

Quintic Software

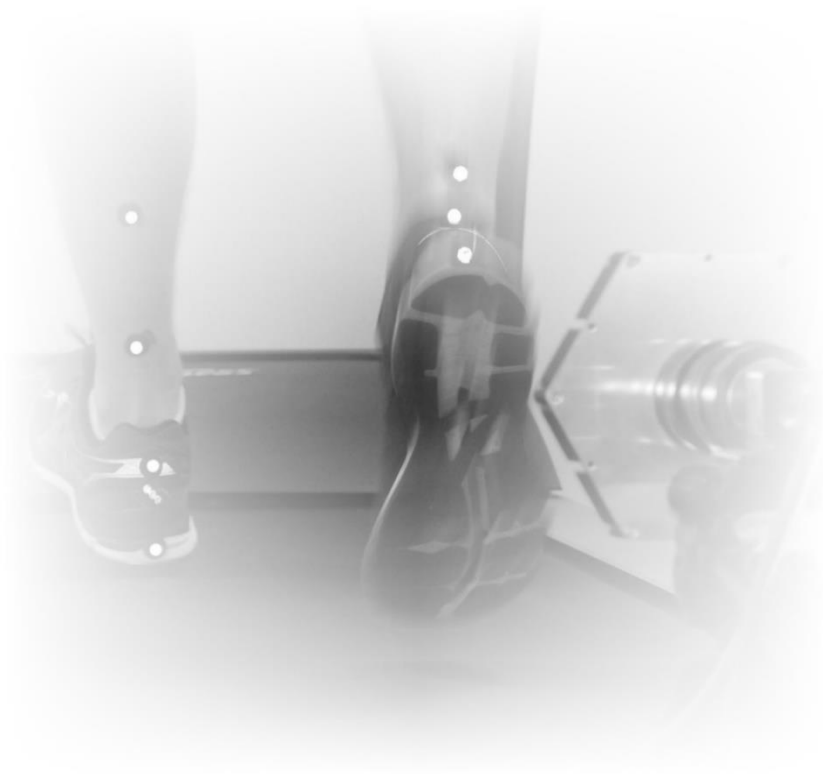
Tutorial 9

Quintic CSV
Synchronisation

V35

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1. Introduction

Within Quintic Biomechanics v35 you are able to synchronise data from an external piece of hardware using the CSV synchronisation function.

This function allows synchronisation of data from any hardware that can export to a .CSV file.

For example:

- Pressure plates
- Force plates
- EMG systems
- Cycling power cranks
- Pressure insoles
- And many more...

This tutorial will guide you through the process of synchronising the exported .CSV file with your videos in the Quintic software. (It assumes the .CSV file has been exported correctly from your external hardware).

If you require any information on how to export to CSV from your external hardware, please contact the hardware supplier directly.

If your hardware can export data to an Excel file, you can then choose 'save as' and select 'CSV (Comma delimited) (*.CSV)' when saving. This will create an Excel file in the correct format to use for synchronisation.

2. File Name and Location

First ensure that the .CSV file you have exported from your external hardware is located in the same folder as your video file.

Then rename the file so that the name is **EXACTLY** the same as the corresponding video file. For example...

Video file name: 120rpm_Gear 5_Cam1.avi

.CSV file name: 120rpm_Gear 5_Cam1.CSV

You **MUST** ensure that all files related to the video (Eg. .CSV, .MRK, .QDF) are saved into the same folder in order for effective synchronisation and display of frame markers on the graphs.

3. CSV File Contents

In order for Quintic to read the information in the .CSV file it requires a specific format. The data should be arranged into columns with the first row of each column containing the name of the variable/series.

The first column should always contain the variable "Time" or "Seconds" with units as seconds. This is used to synchronise the data with the frames of the video.

If the CSV file does not contain a Time/Seconds column, please manually add this yourself in column A. The sampling rate/frequency of the biomechanical equipment used (e.g. force plate, EMG systems etc) would have to be divided by 1 to give your time difference between each data point. For example, if your sampling rate of the Force plate was 500hz, it would be $1/500 = 0.002$. This will then mean there will be a 0.002 difference between each data point within the CSV file.

The rest of the columns should then contain your data variables (eg. Crank_Torque_R). A maximum of 16 variables can be displayed.

An example of the .CSV file structure can be seen below. This has been exported from a cycling power crank.

