Freestyle 2 Training

M Hanneson |June 2025

Using the Freestyle 2

FARO® Authorized Distributor

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The FARO® Freestyle 2

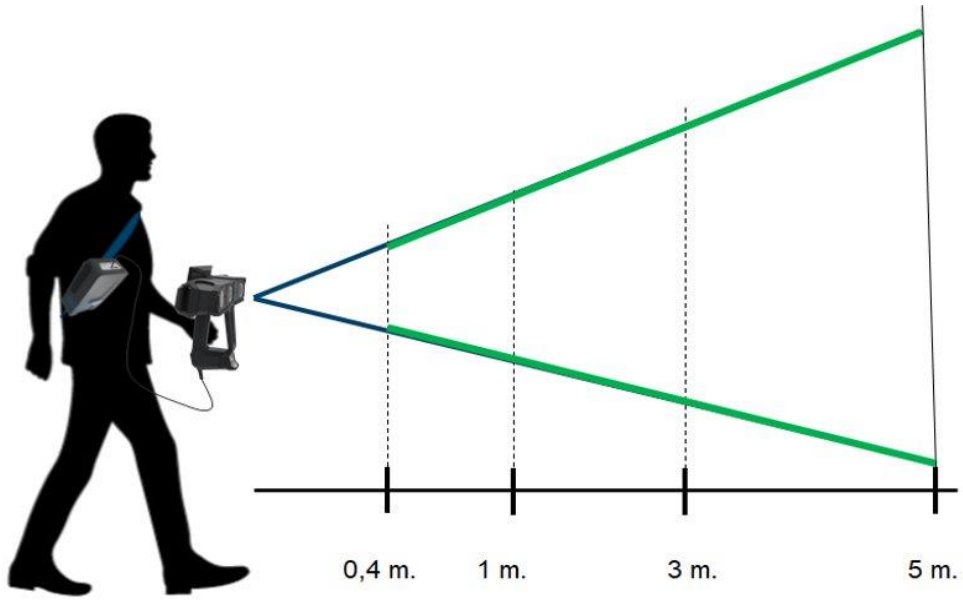
- The FARO® Freestyle 2 is a superior handheld 3D scanner designed for professionals who require quick and easy complete scene documentation.
- Delivering fast, photorealistic 3D reality capture with unparalleled real-time display results, Freestyle 2 offers total mobility to scan even the most confined spaces and difficult objects.

Features:

- Real-Time Visualization
- Wide-Range of Scanning Distances
- Capture in Variety of Lighting Conditions
- One-Hand Operation
- Guided Scanning
- On-Site Compensation
- Integrated Training

Performance

Range	0.4 m – 5 m (1.3 ft – 16ft)
Long Range Accuracy	0.5 mm at 1 m distance 5 mm at 5 m distance 15 mm at 10 m distance
Acquisition Rate	Up to 220,000 points/s, point cloud density increases with time
Lighting conditions	Full daylight, 10,000-45,000 lux (reduced performance in direct sunlight)
Dimensions	285 mm x 256 mm x 130 mm
Connectivity	HDMI, USB 3.0, WiFi
Weight	1.48 kg
IP rating	IP 52
Temperature	0 - 40° C
Eye Safety	Class 1 Laser



Best results will be achieved from 0.4m to 5m

Workflow

Setup

Scan

Process

Set Up

What's in the box :

Targets

Freestyle 2

Mobile PC

Magnetic place

Charging cable

USB wire and power cord

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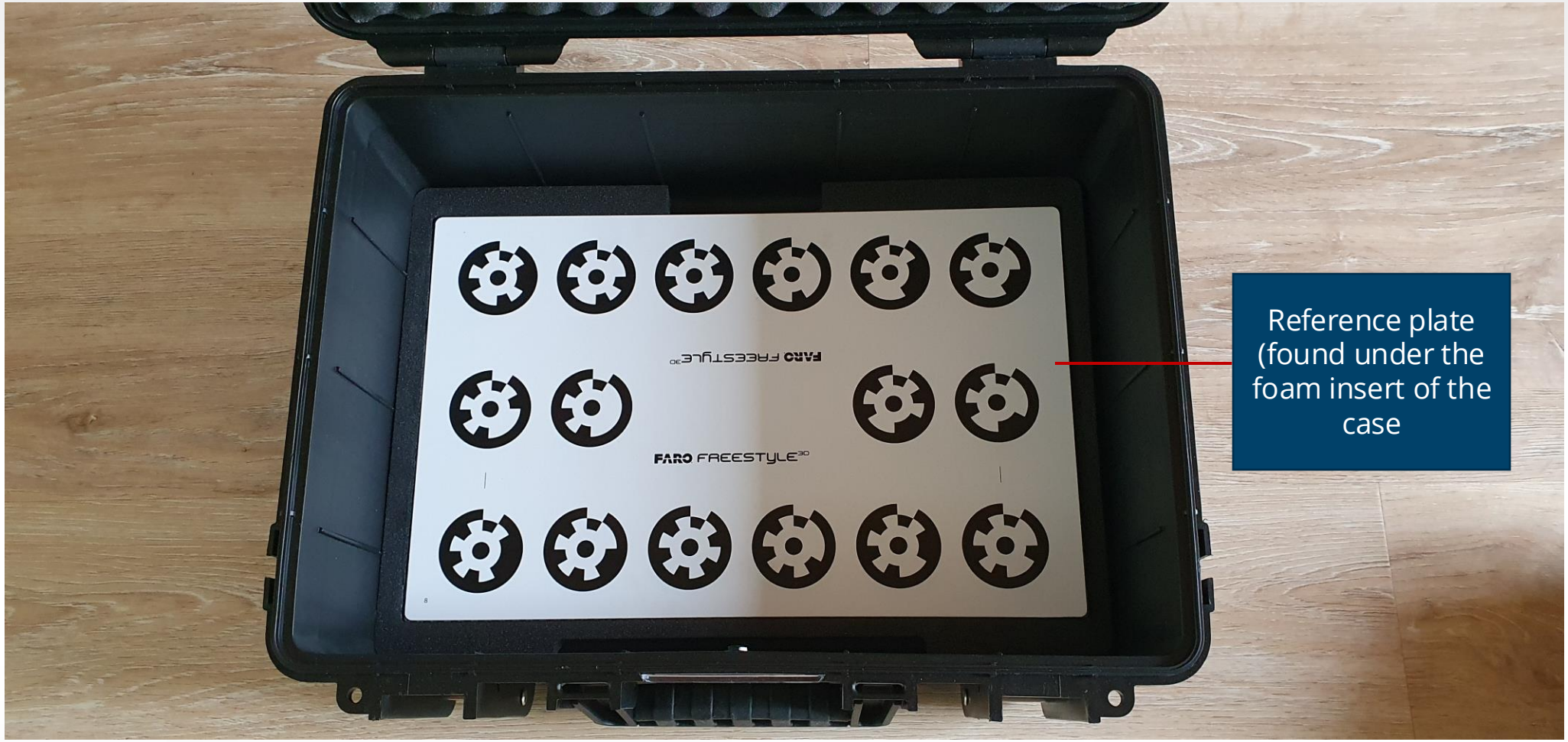
What's in the box :



Getting to know the Freestyle 2

Mobile PC

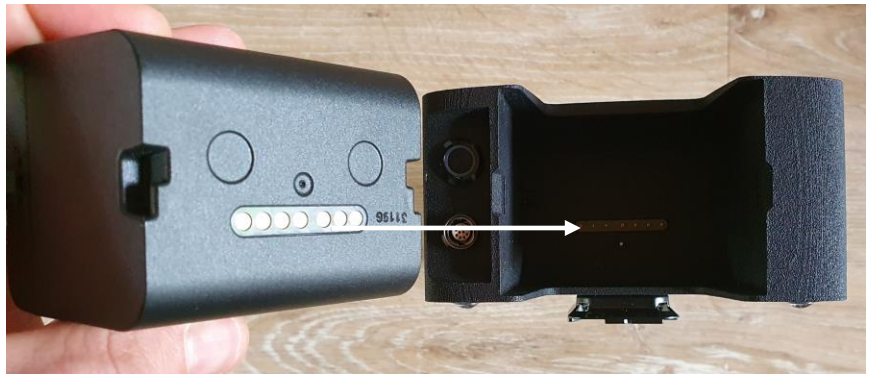
NOTE: Older versions of the Power Block are not compatible with the Mobile PC and Freestyle 2. Ensure that your Power Block type label includes the designation HC

How it works

- The Freestyle 2 projects a pattern of small infrared dots on the surface of the object.
- The two infrared cameras take photographs of this pattern.
- The 3D coordinates of the infrared dots are then calculated using a mathematical method called triangulation

Setting up to Scan - Power

- Charge the Power Block
  - Insert the Power Block into the Mobile PC until the latches click into place. Make sure you align the mobile PC pins with the battery terminals
  - Connect the power supply to the mains and insert into the Mobile PC; the LED will blink green for one second and then blink blue while charging



Setting up to Scan – Mobile PC Strap

- The Mobile PC can be carried either with a shoulder strap or with a belt clip
- Shoulder Strap
  - Insert both ends of the strap to the round plugs that are attached to the Mobile PC. Make sure that you hear it click into place. Ensure that both endings of the strap are fully locked
  - To unlock the strap, push each round plug. While pushing, the strap can be released.

