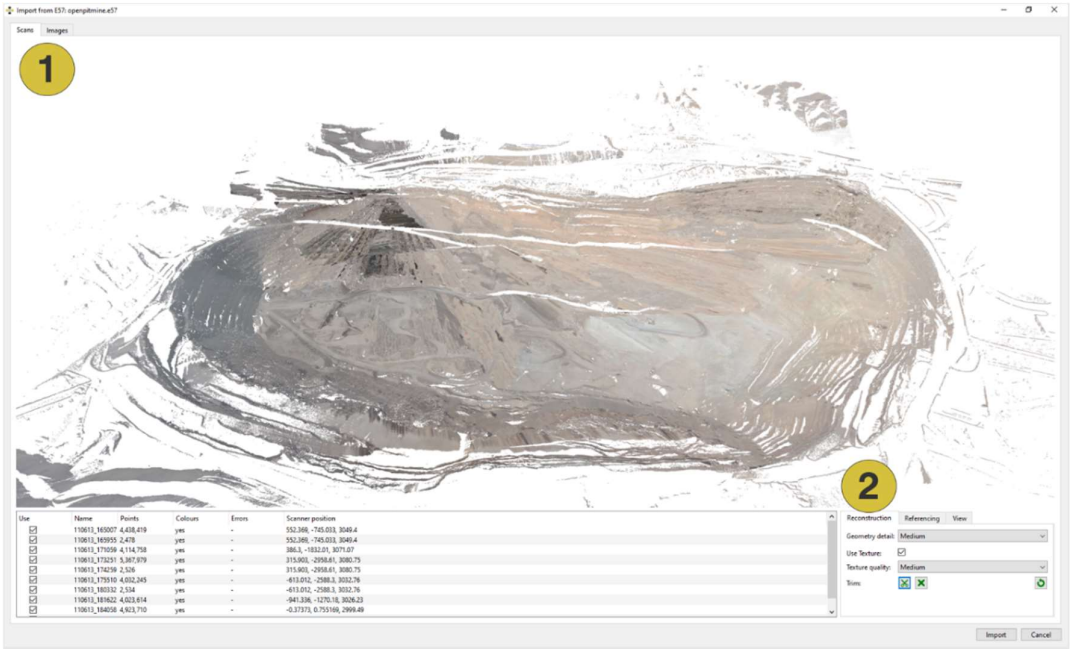
Standard operating procedure

1. Import the 3D data (".e57" file) by using "*File* | *Import 3D model* | *Import from E57"* from the menu bar and choose the file from the directory of your computer.
2. The "*Import E57*" dialog appears requiring the following input in the "*Scans*" tab:
    - Select the scan(s) by enabling the checkbox(es)
    - *Reconstruction* tab (Figure 7):
        - Select the reconstruction mode in the pull-down menu:
          Geometry detail - low, medium, high – defines the mesh resolution to be generated

- Select the texture quality – low medium high in the pull-down menu, if colour and/or images are available with the scan. If there is no information available the corresponding features are inactive and the 3D model will be generated without texture information.
- Trim the point cloud in the 3D viewer by the is use of the provided features:
  - Click the "*Select Region to Trim*" button and enclose the region to delete by dragging the cursor across the 3D point cloud while keeping the left mouse button pressed. Release the mouse button and the selected region is highlighted in red. Delete the desired region by pressing the *"Enter"* key.
  - Click the "Clear Selection" button to delete the selection.
  - Click the "*Restore Point Cloud*" button to keep the original loaded point cloud

- *Referencing* tab (Figure 8):
  - Choose the referencing mode from the pull-down menu. Following options are available:
    - Unreferenced (x, y, z)
    - Referenced (specific co-ordinate system)
    - Referenced (generic E, N, H)
    - Referenced (generic N, E, H)
  - Selection of the co-ordinate system:
    - The referencing modes *Unreferenced (x, y, z), Referenced (generic E, N, H) and Referenced (generic N, E, H)* requires the selection of the unit from the pull-down menu. Millimetre, meter, inch, international food and US-survey foot are available.
    - *Referenced (specific co-ordinate system)* requires the selection of the specific co-ordinate system in the "*Select Co-ordinate Reference System*" dialog
- *View* tab (Figure 9):
  - Checkbox *Point Cloud* hides/shows the imported point cloud in the 3D viewer
  - Checkbox *Bounding Box* hides/shows the extension the point cloud
  - Checkbox *Scanner Positions* hide/shows the scanner position by green pyramids in the 3D viewer
  - The size of the scanner can be adjusted by using the slider *Scanner View Size*