	A	B	C	D	E	F
1	Seconds	Crank_Force_L	Crank_Force_R	Crank_Position	Crank_Torque_L	Crank_Torque_R
2	0	55	567	184.3	7	26
3	0.005	55	556	190.5	7	24
4	0.01	62	533	194.6	9	24
5	0.015	45	523	202.7	8	18
6	0.02	52	519	257.2	9	20
7	0.025	37	496	213.7	12	18
8	0.03	8	474	218.1	11	16
9	0.035	-11	453	225.3	11	12

If required, the data can be edited in Excel, to ensure the correct format, and exported as a .CSV file. Click “save as” and select “CSV (Comma delimited) (*.CSV)” from the “Save as type” drop down menu.

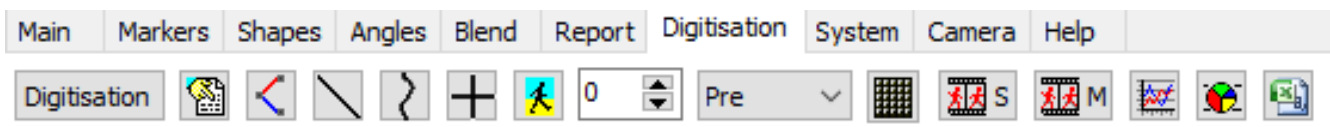
Additional variables can be added (maximum 16) by adding more columns in the same format. For example, if you wish to display data captured from an EMG system simultaneously to the crank shaft data, then add more columns containing the data.


Only **ONE** .CSV file can be synchronised to the video. Therefore, in order to display data collected from multiple pieces of external hardware, all data **MUST** be stored in one .CSV file.

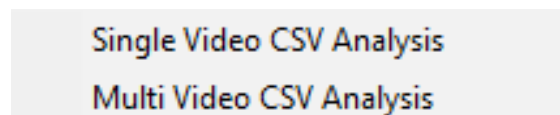
4. Synchronisation

Open the video you wish to analyse in Quintic and determine the key frame for synchronisation. This can be the first key frame (eg. top dead centre) or a form of trigger (eg. a trigger light) depending on your external software.

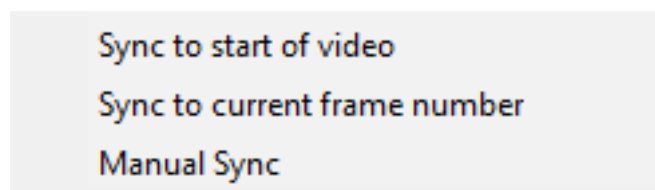
Once the key frame has been identified, use a Quintic frame marker (Tutorial 2) to highlight the frame. This will make the synchronisation process easier later on.



Click on the “Digitisation” tab and select the  button (CSV function) from the toolbar, then select ‘Single Video CSV Analysis’.



A drop down menu will appear giving you a choice of synchronisation methods.



At this point the excel containing the CSV data **MUST** be closed outside of Quintic. If the excel file is being viewed/edited in another program then the .CSV will not open.

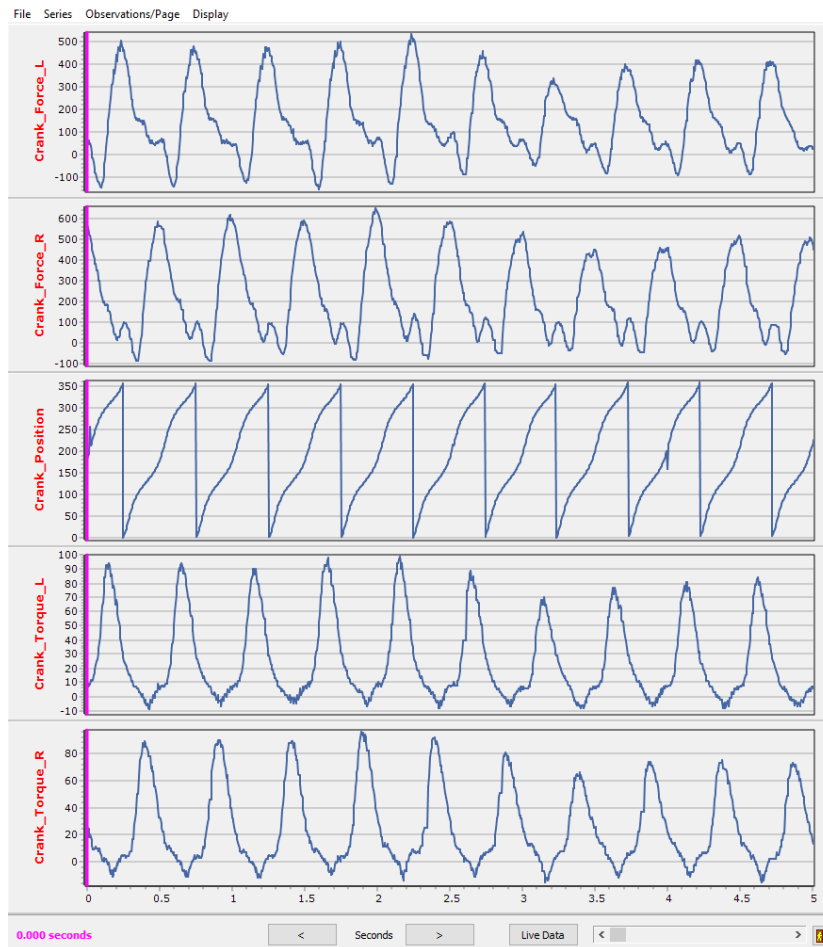
Sync to start of video – This will synchronise time 0 of the CSV trace to frame 1 of the video.

