

The background of the entire page is a complex network of thin, light blue lines connecting numerous small, dark blue dots. Some dots are larger than others, and the connections form a web-like structure that fills the entire space.

# EVIXSCAN

SUITE 2.7

User Manual

Software: **eviXscan SUITE 2.5**  
 Version: 2.7  
 Release date: November 2020

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## 1. Introduction

We are pleased to announce the availability of the new version of eviXscan 3D Suite 2.7. eviXscan 3D Suite 2.7 is a comprehensive software platform that delivers the most powerful and user friendly tools for scanning and mesh post-processing within straightforward workflow.

New features in this release were developed to deliver intuitive and efficient user experience thanks to the introduction of new functionality to enable acquisition and post-processing of high-quality scans and exploit at maximum the scanning device capability: HDR scanning mode, scanning wizards, manual alignment, markers remover, smart decimation and more; as well as to the completely rebuilt easy-to-use User Interface.

## Copyrights

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## 2. Installation

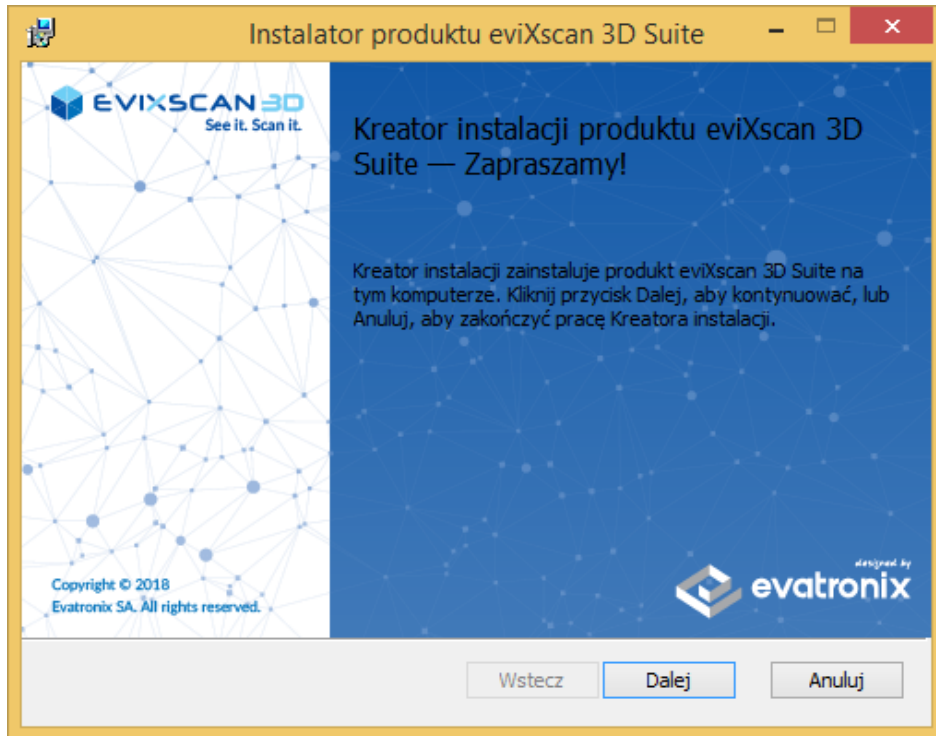
### System requirements

OS	<ul style="list-style-type: none"> <li>- Windows 8</li> <li>- Windows 10</li> <li>- <b>Recommended:</b> Windows 8 and 10 64 bit</li> </ul>
CPU	<ul style="list-style-type: none"> <li>- Intel® and AMD® processors with minimum 2,5 GHz clock speed</li> <li>- <b>Recommended:</b> Multiple core processors. Hyperthreading and clock speeds above 3 GHz can be beneficial, but should be paired with a good balance of cores.</li> </ul>
RAM	<ul style="list-style-type: none"> <li>- Minimum: 8 GB</li> <li>- <b>Recommended:</b> 32+ GB (Based on version of Windows used)</li> </ul>
Hard Disk	<ul style="list-style-type: none"> <li>- 30 GB or more recommended</li> <li>- <b>Recommended:</b> a SSD with more than 256GB</li> </ul>
Display	<ul style="list-style-type: none"> <li>- OpenGL 3.0 or above, 32 bit true color required</li> <li>- Minimum resolution: 1280 x 960</li> <li>- <b>Recommended:</b> resolution: 1920 X 1080 or higher</li> </ul>
GPU	<ul style="list-style-type: none"> <li>- nVidia® GTX 970 or higher</li> <li>- <b>Recommended:</b> nVidia® Quadro P1000 or GTX 1060Ti</li> </ul>

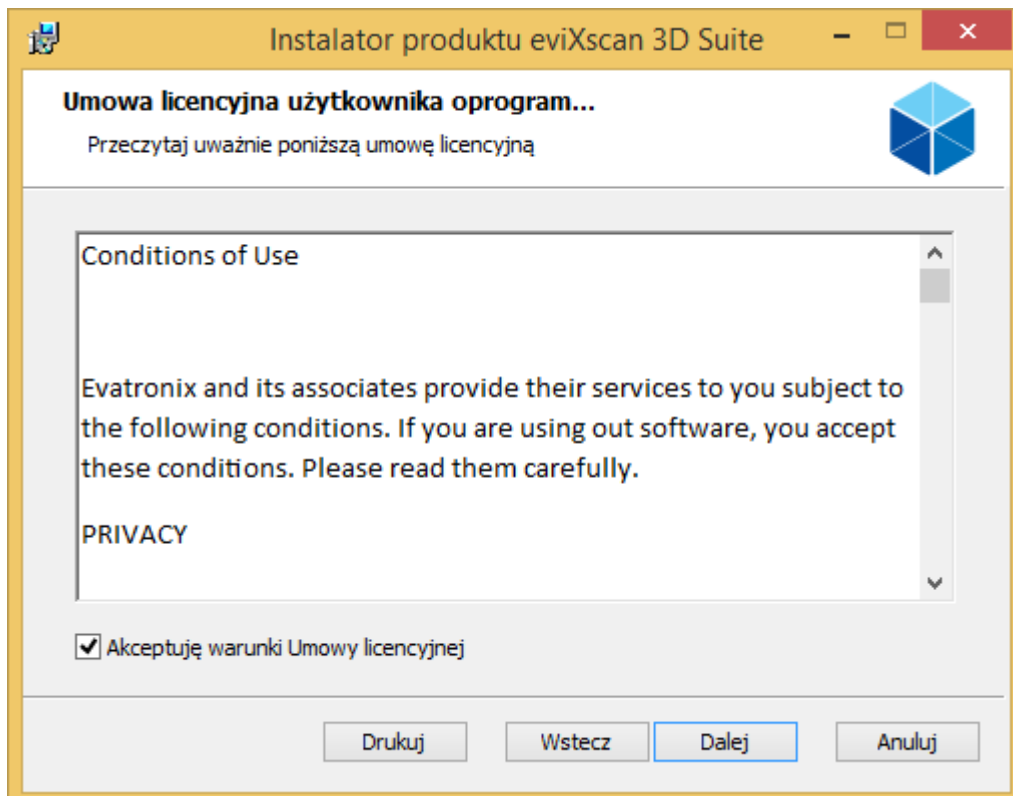
## Installation guide

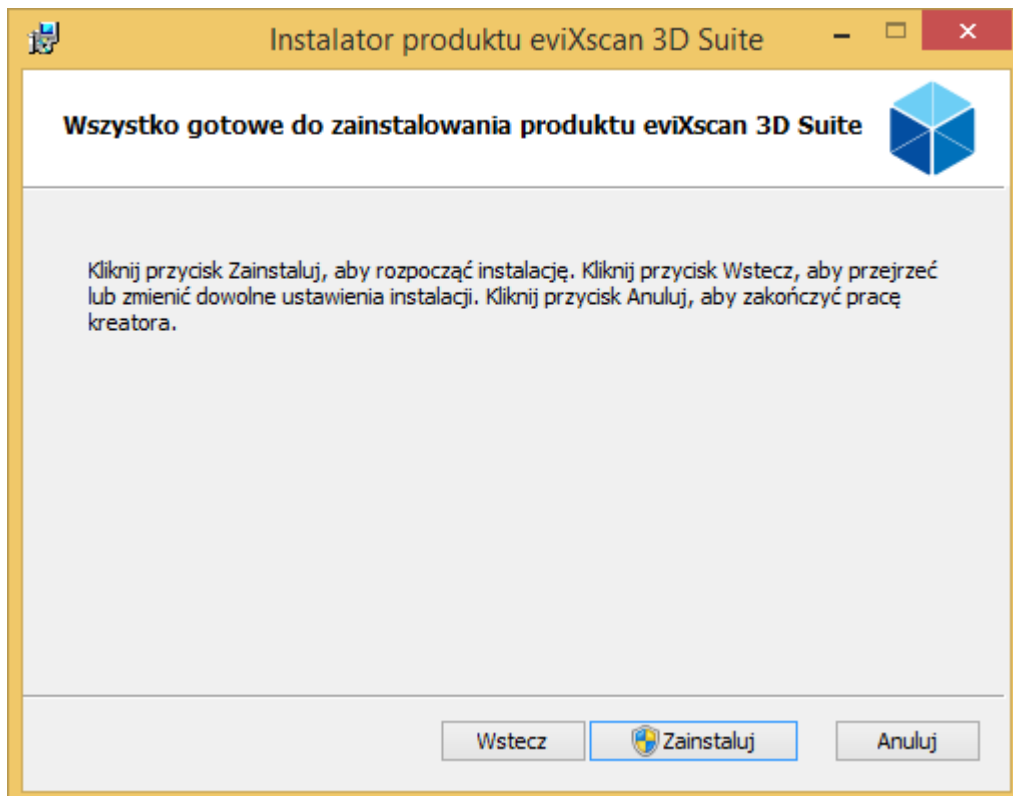
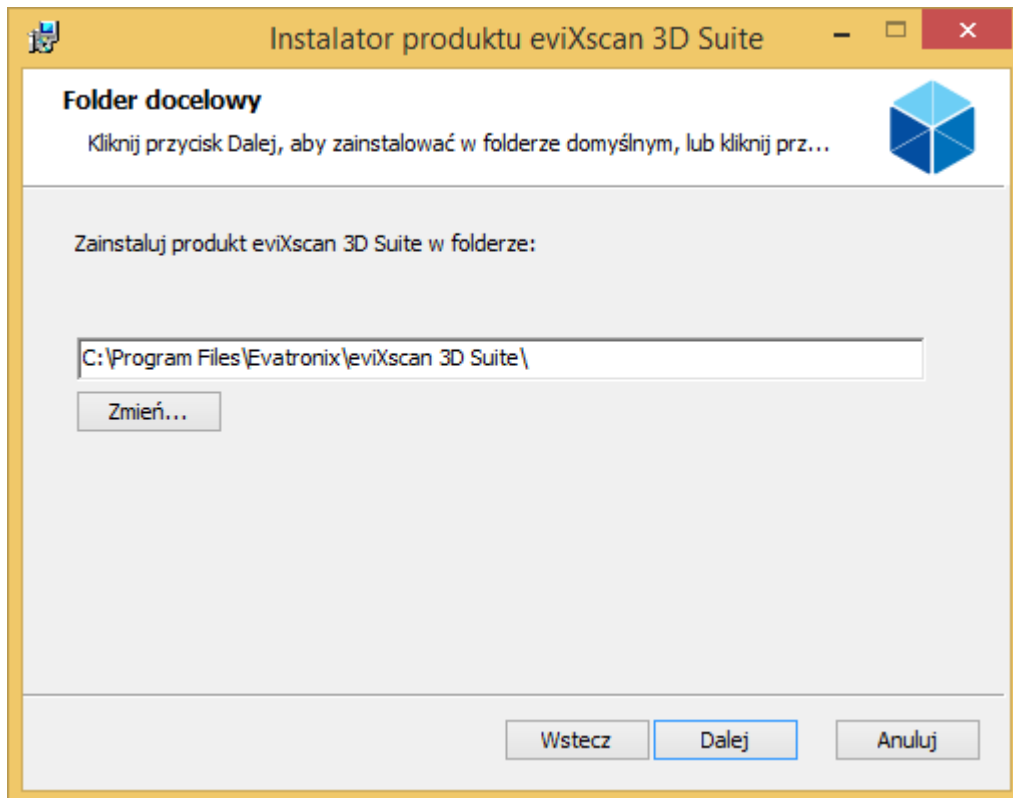
To install the eviXscan software, do the following:

- On the installation media, locate and run the file eviXscan.[version].setup.msi.

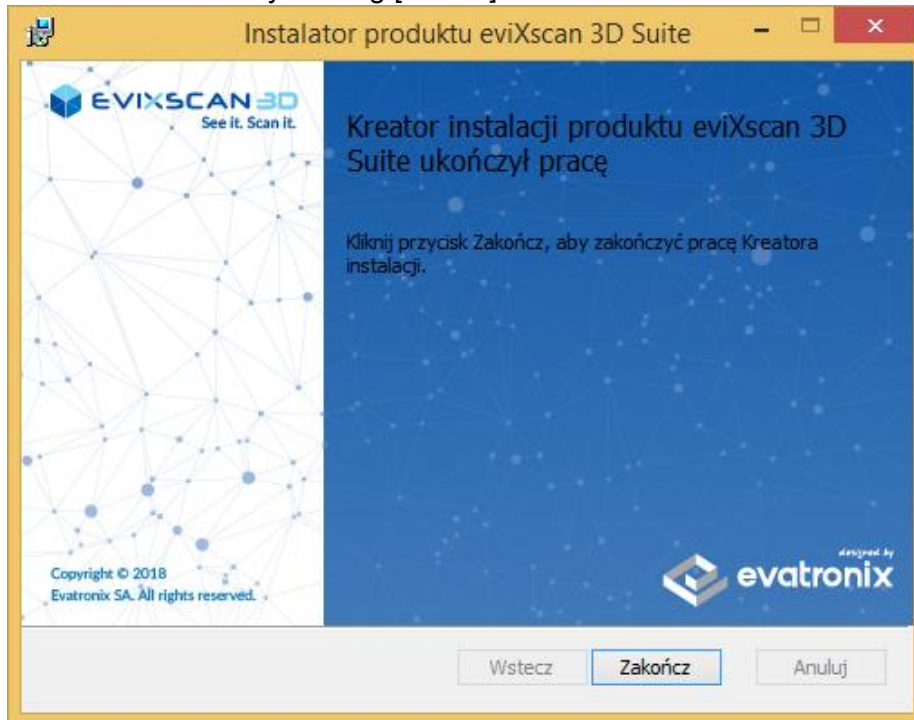


- Accept the installation steps in the wizard by clicking [Next] and confirm by clicking [Install].





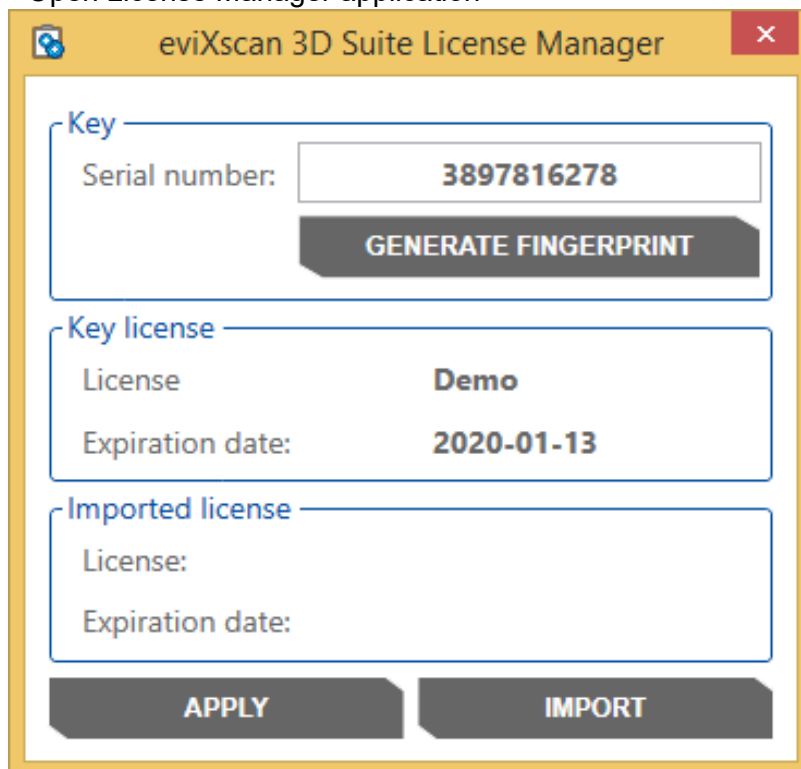
- Close the wizard by clicking **[Finish]**.



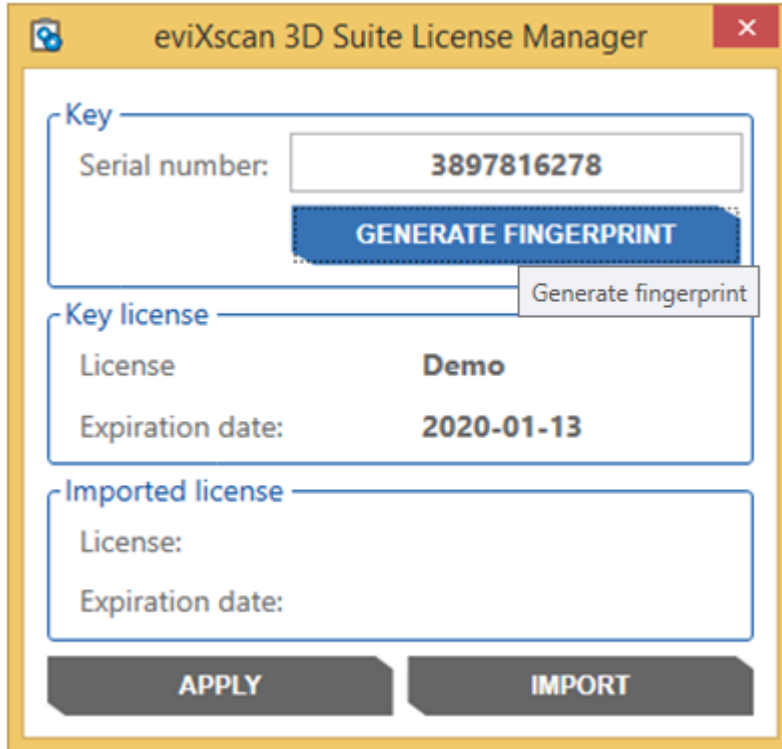
## License activation

For properly work with eviXscan 3D software needs to activate USB hardware key license. That operation can be done following rules described below:

- Connect USB hardware key to USB port
- Open License Manager application



- Click button [**Generate fingerprint**] and save file in suitable location on your local Disk



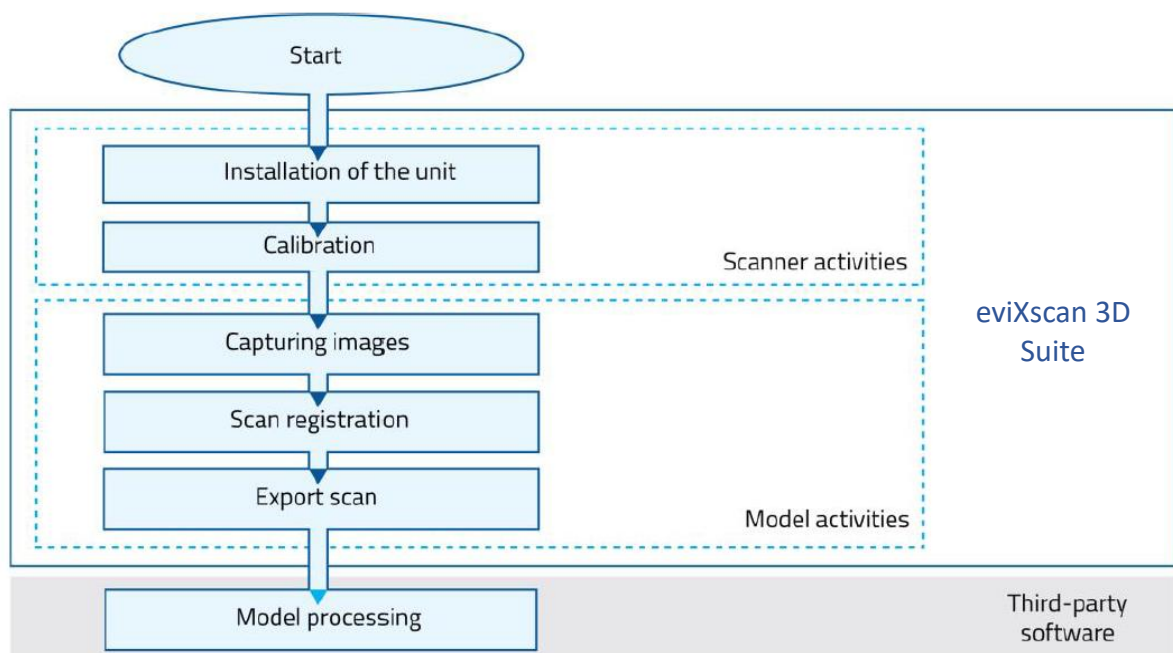
The screenshot shows the 'eviXscan 3D Suite License Manager' window. It features a yellow title bar with a close button. The main content area is divided into three sections: 'Key', 'Key license', and 'Imported license'. The 'Key' section has a 'Serial number' field containing '3897816278' and a blue 'GENERATE FINGERPRINT' button. The 'Key license' section has a 'License' field containing 'Demo' and an 'Expiration date' field containing '2020-01-13'. The 'Imported license' section has empty 'License' and 'Expiration date' fields. At the bottom of the window are two buttons: 'APPLY' and 'IMPORT'.

- Send generated fingerprint file to eviXscan 3D Support Team via e-mail: [support@evixscan3d.com](mailto:support@evixscan3d.com)
- Click button [**Import**] and find .lic file received from Support Team.

### 3. The eviXscan 3D Suite software description

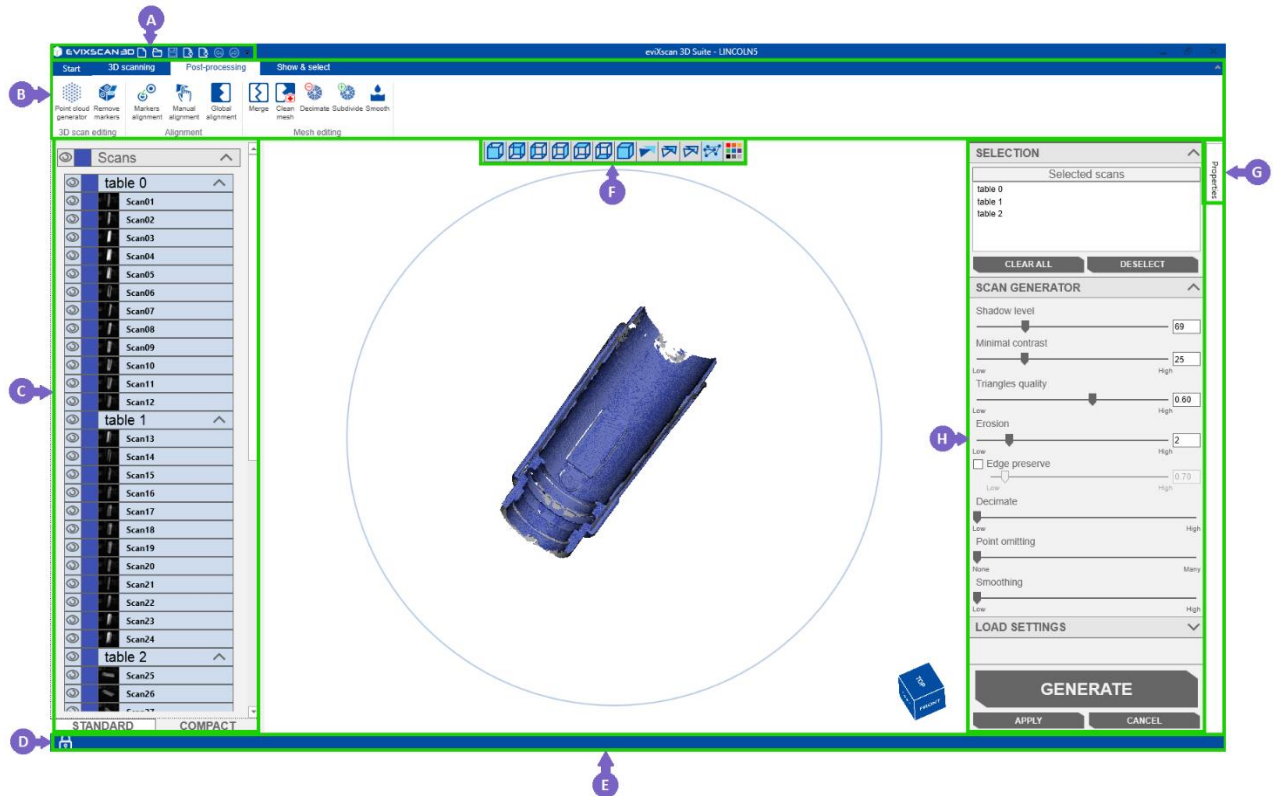
The eviXscan 3D Suite software allows the user to carry out a complete scanning process, from calibration all the way to exporting the scans to a selected file format. The possibilities of the program include:

- Calibration of the optical system.
- Scanning together with the selection of parameters providing the best result.
- Rearrangement of the existing scan with different parameters without having to re-capture images.
- Automatic registration of scans (transformation to a common reference system) using:
  - ❖ rotary table,
  - ❖ artifacts,
  - ❖ markers.
- Exporting scans to one of the following formats:
  - o asc – text 3D point cloud,
  - ❖ bin – binary 3D point cloud,
  - ❖ stl – STL format (STereoLithography file),
  - ❖ ply – PLY format (PoLYgon file format),
  - ❖ obj – OBJ format (geometry definition file format).
- Importing external files in one of the following formats:
  - o asc – text 3D point cloud,
  - ❖ bin – binary 3D point cloud,
  - ❖ stl – STL format (STereoLithography file),
  - ❖ ply – PLY format (PoLYgon file format),
  - ❖ obj – OBJ format (geometry definition file format).
- Align existing files and scans by N-point alignment.
- Clean scans and imported files from noises.



## 4. User Interface overview

### Getting started with new GUI



**A:** [Quick Acces Bar](#)

**D:** [Status Bar](#)

**G:** [Properties](#)

**B:** [Main Tools Ribbon](#)

**E:** [Main Window](#)

**H:** [Action Region](#)

**C:** [Model Tree](#)

**F:** [Viewer Toolbox Bar](#)

eviXScan 3D Suite provides completely new GUI, based on Windows Presentation Foundation (WPF) graphical subsystem. The viewer is clear, intuitive and helpful – user can find the tooltips for every function included in software.

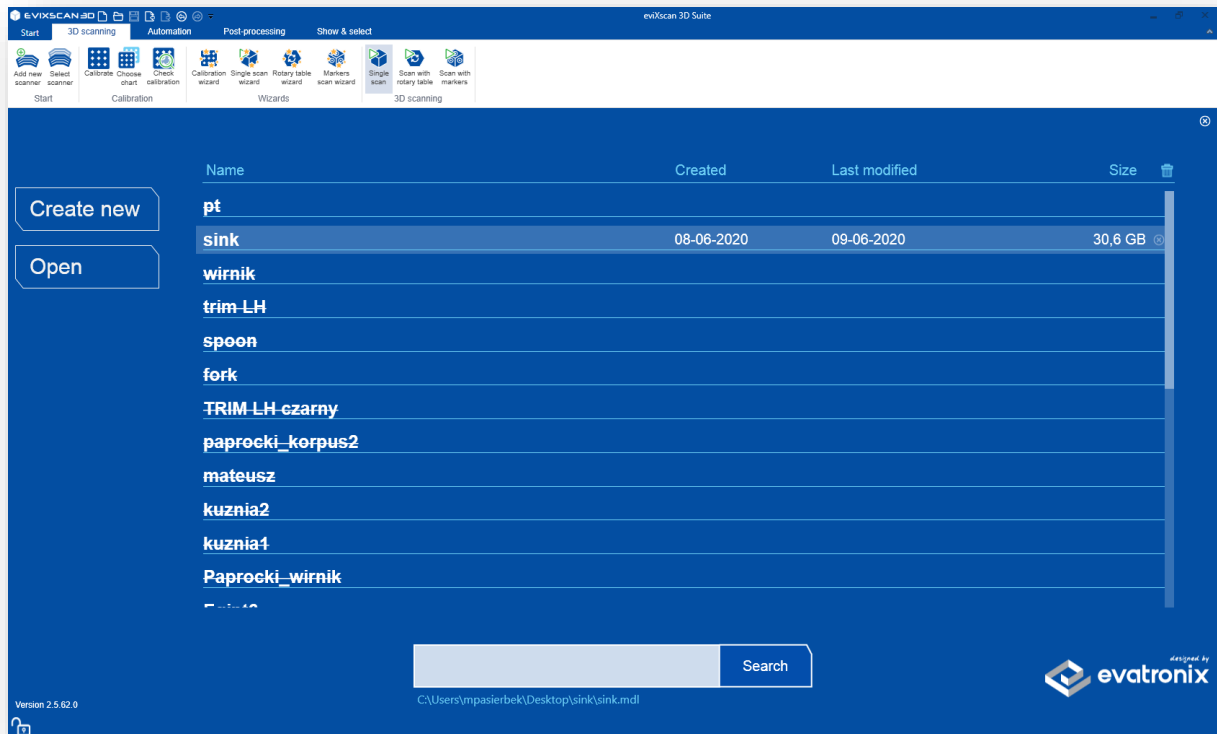
You can launch eviXScan 3D Suite application in one of the following ways:

- using the desktop icon;
- by clicking the Start menu and following the path Start → All Programs → eviXScan 3D → eviXScan2.

