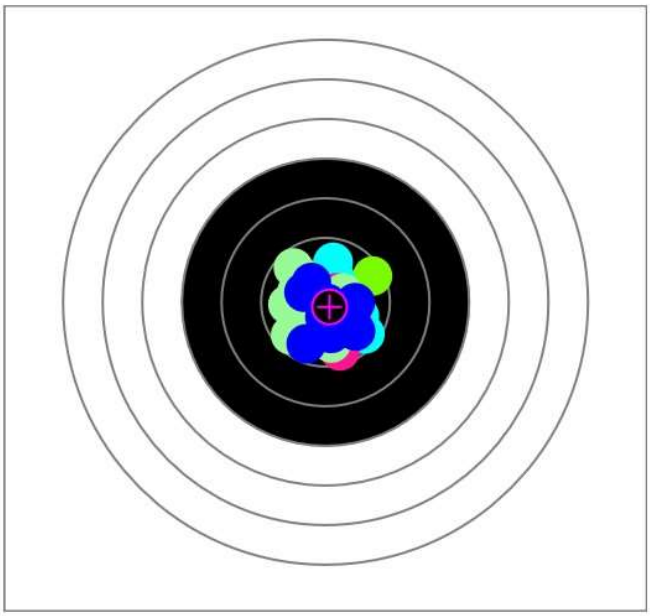
Hold Master
Website Analysis



Achieving your target

through continuous improvement

Realtime Results Ltd

24th September 2019

V1.0

Introduction

The Hold Master is a low-cost solution that is ideal for fixed-target rifle and pistol shooters, where the repeated aiming and firing processes can be tracked, stored and analysed.

The solution includes:

- a multi-axis Hold Master motion sensor to capture a shooter's movement
- a Hold Master Collector Phone App (Android or Apple) to record and save the sensor data
- the website, www.HoldMasterX.com to store and present the captured session data and previous sessions
- a Hold Master Collector and Coach Windows 10 Universal App to record and analyse the data on the range.

It captures and manages the motion data of every shot in a training or match session. This provides the shooter and their coach an insight into a variety of issues that may arise during the hold, aim and release processes. Over time, the session history will track the shooters performance and their improvement.

The Hold Master multi-axis accelerometer monitors all movement in three axes, X, Y, and Z, to millisecond resolution. The frequency of data collection is typically every 10 milliseconds and supports dry firing with an electronic trigger.

Hold Master records all movement of the weapon during a shooting session. Sessions can be dry or live firing during practice or competition.

At the end of a session, the shooter may save the data and upload the file to this site for subsequent analysis. Coaches with multiple shooters are also supported.

While the Hold Master multi-axis accelerometer tracks the movement of the firearm, does not 'view' a target through any optical sensors.

it can only be used to analyse the quality of your hold, timing and rhythm. Consequently, the Hold Master does not give feedback on aiming and is not designed to replace SCATT, Noptel or Rika Shooter Training Systems, as they provide a greater level of analysis than Hold Master.

The Hold Master does support analysis for single or multi-bull targets and both dry and live firing.

The analysis provides the shooter with a range of hold quality results, including:

- Group Size per session;
- Dispersion or distance from the centre for each shot;
- Distance moved in the last 1.0 second and 0.2 seconds;
- Quality of hold for three axes: Horizontal, Vertical, and In-Out;
- Cant and Tilt angles per shot, showing changes during a session;
- Hold time per shot, showing the level of rhythm during a session;
- A Quality Rating for each shot based on the Key Performance Indicators;
- An overall session rating based on the Key Performance Indicators;
- Comparison table of all sessions to measure change and improvement.

High resolution trends of each degree of movement that can be used to identify patterns e.g. pulse, breathing, etc.

This Document

This document covers the Hold Master Website, www.HoldMasterX.com, and how it is used to analyse the shooting sessions.

A separate document covers the introduction of the Hold Master, its sensor and together with the Hold Master Collector App and the first steps necessary to start collecting session data.

The Hold Master Analysis Website

This website provides the storage and analysis of all your shooting sessions that you have captured with our Marksman Trainer Sensor(s).

From the Home page, shown below, shooters can first register and subsequently log in to view their session data.