Sync to current frame number - If you wish to synchronise the start of the CSV trace with a chosen key frame, then scroll through the video or click on a frame marker to determine the key frame. Click “Sync to current frame number” and time 0 of the CSV trace will synchronise to the current frame of the video being viewed in the main Quintic window.

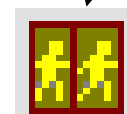
Manual Sync – This function allows you to synchronise any frame of the video with any point of the CSV.

Select “Manual Sync” and the synchronisation window will appear with a pink vertical line displayed on each graph. This pink line represents the point of the CSV trace you wish to sync with the current frame being displayed in Quintic.

Select the frame of the video which displays the chosen time event required for synchronisation. Then, scroll the pink line to the corresponding point of the CSV trace using the scroll bar in the bottom right of the window.



Synchronisation slide bar – controls the position of the pink line.



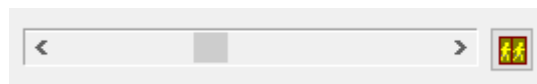
Synchronisation button

Users can also use the Live Data table before syncing. This should allow the user to synchronise their CSV Data more accurately with the video.

Simply click the Live Data table and this will display all the data for that particular time. This will be displayed in pink, indicating that it is yet to be synced with the video.

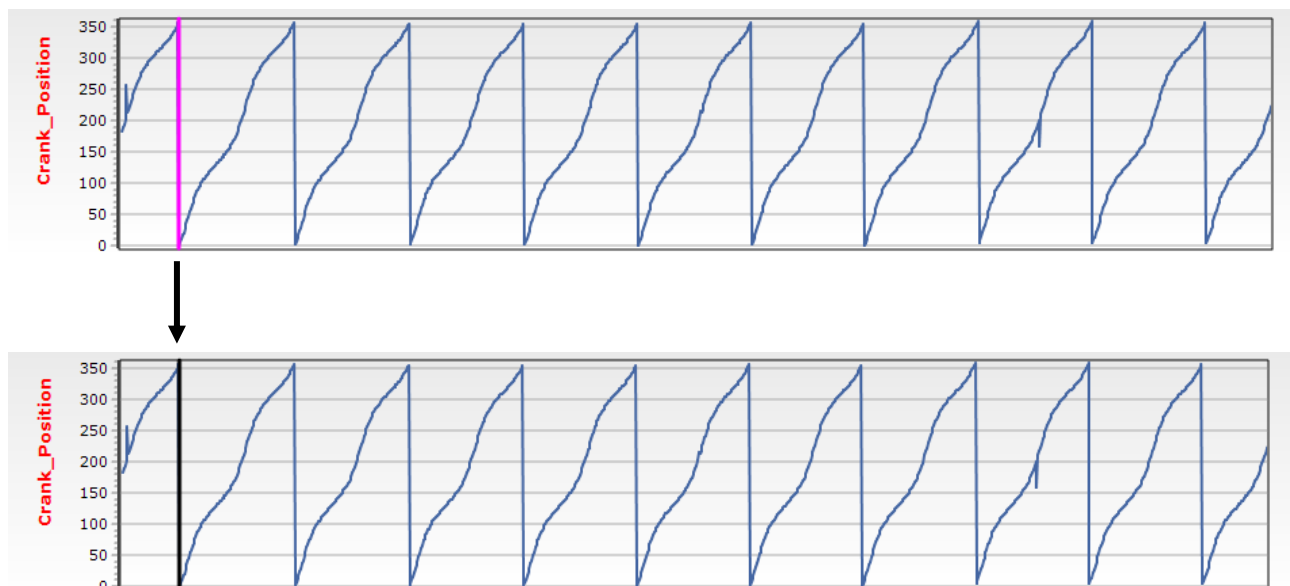
Data At: 1.913 seconds		Value
Fx (N)		-0.13
Fy (N)		0.39
Fz (N)		0.57

When scrolling through the CSV Data by using the scrollbar in the bottom right hand corner of the CSV window, the live data table is also updated.