Upon the launch you will see splash screen and next completely new Start-up Window.

## Start-up Window

eviXscan 3D Suite provides new Start-up window with several sections:



1. List of last used and modified files,

Name	Created	Last modified	Size	
<b>sink</b>	08-06-2020	08-06-2020	30,6 GB	
<b>wirnik</b>	09-06-2020	09-06-2020	367 MB	
<b>trim LH</b>	09-06-2020	09-06-2020	1,90 GB	
<b>spoon</b>	09-06-2020	09-06-2020	318 B	
<b>fork</b>	09-06-2020	09-06-2020	318 B	
<b>TRIM LH czarny</b>				
<b>paprocki_korpus2</b>	03-06-2020	05-06-2020	24,3 GB	
<b>mateusz</b>	04-06-2020	04-06-2020	19,8 MB	
<b>kuznia2</b>				
<b>kuznia1</b>				
<b>Paprocki_wirnik</b>	03-06-2020	03-06-2020	15,4 GB	
<b>Egipt6</b>				
<b>Egipt5</b>				

## 2. Searching panel



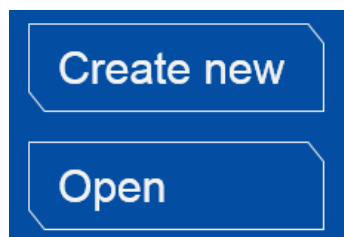
## 3. Information about file location

C:\Users\mpasierbek\Desktop\sink\sink.mdl

## 4. Software version

Version 2.5.62.0

## 5. Create new and Open buttons



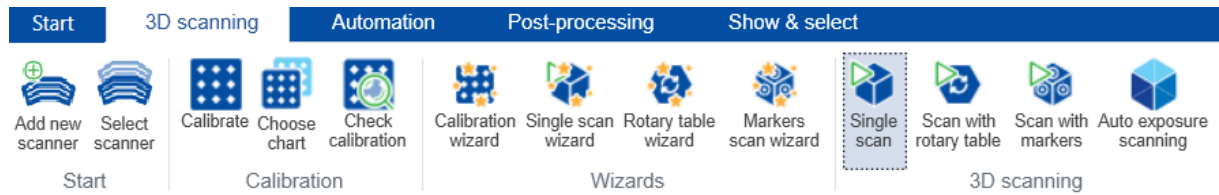
## Quick Access Bar



The **Quick Access Bar** displays information on the current project and basic data management functions. All project management functions are accessible through the **Start Menu**, and key functions can be conveniently accessed through the icons on the Quick Access Bar.

<b>New</b>	Clears all entities and starts a new project
<b>Open</b>	Opens an existing project file
<b>Save</b>	Saves all entities in the model tree into a single project file
<b>Import</b>	Loads data from the file system and adds its entities to the model tree without removing exiting entities
<b>Export</b>	Saves selected entities to various file formats
<b>Undo</b>	Undoes the last operation
<b>Redo</b>	Restores the last undone operation
<b>Customize the toolbar</b>	Allows to modify Quick Access Bar content

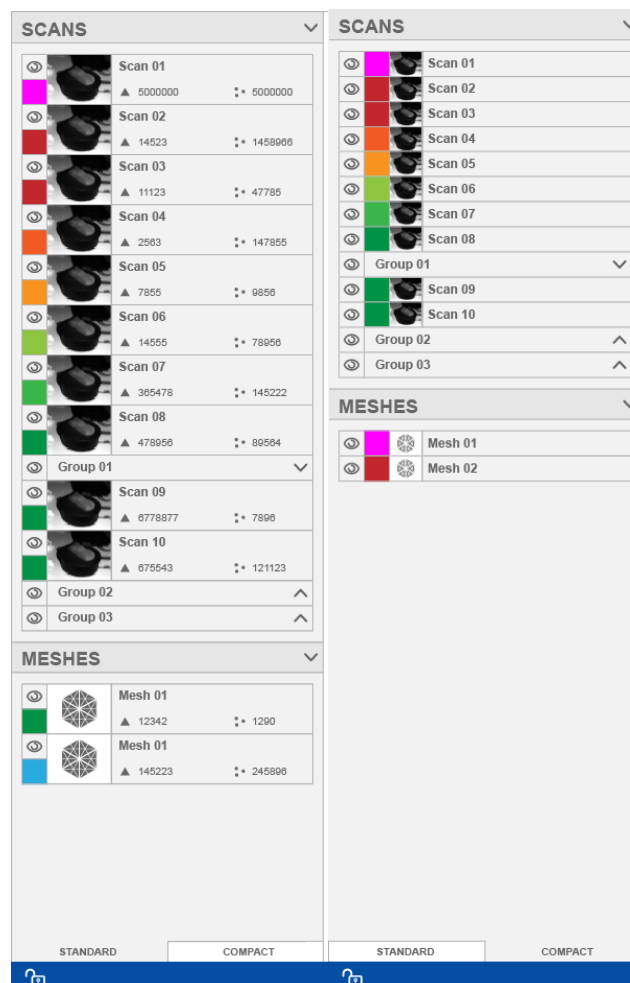
## Main Tools Ribbon



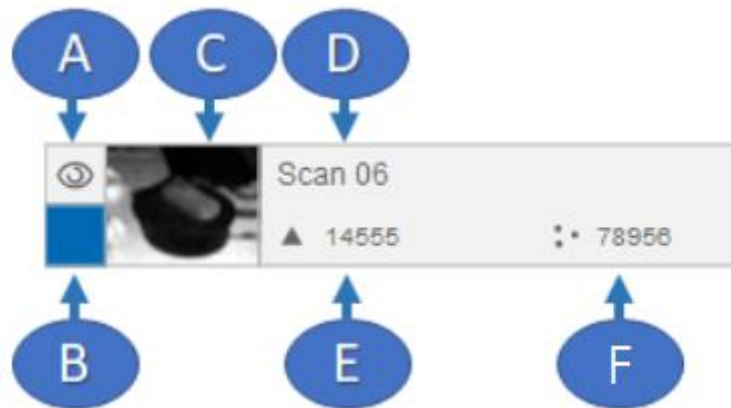
The **Main Tools Ribbon** provides easy access to the main scanning and processing functions in eviXscan 3D Suite. All functionalities and tools are grouped and organized in main ribbons: *Start*, *3D Scanning*, *Post-processing* and *Show & Select*. Each ribbon is arranged intuitively in the order in which tasks would normally be performed, from basic device configuration, initial scanning to post-processing and exporting project data. This simplifies the scanning process and lets focus on project completion.

## Model Tree

Projects contain a variety of data acquired by 3D scanners or your PCs Import function. The **Model Tree** displays data in the current project: scans and imported files. New model tree provides convenient functionalities for data management: change of visibility and color of every scan, screens the information about files in two ways: standard (with basic information about number of points and triangles) and compact, group or ungroup available data.



In Standard mode each scan and mesh contains basic information about a particular entity.



- **A** – Button showing/hiding the scan view in your 3D scans browser,
- **B** – Button for changing colour of selected entity,
- **C** – Left sensor thumbnail view,
- **D** – Name of the entity,
- **E** – Number of triangles in entity,
- **F** – Number of points in entity.

In Compact mode each entity has only information A, B, C, D.

For detailed information on how different groups and entities can be managed easily through the Model Tree, please refer to section Managing Groups and Entities in the Model Tree.

## Status Bar

The **Status Bar** displays useful information such as important project messages, progress for the currently running command or device hardware status.



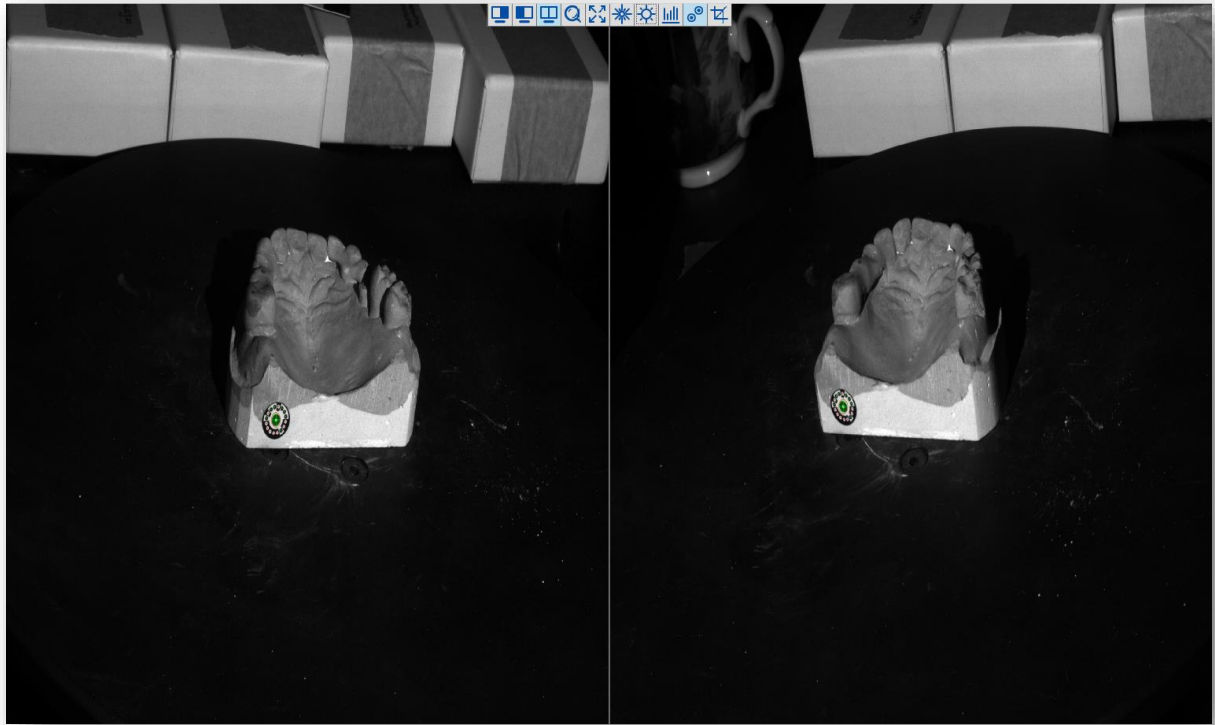
## Main Window

The View section is responsible for the visual representation of data. This section may be in one of the three modes:

- 3D model.
- Scan images.
- Sensor view.

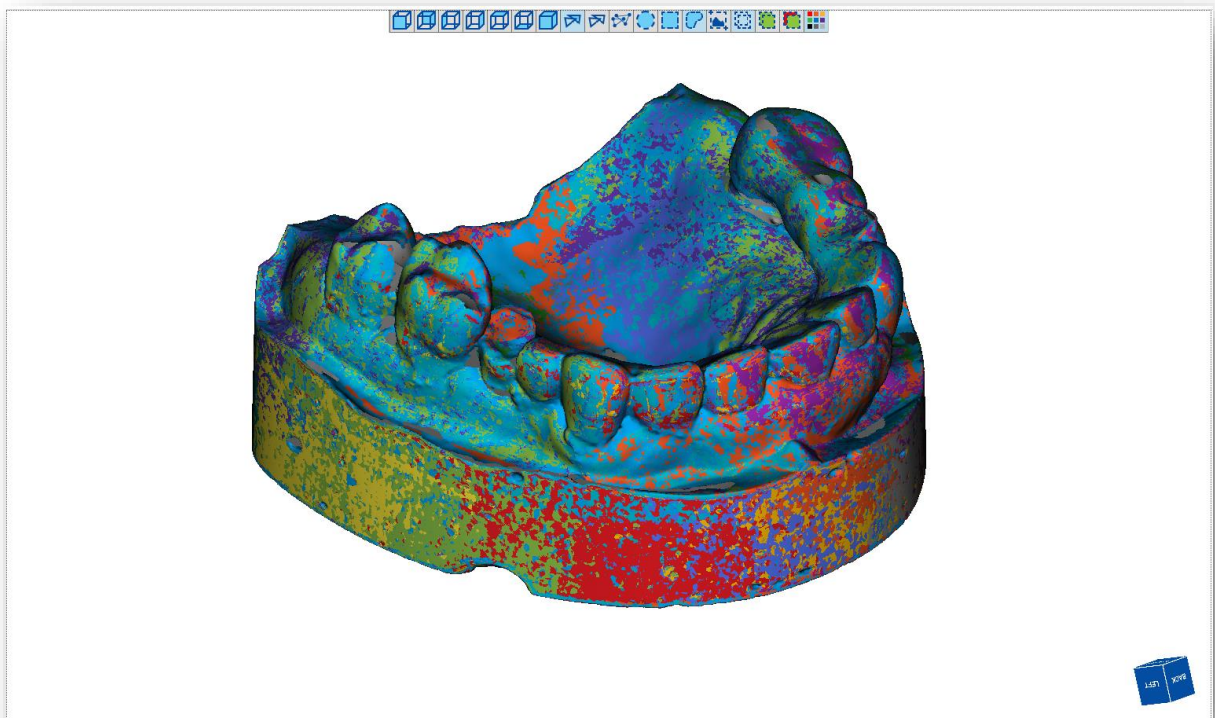
## Camera Preview

The Camera Preview allows for dynamic preview from 3D scanner sensors, making it easier to select the correct values of scanning parameters. With helpful, additional functionalities from Toolbox Bar (under- and overexposed pixels filtering, scanning area selection, markers detection and more) adjustment of the scanning parameters is easy and comfortable.



### ***Mesh Viewer***

The new mesh viewer allows the interaction with scans and meshes – you can observe and judge the quality of 3d scanning and mesh processing results.



Scans can be displayed as a point cloud, mesh (wireframes) and smooth surface in **multicolour mode** or in traditional way (in one colour defined by the user). Every scan can be displayed also in the colour chosen by the user (colour can be changed in Model Tree or in Properties). The viewer allows for interacting with all data included in project editing scans or meshes.

By using the mouse, you can make changes in the position of scans in space. The graphics engine enables:

- Rotate – by holding the right mouse button,
- Move – by holding the middle mouse button,
- Zoom in/zoom out – scroll wheel.

Mesh viewer has additional **Viewer Cube**, which displays the 3D view orientation, and rotates along with the rotation of your project entities.



## Viewer Toolbox Bar

The Sub Toolbox provides a set of commonly used functions such as selecting the entities, displaying options, etc. The content of Toolbox Bar depends on the current viewer status: **Cameras Preview** or **Mesh Viewer**.

### Camera Preview

For Cameras Preview the Toolbox Bar is equipped in following options:



<b>Left Camera</b>	Shows only preview from left camera
<b>Right Camera</b>	Shows only preview from right camera
<b>Multi Cameras</b>	Shows preview from both cameras
<b>Magnifier</b>	Enable magnifier window on camera preview
<b>Zoom</b>	Enable zoom on camera preview
<b>Overexposed pixels</b>	Detects and highlights in red overexposed areas on camera preview
<b>Underexposed pixels</b>	Detects and grayed out underexposed areas on camera preview
<b>Show graphs</b>	Shows graphs with exposure information
<b>Show markers</b>	Shows information and marks detected artifacts on camera preview
<b>Select scanning area</b>	Crops scanning area to required size

For detailed information, please refer to section **Introduction to Toolbox Bar features**.

### Mesh Viewer

For Mesh Viewer the Toolbox Bar is equipped with the following options:

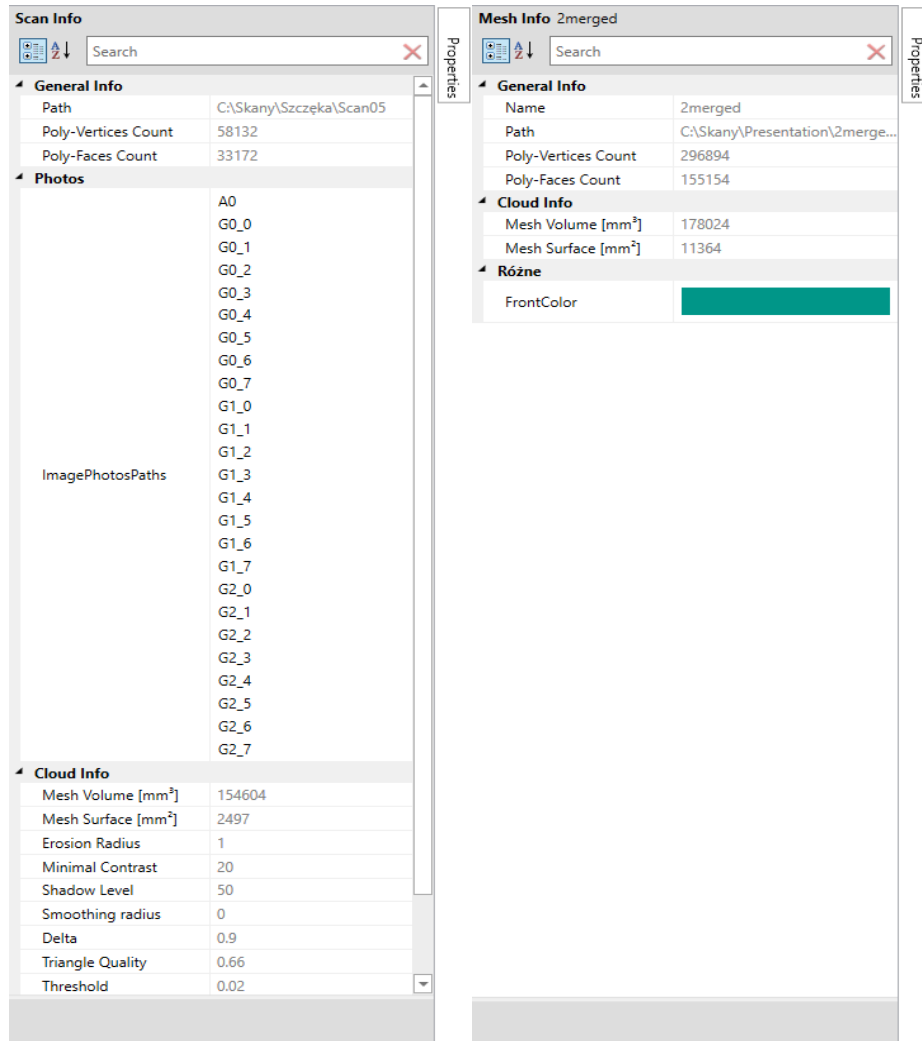


<b>Front</b>	Changes the viewing perspective to the front side of the design
<b>Back</b>	Changes the viewing perspective to the back side of the design
<b>Left</b>	Changes the viewing perspective to the left side of the design
<b>Right</b>	Changes the viewing perspective to the right side of the design
<b>Top</b>	Changes the viewing perspective to the top side of the design
<b>Bottom</b>	Changes the viewing perspective to the bottom side of the design
<b>Isometric</b>	Changes the viewing perspective to the isometric view
<b>Surface type group</b>	Goes to the surface type settings
<b>Show pixels</b>	Shows only pixels
<b>Show points</b>	Shows only points
<b>Show thin wires</b>	Shows thin polygonised wireframes only
<b>Show thick wires</b>	Shows thick polygonised wireframes only
<b>Show surface</b>	Shows polygonised surface only
<b>Triangle smooth</b>	Shows smoothed triangles
<b>Show surface with edges</b>	Shows surfaces with edges
<b>Circle selection mode</b>	Selects entities within a circle drawn on the screen
<b>Rectangle selection mode</b>	Selects entities within a rectangle drawn on the screen
<b>Lasso selection mode</b>	Selects entities within a freehand drawn curve on the screen
<b>Cluster selection mode</b>	Selects entities connected to a selected mesh surface
<b>Select through</b>	Selects all mesh faces through the model from the current view
<b>Select only visible</b>	Selects only visible objects in current view
<b>Select backfaces</b>	Enables the backface selection in <i>Only visible</i> mode
<b>Multicolour mode</b>	Displays every scan or mesh in various colour

For detailed information, please refer to section [Introduction to Toolbox Bar features](#).

### Properties

The Properties region displays the useful information on the selected entity. The content of Properties depends on the type of selected entity (raw scan or imported data). The following information can be found in the property window:



## Scan Properties

<b>General Info</b>	Patch
	Poly-Vertices Count
	Poly-Faces Count
<b>Photos</b>	ImagePhotosPatches
<b>Point Cloud Info</b>	Mesh Volume
	Mesh Surface
	Erosion Radius
	Minimal Contrast
	Shadow Level
	Smoothing Radius
	Edge Preserve
	Triangle Quality
	Decimation (allowable deviation)
<b>Other</b>	Point Omitting
	FrontColour

## Mesh Properties

<b>General Info</b>	Name
	Patch
	Poly-Vertices Count
	Poly-Faces Count
<b>Point Cloud Info</b>	Mesh Volume

	Mesh Surface
Other	FrontColour

### Action Region

The Action Region is a dynamic window – the content depends on actually selected tool/algorithm from Main Tool Ribbon (e.g. Calibration, Scanning with Rotary Table, Point cloud generator, Manual Alignment and more). The Action Region is located on the left side of software window. It can be hidden by calling out Properties region.

PROJECTOR PATTERN ^

Brightness

Distance

CAMERAS EXPOSURE ^

☒ Manual  
☐ Auto  
☒ Grid

8.33

16.67

33.33

66.67

8.33

PROJECTOR BRIGHTNESS ^

100

ADD. SCANNING FEATURES ^

☐ HDR mode

SCAN GENERATOR ^

☒ White object   ☐ Black object

SCAN

SIMPLE

ADVANCED

## 5. Interaction with software

### Mouse control in Mesh Viewer

Button	Action	Description
<b>Left</b>	Double Click	Shows scans and meshes in center of the Viewer
	Drag	Starts selection with current used select tool (rectangle, circle, lasso)
<b>Right</b>	Drag	Rotating the model in 3D view
<b>Scroll wheel</b>	Scroll	Zooms in/out the model in 3D view
	Drag	Translates model in current 2D projection

### Mouse control in Model Tree

Button	Action	Description
<b>Left</b>	Click	Select/deselect entity
	Drag	Allows to move the selected items (into groups)
	Shift + Click	Selects entities consecutively
	Ctrl + Click	Adds entity to selection
<b>Right</b>	Click	Opens context menu
<b>Scroll wheel</b>	Scroll	Scrolls the entities

## Managing groups and entities in Model Tree

The Model Tree is composed of different groups, and each group contains the following 3 types of entities.

<b>Calibration images</b>	Data acquired during Calibration process. Available to preview only in <i>Calibrate</i> manager
<b>Raw scan data</b>	Data acquired and generated during 3D scanning process. It has detailed information about parameters used to generation and can be regenerated every time
<b>Mesh</b>	Data generated from scans in post-processing or imported from external sources

Calibration Images ^

✓ C00

✓ C01

✓ C02

✓ C03

✓ C04

✓ C05

✓ C06

✓ C07

✓ C08

✓ C09

✓ C10

✓ C11

✓ C12

✓ C13

✓ C14

✓ C15

✓ C16

✓ C17

✓ C18

✓ C19

✓ C20

✓ C21

✓ C22

✓ C23

✓ C24

✓ C25

✓ C26

STANDARD

COMPACT

Scans ^

Group 1 v

Group 2 ^

Scan11

Δ 54128

29167

Scan12

Δ 53977

28659

Scan13

Δ 48483

26238

Scan14

Δ 58618

31446

Scan15

Δ 61354

33126

Scan16

Δ 57188

30996

Scan17

Δ 61371

33586

Scan18

Δ 61701

33606

Scan19

Δ 59859

32486

Scan20

Δ 55979

30494

Scan21

Δ 58663

31835

Meshes ^

2merged

Δ 296894

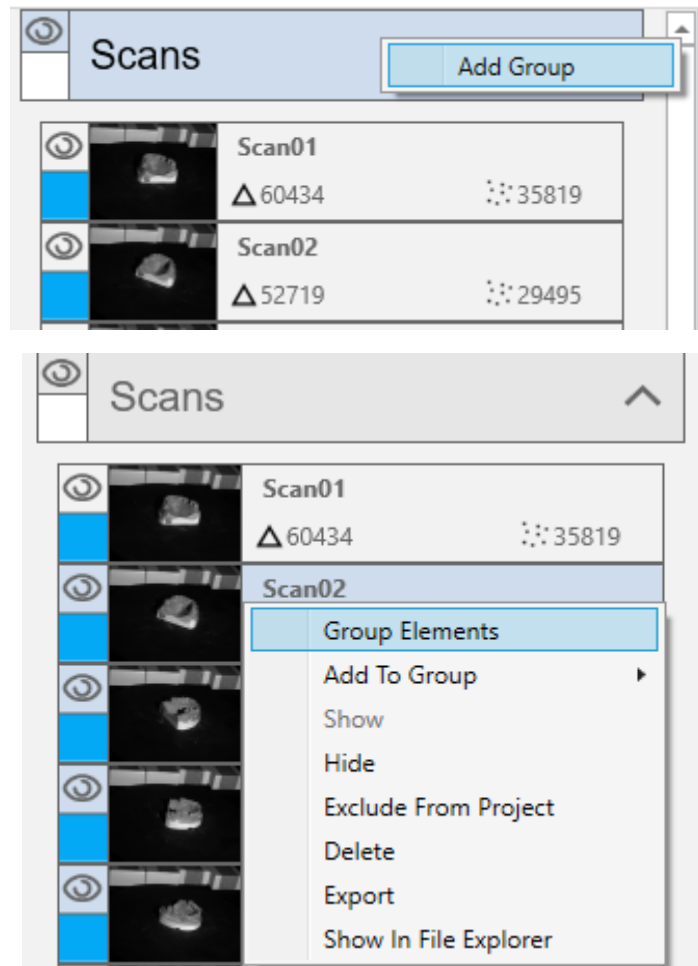
155154

STANDARD

COMPACT

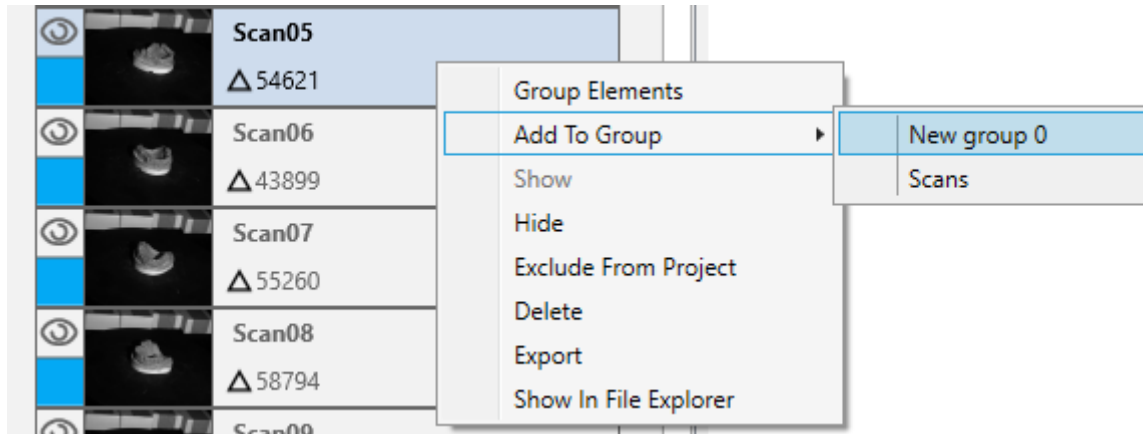
## Default Group

The default Scans and Meshes groups are a built-in group of entities generated automatically when a new project starts. In the main Scans group the user can define new group by clicking RMB (Right Mouse Button) in the area of Model Tree and choosing the command *Add Group*. In another way, user can select variable quantity of scans and from Context menu choose the option *Group Elements*. Also, a new group will be generated automatically when the user defines 3D scanning series with rotary table.



