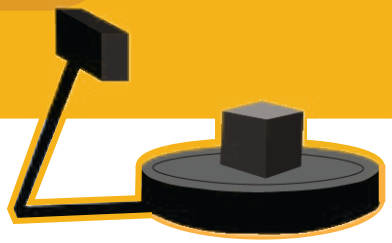
HOW TO OPERATE EINSCAN - SP V2 3D SCANNER



Machine Operation (Scanner Assembly)

1

Turntable Assembly - **Put** the scanner on the turntable.

TURNTABLE - Using turntables for automatic scanning will help scan in more complicated data in some angles, but NOT more accurately. the maximum weight of an object a turntable can carry is less than 5kg (11 lbs)

2

Install the scanner head component - stand the bracket with the scanner head on it.

Machine Operation (Scanner Assembly)

OPTIONAL: Using a tripod and switching to fixed scan mode - keep the tripod in place while attaching the scanner head.

The maximum height for the object to be scanned is objects larger than 30x30x30 mm (1.2x1.2x1.2 cm) and objects smaller than 250x250x250 mm (38x38x38 cm).

3

Connect the scanner and turntable - Connect a USB cord to the turntable's head and the scanner's backs.

Machine Operation (Scanner Assembly)

4

Attach the scaner to the laptop or computer - Connect the USB cable to the USB port of a computer or laptop and the rear of the scanner.

REQUIREMENT:

Preparing a suitable computer will improve your scanning experience. One important notice for PC configuration is the graphic card. it has to be an Nvidia card since a certain function from Nvidia is needed for scanning. The GTX series card is the best for scanning while the Quadro series CAD card also works but you need more expensive model compared to the GTX series to get a good scan experience.

Machine Operation (Scanner Assembly)

5

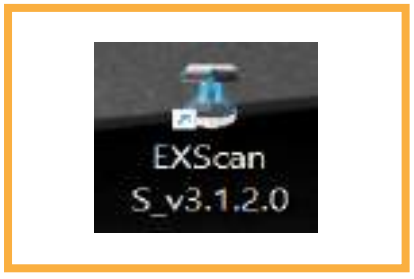
Attach the power source - Connect the power outlet and the scanner's back.

6

Start the scanner- To turn on, **hold** PRESS the button, at the back of the scanner, for one second.

7

Open your software.



Machine Operation (Device Activation)

1

A. If your computer is link to the internet, online activation is advised. A message to activate the device will pop-up.

Click Online Activation
This is recommended as a quick way for activation. Once the device is activated you can move to calibiration.

B. If the activation process is completed successfully, You will see this following messages.

C. If there's a network connection problem, **Select** local activation from the menu or save the .ple license file on your computer. (The USB drive contains a .ple file)

Machine Operation (Device Activation)

D. Once you have obtained the licence file and saved it in your PC, you can start the offline activation.

E. Click the **'i'** button on top right on the activation window. An additional option for "Offline Activation" will reveal.

After selecting the second option (Local Activation), Windows file browser will open. Please select the PLE (*.ple) file from your PC and accept.

F. Once your license is loaded, an information pop-up stating that license was successfully imported will trigger. **Click** Ok.

NOTE:

At this point you are good to start.

Machine Operation (Device Activation)

1

Calibration Board Assembly - **Insert** calibration board onto the board holder.

NOTE:

Calibration is needed when you are in the following situation:
• When the scanner is used for the first time or after a long time without using it.
• When there is strong vibration during transportation.
• When alignment mistakes or failure frequently appear during the scanning.
• When scanning data is incomplete and the quality is much more worse during the scanning.

2

Calibration Board Placement - **Place** the calibration board on the center of the turntable facing the scanner.