Once users are happy with their sync position for both the CSV data and the video (video is controlled through the main screen), simply press the yellow synchronisation button in the bottom right hand corner of the CSV Window.

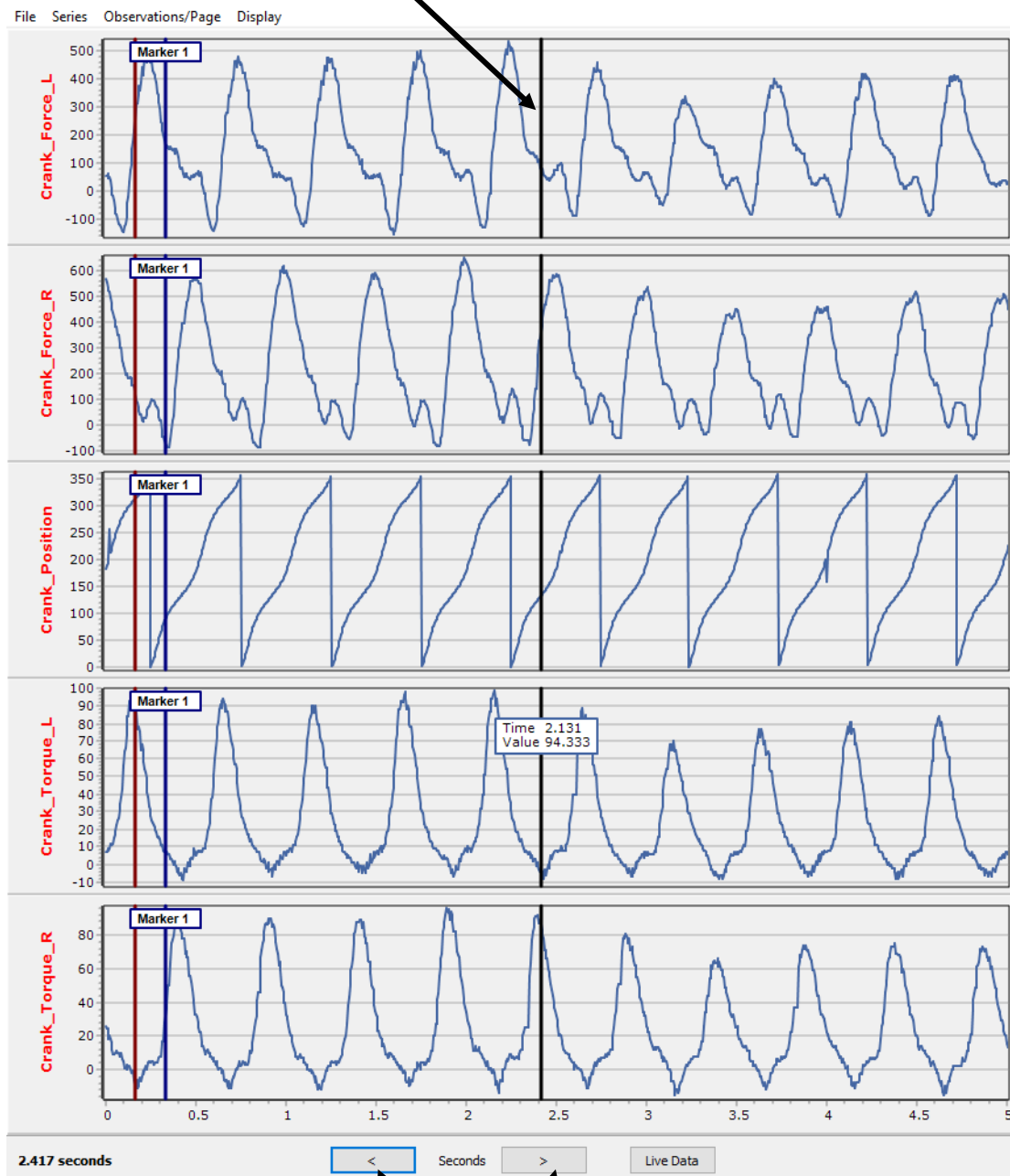
The pink line will now change to black, representing the frame that is displayed in the main window. The video and CSV trace have now been synchronised and the black line will move along the trace according to the frame position of the video being played.



Regardless of which method of synchronisation you choose, the Quintic Biomechanics v35 software will now remember a CSV file has been synchronised with the video, meaning users do not have to keep synchronising the CSV file every time they open the video.