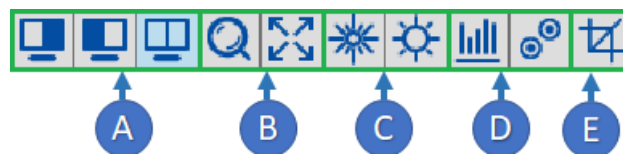
## Moving data between Groups

The data in the Model tree can be moved to another group by using the Context menu (induced by RMB). The user can select variable quantity of the scans from Model Tree and move them to the existing group by the option *Add to Group*.



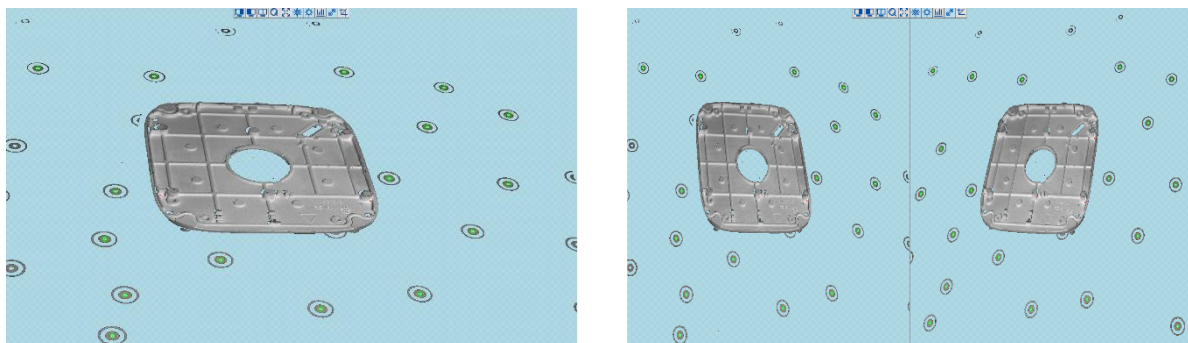
## Introduction to Toolbox Bar features

### 3D scanning preview

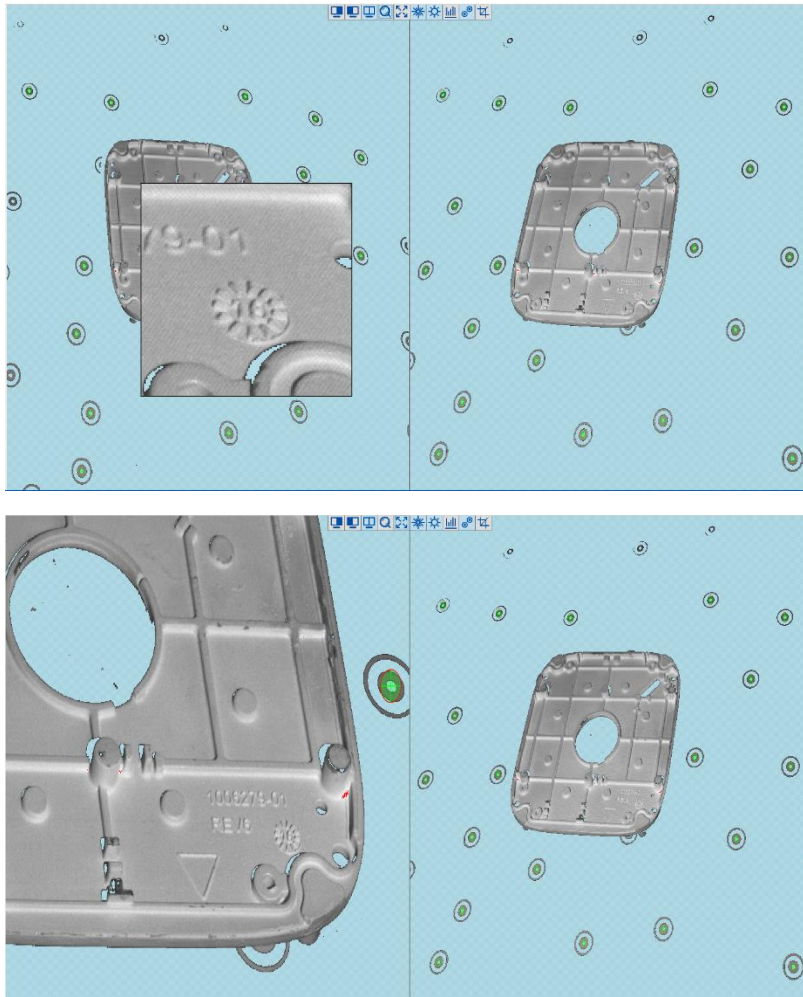


- **A** – Camera preview mode
- **B** – Zooming tools
- **C** – Preview filters
- **D** – Additional scanning entities
- **E** – 3D Scanning Selection Area tool

**Camera preview mode** allows for the optimal selection of cameras preview - from left, right or both cameras.



**Zooming tools** are dedicated to adjust the zoom on the required area and see the details on the preview

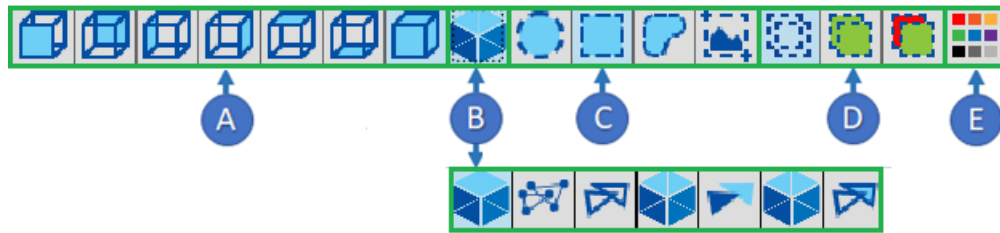


**Preview filters** – allows for filtering the important information about the scanning environment; overexposed and underexposed pixels can be filtered on the live view with clear feedback for 3D scanner operator.

**Additional scanning entities** – in order to better observe the brightness levels in the images, the software enables gradual scaling the **brightness level graph**; marker detector gives clear and intuitive information about correct detection for every target visible on the live preview.

**3D Scanning Selection Area tool** - sets the available scanning area. This is useful when removing the unwanted surfaces data directly on scanning process.

## Mesh viewer



- **A** – Viewpoints
- **B** – Display methods
- **C** – Selection tools
- **D** – Selection methods
- **E** – Multicolour mode

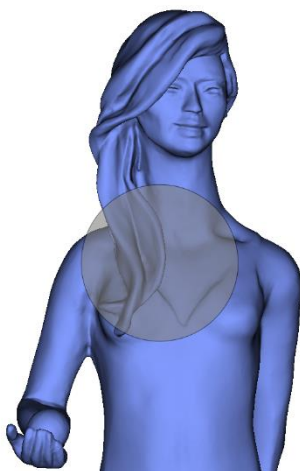
**Viewpoint** functions are used to view model from defined directions, based on the global coordinate system. The different viewpoints can be selected from toolbar or using special hotkeys.

**Display methods** sets the visibility mode of a mesh by utilizing the followings mode types:

- Surface – draws shaded, smooth surface,
- Surface with edges – draws shaded Surface with edges,
- Wireframe – draws only the edges of faces,
- Points – draws only point cloud.

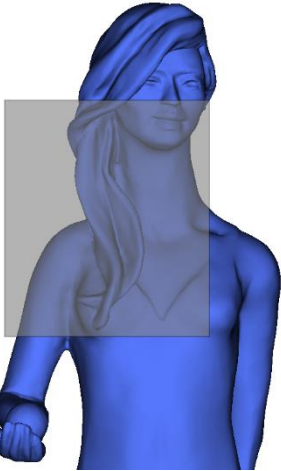
**Selection tools** provides the functionality to select a specific area for editing or removing those entities. The tools provides variety of ways to select:

### *Circle selection*



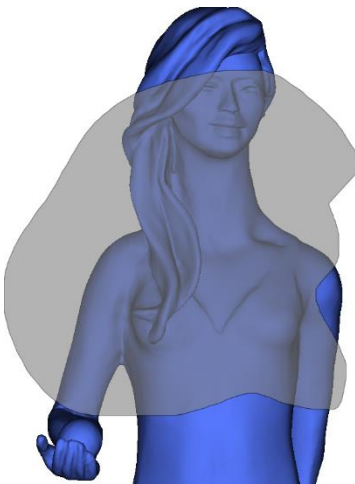
Select all entities within a circle drawn on the screen based on the currently active selection filter. You can define the selection area with the circle tool. Pressing the left mouse button and dragging the mouse defines the selection area. The selection is completed when releasing the left mouse button.

### *Rectangle selection*



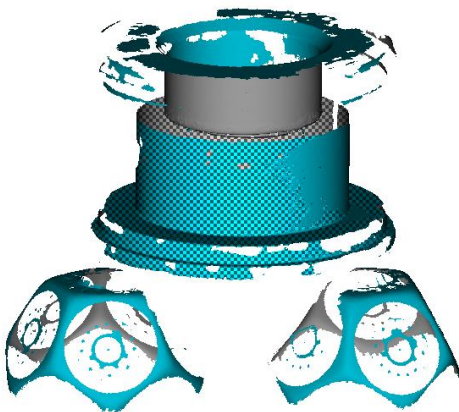
Select all entities within a rectangle drawn on the screen based on the currently active selection filter. You can define the selection area with the rectangle tool. Pressing the left mouse button and dragging the mouse defines the selection area. The selection is completed when releasing the left mouse button.

### *Lasso selection*



Select all entities within a freehand shape drawn on the screen based on the currently active selection filter. You can define the selection area with the lasso tool. Pressing the left mouse button and dragging the mouse defines selection area. The selection is completed when releasing the left mouse button.

### *Cluster selection*



Select all elements by clicking on the area. Pressing the left mouse button determines the selection area. The selection is completed when the left mouse button is released.

**Selection methods** allows for selecting only required data and preventing accidental selection important content.

- Select through – for selecting all data in the selection area (also invisible during selection),
- Select only visible – for selecting only that data, which are visible during the select action,
- Select backfaces – for selecting only visible backfaces during selection.

**Multicolour mode** changes automatically colours of every item in project (scans and meshes) to variable value.



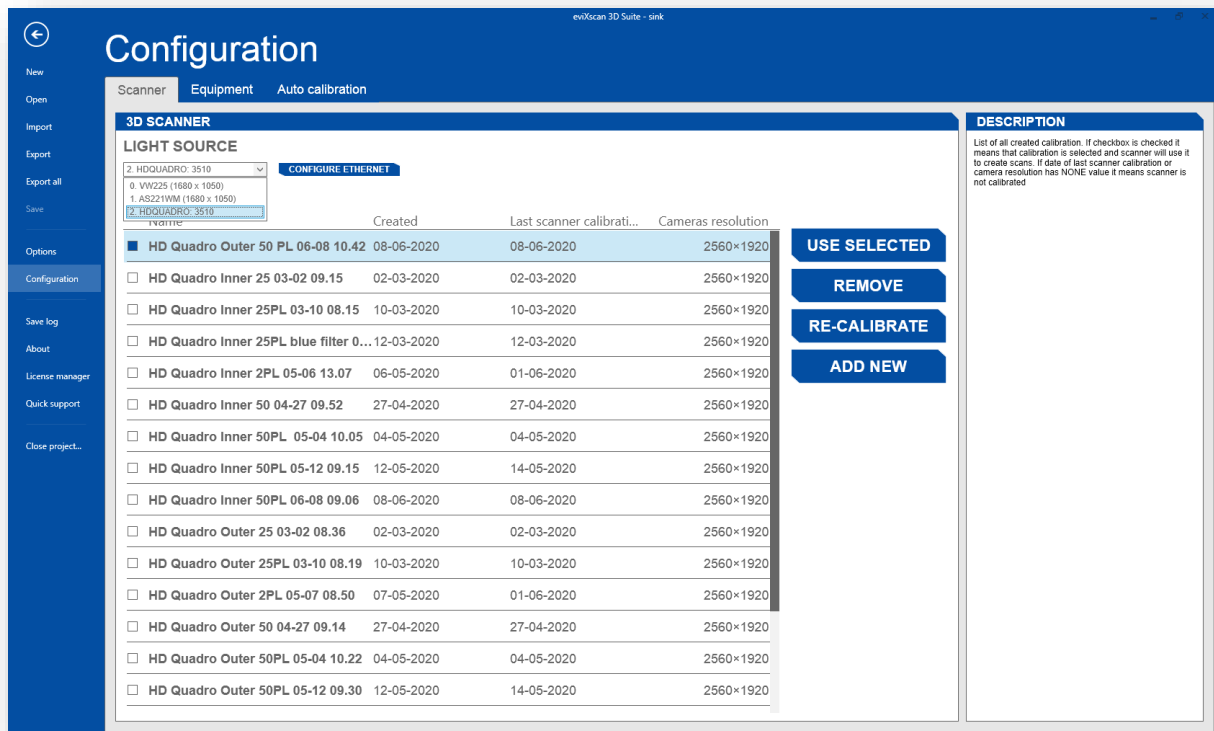
## 6. Configuration process

### Scanner configuration

The scanner configuration in the eviXscan environment is understood as the physical configuration of the device along with its calibration carried out for the optical system. Thus, it is possible to create multiple configurations in the environment on a single physical 3D scanner. The scanner configurations will typically have different calibration of the light path. The software allows opening the configuration of the management window in two ways:

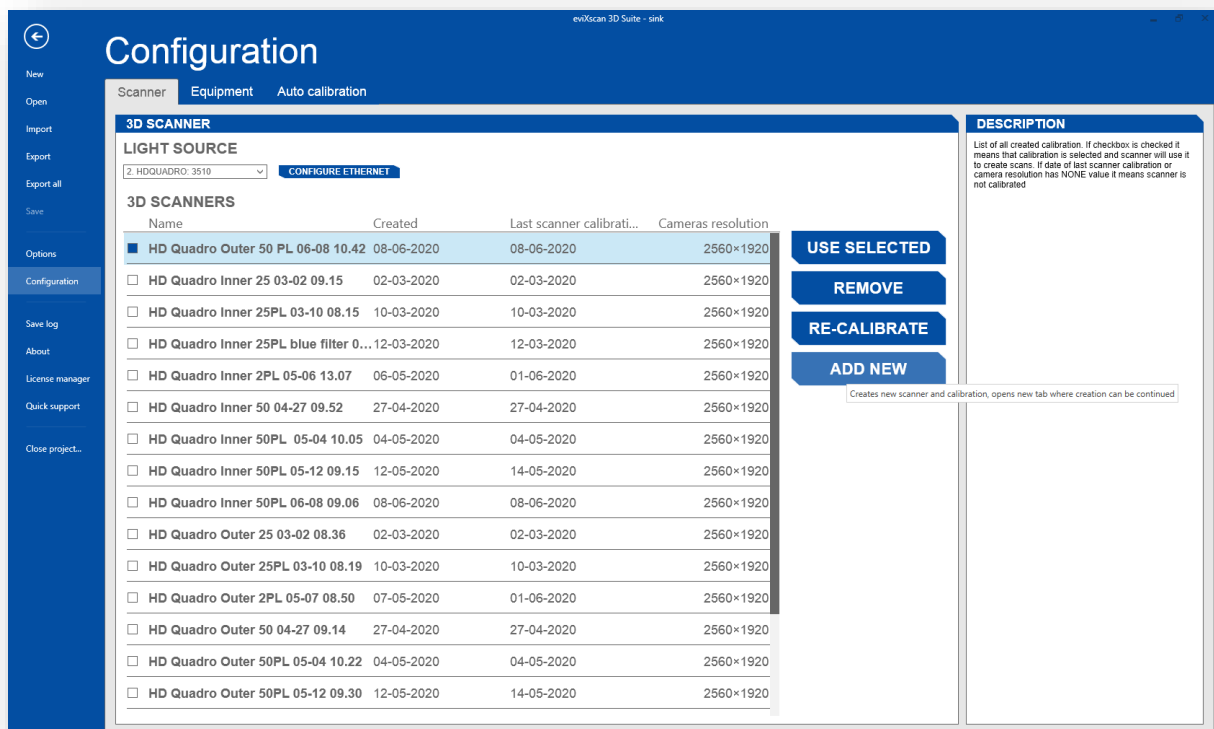
- By selecting the **[Start] -> [Configuration] -> [Scanner]** in the ribbon tab
- By selecting the button **[Add new scanner]** for new configuration or **[Select scanner]** for current existing configuration

In **Configuration** window user can manage the existing scanners or create a new configuration. In the first step, the user has to select correct **light source** from list. In next step, user can choose the configuration created in past or add new.

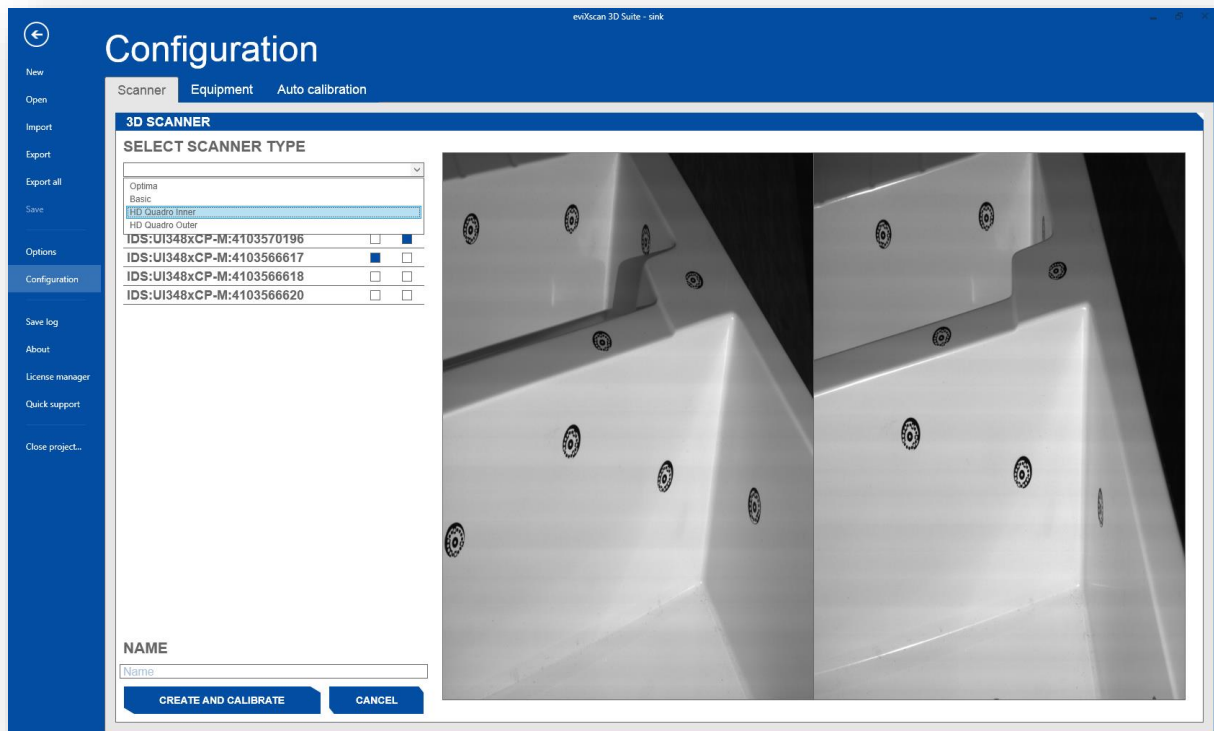


In the next step, the user can choose the configuration created in past or add new one.

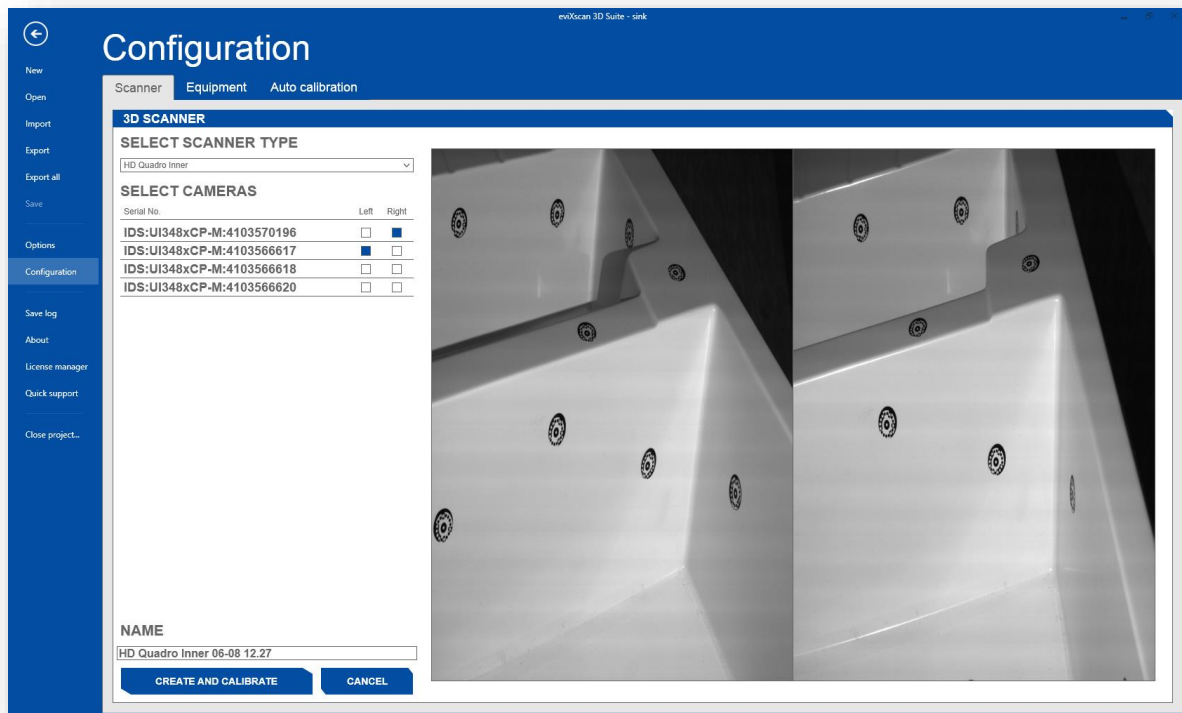
During the creation of the new configuration, the first step is choosing the **Add new** button:



After that step, the software goes to a further step and opens the cameras configuration window. The user has to define the scanner type from the list and choose cameras for the left and right sensor.



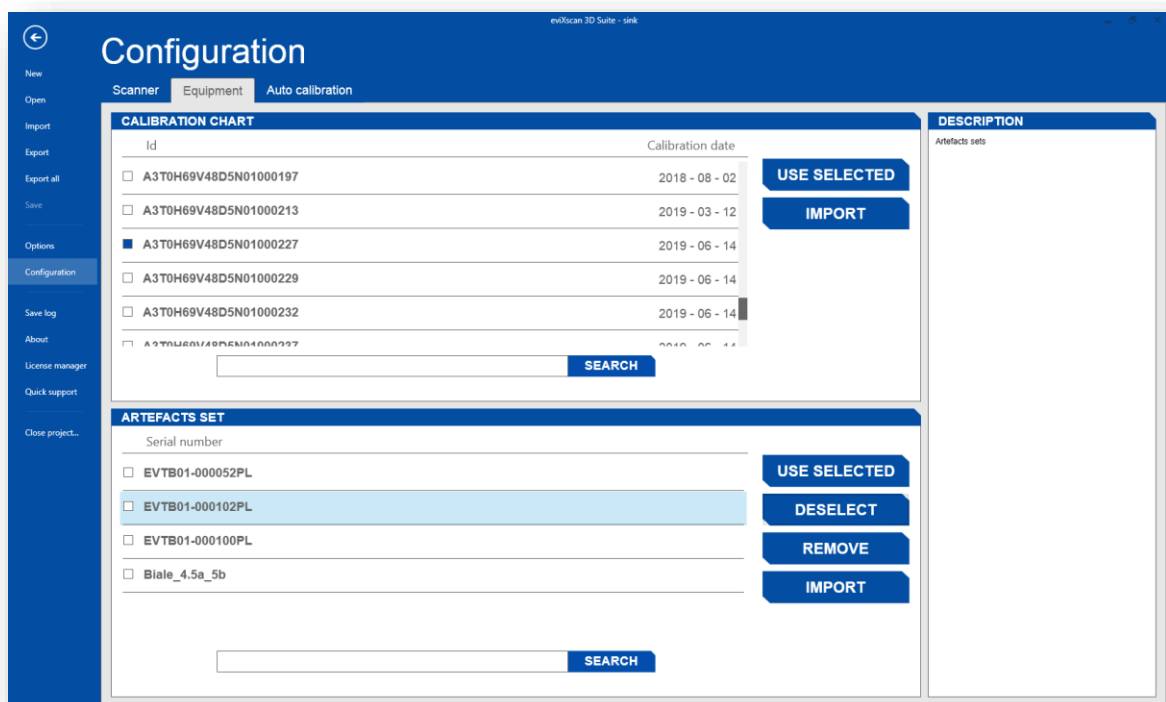
The cameras can be determined by comparing their serial numbers. The camera with the lowest number is the left camera of the outer range. The camera with the highest number is the right camera on the outer range. The other two cameras belong to the inner range and accordingly the one with the lower number is left and one with a higher number is the right one. By the left/right camera we understand the sensor located on the left/right side of the light source (standing behind the scanner). If the sensors were used in a recently added scanner, the software would adapt them to the sides in the configuration identical to the recently added configuration. Always be sure that the sensor is assigned to the correct side. The left side means that from the perspective of the light source, the sensor is on the left side of the light source, and the right one is on the right.



After selecting the appropriate sensors, click **[Create and calibrate]**, then the configuration will be added to the list and receive a name with the selected scanner type and date of creation. The created configuration will be set as active. The camera selection window will be closed automatically.

## Artifacts and Calibration chart

In ribbon **[Equipment]** the user can define the default Artifact Sets and Calibration chart.

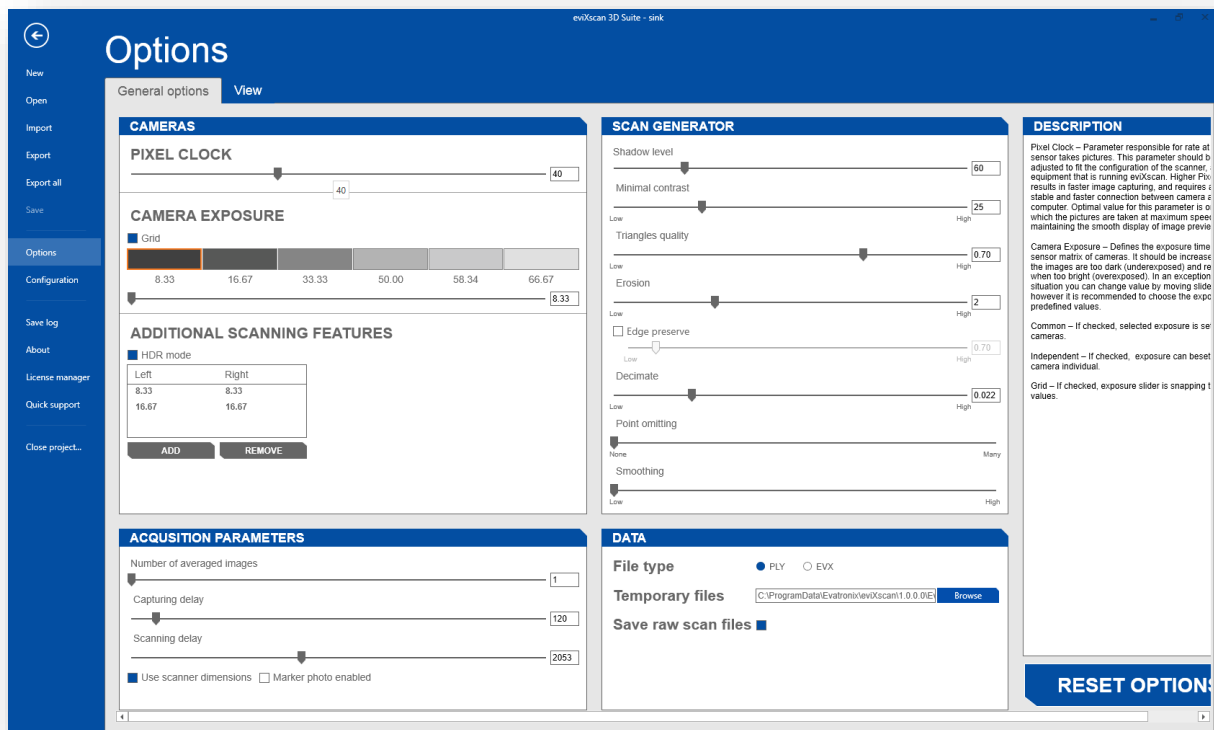


The Calibration Chart and Artifacts have a unique calibration file dedicated for a particular set. To add a new calibration chart and artifact reference file to the software, select **[Import]** button. To define which file needs to be used, select the required file and click the button **[Use selected]**.