Setting up to Scan – Mobile PC Belt Clip

- **Mounting the Belt Clip**
  - Unscrew the screws as shown—only as much as is necessary to swing open the clip.
  - Put the clip around own belt if you choose to carry the Mobile PC in this way. Close the clip and safely fasten the screws
  - Insert the mounting plate that is attached to your device into the clip.
  - Make sure that you hear it click into place. Ensure that the clip is fully locked.
  - To unlock the clip. push the button 1.

Setting up to Scan – Smart Phone

- Your phone is held in place on the Freestyle 2 with a magnet. Attach a metallic sticker
  - Clean the backside of the phone from any dust.
  - Peal the plastic film off the metallic sticker
  - Stick the metallic sticker at the center of the back face of the phone.
- If the Freestyle 2 app is not installed on the phone you intend to use, locate the app in the Google Play store and install on your phone

Setting up to Scan – Attach the phone

- Place the phone on the Freestyle 2 on the metallic sticker.
- Connect the Freestyle 2 using the USB cable

Connect the Freestyle 2 to the Mobile PC

- Insert a charged Power Block into the Mobile PC.
- Slide the Power Block into the slot and press gently until the Power Block latches click into place.
- Plug the connector from the Freestyle 2 into the Mobile PC
- The plug will slide into the socket with gentle pressure when it is correctly aligned

! Do not connect or disconnect the FS while Mobile PC is on. Always switch off the Mobile PC before connecting or disconnecting

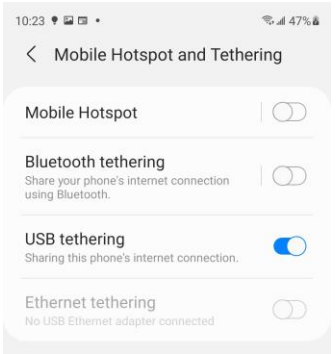
Power on the Freestyle 2

- Start the Mobile PC by pressing the On/Off Button
- The blue LED flashes during the booting process. The computer is ready when the On/Off button stops flashing and shows a constant blue light.
- Start the Freestyle 2 app, and you are now ready to scan

Scan

Freestyle 2 App - USB

- Start the Freestyle 2 app.
- You have two options to connect the phone to the system: USB cable or WiFi.
- If you chose to use the USB cable, tap the **Enable USB** button and the app will automatically redirect you to the right settings page.
  - **If you want to use the USB cable**, disable WiFi on the phone
  - Choose USB, then return to the app.
  - You must do this step each time the phone is reconnected.



Freestyle 2 App - Wifi

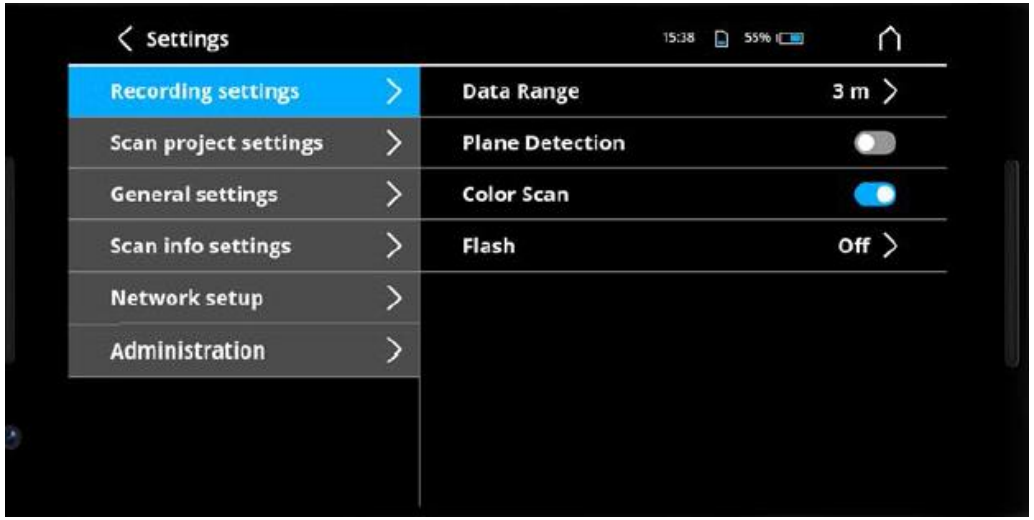
- If you want to use WiFi, open the camera app on your phone or a QR code reader and scan the QR code that is printed on the bottom of the Mobile PC.
- After scanning the code, a dialog box will appear asking if you want to connect to the network. Tap yes and your phone will connect.

Compesation

- The Freestyle 2 scanner is calibrated before shipping, but if you drop or knock the handset, or if it has been subjected to large changes in temperature, you should compensate it—just to be sure that it is ready to accurately capture.
- Each Freestyle 2 kit includes a reference plate and a corresponding calibration file which is found on the provided USB flash drive
- Compensation involves capturing the reference plate from different angles and at different heights

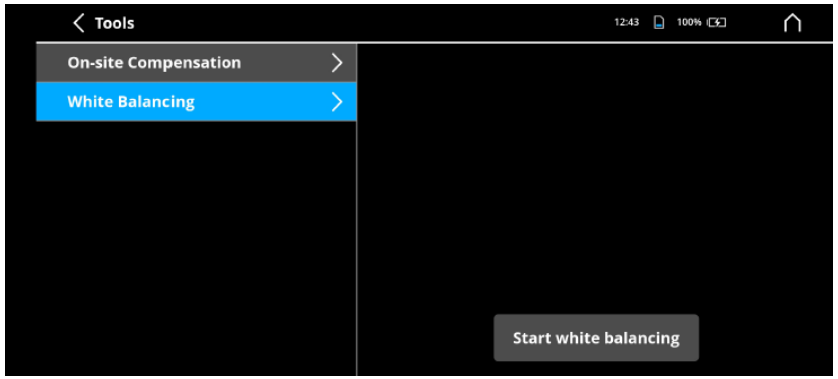
Adjust the Recording Settings

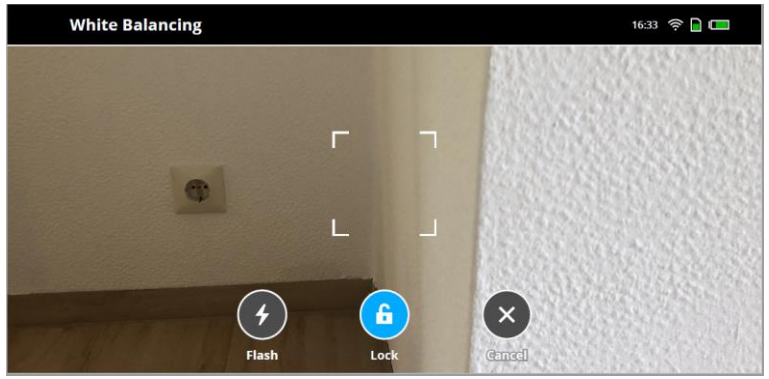
- Set:
  - Data range - Points further from the distance will not be recorded.
  - Use plane detection with area with flat surfaces
  - Switch colour off if needed in grey scale
  - Switch flash on



Adjust White Balance

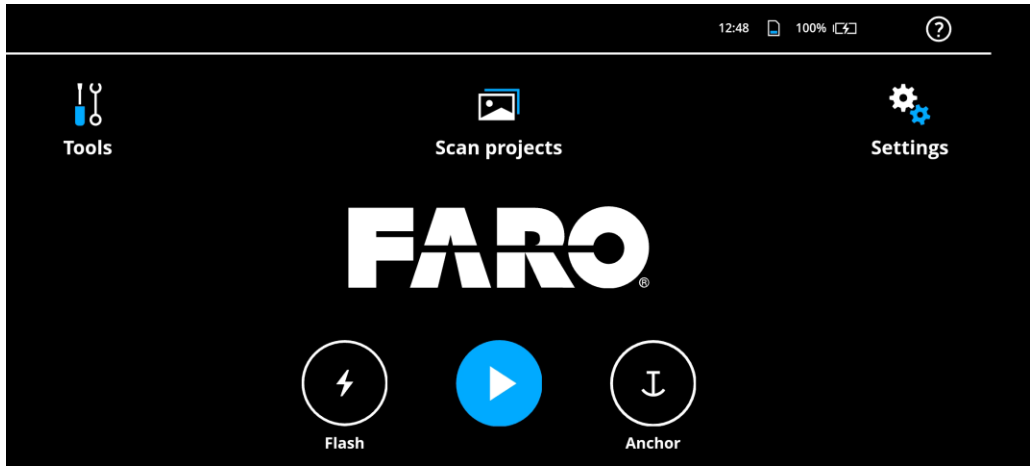
- White balance (also called color balance) is the adjustment of the intensity of primary colors to produce images that match what the human eye sees under different lighting conditions
- To adjust it, select Tool > White Balance
- When the selection box is filled with a white or gray object, press the center button on the handset to lock the white balance





