VICON ENTERTAINMENT

BEYOND MOTION

GETTING STARTED WITH SHOGUN

WHAT'S INSIDE

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About this guide

This guide provides an end-to-end workflow for capturing data with Vicon Shogun Live and processing and exporting it with Vicon Shogun Post.

Videos of the procedures described in this guide, including many additional tips and examples, are available from the Vicon Shogun playlist on YouTube[1], and the Vicon Shogun channel on Vimeo[2], beginning with 1 - Shogun Live - Introduction[3].

> **Note**
> As some videos were recorded using an earlier version of Shogun, you may notice minor differences in the user interface.

1 https://www.youtube.com/playlist?list=PLxtdgDam3USVknig2N6QU1ARXR22LXJfJ
2 https://vimeo.com/channels/1249217
3 https://vimeo.com/218944959

Prepare your Vicon system

It is assumed that your Vicon system hardware (including the Vicon cameras, Vicon connectivity units, and any supported third-party devices) has been set up and connected and that Shogun is installed and licensed.

If you're installing your Vicon system yourself, see the Vicon documentation that was supplied with your hardware and Installing and licensing Vicon Shogun, together with any relevant videos (see the video links below). If you need further help with setting up your Vicon system, please contact Vicon Support[4].

> **Important**
> When you start Shogun Live or connect Vicon devices into your system, Shogun checks to see whether the firmware for all your devices is up-to-date. If your devices aren't using the latest firmware, Shogun displays an icon in the toolbar to let you know that a more up-to-date version of the firmware is available. To benefit from the latest enhancements and bug fixes for your Vicon system, click the icon and update your firmware. (The Vicon Firmware Update Utility is installed with the latest version of Shogun. If you don't have the Vicon Firmware Update Utility, download it from the Vicon website[5].)

To prepare your Vicon system for motion capture with Vicon Shogun Live, you'll need to complete these procedures in this order:

- Create a folder hierarchy to store takes on page 5
- Position the cameras and markers on page 5
- Check the coverage of the capture volume on page 5
- Adjust the focus and aperture on page 5
- Optimize camera settings on page 5
- Set timecode (optional step) on page 16
- Prepare video cameras (optional step) on page 18

4 mailto:support@vicon.com
5 https://www.vicon.com/software/camera-firmware/

Prepare your Vicon system

You can watch a Vicon video: 2 - Shogun Live - System Setup[6], which shows these steps. (If your system includes Vicon video cameras, see also 3 - Shogun Live - Setting up Vue video camera[7].)

6 https://vimeo.com/218944963
7 https://vimeo.com/218944968

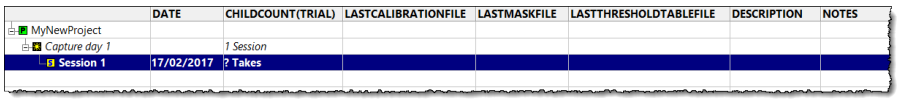
Create a folder hierarchy to store takes

Before you begin motion capture with Vicon Shogun Live, you must create a hierarchy of folders in which to store the files associated with your motion capture takes. You can do this either in Vicon Shogun Post or in Vicon Eclipse running as a standalone application.

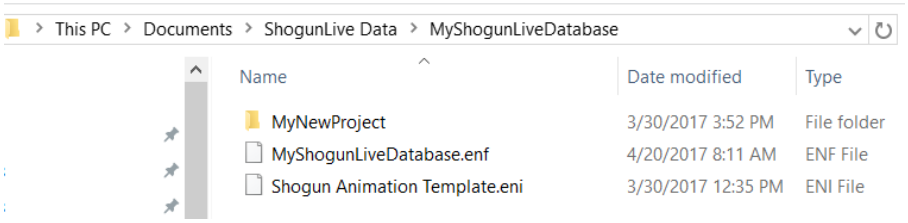
To create the folder hierarchy to store your takes:

1. Start Vicon Shogun Post or Vicon Eclipse .
2. If you are using Shogun Post, open the **Data Management** panel (press F2, or on the **Panels** tab on the ribbon, click **Data Management**).
3. In the **Data Management** panel or in Eclipse, click the **Create a new database** button . (Note that the the Eclipse buttons are slightly different from the Data Management ones, but their function is the same.)
4. In the **New Database** dialog box:
   a. In the **Location** field, browse to or enter the required location. This can be anywhere where you normally save data, for example in your **Documents** folder.
   b. In the **Name** field, supply a name and (if required) a description in the **Description** field.
   c. In the **Based on** list, click **Shogun Animation Template.eni**.
5. Click **Create** and in the next dialog box, ensure your new database is selected and click **Open**.

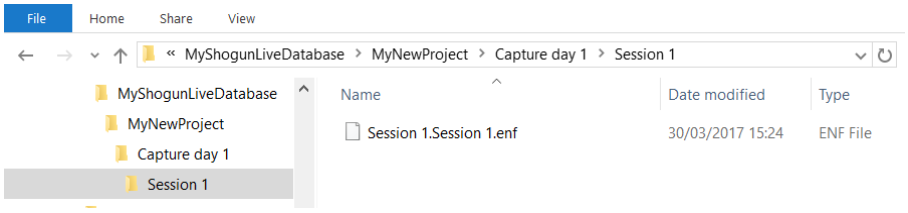
6. In the **Data Management** pane, create the structure in which Shogun Live will store your take:
   a. Right-click in the window, point to **New** and then click **Project** and supply a suitable name for your project.
   b. Click in the **Project** line you just created, then right-click, point to **New** and click **Capture day**.
   c. Click in the new **Capture day** node, right-click, point to **New** and then click **Session**.



7. Open Windows Explorer and view the folder structure you just created.



Note that the *.enf* file has the name you gave to your database. It contains the file structure instructions to Eclipse that tells it which is the main folder and which are the subfolders for this database. The subfolder structure reflects the Project, Capture day and Session that you specified. Each subfolder contains an *.enf* file that indicates to Eclipse where it belongs in the hierarchy.



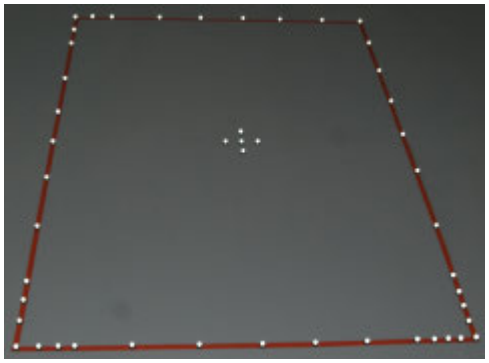
You now have an active session, ready to store your Shogun Live takes.

Before you begin capturing, to save your captured takes into the newly created folder hierarchy, you will specify the path to it in Shogun Live, as described in Capture a take on page 65.

Position the cameras and markers

With your Vicon system set up, installed and licensed, the first task in setting up your capture space is to position the cameras and markers.

1. Position your cameras around the capture volume, ensuring that two or more cameras can see every point in the volume in which you intend to capture motion.
2. Place Vicon retroreflective markers around the floor to outline your capture volume.



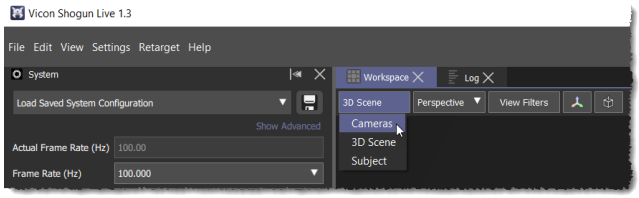
> **Tip**
> You may find it helpful to create an asymmetrical pattern along the perimeter, as shown above, to help orient your view. For example, for a rectangular volume, place a different number of markers at each corner. For an elliptical volume, vary the spacing between markers as you place them around the perimeter.

3. Place five markers in a cross shape to identify the volume origin.

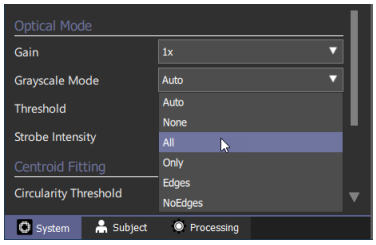
Check the coverage of the capture volume

After you have positioned cameras and markers in the capture volume, the next task is to ensure that the cameras can see the whole of the volume.

1. Ensure your cameras are physically connected to the system (for details, see the hardware documentation supplied with your Vicon system).
2. Switch on your Vicon system and start Vicon Shogun Live.
3. In the **System** panel (by default located on the left of the Shogun Live window), SHIFT+click to select all the cameras or, for a large number of cameras, right-click and click the relevant **Select All** option.
4. In the **Workspace** ensure that the **Cameras** view is selected.



5. Keeping all the cameras selected, in the **Optical Mode** section below, change **Grayscale Mode** to **All**.

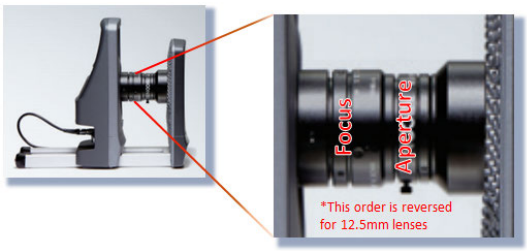


6. Using the default lens settings on each camera, ensure that:
   - You can see 2D marker images from each connected optical camera.
   - Two or more cameras can see every point in the volume in which you intend to capture motion.

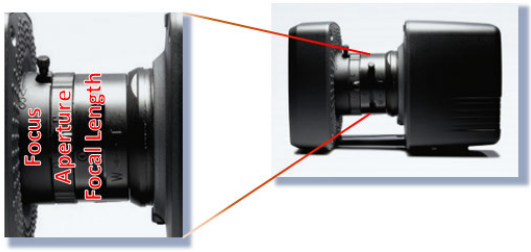
Adjust the focus and aperture

To achieve a good marker image you may need to adjust the camera lens. Depending on your Vicon camera model, you may find two or three adjustment rings on the lens. These control the focus and aperture, and if the camera has an additional ring, the focal length.

Vicon MX T-Series:

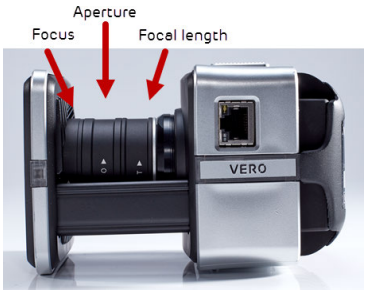


Vicon Bonita:



Vicon Vantage:

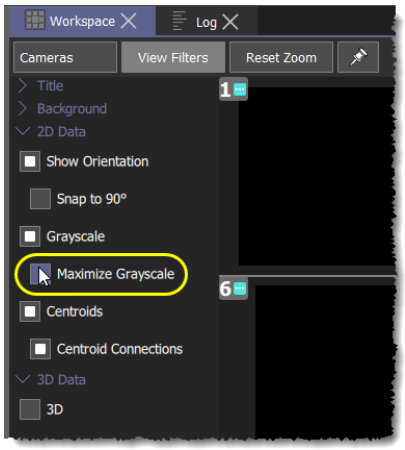
Vicon Vero:



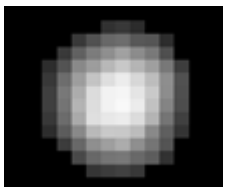
Note that for Vantage cameras (as with T-Series cameras), for 8.5 and 12.5 mm lenses, the order of the aperture and focus rings is reversed from that shown above.

To focus a camera:

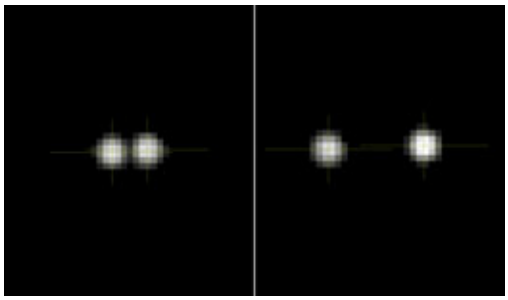
1. To make focusing easier, in the **View Filters**, go to the **2D Data** options and select **Maximize Grayscale**, which zooms the view into any visible markers.



2. Fully open the **Aperture** ring.
3. Adjust the **Focus** ring so that the markers become round and clear. As you rotate the focus ring, notice the marker images get smaller and then at some point will begin to get larger again. Good focus is when the marker is at its smallest size. Leaving this setting at infinity ∞ is normally suitable. Aim for a marker image similar to the following:



4. Close the **Aperture** ring so that as much background noise as possible is removed without compromising the quality of the marker image. Try to obtain good, clear images of markers even when they are close together, as shown in the following image, where the markers on the left are touching. The markers should not be too small, and the center should be just off-white (not fully saturated) when viewed from the middle of the volume.

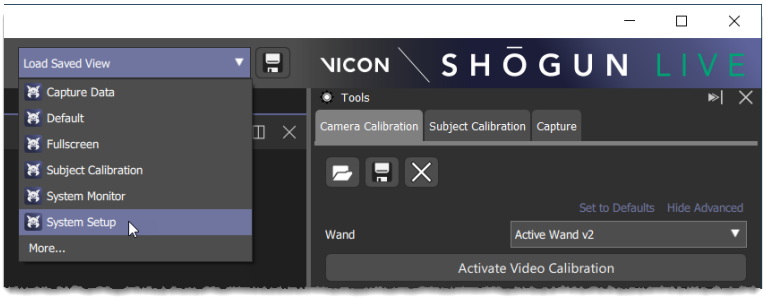


Optimize camera settings

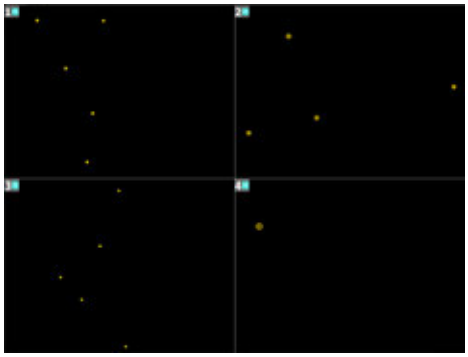
To ensure optimum marker recognition, you adjust the camera settings in Shogun Live.

To optimize camera settings:

1. In Vicon Shogun Live, make sure you are viewing 2D data from your cameras in one or more **Cameras** views. (To display the necessary layout, you can click the **Load saved view** list in the menu bar near the top of the Shogun window, then click **System Setup**.)

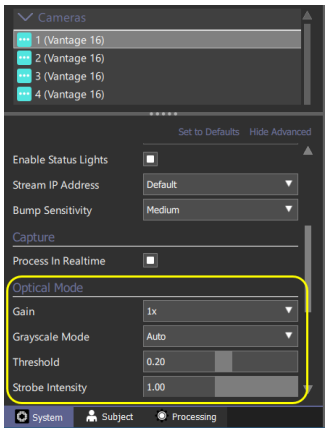


2. Have someone wave the calibration device around in the capture volume and ensure you can see marker images moving in each **Cameras** view.



3. In the **System** panel, SHIFT+click to select all the cameras, go to the **Optical Mode** section below and adjust the following camera settings as necessary:
   - **Gain**: To start with, leave the setting at the default of 1x to ensure 2D marker images are bright enough to see clearly. If the markers appear too faint or if the cameras have trouble distinguishing them, adjust this setting.
   - **Threshold**: A good starting value is 0.2 to 0.3. This setting determines the minimum value at which data is registered by pixels on the camera sensor and considered for circle fitting. As this setting acts like a high-pass filter, reducing this value increases the data that can pass through the sensor.
   - **Strobe Intensity**: Adjust this setting to increase the effective brightness of the strobe and therefore the distance at which and clarity with which it is likely to illuminate. A good starting value is 1.0 (100%), which is why this is the default setting.

If you need to further adjust any of the above settings for individual cameras, in the **System** panel, click the name of the relevant camera and change the required setting(s) in the **Optical Mode** section.



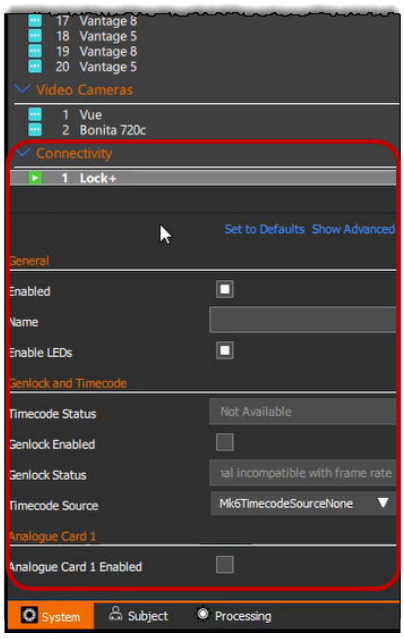
When you have finished focusing and optimizing the cameras, with all cameras selected, in the **Optical Mode** section change **Grayscale Mode** back to **Auto**.

Set timecode (optional step)

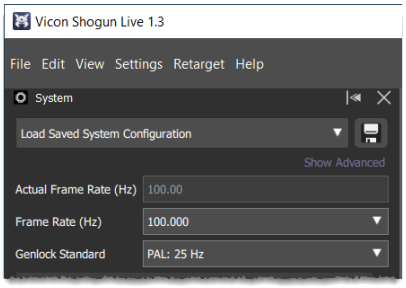
If your system includes an external timecode generator, before you calibrate the cameras, you must set the required timecode in Shogun Live.

To set the timecode:

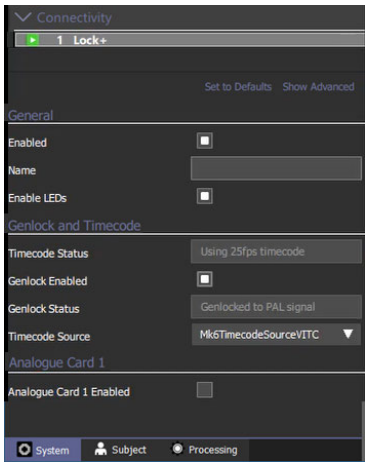
1. In the **System** panel, in the **Connectivity** section, click on your device to view its current settings.



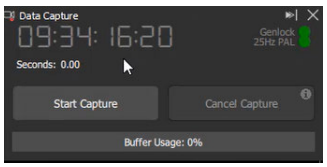
2. At the top of the **System** panel, view the system settings.
3. From the **Genlock Standard** list, select the standard you want to use.
4. In the **Frame Rate (Hz)** list, select the required frame rate. The following example shows the PAL standard and a frame rate of 100 selected:



5. In the **Genlock and Timecode** section for the selected connectivity device, to enable genlock, select the **Genlock Enabled** check box.
6. In the **Timecode Source** list, select the required option.



7. In the **Data Capture** panel (by default displayed at the bottom of the **Camera Calibration** panel, on the right of the Shogun Live window), the timecode is now displayed.

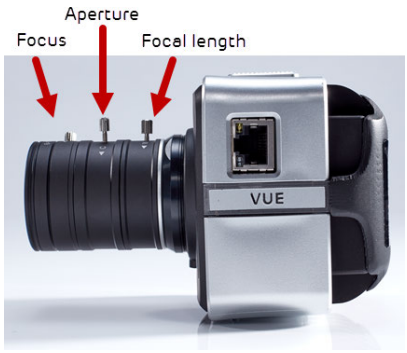


It is also shown as part of the information displayed at the bottom of the **Workspace**.

Prepare video cameras (optional step)

Vicon Vue and Vicon Bonita Video cameras can be calibrated as part of a Vicon system, enabling you to see an accurate video overlay both during a live shoot and offline.

If your Vicon system includes supported video cameras, ensure you have set up your PC to work with the video cameras, physically connected the video cameras to your Shogun system, and set an IP address for each video camera as described in the Vicon video: 3 - Shogun Live - Setting up Vue video camera[8].



Set up aliases for video capture

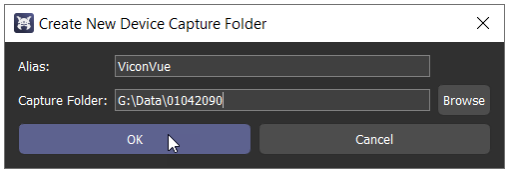
Shogun Live enables you to provides an alias and specify the location to which to capture video. By having a dedicated disk (normally an SSD) for each video camera, you avoid any impact on the main system resources.

Before you begin a capture that includes video, ensure you have specified the required location for video capture, as described in the following steps.

To specify the location to which to capture video:

1. On the **Settings** menu, click **Show Preferences** (or press SHIFT+P).
2. In the **Preferences** dialog box, set up a different alias for each video camera in your system, each pointing to a different SSD as follows:
   a. On the **System Preferences** tab, click **New**.
   b. In the **Create New Device Capture Folder** dialog box, in the **Alias** field enter a name for the folder and in the **Capture Folder** field, enter or browse to the required location and click **OK**.

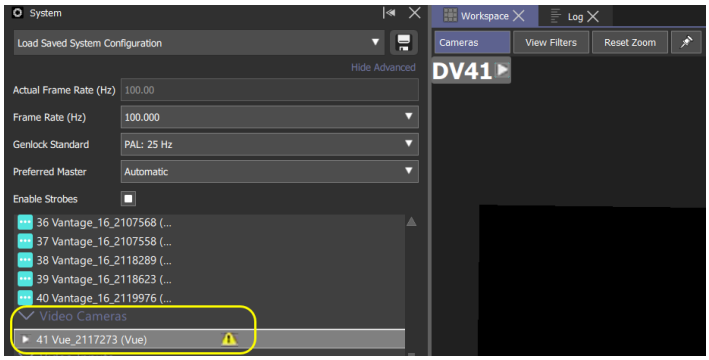
8 https://vimeo.com/218944968



3. When you have finished, click **Save Changes**.
4. In the **System** panel, in the **Video Cameras** section, for each video camera, ensure that the correct alias is selected from the **Capture Directory** list.

Configure video cameras in Shogun Live

After you initially connect your Vicon video camera(s), set up IP addresses and open Shogun Live, icons that represent the cameras are displayed in the **System** panel. However, when you click on a video camera, nothing is displayed in the **Cameras** view. The yellow warning icon next to the video camera name indicates that you need to configure the video camera.



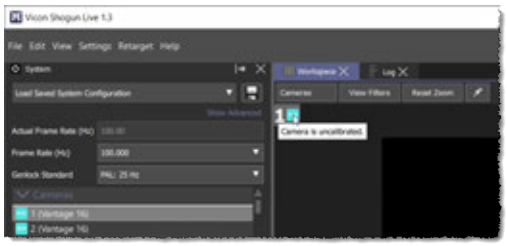
To configure video cameras:

In the **System** panel, select a video camera, and then set the following attributes:

1. In the **General** section, ensure **Enabled** is selected and set the **Stream IP Address** for the selected video camera. This must be the address that was set for this video camera in the Windows Network and Sharing Center, as shown in the Vicon video: *Vicon Vue Configuration* (see above). Ensure the camera's IP address is not the same as that used by any other optical or video camera, or any other device. As the address ending in 192.168.10.1 is always reserved for the system, normally video cameras take the next available IP addresses (for example, 192.168.10.2, 192.168.10.3, etc).
   The video stream is now displayed in the **Cameras** view of the selected video camera.
   You can now calibrate the video camera, along with the other cameras (see Calibrate cameras on page 21).
2. To configure the capture settings:
   a. Note that for the best performance and to avoid running out of disk space, in the **Capture** section, set the **Capture Directory** to a drive that is different from that used by the Data Management or Eclipse database. If possible, specify a different drive for each video camera, as described in Set up aliases for video capture on page 18. If not, at least divide the video cameras into separate groups, depending on the drive speed, and allocate a separate drive to each group.
      The folder structure created by setting the **Capture Directory** duplicates the structure of the **Data Management** capture path.
   b. To change the sampling rate for video cameras, in the **System** panel, in the **Video cameras** section, click to select the required video camera and in the **General** section select the required option from the **Sub Sampling Divisor** list.
   c. If you need to adjust the saturation, click **Show Advanced** and change the relevant setting in the **Video Mode** section.

Calibrate cameras

When you first connect up your Vicon system and start Vicon Shogun Live, notice that in the **System** panel and in the **Cameras** view, icons give you feedback on the current status of the cameras. The cyan icon indicates that although the cameras are connected, they are not yet calibrated.



To calibrate your Vicon cameras, complete these procedures in this order:

- Mask cameras on page 22
- Capture a wand wave on page 26
- Set the volume origin on page 29
- Set the floor plane on page 35
- Auto number cameras on page 38

Important - Before you begin camera calibration, ensure that:

- Cameras have fully warmed up to a stable operating temperature. Vicon recommends a minimum 30–60 minute warm-up period. To ensure strobe activity, which can accelerate the warm-up period, connect up the Vicon system and run Vicon Shogun Live.
- The **Grayscale Mode** for all cameras is set to **Auto**. To do this, in the **System** panel, click and drag or right-click to select all cameras and in the **Optical Mode** section below, change **Grayscale Mode** to **Auto**.

See also the Vicon video: 4 - Shogun Live - System Calibration[9].

