

Quintic Software

Tutorial 7d

Advanced Digitisation

V35

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1. Digitisation

Digitisation allows you to track the location of certain parts of the body or pieces of equipment throughout the duration of a video clip. Quintic software can then calculate linear and angular distances, velocities and accelerations of the points you have tracked.

Quintic Sports v35 – No Advanced Digitisation

Quintic Coaching v35 – No Advanced Digitisation

Quintic Biomechanics v35 – 21 Point Advanced Digitisation

2. Calibration

To begin digitisation, you must first calibrate the video clip. This means that the computer can then convert a distance on the computer screen (pixels) to its relative distance in the real world. Video recording speed also needs to be set so that time-based data e.g. velocity and acceleration, can also be calculated accurately.

Open the video you wish to digitise within Quintic software.

Click on the '**Digitisation**' tab and then on the '**Digitisation**' menu.

Create Frame Templates

Default Frame Template



Default Learnt File



Video File Calibration



Custom Origin



Load External Calibration File (Repeatable Trials)

Manual Digitisation of a New Trace

Automatic Digitisation of a New Trace (White or Black Markers)

Intelligent Digitisation of a New Trace (White Markers)

Either:

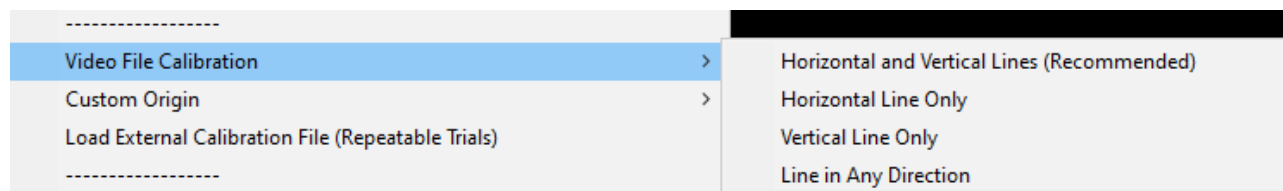
a) Select '**Video File Calibration**' from the drop down menu, if you know the length of something that is part of the action (e.g. a javelin, cricket bat, leg length or stump height).

Choose one of the options presented:

- If you know certain distances in both the horizontal and vertical directions then choose '**Horizontal and Vertical Lines**'
- If only the horizontal distance is known then choose '**Horizontal Line only**'
- If only the vertical distance is known then choose '**Vertical Line only**'
- If any other distance is known then choose '**Line in any Direction**'.

Hold the cursor over one end of the known distance, click the left mouse button and drag the cursor to the other end. Enter the distance and click '**Accept**'

Once the distance has been completed, the software will ask for the frames per second (FPS) of the video. If a Quintic High Speed Camera is used, this will be the true frames per second of the video. If a mainstream camera is used, you may be required to input the frames per second that was used.



Or

b) Select '**Load an external calibration file**' if you have used the same background and camera position as a previous video that has already been calibrated.

Important: The camera must not have been moved between the filming of the two clips.

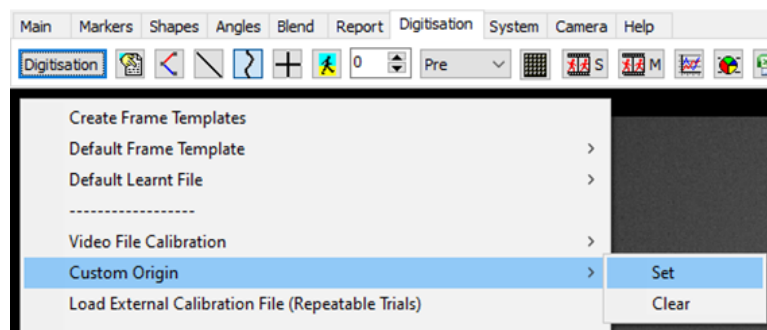
An accurate video recording speed is required to calculate accurate velocity and acceleration. Please make sure this is correct before using the linear or angular analysis functions.

3. Custom Origin

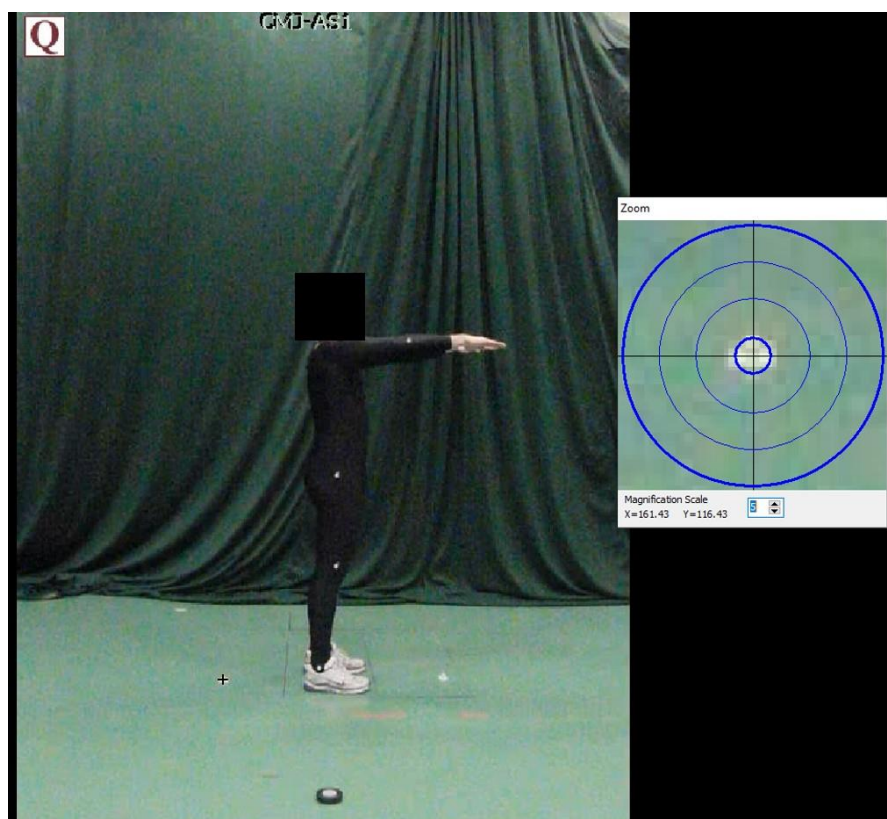
Users are able to set their own custom origin point for the video. This is ideal for users who would like their linear data to be relative to the floor for example.

Please note that the video must already be calibrated before the user is able to move the origin.

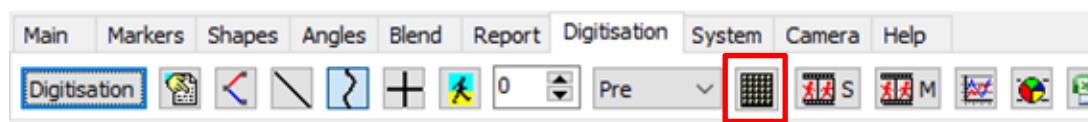
The Custom Origin can be changed by going into the Digitisation Tab > Digitisation > Custom Origin > Set.



The user then simply clicks on the video where they would like their new origin point to be. A magnifier will appear on the screen so that the user is able to click their origin precisely.



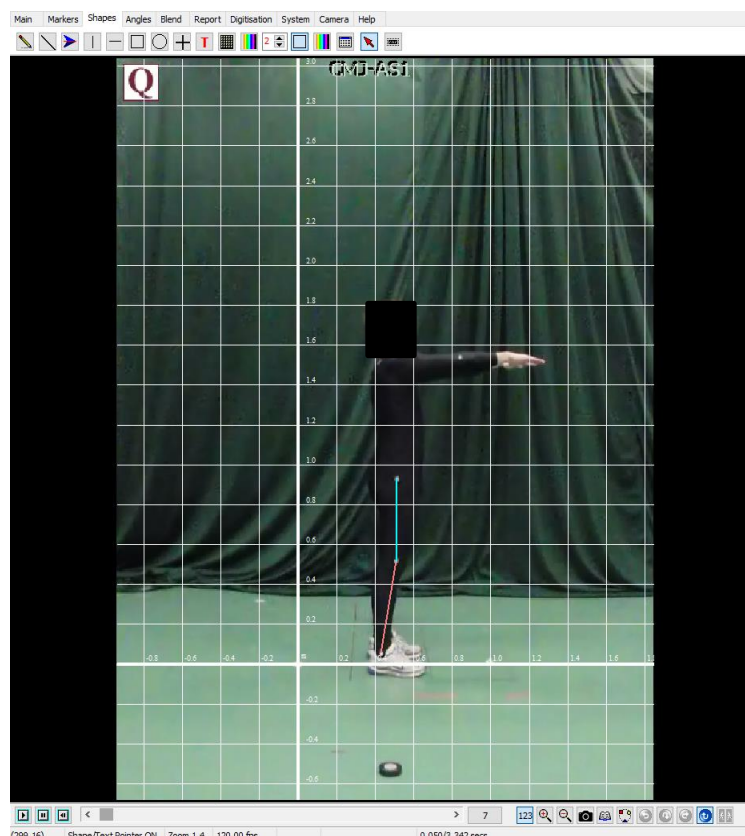
Once the origin of the video has been changed, users are able to check the new origin point by selecting the 'Calibrated Grid' option within the Digitisation tab.



Users can then go to Display > Axes Only, which will display the new origin point on the video in a graphical format. Users can also show the Full Grid if they prefer and change the increments of the grid.



Please see below an example of the custom origin, with the full grid displayed.



Once you have digitised your video, you are then able to use your custom origin within the linear analysis windows (single or multi). Please see Tutorial 8b & 8c for further information on how you are able to use the Custom Origin within the Linear Analysis.

4. Create a Frame Template

In order to start Advanced Digitisation, a suitable **Single Step** template must be used.

Quintic have already created a range of templates that you are able to use. You are able to find these within your '**Quintic Sample Videos**' folder then '**Templates**'.

N.B. The following template has been created in Quintic Biomechanics.

Should you wish to create your own template, please see below.

From the '**Digitisation**' menu click '**Create Frame Template**'. The following window will appear.

The screenshot shows a window titled 'Digitisation' with a close button (X) in the top right corner. Below the title bar is a section labeled 'Create Templates'. It contains several input fields and a grid of points:

- Model Title:** A text box containing 'Reference Model A'.
- Link Colour:** A red color swatch.
- Link Width:** A numeric input field set to '2' with up/down arrows.
- Points:** A numeric input field set to '6' with up/down arrows.
- Step Size:** A numeric input field set to '1' with up/down arrows.
- Point List:** A table with 6 rows, each for a point. Each row has a number, a text box for the point name, and a color swatch.

	1	2	3	4	5	6
1	Point1	[Red Swatch]				
2	Point2	[Green Swatch]				
3	Point3	[Yellow Swatch]				
4	Point4	[Blue Swatch]				
5	Point5	[Magenta Swatch]				
6	Point6	[Cyan Swatch]				
- Grid:** A grid of 21 red-outlined boxes arranged in a triangular pattern (1 box in the first row, 2 in the second, up to 6 in the sixth). The boxes are numbered 2 through 6 at the top, corresponding to the points in the list.

Model: Name your model so that in the future you can use it again.

Points: Select the number of points you are going to track in the movement. Sports is able to do 1 point, Coaching 2 points and Biomechanics 21 points.

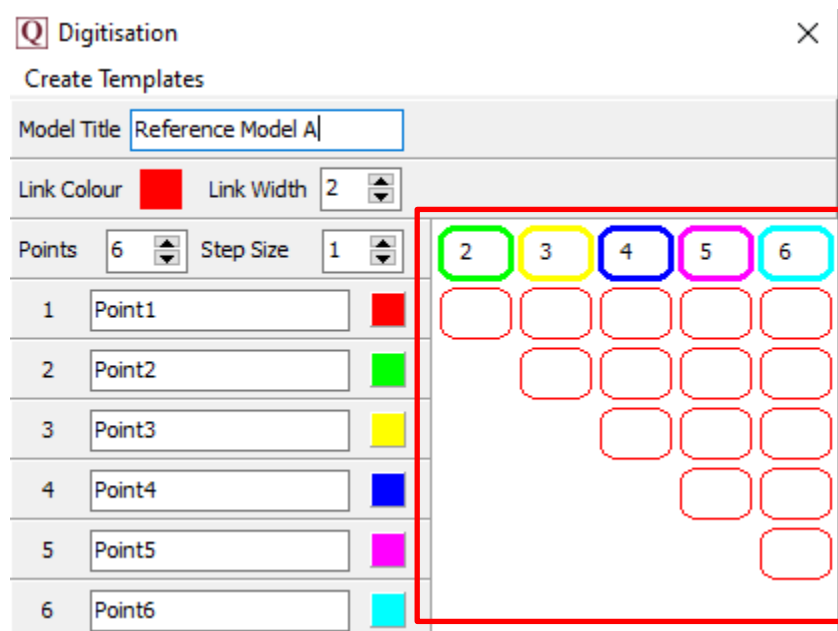
Step Size: This states how frequently frames will be digitised (1 = every frame, 5 = every 5th frame etc).