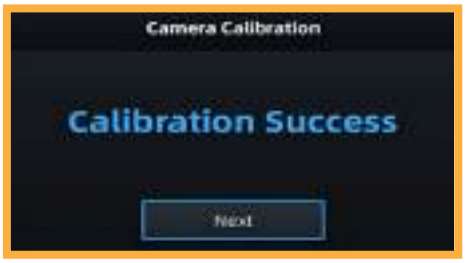
Machine Operation (Device Activation)

3

Run the Calibration - **Open** the software, **Select** your scanner model from EinScan-SP and continue. Starting with the calibration button, follow the on-screen instructionc to rotate the calibration board in three directions.

NOTE:

Follow the on screen instructions to proceed to the next direction.

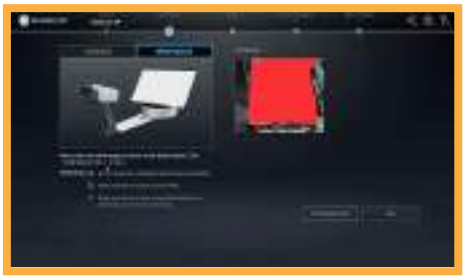


You will see the result as below. Calibration will take longer or fail if you did not follow all the instructions properly. When calibration succeeds, **click** "Next" to move on to the White Balance as the software indicates.

If calibration fails, **click** "Redo calibration" to start the same calibration again from thr biginning.

4

Click the "White balance test" while positioning a white piece of paper on the calibration plate as indicated below.



NOTE:

Follow the on-screen instructions on the software.

Machine Operation

1

BUILD PROJECT

Click “New Work” or “Open Work” button to start a new scan.

NOTE:

Once you click “Open Work”, window file will pop-up, and you can choose your file.

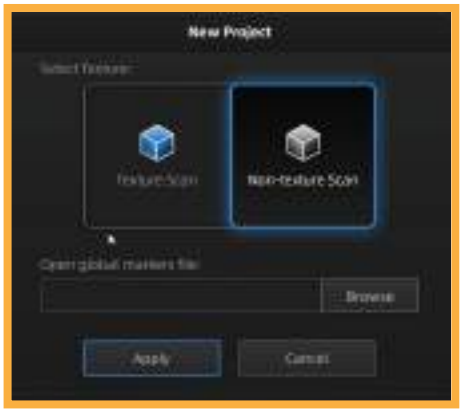
2

TEXTURE SCAN OPTION

Select “Texture Scan” if you want a color texture in your scan. Alternatively, **select** a “non-texture scan”.

NOTE:

Once you click “New Work” you will proceed to Texture Scan Option.



Machine Operation

3

PLACE OBJECT

Make sure the object is stable during the scanning.

Adjust the distance between the object and device, until the cross is clearly to be seen on the object. Make sure the scanner will not move during the scanning. The suitable working distance is 290- 480 mm.

NOTE:

If the object is not stable put a stand (or something like for example a cube block to make the object stand) and the object used to stand should be color black.

4

ADJUST BRIGHTNESS

Select the brightness level based on the condition of the object's surface.

A. Click and **drag** the button to adjust the brightness. The correct brightness setting will depend on the lighting in the environment and the texture of the object.

To scan an object with high contrasting texture, such as something white and black, use HDR. Each single scan will take longer to capture.

B. Turn HDR On when you want to scan contrasting textures

NOTE:

When adjusting the brightness, it should be neither too dark nor too-bright. The ideal setting is where the red dots start to appear slightly in the camera.

5

TURNTABLE

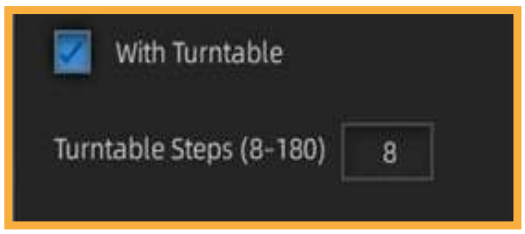
Click the button beside the word “With Turntable” to use the turntable, and **click** again the button if you don’t want to use the turntable.

NOTE:

Once you **click** OPEN WORK, window file will popup on your screen and choose the file.