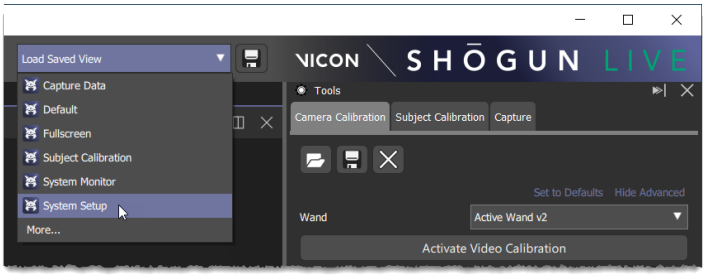
9 https://vimeo.com/218944974

Mask cameras

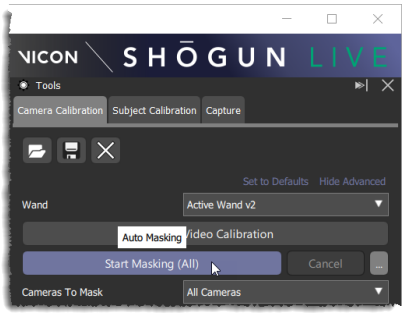
You mask cameras, including supported video cameras, during camera calibration to eliminate any unwanted reflections in the capture volume, so that they are not mistaken for markers by the cameras. Before you start masking, you can see these reflections represented by light pixels in the **Camera** views. During masking, blue pixels are drawn in the **Cameras** views, enabling you to see how much of the view is masked.

To mask reflections:

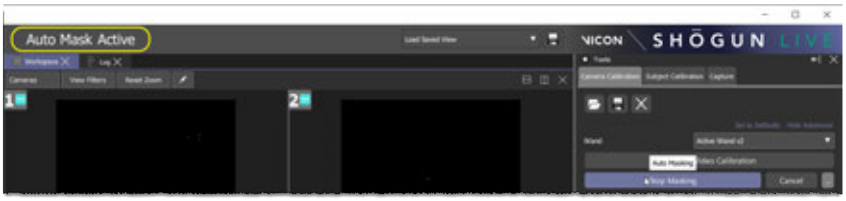
1. Ensure you have removed any objects likely to cause reflections, such as the calibration device or markers, from the capture volume.
2. To display the required panels, in the **Load Saved View** list, click **System Setup**.



3. In the **System** panel, SHIFT+click or drag to ensure all the cameras are selected, including any video cameras in your Vicon system.
4. On the **Camera Calibration** tab, click **Start Masking (All)**.



The button displays **Stop Masking** and at the top of the workspace, **Auto Mask Active** is displayed.



In the **Cameras** views, any video cameras are displayed as black, blank screens.
Shogun Live starts recording the data visible to each of the connected cameras. Any camera masks created are displayed as blue cells in the **Cameras** views for affected cameras. If no data is visible to a particular camera, Shogun Live does not create any masks for it. Both optical and video cameras are masked.

5. After about 5–10 seconds, click **Stop Masking**.
6. In the **Cameras** view for each camera, ensure that any unwanted reflections are eliminated. (Each view should either be completely blank or should contain some blue pixels.)

When you've masked all the reflections, you can capture a wand wave on page 26.

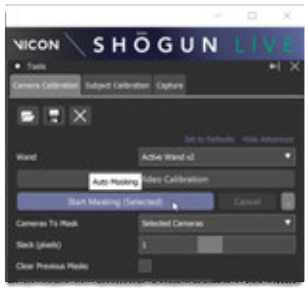
If you need to add equipment or make other changes after you've finished masking, see Change masking on page 24.

Change masking

If you add equipment or markers into the volume after you've finished auto-masking, or if you have an issue with specific camera(s), you'll need to add to any masking that you've already completed. To do this, you can keep your original masking and use further auto-masking to add to it and/or manually paint out any additional reflections.

To add to existing auto-masking:

1. To display the required panels, in the **Load Saved View** list, click **System Setup**.
2. If you want to apply additional masking to only some cameras, make sure you've selected the relevant cameras.
3. On the **Camera Calibration** tab, ensure the Advanced options are displayed and clear the **Clear Previous Masks** check box. This prevents your original masking from being overwritten.
4. If you want to add the new masking to selected cameras only, in the **Cameras To Mask** list, ensure **Selected Cameras Only** is selected.
5. Click **Start Masking**.

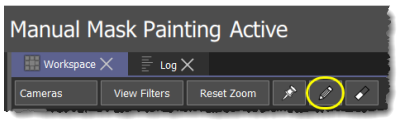


Auto Mask Active is displayed at the top of the Workspace.

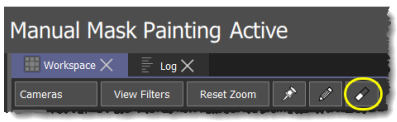
6. When masking is complete, click **Stop Masking**.
   In the Cameras views, observe the additional masking, which is displayed as blue cells.

To manually add masking:

1. To display the required panels, in the **Load Saved View** list, click **System Setup**.
2. On the **Camera Calibration** tab, click **Start Manual Mask Paint**.
   Manual Mask Painting Active is displayed at the top of the Workspace.
3. Use the following shortcuts to select and mask:
   - To select an area: Alt+click and drag
   - To apply masking: Click on the pencil icon next to the pin button or use the shortcut Alt+E.



   - To erase masking: Select the masked area (see above) and click the eraser or use the shortcut Alt+R.



4. When you have finished manual masking, click **Stop Manual Mask Paint**.

When you've masked all the reflections, you can capture a wand wave on page 26.

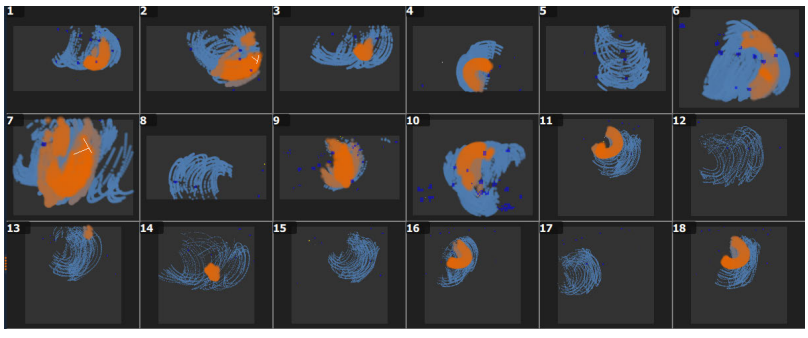
Capture a wand wave

During camera calibration, after you have masked any reflections, you calibrate the cameras by waving a wand (the calibration device) throughout the volume to enable the cameras to capture movements over the whole area.

> **Important**
>
> - If you are calibrating one or more supported video cameras, the calibration device must be an Active Wand.
> - The minimum frame rate supported by the Active Wand is 50 Hz.

To capture a wand wave:

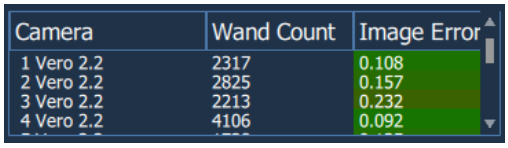
1. At the top of the **Camera Calibration** tab, in the **Wand** list, ensure the option for the type of wand that you are using is selected (this will normally be one of the Active Wand options).
2. To start collecting wand data, click **Start Wave**.
   The button displays **Stop Wave** and in the menu bar, the text **Camera Calibration Active** is displayed, next to a flashing red circle.
3. Have someone wave the wand throughout the capture volume, covering depth as well as height, while you watch the **Cameras** views for all cameras to ensure you get full coverage. Ensure that the markers (LEDs) on the wand remain visible to all the cameras as much as possible while the wand is moved throughout the volume.
   As an indication that sufficient wand wave data has been collected for a particular camera, the display in the each view changes from orange to blue.



4. In the table in the bottom half of the **Camera Calibration** tab, notice that the **Wand Count** column changes from red to green as sufficient data per camera is captured. This helps you concentrate on waving the wand for cameras that need more data.

> **Tip**
> By default, camera calibration stops automatically when each camera has seen enough of the wand to ensure calibration. To adjust this or turn it off, at the top right of the **Camera Calibration** tab, click **Show Advanced** and then click the ellipsis (…) to the right of the **Start Wave** button.

5. In the **Image Error** column, in addition to displaying the values, Shogun Live grades the status of each camera between red (poor) and green (excellent), depending on how much the cameras see the wand.
   In the volume, the display on Vicon optical cameras changes to indicate their calibration status:
   - **Vantage and Vero cameras**: The status light turn magenta and blink during calibration, becoming green and then blue when fully calibrated. On the OLED display (Vantage cameras only), a pie chart indicates the fraction of the required wand data that has been received from the camera.
   - **MX T-Series cameras**: The status light on the front blink while you are performing the wand wave, and then go solid blue when enough data has been collected to calibrate the camera.
6. When enough data has been collected, Shogun Live starts processing the wand wave data. Depending on the number of cameras and the length of your wand wave capture, this may take a few minutes. The progress bar indicates the calibration progress, and table below indicates the calibration results.



7. When the wand wave is finished, an *.xcp* and an *.x2d* file is created in *C:\ProgramData\Vicon\Calibrations*. If your calibration included Vicon video cameras, two *x2d* files are created. The files are:

   - *LatestCalibration.x2d*, which contains the wand wave without any Vicon video cameras
   - *LatestCalibration_withVideo.x2d*, which contains the wand wave including Vicon video cameras.

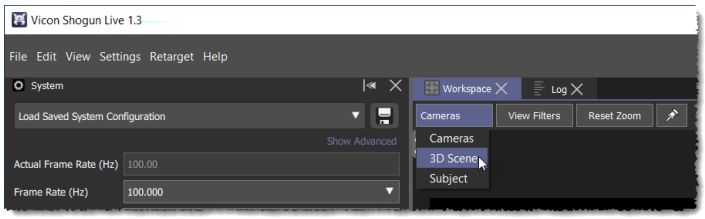
   These two files enable you to recalibrate without Vicon video cameras if needed.

> **Note**
> After a wand wave, Vicon video cameras do not produce video files as they are not needed for calibration.

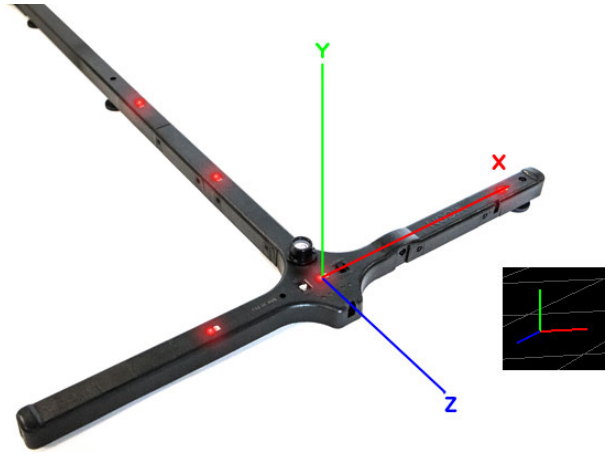
Set the volume origin

After you have captured a wand wave, you set the volume origin and axes so the cameras and volume in Shogun Live reflect the actual positions of the cameras in relation to the capture volume, as well as to each other.

1. To enable you to see the axes in relation to the volume, on the **Workspace** tab, change the view to **3D Scene**.



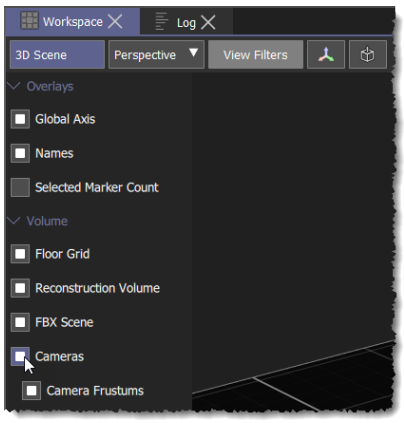
2. Place the calibration device on the capture volume floor in the position you want the volume origin to be and in the orientation you want the axes to be (reflected in the axes displayed in the **3D Scene** view).



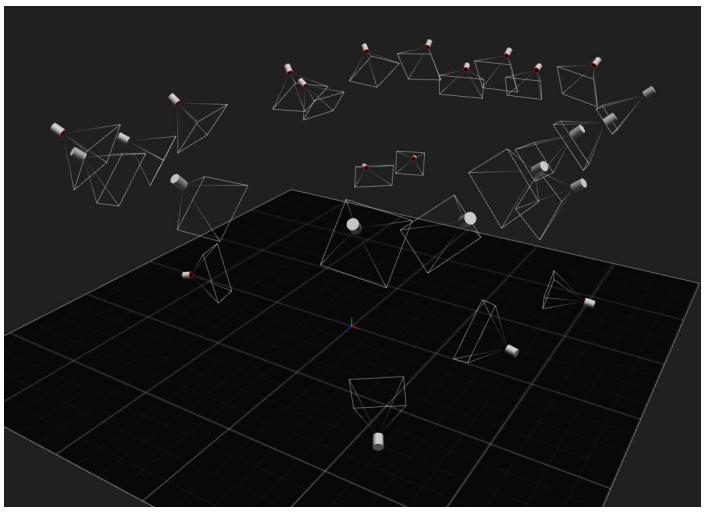
- X: red line
- Y: green line
- Z: blue line

3. At the top of the **Camera Calibration** tab, in the **Wand** list, ensure the appropriate Active Wand is selected.

4. Click **Start Set Origin**.
   The button displays **Set Origin**.
5. After a few seconds, click **Set Origin**.
6. In the **3D Scene**, display the **View Filters** options and under the **Volume** options, ensure that **Cameras** is selected.



7. In the **3D Scene**, **Perspective** view, all of the cameras shift as a group, so the origin of the capture volume is aligned with the wand.



Set the origin with a custom L-frame

To improve calibration stability and consistency over time, you can use a custom L-frame to set the origin of your system.

As described in Set the volume origin on page 29, you can use a Vicon Active Wand to set up your volume coordinate system quickly and easily. However, using a larger, custom calibration object (in this case, markers embedded in the volume floor and/or wall) can improve calibration stability and consistency over time.

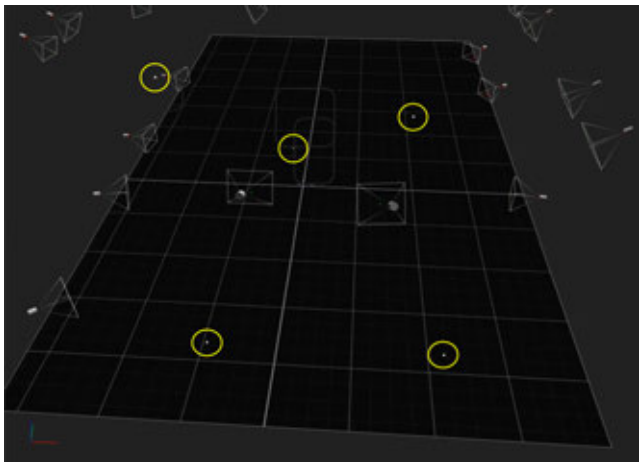
A typical way to use a custom L-frame would be to keep markers on wall, hidden during camera masking, then when you're ready to set the coordinate system for your volume, make the markers visible and use the custom L-Frame as described below.

See also:

Vicon Shogun 1.3 Live Tutorial - Custom L-Frame Workflow[10] on YouTube.

To create a custom L-frame:

1. With system calibrated, set the origin as normal (see Set the volume origin on page 29), including setting the floor offset (see Set the floor plane on page 35), as required.
2. Position a number of markers on the edge of the volume and select them.

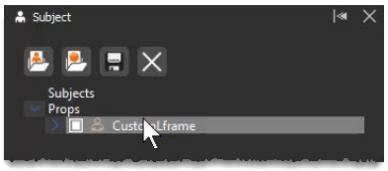


10 https://youtu.be/l4-zV9253ho

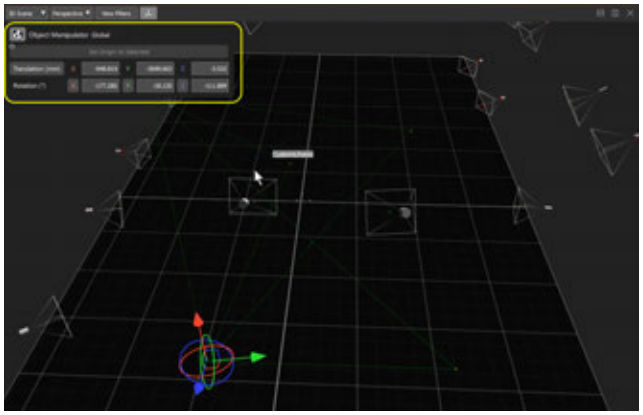
3. On the **Subject Calibration** tab (right), in the **Props** section, enter a name for the custom L-frame and click **Create Prop**.

The new custom L-frame prop is displayed in the 3D Scene view.

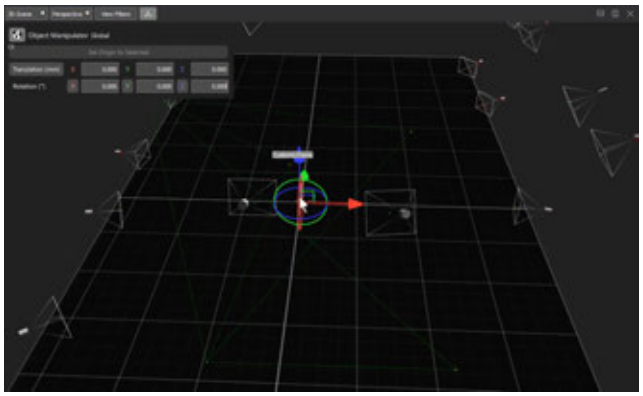
4. Pause the real time and in the **Subject** pane on the left, select the prop you just created.



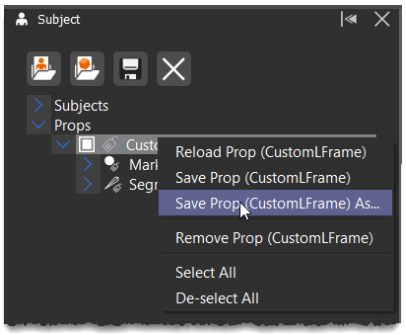
5. To display the Object Manipulator, press M. (For more information on the Object Manipulator, see Move props on page 63.)
In the Workspace (3D Scene view), the Object Manipulator is displayed.



6. In the **Subject** pane on the left, ensure that the custom L-frame is still selected, and with the Object Manipulator set to Global, change all the values to zero, so the origin matches that of the L-frame.



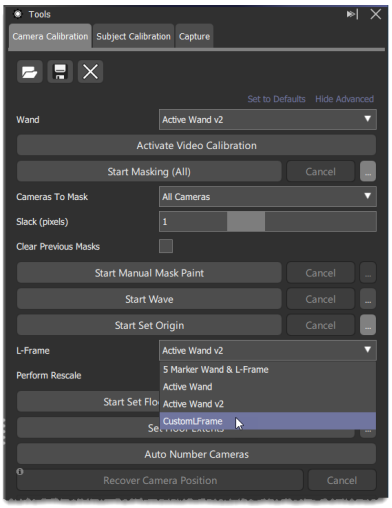
7. In the **Subject** pane, with the custom L-Frame selected, right-click and then click **Save Prop As**.



8. Save the custom L-frame as a VSK into *Users\Public\Documents\Vicon\CalibrationObjects*.

To use the custom L-frame:

1. In the **Subject** pane (left), ensure the check box for the custom L-frame is cleared.
2. Click Play to resume the real time.
3. On the **Camera Calibration** tab (right), ensure the Advanced options are displayed (if not, click **Show Advanced**, top right).
4. In the **L-Frame** list, select the new custom L-frame.



5. Click **Set Origin**.
   The new custom L-frame is used to set the origin.
6. When done, click **Complete Set Origin**.

Set the floor plane

The final stage in calibrating your Vicon cameras is to set the floor plane, using markers in the volume to automatically define it.

The position of the virtual floor that is derived during setting the origin is extrapolated from the position of the wand in relation to floor of the volume. As the wand is a small object compared with the size of the volume, any slight discrepancy from the wand being level has a large effect over the rest of the volume when you set the origin. To account for any discrepancy, you set a floor plane, which takes a much larger area into account, so that the virtual floor lines up correctly with the actual floor plane.

To set the floor plane:

1. Ensure you have completed the rest of the camera calibration procedure and set the origin (see Set the volume origin on page 29).
2. Turn off the calibration object or remove it from the volume.
3. Place a minimum of four 14 mm Vicon markers across the floor of your capture volume.
   (If you are not using 14 mm markers or have changed the default 7 mm floor plane setting, see Adjust the Set Floor Plane settings on page 37.)
4. On the **Camera Calibration** tab, click **Start Set Floor Plane**.
   The button displays **Set Floor Plane**.
5. After a few seconds, click **Set Floor Plane**.
6. In the **3D Scene**, display the **View Filters** options and under the **Volume** options, ensure that **Cameras** is selected
   In the **Perspective** view, note that the cameras shift as a group slightly along one or more rotation axes to better reflect an average of the markers scattered across the floor, taking into account any offsets that you specified.
   In *C:\ProgramData\Vicon\Calibrations*, the *LatestCalibration.xcp* file is updated. This file is automatically used for every subsequent capture.

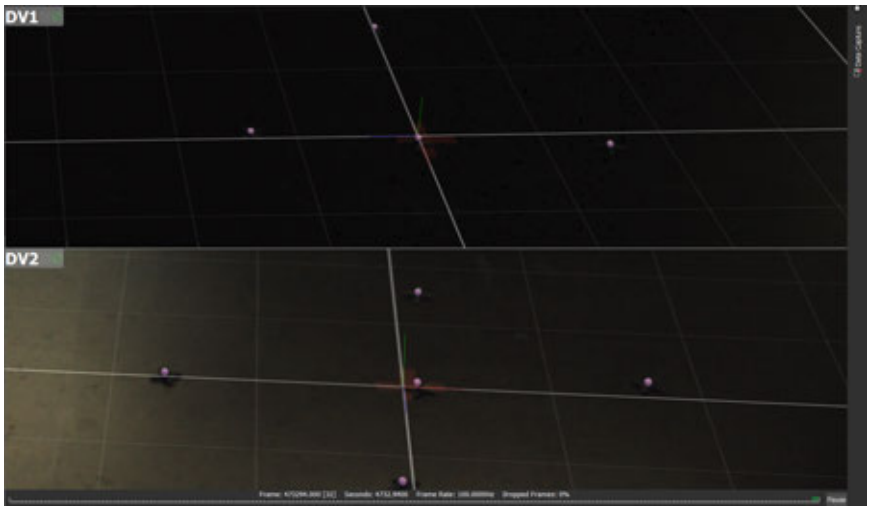
> **Tip**
> To more accurately visualize the size of your volume in Shogun Live, you can change the size and shape of the floor grid. To do this, on the **Camera Calibration** tab, click the ellipsis (...) next to **Set Floor Extents** and change the values (in mm) to give the required result.

Calibrate cameras

If your system includes supported video cameras, you can now check that your video calibration is accurate by viewing a video overlay.

To check a video overlay:

1. In the **System** panel, expand the **Video Cameras** section and click on one or more video cameras.
   The **Cameras** view displays the video data for the selected video camera(s).
2. In the **Cameras** view, click **View Filters** and in the **3D Data** section, select the **3D** option.
   In the view pane, a 3D overlay is displayed. Because this displays a flat overlay on a **3D Scene**, the edges appear distorted.
3. To remove the distorted appearance, select **Distort 3D**.
   The 3D perspective is flattened to match the video.



4. Check that the video of the markers and the 3D perspective line up accurately.

> **Tip**
> To check your calibration, from the **View Filters** options, select **Camera Rays**. If you select one or more cameras, this displays lines (rays) to everything the selected camera(s) can see. If you select one or more markers, this option displays lines from all cameras that can see the selected marker(s).

Your Vicon cameras are now calibrated and ready to capture data.

Adjust the Set Floor Plane settings

If you are not using 14 mm markers, to enable you to set the floor plane accurately, click **Show Advanced**, click the ellipsis next to **Start Set Floor Plane**, and change the **Height offset** value to an appropriate value. The **Height offset** is the amount (in mm) by which to adjust the floor plane (the default is 7 mm). Because Shogun finds the centers of the markers, set a **Height offset** that accounts for the size of the markers (for example, for 14 mm markers, the **Height offset** is 7 mm). If the markers include a base, take this into account in your calculations.

Auto number cameras

The **Auto Number Cameras** feature numbers the currently connected Vicon cameras in ascending order, according to their position in the capture volume. You may want to do this after you calibrate your Vicon system, so that your cameras are logically numbered before you begin capture.

Automatic numbering starts with the camera that is furthest from the volume origin. The cameras are then numbered in a clockwise direction around the volume. If your cameras are positioned at different levels, the cameras in the level that contains the most cameras are numbered first.