Link Width: This is the width of the lines that join up the points. 1 = Thin line, 10 = Thick line.

Point Names: You can change the names from '**point 1**', '**point 2**' etc to specific names of the anatomical points you are going to use.

Point Colour: Left click on the coloured box next to each point and select a colour from the palette. This will allow you to change the colour of each point.

Links between points: To join points together simply click on the box which links the two points you wish to join together. You can find this next to the named points. If you click the coloured box next to '**Default Colour**' this will control what colour you would like the link to be between each point. To remove the colours from one of the squares, right click on it.

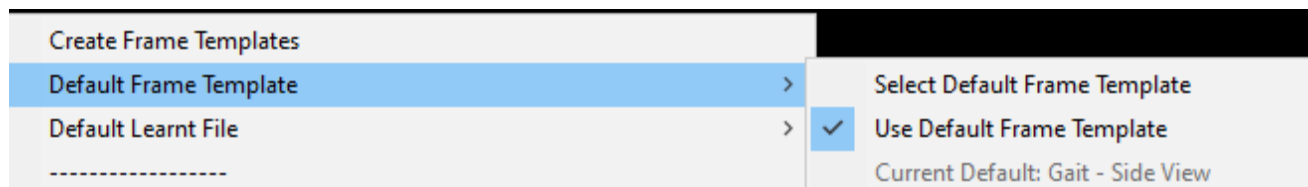


To save the template Click '**Create templates**' in the top-left of this window and click '**Save As**'.

N.B. This will replace any previous traces with the same name.

a. Default Digitisation Template

Users also have the option to choose a default digitisation template, removing the need to select it each time. Ideal for users who use the same digitisation template on a regular basis.

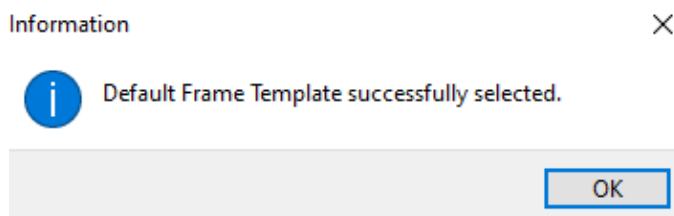


To begin, click on 'Default Frame Template' within the Digitisation Menu.

Then click 'Select Default Frame Template' and choose your preferred template.

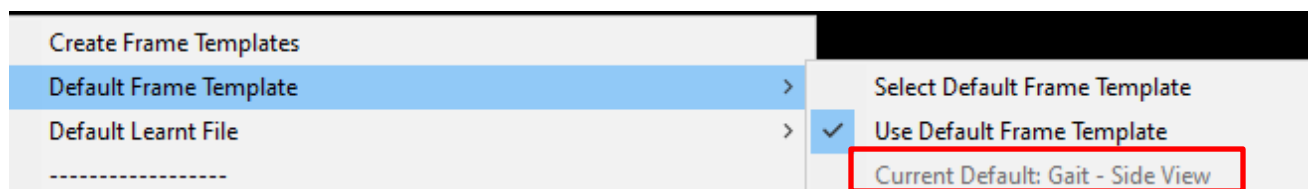
Please bear in mind that for Automatic Digitisation, a suitable **Single Step template** must be used.

Once you have selected your preferred digitisation template, the following pop up will appear, confirming you have selected your default digitisation template:



To use the default template, simply click 'Use Default Frame Template' if you want this to be used all the time.

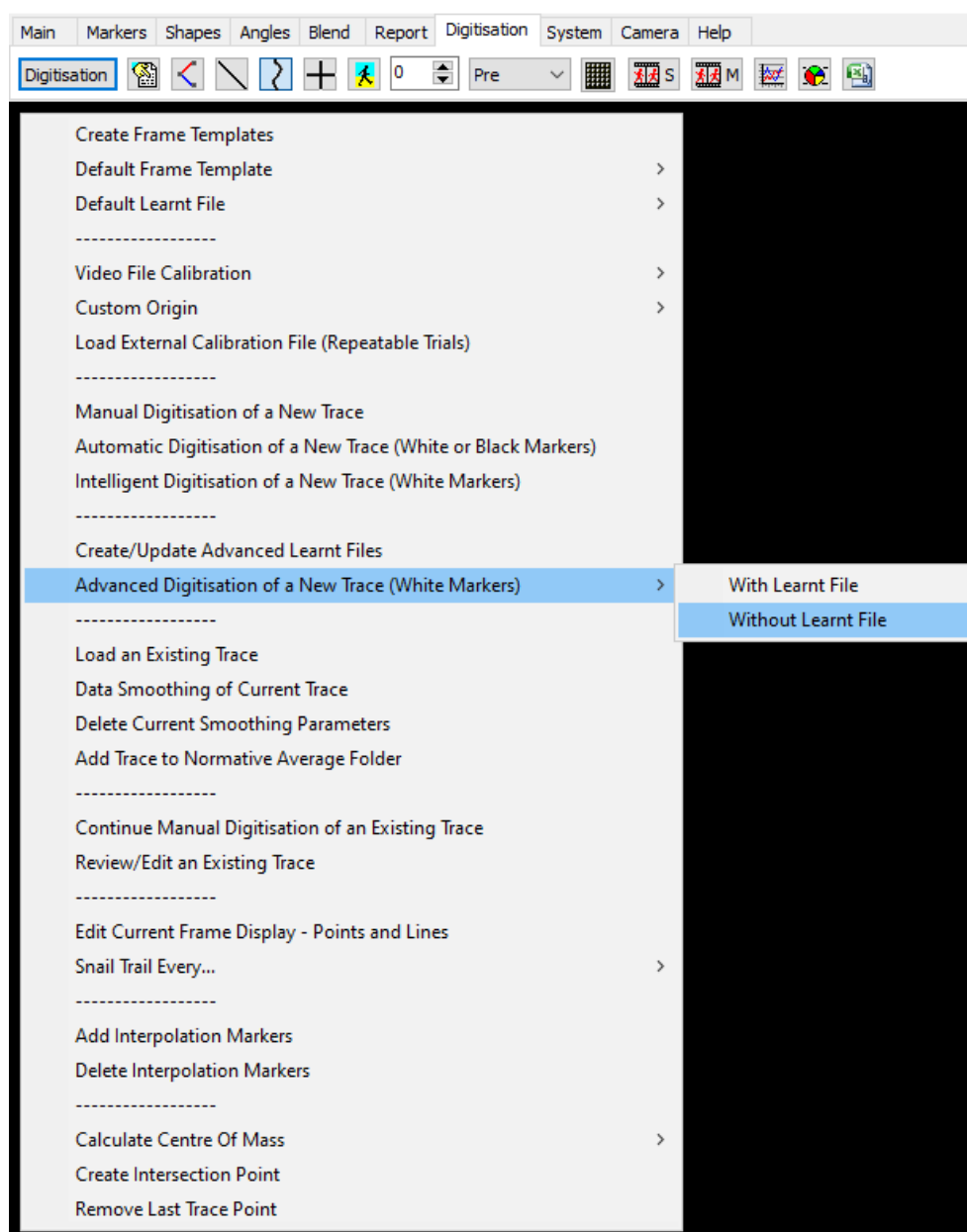
The current default template is shown at the bottom of this menu:



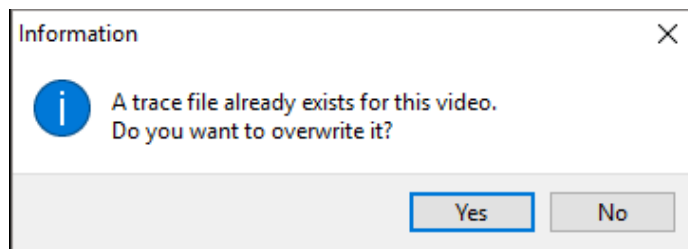
5. Advanced Digitisation – Without Learnt File

Now that the video has been calibrated and a suitable digitisation template has been created/located, you are ready to begin Advanced Digitisation – Without Learnt File. With this option the Advanced Tracking will track all the markers it can see on the video (not markers covered by blockers) and the user must assign the marker traces to the correct marker names at the end of the video and discard any non-markers. Advanced Digitisation requires a contrast in order for the markers to be identified. This must be a “white on black” marker.

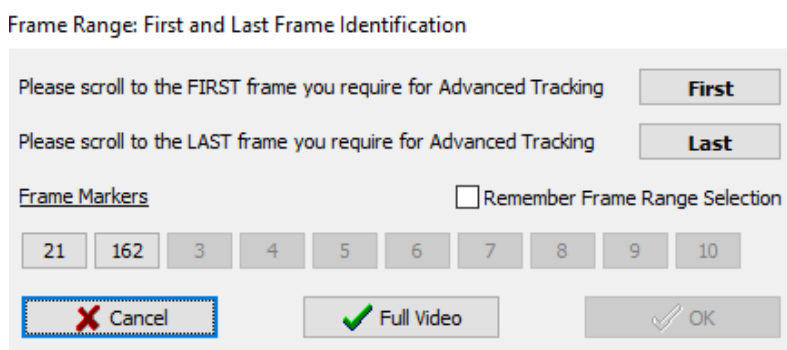
Within Quintic software, click on the **‘Digitisation’** Tab, then **‘Digitisation’** menu and then **‘Advanced Digitisation of a New Trace (White Markers)’** then **‘Without Markers’**.



If the video has already been digitised, a pop-up asking if you want to 'overwrite the existing trace' will appear. Click 'No' if you do not want to, or click 'Yes' if you do want to overwrite the trace, which will enable you to continue with the Advanced Digitisation process.



If the video does not have a previous digitisation trace, or you pressed "Yes" to the above pop-up, a new window will open asking you to locate the digitisation template you wish to use for digitisation. Once selected, a new window will appear containing the same video that is in the main window along with the Frame Range window.



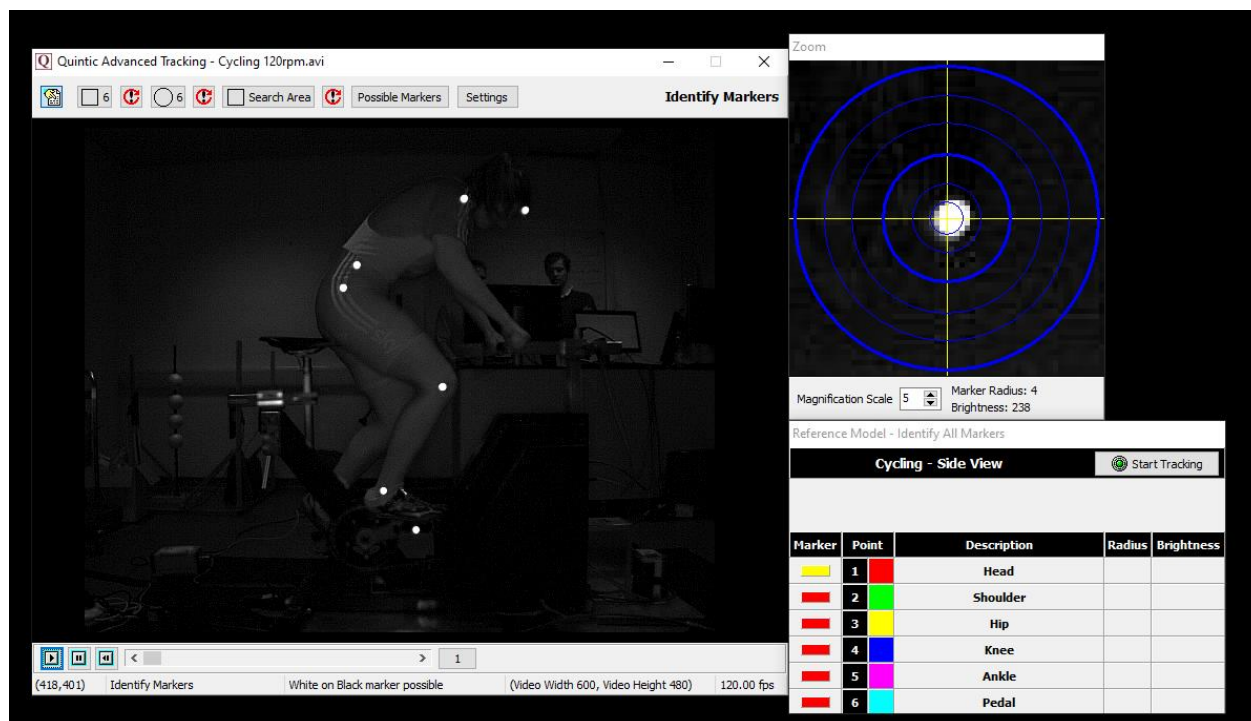
Scroll to the frame you wish to start the tracking from and click on '**First**'. Now scroll to the last frame that you wish to digitise and click on '**Last**'. Alternatively, click '**Full Video**' if all markers are visible at the start and end of the video and you wish to digitise the whole video.

If Frame Markers have been set for the video, these will be displayed within the Frame identification window. This is ideal if a user wants to digitise between two key events for example. The user can click on the first frame marker then FIRST, then the last frame marker then LAST to set the frame markers as the digitisation range.

