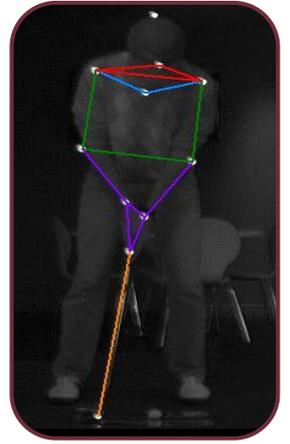
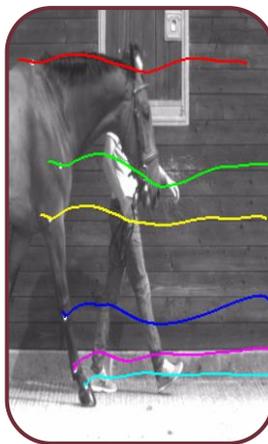
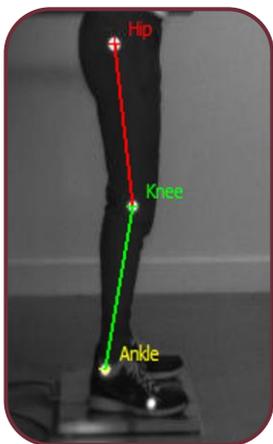


Q

Quintic Software

Quick User

Guide



Quintic[®]

#1 for Sports Analysis

www.quintic.com

“Quintic Biomechanics Software provides ACCURATE & FAST analysis which is why we’re the preferred supplier of Biomechanical Performance Analysis Software to the English Institute of Sport.”



“Centaur Biomechanics have been using Quintic Biomechanics software and hardware for equine research, teaching and consultancy since 2006. To accommodate the needs of new and experienced software users, Quintic offer three levels of software, ideal for all types of horse and rider analysis. To offer maximum flexibility, all levels of the Quintic software can be used with either compatible mainstream cameras or any Quintic High Speed Camera. We strongly recommend the Quintic software to anyone looking to complete horse or rider analysis.”



“The Quintic software has enabled us to objectively measure/assess gait and biomechanics where previously it was down to subjective opinion on where discrepancies were occurring. We are now able to accurately identify anomalies in both gait and functional activities through video capture. I would thoroughly recommend the software and Quintic as a company.”



Quintic Software Quick User Guide

Welcome to the Quintic Software Quick User Guide.

This guide is designed to support the full Quintic Tutorials package and provide quick instructions on the software functionality.

A copy of the all the Quintic Tutorials, covering everything from how to capture high quality video footage to how to use all the features available within all 3 levels of Quintic software are available to download here: [Quintic Tutorials v35](#).

We trust you will enjoy using your Quintic software – if we can be of any further assistance, please do not hesitate to contact us.

Kind Regards,



Dr Paul Hurrion (BA Hons, PhD)

Managing Director

Quintic Consultancy Ltd

Quintic[®]
#1 for Sports Analysis

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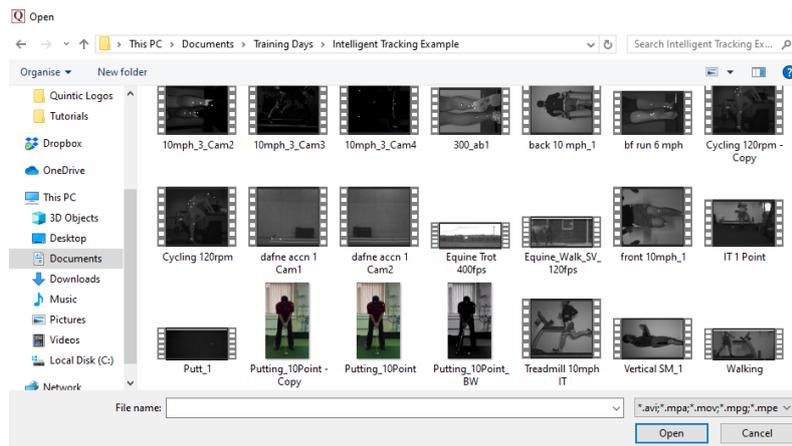
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Opening a video

1. Opening a Video File



- Open the Quintic Software
- Click on the yellow folder button within the Main Window to access video files
- Left double click on the chosen video file to open in Quintic



- Quintic Software is compatible with videos captured from Quintic High Speed Cameras as well as many videos captured from mainstream cameras (e.g. iPads, iPhones, Casios, Go-Pros etc).
- Videos captured from Quintic High Speed Cameras are able to be played directly through the Quintic Software



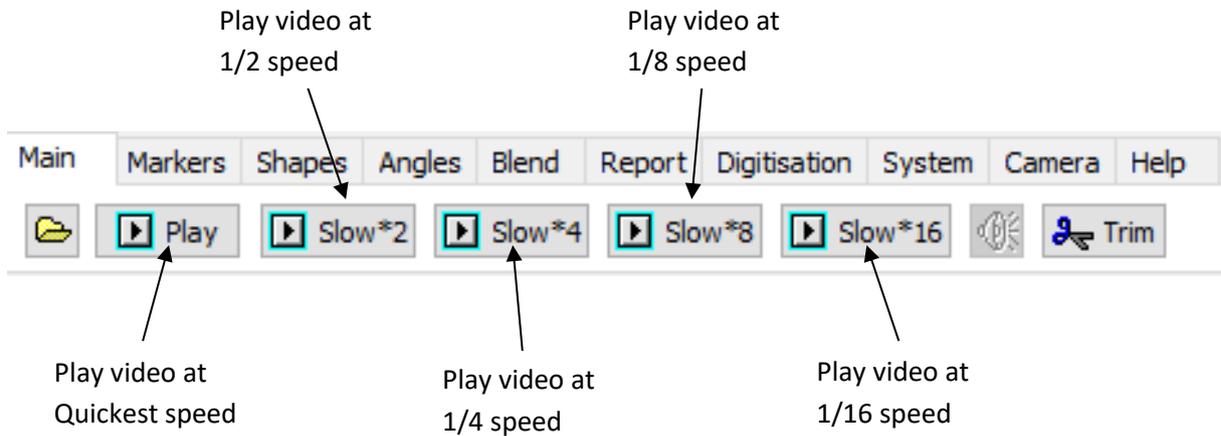
- Videos captured from a mainstream camera may require an additional video codec to be installed on the machine, in order for that video to be opened within the Quintic Software.
- These are available to be downloaded from our Quintic website. Please contact Quintic at info@quintic.com for advice on which video codec you would require.

Video Playback Controls

1. Playback Controls:

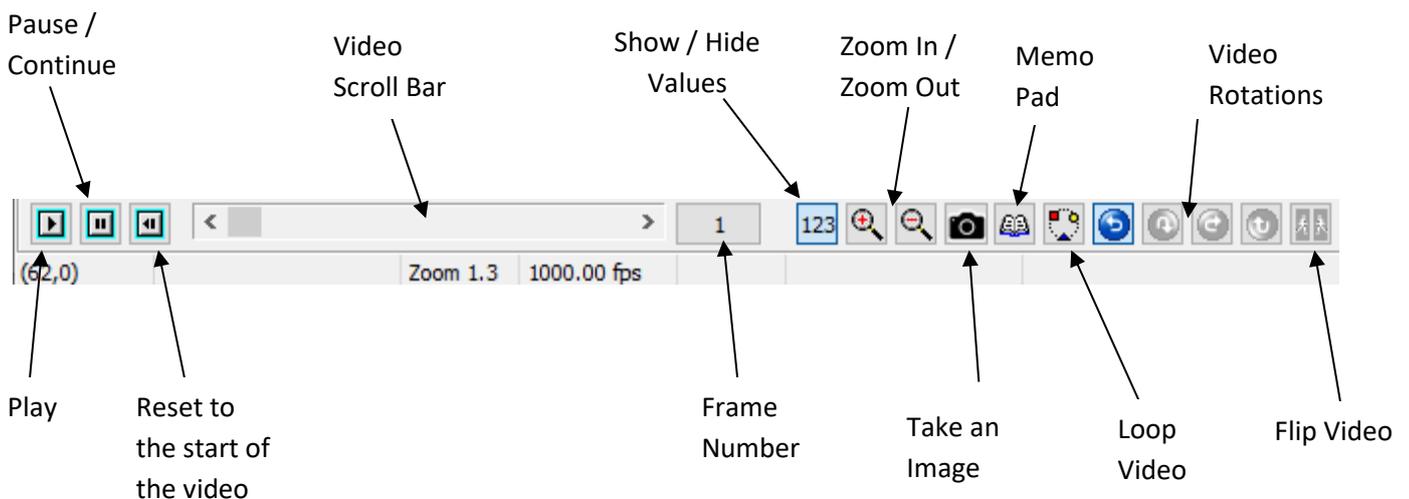
Used to vary the playback speed of the video.

Click on the following buttons to alter video playing speeds. Once pressed the video will start from the beginning.



2. Toolbar Functions:

The diagram below shows the different video functions available for video playback when using the toolbar.



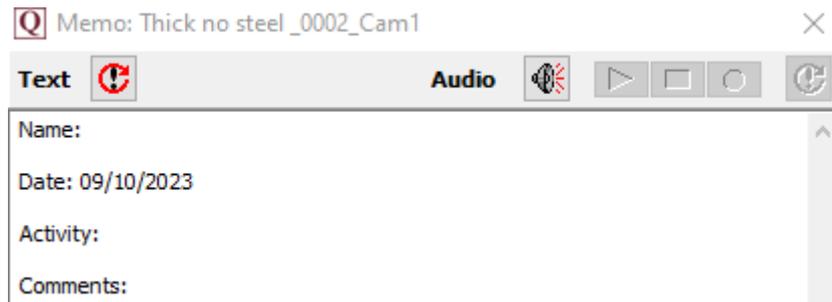
Memo Pad

Used to record audio and/or written feedback on a video for future reference.

Additions can be made to the memo pad at any time. Users are also able to create their own default memo.

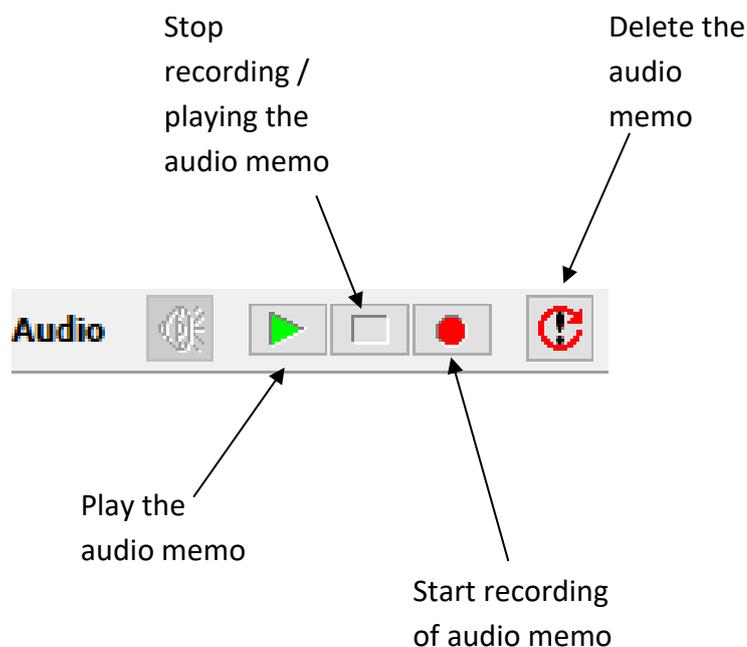
1. Text Memo

- Click on the 'Memo Pad'  button to open the memo pad.
- Add the desired text
- The Memo will be automatically saved every time changes are made.



2. Audio Memo

- Click on the activate memo  button to create the audio memo file. This will activate the other Audio memo buttons. Additional microphone required.
- The diagram below shows the various functions of the audio memo

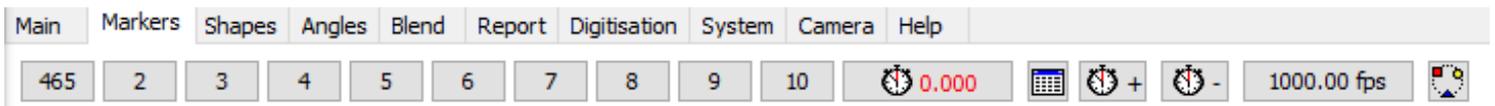


Frame Markers & Stopwatch

1. Frame Markers

The frame marker function allows key frames of a video to be saved and recalled easily.

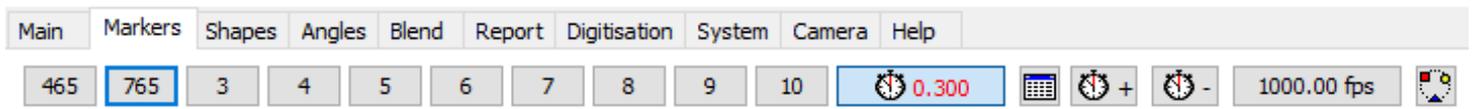
- To save a frame marker, scroll to the desired frame and left click on the marker frame number.
- The marker number will now change to the relevant frame number of the video.
- By right clicking on the marker, the user is able to change the name of the marker, so they know what key event the marker relates to.
- The markers are automatically saved.



2. Stopwatch

Used to calculate the elapsed time between chosen marked frames.