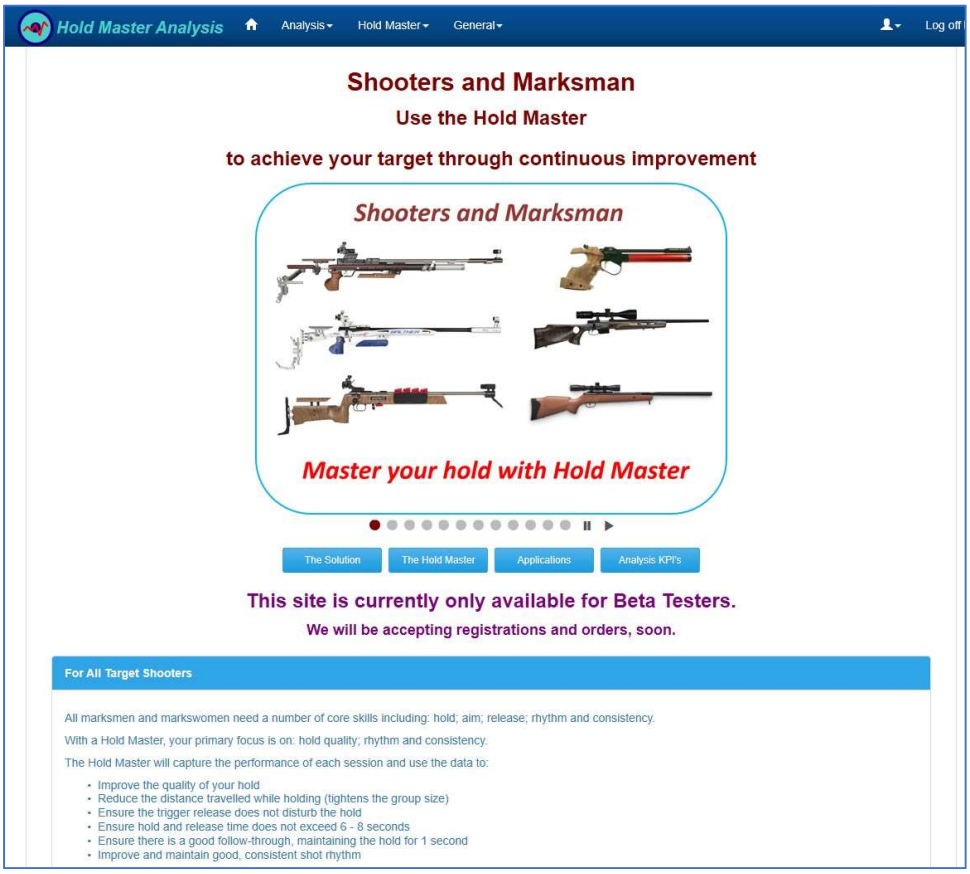


Figure 1 Hold Master Analysis Home Page

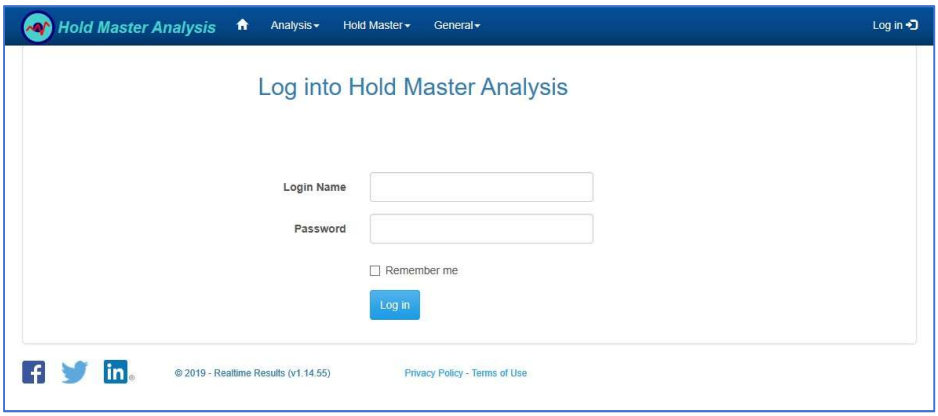


Figure 2 Login Page

Session Analysis

Once you have logged in, you are presented with an empty Analysis page. This allows you to search for all your sessions or a subset of them.

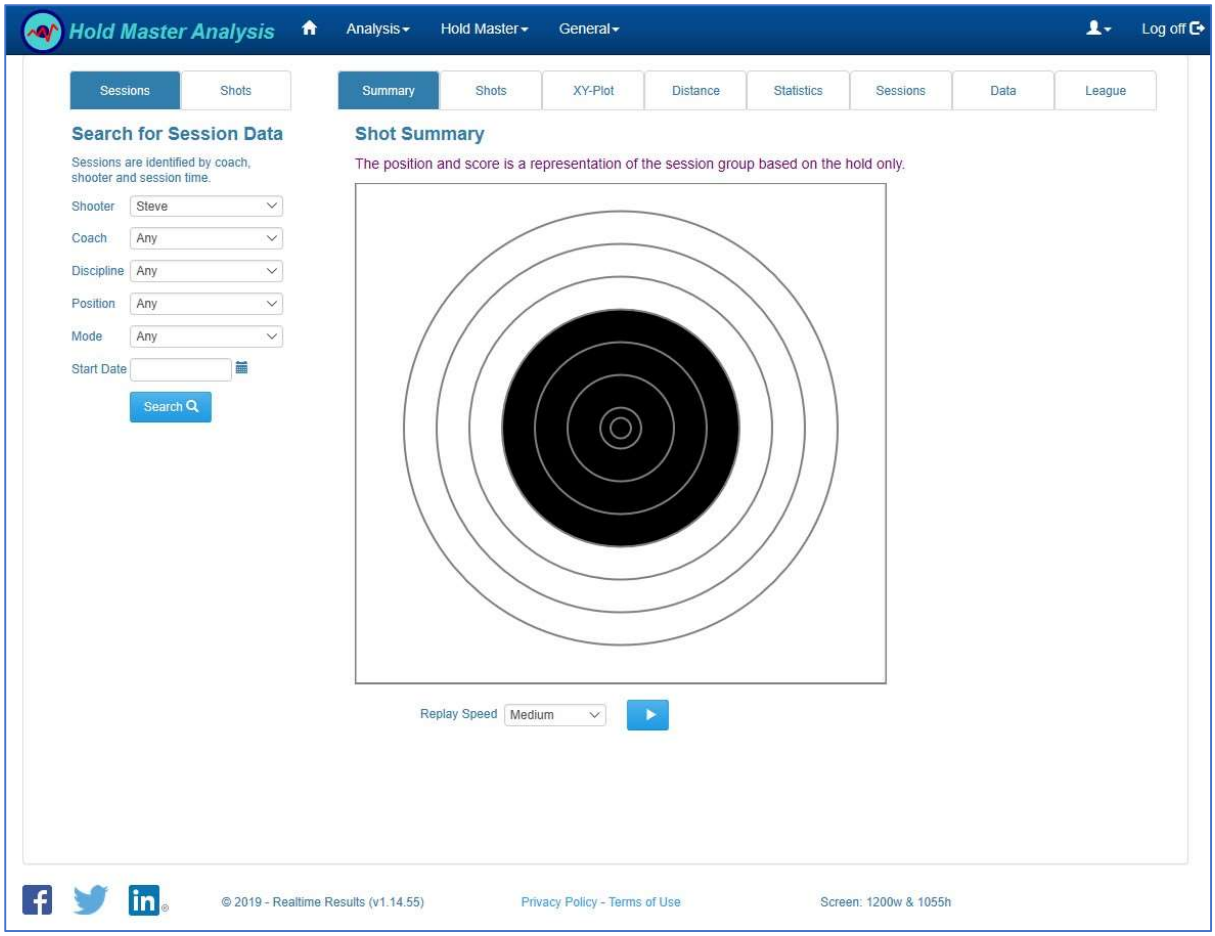


Figure 3 Empty Session Page

This page has two panes of tabs. The left-hand pane provides the search criteria for the sessions of interest and the results. The right-hand pane has several tabs to view and analyse the session data in different ways.