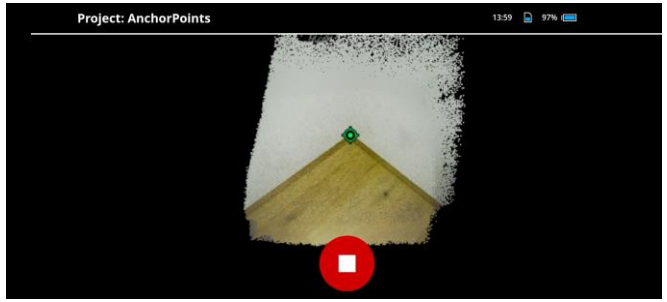
Create a Scan Project

- Tap **Scan Projects**.
- Tap **Add Project**.
- Enter a project name. Tap **OK**. The project is created.
- Tap the home icon to return to the home screen



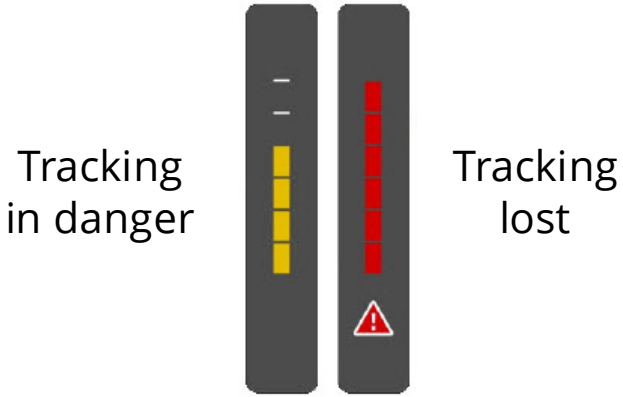
Anchor Points

- Anchor points help to optimize the results of larger scans. It may be helpful to place an anchor point at the beginning of a scan and scan the same area again at the end of the scan.
- An anchor point can be found at regions where 3 plans intersect, e.g., the corner of a room.
- If a corner point is recognized after pushing the button, a green icon will be displayed. If no anchor point was found, a red icon will appear



Tracking lost : Resume Tracking

- If tracking is lost, you can resume it.
- Align the scan to the static picture and if aligned, tracking will resume



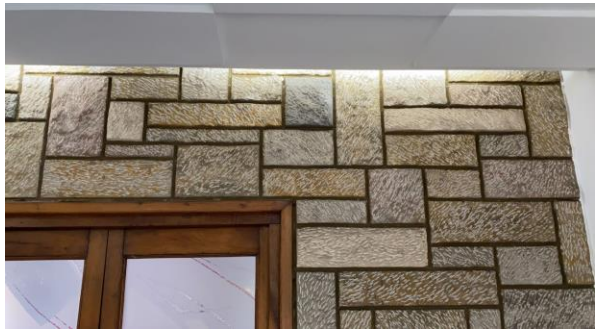
Tracking

- The live tracking mainly uses texture
    - Flat walls (not texture or pattens) will be hard to track

Tracking

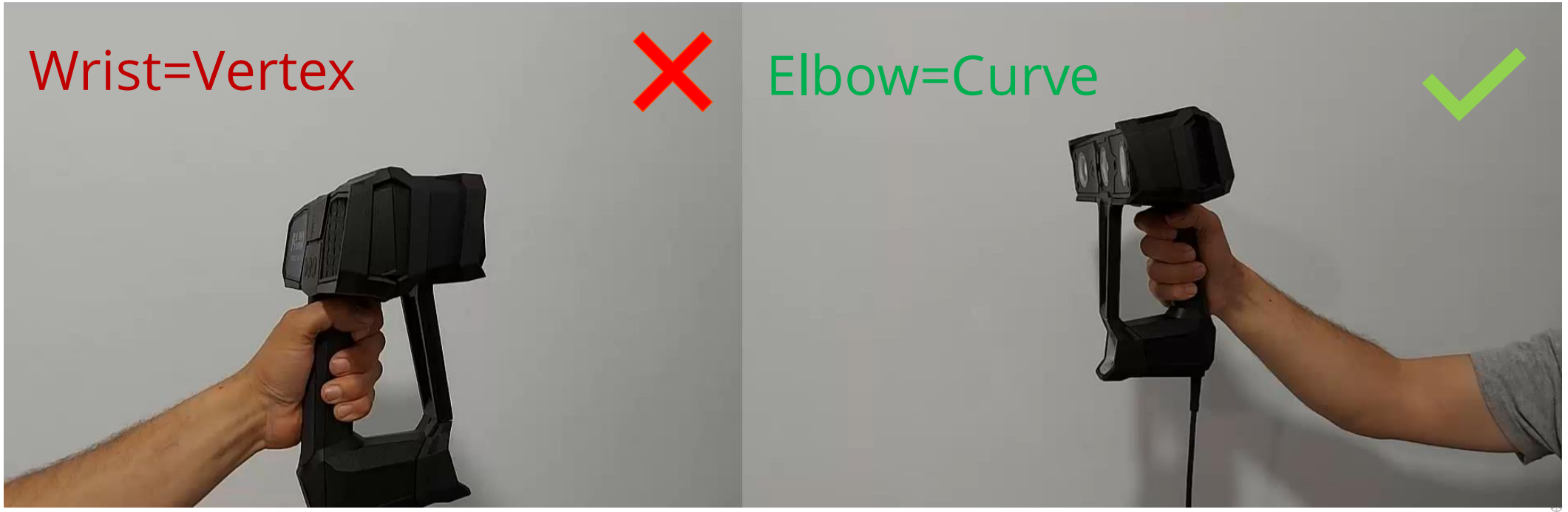
- The live tracking mainly uses texture
- Flat walls (not texture or pattens) will be difficult to track. Avoid plain white walls






How to scan

- Rotation in the FS2 trajectory should describe a curve and not a vertex
- Wrist **vs** Elbow/Shoulder/Arm



Scanning tips

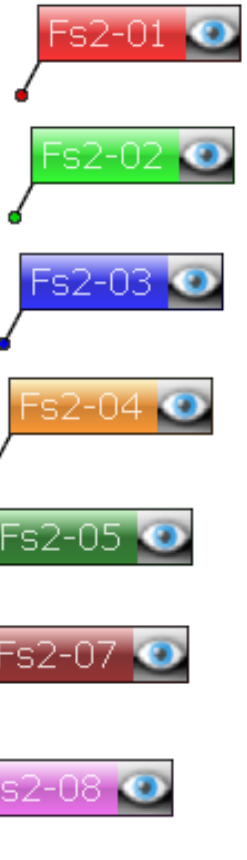
- The longer a single scan takes, the longer the processing time will be. Try to keep scan times as short as possible—under 5 minutes is best
- It is better to have one scan that captures all objects of interest than to have several scans. Fewer scans means less registration.
- Move the hand unit slowly and constantly, avoid jerky movements. Fast and jerky movements may lead to inaccurate data or tracking may be lost.
- Accuracy and tracking may be improved if you avoid excessive twisting movements while scanning
- Objects or surfaces may have an increased noise or reduced data if they are directly illuminated by bright sunshine
- Try to finish a scan at the place where you began. This helps with loop-closing
- Scanning areas with few features or without texture can be difficult. Add markers or other artificial targets for better results.

