

# Typical Shock Accel Processing

## Workshop

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### Images:

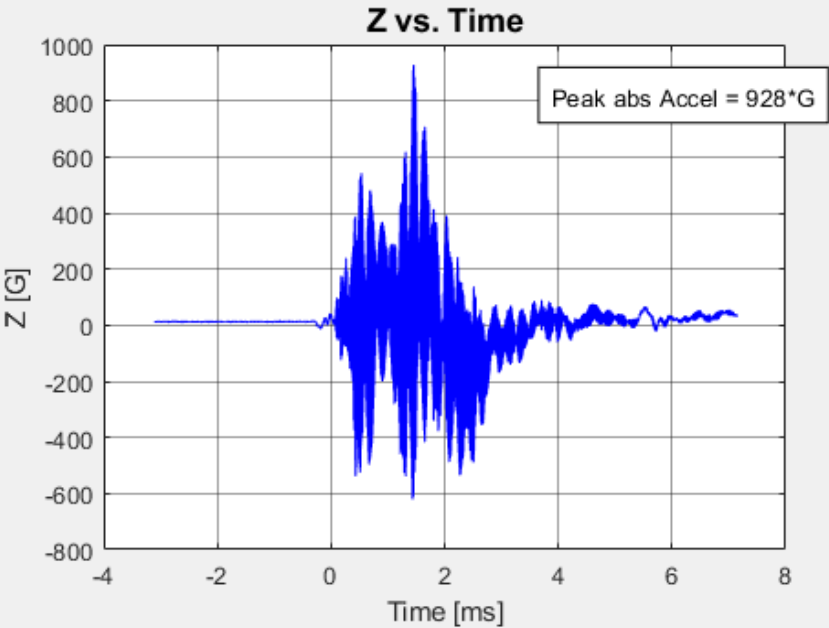
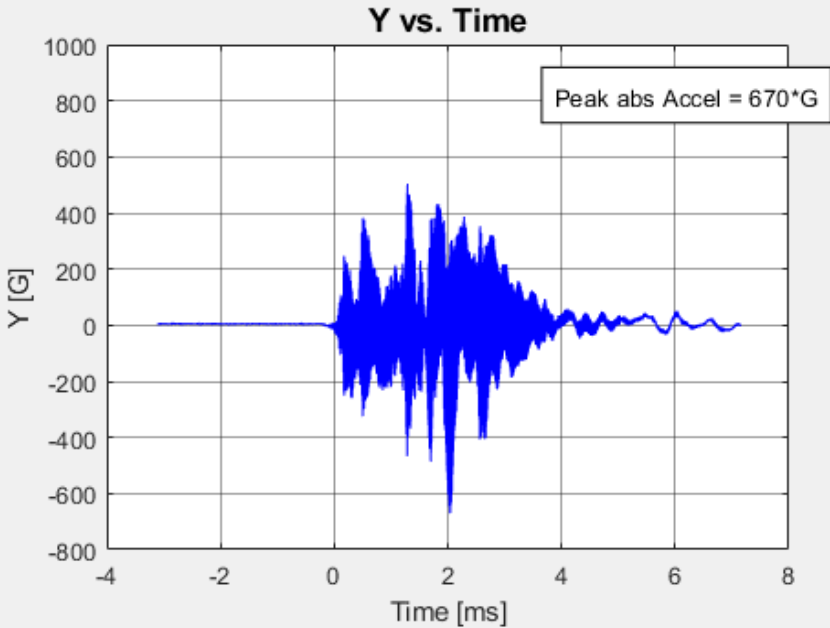
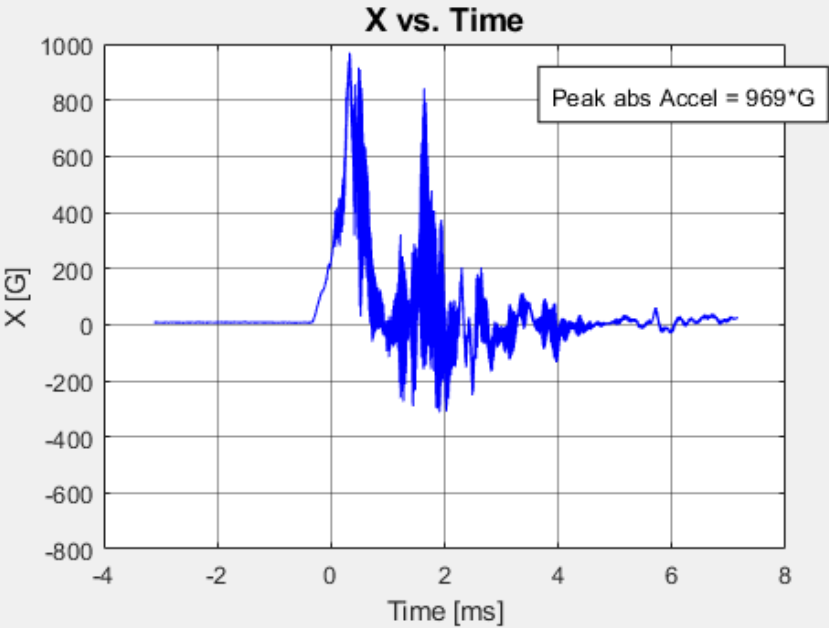
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Raw Accel Plots