Use the dropdown filters to find the sessions of interest and click on the Search button. This will then display the Sessions Table which contains all the sessions that meet the search criteria.

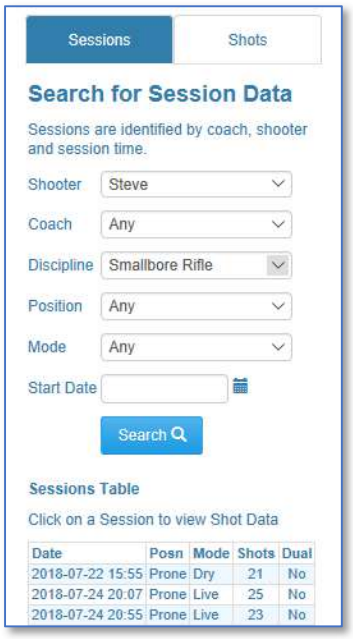


Figure 4 Session Search Filters

Selecting a Session

Select a session by clicking on one of the sessions in the Sessions Table. This session the selected session is highlighted in the table.

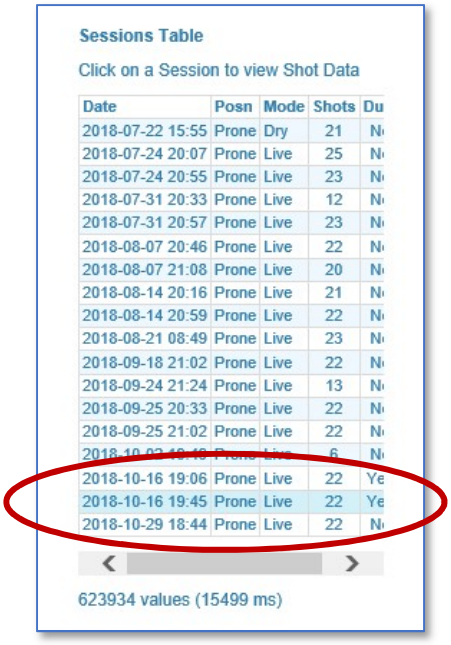


Figure 5 Selected session in Sessions Table

This will retrieve that session from the database, perform the shot identification and prepare the data for analysis. This will update all the Tabs for your review. The Summary Tab is the default tab and provides a good overview of the session.

The summary details the time of the session together with the Session details that were entered via the Collector App.

Several Hold Quality factors are calculated for each session and these are compared with a Grade level to provide a quick assessment of the session performance.

The time for the session is shown, together with the average shot time and hold time.

The shots on the target are colour coded in groups of five. The summary shots can be replayed at different speeds.

A different session may be selected by clicking on the Sessions Tab in the left-hand pane and then clicking on a new session in the table. You may also perform a new search with different criteria, if desired. This will refresh the Sessions Table to match the selection criteria.

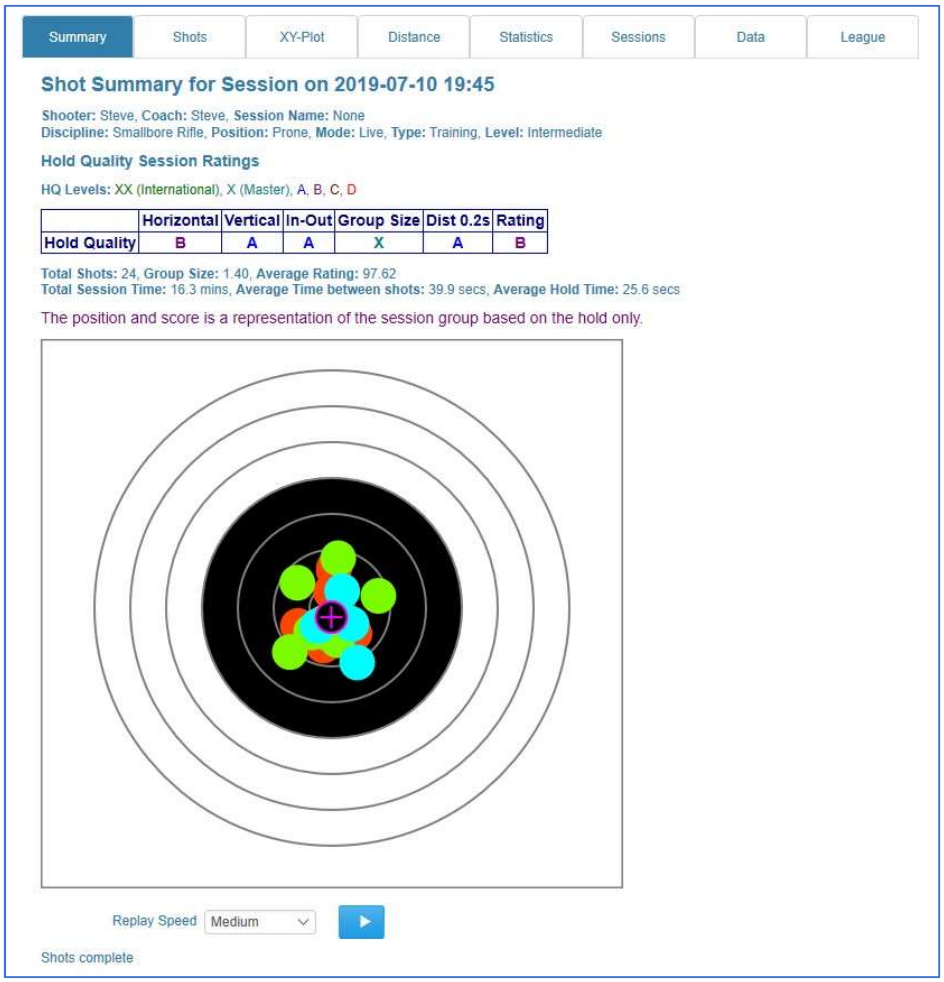


Figure 6 Session Summary Tab

The left-hand pane also switches to the Shots Tab and displays the Session Results and a Shots table, as shown below.

