

# ENGINEERING REPORT

## GOODMORNING.COM

### THIRD PARTY MATTRESS TESTING

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RE: THIRD PARTY MATTRESS TESTING

## INTRODUCTION

In November 2022, GoodMorning.com commissioned Techtree to provide independent 3<sup>rd</sup> party testing of multiple mattresses. Similar testing was done previously by Rus-Tec (5055-1,-2,-3,-4,-5,-6,-7,-8) and Pure Mosaic (PMTM-4211-01 and PMTM-4320-01). Data from all test runs are represented in this document, as provided by GoodMorning.com from the previously validated reports. Techtree followed testing procedures as directed by GoodMorning.com and attached in Appendix B. Below follows an overview of the testing procedures used as well as the results that they produced. Additional results can be found in Appendix A.

## REFERENCE LOADS & TEST INFORMATION



*Figure 1: Reference Load 1. Plastic 5 gallon water cooler bottle. Size: 10.75" diameter, 19.5" height, 42.3 lb weight*



*Figure 2: Reference Load 2. Spherical medicine ball. Size: 9" diameter, 10 lb weight*

As specified by the testing methodology, all testing was completed in a room with a temperature range between 18°C and 25°C and a humidity range between 25% to 50%, in order to simulate the environment of a typical residence. Mattresses were placed on a drop cloth on a flat concrete floor such that the top and sides were unobstructed.



## TEST 1 – MATTRESS FIRMNESS

**Overview and Objective:** Apply Reference Load 1 to the center of each subject mattress and measure the vertical displacement of each to establish their respective positions on a firmness (or “sinkage”) scale. A low relative vertical displacement shall indicate a firmer mattress, while a high relative vertical displacement shall indicate a softer mattress.

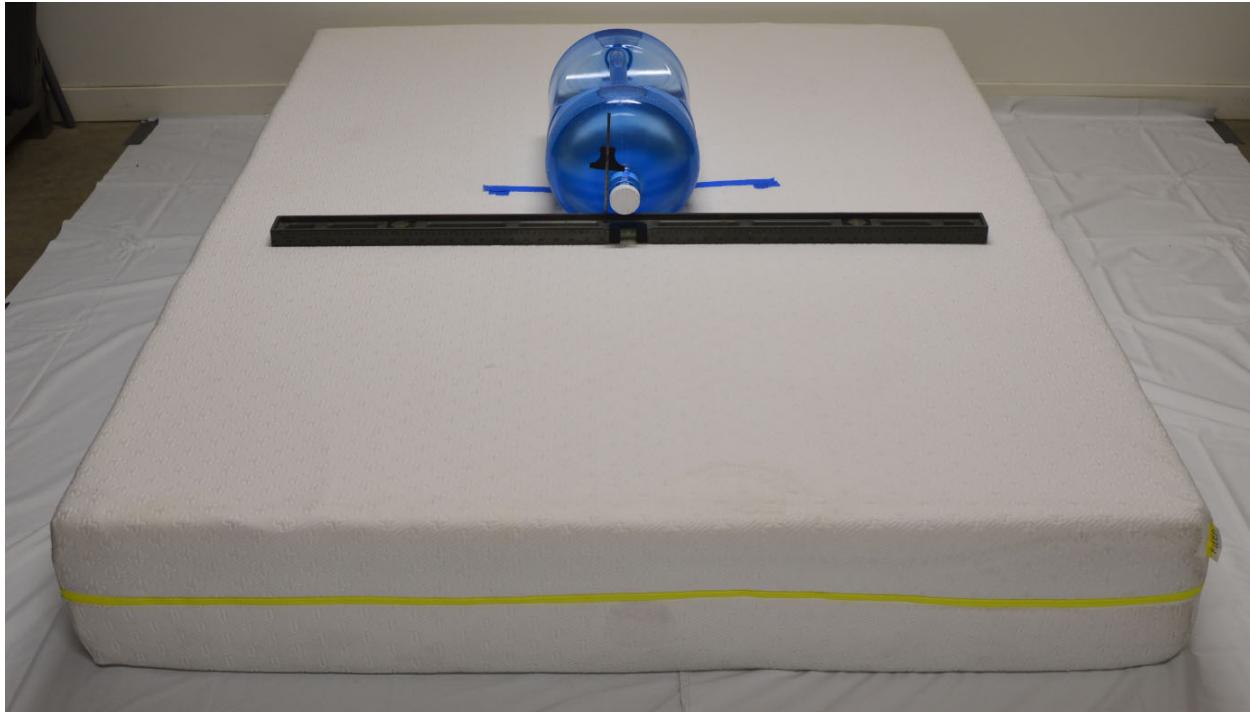


Figure 3: Typical setup for Test 1

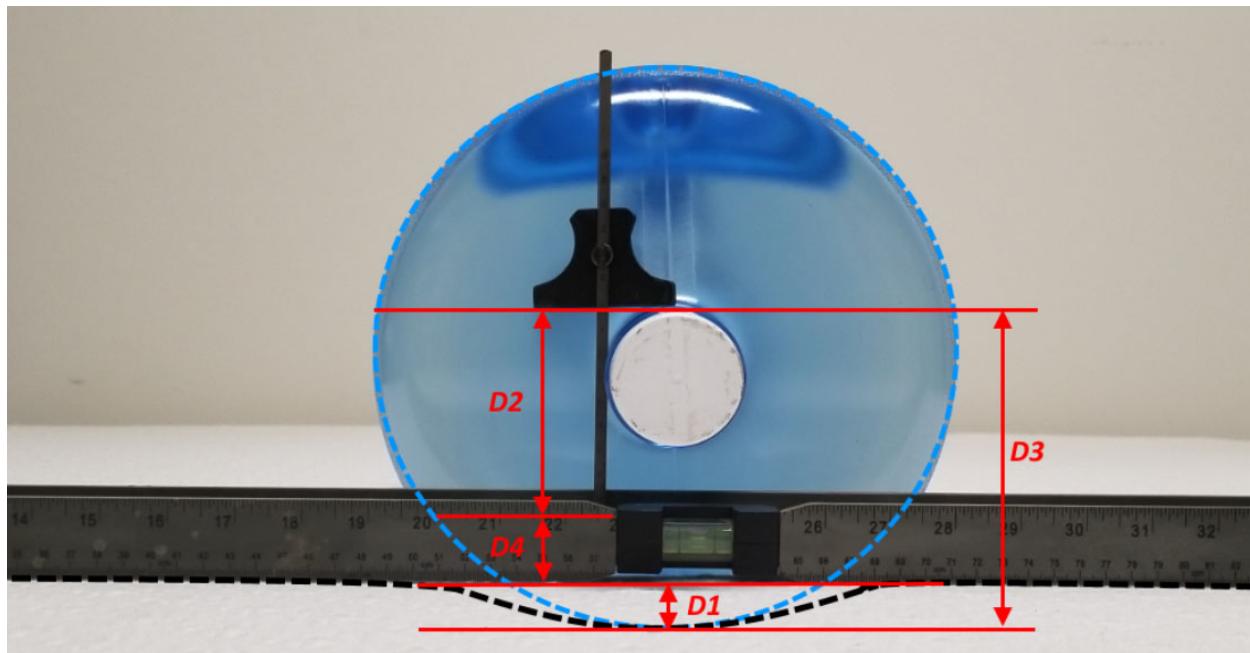


Figure 4: Deflection measurements for Test 1



Figure 4 shows the critical measurements taken for Test 1 in order to determine the vertical displacement with Reference Load 1 applied.

The vertical deflection value of interest for Test 1 is  $D_1$  as defined below:

$$D_1 = D_3 - D_2 - D_4$$

$D_2$  = Measured (Deflection)

$D_3$  = 160 mm (Constant)

$D_4$  = varies (Constant)

The vertical displacement,  $D_1$  can be found by inputting  $D_2$  into the above expression.

## TEST 2 – EDGE SUPPORTIVENESS

**Overview and Objective:** Apply Reference Load 1 to the edge each subject mattress and to measure the resultant vertical displacement of each to establish their respective positions on an “edge supportiveness” scale. A low relative vertical displacement shall indicate a mattress with more edge support, while a high relative vertical displacement shall indicate a mattress with less edge support.

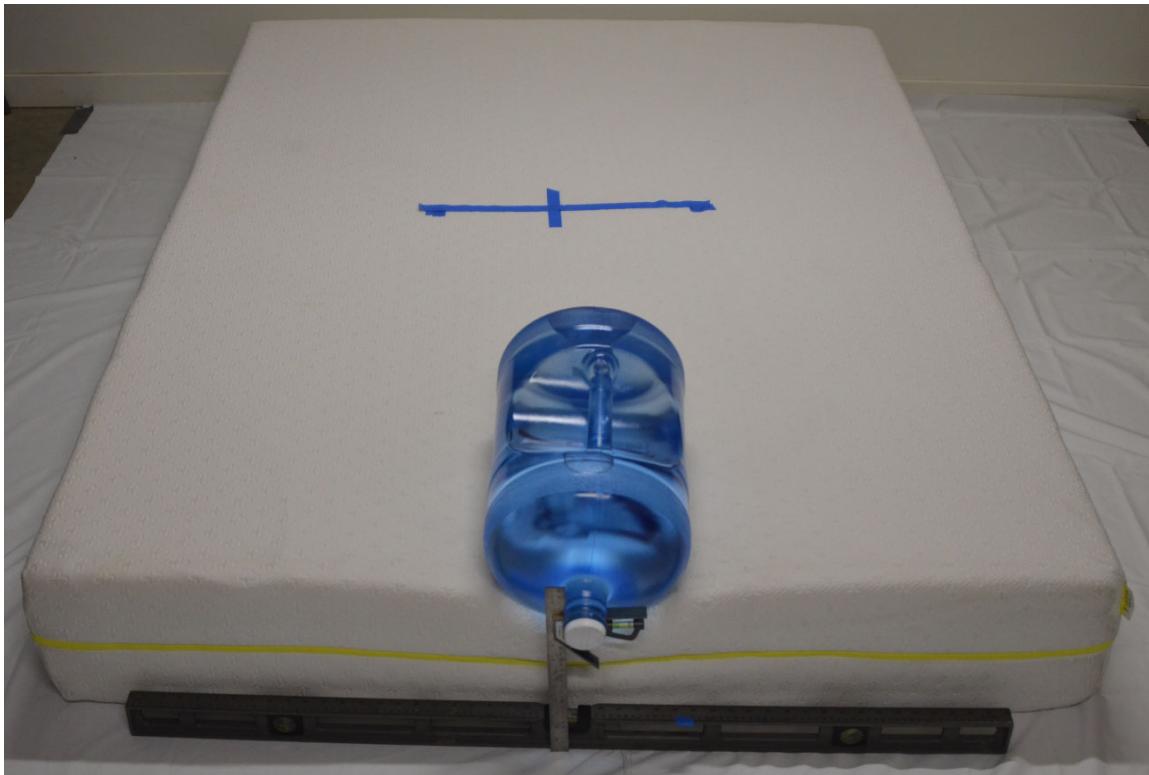
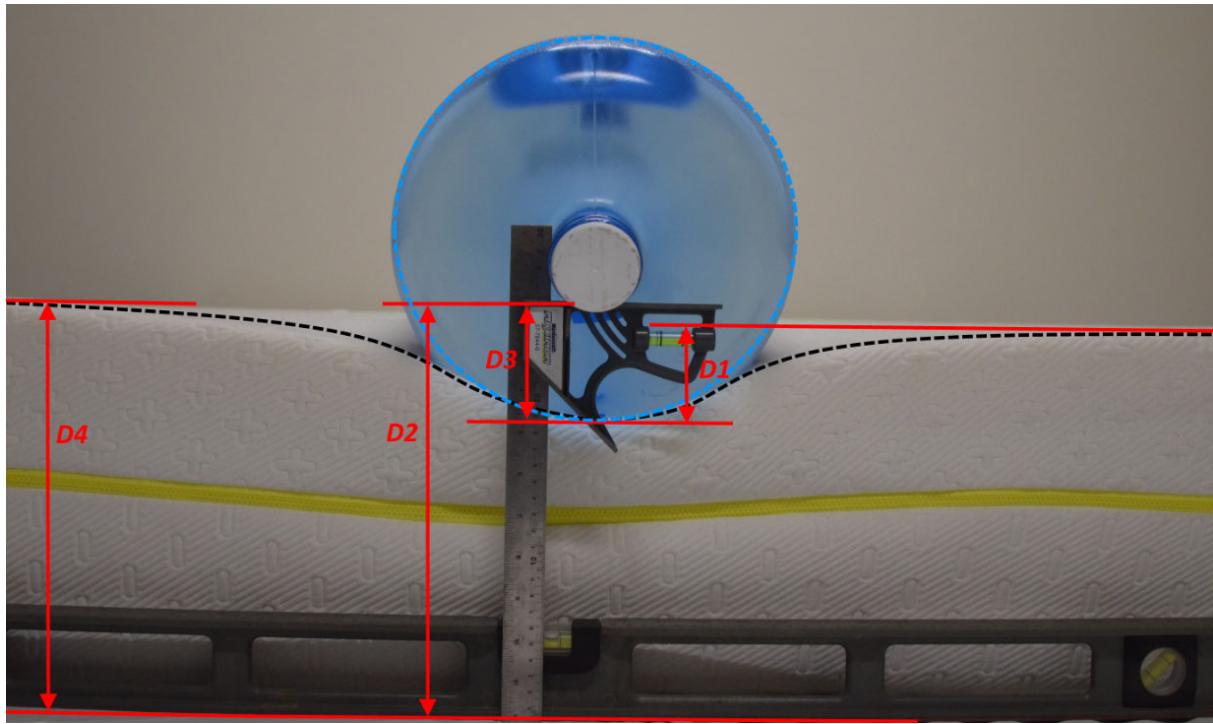


Figure 5: Typical setup for Test 2



*Figure 6: Deflection measurements for Test 2*

The vertical deflection value of interest for Test 2 is  $D_1$  as defined below:

$$D_1 = D_4 - (D_2 - D_3)$$

$D_2$  = Measured (Deflection)

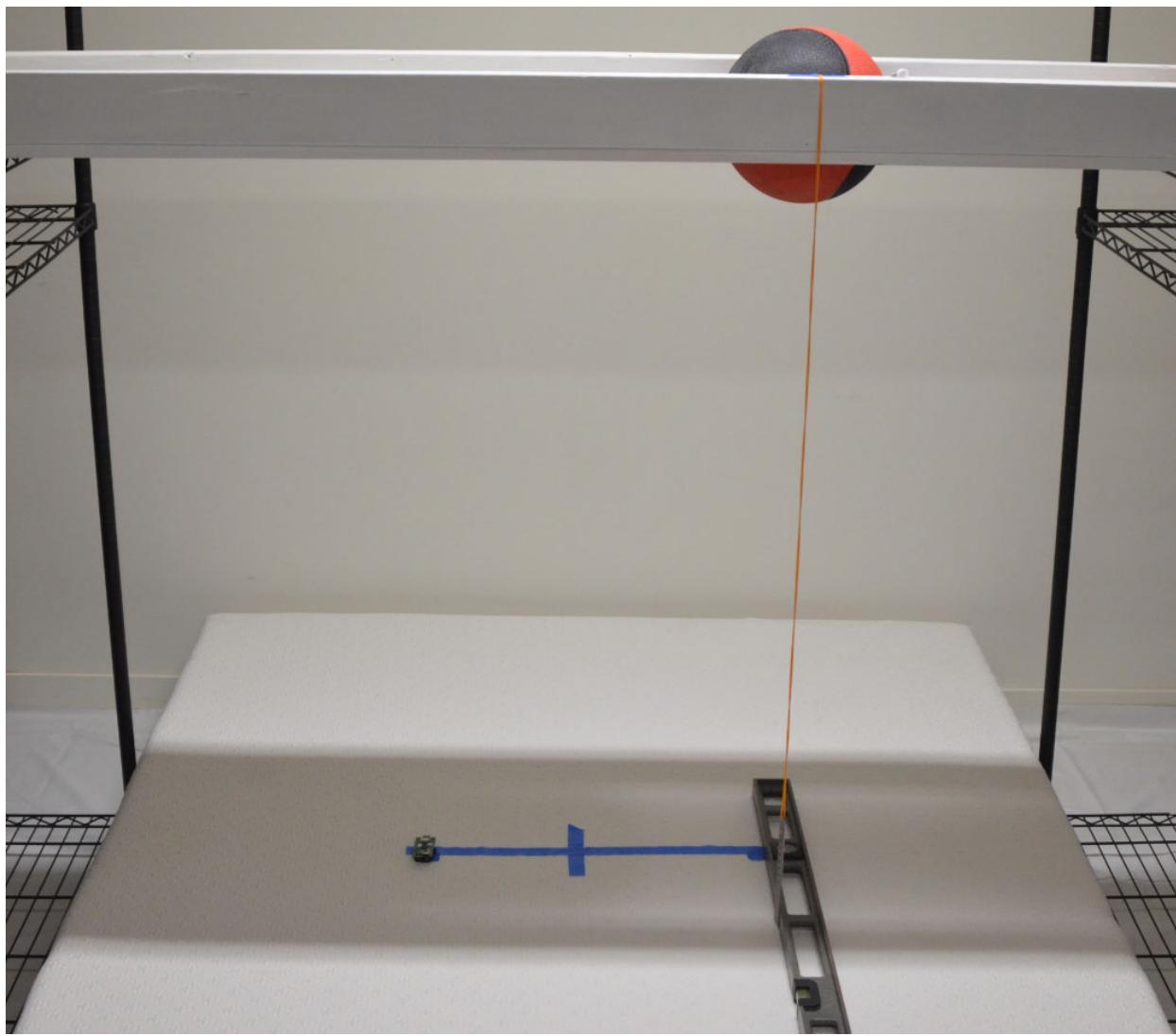
$D_3$  = 104 mm (Constant)

$D_4$  = Measured (Mattress Height)



## TEST 3 – MOTION ISOLATION

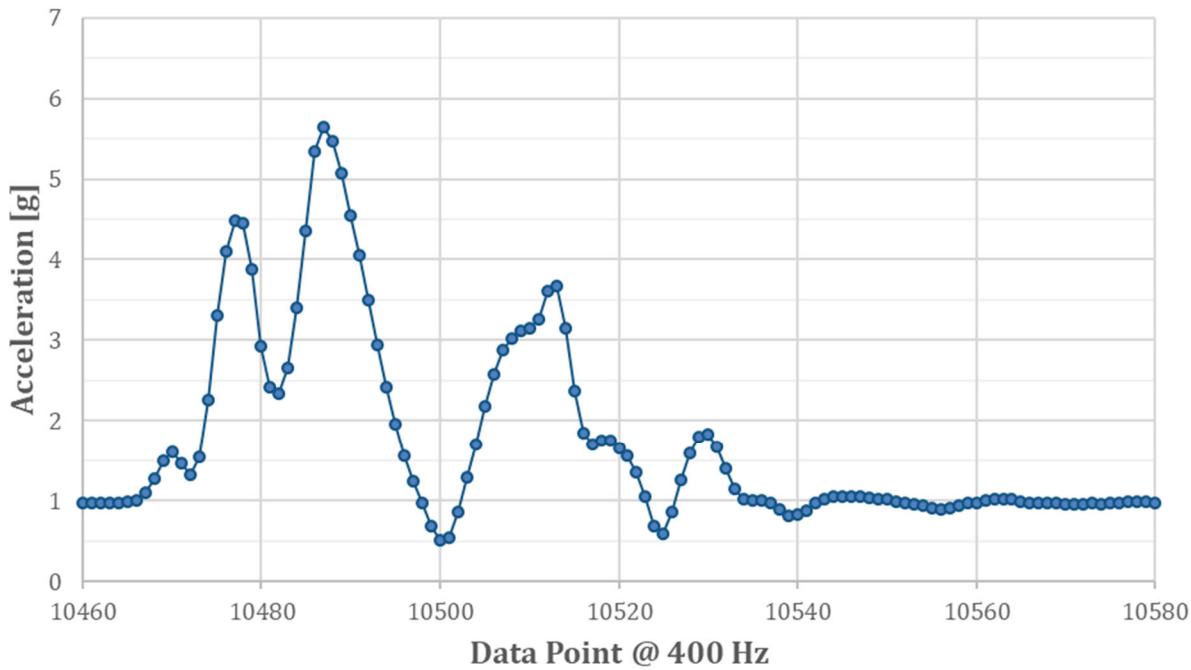
**Overview and Objective:** Apply a reference impulse to the top side of each subject mattress, representative of human movement on the mattress, and measure the resultant peak acceleration of a calibrated accelerometer placed on the mattress a fixed distance away from the epicenter of the impulse to establish their respective positions on a “motion isolation” scale. A high resultant peak acceleration shall indicate less motion isolation, while a low resultant peak acceleration shall indicate more motion isolation.



*Figure 7: Typical setup for Test 3*



## Vector Magnitude Acceleration



*Figure 8: Example Vector Magnitude Acceleration of one ball drop*

The vector magnitude of acceleration as shown above in Figure 8 is calculated using the expression shown below.

$$a = \sqrt{(x^2 + y^2 + z^2)}$$

The responsiveness of the mattress can be seen at one sleep point as a result of an impulse being applied at the second. In order to record this data, a digital accelerometer (ADXL345) was used and set to record data at 400 Hz (400 data points per second).



## TEST 4 – BOUNCINESS

**Overview and Objective:** Drop a 10lb sphere (9" diameter) from a fixed distance on to the top side of each subject mattress and measure the resultant peak rebound height on its first bounce. A high resultant peak rebound height shall indicate more bounciness, while a low resultant peak height shall indicate less bounciness.

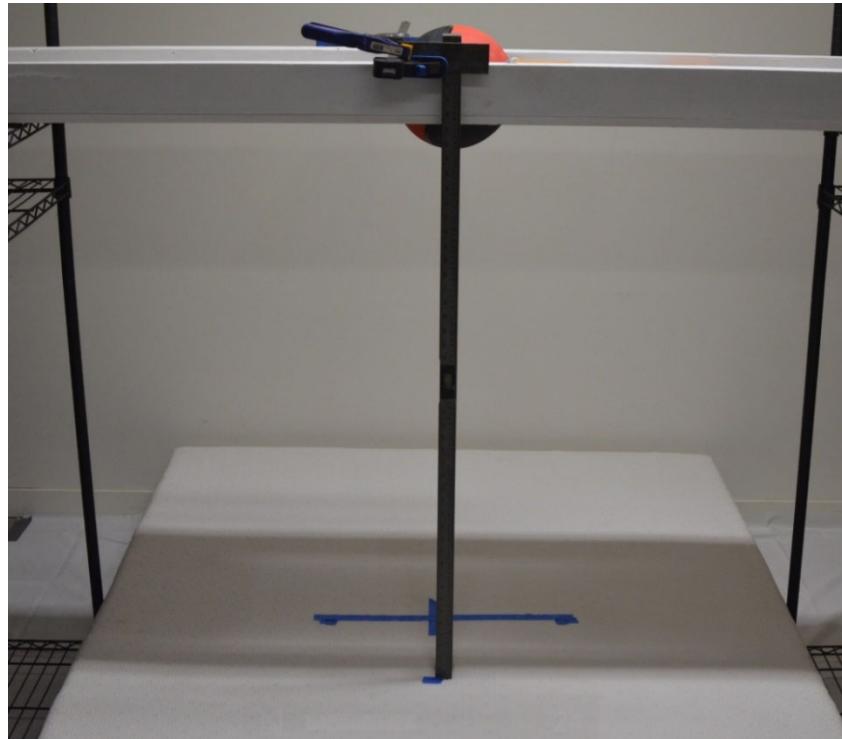


Figure 9: Typical setup for Test 4

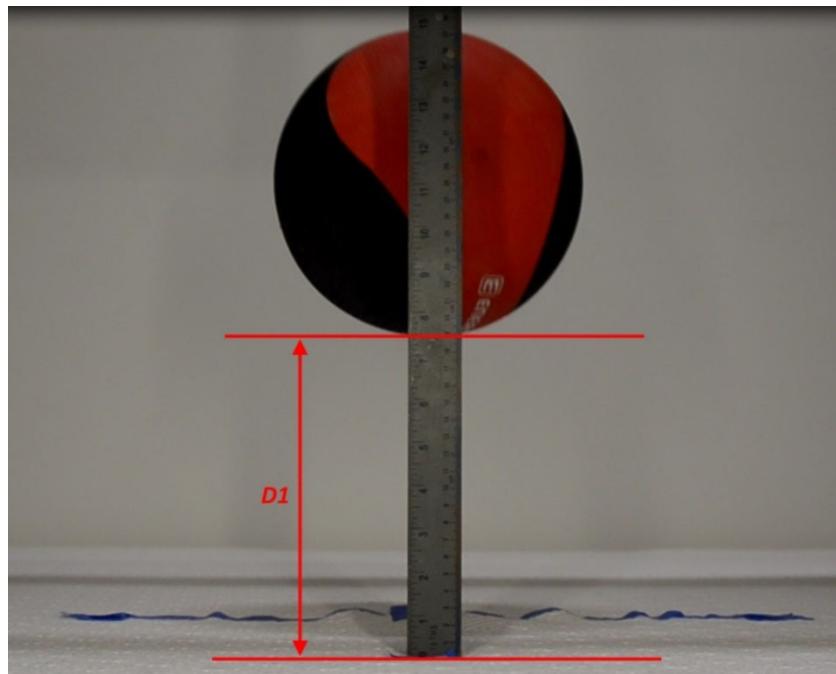


Figure 10: Rebound Measurement for Test 4



## TEST 1 – RESULTS – MATTRESS FIRMNESS

**Table 1: Test 1 – Mattress Firmness**

Mattress	Deflection			
	[mm]	[in]	Measured [mm]	Out of 10
1 Amerisleep AS3	68.8	2.7	70.0	5.2
2 Apollo	76.8	3.0	70.0	4.2
3 Bear	69.8	2.7	69.0	5.1
4 Bloom Air	75.8	3.0	71.0	4.3
5 Bloom Cloud	64.3	2.5	74.5	5.8
6 Bloom Earth	76.8	3.0	70.0	4.2
7 Bloom Mist	65.8	2.6	81.0	5.6
8 Bloom River	51.8	2.0	95.0	7.4
9 Casper (V1)	71.8	2.8	67.0	4.8
10 Casper (V2)	62.8	2.5	76.0	6.0
11 Casper (V3)	78.8	3.1	68.0	3.9
12 Casper (V4)	71.8	2.8	75.0	4.8
13 Casper Element	73.8	2.9	73.0	4.6
14 Casper Essential (V1)	67.8	2.7	79.0	5.4
15 Casper Essential (V2)	65.8	2.6	81.0	5.6
16 Casper Wave	57.8	2.3	89.0	6.6
17 Cherry	53.8	2.1	93.0	7.2
18 Classic Brands (Thick)	56.8	2.2	82.0	6.8
19 Classic Brands (Thin)	46.8	1.8	92.0	8.1
20 Dormeo	76.8	3.0	70.0	4.2
21 Douglas (V1)	68.3	2.7	70.5	5.3
22 Douglas (V2)	57.8	2.3	81.0	6.6
23 Douglas Alpine	78.8	3.1	68.0	3.9
24 Douglas Summit	60.8	2.4	86.0	6.3
25 Emma	67.8	2.7	79.0	5.4
26 Endy (V1)	76.3	3.0	62.5	4.3
27 Endy (V2)	51.8	2.0	87.0	7.4
28 Fleep (Firm)	50.3	2.0	88.5	7.6
29 Fleep (Soft)	69.3	2.7	69.5	5.2
30 Full Moon	68.8	2.7	78.0	5.2
31 GhostBed Classic	68.8	2.7	78.0	5.2
32 GhostBed Luxe	74.8	2.9	72.0	4.5
33 Gotta Sleep (OMG)	81.8	3.2	65.0	3.6
34 Haven Rejuvenate	48.8	1.9	98.0	7.8
35 Helix	61.8	2.4	77.0	6.1
36 Helix Midnight	87.8	3.5	59.0	2.8
37 iComfort	65.8	2.6	73.0	5.6
38 IKEA Foam	58.8	2.3	88.0	6.5
39 IKEA Matrand	31.8	1.3	115.0	10.0
40 IKEA Spring	54.8	2.2	92.0	7.0
41 Juno	65.8	2.6	81.0	5.6
42 Layla (Firm)	61.8	2.4	77.0	6.1
43 Layla (Firm) (V2)	55.8	2.2	91.0	6.9
44 Layla (Soft)	75.8	3.0	63.0	4.3
45 Layla (Soft) (V2)	79.8	3.1	67.0	3.8
46 Leesa	76.3	3.0	62.5	4.3
47 Leesa (V2)	74.8	2.9	72.0	4.5
48 Lucid	53.8	2.1	85.0	7.2
49 Lull	71.8	2.8	75.0	4.8
50 Luna	66.8	2.6	72.0	5.5
51 Mira (V1)	51.8	2.0	95.0	7.4
52 Mira (V2)	61.8	2.4	85.0	6.1
53 Nectar	76.8	3.0	70.0	4.2
54 Nectar (V2)	82.8	3.3	64.0	3.4
55 Nectar Premier	80.8	3.2	66.0	3.7
56 Nolah	78.8	3.1	68.0	3.9
57 Nora	58.8	2.3	80.0	6.5
58 Novaform	82.8	3.3	64.0	3.4
59 Novosbed Firm	59.3	2.3	79.5	6.5
60 Novosbed Firm (V2)	69.8	2.7	77.0	5.1
61 Novosbed Medium	68.3	2.7	70.5	5.3
62 Novosbed Medium (V2)	80.8	3.2	66.0	3.7
63 Novosbed Soft	79.3	3.1	59.5	3.9
64 Novosbed Soft (V2)	84.8	3.3	62.0	3.2
65 PerfectSense	61.8	2.4	85.0	6.1
66 PolySleep	65.8	2.6	73.0	5.6
67 Puffy (V1)	78.8	3.1	60.0	3.9
68 Puffy (V2)	80.8	3.2	66.0	3.7
69 Puffy Lux	72.8	2.9	74.0	4.7
70 Purple	66.8	2.6	72.0	5.5
71 Purple (V2)	77.8	3.1	69.0	4.1
72 Purple Plus	86.8	3.4	60.0	2.9
73 Recore	72.8	2.9	74.0	4.7
74 Saatva Loom & Leaf	82.8	3.3	64.0	3.4
75 Saatva Zenhaven	70.8	2.8	76.0	5.0
76 Sealy Cocoon	48.8	1.9	98.0	7.8
77 Sealy Cocoon Classic	68.8	2.7	78.0	5.2
78 Sealy Posturepedic	76.8	3.0	62.0	4.2
79 Serta Chinook	70.8	2.8	76.0	5.0
80 Silk & Snow (V1)	77.8	3.1	69.0	4.1
81 Silk & Snow (V2)	80.8	3.2	66.0	3.7
82 Simba (V1)	36.8	1.4	110.0	9.4
83 Simba (V2)	84.8	3.3	62.0	3.2
84 Spa Sensations	71.8	2.8	75.0	4.8
85 Structube	41.8	1.6	105.0	8.7
86 TEMPUR-Cloud	43.8	1.7	103.0	8.5
87 Tempur-Pedic	68.8	2.7	70.0	5.2
88 Tuft & Needle (V1)	66.8	2.6	72.0	5.5
89 Tuft & Needle (V2)	57.8	2.3	89.0	6.6
90 Zinus	83.8	3.3	63.0	3.3

**Table 2: Test 1 – Mattress Firmness - Hybrid Mattresses**

Mattress	Deflection			Measured [mm]	Out of 10
	[mm]	[in]			
91 Allswell	76.8	3.0	70.0	6.6	
92 Avocado Green	63.8	2.5	83.0	7.6	
93 Brooklyn	77.8	3.1	69.0	6.6	
94 Brunswick	82.8	3.3	64.0	6.2	
95 Casper Hybrid	79.8	3.1	67.0	6.4	
96 Casper Nova	78.8	3.1	68.0	6.5	
97 Casper Wave Hybrid	81.8	3.2	65.0	6.3	
98 DreamCloud	88.8	3.5	58.0	5.7	
99 Endy Hybrid	88.8	3.5	58.0	5.7	
100 Hamuq	63.8	2.5	75.0	7.6	
101 Haven Lux Hybrid	77.8	3.1	69.0	6.6	
102 Hush	75.8	3.0	71.0	6.7	
103 Kingsdown	80.8	3.2	66.0	6.3	
104 Layla Hybrid (Firm)	65.8	2.6	81.0	7.5	
105 Layla Hybrid (Soft)	79.8	3.1	67.0	6.4	
106 Logan & Cove (Firm)	62.8	2.5	76.0	7.7	
107 Logan & Cove (Medium)	81.8	3.2	65.0	6.3	
108 Parachute	75.8	3.0	71.0	6.7	
109 Purple Hybrid	72.8	2.9	74.0	6.9	
110 Saatva	80.8	3.2	58.0	6.3	
111 Silk & Snow Hybrid (V1)	66.8	2.6	80.0	7.4	
112 Silk & Snow Hybrid (V2)	76.8	3.0	70.0	6.6	
113 Silk & Snow Organic	75.8	3.0	71.0	6.7	
114 Simmons Beautyrest Black	75.8	3.0	63.0	6.7	
115 Springwall	68.8	2.7	78.0	7.2	
116 Stearns & Foster	70.8	2.8	76.0	7.1	
117 WinkBed	75.8	3.0	71.0	6.7	

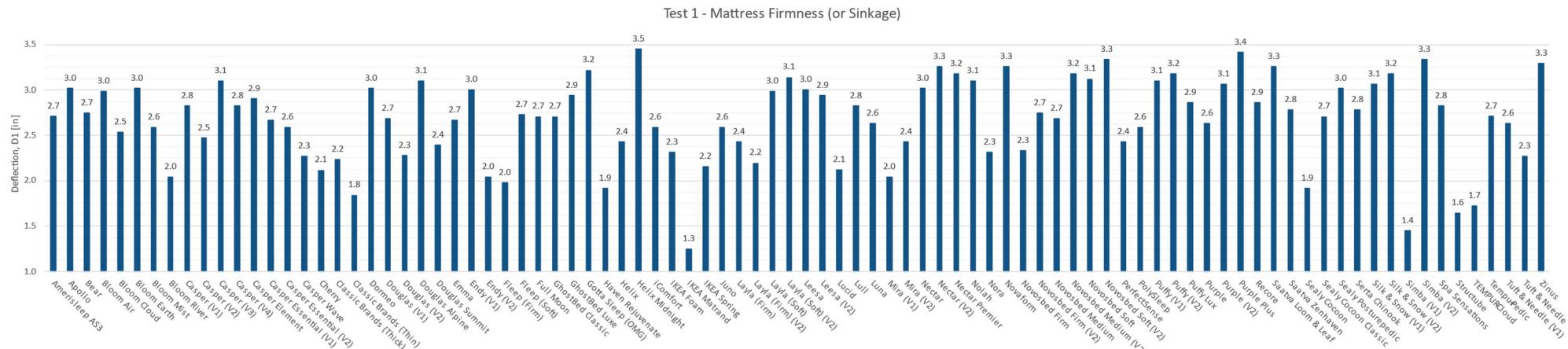


Figure 11: Test 1 – Mattress Firmness measuring how far Reference Load 1 deflects in the center of the mattress. A higher number indicates a softer mattress.

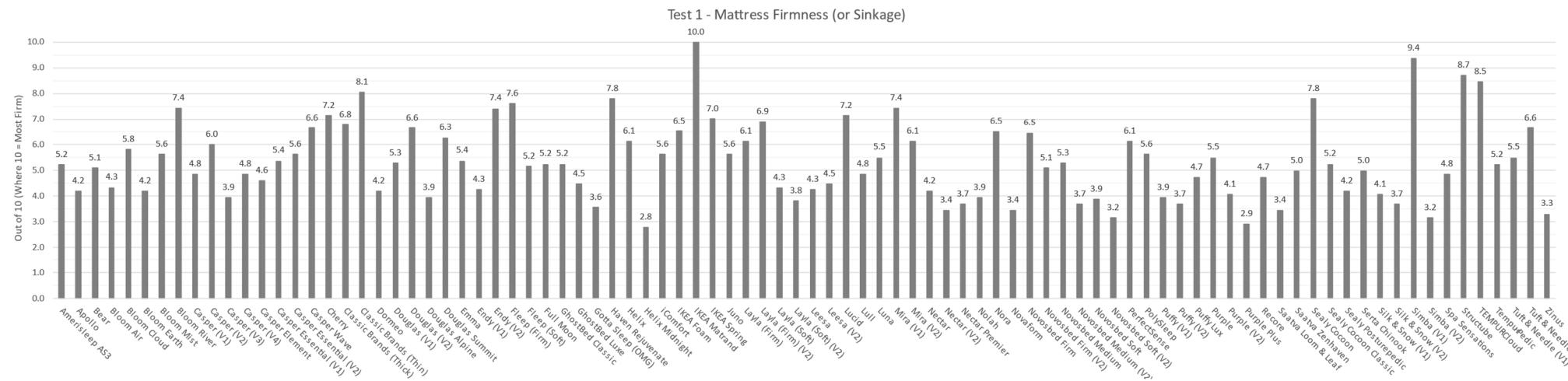


Figure 12: Test 1 – Mattress Firmness on a scale from 1 to 10 based on the given mattresses that were sampled (where 10 = most firm)



Test 1 - Mattress Firmness (or Sinkage) Hybrid Mattresses

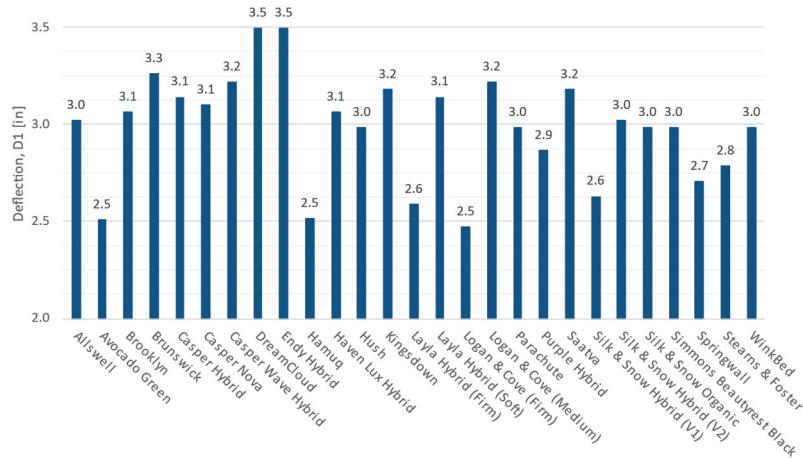


Figure 13: Test 1 – Mattress Firmness measuring how far Reference Load 1 deflects in the center of the mattress. A higher number indicates a softer mattress. Hybrid mattresses.

Test 1 - Mattress Firmness (or Sinkage) Hybrid Mattresses

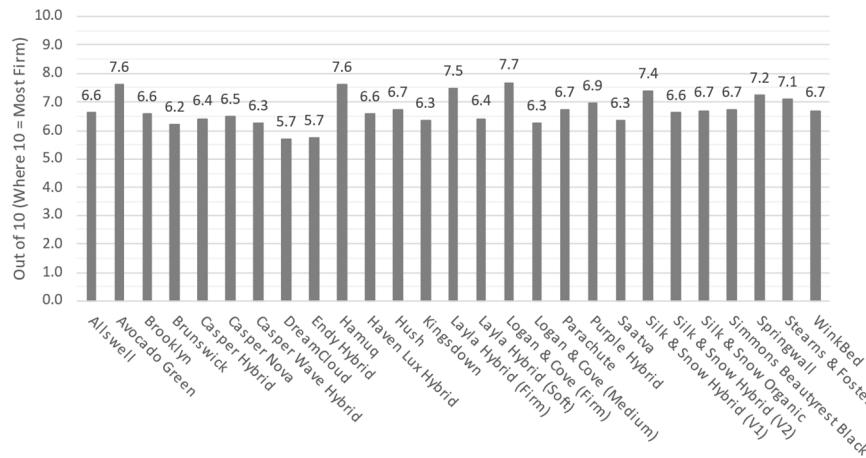


Figure 14: Test 1 – Mattress Firmness on a scale from 1 to 10 based on the given mattresses that were sampled (where 10 = most firm). Hybrid mattresses.



## TEST 2 – RESULTS – EDGE SUPPORTIVENESS

**Table 3: Test 2 – Edge Supportiveness**

Mattress	Mattress Height, D4 [mm] [in]		Measured Depth, D2 [mm] [in]		Deflection, D1 [mm] [in]		Out of 10	
	Mattress	D4 [mm]	D4 [in]	D2 [mm]	D2 [in]	Deflection, D1 [mm]	Deflection, D1 [in]	
1	Amerisleep AS3	288	11.3	285	11.2	107.0	4.2	4.7
2	Apollo	307	12.1	285	11.2	126.0	5.0	3.1
3	Bear	235	9.3	241	9.5	98.0	3.9	5.4
4	Bloom Air	227	8.9	254	10.0	77.0	3.0	7.1
5	Bloom Cloud	281	11.1	301	11.9	84.0	3.3	6.5
6	Bloom Earth	201	7.9	213	8.4	92.0	3.6	5.9
7	Bloom Mist	227	8.9	248	9.8	83.0	3.3	6.6
8	Bloom River	180	7.1	190	7.5	94.0	3.7	5.7
9	Casper (V1)	249	9.8	268	10.6	85.0	3.3	6.5
10	Casper (V2)	233	9.2	198	7.8	139.0	5.5	2.1
11	Casper (V3)	285	11.2	288	11.3	101.0	4.0	5.2
12	Casper (V4)	260	10.2	261	10.3	103.0	4.1	5.0
13	Casper Element	240	9.4	235	9.3	109.0	4.3	4.5
14	Casper Essential (V1)	214	8.4	210	8.3	108.0	4.3	4.6
15	Casper Essential (V2)	271	10.7	279	11.0	96.0	3.8	5.6
16	Casper Wave	270	10.6	281	11.1	93.0	3.7	5.8
17	Cherry	156	6.1	161	6.3	99.0	3.9	5.3
18	Classic Brands (Thick)	204	8.0	239	9.4	69.0	2.7	7.8
19	Classic Brands (Thin)	154	6.1	194	7.6	64.0	2.5	8.2
20	Dormeo	304	12.0	314	12.4	94.0	3.7	5.7
21	Douglas (V1)	258	10.2	276	10.9	86.0	3.4	6.4
22	Douglas (V2)	253	10.0	283	11.1	74.0	2.9	7.3
23	Douglas Alpine	290	11.4	267	10.5	127.0	5.0	3.1
24	Douglas Summit	300	11.8	316	12.4	88.0	3.5	6.2
25	Emma	305	12.0	294	11.6	115.0	4.5	4.0
26	Endy (V1)	261	10.3	250	9.8	115.0	4.5	4.0
27	Endy (V2)	247	9.7	235	9.3	116.0	4.6	3.9
28	Fleep (Firm)	249	9.8	259	10.2	94.0	3.7	5.7
29	Fleep (Soft)	249	9.8	243	9.6	110.0	4.3	4.4
30	Full Moon	208	8.2	210	8.3	102.0	4.0	5.1
31	GhostBed Classic	266	10.5	285	11.2	85.0	3.3	6.5
32	GhostBed Luxe	310	12.2	286	11.3	128.0	5.0	3.0
33	Gotta Sleep (OMG)	251	9.9	246	9.7	109.0	4.3	4.5
34	Haven Rejuvenate	255	10.0	281	11.1	78.0	3.1	7.0
35	Helix	252	9.9	222	8.7	134.0	5.3	2.5
36	Helix Midnight	300	11.8	296	11.7	108.0	4.3	4.6
37	iComfort	302	11.9	324	12.8	82.0	3.2	6.7
38	IKEA Foam	178	7.0	195	7.7	87.0	3.4	6.3
39	IKEA Matrand	190	7.5	233	9.2	61.0	2.4	8.4
40	IKEA Spring	237	9.3	259	10.2	82.0	3.2	6.7
41	Juno	196	7.7	185	7.3	115.0	4.5	4.0
42	Layla (Firm)	270	10.6	271	10.7	103.0	4.1	5.0
43	Layla (Firm) (V2)	280	11.0	268	10.6	116.0	4.6	3.9
44	Layla (Soft)	270	10.6	225	8.9	149.0	5.9	1.3
45	Layla (Soft) (V2)	280	11.0	247	9.7	137.0	5.4	2.2
46	Leesa	250	9.8	273	10.7	81.0	3.2	6.8
47	Leesa (V2)	270	10.6	243	9.6	131.0	5.2	2.7
48	Lucid	254	10.0	292	11.5	66.0	2.6	8.0
49	Lull	250	9.8	257	10.1	97.0	3.8	5.5
50	Luna	256	10.1	275	10.8	85.0	3.3	6.5
51	Mira (V1)	200	7.9	218	8.6	86.0	3.4	6.4
52	Mira (V2)	245	9.6	288	11.3	61.0	2.4	8.4
53	Nectar	267	10.5	270	10.6	101.0	4.0	5.2
54	Nectar (V2)	290	11.4	253	10.0	141.0	5.6	1.9
55	Nectar Premier	330	13.0	279	11.0	155.0	6.1	0.8
56	Nolah	260	10.2	237	9.3	127.0	5.0	3.1
57	Nora	289	11.4	272	10.7	121.0	4.8	3.5
58	Novaform	340	13.4	312	12.3	132.0	5.2	2.7
59	Novosbed Firm	293	11.5	316	12.4	81.0	3.2	6.8
60	Novosbed Firm (V2)	279	11.0	290	11.4	93.0	3.7	5.8

61	Novosbed Medium	307	12.1	311	12.2	100.0	3.9	5.2
62	Novosbed Medium (V2)	272	10.7	258	10.2	118.0	4.6	3.8
63	Novosbed Soft	286	11.3	276	10.9	114.0	4.5	4.1
64	Novosbed Soft (V2)	265	10.4	262	10.3	107.0	4.2	4.7
65	PerfectSense	255	10.0	265	10.4	94.0	3.7	5.7
66	PolySleep	248	9.8	297	11.7	55.0	2.2	8.9
67	Puffy (V1)	246	9.7	248	9.8	102.0	4.0	5.1
68	Puffy (V2)	257	10.1	230	9.1	131.0	5.2	2.7
69	Puffy Lux	304	12.0	297	11.7	111.0	4.4	4.4
70	Purple	242	9.5	236	9.3	110.0	4.3	4.4
71	Purple (V2)	240	9.4	234	9.2	110.0	4.3	4.4
72	Purple Plus	300	11.8	268	10.6	136.0	5.4	2.3
73	Recore	285	11.2	309	12.2	80.0	3.1	6.9
74	Saatva Loom & Leaf	300	11.8	294	11.6	110.0	4.3	4.4
75	Saatva Zenhaven	280	11.0	278	10.9	106.0	4.2	4.8
76	Sealy Cocoon	222	8.7	271	10.7	55.0	2.2	8.9
77	Sealy Cocoon Classic	260	10.2	265	10.4	99.0	3.9	5.3
78	Sealy Posturepedic	325	12.8	312	12.3	117.0	4.6	3.9
79	Serta Chinook	230	9.1	233	9.2	101.0	4.0	5.2
80	Silk & Snow (V1)	265	10.4	268	10.6	101.0	4.0	5.2
81	Silk & Snow (V2)	250	9.8	253	10.0	101.0	4.0	5.2
82	Simba (V1)	263	10.4	301	11.9	66.0	2.6	8.0
83	Simba (V2)	304	12.0	282	11.1	126.0	5.0	3.1
84	Spa Sensations	224	8.8	216	8.5	112.0	4.4	4.3
85	Structube	275	10.8	316	12.4	63.0	2.5	8.2
86	TEMPUR-Cloud	260	10.2	266	10.5	98.0	3.9	5.4
87	Tempur-Pedic	286	11.3	246	9.7	144.0	5.7	1.7
88	Tuft & Needle (V1)	251	9.9	270	10.6	85.0	3.3	6.5
89	Tuft & Needle (V2)	245	9.6	269	10.6	80.0	3.1	6.9
90	Zinus	290	11.4	295	11.6	99.0	3.9	5.3

**Table 4: Test 2 – Edge Supportiveness - Hybrid Mattresses**

Mattress		Mattress Height, D4	Measured Depth, D2	Deflection, D1 [in]		Out of 10		
		[mm]	[in]	[mm]	[in]			
91	Allswell	300	11.8	268	10.6	136.0	5.4	2.3
92	Avocado Green	279	11.0	309	12.2	74.0	2.9	7.3
93	Brooklyn	280	11.0	253	10.0	131.0	5.2	2.7
94	Brunswick	298	11.7	309	12.2	93.0	3.7	5.8
95	Casper Hybrid	260	10.2	236	9.3	128.0	5.0	3.0
96	Casper Nova	300	11.8	281	11.1	123.0	4.8	3.4
97	Casper Wave Hybrid	300	11.8	275	10.8	129.0	5.1	2.9
98	DreamCloud	340	13.4	350	13.8	94.0	3.7	5.7
99	Endy Hybrid	308	12.1	315	12.4	97.0	3.8	5.5
100	Hamuq	300	11.8	328	12.9	76.0	3.0	7.2
101	Haven Lux Hybrid	359	14.1	338	13.3	125.0	4.9	3.2
102	Hush	327	12.9	310	12.2	121.0	4.8	3.5
103	Kingsdown	369	14.5	355	14.0	118.0	4.6	3.8
104	Layla Hybrid (Firm)	330	13.0	326	12.8	108.0	4.3	4.6
105	Layla Hybrid (Soft)	330	13.0	286	11.3	148.0	5.8	1.4
106	Logan & Cove (Firm)	352	13.9	390	15.4	66.0	2.6	8.0
107	Logan & Cove (Medium)	350	13.8	343	13.5	111.0	4.4	4.4
108	Parachute	305	12.0	273	10.7	136.0	5.4	2.3
109	Purple Hybrid	279	11.0	305	12.0	78.0	3.1	7.0
110	Saatva	400	15.7	384	15.1	120.0	4.7	3.6
111	Silk & Snow Hybrid (V1)	284	11.2	285	11.2	103.0	4.1	5.0
112	Silk & Snow Hybrid (V2)	295	11.6	325	12.8	74.0	2.9	7.3
113	Silk & Snow Organic	300	11.8	329	13.0	75.0	3.0	7.3
114	Simmons Beautyrest Black	355	14.0	349	13.7	110.0	4.3	4.4
115	Springwall	232	9.1	288	11.3	48.0	1.9	9.5
116	Stearns & Foster	342	13.5	355	14.0	91.0	3.6	6.0
117	WinkBed	330	13.0	356	14.0	78.0	3.1	7.0

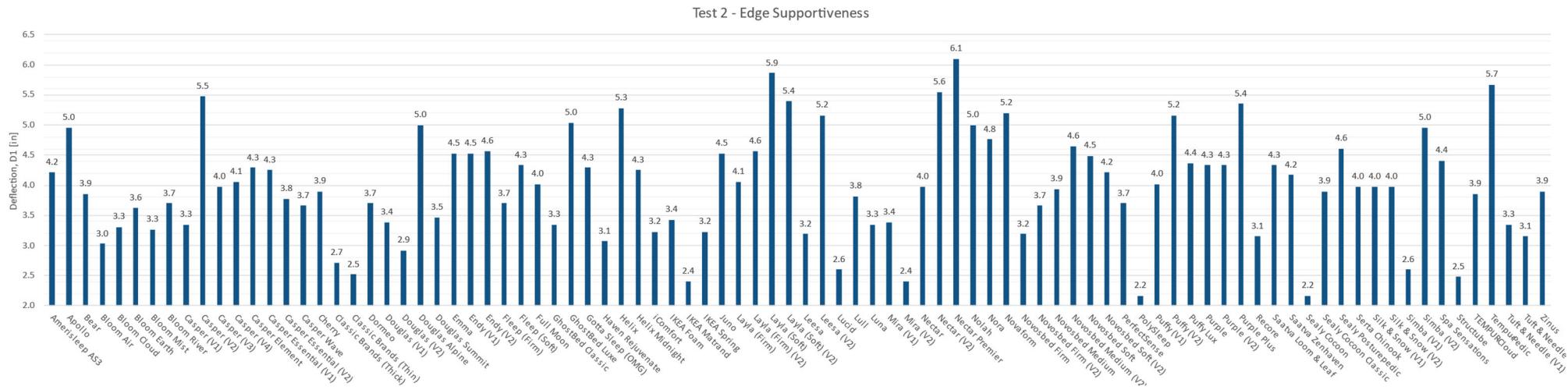


Figure 15: Test 2 – Mattress Firmness measuring how far Reference Load 1 deflects on the edge of the mattress. A higher number indicates a softer mattress.

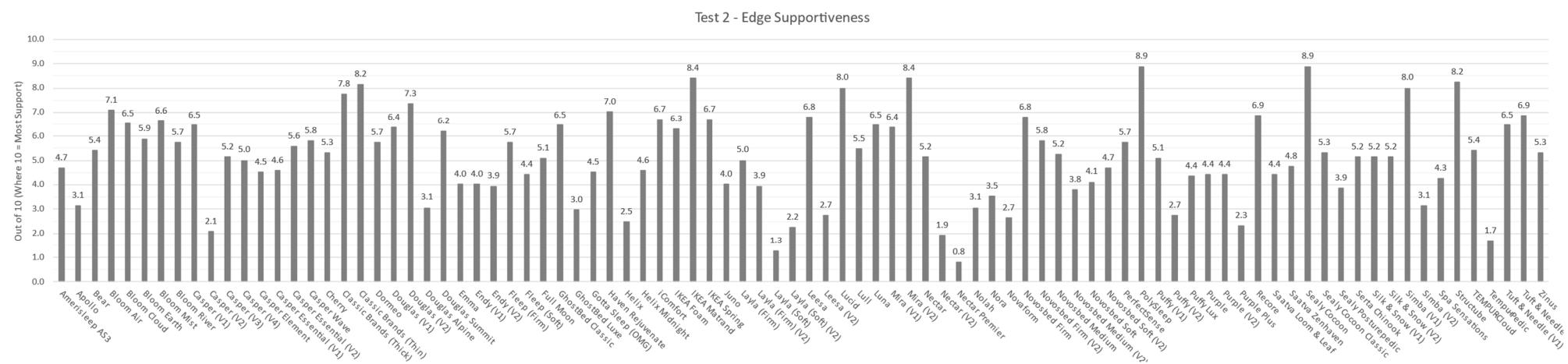


Figure 16: Test 2 – Mattress Firmness on a scale from 1 to 10 based on the given mattresses that were sampled (where 10 = most firm)

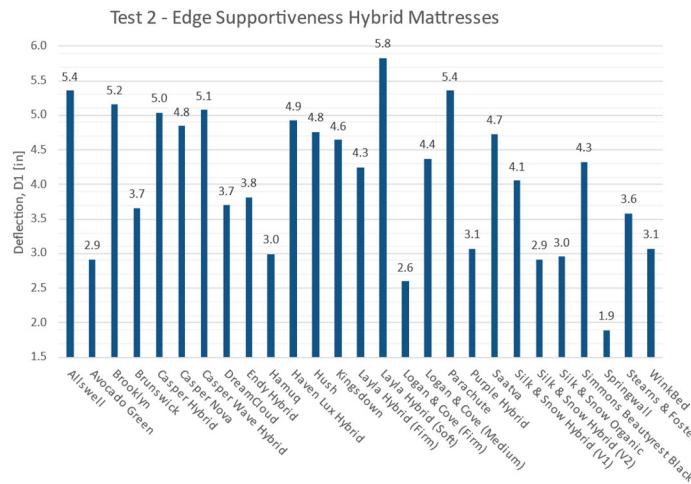


Figure 17: Test 2 – Mattress Firmness measuring how far Reference Load 1 deflects on the edge of the mattress. A higher number indicates a softer mattress. Hybrid mattresses.

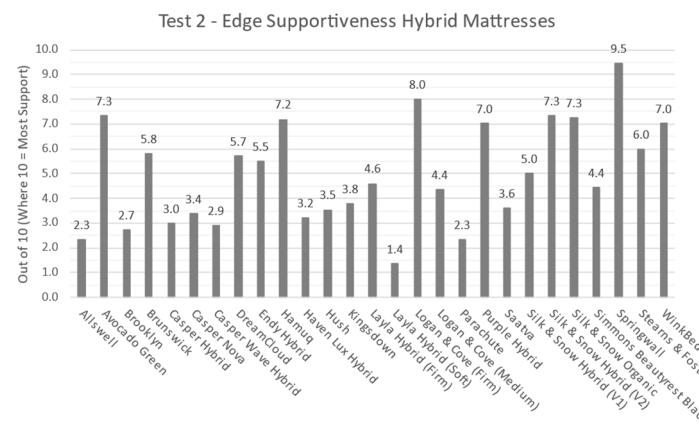


Figure 18: Test 2 – Mattress Firmness on a scale from 1 to 10 based on the given mattresses that were sampled (where 10 = most firm). Hybrid mattresses.



## TEST 3 – RESULTS – MOTION ISOLATION

**Table 5: Test 3 – Motion Isolation**

Mattress	Average Peak Acceleration [g]	Out of 10	
1 Amerisleep AS3	6.8	5.9	
2 Apollo	2.3	8.6	
3 Bear	5.1	6.9	
4 Bloom Air	5.9	6.5	
5 Bloom Cloud	5.1	6.9	
6 Bloom Earth	4.5	7.3	
7 Bloom Mist	5.9	6.5	
8 Bloom River	5.3	6.8	
9 Casper (V1)	8.7	4.8	
10 Casper (V2)	6.1	6.4	
11 Casper (V3)	4.8	7.1	
12 Casper (V4)	4.8	7.1	
13 Casper Element	6.9	5.9	
14 Casper Essential (V1)	5.8	6.5	
15 Casper Essential (V2)	5.3	6.8	
16 Casper Wave	4.9	7.1	
17 Cherry	6.1	6.4	
18 Classic Brands (Thick)	7.0	5.8	
19 Classic Brands (Thin)	6.4	6.2	
20 Dormeo	6.7	6.0	
21 Douglas (V1)	3.3	8.0	
22 Douglas (V2)	2.8	8.3	
23 Douglas Alpine	2.0	8.8	
24 Douglas Summit	2.0	8.8	
25 Emma	4.9	7.0	
26 Endy (V1)	5.1	6.9	
27 Endy (V2)	5.7	6.6	
28 Fleep (Firm)	5.2	6.9	
29 Fleep (Soft)	5.2	6.9	
30 Full Moon	4.2	7.5	
31 GhostBed Classic	4.7	7.2	
32 GhostBed Luxe	4.4	7.4	
33 Gotta Sleep (OMG)	5.9	6.4	
34 Haven Rejuvenate	6.2	6.3	
35 Helix	5.4	6.7	
36 Helix Midnight	5.9	6.5	
37 iComfort	4.4	7.4	
38 IKEA Foam	8.6	4.8	
39 IKEA Matrand	3.9	7.6	
40 IKEA Spring	4.8	7.1	
41 Juno	6.3	6.2	
42 Layla (Firm)	5.8	6.5	
43 Layla (Firm) (V2)	5.8	6.5	
44 Layla (Soft)	5.9	6.4	
45 Layla (Soft) (V2)	9.0	4.6	
46 Leesa	6.4	6.1	
47 Leesa (V2)	8.0	5.2	
48 Lucid	5.4	6.8	
49 Lull	4.3	7.4	
50 Luna	6.6	6.1	
51 Mira (V1)	5.3	6.8	
52 Mira (V2)	3.4	7.9	
53 Nectar	4.5	7.3	
54 Nectar (V2)	8.3	5.0	
55 Nectar Premier	6.7	6.0	
56 Nolah	5.2	6.9	
57 Nora	3.1	8.1	
58 Novaform	3.0	8.2	
59 Novosbed Firm	5.4	6.8	
60 Novosbed Firm (V2)	5.4	6.8	
61 Novosbed Medium	5.0	7.0	
62 Novosbed Medium (V2)	5.3	6.8	
63 Novosbed Soft	6.7	6.0	
64 Novosbed Soft (V2)	4.5	7.3	
65 PerfectSense	9.8	4.1	
66 PolySleep	3.3	8.0	
67 Puffy (V1)	5.0	7.0	
68 Puffy (V2)	6.1	6.3	
69 Puffy Lux	4.6	7.3	
70 Purple	9.9	4.0	
71 Purple (V2)	10.8	3.5	
72 Purple Plus	5.5	6.7	
73 Recore	4.8	7.1	
74 Saatva Loom & Leaf	6.1	6.4	
75 Saatva Zenhaven	6.5	6.1	
76 Sealy Cocoon	6.7	6.0	
77 Sealy Cocoon Classic	3.7	7.8	
78 Sealy Posturepedic	6.5	6.1	
79 Serta Chinook	4.4	7.4	
80 Silk & Snow (V1)	3.9	7.6	
81 Silk & Snow (V2)	4.0	7.6	
82 Simba (V1)	6.2	6.3	
83 Simba (V2)	5.7	6.6	
84 Spa Sensations	7.1	5.7	
85 Structube	5.9	6.5	
86 TEMPUR-Cloud	8.9	4.6	
87 Tempur-Pedic	4.3	7.4	
88 Tuft & Needle (V1)	4.7	7.2	
89 Tuft & Needle (V2)	5.9	6.5	
90 Zinus	4.3	7.4	

**Table 6: Test 3 – Motion Isolation - Hybrid Mattresses**

Mattress	Average Peak Acceleration [g]	Out of 10
91 Allswell	5.6	6.6
92 Avocado Green	6.8	5.9
93 Brooklyn	6.7	6.0
94 Brunswick	5.5	6.7
95 Casper Hybrid	9.5	4.3
96 Casper Nova	4.8	7.1
97 Casper Wave Hybrid	5.2	6.9
98 DreamCloud	6.8	5.9
99 Endy Hybrid	4.8	7.2
100 Hamuq	6.0	6.4
101 Haven Lux Hybrid	4.6	7.3
102 Hush	4.6	7.2
103 Kingsdown	4.9	7.1
104 Layla Hybrid (Firm)	7.0	5.8
105 Layla Hybrid (Soft)	4.6	7.2
106 Logan & Cove (Firm)	5.2	6.9
107 Logan & Cove (Medium)	5.1	7.0
108 Parachute	7.1	5.7
109 Purple Hybrid	5.8	6.5
110 Saatva	5.2	6.9
111 Silk & Snow Hybrid (V1)	4.9	7.0
112 Silk & Snow Hybrid (V2)	3.3	8.0
113 Silk & Snow Organic	5.1	7.0
114 Simmons Beautyrest Black	3.6	7.8
115 Springwall	6.5	6.1
116 Stearns & Foster	4.1	7.6
117 WinkBed	5.6	6.7



### Test 3 - Motion Isolation

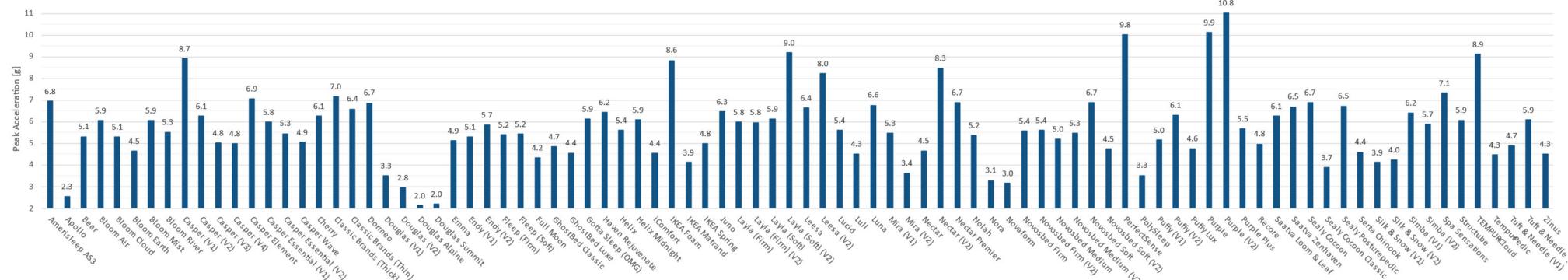


Figure 19: Test 3 - Peak Acceleration at one sleep point when Reference Load 2 is dropped on the other sleep point. Values shown are an average of 20 runs per mattress.

### Test 3 - Motion Isolation

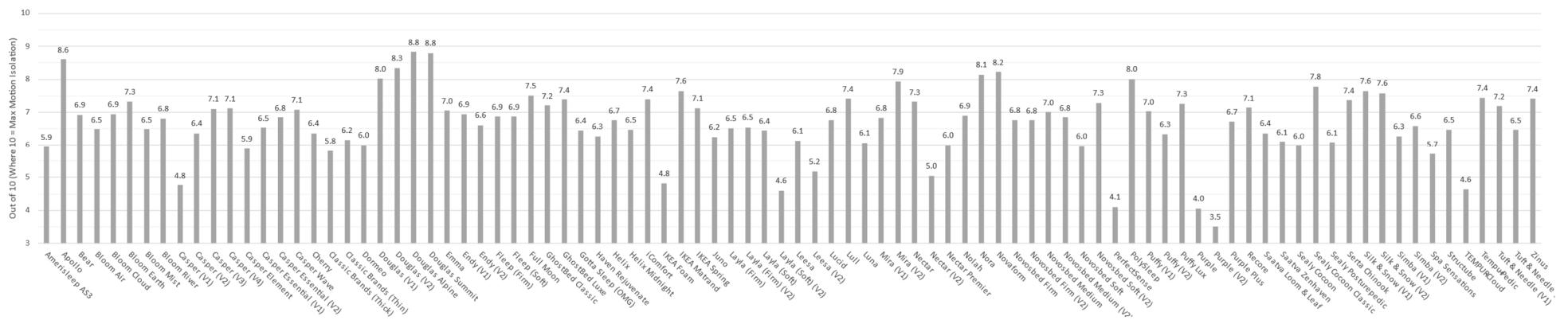


Figure 20: Test 3 – Motion Isolation on a scale from 1 to 10 based on the given mattresses that were sampled (where 10 = max motion isolation)

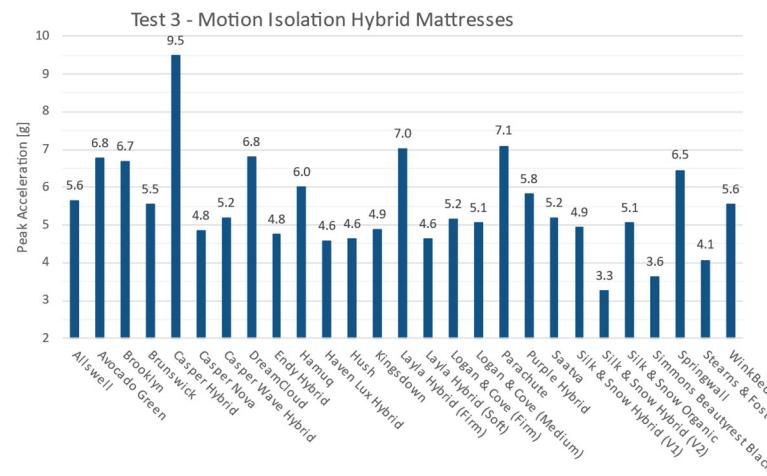


Figure 21: Test 3 - Peak Acceleration at one sleep point when Reference Load 2 is dropped on the other sleep point. Values shown are an average of 20 runs per mattress. Hybrid mattresses.

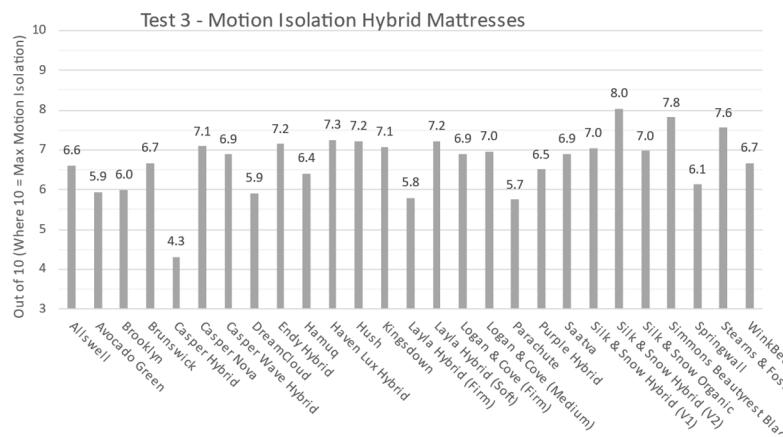


Figure 22: Test 3 – Motion Isolation on a scale from 1 to 10 based on the given mattresses that were sampled (where 10 = max motion isolation). Hybrid mattresses.