- Click on the marker you wish to start timing from
- Click on the stopwatch button
- Click on the marker you wish to time to
- The stopwatch will show the real time between the two markers
- Users can also add Stopwatch readings into the Stopwatch Table



N.B. Please check the recording speed of the video is correct. This can be changed by pressing the 'Set Video Recording Frame Rate' Button.

100.00 fps

- Click the 'Set Video Recording Frame Rate' Button
- This will let you calibrate the speed of the video.
- Enter in the correct frames per second of the video and click accept.

Recording Speed Calibration

Please check the recording speed for this video.
Some videos are recorded at a high speed but are usually played at a much slower speed.

Recording Speed (fps)

Accept ?

Reject ?

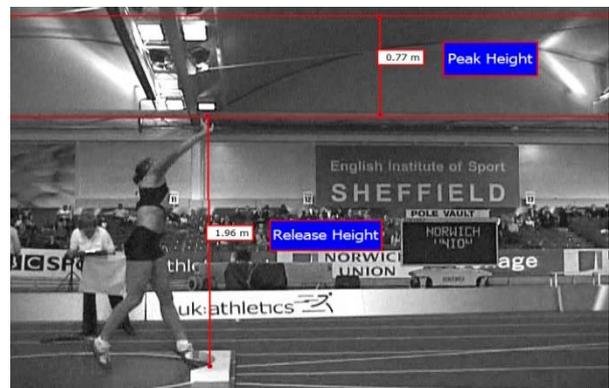
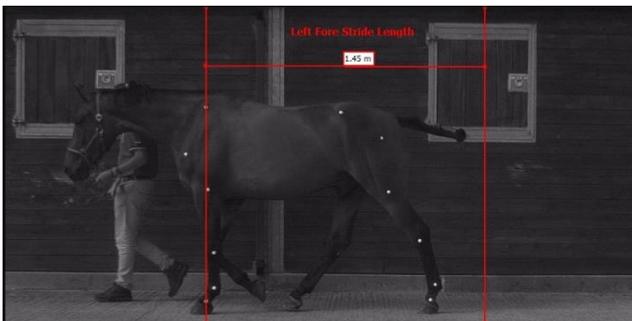
Shapes & Text

1. Shapes

Used to highlight key points on a video.



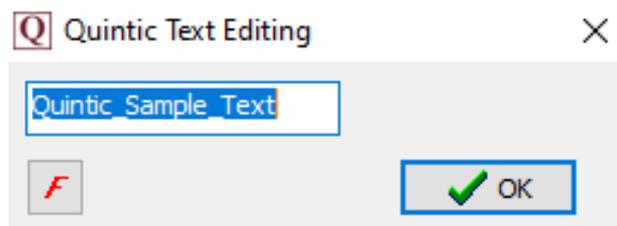
- Shapes can be added to videos by selecting one of the above buttons
- Once selected left click on the area of the video where the shape is required and drag to draw the shape and it will appear
- Shapes are automatically saved
- When within the shapes tab and no shape is selected, users are able to move any existing drawn shapes (not freehand), or double click on a shape to delete it.



2. Text

Used to add text directly onto the video file.

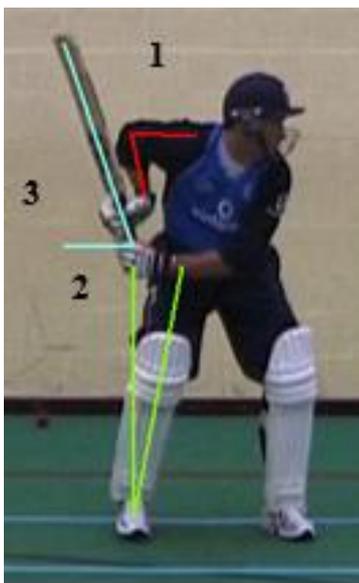
- Click on the **T** button to add text to the video
- Write the required text
- To change the font, click on the 'F' button inside the text editing window and change if required.
- Once you click 'OK', left click and hold and you will see the text attached to your cursor. Position this where you would like the text to stay.
- Release the left click and the text will be placed on the video in the relevant position.



Angles

Used to illustrate and calculate angles directly on the video. Four angles can be measured: Freehand Angle (Angle between two straight lines), Angle to the Vertical (a specified line and an exact vertical line), Angle to the Horizontal (a specified line and an exact horizontal line) and an Intersection Angle (The angle where two specified lines intersect).

- Click on the 'Angles' tab and then select which angle is best suited to your measurement



1. The angle between two straight lines e.g. Elbow angle.



2. The angle between a line you specify and an exact vertical line e.g. angle of body lean. Left mouse button will draw the vertical line up, the right mouse button will draw the vertical line down.



3. The angle between a line you specify and an exact horizontal line e.g. angle at which the bat is being held. Left mouse button will draw the horizontal line to the left, the right mouse button will draw the horizontal line to the right.



The intersection angle: Draw two straight lines anywhere on the video (they do not have to join) and the intersection angle will be calculated and displayed.

- Click the  button to display the angles table.
- Click on the  button to show/hide any drawn angles.
- When within the angles tab and no angle option shape is selected, users can hover the cursor over any drawn angle to highlight this in the angles table, or double click on an angle to delete it.

Take a Picture & Photo Sequence

1. Take a Picture

Used to save an individual image from the video that is open within the Quintic software. The image can include any shapes, angles, digitisation traces, blends and overlays that are also on the video.

- The  button allows screenshots of the video to be taken and is located between the zoom and memo pad buttons.
- To save the image, click on the  button to take an image and then select **'File'** and **'Save as Jpeg'**
- To export the image, click on the  button to take an image, select **'File'** and **'Copy to Clipboard'**. Open Word, PowerPoint etc and select **'Paste'** to insert the captured image from Quintic.

2. Photo Sequence

Used to capture a sequence of images in order to break down/analyse a technique.

- Users are able to create a photo sequence which can contain up to six columns and four rows of images (up to 24 images in total).
- This can be done by going to the **'Photo Sequence'** function located within the **'Report Tab'**.
- By default, the Photo Sequence will open with 2 columns and 2 rows (4 images in total), with the same aspect ratio as the video.
- Simply scroll the video file to the frame(s) you want to include in the photo sequence and press the  button.
- Users have the ability to change the number of columns/rows, the photo region as well create an Automatic Photo sequence.
- Click on **'File'** and either select **'Copy to Clipboard'**, **'Save as Jpeg'** or **'Save as BMP'** to finish.



Export Analysis

Used to create a new .avi or .mp4 video file that includes any shapes, angles, digitisation traces or text that has been added to the video.

This video can then be viewed in any version of the Quintic software including the Player, or smart phone/tablet (MP4 option) thus allowing the user to view an athlete's technique with the relevant coaching points overlaid.

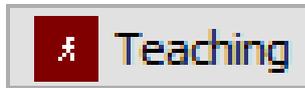
- Open the video you want to export within Quintic. Scroll to the first frame you wish to export.
- Click on the **'Report'** tab and choose your preferred Export option (Video / Screen / Window)
- Click the **'Start Export Analysis'** button, the video will now start exporting.
- Pause the video and add any shapes, text, lines, angles and digitisation traces to the video on the desired frames.
- When the video advances a frame, the previous frame is saved automatically.
- Click on the **'Stop'** button to stop the export analysis (The process will automatically stop once the video has reached the final frame).
- Click on **'Yes'** to save the video, select a file name and video file type and select **'Save'**.
- Once the video has been saved, the new video can be viewed in Quintic Software, the Free Quintic Player or on a smart phone/tablet (MP4 option).



Viewing Modes

Used to change the shape, size and number of windows in which videos can be displayed.

The following functions are found under the **'System'** tab:



Sets the screen in the Teaching mode, which fills the computer screen so you can see the whole image.



Sets the screen in the Vertical mode and opens a second window. Suits videos which are longer than they are wide.



Sets the screen in the Horizontal mode and opens a second window. Suits videos that are wider than they are long.



Opens a total of 3 windows (Coaching & Biomechanics)



Opens a total 4 windows (Coaching & Biomechanics)



Opens a total of 5 windows (Coaching & Biomechanics)

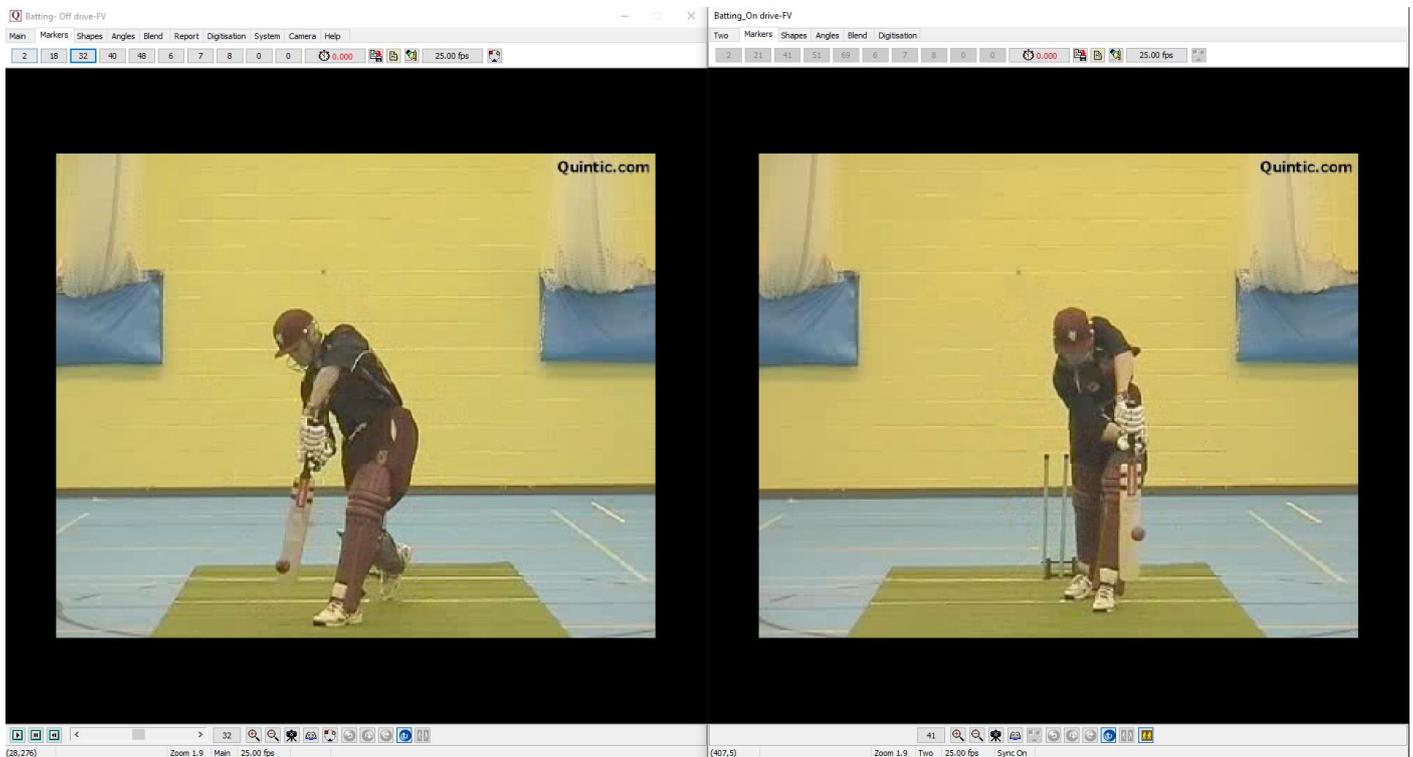


Opens a total of 6 windows (Coaching & Biomechanics)

Manual Synchronisation

Used to synchronise 2 or more videos from a common time point (e.g. Take off, Impact, Landing etc). The videos can then be played through simultaneously, providing they are of the same frame rate.

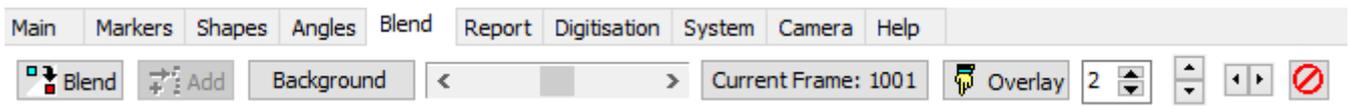
- Go to the 'System' tab and open the required number of windows for the number of videos you would like to synchronise.
- Click on the yellow folder  button within the Main window and select the video you wish to open.
- Repeat this for the other windows you have open.
- Use the 'Play' and 'Pause' buttons, the video scroll bar or the frame markers to advance all the videos to the same specific point (e.g. Take off).
- When reached, press the  button which is located in the bottom right hand corner of the second window (as well as third, fourth, fifth and sixth).
- Once synchronised, video playback is controlled through the main window.
- To turn off synchronisation, press the  button again on each window.



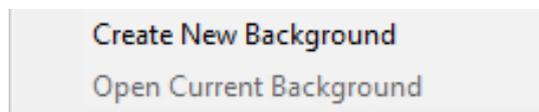
Video Blend

The Blend function allows the user to break down a movement by taking several still jpegs throughout the video and saving them as background images. The saved background images can be seen faintly on screen while the rest of the video plays through, allowing the coach/athlete to see differences in body position throughout the technique.

- Load a video that you want to Blend and click on the **'Blend'** tab.
- Within the **'Blend'** tab, click on the **'Blend'** button



- The following Drop Down Menu will appear. Click on **'Create New Background'**



- Scroll to the first frame you wish to save as a background and click on the **'Add'** button
- Once this has been added, scroll to the next frame required as a background image and click **'Add'**
- Repeat this until all the required background images have been added. The background button will have updated with how many background images you have chosen.
- You are able to use the Blend scroll bar to control how dominant the main video is compared to the background images.



