

Digitizing Pointer Post Processing

The objective for using a digitizing pointer is to identify anatomical landmarks without having to place motion capture markers at the location. For background information see [here](#).

Note that this functionality is not available in Visual3D Lite. We have not sold a copy of Visual3D Lite for many many years, so hopefully this won't adversely affect too many laboratories.

Download the [example files](#) to be used in this tutorial.

Data Collection

The first step in the process is to capture a standing trial. Note that the pointer must be in the scene, so that we can create a model for the pointer.

Before the files are brought into Visual3D, two C3D trials must be collected:

- 1. **The Static trial.** During this trial -
 - 1. The subject must be stationary
 - 2. The subject must be markeded up
 - 3. The pointer must appear in the trial
- 2. **The Pointer trial.** During this trial -
 - 1. The subject should be relatively stationary
 - 2. The pointer should be moved around the volume and the tip of the pointer placed on the landmarks which the user would like to identify
 - 3. If a spring loaded pointer is used, the wand should be compressed when the tip is on the landmark which the user would like to identify. Visual3D will automatically identify when the pointer is compressed
 - 4. The pointer can be used to identify one landmark or multiple landmarks within a trial

NOTE: The target IDs should be consistent between the static and pointer trial

Step 1. Create a model

1. Load Static C3D file

- Create a hybrid model using Static.c3d.

ModelForceSettingsCMO LibraryPipelineHelp

Create (Add Static Calibration File) >Hybrid Model from C3DFile

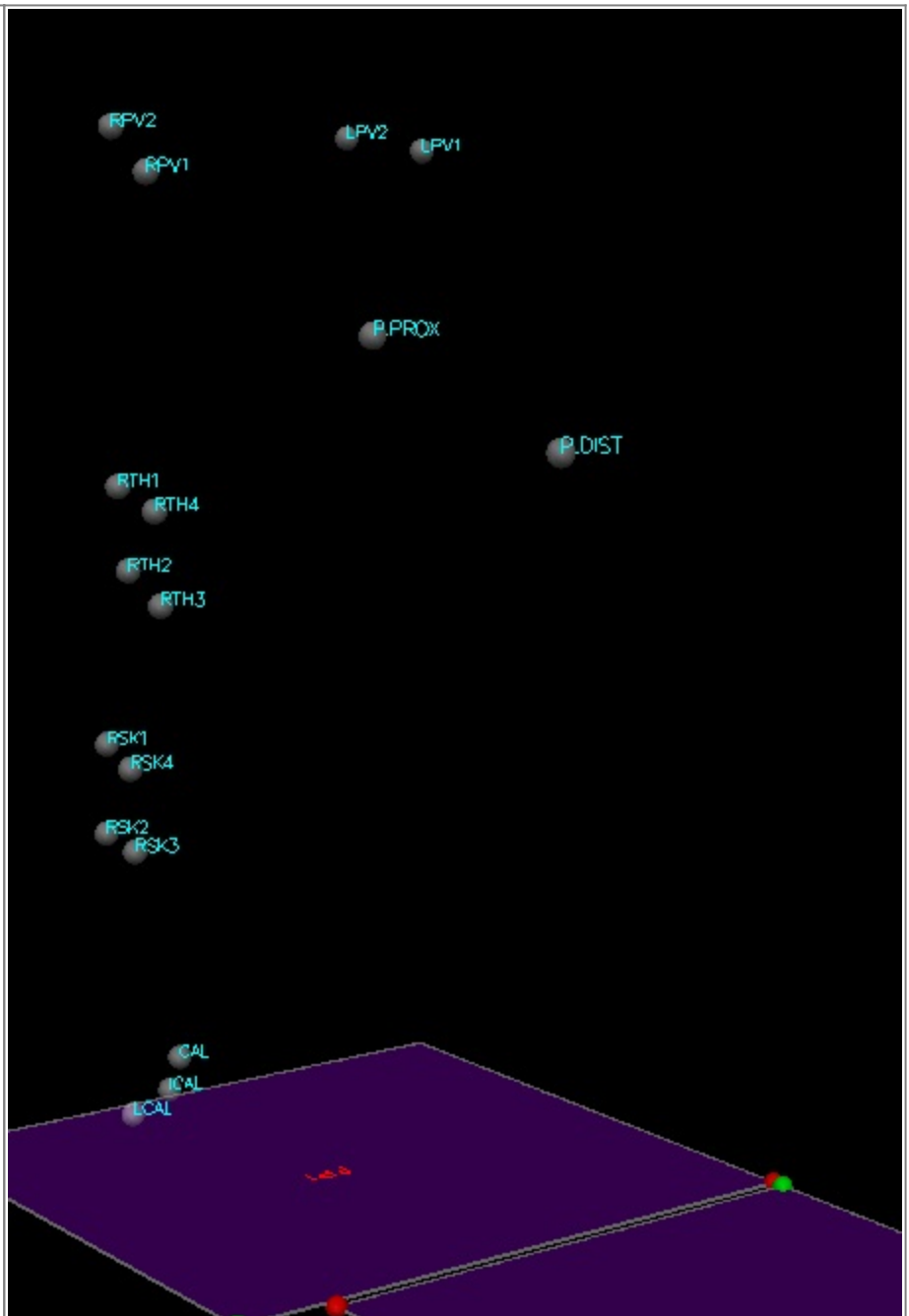
Close ModelHybrid Model from Real Time Streaming