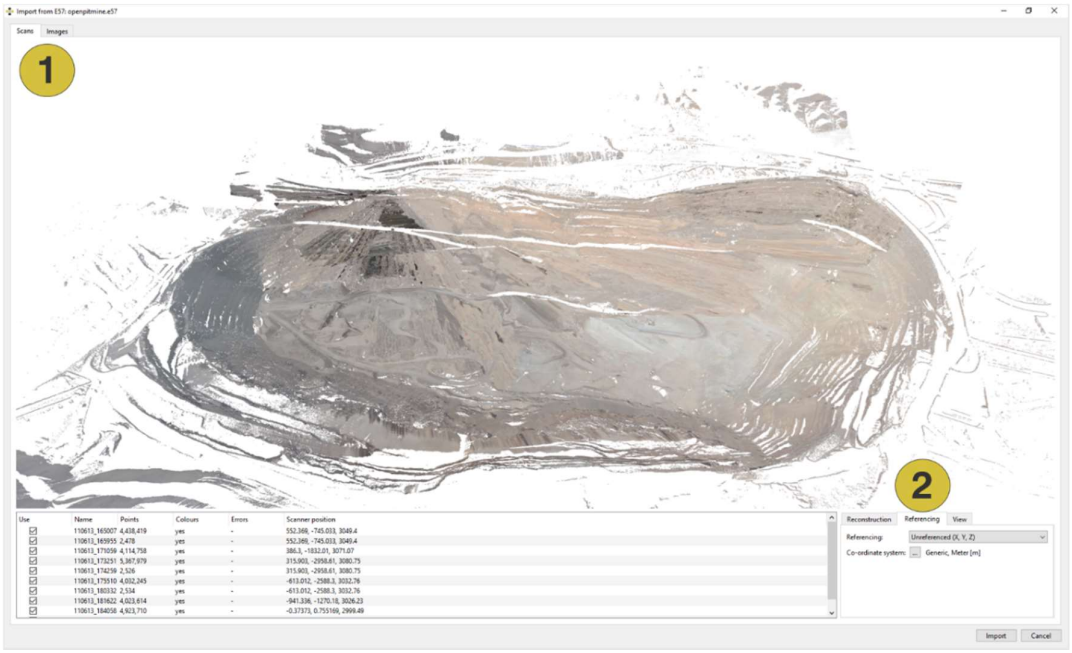
3. If texture information (images) is provided with the import, the images can be inspected in the Images tab (Figure 10)
4. Confirm the conversion by clicking in the "*Import*" button and choose the directory on your computer to save the ".jm3x" file