To automatically number Vicon cameras:

1. Ensure that the cameras are positioned as required, and that you have calibrated the cameras and set the volume origin.
2. To enable you to check the camera numbering for all cameras, in the **System** panel, ensure that you can see the list of Vicon cameras.
3. In the **Camera Calibration** panel, click **Auto Number Cameras**.
   The cameras are automatically numbered in ascending order, according to their position in the volume.
   In *C:\ProgramData\Vicon\Calibrations*, the *LatestCalibration.xcp* file is updated.
4. In the volume, check that the cameras are now numbered as required.

Create subjects

After you have calibrated your Vicon cameras, you are ready to create and calibrate subjects and any props that you need.

To create and calibrate subjects, complete the following procedures as required:

- Choose a marker set on page 40
- Add labeling clusters to the datastore (optional step) on page 41
- Place markers on a performer on page 43
- Create and calibrate a subject on page 49
- Load retargeting setup on page 57

In addition to the following information, see also the Vicon video 6 - Shogun Live - Subject Calibration[11], which demonstrates how to place markers on a performer and how to calibrate a subject using a T-pose and ROM. (Note that the latest version of Shogun uses an A-pose for subject calibration, and includes a cluster-picker to help with subject booting when using the high-density finger marker sets.)

11 https://vimeo.com/218944987

Choose a marker set

Choose a marker set, depending on your requirements. Templates (labeling and solving) for the following marker sets are supplied with the latest release of Shogun:

Marker set	Description
FrontWaist	Standard 53-marker set
FrontWaist10Fingers	Standard marker set plus 10 finger-markers
FrontWaist3Fingers	Standard marker set plus three finger-markers
FrontWaist5Fingers	Standard marker set plus five finger-markers
Production	Production marker set, which helps with marker occlusion and includes extra markers for the back and top of the shoulders to help with gap-filling and solving
Production10Fingers	Production marker set plus 10 finger-markers
Production3Fingers	Production marker set plus three finger-markers
Production5Fingers	Production marker set plus five finger-markers
SideWaist	Alternative standard marker set, which avoids front waist marker occlusion (useful if, for example, the front waist marker is likely to be occluded due to a performer's hands obstructing it or the performer bending forwards)
SideWaist10Fingers	Standard marker set with side waist markers plus 10 finger-markers
SideWaist3Fingers	Standard marker set with side waist markers plus three finger-markers
SideWaist5Fingers	Standard marker set with side waist markers plus five finger-markers

For the most realistic finger animation, the 10 finger-marker set is recommended.

It is assumed that you are using one of Shogun's default labeling templates. If you are using a different template, please contact Vicon Support[12].

12 mailto:support@vicon.com

Add labeling clusters to the datastore (optional step)

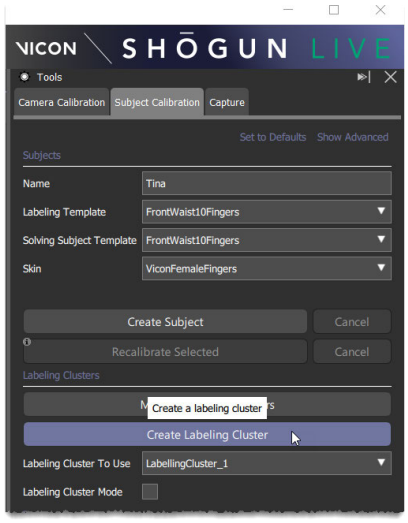
To help Shogun Live in booting the labeling setup and to uniquely identify performers, you can use labeling clusters. Labeling clusters are particularly useful in scenes with multiple performers.

Place one or more labeling clusters on each performer, with each cluster containing five or more markers. Ensure labeling clusters are unique by varying the position of the markers in each cluster.

Before you can use the labeling clusters for motion capture, you must add them to the Shogun Live datastore, to enable Shogun Live to recognize them.

To add labeling clusters:

1. To save clusters, you can either use the default folder (*C:\Users\Public\Documents\Vicon\Clusters*), or to change the default location, in the **Preferences** dialog box (Shift+P), on the **Folders** tab, go to the **Clusters** line and enter or browse to the required folder.
2. Place the labeling cluster(s) in the volume and ensure all the markers are visible to the cameras.
3. In the **3D Scene**, ALT+drag to select all the markers for a cluster.
4. On the **Subject Calibration** tab, in the **Labeling Clusters** section, click the **Create Labeling Cluster** button.



A labeling cluster is created from the selected markers.

> **Tip**
> To check cluster solving, on the **Subject Calibration** tab, select **Labeling Cluster Mode**. All unattached clusters are solved. Use this mode only when you create clusters or to check that they will solve. As Labeling Cluster Mode is resource-intensive, clear the check box when you aren't using this mode.

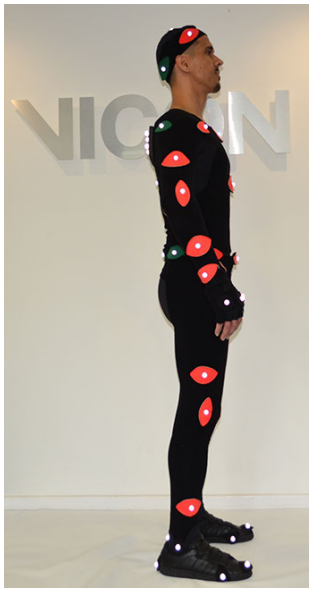
5. If you need to rename or delete clusters, click **Manage Labeling Clusters** and in the dialog box, either double-click to rename or right-click the required cluster and then click **Delete**.

Place markers on a performer

To place markers on a performer:

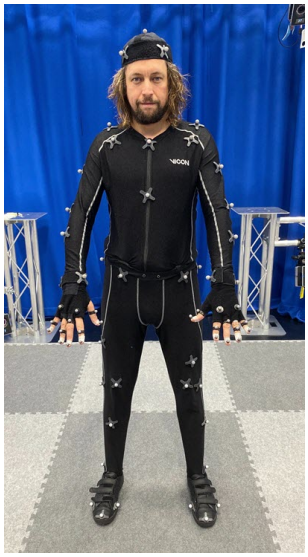
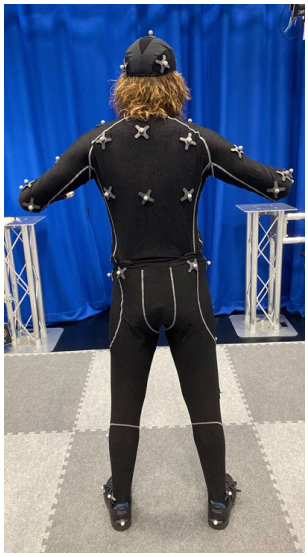
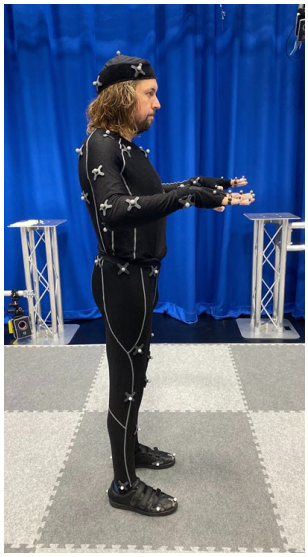
1. Place your chosen marker set on the performer(s).
   The following images show the standard Vicon FrontWaist 53-marker set, and also show the placement of a cluster.





Create subjects

These images show the placement of markers for the Production marker set (with 10 finger-markers):


If you're using side waist markers, place the waist marker(s) at the sides of the performer's waist:

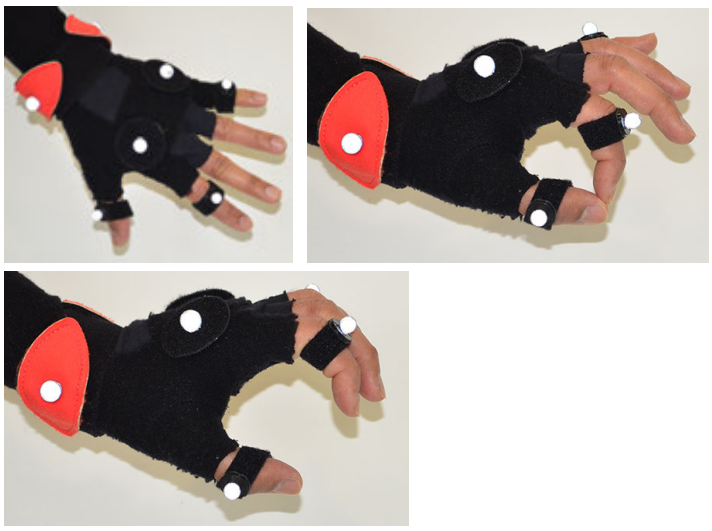

2. Ensure that the foot markers are placed so that the toe marker is as far forward as possible on the foot while still facing upward. Also ensure that the three other markers (the heel marker and the two markers on either side of the front of the foot) are in the same plane, and are as low (ie near to the floor), as possible.



3. If you're using finger markers, place them on the hands.
   Follow these guidelines to ensure that the finger markers produce an accurate solve:

   - **Wrists**: The wrist marker placement is important because the foundation of a good finger solve is a correctly solved wrist. Place the wrist markers on either side of the wrist so that both markers are the same distance down the arm and as close to the joint center as possible.
   - **Hands**: Place the hand markers just before the knuckle of the index and pinky finger.
   - **Fingers**: For 3 finger-marker setups, place a marker just before the first joint of the index, pinky, and thumb, so that it is not affected by rotation of the second joint (see the photo of the 3 finger marker set on page 46).
     For 5 finger-marker setups, place the markers at the end of each of the five fingers (see the photo of the 5 finger-marker set on page 47).
     For 10 finger-marker setups, place the markers at the end of each finger, and mid markers on the second phalange apart from the mid (see the photo of the 10 finger-marker set on page 47).
   - **Upper arms and legs**: To help with calibration, place offset markers on the upper arms and legs.

     These images show placement of the wrist, hand, and finger markers in a three-finger setup:



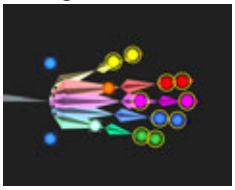
Create subjects

This image shows placement of the wrist, hand, and finger markers in a 5 finger-marker set:

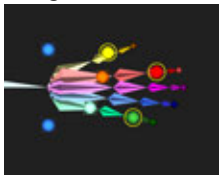
This image shows placement of the wrist, hand, and finger markers in a 10 finger-marker set:

Placement for all the finger marker sets, as displayed in Shogun, is shown below:

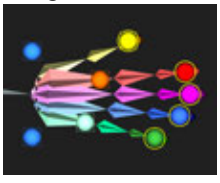
10 finger-marker set



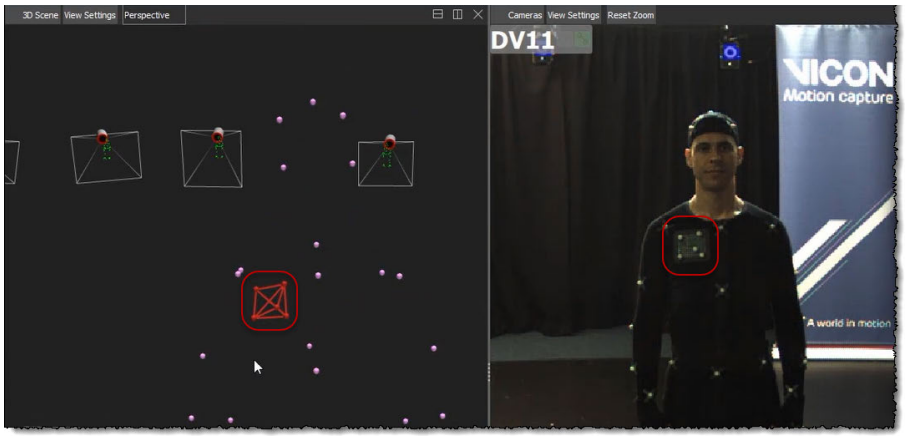
3 finger-marker set



5 finger-marker set



4. If you're using clusters (see Add clusters to the Shogun Live datastore on page 41), if you haven't already done so, place them on the performer(s). Normally, a good location for the cluster is on the torso, but not too close to other markers. This can be on the front, as shown in the following image, or on the back, as shown in the illustrations in Step 1.



Create and calibrate a subject

Calibrating a subject involves having a performer wearing the required marker set stand in an A-pose and then perform a Range of Motion (ROM) in the capture volume. During the ROM, ensure that the performer goes through a full range of movement for every limb and joint that is to be captured.

Before you begin, to give the clearest view of the subject, at the top of the **3D Scene** view, ensure **View Filters** is selected, then under the **Volume** options, clear **Cameras**. In the **Subjects** section, select **Solve** and in the options matrix, in the **S** column, ensure **Skin** is selected (in addition to any other options that you may want to use).

> **Note**
> Live occlusion-fixing occurs by default. This ensures the skeleton continues to behave correctly while markers are occluded. To ensure occlusion fixing is displayed, display the **View Filters**, and in the **Data** section, ensure **Missing Markers** is selected. In the **Subjects** section, select **Solve**, and in the options matrix, in the **S** column, ensure **Skin** is selected. Occlusion fixing is indicated by the red color and is also visible when **X-Ray** is selected.
> To turn off occlusion fixing, at the top of the **Processing** panel, click **Show Advanced** and in the **General** section, clear **Occlusion Fixing**.

If you want to set aside a part of your volume for subject calibration, to avoid having to clear the volume each time you have to calibrate or re-calibrate a subject, see Create a subject calibration hotspot in *Getting more from Vicon Shogun*.

High fidelity fingers marker sets

If you're using a marker set that includes markers for high fidelity fingers, note that labeling also makes use of this feature. To help the calibration, ensure you have placed offset markers on the upper arms and legs.

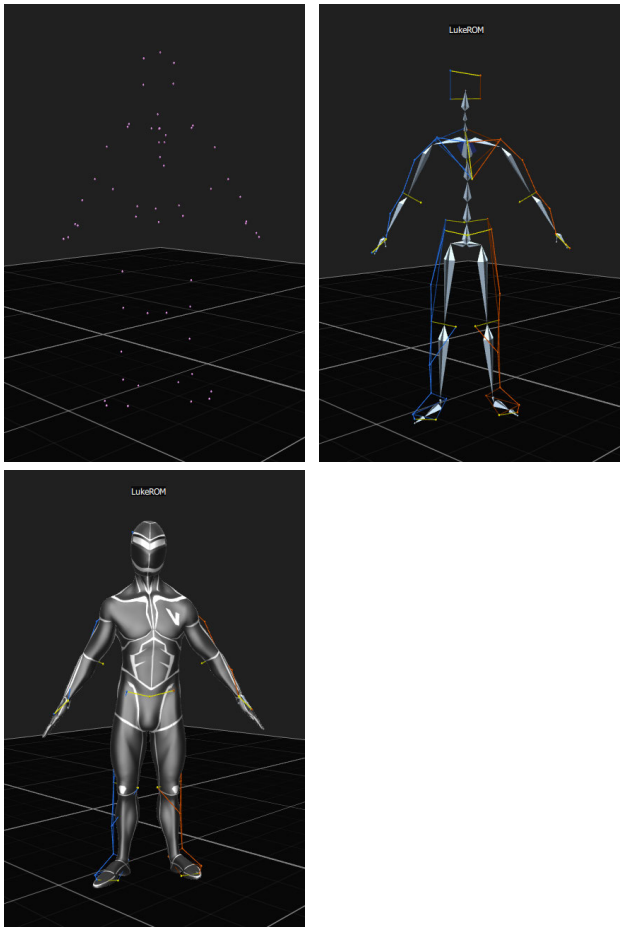
Create subjects

> **Note**
> Because the high-density marker set results in a greater demands on processing, you may experience dropped frames, especially when using more than one actor. Ideally, test first with a single actor on a high-spec, multi-core machine.
> To improve processing, you can run reconstruction, labeling, solving and/or retargeting over multiple machines. For information, see Run Shogun processing on multiple machines in *Getting more from Vicon Shogun*.

To perform live subject calibration:

1. On the **Subject Calibration** tab, in the **Name** field, enter a name for the new subject.
2. In the **Subjects** section, choose the appropriate **Labeling Template** and **Solving Template** for your subject.
   If you using side waist markers and/or finger markers, make sure you choose the templates that include side waist markers and/or fingers (indicated by their names).
3. From the **Skin** list, select the mesh that is to be used for the solving skeleton.
4. If you're using a labeling cluster for the subject who is wearing a high density marker set (ie finger markers or any other high density set), on the **Subject Calibration** tab, go to the **Labeling Clusters** section and select the required labeling cluster from the **Labeling Cluster To Use** list.

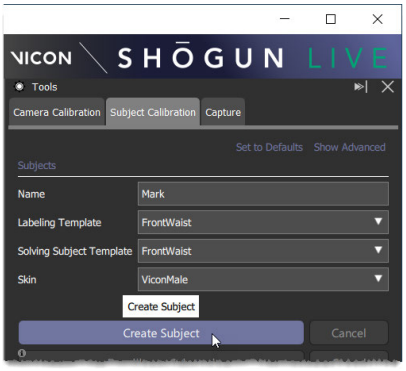
5. Have the performer wearing the correct marker set (see Place markers on a performer on page 43) enter the volume and stand in an A-pose, with the hands flat.



If you're using a template that includes fingers, also ensure that:

- The wrists are straight, not bent to either side or up or down.
- The fingers are straight, with a natural spread, and no bend.
- The thumb is held tight against the index finger. Ensure that the thumb and the fingers all point in the same direction.

6. Click **Create Subject** and wait for the subject to boot.



On the menu bar, above the workspace, **Subject Calibration Active** and a flashing red circle is displayed.
In the **3D Scene** view, the markers are labeled, and the labeling and solving skeleton is displayed.
Look for feedback in top right of view pane, which shows the number of markers found and the number of markers required.

7. Visually check that all the markers have been labeled and everything looks OK.

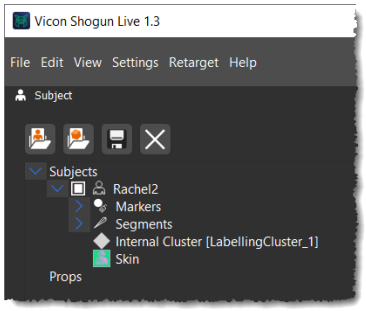
> **Tip**
> To quickly check that all the required markers have been placed on the performer, ensure the subject is selected and check the Marker Selection counter (bottom right of the view pane). For more information, see Check the marker count on the current selection on page 55.

8. After waiting until you're happy with the position of the joints, on the **Subject Calibration** tab, in the **Subjects** section, click **Accept A-Pose**.

> **Tip**
> If, despite using offset and left and right markers (see the guidance on marker placement on page 46 for finger marker sets), you still experience problems with subject booting, on the **Subject Calibration** tab, select the Advanced option, **Capture Canceled Calibrations**. (This enables Support to troubleshoot your issue.)

9. Get the performer to perform a ROM (Range Of Motion) that includes all the required movement. If you're using one of the high-fidelity fingers templates, include some finger movements as part of this process. Include bending and spreading the fingers as well as poses of the hand that will be useful for checking the accuracy of the labeling.
   Include the following in your ROM:
   - Fists
   - Wiggle the fingers
   - Touch the tip of the thumb against the tip of each digit of the same hand:
     - Thumb to index finger
     - Thumb to middle finger
     - Thumb to ring finger
     - Thumb to pinkie

10. When the ROM is complete, click **Stop Calibrating**.
    In the **3D Scene**, you can see the mesh and solving skeleton of the subject (if you need to change the display, at the top left of the workspace, click **View Filters** and choose the required options).
    In the **Subject** panel, a subject with the name you supplied in Step 1 above is displayed, together with nodes representing its markers, segments and skin.



> **Tip**
> To change a skin base color and highlight color, in the **Subject** panel, right-click the **Skin** node. The skin colors are saved in the *.mcp* file when you exit Shogun Live.

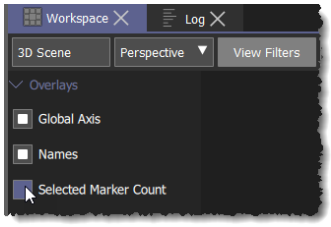
The subject is now fully calibrated and can be used in captures as required (for example, if you're using it for retargeting, see Load retargeting setup on page 57).

Check the marker count of the current selection

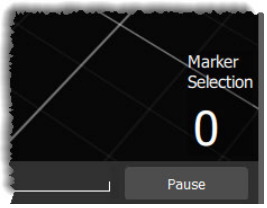
The **Marker Selection** counter enables you to easily check the number of markers currently selected. This is useful during subject calibration, if you need to check that the required number of markers have all been placed on a subject, or within a particular set of markers (for example, facial markers).

To display the number of selected markers:

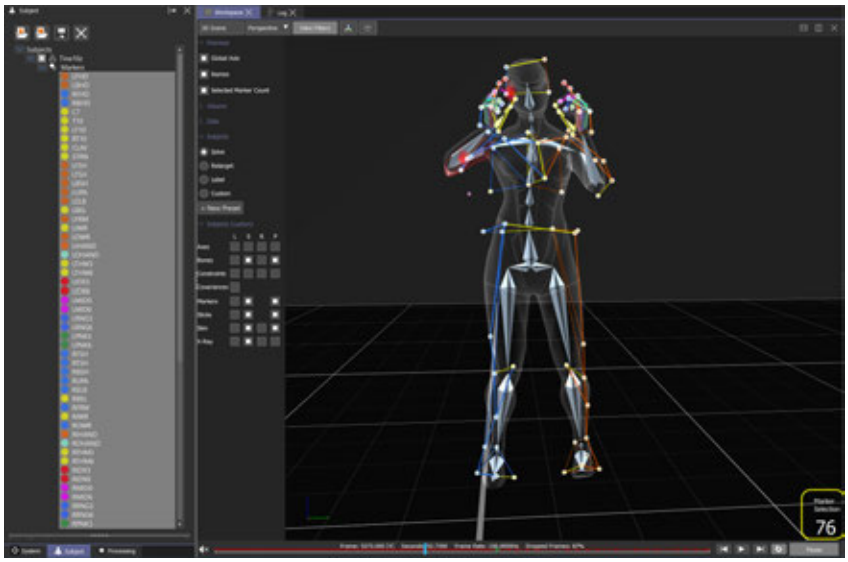
1. In the 3D Scene view, ensure **View Filters** is selected and in the **Overlays** section, select the **Selected Marker Count** option.



2. At the bottom right of the view pane, the **Marker Selection** count is displayed. If no markers are currently selected, a zero is displayed.



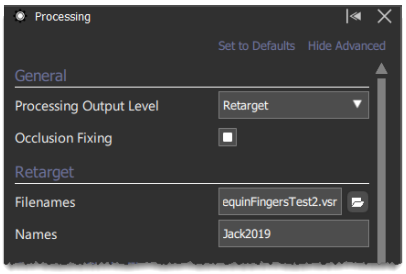
3. As you select markers (in either the Subject pane (left) or the view pane), the Marker Selection counter changes to display the number of selected markers.



Load retargeting setup

If you're retargeting your fully calibrated subject onto a target FBX, you can now load the retargeting setup file (VSR) and link it to your subject.

1. To turn on retargeting in Shogun Live, with Advanced properties displayed in the **Processing** pane, go to the **General** section and set the **Processing Output Level** to **Retargeting**.
2. In the **Filenames** field, select the required VSR file(s).
   Note that in paths in this field, back slashes are forward slashes.
   If you are working with multiple subjects, list the retargeting setup files (VSRs), separated with a comma.
   If you specify multiple VSRs, you need to specify the same number of matching subjects in the Names field.
3. In the **Names** field, enter the name of the subject(s) that you want to retarget.
   If you are working with multiple subjects, separate their names with a comma.



   Your character is now retargeted in the 3D workspace.
4. If you notice discrepancies between the retargeted character and the performer driving it, you will need to modify the retargeting.
   For information on creating and modifying retargets, see Retarget with Shogun Post on page 132.

Create props

In Shogun Live, you can create simple, single-segment (and therefore rigid) props.

For information on working with props, see:

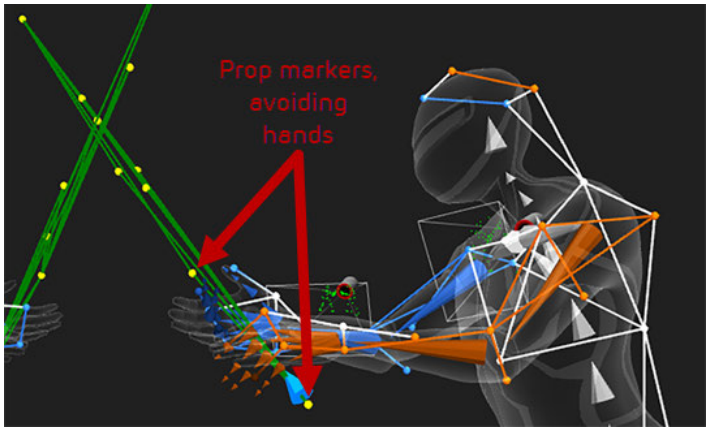
- Place markers on props on page 59
- Move props on page 63

For information on creating a prop as a custom L-frame, see Set the origin with a custom L-frame on page 31.