Scroll towards
'Background' to
show more of the
Background images



Scroll towards
'Current Frame' to
show more of the
current video
frame

Video Overlay

The Overlay function allows two synchronised videos to be played over the top of each other. Ideal for comparing performances from 2 different individuals or the same individual on 2 different occasions.

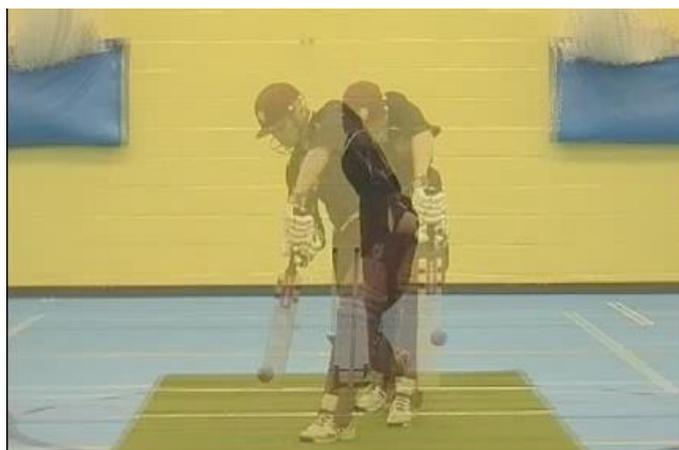
- First, use the **'System'** tab to open 2 windows, either using the **'Vertical'** or **'Horizontal'** option.
- Open the videos you would like to Overlay in each of the Quintic Windows. The videos have to be the same frame rate.
- Scroll to a common time point of both videos (e.g. Impact, Take Off etc).
- Use the synchronise  button in the bottom right hand corner of the second window to synchronise the 2 videos to the common time point.
- When synchronised, click on the **'Blend'** tab and select the **'Overlay'** Button



- The second window will now disappear and both videos will be overlaid on top of each other in the main window.
- The user can scroll through frame by frame or play the videos in synchronisation
- The scroll bar can be used to change the dominance of the video between the main and the second window
- Users are also able to shift the overlaid video if needed by clicking on the  buttons.
- Scroll towards **'Current Frame'** to change the video dominance to the main window, or scroll towards the **'Background'** to change the dominance to the second window. If the scroll bar is positioned in the middle of the scroll bar, both videos can be seen with equal dominance.



- To exit the Overlay function, select the **'Reset'**  button.

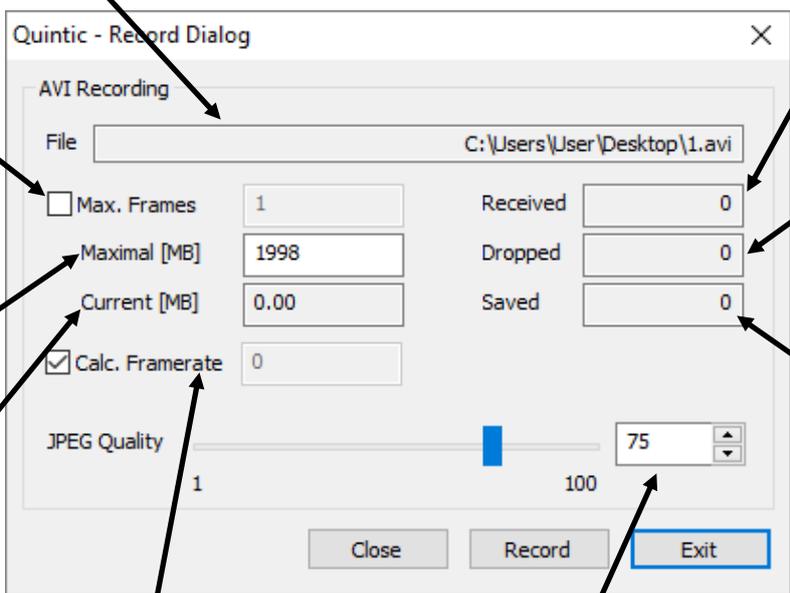


Single High-Speed Camera Capture

Used to capture high speed video footage from a single Quintic camera (USB2 / GigE / USB3 1MP). To use this software all drivers and devices must be installed prior to use. The camera must also be configured correctly.

1. Using the Camera:

- Click on the **'Camera'** tab, then **'High Speed Capture'** then **'Single'**
- Click **'OK'** on the **'Please Install latest USB updates'** window.
- To open the camera, click on the  button.
- To start capture, click on the  button
- The **'Record Dialog'** box will then appear
- Click on the **'Create'** button and select a file name for your video and then click on the **'Save'** Button
- Click on the **'Record'** button to start and stop capture



The screenshot shows the 'Quintic - Record Dialog' window. It has a title bar with a close button. The main area is titled 'AVI Recording' and contains several fields and controls:

- File:** A text box containing 'C:\Users\User\Desktop\1.avi'. An arrow points to it with the text 'File: Name of the AVI being recorded'.
- Max. Frames:** A checkbox that is unchecked, with a value of '1' in the adjacent box. An arrow points to it with the text 'Max Frames: If selected, the user can set the number of frames after which recording will stop automatically.'
- Maximal [MB]:** A text box containing '1998'. An arrow points to it with the text 'Maximal MB: Sets the maximum size (MB) of the AVI File. Recording stops when the AVI file reaches this size.'
- Current [MB]:** A text box containing '0.00'. An arrow points to it with the text 'Current MB: Indicates the current AVI file size.'
- Calc. Framerate:** A checkbox that is checked, with a value of '0' in the adjacent box. An arrow points to it with the text 'Calc. Frame Rate: If selected, the frame rate of the video is determined automatically during recording. Quintic recommend keeping this selected.'
- JPEG Quality:** A slider control ranging from 1 to 100, with a value of 75. An arrow points to it with the text 'JPEG Quality: Sets the JPEG compression level, 1 = lowest quality/highest compression, 100 = highest quality/lowest compression. Quintic recommend a setting of 75, as going higher than this value may result in dropped frames.'
- Received:** A text box containing '0'. An arrow points to it with the text 'Received: Indicates number of frames transferred.'
- Dropped:** A text box containing '0'. An arrow points to it with the text 'Dropped: indicates number of dropped frames during capture.'
- Saved:** A text box containing '0'. An arrow points to it with the text 'Saved: Indicates number of frames saved to the AVI file.'

At the bottom of the dialog are three buttons: 'Close', 'Record', and 'Exit'.

NB: Do not use commonly unaccepted symbols such as '&' or '/' as this may result in the file not saving correctly.

Multi High Speed Camera Capture

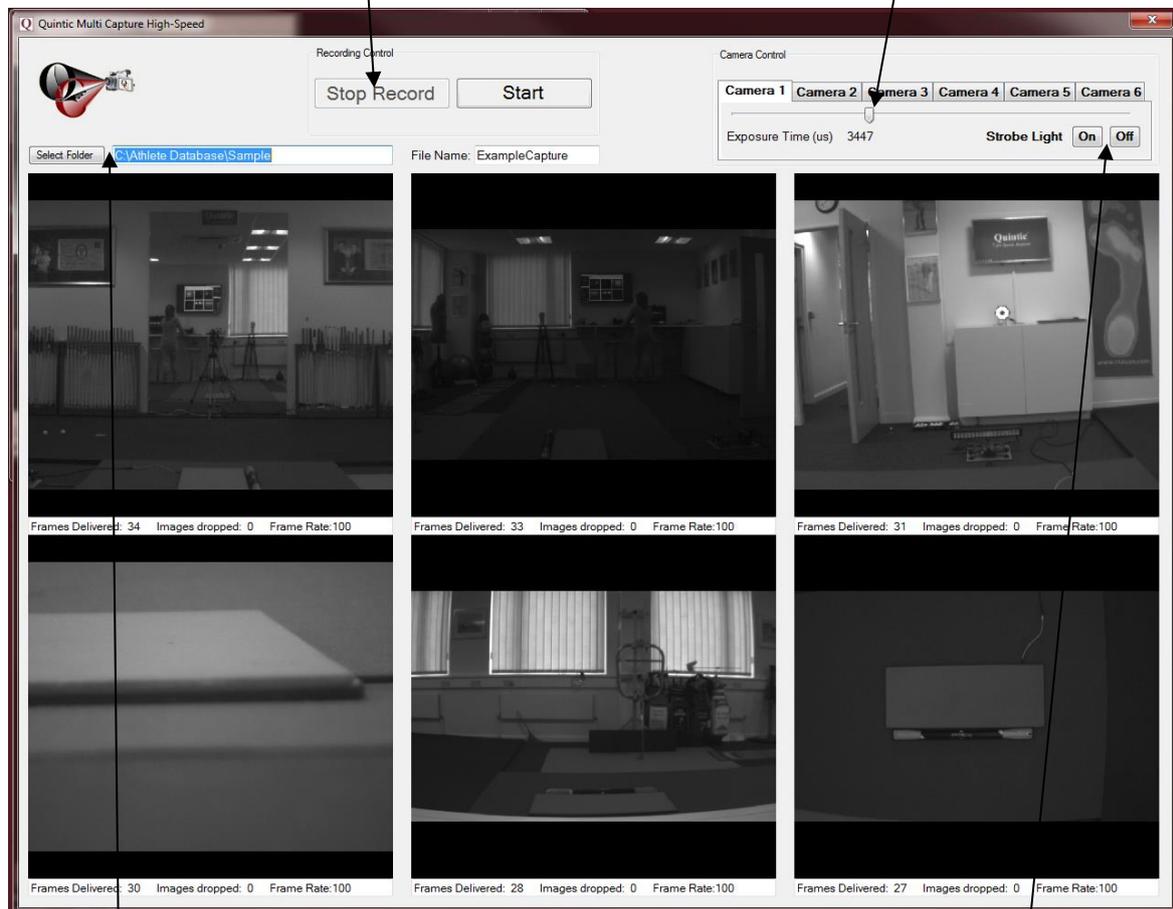
Used to capture high speed video footage from more than one Quintic camera (USB2 / GigE / USB3 1MP). To use this software all drivers and devices must be installed prior to use. The camera must also be configured correctly. This is only available in Coaching and Biomechanics.

1. Using the Camera:

- Click on the 'Camera' tab, then 'High Speed Capture' then 'Multi'.
- This will load all the live views from the Quintic Cameras.
- When recording, the live image will freeze as the video is being saved directly to the PC in the background.

It is possible to pause and continue, or stop recording.

It is possible to change the Camera exposure time using the slider bar should you require.



Select the destination folder you wish to save the video files into, enter a file name, and start recording. This is recommended to be a physical drive on the PC (i.e. C / D Drives etc).

If you are using an IR ring light you can control this here.

NB: Do not use commonly unaccepted symbols such as '&' or '/' as this may result in the file not saving correctly.

High-Speed 1.3MP Camera Capture

Used to capture high speed video footage from 1 to 6 Quintic USB3 1.3MP High Speed Cameras. To use this software all drivers and devices must be installed prior to use. The camera must also be configured correctly.

1. Using the Camera:

- Click on the **'Camera'** tab, then **'High Speed Capture'** then **'1.3 MP'**
- This will load all the live views from the Quintic 1.3MP Cameras.
- The Quintic 1.3MP camera has a recording time limit of 15 seconds regardless of how many 1.3MP cameras are being used at once.

The screenshot shows the software interface with several annotated components:

- Stop Button:** A button labeled "Stop Record" in the Recording Control panel.
- Start/Resume Live Button:** A button labeled "Start Record" in the Recording Control panel.
- Auto-Increment:** A dropdown menu showing "1" in the File Name field, with a note: "Auto-Increment - Every time a video is saved, the Auto-Increment will increase by 1."
- Exposure Slider:** A slider in the Camera Control panel for "Exposure Time: 4.89us", with a note: "Exposure Slider – should the user want to manually control the exposure".
- Strobe Light:** A toggle switch labeled "Strobe Light" with "On" and "Off" options, and a "Full Screen" button next to it. A note says: "Strobe Light for use with IR Lights".
- Select Folder:** A text box labeled "Select Folder" containing "C:\", with a note: "Select the folder where you wish to save the video file. Then enter a valid name into the 'File Name' box."
- Capture Area:** A large video preview window showing a person in a starting crouch on a track, with a note: "Capture Area".

NB: Do not use commonly unaccepted symbols such as '&' or '/' as this may result in the file not saving correctly

High-Speed 4MP Camera Capture

Used to capture high speed video footage from 1 to 6 Quintic USB3 4MP High Speed Cameras. To use this software all drivers and devices must be installed prior to use. The camera must also be configured correctly.

1. Using the Camera:

- Click on the 'Camera' tab, then 'High Speed Capture' then '4 MP'
- This will load all the live views from the Quintic 4MP Cameras.
- The Quintic 4MP camera has a recording time limit of 10 seconds regardless of how many 4MP cameras are being used at once.