## TEST 4 – RESULTS - BOUNCINESS

**Table 7: Test 4 – Bounciness**

Mattress		Rebound	Rebound	Rebound	Rebound Height	Average, [in]	Out of 10
		Height Run 1,	Height Run 2,	Height Run 3,	Average, [in]		
1	Amerisleep AS3	3.1	3.0	3.3	3.1	2.9	
2	Apollo	1.8	1.8	1.5	1.7	2.0	
3	Bear	3.8	3.8	3.9	3.8	3.3	
4	Bloom Air	3.4	3.3	3.4	3.3	3.0	
5	Bloom Cloud	3.5	3.7	4.0	3.7	3.2	
6	Bloom Earth	5.3	5.1	5.1	5.2	4.1	
7	Bloom Mist	3.6	3.5	3.5	3.5	3.1	
8	Bloom River	3.8	4.0	3.8	3.8	3.3	
9	Casper (V1)	4.9	5.0	5.1	5.0	4.0	
10	Casper (V2)	5.0	4.9	5.0	5.0	4.0	
11	Casper (V3)	3.5	3.5	3.5	3.5	3.1	
12	Casper (V4)	6.3	6.3	6.3	6.3	4.8	
13	Casper Element	8.8	8.6	8.8	8.7	6.2	
14	Casper Essential (V1)	3.3	3.3	3.4	3.3	3.0	
15	Casper Essential (V2)	4.3	4.1	4.3	4.2	3.5	
16	Casper Wave	6.0	6.0	6.0	6.0	4.6	
17	Cherry	3.5	3.8	3.4	3.5	3.1	
18	Classic Brands (Thick)	3.4	3.6	3.5	3.5	3.1	
19	Classic Brands (Thin)	7.1	7.1	7.2	7.1	5.3	
20	Dormeo	8.8	8.8	8.6	8.7	6.2	
21	Douglas (V1)	5.5	5.7	5.5	5.6	4.3	
22	Douglas (V2)	3.8	3.8	3.5	3.7	3.2	
23	Douglas Alpine	3.2	3.4	3.0	3.2	2.9	
24	Douglas Summit	3.5	3.3	3.7	3.5	3.0	
25	Emma	3.3	3.3	3.3	3.3	3.0	
26	Endy (V1)	2.5	2.6	2.6	2.6	2.5	
27	Endy (V2)	6.3	6.0	6.3	6.2	4.7	
28	Fleep (Firm)	7.5	7.6	7.5	7.5	5.5	
29	Fleep (Soft)	3.6	3.7	3.5	3.6	3.2	
30	Full Moon	4.0	3.8	4.2	4.0	3.4	
31	GhostBed Classic	3.5	3.4	3.5	3.5	3.1	
32	GhostBed Luxe	3.2	3.5	2.9	3.2	2.9	
33	Gotta Sleep (OMG)	3.0	3.0	3.0	3.0	2.8	
34	Haven Rejuvinate	6.6	6.6	6.5	6.6	5.0	
35	Helix	9.3	9.3	9.3	9.3	6.6	
36	Helix Midnight	8.0	8.2	7.8	8.0	5.8	
37	iComfort	1.8	2.0	1.8	1.8	2.1	
38	IKEA Foam	9.6	9.5	9.8	9.6	6.8	
39	IKEA Matrand	5.7	6.0	5.4	5.7	4.3	
40	IKEA Spring	12.3	12.1	12.3	12.2	8.3	
41	Juno	2.6	2.6	2.6	2.6	2.6	
42	Layla (Firm)	4.5	4.4	4.5	4.5	3.7	
43	Layla (Firm) (V2)	6.6	6.7	6.5	6.6	4.8	
44	Layla (Soft)	1.8	1.8	1.5	1.7	2.0	
45	Layla (Soft) (V2)	2.3	2.1	2.5	2.3	2.3	
46	Leesa	4.4	4.4	4.3	4.4	3.6	
47	Leesa (V2)	3.3	3.4	3.2	3.3	2.9	
48	Lucid	3.4	3.5	3.4	3.4	3.1	
49	Lull	4.9	5.1	4.7	4.9	3.9	
50	Luna	3.3	3.4	3.4	3.4	3.0	
51	Mira (V1)	5.4	5.4	5.5	5.4	4.3	
52	Mira (V2)	4.8	4.5	4.8	4.7	3.8	
53	Nectar	1.3	1.3	1.1	1.2	1.7	
54	Nectar (V2)	4.4	4.6	4.2	4.4	3.6	
55	Nectar Premier	2.0	2.3	1.7	2.0	2.2	
56	Nolah	3.1	2.9	3.3	3.1	2.8	
57	Nora	3.4	3.5	3.5	3.5	3.1	
58	Novaform	0.6	0.8	0.6	0.7	1.4	
59	Novosbed Firm	1.2	1.3	1.3	1.3	1.8	
60	Novosbed Firm (V2)	3.3	3.1	3.3	3.2	2.9	
61	Novosbed Medium				1.7	1.7	1.6
62	Novosbed Medium (V2)				2.1	2.1	2.1
63	Novosbed Soft				3.4	3.5	3.6
64	Novosbed Soft (V2)				1.6	1.6	1.8
65	PerfectSense				4.3	4.4	4.3
66	PolySleep				3.5	3.8	3.6
67	Puffy (V1)				0.5	0.4	0.5
68	Puffy (V2)				4.1	4.1	4.2
69	Puffy Lux				2.8	2.9	2.8
70	Purple				8.6	8.5	8.6
71	Purple (V2)				8.5	8.1	8.9
72	Purple Plus				5.4	5.1	5.7
73	Recore				4.3	4.4	4.4
74	Saatva Loom & Leaf				3.2	3.5	2.9
75	Saatva Zenhaven				6.1	6.3	5.9
76	Sealy Cocoon				8.0	8.0	8.0
77	Sealy Cocoon Classic				4.1	4.4	3.8
78	Sealy Posturepedic				5.4	5.4	5.4
79	Serta Chinook				4.4	4.3	4.3
80	Silk & Snow (V1)				2.5	2.5	2.5
81	Silk & Snow (V2)				3.1	3.3	2.9
82	Simba (V1)				5.5	5.5	5.6
83	Simba (V2)				5.8	5.5	5.8
84	Spa Sensations				12.5	12.6	12.5
85	Structube				9.0	9.0	9.0
86	TEMPUR-Cloud				4.4	4.6	4.2
87	Tempur-Pedic				1.1	1.1	1.0
88	Tuft & Needle (V1)				6.3	6.5	6.4
89	Tuft & Needle (V2)				5.0	5.3	5.0
90	Zinus				1.5	1.5	1.4

**Table 8: Test 4 – Bounciness - Hybrid Mattresses**

Mattress		Rebound	Rebound	Rebound	Rebound	Out of 10
		Height Run	Height Run	Height Run	Height	
91	Allswell	3.1	3.0	3.2	3.1	2.8
92	Avocado Green	9.1	8.8	9.4	9.1	6.3
93	Brooklyn	6.7	6.5	6.9	6.7	4.9
94	Brunswick	7.8	7.6	7.8	7.7	5.5
95	Casper Hybrid	7.3	7.6	7.0	7.3	5.2
96	Casper Nova	6.2	6.0	6.4	6.2	4.6
97	Casper Wave Hybrid	7.5	7.6	7.4	7.5	5.4
98	DreamCloud	5.0	5.2	4.8	5.0	3.9
99	Endy Hybrid	7.5	7.3	7.7	7.5	5.4
100	Hamuq	6.8	6.5	6.8	6.7	4.9
101	Haven Lux Hybrid	9.5	9.3	9.4	9.4	6.4
102	Hush	7.8	7.5	8.1	7.8	5.5
103	Kingsdown	5.4	5.3	5.3	5.3	4.1
104	Layla Hybrid (Firm)	6.3	6.0	6.6	6.3	4.7
105	Layla Hybrid (Soft)	3.7	3.5	3.3	3.5	3.0
106	Logan & Cove (Firm)	7.5	7.8	7.6	7.6	5.4
107	Logan & Cove (Medium)	3.8	3.8	3.6	3.7	3.2
108	Parachute	8.8	9.0	8.6	8.8	6.1
109	Purple Hybrid	15.5	15.4	15.6	15.5	10.0
110	Saatva	12.2	12.5	12.3	12.3	8.2
111	Silk & Snow Hybrid (V1)	7.5	7.5	7.5	7.5	5.4
112	Silk & Snow Hybrid (V2)	6.4	6.1	6.7	6.4	4.7
113	Silk & Snow Organic	9.9	10.2	9.7	9.9	6.8
114	Simmons Beautyrest Black	6.0	5.9	6.0	6.0	4.5
115	Springwall	13.6	13.8	13.6	13.7	8.9
116	Stearns & Foster	3.3	3.3	3.1	3.2	2.9
117	WinkBed	4.9	5.2	4.6	4.9	3.8



Test 4 - Rebound Height

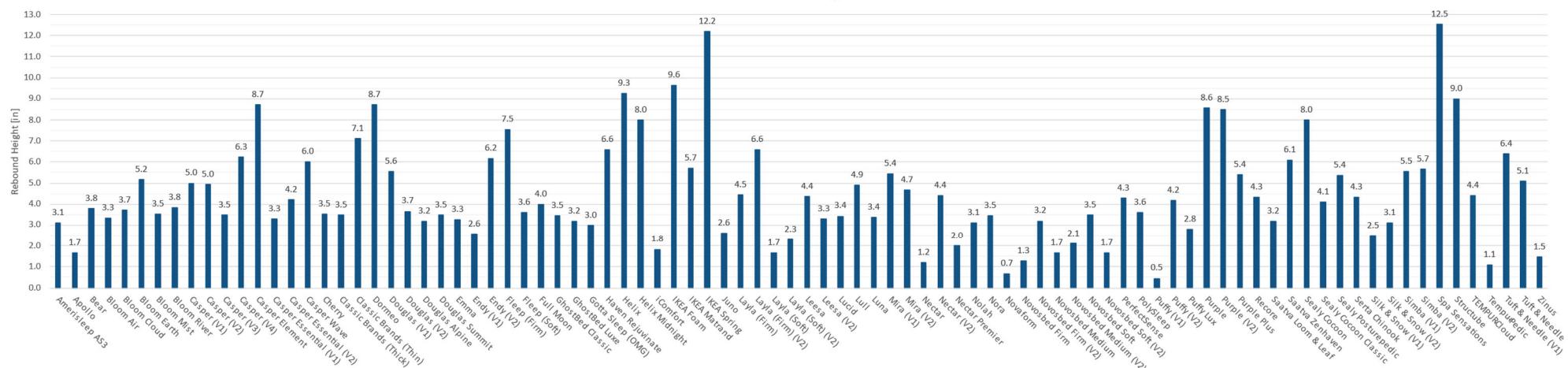


Figure 23: Test 4 - Rebound height of Reference Load 2 when dropped in the center of the mattress. Values shown are an average of 3 runs per mattress.

Test 4 - Rebound Height

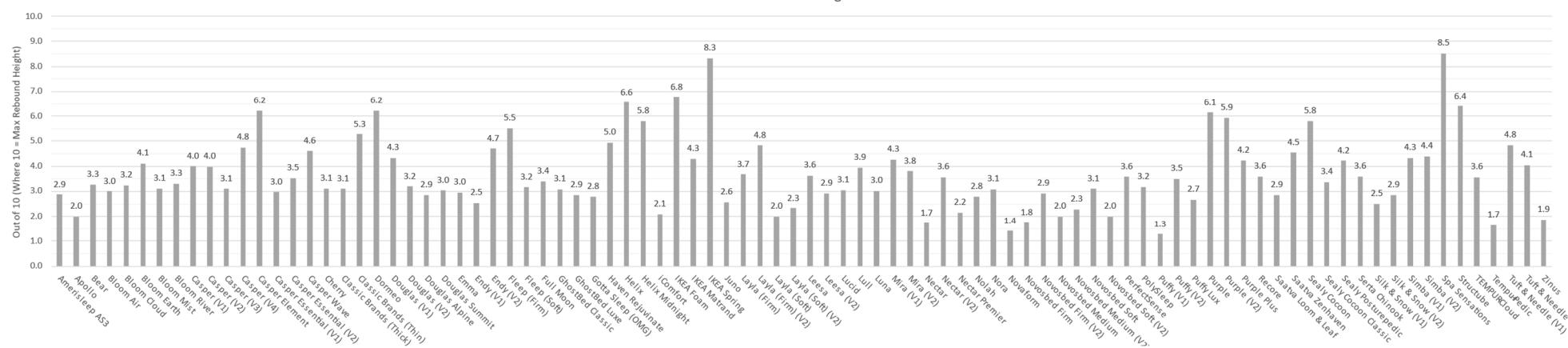


Figure 24: Test 4 – Rebound height on a scale from 1 to 10 based on the given mattresses that were sampled (where 10 = max rebound height)

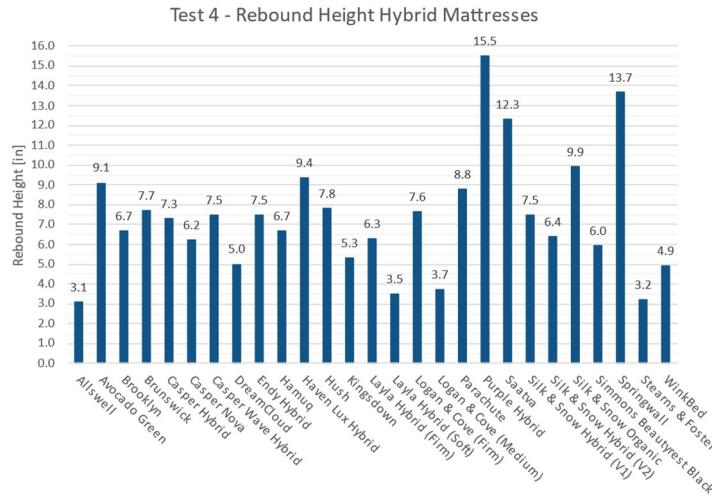


Figure 25: Test 4 - Rebound height of Reference Load 2 when dropped in the center of the mattress. Values shown are an average of 3 runs per mattress. Hybrid mattresses.

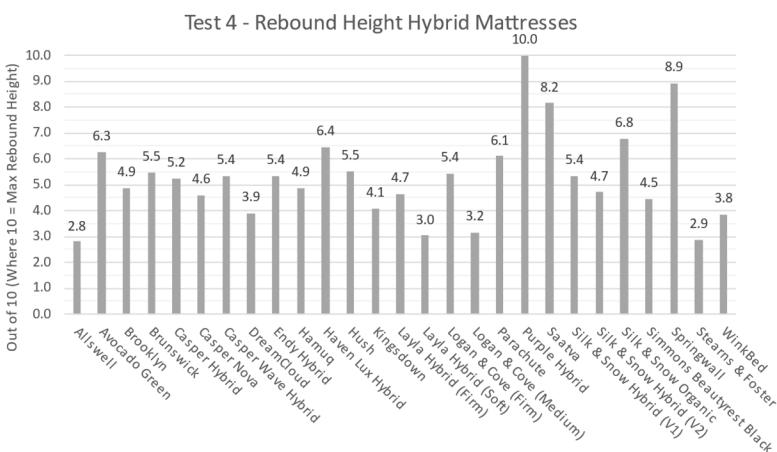


Figure 26: Test 4 – Rebound height on a scale from 1 to 10 based on the given mattresses that were sampled (where 10 = max rebound height). Hybrid mattresses.



## CONCLUSION

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We trust that the above and attached information is satisfactory. Please do not hesitate to contact the undersigned if you have any questions or require further information.

Sincerely,

**Techtree Engineering Ltd.**

Brad Schroeder, P.Eng.



## APPENDIX A

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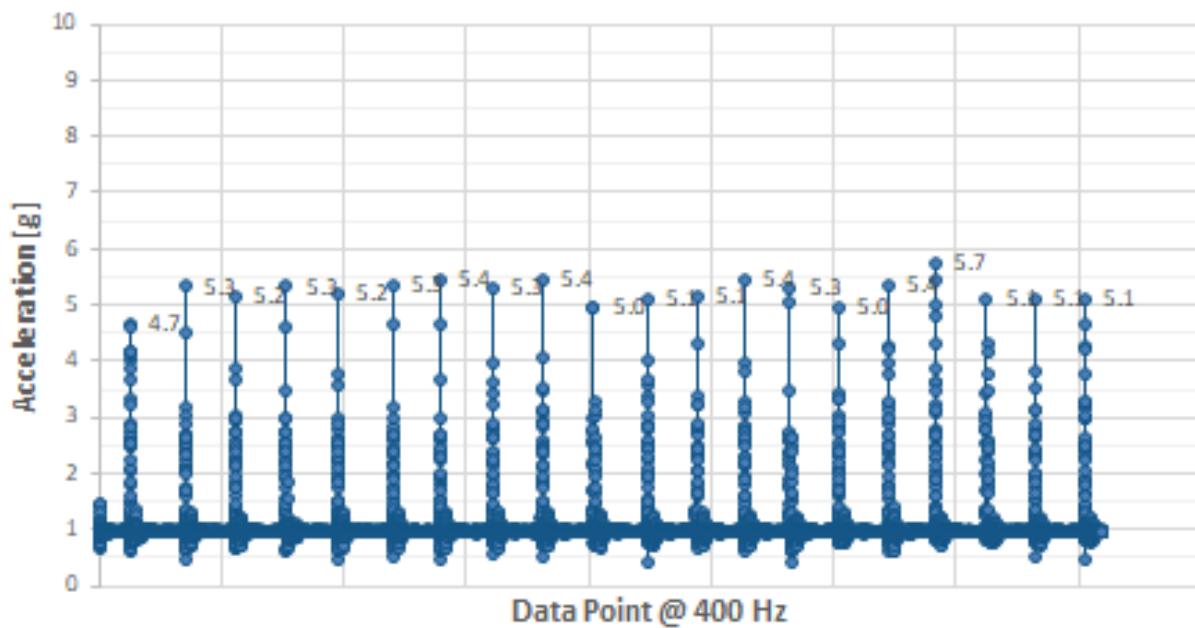
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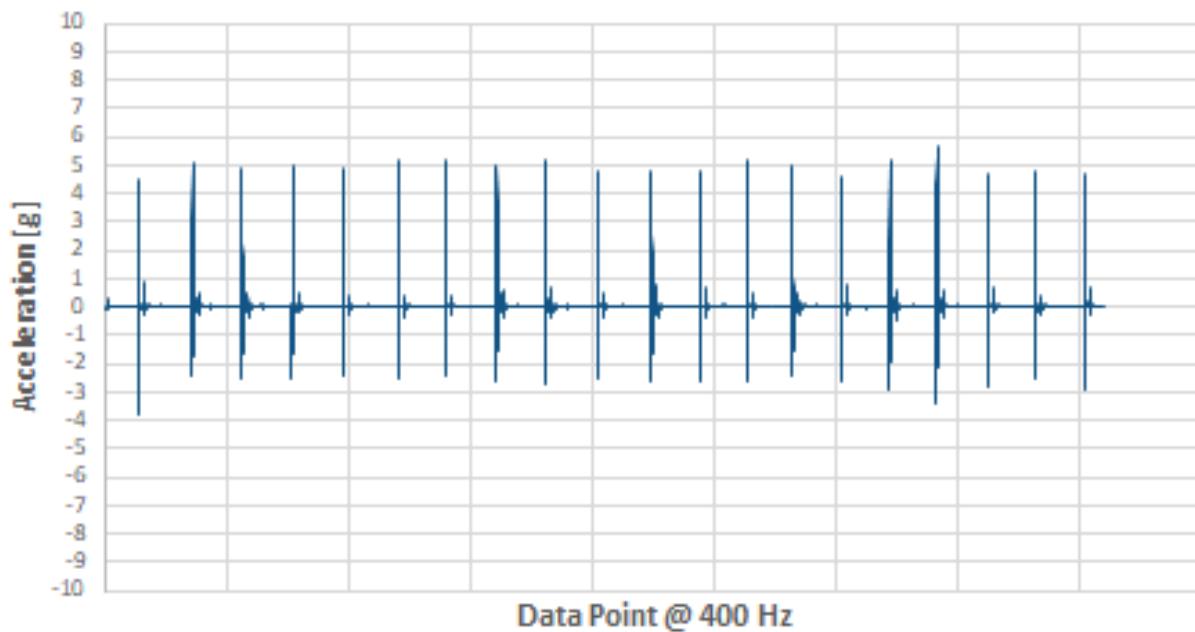
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## TEST 3 – FLEEP (FIRM)

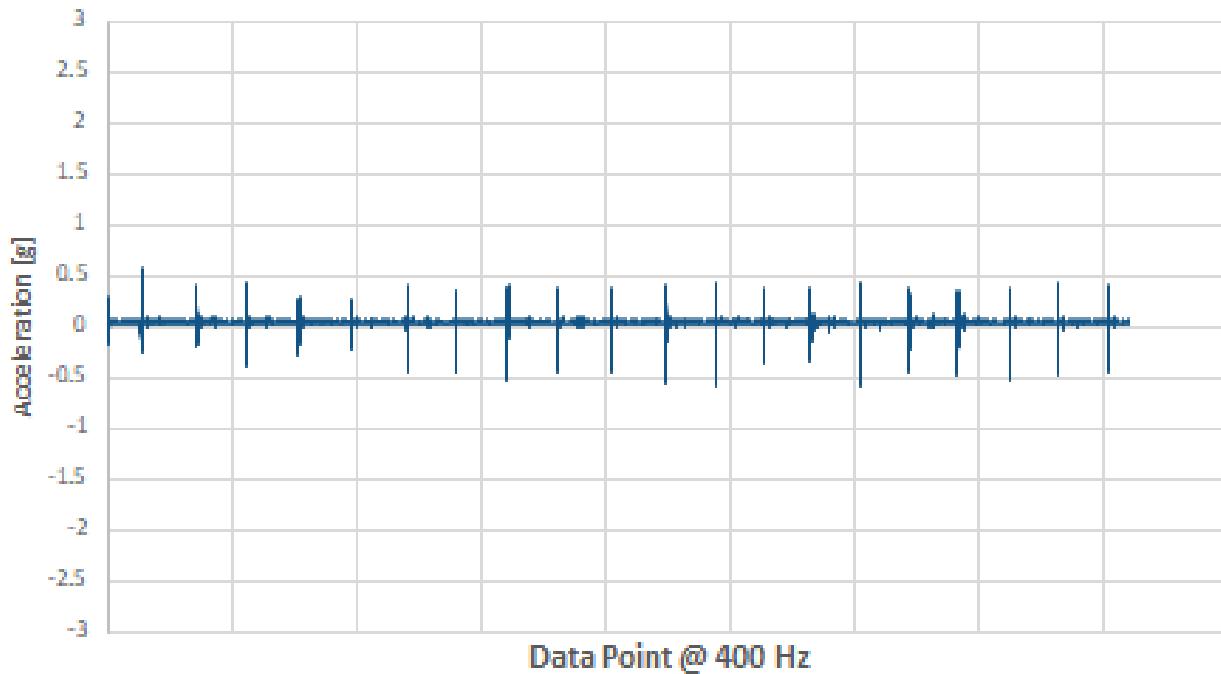
Vector Magnitude Acceleration - Fleep (Firm)



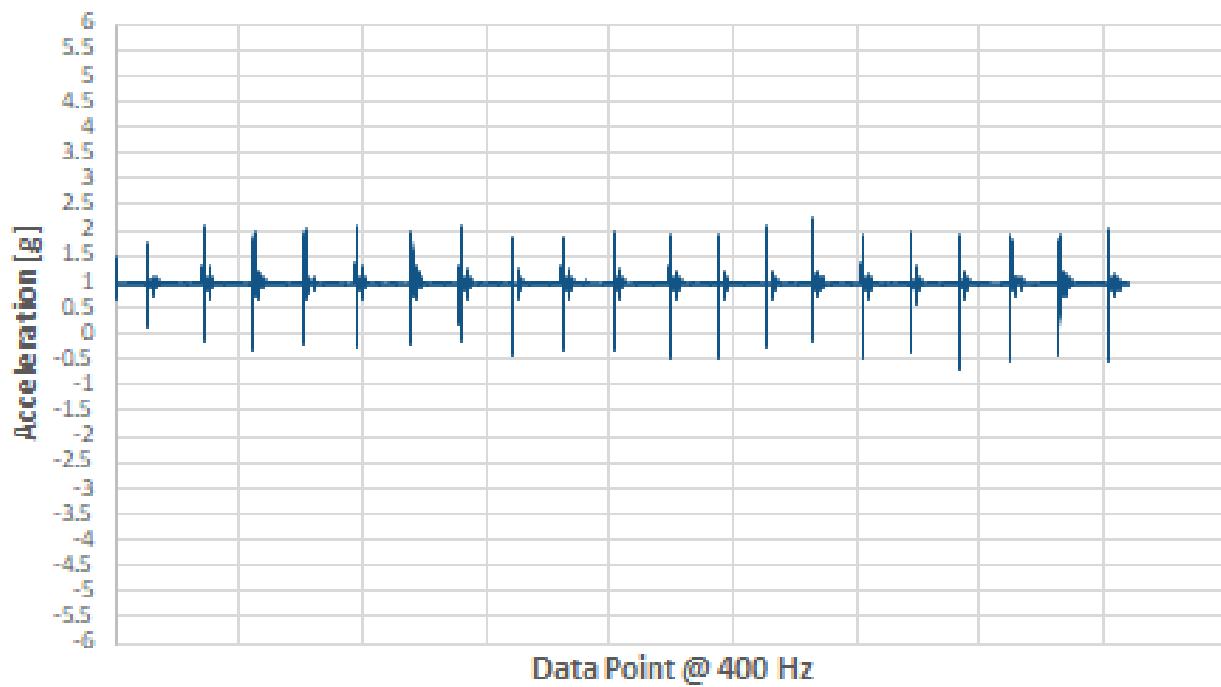
X Acceleration (Side to Side) - Fleep (Firm)



Y Acceleration (Head to Toe) - Fleep (Firm)



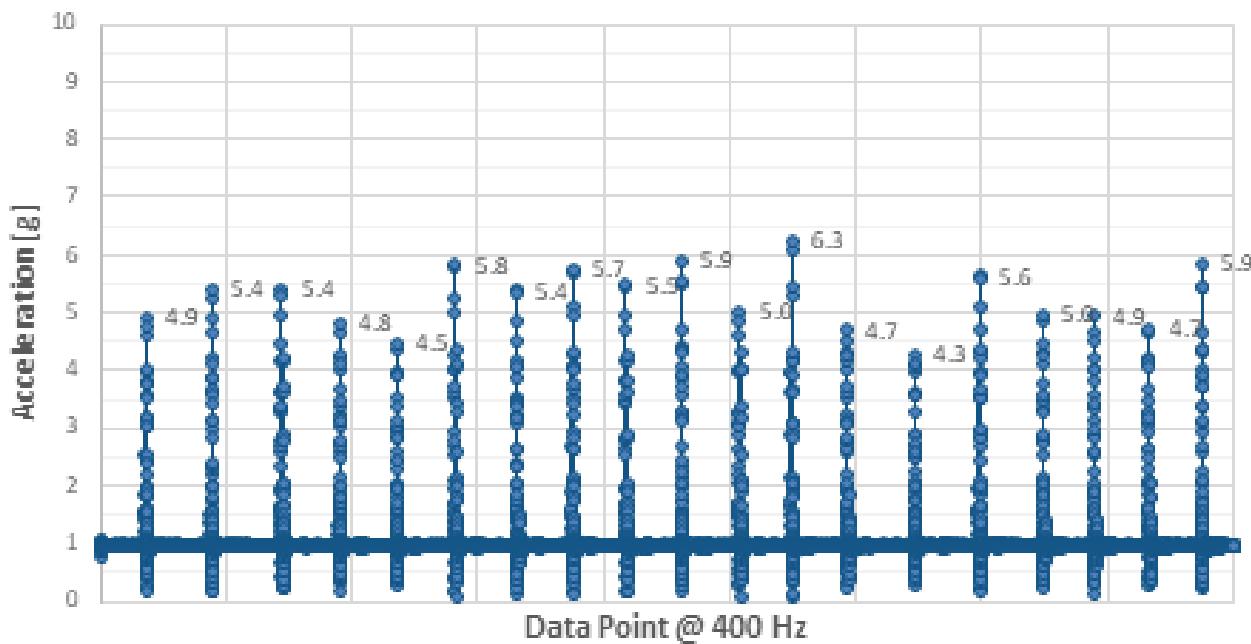
Z Acceleration (Up and Down) - Fleep (Firm)



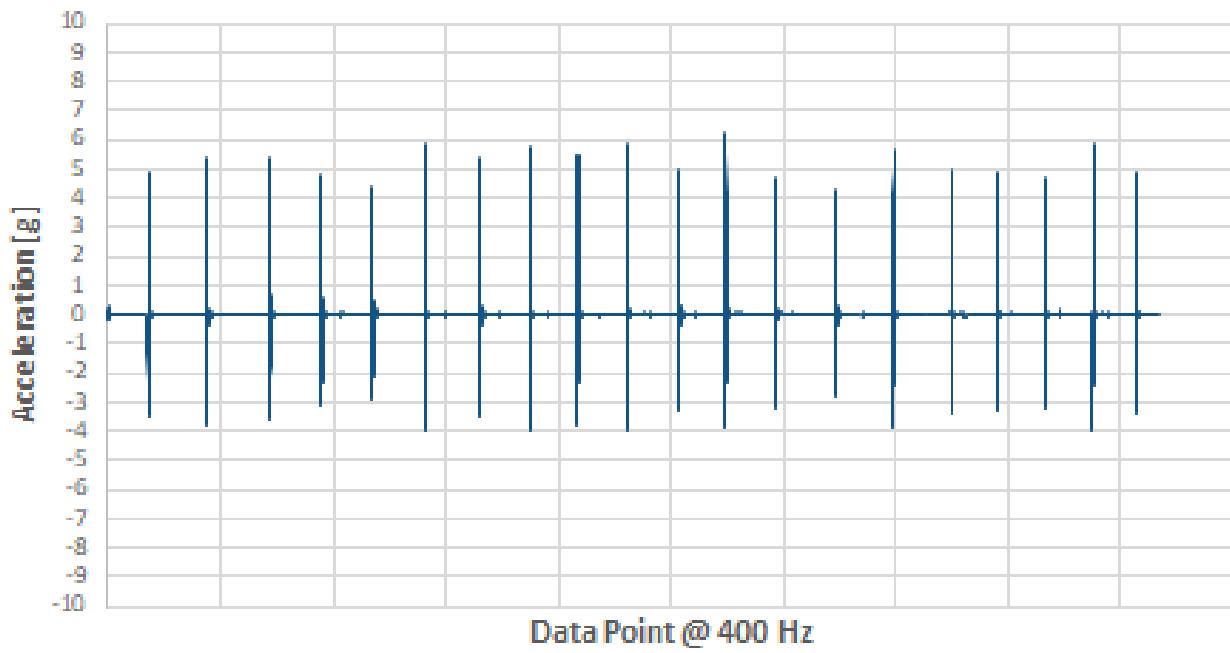


## TEST 3 – FLEEP (SOFT)

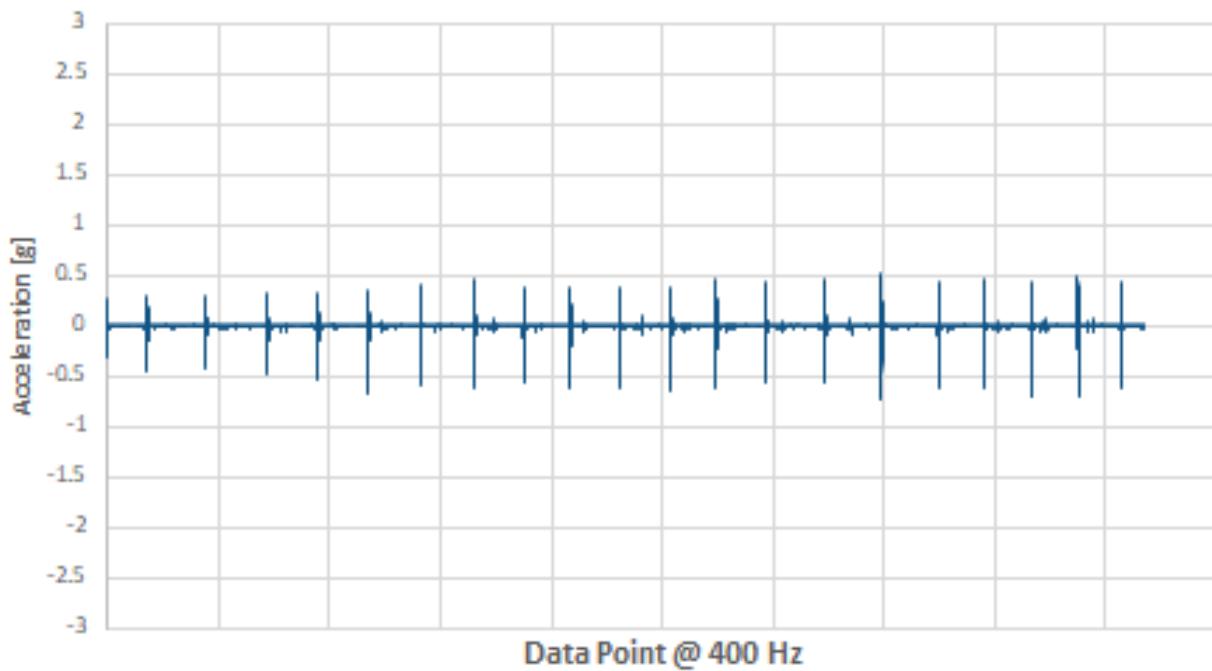
Vector Magnitude Acceleration - Fleep (Soft)



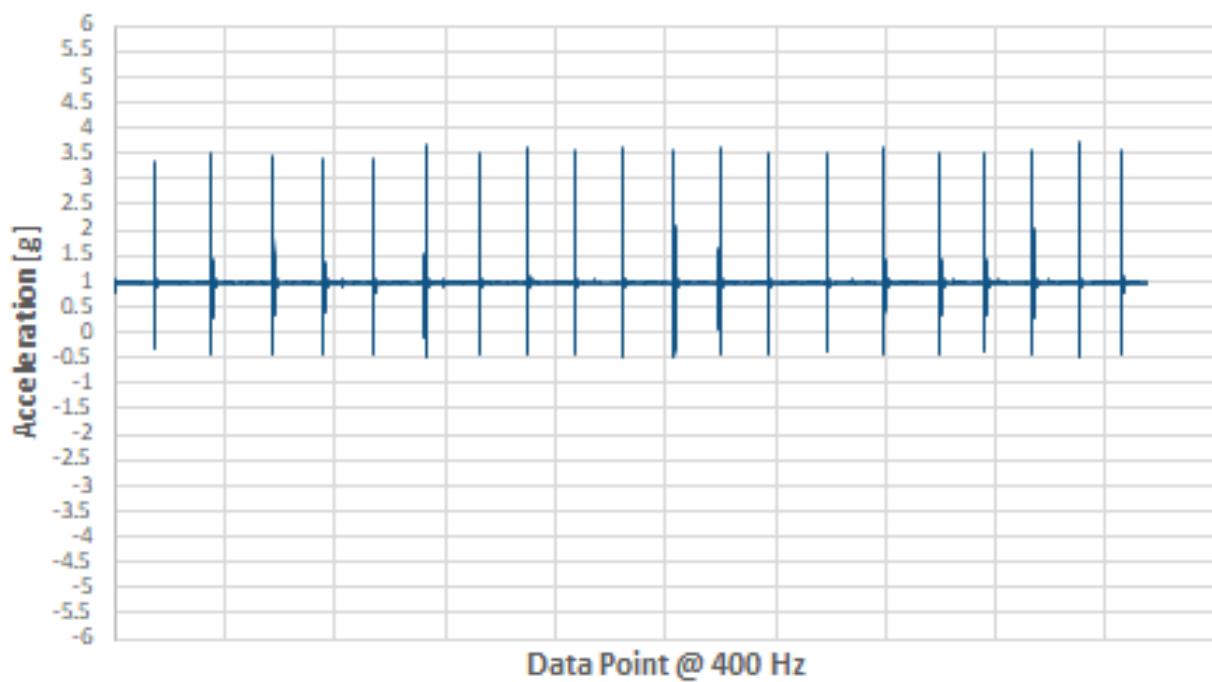
X Acceleration (Side to Side) - Fleep (Soft)



Y Acceleration (Head to Toe) - Fleep (Soft)



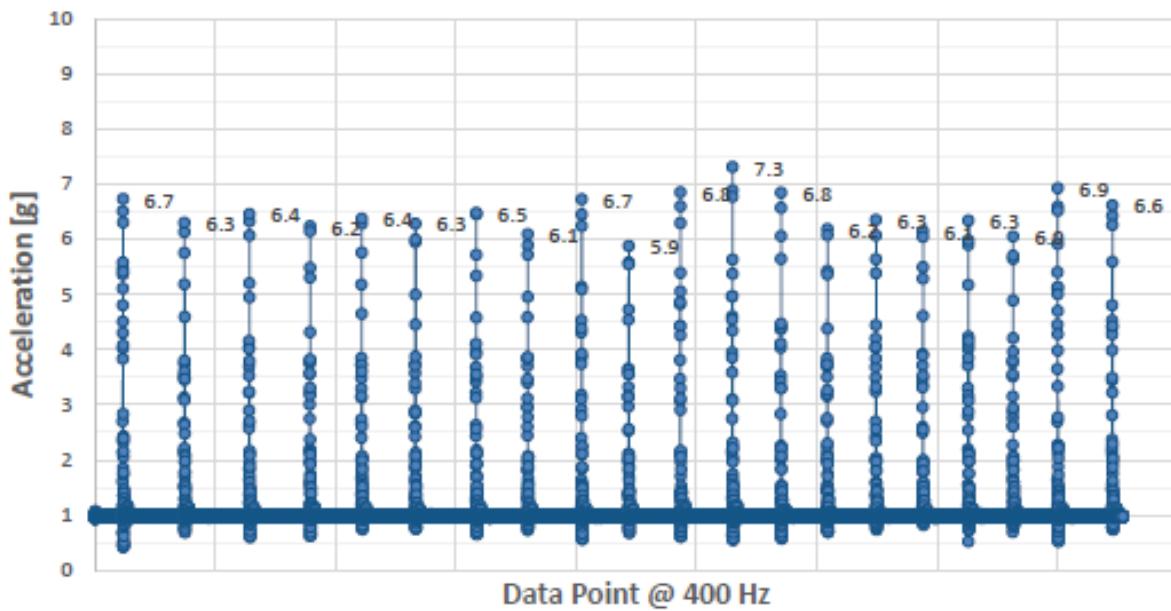
Z Acceleration (Up and Down) - Fleep (Soft)



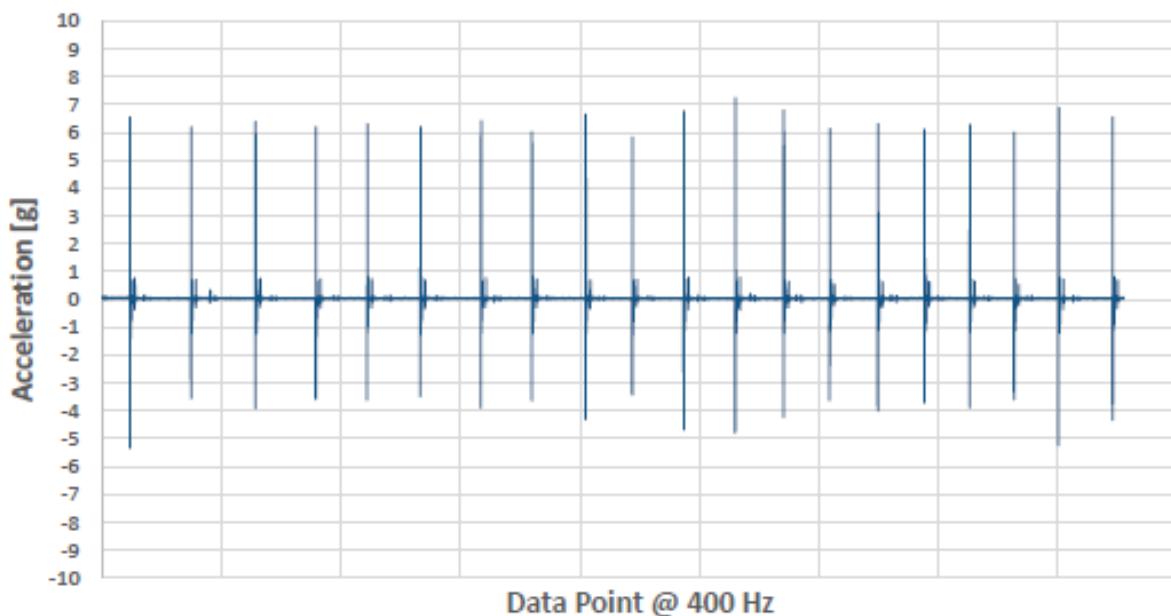


## TEST 3 – LEESA

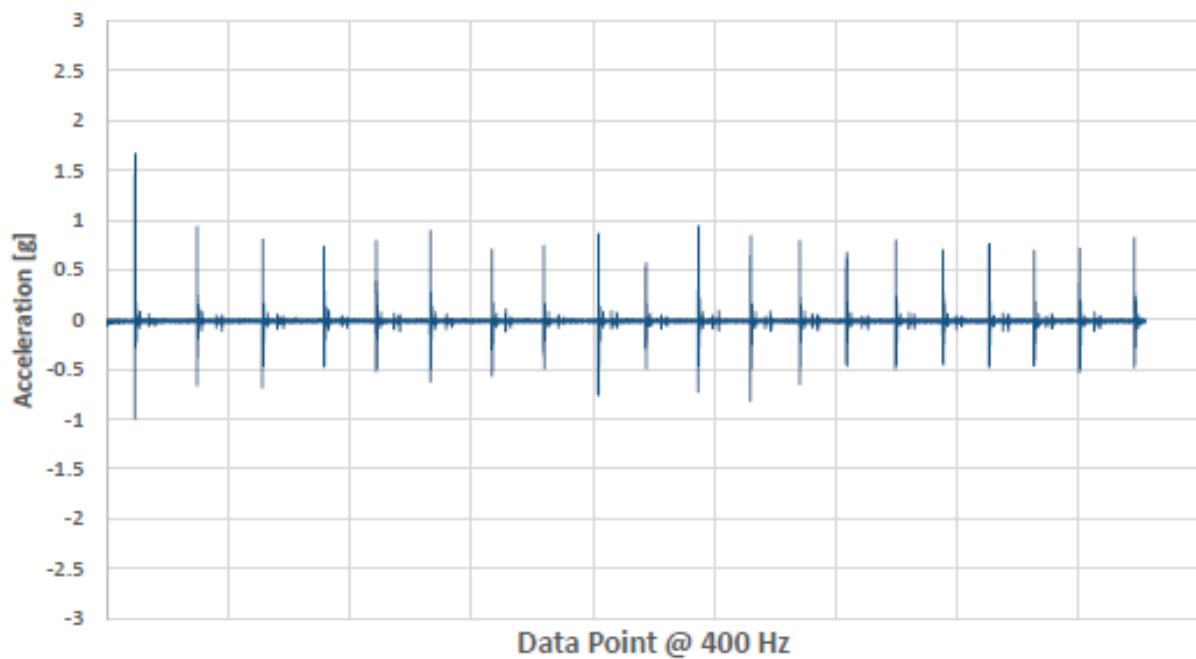
Vector Magnitude Acceleration - Leesa



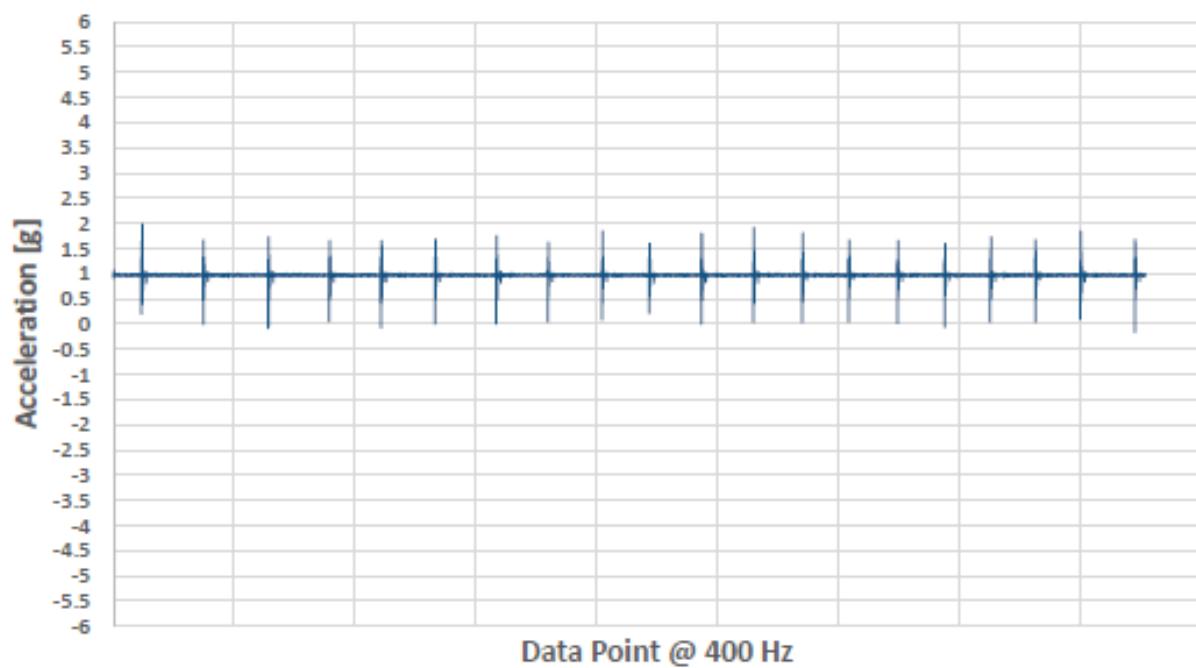
X Acceleration (Side to Side) - Leesa



**Y Acceleration (Head to Toe) - Leesa**



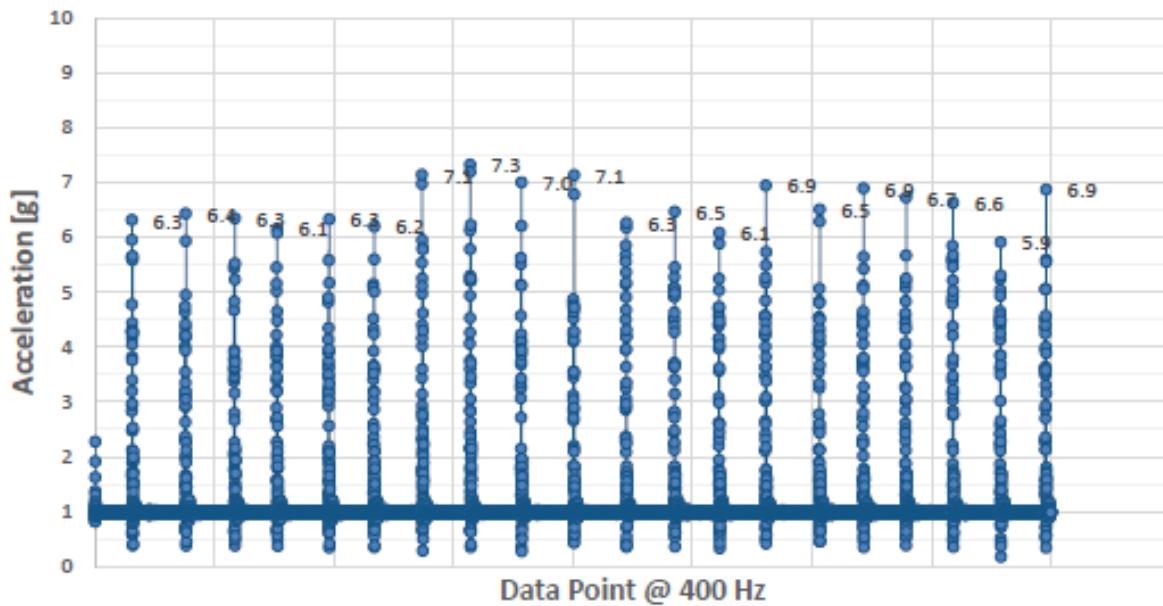
**Z Acceleration (Up and Down) - Leesa**



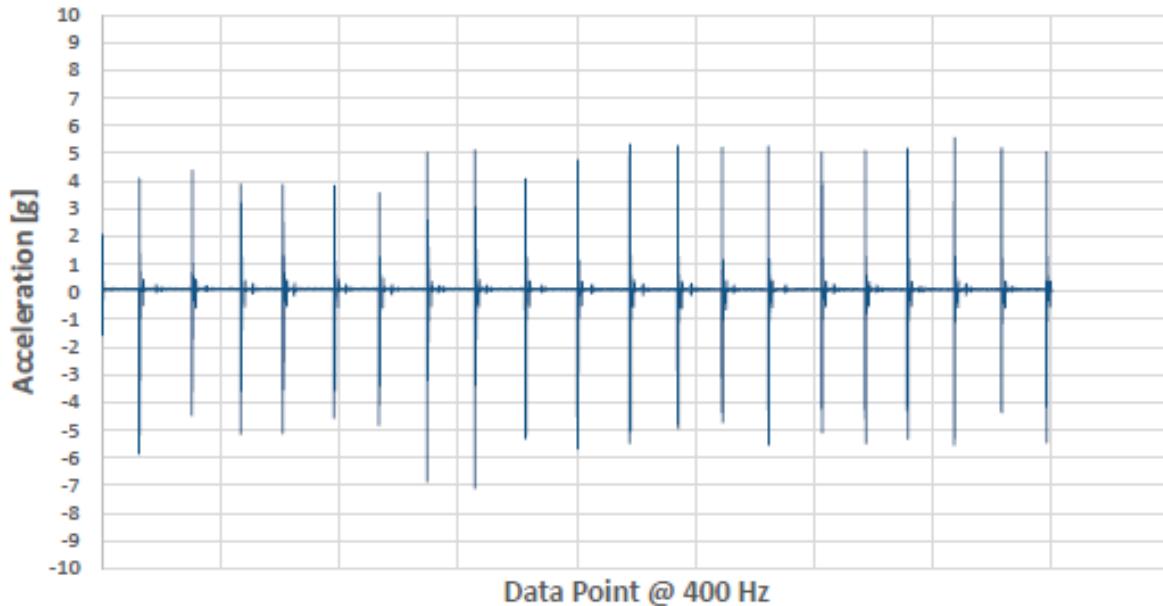


## TEST 3 – LUNA

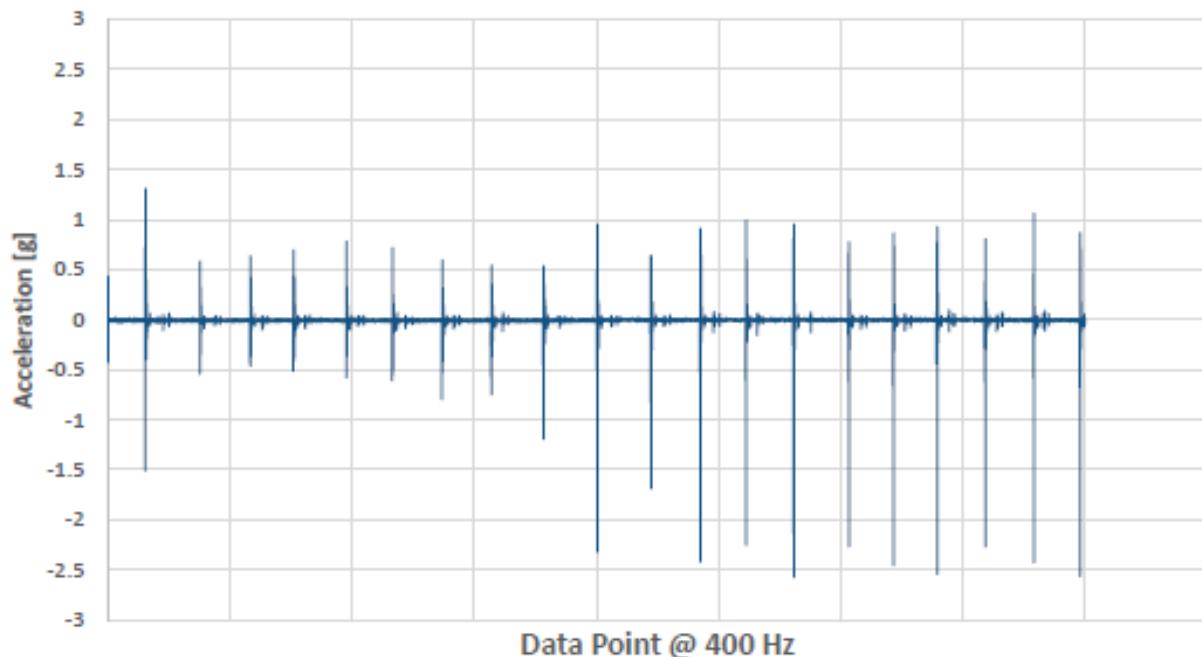
Vector Magnitude Acceleration - Luna



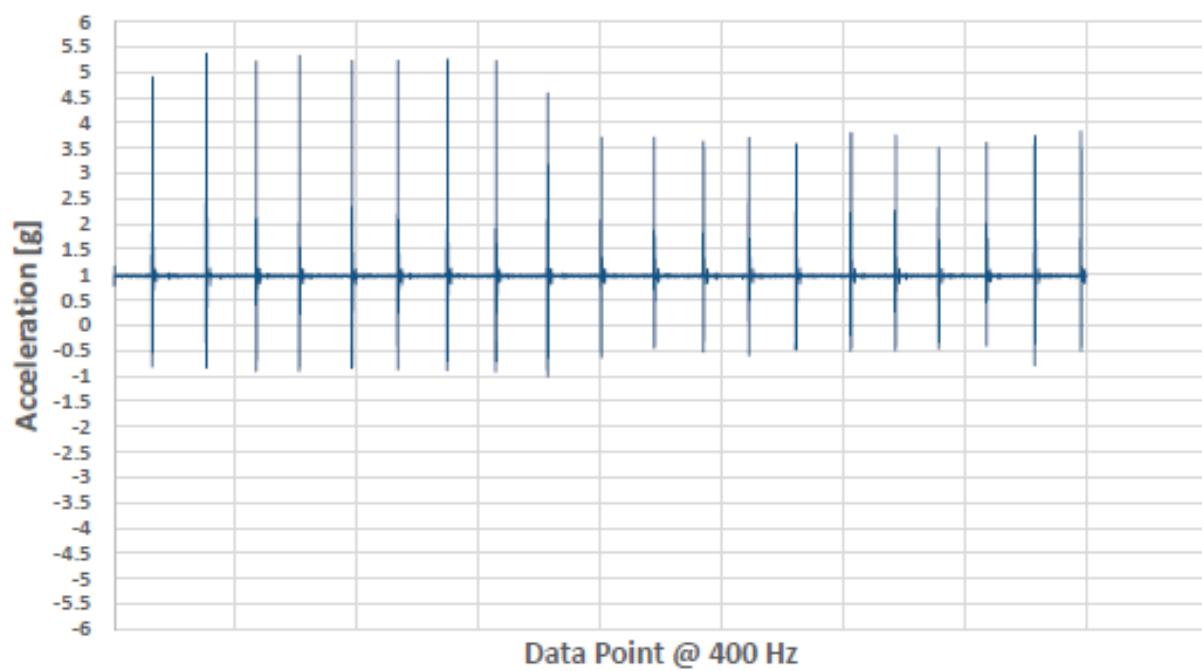
X Acceleration (Side to Side) - Luna



**Y Acceleration (Head to Toe) - Luna**



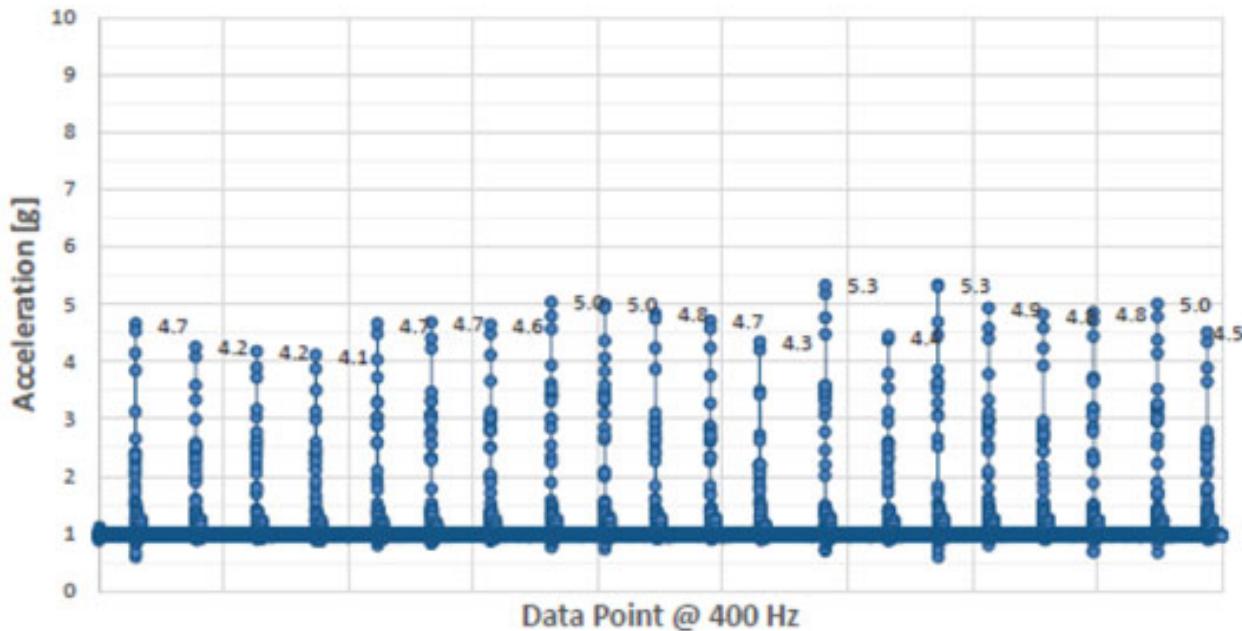
**Z Acceleration (Up and Down) - Luna**



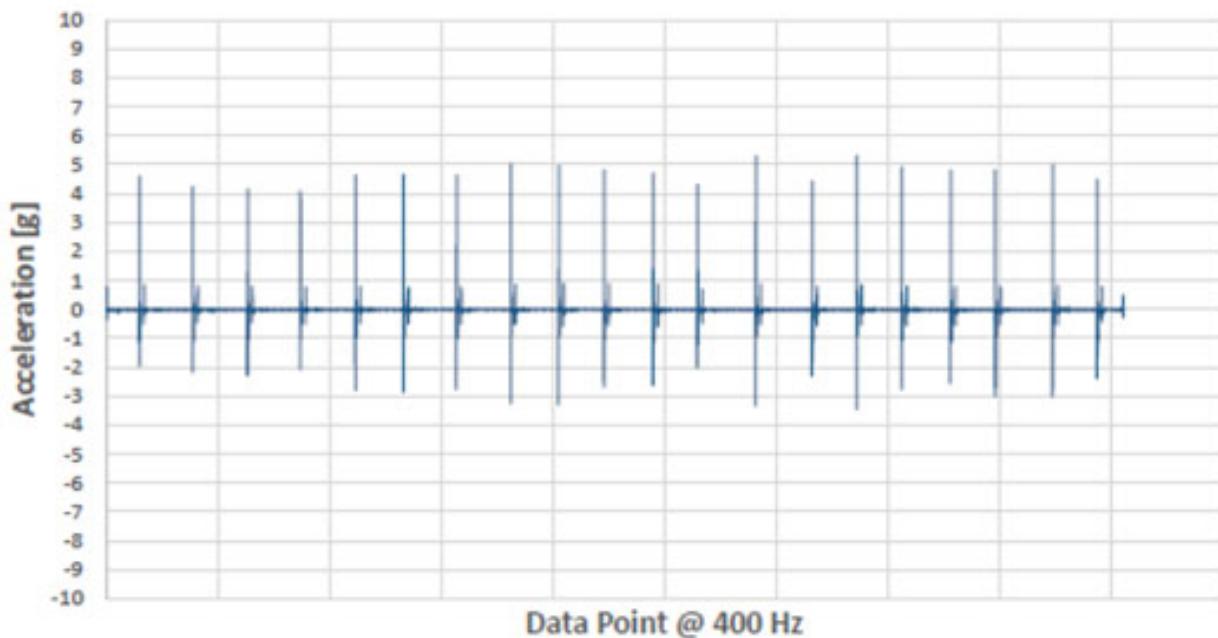


## TEST 3 – TUFT & NEEDLE (V1)

Vector Magnitude Acceleration - Tuft & Needle (V1)

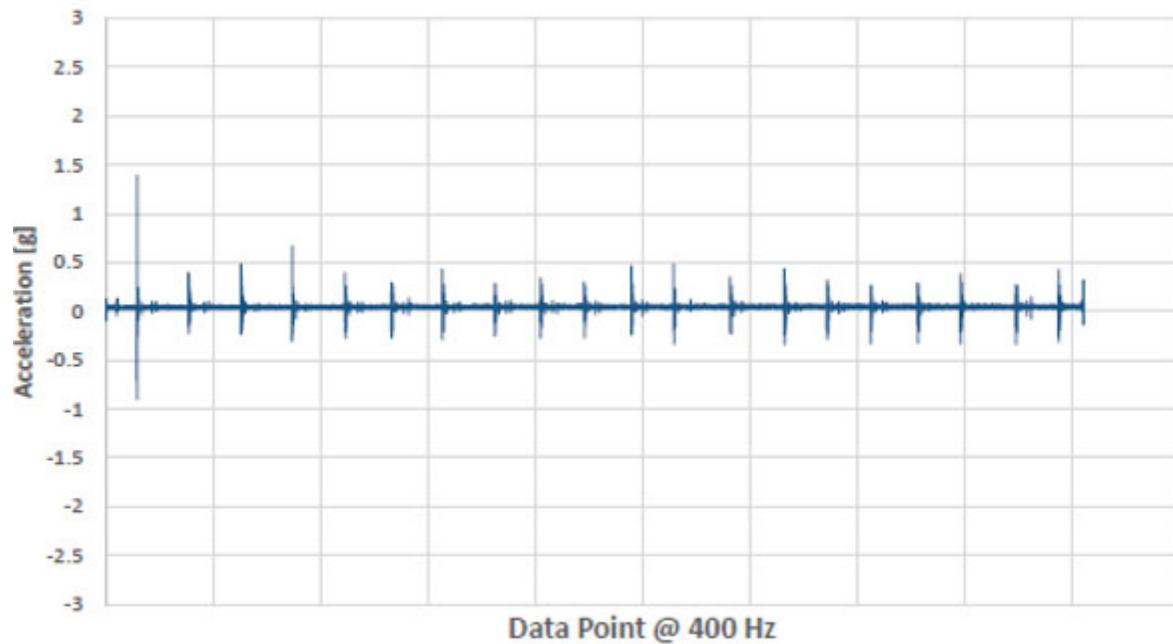


X Acceleration (Side to Side) - Tuft & Needle (V1)

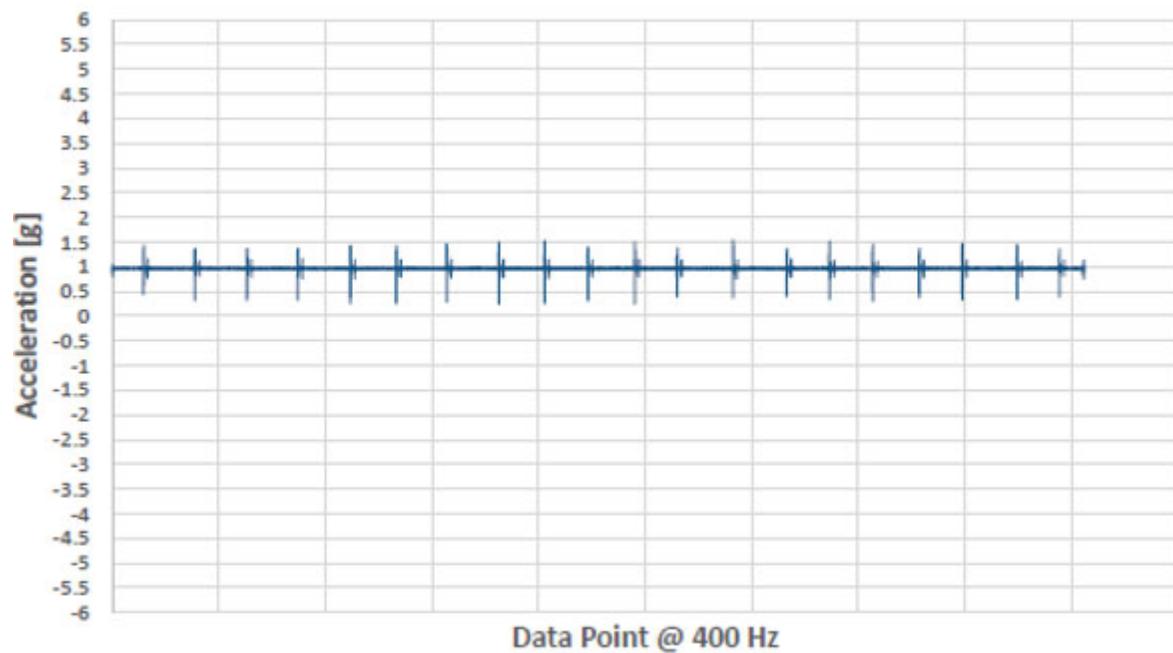




Y Acceleration (Head to Toe) - Tuft & Needle (V1)



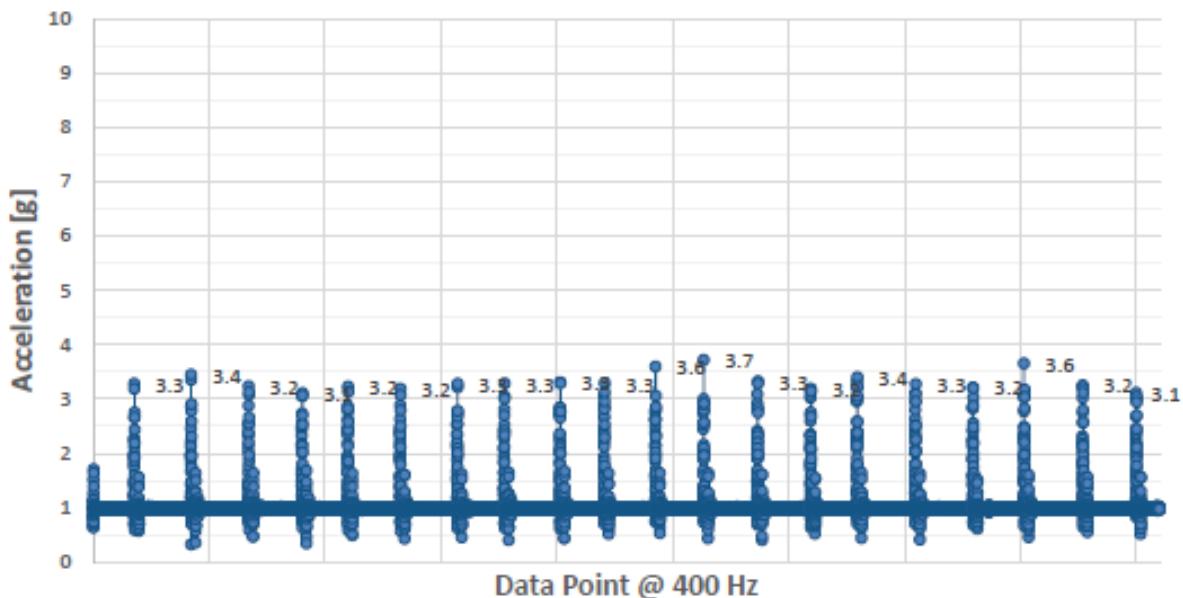
Z Acceleration (Up and Down) - Tuft & Needle (V1)