Should you be using the same frame ranges (i.e for a multi camera digitisation), you can select the 'Remember Frame Range Selection' box which will remember the frame ranges next time you digitise a video.

Once you have set the range of frames you wish to digitise, click on the '**OK**' button to begin identifying the points within the selected digitisation template.

Once the digitisation region has been determined, the user is then able to either identify the markers in their template, or just press start tracking to track all the visible reflections. Similar to Intelligent Tracking, users are able to select a Search Area, add Blockers, check Possible Markers and adjust settings.



a. Possible Markers

The 'Possible Markers' feature available in the Quintic Advanced Tracking windows allows the user to see all the possible markers on the video before assigning any markers. This includes any actual markers, as well as any unwanted reflections.

To see all the Possible Markers on a video, simply click the Possible Markers button within the Advanced tracking window.

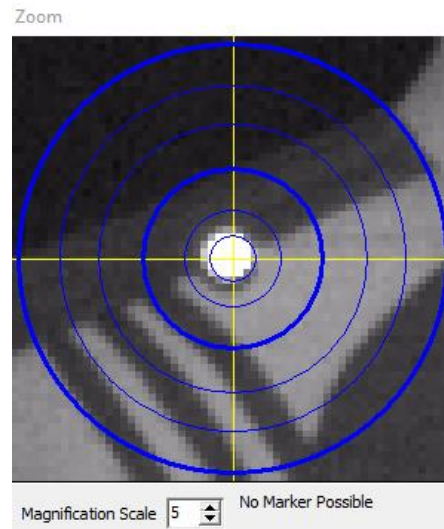
Possible Markers

Once selected, this will then show all possible markers for the current frame on the video. Possible markers are highlighted by a light blue cross with a number next to it. The number is the brightness value out of 255.

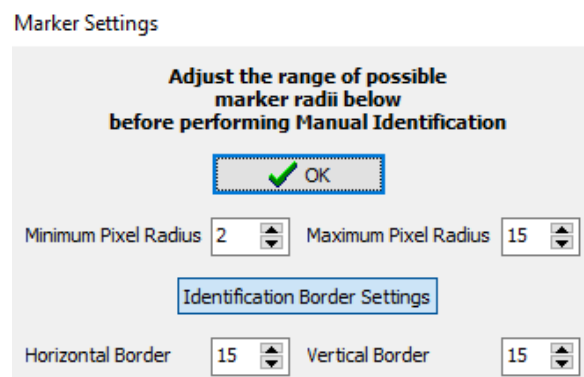


Right Clicking the 'Possible Markers' button will remove all the possible markers from the video.


Should you hover over a marker that the software is unable to identify, or Possible Markers is unable to identify, it may be because the marker is too big and you may need to increase the marker radius range or the border settings.



You are able to adjust the range of possible marker sizes, by clicking on the **'Settings'** button, which is displayed in the top left-hand corner of the automatic tracking window. Once you have clicked settings, you will be able to adjust the minimum and maximum pixel radius by adjusting the counters accordingly. Press OK to accept the changes to the radius sizes once you are happy with them. The default range is between 2 and 15, however this can be changed to 1 to 25 to help identify smaller/larger markers accordingly.

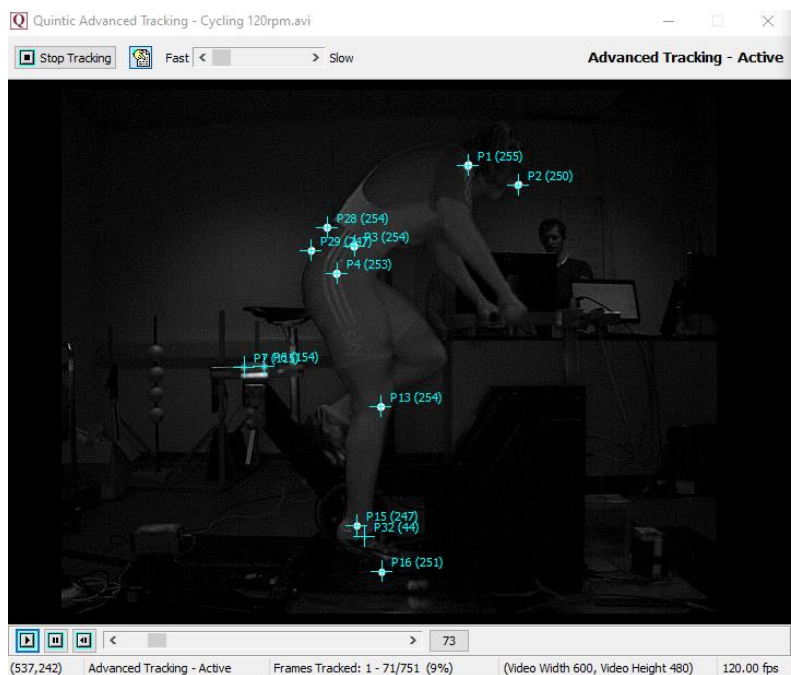


Users are also able to change the Identification Border Settings. This is particularly useful if a marker is close the edge of the image. Users are then able to change increase or decrease the horizontal/vertical borders so that the marker is able to be identified.

If you make a mistake identifying the markers, you are able to undo the last marker identified by pressing the  button.

b. Using Advanced Digitisation – Without Learnt File

To start the Advanced Tracking process, simply press the 'Start Tracking' button. The user does not have to identify any of the markers in their template. The Advanced Tracking tracks all of the potential markers. A potential marker is identified by the software by a blue crosshair (P means Potential Marker, the number is the marker's "ID number," assigned in the order in which the markers were identified, and the number in brackets is the brightness value).



The screenshot shows the Quintic Advanced Tracking software interface. The main window displays a video of a person on a bicycle with several potential markers (P1 to P16) identified by blue crosshairs. The markers are labeled with their ID number and brightness value in parentheses. For example, P1 (255) is at the head, P2 (250) is at the shoulder, P3 (254) is at the hip, P4 (253) is at the knee, P5 (247) is at the ankle, and P6 (244) is at the pedal. The interface includes a 'Stop Tracking' button, a 'Fast' slider, and a 'Slow' slider. The status bar at the bottom shows 'Frames Tracked: 1 - 71/751 (9%)' and '120.00 fps'.

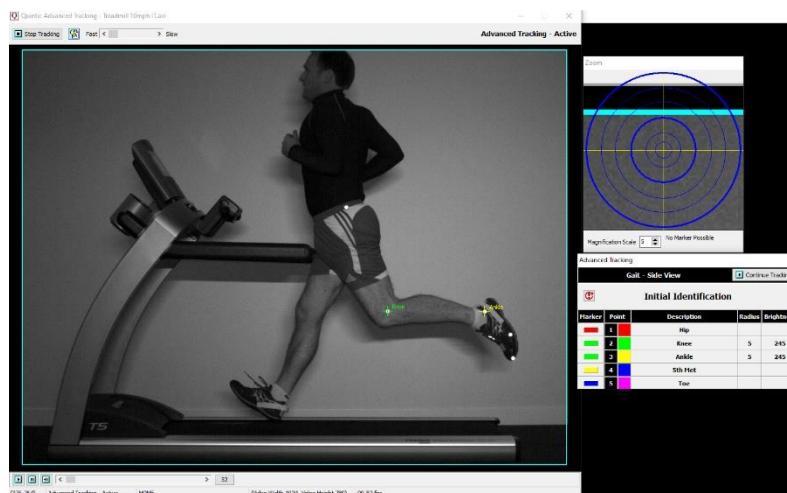
Advanced Tracking

Cycling - Side View

Frames Tracked: 1 - 71/751 (9%)

Marker	Point	Description	Radius	Brightness
1	Head			
2	Shoulder			
3	Hip			
4	Knee			
5	Ankle			
6	Pedal			

The user does have the option to pause the tracking by pressing the 'Pause Tracking' button. This should only be used if the user wants to manually allocate a marker. Once the video has been paused, to allocate a marker simply click the box to the marker name (so it turns yellow), then click the relevant marker on the video to assign this. Once you have finished manually assigning the marker, simply click 'Continue Tracking' to continue the digitisation process.



The screenshot shows the Quintic Advanced Tracking software interface. The main window displays a video of a person on a treadmill with several potential markers (P1 to P16) identified by blue crosshairs. The markers are labeled with their ID number and brightness value in parentheses. For example, P1 (255) is at the head, P2 (250) is at the shoulder, P3 (254) is at the hip, P4 (253) is at the knee, P5 (247) is at the ankle, and P6 (244) is at the pedal. The interface includes a 'Stop Tracking' button, a 'Fast' slider, and a 'Slow' slider. The status bar at the bottom shows 'Frames Tracked: 1 - 71/751 (9%)' and '120.00 fps'.

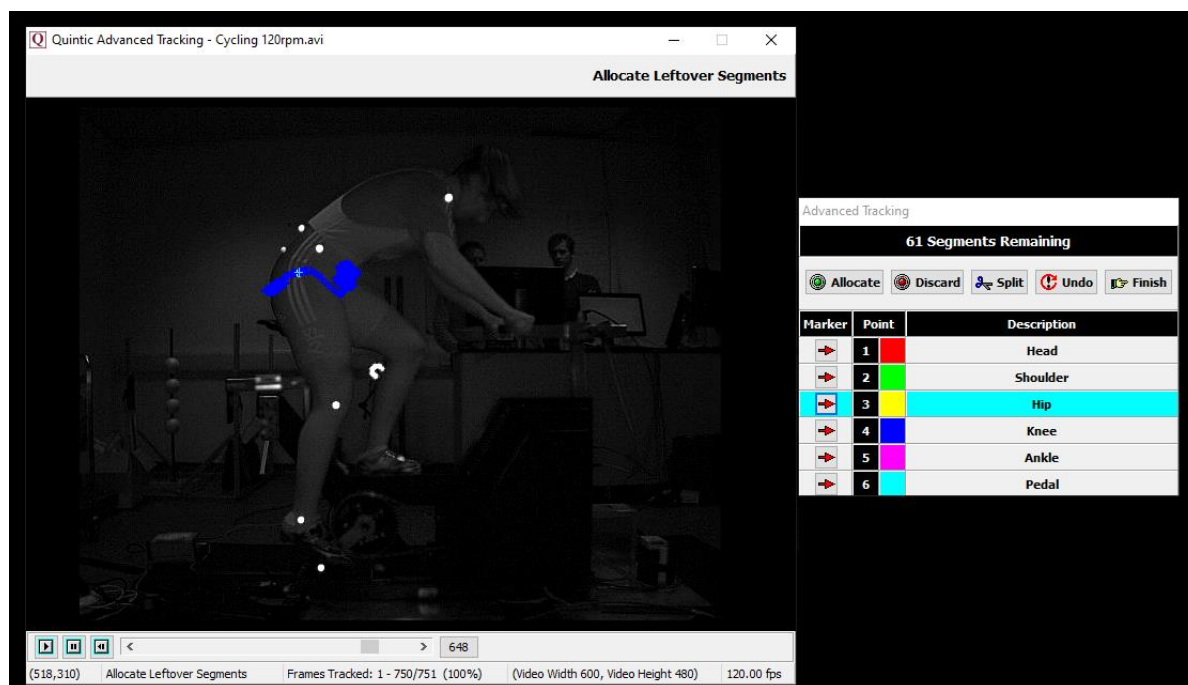
Advanced Tracking

Gait - Side View

Initial Identification

Marker	Point	Description	Radius	Brightness
1	Head			
2	Shoulder			
3	Hip			
4	Knee			
5	Ankle			
6	Pedal			

Once the tracking has finished, the user then either allocates each tracked segment to a marker or discards them. The segments are loaded in order of descending length (longest trace to shortest trace). To allocate a segment as a marker, simply click the arrow next to the name within the allocation window to highlight the marker in light blue, and then press Allocate.



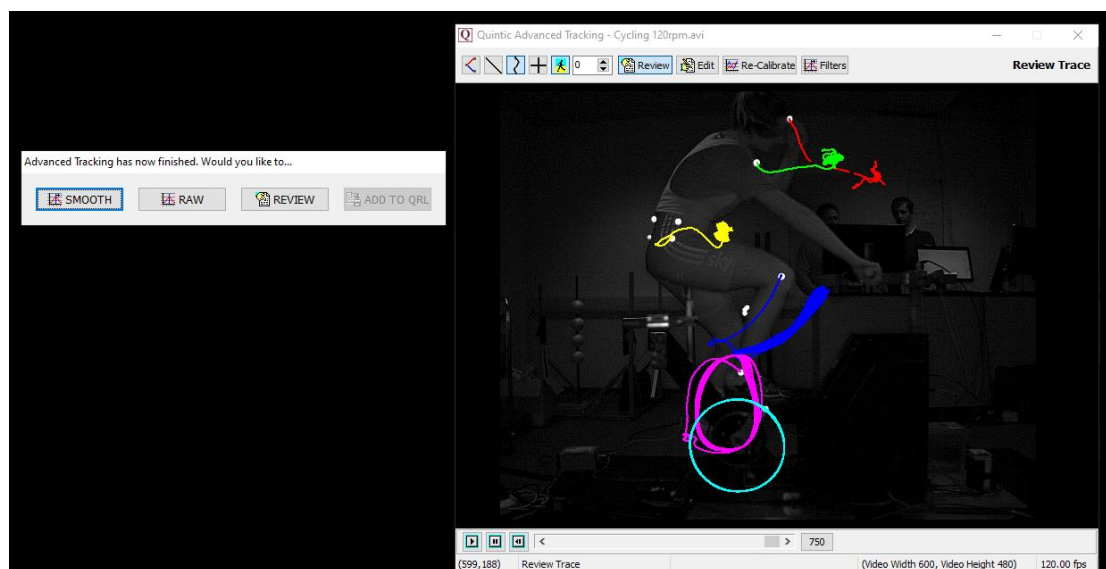
Users can also Split a segment into two separate segments. This is to be used if a real marker segment has merged with a non-marker segment, so one part of the segment can be allocated as a real marker and the other part can be discarded. If a segment needs splitting, wait for this segment to appear within the allocation window. When it does, simply scroll the video to the point in which the tracked segment requires splitting and click the 'Split' button. This will then split the tracked segment into two pieces. The segments which have been split are then sorted into descending order, meaning once they are split, they may not necessarily be the next segment to be allocated. When the split segments do appear, simply assign/discard accordingly.