The screenshot shows the software interface for capturing high-speed video. It features a 'Recording Control' panel with 'Stop Record' and 'Start Record' buttons, a 'Camera Control' panel for 'Camera 1' with 'Exposure Time: 4.89us', 'Strobe Light' controls (On/Off), and a 'Full Screen' button. A 'File Name' field contains 'Example' and a 'Select Folder' button is visible. The main area is a 'Capture Area' showing a black and white video of a person in a starting crouch on a track. Annotations with blue arrows point to various elements: 'Stop Button' points to the 'Stop Record' button; 'Start/Resume Live Button' points to the 'Start Record' button; 'Auto-Increment - Every time a video is saved, the Auto-Increment will increase by 1.' points to the file name field; 'Exposure Slider - should the user want to manually control the exposure' points to the 'Exposure Time' field; 'Strobe Light for use with IR Lights' points to the 'Strobe Light' controls; 'Select the folder where you wish to save the video file. Then enter a valid name into the "File Name" box.' points to the 'Select Folder' button; and 'Capture Area' points to the video frame.

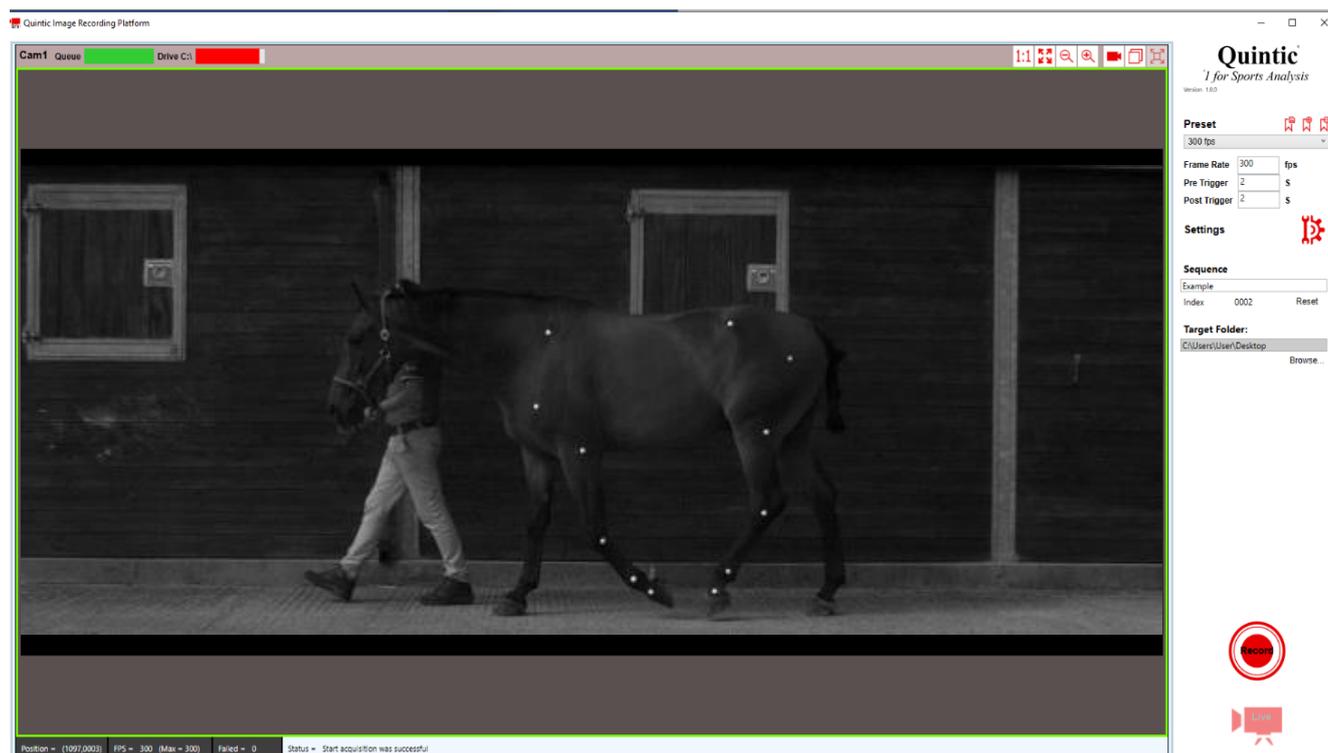
NB: Do not use commonly unaccepted symbols such as '&' or '/' as this may result in the file not saving correctly

Quintic Image Recording Platform

Used to capture high speed video footage from 1 to 6 Quintic High Speed Cameras. To use this software all drivers and devices must be installed prior to use. The camera(s) must also be configured correctly.

1. Using the Camera:

- Click on the 'Camera' tab, then 'Quintic Image Recording Platform'
- This will load all the live views from the Quintic Cameras.
- For further information on how to configure your Quintic Cameras within the Quintic Image Recording Platform, please see tutorial 6G.



- Users are able to record video footage by pressing the 'Record' button on the bottom right-hand side of the Quintic Image Recording Platform software.
- When the video is being captured, a green progress bar will appear to show the progress of the video being recorded.
- Once the video has been recorded, this will then load in the Quintic Image Recording Platform. Users are able to play and trim the video before moving onto the next recording.
- If the users are happy with the video, they are able to press the Live button which will then close off the current video and save this, as well as open the live feed of the camera.
- If the video needs trimming to remove excess footage, they can do this by using the trim buttons. Once trimmed, press the Live button to open the live feed of the camera and continue to capture videos should you wish to do so.

NB: Do not use commonly unaccepted symbols such as '&' or '/' as this may result in the file not saving correctly

Digitisation Setup

Digitisation allows you to track the location of different body parts (or pieces of equipment) for the duration of a video clip (or a selected part of the video). This allows Linear and Angular Distances, Velocities and Accelerations to be calculated.

- Click on the **'Digitisation'** tab and select the **'Digitisation'** menu.
- Work down the **'Digitisation'** menu to produce a frame template, calibrate and digitise your video



1. Frame Templates:

Quintic have provided a selection of Manual, Automatic and Intelligent tracking frame templates for your convenience. These can be found in the **Quintic Sample Videos > Templates** folder on your PC. Users are also able to create their own template for Manual, Automatic or Advanced Digitisation.

2. Calibration:

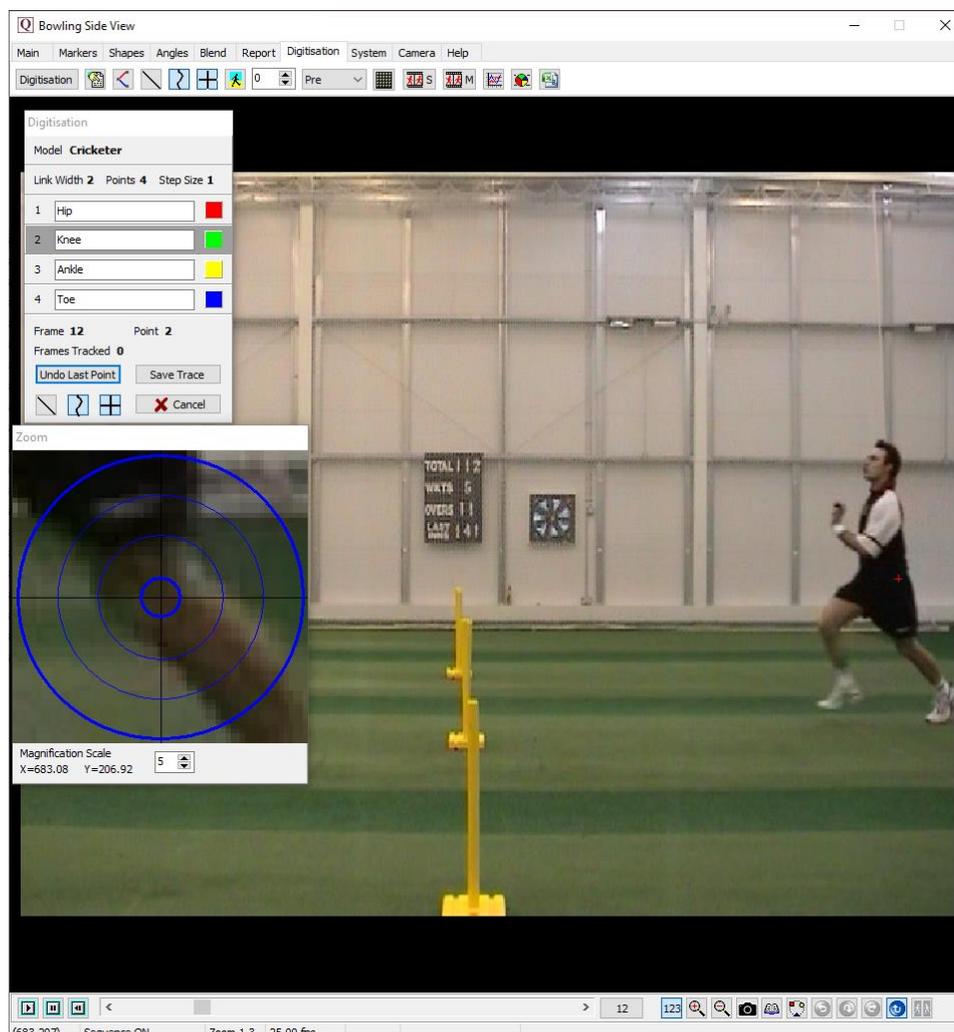
Used to identify a known length on the video to allow linear measurements to be calculated.

- Calibrate the video by selecting **'Video Calibration'** and selecting one of the calibration options.
- **'Horizontal and Vertical Lines (Recommended)'** requires the user to calibrate both the horizontal and vertical axis of the video. **'Horizontal Line Only'** requires the user to calibrate the horizontal axis only. **'Vertical Line Only'** requires the user to calibrate the vertical axis only. **'Line in any Direction'** allows the user to calibrate using a line which is not vertical or horizontal.
- Once the calibration line(s) have been drawn, the user will then enter the recording speed of the video, if this has not come through at the correct speed.
- Once confirmed, the video has been calibrated and is ready to be digitised using Manual/Automatic/Intelligent/Advanced Digitisation.
- If the same calibration is being used for more than one video, click on **'Load an external calibration file'** from the Digitisation menu.
- Find the calibration file in question and select this in order for the video to be calibrated with the existing calibration file.

Manual Digitisation

Manual Digitisation is used when markers have not been placed on the participant or object. This is ideal for understanding the fundamentals of digitisation or when the athlete is in competition, where no markers are allowed to be placed on the athlete.

- Complete the calibration steps and then select **'Manual Digitisation of a New Trace'** from the **'Digitisation'** menu.
- Locate and load up the frame template you wish to use
- The system is now ready for digitising, scroll to the first frame you want to digitise
- The Frame Template identifies which point to digitise. Use the zoom window to hover over the correct area and left click on the relevant point
- The template will recognise the selection and move to the next point
- Once all the digitisation points have been selected for the current frame, the video will ask you to confirm the current frame before advancing onto the next frame.
- Repeat these steps until digitisation is complete
- If you make a mistake, click the **'Undo Last Point'** button
- To save the digitisation trace, click on the **'Save Trace'** button



Automatic Digitisation

Automatic Digitisation is used when markers have been placed on the participant or object, allowing for a more accurate and efficient digitisation.

1 Point Automatic Digitisation is available within Quintic Sports v35

2 Point Automatic Digitisation is available in Quintic Coaching v35

21 Point Automatic Digitisation is available in Quintic Biomechanics v35.

- Complete the calibration steps and then select **'Automatic Digitisation of a New Trace (White or Black Markers)'** from the **'Digitisation'** menu.
- Locate and load up the single step frame template you wish to use
- Once selected, you will be required to select the **'First'** and **'Last'** frames for digitisation or to digitise the **'Full Video'**
- The whole marker set has to be in the first and last frames of digitisation
- Once selected, please identify the markers in the order of the template and select the **'Start Tracking'** button to start the Automatic digitisation.
- The video will begin to play and the identified markers will be tracked automatically.
- The video will stop when a marker is not visible (e.g. covered by an arm swing etc), where the user will have to either Manually track that point or put the tracking into Interpolation until that marker is visible again.
- When the last frame has been digitised or if the user clicks **'Stop Tracking,'** a pop up will appear that will inform the user Automatic Digitisation has finished. The user is then able to choose **'Smooth'** to apply smoothing parameters, **'Raw'** to save the raw data without any filters or **'Review'** to review the trace.



Intelligent Digitisation

Intelligent Digitisation is used when markers have been placed on the participant or object, allowing for a more accurate and efficient digitisation. There is no need for any manual intervention from the user as Intelligent digitisation is able to automatically locate, relocate and interpolate lost markers.

2 Point Intelligent Digitisation is available in Quintic Coaching v35 and up to 3 Point Intelligent Digitisation is available in Quintic Biomechanics v35 as well as specific templates for human gait, equine gait, cycling and putting.

- Complete the calibration steps and then select **'Intelligent Digitisation of a New Trace (White Markers)'** from the **'Digitisation'** menu.
- Locate and load up the relevant Intelligent tracking template from the **'Intelligent templates'** folder
- Once selected, you will be required to select the **'First'** and **'Last'** frames for digitisation or to digitise the **'Full Video'**
- The whole marker set has to be in the first frame of digitisation
- Add blockers, an initial search area and edit the marker pixel radius and brightness settings accordingly.
- Select **'Auto Detect Markers'** or manually select markers if not possible
- Tracking will start and continue until the chosen end point of digitisation or the user has chosen to stop tracking.
- When the last frame has been digitised or if the user clicks **'Stop Tracking,'** a pop up will appear that will inform the user Intelligent Digitisation has finished. The user is then able to choose **'Smooth'** to apply smoothing parameters, **'Raw'** to save the raw data without any filters or **'Review'** to review the trace.