fs = 5.0000\*MHz

raw =  
X-direction Free-Drop of Test Article  
Measurement @ proposed camera location  
Sensors: Endevco 727 Piezoresistive Accels  
Drop height = 0.6\*m  
=====

Time	X	Y	Z
[ms]	[G]	[G]	[G]
-3.0960	9.8759	4.5338	14.7196
-3.0958	7.8184	2.2669	11.0397
-3.0956	8.6414	6.4769	14.0506
-3.0954	7.8184	3.5623	11.0397
-3.0952	4.9379	4.5338	11.0397
-3.0950	9.4644	5.1815	11.7088
-3.0948	8.2299	1.2954	13.0470
-3.0946	10.6988	4.8577	12.0433
... 51192 rows not shown.			

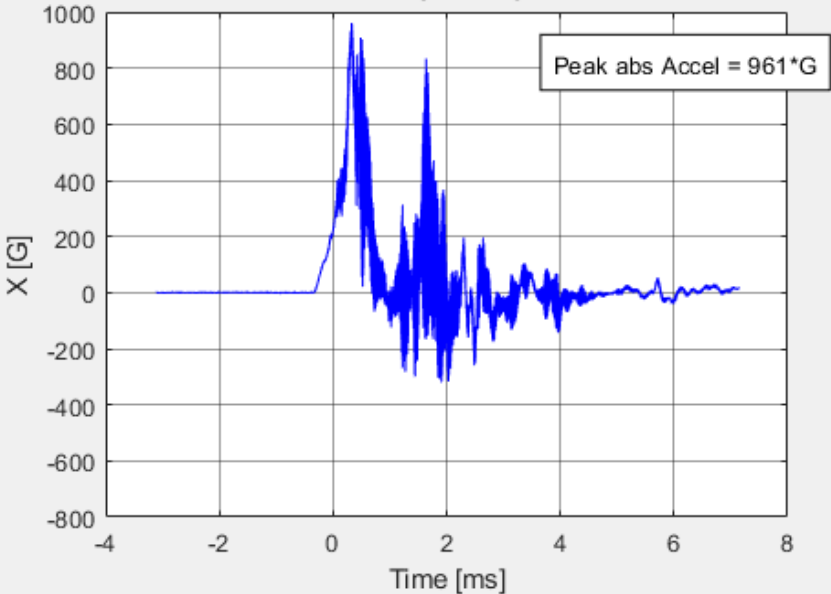


After Removing DC Bias

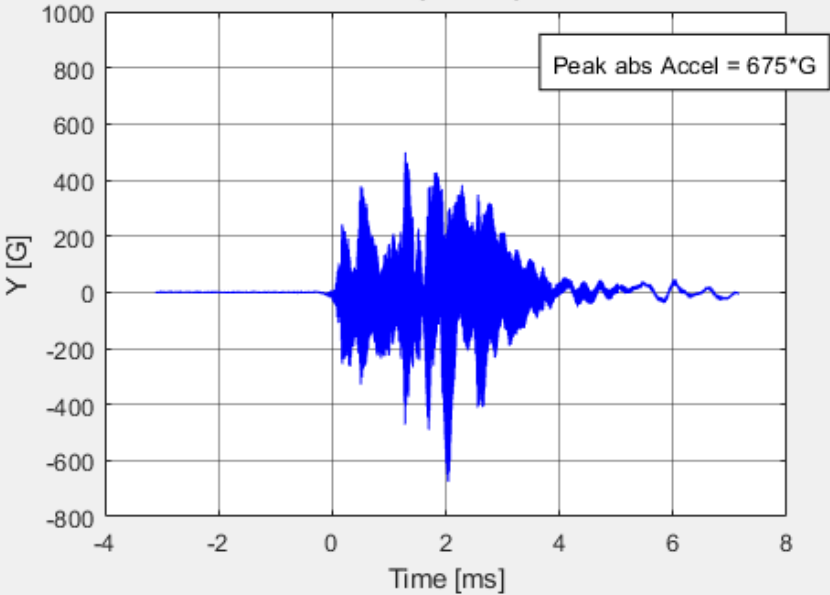
Data adjusted to remove mean DC amplitude offsets.  
Small changes in Peak Accels occur from this adjustment.