Shot	Trigger	Hold(s)	HorzHQ	VertHQ	Cant
1	125.6	15	2.5	3.5	0.2
2	153.0	17	2.8	3.4	0.4
3	196.1	17	3.2	3.4	0.4
4	218.8	16	2.6	2.7	0.3
5	244.9	18	2.9	3.2	0.5
6	270.3	16	2.9	3.1	0.4
7	302.0	17	2.5	2.7	0.2
8	323.4	14	2.8	3.1	0.4
9	350.3	15	2.5	2.7	0.4
10	376.7	15	2.6	2.7	0.3

Figure 7 Session Shots Table

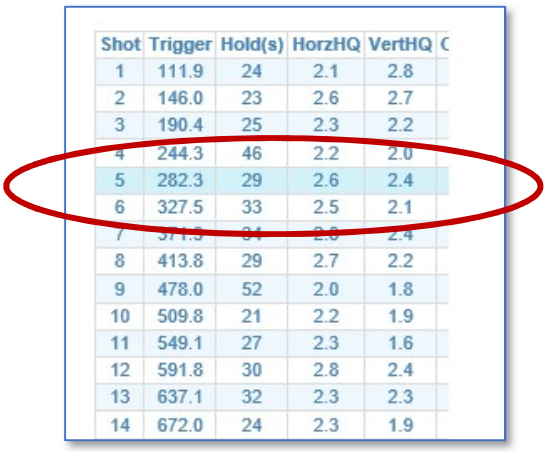
Right-hand Pane Tabs

As well as the Summary tab, there are four Analysis tabs, a Statistics tab for the session, a Sessions Summary tab and the League tab.

The four Analysis tabs include: Shots; XY-Plot; Distance; and Data.

Figure 8 Analysis Tabs

Clicking on a different tab switches from one to the other. The Analysis tabs are 'driven' by selecting one of the shots from the Shot Data Table and then clicking on Play button in the Controls section.



Shot	Trigger	Hold(s)	HorzHQ	VertHQ	C
1	111.9	24	2.1	2.8	
2	146.0	23	2.6	2.7	
3	190.4	25	2.3	2.2	
4	244.3	46	2.2	2.0	
5	282.3	29	2.6	2.4	
6	327.5	33	2.5	2.1	
7	371.3	34	2.6	2.4	
8	413.8	29	2.7	2.2	
9	478.0	52	2.0	1.8	
10	509.8	21	2.2	1.9	
11	549.1	27	2.3	1.6	
12	591.8	30	2.8	2.4	
13	637.1	32	2.3	2.3	
14	672.0	24	2.3	1.9	

Figure 9 Shot Data Table

Figure 10 Controls Buttons

Shots Tab

The Shots Tab is used to view the shot race over time, typically the last 3 seconds before the shot release. The initial display selects the first shot in the table. Clicking on the Play button will draw the shot trace. The associated Play buttons will display the next/previous trace.

A different shot can be selected by clicking on the shot in the table.

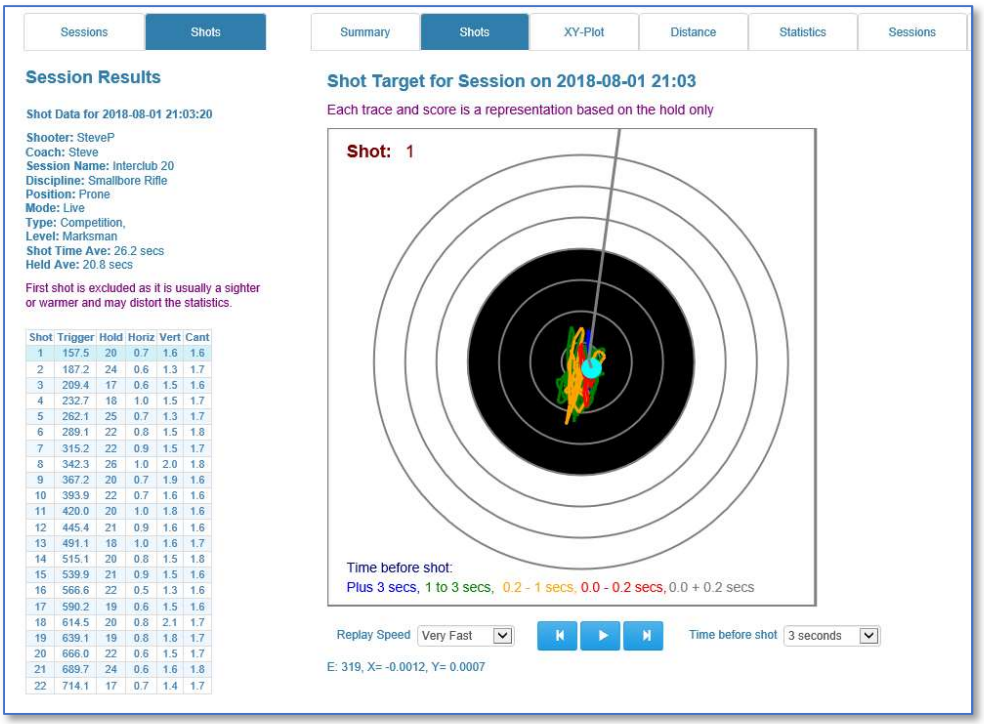


Figure 11 Shots Tab Display

XY-Plot Tab

The XY Plot shows the Horizontal, Vertical and the To/From movement over the selected period, prior to the shot release. The initial display selects the first shot in the table. Clicking on the Play button will draw the shot movement trace. The associated Play buttons will display the next/previous trace.