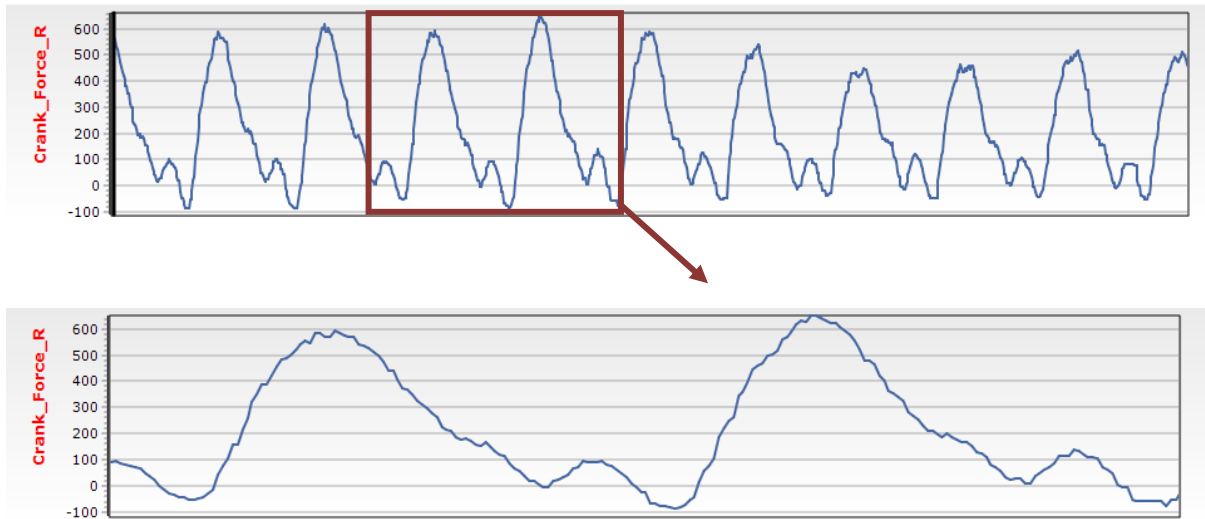
5. CSV Analysis

The black interactive line indicates the current frame of the video.



You can scroll through the CSV trace using these arrows to move between the 'pages' of CSV data.

Click and drag the cursor over a specific area of the CSV graph to zoom in. The graph will resize in order to fill the graph area.

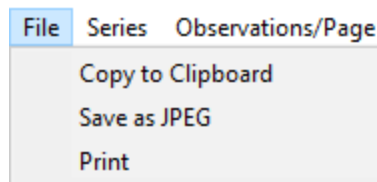


Within the Quintic CSV program, there are a range of different options which the user is able to change, which directly affects the display of the CSV data. These are:

File Series Observations/Page Display

a. File

Within the File menu, the user is able to Copy to Clipboard, Save as JPEG or Print the CSV graphs which are currently displayed.

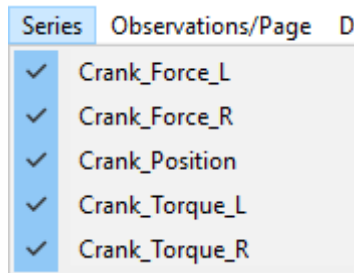


If you wish to only Copy to Clipboard, Save as JPEG or Print a specific graph, then first ensure that you have selected only the appropriate series to be displayed.

b. Series

The CSV file can have up to 16 different variables within it.

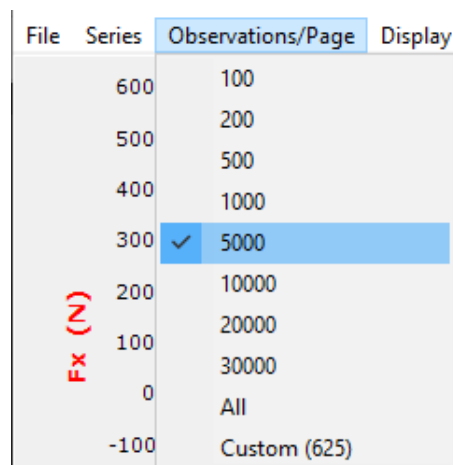
To select which variables are displayed on the graph(s), click “Series” from the toolbar and select the appropriate variables from the drop down menu.



Simply select which variables you would like to display from the possible 16 (do not have to have 16 variables in the CSV file, can be 5 for example). These are the columns of the .CSV file.