Note: The data at this point is still essentially "raw",  
meaning it contains the intended signals PLUS potentially  
some distortion from the accelerometer's transfer function.

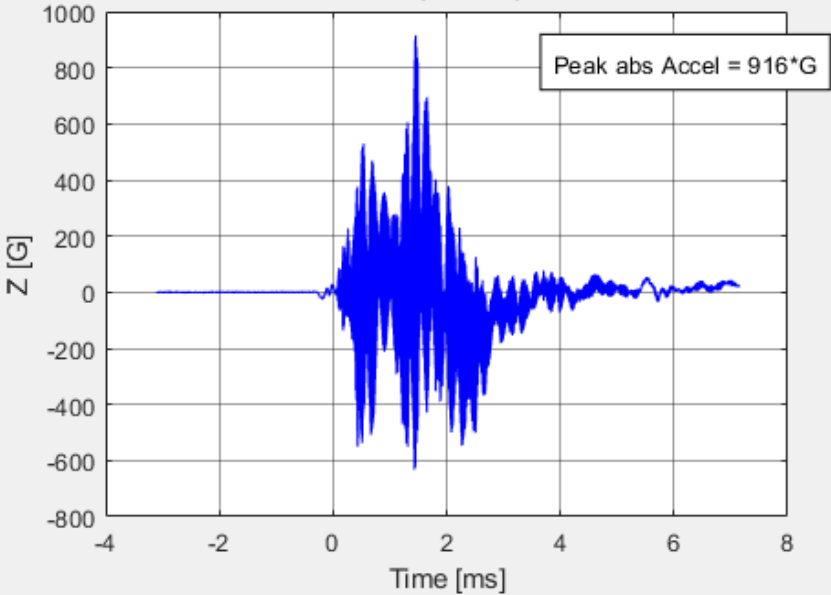
X vs. Time



Y vs. Time



Z vs. Time

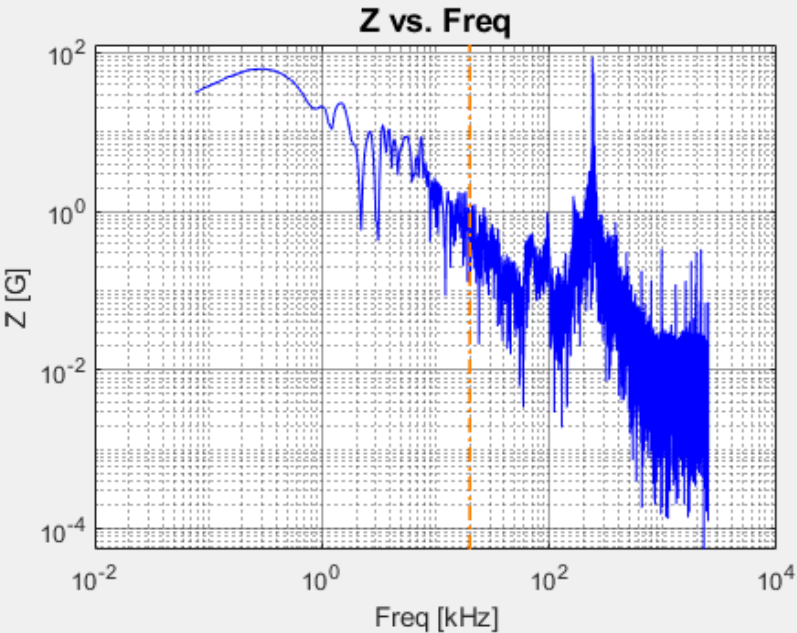
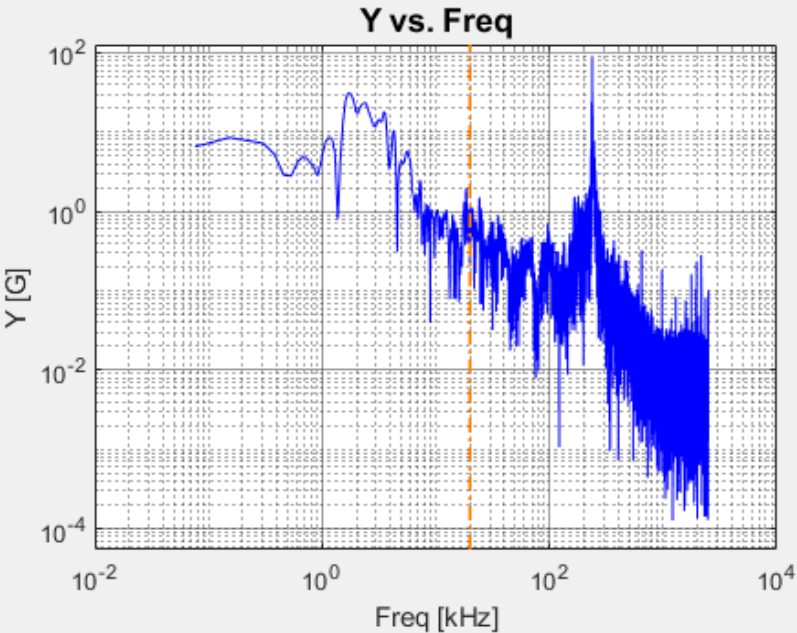