The screenshot displays the Quintic Intelligent Tracking software interface. The main window shows a video of a horse being tracked, with a red box highlighting a specific area and a cyan box highlighting the horse's body. A zoomed-in view of the horse's head is shown in the center, with a blue circular target area. The interface includes a toolbar with icons for search, possible markers, and settings. A table on the left lists markers for an equine foreleg, with columns for Marker, Point, Description, Radius, and Brightness. The table is currently empty, and the 'AUTO DETECT MARKERS' button is visible above it.

Marker	Point	Description	Radius	Brightness
1	Wither			
2	Shoulder			
3	Elbow			
4	Knee			
5	Fetlock			
6	Coronet			

Reference Model - Identify All Markers
Equine - Fore Leg
AUTO DETECT MARKERS

Zoom
Magnification Scale: No Marker Possible, Brightness: 186

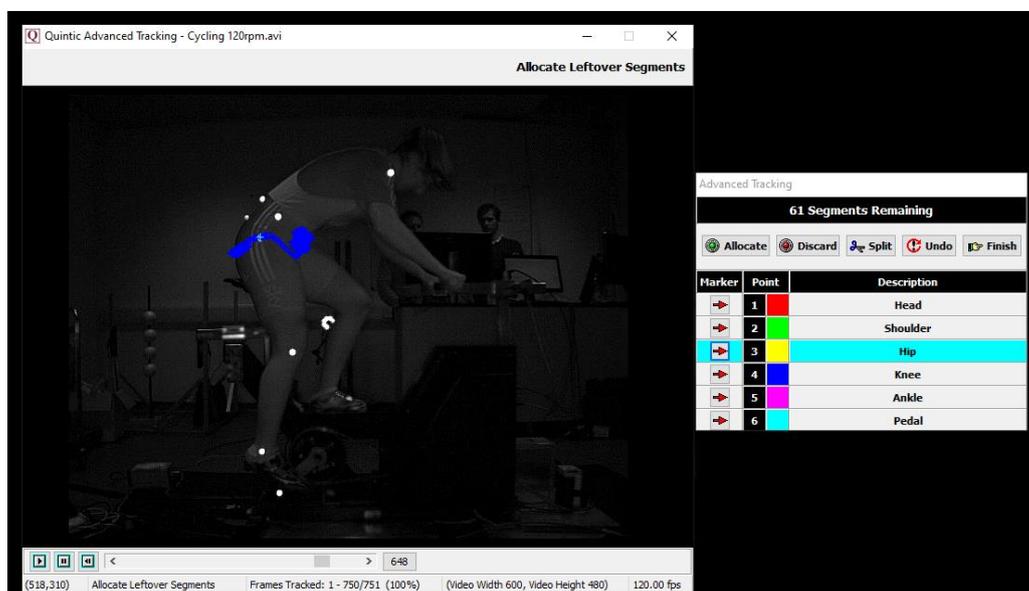
Quintic Intelligent Tracking - Left_Fore_1.avi
Blocker Drawing ON
(962,312) Blocker Drawing ON (Video Width 1280, Video Height 488) 120.00 fps

Advanced Digitisation – Without Learnt File

Advanced Digitisation is used when white on black markers have been placed on the participant or object, allowing for a more accurate and efficient digitisation.

Advanced Digitisation is only available in our Quintic Biomechanics v35 software (up to 21 points).

- Complete the calibration steps and then select **'Advanced Digitisation of a New Trace (White Markers)'** then **'Without Learnt File'** from the **'Digitisation'** menu.
- Locate and load up the single step frame template you wish to use
- Once selected, you will be required to select the **'First'** and **'Last'** frames for digitisation or to digitise the **'Full Video'**
- Add blockers, an initial search area and edit the marker pixel radius and brightness settings accordingly.
- To start the Advanced Tracking process, simply press the **'Start Tracking'** button. The user does not have to identify any of the markers.
- The Advanced Tracking tracks all of the potential markers.
- 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. To discard a segment, simply click the discard button.
- 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'** will apply the optimum smoothing parameters, **'Raw'** will save the raw data without any filters or **'Review'** will allow the user to review the trace.

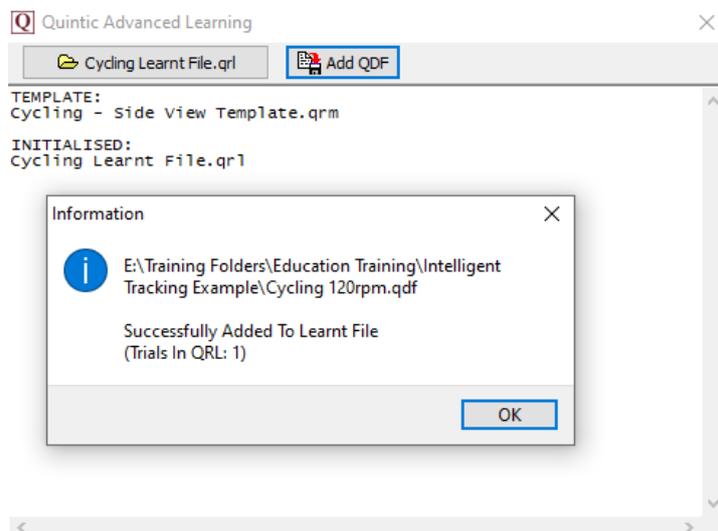


Creating a Learnt File

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). 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.
- 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.
- 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.

N.B 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.



Advanced Digitisation – With Learnt File

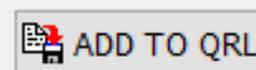
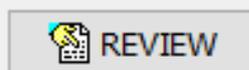
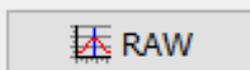
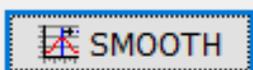
Advanced Digitisation is used when white on black markers have been placed on the participant or object, allowing for a more accurate and efficient digitisation.

Advanced Digitisation is only available in our Quintic Biomechanics v35 software (up to 21 points).

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.

- Complete the calibration steps and then select **'Advanced Digitisation of a New Trace (White Markers)'** then **'With Learnt File'** from the **'Digitisation'** menu.
- Locate and load up the single step frame template you wish to use, then the appropriate Learnt file.
- Once selected, you will be required to select the **'First'** and **'Last'** frames for digitisation or to digitise the **'Full Video'**
- Add blockers, an initial search area and edit the marker pixel radius and brightness settings accordingly.
- To start the Advanced Tracking process, simply press the **'Start Tracking'** button. The user does not have to identify any of the markers.
- 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.
- Once the tracking has finished, the user will then have to allocate or discard any leftover segments which have been tracked but not assigned.
- 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. To discard a segment, simply click the discard button.
- 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 or Add to QRL. **'Smooth'** will apply the optimum smoothing parameters, **'Raw'** will save the raw data without any filters or **'Review'** will allow the user to review the trace. **'Add to QRL'** this will add the current QDF file to the current Learnt file that is in use.

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

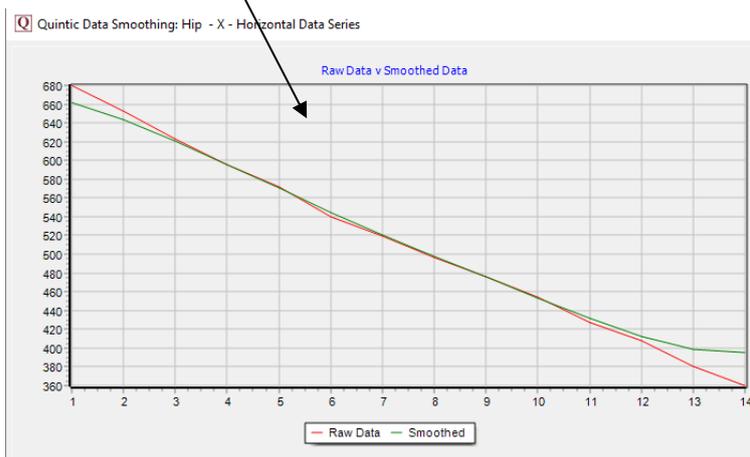


Data Smoothing

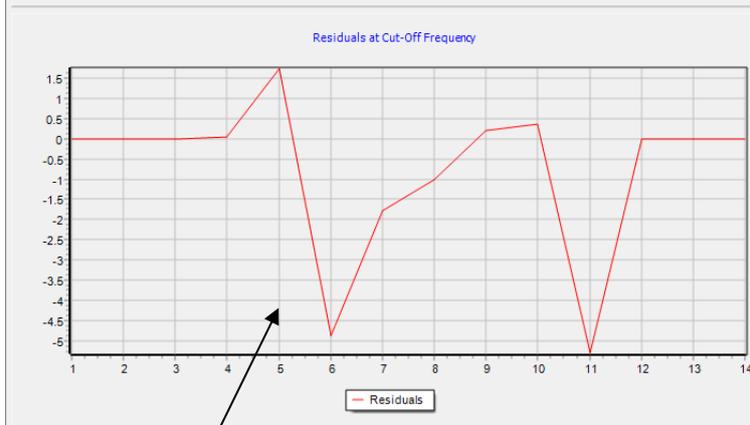
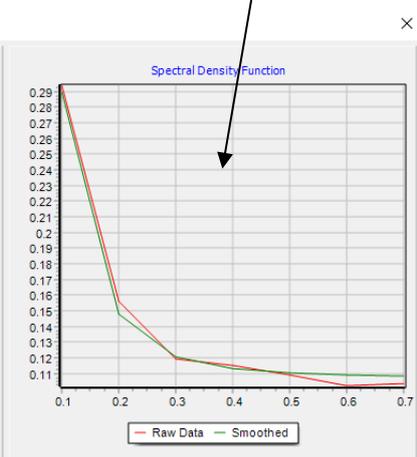
Data smoothing 'smooths out' data that has been produced via Manual, Automatic or Intelligent digitisation by removing any errors and noise that may have occurred during the digitisation process. Data smoothing can happen straight after a video is digitised by selecting the 'Smooth' option at the end of a digitisation. Alternatively, Data smoothing can be applied to previously digitised videos.

- To smooth a previously digitised video, go to 'Data Smoothing of Current Trace' within the 'Digitisation' menu to open the Quintic Data Smoothing Window.
- Each point that has been digitised has its X and Y co-ordinates smoothed independently. 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.

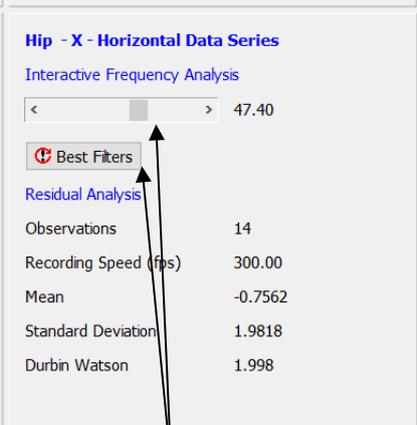
Raw Data v Smoothed Data - This graph illustrates values for both the raw and smoothed data.



Spectral Density Function - Describes how the energy (or variance) of a signal or a time series is distributed with frequency.



Residuals at Cut Off Frequency - This illustrates the difference between the raw and smooth data. Good values should oscillate around 0.



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.

Digitisation Trace Review

Used to review the digitisation trace on the selected video. These features can be found within the Digitisation tab and the digitisation trace must be loaded.



Show / Hide Marker Descriptions – This will display the marker names for the digitised trace. For this to be active, the crosses must also be selected.



View Individual Frames – This will display the digitisation trace for every individual frame. Any connections between digitisation points will also be displayed.



Show / Hide Figure Trace – This will display any connections between the points between the current digitised frame and the first digitised frame (Step Trace also selected).



Show / Hide Smoothed Trace – This will display the digitisation trace for the points that have been digitised, between the current digitised frame and the first digitised frame (Step trace also selected). Draws the “trajectory” of each digitised point.



Show / Hide Crosses – This will display the digitisation trace as crosses for the points that have been digitised, between the current digitised frame and the first digitised frame (only if step trace is on).



Show / Hide Step Trace – When this button is not selected, the entire trace will be displayed when you play the clip. When this button is selected, the trace will develop as the clip is played. This is for the Figure Trace, Smoothed trace and Crosses only.



Snail Trail – Allows the user to see ‘x’ number of frames. This is for the Figure Trace, Smoothed trace and Crosses only. Users can select whether they would like the Snail Trail to be Pre (pre the current frame), Post (post the current frame) or Pre & Post.



Pre / Post Selector – This button allows the user to control whether the Snail Trail is ‘Pre’ which will display the digitisation trace before the current frame, ‘Post’ which will display the digitisation trace after the current frame, or ‘Pre/Post’ which will display the digitisation trace with a combination of Pre and Post frames.



Display Calibrated Scale – This button will display a scale on both the video and animation window if the video has been calibrated and has a digitisation trace.