Compute Model Based DataLegacy Models >

The digitized landmarks will be created in the static trial.

The 3D viewer should show a unilateral marker set with only tracking markers and the two markers on the pointer collected. In this file the pointer markers are labelled *P.PROX* and *P.DIST*

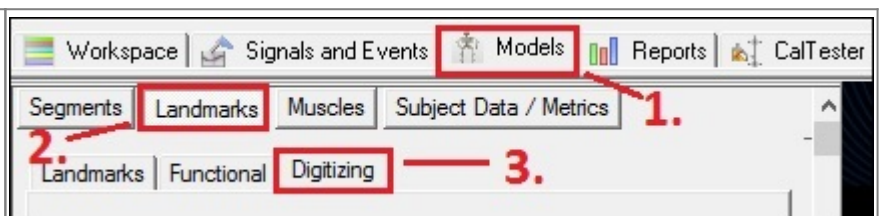
Note: The pointer **MUST** be in the scene, so that we can create a model for the pointer.



Step 2. Define Landmarks

1. Go to the digitizing landmark

- Select the Model Builder tab
- Select the Landmarks Property page
- Select the Digitizing Tab



2. Define digitizing landmarks

- Under Digitizing Point Name type *D_RTOE_MEDIAL*
- Click **Create**

NOTE: Digitizing points may be explicitly defined by typing directly into the combo box, or user's can select from the list of default default digitizing landmark definitions. The naming convention for the default digitizing landmark definitions is as follows: D_RHIP_LATERAL refers to a **Digitizing landmark for the Right Hip Lateral Surface**

1. Digitizing Point Name

D_RTOE_MEDIAL

D_RASIS
D_LASIS
D_RHIP_LATERAL
D_LHIP_LATERAL
D_RKNEE_LATERAL
D_LKNEE_LATERAL
D_RANKLE_LATERAL
D_LANKLE_LATERAL
D_RTOE
D_LTOE
D_NECK_LATERAL
D_WAIST_LATERAL
D_RSHOULDER_LATERAL
D_LSHOULDER_LATERAL
D_RACROMIUM
D_LACROMIUM
D_RELBOW_LATERAL
D_LELBOW_LATERAL
D_RWRIST_LATERAL
D_LWRIST_LATERAL

2. Create

Delete Selected Digitizing Point Edit Digitizing_Points

Load Points From File Create/Modify Digitizing Wand

Save Points To File Build Model

3. In the list box that appears select the 3 tracking markers associated with this landmark.

4. Click Close Tab

Workspace Signals and Events Models Reports

Segments Landmarks Muscles Subject Data / Metrics

Landmarks Functional Digitizing D_TOE_MEDIAL

Select 3 target for tracking digitizing landmark (ctrl-click)