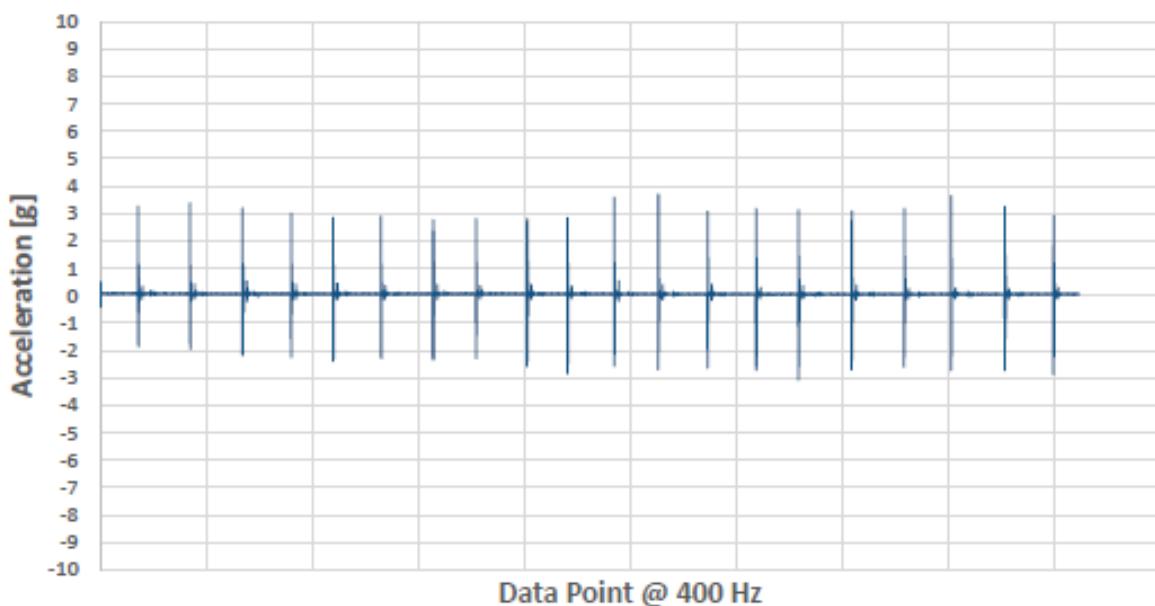


## TEST 3 – DOUGLAS (V1)

Vector Magnitude Acceleration - Douglas V1

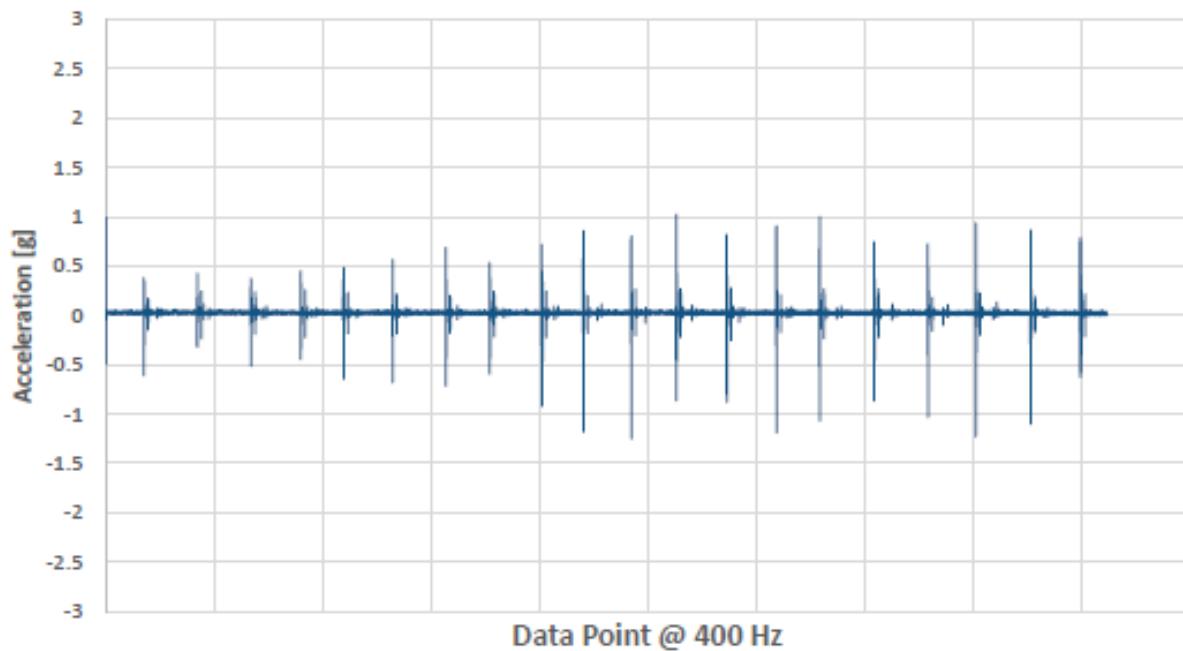


X Acceleration (Side to Side) - Douglas V1

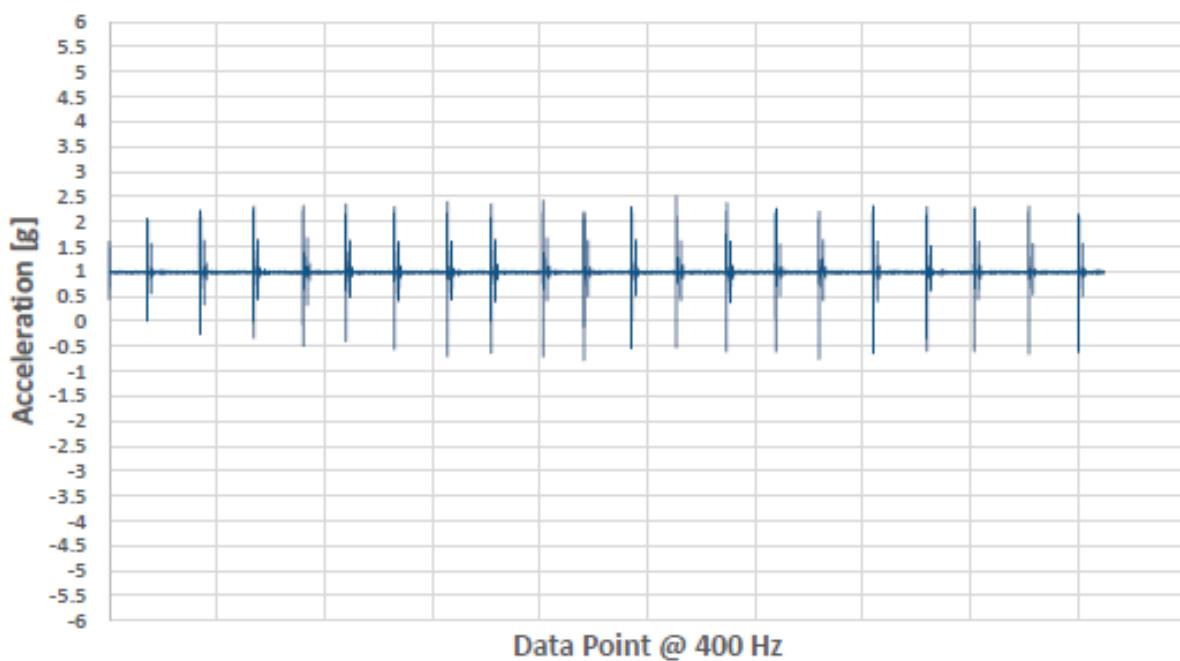


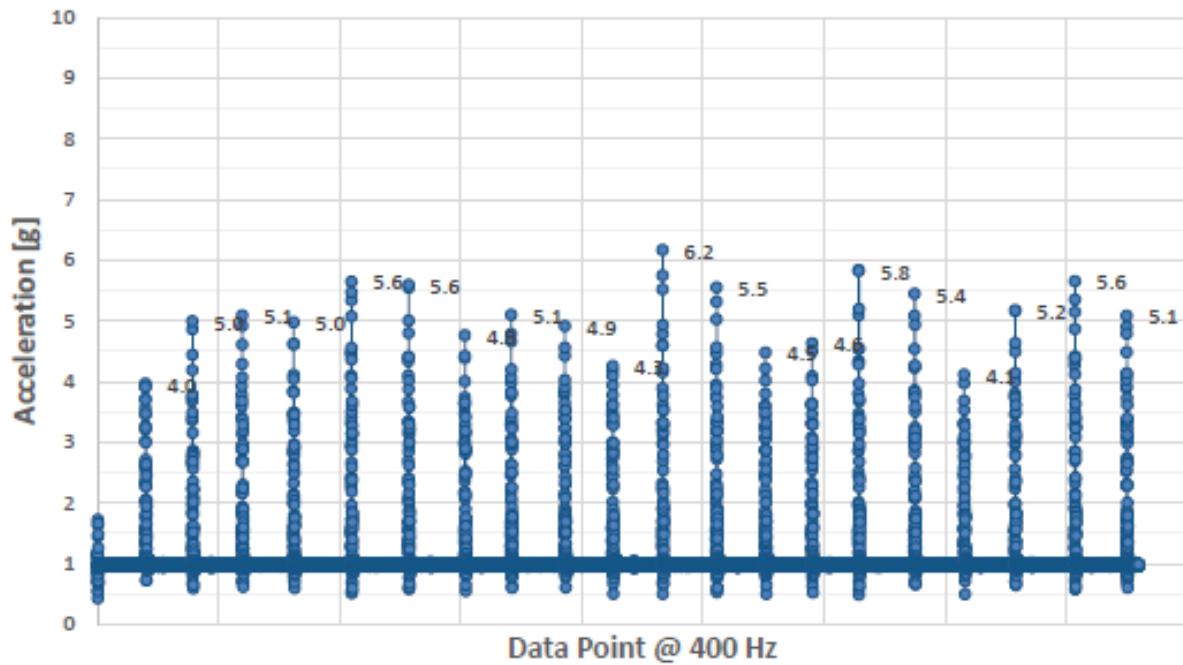
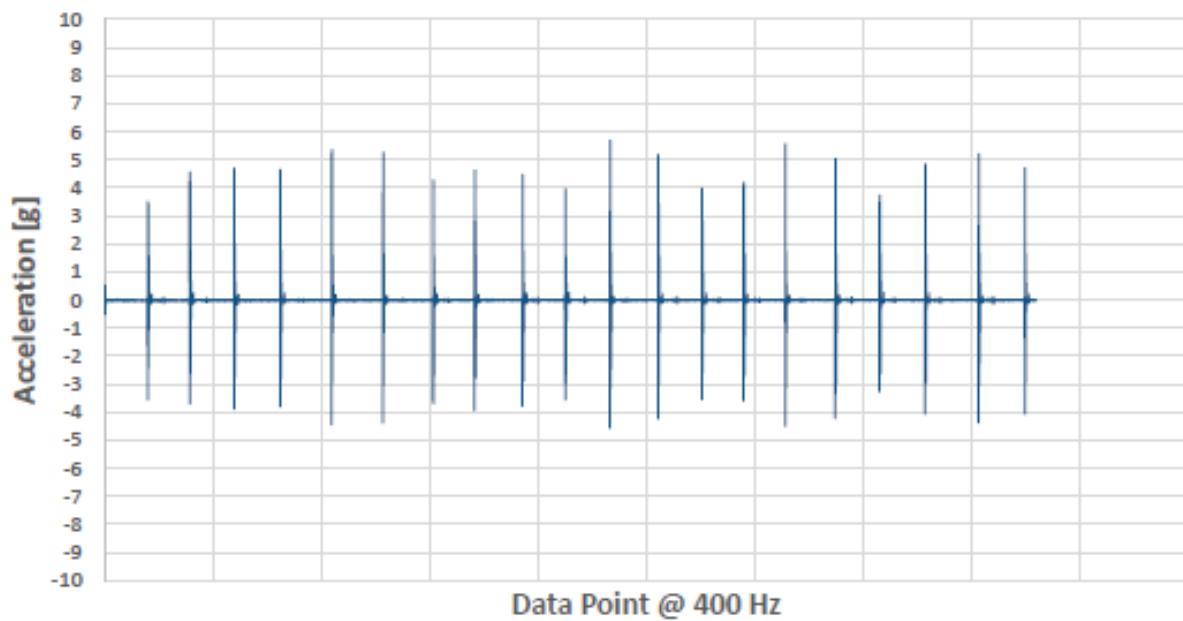


**Y Acceleration (Head to Toe) - Douglas V1**

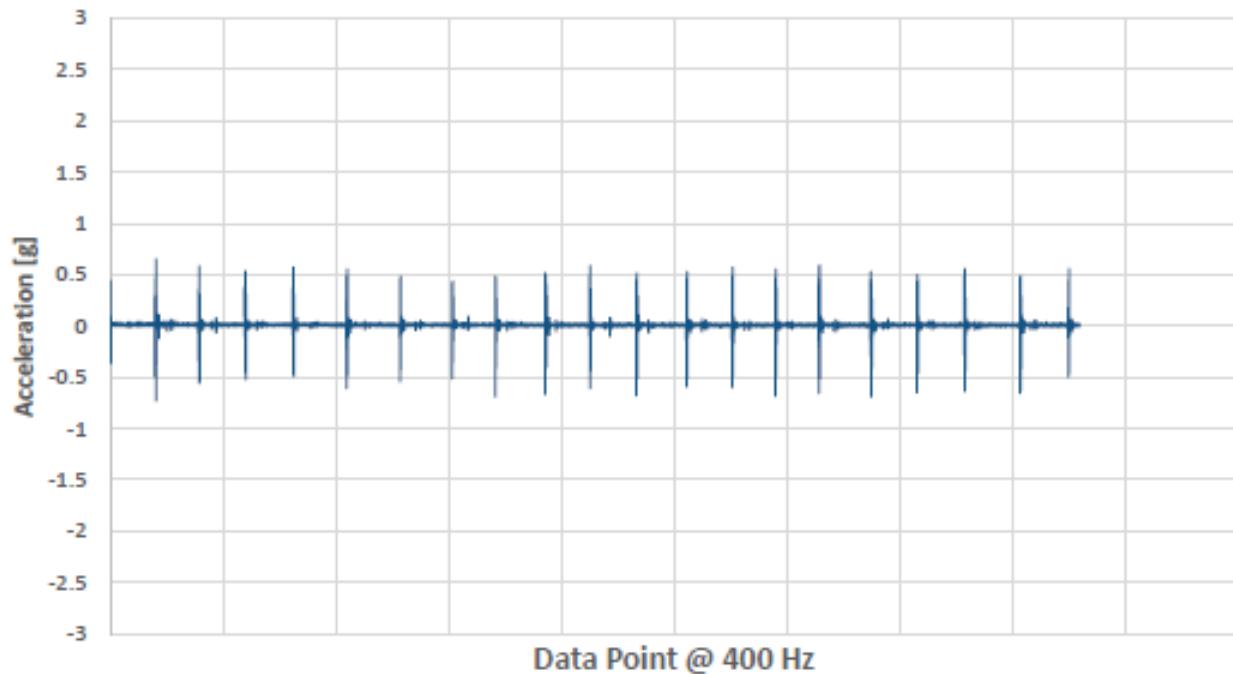


**Z Acceleration (Up and Down) - Douglas V1**

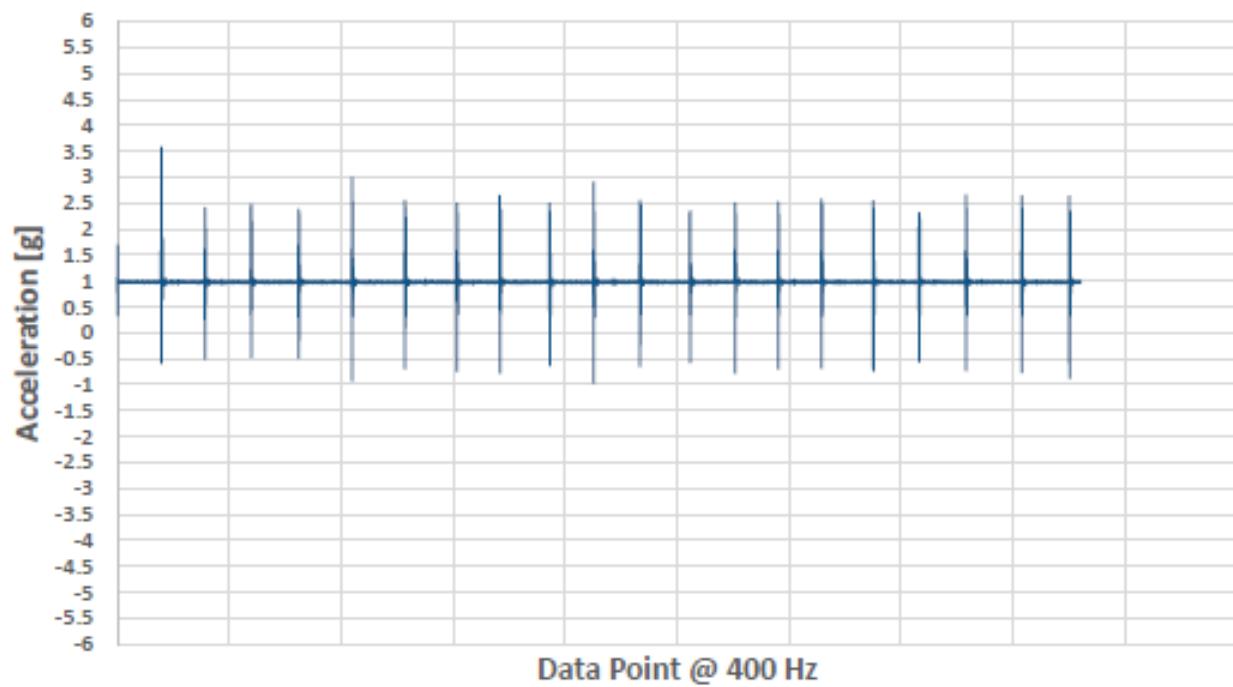


**TEST 3 – ENDY****Vector Magnitude Acceleration - Endy****X Acceleration (Side to Side) - Endy**

Y Acceleration (Head to Toe) - Endy

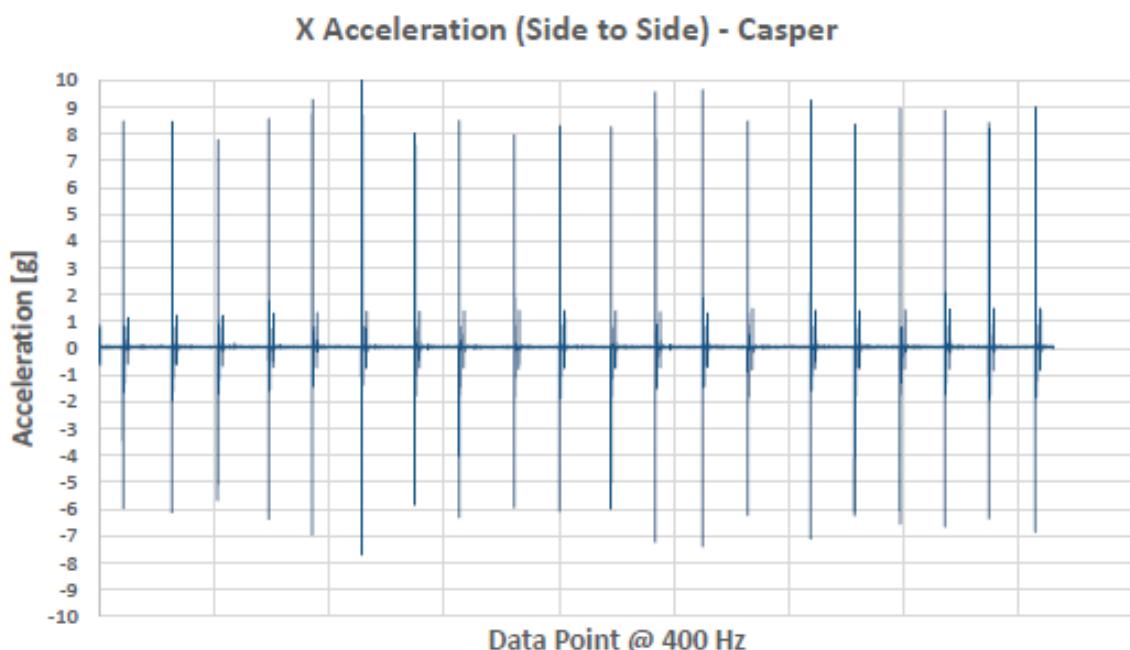
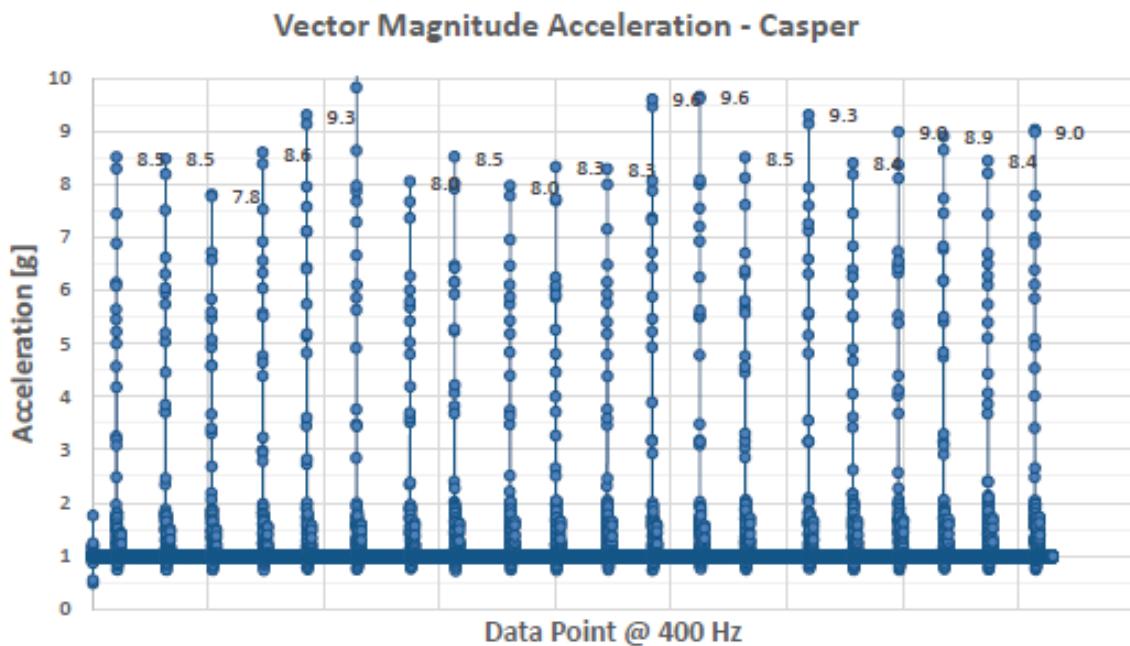


Z Acceleration (Up and Down) - Endy



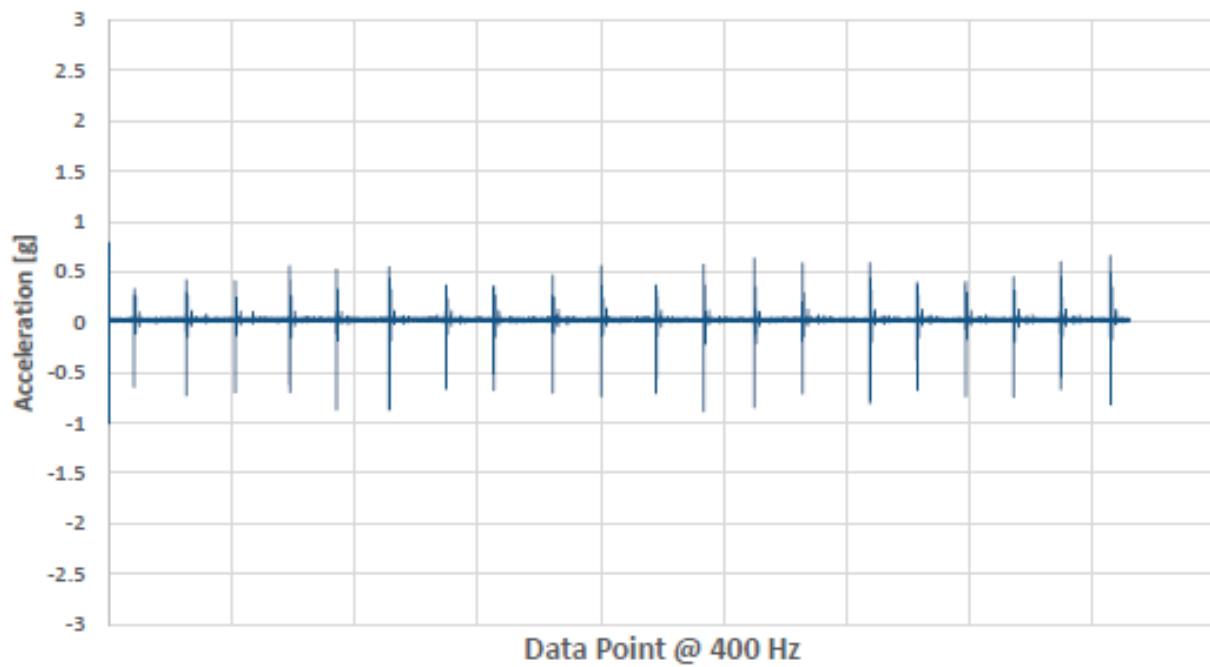


## TEST 3 – CASPER

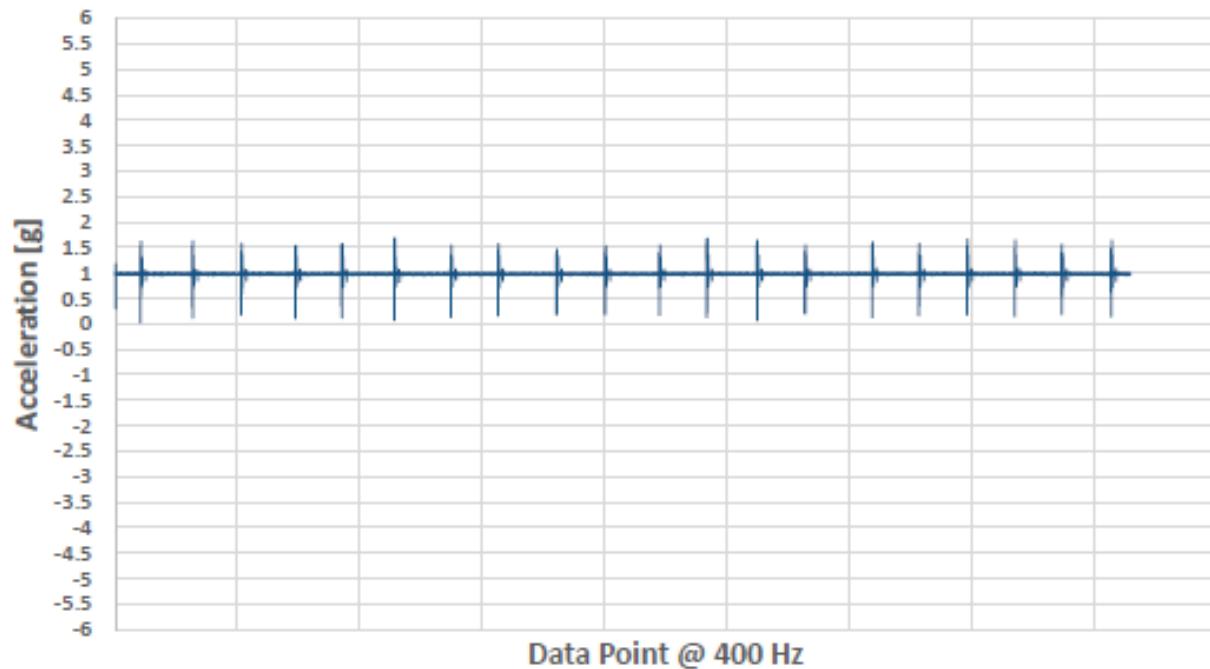




Y Acceleration (Head to Toe) - Casper



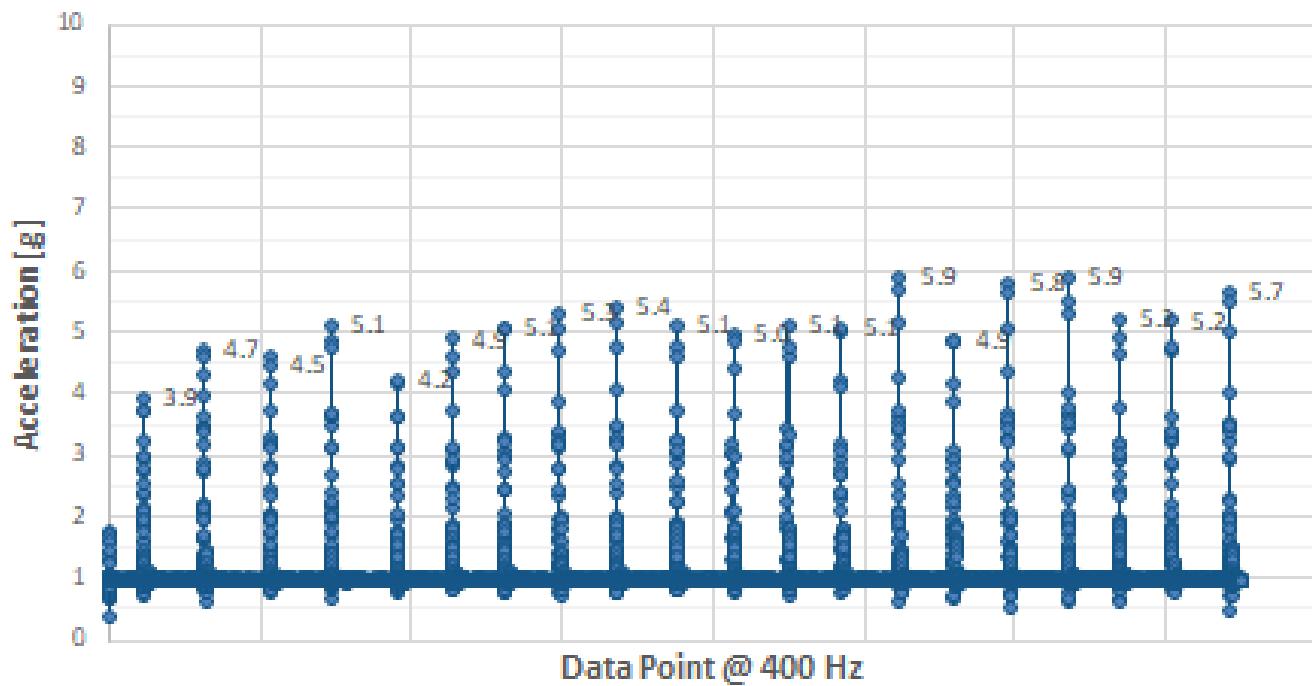
Z Acceleration (Up and Down) - Casper



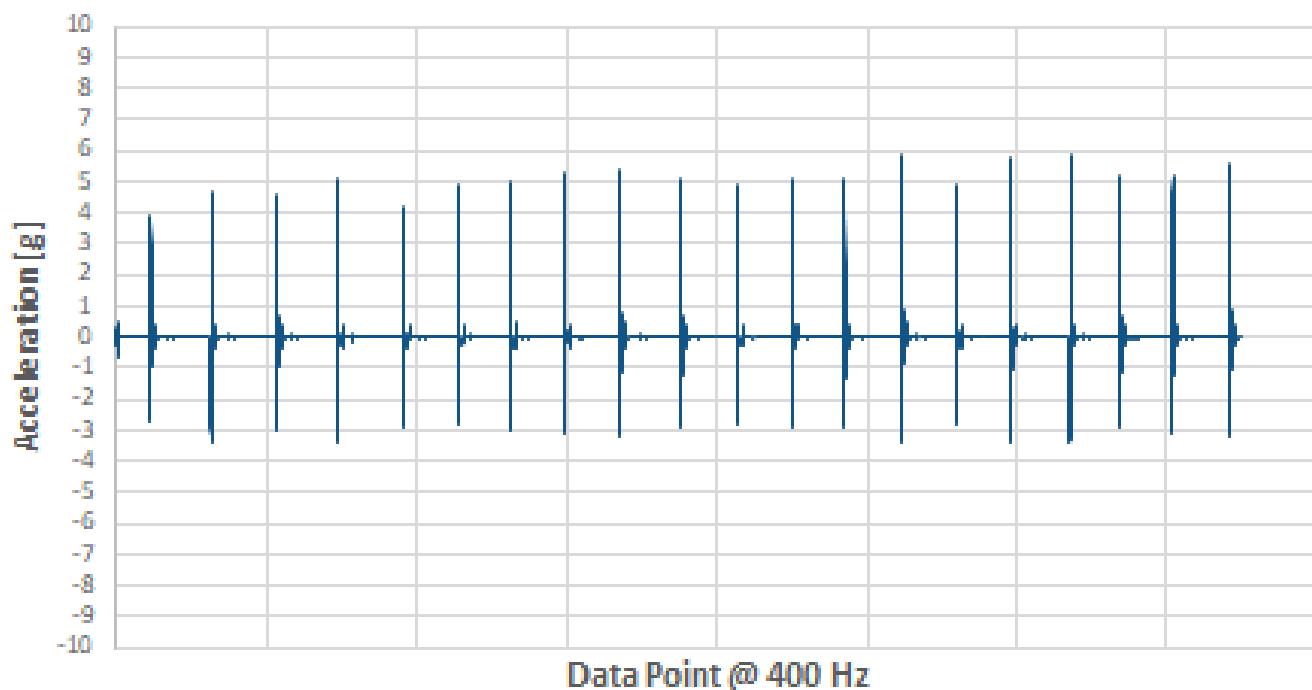


## TEST 3 – BLOOM CLOUD

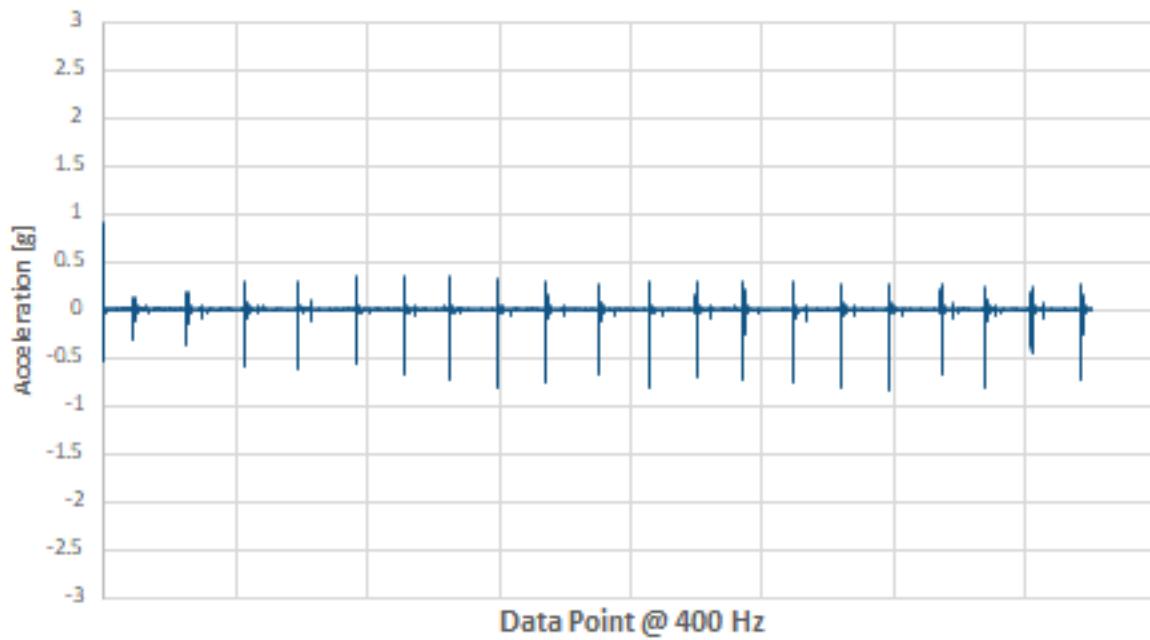
Vector Magnitude Acceleration - Bloom Cloud



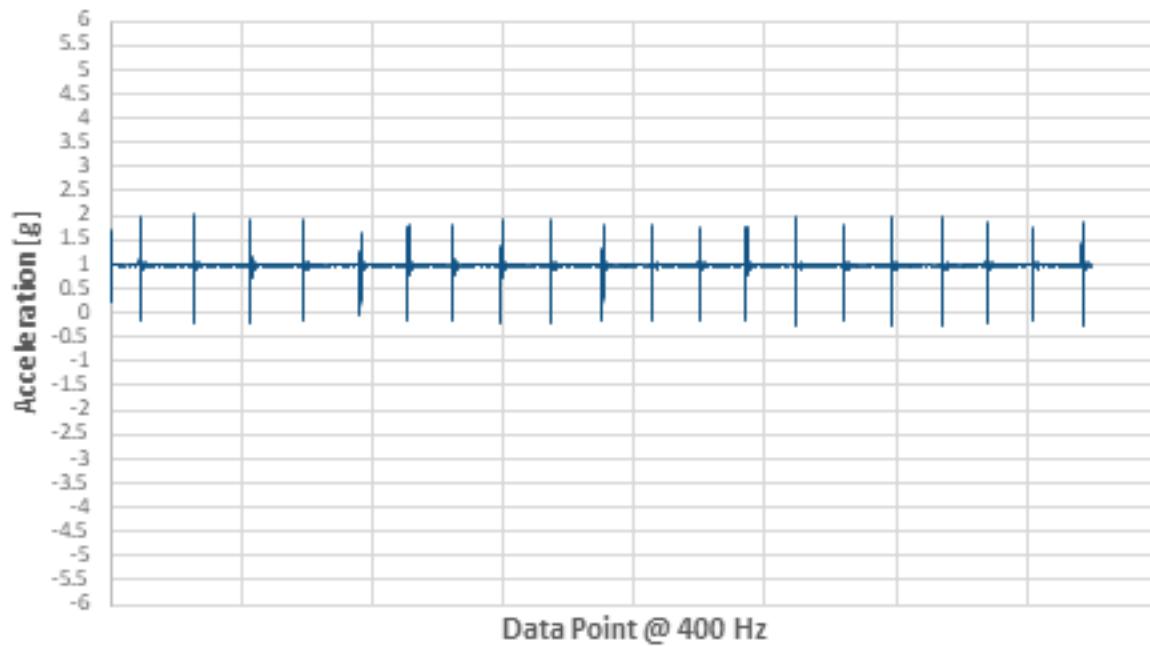
X Acceleration (Side to Side) - Bloom Cloud



Y Acceleration (Head to Toe) - Bloom Cloud

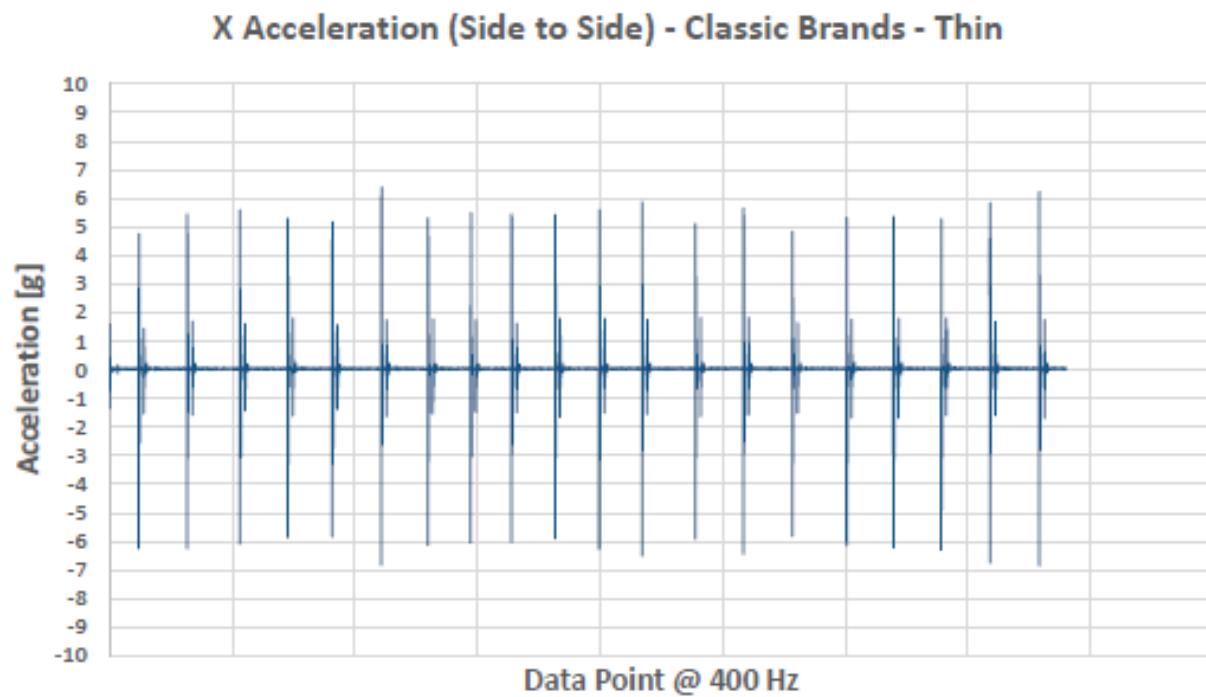
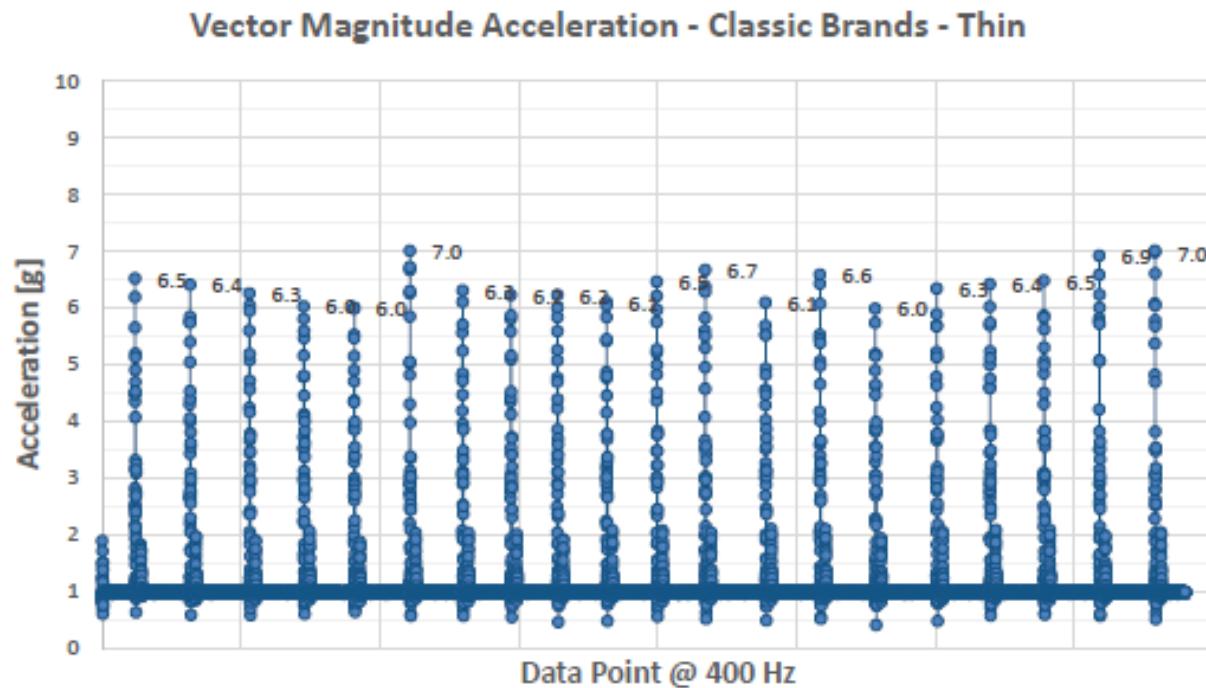


Z Acceleration (Up and Down) - Bloom Cloud

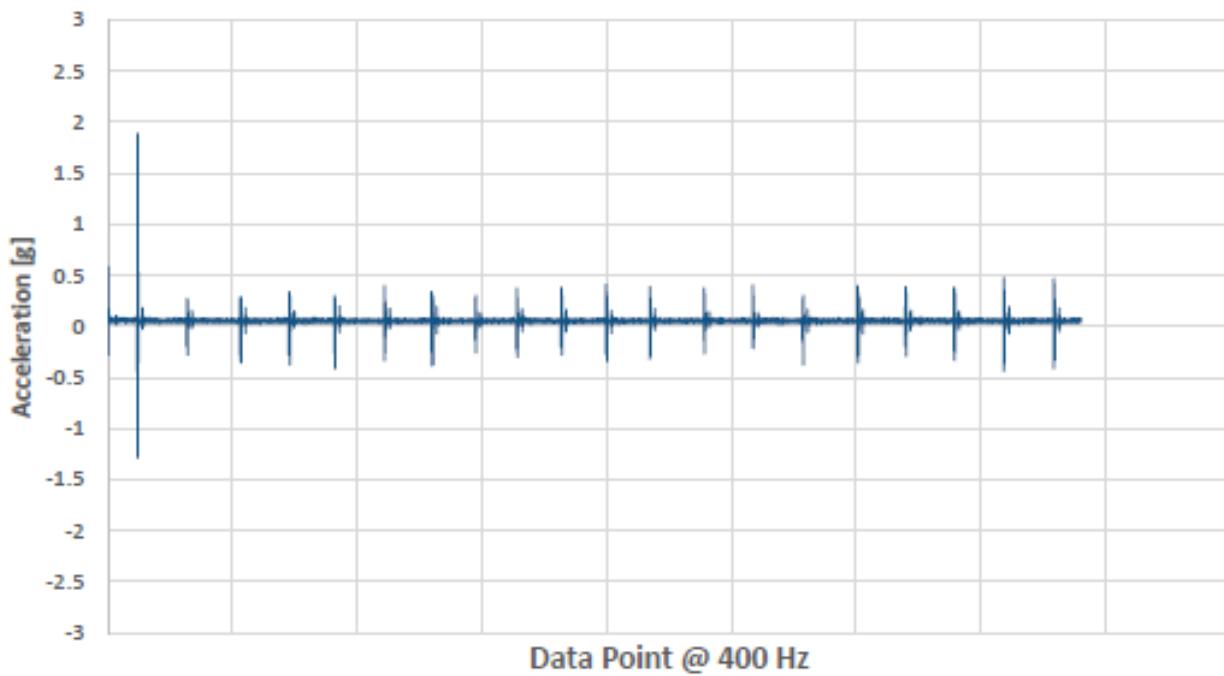




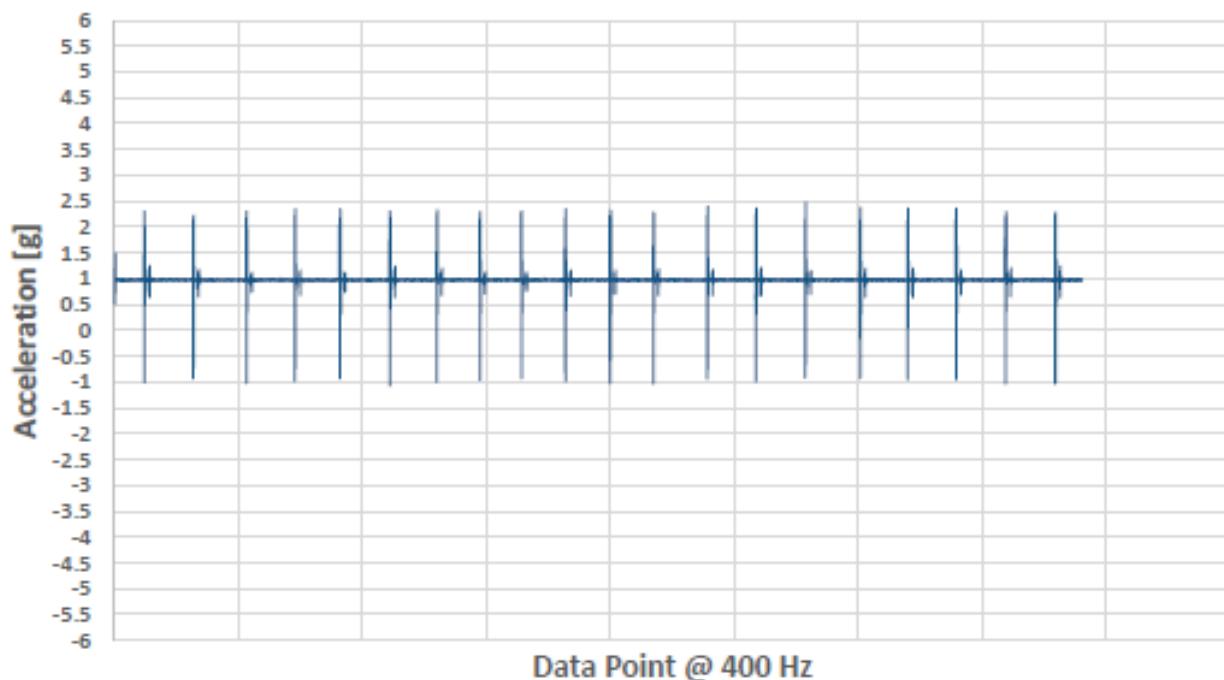
## TEST 3 – CLASSIC BRANDS – THIN



**Y Acceleration (Head to Toe) - Classic Brands - Thin**



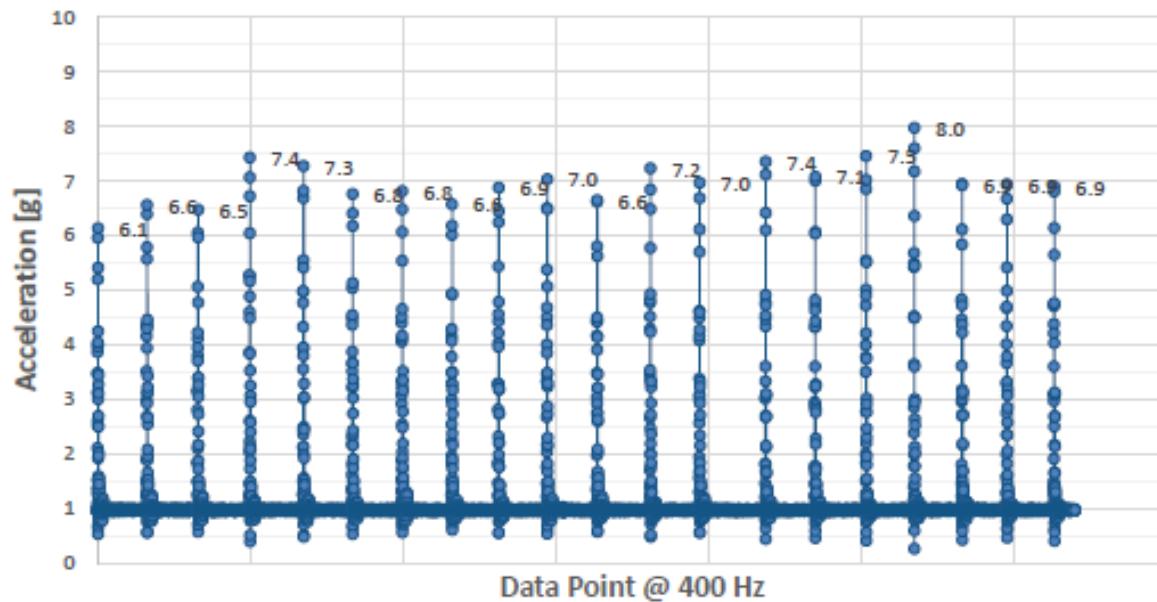
**Z Acceleration (Up and Down) - Classic Brands - Thin**



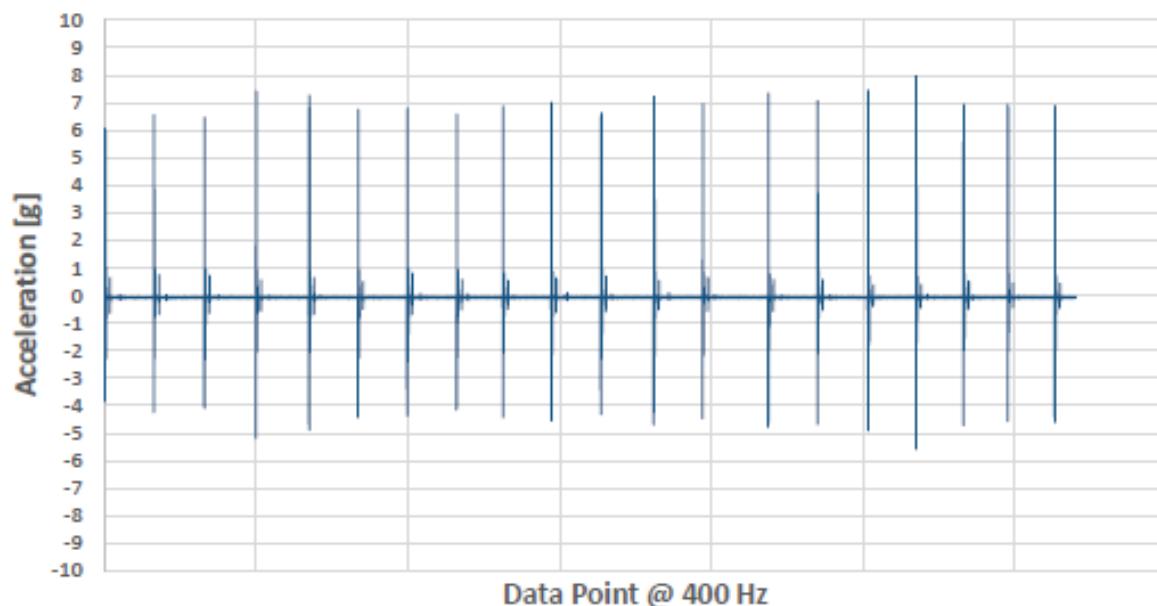


## TEST 3 – CLASSIC BRANDS – THICK

Vector Magnitude Acceleration - Classic Brands - Thick

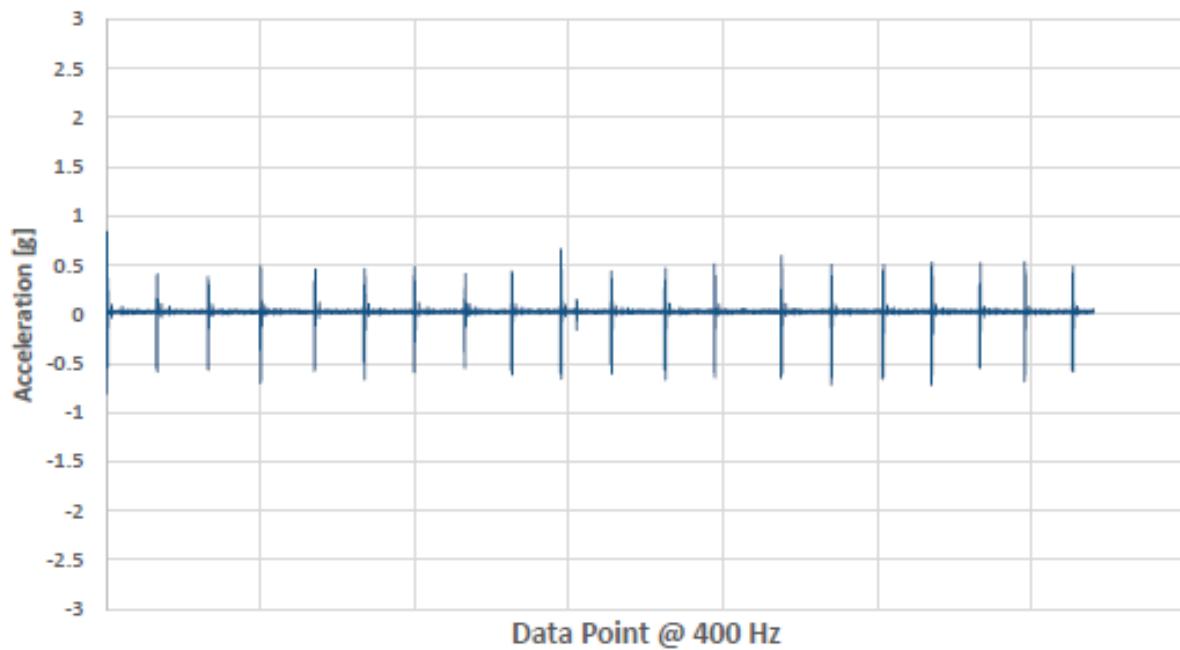


X Acceleration (Side to Side) - Classic Brands - Thick

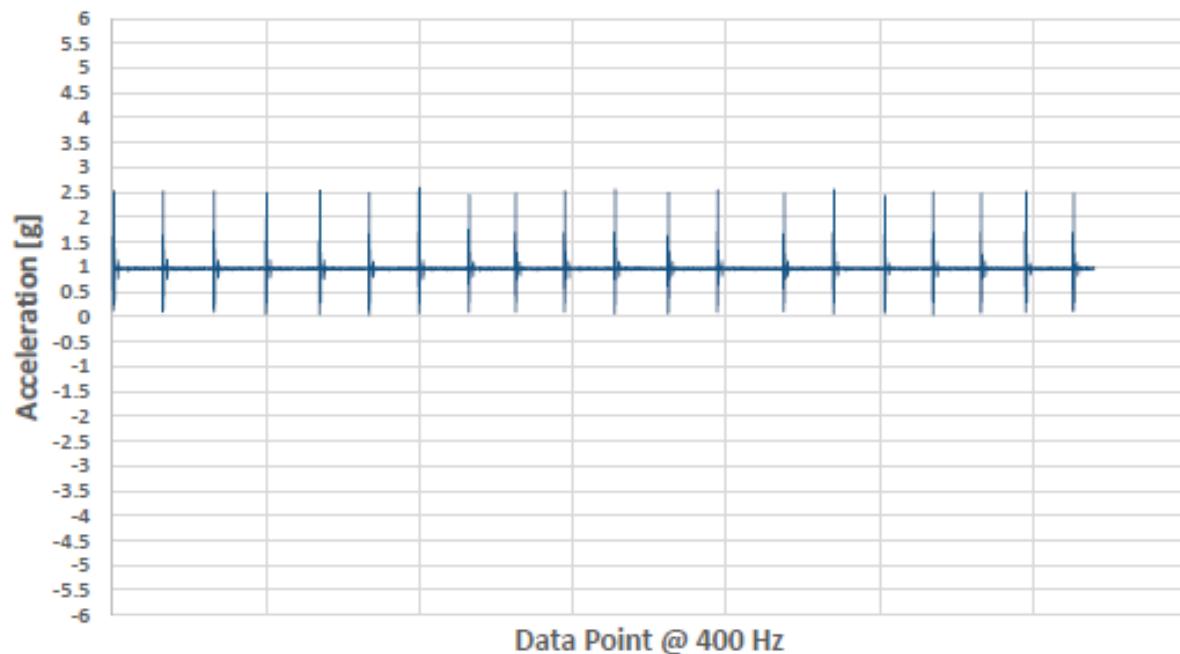




Y Acceleration (Head to Toe) - Classic Brands - Thick



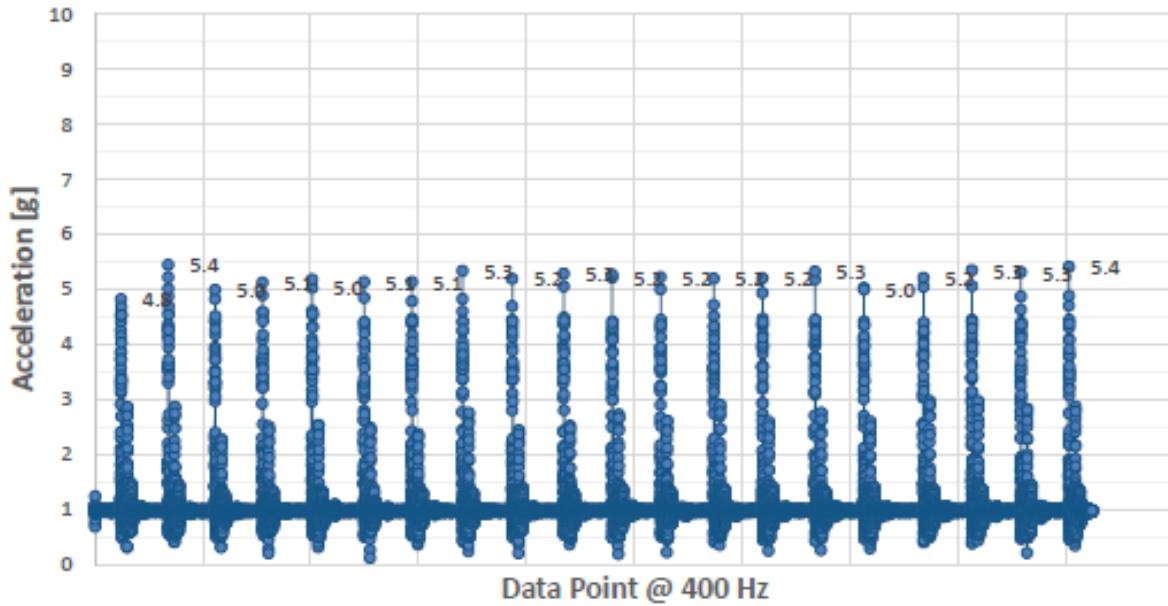
Z Acceleration (Up and Down) - Classic Brands - Thick