Place markers on props

When placing markers on props, note that minimum of four markers is recommended for each prop. Be sure to:

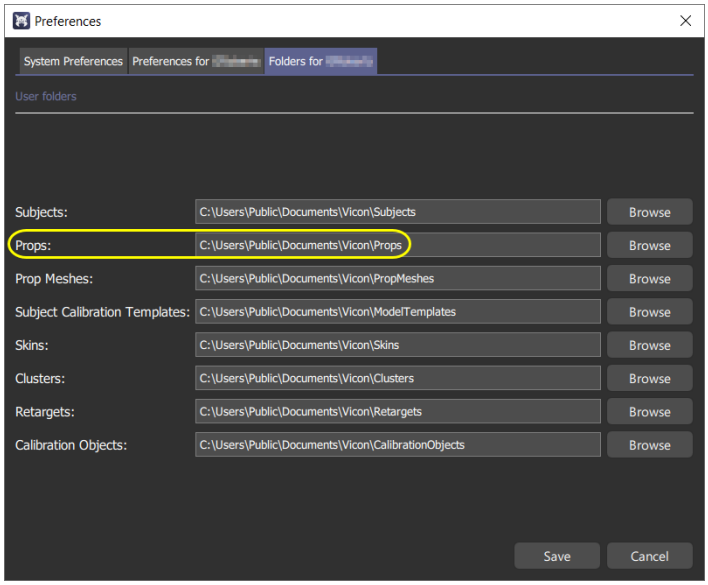
- Place the markers across the prop object to reach the extremities as far as possible.
- Avoid placing markers in a straight line and/or on the same plane.
- Avoid placing markers symmetrically.
- Prevent marker swaps by avoiding placing prop markers too close to the hands or where the actor will interact with the prop.
  For example, if a performer will interact with a prop, place markers at the extremities of the prop, but not directly in the location where the interaction occurs, as shown below, where a performer holds a sword:



Create props

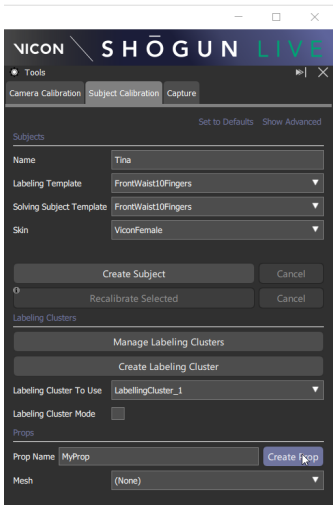
To create a single-segment prop:

1. Ensure the markers are positioned on the prop as described above.
2. Place the prop in the volume.
3. In Shogun Live, in the **Settings** menu, click **Show Preferences** (or press SHIFT+P).
4. In the **Preferences** dialog box, on the **Folders for** *username* tab, ensure that the **Props** folder is as required, or if not, click **Browse** to specify the appropriate folder.

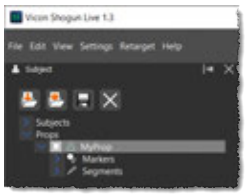


5. In the **3D Scene**, select a minimum of four reconstructed markers. To ensure that Shogun Live places the bone logically within the prop, select (CTRL+click) the markers in the following order:
   - The first selected marker defines the origin (base) of the prop bone.
   - The second selected marker defines the end of the prop bone.
   - Any other markers can be selected in any order.

6. On the **Subject Calibration** tab, in the **Props** section, enter a name for the prop and click **Create Prop**. (Note that, if required, you can also select a mesh for the prop from the selection in the **Mesh** field. Prop meshes are FBX files, by default stored in *C:\Users\Public\Documents\Vicon\PropMeshes*).



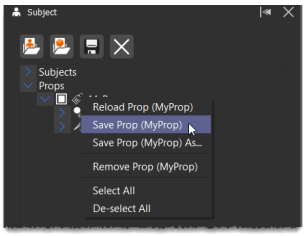
A single-segment prop is created from the selected markers and appears in the **3D Scene** in the orientation defined by the order in which you selected the markers in the previous step.
The prop is displayed as a node on the **Subject** tab on the left of the Shogun Live window, under **Props**.



The prop's *.mcp* file is saved to the location specified in step 2 above.

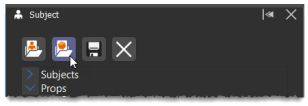
Create props

7. To save or remove a prop from the current scene, on the **Subject** tab, right-click the prop and then click the relevant option.



   After you have saved props, you can import them into subsequent takes as required.

Note that in addition to creating simple, single-segment props, you can also import both simple props and more complex, multi-segment props by clicking the **Import Props** button at the top of the **Subject** panel:

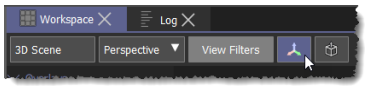


Move props

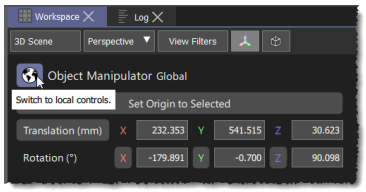
To move props in Shogun Live, you use the Object Manipulator, at the top of the 3D Scene view.

To use the Object Manipulator:

1. Select the object and if the Object Manipulator isn't displayed, click the Object Manipulator button or press M.



2. Drag to move the prop in the 3D Scene view or enter the required values in the Object Manipulator fields.
3. To change between global and local values, click the Object Manipulator symbol:

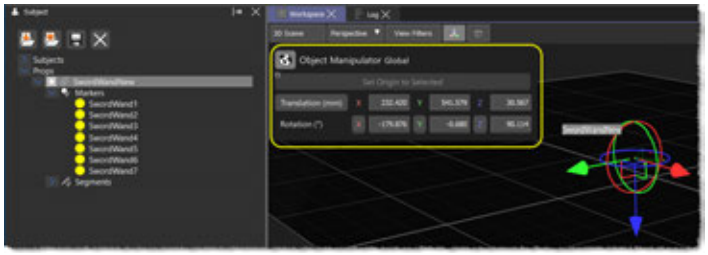


Create props

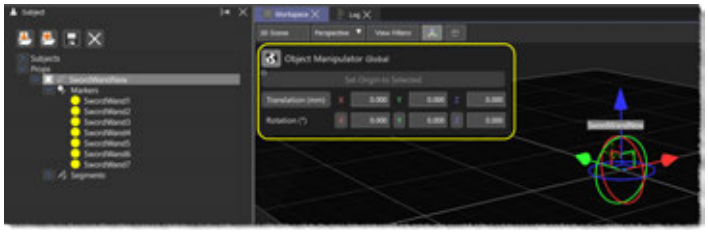
You can use the manipulator to quickly align a prop to the world axis.

To align a prop to the world axis:

1. Pause the real time and in the **Subject** pane on the left, select the prop you want to align and press M to display the Object Manipulator.
   In the Workspace (**3D Scene** view), the Object Manipulator is displayed. By clicking on the Object Manipulator symbol (top left), you can set it to **Local** (values at zero) or **Global** (values relative to the scene origin).



2. To align the selected prop to the scene origin, ensure the Object Manipulator is set **Global** and change all the values to zero.



Capture a take

Vicon Shogun Live enables you to go straight from live capture to post processing. Data is saved as a mocap file (*.mcp*), which contains a copy of the current calibration, active subject, and real-time data, along with paths to the *.x2d* (an XML file, which contains 2D camera data) and any video cameras in the system. As soon as you've captured takes (*.mcp* files), you can replay and review them without leaving Live. For cleanup, you open the *.mcp* file in Shogun Post.

In addition to the following information about capturing with Shogun Live, see also the Vicon video:

7 - Shogun Live - Capture Direct to Disk and Realtime Settings[13]

To find out about streaming real-time data from Shogun Live into Autodesk MotionBuilder, Unity, or Unreal Engine 4, see the Vicon video:

8 - Shogun Live - Streaming to Game Engines[14]

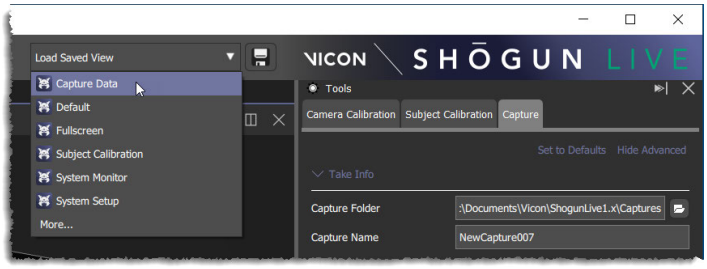
> **Note**
> If cameras are bumped after they have been calibrated, or if any other issue with your system is detected, Shogun displays warning icons. For more information, see Understand the system health icons on page 65.

13 https://vimeo.com/218944993
14 https://vimeo.com/218944997

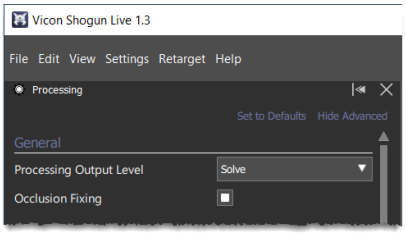
Capture a take

To capture a take:

Note that for capturing takes, you may find it easiest to use the **Capture Data** layout to display the views and panels that you will use for motion capture. To do this, in the **Load Saved View** list at the top right of the menu bar, click **Capture Data**.



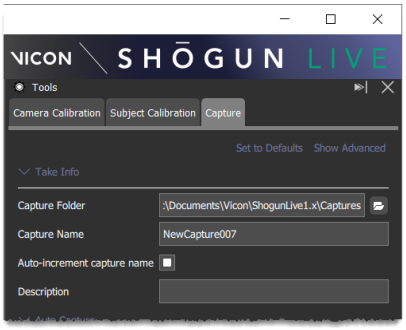
1. Ensure you have completed the necessary preparations, described in Create subjects on page 39 and Create props on page 58.
2. At the top of the **Processing** panel, in the **General** section, make sure the **Processing Output** level is set to **Solve** (this is its default setting) and **Occlusion Fixing** is selected.



> **Important**
> To ensure you record the required data, always check the **Processing Output** level before capturing. Normally, make sure it is set to **Solve**. If you set it to **Reconstruct**, the system will save only reconstructed data, and you will not see any labels or a solving skeleton when you open the data in Shogun Post. Similarly, if you select **Label**, you will not see a solving skeleton in Post.

3. In the **Tools** panel on the right of the Shogun Live window, ensure the **Capture** tab is selected.

4. In the **Take Info** section, click the folder icon to the right of the **Capture Folder** field and select the **Session** folder that you created as described in Create a folder hierarchy to store takes on page 7. Anything you capture from now on will be saved inside the database you created.
5. In the **Capture Name** field, enter a suitable name that will enable you to identify the take.



6. If you will be capturing multiple takes, to append a number at the end of the capture name for each take in the sequence, ensure **Auto-increment capture name** is selected.
7. If required, add text to the **Description** field. Note that if preferred, you can add comments after capture in the Eclipse database (also accessible in Shogun Post in the **Data Management** panel).
8. In the **Capture** section, note the options to capture processed data and video data. The option selected by default is **Capture Processed Data**. If the **Solve** option is selected in Step 2 above, this includes 3D labels and solving bones. To capture video from Vicon video cameras, select **Capture Video**. This lets you view a video overlay to check your 3D data in Shogun Post.

> **Tip**
> A fast SSD is required to capture large datasets to disk. If you're using live video, a second SSD is recommended.

The **Capture Buffer Size** is also displayed. This represents the amount of memory allocated to Shogun Live's capture. By default, this is set to 2 GB, which should be enough for most situations. For multiple video cameras, you

may need to set it higher. You are recommended to always record your data onto a fast SSD drive.

9. Before capturing any data, you may want to reposition and/or resize the **Data Capture** panel as required (to move it, drag its title bar).

10. In the **Data Capture** panel (by default at the bottom right of the Shogun Live window), click **Start Capture**.
In both the panel and in the menu bar at the top of the view pane, a flashing red circle and **Capture Active** are displayed.

> **Tip**
> If possible, begin and end each take with the performer(s) in an A-pose. This can help with labeling and retargeting.

Data is captured to disk at your source frame rate.
If you are using an external timecode generator, in the **Data Capture** panel you can see the current timecode being received, and green icons, indicating that the system is running at genlock at the specified standard. This panel also displays any issues with the capture.

The bar at the bottom of the **Workspace** displays red marks when the real-time system cannot keep up with the target frame rate and has to drop a frame. The percentage of dropped frames is also shown. Unless this number becomes very high (above 30%), you can continue to capture. If it is above 30%, this normally indicates that your system is out of calibration, and can't keep up with amount of data currently being processed. In this case, you may need to re-calibrate or even upgrade your PC.

The *.x2d* data from the cameras is also recorded. When you load the *.mcp* file in Post, *.x2d* data can be used to fix dropped frames (for more information, see Load mocap data files into Shogun Post on page 85).

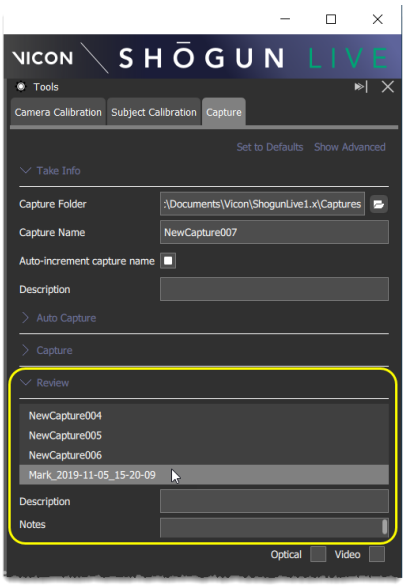
11. When you have captured the required take, click **Stop Capture**. Shogun Live saves the necessary files to the folder specified in the **Take Info** section (see Step 4 above).
12. Depending on whether you want to remain in Shogun Live to continue capturing or move to Shogun Post for cleanup and further processing, you can now do one of the following:
    - Capture another take, as described above.
    - Review the last take (or other recent takes) while remaining in Shogun Live. (For more information, see MCP review in Shogun Live on page 70.); or
    - Load the data into Shogun Post. For information, see Load mocap data files into Shogun Post on page 85.

MCP review in Shogun Live

Shogun Live enables you to replay takes as soon as you've captured them. MCP review enables you to review a take (*.mcp* file), update your notes on a take, or investigate technical issues, all without having to leave Live. When you've finished reviewing the take, you can immediately resume capturing.

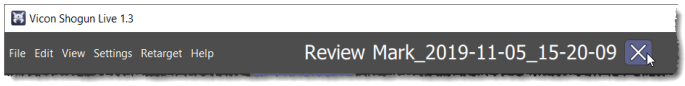
To review takes in Live:

1. Ensure that you have at least one take in the Session folder (see Capture a take on page 65).
2. On the **Capture Tools** pane, in the **Review** section, click the required row.



3. If required, you can change the **Description** and **Notes** fields.
4. To review the selected take, double-click the row.
   At the top of the Shogun Live window, in the center of the menu bar, the word **Review** is displayed, followed by the title of the selected take.
   At the bottom of the screen a time bar displays information about the selected take. It shows you the current frame, current timecode and duration.

5. To play through the take, you can use the Play/Stop button and the Go to beginning and Go to end buttons to the right of the time bar. You can also press the default A and S hot keys to scrub back and forward one frame at a time (to change hot keys, click **Manage Hot Keys** on the **User Preferences** tab (Shift+P)).
6. To close review mode and return to capturing, click the exit button to the right of the take title in the menu bar.



> **Note**
> Shogun Live is either in capture mode (ie live) or in review mode for a single take. You cannot view both live and captured data simultaneously, or compare two takes.

For more information, see:

- Streaming via Vicon DataStream SDK on page 71
- Review Vicon Video and SDI video files on page 72
- Review raw camera data on page 73

Streaming via Vicon DataStream SDK

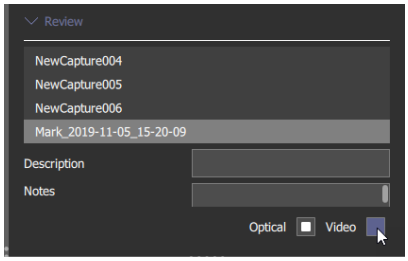
The current data in Shogun Live is served to Vicon DataStream SDK clients over port 801, so that MotionBuilder and Unreal show the reviewed clip when Shogun Live is not capturing.

For clients that require uninterrupted live, an additional DataStream SDK server sends the current live data over port 804.

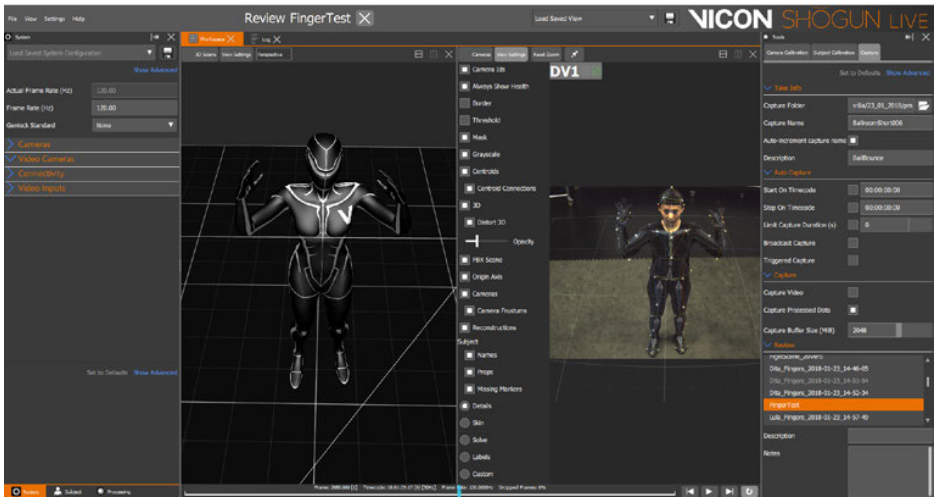
Review Vicon Video and SDI video files

You can check your reference footage against what was captured, including any overlay of the 3D mesh. To do this:

1. Load an *.mcp* file with video data into MCP review (see MCP Review in Shogun Live on page 70).
2. On the **Capture** tab, in the **Review** section, select **Video**. (Note that this option is cleared by default, as performance may be affected in files with multiple video cameras.)



3. Play or scrub through the review of the take, which includes data from Vue or SDI video cameras.



Review raw camera data

You can check raw data for captured takes. This can be useful when troubleshooting or investigating possible issues. To do this:

1. Load an *.mcp* file into MCP review (see MCP Review in Shogun Live on page 70).
2. Ensure the **View Filters** are set as required.
3. Play or scrub through the take and review the raw data as required.

Understand the system health icons

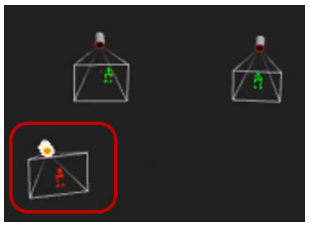
In addition to the following information, see also the Vicon video 5 - Shogun Live - System Health and Camera Fixing[15], which covers how to monitor and maintain the health of your Vicon Shogun system.

Throughout Shogun Live, the color red is used as a warning of possible issues, the color green is used as an indicator of good system health, while the colors between these extremes (orange, amber, yellow) are used to indicate an interim state.

For example, the color of centroids that are displayed in the **Cameras** view indicates the current state of camera calibration:

- Centroids that are not contributing are displayed in red in the **Cameras** views, indicating that the relevant camera is not well calibrated.
- Centroids from uncalibrated cameras are displayed in gold.
- Centroids from calibrated cameras are green, indicating they are now contributing.

In a **3D Scene** view, the color of the markers shown in the representations of the cameras also indicates whether or not the camera is contributing to the reconstructions. As elsewhere in Shogun, the color red indicates an issue, and helps you to identify a problematic camera.



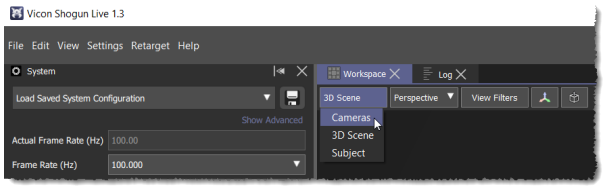
15 https://vimeo.com/218944981

On the **System** tab, the camera icons give you an overall indication of the cameras' status.

Icon	Meaning
	Camera is active or connected (and calibrated)
	Camera is not calibrated
	Camera is (manually) disabled
	Camera is connected but not contributing
	Camera is disconnected
	Camera has been bumped since calibration
	General warning symbol indicating an error

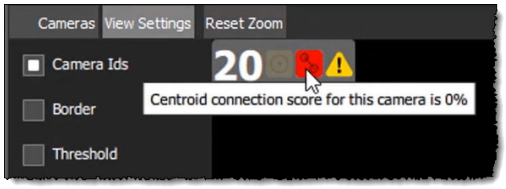
To display more information about the status of a camera:

1. In the **Workspace**, select the **Cameras** view.



2. On the **System** tab, click a camera.
3. At the top of the **Cameras** view, hover the mouse pointer over the **Centroid connection score** icon:

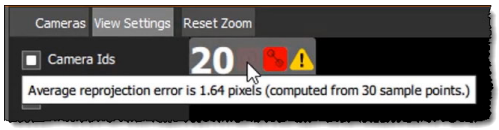

Note that, as usual, the color of the icons at the top of the **Cameras** view provides an additional indication of the camera status.



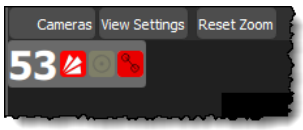
This icon represents the centroid connection score: for the selected camera, the percentage of centroids that are contributing to reconstructions. A low centroid connection score (as shown in the above example), indicates issues with the selected camera.

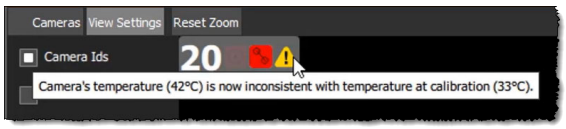
4. Hover the mouse pointer over the **Average reprojection error** icon:

This icon represents the reprojection error: the distance between the 2D image of the markers on the camera and the 3D reconstructions of those markers projected back to the camera sensor.



5. To investigate camera status further, hover the mouse pointer over any additional camera status icons to the left or right of the other two icons. These additional icons provide further information about the state of the camera: eg, a bumped camera icon and/or a camera temperature warning.



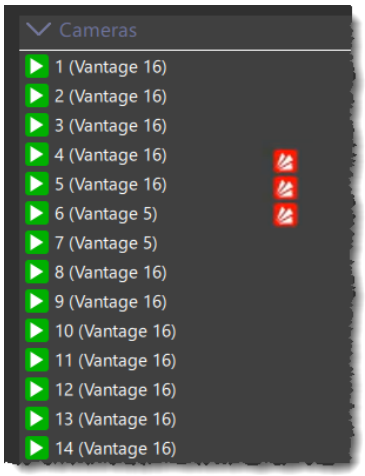


For information about bumped cameras, see Fix bumped cameras on page 77. If one or more camera's operating temperature is inconsistent with its temperature at calibration, re-calibration is necessary (see Calibrate cameras on page 21).

Fix bumped cameras

In addition to the following information, see also the Vicon video: 5 - Shogun Live - System Health and Camera Fixing[16].

Vicon cameras with accelerometers (Vicon Vantage, Vero and Vue), provide a bump detection feature. On these cameras, the status indicators flash red when the camera is bumped and (on Vantage cameras only) the OLED display changes to indicate a bumped camera. In the Vicon Shogun Live **System** panel, icons are displayed to the right of the camera names to indicate a bump.

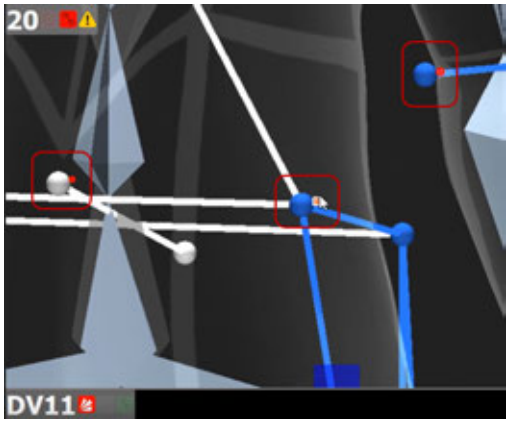


To prevent you from having to recalibrate the whole system after a camera has received a minor bump, when a calibrated subject (or prop, or wand) moves through the volume, cameras automatically detect whether further action is necessary:

- If a calibrated subject moves through the volume and the cameras have returned to their original position, the cameras' bump status indicators change from red back to blue and in the **System** panel, the bumped icons disappear.
- If you need to take further action, the status indicators continue to display an error and the bumped icons remain on the **System** panel.