☐ D_TOE_MEDIAL ☐ RTH4

☒ CAL

☒ ICAL

☒ LCAL

☐ LPV1

☐ LPV2

☐ P.DIST

☐ P.PROX

☐ RPV1

☐ RPV2

☐ RSK1

☐ RSK2

☐ RSK3

☐ RSK4

☐ RTH1

☐ RTH2

☐ RTH3

☒ Create Landmark as Calibration Only

Audio Prompt

Close Tab Build Model

5. Continue to add the following landmarks to the listbox:

D_RTOE_LATERAL D_RANKLE_LATERAL D_RANKLE_MEDIAL D_RKNEE_MEDIAL D_RKNEE_LATERAL D_RASIS D_RILCR D_RTROCH D_LASIS D_LICR D_LPSIS D_LTROCH The tracking targets selected should not move relative to the “landmark” between the digitizing point trial and the static calibration trial. You can also load the previously defined digitizing landmarks to see an example. The instructions to do this are listed below (both a mdh and vpn file are included in the sample data files). **To load previously defined digitizing landmarks:**

If you already have a **model template (mdh)** with digitizing landmarks created, you can select Model → Apply Model Template. This will load data from a MDH file. This is the recommended method to save the definition of digitizing landmarks If you already have a **landmarks template file (vpn)**, you can select **Load Points From File**. This will load data from a VPN file. This is a legacy feature and it is recommended to save this information in the model template. **NOTE:** Please note that if you are using a spring loaded pointer, **the order in which you define the digitizing points**, should reflect the order in which you will point to the landmarks in the digitizing trial

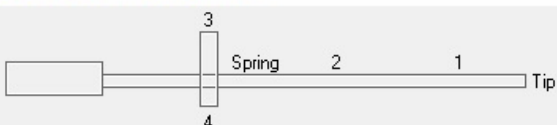
Step3.Create the digitizing wand

If you have already created the digitizing wand, this step may not be necessary. It doesn't, however, hurt to check the properties.

1. Define the wand:

- Select **Create/Modify Digitizing Wand** from the Digitizing Landmark tab
- The landmark will be created relative to the markers labelled **P.DIST** and **P.PROX**. These same two markers will move when the spring is compressed (this pointer trial was created using our original 2 marker pointer).
- Select **OK**

Digitizing Pointer Configuration



Define Pointer Tip

The tip of the wand is defined using two markers on the wand and an offset from one of the markers.

Typically, the two markers along the long axis of the pointer are used.

Marker 1: P.DIST

Marker 2: P.PROX

☐ Use 3rd marker (When the tip is not aligned with the long axis)

Offset from marker 1 to the pointer tip (e.g. (0, 0, -0.127))

X 0 Y 0 Z -0.127

Optional offset (creates an axis landmark for each digitized point)