This button opens the single animation window. It is a black screen that shows only the digitisation traces when the video is played through



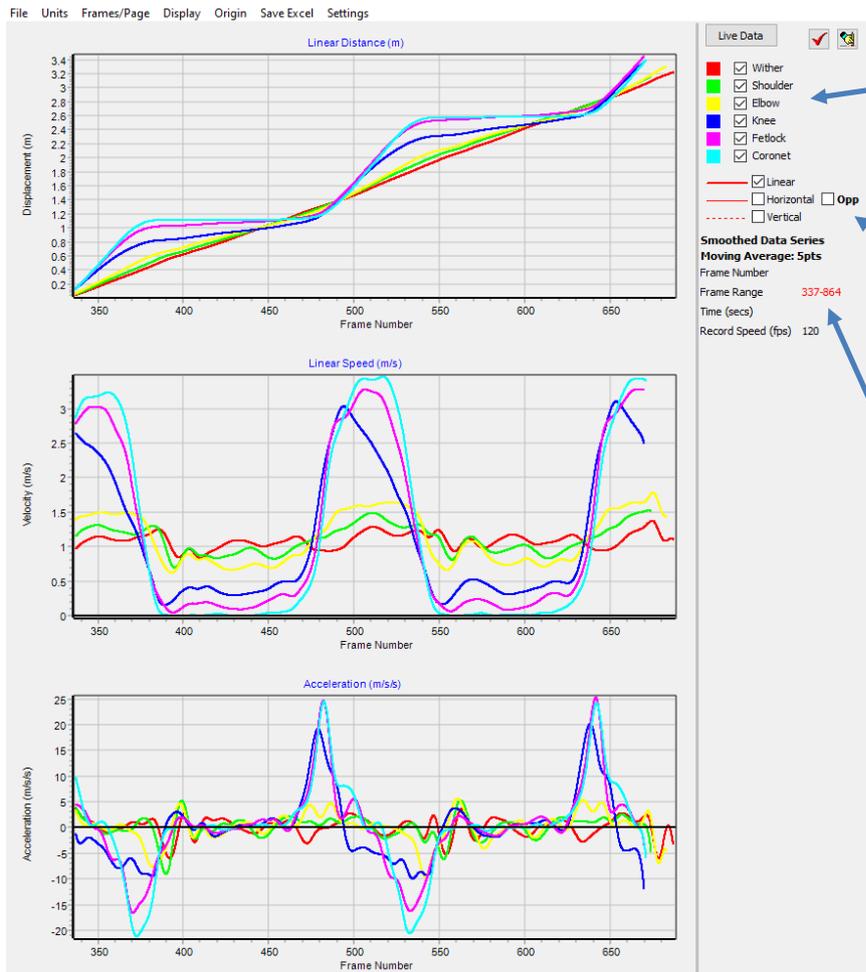
This button opens the multi-animation window. This allows the users to overlay digitisation traces from different videos that are open within Quintic. This feature is only available within Quintic Biomechanics v35.

Single Video Linear Analysis

Used to view, export and save linear displacement, velocity and acceleration following the digitisation process. All of the data is represented via interactive graphs.

1. Linear Analysis

- Select the  button within the 'Digitisation' tab.
- Then click 'Single Video Linear Analysis' to open the Single Video Linear Analysis Window



Select which digitised markers you want to display on the graph by ticking/unticking the relevant boxes.

Select linear, horizontal or vertical values by ticking the relevant box. These values will then also be displayed on the corresponding graphs. Users are also able to 'opposite' the horizontal direction of the trace.

Digitisation Trace Information.

2. Saving Linear Analysis:

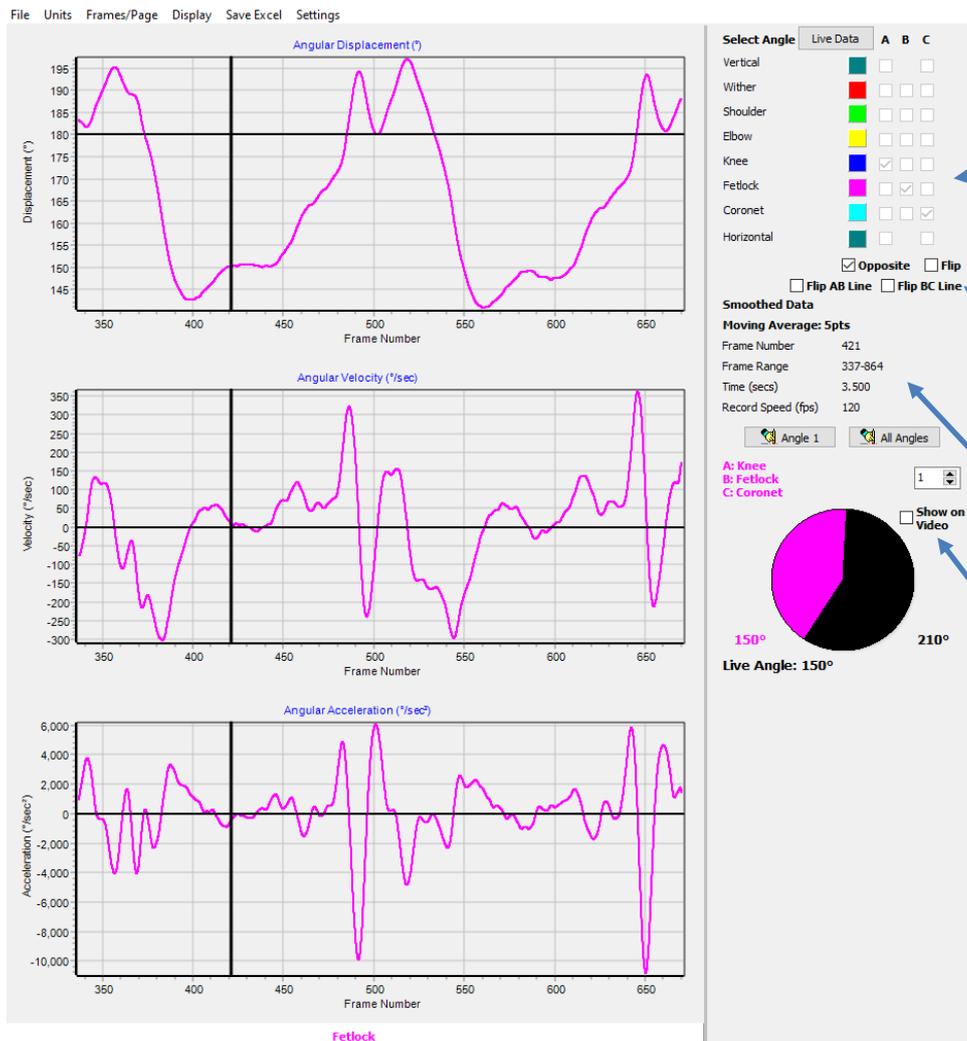
- The user has the option to export the data produced from the digitisation as an Excel for further analysis.
- Users can 'Save All Points', 'Save Selected Points', 'Use Focus Region' or 'Save Frame Markers ONLY' in the Settings menu of the Linear Analysis window.
- To export the data as an Excel, simply go to 'Save Excel' then 'Save Results', 'Save Results (Coordinates Only)' or 'Save Min/Max' and choose a file name and where you would like to save the Excel.
- To export your data in a graphical format, click on 'File' then select the graph, all graphs or all graphs and sidebar. Users are able to 'Print', 'Print Preview', 'Save as JPEG' or 'Copy to Clipboard'.

Single Video Angular Analysis

Used to view, export and save angular displacement, velocity and acceleration following the digitisation process. All of the data is represented via interactive graphs.

1. Angular Analysis

- Select the  button within the 'Digitisation' tab.
- Then click 'Single Video Angular Analysis' to open the Single Video Angular Analysis Window



This is where the user is able to create the angle they wish to analyse. To create an angle, the user simply chooses the three points from which the angle is created.

This allows the user to 'opposite', 'flip', 'Flip AB Line' or 'Flip BC Line' for the angle being displayed.

Digitisation Trace Information.

Show on Video – Shows the angle in Pie 1 on the video if selected.

2. Saving Angular Analysis:

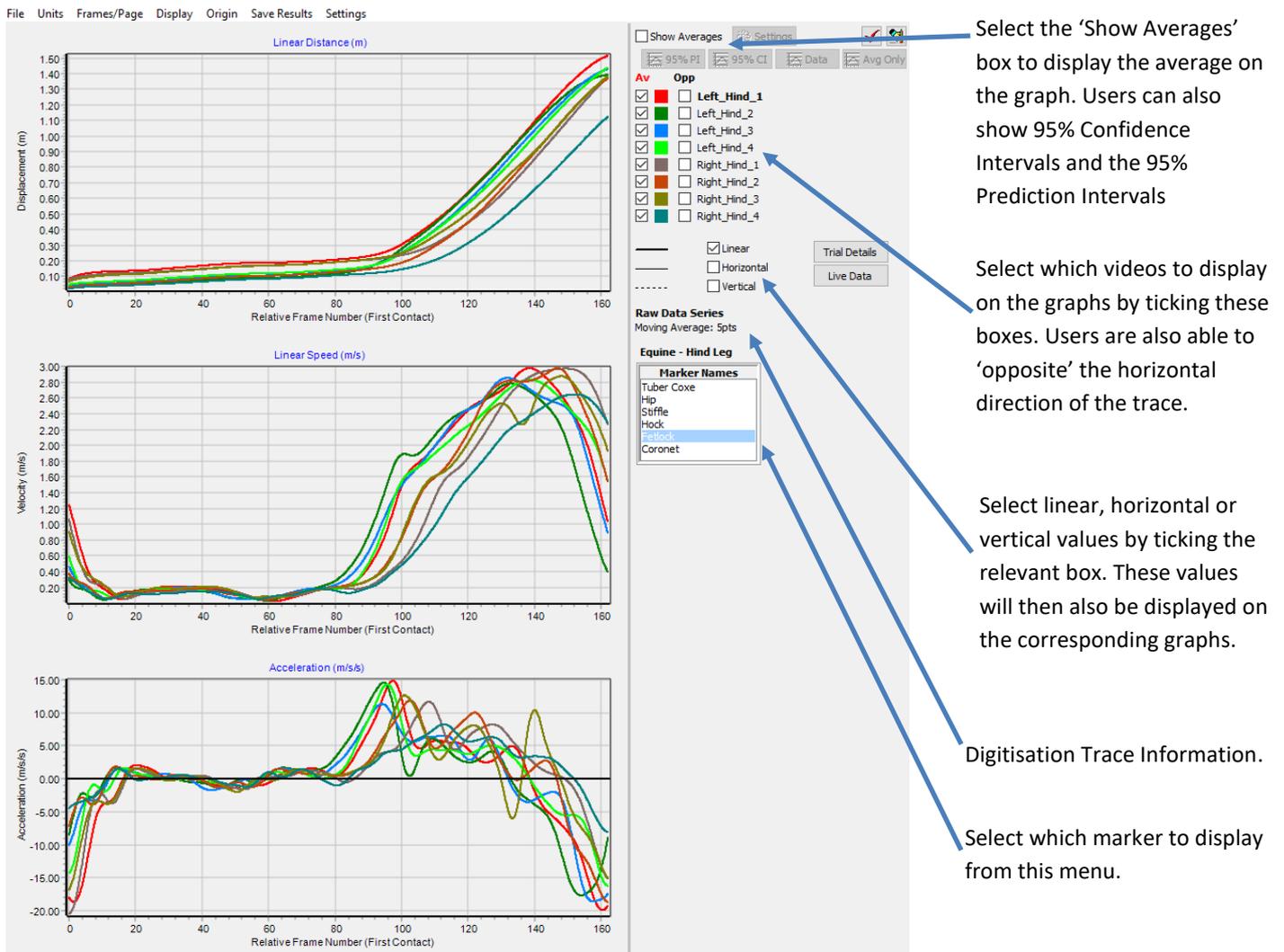
- The user has the option to export the data produced from the digitisation as an Excel for further analysis.
- Users can 'Use Focus Region' or 'Save Frame Markers ONLY' in the Settings menu of the Angular Analysis window.
- To export the data as an Excel, simply go to 'Save Excel' then 'Save Results', 'Save Results (Angles Only)' or 'Save Min/Max' and choose a file name and where you would like to save the Excel.
- To export your data in a graphical format, click on 'File' then select the graph, all graphs or all graphs and sidebar. Users are able to 'Print', 'Print Preview', 'Save as JPEG' or 'Copy to Clipboard'.

Multi Video Linear Analysis

Used to view, export and save linear displacement, velocity and acceleration following the digitisation process. All of the data is represented via interactive graphs.