Turntable Steps

Before scanning set the turntable steps between 8 and 180. The number shows the times of steps that the turntable will stop and data will be captured during the 360° full rotation. The default setting, 8 steps, is recommended. You can change the number of steps according to the features of the objects..



NOTE:

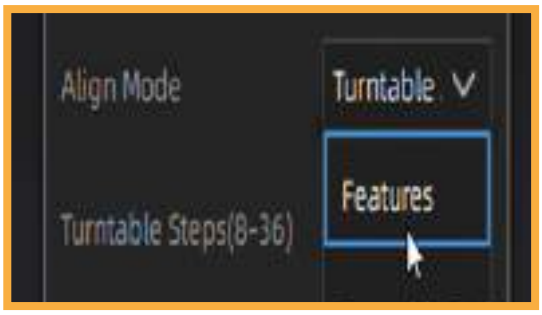
Using more turntable steps will help scan more complete data in some angles, but NOT more accurate.

Machine Operation

A . Features

When the distance between turntable and scanner is inconsistent with it is during calibration, feature alignment will be helpful.

Working principle: With feature alignment, after starting scanning, software will capture four data to calibrate. The scans are matched by knowing the center and angle of rotation between successive captures.



B. Turntable coded targets

The turntable coded target alignment works as follows:

On every step of the turntable, the scanner recognizes common coded targets on the turntable to calculate the new position of the object. At least 4 common targets need to be recognized between 2 neighboring scans.

NOTE:

Once you **click** “Open Work”, window file will popup on your screen and choose the file..

C. Markers

Markers alignment is used when the scanner cannot see enough coded targets on the turntable for auto alignment. Markers alignment works in a similar way as turntable coded target alignment; the software matches 2 neighboring scans by recognizing at least 4 common markers.

NOTE:

Using more turntable steps will help scan more complete data in some angles, but not more accurate.

D. Turntable alignment

If you do not want to stick marker points on the object you want to scan, and it is too big and covers the coded targets on the turntable, you could **choose** turntable align.

Working Principle: Align the data with the assistance of turntable.

Machine Operation

6

SCAN

To begin scanning,**Click** “scan” button or use the spacebar. **Click** the samebutton to pause the scan,and click again to resume scanning.

NOTE:

• When the scan is completed the data is automatically saved in the project file. Make sure the relative position does not change during the scan.

• When auto scan mode is scanning, you can **click** the button to stop the current scan. The current data will be deleted directly.

• **Right Click** on the camera preview to display the Right camera in the window. You will see the arts shown in the window from right camera. The parts which can be seen by both cameras will be captured.

7

EDIT SCAN

SHIFT + LEFT MOUSE: **Choose** undesirable points. Ctrl + Left mouse: **Deselect selected** data.

Machine Operation

Delete selected data

Click the button or the “Delete” key on the keyboard to delete selected data.

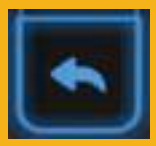
Undo

Click “undo” if you want to undo. You can only undo the most recent deleted data.

Show/Hide Stripes (for data with color texture only)

This is the button of show/ hide stripes. **Click** the button to switch the texture option between display and hide.

This is the button to save and exit the single-scan editing. **Click** the button to save data and exit the single-scan editing.



Click this button to Cancel editions on the data.

Delete data

Click the delete button to erase the current data.

Machine Operation

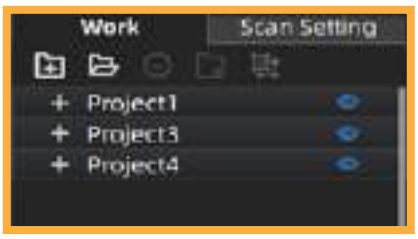
1

PROJECT GROUP

You are able to edit, manually align, rename, or save the scan project in the project group list.

Click on the project tree or on the project button create a new project or import a project into the work.