More tips

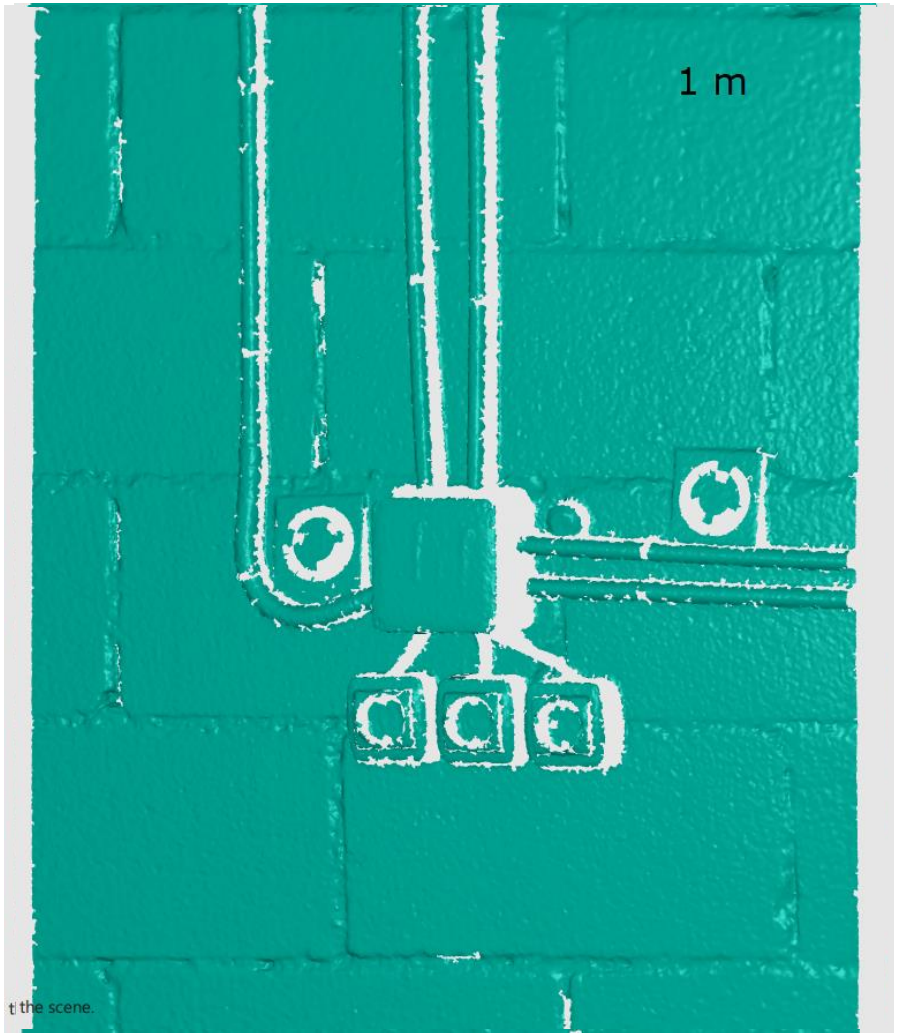
- Avoid
  - scanning your shadow while making outdoor scans
  - having only plain-colored surfaces (e.g., a white wall)
  - having only shiny surfaces
  - having only highly absorbing surfaces (e.g. black furniture)
  - scanning when the temperature is lower than 0 °C or higher than 40 °C
  - high concentrations of dust, fog, rain or snowfall. This may result in bad measurements. Avoid scanning under these conditions.

Accuracy: Noise

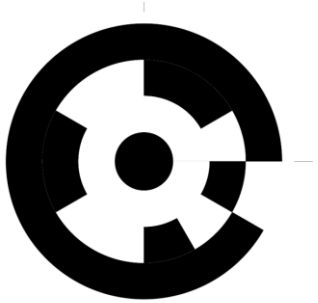
- At 0.5 m
- At 1m
- At 1.5m
- At 2.0m
- At 2.5
- At 3 m
- At 3.5 m



Accuracy: Noise

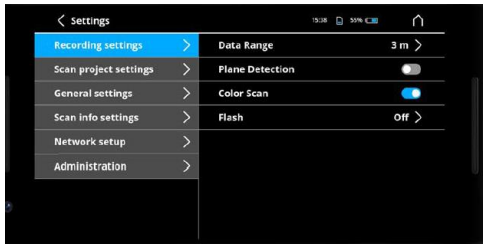


Markers



- Markers
  - Predictable and reliable.
  - Not dependent of the environment features (geometry and texture)
  - Use markers for high accuracy tasks
  - Helps with combining Focus and Freestyle data.

Setting up to scan



Insert the power block and charge it up. Attach the shoulder strap

Power

Place the phone on the Freestyle2 using the metallic sticker securely.

Phone

Adjust recording settings, white balancing and create a scan project
Add markers (optional)

Settings

Start scanning

Scan

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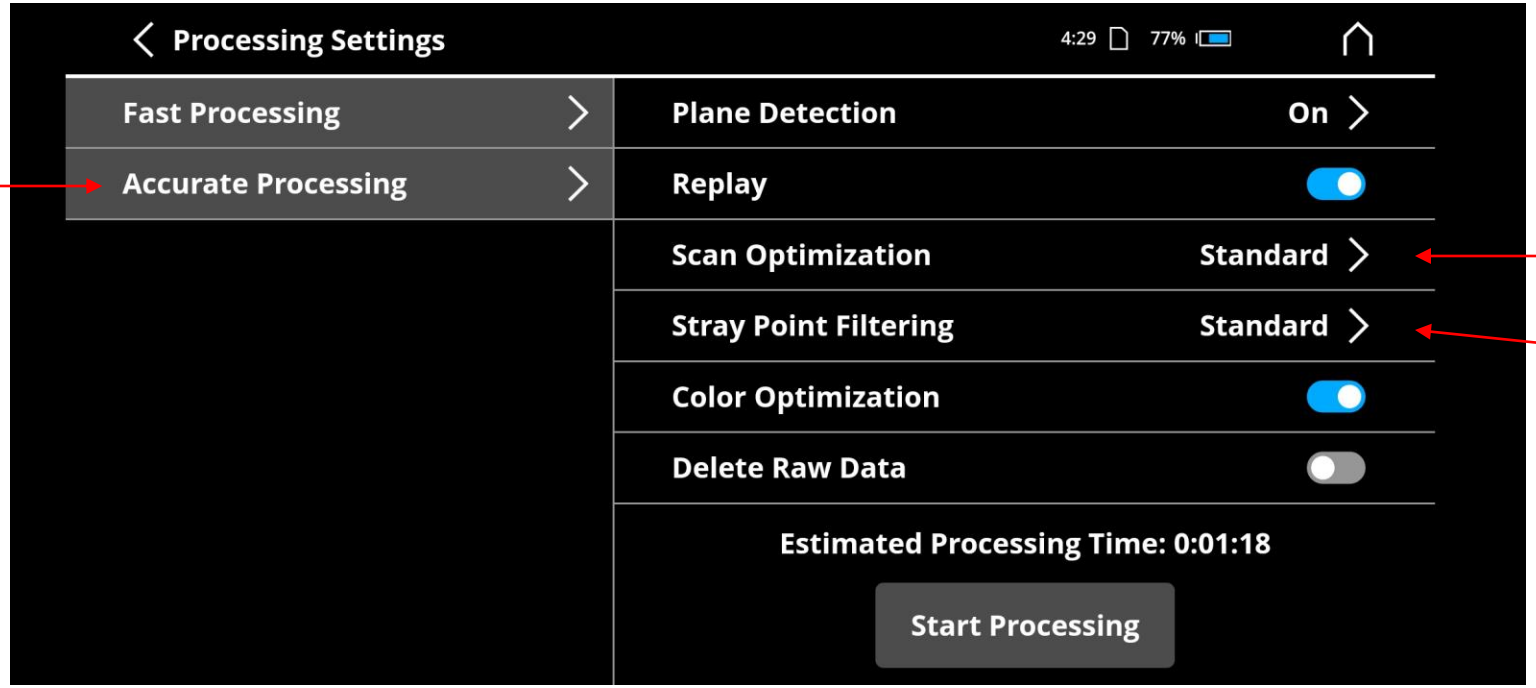
Process

Process

- Processing is a series of manipulations to the scan data in a project that improve the quality of the scan
- Normally we would process an entire scan project, though you can also process single scans.
- Select the project you want to process. (Tap **Scan Projects**, **Select)**