## Default scanning parameters

In **[Options]** menu, located in **[Start]** ribbon, the user can define default parameters responsible for scanning process. The parameters are divided into four categories:

- Cameras – options managed the cameras settings (pixelclock, default exposure time level)
- Acquisition – stewardship the process of image acquisition
- Scan generator – managing the point cloud/mesh generation
- Data – selection of the input data type and basic location of the temporary project



## Cameras

That section provides the possibilities to set the parameters for camera sensors, responsible for properly functioning data flow to PC.

- **Pixel clock** – this parameter is responsible for the rate at which the sensor takes pictures. This parameter should be adjusted to fit the configuration of the scanner. Higher PixelClock results in faster image capture and requires a more stable and faster connection between the computer and the cameras.
- **Camera Exposure** - this parameter defines the time of the exposure of the sensor matrix. It should be increased when the images are too dark (underexposed) and reduced when they are too bright (overexposed). In an exceptional situation you can change the value by moving a slider, however it is recommended to choose the exposure from predefined values on buttons.

## Acquisition Parameters

- **Number of averaged images** This parameter can be changed in the range of [1 – 10]. It represents the number of averaged images to eliminate noise of the sensor matrix. Increasing the number of averaged images will cause a longer scan acquisition time but will reduce the impact of temperature from the cameras noise on the accuracy of scanning.
- **Capture delay** – the delay in milliseconds used while capturing the base images. For delay equal to 100 ms and 21 base images, the entire scanning process will not take less than 2.1 second. If you select the delay time that is too short, some images may show the object illuminated by the previous pattern. Increasing the parameter extends the time it takes to acquire the images.
- **Scanning delay** - This parameter can be changed in the range on 0 – 5000 [ms]. When scanning by using the peripheral devices (e.g. rotary table), you can set a delay between the end of the device's movement and commencement of scanning in order to stabilize the position of the scanned object.
- **Use scanner dimensions** – if checked, the software generates the mesh only on the calibrated area.
- **Marker photo enabled** – with that option the scanner capture additional photo on low exposure time especially dedicated to the correct markers detection. It is dedicated specially to scanning the objects which require the high light intensity and the high level of exposure time.

## Scan Generator

In this section you will find all the settings used to generate the scans, both during the scanning stage and while re-generating the scan. The layout of this section depends on the application's status

- **Shadow level** - can be varied in the range [0-200]. It is used mainly for cutting out the areas that are too dark in the image while analyzing the images from the sensors, so that the output scan is free of some of the noise, points that do not belong to in the scanned model, or are not sufficiently visible. All of the spots in the image whose brightness is lower than the shade level are recognized as a shadow, and thus will not be analyzed while generating a 3D scan. The default value for this parameter is 60.
- **Minimal contrast** - this parameter can be changed in the range of [0 – 100]. It is the difference of brightness levels for a series of images, below which the program recognizes the point as incorrect. Lowering this parameter can cause better coverage of the scanned object by the point cloud, but also can increase the noises.
- **Erosion** - most of the inaccuracies and noise in the scan occurs on the scan boundaries, so the software enables the gradual erosion of the scan's edges to speed up and facilitate the scan processing. The radius of erosion can be varied in the range [1 - 7], wherein the parameter 1 is one mm erosion from the boundary, and 7 - the maximum erosion. The erosion works on all edges of the scan, so if there are openings in the scan, they will be expanded. This parameter should be chosen according to the current needs.
- **Edge preserve** – the parameter, which is responsible for removing not properly generated points on edges. Increasing the value will cause the decreasing of the cutoff wrong points. Decreasing the value should be provided only when the edges are not generated properly. Too low value will lead to removal of proper points also. The recommended value is 0.70
- **Decimation** – that parameter is useful to decrease the number of the mesh points while preserving the accuracy. The adjustable value is the level of the allowable deviation in comparison to the original, raw data. The range of the parameter is from 0.00 mm to 0.10 mm. The value, which can reduce the number of triangles above 60% is 0.02 and

it is recommended for good ratio between the scan accuracy and the level of decimation.

- **Point omitting** – the parameter is responsible for the decreasing the generated points on the mesh. In accordance to Decimation, that algorithm decreases number of points without constrains on the accuracy and avoiding certain columns of points in during generation.
- **Smoothing** - gradual smoothing of the output point cloud of the scanned object. This parameter may be varied in the range [0 - 2], wherein 0 means no smoothing, and 2 is the maximum smoothing. Smoothing may be a useful tool as it allows the elimination of some of the noise appearing on the surface of the scan, resulting e.g. from the noise in the sensor matrices or the roughness on the object. It should be noted here that during the smoothing operation, the level of detail of the scan is reduced, so this parameter should be selected according to the current needs.

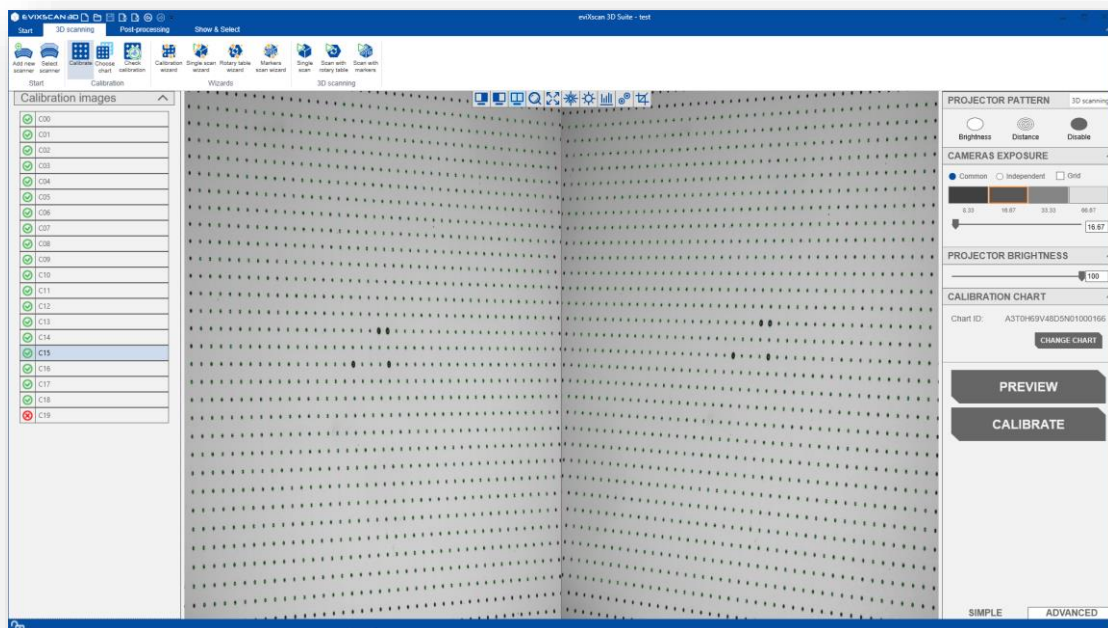
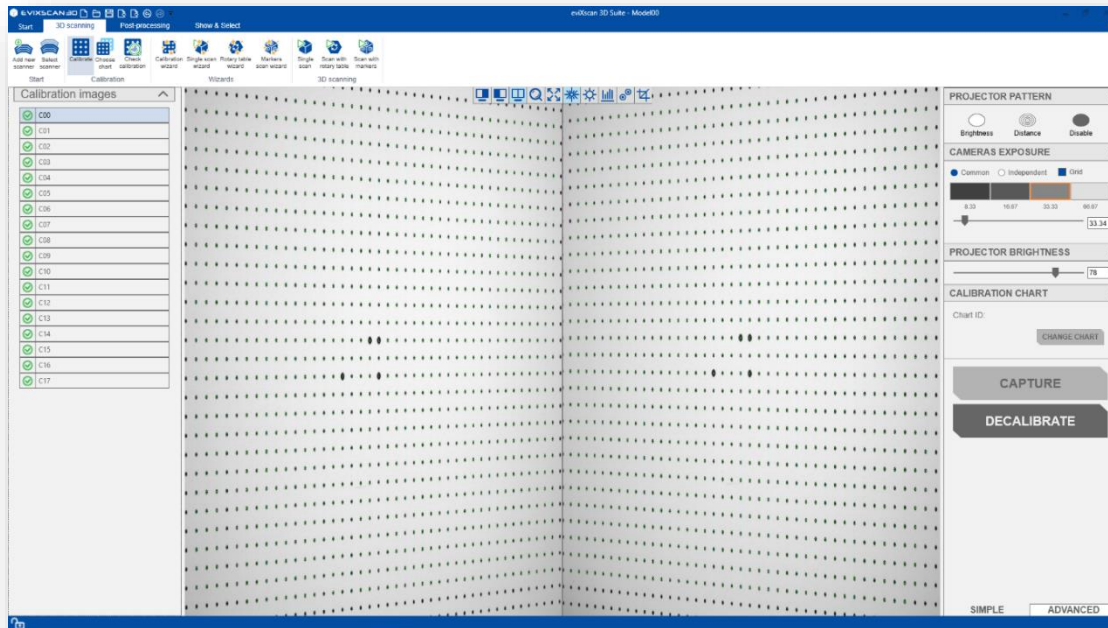
## Data

- Scan format – the default format for saving the mesh; PLY is a Polygon file – the standard file format, supported by most software on the market; EVX is a old eviXscan3D file format.
- Temporary directory – the default catalogue, where scans are saved if the model catalogue is not defined by the user during the scanning process.

## 7. Scanning proces

### Calibration

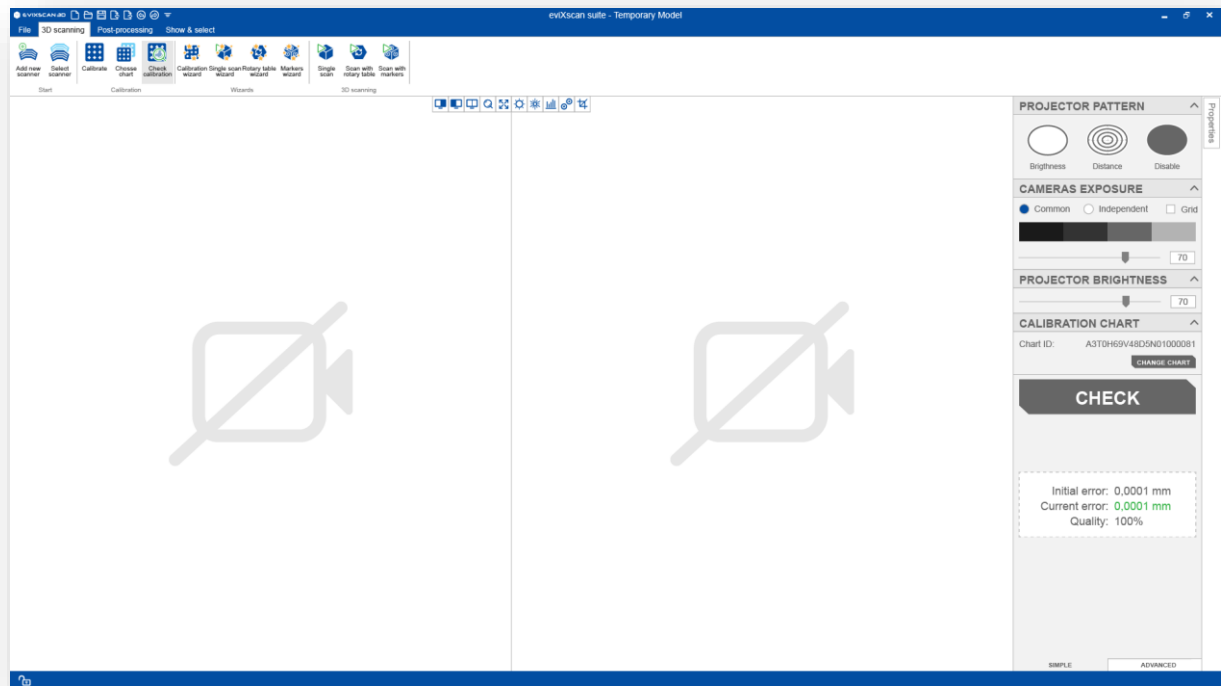
In the calibration image creation mode, the preview section shows the live view from the sensors. After clicking [Capture], the images will be taken, and the points from the calibration chart automatically will be detected. The images are then added to the list, along with the pattern detection status mark. After selecting a specific image, you can verify the detected points in the calibration chart, and if necessary, remove it using the RMB and choosing the [Delete] button. The application automatically switches to this mode when you open the calibration window, or when you click [Preview] in the calibration image preview mode.



The red cross icon informs that photos are not okay, so it has to be removed from the calibration.

## Calibration Accuracy Analyser

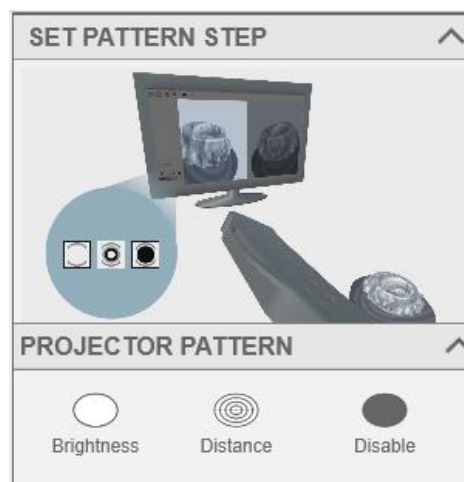
The user can easily check the calibration accuracy – just take a photo of calibration chart in “0 position” and the system will inform about the accuracy error.



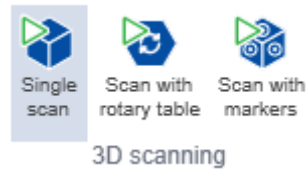
**NOTE:** the calibration chart used for accuracy analyse must be the same that used in the calibration procedure.

## Wizards – easy to calibrate and scan

Make calibration and scan in easily way with helpful tips and short movies about every step.



## Scanning scenarios



Depending on from the requirements for the scanned objects, eviXscan 3D Suite provides three main 3D scanning strategies:

- Single scan – the easiest way to create a single scan without alignment constraints
- Scan with rotary table – semi-automated scenario to scan the object using the rotary table; the user can define how many scans needs to be created in series, add extra scans or align the groups to one coordinate system based on the markers/artifacts
- Scan with markers – the scenario dedicated to objects bigger than single scanning volume; the user can align scans to one coordinate system based on the markers or artifacts placed on the scanned object.

## Scanning – action panel

### Single scan/ Scan with markers

PROJECTOR PATTERN ^

Brightness

Distance

Disable

CAMERAS EXPOSURE ^

Common

Independent

Grid

8.33

16.67

33.33

66.67

16.67

PROJECTOR BRIGHTNESS ^

100

ADDED SCANNING FEATURES ^

☐ HDR mode

SCAN

SIMPLE

ADVANCED

PROJECTOR

CAMERAS

PROJECTOR BRIGHTNESS

ACQUISITION ^

Number of averaged images

1

Capturing delay

60

☐ Vibration check enabled

☐ Use scanner dimensions

☐ Marker photo enabled

☐ Filter Enabled

SCAN GENERATOR ^

Shadow level

50

Minimal contrast

15

Triangles quality

0.60

Erosion

1

Edge preserve

0.70

Decimate

Low

High

Point omitting

None

Many

Smoothing

Low

High

SCAN

SIMPLE

ADVANCED

Panel	Field	Control	Description
Simple	Projector pattern	Brightness	Screens clear pattern to setting the brightness level and cameras exposure time
		Distance	Screens ellipses with target to set correct distance between scanner and scanned object
		Disable	Turned off the light source
	Cameras exposure	Grid	Locks the specific positions on the cameras exposure time slider
		Slider	Allows to set correct cameras exposure time value
	Projector brightness	Slider	Allows to adjust the right intensity of light on the projector
	Additional scanning features	HDR mode	Allows to set the multiexposure levels

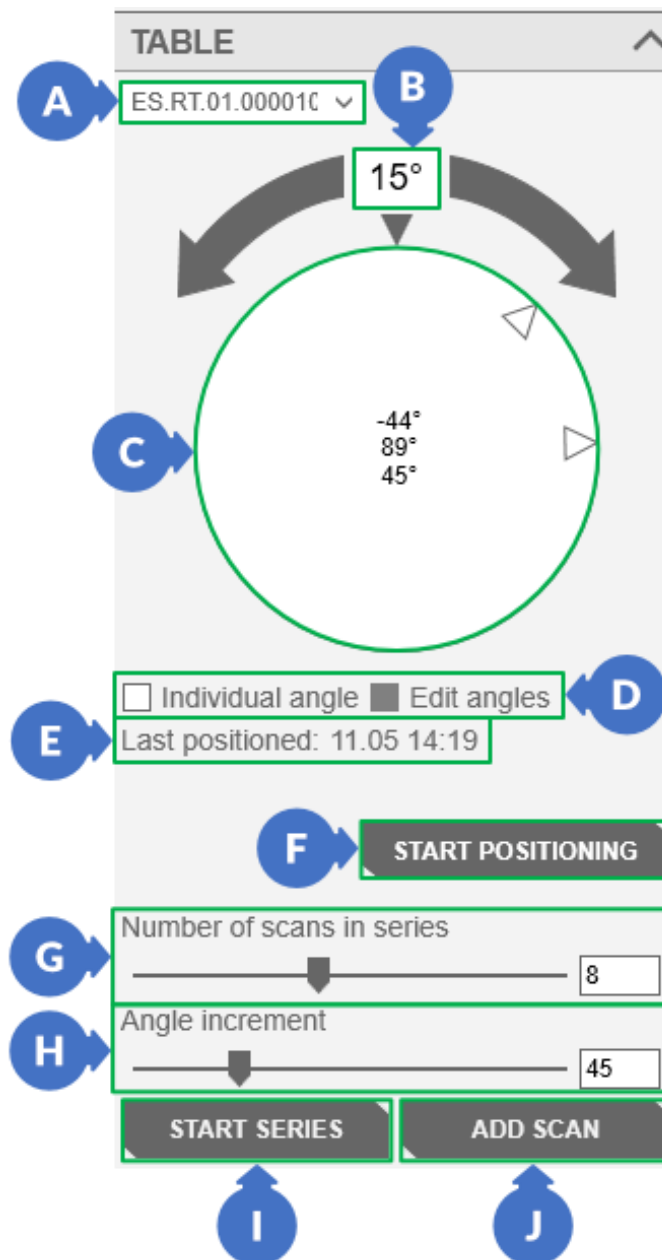
Panel	Field	Control	Description
Advanced	Projector	Brightness	Screens clear pattern to setting the brightness level and cameras exposure time
		Distance	Screens ellipses with target to set correct distance between scanner and scanned object
		Disable	Turned off the light source
		Servo settings (only in HDQ)	Allows to set the right focus on the projector
	Cameras	Pixelclock slider	Allows to set the cameras capturing speed
		Grid	Locks the specific positions on the cameras exposure time slider
		Slider	Allows to set correct cameras exposure time value
		HDR exposure	Allows to set the multiexposure levels
	Projector brightness	Slider	Allows to adjust the right intensity of light on the projector
	Acquisition	-	Allows to set the acquisition parameters
	Scan generator	-	Allows to set parameters of scan generator

**Note:** Detailed specification of the parameters placed in the Acquisition and Scan generator tabs are located in [\[Acquisition\]](#) and [\[Scan Generator\]](#)

## Scan with rotary table

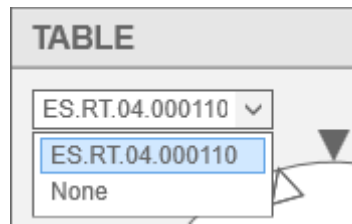
After selection of the Scan with rotary table option from the Main Tools Ribbon, the software opens the Action Panel similar to Single Scan, but with extended functionality for table control.

The control window of the rotary table includes the following functionalities:



- A – list of active tables.
- B – the value representing the rotation angle generated by right mouse button click.
- C – control handwheel for manual change of the rotation angle.
- D – option that allows you to manually set the angles of the table.
- E – information about table positioning.
- F – table positioning call button.
- G – slider to select the number of scan positions in created scanning series.
- H – slider to select the angle increment in created scanning series.
- I – a button that initiates scanning the configured series.
- J – a button that initiates single, additional scanning, which will be added to the last scan serie.

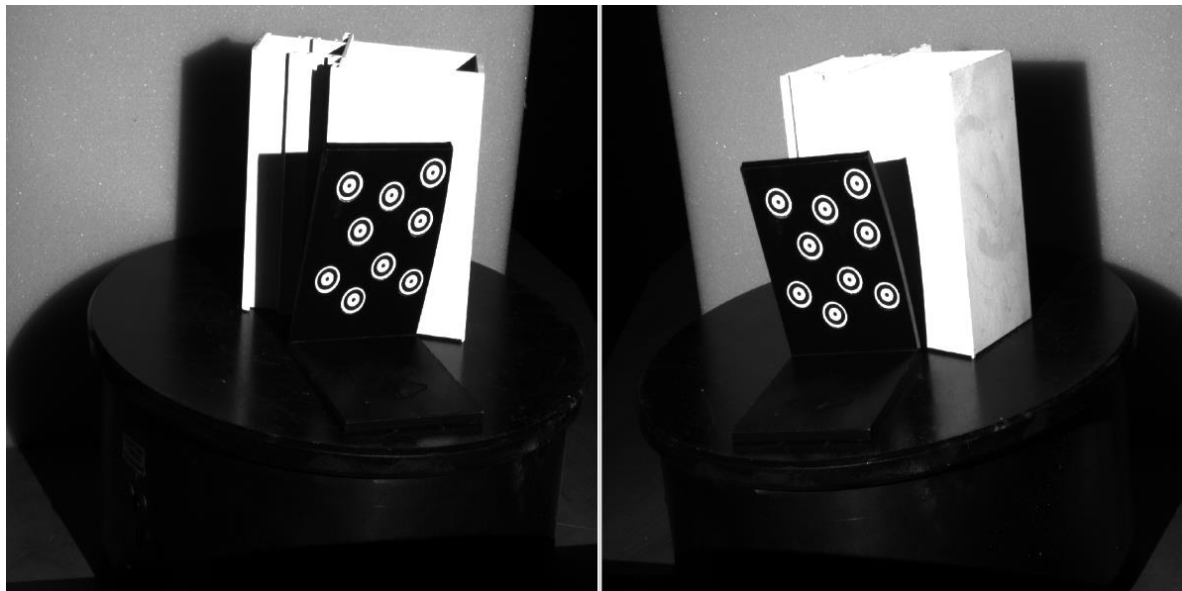
To enable the scan process with rotary table, select the device from the list:



Once the software has successfully connected to the device, the current position of the table will be set as 0°.

To obtain the correct alignment of scans in series, the software requires a procedure for determining the neutral axis of the table, called *positioning*. The process runs as follows:

- Put the scanned object on the table.
- Adjust the correct distance between the scanner and the scanned object.
- Put the calibration artefact on the table.

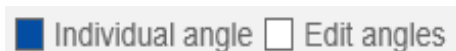


- Run positioning procedure, by clicking the **[START POSITIONING]** button.
- By clicking the [Take Pictures] button 3x, the three pictures must be taken at the table angles differing by at least 10° and not larger than 80°. If it is possible to take pictures at a larger angle, this should be done, because the larger the angle is the more accurate the calibration is. Make sure that at least 4 of the same markers are detected in all pictures. The calibration artefact should not move when the table is rotated.
- Close the from positioning procedure by clicking **[CLOSE]** button.

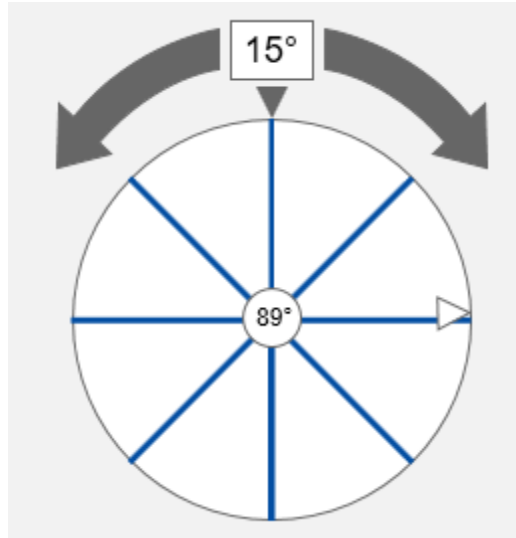
After positioning procedure, the user can define the number of scans in series, set the additional scanning functions such as the multi exposure time levels or add the alignment between the series basing on the unique markers/artifacts.

### **Manual setting of scanning angles on the table**

To change the method of setting the scanning angles, select the Individual angle (D) option in the table scanning options.

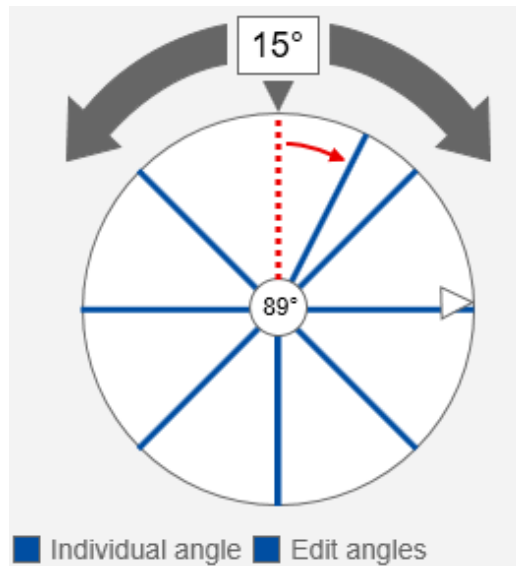


Depending on the number of scans in the series (G), lines will be drawn on the table to symbolize the table position to which the table will rotate.

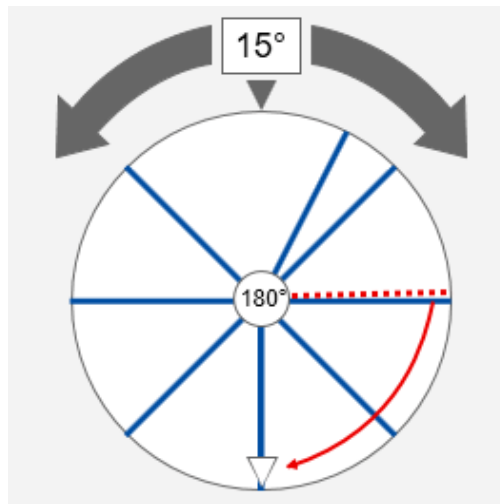


Each change of the position of the slider used to change the number of scans resets the position of the lines and places them at an equal distance from each other, always starting from the 0° position (marked with a gray triangle above the table dial in the program interface).

Selecting the Individual angle option unlocks the Edit angle option. This option is used to change the angle position of each line. In order to change the angle of the line, click on it with the left mouse button and, with the button pressed, drag it to any place on the table. However, it should be remembered that the angle between the other line and the line whose position is being changed should be greater than or equal to 5°, otherwise the line position will not be accepted.

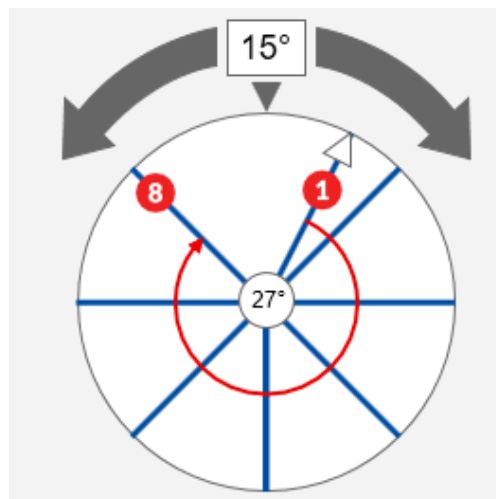


To change the current angle of the table rotation, click on any line with the right mouse button - then the table will automatically move to the position of the line you clicked.