A different shot can be selected by clicking on the shot in the table.

Figure 12 XY Plot Display

Distance Tab

The Distance display shows the apparent distance from the centre of the target over the selected period, prior to the shot release. The initial display selects the first shot in the table. Clicking on the Play button will draw the shot distance trace. The associated Play buttons will display the next/previous trace.

A different shot can be selected by clicking on the shot in the table.

Figure 13 Distance Display

Statistics Tab

Each shooting session results in a significant range of statistics. These statistics are key to determining the performance of different aspects as well as the overall performance level.

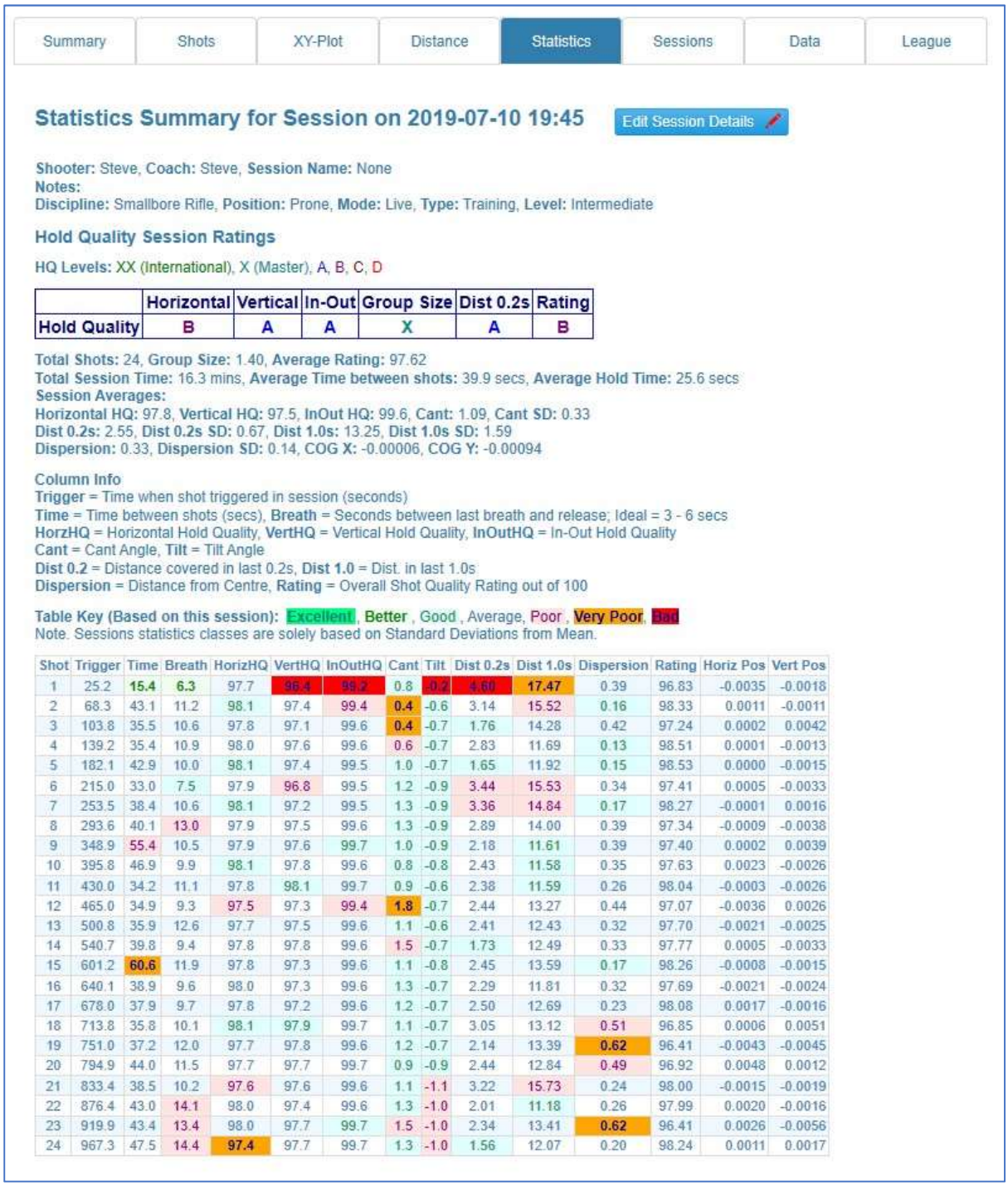
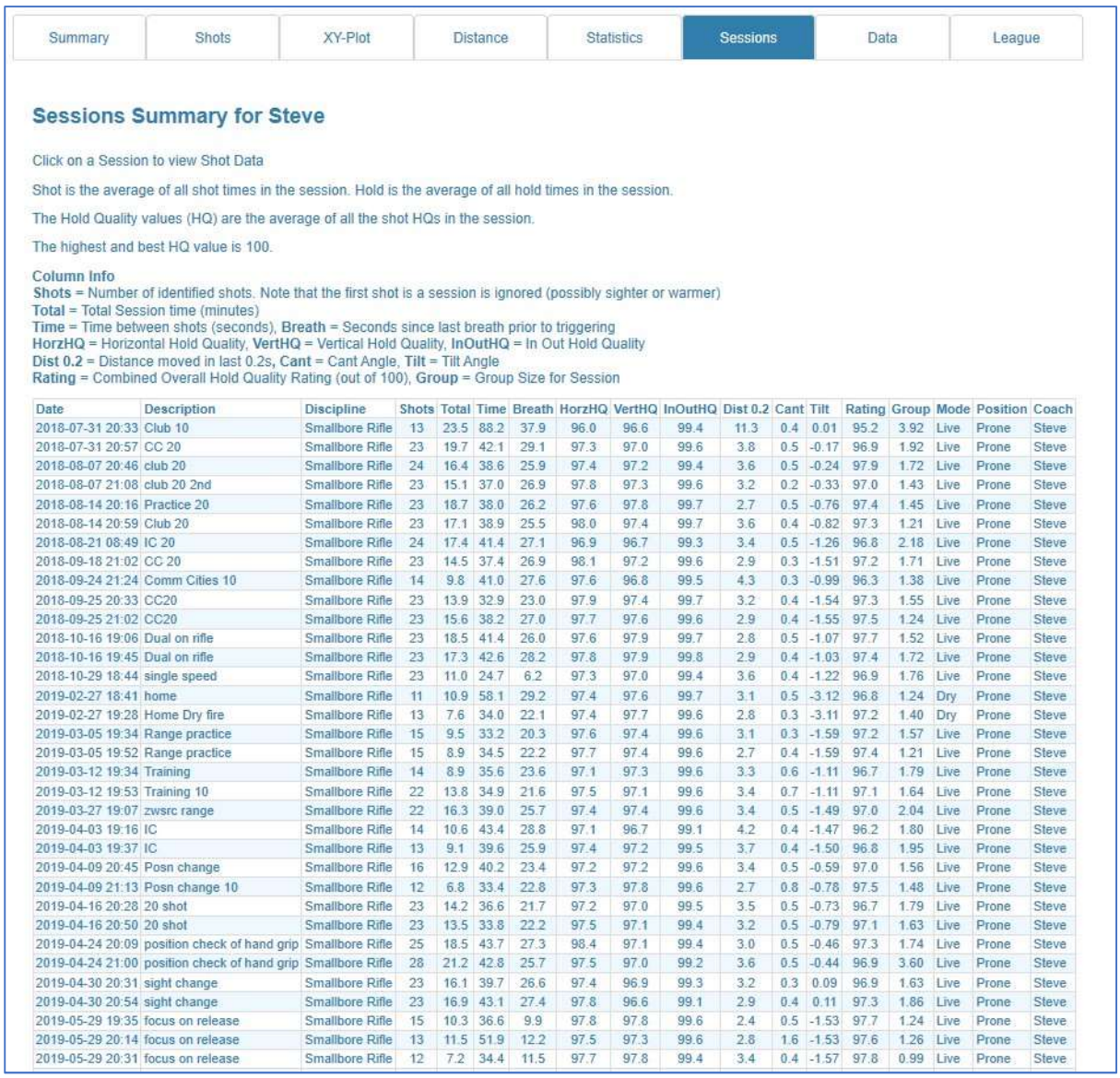