1 Scans tab – 3D viewer

2 Reconstruction settings

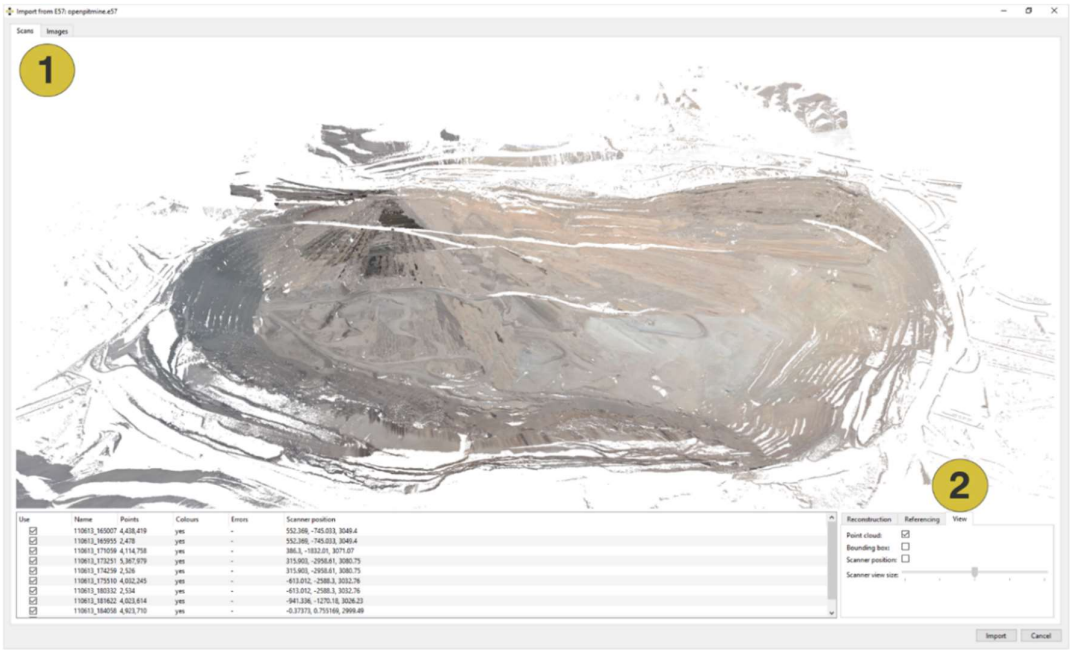
Figure 7: Import from E57 – Reconstruction settings



1 Scans tab – 3D viewer

2 Referencing settings

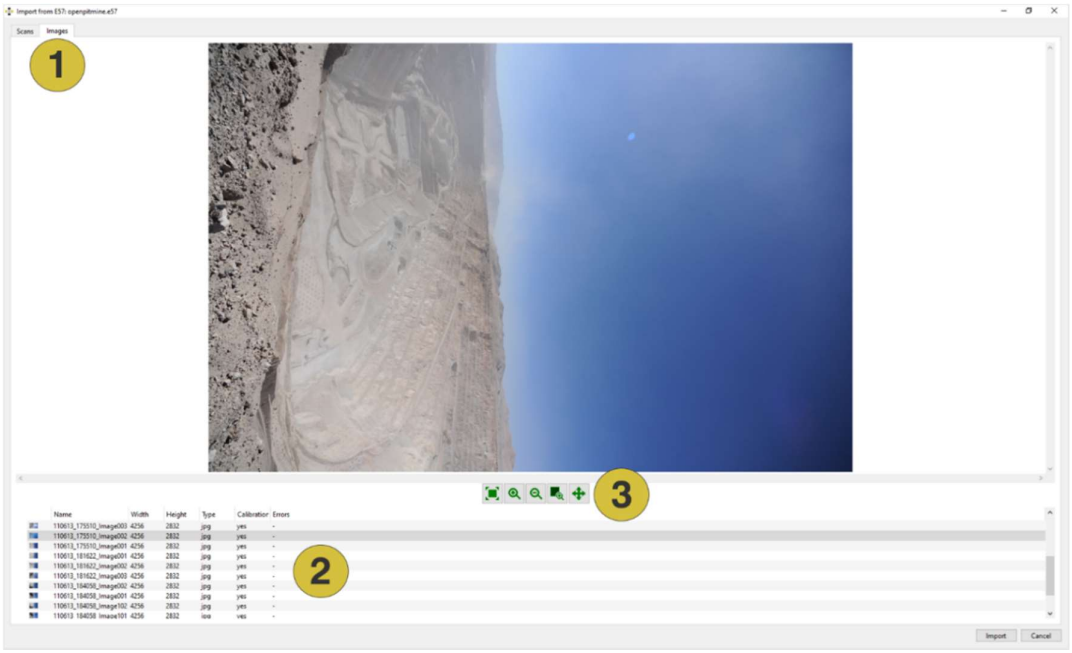
Figure 8: Import from E57 – Referencing settings