Changing the angle by  $15^\circ$  (the value set in the (B) field) after selecting the Individual angle (D) option is possible only using the arrows above the stage disc. Clicking the left mouse button on the table face after turning off the Edit angle option will set the table in the position represented by the mouse cursor on the table. It is not possible to change the angle of the table with the left mouse button while in Edit angle mode.

Performing a series of scans on a table with the Individual angle selected will cause the collection of photos in individual positions, always from the smallest angle to the largest (clockwise). Analyzing the above case, the stage will start scanning from position (1) regardless of the angle in which it is located. Then it will go through the railroad positions, stopping at position number (8). So we get 8 scans in the table positions (1) to (8).



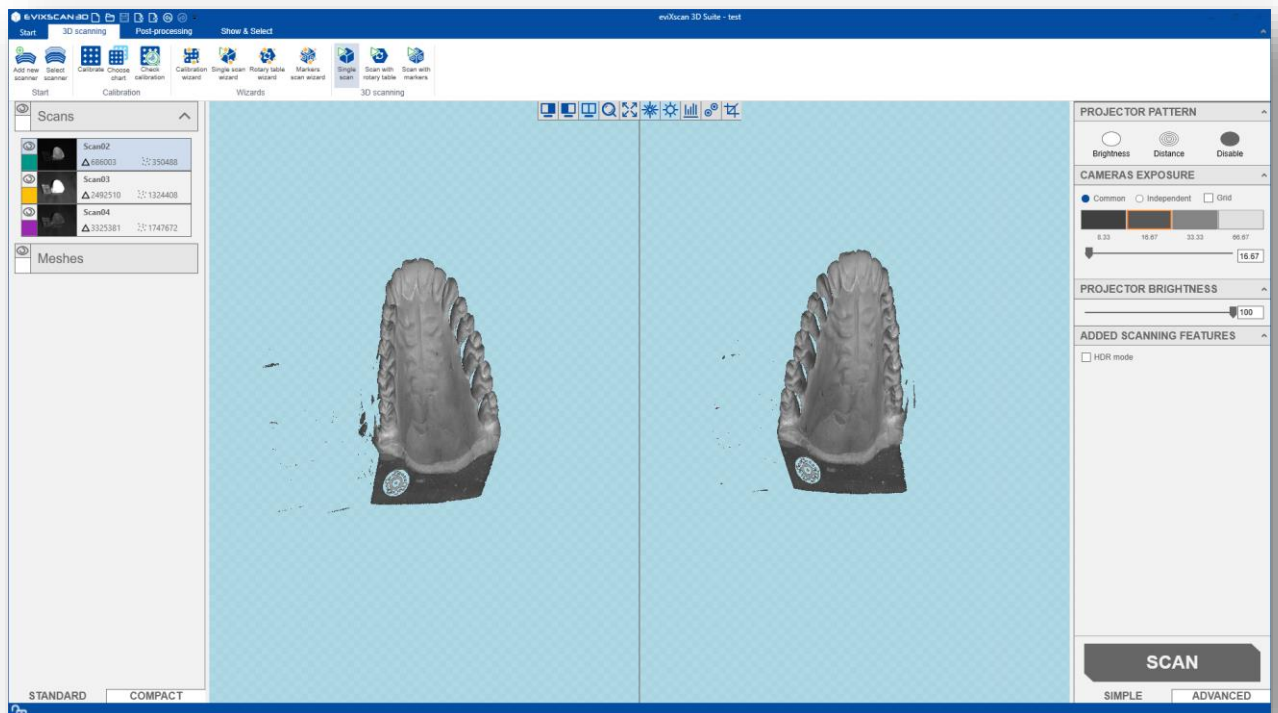
## Additional scanning features

### HDR mode (Multiexposure)

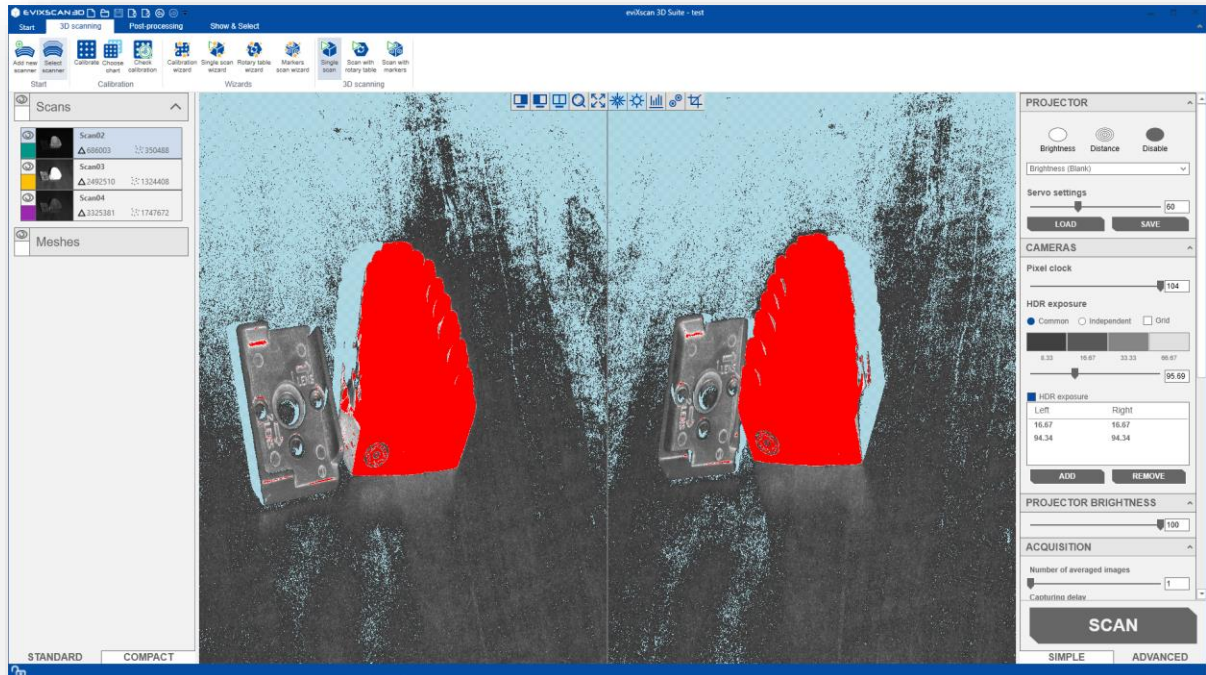
For dark, grey or multicolour parts eviXscan 3D Suite provides the Multiexposure functions (HDR mode). In every scanning scenario, the user can define more than one exposure time for scanning process.

In described example, for scanning process two objects are selected with different colours. In the standard way, user needs to make two scans with different projector brightness and exposure time level. After activation of HDR mode, the user defines two exposure times, suitable for each part.

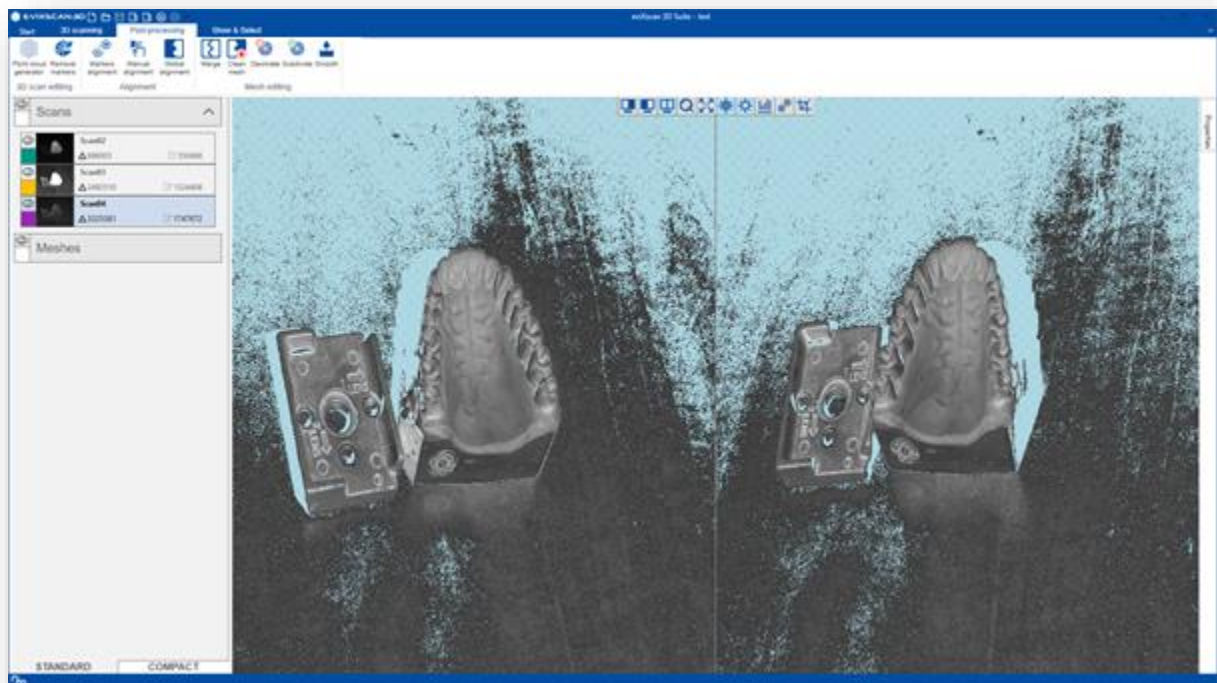
Preview from cameras with exposure time level 16,67 ms:



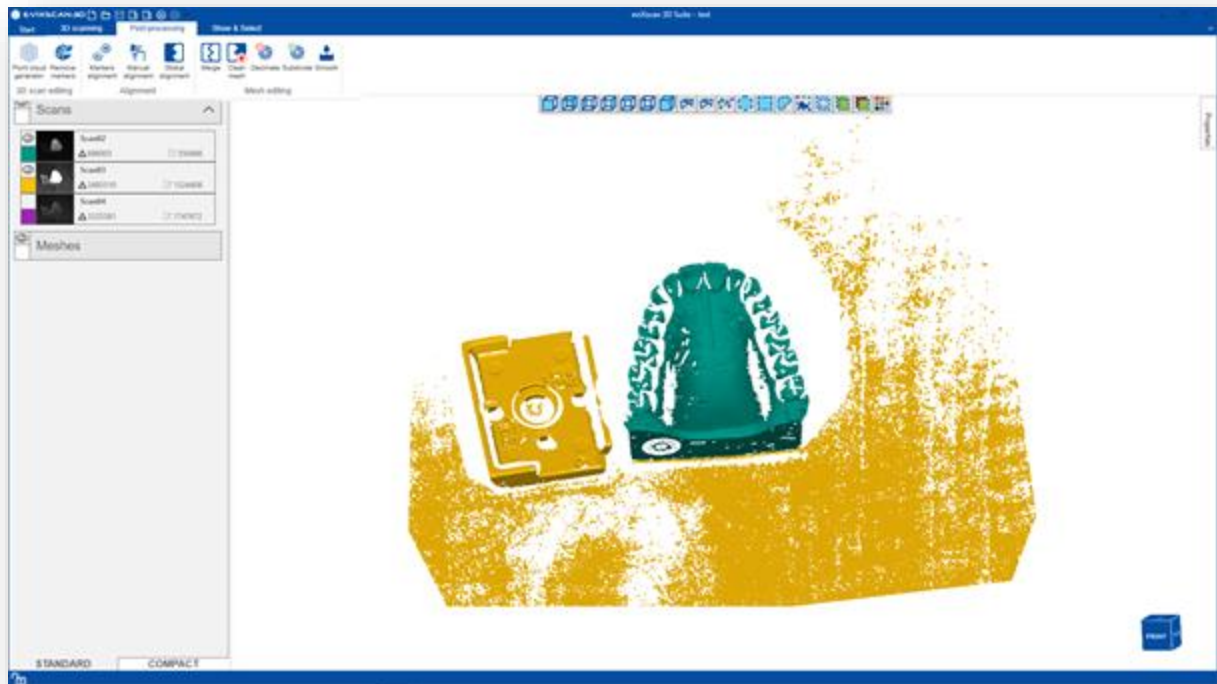
Preview from cameras with exposure time level 94,34 ms:



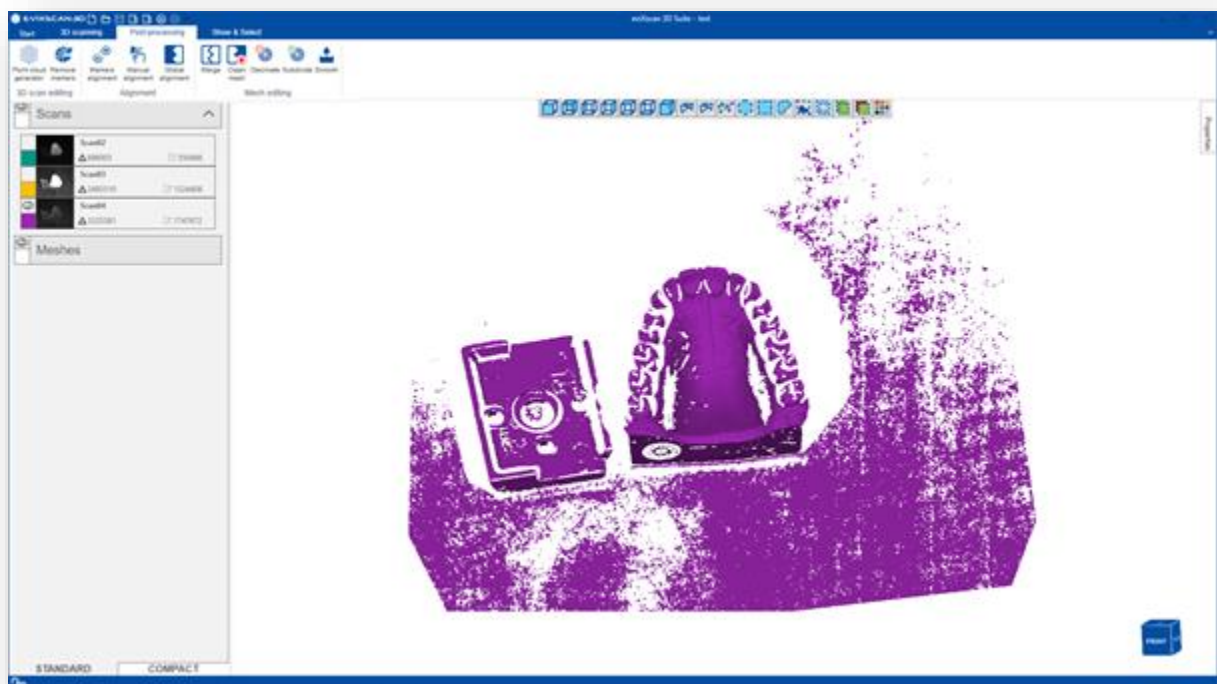
As result, software automatically recognizes optimal light level for every pixel and recalculates the scanning result. In screen below it is recalculated photo with both exposure time value.



Two, different scanning results from standard scanning process:



Scanning result with HDR mode:



To set the HDR levels, user needs to make following steps:

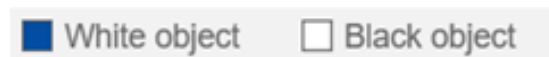
- Select the HDR mode checkbox
- Adjust the lowest exposure level for light objects
- Press **[ADD]** button
- Adjust higher exposure level for grey areas
- Press **[ADD]** button
- Adjust the highest exposure level for the darkest areas
- Press **[ADD]** button

**NOTE: User can define maximum 10 exposure levels for each scan. Every additional exposure level added to scan process increase the scanning time significantly.**

#### *Include markers/artifacts*

During scanning process with using the rotary table, this type of adjustment should be used, also in the case of rotary table scanning with unique markers or artifacts. In this case, the scans are automatically oriented relative to the axis of the table, and then, using the function, scans are matched with markers/artifacts.

#### *White or black object*

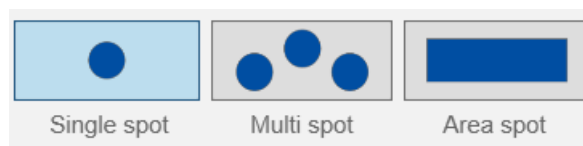


Pre-selection of the color of the object, whether white or dark – black

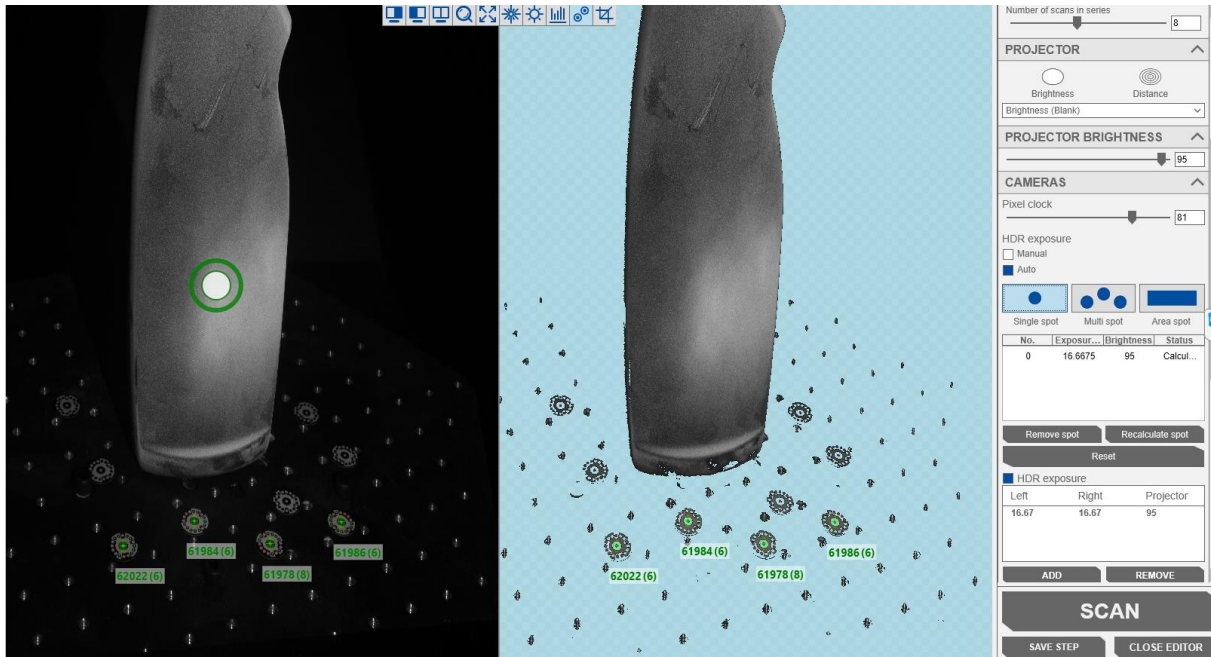
#### **Auto exposure scanning**



The latest version of evixscan allows you to select the exposure automatically. This is done in one of three ways:

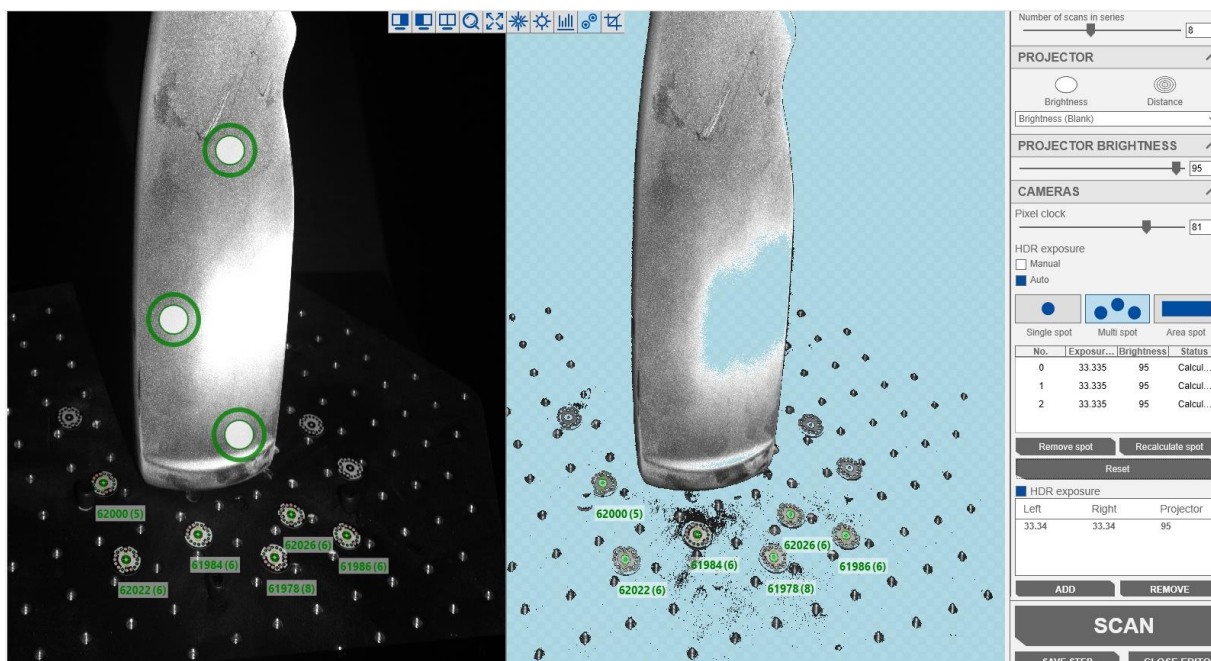


- **Single spot** – spot selection of exposure on the subject.



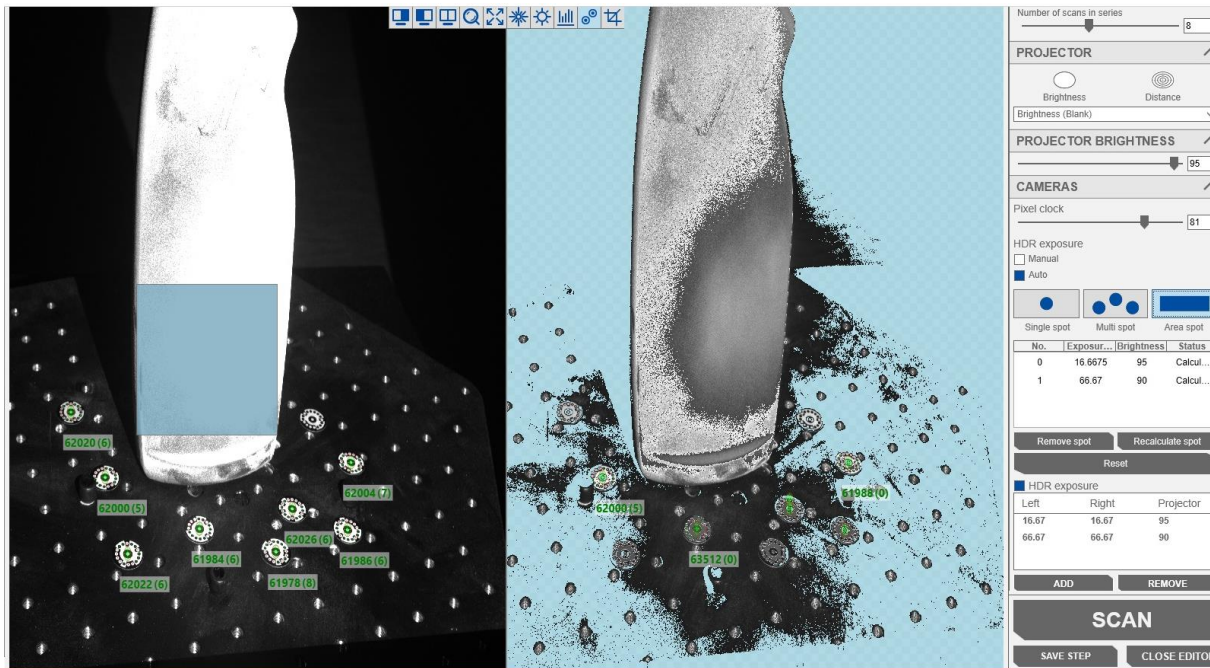
Select a point on the screen based on the currently active auto exposure selection filter. You can define a selection area with the Single spot tool. Pressing the left mouse button defines the selection area. The selection is complete when the left mouse button is released

- **Multi spot** – multi-point selection of the exposure on the subject.



Select all items on the screen based on the currently active auto exposure selection filter. You can define the selection area with the Multi spot tool. Pressing the left mouse button defines the selection area. The selection is complete when the left mouse button is released. To select another point, repeat this step.

- **Area spot** – selecting the exposure using an area on the subject.

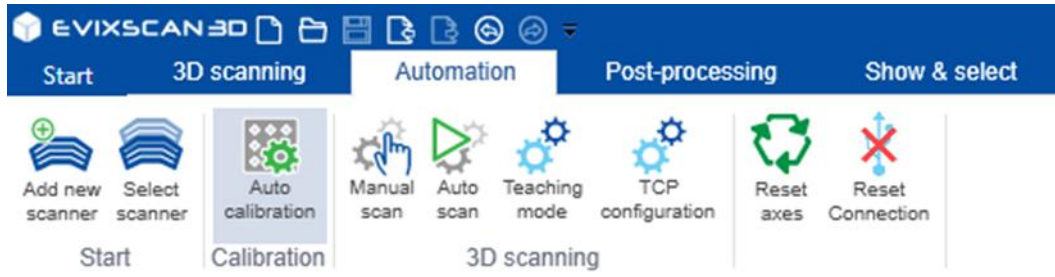


Select all items in the rectangle drawn on the screen based on the currently active auto exposure selection filter. You can define a selection area with the Area spot tool. Pressing the left mouse button and dragging the mouse defines the selection area. The selection is complete when the left mouse button is released.

## 8. Automation

The eviXscan 3D Suite Automation extension allows the user to carry out a complete scanning automated process all the way to exporting the scans to a selected file format.

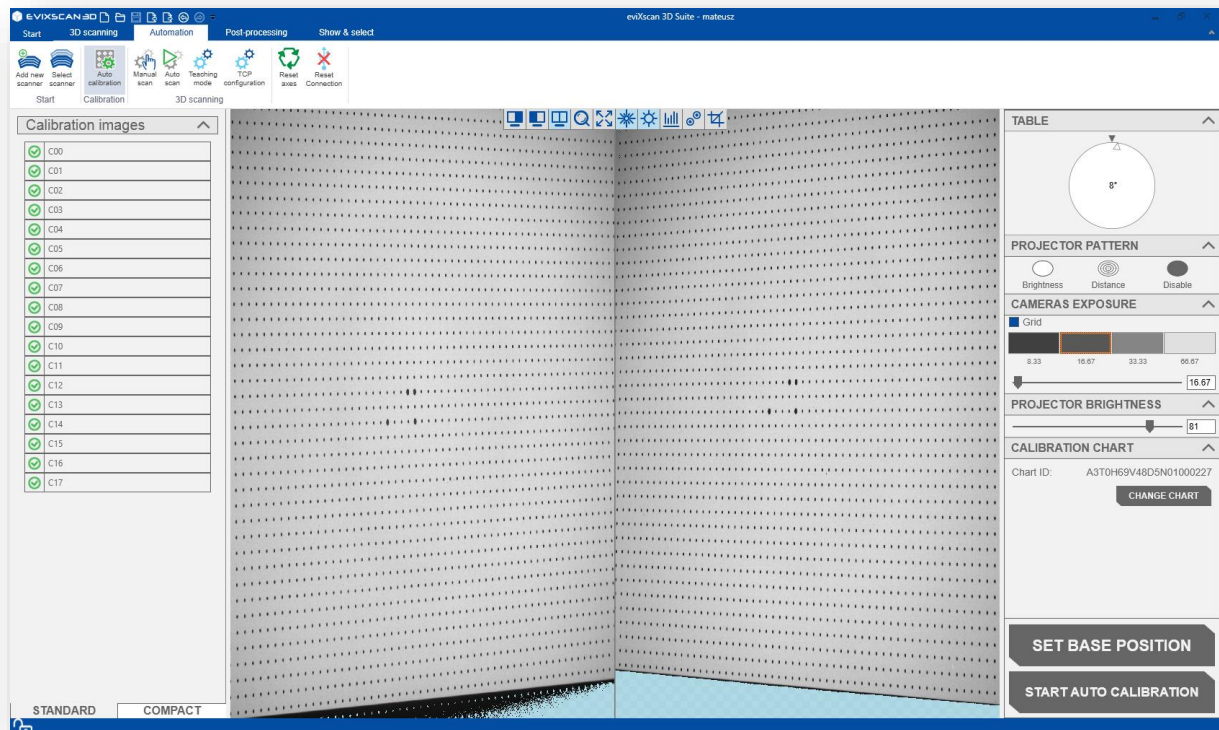
### Automation Tools



The **Automation tools** provides easy access to the automation scanning and processing functions in eviXscan 3D Suite. There is no need to change between other tabs. All necessary options contained in **Automation** tab.