To discard a segment, simply click the discard button.

Users are able to undo one segment if they make a mistake.

To end the allocation process, simply click Finish when all your markers have been identified or keep allocating/discarding until there are no segments left. The Advanced Tracking software will automatically reduce the number of segments if it knows some of the remaining traces cannot possibly be those of real markers.

Once there are no segments left, or the user has pressed Finish, there is then the option to Smooth the trace, leave it Raw or Review it.



Smooth – Saves the data of the trace with the optimal Butterworth filters, without review of the trace. The window will then close.

To change or add filters at a later time, click “Digitisation” on the Main window and select “Load an Existing Trace” and then “Data Smoothing of Current Trace”. This will bring up filtering options (refer to section 7d for further information).

Raw – Directly saves the raw data of the trace without editing or filtering.

To change or add filters at a later date, click “Digitisation” on the Main window and select “Load an Existing Trace” and then “Data Smoothing of Current Trace”. This will bring up filtering options (refer to section 7d for further information).

Review – Opens the review screen allowing you to edit the digitised points before the trace is finalised. The user is able to review, edit, re-calibrate or apply filters to the digitisation trace. Please see section 7 for more information on the review process.

6. Advanced Digitisation - With Learnt File

Users are able to create a Learnt file from digitisation traces of other videos which use the same digitisation template.

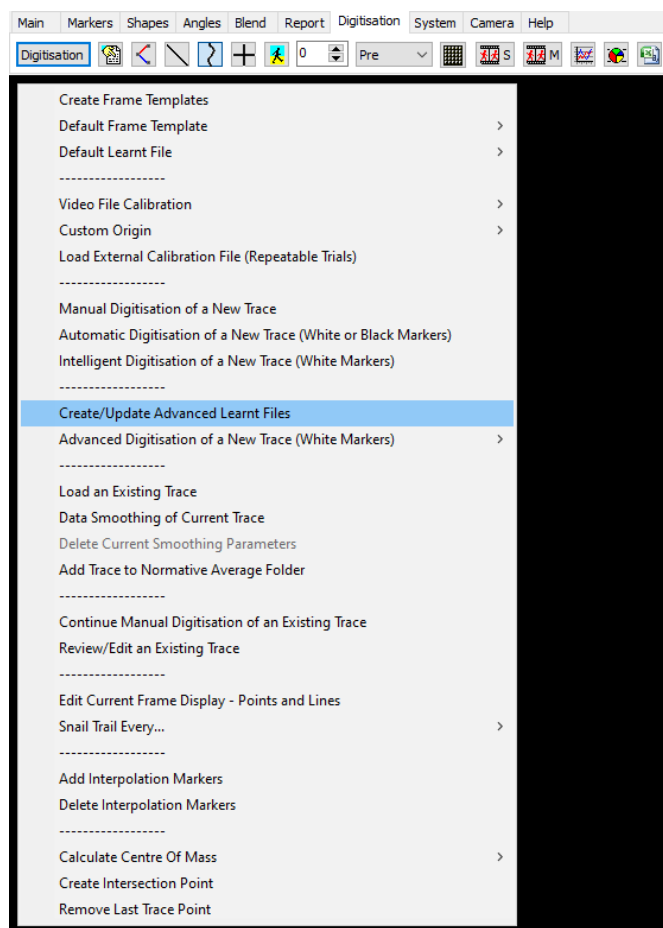
Advanced Tracking uses this learnt file to understand which markers to track and how to track them. It also knows what can be discarded.

When a marker gets covered/lost, based on the information in the learnt file, the advanced tracking feature is able to automatically re-allocate the marker if/when it comes back into view and continue tracking this marker.

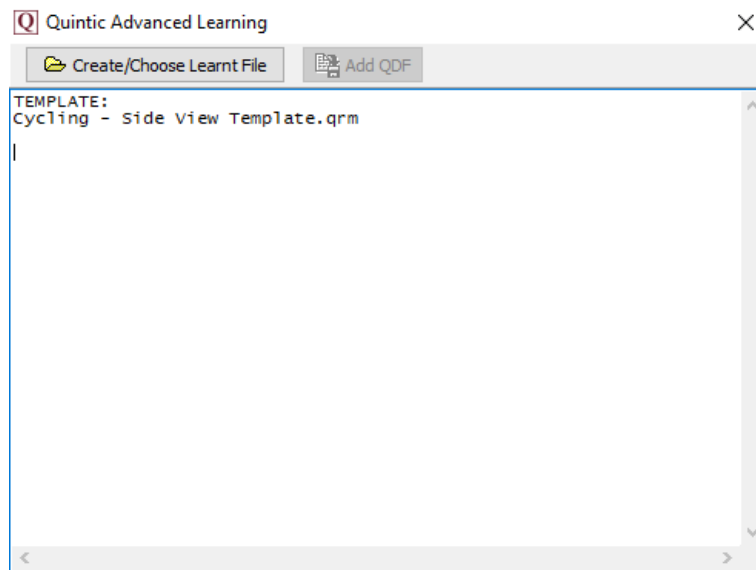
a. Creating a Learnt File

In order to use Advanced Tracking with a Learnt file, a Learnt file needs to be created. Learnt files are able to be created by loading QDF's (Quintic Digitisation Files) from any method of digitisation (Manual, Automatic, Intelligent, Advanced). The digitisation traces need to use the same template for which you wish to create a Learnt file. Please see below for the steps to create a Learnt file.

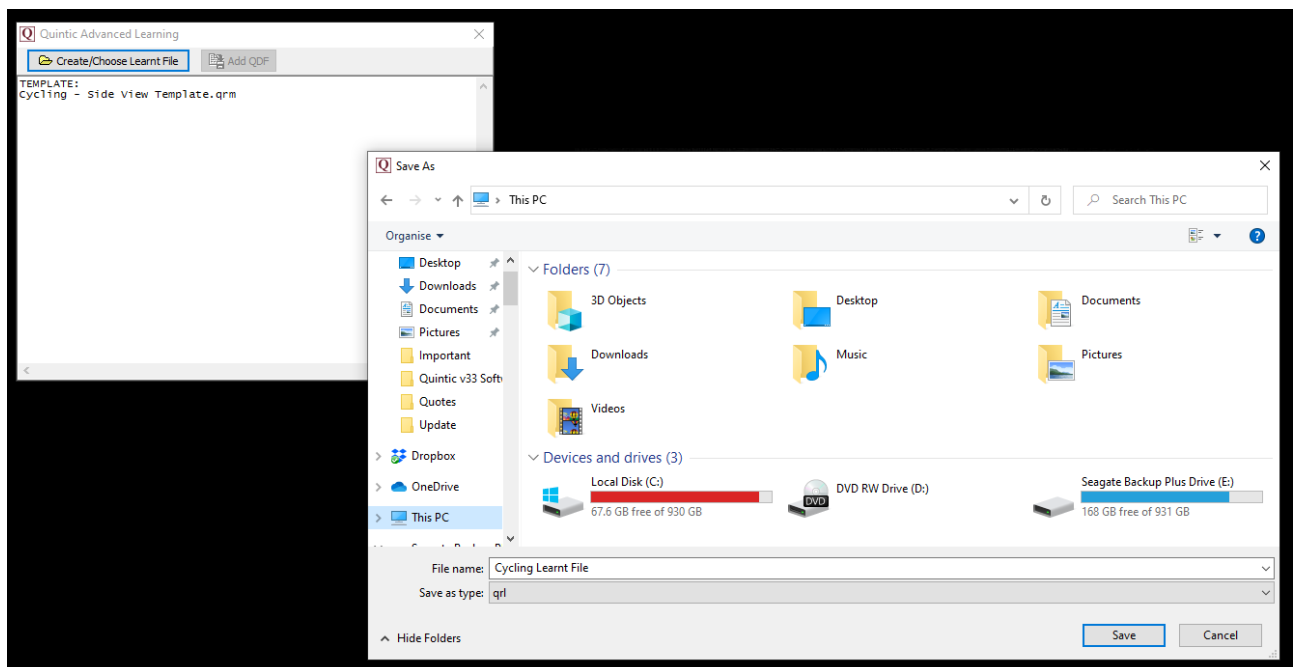
Firstly, go to the Digitisation Tab, then Digitisation Menu and click 'Create/Update Advanced Learnt File'.



Once clicked, this will bring up the Quintic Advanced Learning window. The digitisation trace will have to be loaded on the video which is currently open within the Quintic software. The template being used will automatically show in the Quintic Advanced Learning Window.

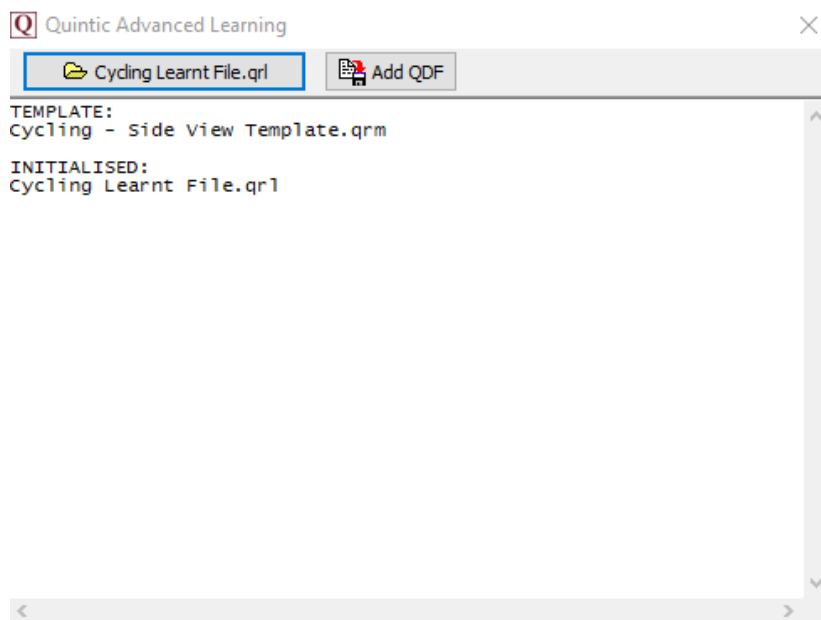


Users then click 'Create/Choose Learnt File' and find a location on your machine where you would like to save this Learnt file. Users should also name the Learnt file appropriately.

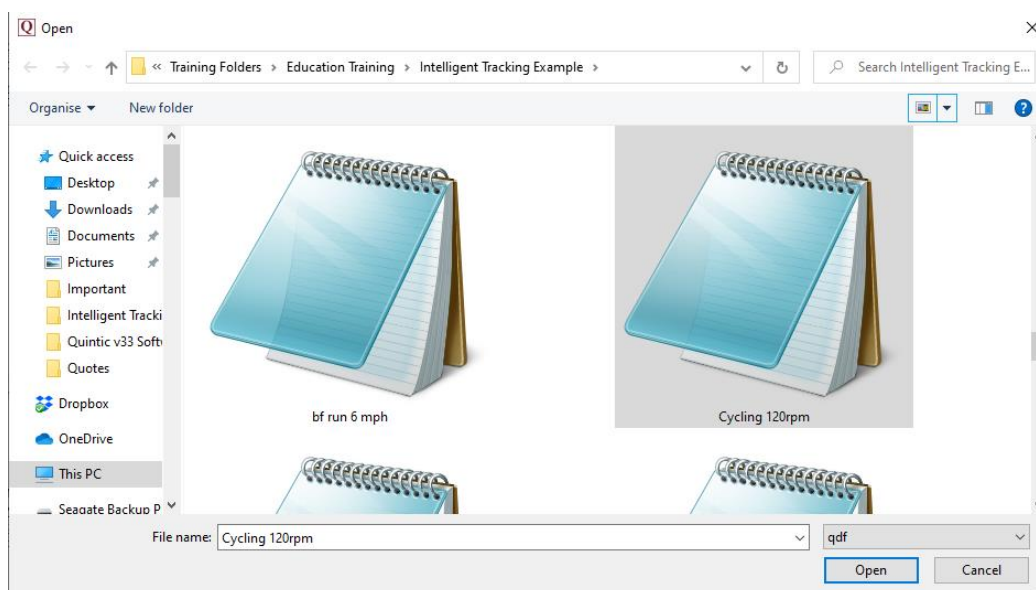


Once you have chosen the name and where you would like to save the Learnt file, click Save, which will then return you to the Quintic Advanced Learning window. If you already have a Learnt file created and want to upload new QDF's, please locate your learnt file.