Figure 14 Statistics Display

Sessions Tab

The Sessions Summary page contains the summary of all your sessions that meet the search results. This provides a quick way of reviewing your performance over time. One of the key performance indicators is the group size.



Sessions Summary for Steve

Click on a Session to view Shot Data

Shot is the average of all shot times in the session. Hold is the average of all hold times in the session.

The Hold Quality values (HQ) are the average of all the shot HQs in the session.

The highest and best HQ value is 100.

Column Info
Shots = Number of identified shots. Note that the first shot is a session is ignored (possibly sighter or warmer)
Total = Total Session time (minutes)
Time = Time between shots (seconds), **Breath** = Seconds since last breath prior to triggering
HorzHQ = Horizontal Hold Quality, **VertHQ** = Vertical Hold Quality, **InOutHQ** = In Out Hold Quality
Dist 0.2 = Distance moved in last 0.2s, **Cant** = Cant Angle, **Tilt** = Tilt Angle
Rating = Combined Overall Hold Quality Rating (out of 100), **Group** = Group Size for Session

Date	Description	Discipline	Shots	Total	Time	Breath	HorzHQ	VertHQ	InOutHQ	Dist 0.2	Cant	Tilt	Rating	Group	Mode	Position	Coach
2018-07-31 20:33	Club 10	Smallbore Rifle	13	23.5	88.2	37.9	96.0	96.6	99.4	11.3	0.4	0.01	95.2	3.92	Live	Prone	Steve
2018-07-31 20:57	CC 20	Smallbore Rifle	23	19.7	42.1	29.1	97.3	97.0	99.6	3.8	0.5	-0.17	96.9	1.92	Live	Prone	Steve
2018-08-07 20:46	club 20	Smallbore Rifle	24	16.4	38.6	25.9	97.4	97.2	99.4	3.6	0.5	-0.24	97.9	1.72	Live	Prone	Steve
2018-08-07 21:08	club 20 2nd	Smallbore Rifle	23	15.1	37.0	26.9	97.8	97.3	99.6	3.2	0.2	-0.33	97.0	1.43	Live	Prone	Steve
2018-08-14 20:16	Practice 20	Smallbore Rifle	23	18.7	38.0	26.2	97.6	97.8	99.7	2.7	0.5	-0.76	97.4	1.45	Live	Prone	Steve
2018-08-14 20:59	Club 20	Smallbore Rifle	23	17.1	38.9	25.5	98.0	97.4	99.7	3.6	0.4	-0.82	97.3	1.21	Live	Prone	Steve
2018-08-21 08:49	IC 20	Smallbore Rifle	24	17.4	41.4	27.1	96.9	96.7	99.3	3.4	0.5	-1.26	96.8	2.18	Live	Prone	Steve
2018-09-18 21:02	CC 20	Smallbore Rifle	23	14.5	37.4	26.9	98.1	97.2	99.6	2.9	0.3	-1.51	97.2	1.71	Live	Prone	Steve
2018-09-24 21:24	Comm Cities 10	Smallbore Rifle	14	9.8	41.0	27.6	97.6	96.8	99.5	4.3	0.3	-0.99	96.3	1.38	Live	Prone	Steve
2018-09-25 20:33	CC20	Smallbore Rifle	23	13.9	32.9	23.0	97.9	97.4	99.7	3.2	0.4	-1.54	97.3	1.55	Live	Prone	Steve
2018-09-25 21:02	CC20	Smallbore Rifle	23	15.6	38.2	27.0	97.7	97.6	99.6	2.9	0.4	-1.55	97.5	1.24	Live	Prone	Steve
2018-10-16 19:06	Dual on rifle	Smallbore Rifle	23	18.5	41.4	26.0	97.6	97.9	99.7	2.8	0.5	-1.07	97.7	1.52	Live	Prone	Steve
2018-10-16 19:45	Dual on rifle	Smallbore Rifle	23	17.3	42.6	28.2	97.8	97.9	99.8	2.9	0.4	-1.03	97.4	1.72	Live	Prone	Steve