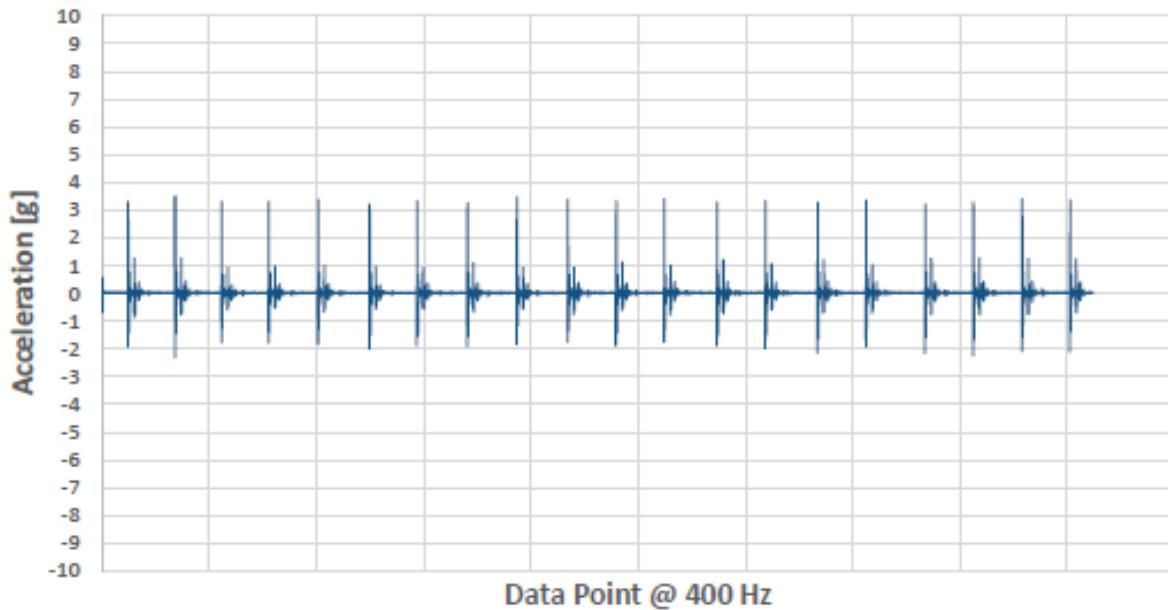


## TEST 3 – SAATVA

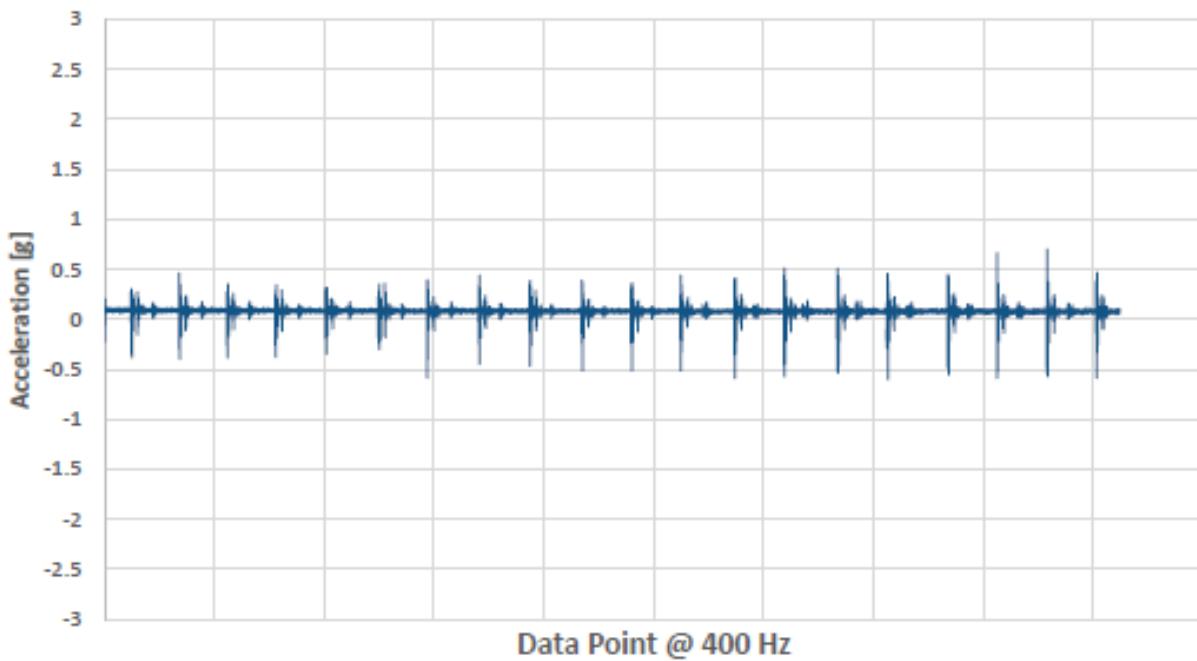
Vector Magnitude Acceleration - Saatva



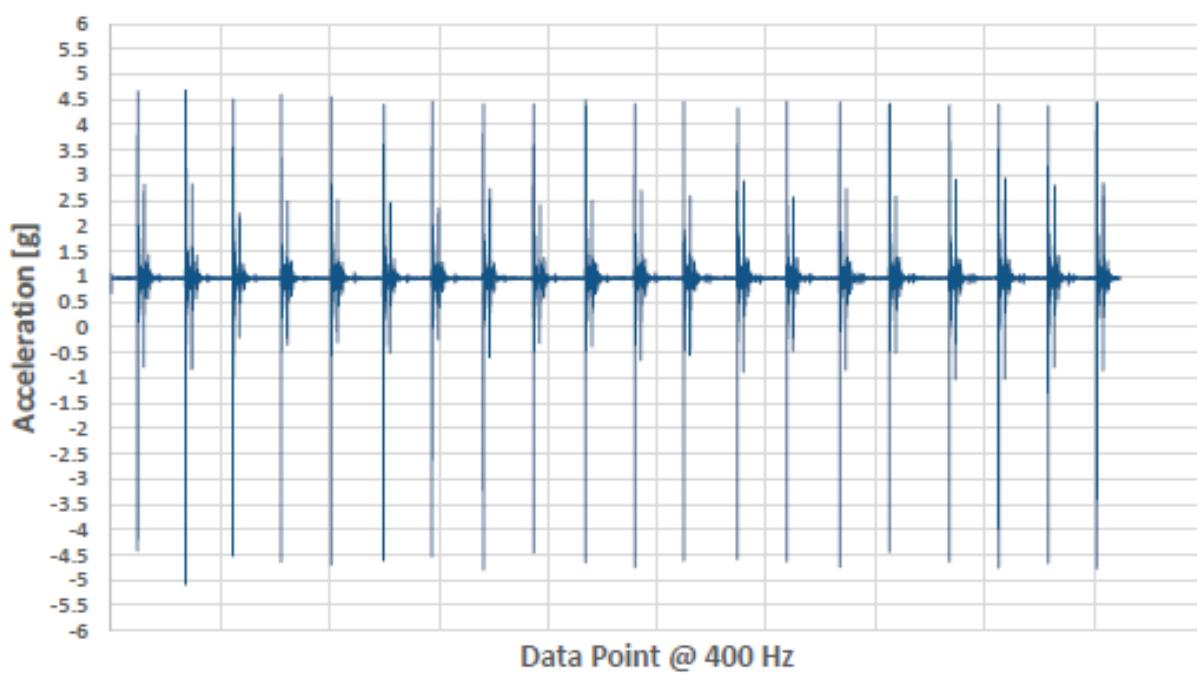
X Acceleration (Side to Side) - Saatva



Y Acceleration (Head to Toe) - Saatva



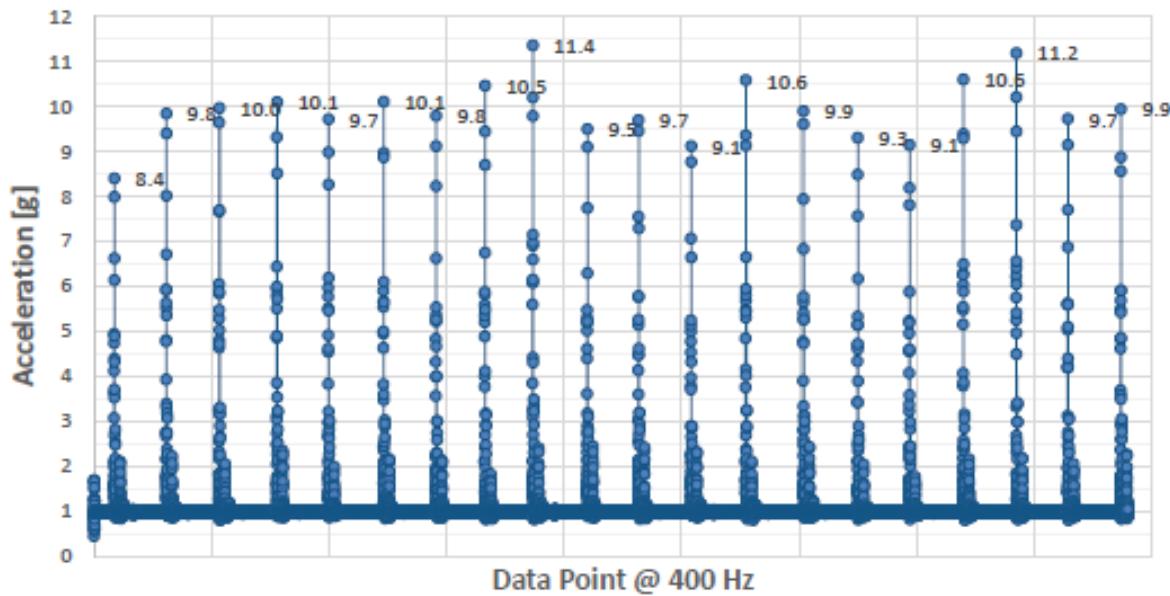
Z Acceleration (Up and Down) - Saatva



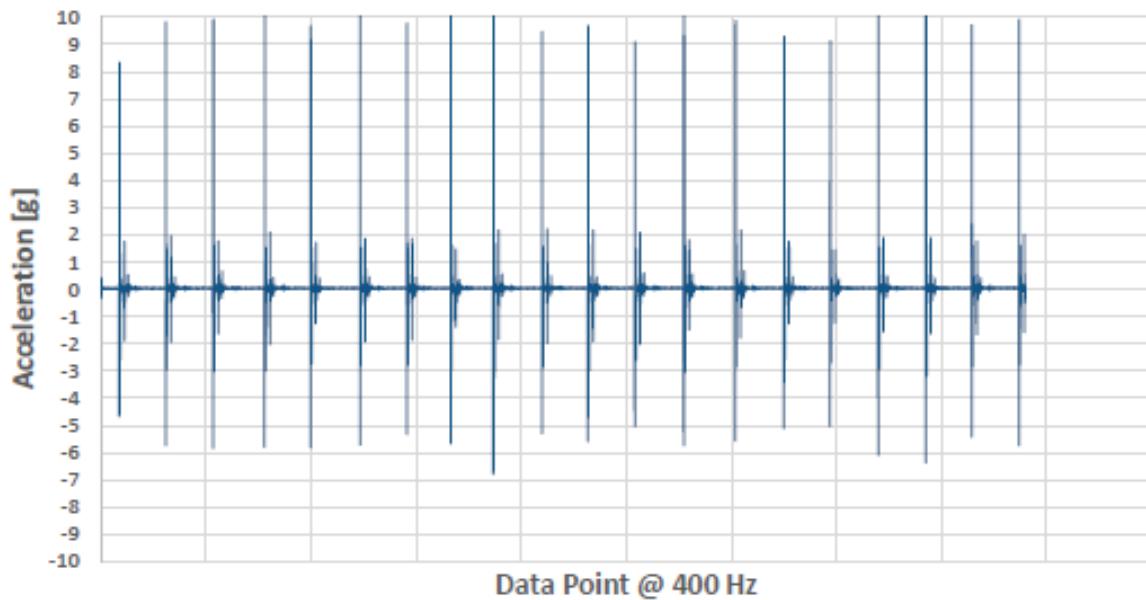


## TEST 3 – PURPLE

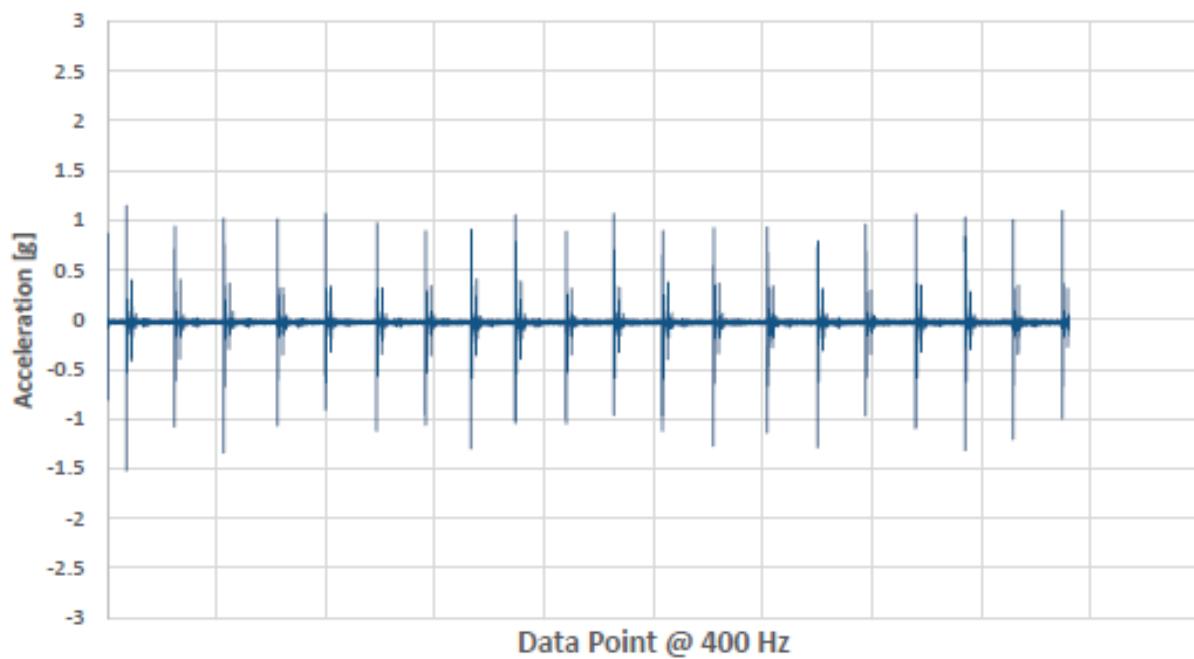
Vector Magnitude Acceleration - Purple



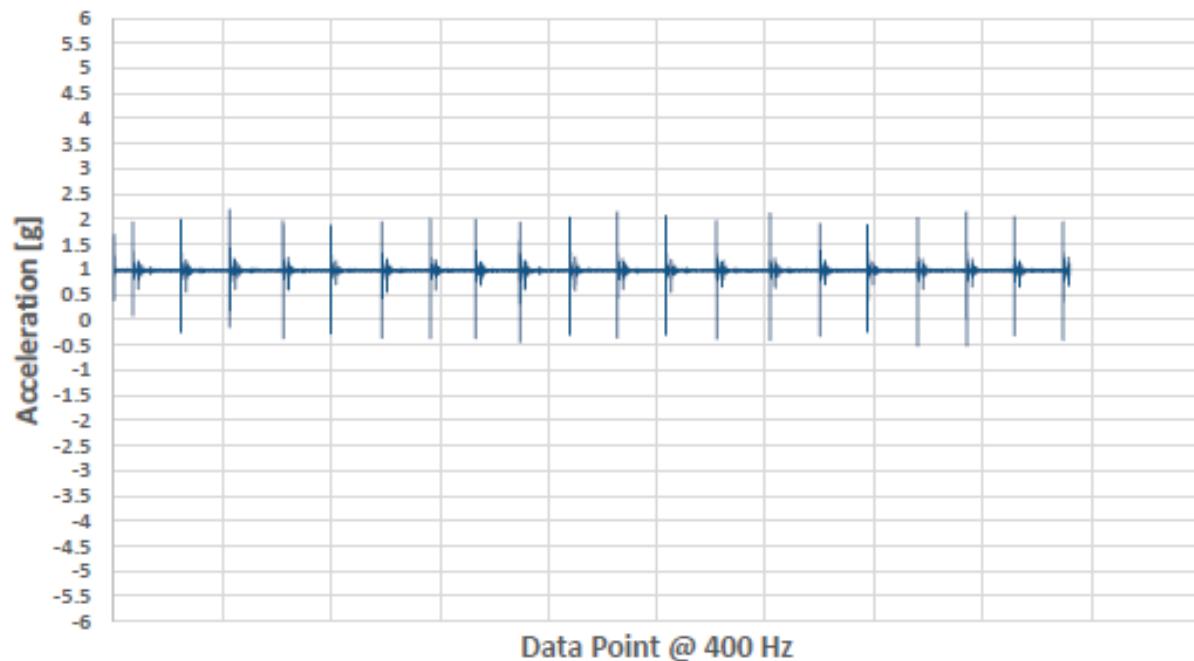
X Acceleration (Side to Side) - Purple



Y Acceleration (Head to Toe) - Purple

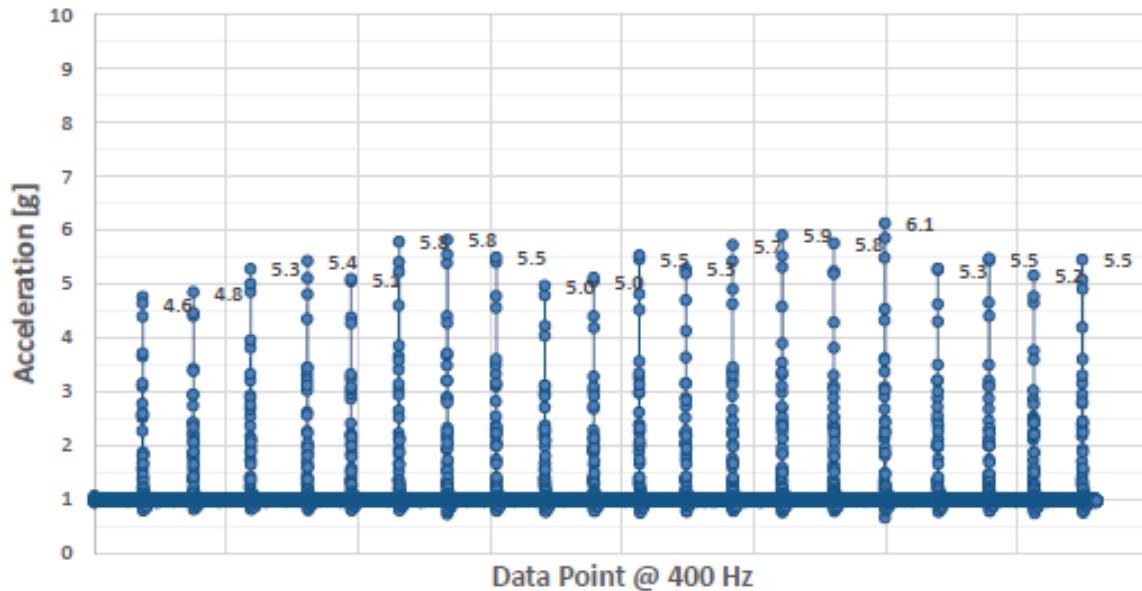


Z Acceleration (Up and Down) - Purple

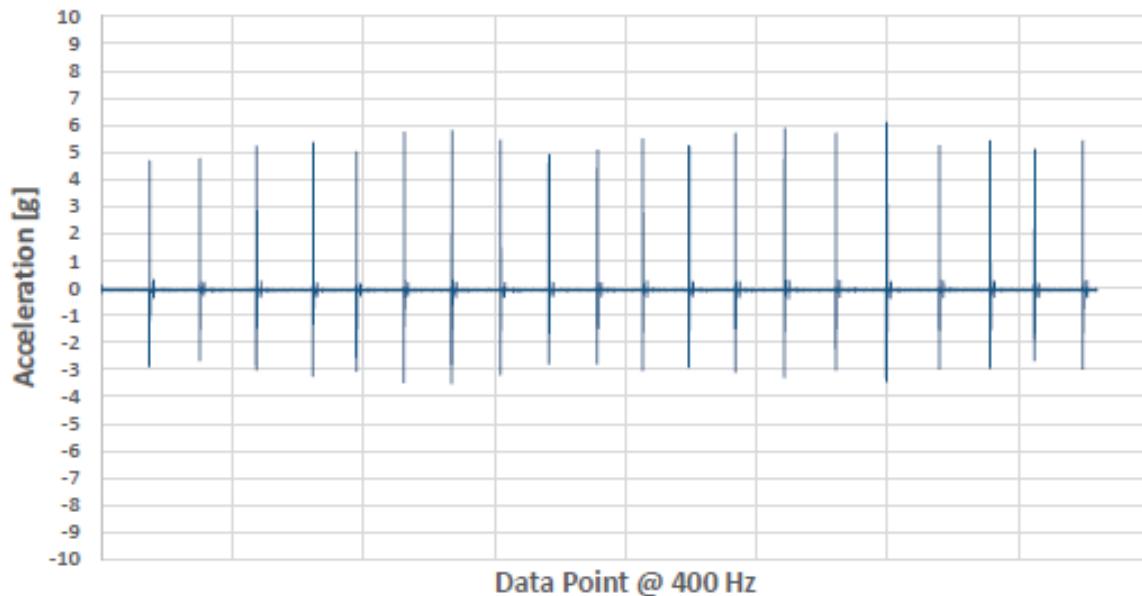


## TEST 3 – LUCID

Vector Magnitude Acceleration - Lucid

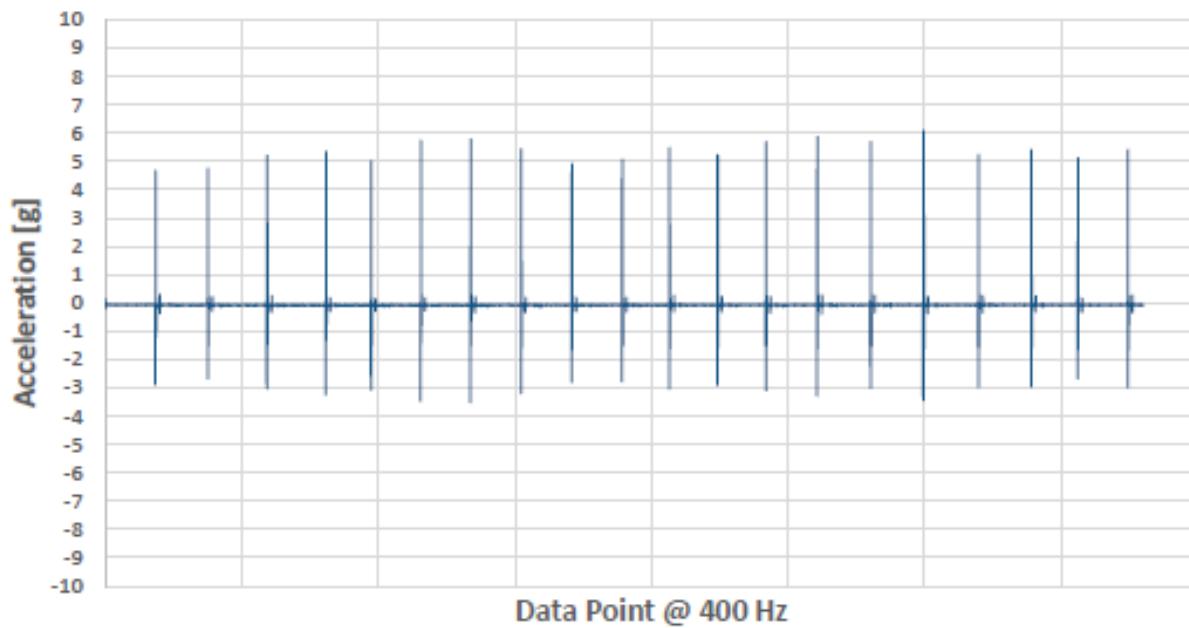


X Acceleration (Side to Side) - Lucid

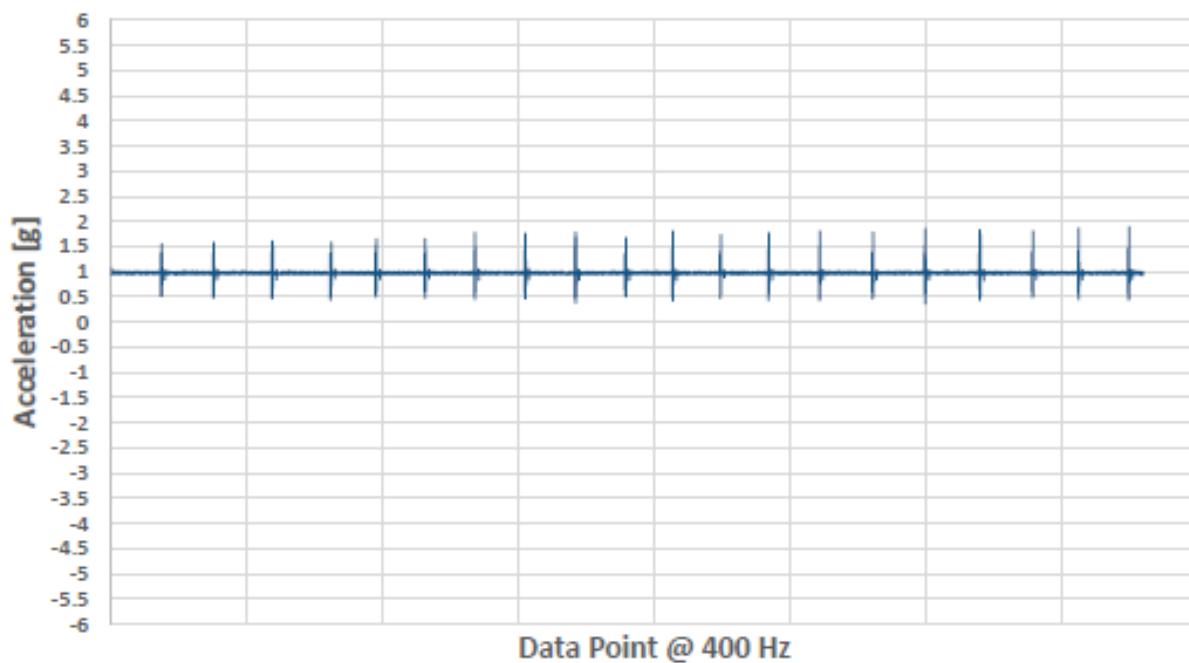




### X Acceleration (Side to Side) - Lucid

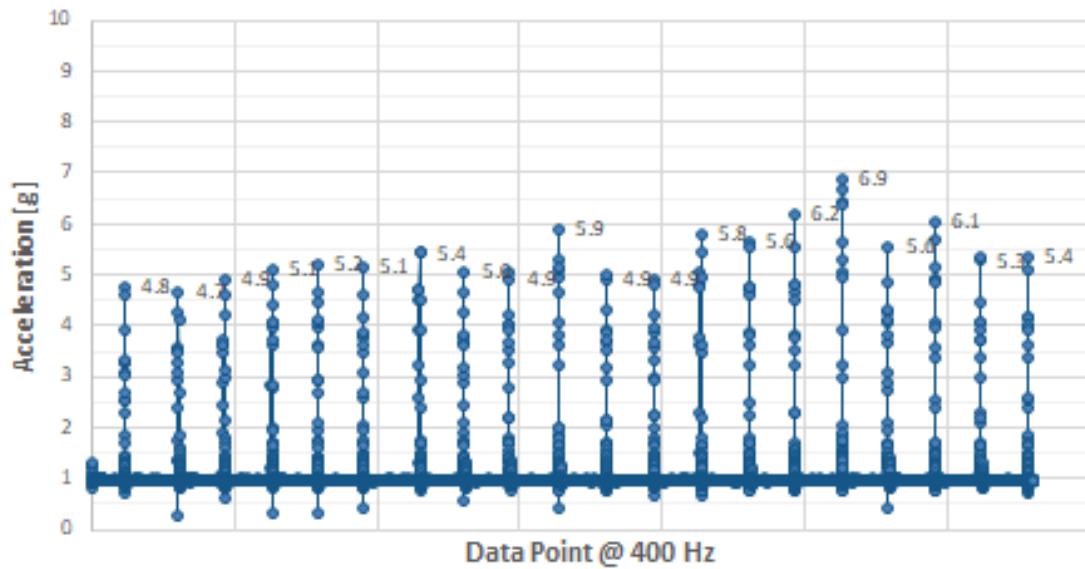


### Z Acceleration (Up and Down) - Lucid

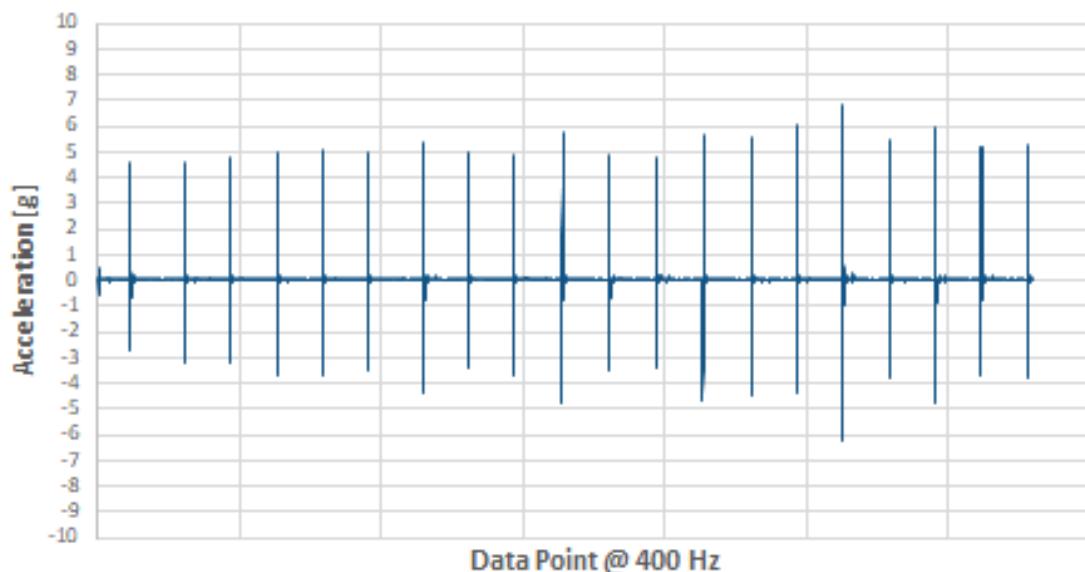


## TEST 3 – NOVOSBED FIRM (V1)

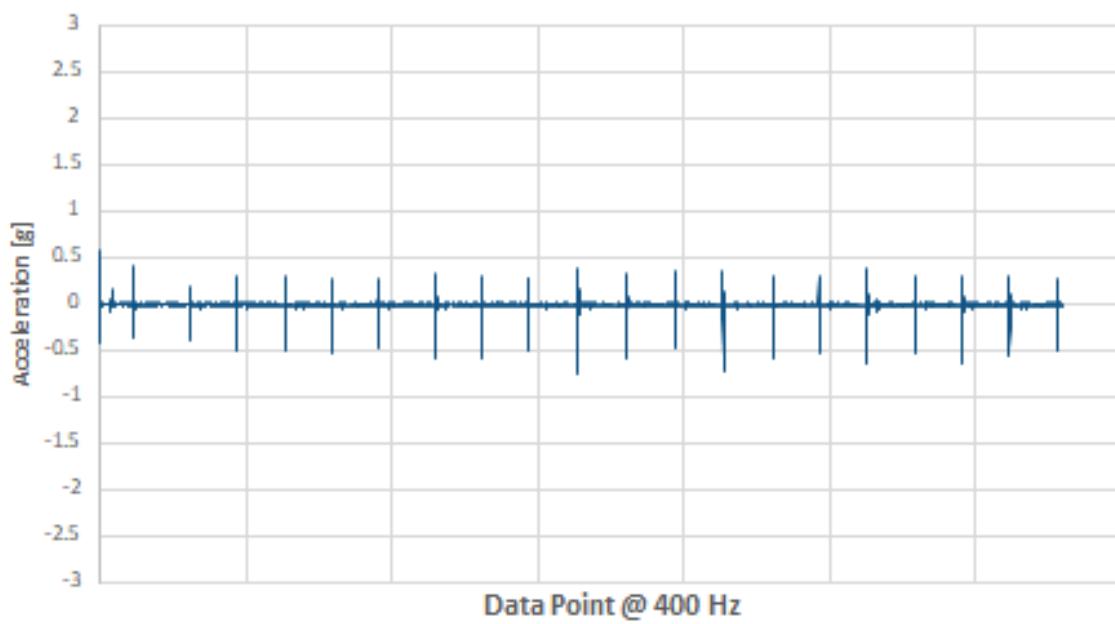
Vector Magnitude Acceleration - Novosbed Firm (V1)



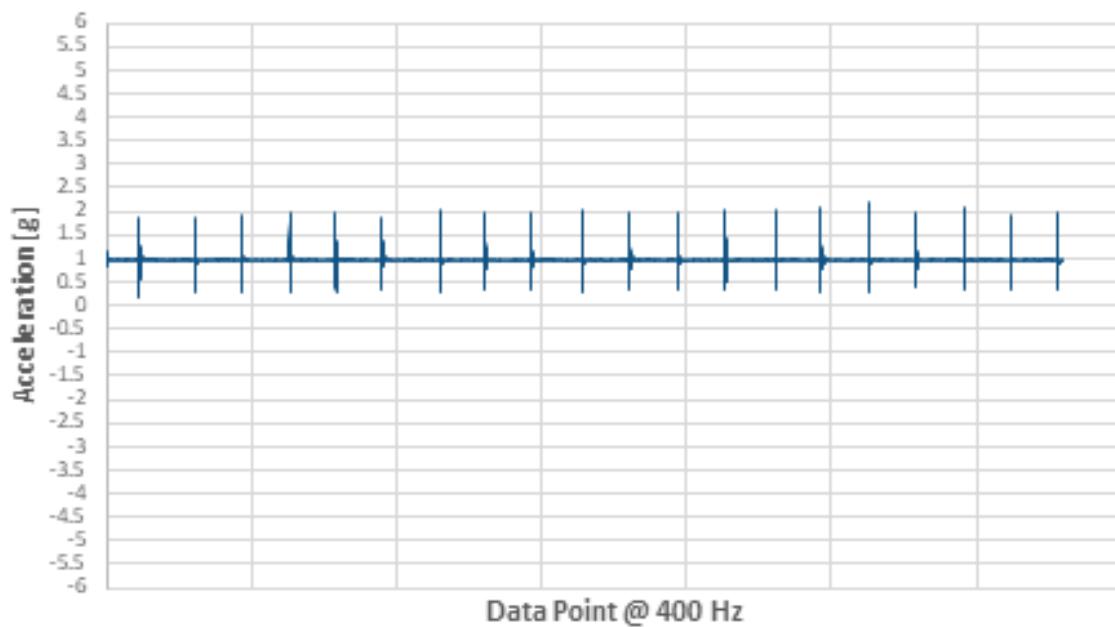
X Acceleration (Side to Side) - Novosbed Firm (V1)



Y Acceleration (Head to Toe) - Novosbed Firm (V1)

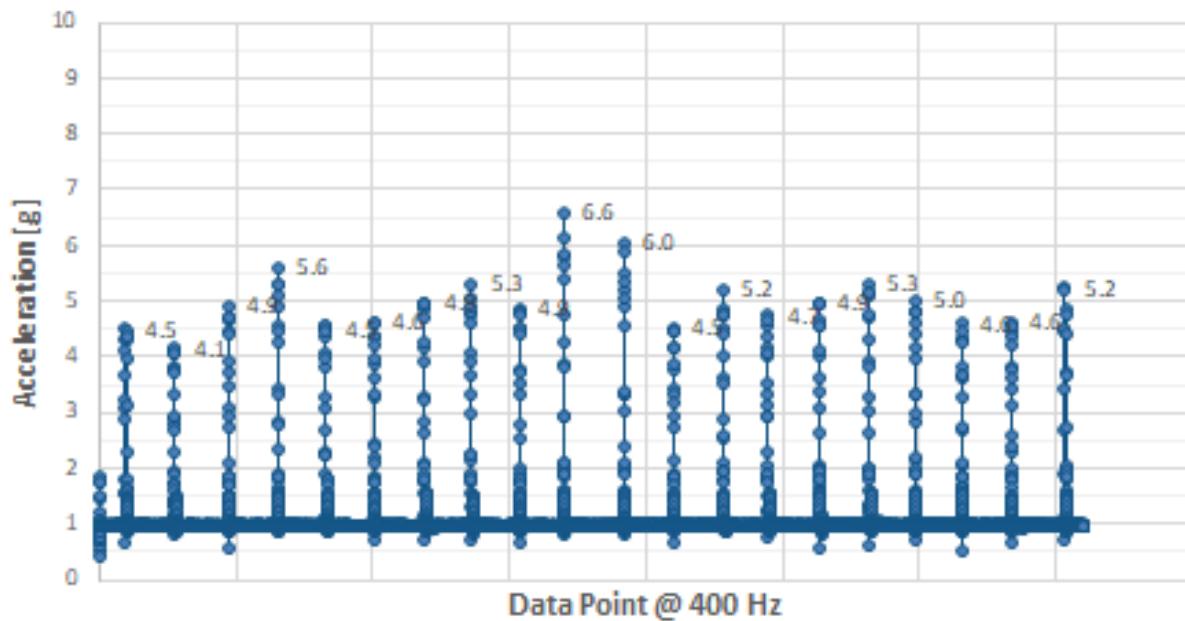


Z Acceleration (Up and Down) - Novosbed Firm (V1)

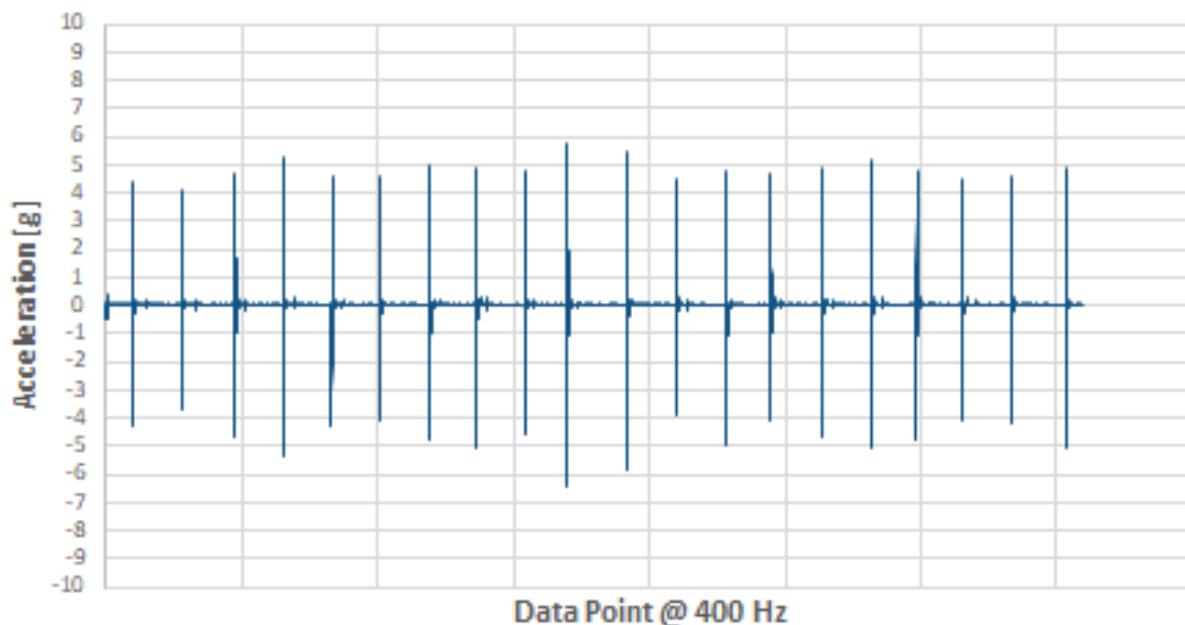


## TEST 3 – NOVOSBED MEDIUM (V1)

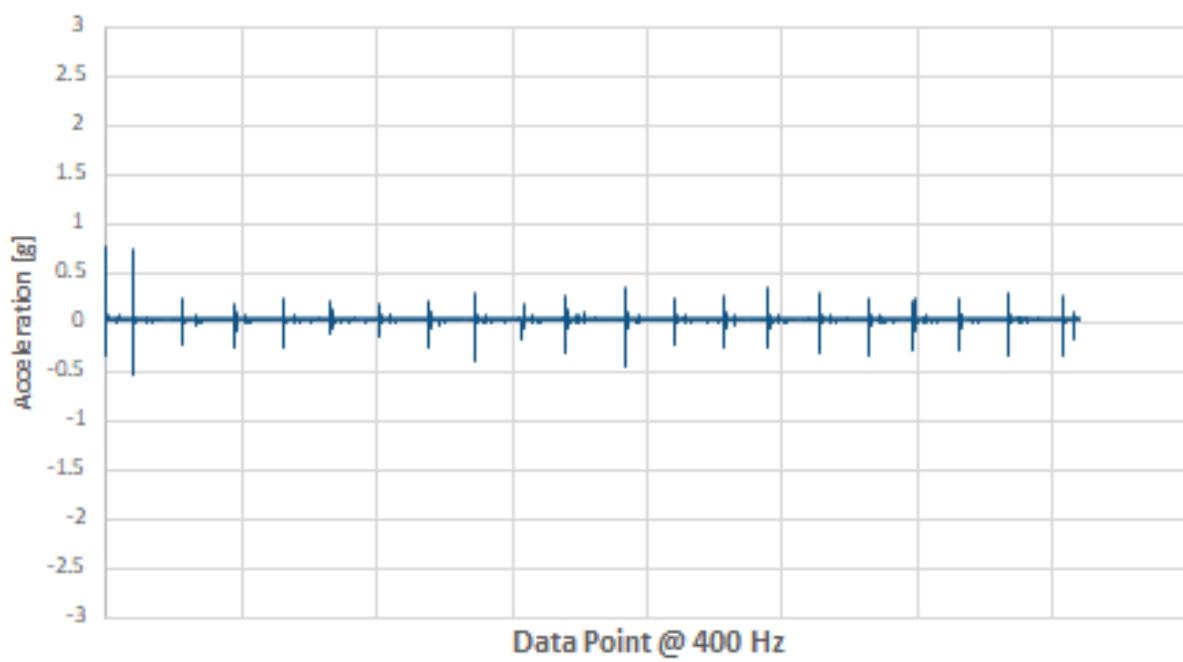
Vector Magnitude Acceleration - Novosbed Medium (V1)



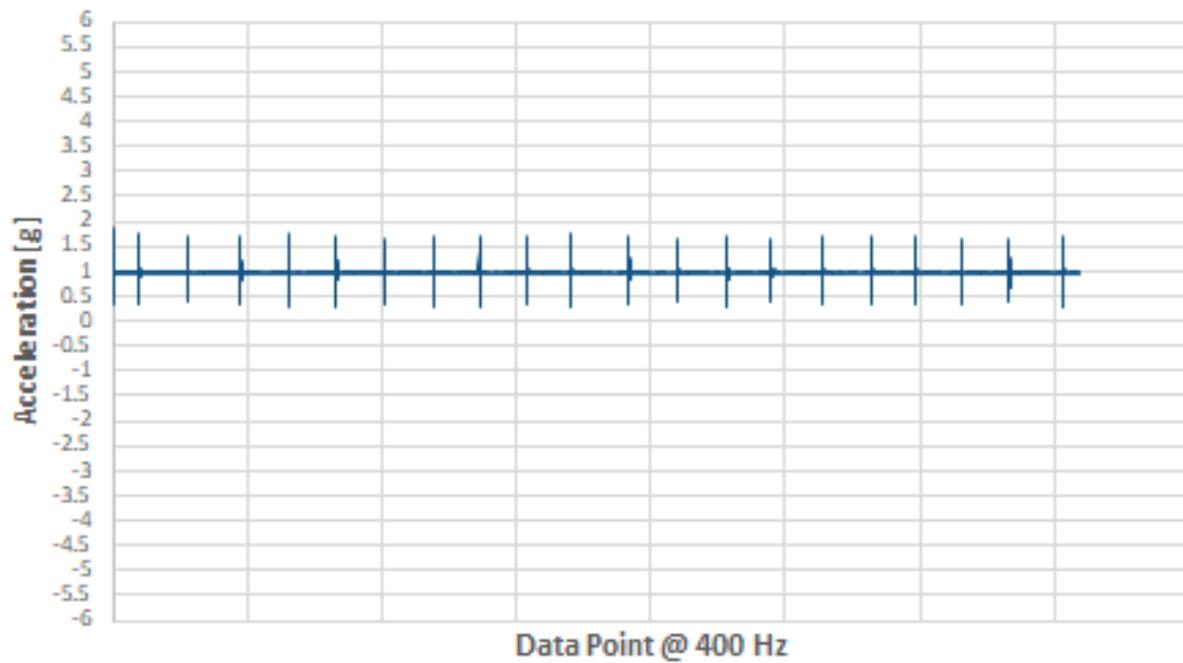
X Acceleration (Side to Side) - Novosbed Medium (V1)



### Y Acceleration (Head to Toe) - Novosbed Medium (V1)

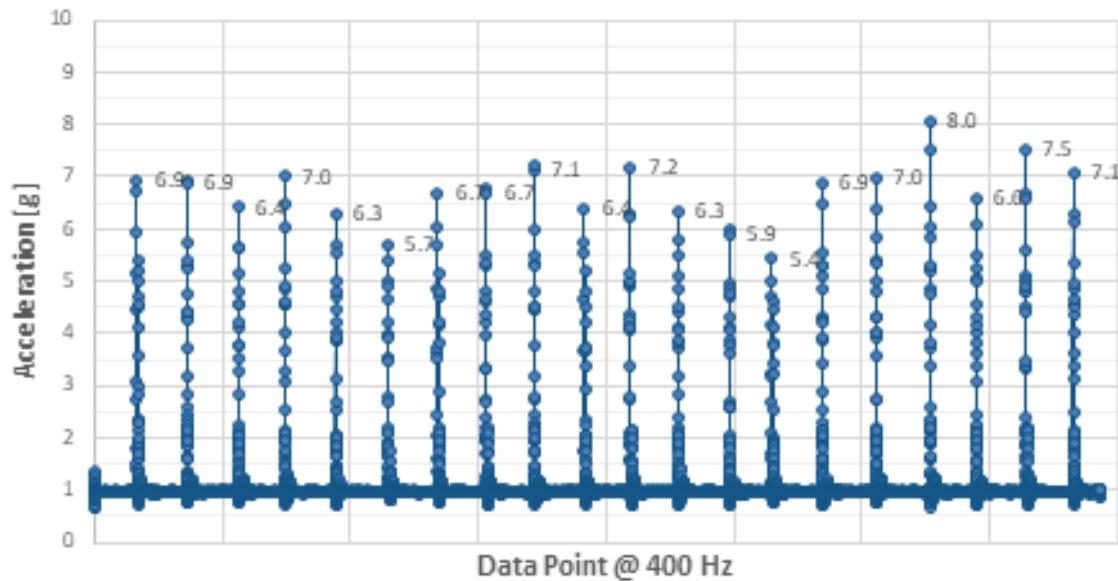


### Z Acceleration (Up and Down) - Novosbed Medium (V1)

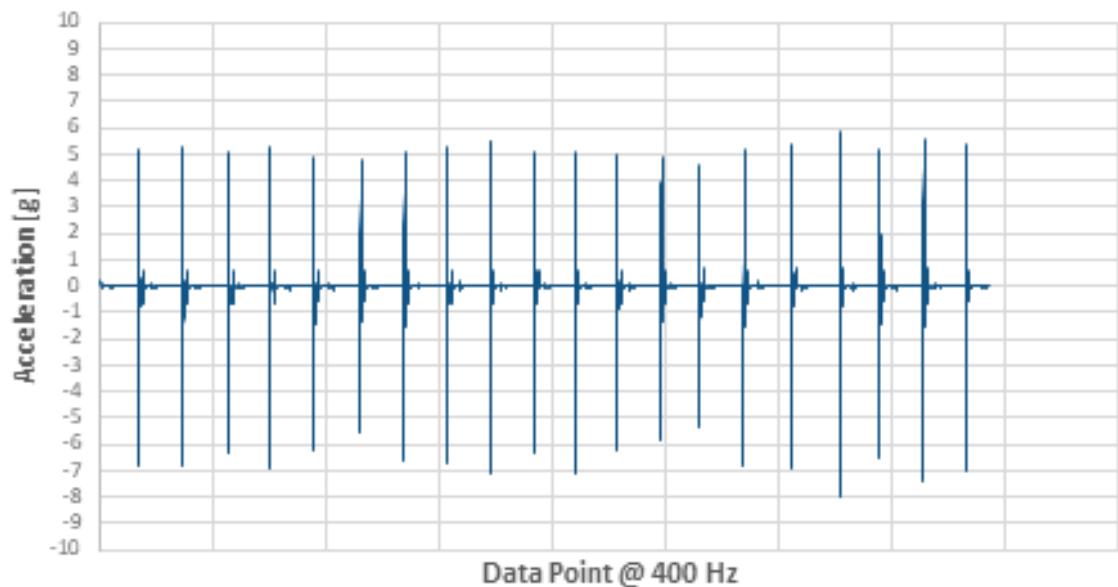


## TEST 3 – NOVOSBED SOFT (V1)

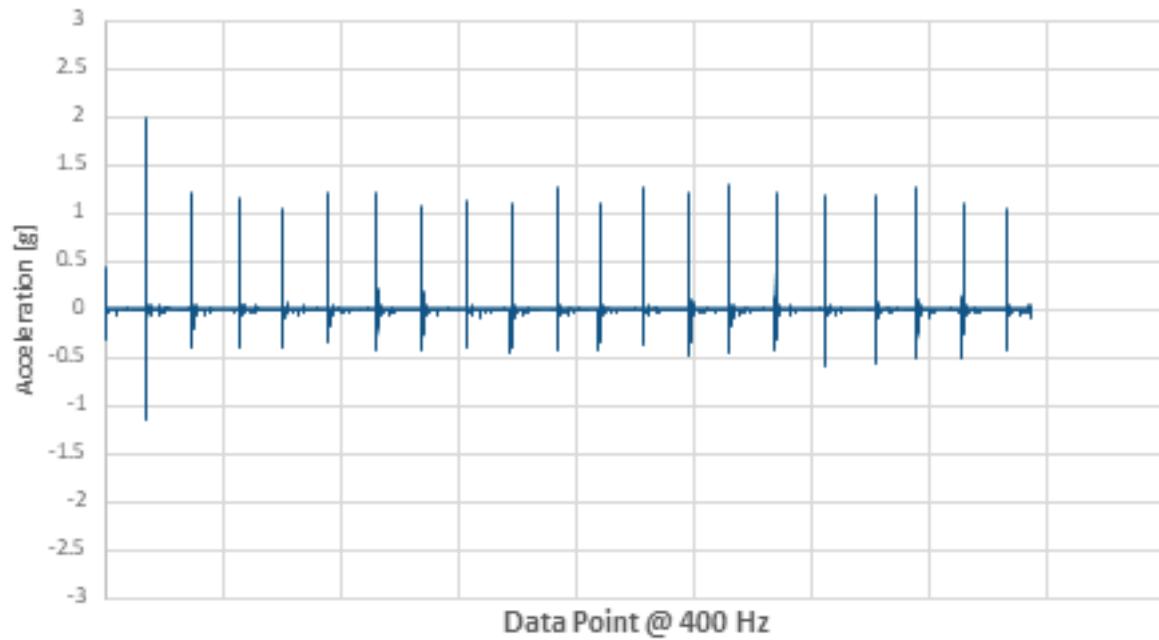
Vector Magnitude Acceleration - Novosbed Soft (V1)



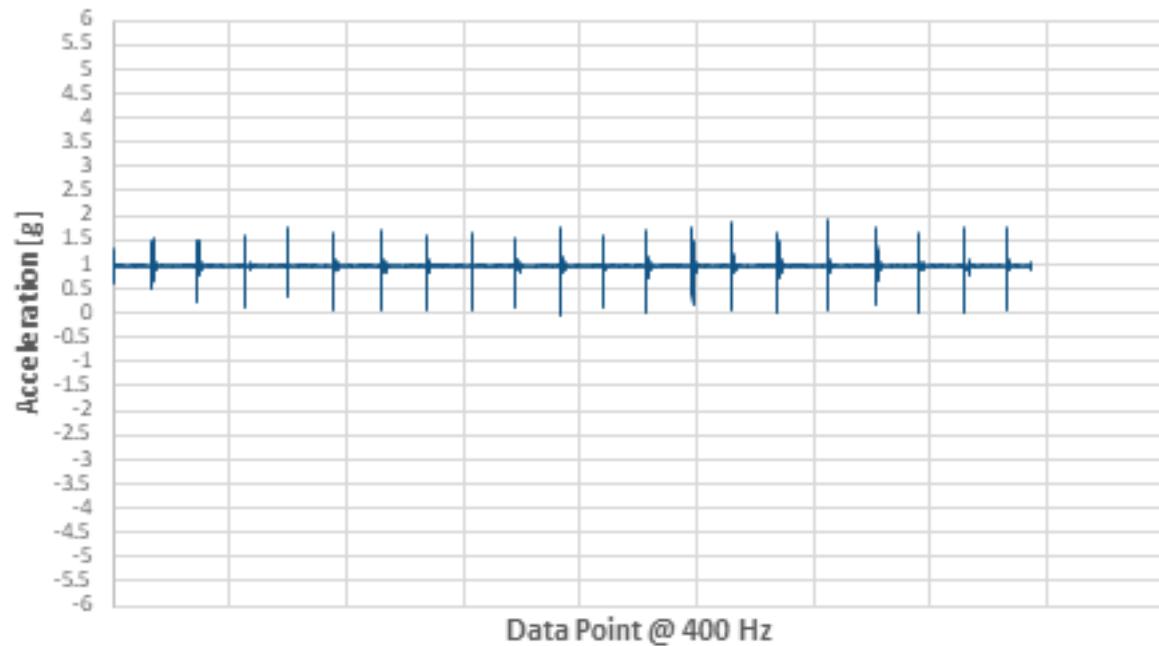
X Acceleration (Side to Side) - Novosbed Soft (V1)



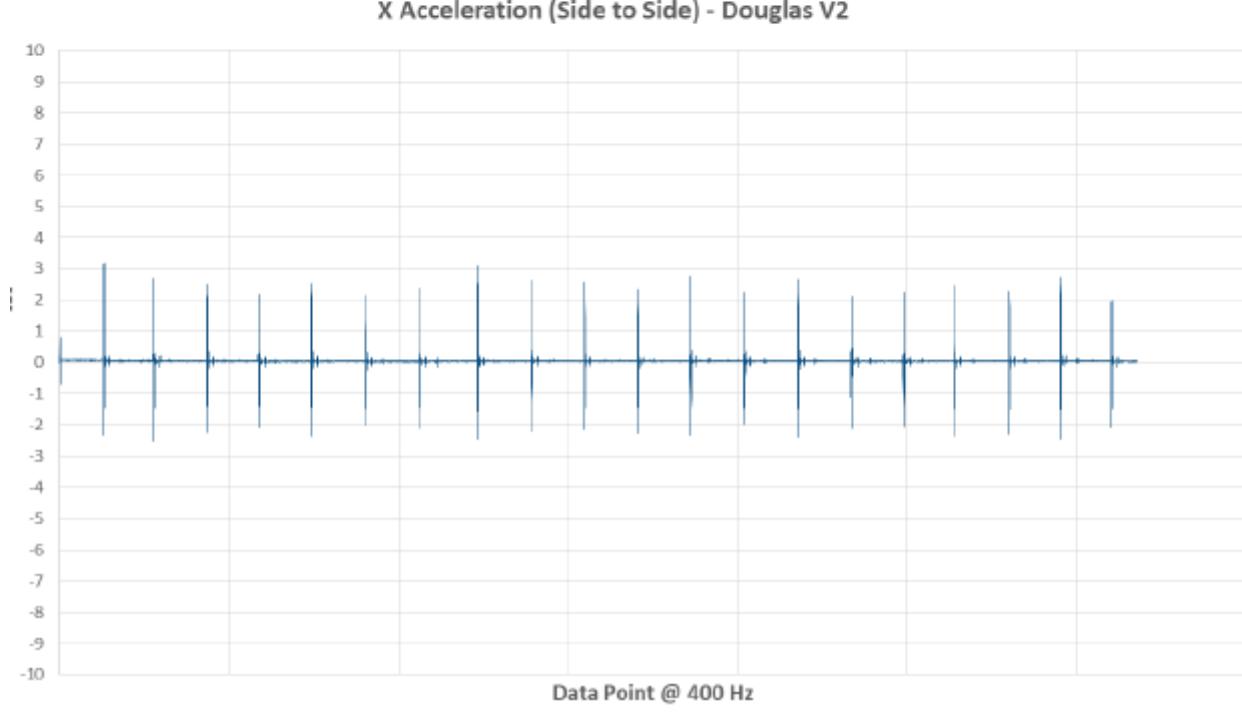
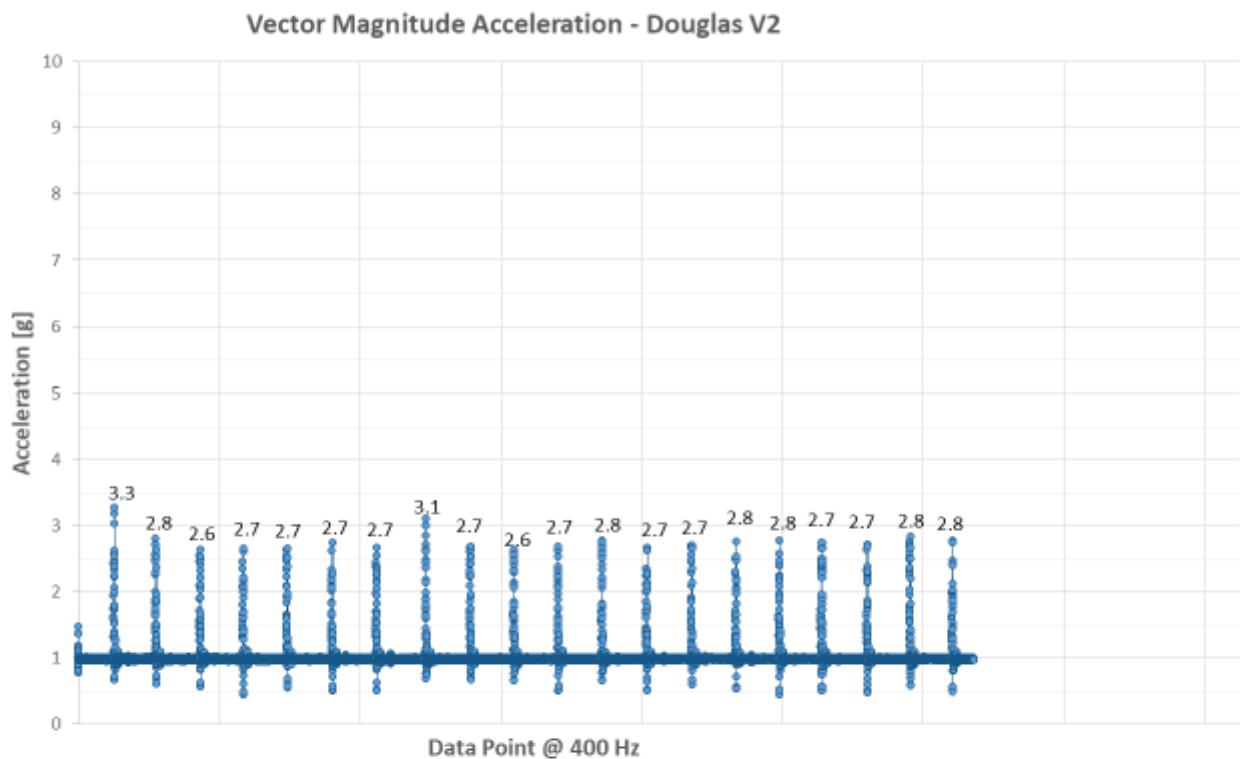
Y Acceleration (Head to Toe) - Novosbed Soft (V1)



Z Acceleration (Up and Down) - Novosbed Soft (V1)

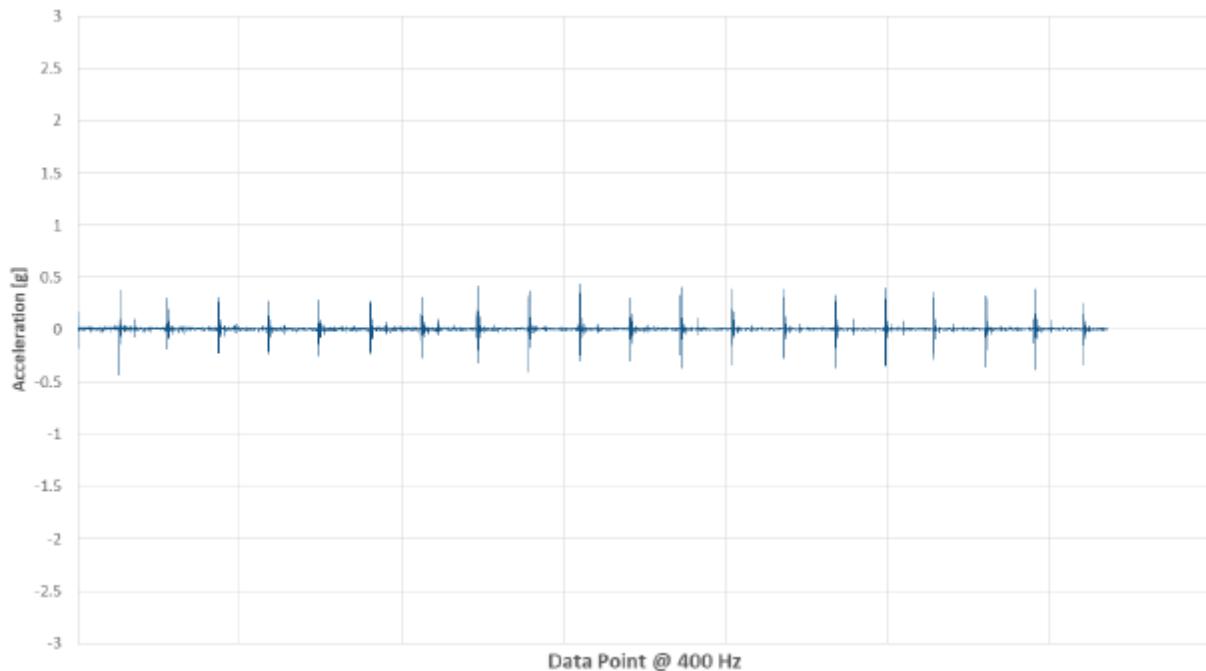


## TEST 3 – DOUGLAS (V2)

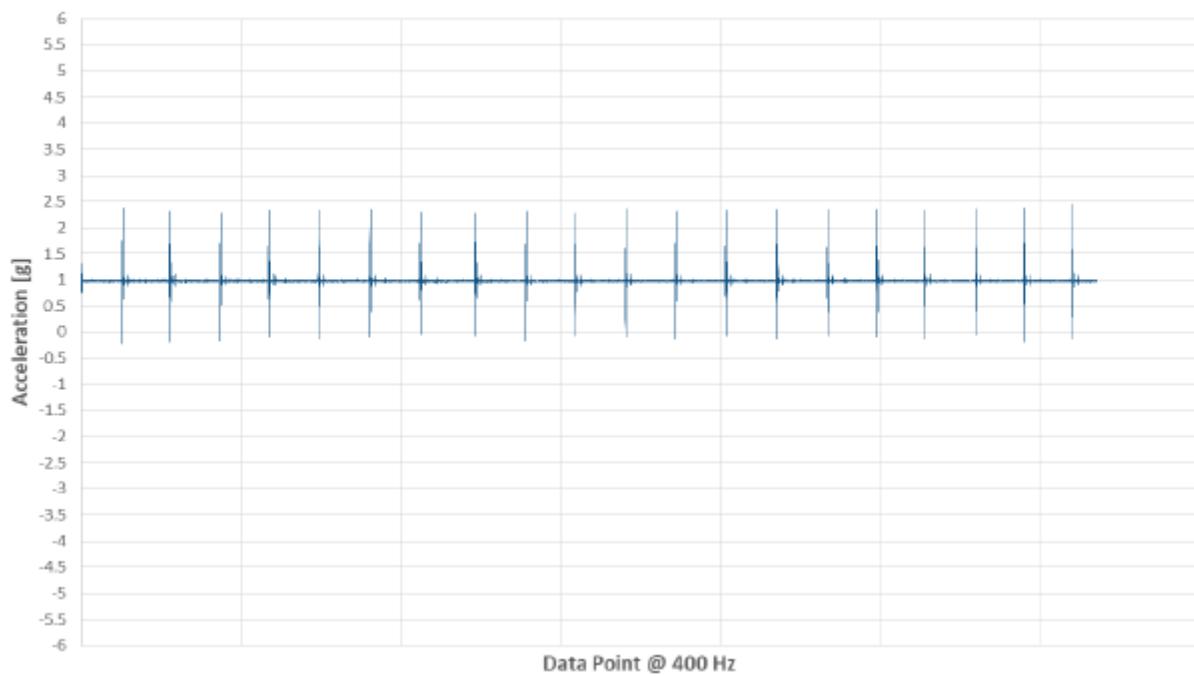




Y Acceleration (Head to Toe) - Douglas V2

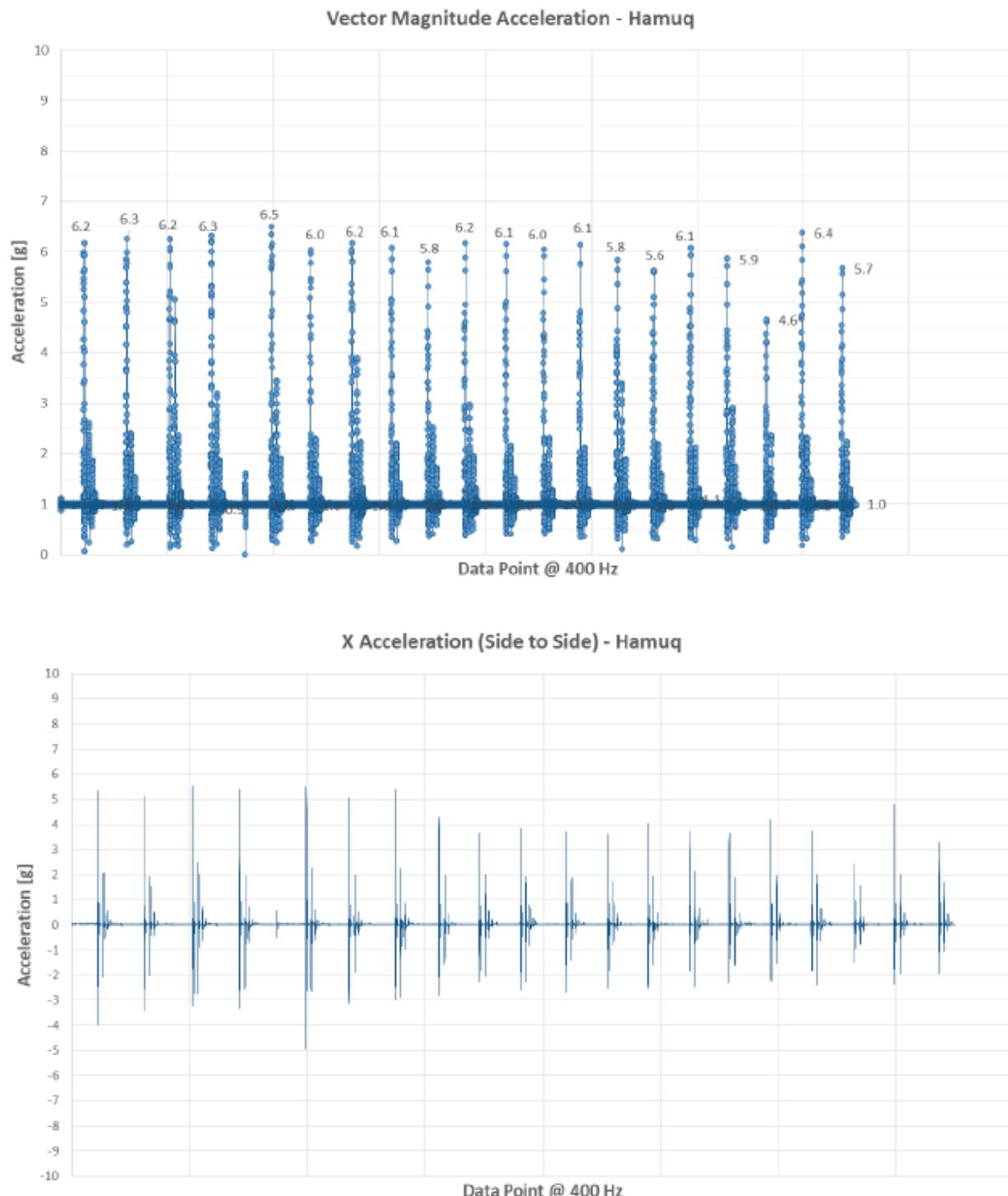


Z Acceleration (Up and Down) - Douglas V2



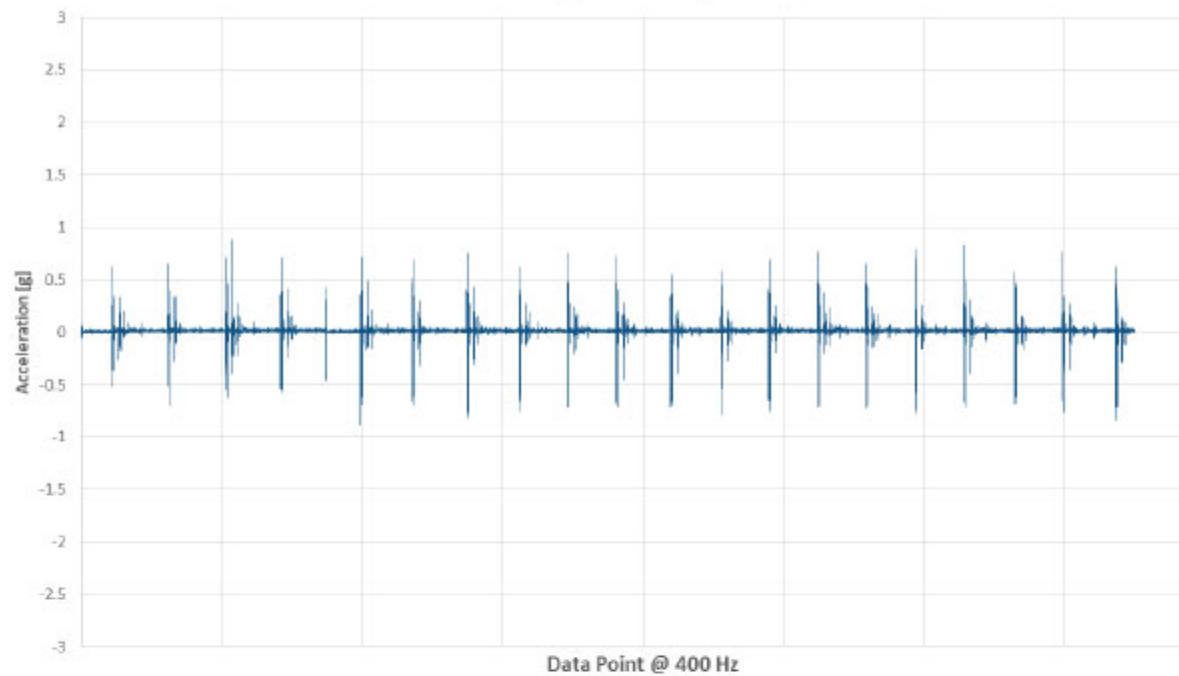


## TEST 3 – HAMUQ

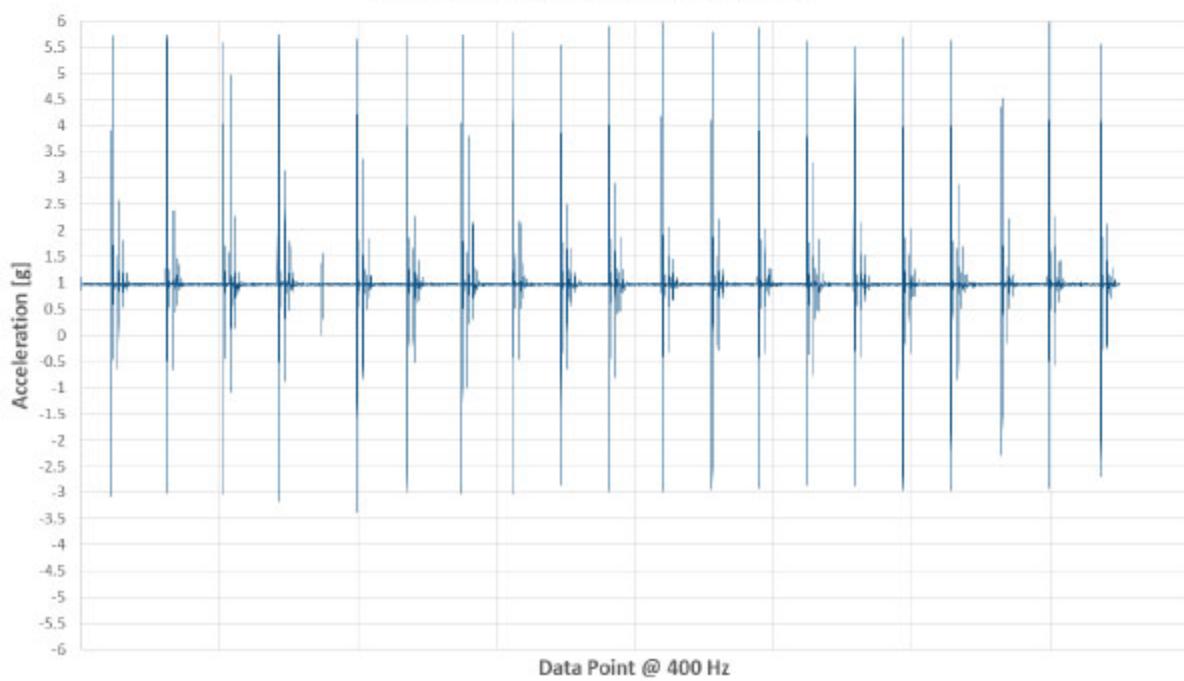




Y Acceleration (Head to Toe) - Hamuq



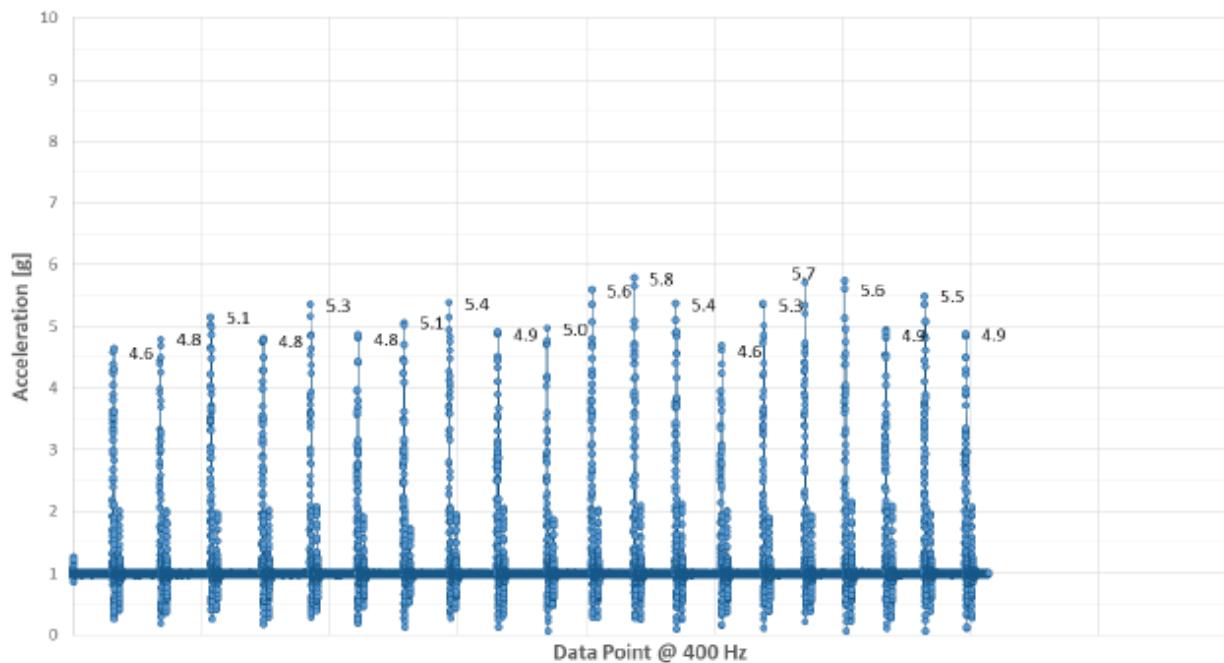
Z Acceleration (Up and Down) - Hamuq



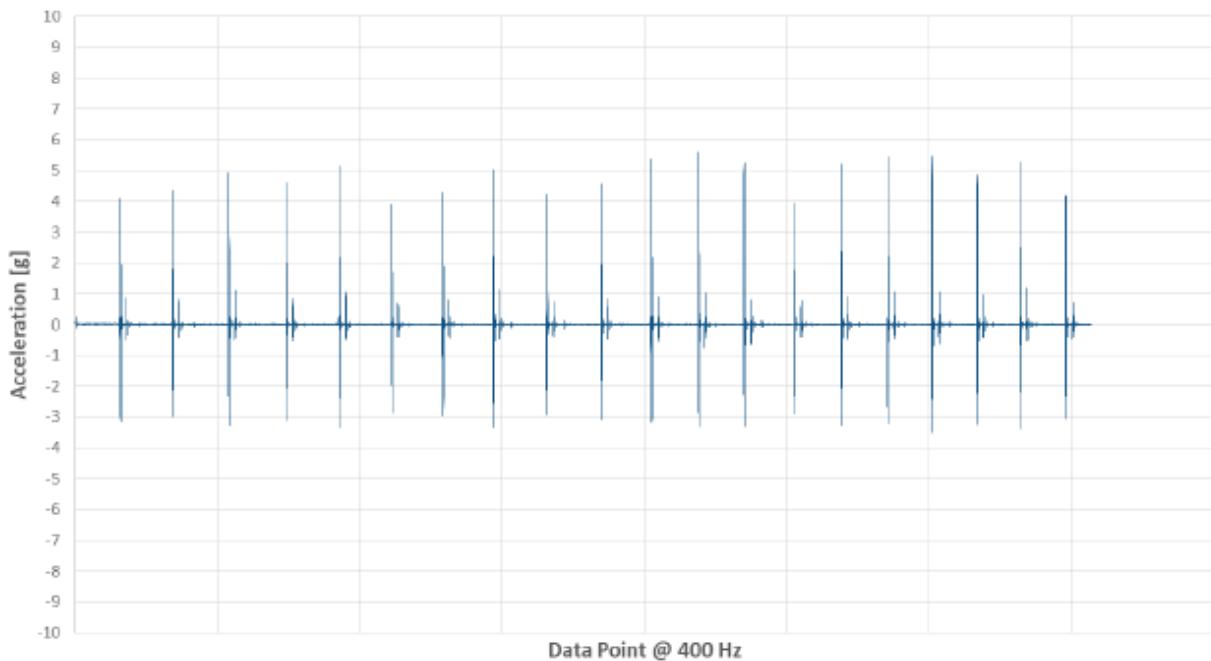


## TEST 3 – LOGAN & COVE

Vector Magnitude Acceleration - Logan & Cove

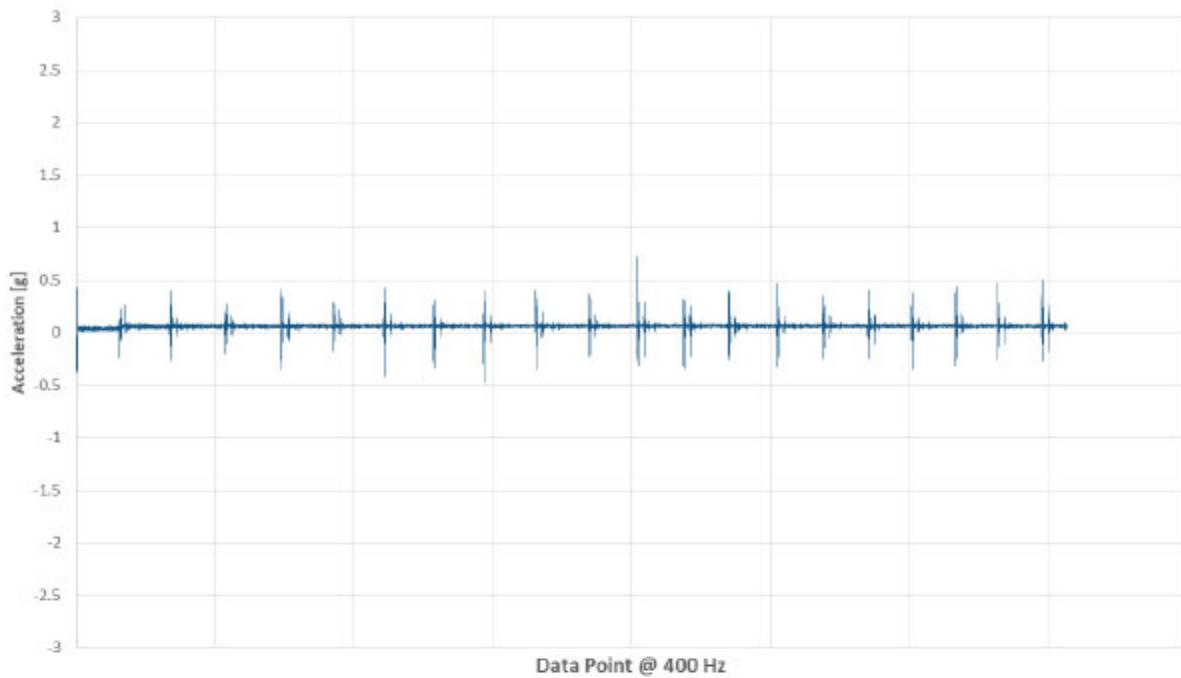


X Acceleration (Side to Side) - Logan & Cove

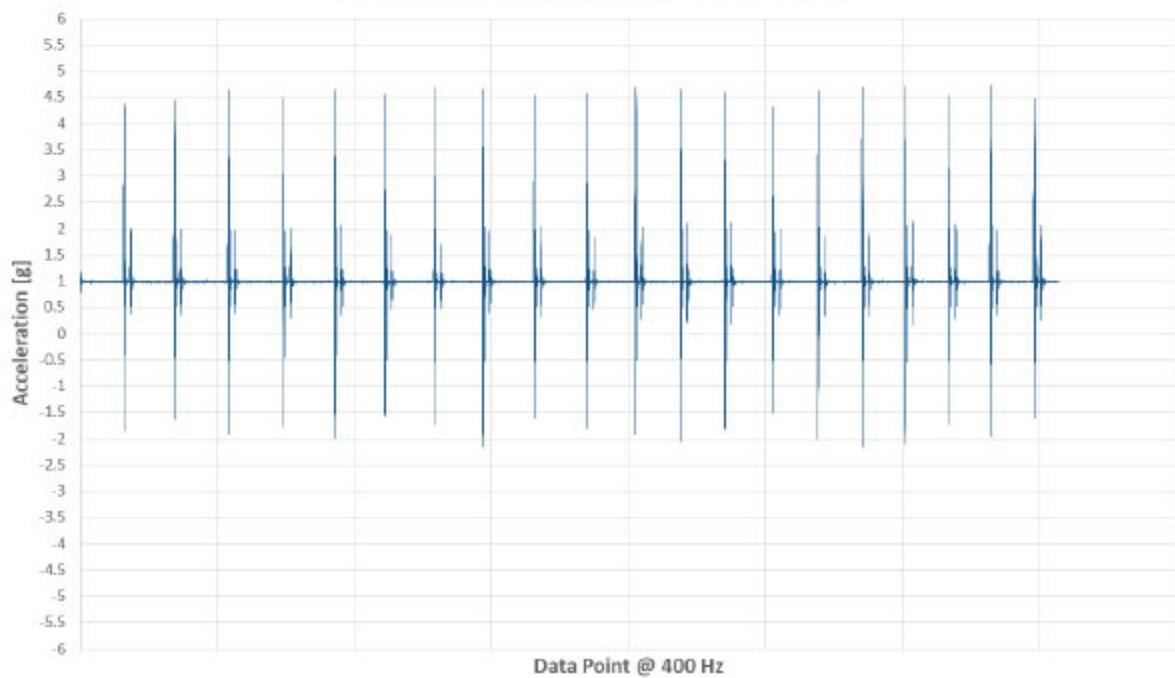




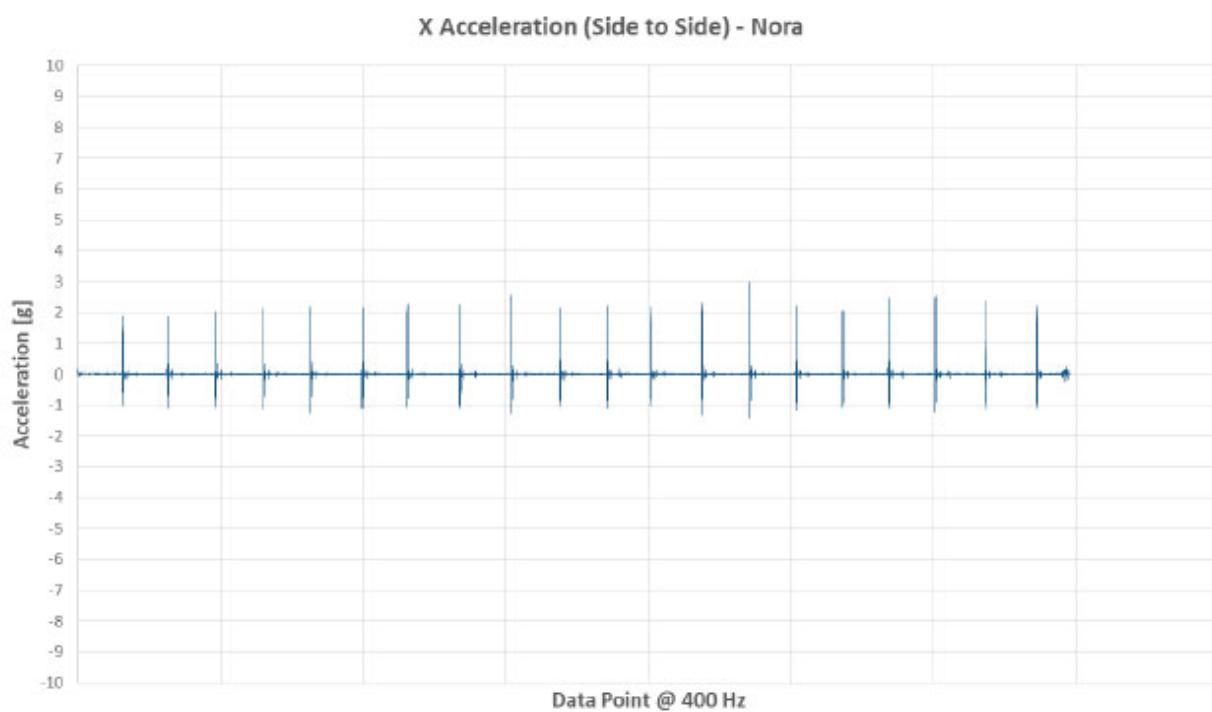
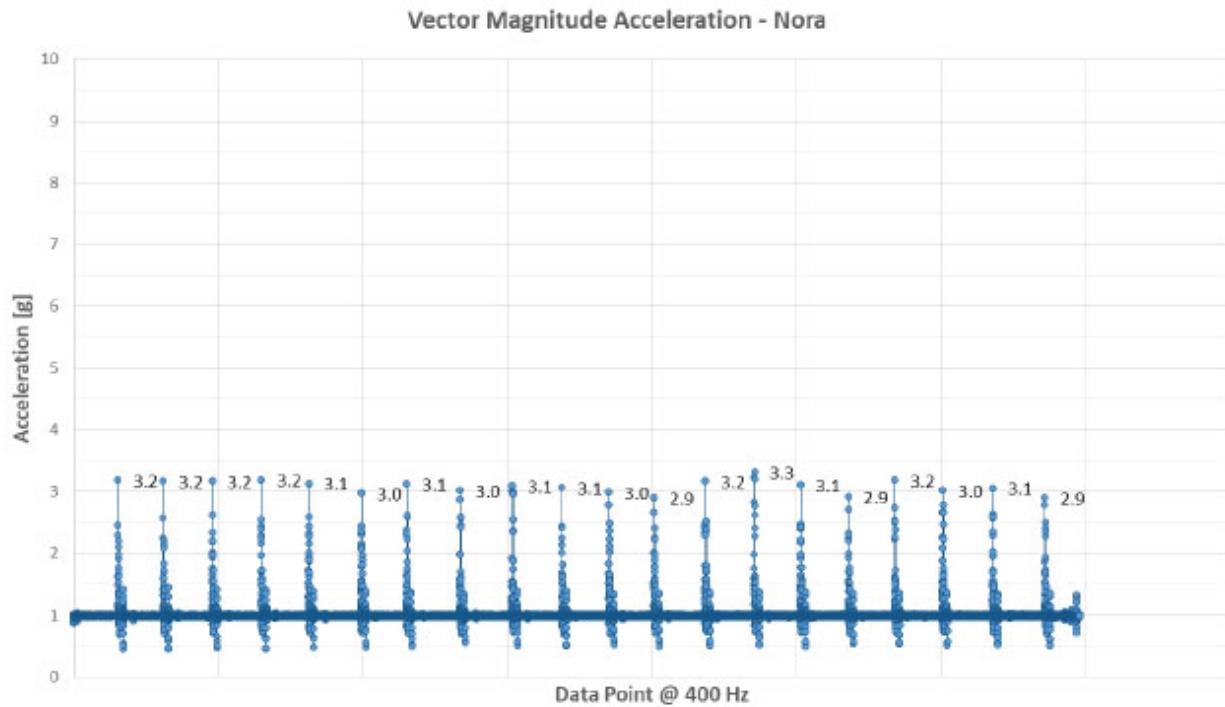
Y Acceleration (Head to Toe) - Logan & Cove