### Auto Calibration

Auto calibration main view is shown below.

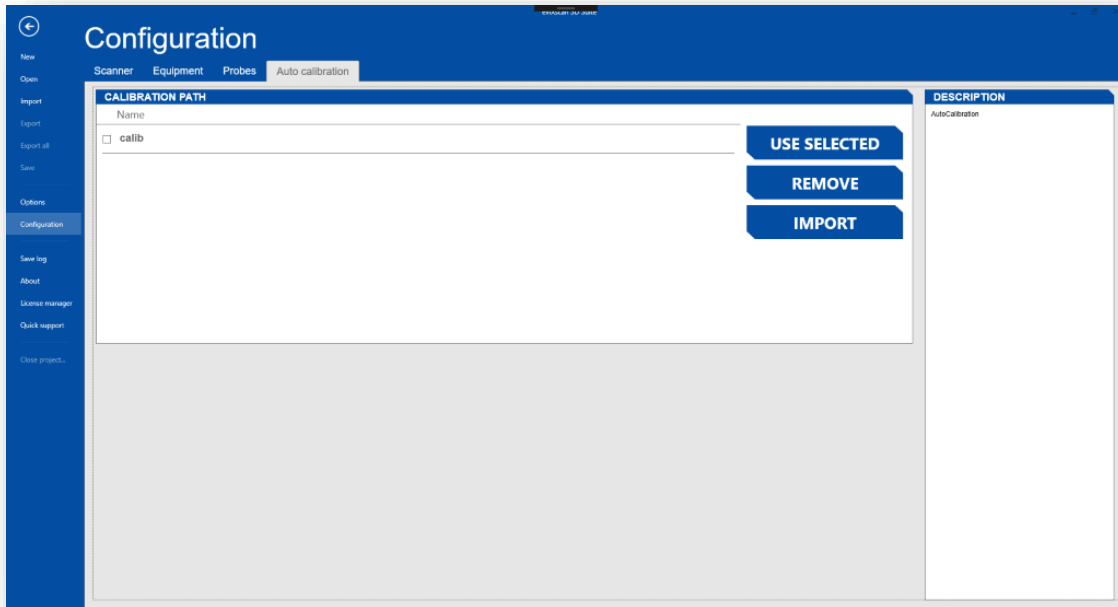


Currently **Auto calibration** is only available for eviXmatic. It uses special path to capture calibration images, to make sure the path is correct it is created by Evatronix staff. User receives only calibration path file.

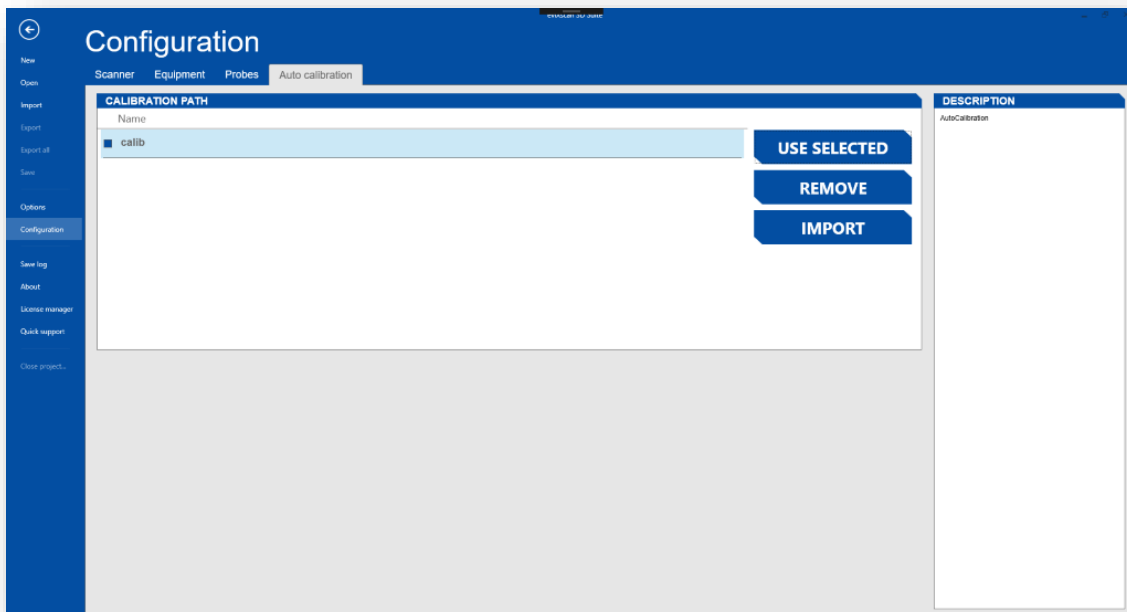
## Importing auto calibration path

The file has to be imported to software in **Configuraiton** tab. The software allows opening the configuration of the management window:

- By selecting the **[Start] -> [Configuration] -> [Auto calibration]**



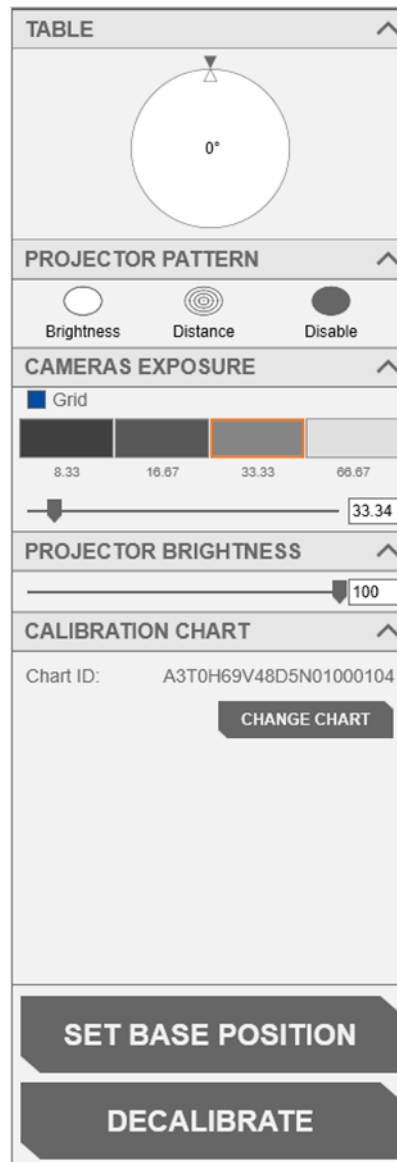
- To import calibration path press **[IMPORT]** button, then browse for your file. After success import the file will appear in list.



To select path use **[USE SELECTED]** button. After pressing button checkbox next to name should be marked as checked. When selecting calibration path is not working contact support and send them calibration file.

## Auto Calibration Panel

Auto calibration panel contains all necessary options to start auto calibration. This feature is supported only by **eviXmatic**!



The screenshot shows the 'Auto Calibration Panel' interface. It consists of several sections:

- TABLE**: A circular diagram with a triangle at the top and '0°' in the center.
- PROJECTOR PATTERN**: Three radio button options: 'Brightness' (selected), 'Distance', and 'Disable'.
- CAMERAS EXPOSURE**: A 'Grid' checkbox is checked. Below it is a horizontal bar with four segments labeled 8.33, 16.67, 33.33, and 66.67. The third segment (33.33) is highlighted with an orange border. Below the bar is a slider with a value of 33.34.
- PROJECTOR BRIGHTNESS**: A horizontal slider with a value of 100.
- CALIBRATION CHART**: Displays 'Chart ID: A3T0H69V48D5N01000104' and a 'CHANGE CHART' button.
- SET BASE POSITION**: A large button at the bottom.
- DECALIBRATE**: A large button at the bottom.

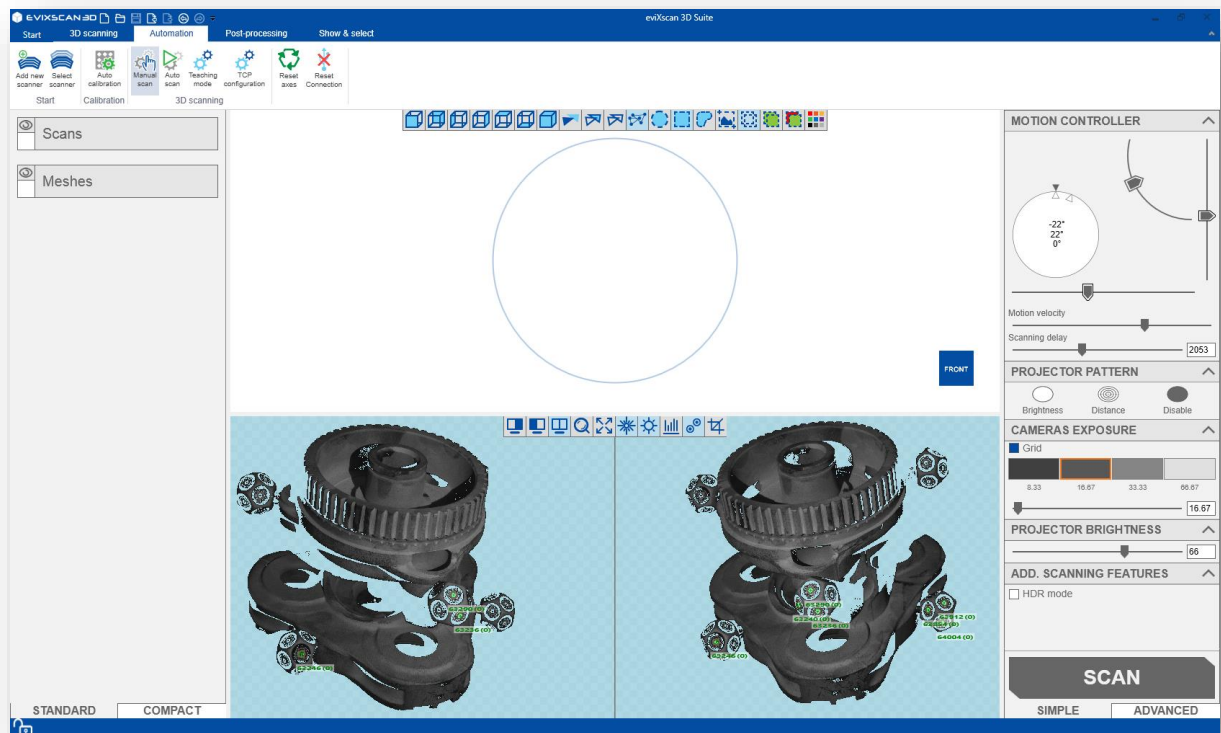
After importing calibration path and correctly set calibration chart on eviXmatic's table, user can press button **[SET BASE POSITION]**, the eviXmatic will move to starting position for calibration. Next step is set maximum projector brightness with Brightness pattern. Remember to check if underexposed and overexposed pixels are shown at live view. If cameras exposure, projector brightness are set correct and there is not overexposed pixels on calibration chart, user has to make sure the calibration chart ID is correct.



To start calibration process press **[START AUTO CALIBRATION]** button. If scanner is currently calibrated first user has to decalibrate scanner by pressing **[DECALIBRATE]**, then access to **[START AUTO CALIBRATION]** button is granted.

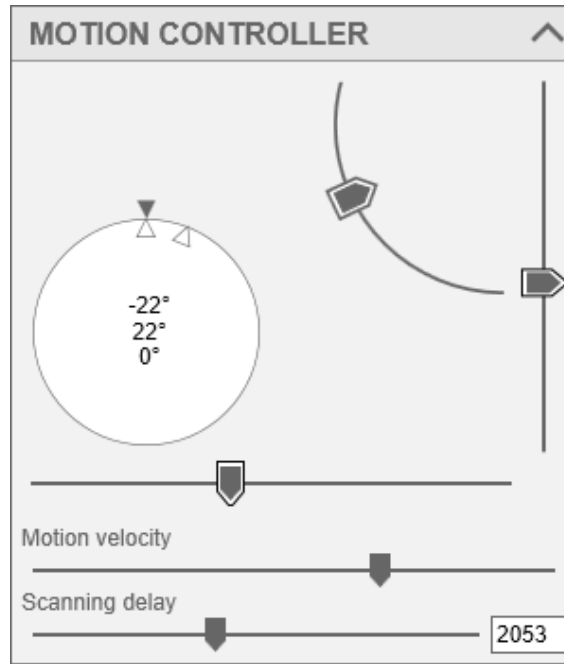
## Manual Scan

Manual scanning is the easiest way to perform a single scan for any scanner setting.



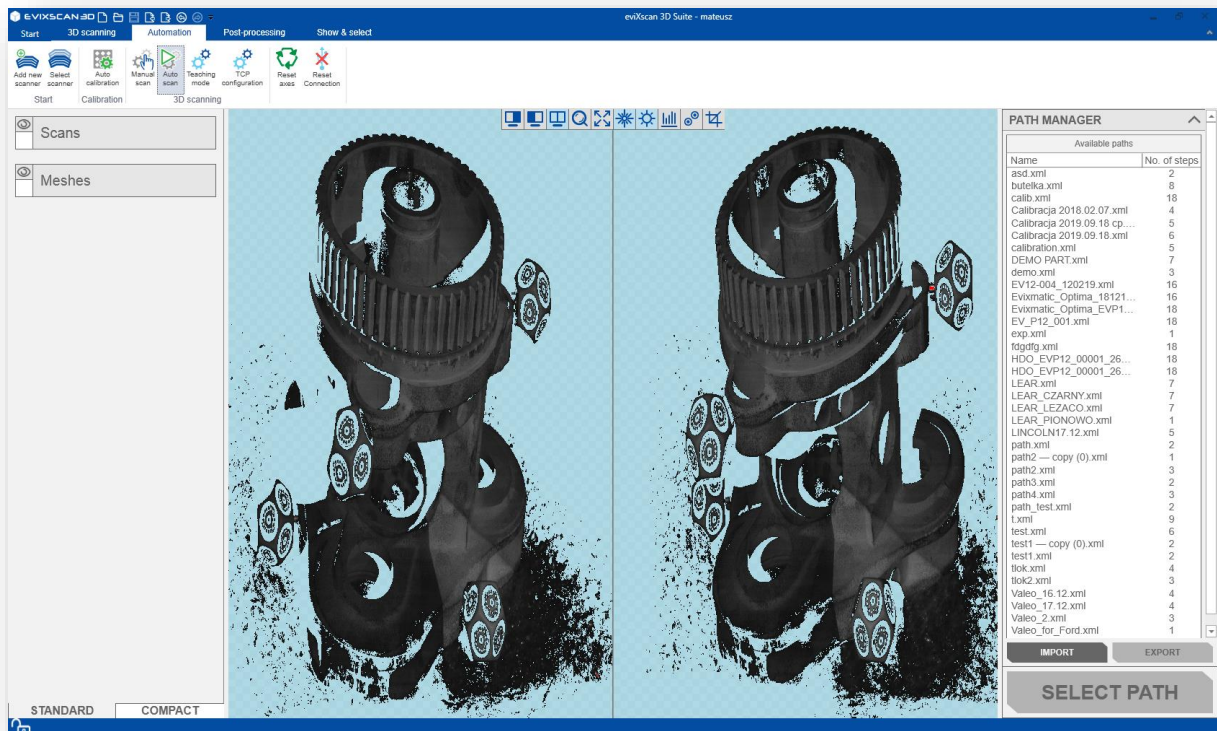
The motion controller allows you to control the scanner setting as well as the table (height, angle, table distance from the scanner, table angle) and allows you to set the speed of scanner movement and scanning delay (the same like in normal table).

**Warning!** Each scan is performed only with markers. High speed of the table may cause the detail to fall down.



## Auto Scan

Auto scan panel is simplify as much as it can be to give user fast tool for creating STL's files for same objects. To start automatically scanning select **Auto scan** from **Main Tools Ribbon**.



## Auto scan panel

In auto scan panel user can choose one of many scanning paths. Path manager contains all available paths that exist in software. Paths are identified by name, there cannot be two paths with same name. Each path has displayed number of steps to give user some information how much time path can take.

PATH MANAGER

Available paths

Name	No. of steps
Path one.xml	11
Shortpath.xml	2
calib.xml	15
Large object.xml	2
test.xml	8

IMPORT

EXPORT

SELECT PATH

PATH MANAGER

test.xml

< Back to path selection

Path steps

No.	Name
1	Step 342,00 700,01 9 138
2	Step 341,99 373,00 9 138
3	Step 341,99 509,00 9 138
4	Step 121,00 700,01 84 138
5	Step 341,99 509,00 9 138
6	Export
7	GlobalAlignment
8	RemoveMarkers

SCAN

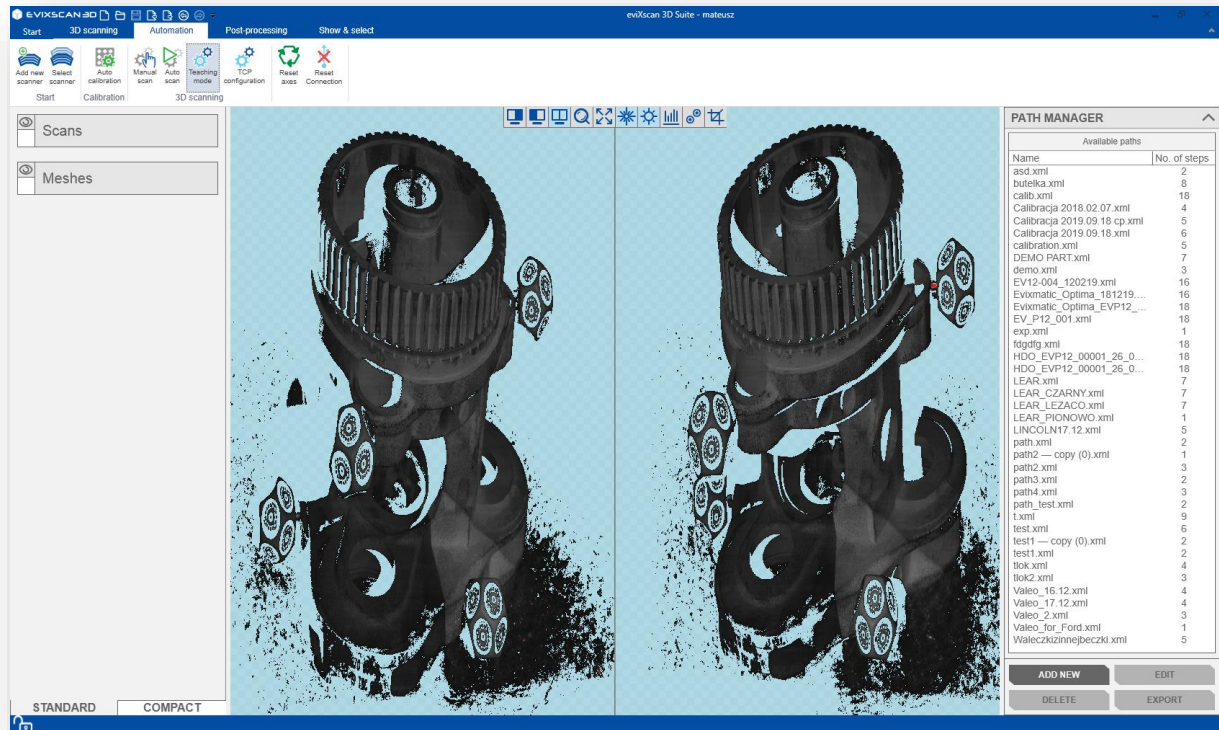
User can import new path using **[IMPORT]** button or export path created by himself using **[EXPORT]** button. Path can be selected using left mouse button, after selecting path in list next step is press **[SELECT PATH]** to confirm selection.

Next window shows list of steps in selected path. To return to list of paths press **[Back to path selection]**. To start scanning press **[SCAN]** button.

Execution of path can be cancelled by pressing **[CANCEL]**

## Teaching mode

Using Teaching mode user can create custom advanced scanning path using scanning process and computing scans using 3D algorithms. Teaching mode can be selected from **Main Tools Ribbon**.



## Teaching mode panel

After selecting **Teaching mode** panel will show with **Path manager** like in **Auto scan**.

PATH MANAGER	
Available paths	
Name	No. of steps
calib.xml	15
Large object.xml	2
Path one.xml	11
Shortpath.xml	2
test.xml	8

ADD NEW

EDIT

DELETE

EXPORT

At the bottom of panel four buttons allow user interact with paths in software:

- **[ADD NEW]** – opens new window for creating new path, after naming the path user has to press **[APPLY]** and path is created

CREATE PATH

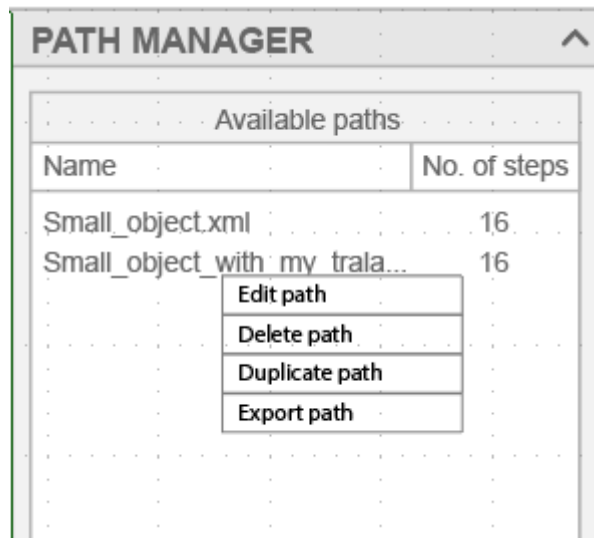
Path name...

APPLY

CANCEL

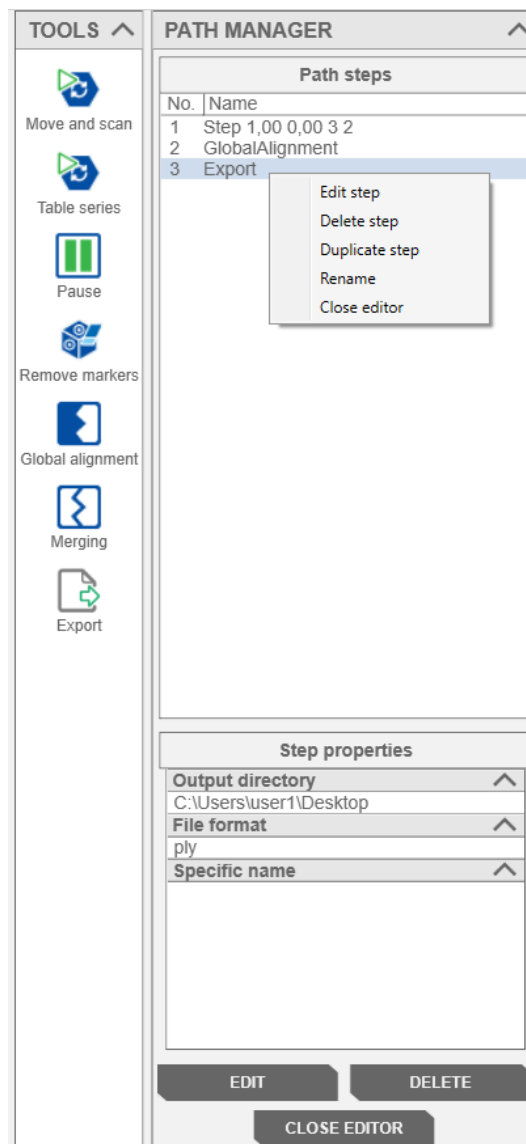
- **[EDIT]** - opens path editor for selected path
- **[DELETE]** – deletes selected path from hard drive
- **[EXPORT]** – exports selected path to destination choose by user

Those options can be also accessed using context menu by pressing right mouse button on selected path. In context menu user can find extra option **[DUPLICATE]** allowing duplicate path.



## Path editor

Path editor allow user modify steps inside path. Steps can be added, removed deleted, edited. Custom software version may contains different tools, below are showed most common tools.



Path editor also have context menu if user press right mouse button on selected step.

## Create new step

On left side of panel there is **Tools** window that contains different steps. Those steps can be dragged and dropped into list of steps in **Path steps** window. Every changes made to steps, path are automatically saved to path file. Some steps cannot be added if some components are missing like scanner.

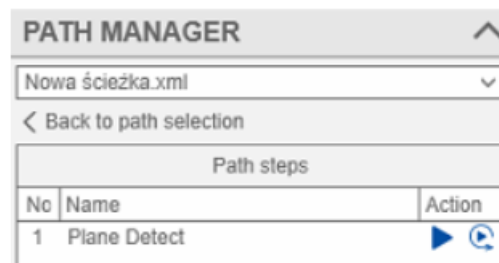
Steps are created with default parameters and default name. Name can be changed by using **Rename** option in context menu.

## Edit step

To edit step user has to select step using left mouse button. **[EDIT]** button should be enabled to click if not, it means the step does not have edit option. The same behaviour has context menu under mouse right click. Each step has different editor.

## Running paths

There are three ways to start the selected path with steps.



One way is to make a full path (from start to finish if the path has more than one step) with the **[START]** button.











The second way is to call only the selected step - the **Execute** action button is used for this.



The last way is the **Execute from** button used to call the steps from the step on which it was called (including it) to the end of the list.

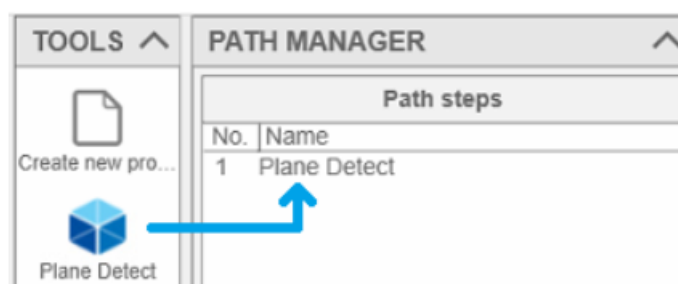


## STEP CREATING TEMPLATES:

 Plane Detect	<i>Plane Detect</i> – step template responsible for plane detection and cutting
 Move and scan	<i>Move and scan</i> – step template responsible for move the scanner and perform a single scan
<p><b>SYSTEM STEERING</b> category allows to write to the file the parameter responsible for the angle and table shift as well as the appropriate scanner setting. The scanner is positioned with the slider on a vertical line, and the angle of inclination of the scanner with the slider on a quarter circle. The angle of the table can be changed using the arrows located above the table shield, or by clicking the virtual table shield with the left mouse button. The text field between the arrows contains the angle by which the table will rotate when you click on the arrow. Clicking with the right mouse button on the table wheel will rotate the table by the entered angle to the right. With the left mouse button you can indicate the position to which the table should rotate. The table distance is set using the slider on the horizontal line below the table. The rest of the options like in normal scanning.</p>	
 Table series	<i>Table series</i> – step template for scanning using a rotary table.
 Pause	<i>Pause</i> – pauses the scanning process
 Remove markers	<i>Remove markers</i> – step template responsible for automatically removing detected markers
 Global alignment	<i>Global alignment</i> – a step template responsible for automatically matching scans received from scans when inductioning a specific sequence with a list of steps. Scans in the tree before inductioning the sequence are not included. It does not require setting any parameters - it is an uneditable step.
 Merging	<i>Merging</i> – template of the step responsible for combining scans obtained from a specific sequence of steps. Scans in the tree before inductioning the sequence are not included. When Merging is inductioned for further editing, scans from before merging are not taken (e.g. exporting files after merging will only export the model obtained after merging). Just like Global alignment, this is an uneditable step.
 Export	<i>Export</i> – step template responsible for exporting scans received from a specific sequence of steps. Scans in the tree before inductioning the sequence are not included. This step has the ability to edit parameters.

## Plane detect

In edit mode, from the **TOOLS** tab, drag an element named **Plane Detect**



and then enter the step editing mode with the **[EDIT]** button at the bottom of the panel.