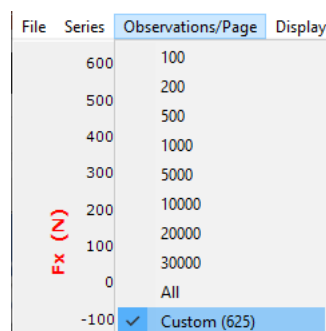
c. Observations/Page

The number of observations displayed per page.

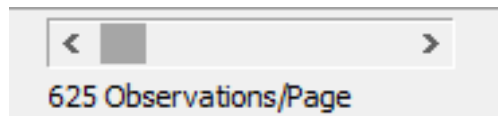


Click “Observations/Page” and select the number of data points you wish to be shown on the graph per page.

Users can also set their own observations per page. This can be set by clicking ‘Custom’.



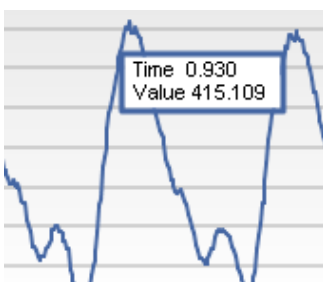
Once Custom has been selected, this will display the 'Observations/Page' scrollbar at the bottom of the CSV window. The user is then able to use the scrollbar to select their preferred number of observations.



d. Display

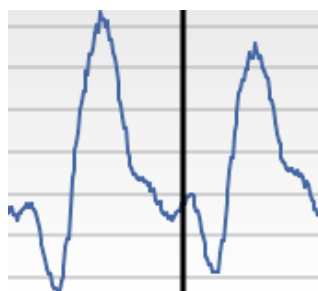
Allows the user to select the additional frame markers and values displayed on the graph.

Show Series Value



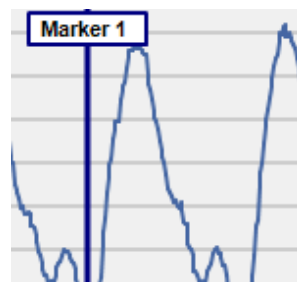
When the cursor is placed over a series, the values are displayed for that data point.

Show Frame Position



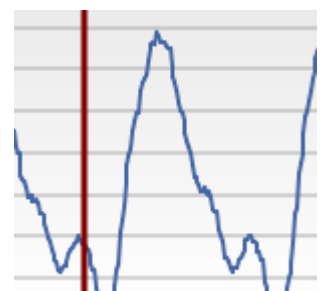
A black bar indicates the current frame displayed in Quintic.

Show Frame Markers



A blue bar indicates the frame where frame markers have been placed on the video.

Show Interpolation Markers

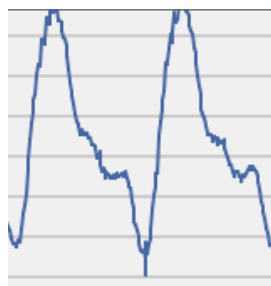


A burgundy bar indicates the frame where interpolation markers have been placed on the video.

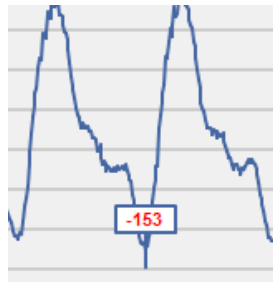
Minimums – The user is able to identify the minimum point on each graph displayed within the Quintic CSV Program. Options are:

- Min
- Min and Value
- Min, X Pos and Value.

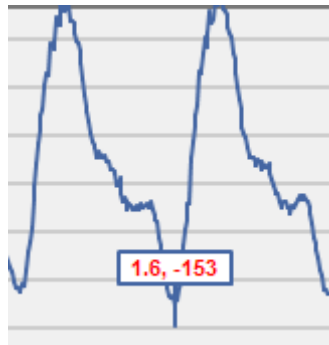
Min – This will draw a small notch on each graph displayed within the CSV program for the minimum point.



Min and Value – This will draw a small notch and give the minimum value on each graph displayed within the CSV program for the minimum point.



Min, X Pos and Value – This will draw a small notch, give the X position and minimum value on each graph displayed within the CSV program for the minimum point.



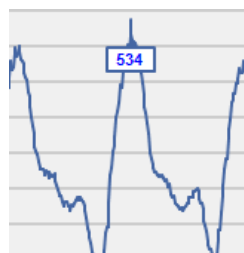
Maximums – The user is able to identify the maximum point on each graph displayed within the Quintic CSV Program. Options are:

- Max
- Max and Value
- Max, X Pos and Value.

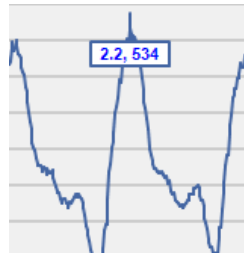
Max – This will draw a small notch on each graph displayed within the CSV program for the maximum point.