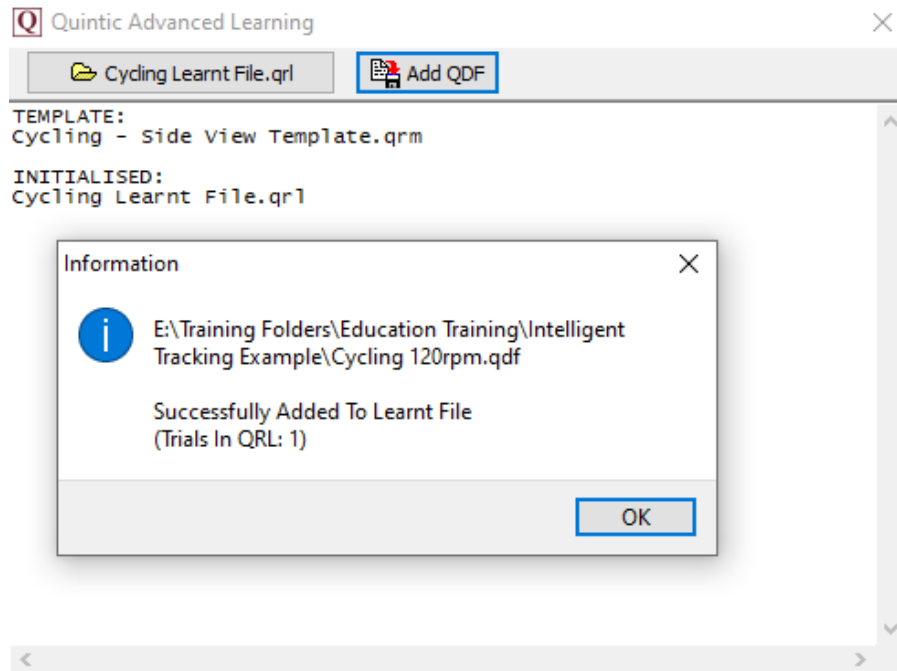
The Quintic Advanced Learning window will now be updated with the name of the learnt file being initialised.



Next, the users must select which QDF (s) they would like to load into the learnt file. This should be a QDF which uses the same template the learnt file is now using. Users do this by clicking 'Add QDF' and locating the QDF they would like to load into the Learnt file, then clicking Open.

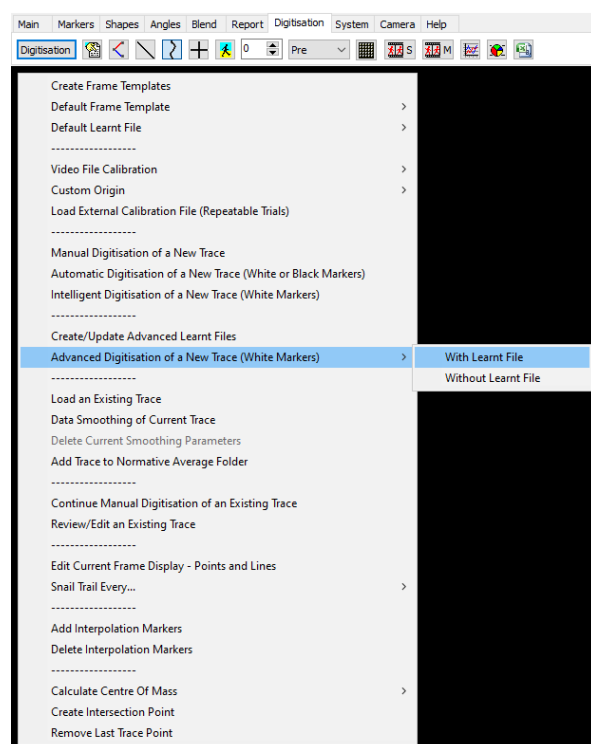


Once the QDF is loaded into the Learnt file, a pop up will appear confirming that the QDF has been successfully added into the Learnt file. Click OK and close the Quintic Advanced Learning window. Quintic would recommend using either 2 – 3 QDF's in your learnt file. Please remember the idea of the learnt file is to learn a specific movement. If users add to many different movements in the same learnt file, this could be detrimental to the learnt file and allocating markers.

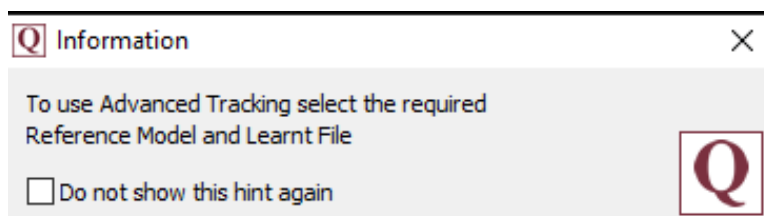


b. Using Advanced Tracking – With Learnt File

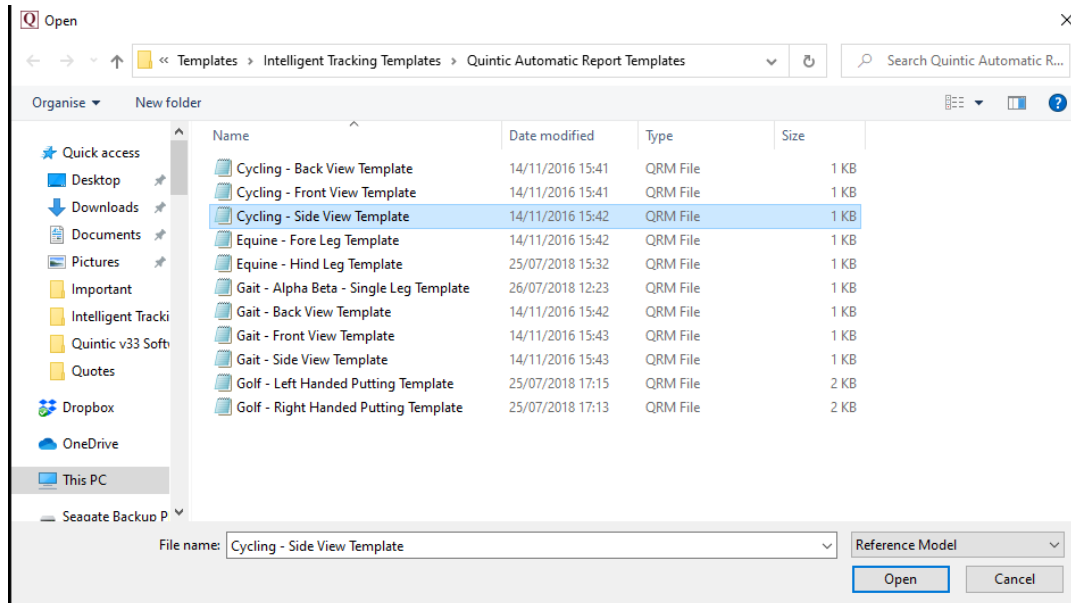
To use Advanced Tracking – With Learnt File, go to the Digitisation Tab, click the Digitisation button and then click 'Advanced Digitisation of a New Trace (White Markers) – With Learnt File'.



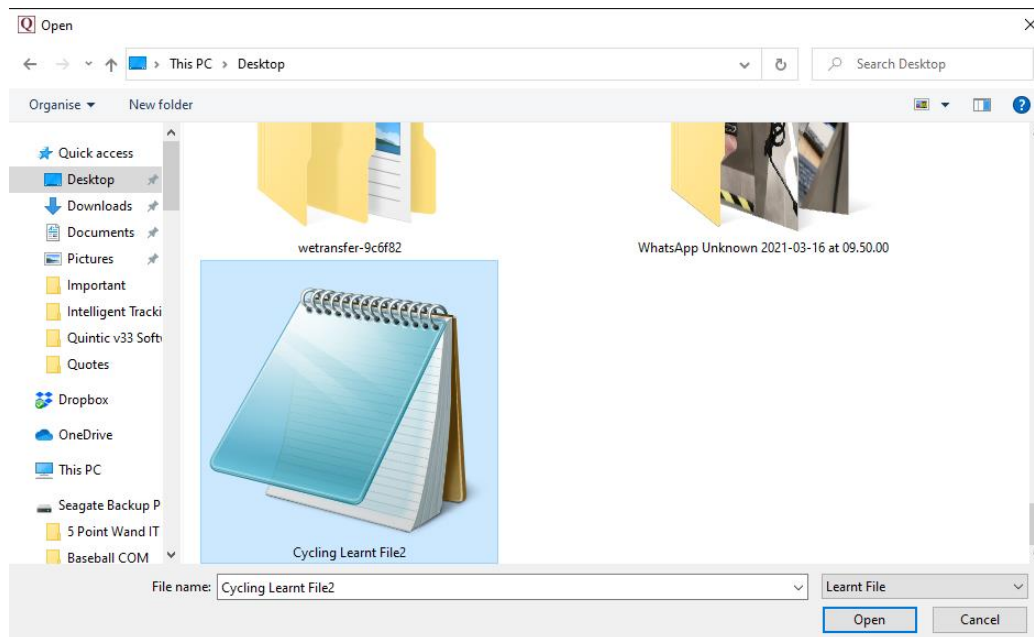
This will then bring up the following message, indicating that the user needs to select a digitisation template, then a Learnt file (if default template/learnt file are not being used).



Users will then have to locate the digitisation template they would like to use for this video. Once located, click open.



Once the digitisation template has been selected, users will then have to locate the learnt file they wish to use. This learnt file has to use the same digitisation template as the one which has just been selected. Once located, press open.



This will then load the Advanced Tracking window. Users will have to choose the region they would like to digitise, or select full video. Should you be using the same frame ranges (i.e for a multi camera digitisation), you can select the 'Remember Frame Range Selection' box which will remember the frame ranges next time you digitise a video.

Once you have set the range of frames you wish to digitise, click on the 'OK' button to begin identifying the points within the selected digitisation template.

Frame Range: First and Last Frame Identification

Please scroll to the FIRST frame you require for Advanced Tracking First

Please scroll to the LAST frame you require for Advanced Tracking Last

Frame Markers ☐ Remember Frame Range Selection

21 162 3 4 5 6 7 8 9 10

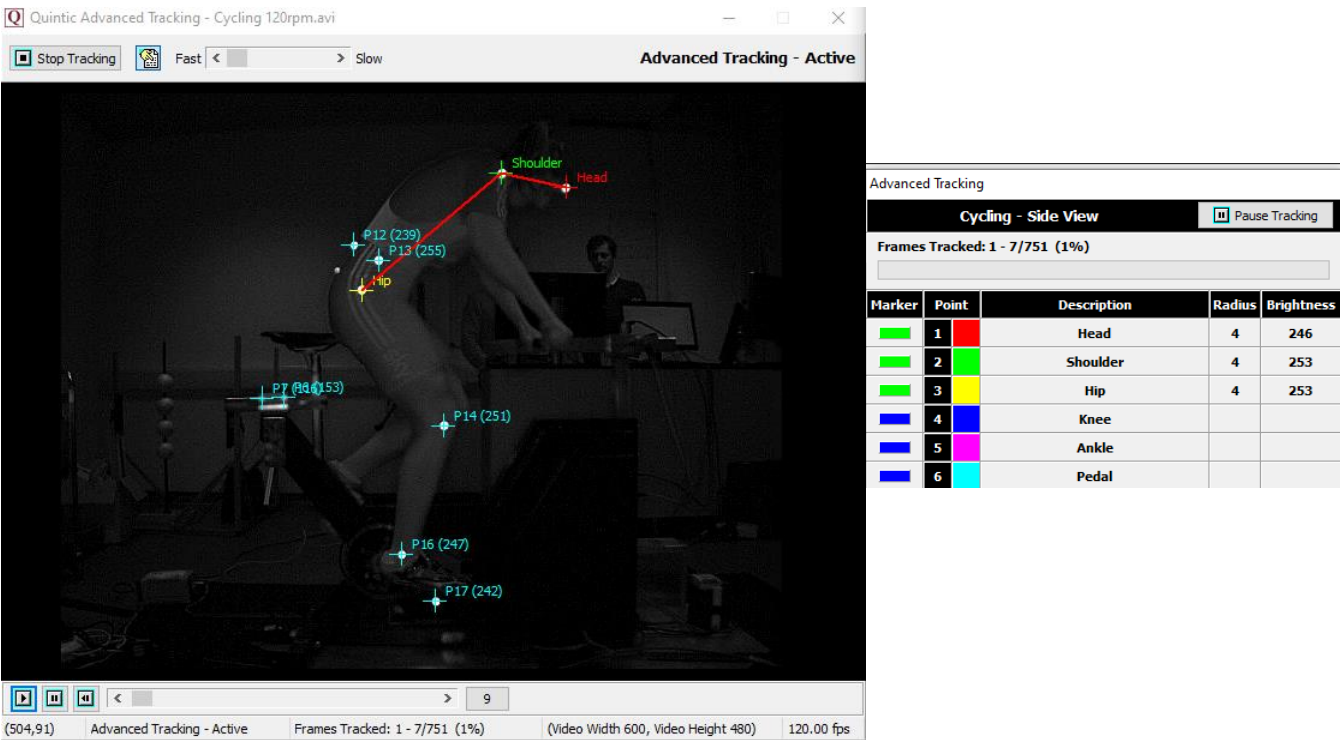
Cancel Full Video OK

This will then load the video ready to be digitised. Users are able to use a Search area, blockers, adjust settings and look at any potential markers (please see section 5a for more information on Possible Markers) before starting tracking. Users can just press the Start Tracking button to start the tracking. There is no need to identify markers manually but this is still possible if you wish to give the software a “head start.”