16 https://vimeo.com/218944981

As an additional check, in the **System** panel click the camera with the bumped icon to select it and in a **Cameras** view, zoom in on the markers. When a camera is bumped, red warning symbols are displayed, indicating the difference between where the system expects the markers to be, and where they actually are.



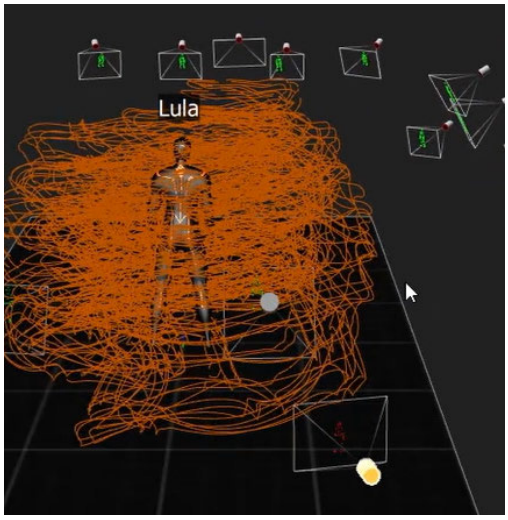
Shogun Live enables you to quickly correct a camera whose position has changed due to having been bumped or moved, using any labeled object in the volume – subject, prop, or wand, and the **Recover Camera Position** feature.

> **Important**
> You can use **Recover Camera Position** to recover cameras that have been either bumped or moved. This process relies on having enough cameras within a calibrated system to act as a calibration anchor. For this reason, it is recommended that it is run on only a small proportion of the cameras in a system. A single camera or a small number of affected cameras can be recovered with good results. If a larger number of cameras is affected, perform a full camera calibration instead (see Calibrate cameras on page 21).

Correct a bumped or moved optical camera

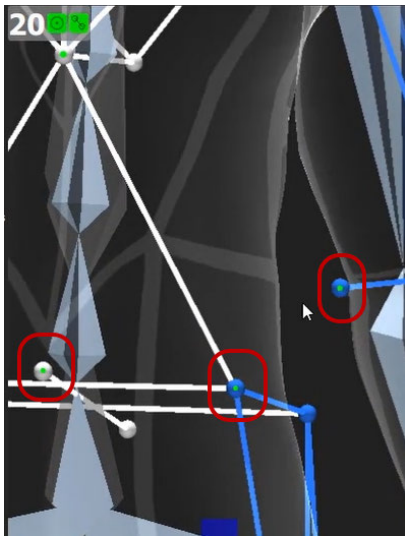
The following procedure corrects a bumped optical camera (Vantage or Vero): for bumped video cameras, see Correct a bumped Vicon Vue video camera on page 80.

1. On the **System** tab, select the camera that was bumped or moved.
2. In the **Tools** panel, on the **Camera Calibration** tab, click **Recover Camera Position**.
3. In the volume, have the subject move (or move the labeled object) in front of the affected camera.
   In the **3D Scene** view and **Cameras** view, you can see orange trails as the system determines the offset between the camera and the rest of the calibration.



4. When enough of the view has been covered (indicated by orange trails that thickly cover the affected camera view, as shown above), click **Recover Camera Position** again.

5. In the **Cameras** view, zoom in and check that the markers are now aligned, with no red warning symbols.



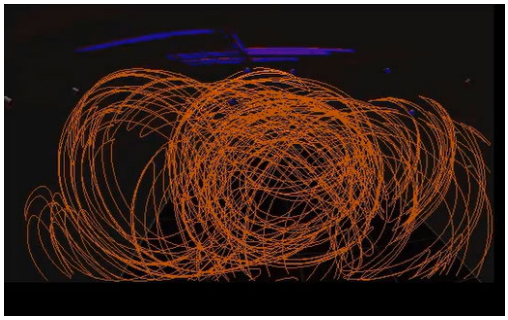
The camera is now correctly aligned with the rest of the system. Note that masking of the affected camera is not preserved, so for optimum results, you may need to mask this camera again. For information, see Mask cameras on page 22.

Correct a bumped or moved Vicon Vue video camera

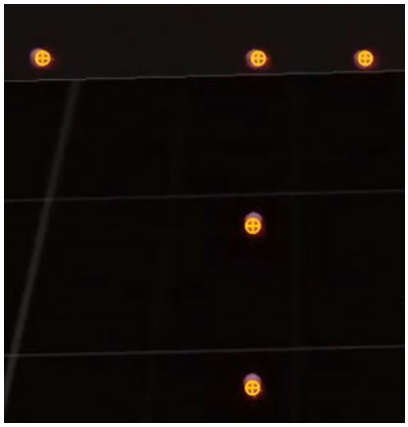
Note that to correct a Vue camera, you need to use active markers, so ensure you have a Vicon Active Wand to use during the procedure.

1. On the **System** tab, select the video camera(s) that are bumped, or that have been moved.
2. In the **Tools** panel, on the **Camera Calibration** tab, click **Show Advanced**.
3. In the **Wand** section, click **Activate Video Calibration**.
4. Have someone wave the Active Wand in the volume.
5. Click **Recover Camera Position**.

6. Have the wand moved in front of the affected camera until the camera view is covered with orange trails. (You can observe this in the **3D Scene** and the **Cameras** view.)



7. Again, click **Recover Camera Position**.
8. In the **Cameras** view, zoom in and check that the markers are now aligned.



9. On the **Camera Calibration** tab, in the **Wand** section, click **Deactivate Video Calibration**.

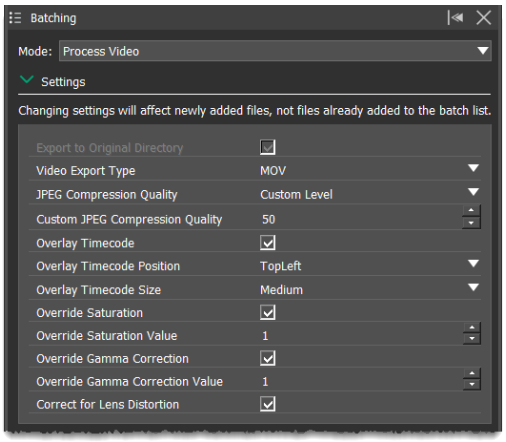
Transcode video files

You can use Vicon Shogun Post's batch-processing feature to convert raw Vicon video files (*.vvid*) captured from Vicon video cameras (Bonita Video or Vue) to *.mov* files, using Bayer conversion. Batch transcoding to *.mov* produces smaller video files that can be used in third-party applications as well as within Shogun, and enables you to easily move the files to an appropriate location for use in Post.

The following steps provide a quick introduction to using Shogun Post to transcode video. For more information on batch processing with Shogun Post, see the Vicon video: 8 - Shogun Post - Batch Processing Data[17].

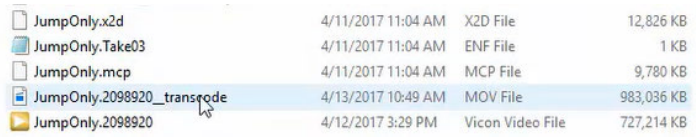
To transcode video files:

1. In Shogun Post, on the **Processing** tab of the ribbon, click **Batching**.
2. In the **Batching** panel, in the **Mode** field, select **Process Video**.
3. In the **Settings** section, ensure **Export to Original Directory** is selected (the default). When this option is selected, the converted *.mov* files are saved to the same location as the *.x2d*, whether your raw video files (*.vvid*) were saved to a custom location (such as an SSD) or are already in the same location as the *.x2d*.
4. Ensure the **Quality** field is as required.



17 https://vimeo.com/218945109

5. In the **Files and Processing** section, below the **Batch Progress** line, ensure no unwanted files remain from previous batch processes. (If you find any unwanted files, click on their names and then click the **Remove** button.)
6. Click the **Add Files** button and in the **Import** dialog box, select the *.x2d* or *.vvid* files that you want to transcode and click **Open**. (Use the *.x2d* option if you have multiple Vicon video cameras, as it transcodes all the related video files.)
   The names of the files you added are displayed in the **Files and Processing** section near the bottom of the **Batching** panel.
7. Click **Start**.
8. To check that your files have been transcoded, when the **Batch Progress** bar turns blue and displays 100%, you can open the relevant folder (see Step 3 above) in Windows Explorer and see your transcoded file(s).



9. When you have checked that your *.vvid* files have all been transcoded and saved to the specified folder, you can delete them from their original location (for example, from an SSD).

Check data quality

After you have loaded your captured data files into Vicon Shogun Post, you can use its diagnostic tools to help you to identify any issues with the data. For more information, see:

- Load mocap data files into Shogun Post on page 85
- Review occlusion fixing on page 87
- Check for swaps and other errors on page 91
- Use video overlay to check accuracy on page 92
- Get an overview with the time bar Issues map on page 95
- Find issues using the Data Health view on page 97
- Find issues using the Graph view on page 100
- Work with time ranges on page 102

See also the Vicon videos:

- 2 - Shogun Post - MCP Loading[18]

and

- 4 - Shogun Post - Checking Data Quality[19]

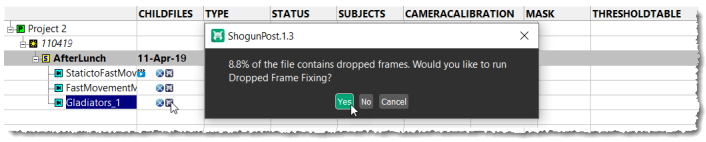
18 https://vimeo.com/218945087
19 https://vimeo.com/218945095

Load mocap data files into Shogun Post

> **Note**
> Shogun Live can record processed real-time data (*.mcp* files) along with raw 2D camera data (*.x2d* files). You can use *.mcp* files as a starting point for processing in Shogun Post. Because the frame rate during real time can vary, *.mcp* files may contain missing (dropped) frames. When you open an *.mcp* in Shogun Post, a dialog box prompts you to confirm whether you want to fill in the data for these missing frames. The fixing operation requires an *.x2d* with the same name as the *.mcp* file to exist in the same folder.

1. To load mocap data files (*.mcp* that contains everything captured in Shogun Live, or *.vdf* saved in Shogun Post) you can:
   - Open Windows Explorer, locate the files you saved and drag and drop them into the Shogun Post view pane; or
   - On the the **File** menu, click **Open** and locate your files; or
   - In the **Data Management** panel, locate the required file icon (an *.mcp* has a purple icon) and double-click it.

   Although the recommended workflow is to load an *.mcp* file (processed real-time data), you can instead import an *.x2d* (raw 2D data), but in this case, you must run reconstruct, label, and occlusion-fixing operations before proceeding with any required cleanup.
   If you chose an *.mcp* file and if dropped frames are detected, a dialog box informs you of the percentage of dropped frames in the file and asks whether you want to fix them.



2. To automatically fill the dropped frames, click **Yes**.
   The dropped frames are reconstructed, labeled and solved, smoothly integrating data from the related *.x2d* file into the existing data.(If you click **No**, processing is quicker as Shogun Post just interpolates between the

dropped frames, but note that no keys are created and you will still need to fix the dropped frames.)

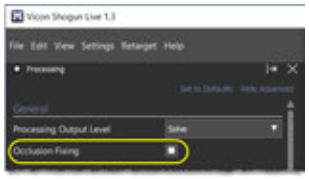
> **Tip**
> If you click No, but then decide that you want to enable Shogun Post to fix the dropped frames, open the **Processing** panel and at the top right, in the **Operations** section, click **Fix RT Drops**.

Review occlusion fixing

When you import an *.mcp* file or perform any processing that includes occlusion fixing, your first step is to review it to ensure that it is labeled correctly and that the automatic occlusion fixing worked well.

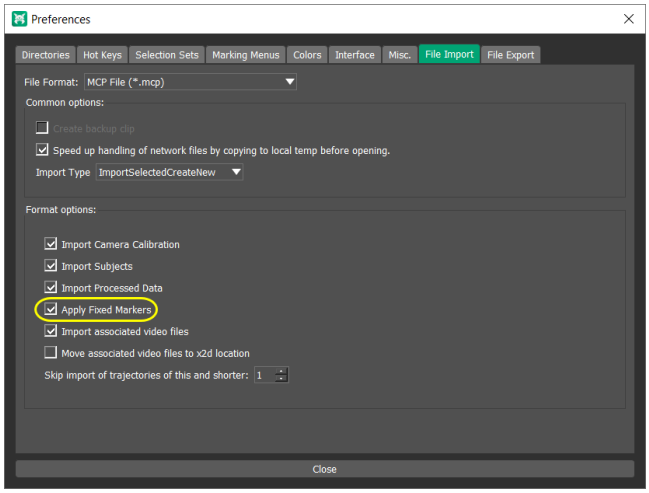
To review occlusion fixing in Shogun Post, both of the following (default) settings must be selected:

- In Shogun Live: Before capture, in the **General** section of the **Processing** panel, **Occlusion Fixing** must be selected.



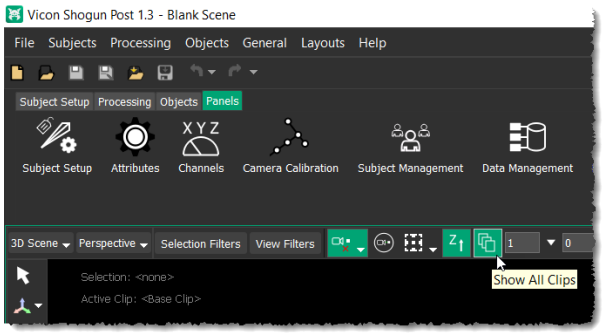
  This normally produces higher quality results, especially during occlusion-heavy moves such as interactions and when a subject is on the edge of the volume. Occlusion fixing is stored as a layer when the *.mcp* data is recorded.

- In Shogun Post: Before importing the *.mcp* file that was captured with **Occlusion Fixing** selected as described above, in the **Preferences** dialog box (**General** > **Preferences**), on the **File Import** tab, in the **File Format** field, select **MCP File** and ensure **Apply Fixed Markers** is selected.



You can then compare the data before and after occlusion fixing in a **3D Scene** view (or any other 3D view) in Post.

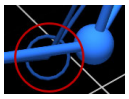
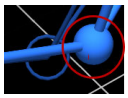
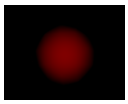
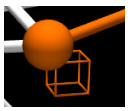
Note that, by default, in the 3D Scene view **Show All Clips** is selected:



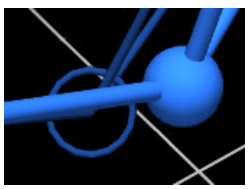
This is necessary to enable you to view data from the backup clip, which contains the data before occlusion fixing, as well as the current (occlusion-fixed) clip.

> **Important**
> If required, you can revert back to the raw data after loading the *.mcp* file into Shogun Post by using the **Restore** section of the **Marker Editing** panel.
> Note that the occlusion fixing algorithm affects **all** the markers on a subject. For this reason you should run occlusion fixing only once: either during capture in Shogun Live, or at the end of data processing in Shogun Post.

Before you start your review, ensure you can recognize the various types of data that may be displayed in the **3D Scene** view, as listed below.

Symbol in 3D view	Description	Data type
	Circle	Original labeled markers from the backup clip. Displayed by default if the difference between the position of the original marker and the occlusion-fixed marker is greater than 1 cm.
	Sphere	Markers without gaps
	Sphere with a dot in the center	Markers that have been occlusion-fixed during a gap
	Sphere with a cross in the center	Markers that have had a gap manually filled
	Red sphere	Markers that are missing at the current frame
	Wireframe box	Constraint, showing expected location of marker

If circles are displayed for some markers during some time ranges, it indicates that the marker position was changed by more than 1 cm by occlusion fixing.



In this case, check the position of the occlusion-fixed marker. If it doesn't look right, the cause is likely to be either a labeling mistake or an occlusion-fixing error. To fix these problems, see Correcting labeling mistakes on page 90.

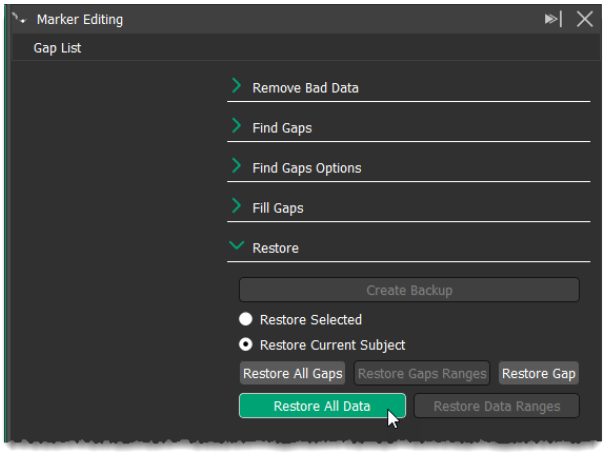
Correcting labeling mistakes

If you notice any swaps, mis-labels or other issues with marker data and the file has already been occlusion fixed, the recommended workflow is to restore the data back to its original state before it was occlusion-fixed.

You can do this on a per subject basis using the **Restore** section of the **Marker Editing** panel. Normally, restore the data across the whole take, because occlusion fixing across a range leads to jumps in the data.

The recommended workflow for dealing with problematic occlusion-fixed data is:

1. From the **Current Subject** chooser, select the required subject, or if you want to work on everything, select **All**.
2. In the **Restore** section of the **Marker Editing** panel, with selected subject active, click **Restore All Data**.



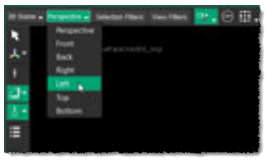
3. Fix any labeling issues that are present in your data. For more information, see Use the Labeling panel on page 109 and Fix common labeling issues on page 113.
4. Re-run occlusion fixing from the **Processing** panel.
5. Re-run **Solve Solving** to update the solving skeletons.

Check for swaps and other errors

> **Important**
> Before filling gaps, you must find and fix any labeling swaps or errors in your data. Gap-filling in Shogun relies on the data before and after the gaps to predict marker location, so any labeling errors will cause gap-filling to fail.

To identify swaps and other errors, on the time bar, click the Play button to view your data in the **3D Scene** view. For a closer look, slowly scrub through the whole take (drag the current time indicator along the timeline, or for finer control, press the A or S key), carefully checking for any 'popping', unexpected movement or obvious misalignment.

For a more detailed view, use the normal mouse actions to move around the view: drag to rotate the view, right-click and drag to zoom in or out, left- and right-click and drag to pan. If you need to view the image from a different angle, you can use one of the orthogonal views.



Use the **View Filters** options in the **3D Scene** view to make it easy to recognize any issues. For more information on recognizing and correcting swaps and other errors, see Fix common labeling issues on page 113.

> **Tip**
> To snap a 3D view camera to selected object(s), press C or click the **Snap** button in the **3D Scene** view toolbar.

Use video overlay to check accuracy

If your system includes Vicon video cameras, you can check your data accuracy by comparing optical capture data with supported video data. You do this by overlaying the 3D data onto the video (*.vvid* or *.mov*) data.

Shogun Post supports the following types of video files:

- *.vvid* files captured from Vicon Shogun Live using Vicon Bonita and Vicon Vue cameras
- *.mov* files that have been transcoded using Shogun Post or the standalone ViconVideoConverter tool (a command line tool that is installed with Vicon Video Viewer, by default to *C:\Program Files\Vicon\ViconVideoViewer*).

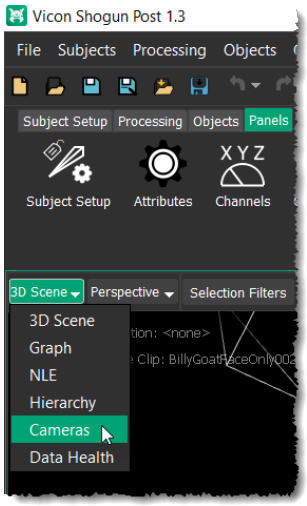
To overlay 3D data onto video files in Shogun Post:

1. Ensure that the video files are in the same folder as the required 3D data (*.x2d* or *.mcp*) file. If a different path was defined during capture (often an SSD per pair of cameras), use the batch transcoding feature of Shogun Post to ensure the files are moved to the correct location. For more information, see Transcode video files on page 82.

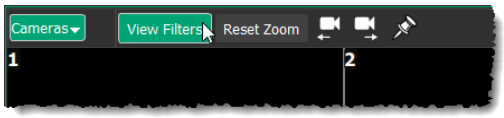
   > **Tip**
   > If video files are kept in a different folder from the 3D data files, when you load an . *x2d* or . *mcp* file, Shogun Post warns you that the video files cannot be located. To manually specify the video file path, in the **Selection** panel (or **3D Scene** view) select the video camera, then in the **Attributes** panel, expand the **Video (Offline)** section and set its **Video_File** attribute to the path of the file. This change is saved when you save the scene in Shogun Post.

2. Open the *.x2d* or *.mcp* file (either from the **Data Management** panel, or click **Import** on the **File** menu, or drag and drop the relevant file from Windows Explorer, as described in Load mocap data files into Shogun Post on page 85). The video files are automatically loaded.
3. In the **Selection** panel, expand the **System** node and click the required camera.

4. At the top left of the view pane, click the current View type button, and then click **Cameras**.

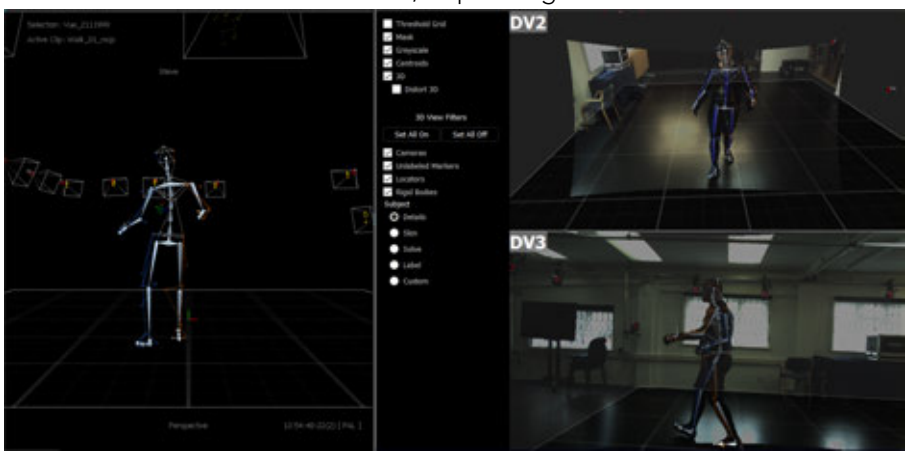


5. At the top of the **Cameras** view, ensure **View Filters** is selected.

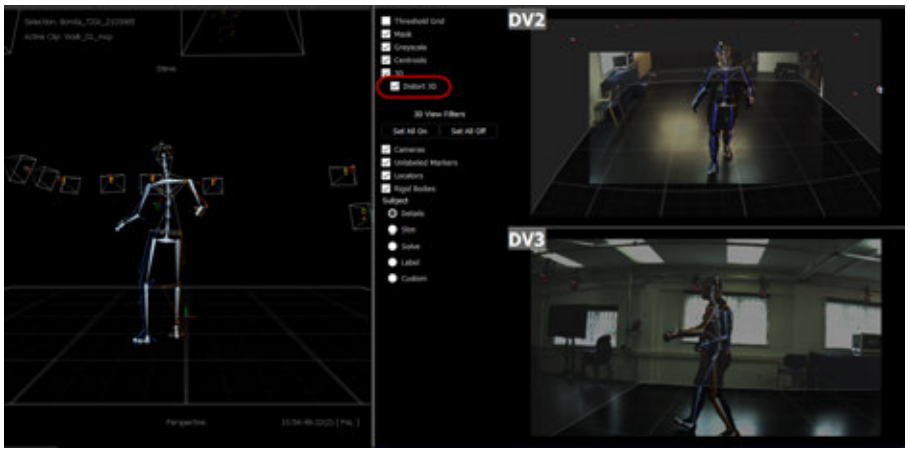


6. Select the **3D** check box.

7. The video for each Vicon video camera is displayed in a 3D overlay.
   Video is in black and white or color, depending on the video camera used.



8. To see the image plane of the camera corrected for lens distortion, select **Distort 3D**.



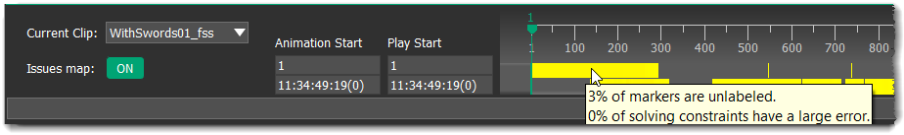
   The 3D overlay should line up with the subject in the **Cameras** view and the grid should line up with the floor.
   You can zoom and pan the video using normal **Cameras** view controls.
   You can select or clear the **View Filters** to control which 3D elements are displayed.