X2 0 Y2 0 Z2 0

Pointer Trigger Markers for Detecting Spring Compression

☒ Check this box if the pointer has a spring compression mechanism

Trigger Marker 1 (e.g. Marker 1 or 2 for wand pictured above): P.DIST

Trigger Marker 2 (e.g. Marker 3 or 4 for wand pictured above): P.PROX

Tracking Markers

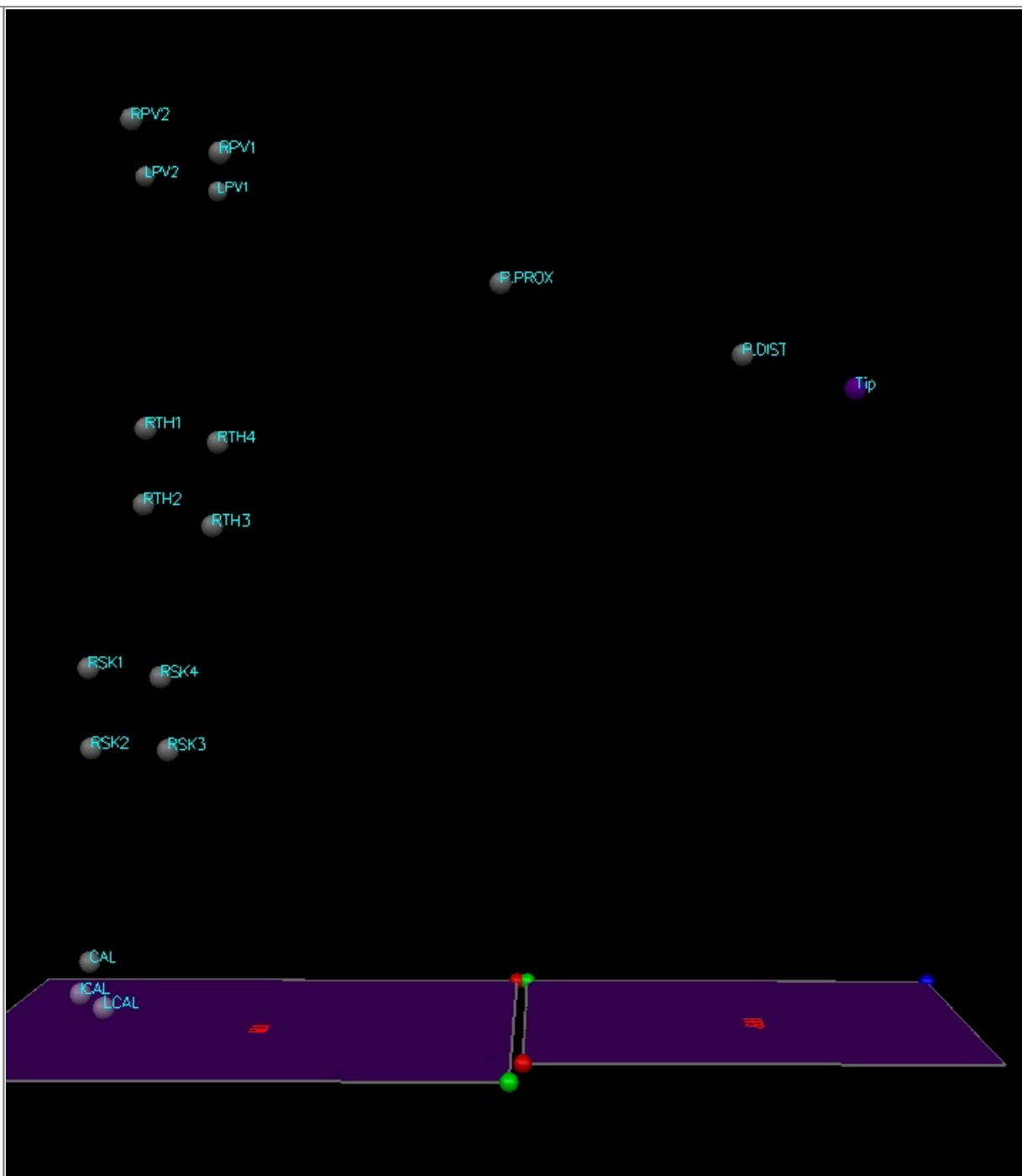
Only use for wands where all markers are static, and tip is not aligned with the long axis of the wand.

CAL	P.DIST	RSK2	RTH3
ICAL	P.PROX	RSK3	RTH4
LCAL	RPV1	RSK4	
LPV1	RPV2	RTH1	
LPV2	RSK1	RTH2	

Load from config file Save to config file OK

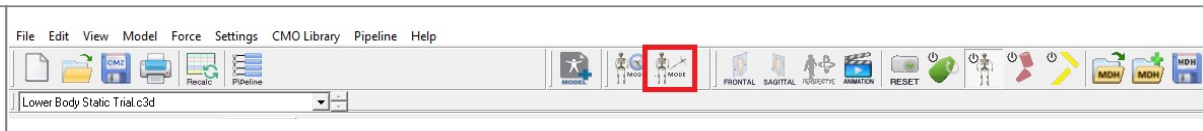
2. View the pointer in the 3D viewer:

A. Select **Build Model** and a landmark should be created relative to these two markers. This landmark represents the tip of the pointer.