1 Scans tab – 3D viewer

2 View settings

Figure 9: Import from E57 – View settings



1 Images tab

2 List of images

3 Navigation bar

Figure 10: Images tab

Navigation bar 2D viewer

The viewer window comprises two scroll bars and five buttons supporting the image display:

Window fit

Fits the size of the image to the size of the viewer

Zoom in

Zooms into the photo

Zoom out

Zooms out of the photo

Zoom to region

Enables to zoom in and out by using the computer mouse

Move

Enables mouse navigation

5 Trimming a 3D model

Standard operating procedure

1. Load 3D model (".jm3x" file) by using "*File* | *Open 3D model"* from the menu bar
2. Click the:
   - "*Trim Mode with Polygon"* button and enclose the region to delete by dragging the cursor across the 3D point cloud while keeping the left mouse button pressed (Figure 11). Release the mouse button and the selected region is highlighted in red (Figure 12).

     OR
   - "*Trim Model with Sphere*" button and mark the region to delete by a sphere. Adapt the size by holding "Shift" and moving the mouse wheel (Figure 11). Release the mouse button and the selected region is highlighted in red (Figure 12).
3. Delete the desired region by pressing the *"Enter"* key (Figure 13). Save the 3D model by clicking *"File* | *Save"* or alternatively *"File* | *Save as"* in the menu bar or use the corresponding icons in the toolbar.

Hints:

- Press "*Shift*" while keeping the left mouse button pressed to draw a straight line.
- Invert the selected area by clicking on the "*Invert Selection*" icon in the *tool bar* or by using the shortcut key "*I"*. Previously unselected points are now highlighted and will be deleted by pressing the *"Enter"* key. See Figure Figure 14 and Figure 15.
- To delete multiple areas at once press "*Ctrl*" between individual selections
- Clear a selection by clicking the "*Escape*" button
- Adjust the orientation of the upward normal vector of the 3D model by a click on the "*Flip Mesh Orientation*" icon in *the menu bar.* The bright side of the 3D models means that the observer faces the upward normal vector shaded side means the upward normal vector points away from the observer.

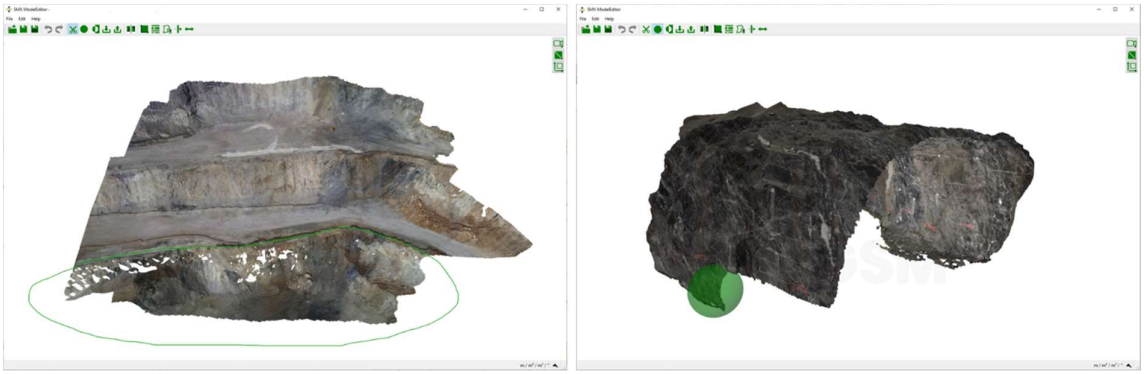


Figure 11: Region to delete. Left: enclosed by a polygon (green solid line). Right: enclosed by a (green) sphere