Get an overview with the time bar Issues map

To enable you to identify frames with issues, between the play range (green vertical) bars on the time bar, two horizontal colored bars are displayed. For each frame:

- The top bar indicates the percentage of markers that are labeled.
- As the top bar percentage may include markers that are incorrectly labeled, to help you identify issues further, the lower bar indicates the percentage of markers that have a high solving constraint error (that is, the number of markers whose solving constraint error is considered too large). This can indicate issues like mislabels, swaps, or a poor solve due to an incorrect fill, over filtering, etc.

For both bars, the color varies from yellow to red, depending on the number of markers with issues at each frame. In each bar, the longer the yellow part exists, the longer the issue exists, whereas the more red it turns, the more markers have issues. To show more information about the errors found at a particular frame, hover the mouse pointer over the relevant frame.



> **Note**
> The issues map is all red if there is no labeled data in the current scene.

You can use the mouse to work with the time bar as follows:

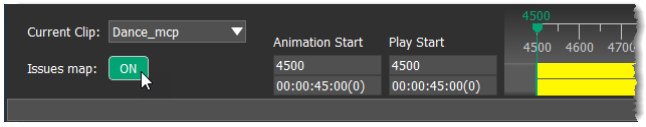
To	Do this
Show a tooltip that explains the issues that are present at this frame	Hover the mouse pointer over the frame.
Set the current time	Click on the time bar or drag the current time indicator.
Set the current time (ie select a frame), highlight the markers that are missing labels or have high constraint errors, and snap the camera to them	Using the tooltip as a guide to where to click on the time bar, double-click on it.
Select a time range	ALT+drag. See also Work with time ranges on page 102.

After you have gained an overview of your data with the time bar, you can use the **Data Health** view, the **Graph** view and/or the **Marker Editing** and **Labeling** panels to further identify and correct any issues.

To enhance system performance when working on a scene that contains very large amounts of data, you may want to turn off the **Issues map**.

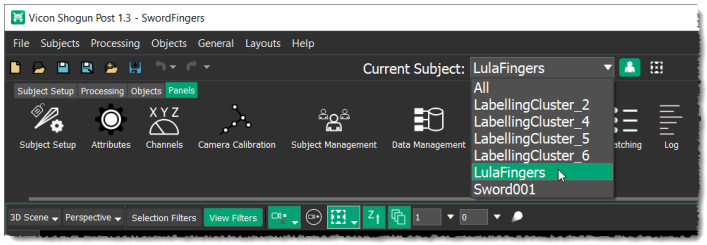
To turn the issues map on and off:

Click the **Issues map** button to the left of the time bar.



To set the issues map to show all issues or only those for a specific subject:

From the **Current Subject** list, select the required option.

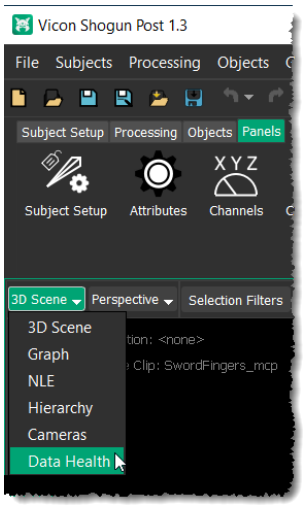


Note that you can snap the 3D view to the selected subject by clicking the **Snap 3D view** button  to the right of the **Current Subject** list.

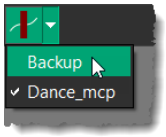
Find issues using the Data Health view

The **Data Health** view enables you to view detailed information about the labeling and gaps in the markers in the current scene.

To open a **Data Health** view, in any view pane, click the View type button and then select **Data Health**.

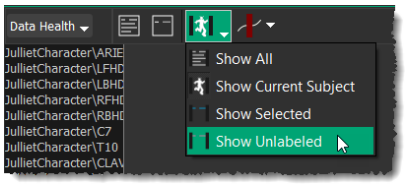


By default, if a Backup clip exists, it is displayed, but if required, you can select a different clip by clicking the arrow on the **Display Gaps** button. (Clips contain keys for objects in your scene. The clip stores keys only; not markers, bones, or any other objects.)

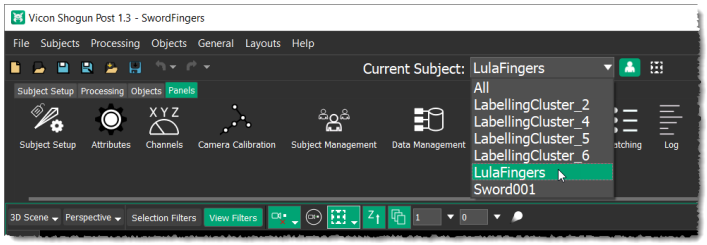


To display the time ranges for the gaps in the markers on the selected clip as gray rectangles, ensure the **Display Gaps** button is selected.

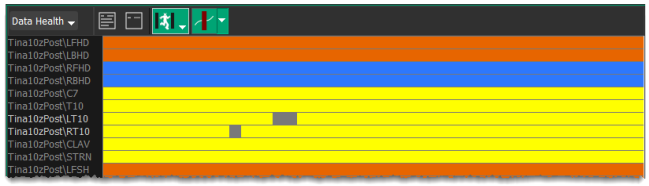
To view unlabeled markers, from the **Show current subjects' markers** list, select **Show Unlabeled**.



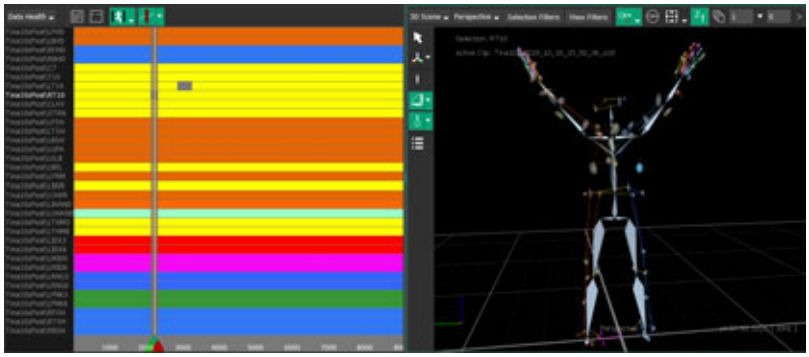
To view the labeling for a different subject, from the **Current Subject** list at the top of the Shogun Post window, select the required name.



Use the marker list on the left of the **Data Health** view to find the required marker, then follow line along to see the gray rectangles that indicate gaps.



To select the range of a gap, in the **Data Health** view, double-click the relevant gray rectangle. The following image shows a **Data Health** view and **3D Scene** view of a gap selected for a marker.



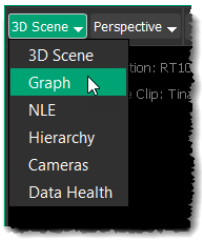
Check data quality

> **Note**
> The **Show all markers** button shows *every* marker in your scene. Select this option only if you need to see all markers because if, for example, someone is standing to one side but wearing a full marker set, you'll see all their markers listed, as well as the markers for the rest of the volume. Normally, it is more useful to have the **Show current subject's markers** button selected.

Find issues using the Graph view

In the **Graph** view, you can see a graphical representation of the X, Y and Z positions, as well as gaps, for selected marker(s). This is useful during gap-filling, as it gives you another way of checking that the gap-filling looks reasonable for the data.

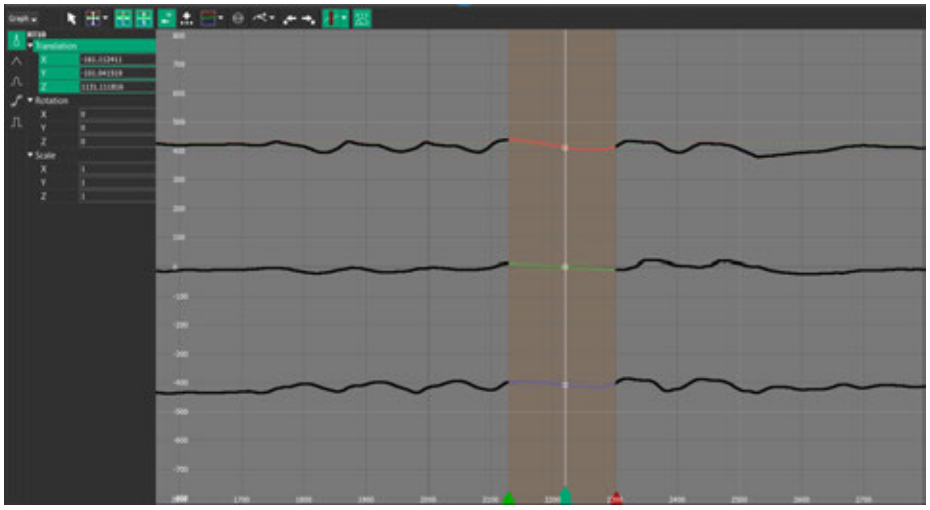
To open a **Graph** view, in a view pane, click the View type button and then select **Graph**.



To select and fill gaps in a marker:

1. To keep the **Data Health** view open as well as a **3D Scene** view, split the screen by clicking one of the three-way split buttons at the top right of the window, such as the Three Views Split Left button .
2. As in the **Data Health** view, if there are multiple clips in your scene, you can select the required clip by clicking the arrow on the **Display Gaps on Specified Clip** button .
   To display X, Y and Z values of the selected marker at the current position of the time indicator in the graph, click the **Show Display Channels** button .
3. In the **3D Scene** view, select the marker. In the **Data Health** view, double-click a gap to select its range.

The **Graph** view now displays all the keys for the selected marker.



As in the **Data Health** view, any gaps are clearly visible.

4. Zoom in by right-click and dragging for a clearer view or by using one of the options under the Zoom button  .
5. You can now use the **Labeling** panel or one of the options from the extended context menu (press CTRL+ALT and right-click in the **Graph** view pane) as required.

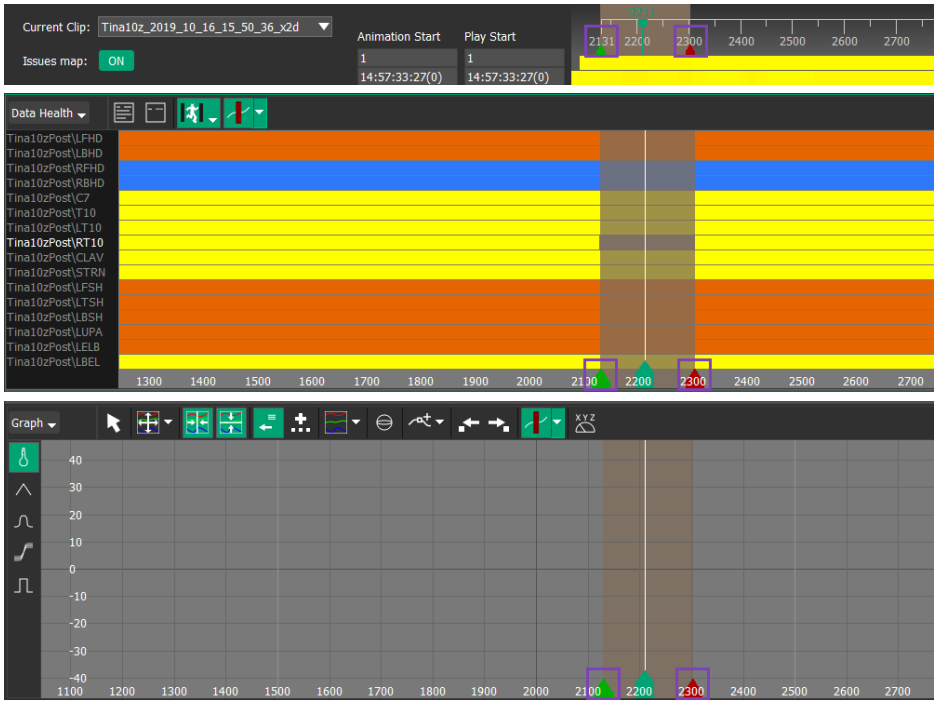
For further tips on using the Graph view to identify and fix data issues, see Fix common labeling issues on page 113 .

Work with time ranges

While identifying and fixing issues in your captured data, you will often need to select a particular time range on which to work.

To select and clear time ranges:

1. On the main time bar, and in the **Data Health** and **Graph** views, select a range (ALT+drag).
   Green and red triangles that indicate the start and end of a selected range are displayed.



2. To adjust the start or end of the time range, on the time bar, or in the **Data Health** view or **Graph**, hover the mouse pointer over the required arrow and drag it.

> **Tip**
> You can also update the range handles using hot keys:
> , sets the start handle
> . sets the end handle
> To change these hot keys, on the **General** menu, click **Preferences** and then click the **Hot Keys** tab.

3. To clear a selected range, ALT+double-click within the range.

Clean up data

If your visual assessment and Vicon Shogun Post's diagnostic tools have revealed issues with your recorded data (see Check data quality on page 84), you can use its cleanup tools to correct mislabels and fill any gaps.

> **Important**
> Before filling gaps, you must find and fix any labeling swaps or errors in your data. Gap-filling in Shogun relies on the data before and after the gaps to predict marker location, so any labeling errors will cause gap-filling to fail.

The following topics provide an introduction to fixing data issues:

- Find and fix bad data on page 104
- Find and fix noise on page 104
- Use the Labeling panel on page 104
- Fix common labeling issues on page 104
- Processing during cleanup on page 128

See also the related Vicon videos: 5 - Shogun Post – Labeling Data[20] and 6 - Shogun Post - Marker Editing[21].

Note that each time you finish cleaning up a range, you must check its solve (see Solve during cleanup on page 128).

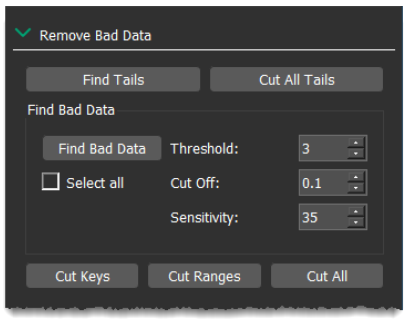
20 https://vimeo.com/218945101
21 https://vimeo.com/218945104

Find and fix bad data

To help you identify and fix bad data, you can use the **Marker Editing** panel.

To find and remove bad data:

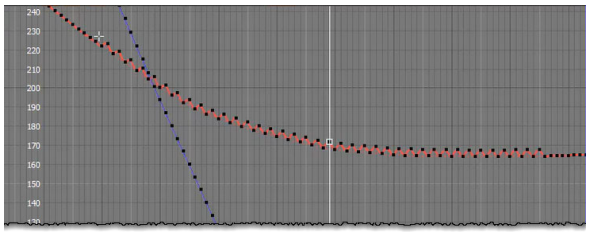
1. To open the **Marker Editing** panel, in the **Processing** menu, click **Marker Editing** (or click **Marker Editing** on the **Processing** tab of the ribbon).
2. In the **Remove Bad Data** section, go to the **Find Bad Data** button and notice the options:
   - **Threshold** Allowable deviation
   - **Cut-Off** Data filter. Decreasing this value filters the data more heavily.
   - **Sensitivity** Amplifies the effect of the **Cut-Off** filter.



3. Click **Find Bad Data**.
4. Experiment with these values to find out what works best for your data.
5. When you have identified the bad data, remove it by clicking the appropriate **Cut** button, and apply a fill (see Gap-filling options on page 124).

Find and fix noise

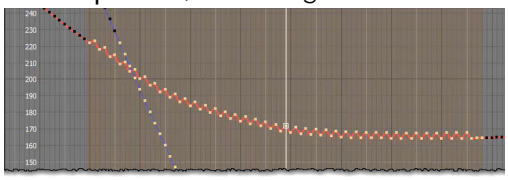
Noise can be easily identified in a **Graph** view:



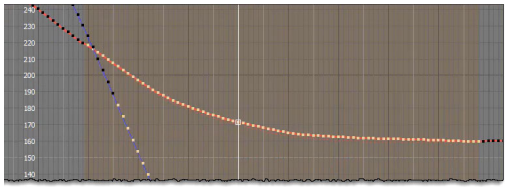
It also produces flickering as you play through a take in the **3D Scene** view. You can fix it with the filtering options in the **Marker Editing** panel.

To fix noisy data:

1. In a **Graph** view, ALT+drag to select it.



2. At the bottom of the **Marker Editing** panel, expand the **Filter** section, and select whether filtering applies to **Ranges**, as above, or to **Selected Keys**.
3. If you're not sure how much filtering to apply to your data, keep the default settings (**Cut Off**: 0.3 and **Threshold**: 15) and click **Apply**. You can reapply this as many times as required.



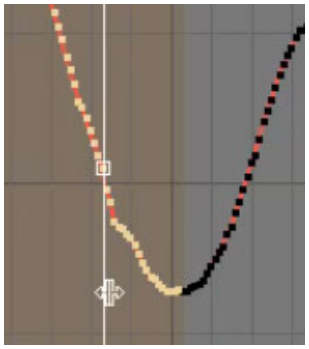
4. In the **Graph** view and **3D Scene** view, check that the trajectory is now smooth over the selected range.

> **Tip**
> To display a tooltip for any of the controls, hover the mouse pointer over the relevant control.

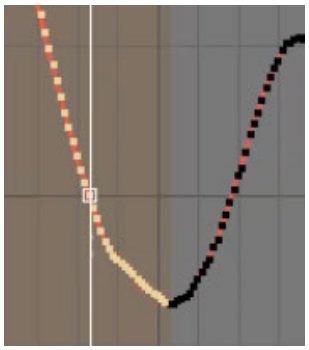
Ensure smooth start and end to filtered trajectories

When you apply filtering, the **Smooth In/Out** option in the **Marker Editing** panel provides smooth blending at the start and end of the filtered section of a trajectory curve.

The following example shows a Graph view of a trajectory curve that requires smoothing.



With **Smooth In/Out** cleared, when filtering is applied, the curve is made smoother, but the start and end does not take into account what is either side of the smoothed section, resulting in a straight line, with an unwanted angle at the end.



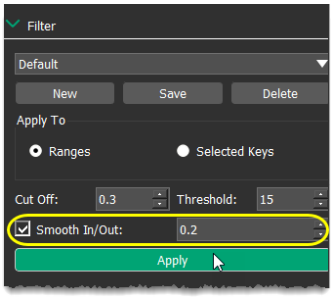
For details, see the following steps or watch Vicon Shogun 1.3 Post Tutorial - Filter in/out Smoothing[22] on YouTube.

22 https://youtu.be/0csCqSmKe9E

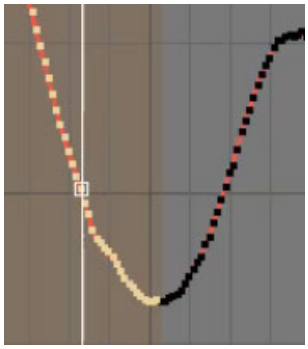
Clean up data

To give a smoother start and end to the filtered section of a trajectory:

1. In the **Marker Editing** panel, expand the **Filter** section and select **Smooth In/Out**.
2. If you want to change how much of the trajectory is affected on either side of the gap, edit the value of the adjacent field. The default is 0.2 (20%). Smoothing works by blending between the original and filtered result by progressively more or less, across the smoothing range.



The filtered section is smoothed at the start and end.



Use the Labeling panel

You can fix labeling issues using the tools in the **Labeling** panel. The following steps introduce the main components of the labeling panel. To go straight to examples of how to use it to fix labeling issues, see Fix common labeling issues on page 113.

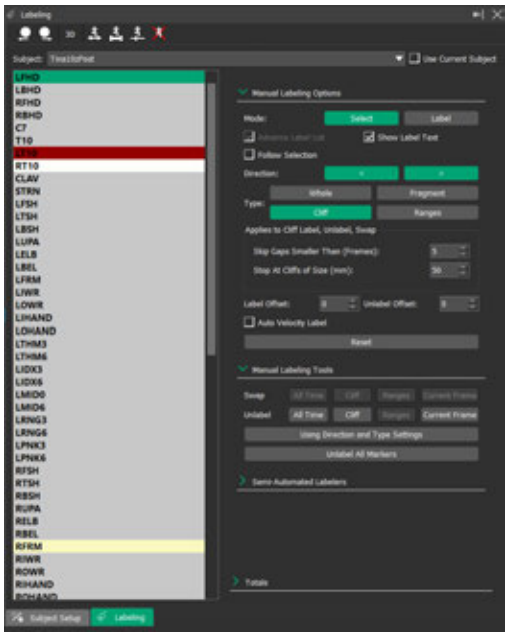
To use the Labeling panel:

1. On the **Processing** tab on ribbon, click **Labeling**.
2. In the toolbar at the top of the Shogun Post window, ensure that the required subject is selected in the **Current Subject** list.

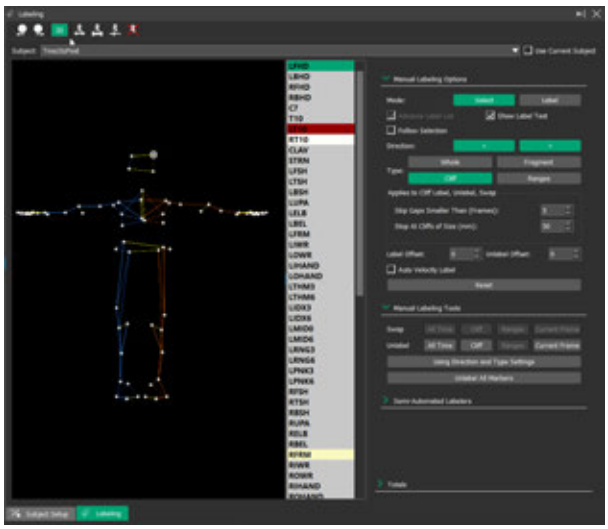
> **Tip**
> By default, the selection in the **Current Subject** list at the top (middle) of the Shogun Post window determines which subject to label.
> If **All** is selected in the **Current Subject** list, the labeler uses the last subject it was set to.
> If you want to select a subject different from that specified in the **Current Subject** list, in the **Labeling** panel, clear the **Use Current Subject** box and select the required subject from the **Subject** list at the left of the check box.

On the left of the **Labeling** panel, a list of labels for the selected subject is displayed. The color variations indicate marker issues:

- **Yellow**: Mislabels or missing labels (the depth of the color indicates the severity of the issue, eg, more or fewer gaps)
- **Red**: Labels for this marker are missing from the current frame



3. To display a 3D representation of your labels for the current subject, click the **3D** button at the top of the **Labeling** panel. The 3D view helps you to quickly identify where the markers should be. You can drag and drop labels from the 3D Labeling view to the **3D Scene** view pane (and vice versa).



You can use the usual mouse actions (click and drag, right-click and drag, left- and right-click and drag) in the 3D view, in the same way as in a **3D Scene** view.

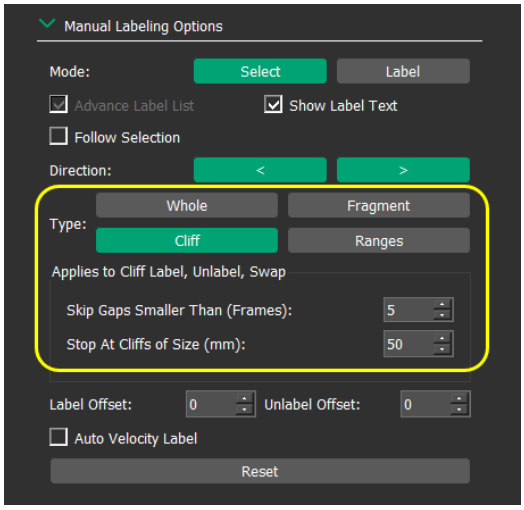
4. At the top of the **Labeling** panel, in the **Manual Labeling Options** section, select the **Mode** option (**Select** or **Label**), which affects the way in which you select and label markers.

   - **Select** Click a marker on your subject in a **3D Scene** view and then click a label name in the list in the **Labeling** panel.
   - **Label** Click name of the label in the marker list and then click the required marker on the subject in the **3D Scene** view.

   > **Tip**
   > To quickly switch between labeling and select modes when labeling a subject, you can use the default hot key (L) that duplicates the functionality of the **Label** and **Select** buttons at the top of the **Labeling** panel.

5. In the **Direction** line, choose to label forward > (through time) or backward <.
   You can also select both options (ie, label both forward and backward), but to help you avoid confusion, at least initially, choose either backward or forward and use only that option.

6. From the **Type** options, select the way in which labeling will be applied:



- **Whole** Labels entire trajectory.
- **Fragment** Labels the trajectory that intercepts the current frame.
- **Cliff** Labels the current frame and continues until a specified value is encountered, which stops the labeling (see the text below in the **Labeling** panel, for example, the default is to skip gaps smaller than 5 frames and stop labeling at cliffs that are larger than 50 mm).
- **Ranges** Lets you select an area on your graph or timeline and label only the selected time range.

In the **Manual Labeling Tools** section in the middle of the **Labeling** panel, you can correct swaps, unlabel information, and unlabel markers.