Process settings

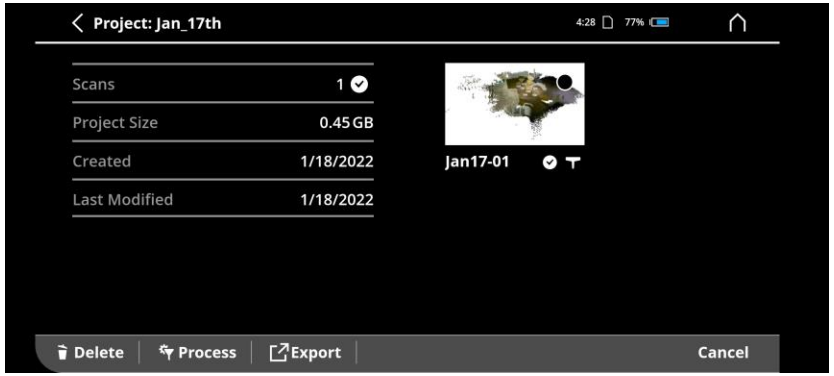


Extended give better results but takes longer

Standard makes edges and corners look better
Smooth makes plane look better

Project Transfer to SCENE

Insert a USB

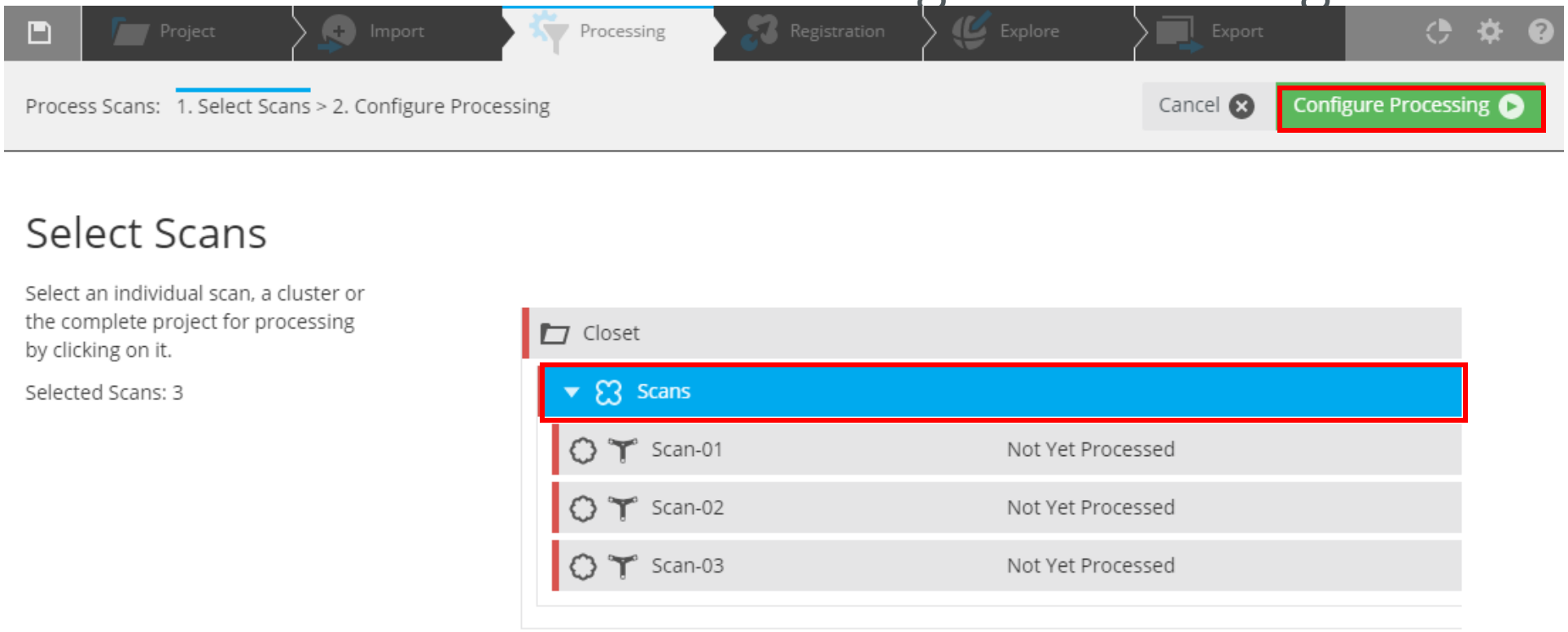


Select the project then export to the USB

Import the project from the USB and open the *.lsproj file in Scene

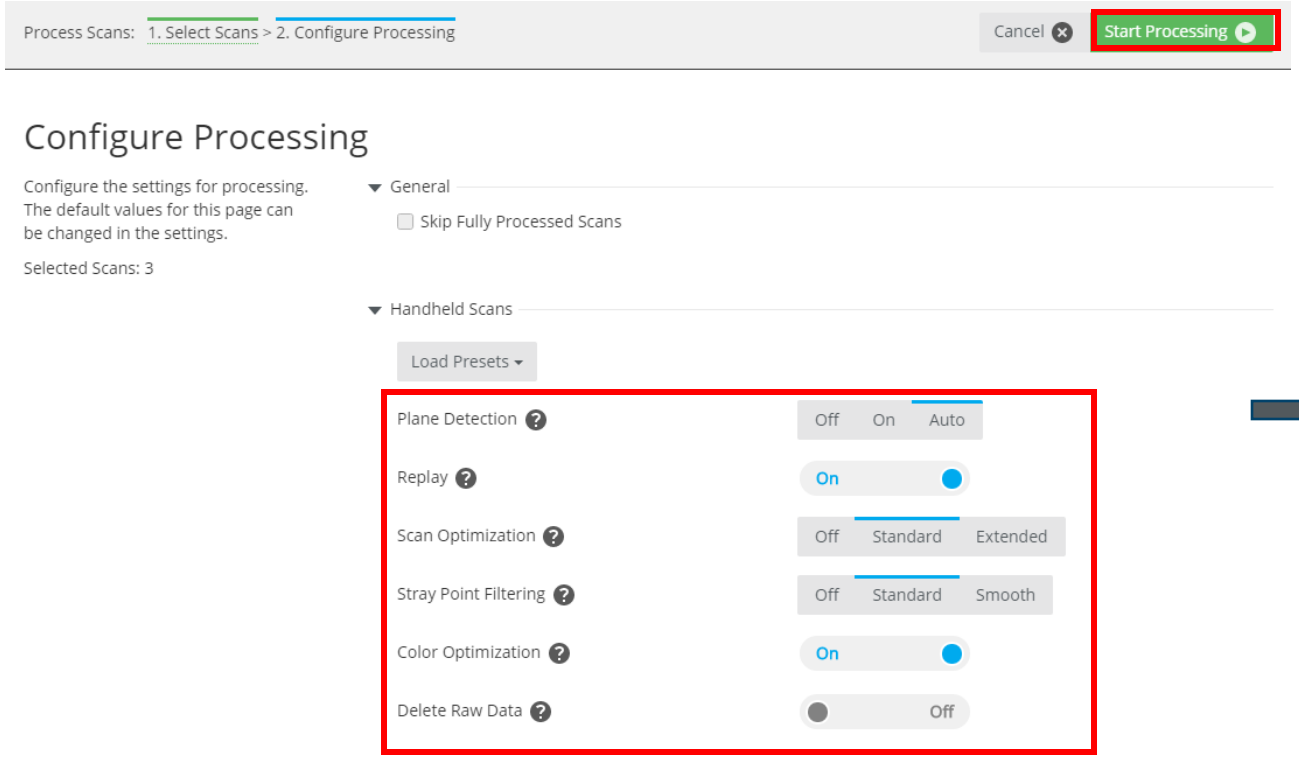
Process

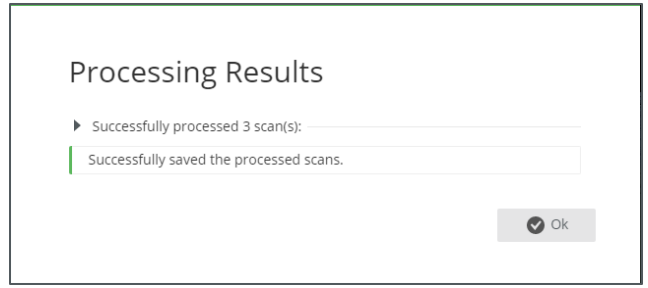
- Select the scans and click on “Configure Processing”



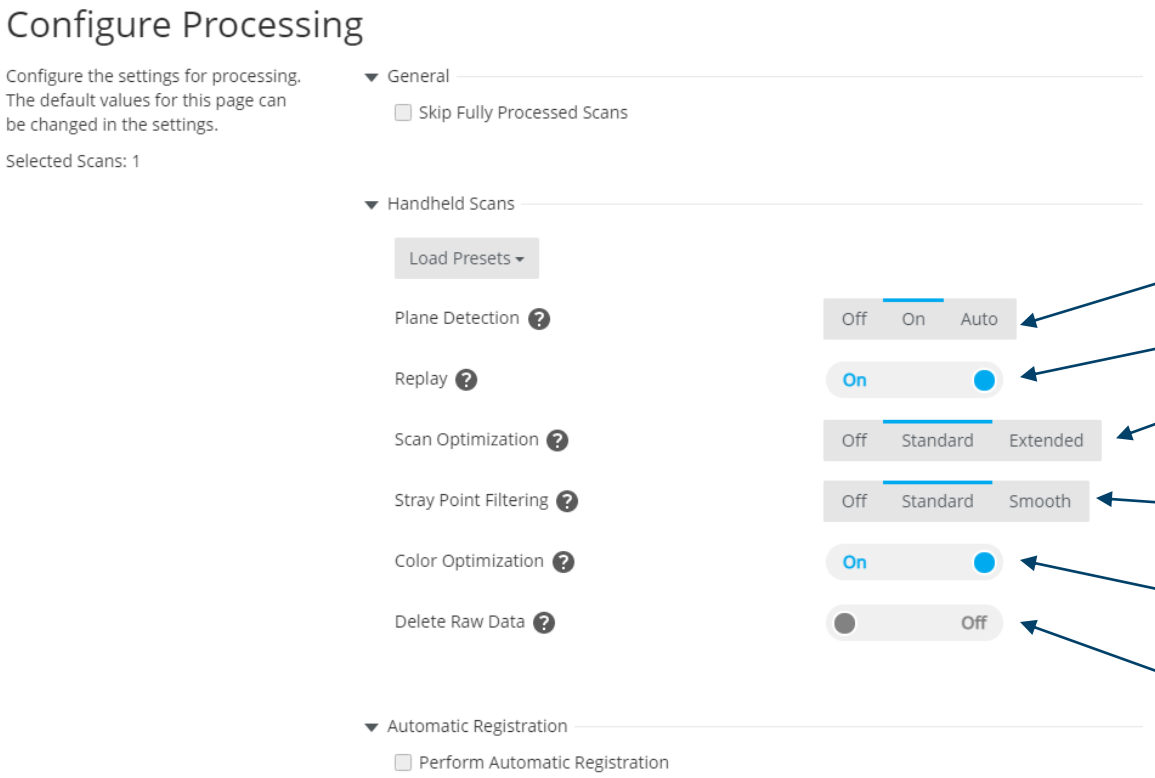
Configure Processing

- Select the process settings and “start processing”