Step 4. Select the Model Builder Post Process icon on the Toolbar

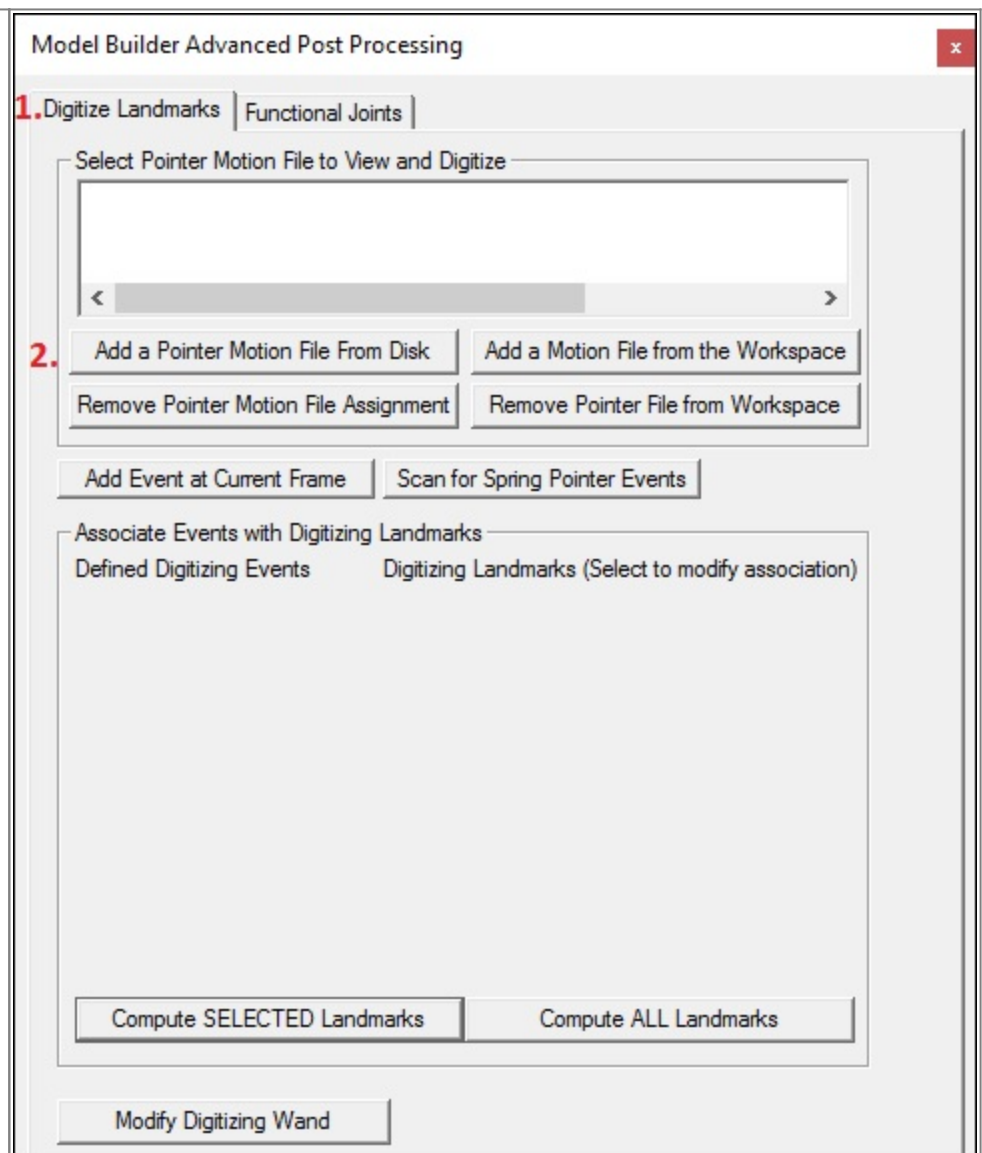
1. Open the Post processing dialog



2. In the post processing dialog:

1. Select the **Digitize Landmarks** tab

2. Select **Add a Pointer Motion File From Disk** and add the motion file **Motion.c3d** (e.g. the file in which the pointer is moved around in the scene to identify the landmarks)



3. Define the time in the trial when the pointer is identifying a landmark:

There are two ways that you can define the frame at which to capture the tip location:

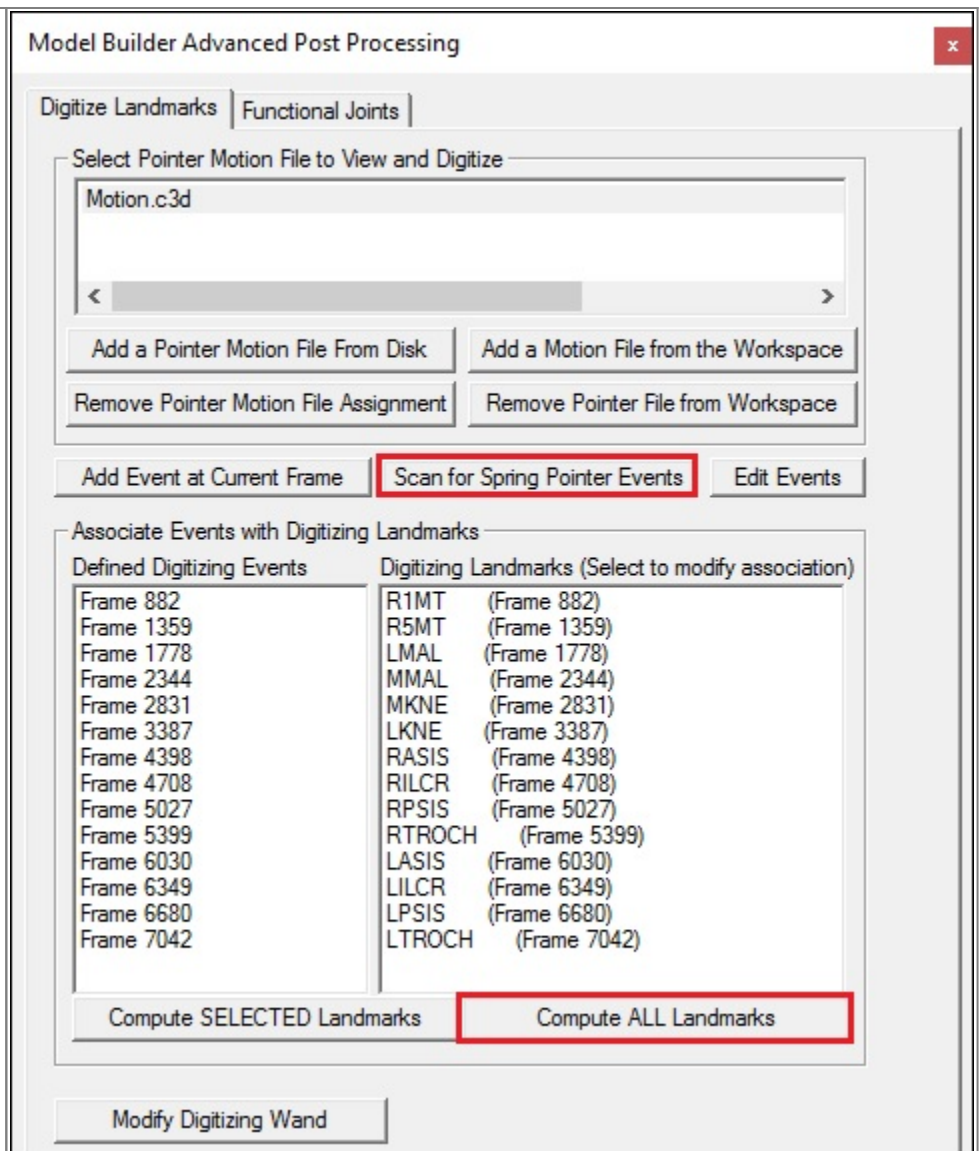
Option 1:

You can play the motion trial and stop the trial at the frame of data that you want. Select the **Add Event at Current Frame** button.

Option 2:

1. You can select Scan for **Spring Pointer Events**, which causes Visual3D to look for frames in which the spring is being compressed in the motion trial.