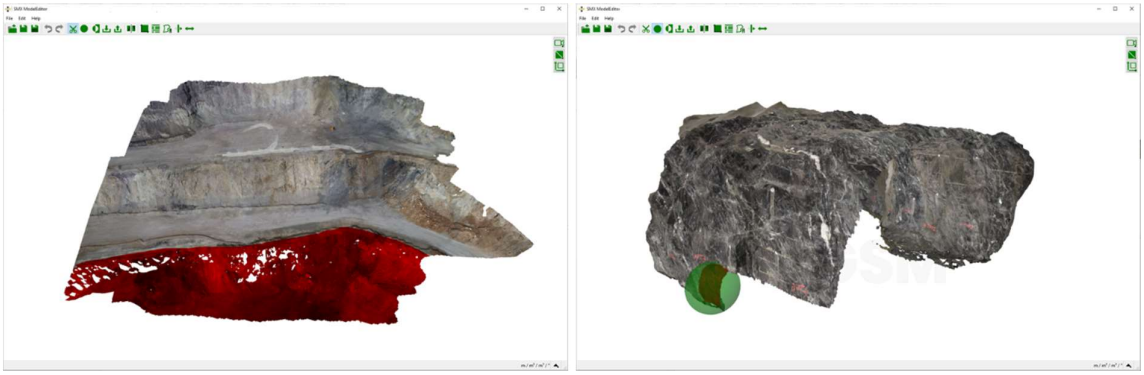


Figure 12: Highlighted region to delete (red)

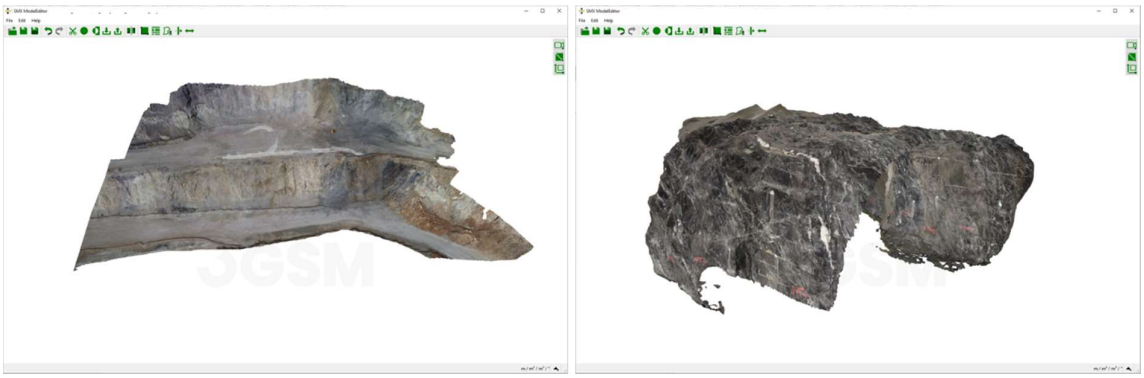


Figure 13: 3D model after deletion of the marked region

Figure 14: Selection of points

Figure 15: Inverted selection of points

6 Alignment of the Reference Plane

The *Reference Plane* is set automatically after 3D model generation as the plane having the mean orientation and position of the 3D model. It is visualized in the 3D viewer by clicking the "*Show Reference Plane*" button. The *Reference Plane* is used as the basis for measurements, e.g. depth colouring in the *Analyst*. The position of the *Reference Plane* can be modified interactively by setting the *Reference Plane* from a user defined region defined directly on the 3D model or from measured co-ordinates (x, y, z or easting, northing, height) and slopes (azimuth and inclination).

Set Reference Plane from Region

1. Click on the "*Set Reference Plane from Selection*" icon in the toolbar and mark a polygonal region on the 3D model. The *Reference Plane* is defined by the set of points enclosed by this region.
2. The *Reference Plane* will be calculated and immediately set after releasing the mouse (see Figure 16).