Configure Procesing



Detect Plane

Replay starts processing from the beginning

Extended give better results but takes longer

Standard makes edges and corners look better
Smooth makes plane look better

Adjust colour effects caused by different lighting

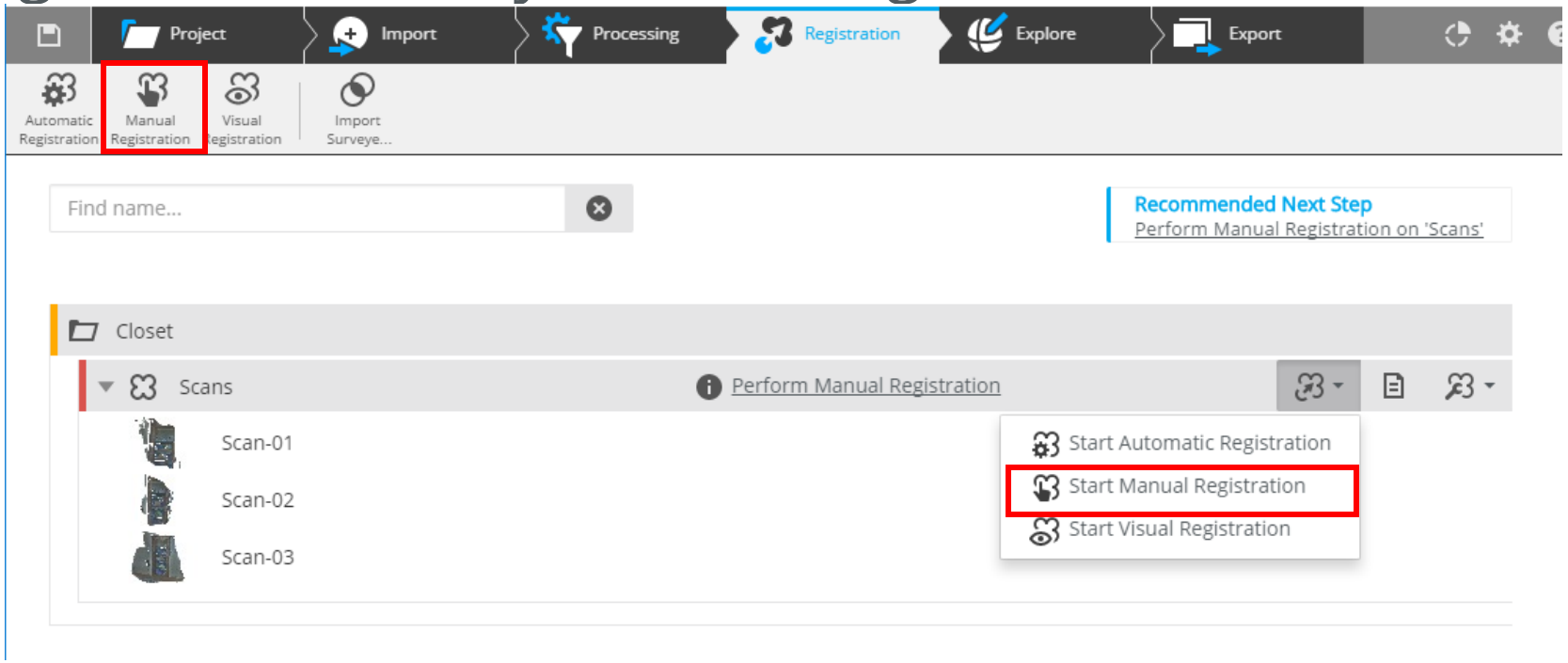
Select this to save space and reduce project size, use this when the project is finalized.

Registration

- If markers were used during the scanning, use Target based registration. The markers will be identified and automatically registered.
- However, if there are no markers used, use Manual Registration.

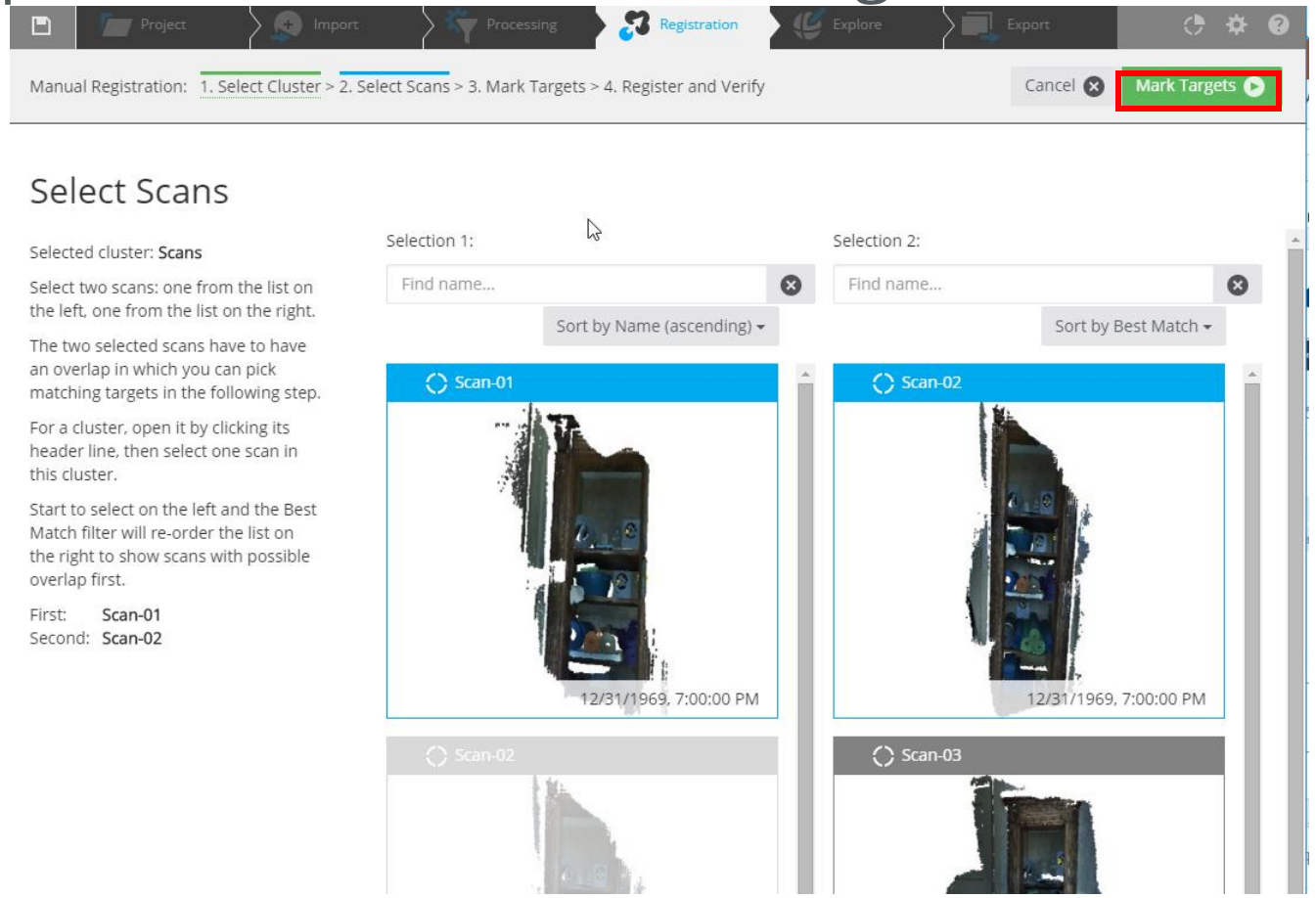
Register Scans Manually

- Register the scan by Manual Registration



Select Scans

- Select the pair of scans and “Mark Targets”