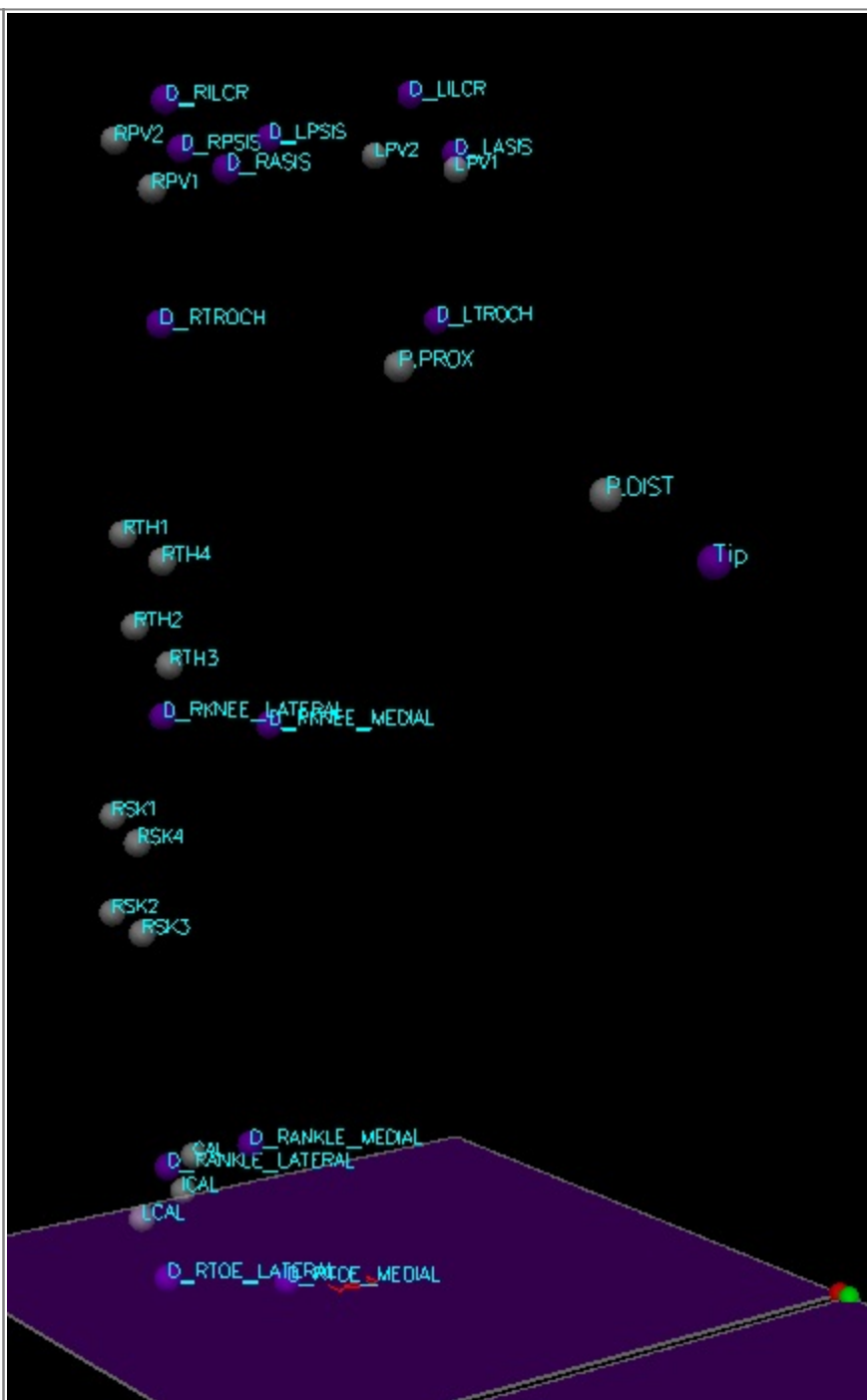
2. Select **Compute ALL Landmarks** will create the landmarks in the static trial.



In order to see the landmarks you will need to close the Post Processing Modeling Tab, so that Visual3D makes the standing trial active in Model Builder Mode.

These landmarks are now part of the model. If the model template is saved, these landmarks (and their definitions) will be saved in the model template file.

These landmarks can be used to define the segments.



NOTE: It's also possible to use the digitizing pointer in Real Time streaming mode, however, it's recommended to use the post processing to ensure you still have the data. An example of using the [digitizing pointer from streaming data can be found here](#).

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