2018-10-29 18:44	single speed	Smallbore Rifle	23	11.0	24.7	6.2	97.3	97.0	99.4	3.6	0.4	-1.22	96.9	1.76	Live	Prone	Steve
2019-02-27 18:41	home	Smallbore Rifle	11	10.9	58.1	29.2	97.4	97.6	99.7	3.1	0.5	-3.12	96.8	1.24	Dry	Prone	Steve
2019-02-27 19:28	Home Dry fire	Smallbore Rifle	13	7.6	34.0	22.1	97.4	97.7	99.6	2.8	0.3	-3.11	97.2	1.40	Dry	Prone	Steve
2019-03-05 19:34	Range practice	Smallbore Rifle	15	9.5	33.2	20.3	97.6	97.4	99.6	3.1	0.3	-1.59	97.2	1.57	Live	Prone	Steve
2019-03-05 19:52	Range practice	Smallbore Rifle	15	8.9	34.5	22.2	97.7	97.4	99.6	2.7	0.4	-1.59	97.4	1.21	Live	Prone	Steve
2019-03-12 19:34	Training	Smallbore Rifle	14	8.9	35.6	23.6	97.1	97.3	99.6	3.3	0.6	-1.11	96.7	1.79	Live	Prone	Steve
2019-03-12 19:53	Training 10	Smallbore Rifle	22	13.8	34.9	21.6	97.5	97.1	99.6	3.4	0.7	-1.11	97.1	1.64	Live	Prone	Steve
2019-03-27 19:07	zwsrc range	Smallbore Rifle	22	16.3	39.0	25.7	97.4	97.4	99.6	3.4	0.5	-1.49	97.0	2.04	Live	Prone	Steve
2019-04-03 19:16	IC	Smallbore Rifle	14	10.6	43.4	28.8	97.1	96.7	99.1	4.2	0.4	-1.47	96.2	1.80	Live	Prone	Steve
2019-04-03 19:37	IC	Smallbore Rifle	13	9.1	39.6	25.9	97.4	97.2	99.5	3.7	0.4	-1.50	96.8	1.95	Live	Prone	Steve
2019-04-09 20:45	Posn change	Smallbore Rifle	16	12.9	40.2	23.4	97.2	97.2	99.6	3.4	0.5	-0.59	97.0	1.56	Live	Prone	Steve
2019-04-09 21:13	Posn change 10	Smallbore Rifle	12	6.8	33.4	22.8	97.3	97.8	99.6	2.7	0.8	-0.78	97.5	1.48	Live	Prone	Steve
2019-04-16 20:28	20 shot	Smallbore Rifle	23	14.2	36.6	21.7	97.2	97.0	99.5	3.5	0.5	-0.73	96.7	1.79	Live	Prone	Steve
2019-04-16 20:50	20 shot	Smallbore Rifle	23	13.5	33.8	22.2	97.5	97.1	99.4	3.2	0.5	-0.79	97.1	1.63	Live	Prone	Steve
2019-04-24 20:09	position check of hand grip	Smallbore Rifle	25	18.5	43.7	27.3	98.4	97.1	99.4	3.0	0.5	-0.46	97.3	1.74	Live	Prone	Steve
2019-04-24 21:00	position check of hand grip	Smallbore Rifle	28	21.2	42.8	25.7	97.5	97.0	99.2	3.6	0.5	-0.44	96.9	3.60	Live	Prone	Steve
2019-04-30 20:31	sight change	Smallbore Rifle	23	16.1	39.7	26.6	97.4	96.9	99.3	3.2	0.3	0.09	96.9	1.63	Live	Prone	Steve
2019-04-30 20:54	sight change	Smallbore Rifle	23	16.9	43.1	27.4	97.8	96.6	99.1	2.9	0.4	0.11	97.3	1.86	Live	Prone	Steve
2019-05-29 19:35	focus on release	Smallbore Rifle	15	10.3	36.6	9.9	97.8	97.8	99.6	2.4	0.5	-1.53	97.7	1.24	Live	Prone	Steve
2019-05-29 20:14	focus on release	Smallbore Rifle	13	11.5	51.9	12.2	97.5	97.3	99.6	2.8	1.6	-1.53	97.6	1.26	Live	Prone	Steve
2019-05-29 20:31	focus on release	Smallbore Rifle	12	7.2	34.4	11.5	97.7	97.8	99.4	3.4	0.4	-1.57	97.8	0.99	Live	Prone	Steve

Figure 15 Sessions Summary Page

Data Tab

The data tab allows you to trend the raw data that was collected by the sensor for the selected session. This provides tools to select and view either the horizontal, vertical or in/out movement. You can also combine multiple trends on one display.