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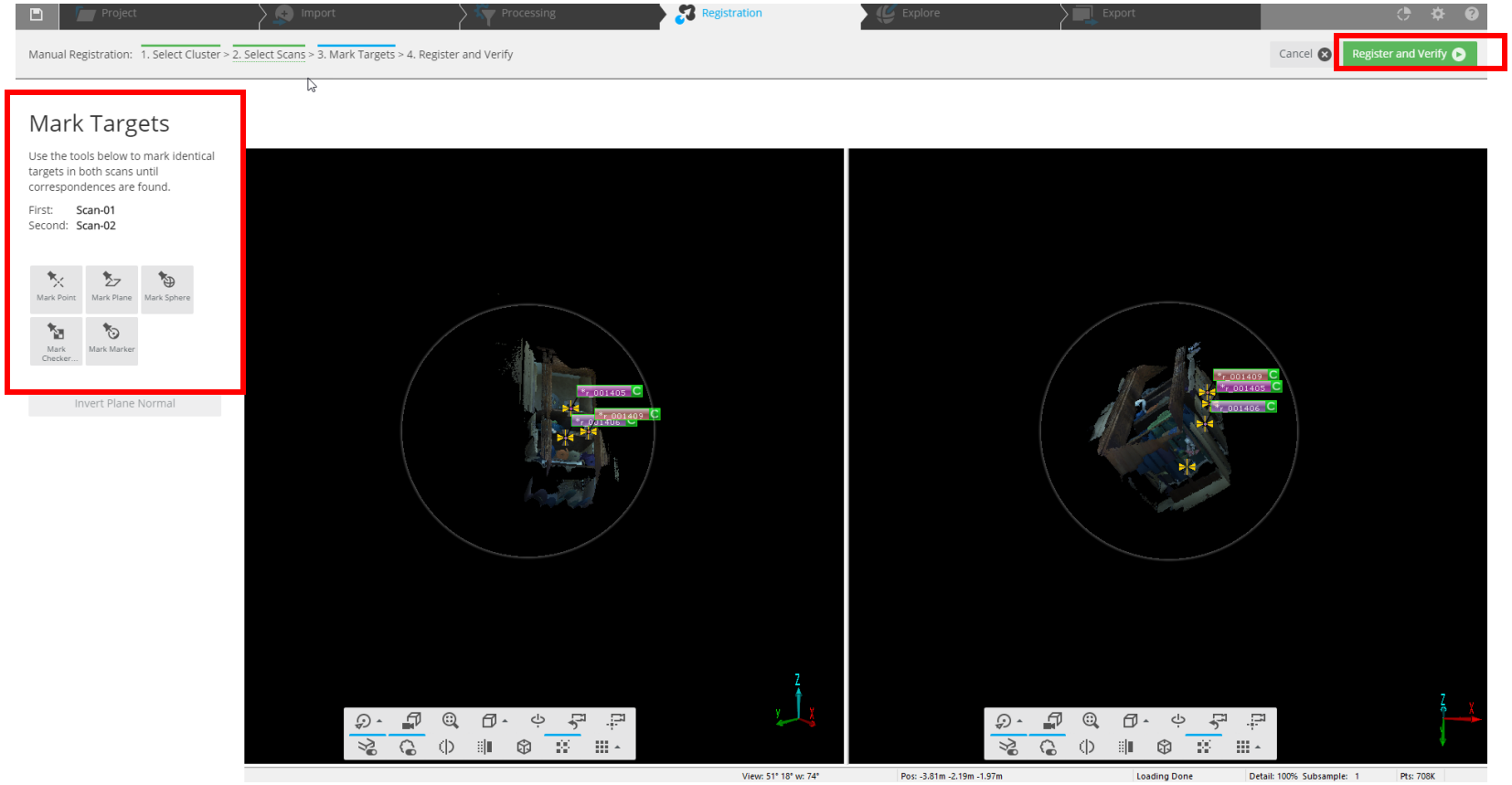
Mark Targets

- Mark the targets and “Register and Verify”



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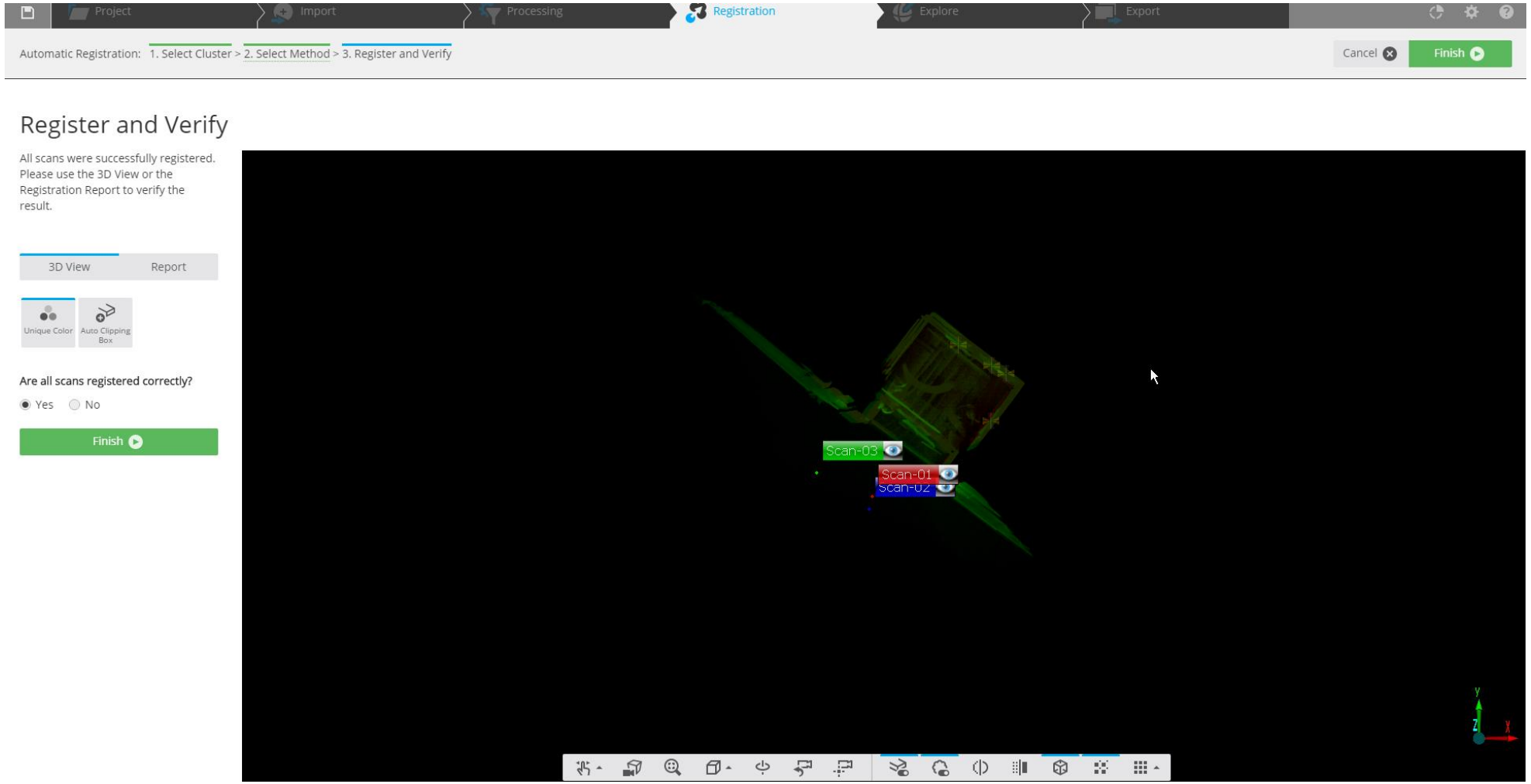
Verify the results