Max and Value – This will draw a small notch and give the maximum value on each graph displayed within the CSV program for the maximum point.



Max, X Pos and Value – This will draw a small notch, give the X position and maximum value on each graph displayed within the CSV program for the maximum point.

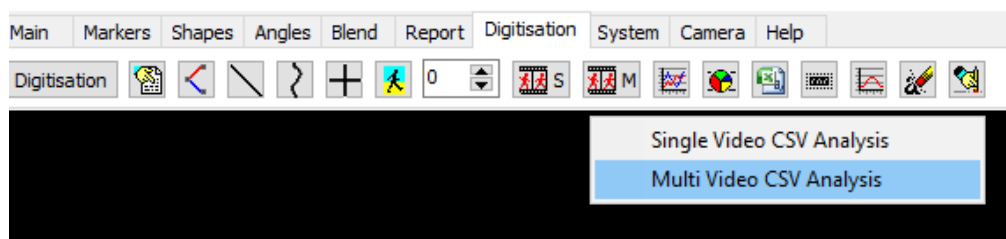


6. Multi CSV Analysis

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.

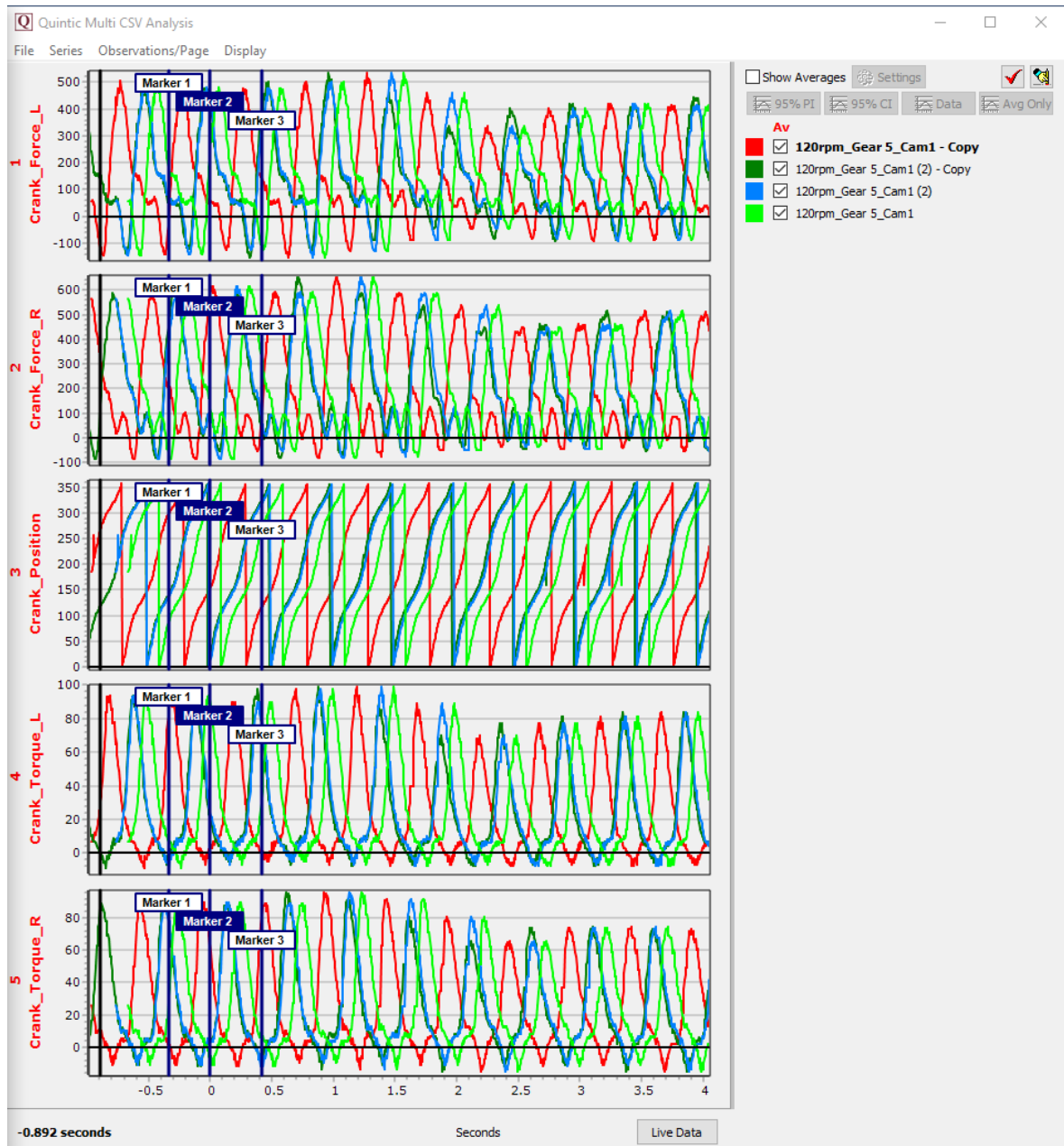
Users can perform a Multi CSV Analysis by going to the Digitisation Tab and clicking on the 'Quintic CSV Program' button then selecting Multi Video CSV Analysis.