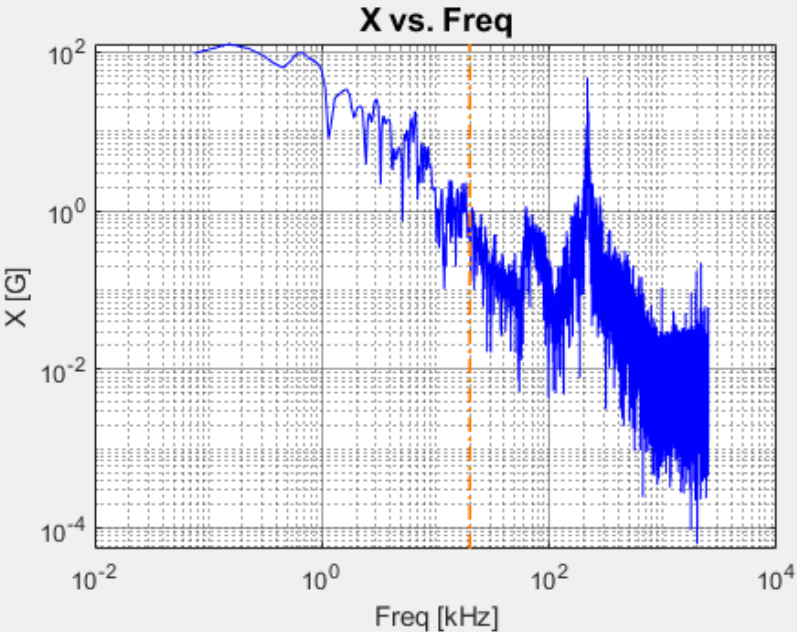


# DFS of Data

From the DFS plots we can clearly see the resonance of the Endevco 727 accelerometers. This is common for MEMS-based piezoresistive sensors.

For the 3 accels, their resonance is approximately  $f_{n\text{Sensor}} = 200 \text{ kHz}$  or higher.