In the **Semi-Automated Labelers** section, you can access the Velocity Labeler, which is normally used after automated labeling, on a partially labeled take. You can use it to correct labeling where the path of a single marker consists of multiple trajectories that are consecutive in time with a small gap in between where the marker is unlabeled over part of its trajectory. The **Velocity Label** option is useful when a marker has been labeled for a range of time, and then becomes unlabeled, yet going forward or backward in time there are multiple trajectories that do not have a large gap between them and are all the same marker. It is best suited for cases when unlabeled trajectories are not many frames away from the labeled marker and the velocity of the marker around the end of the labeled marker and the start of the unlabeled trajectory is fairly constant.

Fix common labeling issues

The following basic procedures are just a few of the ways in which you can use Shogun Post to clean up data.

- Identify issues on page 114
- Correct a swap on page 115
- Label an unlabeled marker on page 117
- View and select gaps on page 118
- Auto-fill with intelligent rigid fill on page 119
- Manually fill gaps on page 121

See also:

Vicon Shogun 1.3 Post Tutorial - Gap List & Auto Rigid Fill[23] on YouTube.

23 https://youtu.be/U3jmKTqykOE

Identify issues

1. To help you identify issues, in the **3D Scene** view, click **View Filters**, and ensure that in the **Scene** section, **Missing Markers** is selected. Also ensure that in the **Subjects** section, **Label** is selected and that in the **L**(abeling) column of the views matrix, **Constraints** is selected.

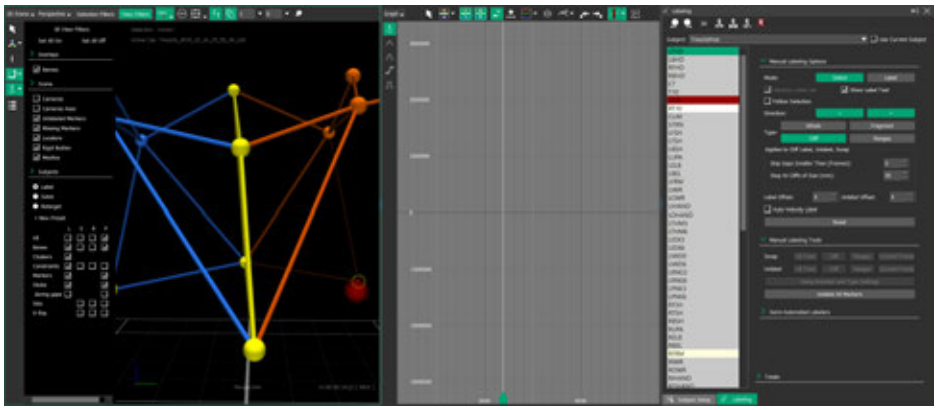
2. In **3D Scene** view, scrub through the whole take (drag the current time indicator along the timeline, or for finer control, press the A or S key), noting times when markers are likely to be occluded (sitting, crouching, subjects interacting, etc).
3. In the marker list in the **Labeling** panel, note any missing (red) markers and watch for 'popping' or moving in the **3D Scene** view. Look for any swapped markers (for an example, see the Vicon video 5 - Shogun Post – Labeling Data[24], which shows an example of a swap of knee and heel markers).

   Missing markers are clearly visible, highlighted in red. However, after you've identified the erroneous markers, it may help with labeling to clear **Missing Markers** and **Labeling Constraints**.

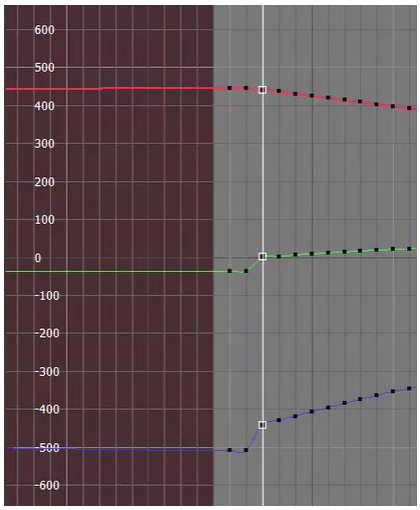
24 https://vimeo.com/218945101

Correct a swap

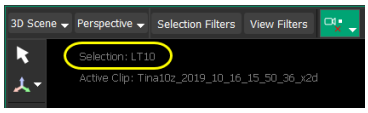
1. Ensure the **Labeling** panel is displayed.
2. Split the **3D Scene** view (at the top right of the Shogun Post window, click the vertical split button) and in one of the panes, change to a **Graph** view, so that you can now see a **3D Scene** view, a **Graph** view and the **Labeling** panel.



3. In the **Labeling** panel, ensure **Select** mode, Forward direction (>), and **Cliff** are selected.
4. In the **3D Scene** view, select a marker that is incorrectly labeled and in the **Graph** view, zoom in (right-click and drag) and go to the start of the where the swap happens (this should be identifiable on the graph by a sharp change).

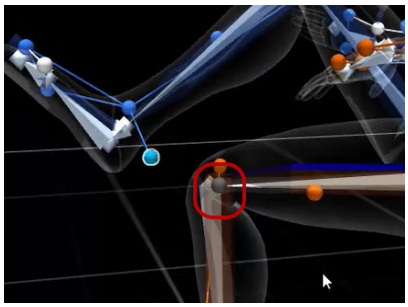


5. From the position of the marker in the **3D Scene** view, decide which is the correct marker and click it in the 3D view.
   In the marker list, its name is displayed in heavier text, and at the top left of the **3D Scene** view, the **Selection** text displays the name of the selected marker.



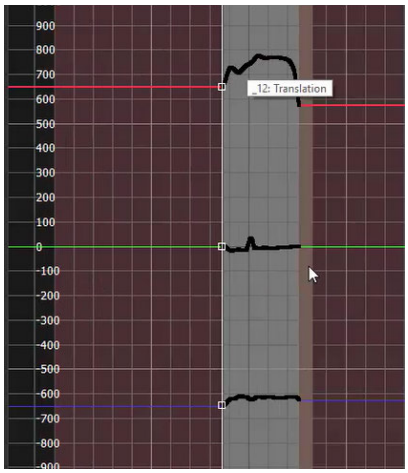
6. Click the wrongly labeled marker in the **3D Scene** view and then click the correct marker name in the **Labeling** panel list.
   The marker is now correctly labeled. To check, scrub back and forward in the **3D Scene** view and check that the marker is now behaving correctly.

However, you now have a previously incorrectly labeled marker that is unlabeled from this point forward.



Label an unlabeled marker

1. In the **3D Scene** view, click on the unlabeled marker to select it. Scrub back and forward to identify where it is correctly labeled. This is the point at which it is correctly colored in the **3D Scene** view and the **Labeling** panel marker list. You can also observe this on the **Graph**.



2. To label a marker using the tools in the **Labeling** panel, do one of the following, depending on your chosen **Mode**:
   If you prefer to label using **Label** mode:
   a. In the **Manual Labeling Options** section, in the **Mode** line, click **Label**.
   b. In the marker list in the **Labeling** panel, click the name of the marker and then in the **3D Scene** view, click the marker that is currently unlabeled.

   Or, if you prefer to label by dragging, using **Select** mode:
   a. In the **Manual Labeling Options** section, in the **Mode** line, ensure **Select** mode is selected.
   b. In the **Labeling** panel, click to select the required marker in the **3D** view.
   c. SHIFT+CTRL then click+drag from the selected marker in the **Labeling** panel to the unlabeled marker in the **3D Scene** view.

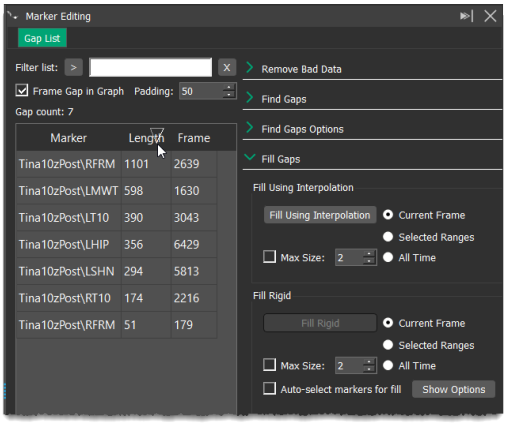
3. As before, to check the labeling, scrub back and forward in the **3D Scene** view and check that the marker is now behaving correctly.

After you have corrected any swaps, you may want to use Shogun Post's diagnostic tools to help to identify gaps (see Check data quality on page 84).

View and select gaps

You can view all the gaps in your scene in the **Marker Editing** panel, in the **Fill Gaps** section, by looking at the **Gap List**. (If you can't see the list, at the top of the **Marker Editing** panel, click the **Gap List** button.)

To make it easy to find the longest gaps, click the **Length** column heading to rearrange the list, with the longest gap at the top.



When you select a gap in the list, it is automatically displayed in the Graph view, enabling you to edit it.

You can then decide the best approach for filling the gaps:

- As a first step, try automatically filling as many gaps as possible (see Auto-fill with intelligent rigid fill on page 118).
- If your scene still contains gaps after using the automatic fill, or if auto-fill is unsuitable, try manually filling the gaps (see Manually fill gaps on page 118).

> **Tip**
> To undo unwanted gap-filling, click Undo on the quick access toolbar  .

Auto-fill with intelligent rigid fill

Shogun Post enables you to automatically fill gaps using a rigid fill operation. This looks at all the markers in your scene and then compares them against the marker you are trying to fill. It then uses a combination of similarly moving markers to fill the gap. Finally, it checks the fill to make sure it looks correct and if not, it chooses another set of markers.

This process is also available via scripting, using the selectMarkersForRigidFill command to select the markers and the autoFillGaps command to fill them. For information on these commands, see the *Vicon Shogun Scripting Guide*.

To auto-fill a selected marker:

The following procedure for rigid gap-filling is semi-automated, in that you choose a marker for the fill:

1. In the **Marker Editing** panel, expand the **Fill Gaps** section and in the **Fill Rigid** area, select the **Auto-select markers for fill** check box.
   To change the default options for auto-selection, click the **Show Options** button next to the check box. The options are:
   - **Max Deviation**: Specifies in mm how rigid the set of markers used to fill must be, as the maximum deviation in distance between all pairs in the set. For example, a value of 60 enables the markers to flex in rigidity by 6 cm.
   - **Max Distance**: Specifies in mm how far away the candidate can be from the selected marker. The default of 900 is just under 3 feet (1 m), because a greater distance is likely to be another subject or body part, which is unlikely to move rigidly during the gap.
   - **Percent Time Rigid**: Specifies the percentage of time over the adjacent fragment ranges that the selected marker must be rigid with the chosen set. The default of 0.75 means 75% of the time.
2. Select a marker with a gap.
3. Ensure the current time is in the gap.
4. Click **Fill Rigid**.
   Gaps are filled using the intelligent rigid fill.

To auto-fill selected markers or all markers:

In addition to the semi-automated procedure described above, you can also automatically fill all gaps on either all markers, or only those currently selected. To do this:

1. Depending on which markers you want to fill:
   - **Only selected markers**. Ensure you have selected the required markers.
   - **All markers**. Ensure no markers are selected.
2. In the **Marker Editing** panel, expand the Fill Gaps section and in the **Fill Rigid** area, select the **Current Frame**, **Selected Ranges** or **All Time** option.
3. Select **Auto-select markers for fill** and ensure the options are as required (see above).
4. Click **Fill Rigid**.
   All gaps on the selected markers, or on all markers if no markers are selected, are filled over the play range, or selected ranges.
   Note that in the case of all markers, only labeled markers are filled, though unlabeled markers can be auto-selected for filling the labeled marker.

> **Note**
> After running automated gap-filling, if Shogun did not find a set of rigid markers based on the settings, you may find that not all gaps are filled. You can either fill the remaining gaps manually, or you can try changing the settings, specifically by increasing **Max Deviation** from the default.

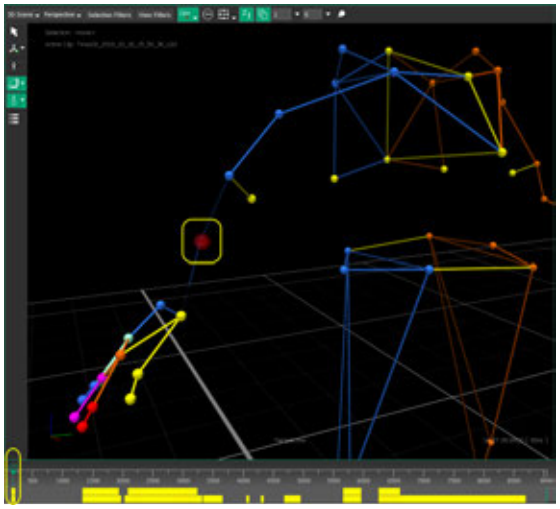
You can run automated gap-filling multiple times to achieve the required results, in particular when:

- After first run, it either made an unwanted fill or wasn't able to fill a gap due to a mislabel. Fix the mislabel and then run it again to fill the remaining gaps.
- After first run, it either made an unwanted fill or wasn't able to fill a gap due to the gap being too complex. Fill the gap manually, then run automated gap-filling again to fill any remaining gaps. These can now can be filled due to more data being available.
- After first run, some gaps remain. Loosen the rigidity settings (see Note above) and run it again.

Manually fill gaps

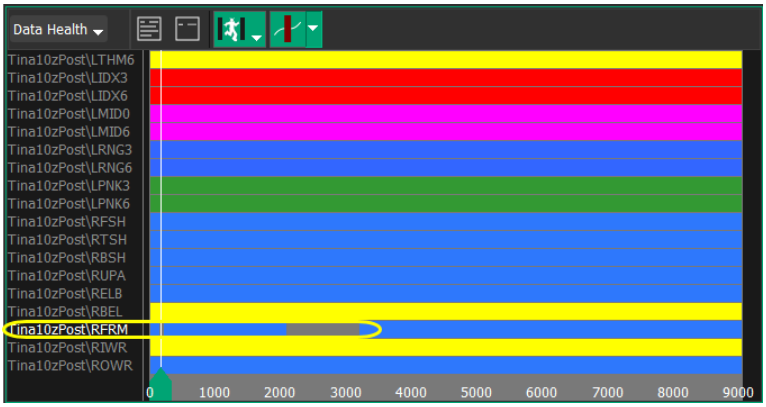
You fill gaps using the **Marker Editing** panel, normally in conjunction with the **Data Health** view and/or a **Graph** view. The **Marker Editing** panel contains all the tools necessary to fill gaps, alter trajectory keys and filter your data.

For example, you might first notice a gap from the display on the time bar Issues map, then note which marker is affected in the **3D Scene** view:

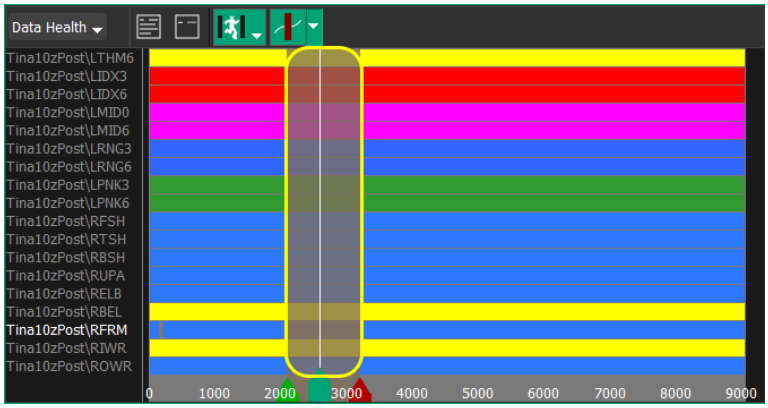


1. To quickly gap-fill the selected marker, on the time bar double-click to move the current time indicator to the relevant frame.
   The affected marker is automatically highlighted in the **3D Scene** view (you can right-click and drag to zoom in further to check the marker).
2. To open a **Data Health** view and a **Graph** view, as well as a **3D Scene** view, split the screen by clicking the Three Views Split Left button at the top of the Shogun Post window and change the views in the new panes.
3. If the **Marker Editing** panel is not already open, on the **Processing** tab on the ribbon, click **Marker Editing**.

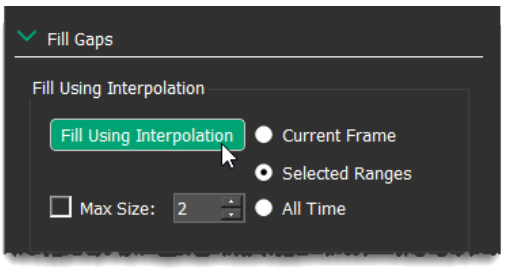
4. In the **Data Health** view, find the relevant marker's line, which shows a gray rectangle that represents the gap.



5. In the **Data Health** view, double-click to select the range of the gap.

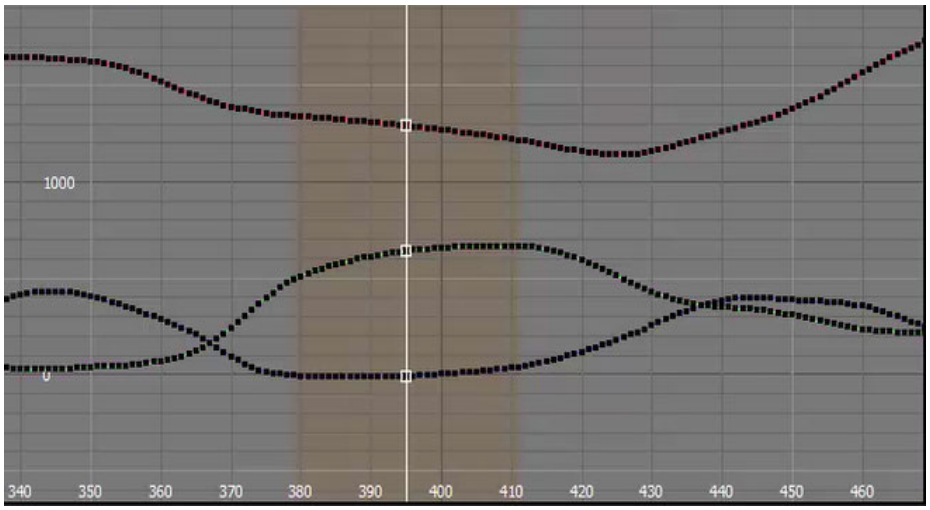


6. In the **Marker Editing** panel, expand the **Fill Gaps** section. In the **Fill Using Interpolation** area, select **Selected Ranges** (to fill only the current selection), and then click **Fill Using Interpolation**.



This looks at the keys on either side of the gap and fills it by interpolating between them. It works well for small gaps.

7. In the **3D Scene** view and **Graph** view, check that your fill has given the required result.



8. If the fill does not give an appropriate result, you can click Undo on the quick access toolbar , and try other gap-filling options in the **Marker Editing** panel (see Options for gap filling on page 123).

Options for manual gap-filling

The appropriate option to use depends on the type of gap that you want to fill.

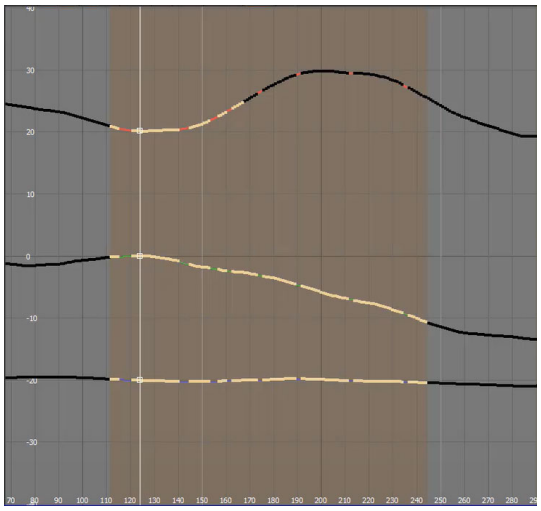
Short gaps

1. Manually select a short gap by double-clicking in a **Graph** view or **Data Health** view, and in the **Marker Editing** panel, expand the **Fill Gaps** section and click **Fill Using Interpolation**.
   This looks at data before and after the gap and uses a spline fill to interpolate between them.
2. Check that the result looks reasonable in a **3D Scene** view and **Graph** view.

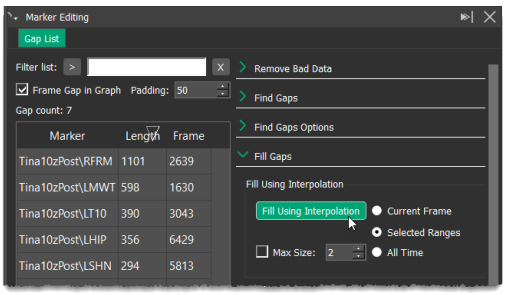
Clean up data

Sequence of short gaps

1. For a sequence of small gaps with a smooth line running through the gap in the **Graph** view, ALT+drag to select the affected data.



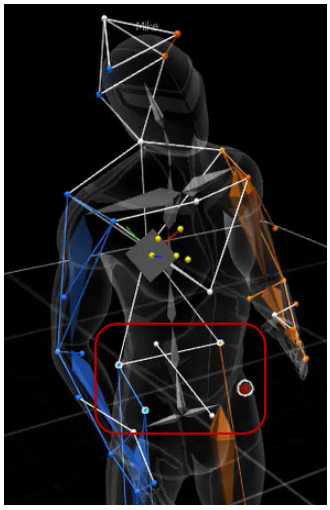
2. In the **Fill Using Interpolation** area, select **Selected Ranges**, and then click **Fill Using Interpolation**.



Non-linear motion

For non-linear motion, for example, where rotational movement is involved, as interpolation does not account for this kind of motion, a different approach is needed. If a missing marker is part of set of markers that are rigid (ie, remain in the same relation to each other, for example, a pelvis), you can use three or more markers in the rigid object (three in addition to the marker that has the gap is recommended) to help fill in the data for the missing marker.

1. To select the range of the gap, double-click in a **Graph** view or **Data Health** view, then select (CTRL+click) the three other markers in the rigid object.



2. In the **Marker Editing** panel, expand the **Fill Gaps** section.
3. In the **Fill Rigid** area, select **Selected Ranges** and click **Fill Rigid**.
   The pattern of the present markers is copied onto the missing marker.
4. As usual, check in the **Graph** view and in a **3D Scene** view that the fill looks sensible.

Other rigid objects you can use in default marker set include hands, forearm, upper arm, shoulders, thorax, and head.

Non-linear motion where rigid fill impossible

In cases where the motion is non-linear, but a rigid fill is not possible due to all the related markers being absent, you can use the **Fill Using Constraints** option. This uses the labeling or solving skeleton to produce the fill. It requires a skeleton be present, the skeleton to be constrained by markers, and enough markers to have data that the solve is fairly good. The marker being filled must be constrained to the skeleton because it is the constraint offset that is used to determine where the marker should be during the fill.

Before using this type of fill, check that the bones and missing markers (by default displayed in red in the **3D Scene** view), are in sensible locations.

Processing during cleanup

Note that the previous steps for fixing data issues assume that your existing *.mcp* data is largely of acceptable quality. However, in some circumstances (for example when you are trying to produce better quality data), rather than persisting in trying to fix a problematic *.mcp* file, you may need to clear the scene and start from the *.x2d* file, or unlabel all the data first. In this case, do not just open the **Processing** panel and click **Reconstruct** or **Label** or run other **Combined Processing** operations as this will not fix problems with the underlying data.

Clear existing data

To remove all unlabeled data and clear existing labels and solves, at the top of the **Processing** panel, select the **Reset Scene** check box. You can then run **Reconstruct**, etc. Note that you can't undo the reset.

To remove existing labels from the current file, on the **Labeling** tab of the **Processing** panel, select **Clear Existing Labels** and then run **Labeling** as required.

To remove occlusion fixing from your data, in the **Marker Editing** panel, expand the **Restore** section and select the required option.

Solve during cleanup

During the cleanup operation, each time you finish cleaning up a range, check its solve. To do this:

1. Ensure the range you cleaned up is selected.
2. On the **Processing** tab on the ribbon, click the arrow on the **Solve Solving** button.
3. Click **Solve Solving Ranges**.
   The selected range is solved, enabling you to quickly check that your cleanup has been successful, without having to solve the whole take.
4. Proceed to clean up the next range that contains mislabels, gaps or noisy markers, etc.
   After you have completed all the cleanup required, finish by solving the entire take. For more information see Solve the data on page 129.

Solve the data

When you have finished any necessary cleanup of your data, run a final solve to produce the finished file ready for export.

In addition to the following information, see also the Vicon video 3 - Shogun Post - Processing and Solving[25], which covers using the **Processing** panel, editing a solving skeleton, and solving.