1. Linear Analysis

- Select the  button within the 'Digitisation' tab.
- Then click 'Multi Video Linear Analysis' to open the Multi Video Linear Analysis Window



2. Saving Linear Analysis:

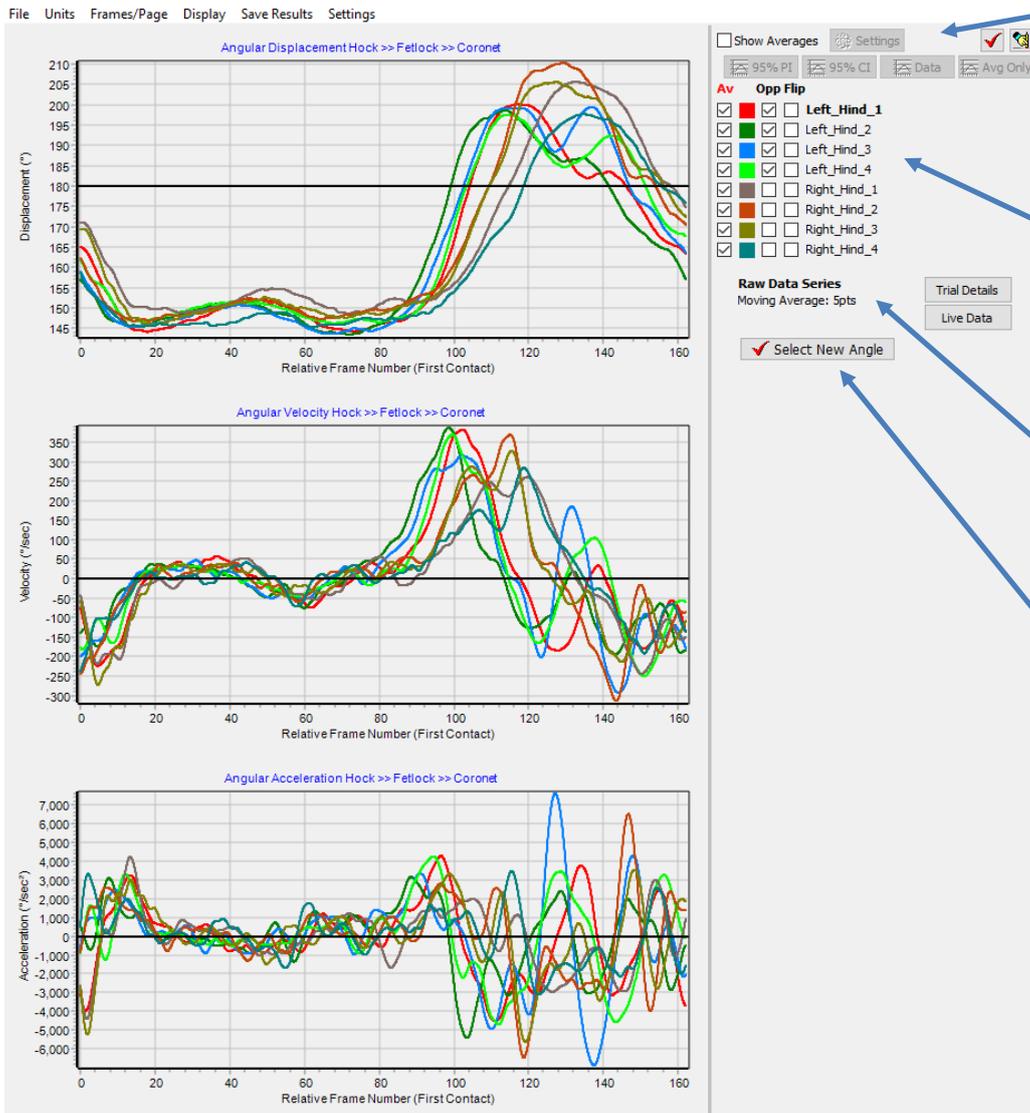
- The user has the option to export the data produced from the digitisation as an Excel for further analysis.
- To export the data as an Excel, simply go to 'Save Results' then 'Save Results in an Excel File' or 'Save Results in an Excel File (Coordinates Only)' and choose a file name and where you would like to save the Excel.
- To export your data in a graphical format, click on 'File' then select the graph, all graphs or all graphs and sidebar. Users are able to 'Print', 'Print Preview', 'Save as JPEG' or 'Copy to Clipboard'.

Multi Video Angular Analysis

Used to view, export and save angular displacement, velocity and acceleration following the digitisation process. All of the data is represented via interactive graphs.

1. Angular Analysis

- Select the  button within the 'Digitisation' tab.
- Then click 'Multi Video Angular Analysis' to open the Multi Video Angular Analysis Window



Select the 'Show Averages' box to display the average on the graph. Users can also show 95% Confidence Intervals and the 95% Prediction Intervals

Select which videos to display on the graphs by ticking these boxes. Users are also able to 'opposite' and 'flip' the angle displayed on the graphs.

Digitisation Trace Information.

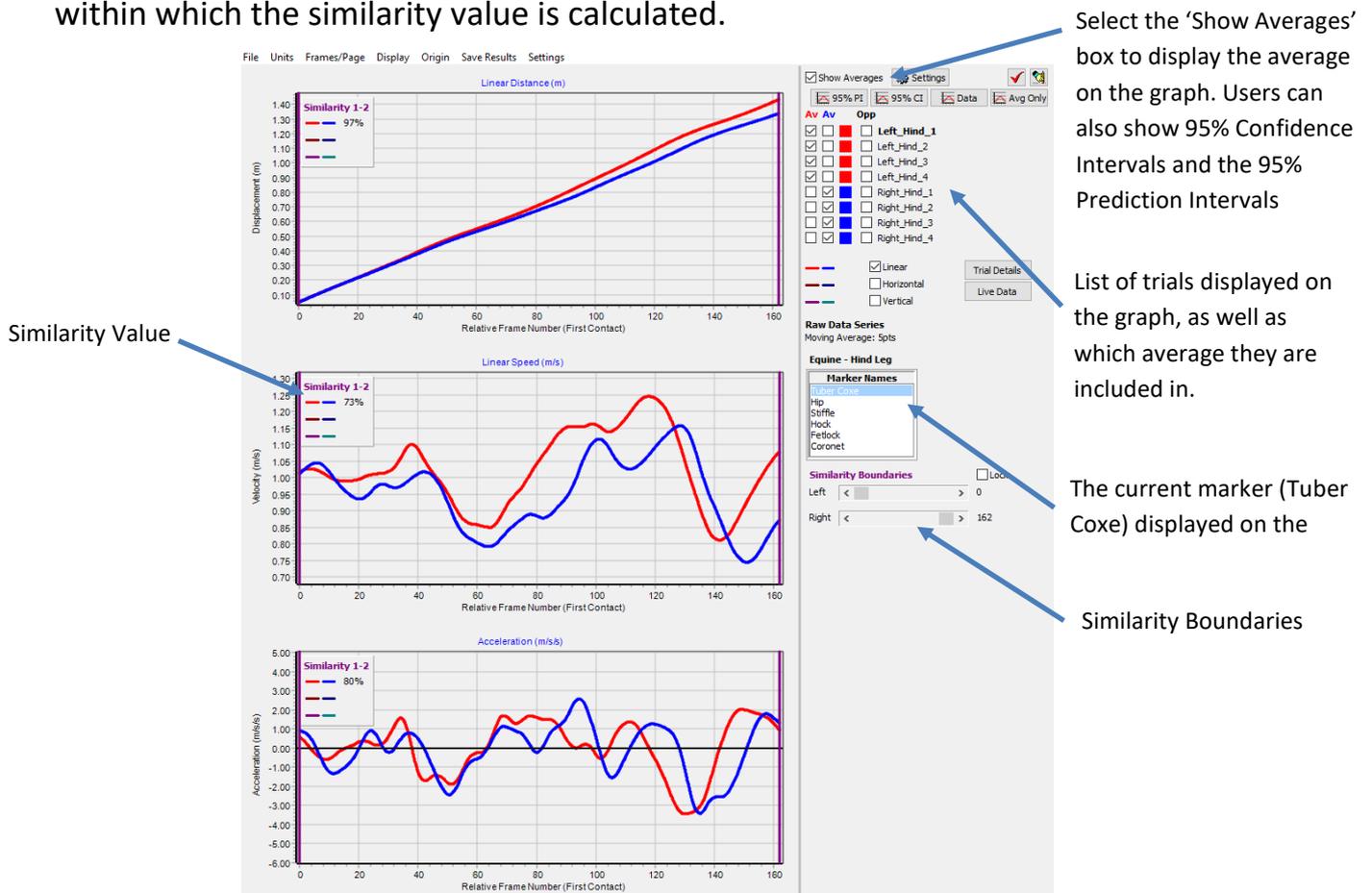
This is where the user is able to create the angle they wish to analyse. To create an angle, the user simply chooses the three points from which the angle is created.

2. Saving Angular Analysis:

- The user has the option to export the data produced from the digitisation as an Excel for further analysis.
- To export the data as an Excel, simply go to 'Save Results' then 'Save Results in an Excel File' or 'Save Results in an Excel File (Angles Only)' and choose a file name and where you would like to save the Excel.
- To export your data in a graphical format, click on 'File' then select the graph, all graphs or all graphs and sidebar. Users are able to 'Print', 'Print Preview', 'Save as JPEG' or 'Copy to Clipboard'.

Multi-Trial Analysis

- Ensure that all relevant files for all trials (up to 21 different trials) are in the same folder. This includes: The video file itself, QDF (Digitisation Trace Data), QBC (Butterworth filter parameters, optional), CAL (Calibration) and MRK (Key Frame Markers, optional).
- The optional files have to be there for all trials for them to be used. If not, the Multi Trial analysis will still work but these features will not be available.
- Open a video from the folder within our Quintic Coaching/Biomechanics software
- Select the **'Digitisation'** tab
- Select **'Multi Video Linear Analysis'** or **'Multi Video Angular Analysis'**
- Display trials relative to the start of digitisation or a common frame marker representing a common time event in all the videos (**'Display'** tab > **'Horizontal Axes'**). Both options have the choice to display the horizontal axes as relative to time or frames.
- Display two averages at once (**'Display'** > **'Allow Second Average'** then select the trials for each average from the list on the right-hand side')
- The similarity value will appear in the top left corner of the graph when the Show Averages button has been ticked within Multi Linear/Angular analysis.
- There is also the ability to select the range of the traces between which the Similarity is calculated (defaults at full trace). Users are able to do this by adjusting the Similarity boundaries. The left and right scrollbars will control the purple lines on the graph, within which the similarity value is calculated.



Live Data Table

- Within the Linear and Angular analysis windows, there is an option to display the live data table.
- To display the Live Data Table, simply click the Live Data button within the Linear or Angular analysis window.

Live Data

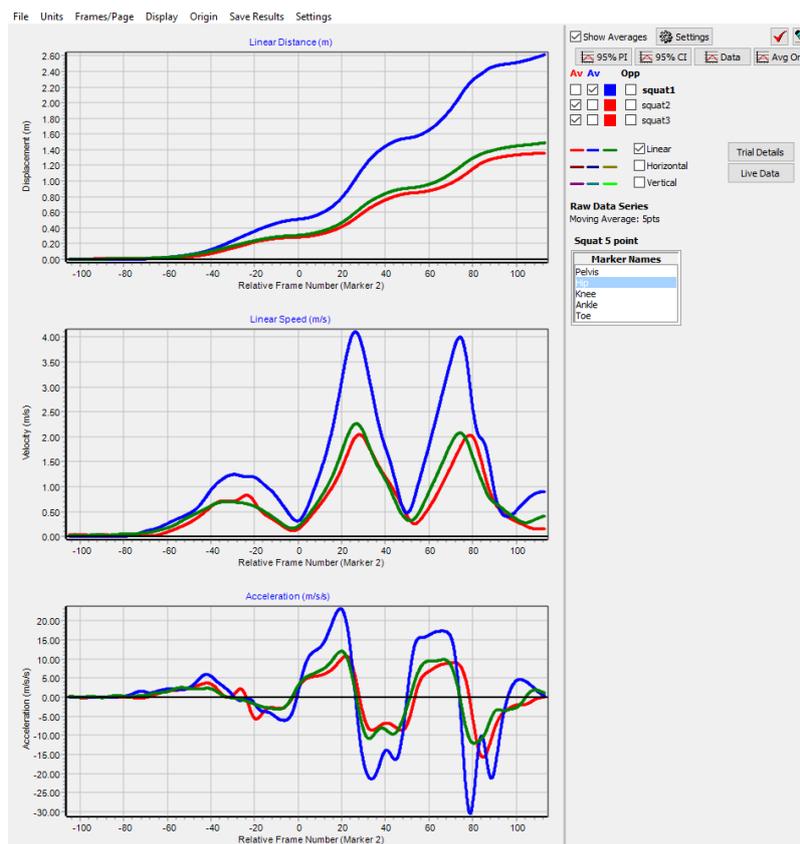
- This will then display the data which is displayed on the Distance/Angular Displacement, Velocity and Acceleration graphs.
- As the video plays through, the Live Data table will be updated with the current frame data.
- Within the Analysis windows, if any points/trials are unticked these will not be displayed in the Live Data Table. If Horizontal and Vertical (Linear Analysis only) are ticked on the graph, they will also be displayed on the Live Data Table.