Imported data will be copied in the work folder and appear on the project tree. New project will create a new entry in the project tree and a new project file in the work folder.



A. When the scan data is saved, you can create new projects with more scans, or import the saved projects and manage all projects on the project tree.

Click the project button to create or load a new data.

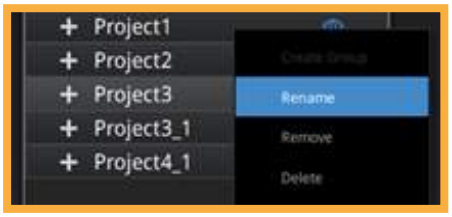
B. Current project

The last loaded project is the current project, new data will be added and align with the current project. The current project is the last listed on the project tree.

Reopen a previous project to make it as the current project.

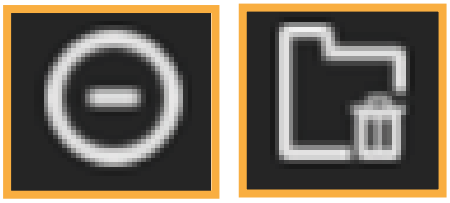
C. Rename project

Right click on the project on the tree to rename it. The new name will be updated in the work folder.



D. Remove/Delete

Select one or many projects Click remove to remove the project(s) from the project tree, but not from the work folder. Click Delete or right click and delete to delete the selected data, group(s) or project(s) from the project tree and the work folder.If you remove or delete the current project the last project will reload and become the new current project.

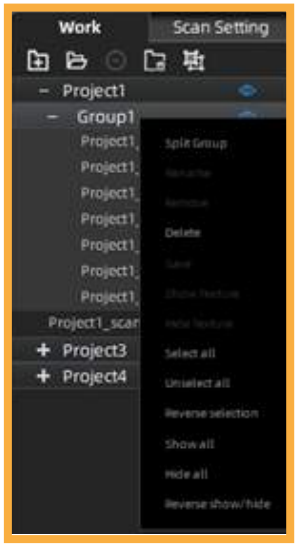


Machine Operation

E. Create/Split group

Left mouse: **Select** data in the data list or on the scanned model.

Shift/Ctrl + Left mouse: **MultiSelect** in the data list.



F. Edit data

Double click on a project, group or a scan, to enter the edition mode. The edition are applied to the selected data only. Modifications will not affect the rest of the data.

Shift + left mouse: **select** data on the 3d view, and enter the edition mode. The edition are applied on the visible data only.

9

MANUAL ASSIGNMENT

If automatic alignment fail during scanning, you can use manual alignment. (Misalignmentdoesn't frequently happen

Click the button to open the Manual Alignment interface.

Drag and drop single scan, group or project to the float and fixed window.

Manual Align buttons

Shift + click left mouse button: **select** at least 3 non-collinear corresponding points in the 3D preview windows for Manual Alignment, as shown below.

Ctrl+Z: **cancel** last point picked.

NOTE:

• Single scan, group or project can be dropped into both windows. Scans in the group or are not allowed, split the group first.

• Manual alignment can be used between projects, load the full projects on the float and fixed window. A single data can not be aligned with another project

Machine Operation

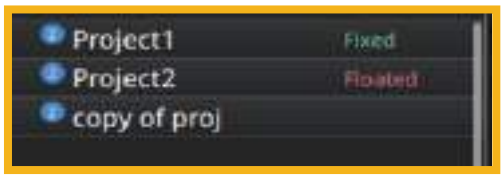
Select 3 points to align the data

How it works:
The software calculates by the best fit alignment from the picked points, and refine the alignment by best fit of all the points of the floating to the points of the fixed.

Auto-alignment

After dragging the data into fixed and floated windows, **click** the feature alignment button on the left, then the data will be automatically aligned according to features.

After data are aligned the blue number represents the alignment reference. The floated data is transferred to the reference of the fixed. it is recommended to keep data with the same reference into the same group.