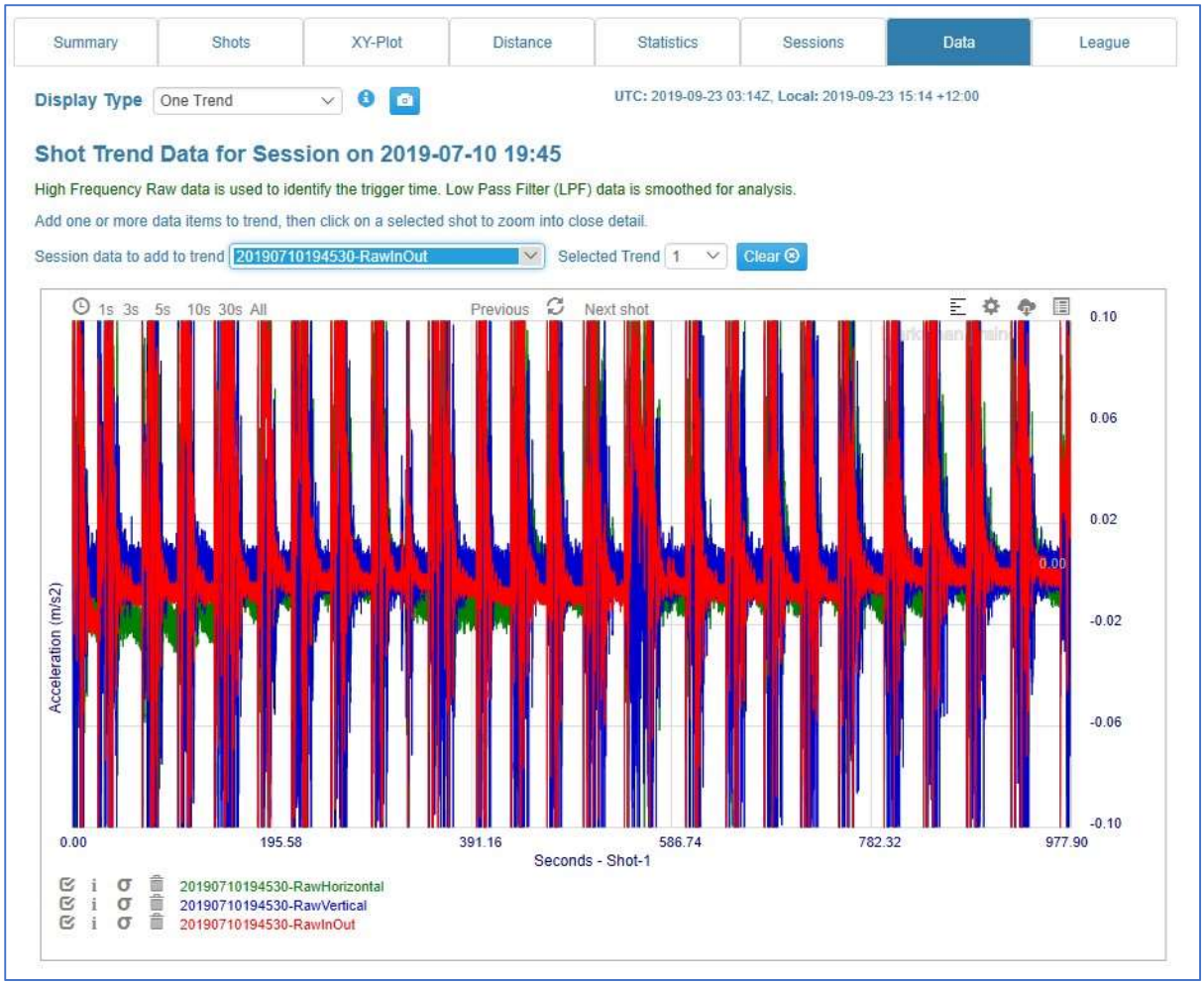


Figure 16 Trend of the X, Y and Z data for the full session

Use the data selection dropdown to select what data is to be added to the trend.

Figure 17 Data Selector Dropdown Box

The full trend can then be modified by selecting a shot from the table and also the period from the options just above the trend box.

Figure 18 Trend Time selection options

Figure 19 30 second Trend for a selected shot

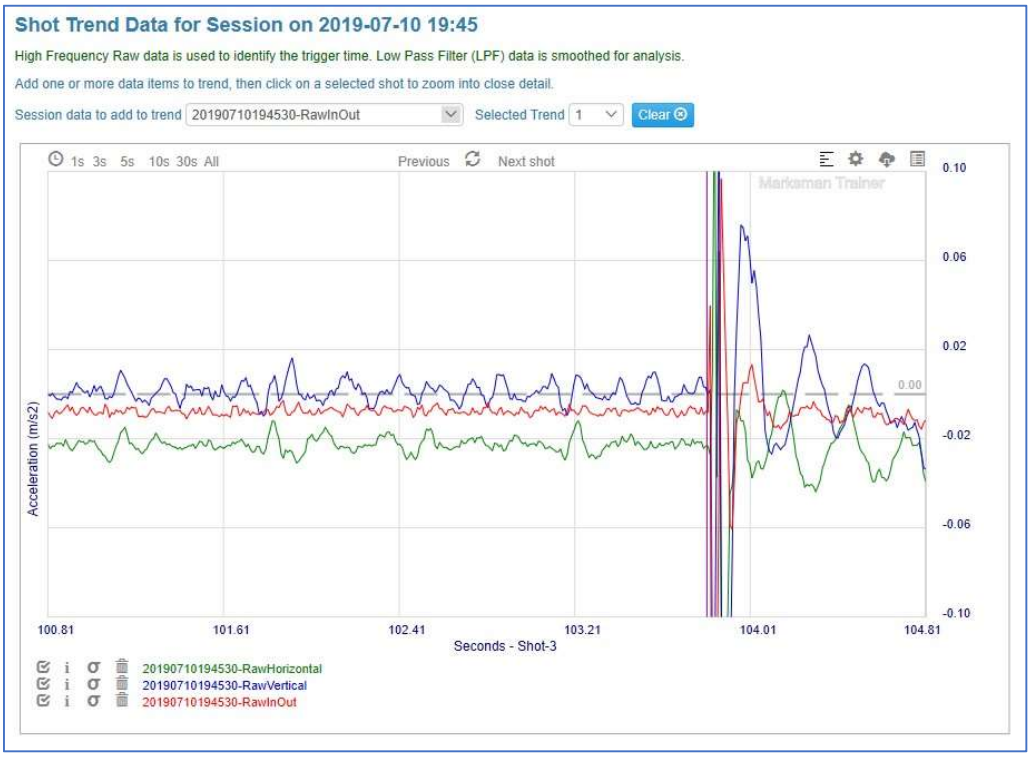


Figure 20 Trend for three seconds prior to shot release