The screenshot displays the Quintic Advanced Tracking software interface. The main window shows a video of a cyclist on a stationary bike with several white markers placed on their body. The interface includes a toolbar with icons for search, markers, and settings. A 'Zoom' window on the right shows a circular target with concentric circles and a crosshair. Below the video, a 'Reference Model - Identify All Markers' section is visible, featuring a 'Cycling - Side View' button and a 'Start Tracking' button. A table lists the markers and their corresponding controls.

Marker	Control	Description	Radius	Brightness
1	Head	Head		
2	Shoulder	Shoulder		
3	Hip	Hip		
4	Knee	Knee		
5	Ankle	Ankle		
6	Pedal	Pedal		

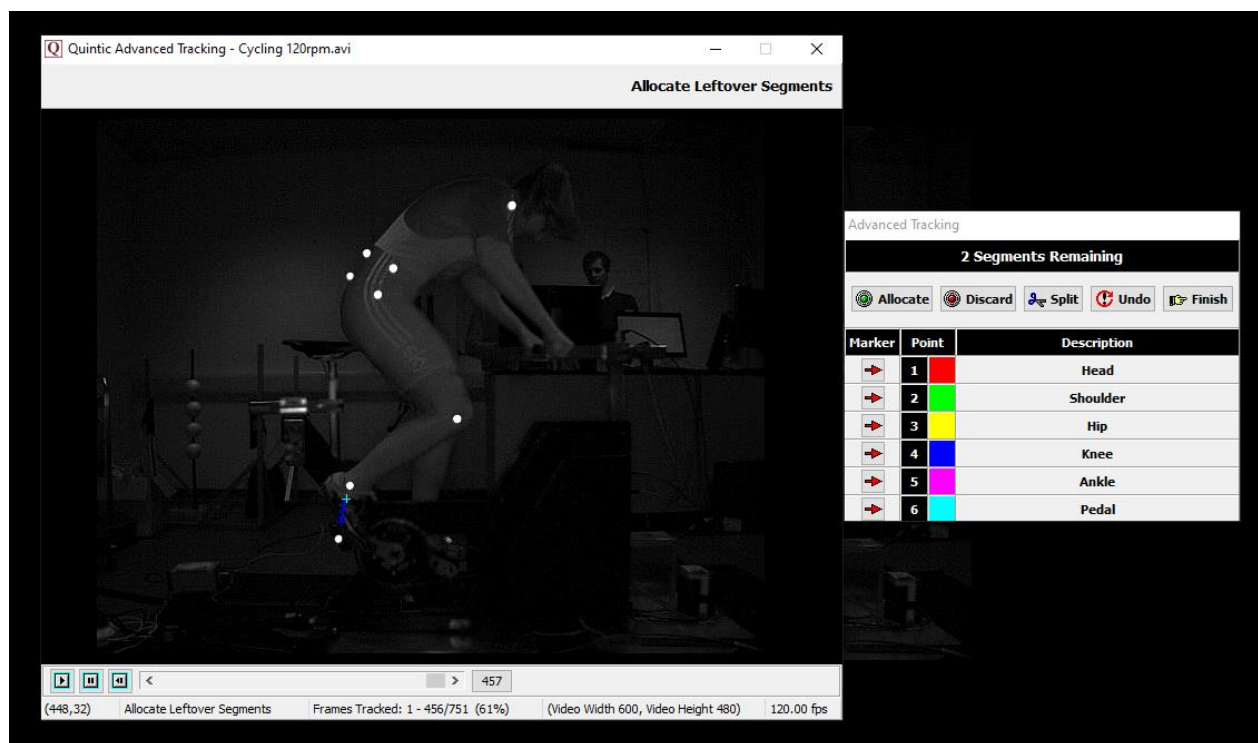
The Advanced Tracking will then start. The software will then use the learnt file to determine which of the possible markers are real markers and which markers are non-markers. When the conditions set out by the learnt file have been met, the markers will be assigned.



The image below shows the Advanced Tracking in use, with it now assigning the majority of the markers (the head marker is out of view). Other reflections are discarded.



Once the tracking has finished, the user will then have to allocate or discard any leftover segments which have been tracked but not assigned. The segments are loaded in descending order of length (longest trace to shortest trace). To allocate a segment as a marker, click the arrow next to its name to highlight the marker in blue, then press Allocate.



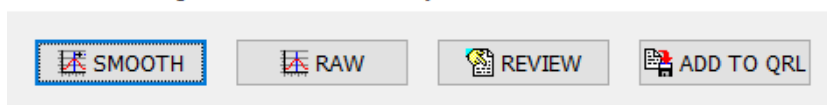
Users can also Split a segment into two separate segments. This is to be used if a real marker segment has merged with a non-marker segment, so one part of the segment can be allocated as a real marker and the other part can be discarded. If a segment needs splitting, wait for this segment to appear within the allocation window. When it does, simply scroll the video to the point in which the tracked segment requires splitting and click the 'Split' button. This will then split the tracked segment into two pieces. The segments which have been split are then sorted into descending order, meaning once they are split, they may not necessarily be the next segment to be allocated. When the split segments do appear, simply assign/discard accordingly.

To discard a segment, simply click the discard button. Users are able to undo one segment if they make a mistake.

To end the allocation process, simply click Finish when all your markers have been identified or keep allocating/discarding until there are no segments left. The Advanced Tracking software will automatically reduce the number of segments if it knows some of the remaining traces cannot possibly be those of real markers.

Once there are no segments left, or the user has pressed Finish, there is then the option to Smooth the trace, leave it Raw, Review it as well as add the QDF to QRL.

Advanced Tracking has now finished. Would you like to...



Smooth – Saves the data of the trace with the optimal Butterworth filters, without review of the trace. The window will then close.

To change or add filters at a later time, click “Digitisation” on the Main window and select “Load an Existing Trace” and then “Data Smoothing of Current Trace”. This will bring up filtering options (refer to section 7d for further information).

Raw – Directly saves the raw data of the trace without editing or filtering.

To change or add filters at a later date, click “Digitisation” on the Main window and select “Load an Existing Trace” and then “Data Smoothing of Current Trace”. This will bring up filtering options (refer to section 7d for further information).

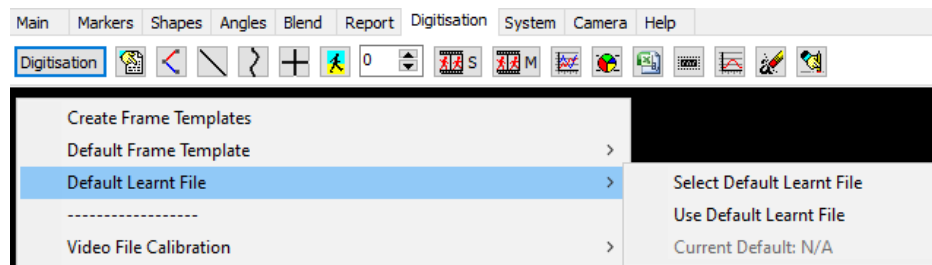
Review – Opens the review screen allowing you to edit the digitised points before the trace is finalised. The user is able to review, edit, re-calibrate or apply filters to the digitisation trace. Please see section 7 for more information on the review process.

Add to QRL - If the user selects ‘Add to QRL’, this will add the current QDF file to the current Learnt file that is in use.

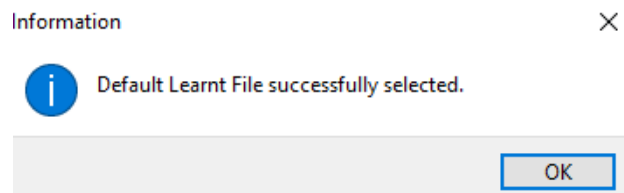
c. Default Learnt File

Users are able to select a default learnt file. Once selected, the Default Learnt File is automatically used within Advanced Tracking.

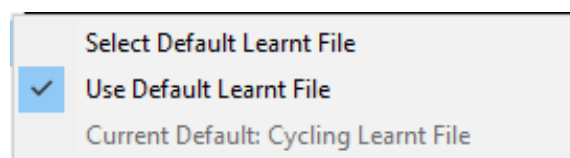
Users can set a default learnt file by going to the Digitisation Tab > Digitisation > Default Learnt File.



First, users have to select which Learnt file they would like to be loaded as the default Learnt file. Click “Select Default Learnt File” and find the desired Learnt File. Once chosen, a window will appear confirming a Default Learnt file has been successfully selected.



To use the selected Default Learnt file, simply click Use Default Learnt File.