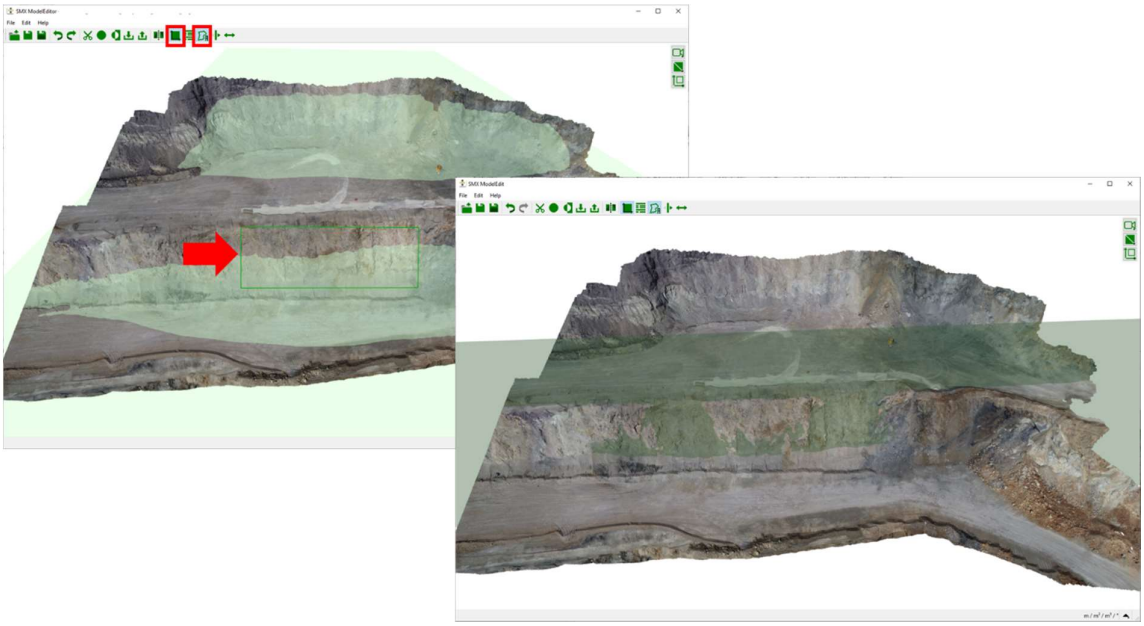


Figure 16: Definition of the Reference Plane: Selection of a polygonal region (left); matching Reference Plane for selected region (right).

Set Reference Plane from co-ordinates

1. Select *"Set Reference Plane"* in the *Tools* pane
2. Enter values for positioning the *Reference Plane* in the appearing dialog (see Figure 17):
    a. inclined plane
        - co-ordinate system (easting, northing, height)
        - slope (dip direction and dip angle)
    b. horizontal plane
        - elevation
        - co-ordinate system (local or global)

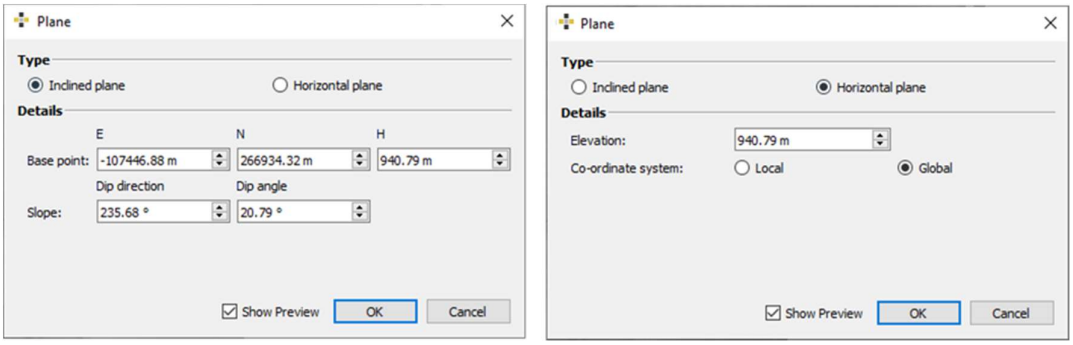


Figure 17: Positioning of the Reference Plane

Adjust Reference Plane

1. If necessary, adjust the orientation of the upward normal vector of the *Reference Plane* by a click on the "*Flip Normal*" icon in the *Tools* pane. The orientation of the normal vector is indicated by a green shading of the *Reference Plane*. Light green shading means that the observer faces the upward normal vector (Figure 18 and Figure 19 left) while dark green shading means the upward normal vector points away from the observer (Figure 18 and Figure 19 right).
2. The *Reference Plane* can be moved by clicking the "*Move Reference Plane"* icon in the menu bar and clicking the desired position on the 3D model.