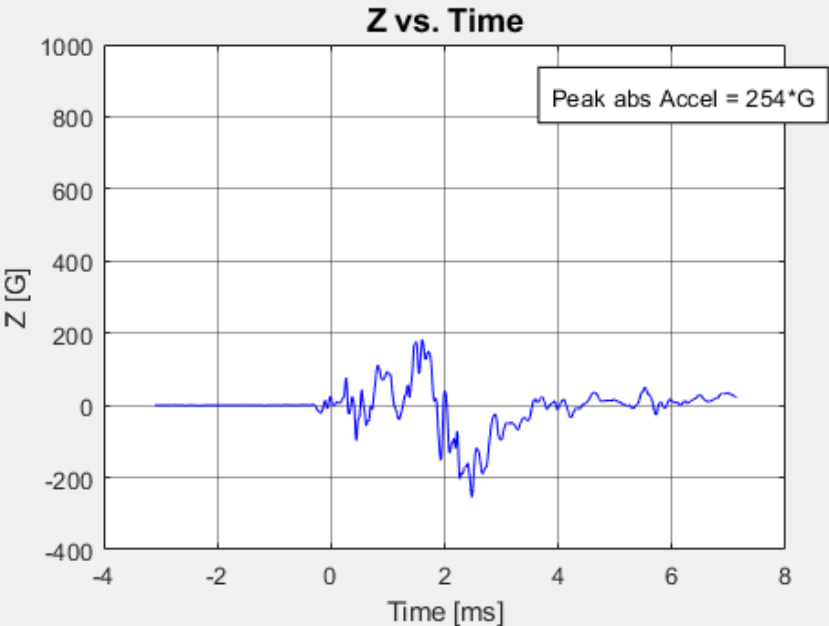
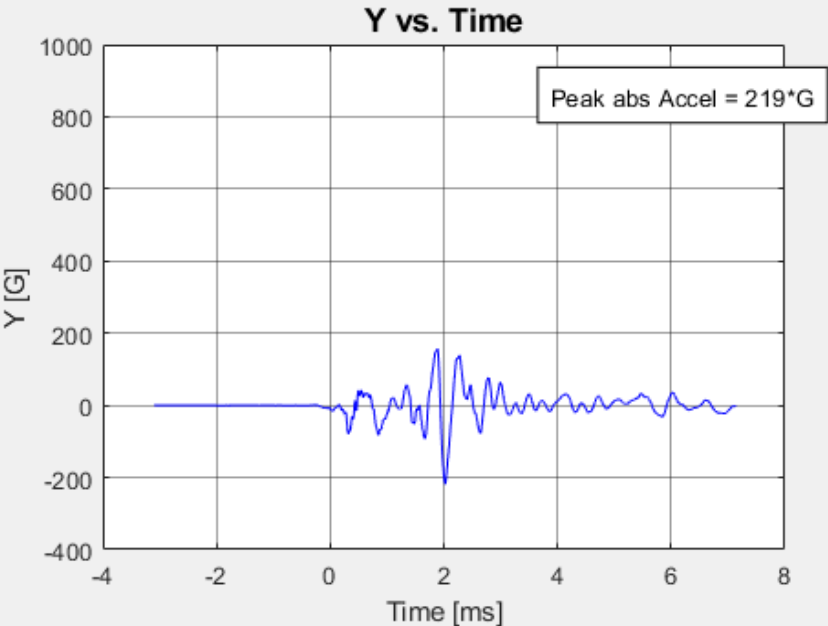
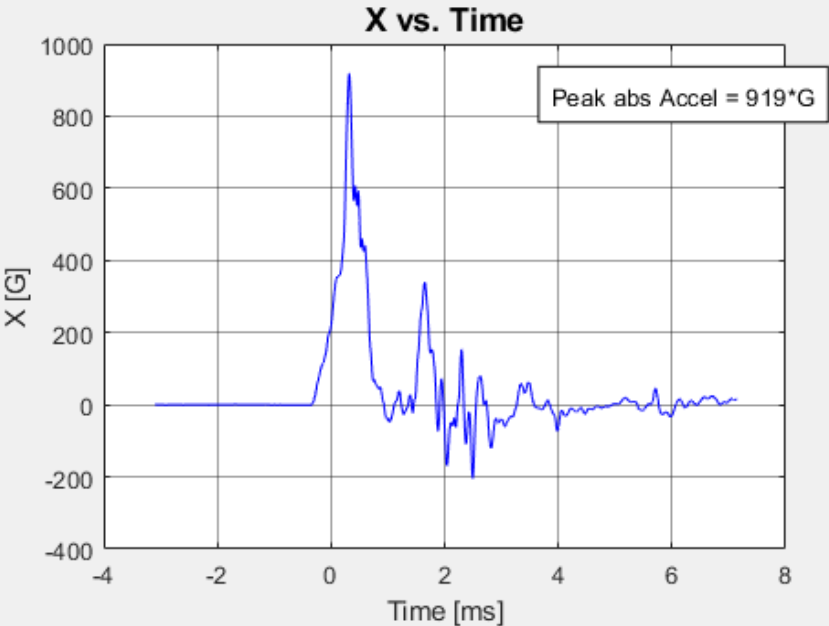
The max bandwidth of the measurement that would be undistorted by the sensor's transfer function resonance behavior is  $0.1 \cdot f_{n\text{Sensor}} = 20 \text{ kHz}$ . This is presented on the graphs by the Orange line.