In the edit panel there is a **Plane offset** slider that is responsible for the shift of the plane in relation to the scanner. By default, the offset is 0 mm. All values above 0 change the position of the cut plane towards the scanner. All values below 0 are the inverse of positive values (move the plane away from the scanner). This parameter should be selected by trial and error, checking whether the plane from the scan is cut off or not. The set offset value is taken into account for scanning after invoking the setup command. **[DETECT PLANE]** button for collecting markers from the plane for its subsequent identification and removal during scanning.



When you click the button above and the software detects markers, the list of markers will be full.



The **[DELETE]** button is used to remove selected markers from the list. **[ADD]**, on the other hand, allows you to add missing marker identifiers.

Add marker...

Marker ID

ADD

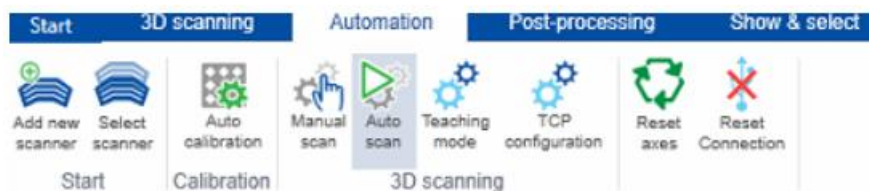
ADD AND CLOSE

CLOSE

**Attention:**

Remember to save your editor changes with the **[SAVE STEP]** button. Exiting the step with the **[CLOSE EDITOR]** button will discard all changes made during the edition, if the changes have not been saved before.

The created step (with detected marker IDs) can be run in the **Auto scan** panel.



Select a path and click on **[SELECT PATH]**.

Nowa ścieżka.xml1

IMPORT

EXPORT

SELECT PATH



The selected path with steps should be started with the **[START]** button at the bottom of the panel.

PATH MANAGER

Nowa ścieżka.xml

< Back to path selection

Path steps

No	Name	Action
1	Plane Detect	 

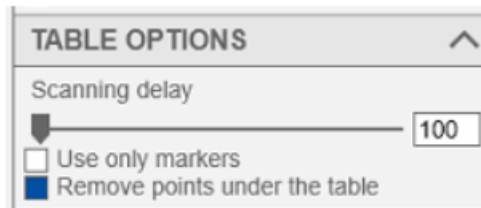
START

No	Name	Action
1	Plane Detect	 

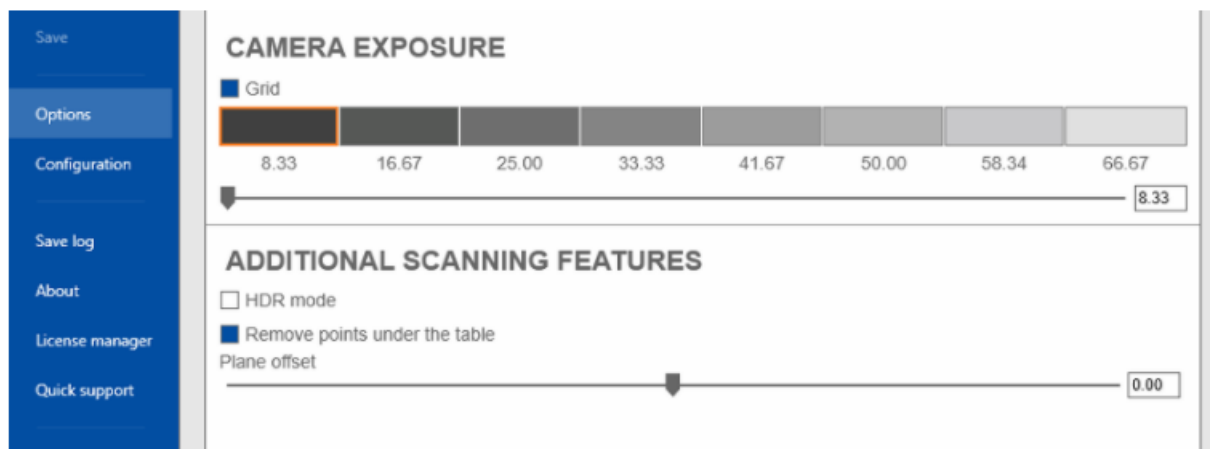
Execute from

## Removing a plane

Before scanning an object, select the **Remove points under the table** option in the **Scan with rotary table, ADVANCED** tab.



The **Scan with rotary table** option can also be enabled in the side menu under the **Options** tab.



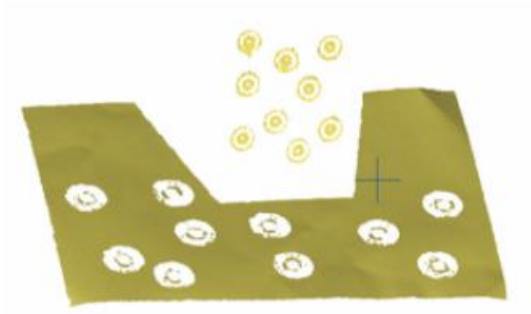
In the case of the automation process, it is best to create a path that includes the **Plane detect** process at the very beginning, and then the scanning (**Table series**) and possible modification of the scans (**Merging, Export**), then the whole thing can be done by calling one path.

PATH MANAGER	
Path steps	
No.	Name
1	Plane Detect
2	Table series
3	Merging
4	Export

## Attention:

In the case of partial plane cutting, check that the appropriate value of the **Plane offset** slider has been selected. You should also remember that the plane should be "flat". It is best to stick the markers on the rotary table. Using a sheet with markers can be problematic because it is too susceptible to distortion.

The distortion problem for a sheet with markers glued on after using the plane cutting algorithm can be seen in the screenshots below. The deformed paper was not cut - only the flat fragments were removed. The screenshots present the situations before and after the cut.



## Rotary table scanning step editing

**SYSTEM STEERING**

360°

Motion velocity

Scanning delay 2053

Number of scans in series 6

**PROJECTOR**

Brightness Distance Disable

Brightness (Blank)

**CAMERAS**

Pixel clock 40

HDR exposure

Grid

8.33 16.67 33.33 66.67

16.67

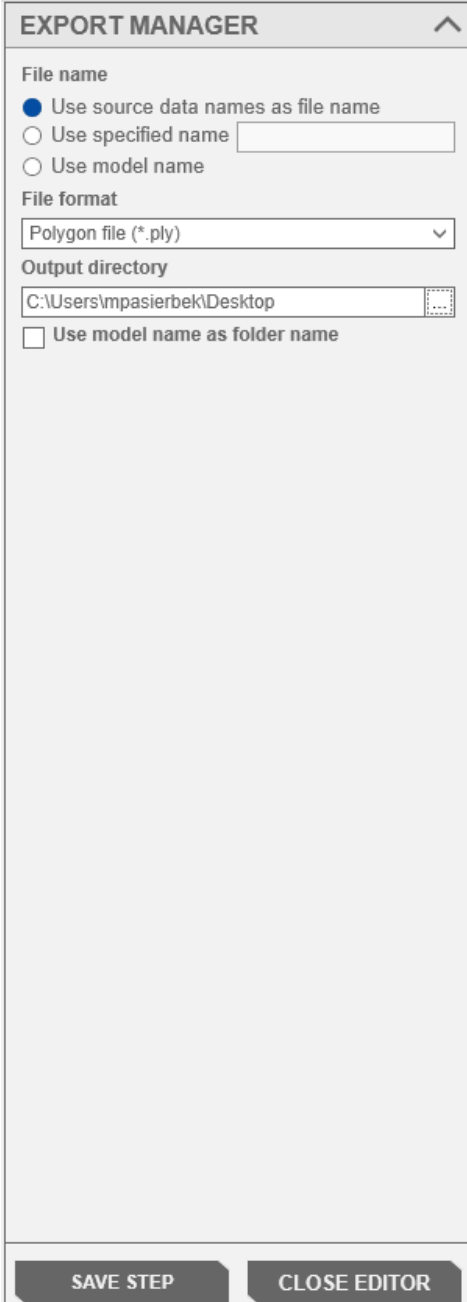
HDR exposure

**SCAN**

SAVE STEP CLOSE EDITOR

Editing step allow user set cameras exposure, HDR, projector brightness and other parameters like in classic scanning. After setting correct parameters user can press **[SCAN]** button to check how well scanning went. If scan result is acceptable user can press **[SAVE STEP]** then **[CLOSE EDITOR]** to leave step editor.

## Export step editing



**EXPORT MANAGER**

File name

☒ Use source data names as file name

☐ Use specified name

☐ Use model name

File format

Polygon file (\*.ply) ▼

Output directory

C:\Users\mpasierbek\Desktop

☐ Use model name as folder name

SAVE STEP CLOSE EDITOR

Editing export step allow user to choose if export should use scans names or user defined name or model name. In **File format** part user can choose which file format is best for him. Default value is \*.ply. **Output directory** defines folder where files will be exported. If changes were done user have to click **[SAVE STEP]** then **[CLOSE EDITOR]**

## Close path editor

To close path editor press **[CLOSE EDITOR]**. User will be returned to list of paths.

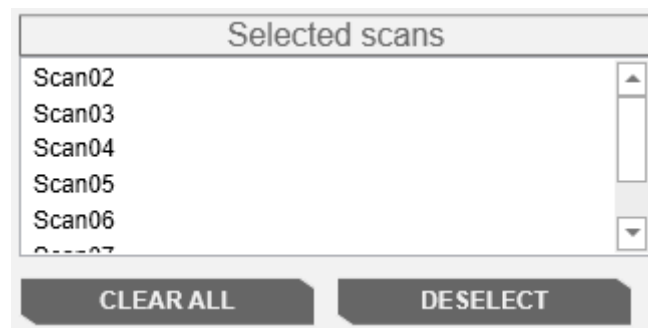
**Warning!** If after adding another scan with a new part to the same path, the old scans will also be merged.

## 9. Post-processing

Before begin building a 3D model, user should start by pre-processing scans: remove unwanted frames, separate misaligned areas (if any) into separate scans, cut out unwanted and non-rigid objects from the scene. Cleaning operations can be done directly into eviXscan 3D Suite software. User can define selection on the unwanted areas by selection tools and delete it by DELETE button.

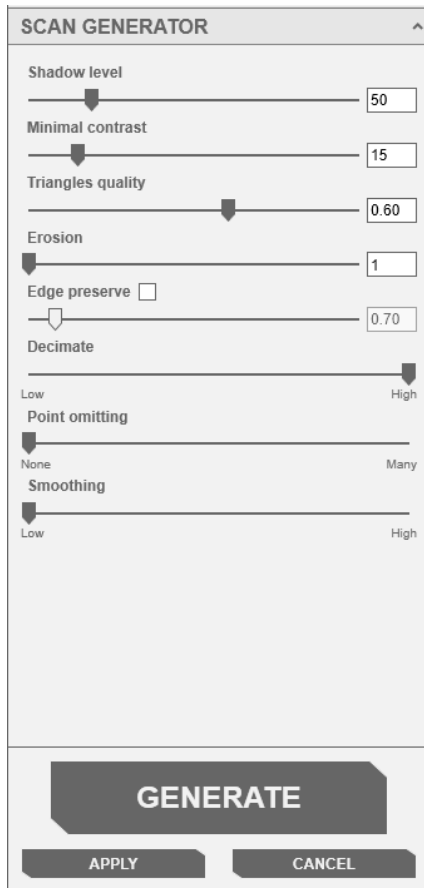
### Point cloud generator

The point cloud generator is a multi-functional algorithm, which provides the regeneration of the scans based on the mesh generation algorithms (the same as used during scanning process). User can select which scans needs to be recalculate by selection on the Result Tree. Selected scans automatically will be shown on *Selected scans* window:



All selected scans can be deselected by clicking the **[CLEAR ALL]** button. Also, one or more scans can be deselected by clicking **[DESELECT]** option.

On the SCAN GENERATOR parameters list, software automatically set the parameters which was used during scanning process. The user can define, which parameters will be changed or not.



The **SCAN GENERATOR** dialog box contains the following controls:

- Shadow level:** A slider set to 50.
- Minimal contrast:** A slider set to 15.
- Triangles quality:** A slider set to 0.60.
- Erosion:** A slider set to 1.
- Edge preserve:** An unchecked checkbox.
- Decimate:** A slider set to 0.70.
- Point omitting:** A slider ranging from Low to High.
- Smoothing:** A slider ranging from None to Many.
- Buttons:** A large **GENERATE** button, and **APPLY** and **CANCEL** buttons at the bottom.

After clicking the **[GENERATE]** button, software automatically recalculates the scans. If the user want to change some parameters, can repeat the parameterization operation and again click **[GENERATE]**. After operation, user can confirm the operations by clicking **[APPLY]** or decline changes by **[CANCEL]**.

**NOTE:** the point cloud generator completely cleans the editing history of the scans. Every deleted area are again recalculated and appear on the scans.

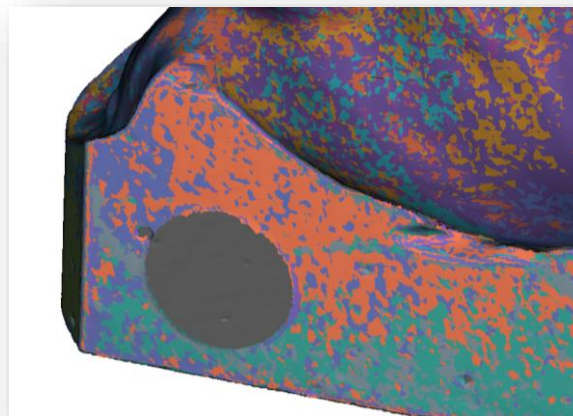
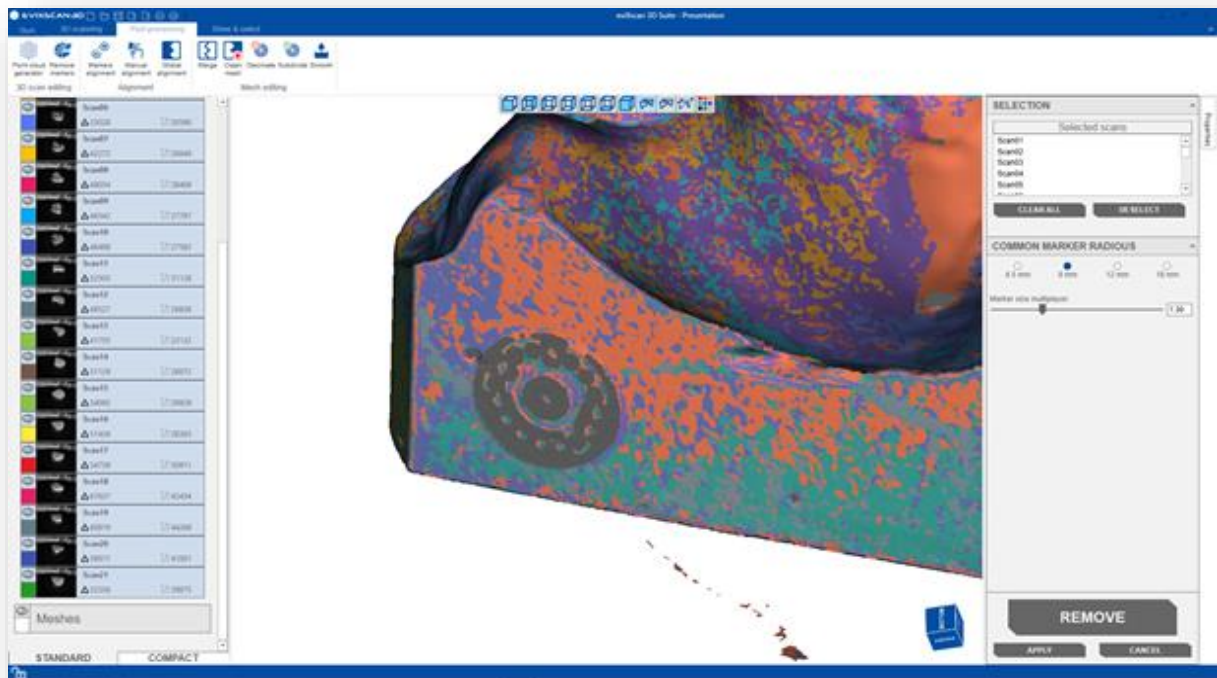
## Remove markers

Detected markers can be deleted automatically from the selected scans with *Remove markers option*.



To remove the scanned areas with tracers from markers user can select the scans on the Result Tree and activate for the remove marker icon.

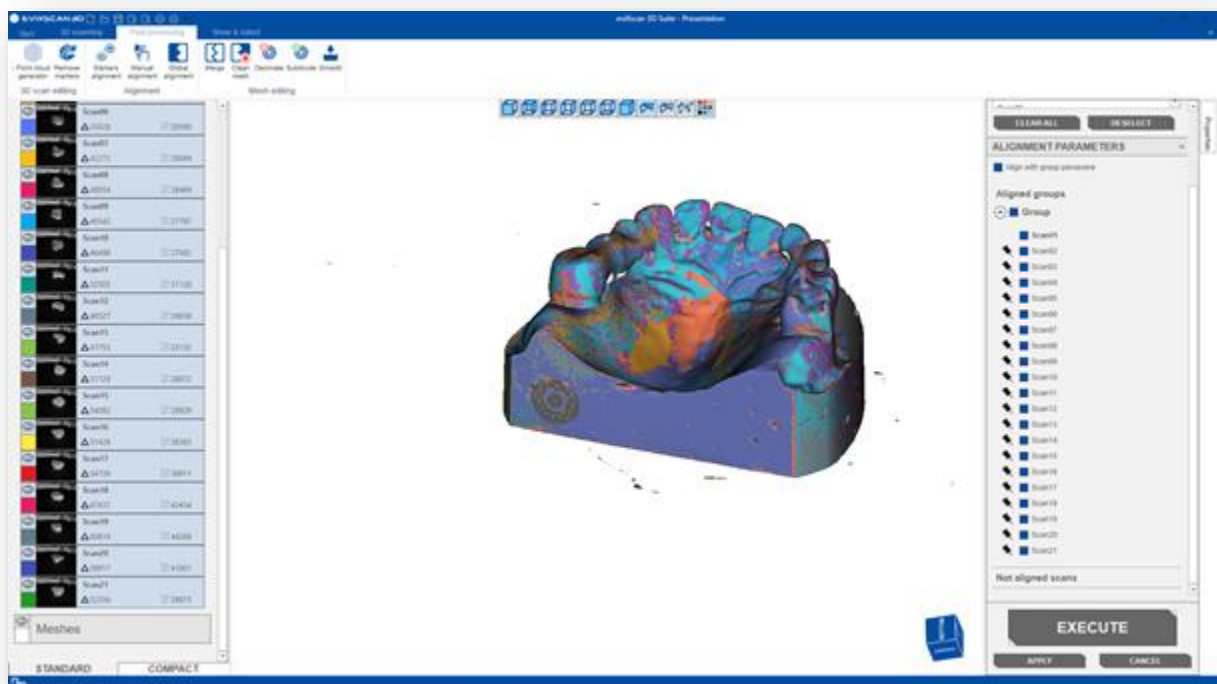
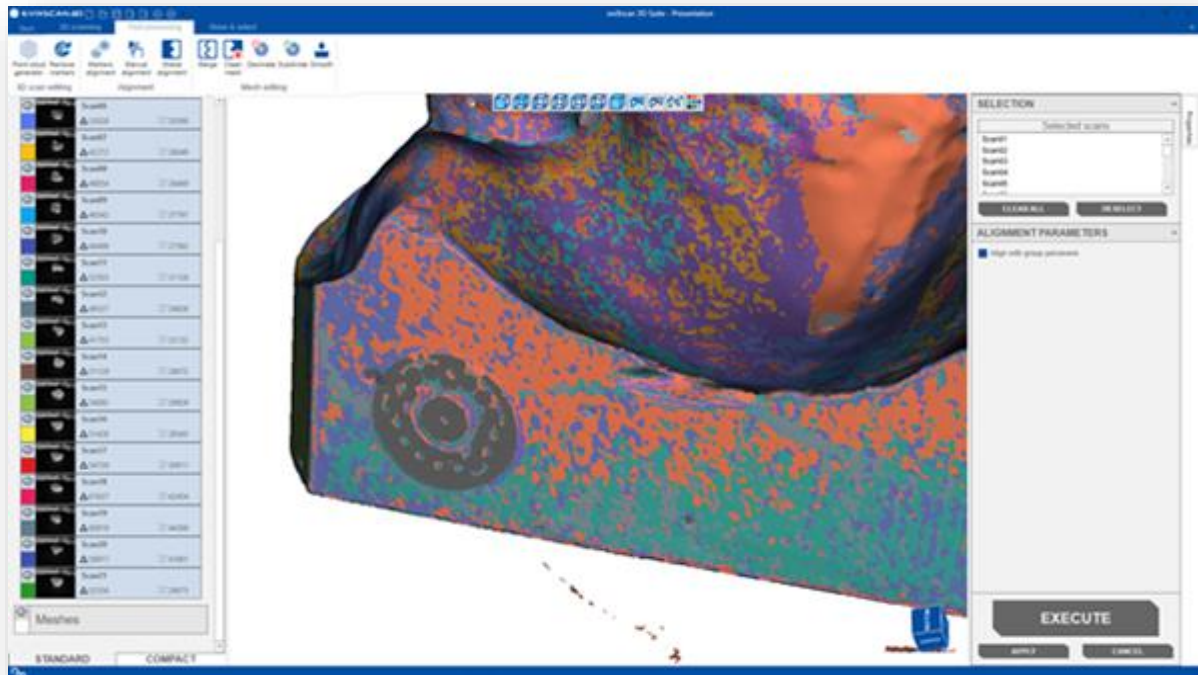
On the Action Panel the user can deselect unnecessarily selected scans, set the size of standard markers (for unique markers software recognizes them size automatically) and define the margin, which will be removed from scans.



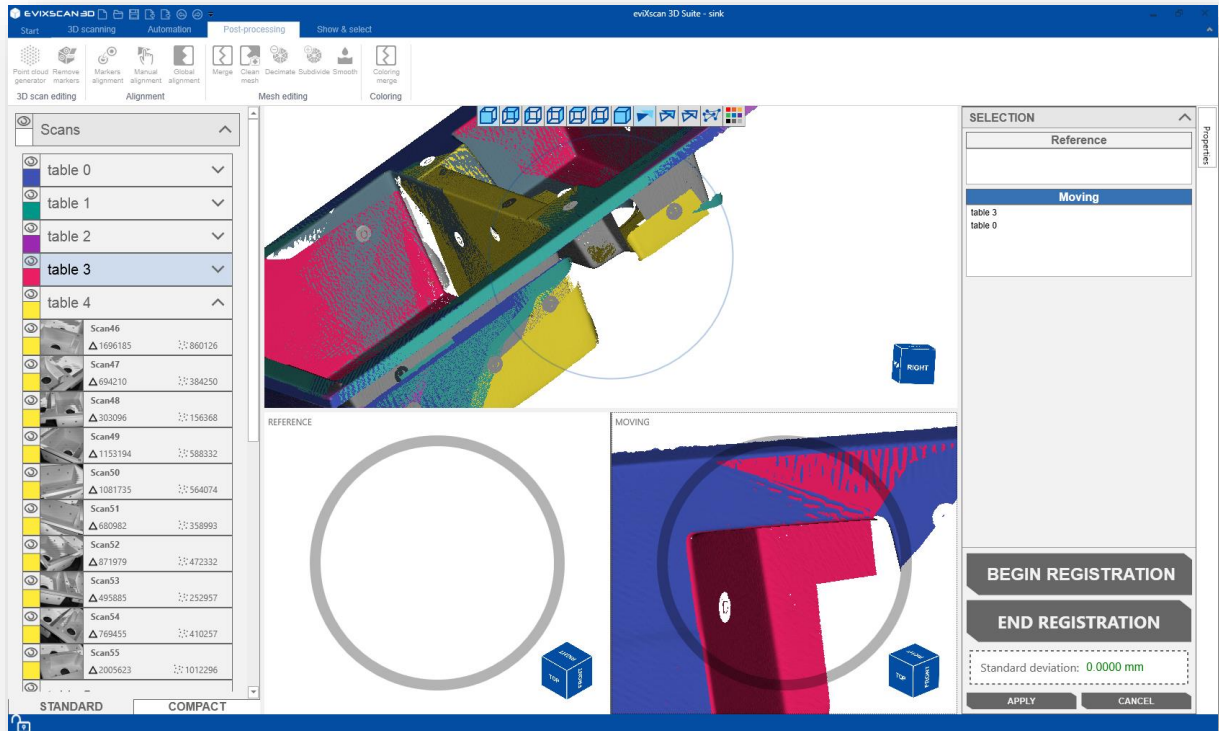
After process, user can confirm the operations by clicking **[APPLY]** or decline changes by **[CANCEL]**.

## Markers alignment

The scans can be automatically aligned by unique markers and artifacts placed on the scanned object. Also, in the case, when the user did not select checkbox *Use markers/artifacts* during scanning with rotary table, scanning results can be realign by the markers detected on the scans. In that case, after selection scans from the **Result tree**, user needs to choose the *Markers alignment* icon and check option *Align with group preserve*. If the markers or artefact was detected during scanning operation, scans will realign.



## Manual alignment



The Manual Align function provides an easy-to-use UI for this job. Manual Align provides 3 separate 3D views for the users to easily identify moving, fixed and aligned result data.