Q Live Data Table

Relative Frame -79		Displacement	Velocity	Acceleration
Left_Hind_1		145.08	23.98	434.69
Left_Hind_2		146.69	39.06	-142.06
Left_Hind_3		146.74	24.29	97.84
Left_Hind_4		147.99	25.54	182.06
Right_Hind_1		149.95	26.05	302.17
Right_Hind_2		148.73	5.54	256.09
Right_Hind_3		148.46	22.23	-212.23
Right_Hind_4		145.93	13.96	785.61
Average		148.27	16.94	282.91
Average		146.62	28.22	143.13

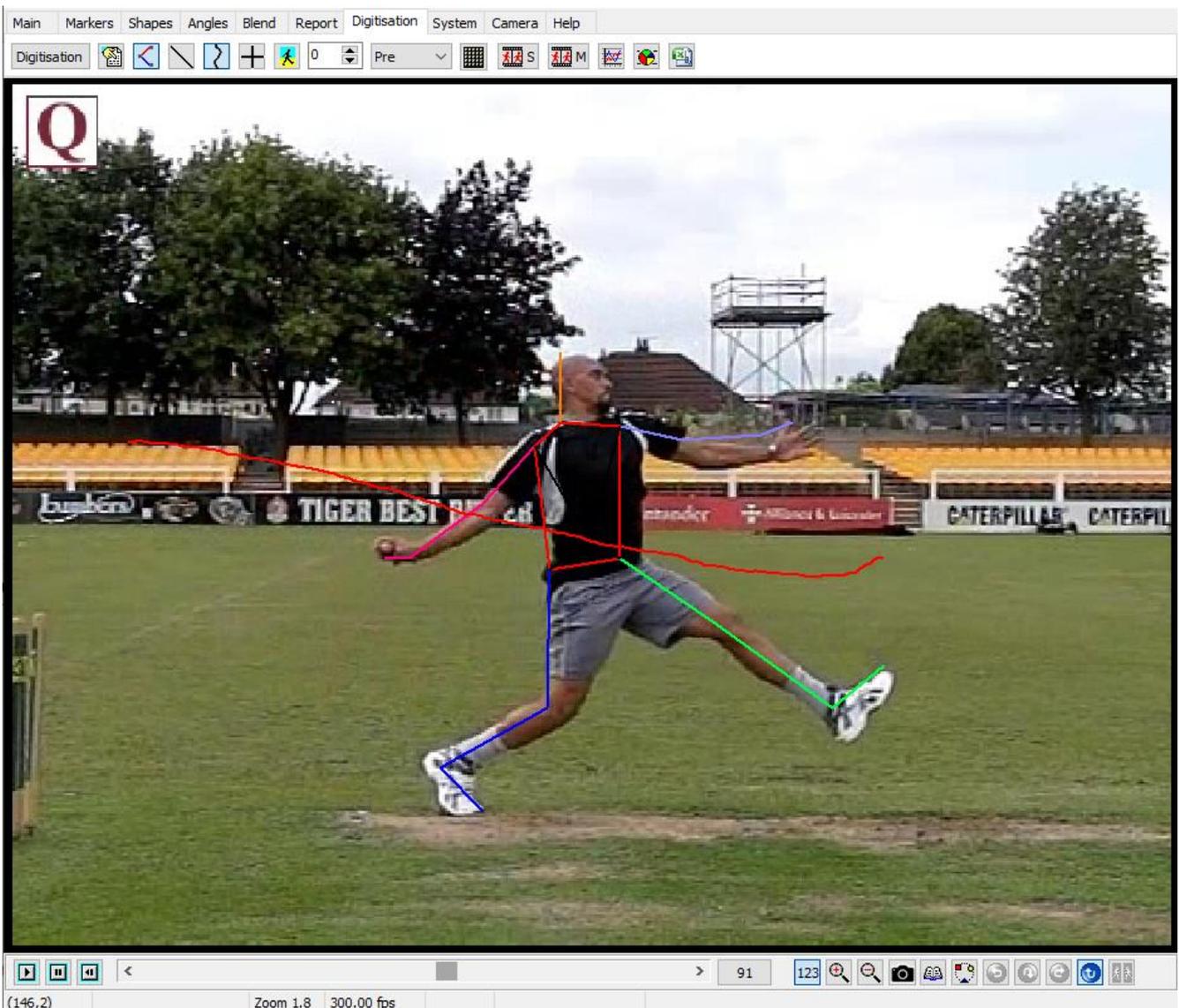
Normative Average

- The Normative Average function allows the user to create their own Normative Average of up to 100 digitised videos which can be displayed on the Linear/Angular graphs.
- The user creates their own normative average folder and selects this within the Multi Linear/Angular analysis window from which the average will be calculated and displayed.
- To create your own Normative Average, the user must first create their own folder where the digitisation traces are to be added to.
- Once the digitisation process has been completed (can be Manual, Automatic, Intelligent or Advanced) the user is then able to add the digitisation trace to their Normative Average folder.
- To add the completed digitisation trace to the normative average folder, click on the **'Digitisation'** button within the **'Digitisation'** tab and Click **'Add Trace to Normative Average Folder'**
- Once you have added the digitisation traces to the normative average folder (up to 100 digitisation traces) you then simply select the normative average folder within the Display Menu in either the Multi Linear/Angular window.
- Go to **'Display' > 'Normative Average' > 'Select Folder'** and select the normative data folder you have created. The normative data will then appear on the same graph when **'Show Averages'** has been selected.
- N.B The same template must be used in both the Multi Trial videos and the Normative Average folder in order for the Normative Average to be loaded.



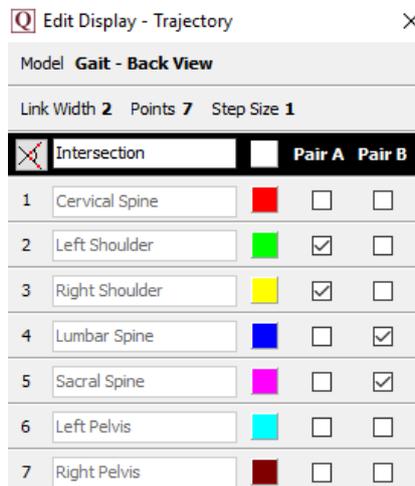
Centre of Mass (CoM) Model

- Users are able to calculate the Centre of Mass (CoM) of an athlete using Quintic Biomechanics v35 software. We have 3 different Centre of Mass Models available; 18 COM (Single Step), 18COM – 2 Step or 18COM – 5 Step and can be found within the **'Templates'** folder with the **'Quintic Sample Videos'** folder.
- Centre of Mass templates will require Manual Digitisation
- Once you have finished manually digitising and want to create the 19th point (Centre of Mass), simply click the **'Calculate the Centre of Mass'** option within the **'Digitisation'** menu, selecting whether your athlete is either Male or Female.
- Once you have clicked either the Male or Female option, the Centre of Mass point will now be generated throughout the digitisation trace.
- Unlike older versions of Quintic Biomechanics (v29/v26 etc) there is no need for the video file to be duplicated.
- Once you have clicked OK, if the video has smoothing parameters applied to it, the smoothing window will appear so that you are able to smooth the Centre of Mass point.



Intersection Model

- The user is able to create an intersection point between any two pairs of points on a digitisation trace.
- To create the intersection point, simply click on the **'Create Intersection Point'** button within the **'Digitisation'** menu.
- Simply select the two pairs of points that you would like to create the intersection between.



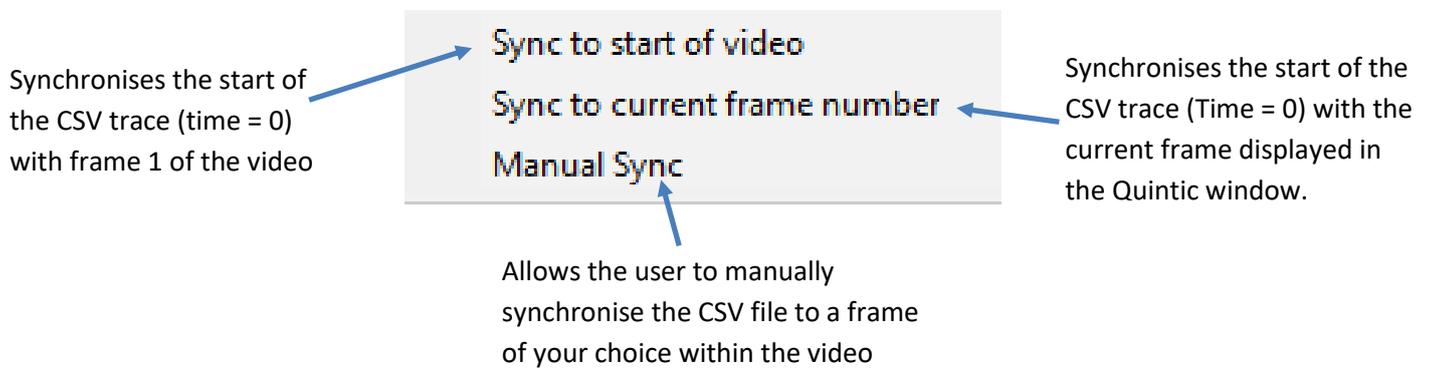
- You are able to name the intersection by typing the name you would like in the top box. You are also able to change the colour of the intersection point.
- Once you have selected the two pairs of points you would like to intersect, simply click the intersect button to create that point.
- Once you have clicked OK, if the video has smoothing parameters applied to it, the smoothing window will appear so that you are able to smooth the Intersection point.



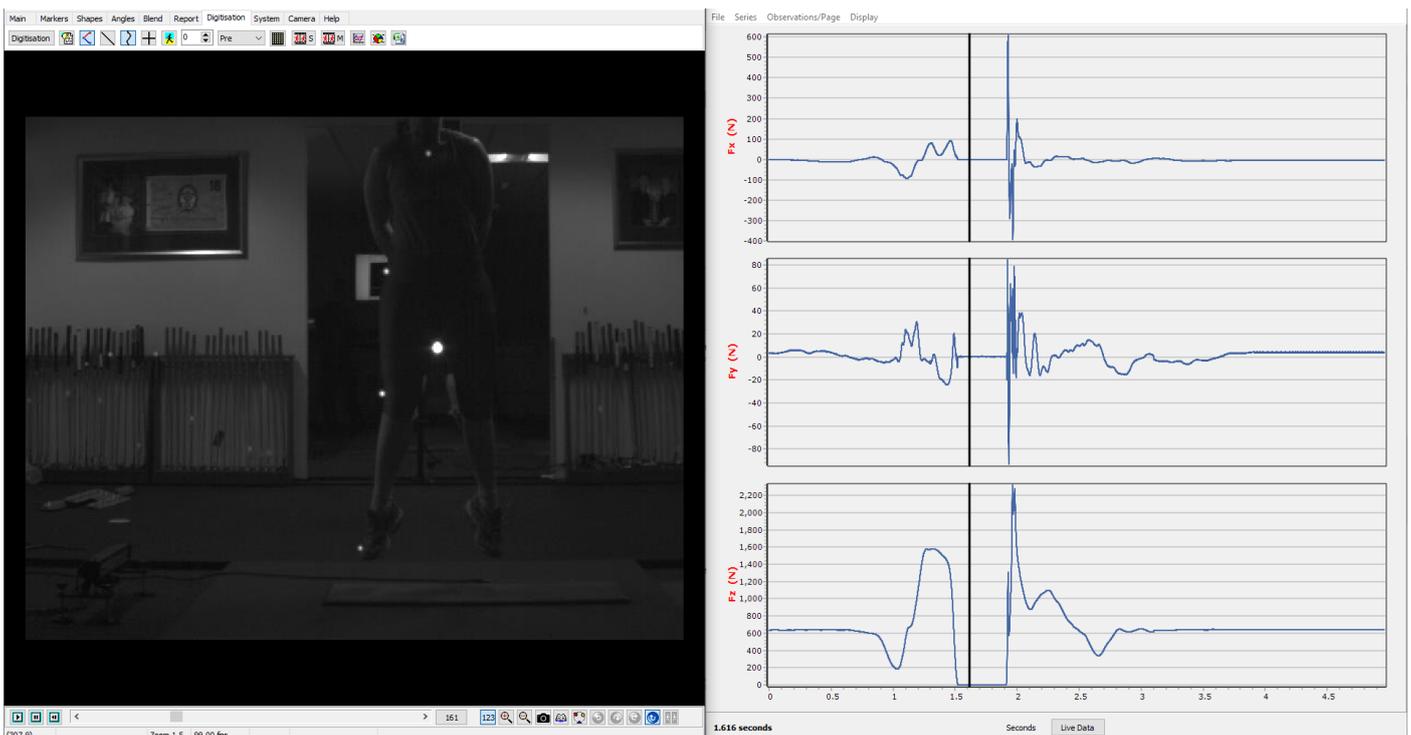
CSV Synchronisation

It is possible to synchronise CSV Data with a video in Quintic Biomechanics v35 software. Data can be synchronised with other biomechanical equipment such as: Force Plates, Pressure Plates, EMG Systems, Pressure Insoles, Cycling Power Cranks etc as long as a CSV file can be exported.

- Ensure that the CSV file you would like to synchronise with the video in the Quintic Biomechanics v35 software is in the correct format, in the same folder and has the exact same file name (case sensitive).
- Click on the **'Digitisation'** tab.
- Click on the **'Quintic CSV Program'**  button
- Select the method you wish to use to synchronise the CSV trace with the video.



- Once synchronised, the video will play alongside the CSV file.

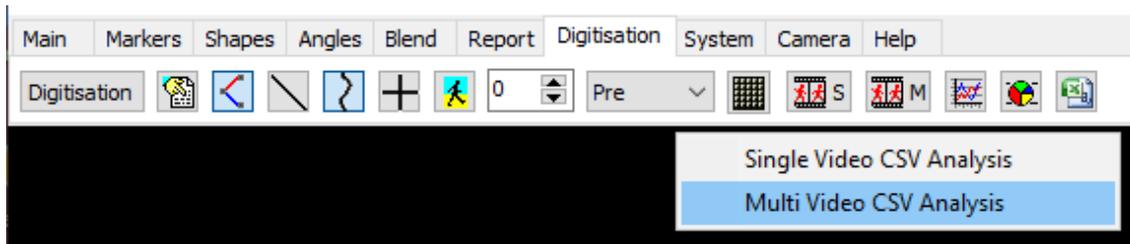


Multi CSV Analysis

Users are now able to compare the data from multiple CSV files (up to 21 trials) on the same graphs. Users will have to synchronise each video in Single CSV Analysis first.

When users have synchronised all of their CSV files individually, they can then compare all of these on the same graphs. It is important that all of these video files, Quintic files and CSV files are in the same folder. It is also recommended to have Time Event Markers set for each video, so the data from the CSVs can be synchronised to a common time point.

Users can perform a Multi CSV Analysis by going to the Digitisation Tab and clicking on the 'Quintic CSV Program' button then selecting Multi Video CSV Analysis.



This will then open the Quintic Multi CSV Window which will display all of the synchronised CSV files in the same folder location as the main video.