- **Click** Complete to validate and leave the Alignment interface
- **Click** Reset to cancel all alignments done in this session
- **Click** Next to validate the alignment and continue to use the Alignment interface.

10

MESH

Click to build mesh once scanning and edits are complete.

There are two different types of mesh:
•Watertight
•Un-watertight.

Mesh Editing

Select/delete, Hole filling, Sharpening, Smoothing, Simplification, and Multiview are all editing options for the mesh.

A. Create Mesh (watertight/un-watertight)

When scanning and editing are completed, **click** to create mesh.2 types of mesh are available: Watertight and Un-watertight.

• If there are non-texture projects, there will be a data optimization option. After clicking it, the amount of triangles will be optimized in less than 2,500,000 triangles.

• If the projects are all with texture, the data optimization option will be unavailable. The software will simply the data by default

B. The mesh can be edited:
Select/delete, Hole filling, Sharpen, Smooth,Simplification, Multiview.

Mesh Select / Delete
Shift + Left mouse: **select** data and enter the selection menu

CTRL+ Left mouse: **Deselect** an selected region

C. HOLE FILLING

When selecting meshing in unwatertight, the 3d model will keep the missing scanned regions as holes.

You can **click** use the hole filling tools.

Click for Manual hole filling. The hole edges are displayed green, and get red after picking. **Click** the edge of the hole to fill it

Click for Marker filling. **Input** the radius of the marker used, all holes generated by markers will be automatically filled. This function is only applicable to the meshed scan data with markers, while it is not available for imported data.

Click for Auto filling. **Input** the perimeter of the biggest hole to be filled. Less than 100mm is recommended. This function will fill every hole with a smaller perimeter than the number input.

The hole edges are displayed green.
Choose Curvature, Tangent or Flat before picking a hole

• FLAT calculates the solution for the hole filling considering the point position on the boundary.

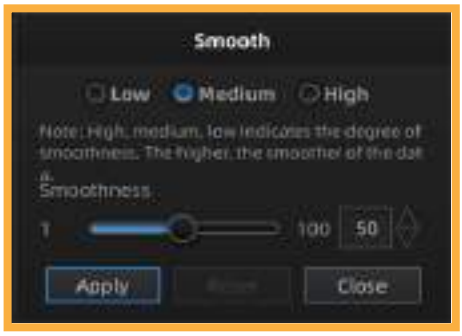
• TANGENT calculates the solution considering the point position and the normal of the last row of triangles forming the boundary.

• CURVATURE calculates the solution considering the point position and the normal of the 2 last rows of triangles forming the boundary.

D. **Click**  the Sharpen button to display the sharpen menu, **choose** any from the three (low, medium,and high). Then **click** apply if you apply sharpen. **Click** close if you do not want to apply sharpening.

E. **Click**  Smooth button to display the smooth menu. Then **click** apply if you apply smooth. **Click** the close button to close the menu.

Smooth the possible noise on the surface of the scan data. It might remove some small details or smooth some sharp edges at the same time. The example of before and after smoothing is shown below. Run 2 times, data will be smoothed twice.



F. **Click**  the Data simplification button to display the simplification menu.

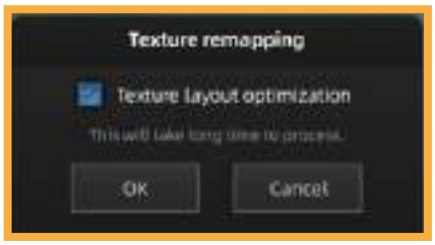
After simplification, the polygon numbers, file size and level of detail of data will be reduced accordingly. Set the ratio from 1 to 100, the default is 100%. The comparison of detail between before simplification and after simplification (at 30% simplify proportion).

G. **Click**  Texture Remapping to display the Texture menu.

Mesh edition of simplification, hole filling on texture scanned data will affect the texture render. By doing the texture remapping, the texture information will be reapplied on the mesh.

Texture remapping is accessible before saving the data.