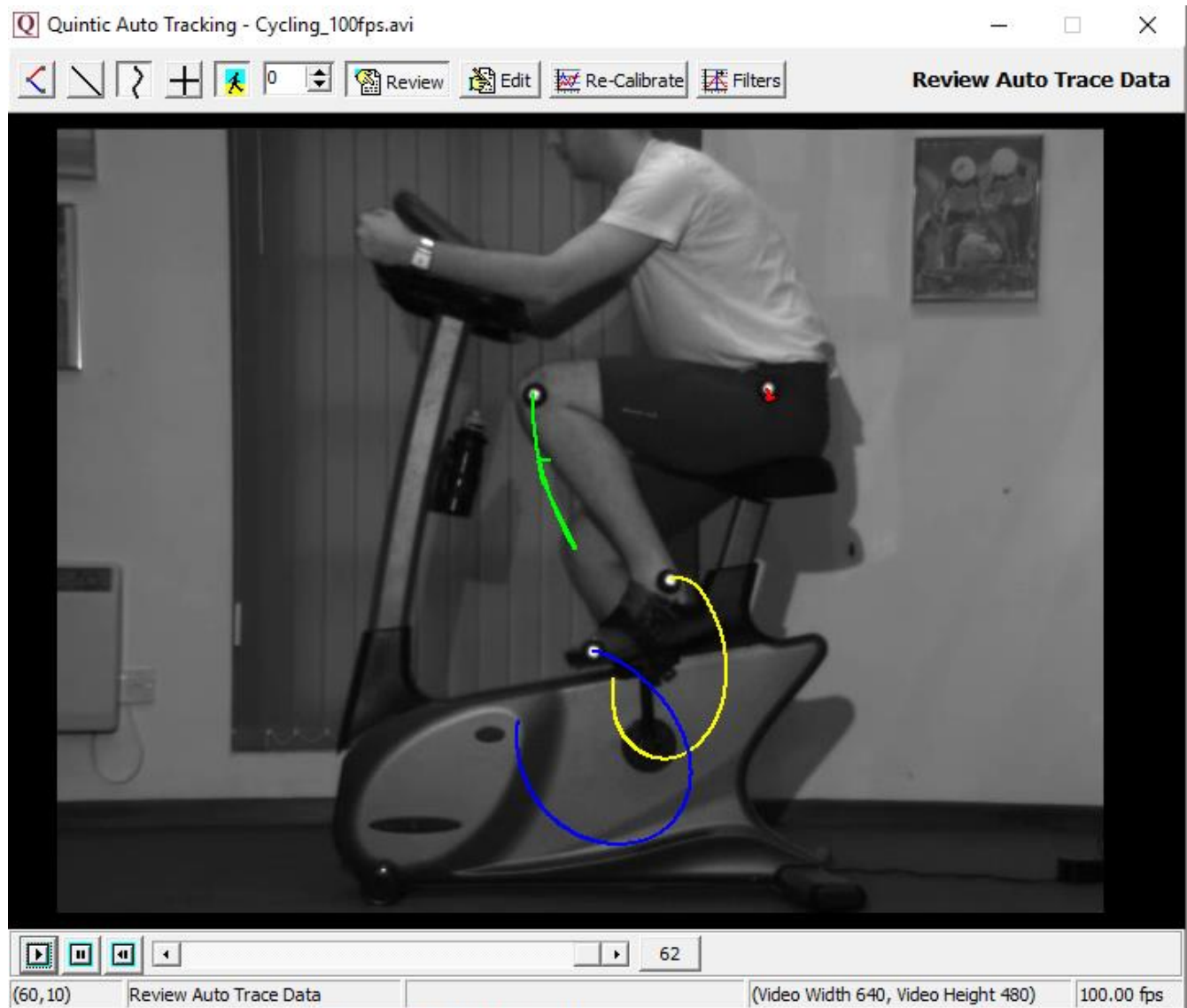
7. Reviewing the Digitisation Trace

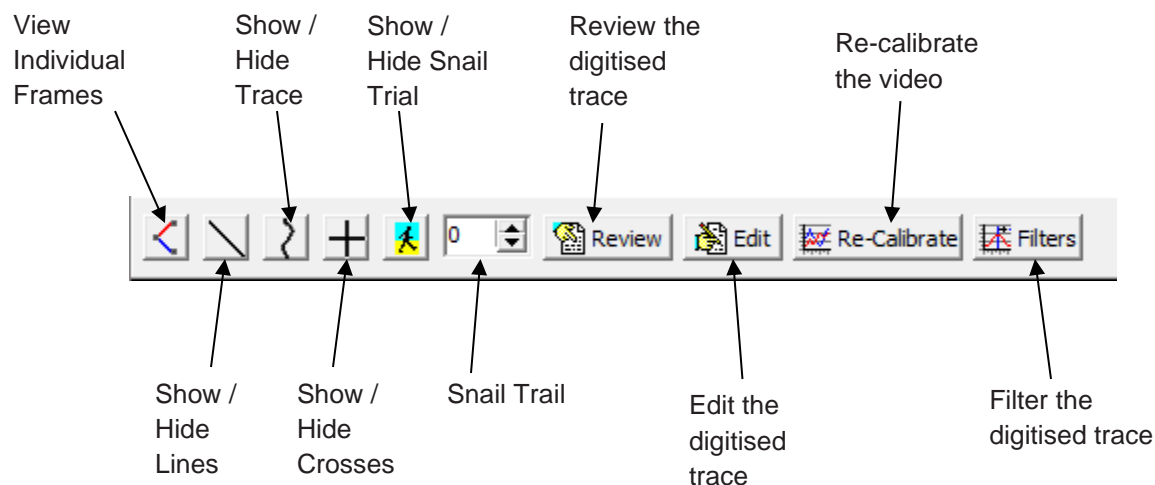
At the end of either Advanced Digitisation method, users have the option to review the digitisation trace. This section provides you further information on the options available within the review window.

a. Reviewing the Digitisation Trace

If you have pressed the 'Review' trace button, this will bring up the following window where you are able to Review, Edit, Re-Calibrate or Filter the digitisation trace.

IT MUST BE A SINGLE STEP TRACE IN ORDER FOR IT TO BE EDITED.





View Individual Frames – Shows the digitisation trace at that particular frame. If there are any links joining the points together, this will be displayed.

Show / Hide Lines – Shows the lines between the digitisation points. This will also include the current and all previous digitised frames (depending on whether the snail trail is in use).

Show / Hide Trace – Shows the smoothed digitisation trace. This will also include the current and all previous digitised frames (depending on whether the snail trail is in use).

Show / Hide Crosses – Shows the crosses of where the software has tracked each point. This will also include the current and all previous digitised frames (depending on whether the snail trail is in use).

Show / Hide Snail Trail – Shows a snail trail, where the user is able to control how many previous frames are to be displayed.

Snail Trail – Allows the user to control how many frames are to be displayed behind the current frame.

Review the digitised trace – This will allow the user to review the digitised trace.

Edit the digitised trace – This will allow the user to edit the digitisation trace. Please see the heading 'Editing a Digitised Trace' below for more information on how to do this.

Re-calibrate the video – This will allow the user to re-calibrate the video. Please see the heading 'Re-Calibrating an already Digitised Video' below for more information on how to do this.

Filter the digitised trace – This will allow the user to filter the digitisation trace using a Butterworth filter. Please see the heading 'Filtering a Digitised trace' below for more information on how to do this.

b. Editing a Digitised Trace

Press 'Edit' within the Edit Trace Data Window, which will pop up the 'Edit Marker Position' window.

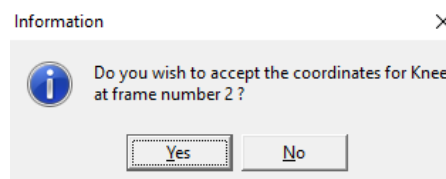


This will bring up all of the digitisation points for every frame that has been digitised, one point at a time. The point that is currently active will be displayed in green, so for the example above, the hip point is displayed. All the other points in the marker set will be highlighted in red within the Edit Marker Positions box.

N.B. You can only edit one trace at a time.

To edit, simply click on the marker point of interest and scroll to the frame(s) of which you want to edit and click on the screen to overwrite that digitisation point for that frame.

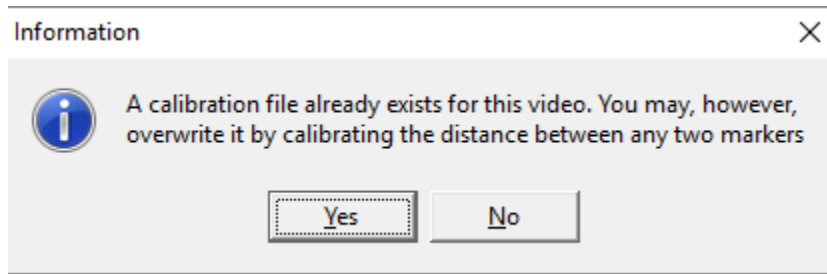
Once clicked, it will bring up a pop up to confirm that you are happy to accept the new point in the digitisation trace. Simply click YES if you are or NO to locate that point again.



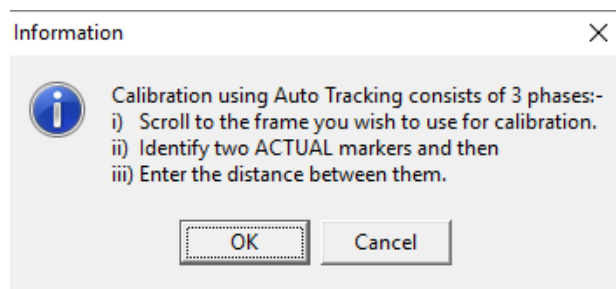
To exit from the editing mode, select one of the other options from the top menu bar or close the window.

c. Re-Calibrating an Already Digitised Video

Should you ever be required to re-calibrate a digitised video, please select the 'Re-Calibrate' Button within the Edit Window. This will pop up a new window stating this video already has a calibration file and asking if you would like to Re-Calibrate. If you would like to, simply click yes, if not, click no and this will continue to use the existing calibration file.

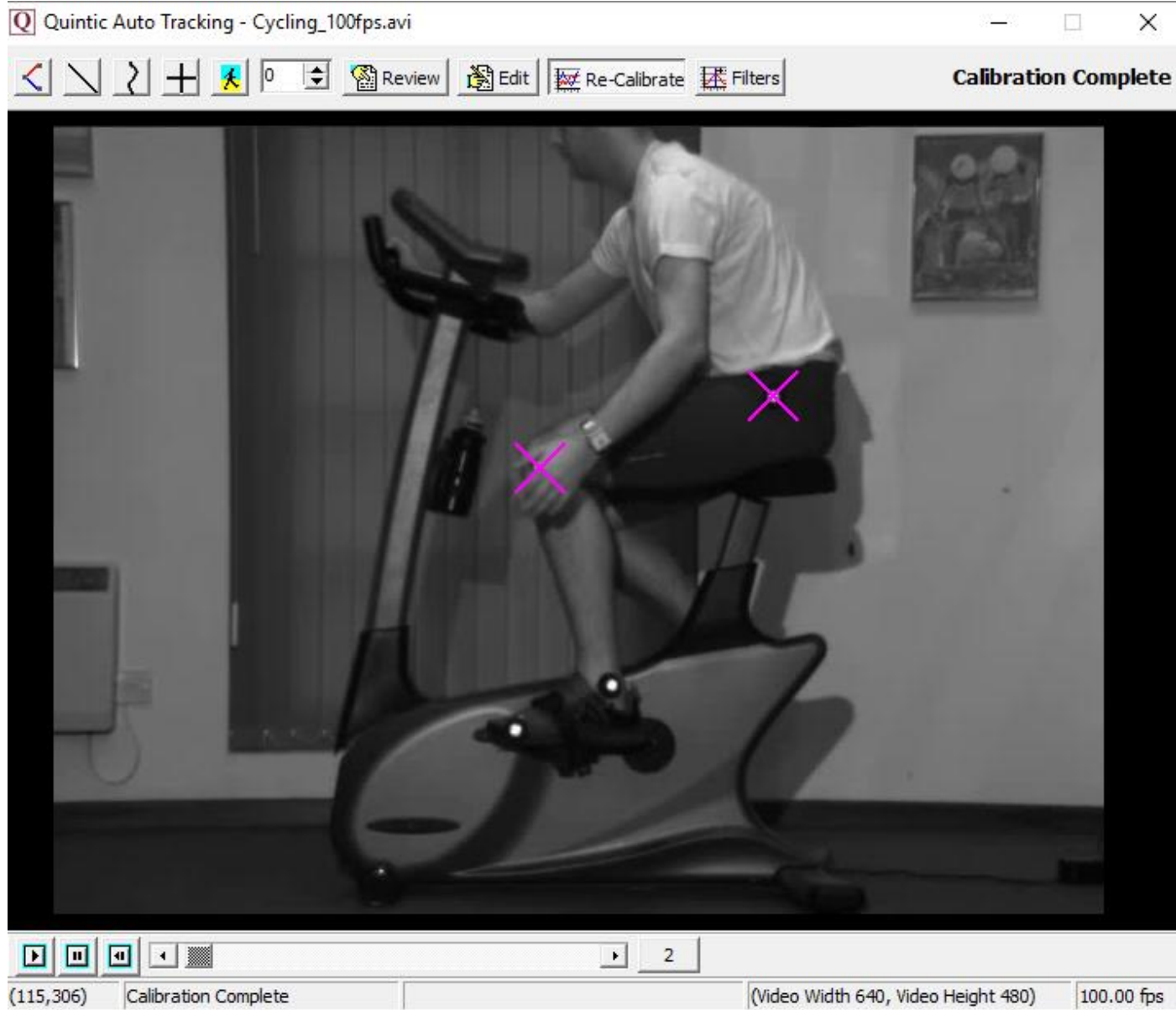


If you clicked yes, you will be brought to the following pop up window, where you will be required to scroll to the frame you wish to use for re-calibration, identify the two markers you wish to use for re-calibration, then enter the distance between them.



When re-calibrating, the software will only calibrate between two markers that have been digitised. Once you have selected the two markers and entered the distance between them, it will say calibration complete. Please see example below.

The software will 'lock on' to the nearest real marker point to where the user clicks.

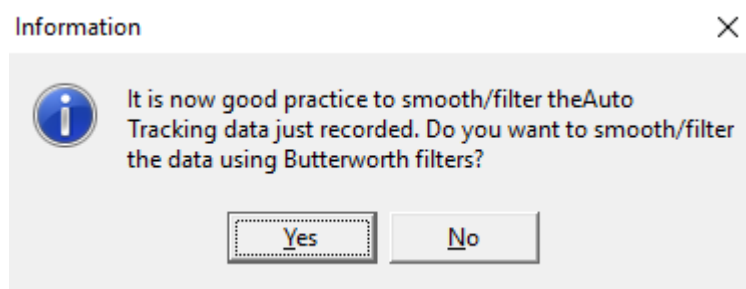


d. Filtering a Digitised Trace

It is important to smooth data that has been produced by digitising to remove any errors that may have occurred during the digitisation process, e.g. marker /skin / clothing movement errors.

If you would like to filter the digitised data, please select the 'Filters' Button within the Edit Window.

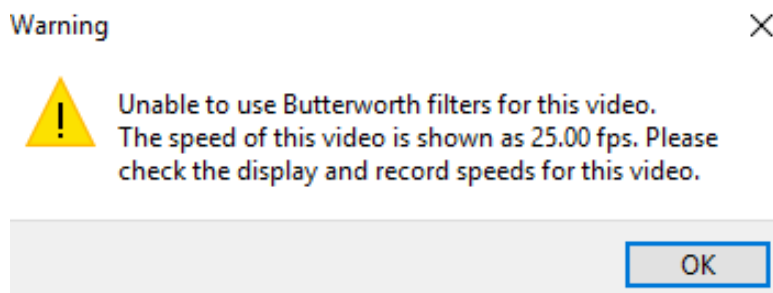
This will bring up the following window.



N.B The recording speed of the video has to be above 25 fps in order for that video to be filtered.