Z Acceleration (Up and Down) - Logan & Cove

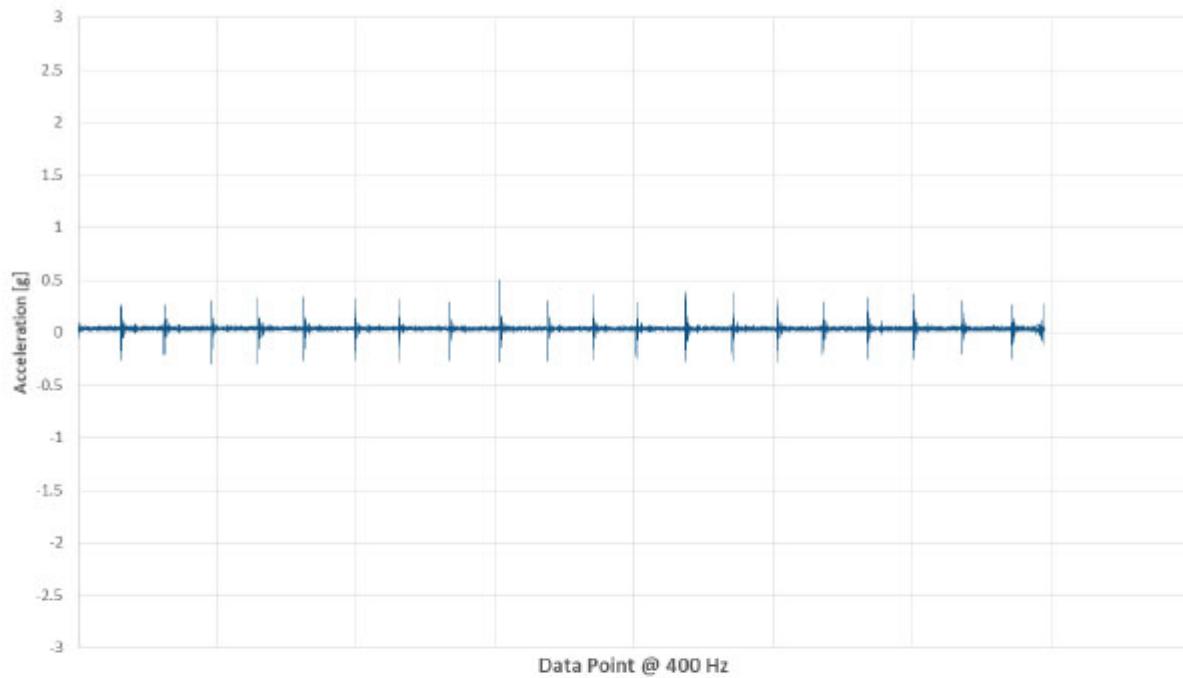


## TEST 3 – NORA

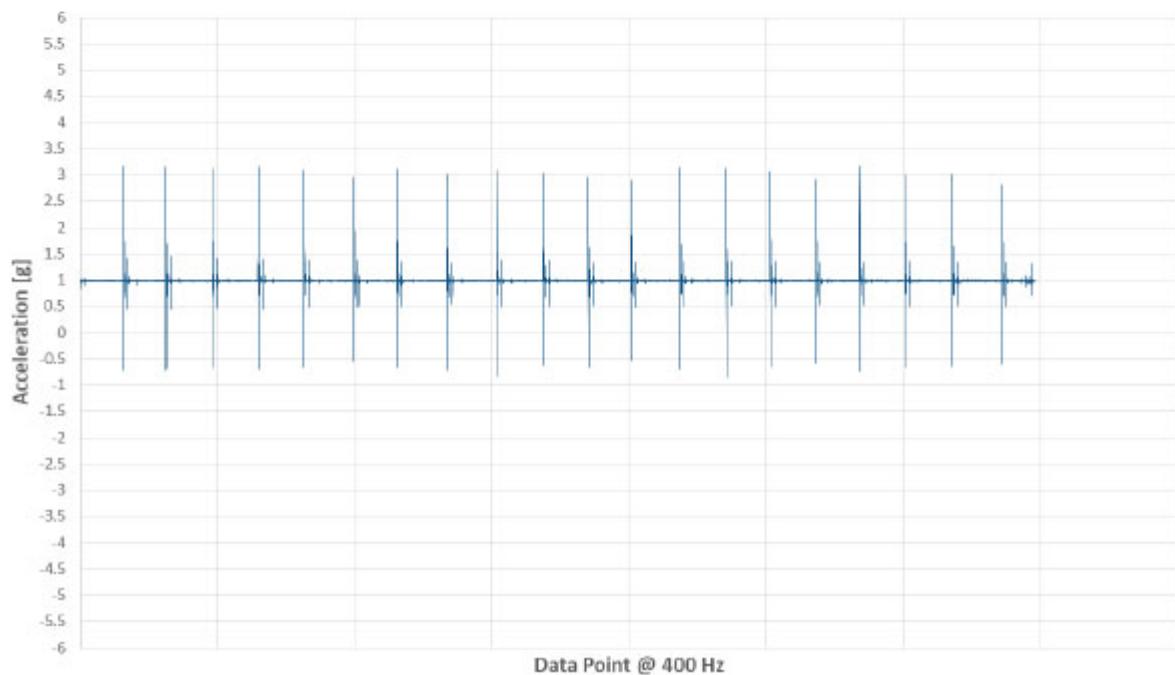




Y Acceleration (Head to Toe) - Nora

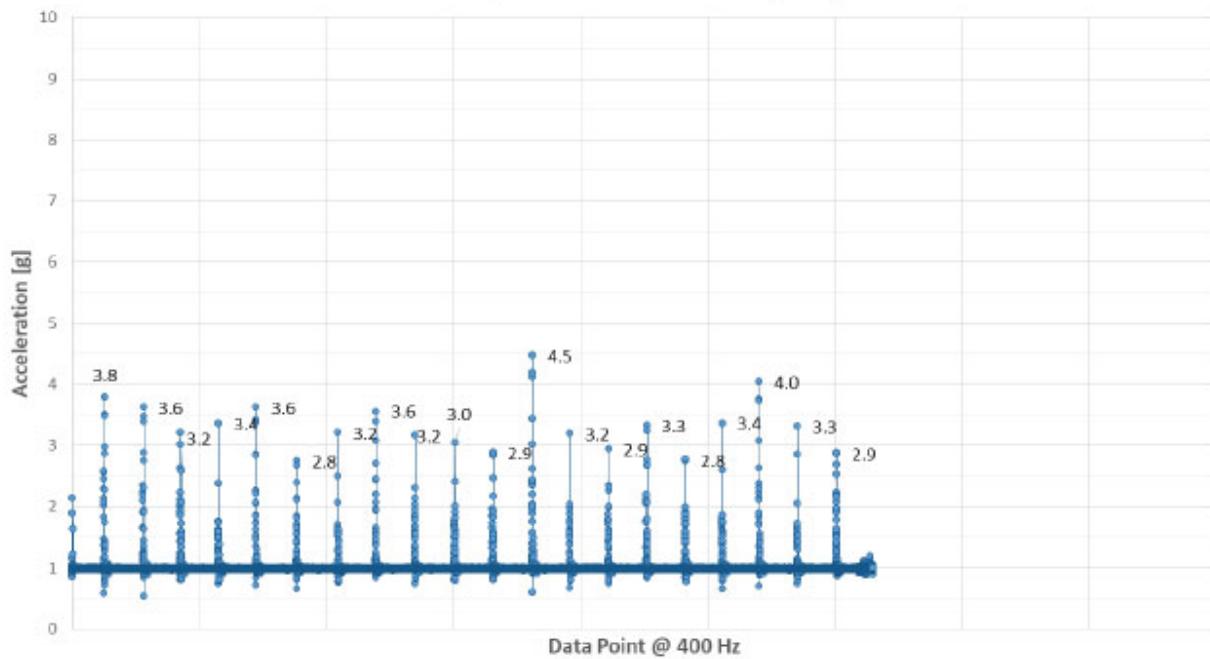


Z Acceleration (Up and Down) - Nora

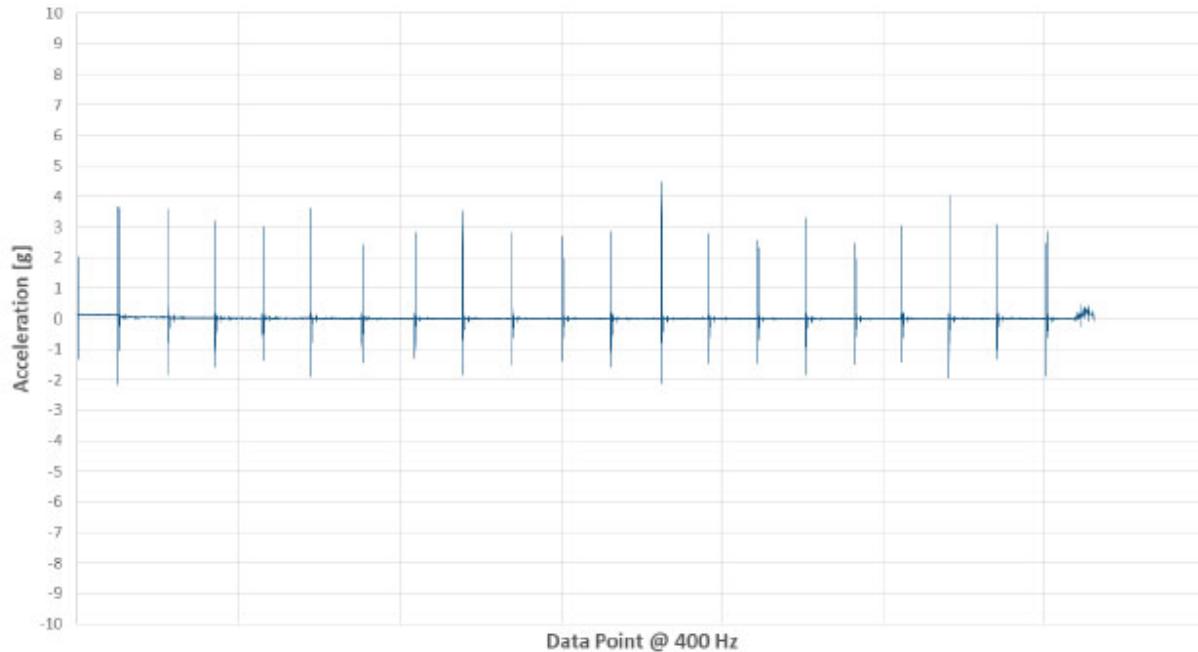


## TEST 3 – POLYSLEEP

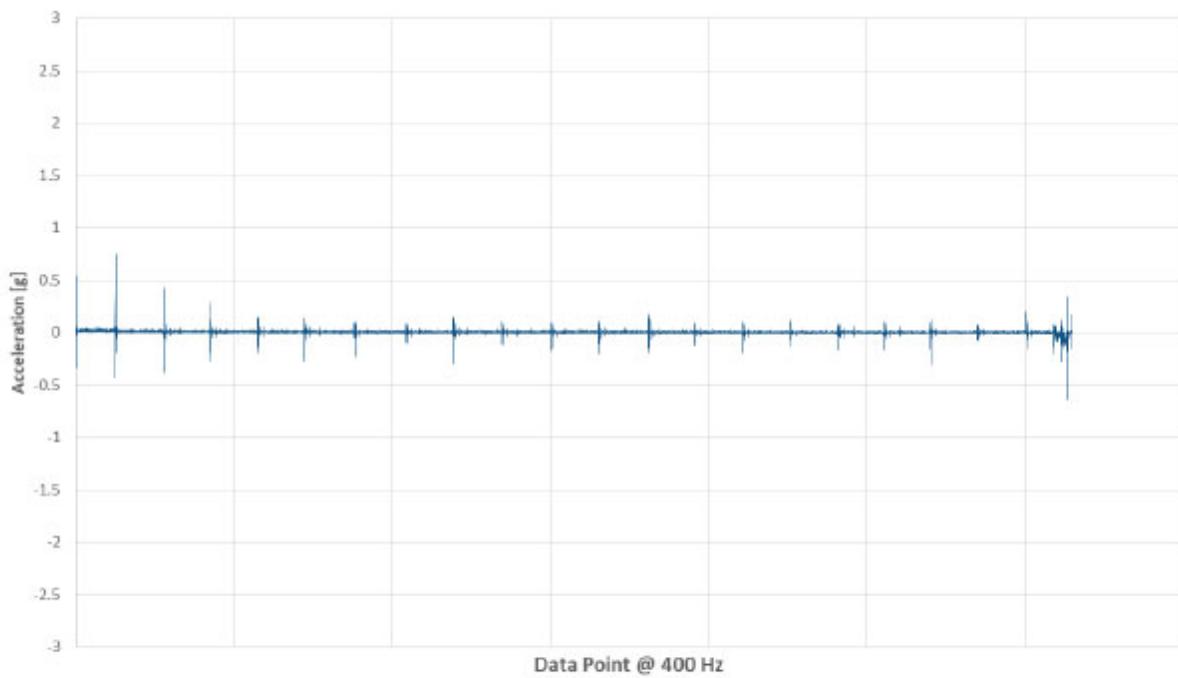
Vector Magnitude Acceleration - PolySleep



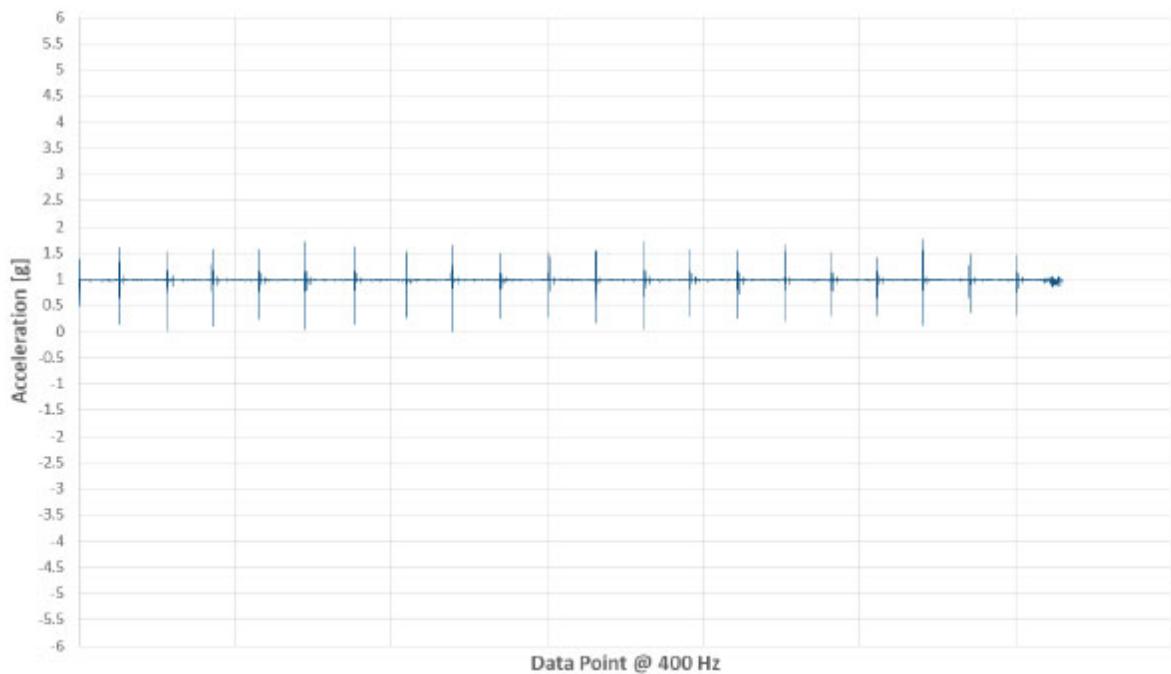
X Acceleration (Side to Side) - PolySleep



Y Acceleration (Head to Toe) - PolySleep

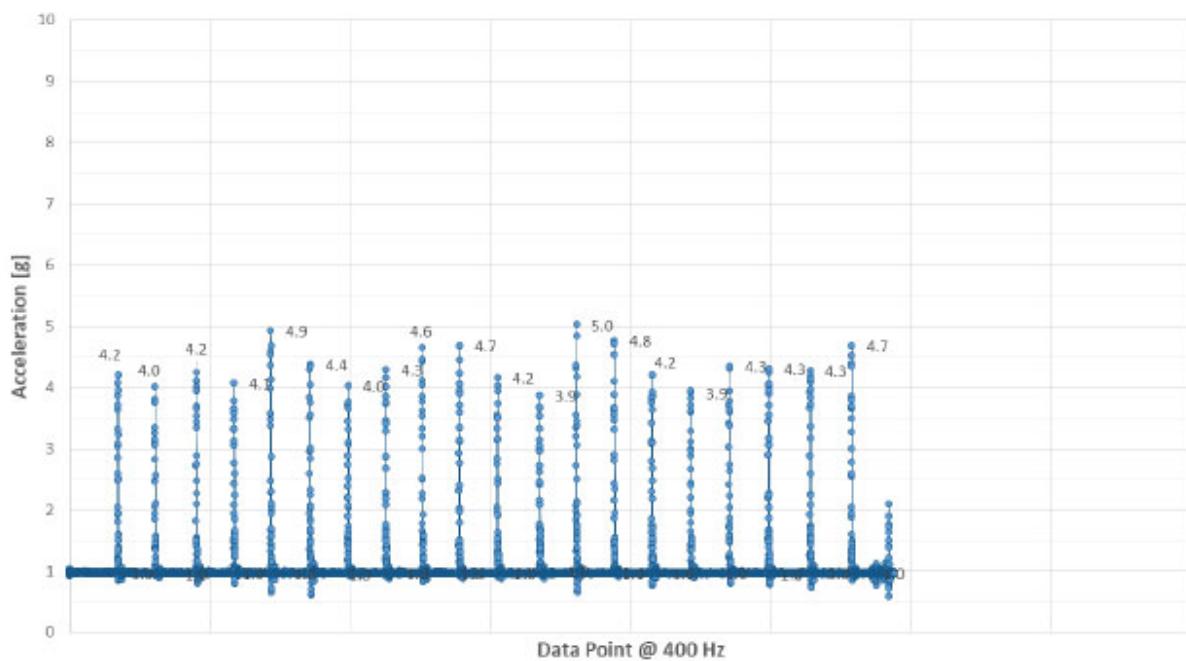


Z Acceleration (Up and Down) - PolySleep

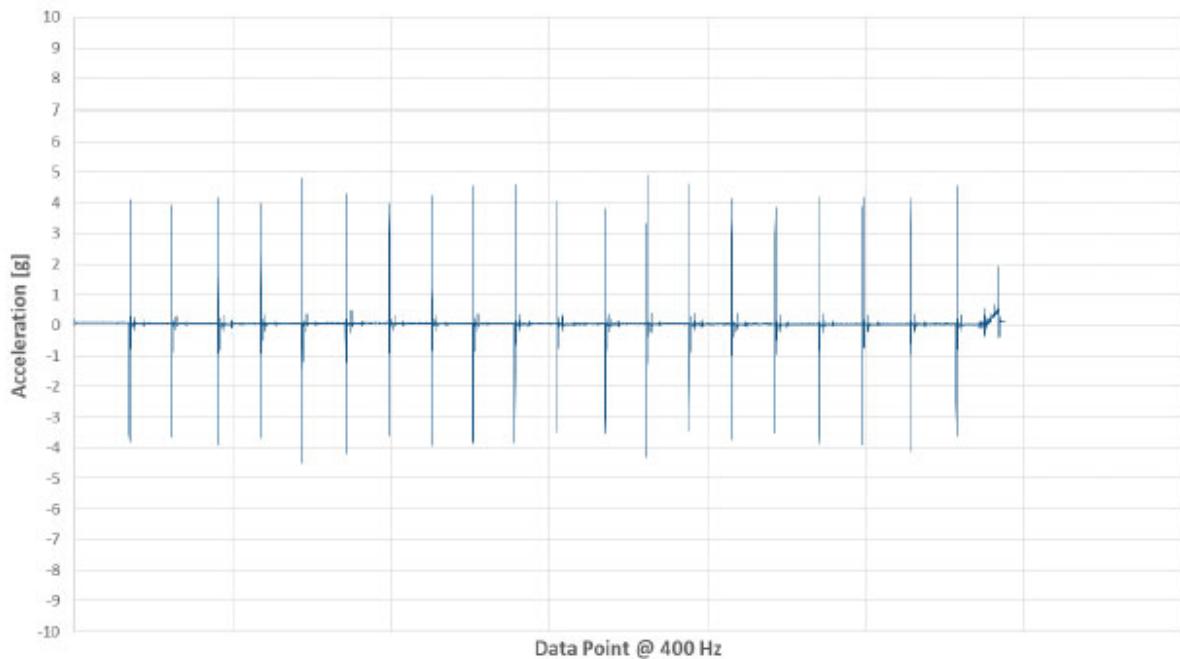


## TEST 3 – iCOMFORT

Vector Magnitude Acceleration - iComfort

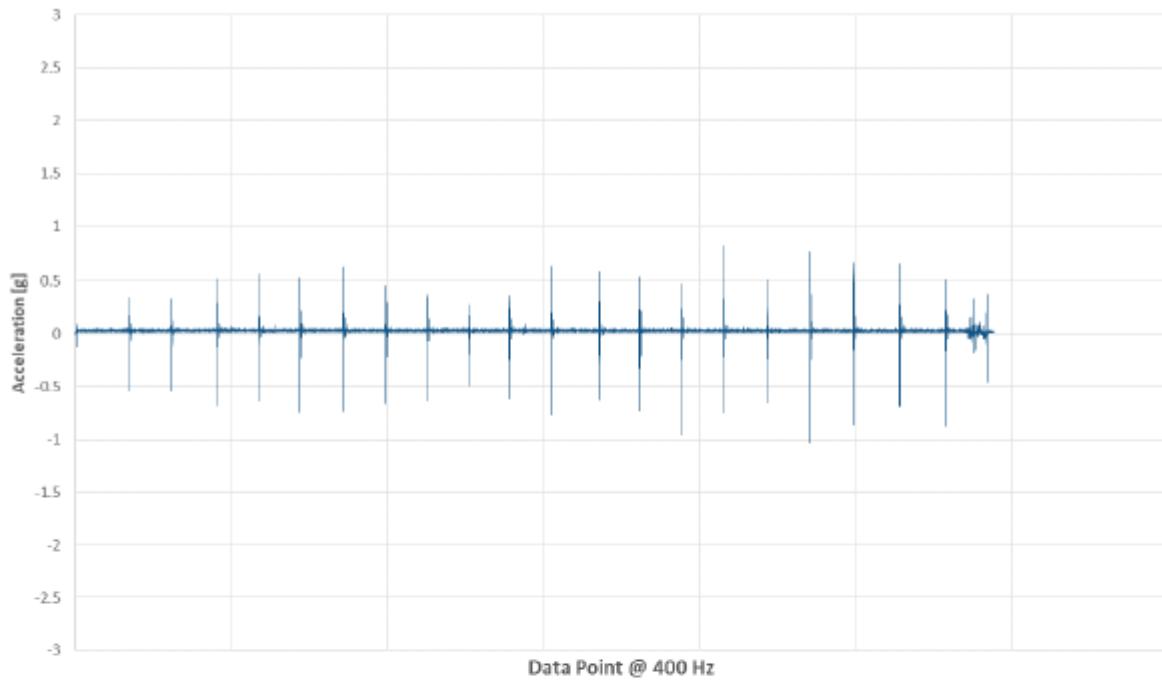


X Acceleration (Side to Side) - iComfort

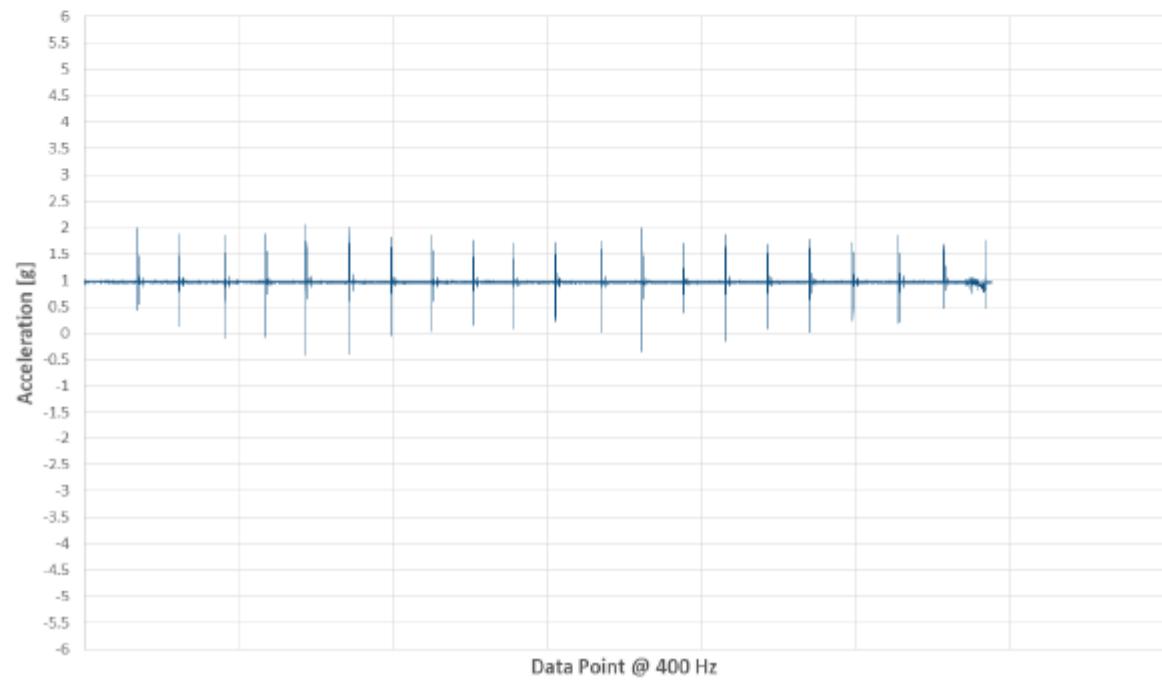




Y Acceleration (Head to Toe) - iComfort



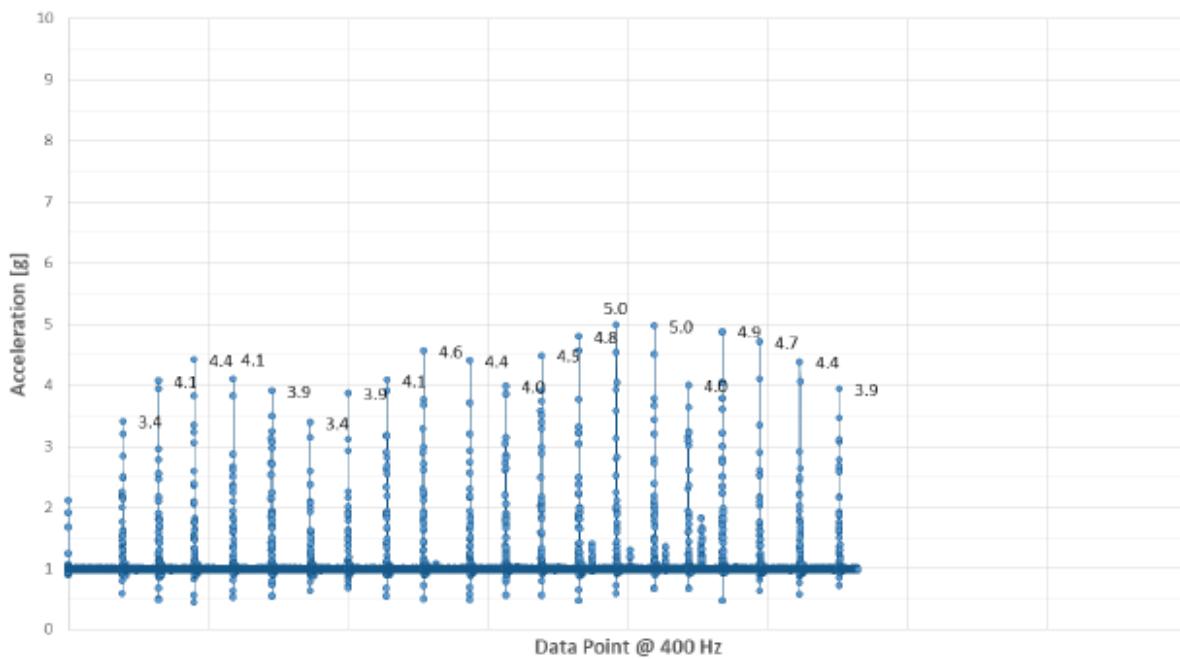
Z Acceleration (Up and Down) - iComfort



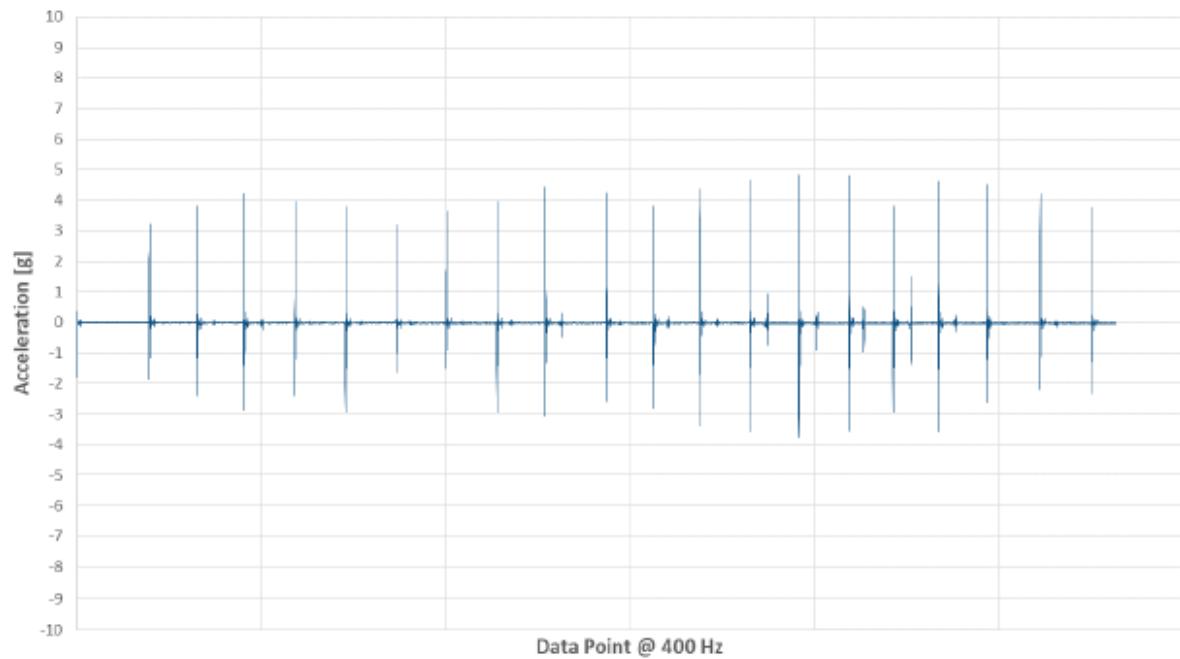


## TEST 3 – TEMPUR-PEDIC

Vector Magnitude Acceleration - Tempur-Pedic

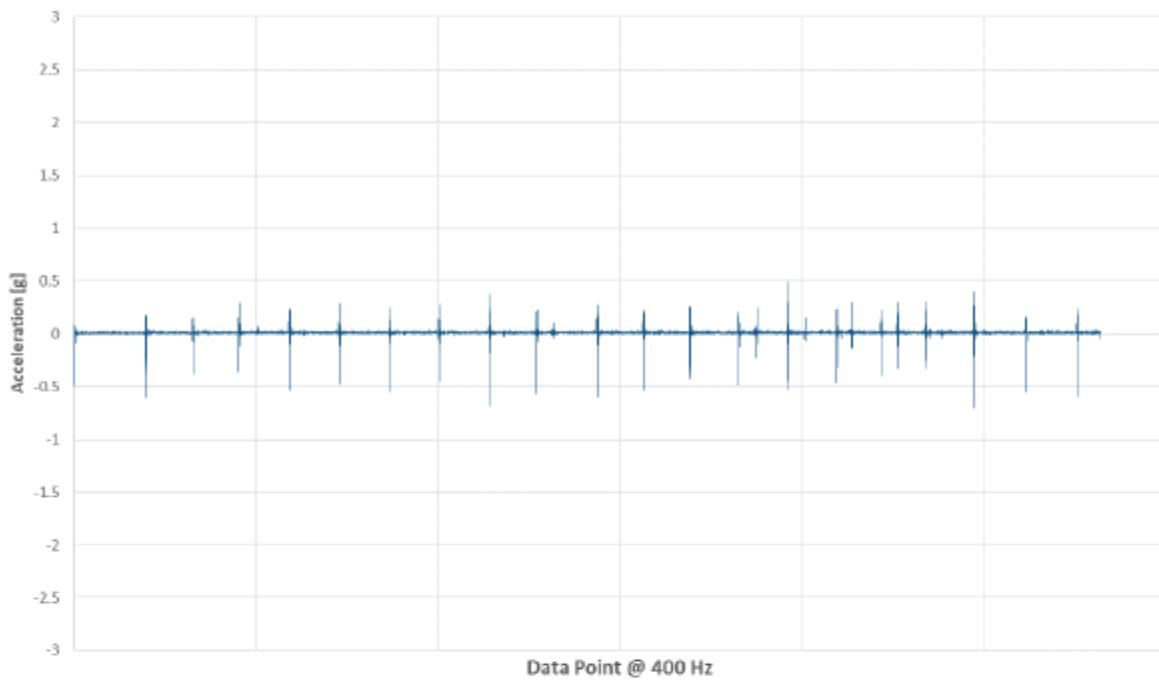


X Acceleration (Side to Side) - Tempur-Pedic

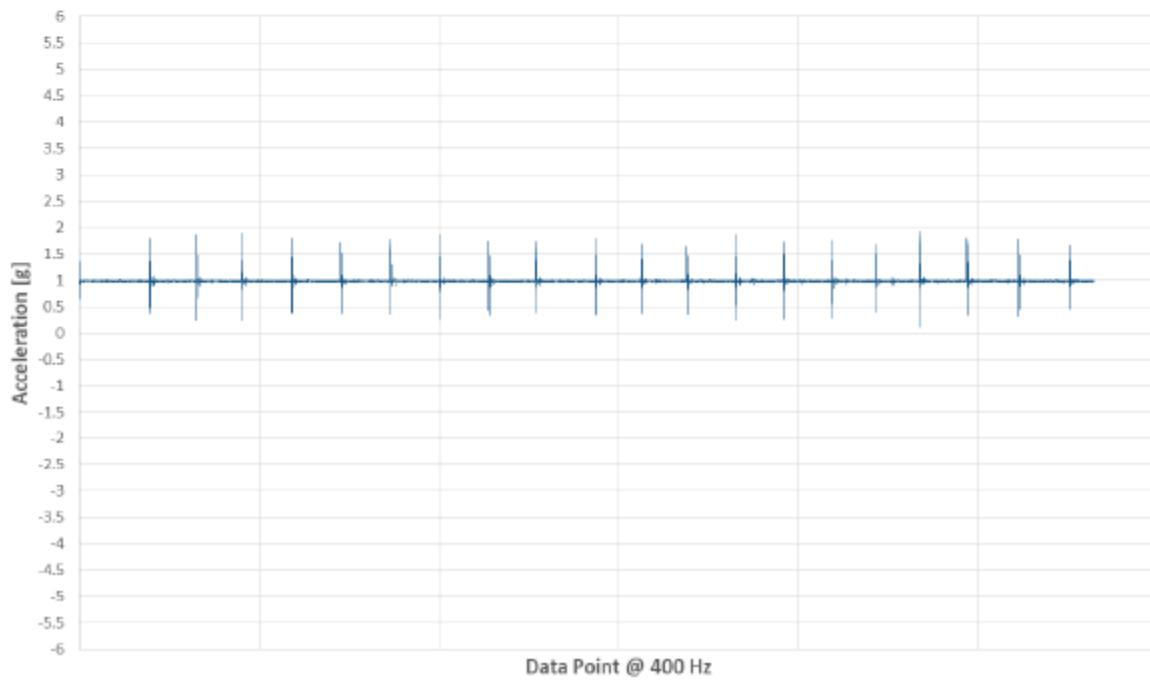




Y Acceleration (Head to Toe) - Tempur-Pedic

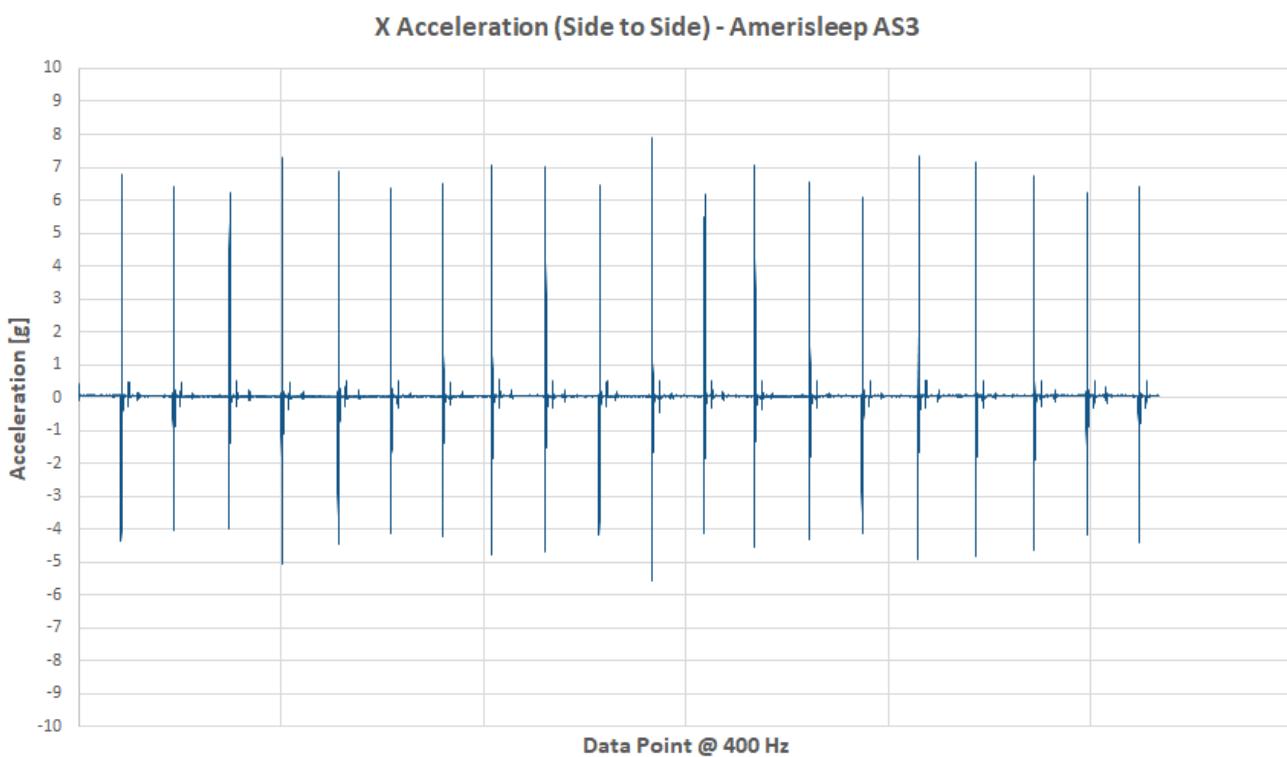
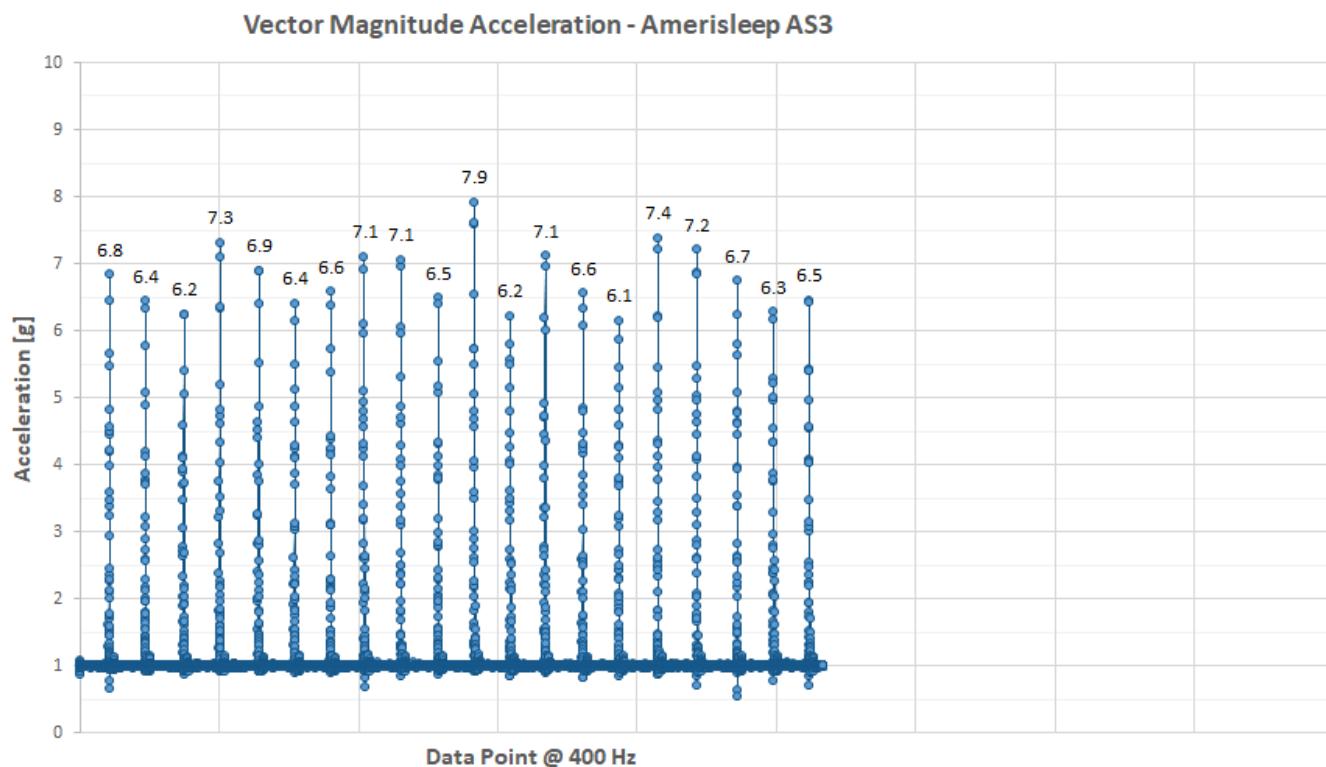


Z Acceleration (Up and Down) - Tempur-Pedic



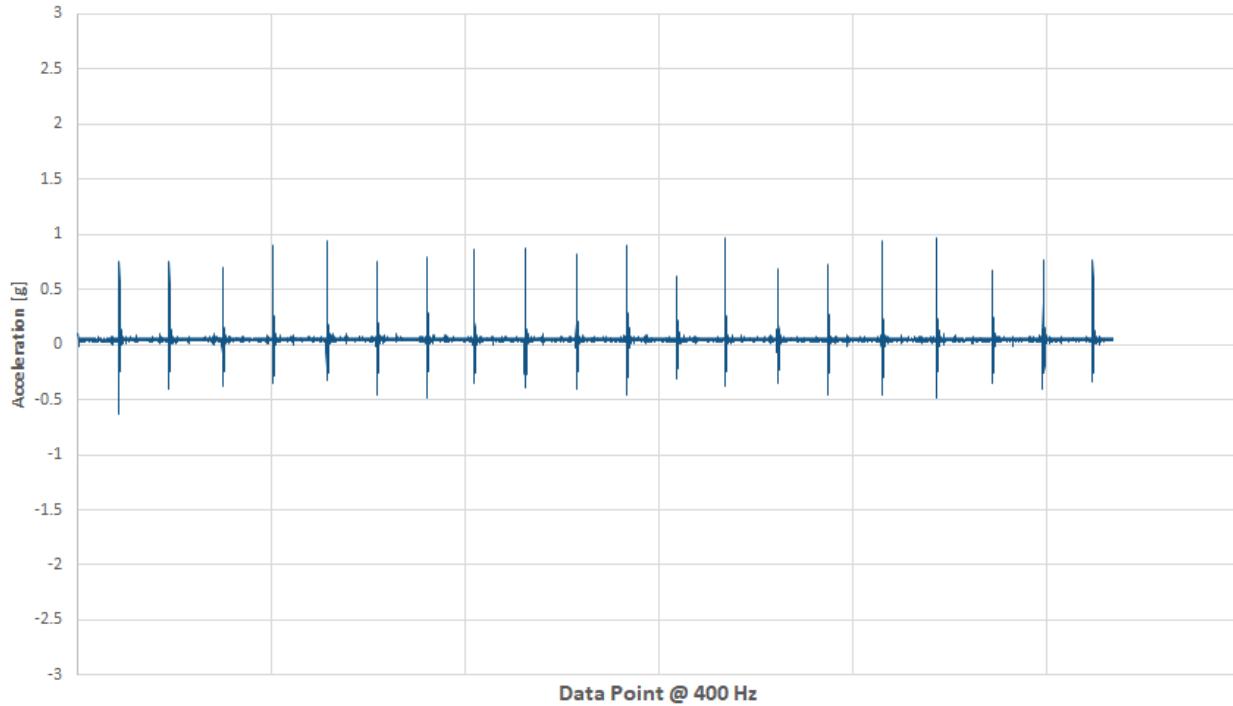


## TEST 3 – AMERISLEEP AS3

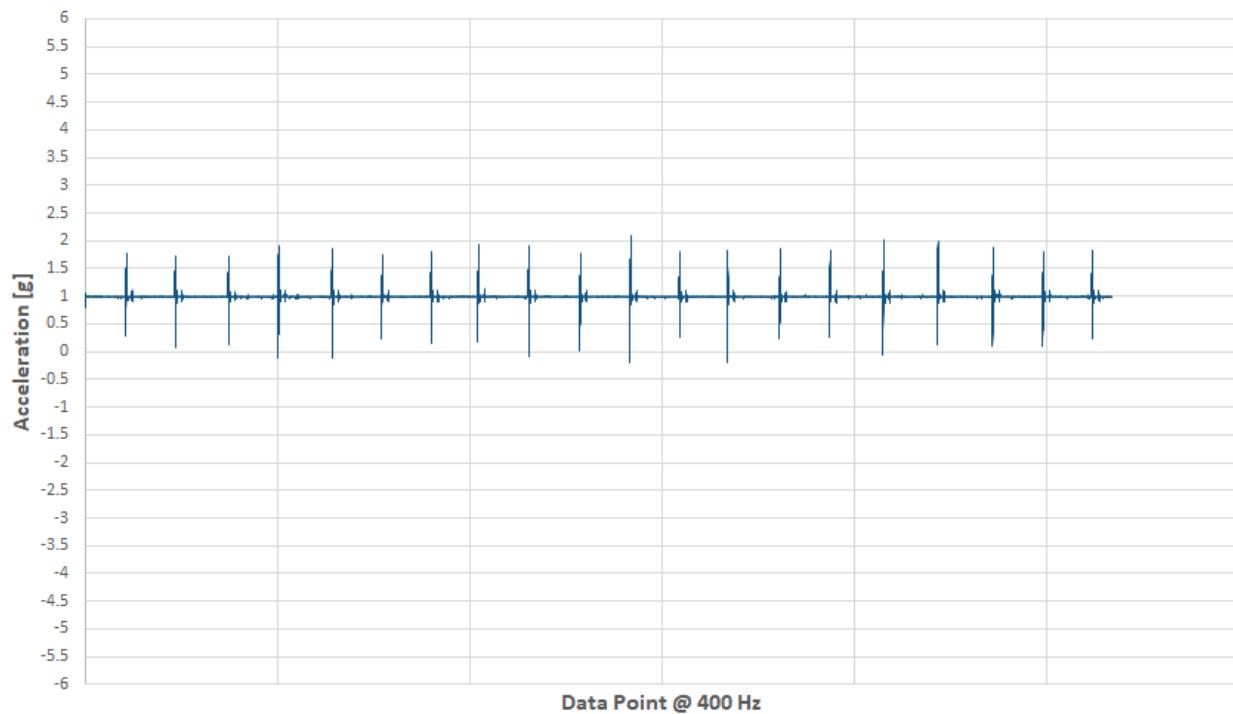




Y Acceleration (Head to Toe) - Amerisleep AS3



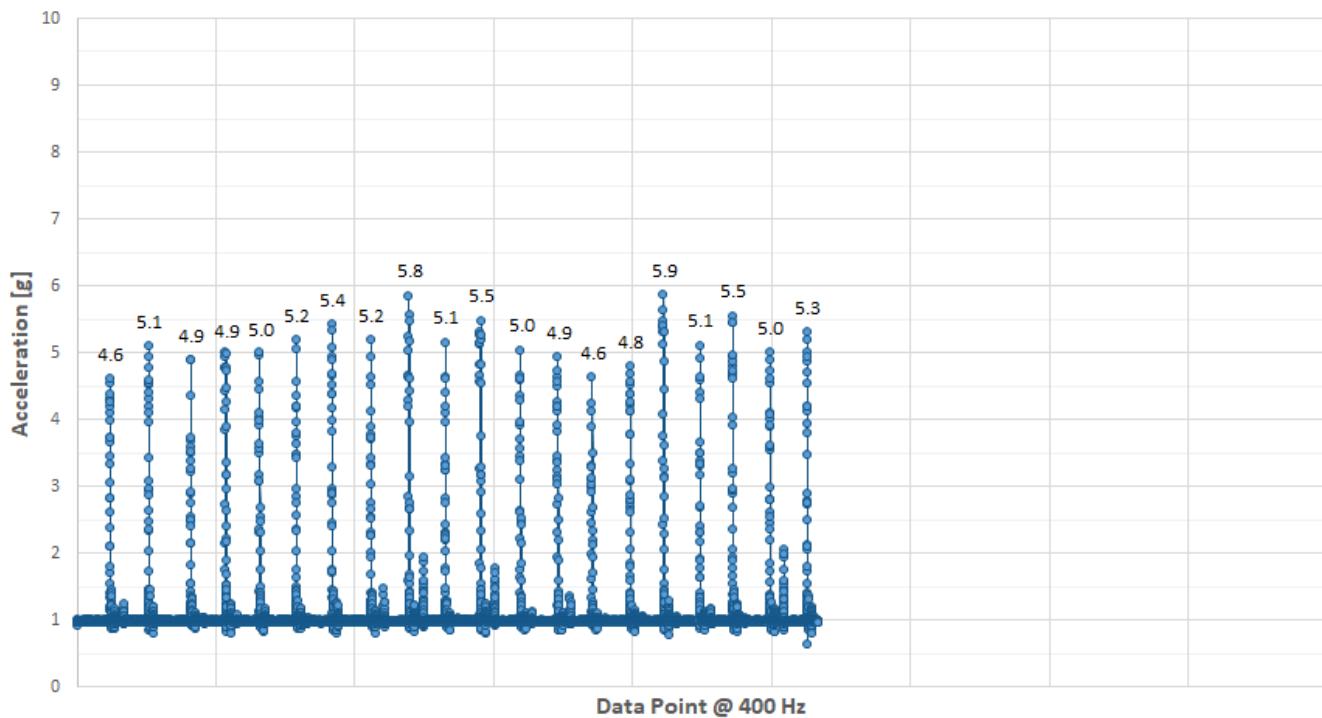
Z Acceleration (Up and Down) - Amerisleep AS3



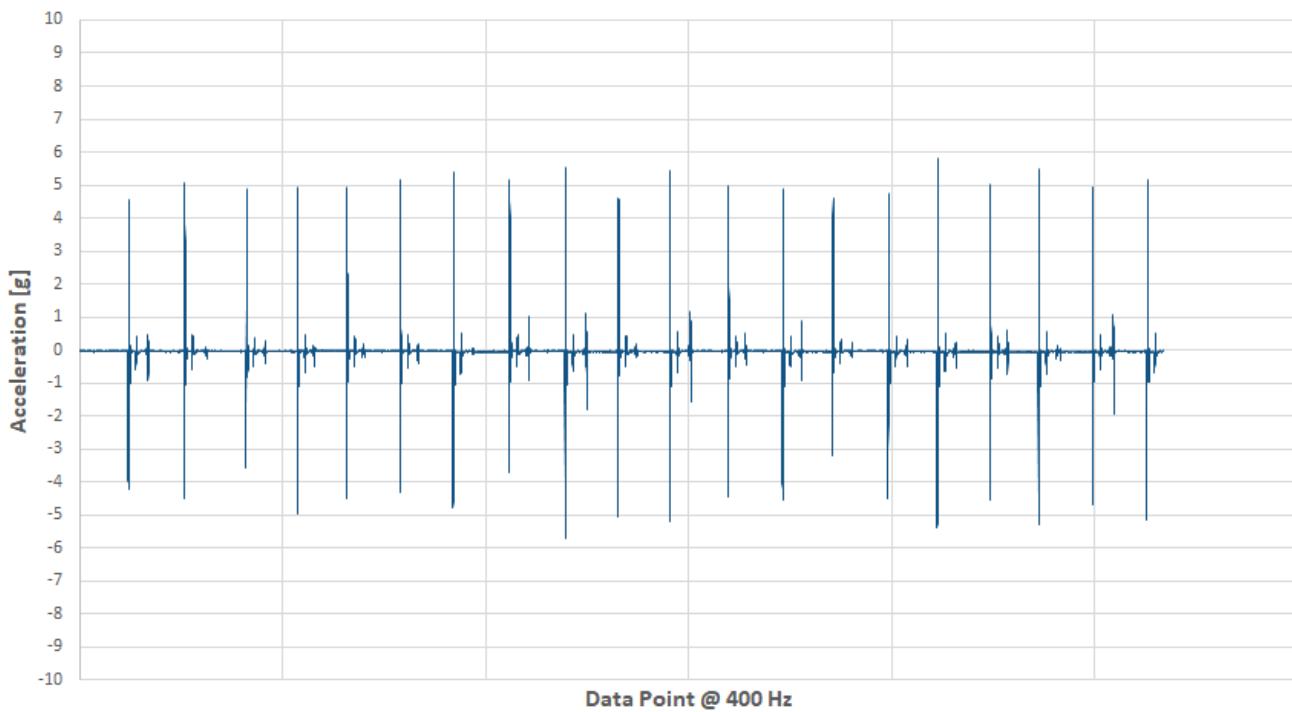


## TEST 3 – BEAR

Vector Magnitude Acceleration - Bear

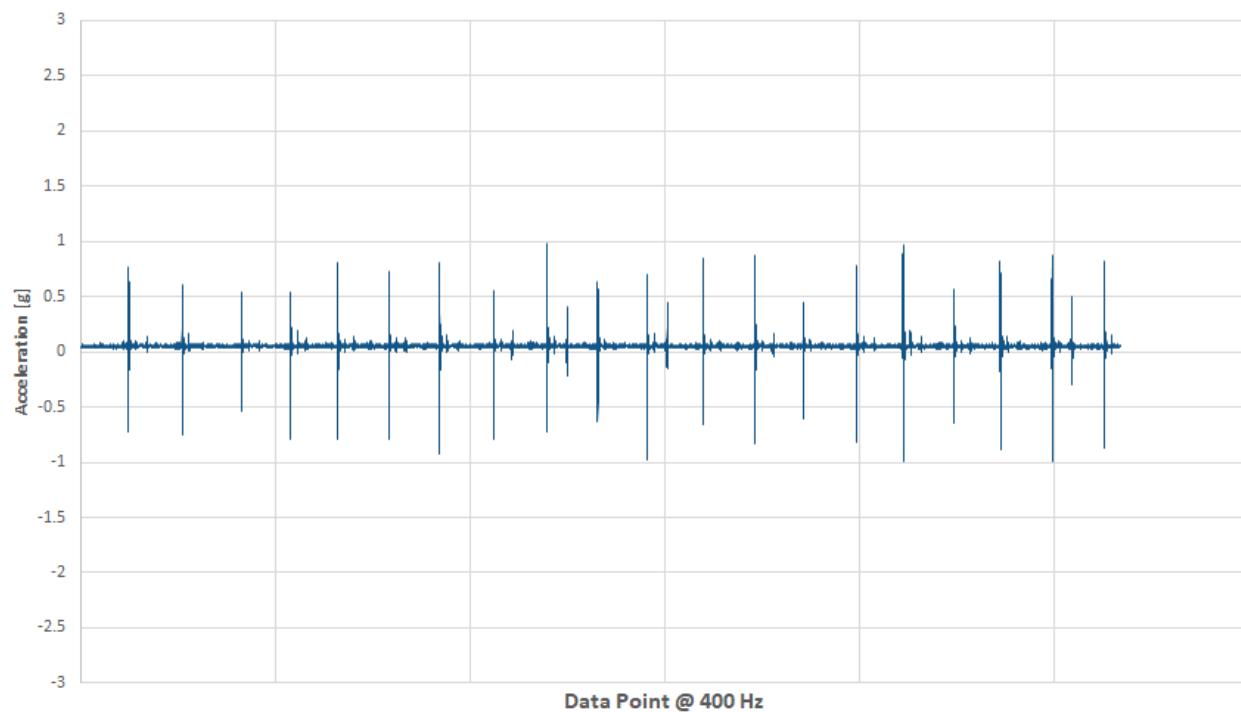


X Acceleration (Side to Side) - Bear

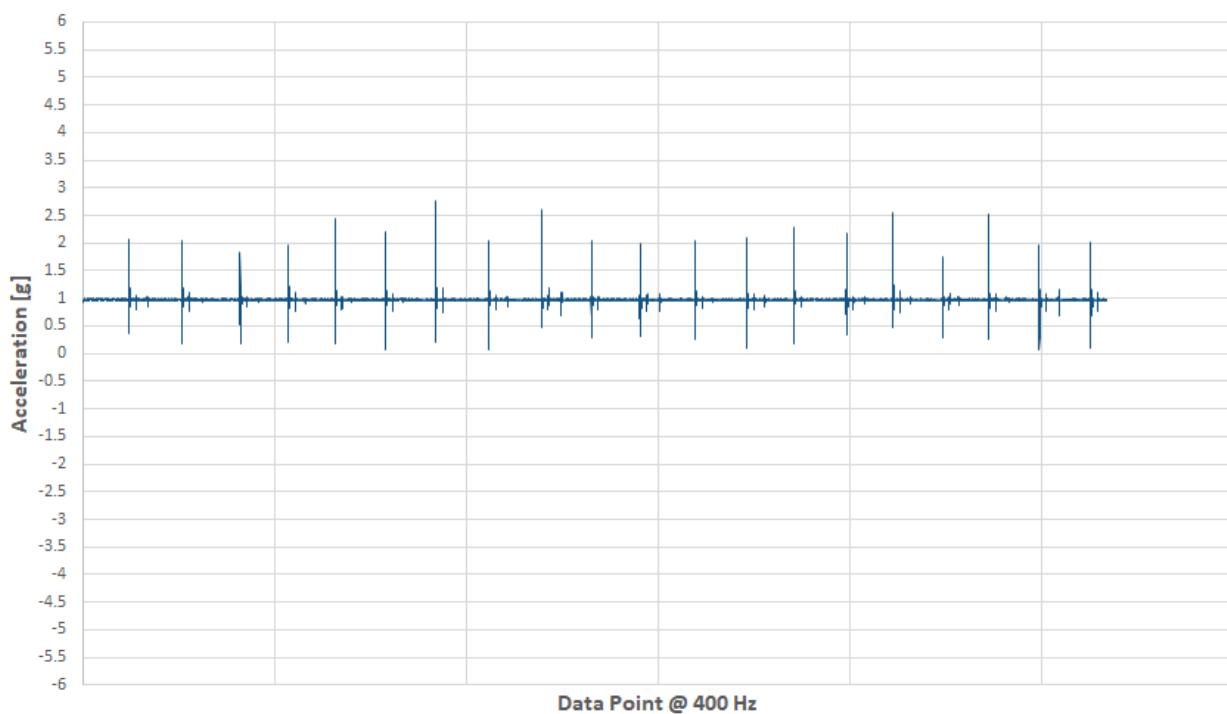




Y Acceleration (Head to Toe) - Bear



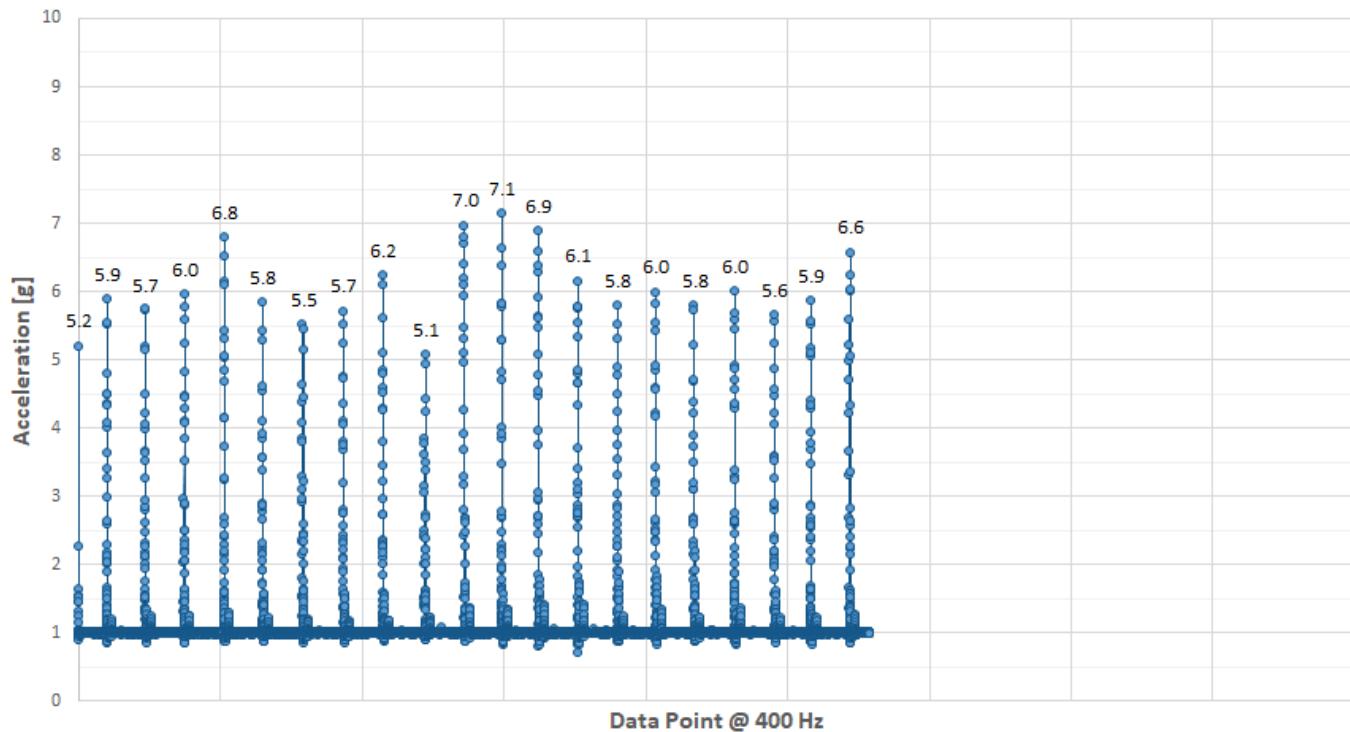
Z Acceleration (Up and Down) - Bear



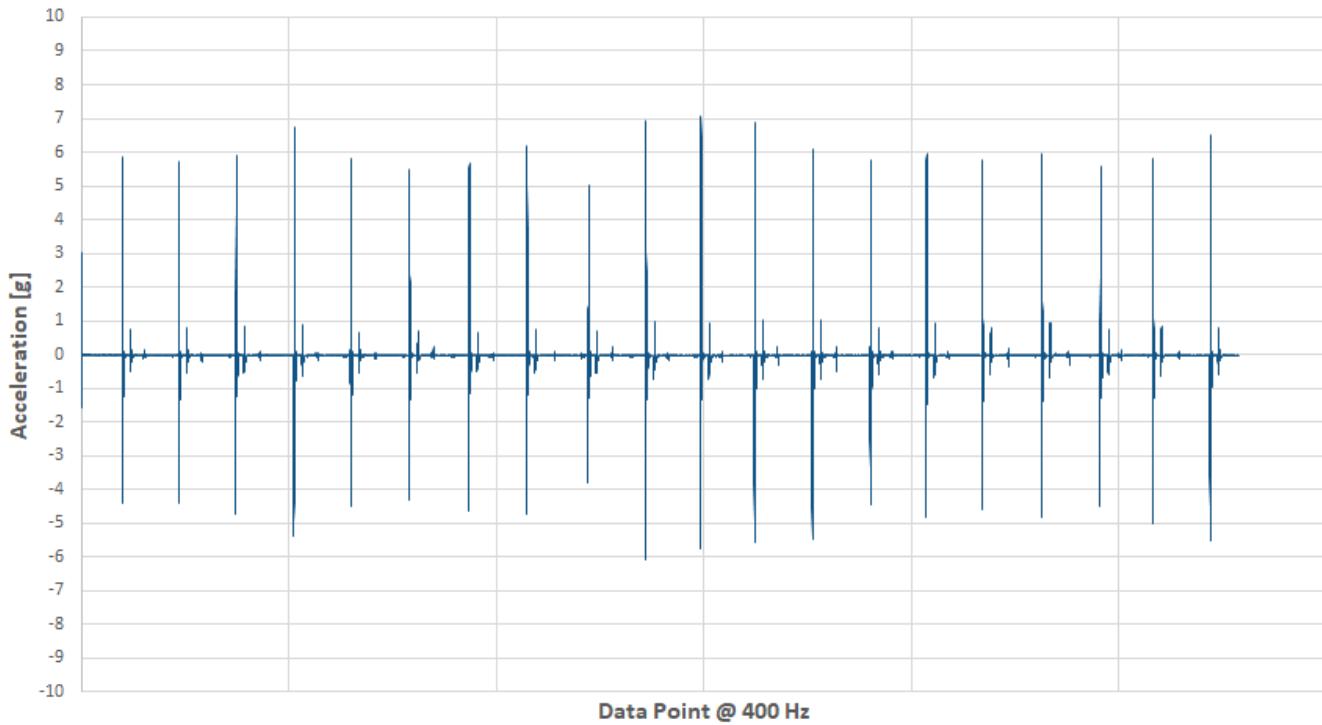


## TEST 3 – CASPER (V2)

Vector Magnitude Acceleration - Casper (V2)