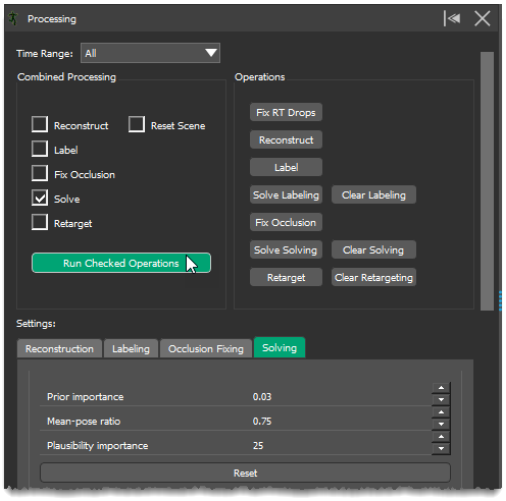
Even if you only had to clean up a single frame or a small range of frames, always run a final solve on the entire play range. You can run solves on smaller ranges so that you can review the results of your cleanup while you are working (depending on your requirements, you would probably use the **Solve Labeling** and/or **Solve Solving** options on the ribbon or in the **Processing** panel), but to avoid any jumps at the start and end of the solved range(s), when you have finished editing, you must run a solve of the whole play range.

To solve your data:

1. On the **Processing** tab of the ribbon, click **Processing**.
2. At the top of the **Processing** panel, ensure the required options are selected from the **Time Range** list (for example, to affect the whole play range, select **All**, as shown in the following illustration).
3. In the **Processing** panel, ensure the options for **Reconstruct**, **Label**, and **Fix Occlusion** are cleared (for more information, see About occlusion fixing on page 131), but **Solve** is selected.

25 https://vimeo.com/218945089

4. On the **Solving** tab, ensure the settings are as required.
   If you are using any of the high fidelity fingers templates:
   - Ensure that the **Plausibility importance** option is set to a suitable value. The default, 25, is normally a good starting point. Smaller values produce better data fidelity (ie, the markers will better fit their constraints), but the pose likelihood may be weaker. Larger values produce better pose likelihood, but weaker data fidelity.
   - Note that the **Mean pose ratio**, which affects the entire skeleton, has a strong impact on the final hand poses. The default, 0.75, is normally a good starting point, but if you need to adjust it (for example, if there is too much noise), try a lower value.
5. Click **Run Checked Operations**.



   Any changes you have made to the labeling skeleton and the solving skeleton are included in this final solve.
6. Review your solved data and perform any further cleanup needed.

About occlusion fixing

> **Note for Blade users:**
> Occlusion fixing in Shogun is similar to that available in Blade. However, by default, the *.mcp* files that are produced in Shogun Live are automatically occlusion fixed, so are unlikely to need further occlusion fixing when opened and processed in Shogun Post.

Occlusion fixing uses data from non-occluded markers to supply the missing data for the occluded markers. To give the best results and the smoothest trajectories, occlusion fixing may affect non-occluded markers throughout the take, even if you have selected a range before applying it. If you repeatedly run occlusion fixing in Post, the effect may be cumulative, resulting in greater (possibly unwanted) smoothing.

Retarget with Shogun Post

Shogun Post's full retargeting pipeline enables you to create and solve motion capture data onto any custom FBX/USD biped.

You can use the resulting VSR file in Shogun Live and stream it to a game engine, or solve and export from Shogun Post for use in a CG app.

You can use either Shogun Post or the Vicon Retarget app for retargeting:

- Use Shogun Post for retargeting instead of Vicon Retarget if you want script the process, need to align the source skeleton to the target skeleton or change the bone lengths of your target skeleton to better match the source.
- Use the Vicon Retarget app if you need Joint Symmetry or Target Symmetry.

The current retargeting implementation is Phase 1 of a longer planned roadmap. Use the retargeting workflow as a first step in the retargeting process, and as a quick and easy way to get your custom characters driven by Vicon mocap.

- Set up a retarget on page 133
- Modify a retarget on page 145
- Export the retarget setup on page 147

See also:

- Vicon Shogun 1.3 Post Tutorial - Retargeting Setup[26]
- Vicon Shogun 1.3 Post Tutorial - Retargeting Test[27]
- Vicon Shogun 1.3 Post Tutorial - Streaming Retargets into Unreal[28]

26 https://youtu.be/S5otK-hx8QM
27 https://youtu.be/FFYwa2_FSak
28 https://youtu.be/3vUuTgp0PTE

Set up a retarget

To set up a retarget in Shogun Post, see the following information.

- Create an optimal target skeleton on page 134
- Import the target skeleton into Shogun Post on page 137
- Prepare the skeleton before posing on page 139
- Pose the skeleton on page 141
- Create constraints on page 142
- Test the retarget setup on page 144

Retargeting terms:

- **Source skeleton**: Solving skeleton
- **Target skeleton**: Retargeting skeleton (game skeleton)
- **Map pose**: The pose that is used for mapping (creating constraints between the source (solving) and target (retargeting) skeletons and setting the offsets). For more information, see Map pose and best rig practices in *Getting more from Vicon Shogun*.
- **Base pose**: The pose of the skeleton when all keys are deleted and the rotation channel for all bones is set to zeros. It's defined by the pre-rotation, which is known as 'joint orient' in Autodesk® Maya®.

Create an optimal target skeleton

The following tips help you to ensure that your FBX, USD or VSR file works well as a target.

Use pre-rotation, not keys

It's best to define the base pose of a skeleton using pre-rotation, not keys.

If keys put the skeleton into a T-pose, A-pose, or another suitable pose, and pre-rotations don't exist, you can still use the skeleton, but you'll need to know what the base pose looks like and use the map pose to both retain the pose used for mapping and to get best results. See About map mode on page 140 and, if your skeleton uses keys rather than pre-rotations, see also Map pose and best rig practices in *Getting more from Vicon Shogun*.

Pay attention to degrees of freedom (DoFs)

Most skeletons have Degrees of Freedom (DoFs), and generally, skeletons work best when they have them.

- **FBX files**: After you import an FBX, check that the DoFs are set correctly before setting up retargeting.
- **USD files**: The USD format doesn't currently support DoFs. If you want to use DoFs with a USD skeleton, set them in Post after importing the USD skeleton.

Be aware of dummy bones

End joints that are dummy bones (bones with zero DoFs) are ignored by retargeting in that any keys they may have aren't retained and a map pose isn't stored for them.

- For extremities like the ends of hands, toes, and fingers, this is fine because the end bones must be zero DoF dummy bones with no keys.
- For parts of a skeleton that define things such as face, hair, and clothes, this can be problematic if these bones don't use pre-rotation to define their base pose. If you use keys to define a pose that is required for the skin to look right, note that these keys are not stored in the VSR/map pose because all of these bones are treated as dummy bones. If they aren't dummy bones already, change them to dummy bones because they have no data and setting them to dummy bones enables retargeting to ignore them and therefore to run faster.

To convert unused bones to dummy bones in Shogun Post, either:

- If your bones have pre-rotation values that you want to keep, note their values. In the **Subject Setup** panel, on the **Retargeting** tab, click the **Prep Unused Bones** button. This ensures all unused bones have zero DoFs and moves their rotations from channels to pre-rotations. You can enter the pre-rotation values that you noted to manually reset them.

or

- Manually set the DoFs to off. To do this, in the table on the **Retargeting** tab, select the bones you want to be dummy bones and clear the **Active** check box.

Know what's above the root bone

On import:

Sometimes, skeletons in CG apps like Autodesk® Maya® or Autodesk® MotionBuilder® contain one or many bones, locators, groups, etc, above the root. Generally Vicon Shogun doesn't support this. Aim to have no extra nodes between the Retargeting node and the root bone in Shogun Post. Dummy bones can exist above the root. These must have zero DoFs and the root must have six DoFs. If this isn't already the case on import, in the **Target Root** field, specify the correct root, which switches DoFs.

On export:

In Shogun Post, on the **Retargeting** tab, you can select or clear the **Preserve dummies above root** check box, which controls whether the dummy bones above the root are exported in the VSR.

If any objects above the root have non-zero transforms, they can be successfully imported in FBX format, but you'll probably need to modify the hierarchy in Post to set them aside during setup. If you need them to exist in the exported FBX because it will be merged into the original file, you must restore the hierarchy to its original form after you finish retargeting. You can create export scripts to do this via batching.

Know how to use scaling

Scale (values in the **Scale** channel) is not supported on bones or anything above them.

Retargeting enables you to scale each joint so that it better matches the source skeleton. You can revert this back to the original scale on export, if desired (see Export FBX on page 147).

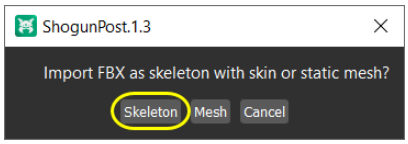
Import the target skeleton into Shogun Post

You can import the target skeleton as an FBX or USD file, or VSR, if a setup already exists. Ideally the imported file will contain just the skeleton and skin and as little else as possible.

To import the target skeleton:

1. In Post, open the relevant .MCP file and ensure that the required solving skeleton is selected in the **Current Subject** field.
2. To check that no target skeleton has been imported, open the **Subject Management** panel.
   The **R**etargeting column displays a red circle, indicating that no retargeting setup is present.

   For more information on the Subject Management panel, watch Vicon Shogun 1.3 Post Tutorial - Subject Management[29] on YouTube.
3. Do either of the following:
   - In the **Subject Setup** panel, select the **Retargeting** tab, click the **Load** button and select the required target.
     Or
   - Drag the target skeleton file into the Shogun Post view pane.
     When you are prompted, choose **Skeleton**.



The target skeleton is imported into the current subject hierarchy with the topmost bone of the target skeleton parented to a Retargeting node.

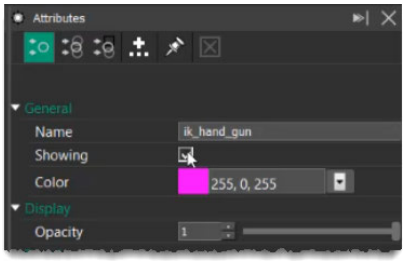
29 https://youtu.be/QuA8akXSZTw

Retarget with Shogun Post

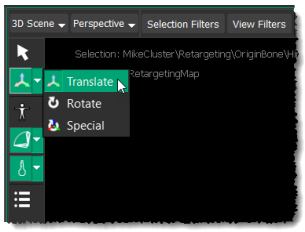
> **Note**
> When you import an FBX, it sometimes isn't added under the Retargeting node. In this case, manually parent the skeleton to the node (select the required nodes and on the **Objects** menu, click **Parent**).

Prepare the skeleton before posing

1. Hide any unnecessary joints. To do this, select the bone, and in the **Attributes** panel, clear the **Showing** box.



2. On the **Retargeting** tab, click **Map Mode** (see About map mode on page 140) to enable this mode.
   This creates a separate clip that you use to pose the target skeleton relative to the source skeleton.
3. In the **Target Root** field, specify which bone is the root. This ensures the root has six DoFs and any bones above it have zero DoFs.
4. Confirm the target skeleton's DoFs were imported or set them as required.
5. If the source and target skeletons don't have roots in the same position or have differing orientation, on the **Retargeting** tab, click **Align Skeletons**. Shogun Post tries to put the skeletons into the same positions and root pose. You can more closely align the skeletons using the **Translate** and **Rotate** manipulators (not the Special manipulator).

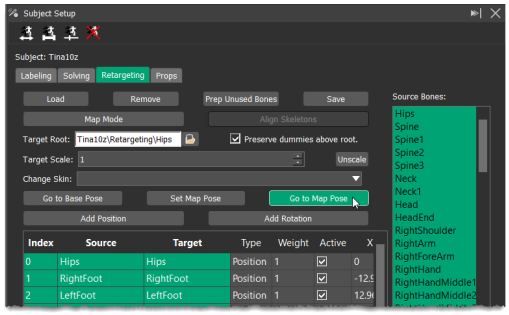


   Be sure to move the root, not any dummy bones above it.
6. If you need to globally scale the target skeleton to be the same size as the source skeleton, on the **Retargeting** tab, change the **Target Scale** value. Ensure the ankles and clavicles in the target and source skeletons match.

About map mode

The process of creating the constraints between the source (solving) and target (retargeting) skeleton and setting the offsets is called mapping. Before mapping, both skeletons must be in the same pose. This involves posing the target skeleton to match the source (which is its base pose) and you do this in map mode. First you pose the target, then you create the constraints. At the time a constraint is created, its offset is calculated. The offset is the difference in pose between the source and target.

If you need to tweak the setup, or just check how it was set up, you can return to map mode. When making any adjustments, the target must be in the same pose it was when it was mapped. The map pose makes this possible. If constraints exist, implying a map pose is likely to exist, entering map mode automatically places the target skeleton in the map pose. If needed, you can also use the **Go to Map Pose** button (on the **Retargeting** tab of the **Subject Setup** panel) to set the retarget skeleton's pose to the map pose.



After you've finished posing, to define the map pose, click **Set Map Pose**.

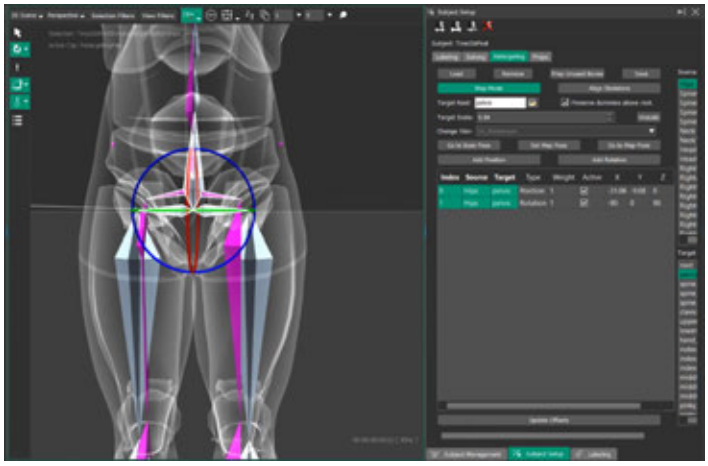
In addition to restoring the pose you used for mapping, the map pose is also useful for retargeting. Retargeting is faster and easier if the map pose is set because it uses the map pose as a starting point instead of the base pose, which, for some skeletons, may differ widely from the map pose.

Pose the skeleton

1. Make sure that the target skeleton is keyed in the same pose as the source skeleton.
2. Start with the root. Make sure that you've selected the actual root and not any dummy bones above it. Using the **Translate** and **Rotate** manipulators (not the Special manipulator), move it to the same place as the source skeleton.
3. Use the **Rotate** manipulator (or enter values in the **Channels** panel) to rotate all the target bones to the same pose as the source skeleton.
   Note you can also rotate the source skeleton to match the target skeleton or a mix of the two.
4. If you need to change bone length to make the target skeleton exactly the same proportion as the source (assuming your pipeline both allows this), use the **Special** manipulator. Note that you must remove the GlobalScale retargeting parameter. This removes the ability to perform global scaling and unscaling (using the **Unscale** button), so ensure you've scaled your target skeleton first.
5. When you have finished posing the skeleton, in the **Subject Setup** panel, on the **Retargeting** tab, click the **Set Map Pose** button to store the matching pose. If you later modify the pose, remember to click this button again so that the map pose is updated.

Create constraints

1. In the lists on the right of the **Retargeting** tab (or anywhere else in Shogun Post), select a matching source and target bone, then click **Add Position** or **Add Rotation** to create a constraint between them. The order of selection does not matter.

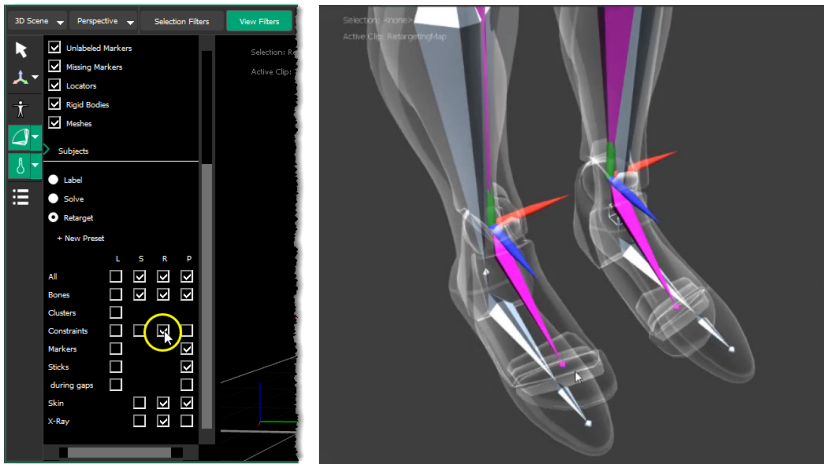


2. As a starting point for the constraints, add a position on hands, feet and hips; and rotation on all joints.
   If your target skeleton has more joints than the Vicon source skeleton, you can constrain multiple target joints to the same Vicon source joint.

> Tip
> You can use HSL scripting to speed up creating constraints. For information and examples, see attach in the Vicon Shogun Scripting Guide.

3. You can alter multiple constraint weights in the table on the **Retargeting** tab. You can also select or clear **Active** to turn constraints on or off.

4. To check targets, ensure the **View Filters** option for **Constraints** (for **Retarget**) is selected.



5. Set weights for all rotations. The recommended value for Rotation weights is 200. To set multiple rotations to 200, on the **Retargeting** tab, drag to select the required rows in the table and then in the **Weight** column, set the value of one of them to 200.
   All the selected rotation weights are updated to 200.
6. To save the VSR mapping file, at the top right of the **Retargeting** tab, click the **Save** button.
   By default, VSR files are saved to *C:\Users\Public\Documents\Vicon\Retargets*.

Test the retarget setup

You can test the retarget setup in Shogun Post or in Shogun Live.

To test the retarget setup in Post:

1. When you have finished setup, click **Map Mode** again to turn it off. You are returned to the motion in the file, ideally a ROM.
2. In the **Subject Setup** toolbar, click the **Retarget Play Range** button.

3. Review the retarget.

To test the retarget setup in Live:

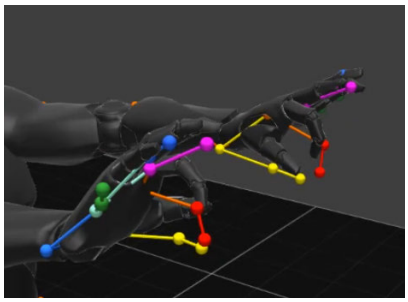
1. Load the VSR. To do this, on the **Processing** tab, in the **Retarget** section supply the required names:
   - **Filenames**. Enter or browse to the required VSR files. You can select or enter multiple files, separated with a comma.
   - **Names** Enter the subject name(s). You can enter multiple subject names, separated with a comma. Ensure the order of multiple names matches that of the VSR file names.
2. In the **General** section, ensure the **Processing Output Level** is set to Retarget. Your FBX is displayed and is driven by the source skeleton. The retarget skeleton is recorded as part of the MCP capture.

If after testing, you find that further changes are needed, return to map mode and modify the setup (see Modify a retarget on page 145).

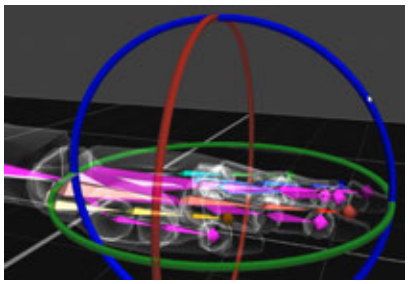
Modify a retarget

To check and modify your retargeting:

1. In Shogun Post, make sure you have turned off **Map Mode** and then run **Retarget** from the **Processing** menu.
2. Assess the results.
   When checking the solve, if you need to reduce arm pull, try adding position targets on the clavicles. If the hands need to match more closely, consider zeroing the hand position offsets.
   To see any changes, re-run **Retarget** from the **Processing** menu.
3. Pay particular attention to the finger solve. Make sure the hands look correct.



4. If necessary, update the joint placement to get a better fit.



For more information, see:

Vicon Shogun 1.3 Post Tutorial - Finger Solve Adjustments[30] on YouTube.

30 https://youtu.be/lU4BMD1-5lU

5. When you have finished updating the joint placement, in the **Subject Setup** panel, on the **Retargeting** tab, click **Update Offsets** to use the new joint positions.
6. Re-solve the range and check the updated target.
7. Save the final VDF and export the updated VSR.

Export the retarget setup

When you're happy with the setup, or if you'd like to see how it works on other motions, export the file, which contains the retarget skeleton, the retargeting constraints, and the map pose.

Export VSR

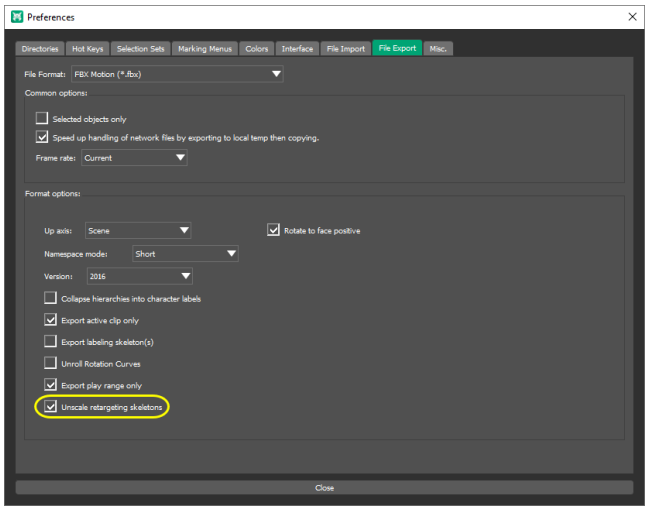
When you export in VSR format, you can:

- Load the VSR into other takes that only have a solving skeleton and then run retargeting.
- Load the VSR into Shogun Live to use it in real time.

Export FBX

1. To export in FBX format, select the Retargeting node, then right-click and click **Select Branch**.
   This selects the target skeleton, so that you can choose to export **Selected objects only** in the next step.
2. To choose what is exported and whether to reset scaling on export, open the **Preferences** dialog box (on the **General** menu, click **Preferences**), click the **File Export** tab and in the **File Format** box, select **FBX Motion**.

3. If you want to reset scaling on export, ensure the **Unscale retargeting skeletons** option is selected.



See also Export from Shogun Post on page 149.

You can now test the exported FBX in your CG app.

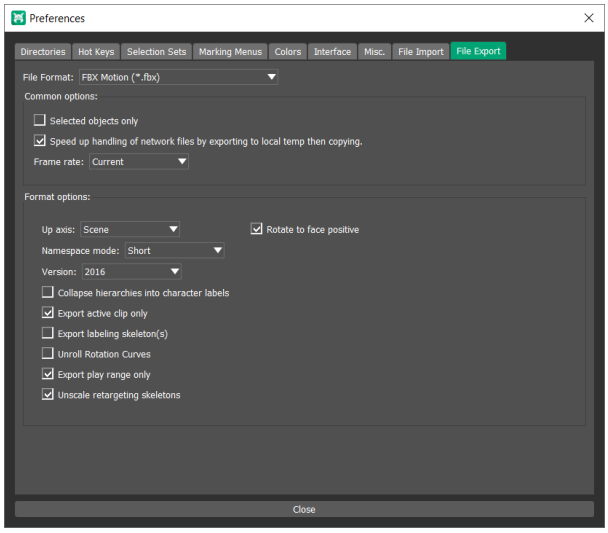
Export from Shogun Post

When you are happy with the quality of your data, you can export it from Shogun Post in a format that is appropriate for your chosen animation software.

If you are exporting to FBX, to ensure you choose an appropriate frame rate, see also Frame rates supported by the FBX file format on page 151.

To export a take:

1. If you want to export only particular aspects of your take (eg bones), select them in your preferred way (eg, in the **Selection** panel, or by using the **Selection Filters** options in the **3D Scene** view, etc).
2. To specify the required options for your export, on the **General** menu, click **Preferences**, and in the **Preferences** dialog box, click the **File Export** tab.



3. Select the required export file format and, if you made a selection for export in Step 1, be sure to select the **Selected objects only** box. Select any other options needed, such as the appropriate frame rate (for FBX, see Frame rates supported by the FBX file format on page 151), and then click **Close**.
4. On the **File** menu, click **Export**.
5. In the **Export** dialog box, if necessary, change the location of the export and enter a name for your exported file.

6. Select the appropriate file type (e.g. FBX).
7. Click **Save** to export your file to the specified location.

Frame rates supported by the FBX file format

The following are the frame rates supported by the FBX file format and so are the only frame rates that can be exported from Vicon Post to this format.

- 120 fps
- 100 fps
- 60 fps
- 50 fps
- 48 fps
- 30 fps (black and white NTSC)
- 30 fps (use when display in frame is selected in MotionBuilder, equivalent to NTSC drop)
- ~29.97 fps (drop color NTSC)
- ~29.97 fps (color NTSC)
- 25 fps (PAL/SECAM)
- 24 fps (Film/Cinema)
- 1000 milli/s (use for date time)
- ~23.976 fps
- 96 fps
- 72 fps
- ~59.94 fps
- 119.88 fps (requires custom MotionBuilder version)