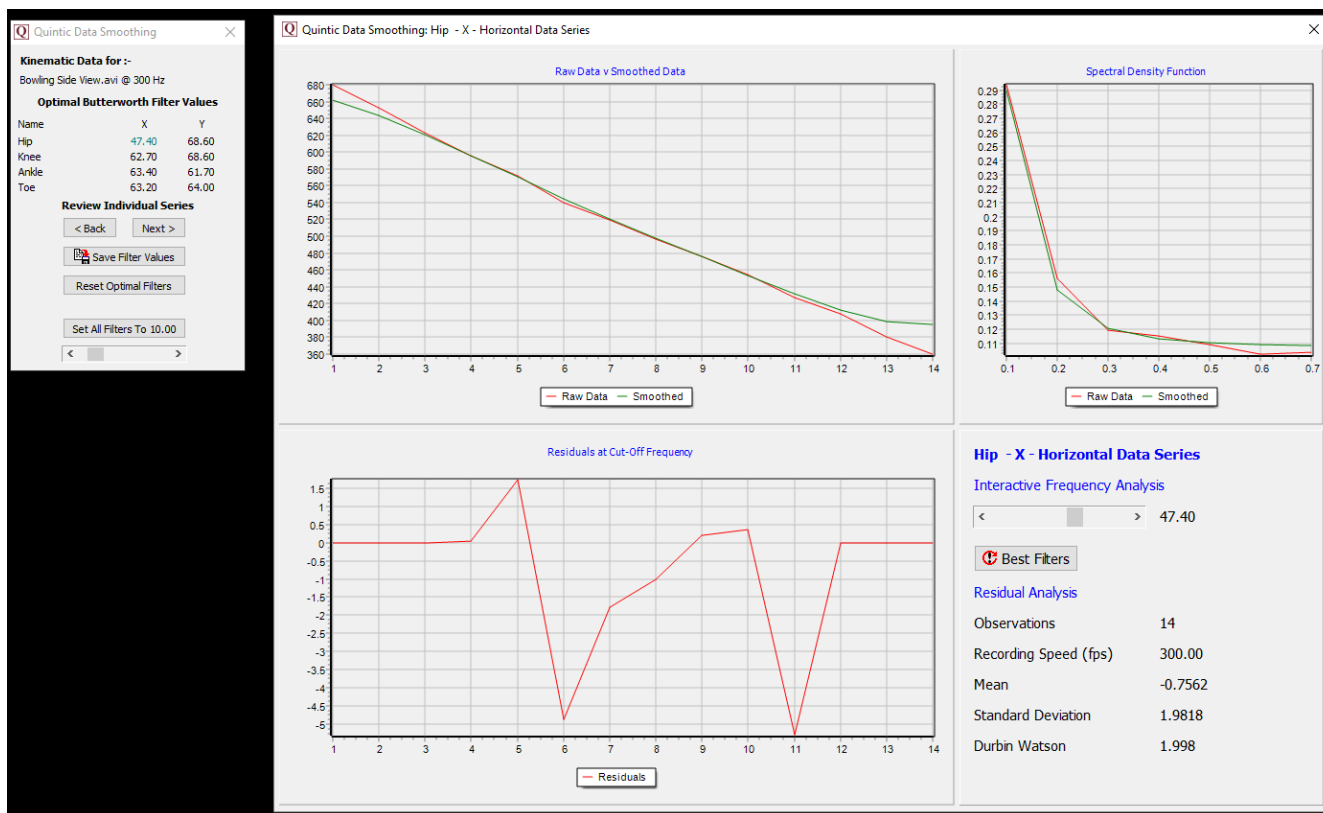
If you click No, no Butterworth filters will be applied.

If you click Yes but your video is less than or equal to 25 fps, the following message will appear.



If you clicked Yes and your video is greater than 25 fps, you will be brought to the screen below, to begin the data filtering procedure.

The '**Quintic Data Smoothing**' window will now load, illustrating the optimal Butterworth Filter values that have been placed on the data to smooth any data anomalies that may have occurred during the digitisation process.



Quintic Data Smoothing

Kinematic Data for :-
Bowling Side View.avi @ 300 Hz

Optimal Butterworth Filter Values

Name	X	Y
Hip	47.40	68.60
Knee	62.70	68.60
Ankle	63.40	61.70
Toe	63.20	64.00

Review Individual Series

< Back Next >

Save Filter Values

Reset Optimal Filters

Set All Filters To 10.00

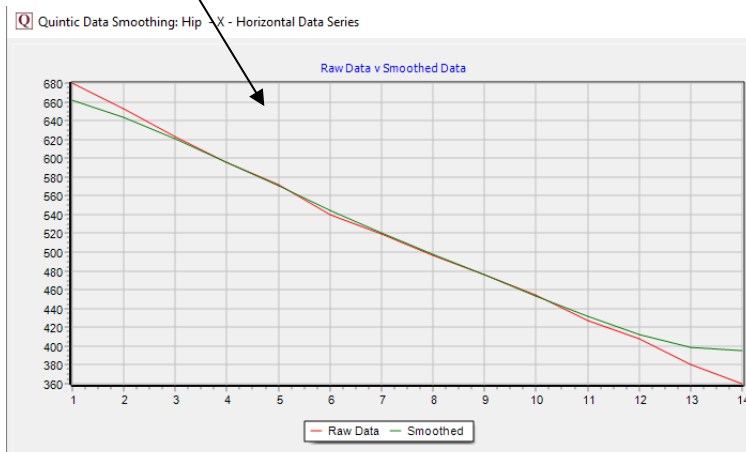
< >

Each point that has been digitised has its X and Y co-ordinates smoothed independently. These smoothing values are shown in the Quintic Data Smoothing window above, e.g. 47.40.

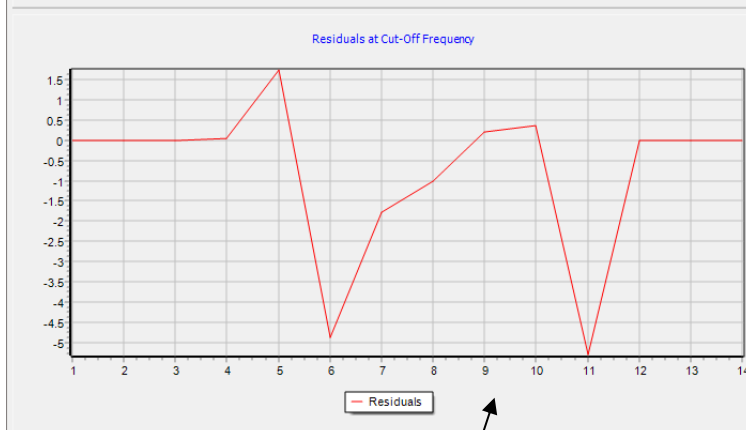
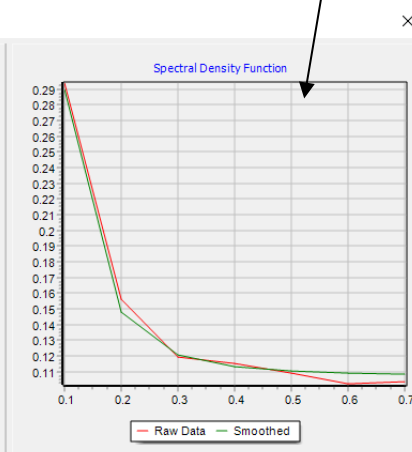
To move between each filter value, please click on the Next or Back buttons.

Should you like to review the filter settings to confirm optimal filters have been used, you are able to consider these values in the additional window. Please see below for more information on this window.

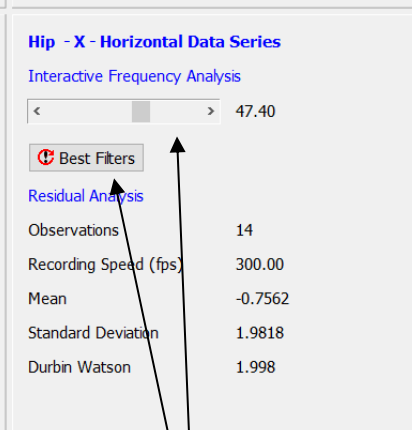
Raw Data v Smoothed Data



Spectral Density Function



Residuals at Cut Off Frequency




Interactive Frequency Analysis

Raw Data v Smoothed Data - This graph illustrates values for both the raw and smoothed data.

Spectral Density Function - Describes how the energy (or variance) of a signal or a time series is distributed with frequency. In physics, the signal is usually a wave, such as an electromagnetic wave, random vibration, or an acoustic wave. The spectral density of the wave, when multiplied by an appropriate factor, will give the power carried by the wave, per unit frequency.

Residuals at Cut off Frequency - This illustrates the difference between the raw and smooth data. Good values should oscillate around 0. If predominantly positive or negative values are produced, an incorrect filter value has been used.

Interactive Frequency Analysis - This function allows the user to control the level of filtering that is placed upon the raw data, by using the scroll bar. To reset the filters back to their optimum value, click on the 'Best Filters' button.

Once you are happy with the filter values that have been applied, simply click the Save Filter Values  Save Filter Values button and close the smoothing window(s).

8. Continue Manual Digitisation of an Existing Trace

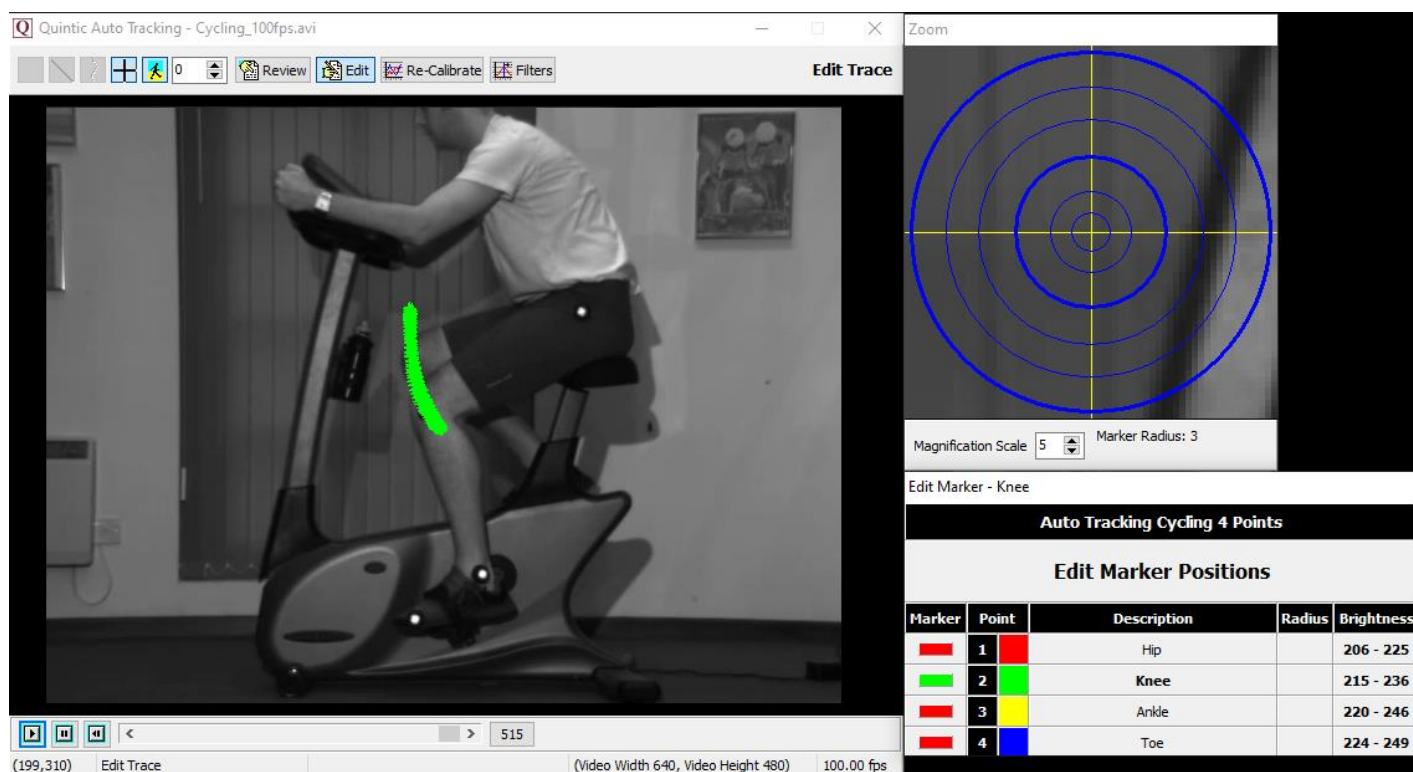
You are able to save a digitisation trace and then carry on Manually digitising it at a later time. This can be done by clicking the Digitisation button within the Digitisation tab, then clicking **'Continue Manual Digitisation of an Existing Trace'**.

This will allow the user to carry on digitising from the next frame after the last frame previously digitised. Please note, you are unable to re-edit previously digitised traces within this window.

9. Editing an Existing Trace

Should you like to edit a trace, you are able to do this by clicking on the 'Review/Edit an Existing Trace' button which is found by clicking the Digitisation button, within the Digitisation Tab.

This will pop up the following window, where you are able to Review, Edit, Re-Calibrate or Filter the digitisation trace, as detailed earlier in this tutorial.



The screenshot displays the Quintic Auto Tracking software interface. The main window shows a video of a person on a stationary bike with a green trace on their leg. The interface includes a toolbar with buttons for Review, Edit, Re-Calibrate, and Filters. A zoomed-in view of the tracking points is shown on the right, with concentric circles and a crosshair. Below the zoomed view, there is a table titled "Auto Tracking Cycling 4 Points" and "Edit Marker Positions".

Marker	Point	Description	Radius	Brightness
1	Red	Hip		206 - 225
2	Green	Knee		215 - 236
3	Yellow	Ankle		220 - 246
4	Blue	Toe		224 - 249