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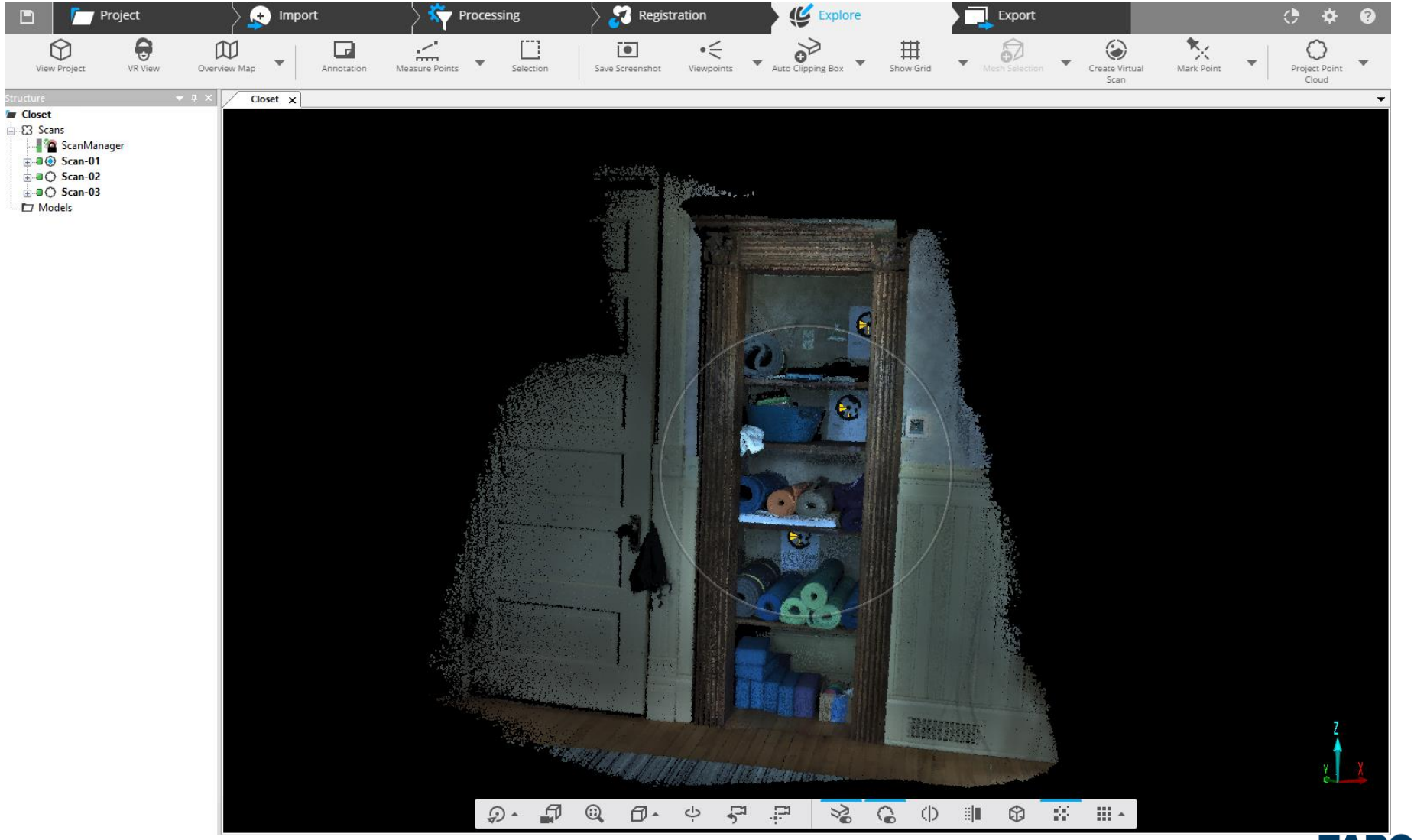
Explore



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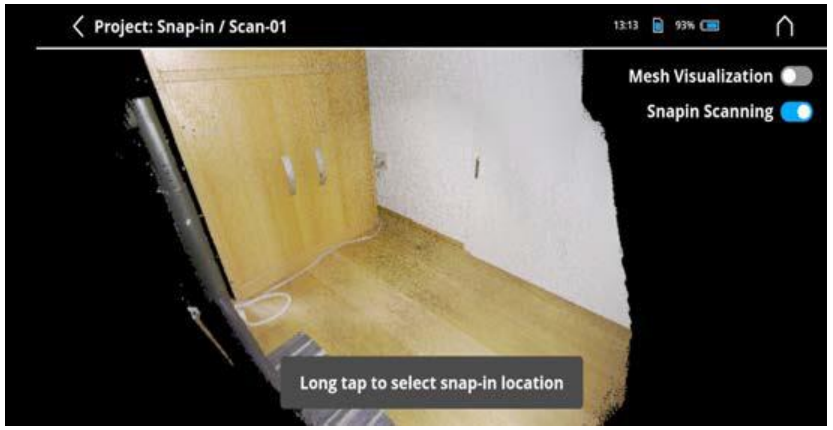
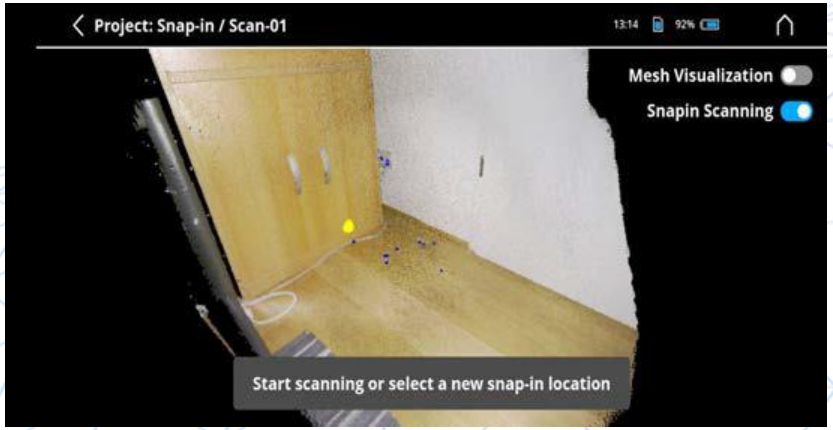
Optional

Snap in Scanning

Freestyle-to-Freestyle Snap-in Workflow

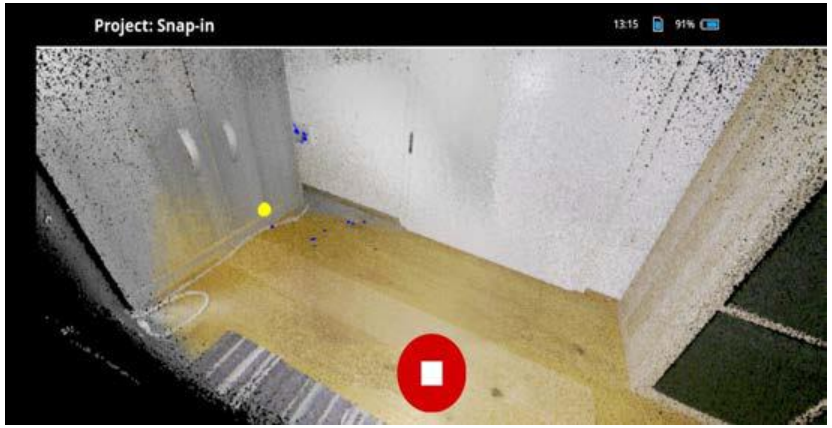
- After scanning an area with the FS, you may want to add an area to scan
- Open the original scan in the 3D viewer, and top “Snap-in Scanning” to activate it.
- Move to the position where you would like to “snap-in” a scan.
  - Using markers will help, however if there are no markers present try to snap in area where three planes meet at a corner
- As soon as the system is ready, a message will appear





Freestyle-to-Freestyle Snap-in Workflow

- Now the scan can be started. Press the start-button of the scanner.
  - Try to point the scanner at the same region that was chosen at the 3D view of the base scan.
- When the scan aligns, the base scan will display in grey.
- Stop the scan when done.
- At the scan overview page,
  - Base scans show a blue dot at the left bottom corner
  - Snap-in scans are shown without



Freestyle-to-Focus Snap-in

- Transfer the SD card to the FS after scanning with the Focus using the USB adapter or wirelessly
  - Wirelessly
    - On the Focus scanner, switch on the WLAN and set the mode to Access Point.
    - In the Freestyle 2 app, open Settings > Focus Network Settings, and find the Focus scanner, and enter the password (0123456789)
    - Tap Connect to establish the connection.
    - Open the project into which you want to import the scans and tap Import Scans or Projects
    - Disconnect the Mobile PC . Focus Network Settings, tap Disconnect.
- After importing the scans, choose Process.

Freestyle-to-Focus Snap-in

- Open Focus Scan in 3D view
- Navigate to the position to start the “snap in”
- Select the location with a long press (use markers)
- Start scanning with the FS, the Focus scan will be shown in grey

Updating Scene Capture

Updating SCENE Capture

- Download the SCENE Capture to the root directory of a USB
- Plug the Freestyle 2 hand unit into the Mobile PC, and power
- Plug this USB stick to the Mobile PC.
- Start the FARO Freestyle App
- At the home screen, tap Settings > Administration > Operations > SCENE Capture.
- Tap Install SCENE Capture from USB drive
- Select the Installer file and wait until the installation process

Capture 2021.5 released (NEW)

- The following new features are integrated in this version:
  - The Freestyle 2 can now **hash** and **digitally sign** all scan data
  - **Color images** that were made during scanning can now be exported
  - **Checkerboards** now can be detected during scan processing
  - If a FARO Focus scan which includes detected markers in the scan is available, **External Constraints** can be used as a reference for the Freestyle 2 scan if it contains the same markers
  - To get a better view of details or textures, an **advanced version** of **viewing a mesh**
  - While scanning, press the start button for at least one second to get the viewpoint in the **3D view being locked**
  - When post-processing the scan with scan optimization turned on, a **leveling** will be automatically computed and applied to the scan
- For the download and the release notes click here

Questions?

Thank you!