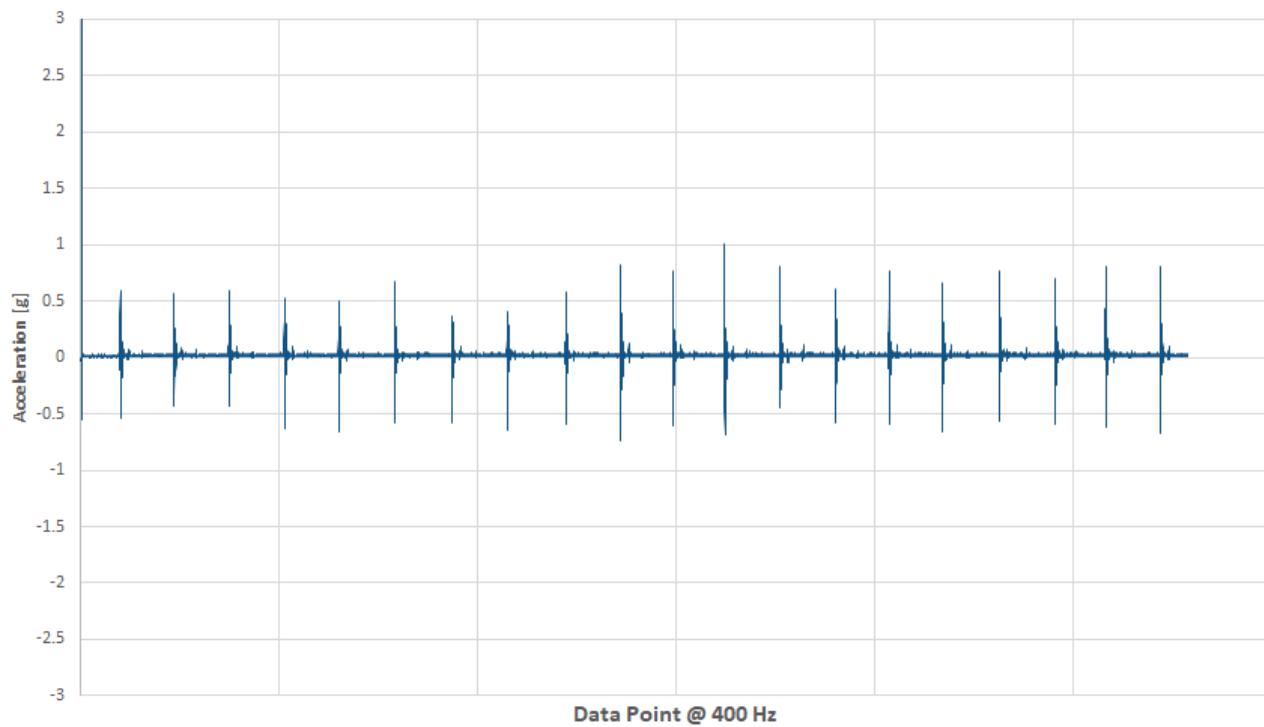


X Acceleration (Side to Side) - Casper (V2)

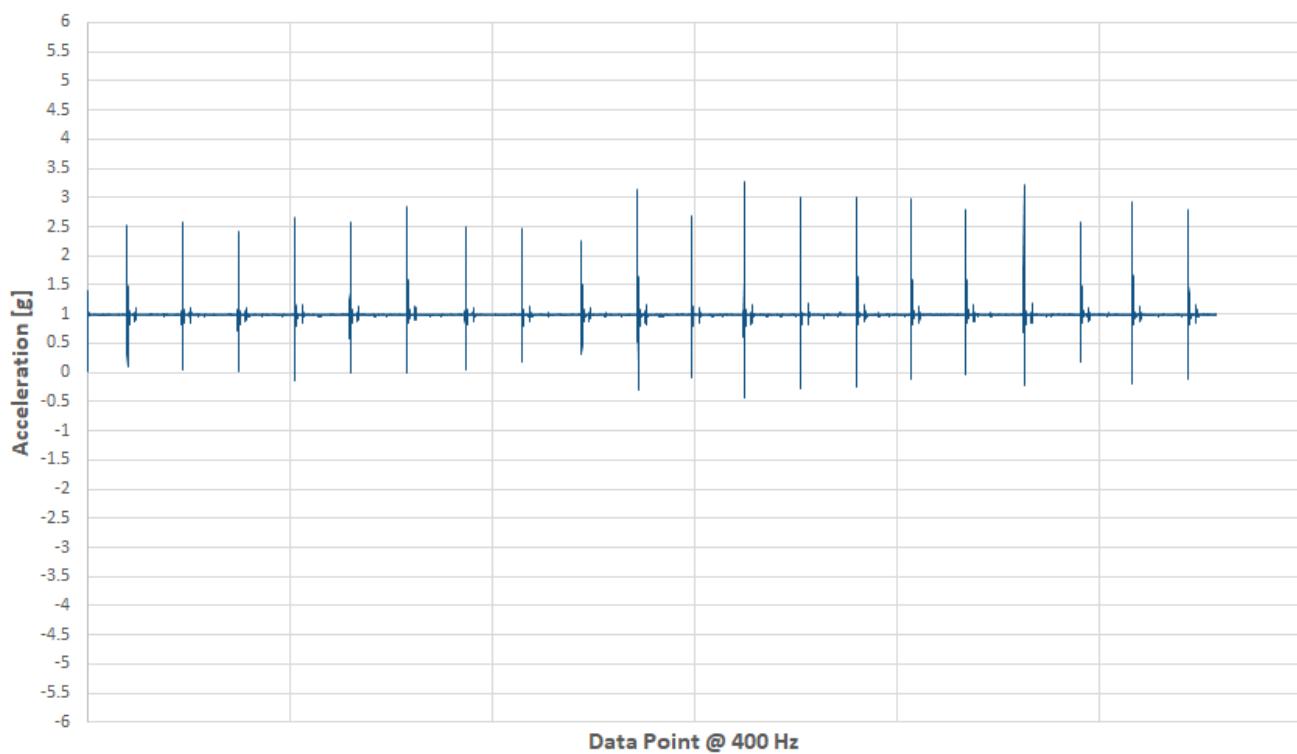




Y Acceleration (Head to Toe) - Casper (V2)



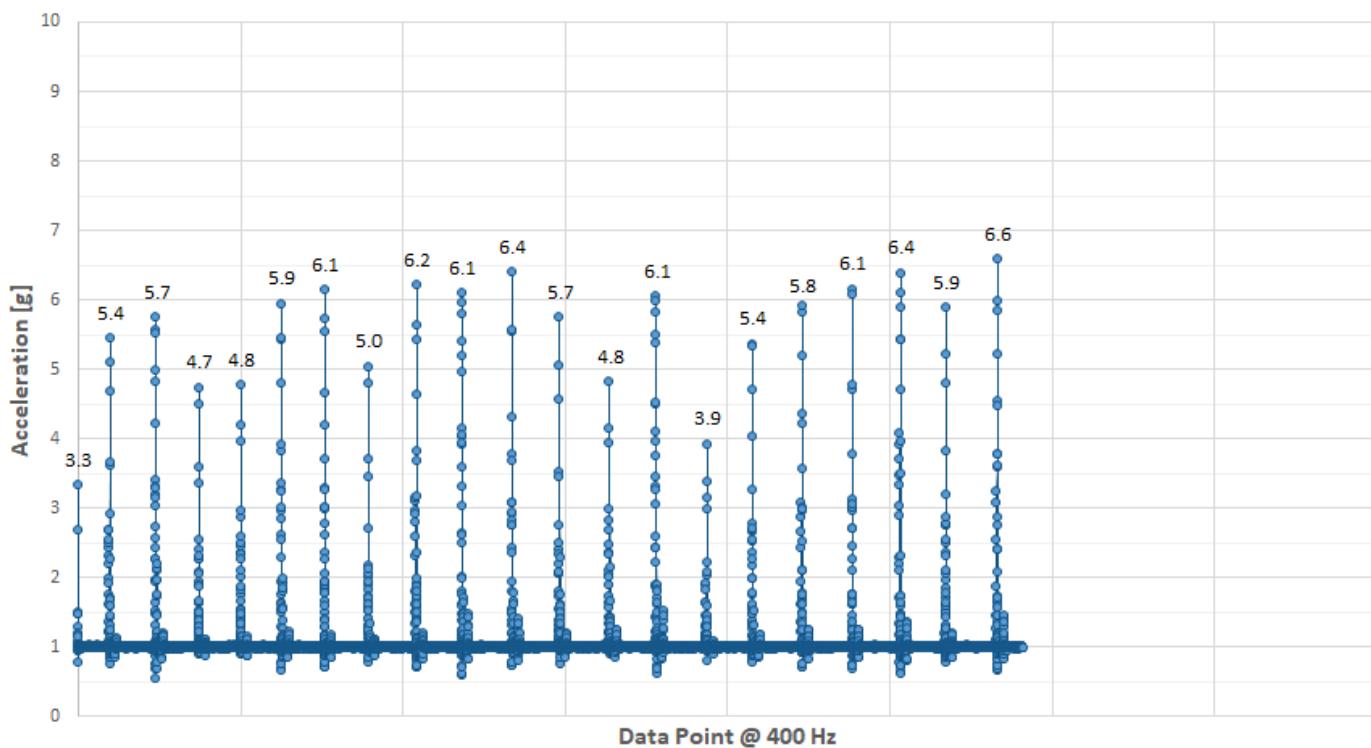
Z Acceleration (Up and Down) - Casper (V2)



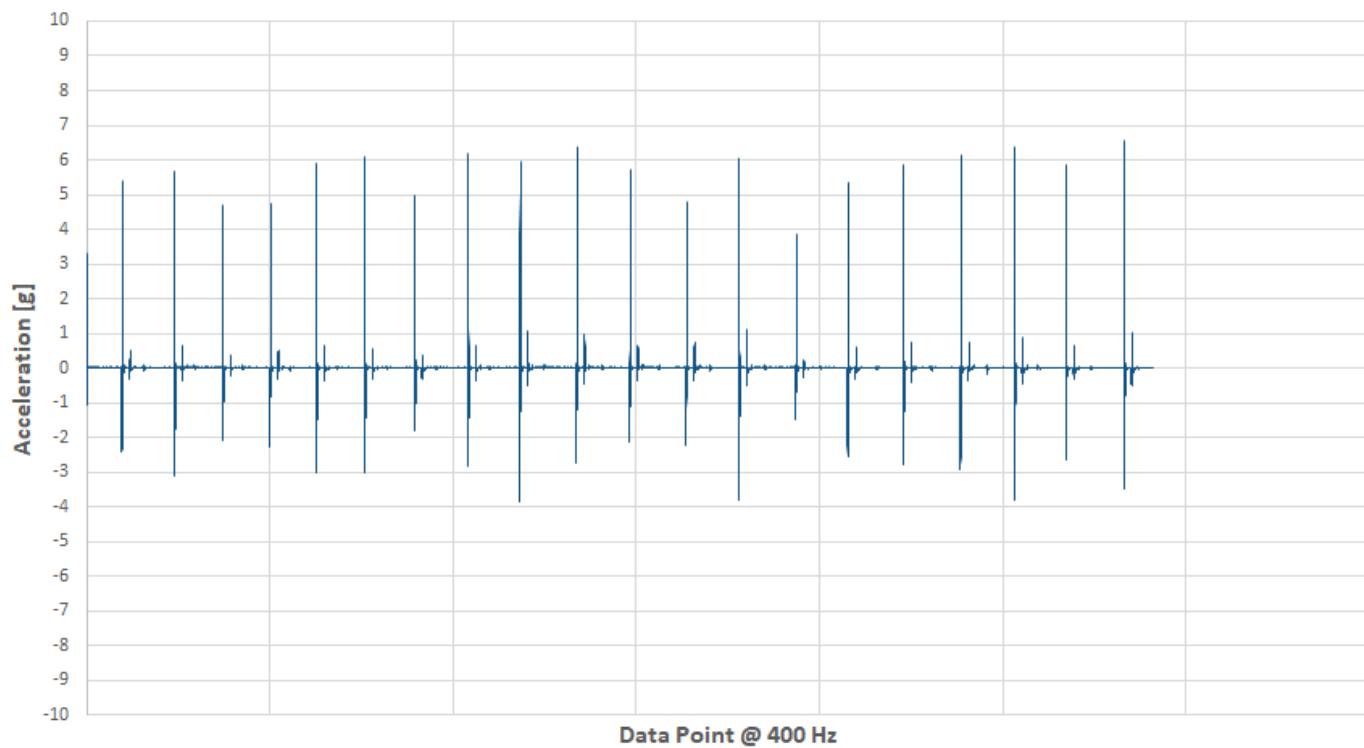


## TEST 3 – ENDY (V2)

Vector Magnitude Acceleration - Endy (V2)

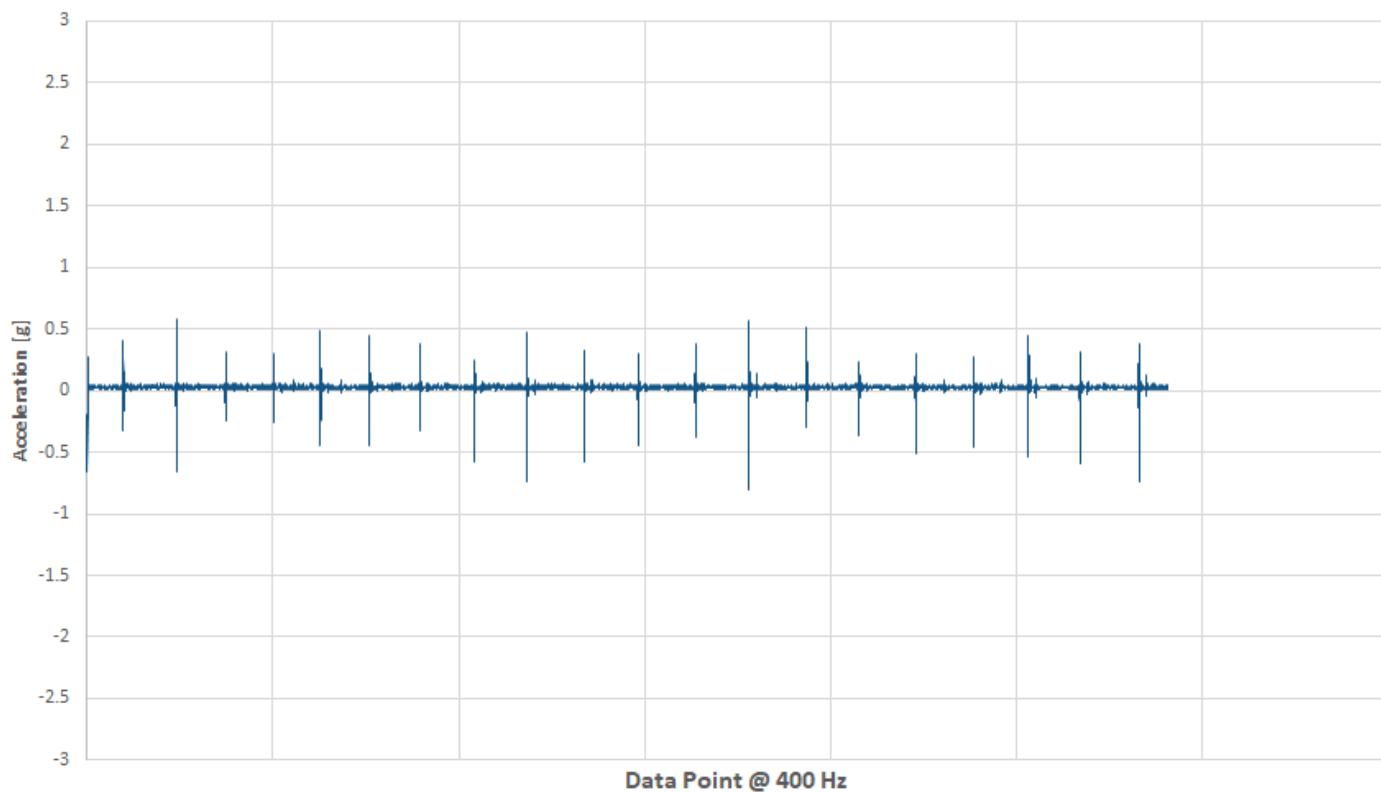


X Acceleration (Side to Side) - Endy (V2)

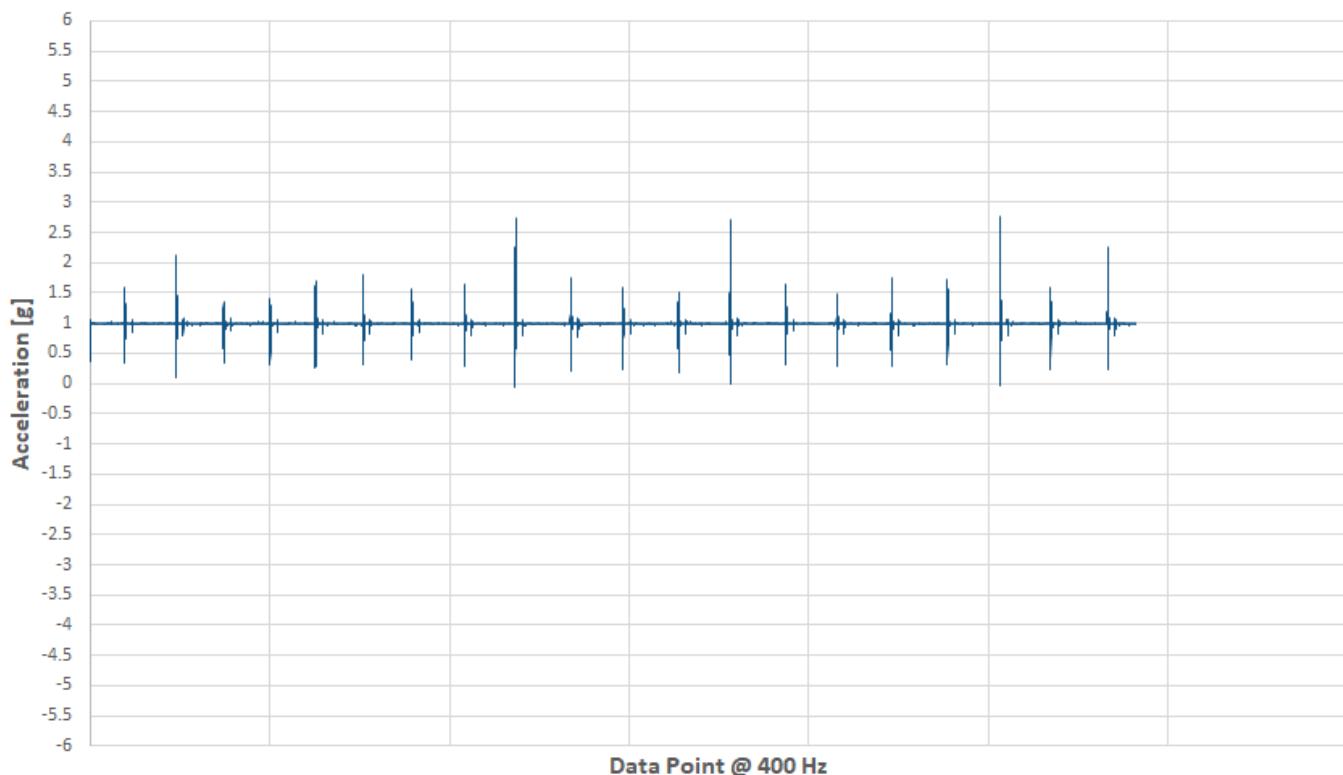




Y Acceleration (Head to Toe) - Endy (V2)



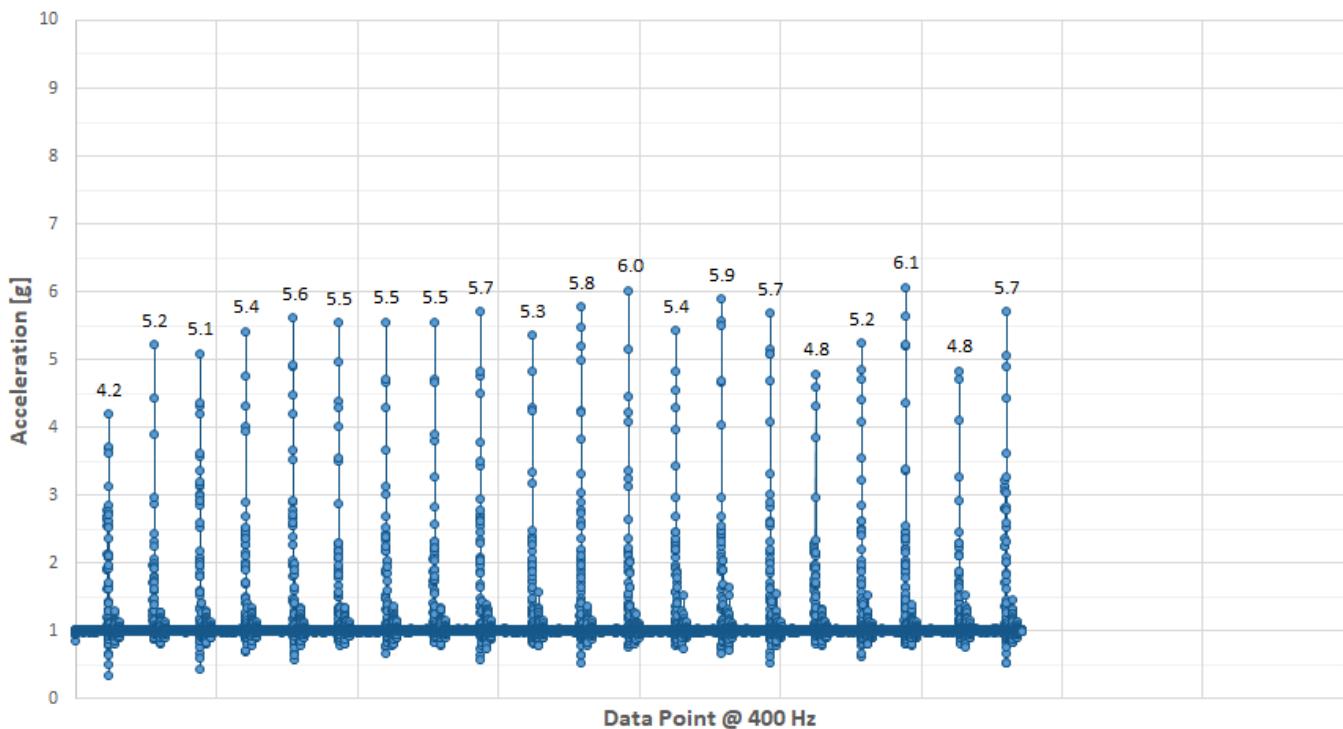
Z Acceleration (Up and Down) - Endy (V2)



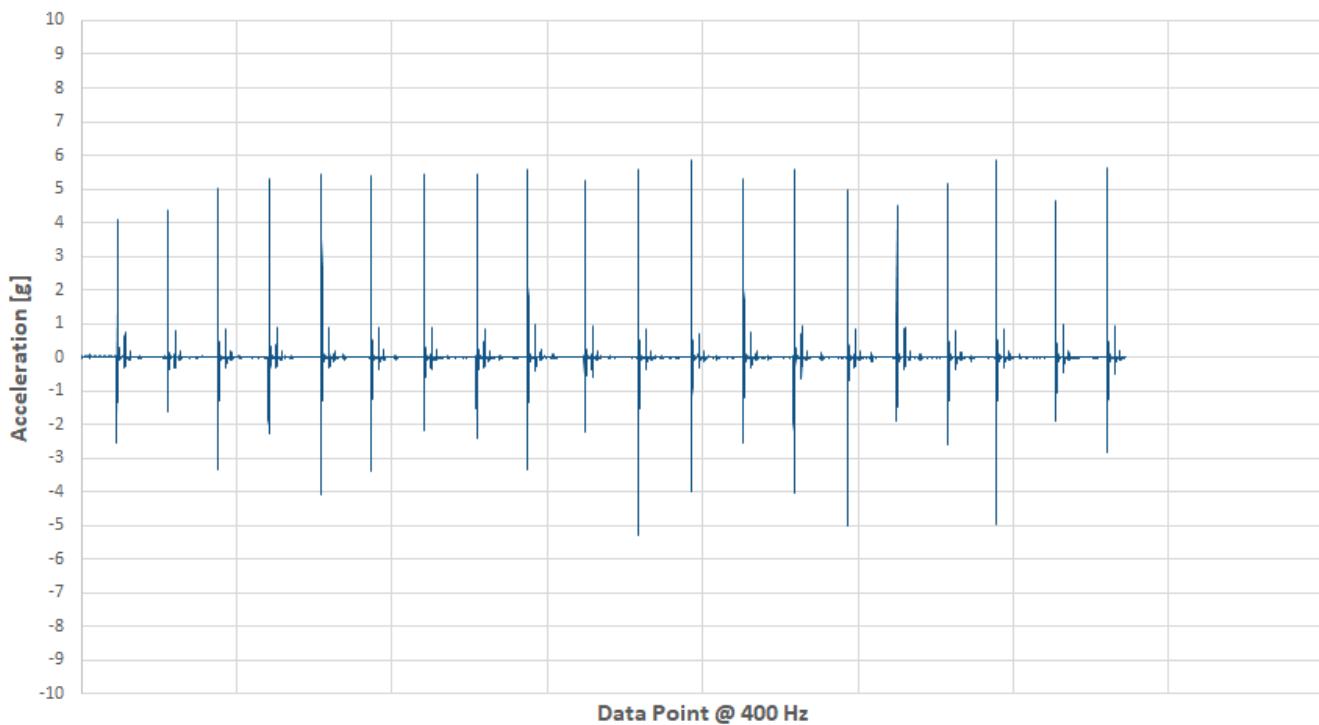


## TEST 3 – HELIX

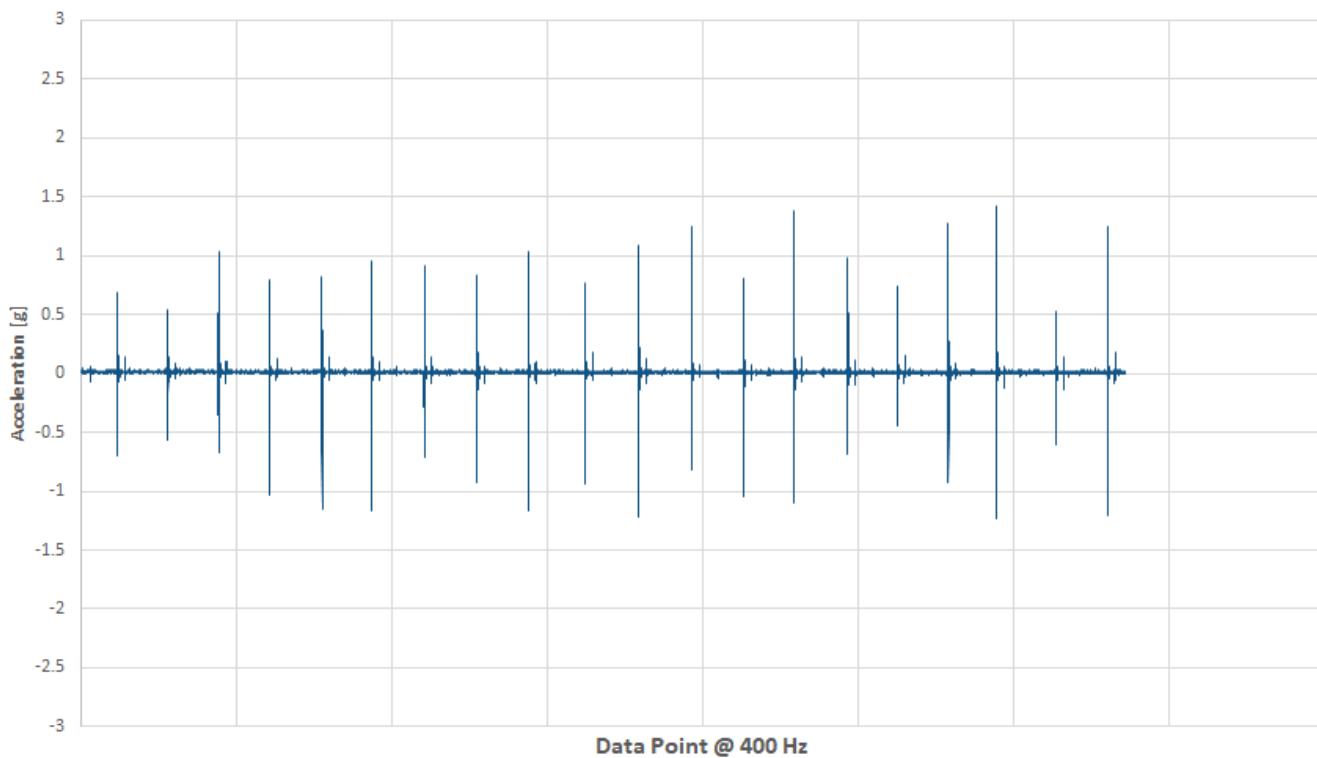
Vector Magnitude Acceleration - Helix



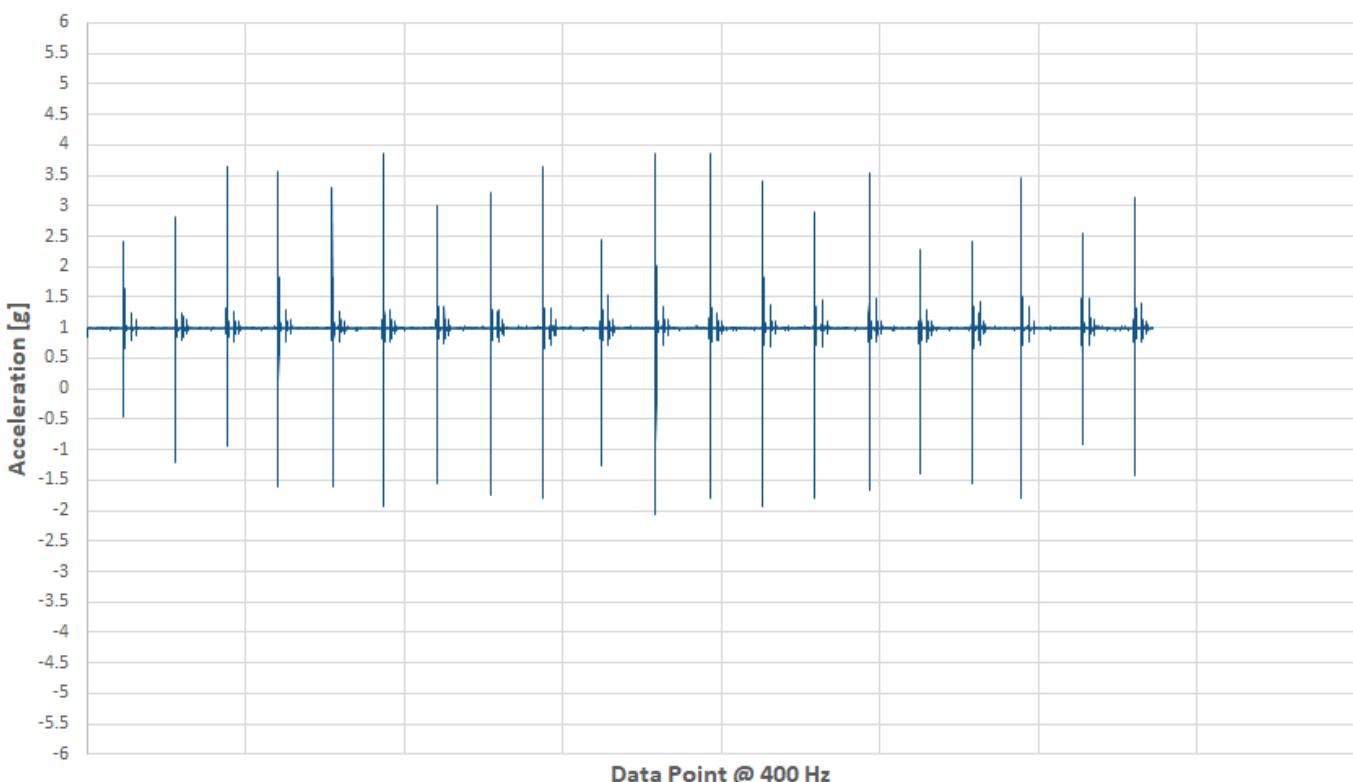
X Acceleration (Side to Side) - Helix



### Y Acceleration (Head to Toe) - Helix



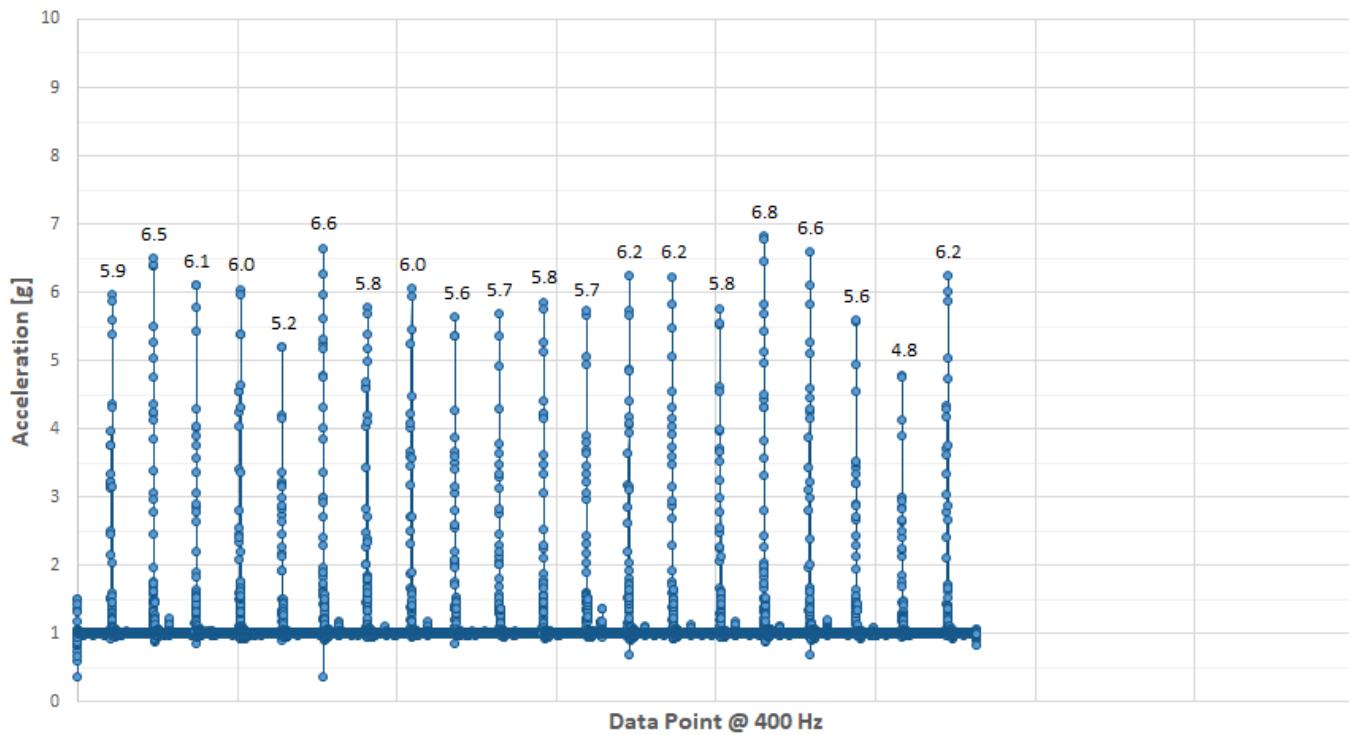
### Z Acceleration (Up and Down) - Helix



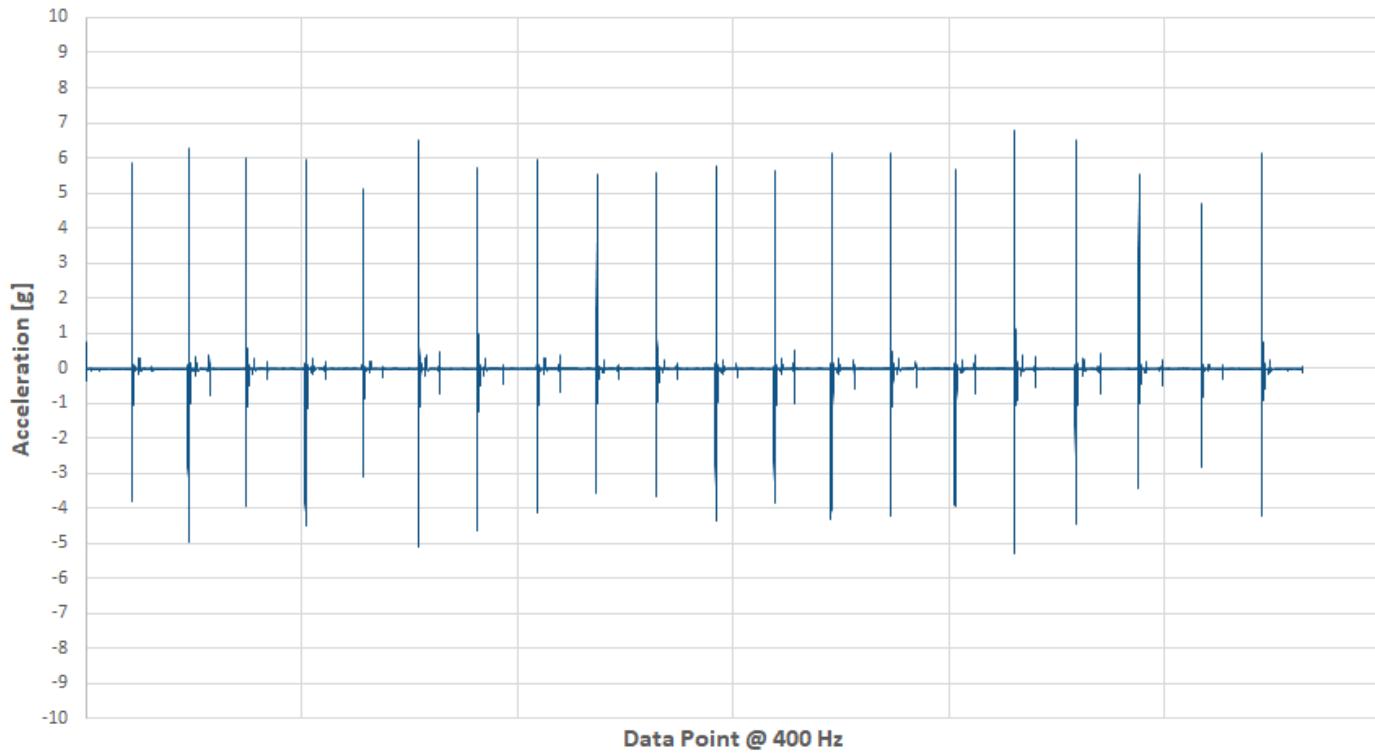


## TEST 3 – LAYLA (SOFT)

Vector Magnitude Acceleration - Layla (Soft)

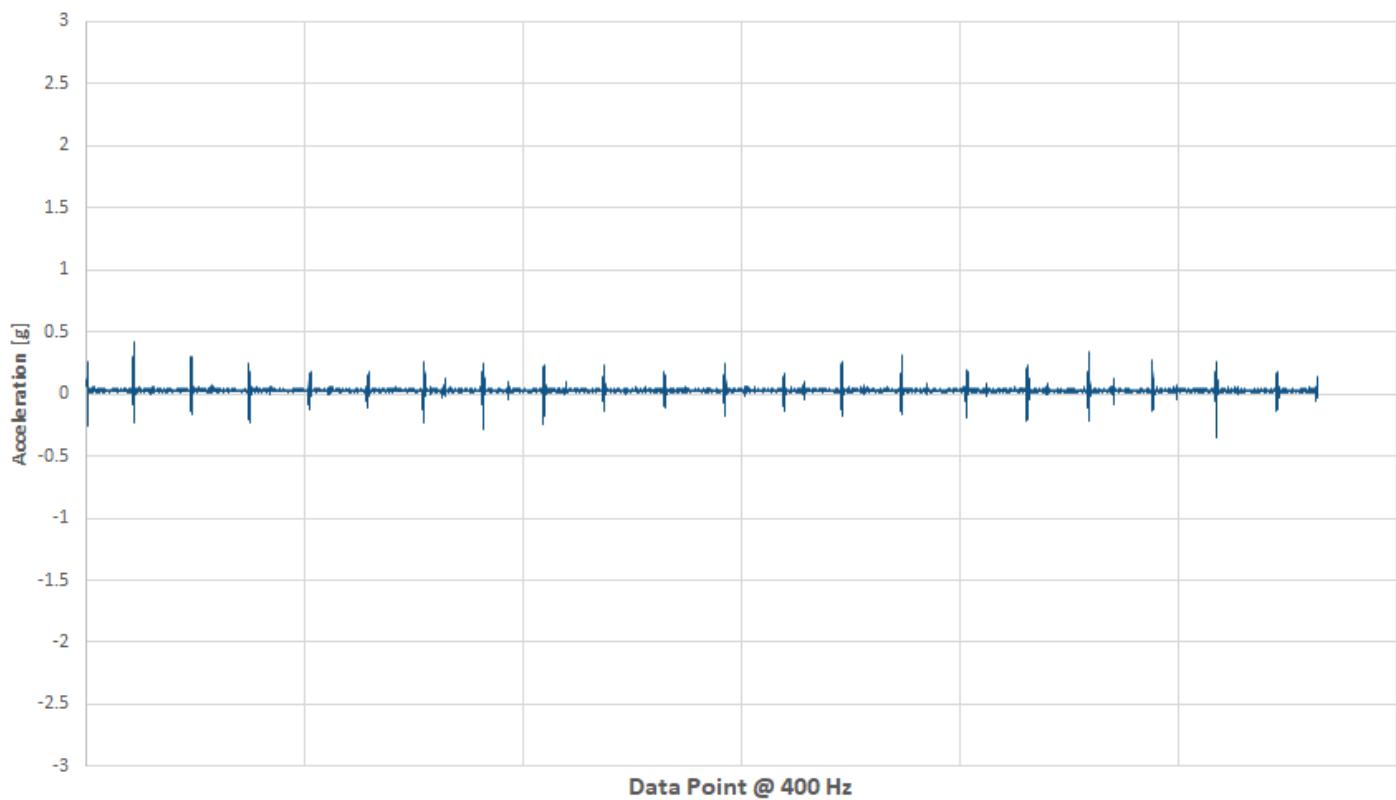


X Acceleration (Side to Side) - Layla (Soft)

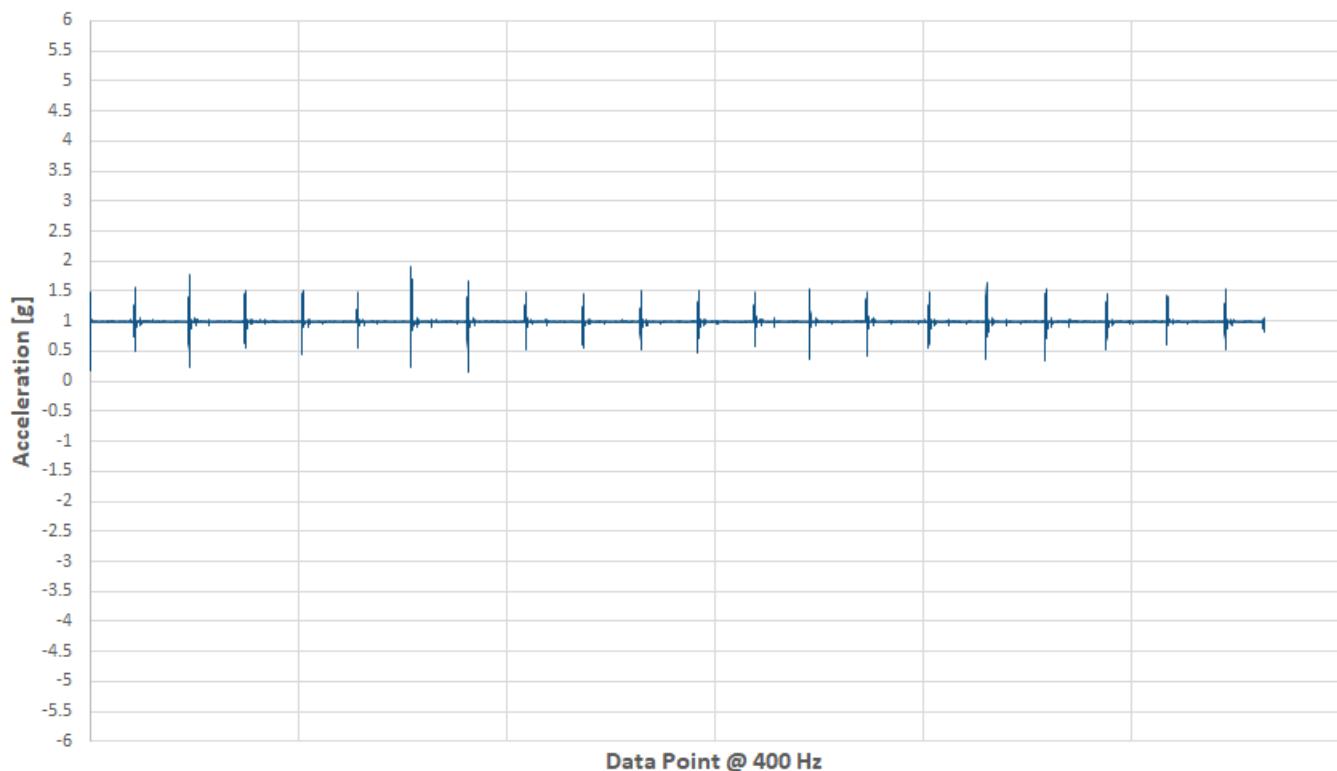




**Y Acceleration (Head to Toe) - Layla (Soft)**



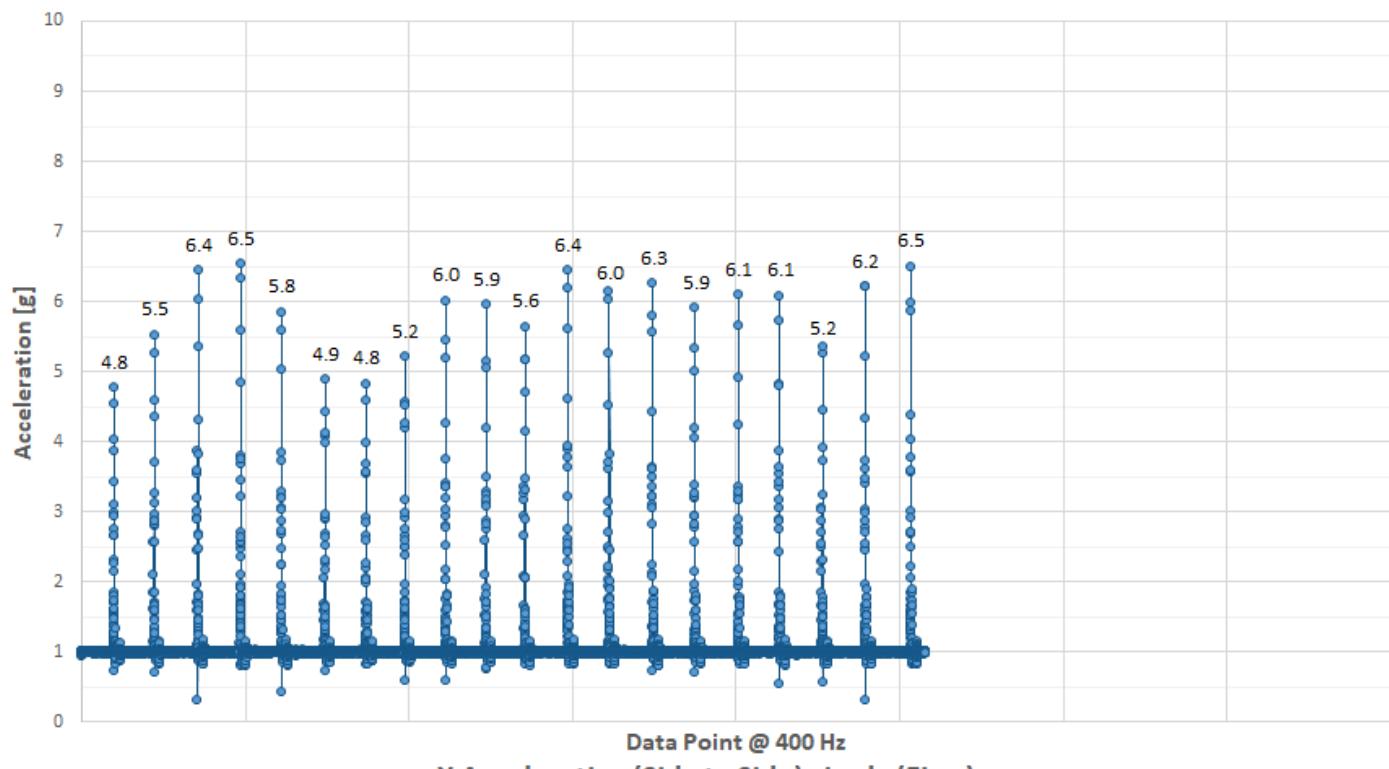
**Z Acceleration (Up and Down) - Layla (Soft)**



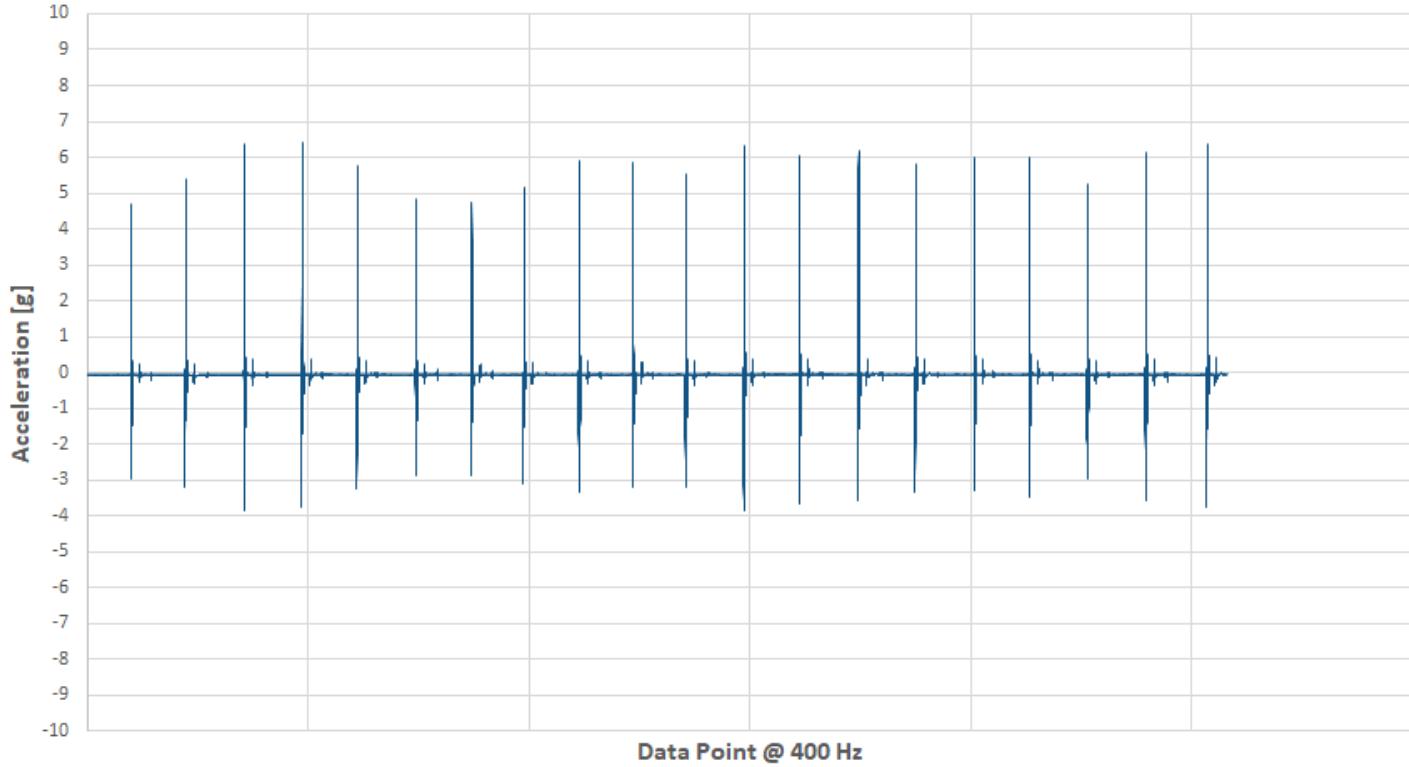


## TEST 3 – LAYLA (FIRM)

Vector Magnitude Acceleration - Layla (Firm)

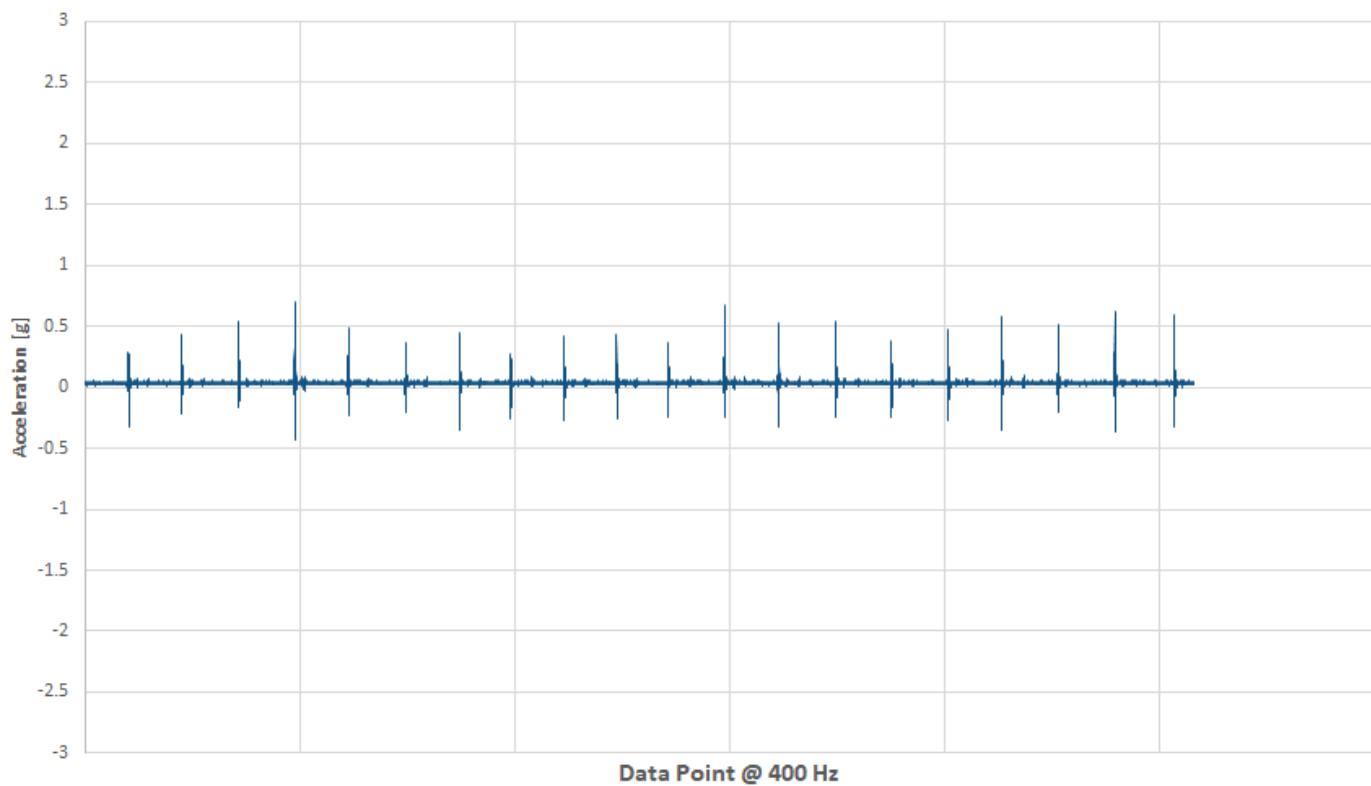


X Acceleration (Side to Side) - Layla (Firm)

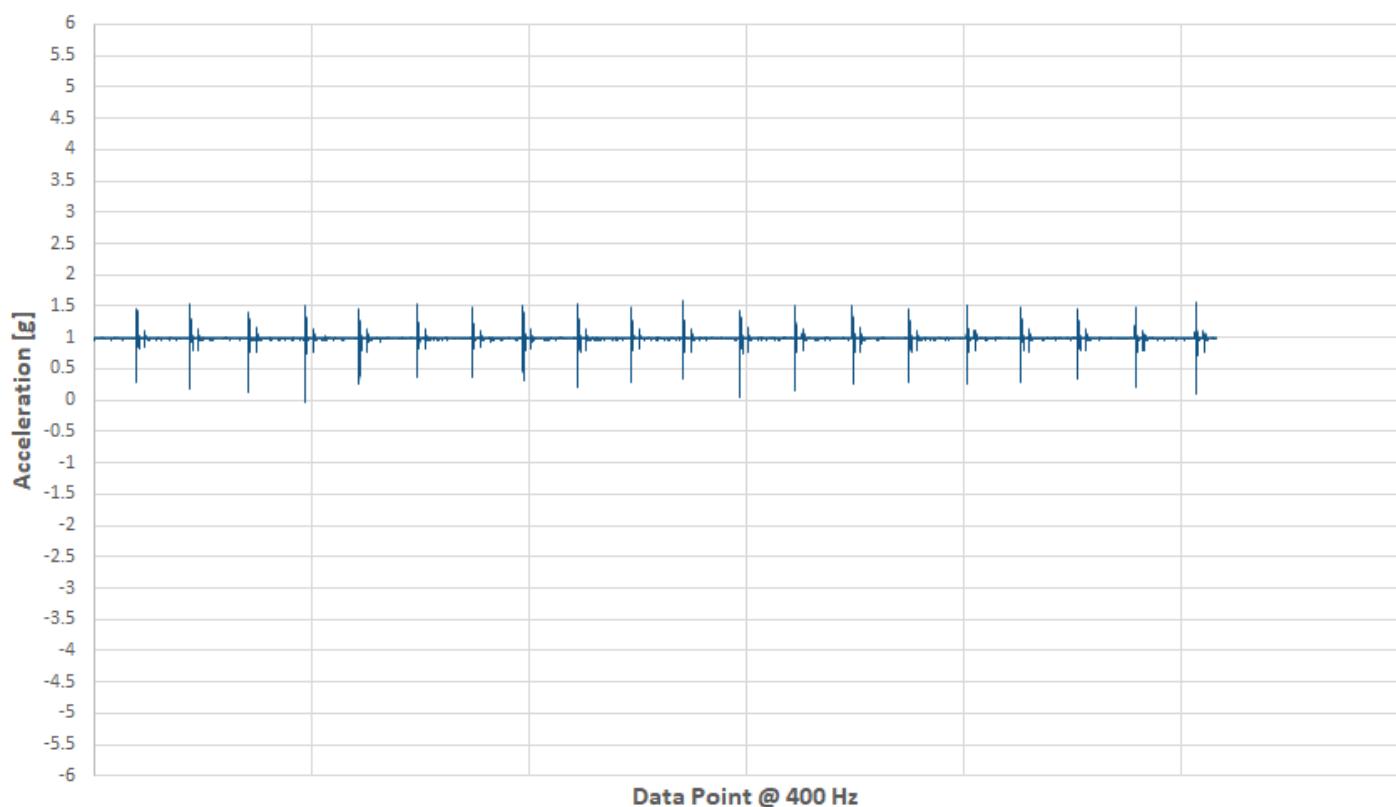




**Y Acceleration (Head to Toe) - Layla (Firm)**



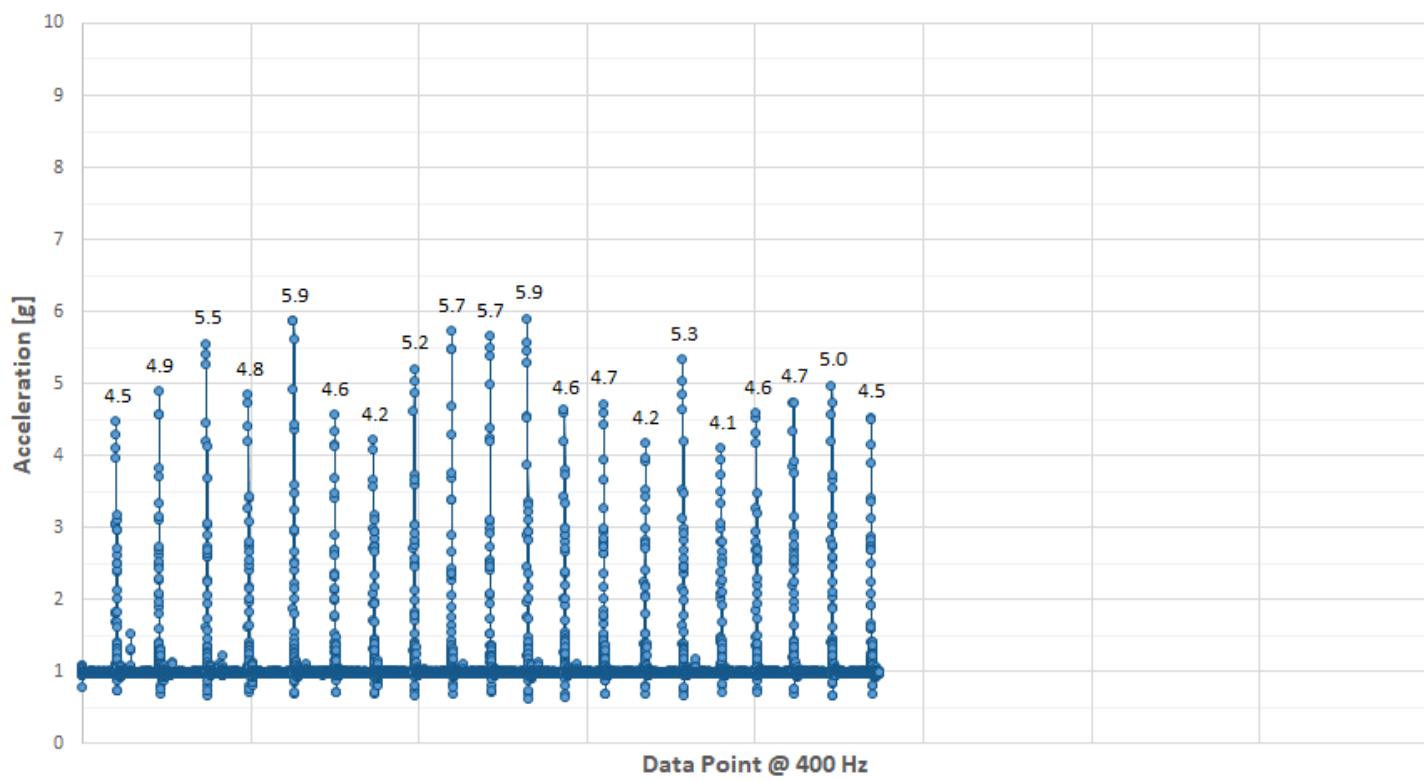
**Z Acceleration (Up and Down) - Layla (Firm)**