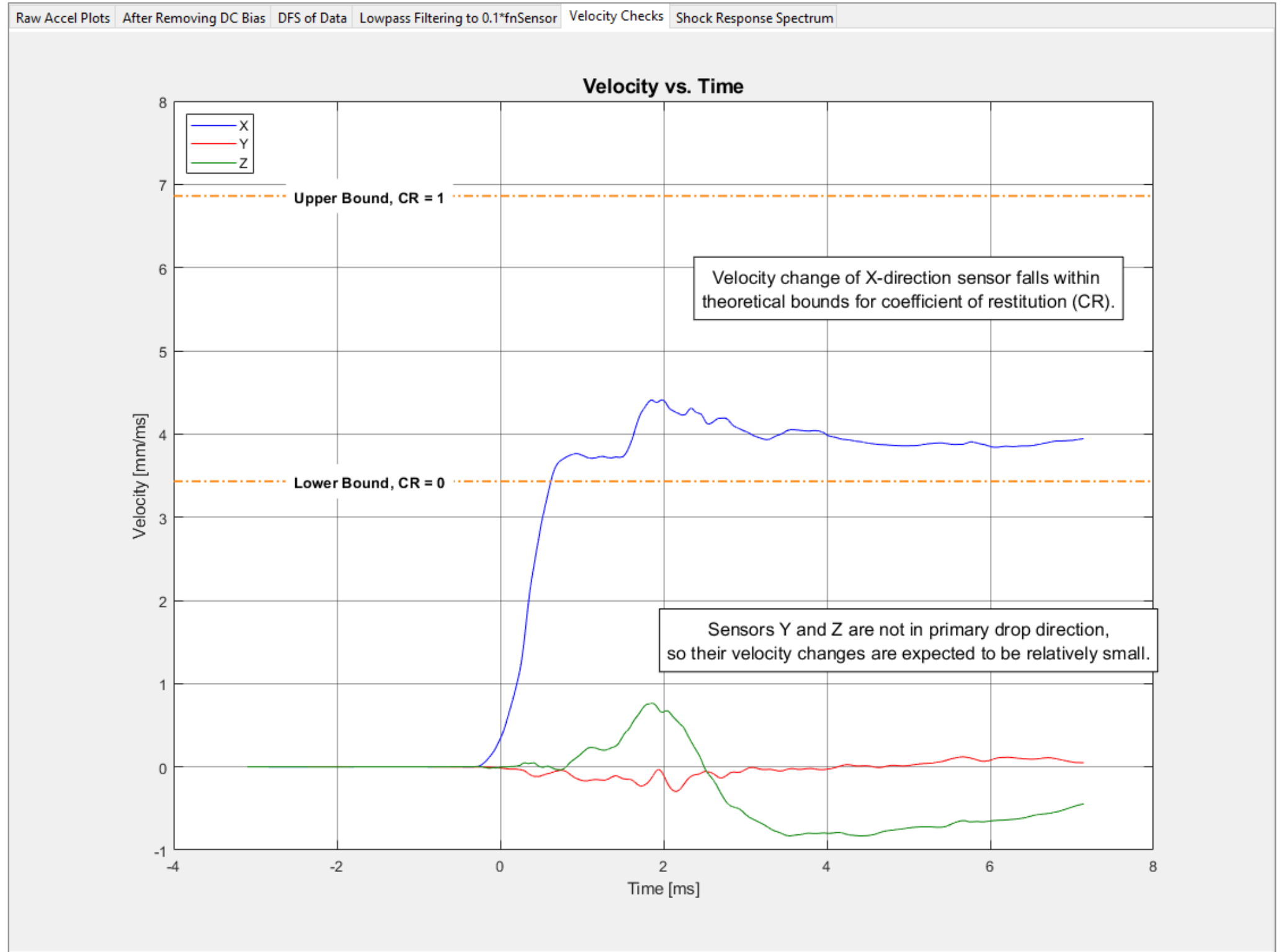
Lowpass Filtering to 0.1\*fnSensor

These are the best representations of the accelerations that occurred in the product being tested.