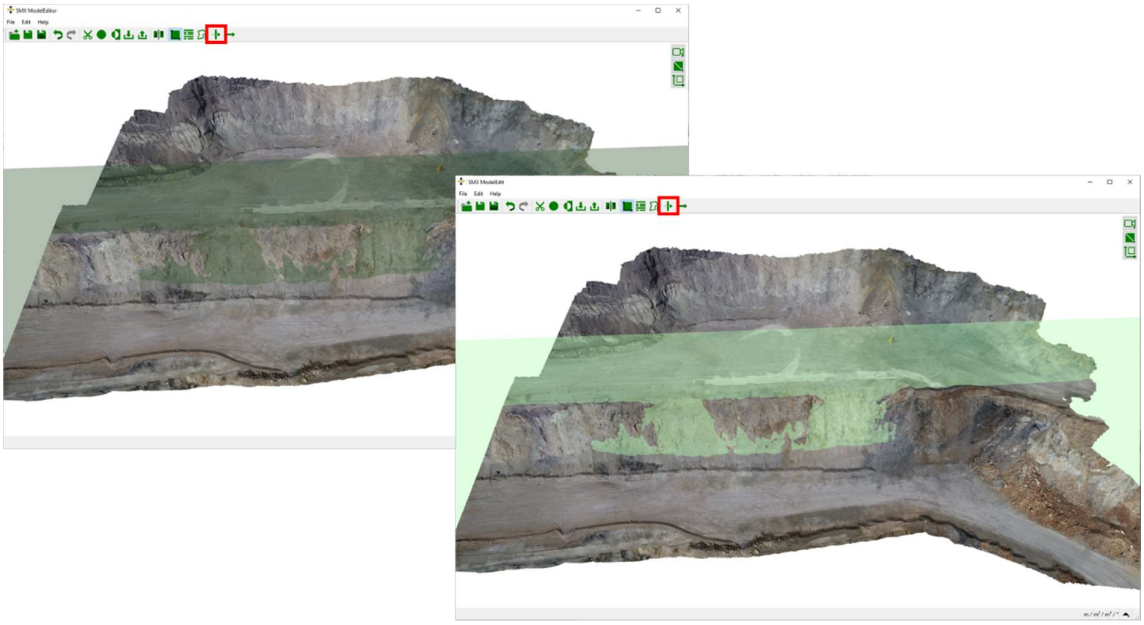


Figure 18: Left: Reference Plane (light green shaded) with the upward normal vector faces the observer. Right: Reference Plane (dark green shaded) with the upward normal vector points away from the observer.

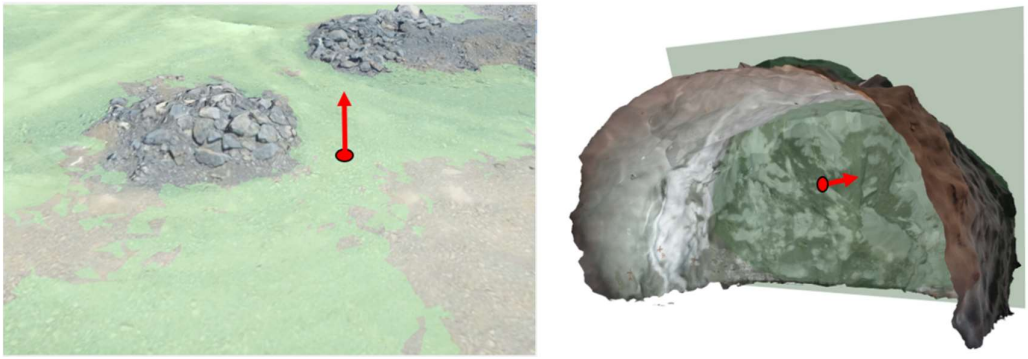


Figure 19: Left: Upward normal vector pointing the physical upward direction in a surface quarry. Right: Upward normal vector pointing in the direction of excavation in a tunnel.