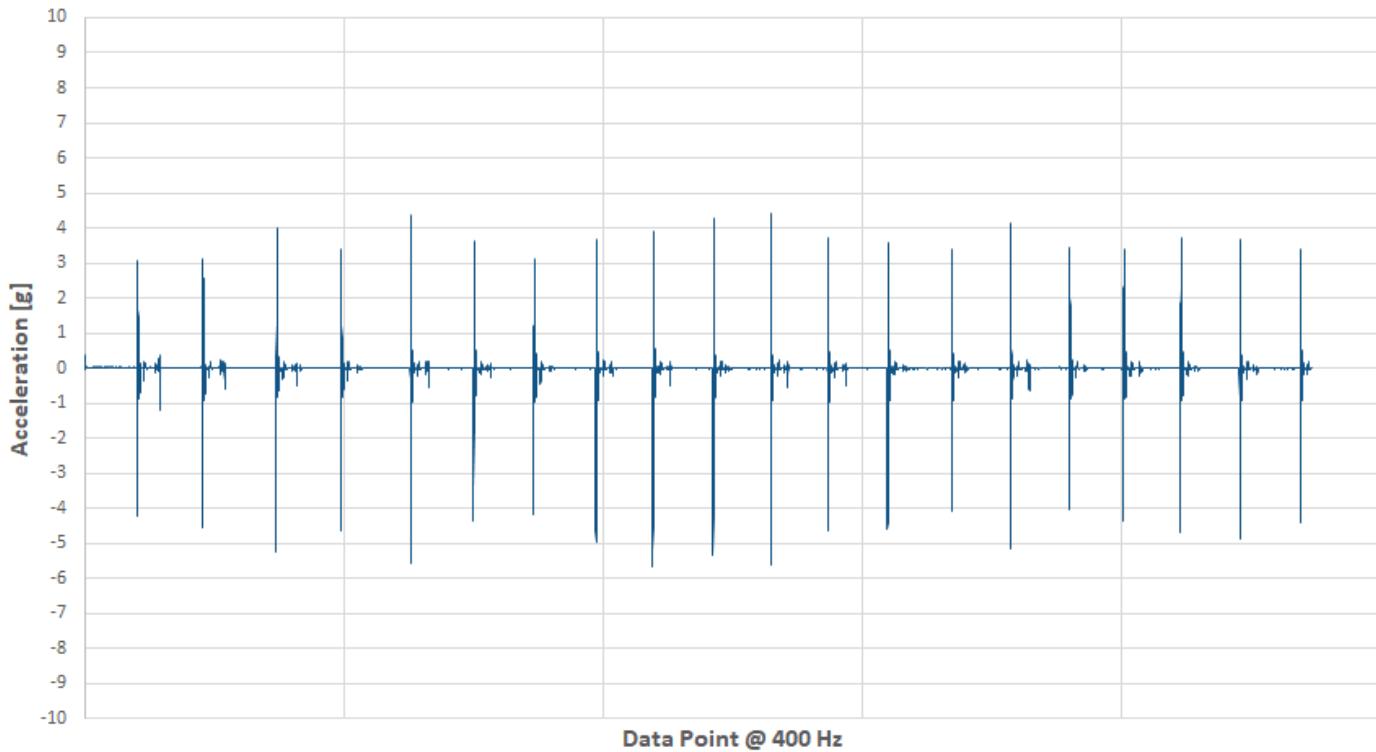


## TEST 3 – PUFFY

Vector Magnitude Acceleration - Puffy

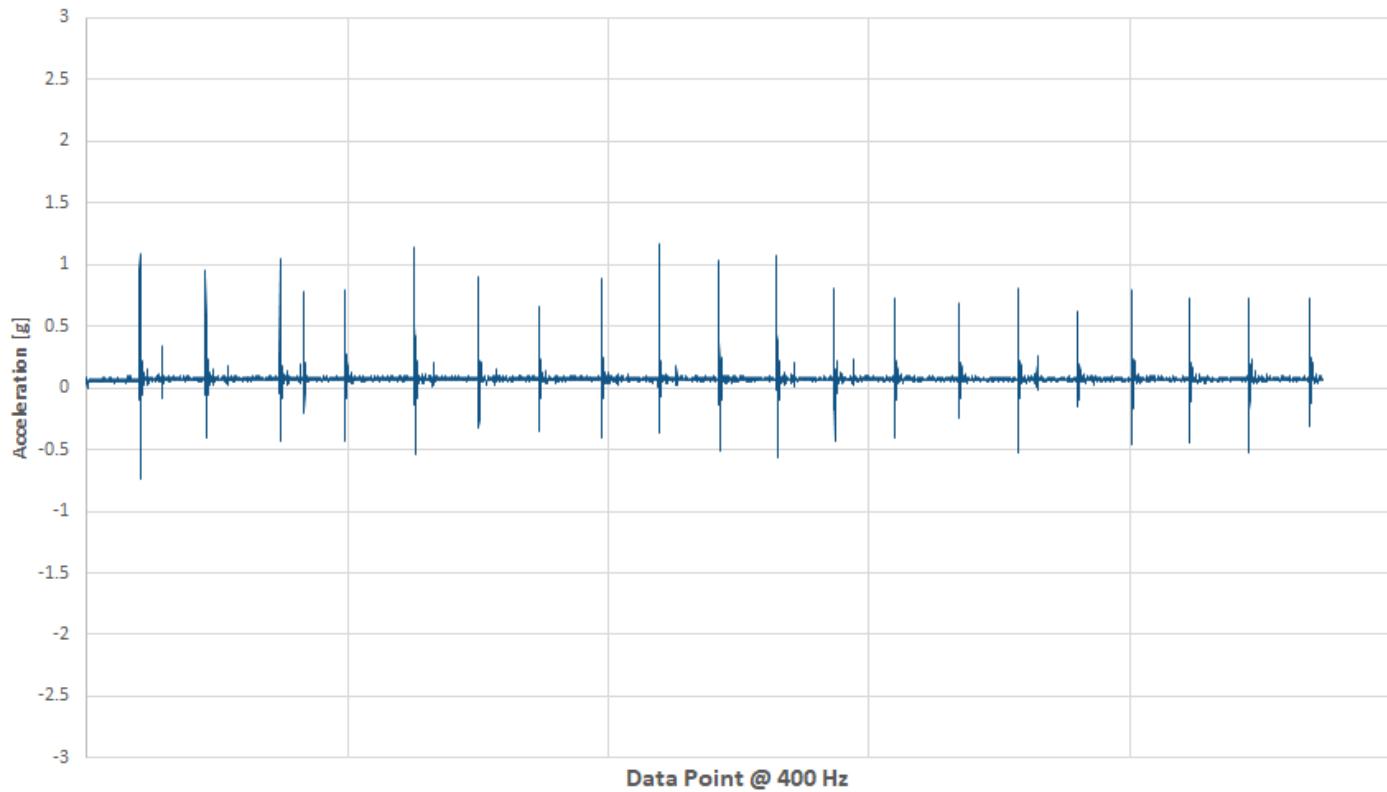


X Acceleration (Side to Side) - Puffy

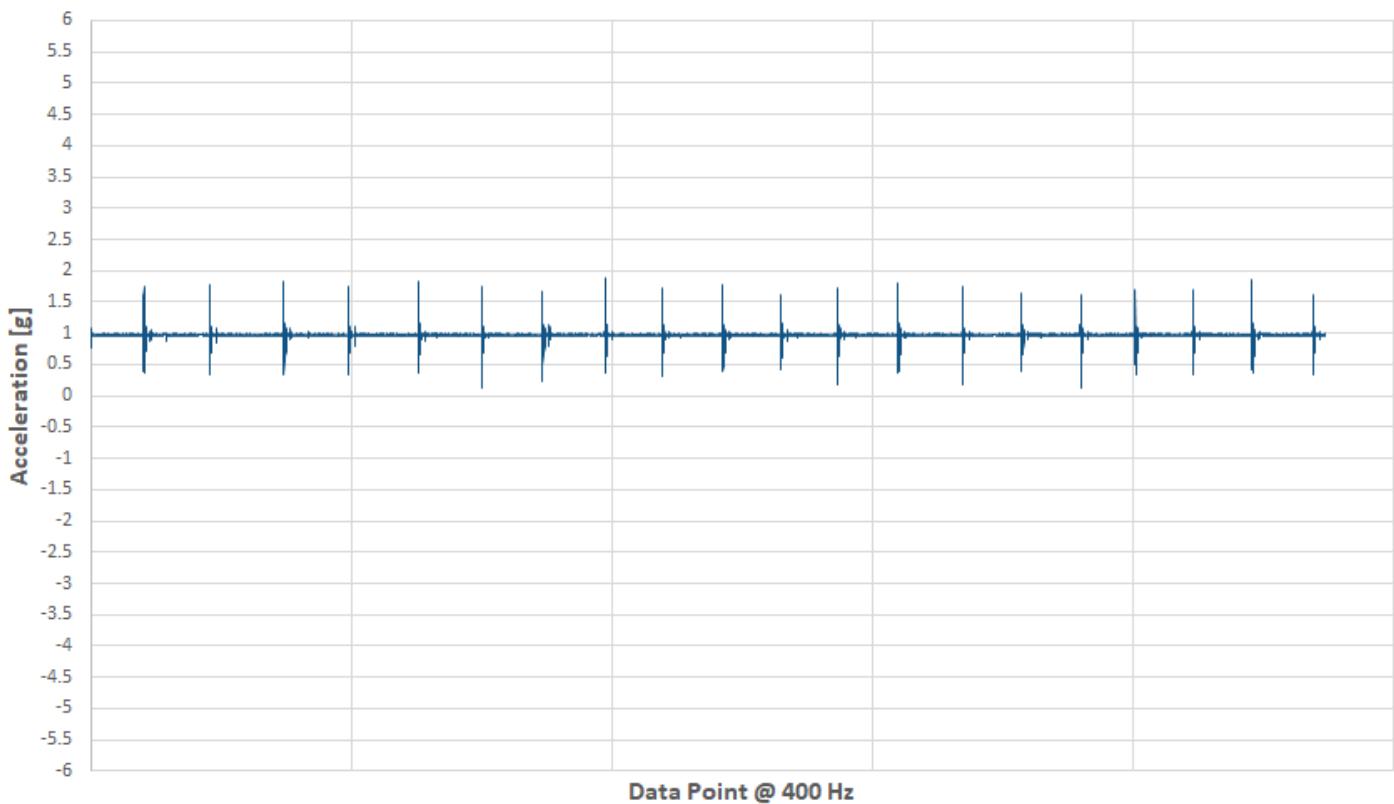




Y Acceleration (Head to Toe) - Puffy



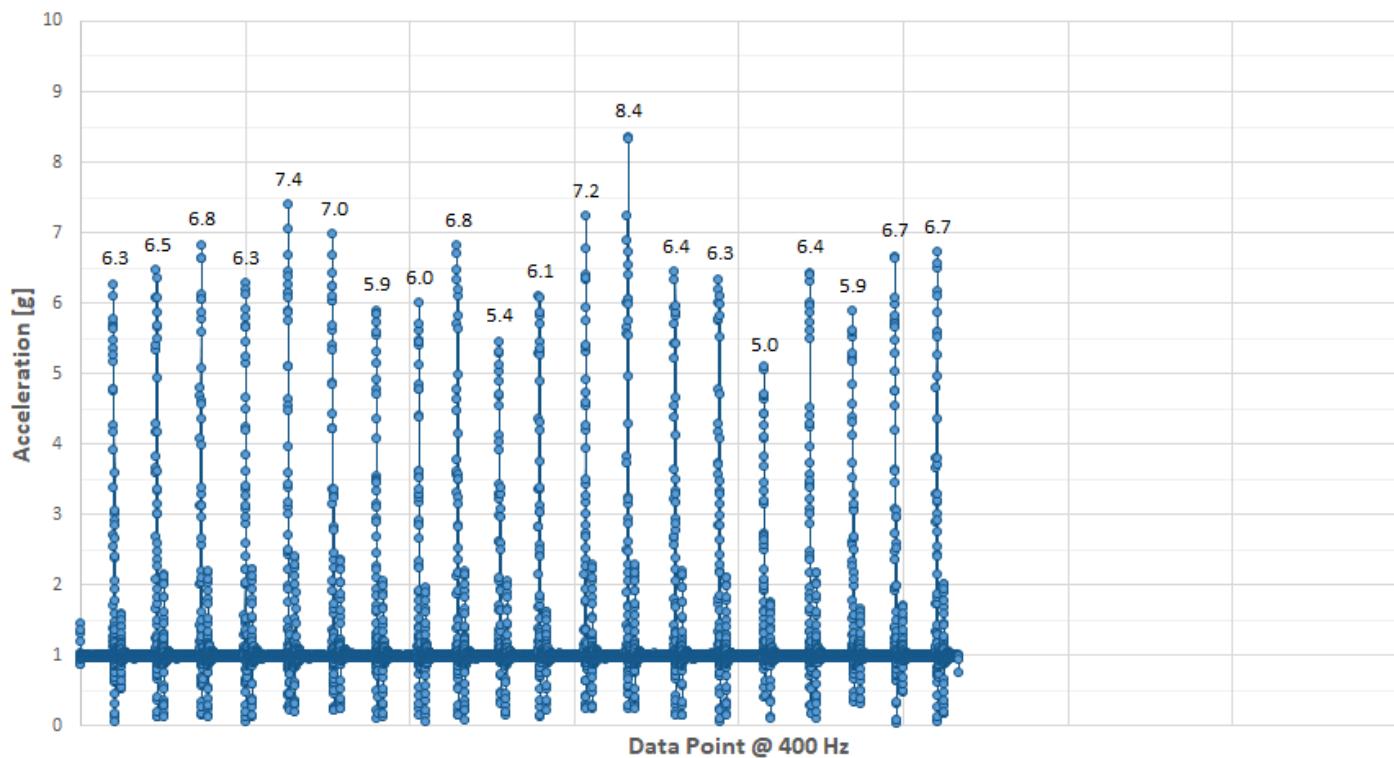
Z Acceleration (Up and Down) - Puffy



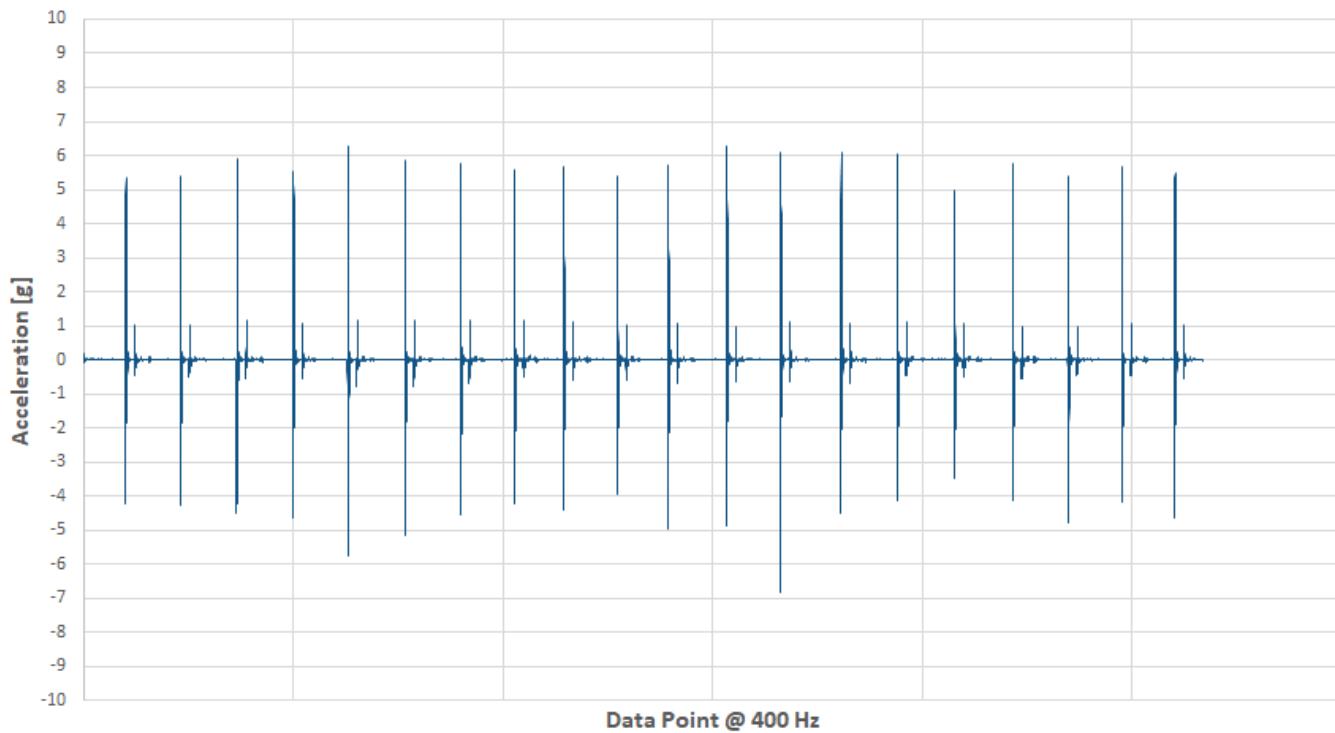


## TEST 3 – SEALY POSTUREPEDIC

Vector Magnitude Acceleration - Sealy Posturepedic

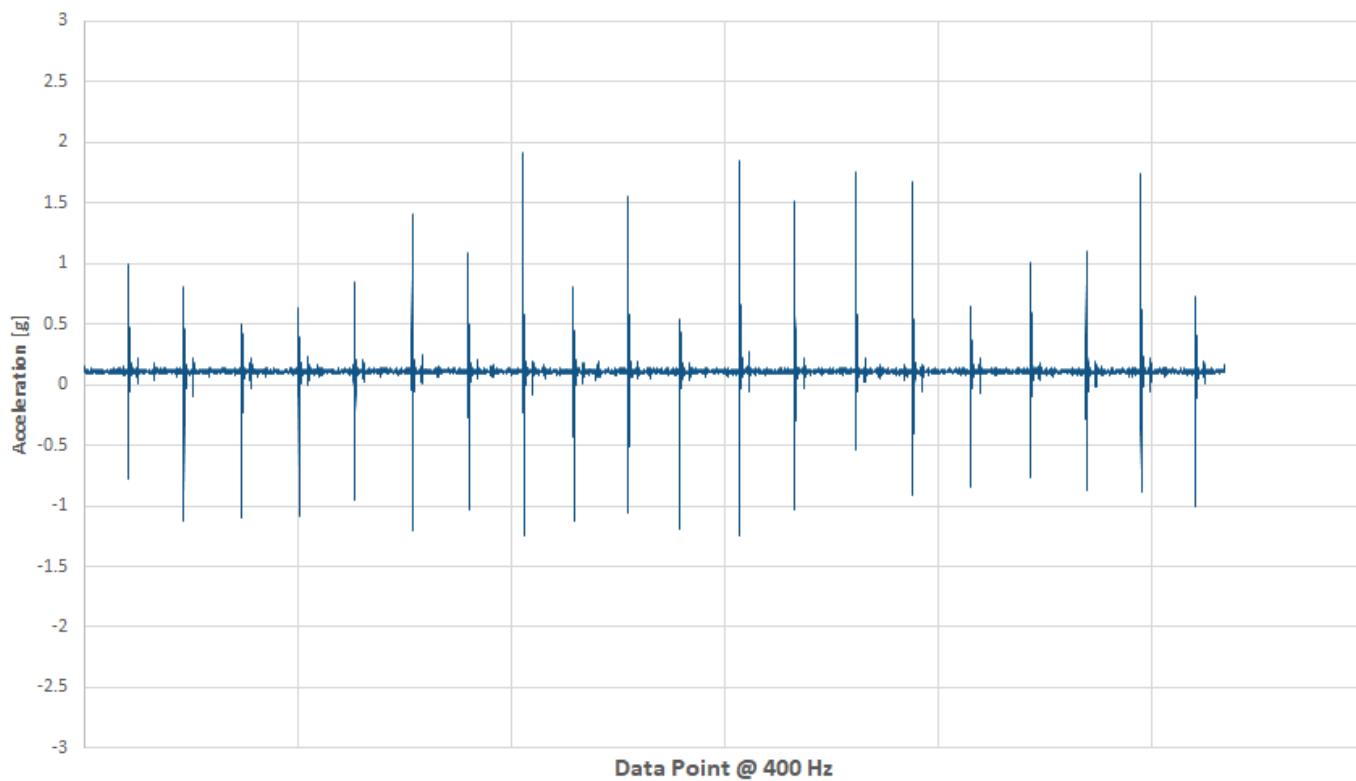


X Acceleration (Side to Side) - Sealy Posturepedic

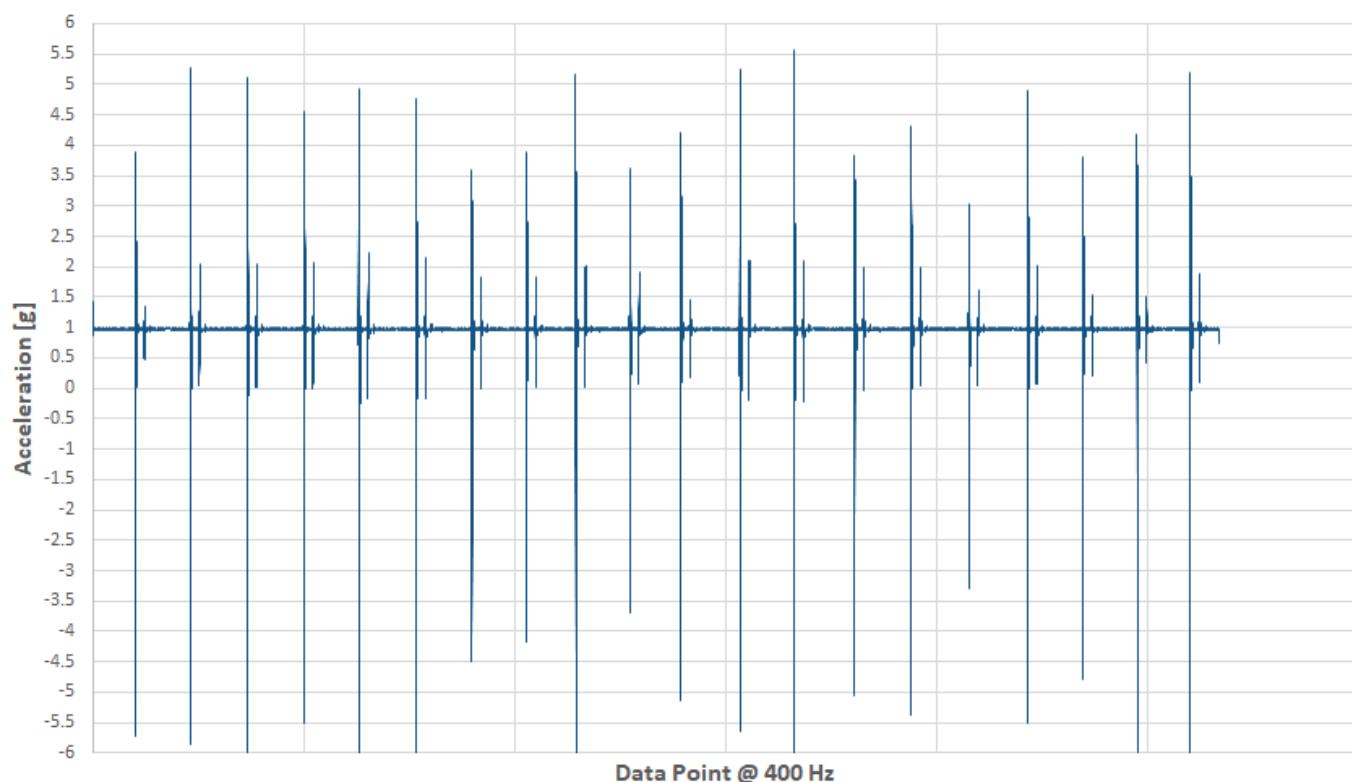




Y Acceleration (Head to Toe) - Sealy Posturepedic



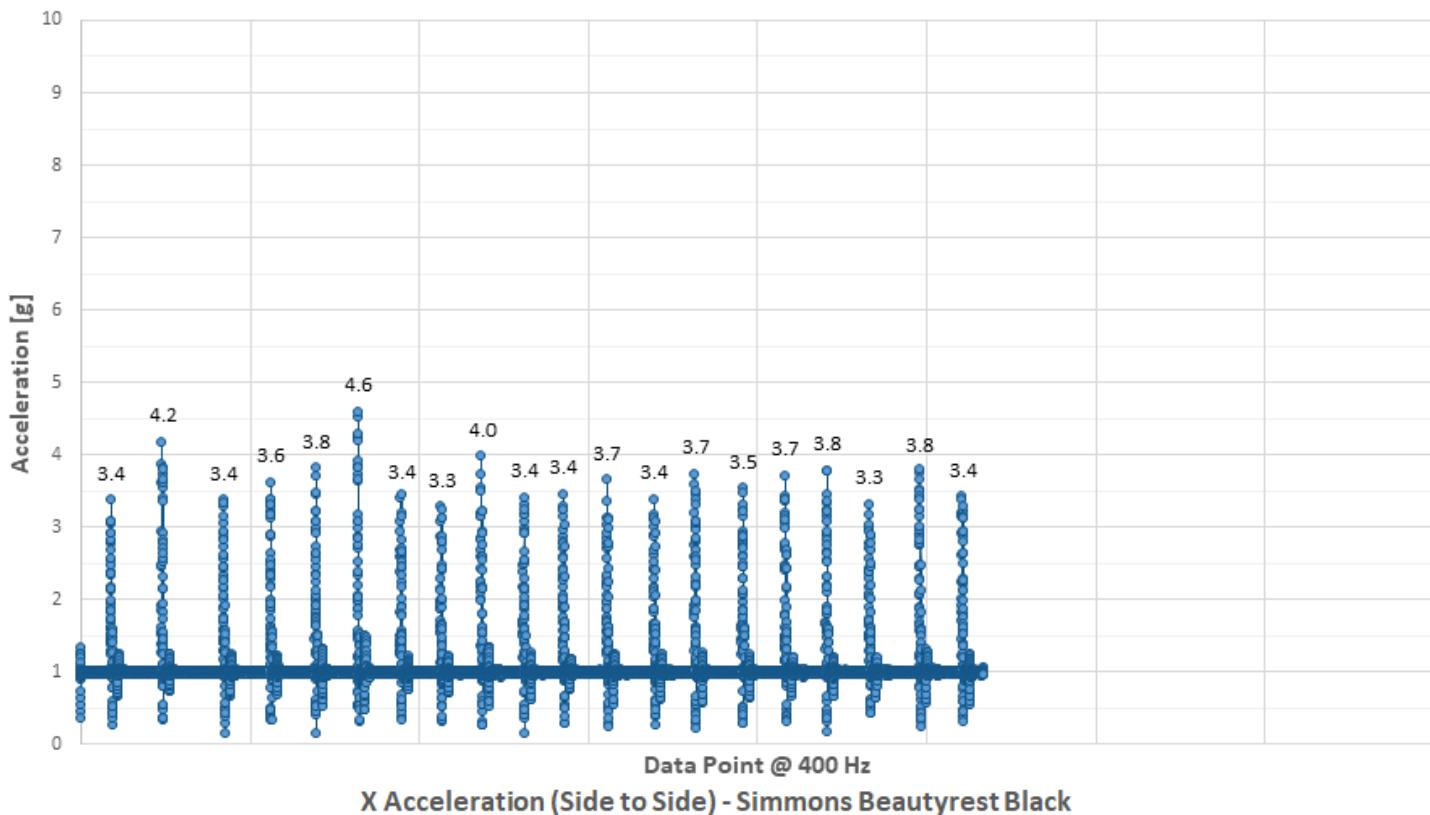
Z Acceleration (Up and Down) - Sealy Posturepedic



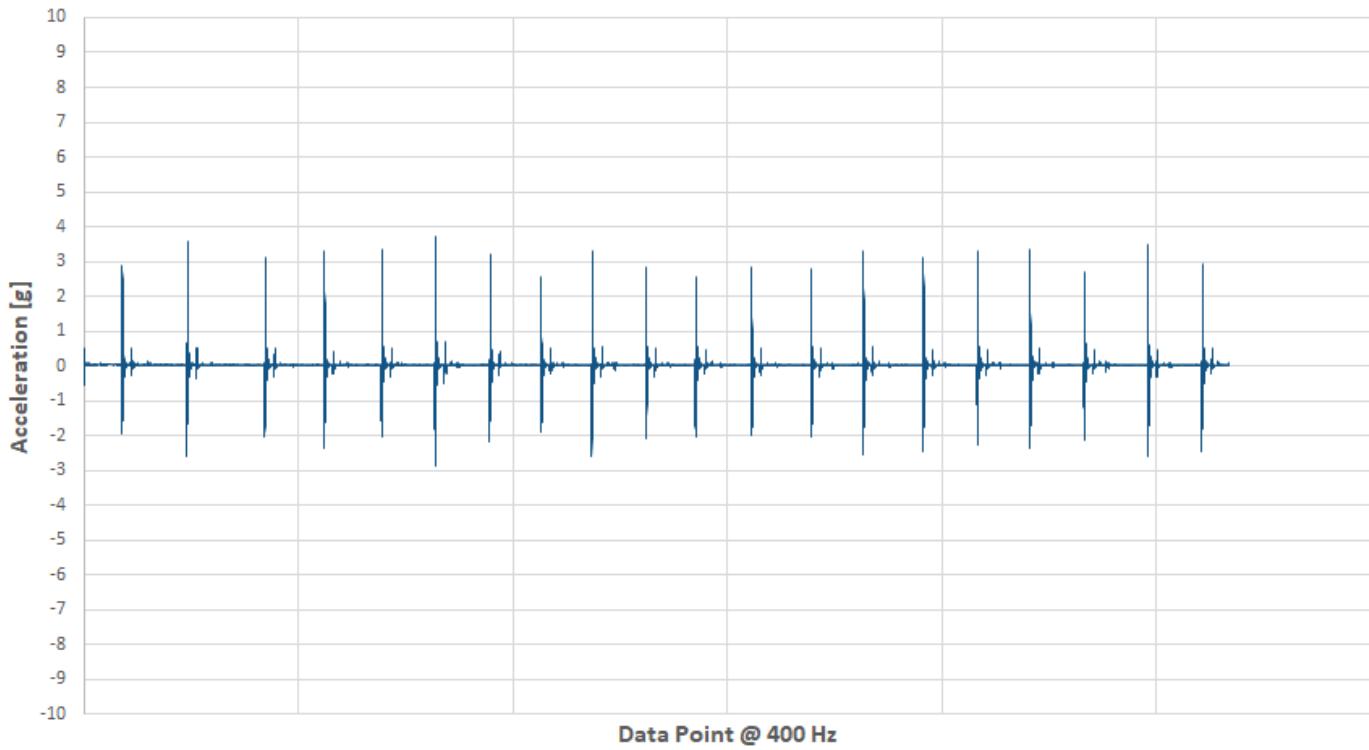


## TEST 3 – SIMMONS BEAUTYREST BLACK

Vector Magnitude Acceleration - Simmons Beautyrest Black

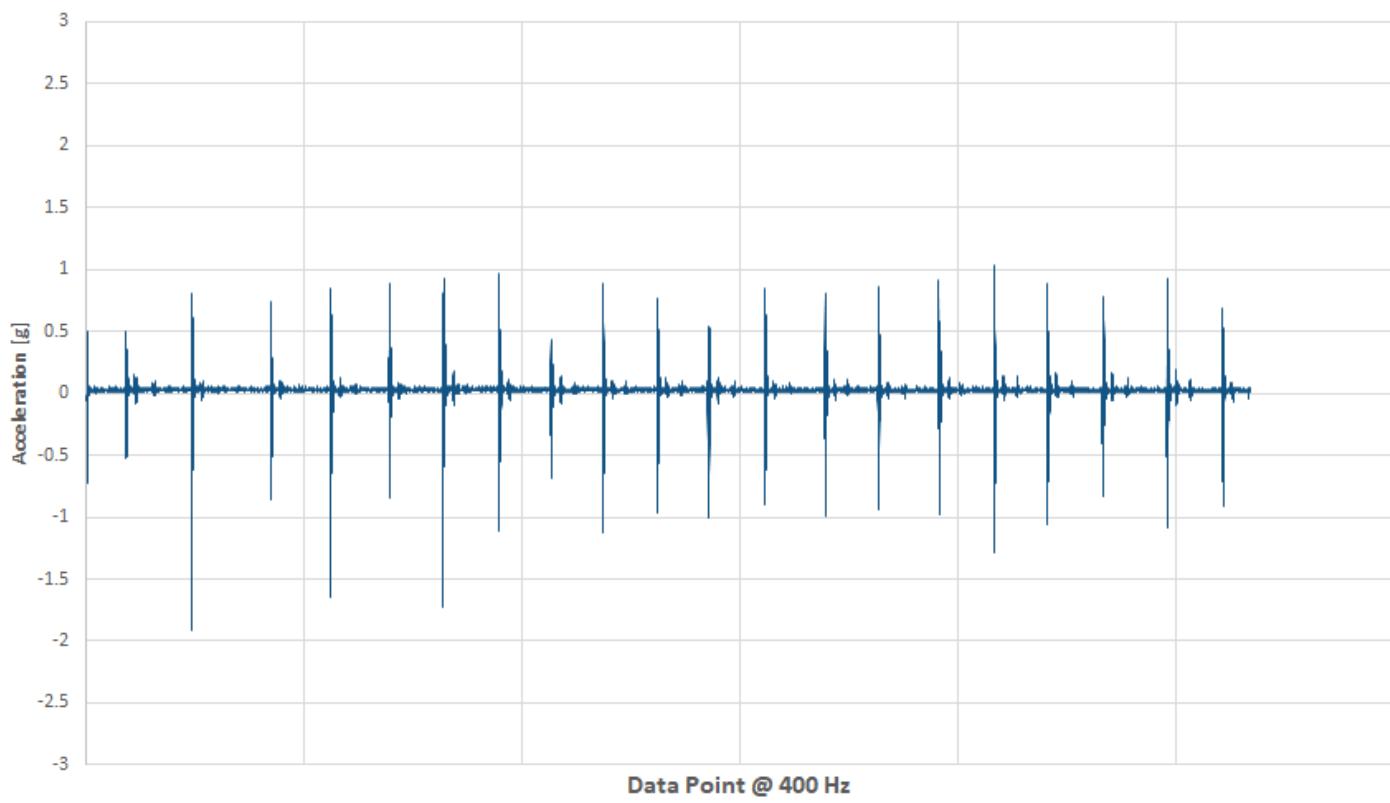


X Acceleration (Side to Side) - Simmons Beautyrest Black

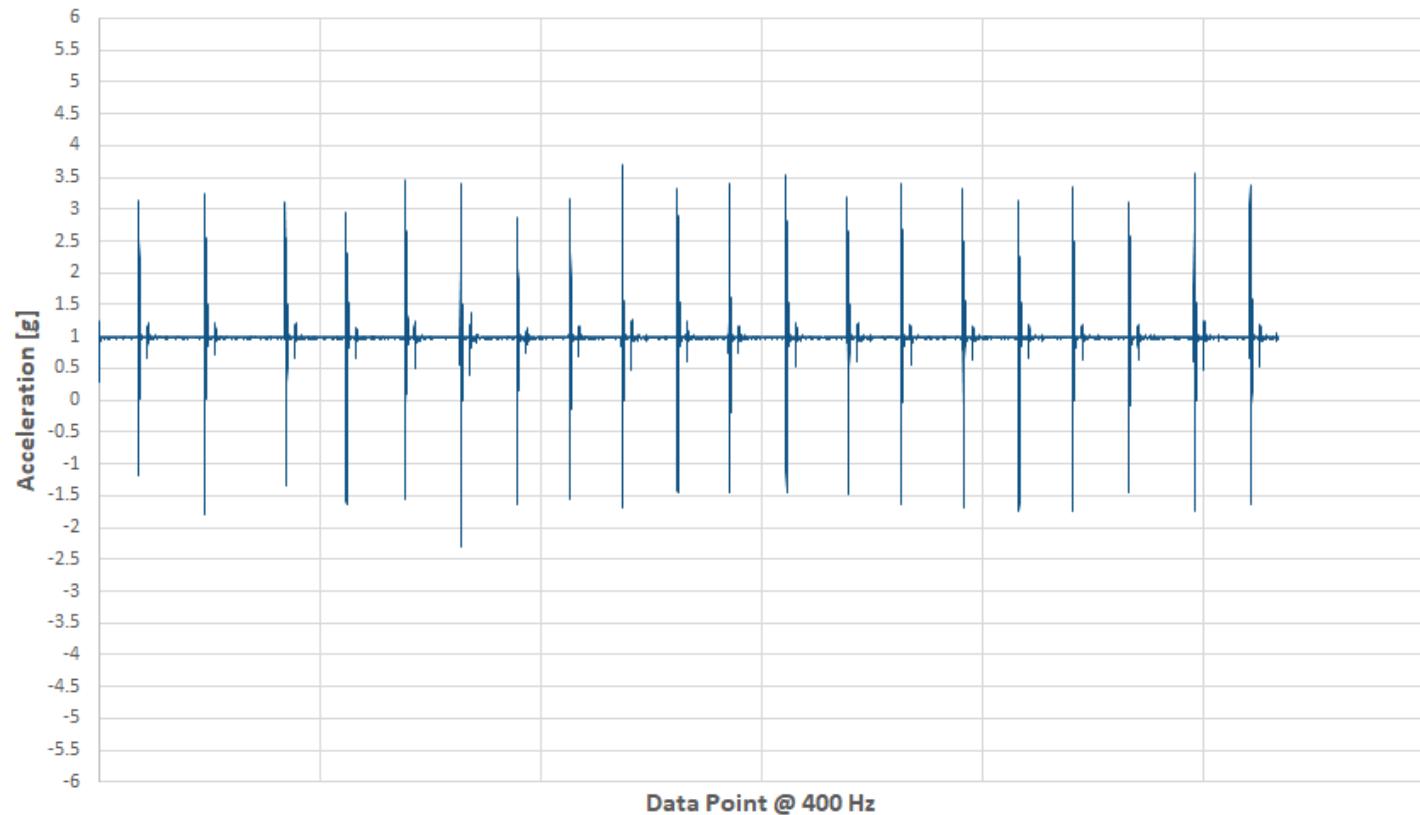




**Y Acceleration (Head to Toe) - Simmons Beautyrest Black**



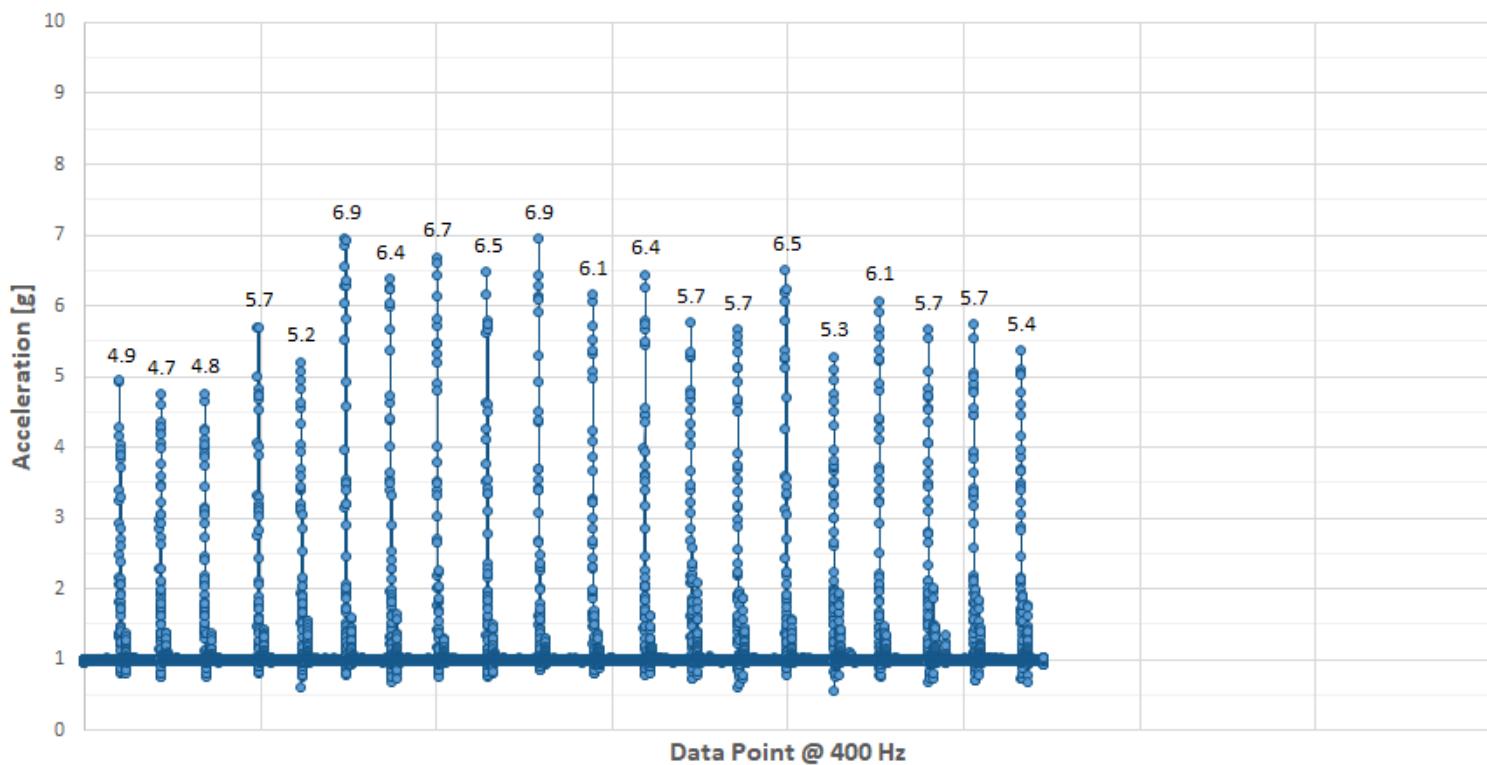
**Z Acceleration (Up and Down) - Simmons Beautyrest Black**



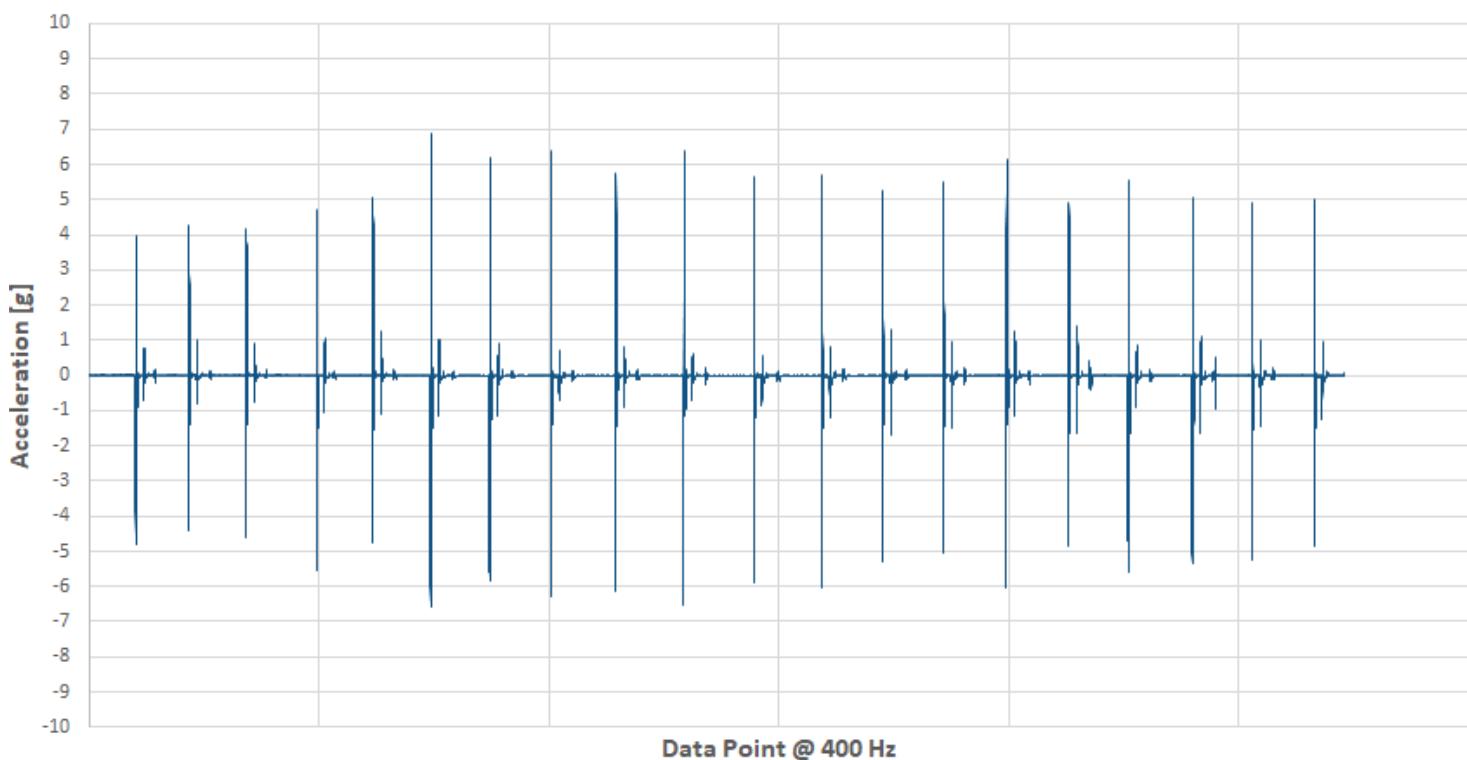


## TEST 3 – BLOOM AIR

Vector Magnitude Acceleration - Bloom Air

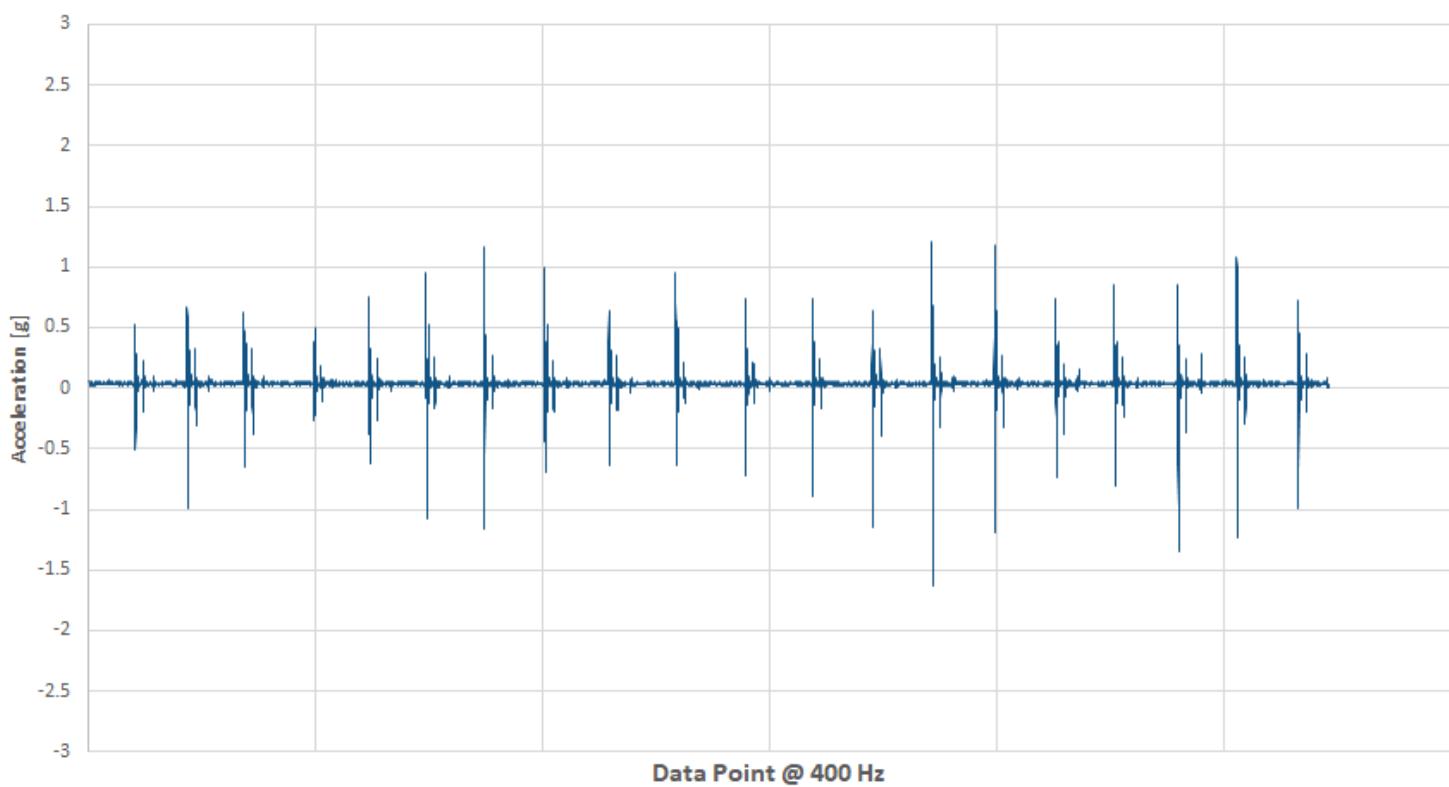


X Acceleration (Side to Side) - Bloom Air

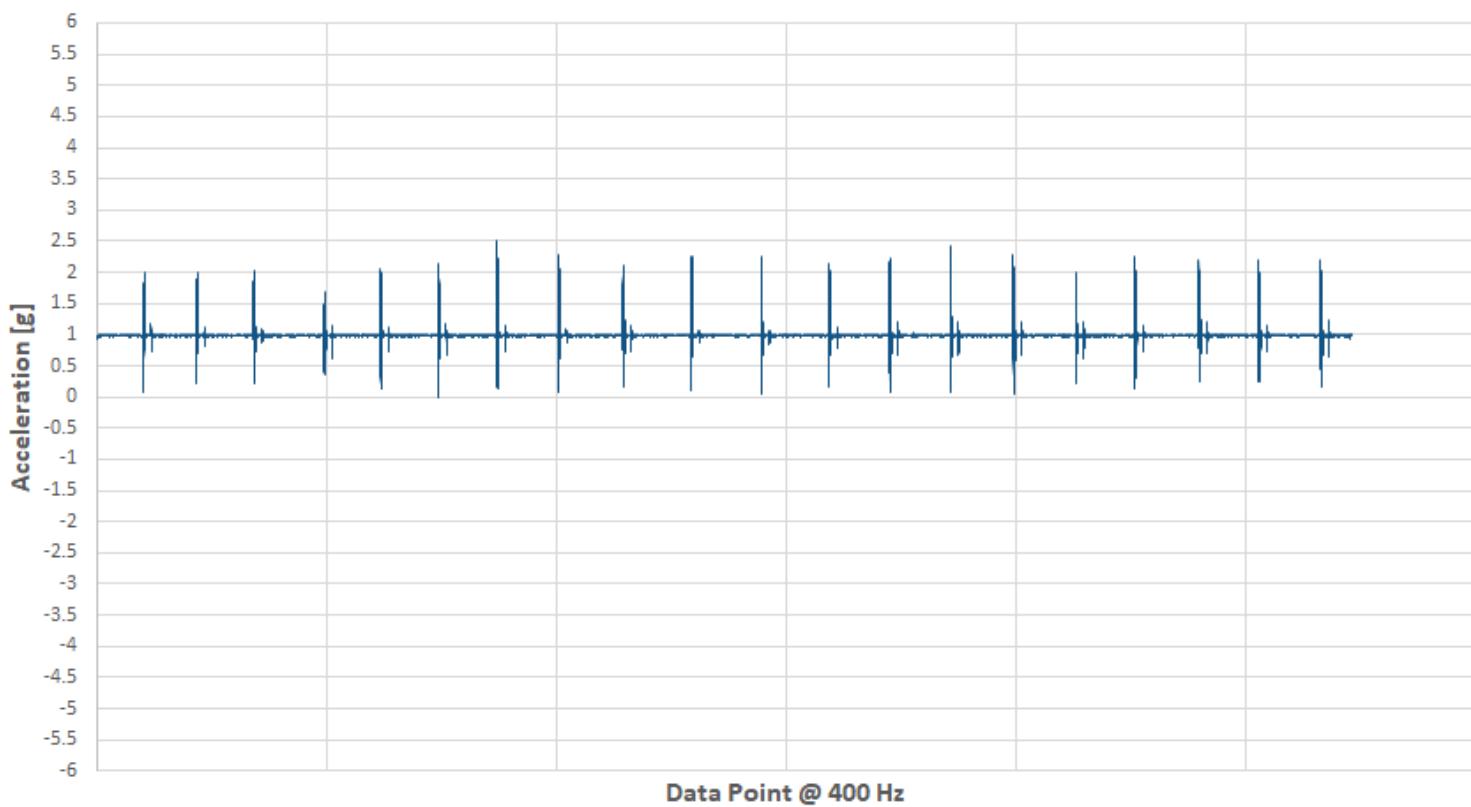




Y Acceleration (Head to Toe) - Bloom Air



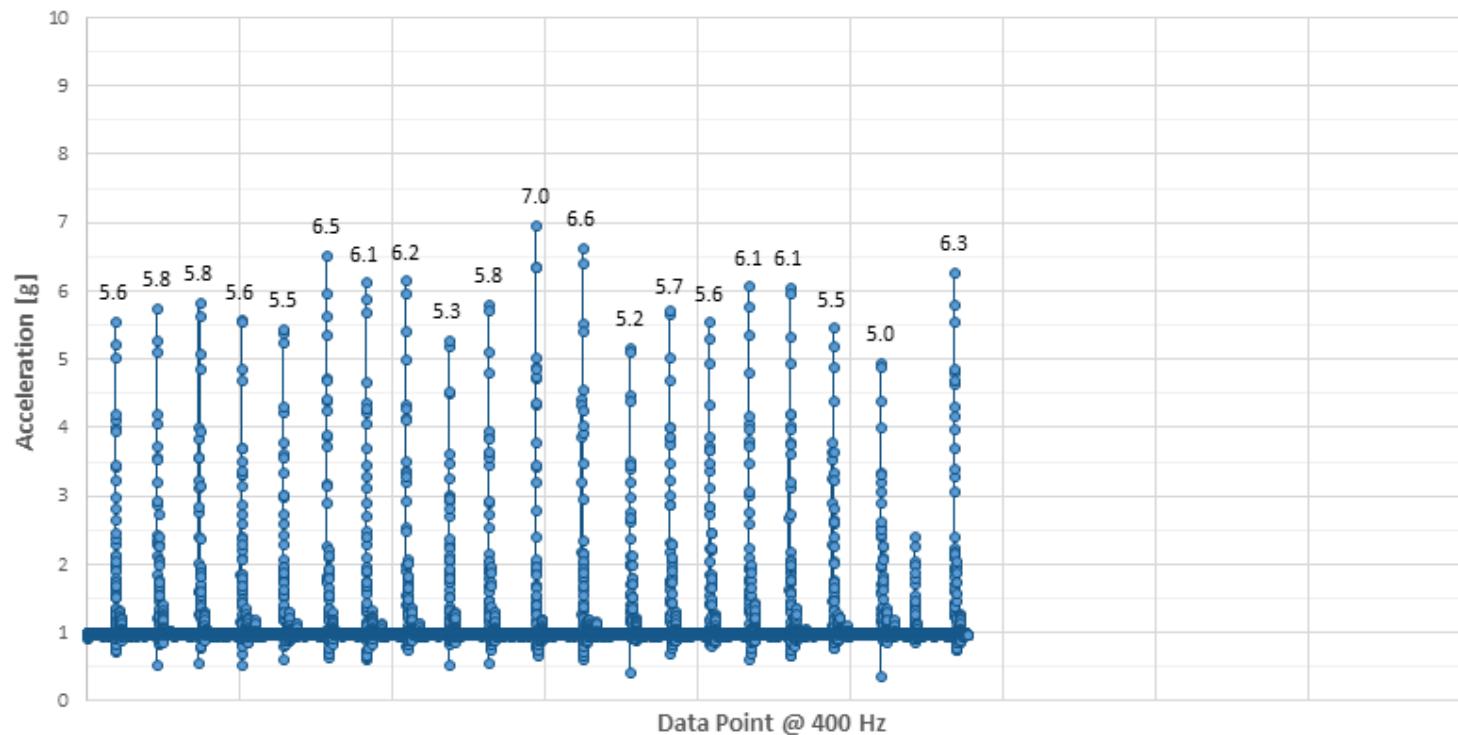
Z Acceleration (Up and Down) - Bloom Air



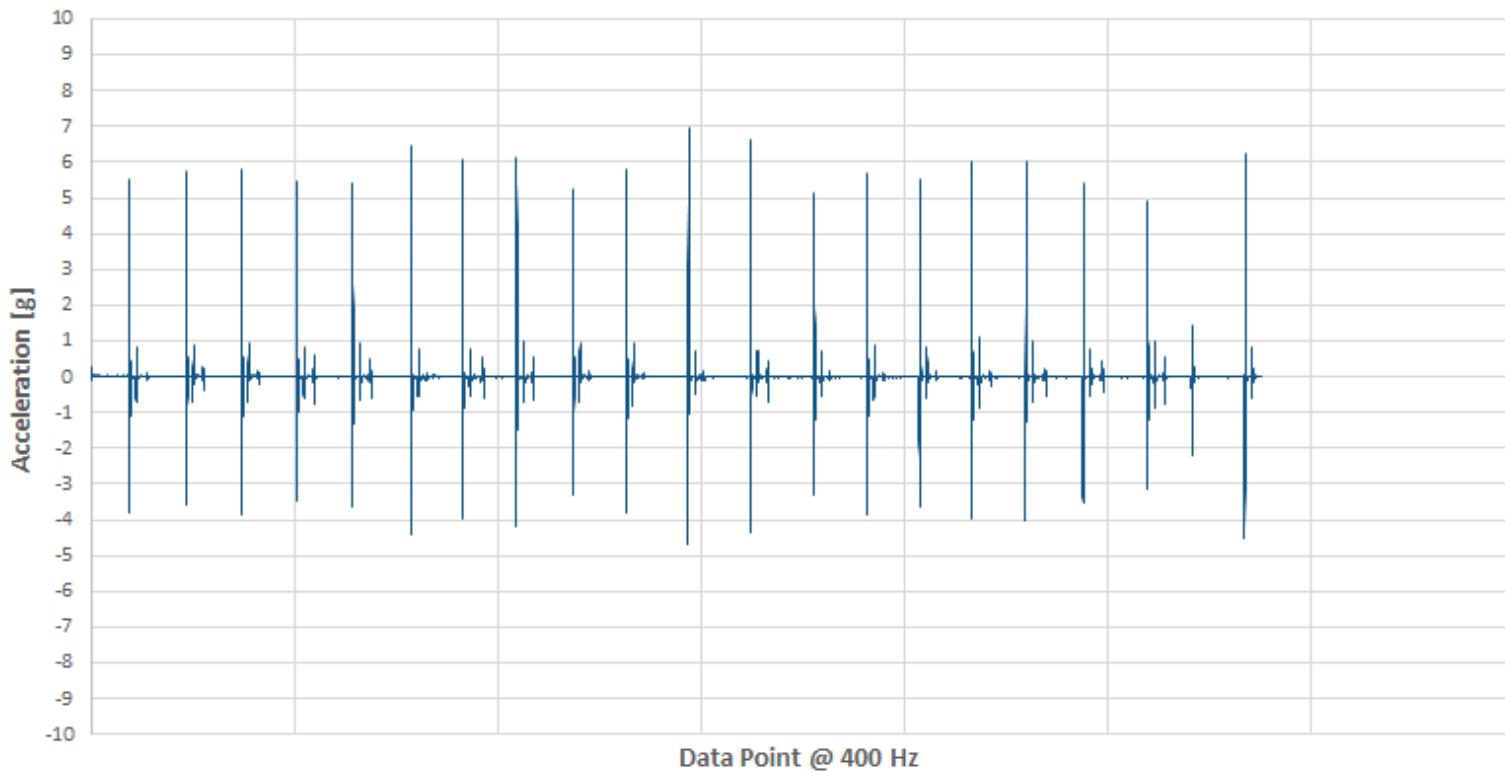


## TEST 3 – BLOOM MIST

Vector Magnitude Acceleration - Bloom Mist

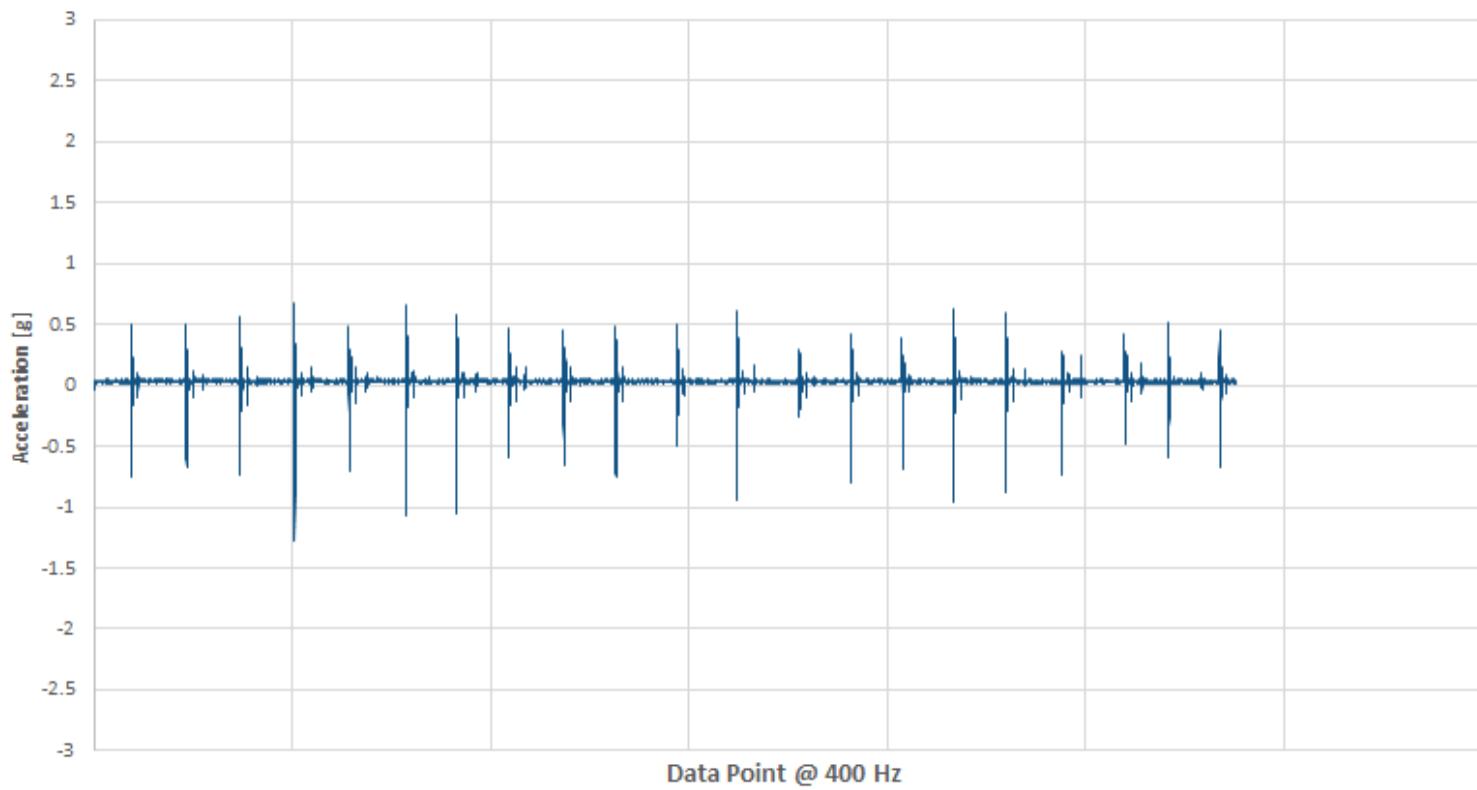


X Acceleration (Side to Side) - Bloom Mist

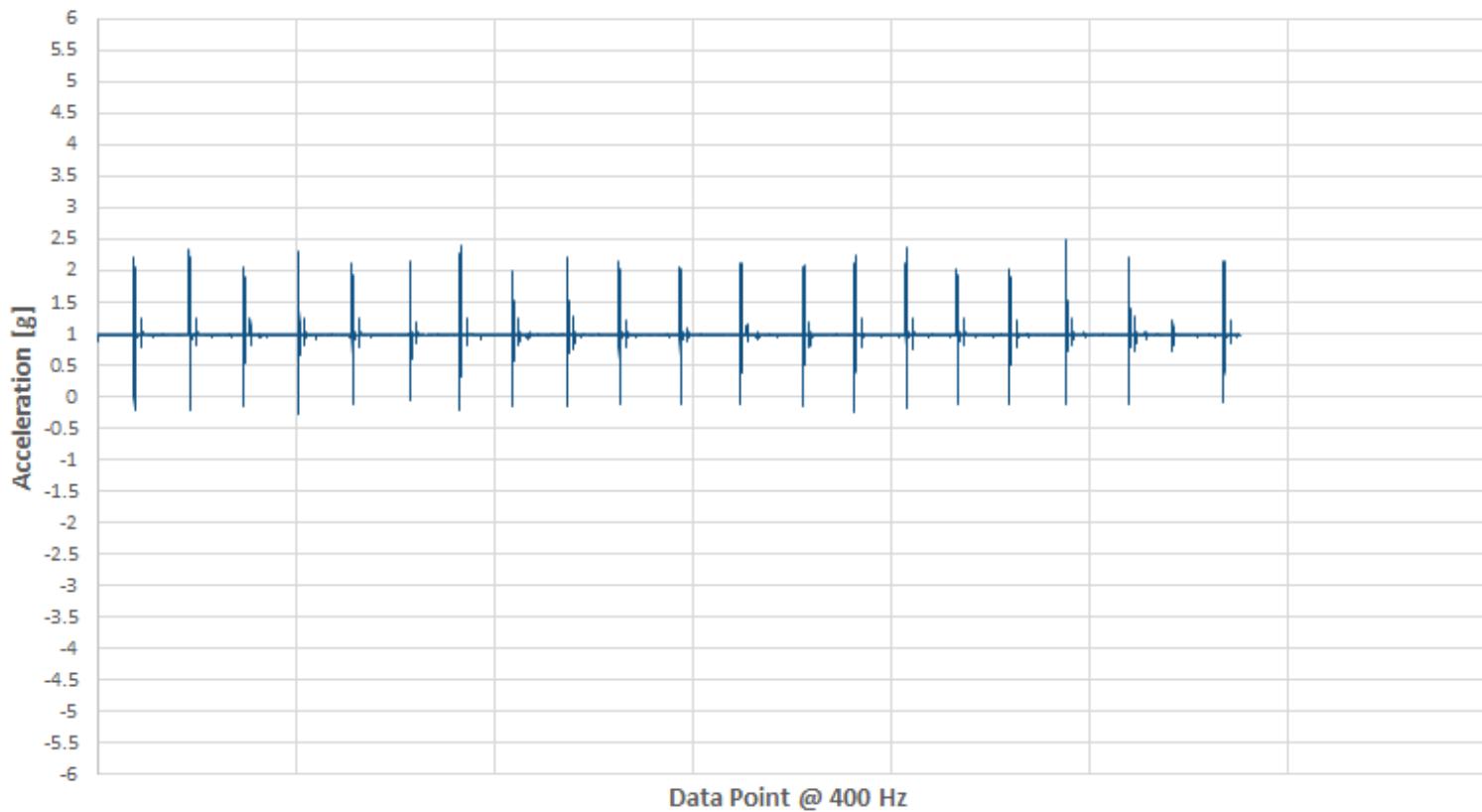




**Y Acceleration (Head to Toe) - Bloom Mist**



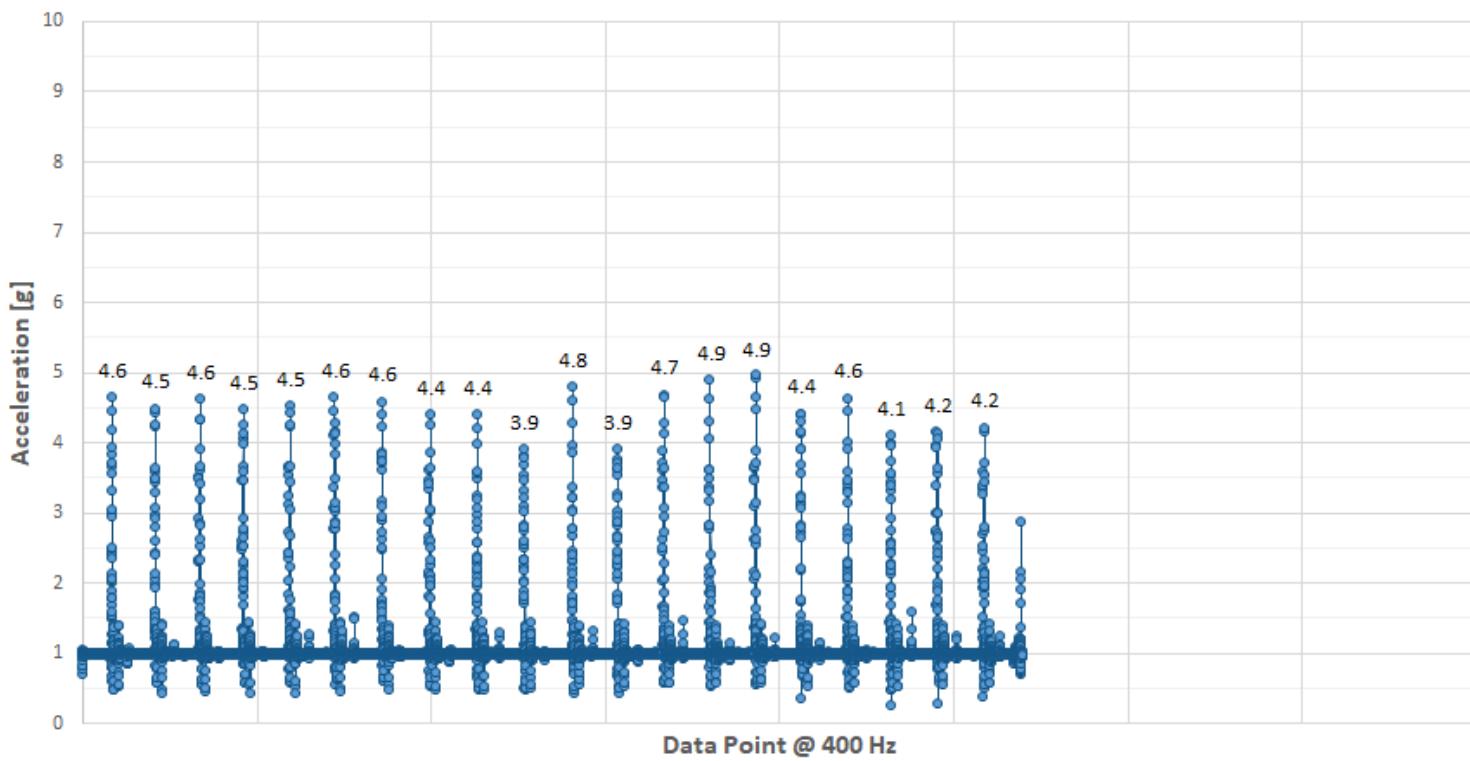
**Z Acceleration (Up and Down) - Bloom Mist**