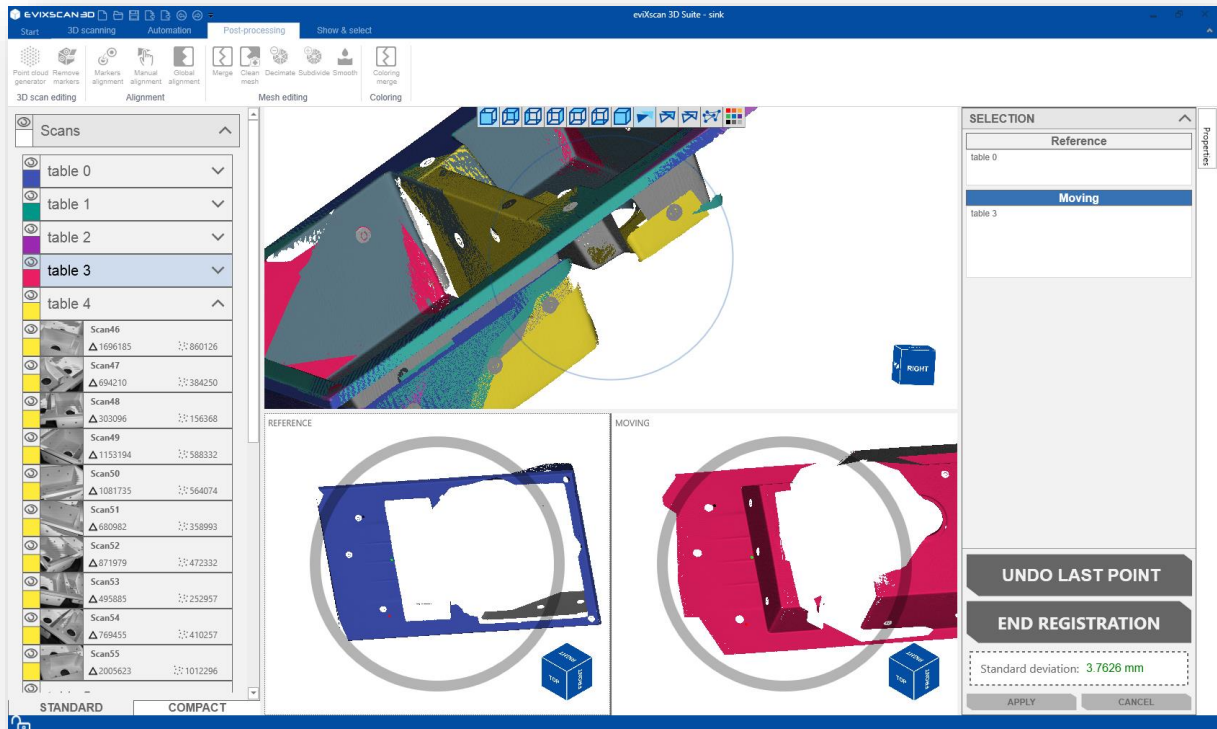
After selection the groups or scans from result tree and start-up the Manual alignment tool, user can define which scans will be the reference and moved. At the beginning, all scans are selected as moved. When one or more group/scan will be selected on the **Moving** window, automatically change the position to **Reference**



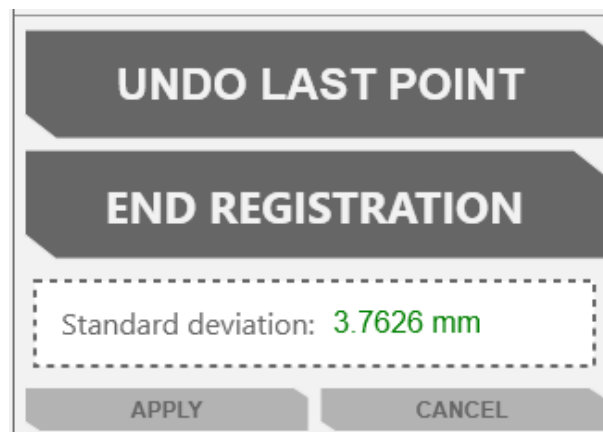
After selection which scans needs to be reference and moving, the user can start the registration by clicking the **[BEGIN REGISTRATION]** button:

**BEGIN REGISTRATION**

and start select the similar area on the scans:

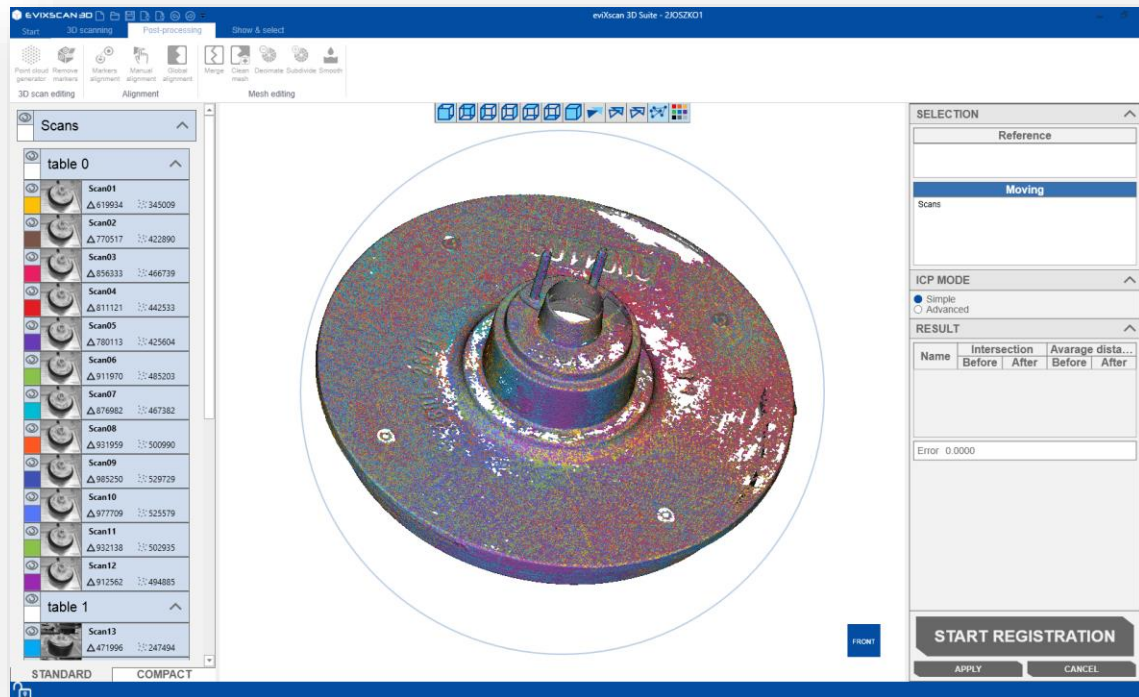


After alignment, software shows the standard deviations between aligned scans/groups.



If necessary, the user can undo the selection of the last points or end registration and apply the changes.

## Global alignment



Using the previous rough alignment, this stage performs a global alignment to accurately align scans.

**MESH SELECTION METHODS** ^

☒ One by one  
☐ Consider all

**POINTS SELECTION METHODS** ^

**Point to point**

☐ The closest  
☐ The farrest  
☐ All  
☐ Optimal  
☐ The closest scan

**Point to triangle**

☒ The closest  
☒ The farrest  
☒ All  
☒ Optimal  
☒ The closest scan

**FITTERS** ^

☒ Base on normal  
☒ Withouth normals

Radius

2.50

Intersection preserve in second iteration

Low High

The Global Align function has two options: simple and advanced. In simple the user only clicks start registration. In advanced he can choose mesh selection methods: one by one or consider all, points selection methods for point to point and point to triangle, fitters: base on normal and without normals. The user can define radius and intersection preserve in second iteration.

RESULT					
Name	Intersection		Avarage dista...		
	Before	After	Before	After	
Scan01	51.522 %	99.969 %	1.298 mm	0.044 mm	
Scan02	63.905 %	99.633 %	0.925 mm	0.043 mm	
Scan03	77.670 %	99.565 %	0.798 mm	0.042 mm	
Scan04	71.618 %	99.912 %	1.277 mm	0.049 mm	
Scan05	88.039 %	99.861 %	0.753 mm	0.041 mm	
Scan06	88.378 %	99.766 %	0.708 mm	0.040 mm	
Scan07	72.349 %	99.723 %	0.780 mm	0.040 mm	
Scan08	50.685 %	97.978 %	0.938 mm	0.038 mm	
Scan09	58.950 %	98.419 %	0.987 mm	0.041 mm	
Scan10	80.387 %	99.669 %	0.604 mm	0.042 mm	
Scan11	91.963 %	99.891 %	0.632 mm	0.037 mm	
Scan12	99.066 %	99.835 %	0.594 mm	0.042 mm	
Scan13	99.296 %	99.849 %	0.503 mm	0.042 mm	
Scan14	99.400 %	99.737 %	0.510 mm	0.045 mm	
Scan15	95.562 %	99.972 %	0.555 mm	0.045 mm	
Scan16	70.427 %	99.858 %	0.832 mm	0.045 mm	
Scan17	100.000 %	100.000 %	0.585 mm	0.046 mm	
Scan18	99.001 %	99.944 %	0.480 mm	0.045 mm	
Scan19	98.239 %	99.965 %	0.512 mm	0.044 mm	

**START REGISTRATION**

APPLY CANCEL

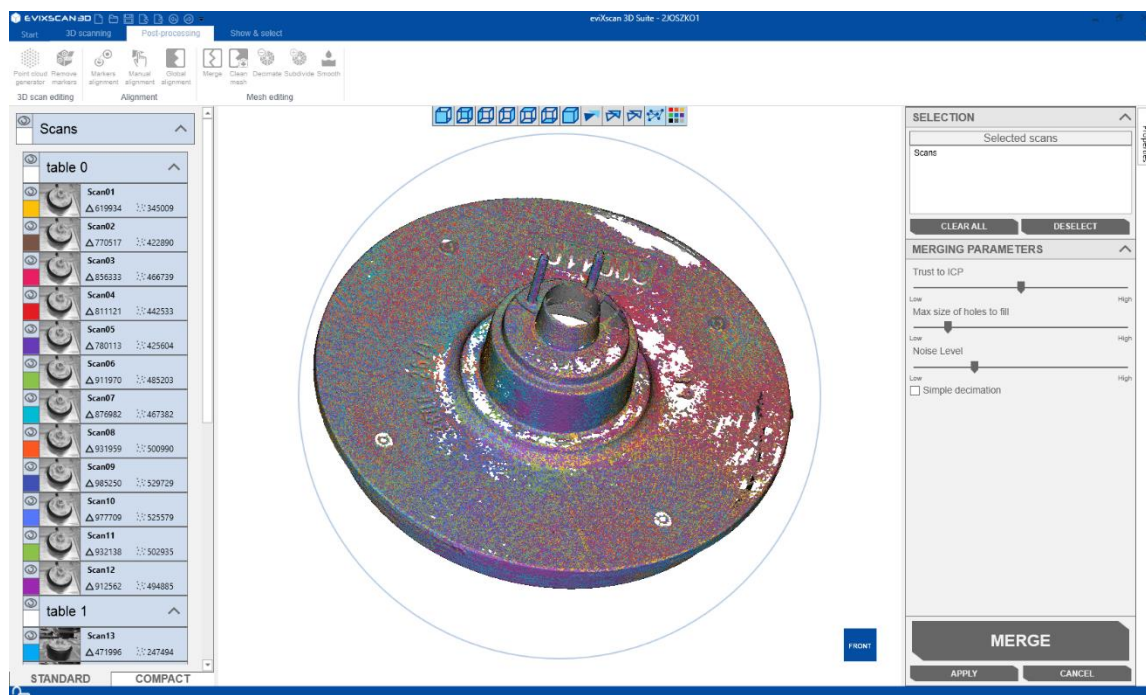
Name	Intersection		Avarage dista...		
	Before	After	Before	After	
Scan145	41.014 %	89.401 %	1.094 mm	0.045 mm	
Scan146	58.025 %	97.531 %	0.698 mm	0.038 mm	
Scan147	96.667 %	96.667 %	0.471 mm	0.025 mm	
Scan148	100.000 %	100.000 %	0.320 mm	0.067 mm	
Scan149	100.000 %	91.429 %	0.162 mm	0.122 mm	
Scan150	97.403 %	98.052 %	0.145 mm	0.052 mm	
Scan151	93.528 %	91.023 %	0.111 mm	0.130 mm	
Scan152	83.232 %	83.537 %	0.109 mm	0.040 mm	
Scan153	88.060 %	87.463 %	0.130 mm	0.057 mm	
Scan154	95.992 %	95.992 %	0.109 mm	0.056 mm	
Scan155	96.296 %	98.148 %	0.117 mm	0.041 mm	
Scan156	76.471 %	64.706 %	0.739 mm	0.207 mm	
Scan157	79.070 %	83.721 %	0.486 mm	0.104 mm	
Scan158	40.602 %	87.218 %	0.547 mm	0.396 mm	
Scan159	57.339 %	88.073 %	0.533 mm	0.348 mm	
Scan160	28.713 %	85.149 %	0.902 mm	0.054 mm	
Scan100	46.732 %	97.751 %	1.331 mm	0.051 mm	
Scan101	49.693 %	95.799 %	0.861 mm	0.065 mm	
Scan102	97.231 %	96.254 %	0.552 mm	0.051 mm	
Scan103	100.000 %	99.781 %	0.543 mm	0.038 mm	
Scan104	98.831 %	99.666 %	0.525 mm	0.031 mm	
Scan105	94.615 %	96.769 %	0.517 mm	0.035 mm	
Scan106	84.423 %	91.439 %	0.534 mm	0.041 mm	
Scan107	39.503 %	90.858 %	0.689 mm	0.046 mm	
Scan108	92.500 %	94.904 %	0.434 mm	0.052 mm	
Scan109	56.309 %	96.824 %	0.727 mm	0.067 mm	
Scan110	54.774 %	98.618 %	0.853 mm	0.071 mm	
Scan111	85.812 %	94.050 %	0.620 mm	0.087 mm	

**START REGISTRATION**

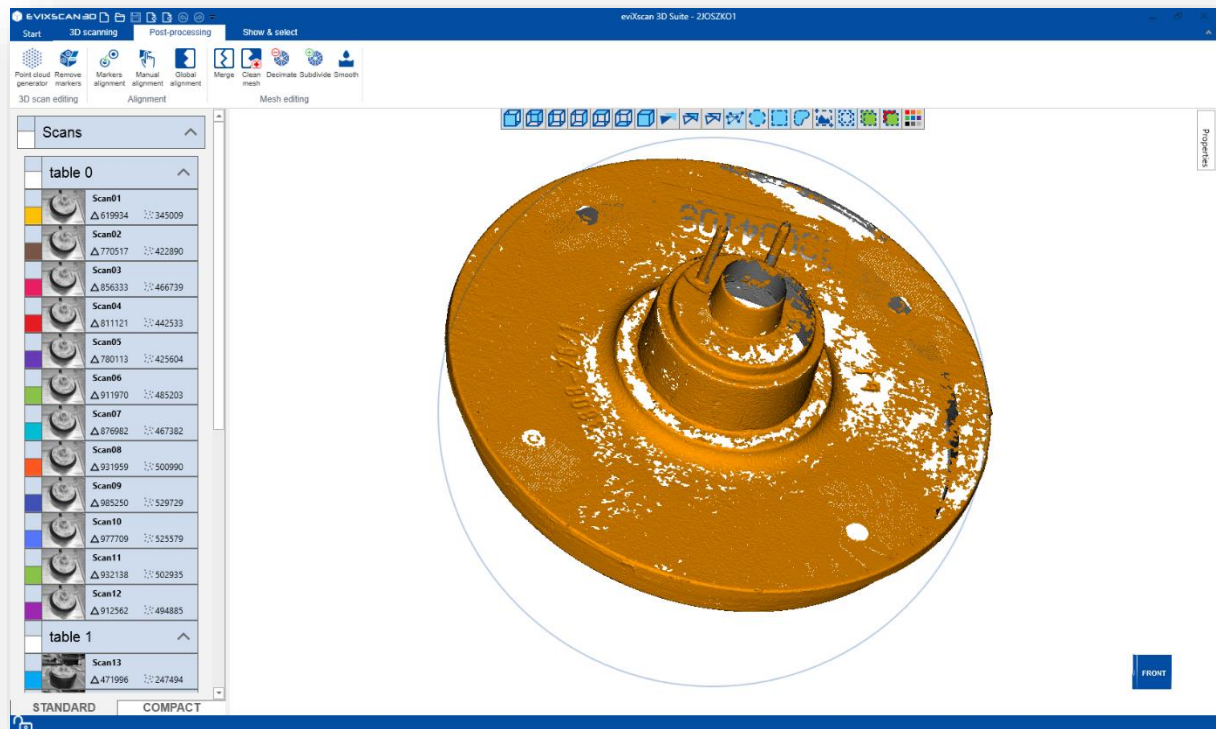
APPLY CANCEL

Results green is correct and red is incorrect.

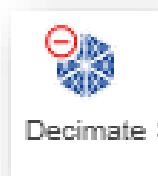
## Merge



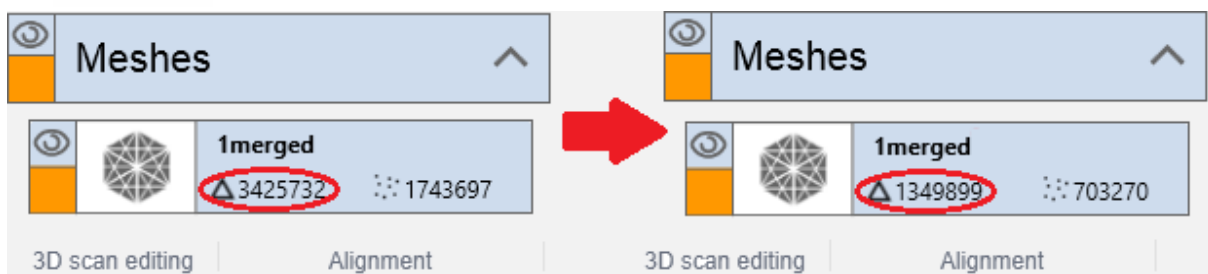
Merge is a wizard style interface for creating defect-free and watertight mesh models from raw 3D scan data. The user can set trust to ICP, max size of holes to fill, noise level and simple decimation.



## Decimate

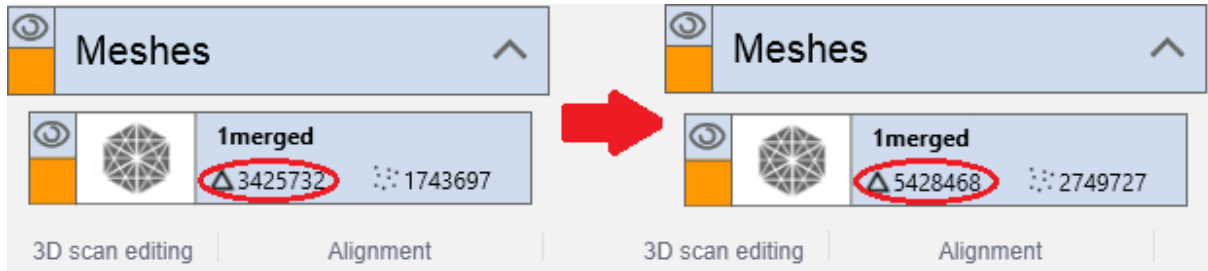
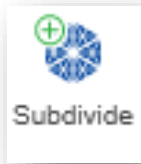


Reduce the number of triangles with preserving the shapes and Surface details on mesh.



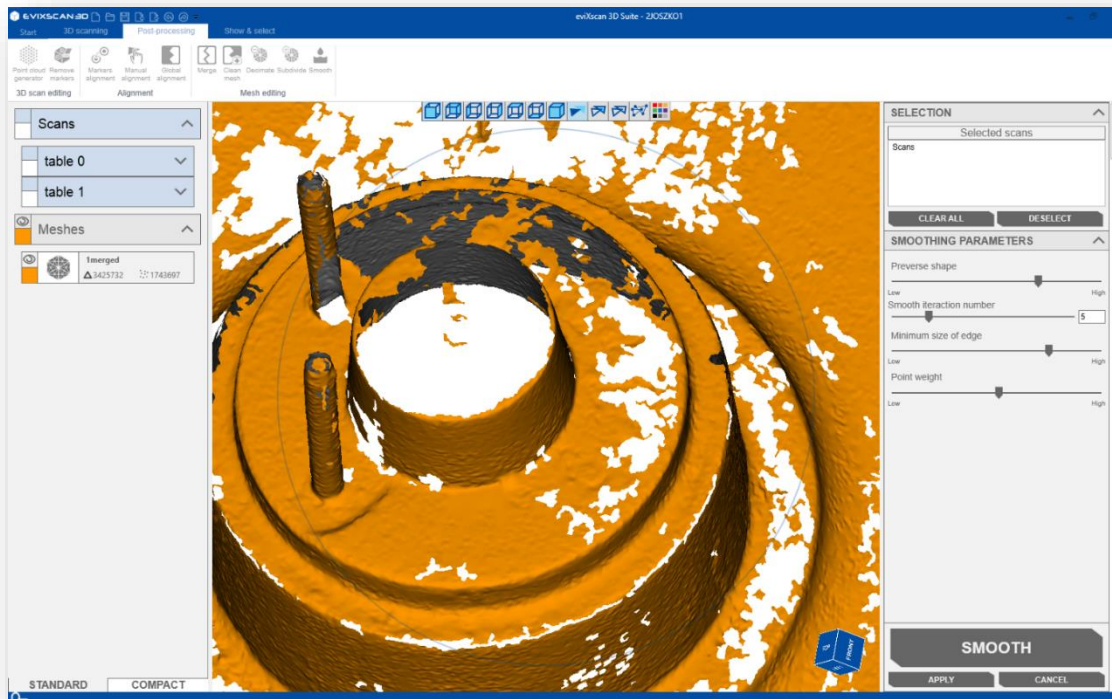
## Subdivide

Increase the number of triangles to improve curvature flow on the mesh.



## Smooth

Increase the smoothness of an entire mesh. Smooth can have an effect like a noise reduction.



## 10. FAQ

### Why is the name temporary model after calling the scan?

If the model has a temporary name, you probably did not create a new model, or in the case of automatic scanning, the *Create new project* step was not added to the path.

### Why can't I start a scan or other action in EviXscan 3D Suite?

The lack of a hardware key blocks the possibility of performing scans or other key actions. This is indicated by the icon in the lower left corner of the software. If the padlock is closed, the key is probably not in the USB port. If the dongle is in the USB port but the LED is off and is not detected by the software, try to move it to another port. If the port change did not solve the problem, the key is probably damaged and you should contact technical support to replace the key.



Hardware key plugged into USB port



There is no dongle in the USB port

### Why does the software not detect markers?

If the software is unable to recognize markers, check if the **SHOW MARKERS** option is used to detect markers in real-time from cameras.



If the **SHOW MARKERS** option is enabled, check whether calibration to the connected scanner has been selected or the scanner has been calibrated.

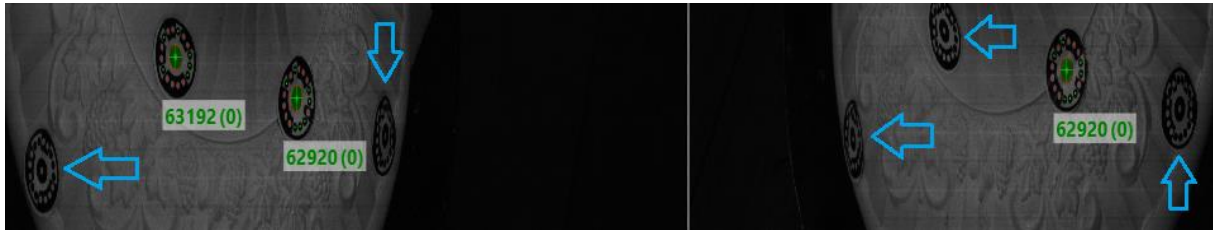
The problem of detecting markers may also be related to overexposure or underexposure of the scanned object (projector brightness and camera exposure set incorrectly). Overexposure can be detected by enabling the **Overexposed Pixels** algorithm that marks in the camera preview areas overexposed red.



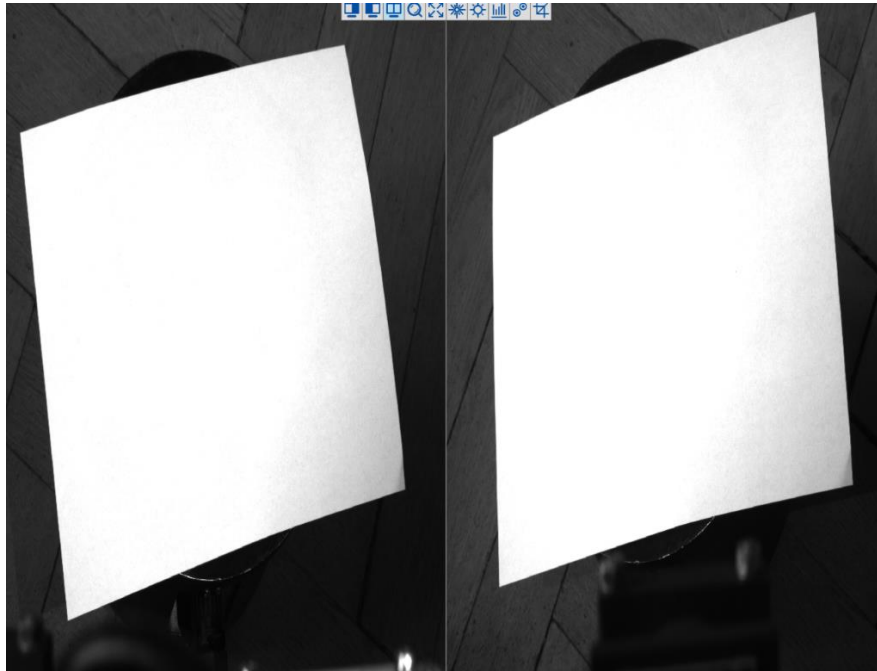
Markers without green indexes and markers within them were not detected due to overexposure



or underexposure:



No markers detected may cause a problem with the projector. Check if the projector displays the **BRIGHTNESS** pattern (glows brightly)



### Why does not show any 3D model after scanning?

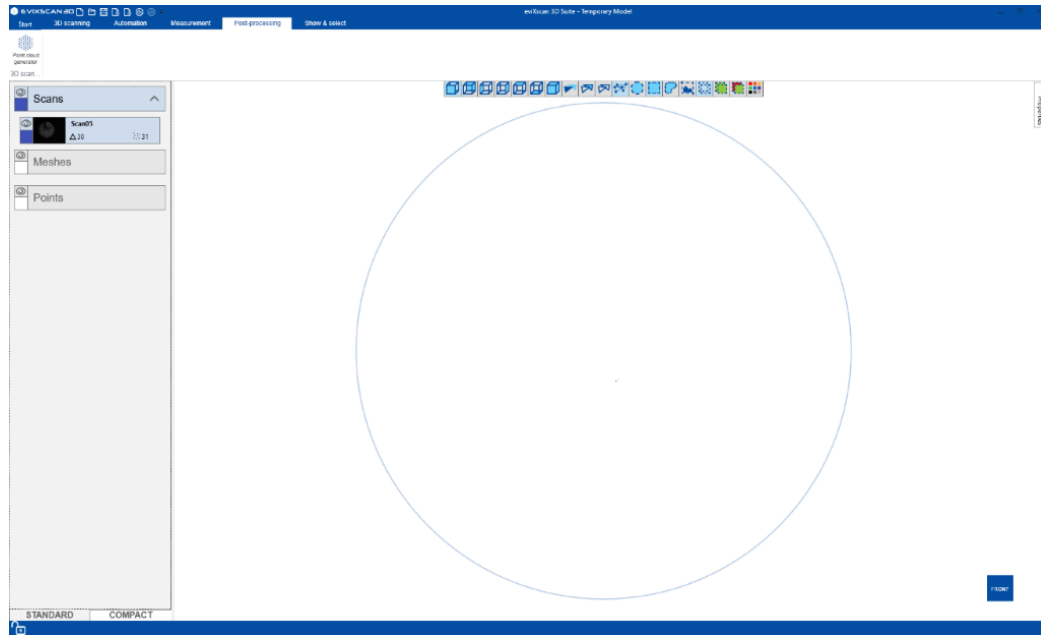
If you don't see any results in the 3D view, make sure that the selected scanning parameters are optimal, i.e. the object is well lit (projector brightness and camera exposure set correctly) and the parameters for scanning (SCAN GENERATOR) do not differ much from the default parameters or they differ but are correctly and purposely selected (by experienced users).

In addition, it is worth checking the date of the last calibration of the scanner in **START** → **CONFIGURATION (Scanner)**.

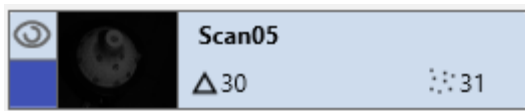
The reason for the lack of visibility of the scan is usually too few points and triangles due to the problems described above. If the number of points and triangles is very small, repeat the scan.

#### EXAMPLE

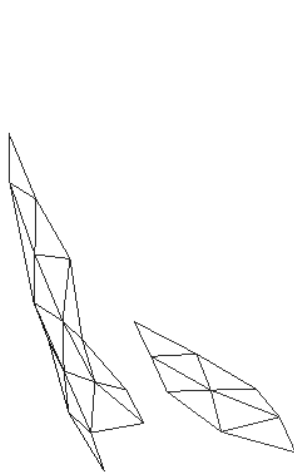
In the figure below we have a view of the scan made.



The number of triangles of the performed scan is 30 and the points 31:



The scan is very small so it is not visible in 3D without zoom. At a larger zoom it looks as follows (on the left a grid view, on the right a surface view)



Model grid view



Model surface view

### What to do if scans made using the table do not fold properly?

The problem with submitting scans with table scanning may be due to the lack of table positioning. Each movement of the table causes a change in its center and requires re-positioning. How to position the table is described in chapter 7 point: Scan with rotary table

### What is the correct exposure?

To set the correct exposure, enable the **Overexposed Pixels** display option to display overexposed pixels on the camera preview.



Then change the exposure gradually until all the red pixels in the preview are leveled out.

### What is the projector's brightness?

Mostly used projector brightness is 100%. However, to set a better exposure, you can set the brightness to 80% and set the exposure before the exposure causing the image to be overexposed in the preview.

### Why can't I see camera previews?

Lack of camera previews may be caused by disconnecting the camera USB cables from the computer or selecting a calibration designed for another scanner. Before calling for technical support, make sure that no camera cable has been disconnected or is "loose". In addition, check whether the application has not set on the Post-processing tab, because the 3D model is displayed in this mode. Also make sure that two windows with the *EviXscan 3D Suite* application have not been fired, because then the cameras will be available only in one of the open software windows.

### Why is the projector off?

One reason for the projector not being able to emit light is by unplugging the power cord from the power list or disconnecting the HDMI cable from the port on the computer. Therefore, make sure that the power and communication cables (HDMI) are in the right places. If the projectors do not emit light, please contact the technical service for assistance, as this may be caused by damage to the projectors.

### Why do we use HDR instead of normal exposure?

To get the best quality scan, you should use multi-exposure (HDR). In this case, photos are taken using the set exposures so that when generating a scan, the processing algorithm is able to extract more details from the pictures taken, and as a consequence we will get a more detailed three-dimensional model.

### Can I remove unwanted items from the scan?

Yes. Using the built-in selection tools located in the Post-processing tab it is possible to delete fragments of the model by selecting the selection method, selecting the fragment in the scan view and removing using the delete button.



## 11. Technical support

In case of problems, please contact our technical support:

**Phone:** +48 33 499 59 32

**e-mail:** [support@evatronix.com](mailto:support@evatronix.com)