- Notes:
- 1) The Y and Z sensors now show much lower response. What we were seeing before was mostly sensor resonance.
  - 2) Look back at the Raw Accel tab (or Adjusted data tab). Those results were being distorted by the sensor's transfer function resonance.

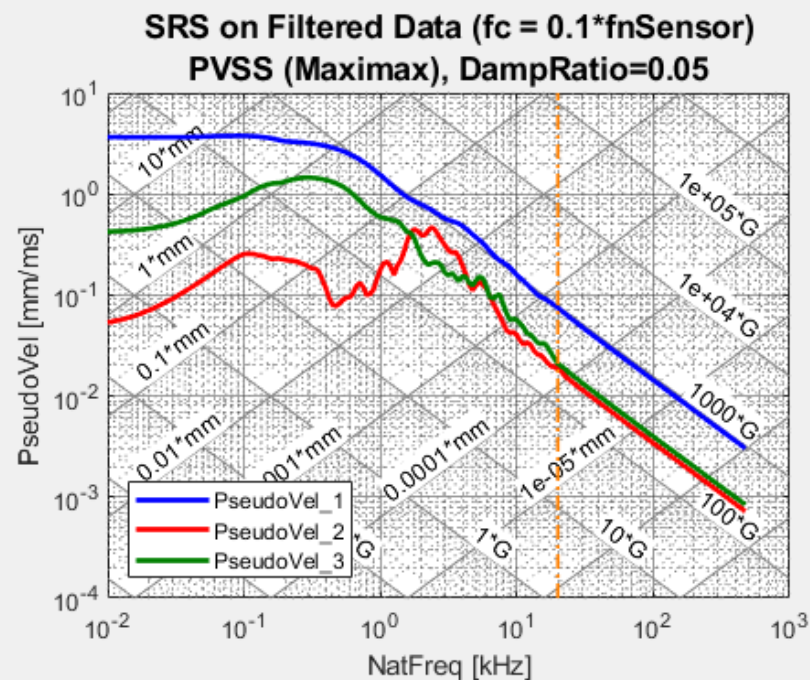
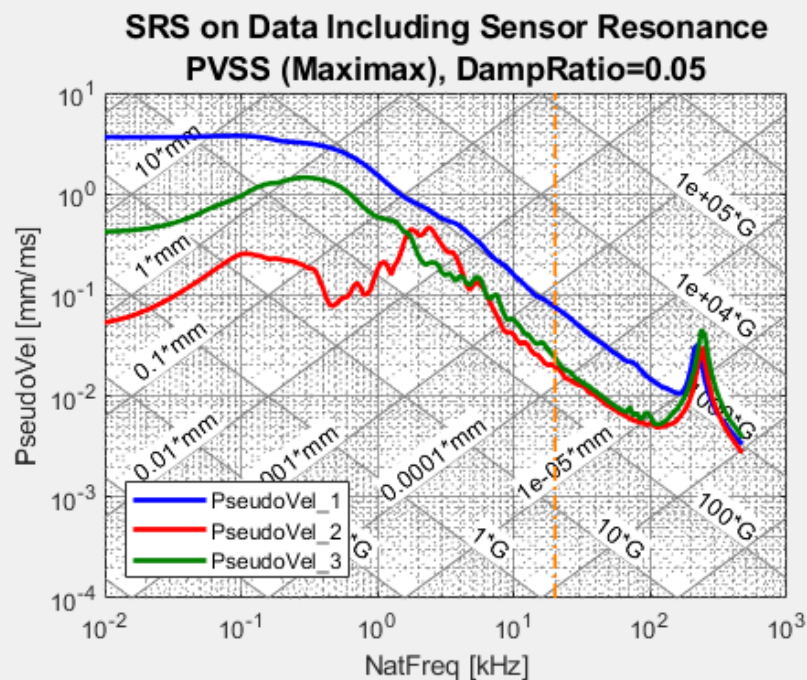


Velocity Checks



# Shock Response Spectrum

Raw Accel Plots   After Removing DC Bias   DFS of Data   Lowpass Filtering to  $0.1 \cdot f_{n\text{Sensor}}$    Velocity Checks   Shock Response Spectrum



The orange line in plots above denotes  $f_c$ .

By filtering the data with  $f_c = 0.1 \cdot f_{n\text{Sensor}}$  for the plot on the right, we removed distortions caused by the sensor resonance and achieve the best estimate of the SRS.