Choose “Texture Layout Optimization” (TLO) to create an optimized arrangement for the texture file. It will make the texture manual editing much more convenient if you are going to process the texture in a 3rd party software.
This option has no effect on the texture itself.

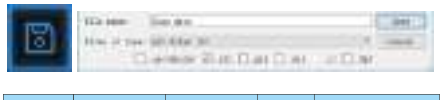


Machine Operation

11

SAVE

Click "Save" button to export the data. Navigate to choose a save folder. And **input** the file name. Select one of the formats below. By default, the saving path is the project folder, the file name is “Scan data”, and the format is .stl.



Format	Texture	Data Type	Save as	Recommended for
.asc (whole)	No	Optimized point-cloud	scan.asc	• Inspection • Fast export (no post-processing needed in handheld mode) Large data to post process in another software • Complex data to post process in another software
.stl	No	Mesh	scan.stl	• 3D printing (watertight mesh data) • Reverse Engineering • Compatibility with most mesh editing software
.ply	Yes	Mesh	scan.ply	• Low storage • Easy texture editing
.obj	Yes (separated)	Mesh,Texture & Matching file	scan.obj scan.jpg scan.mt	• Artistic applications • 3D rendering • Compatibility with most mesh editing software
.p3	No	Marker position	scan.p3	• Global Marker File in EXScan S software • Measurement of the marker position
.3mf	Yes	Mesh	scan.3mf	• Low storage • Compatibility with Microsoft painted

FAQs

What’s wrong if scans don’t align?

Your 3D scanner needs a calibration. In order to acquire and align the 3D images, it’s crucial to make sure the 3D scanner is properly calibirated.

Data Making using Adobe Illustrator

FAQs

What should I do if there is a notice about the multiple graphics cards while opening the software?

If the computer has multiple graphic cards, access to the NVIDIA Control Panel (right click on the desktop). In Manage 3D Settings > Program Settings, Add EXScan S software. Then change the preferred graphic processor for this program. Select NVIDIA processor. Click “Apply” to save settings.

What is the resolution of scanned data?

Resolution is how close each point is to the next point so at 0.05 mm those are really close together at 1mm, they’re little more spaced apart so if you have super fine details them the resolution is going to matter, accuracy is actually a measure of how close that point in the point cload that is gathering where that oint actually was on the actaul object.

What is the use of dot markers in the objects?

3D Scanning Marker is a small sticker or magnet with an image of a black/white dots printing on it. This are used on high contrast object to determine its location. Markers are usually applied on (or near) the object being scanned, to increase accurancy and repeatablìility of 3D data.

Data Making using Adobe Illustrator

FAQs

How to use these markers?

Stick the markers around/on the object you want to scan.

When you stick the markers on the surface of the object, you need to follow the following rules:

- Stick the markers in a random, non-linear pattern.
- When scanning, make sure at least 4 markers on each frame can be taken.
- Control the number of markers seen on the camera view.
- Use the markers provided with the device only. Other markers can result in bad accuracy or not be seen.
- Some cases like small objects, we suggest distrbuting the markers on black surfaces around the object.

What are the ideal items to scan with EinScan 3D scanners?

Not translucent or transparent, but opaque. Not- too - shiny surfaces.

Why am I not seeing any 3D scan data in the software?

Check that Window and graphics cards are up to date and ensure the antivirus software is not interfering.

Data Making using Adobe Illustrator

FAQs

What would I do if the 3D Scan software won't open?

Verify that the Cameras in the device manager are operational, then reinstall.

Under auto scan mode, if the turntable is not moving, but with a humming sound, how to solve it?

Disconnect power line and connect again after a few seconds.

What should I do if EinScan SP calibration keep failing?

Turn off all the other cameras and imaging devices on your PC, as well as antivirus software.

Where can I download the software of my scanner?

Go to https://www.einscan.com7support7download/. Select your scanner model, and download the software of your operating computer.

NOTE: You are required to register before downloading.