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.

Users are able to print/save and copy the graphs to clipboard by going to the file tab. Within the series tab, users are able to select which graphs they would like to display from the CSV file. Within the Observations/Page users can control how many data points are on the graph at any one time. Within the Display tab, users can turn on/off Series Values, Frame Position Indicator (Black line on graph synchronised with the main video) and Frame Markers (Blue Lines on the graphs). As well as this, users can display the maximum and minimum points on the graphs, synchronise the horizontal axis to a frame marker, as well as show the second average and similarity values.

On the right-hand side of the Multi CSV Window, users are able to control which CSV files are displayed on the graph, as well as showing averages, 95% Confidence Intervals, 95% Prediction Intervals or the data only.

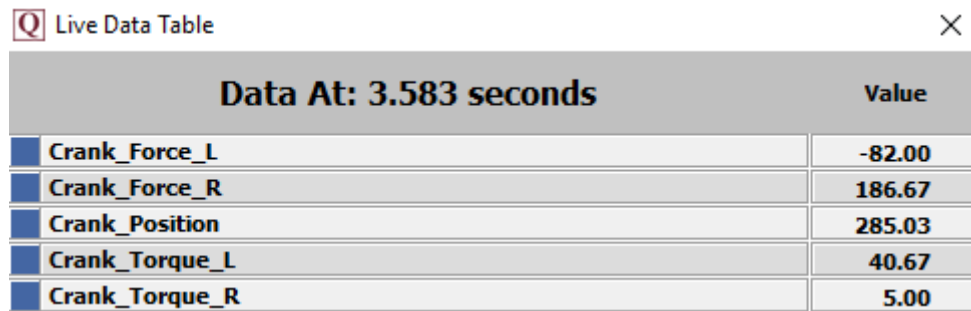


7. Live Data Table

Within the CSV program, there is an option to display the live data table.

A rectangular button with a thin border and the text "Live Data" in a blue, sans-serif font.

To display the Live Data Table, simply click the Live Data button within the CSV Program.

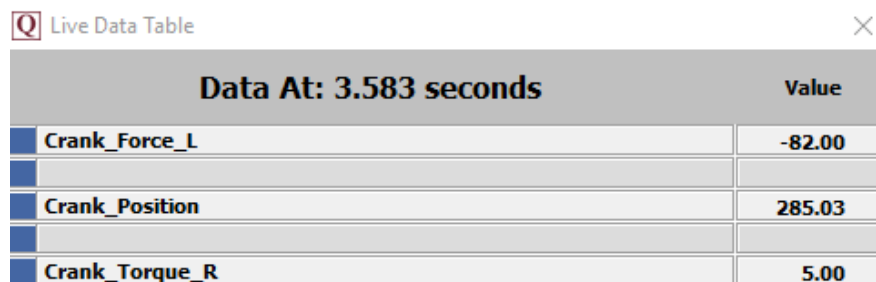
A screenshot of a software window titled "Live Data Table" with a close button (X) in the top right corner. The window contains a table with a header row and five data rows. The header row is grey and contains "Data At: 3.583 seconds" and "Value". The data rows have a blue header cell and a white value cell.

Data At: 3.583 seconds		Value
Crank_Force_L		-82.00
Crank_Force_R		186.67
Crank_Position		285.03
Crank_Torque_L		40.67
Crank_Torque_R		5.00

This will then display the data from the graphs which are displayed within the CSV Program.

As the video plays through, the Live Data table will be updated with the current frame data.

Within the CSV program, if any data series are not displayed as a graph, the associated data will also be removed from the Live Data Table and vice versa.

A screenshot of the "Live Data Table" window, similar to the previous one, but with two rows removed. The table now only shows three data rows: Crank_Force_L, Crank_Position, and Crank_Torque_R. The header row remains the same.

Data At: 3.583 seconds		Value
Crank_Force_L		-82.00
Crank_Position		285.03
Crank_Torque_R		5.00