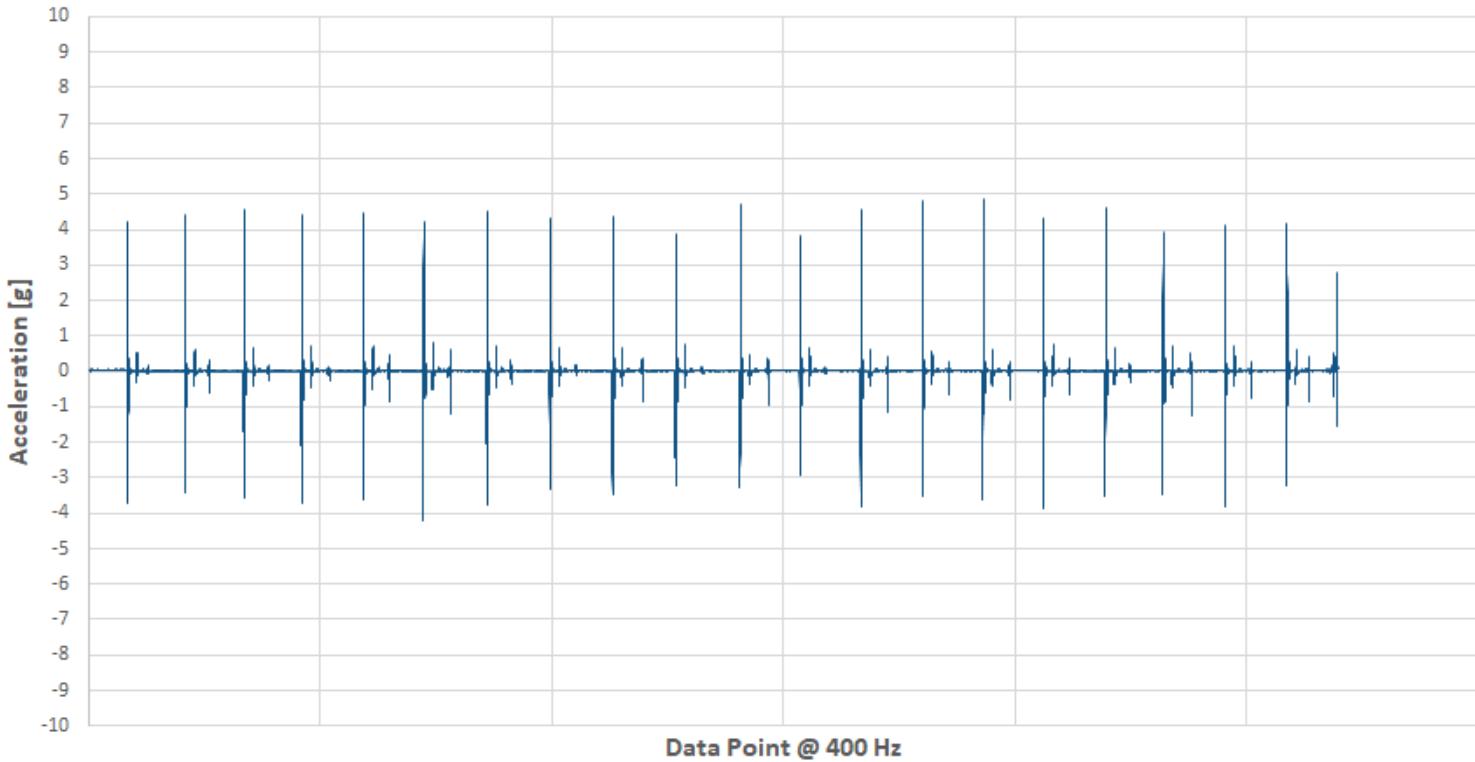


## TEST 3 – BLOOM EARTH

Vector Magnitude Acceleration - Bloom Earth

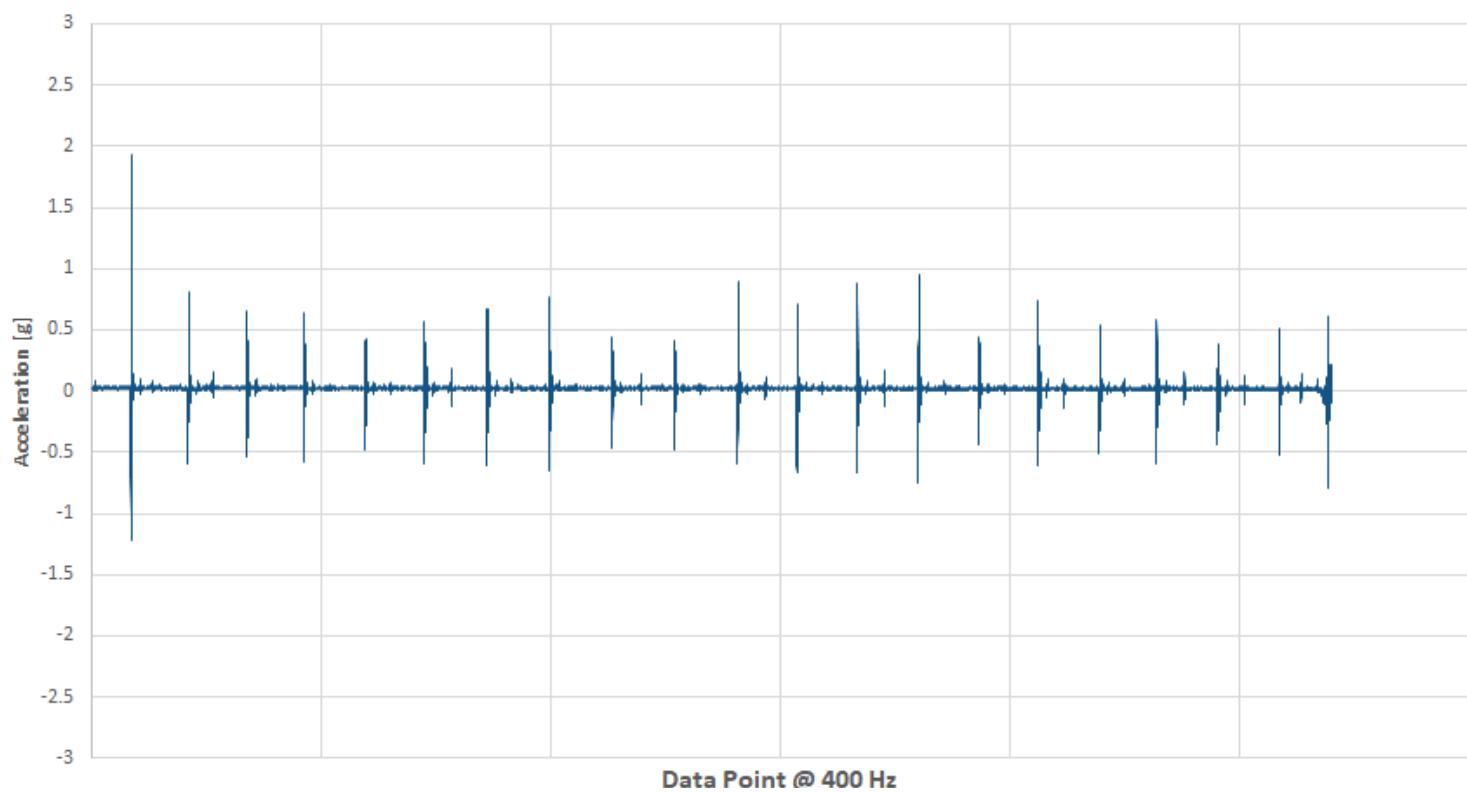


X Acceleration (Side to Side) - Bloom Earth

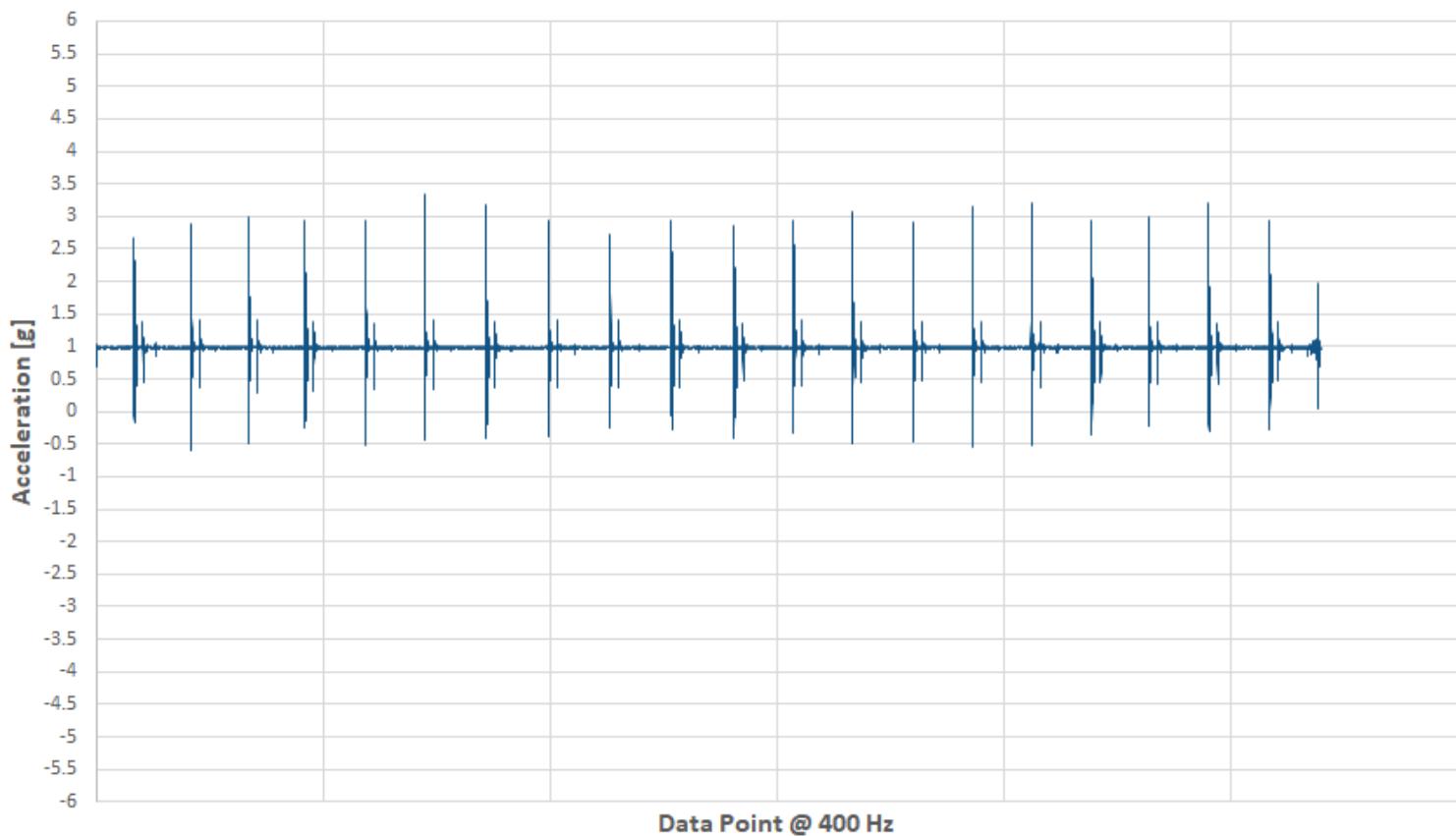


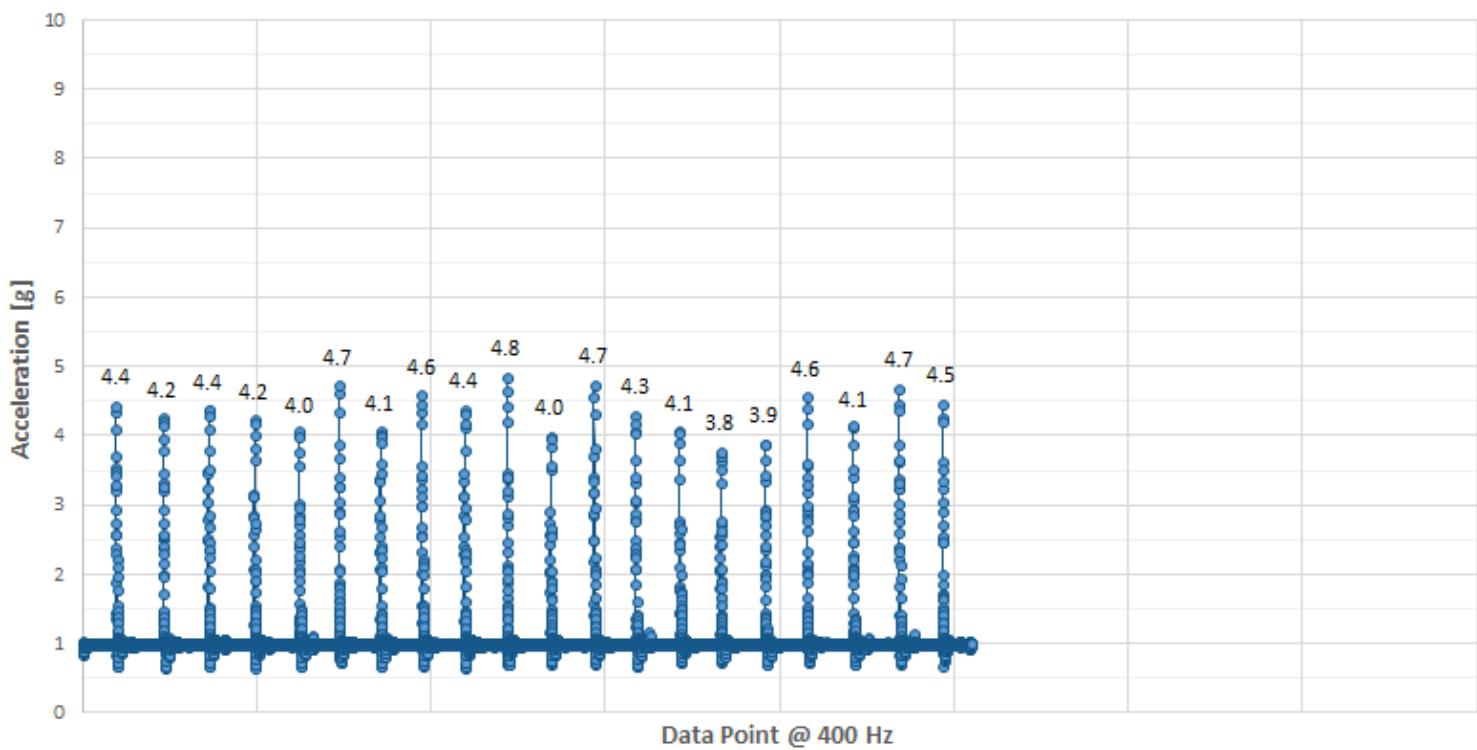
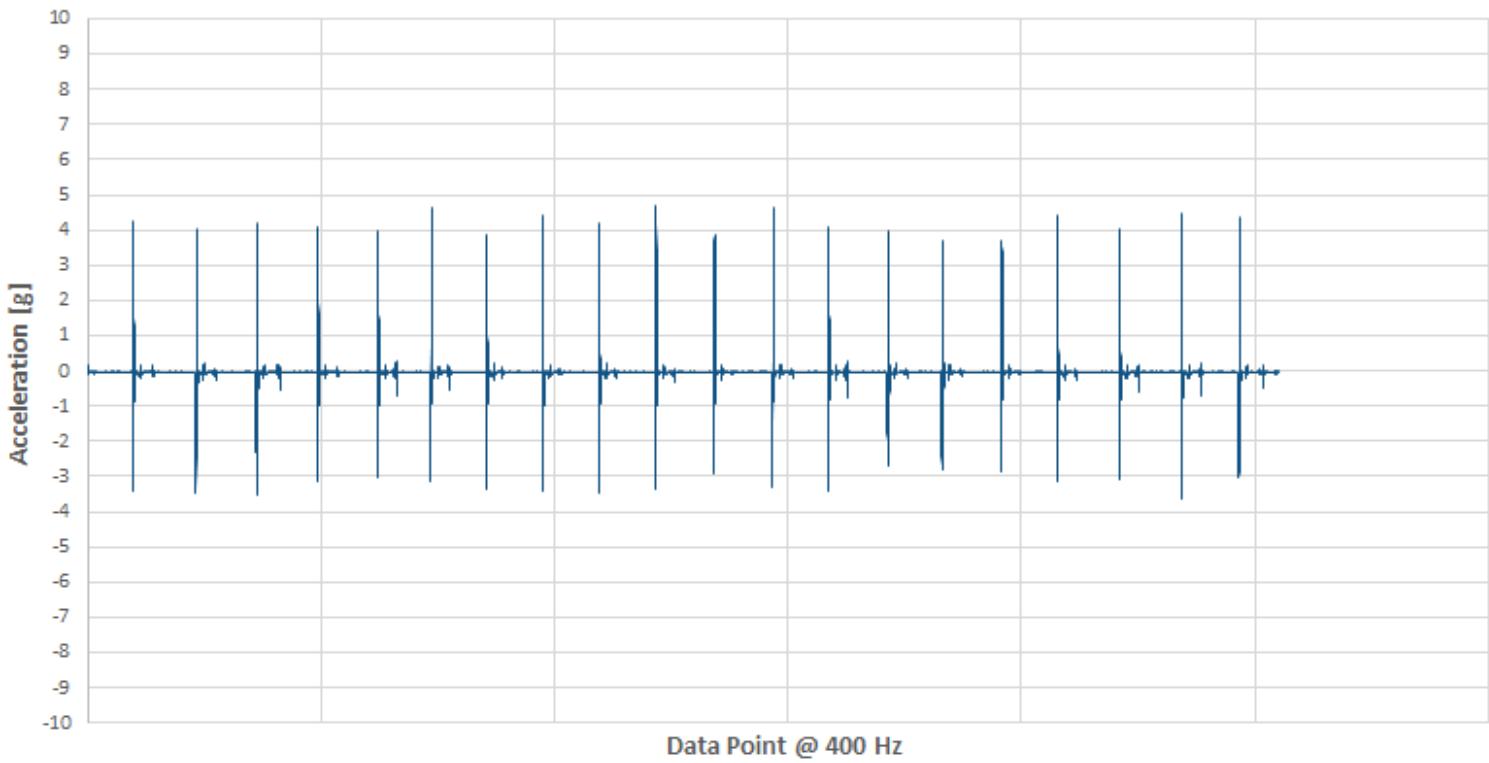


Y Acceleration (Head to Toe) - Bloom Earth



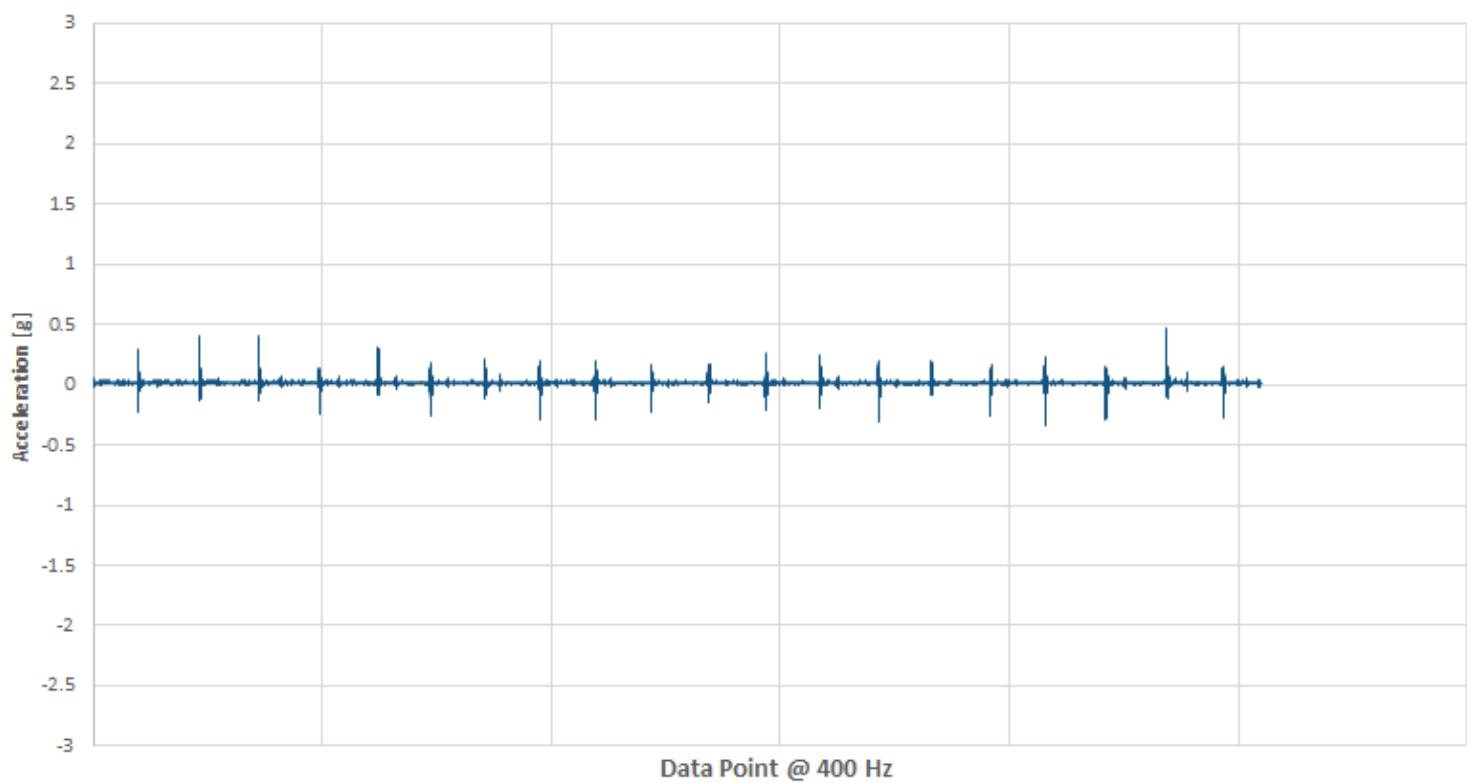
Z Acceleration (Up and Down) - Bloom Earth



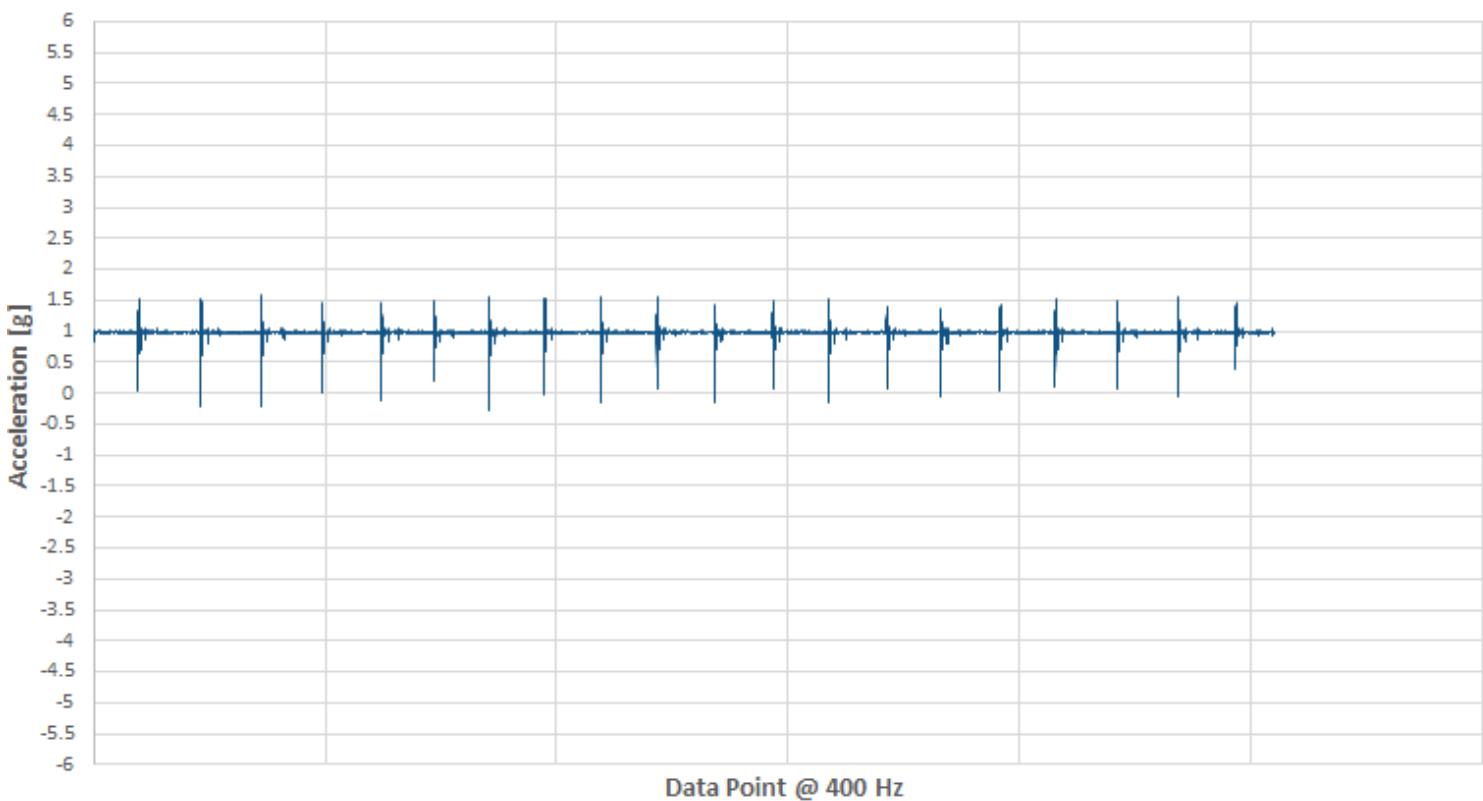
**TEST 3 – ZINUS****Vector Magnitude Acceleration - Zinus****X Acceleration (Side to Side) - Zinus**



**Y Acceleration (Head to Toe) - Zinus**



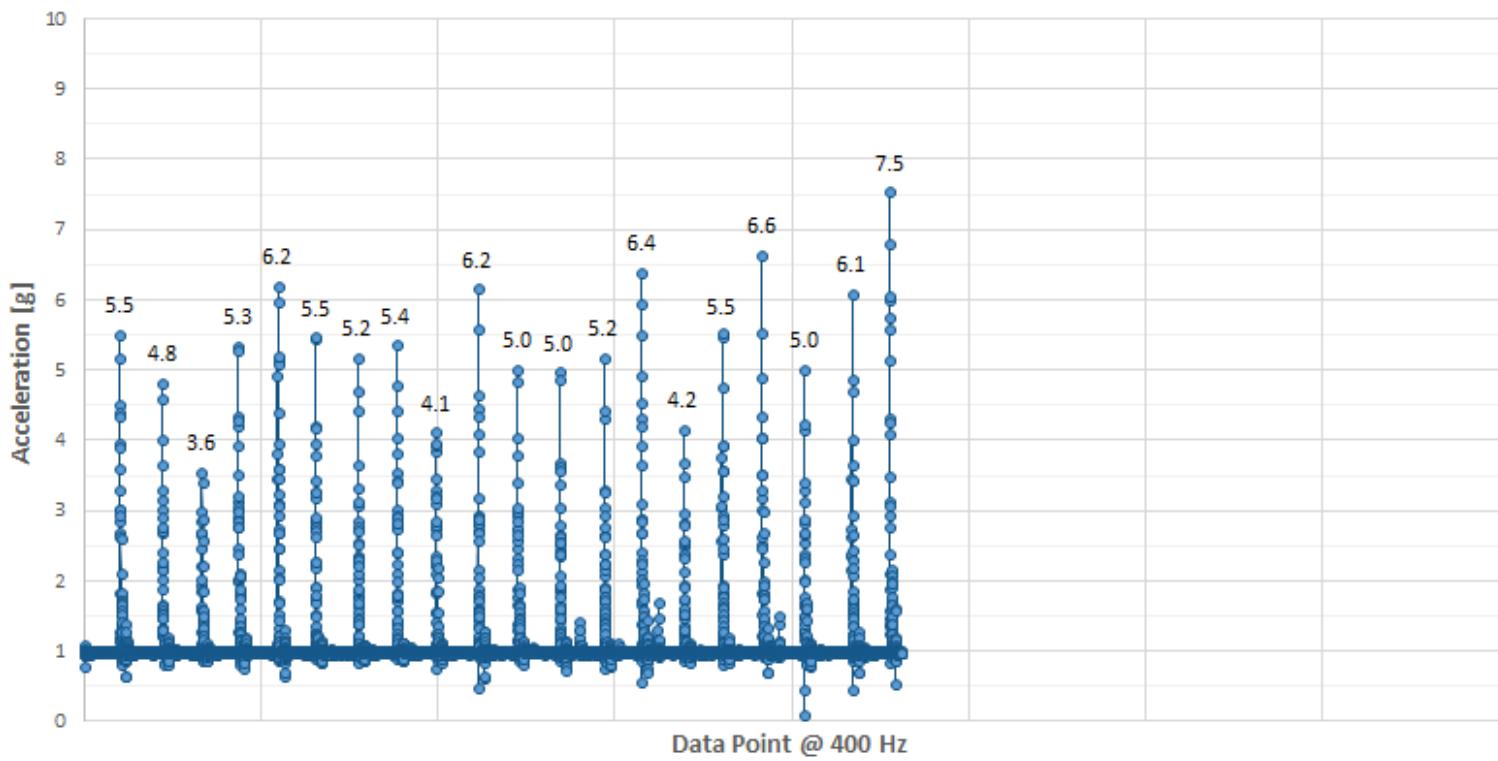
**Z Acceleration (Up and Down) - Zinus**



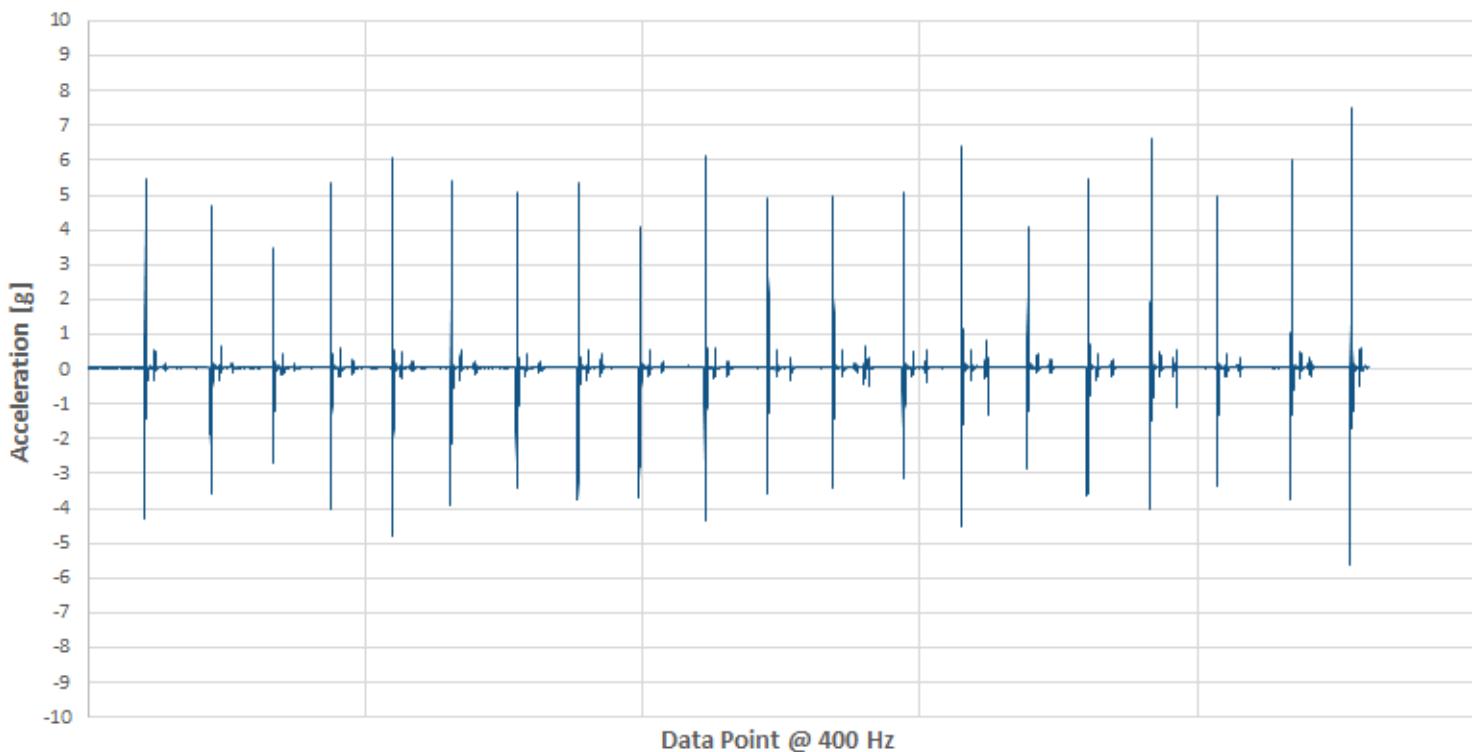


## TEST 3 – NOVOSBED FIRM (V2)

Vector Magnitude Acceleration - Novosbed Firm (V2)

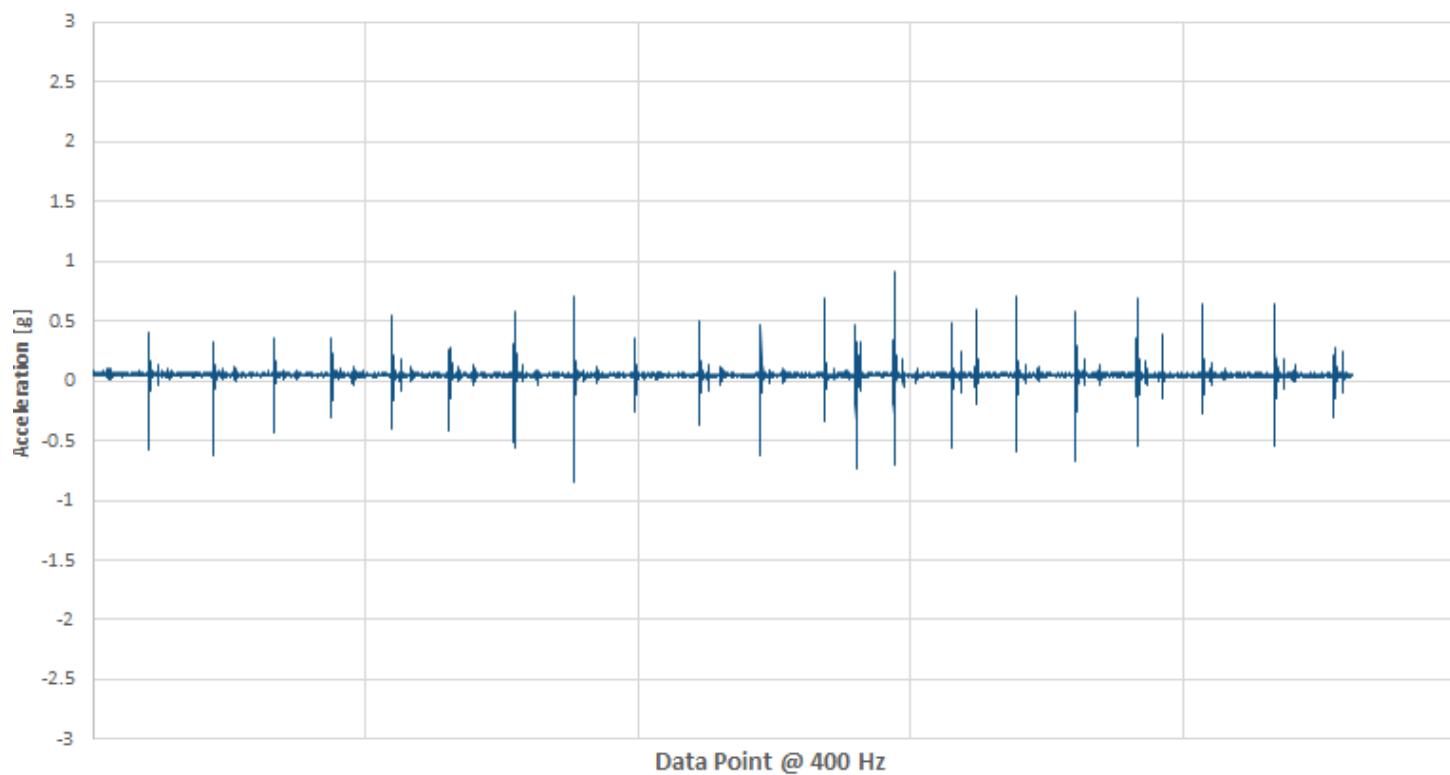


X Acceleration (Side to Side) - Novosbed Firm (V2)

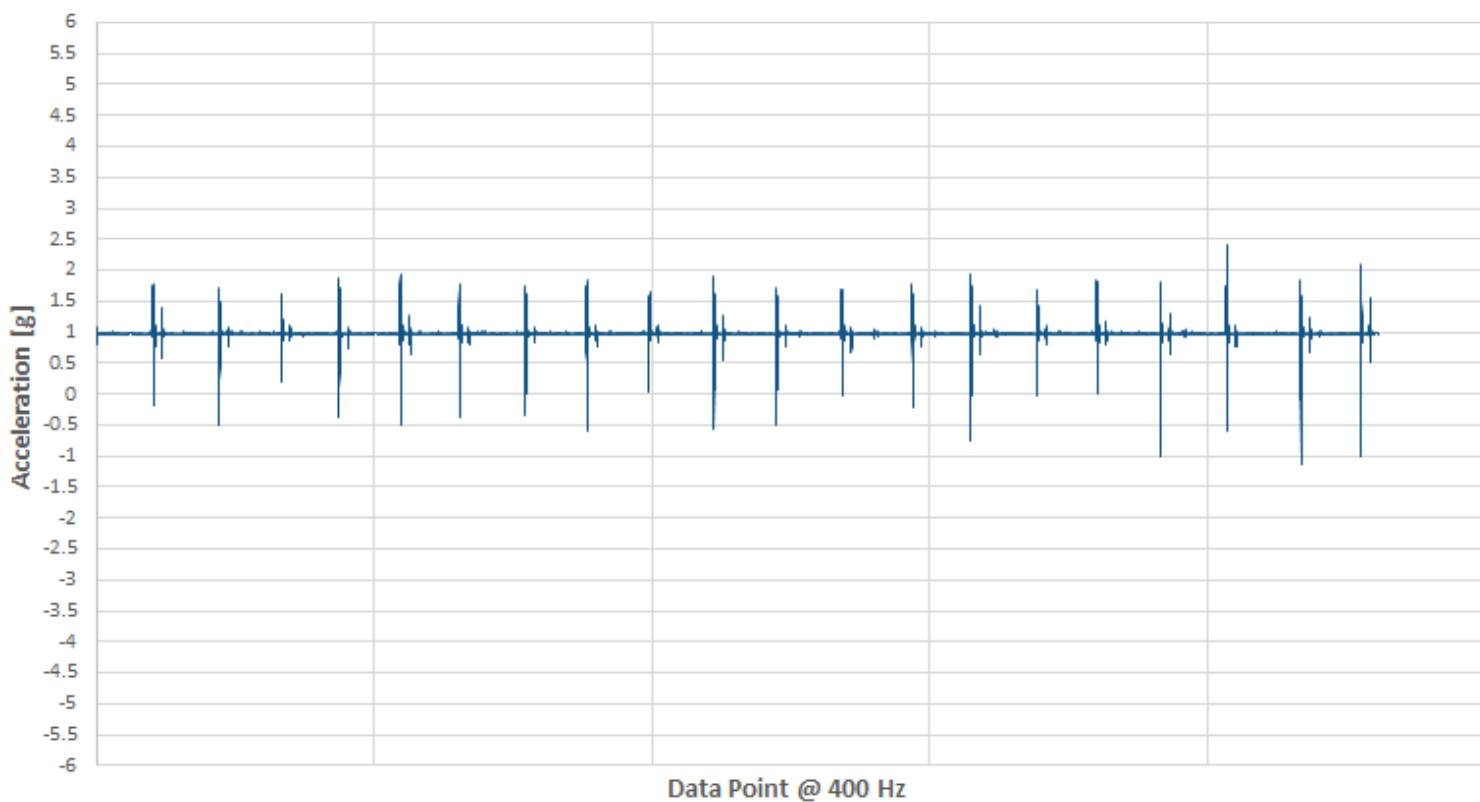




Y Acceleration (Head to Toe) - Novosbed Firm (V2)



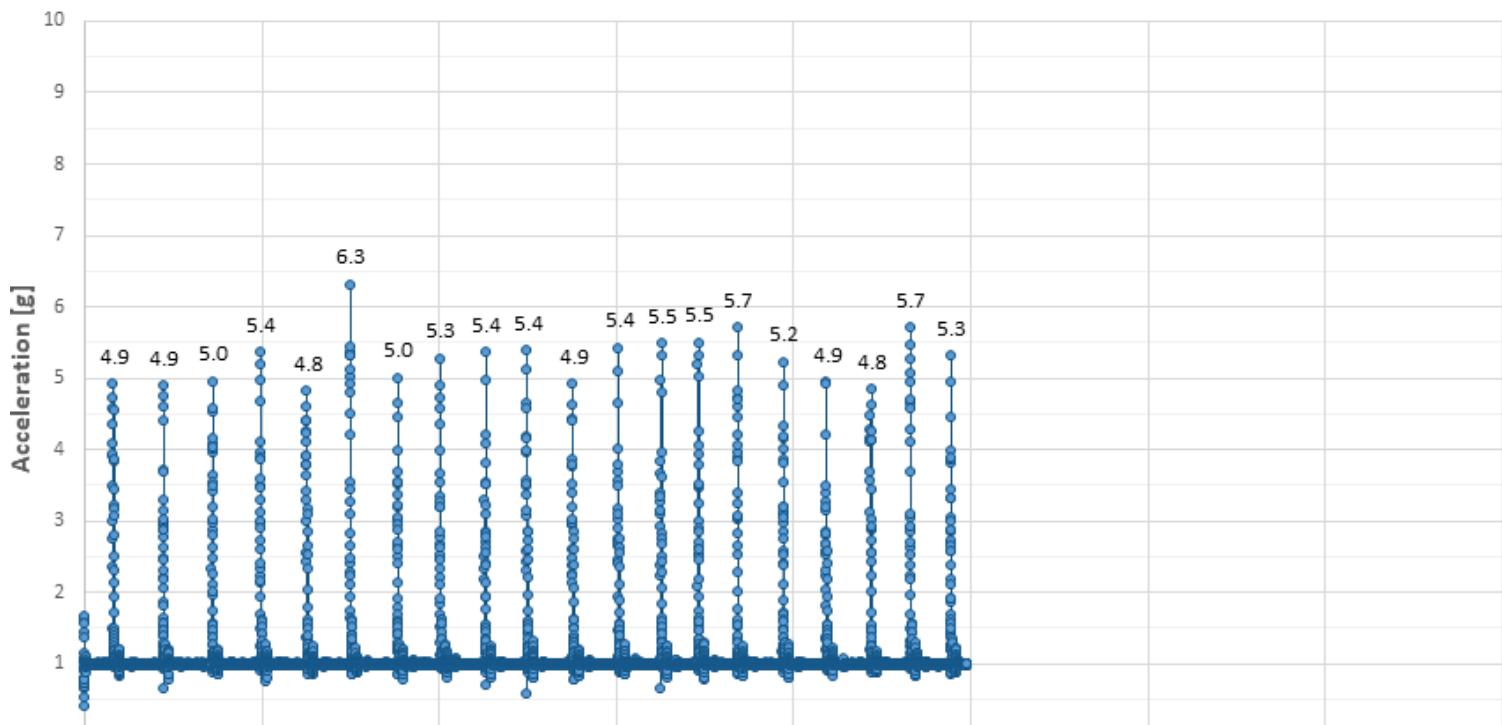
Z Acceleration (Up and Down) - Novosbed Firm (V2)



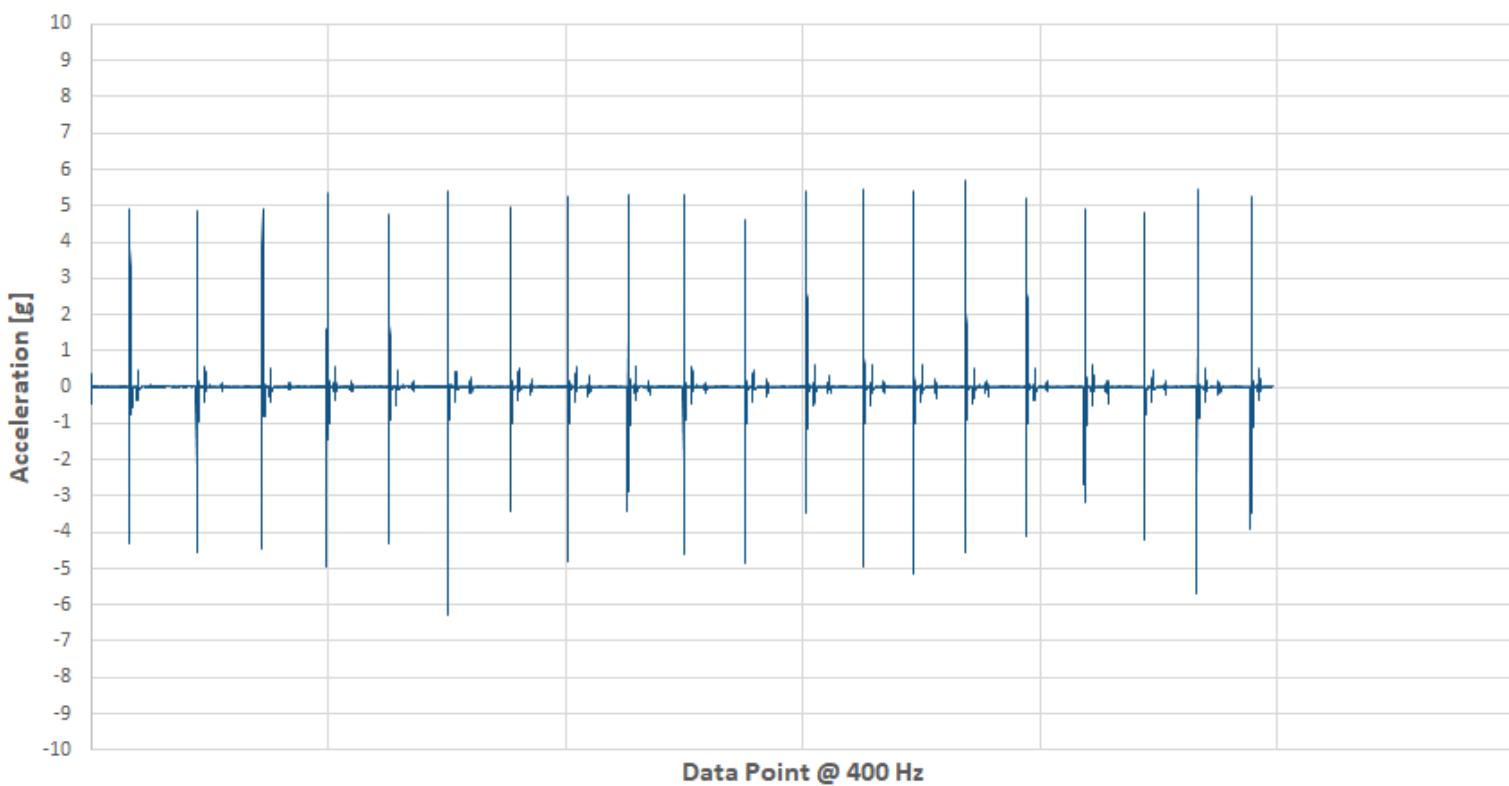


## TEST 3 – NOVOSBED MEDIUM (V2)

Vector Magnitude Acceleration - Novosbed Medium (V2)

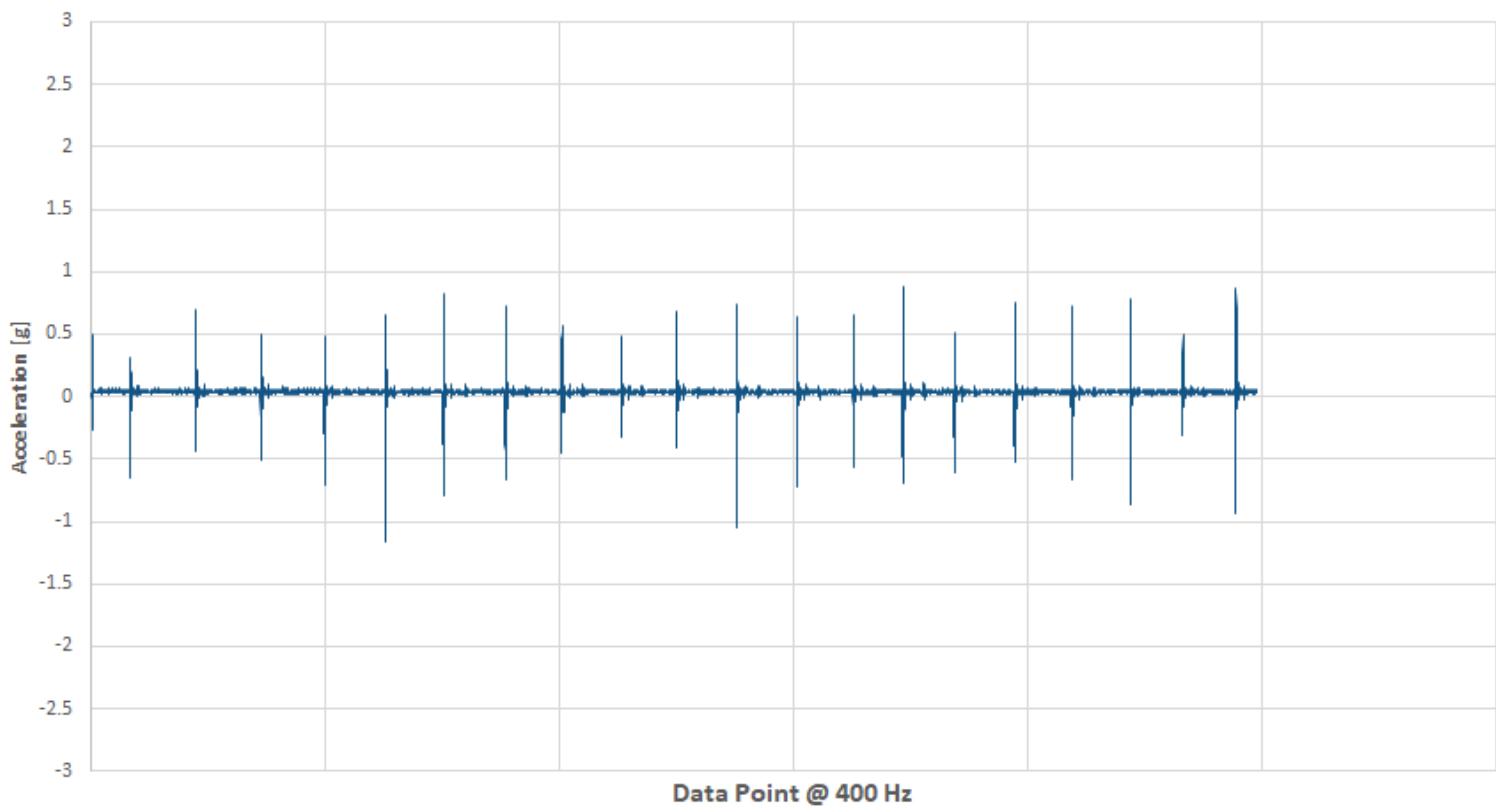


X Acceleration (Side to Side) - Novosbed Medium (V2)

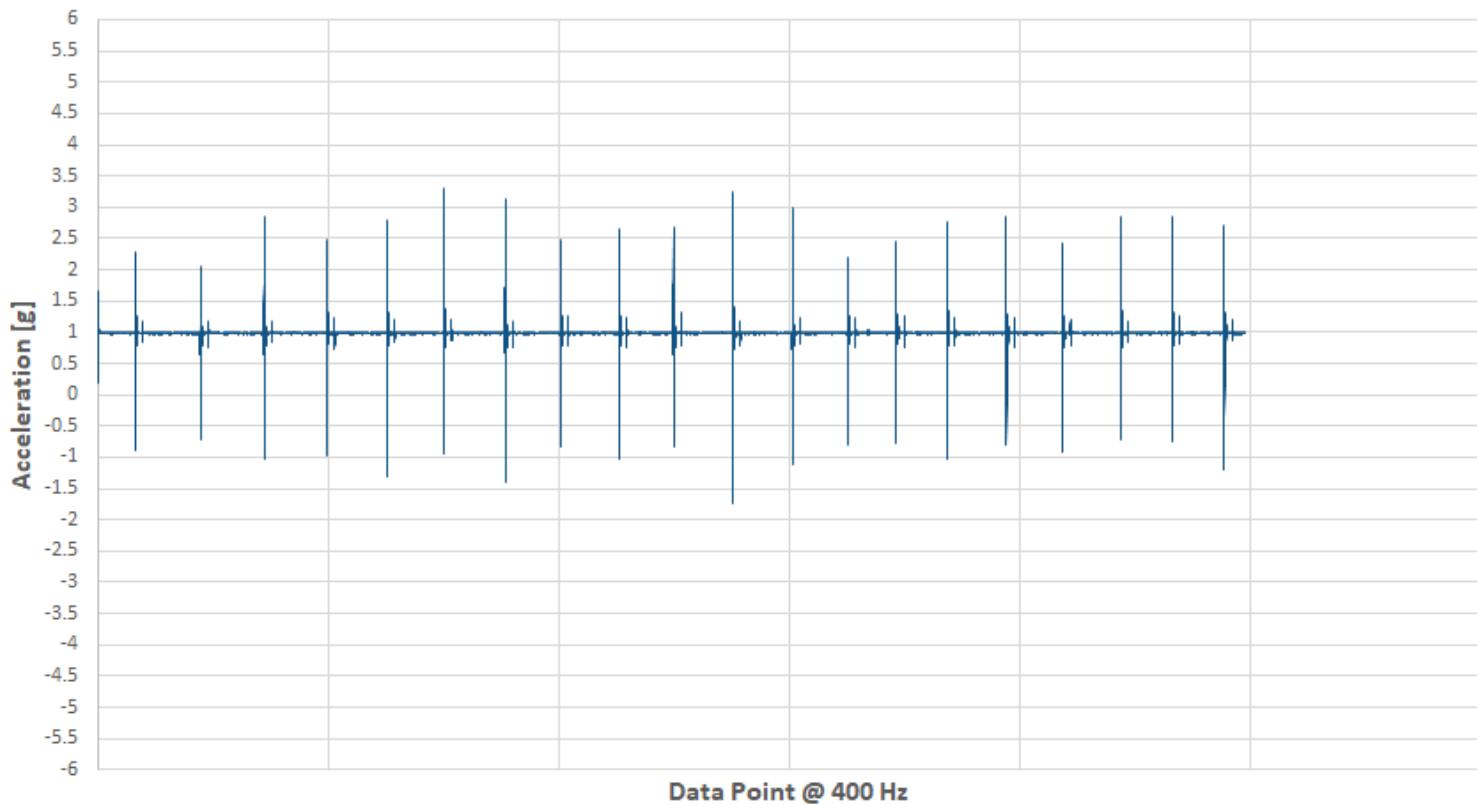




**Y Acceleration (Head to Toe) - Novosbed Medium (V2)**



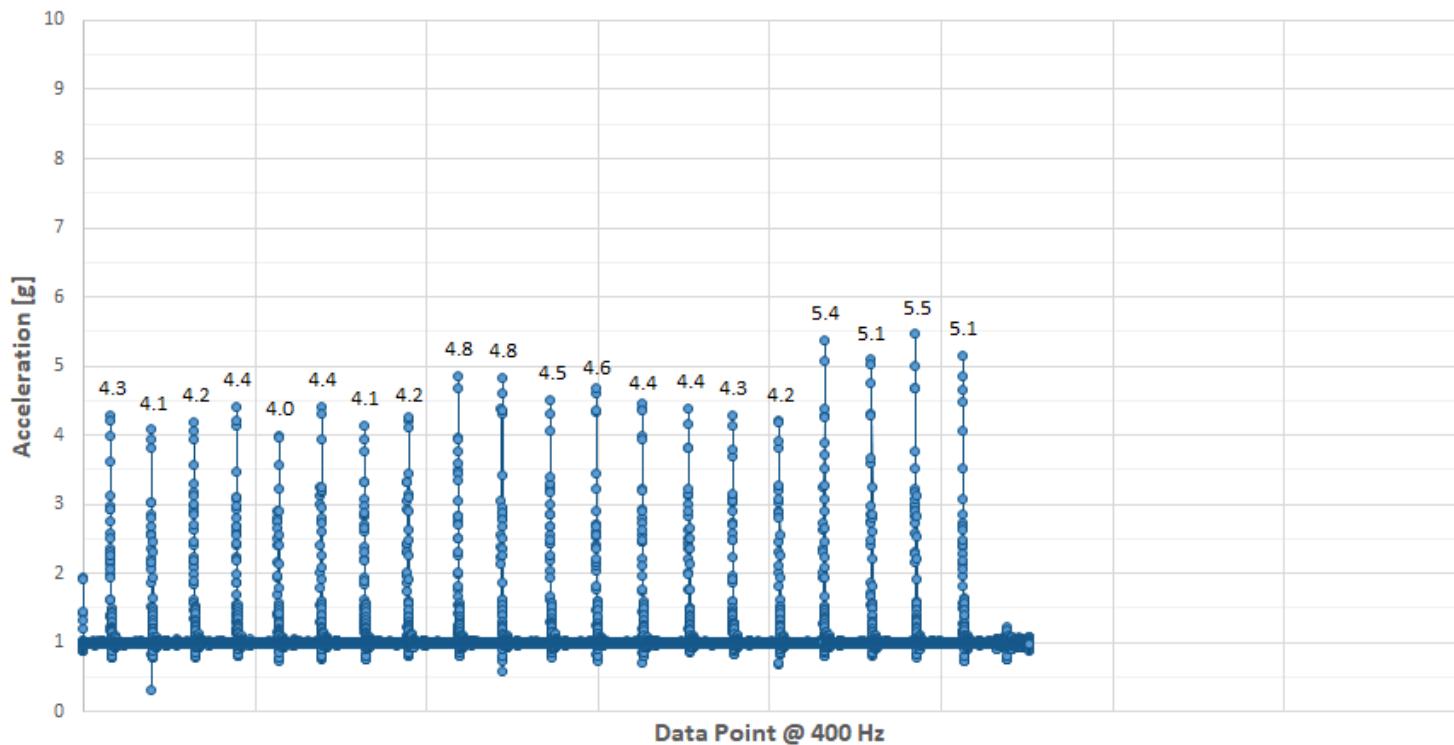
**Z Acceleration (Up and Down) - Novosbed Medium (V2)**



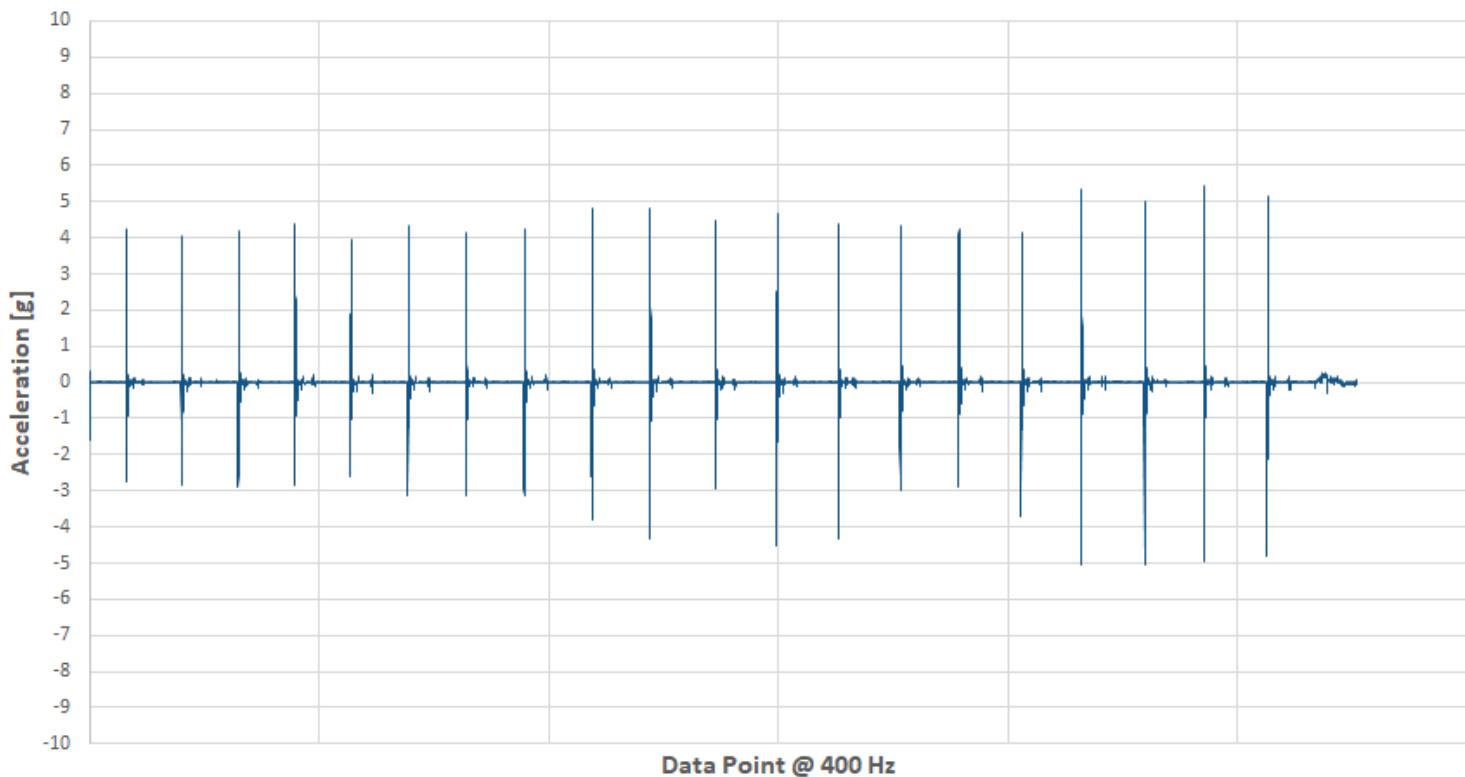


## TEST 3 – NOVOSBED SOFT (V2)

Vector Magnitude Acceleration - Novosbed Soft (V2)

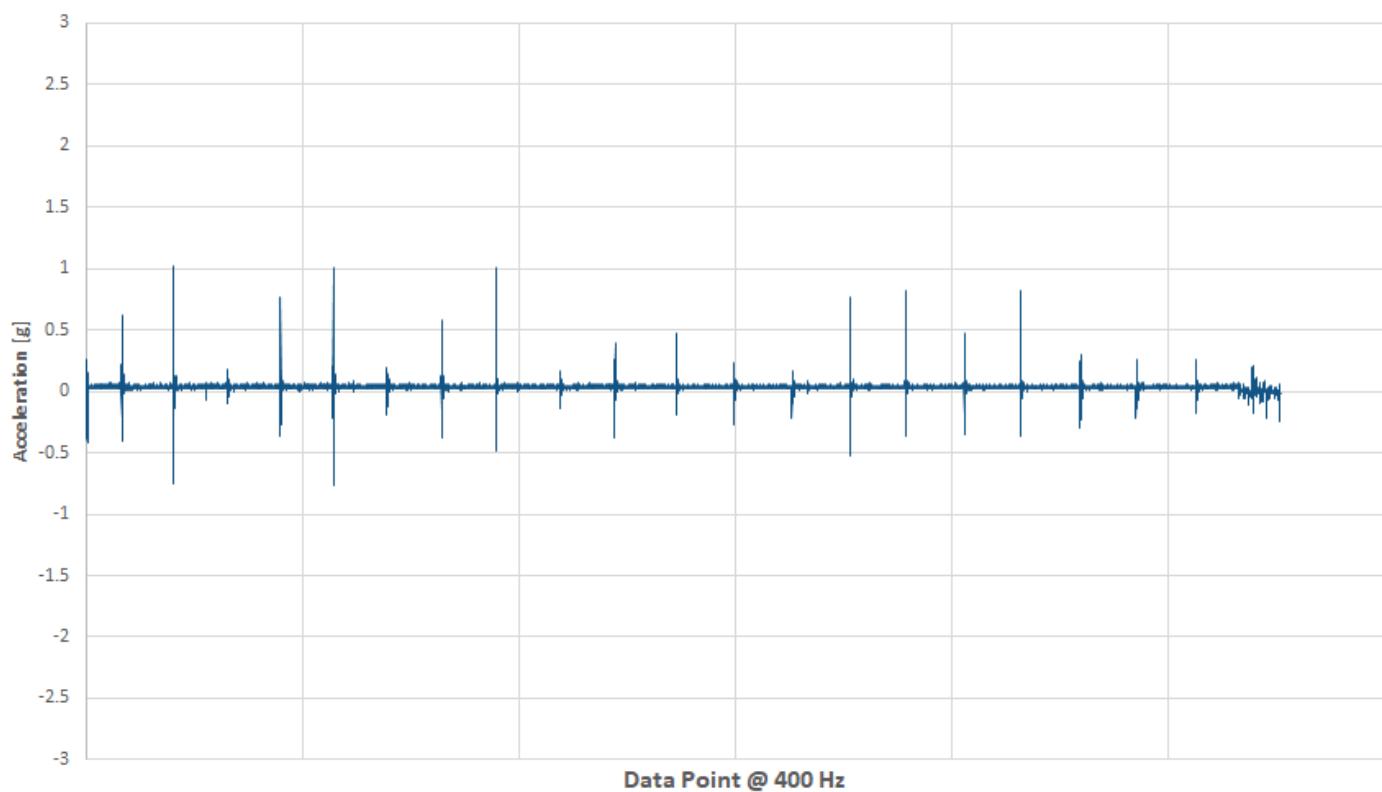


X Acceleration (Side to Side) - Novosbed Soft (V2)

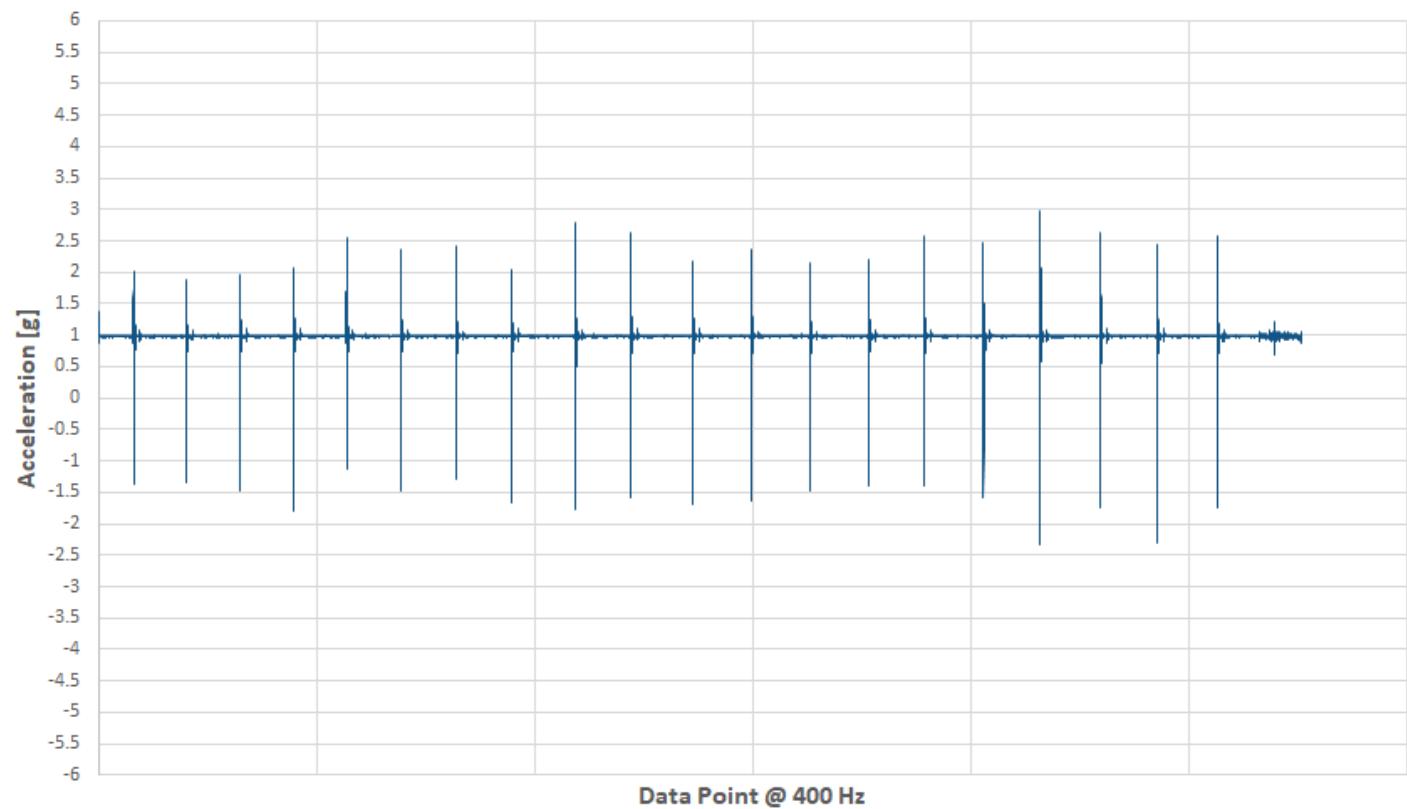




Y Acceleration (Head to Toe) - Novosbed Soft (V2)



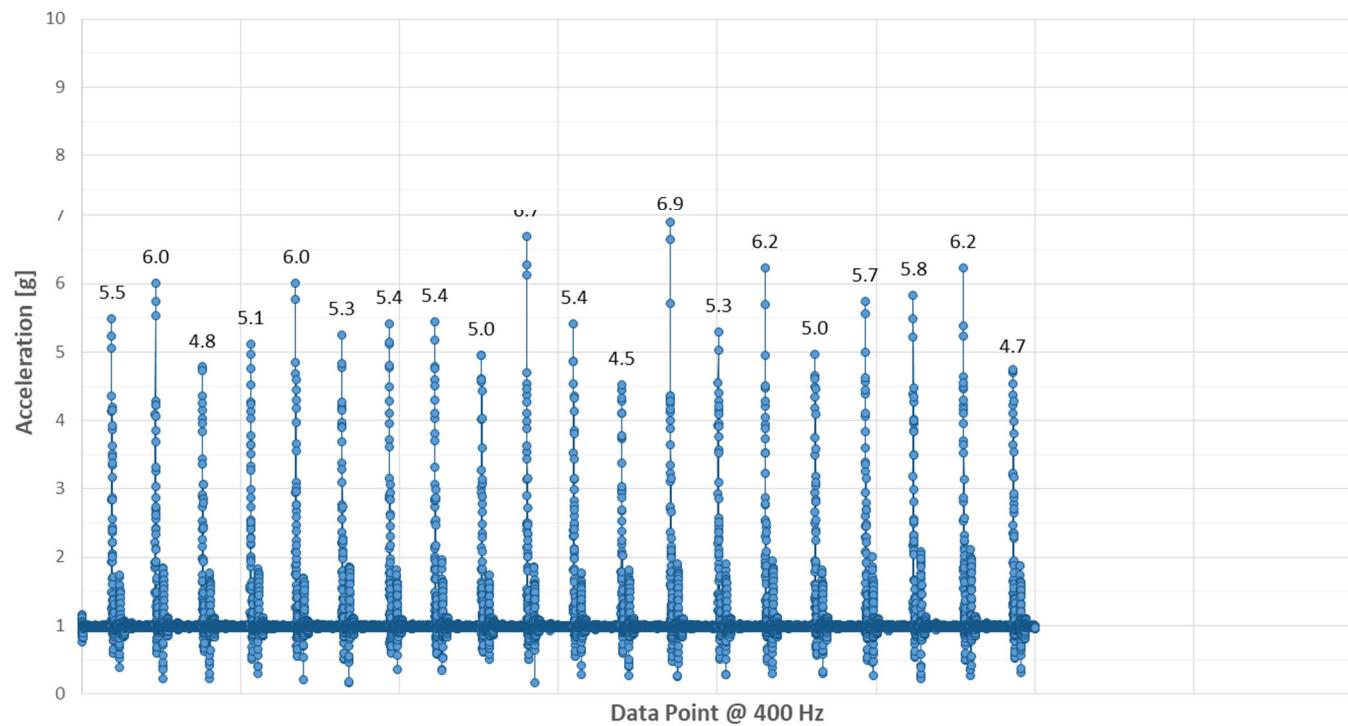
Z Acceleration (Up and Down) - Novosbed Soft (V2)



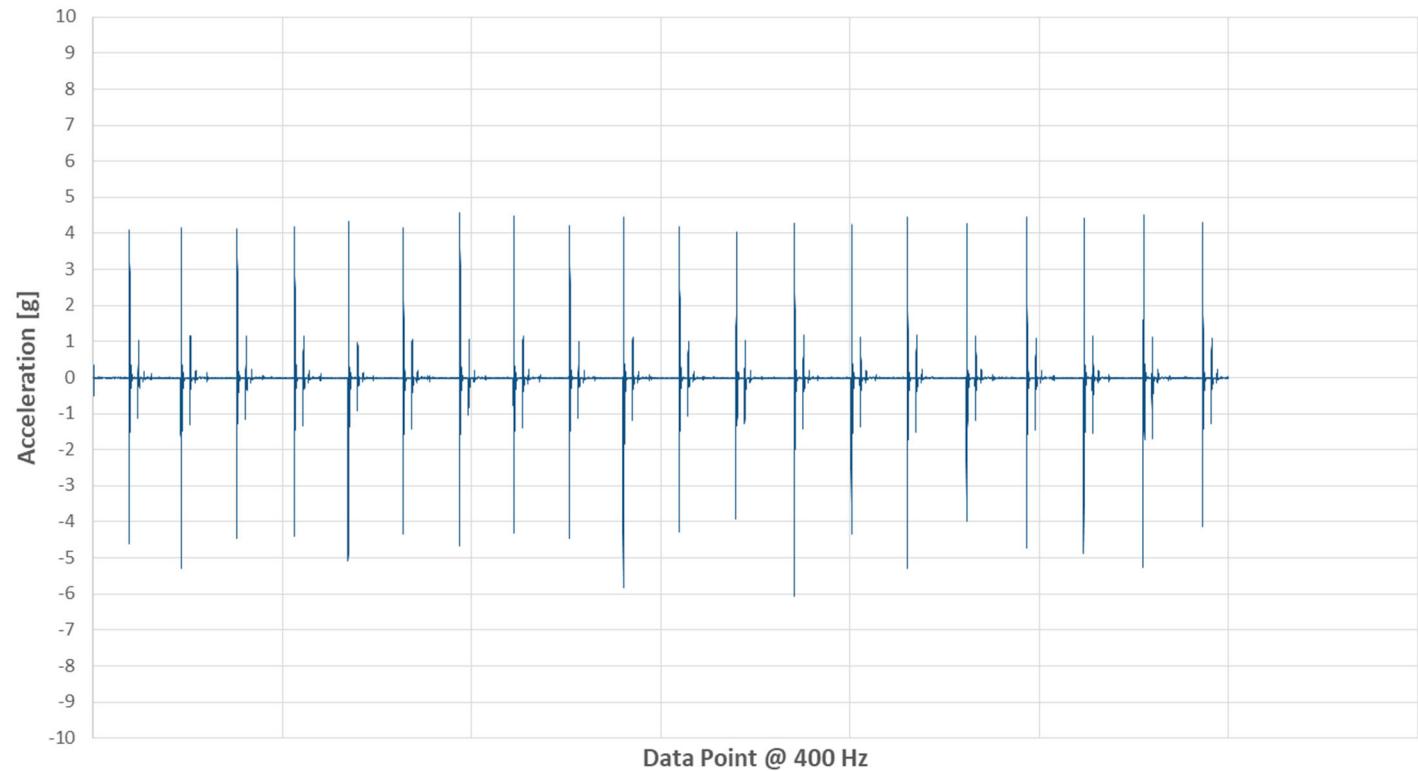


## TEST 3 – BRUNSWICK

Vector Magnitude Acceleration - Brunswick

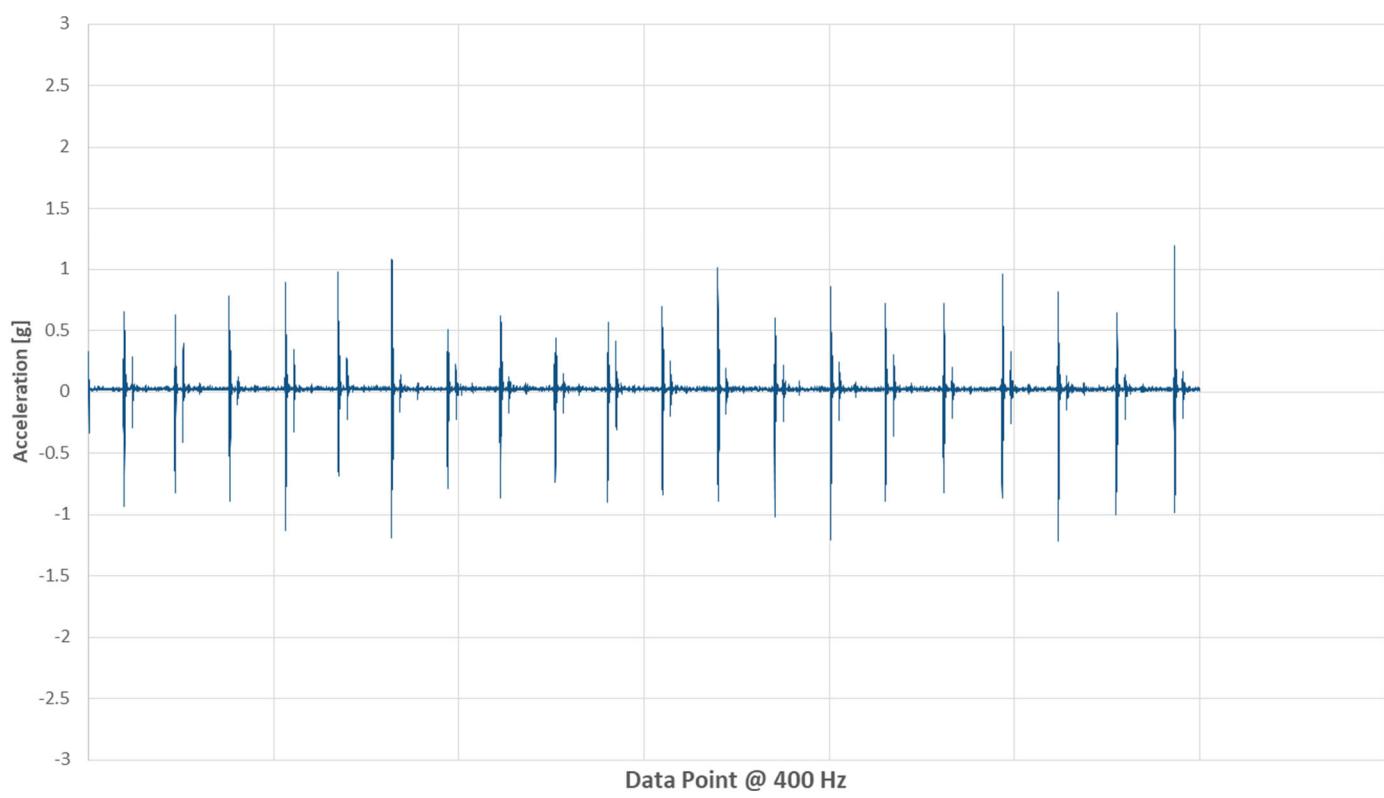


X Acceleration (Side to Side) - Brunswick

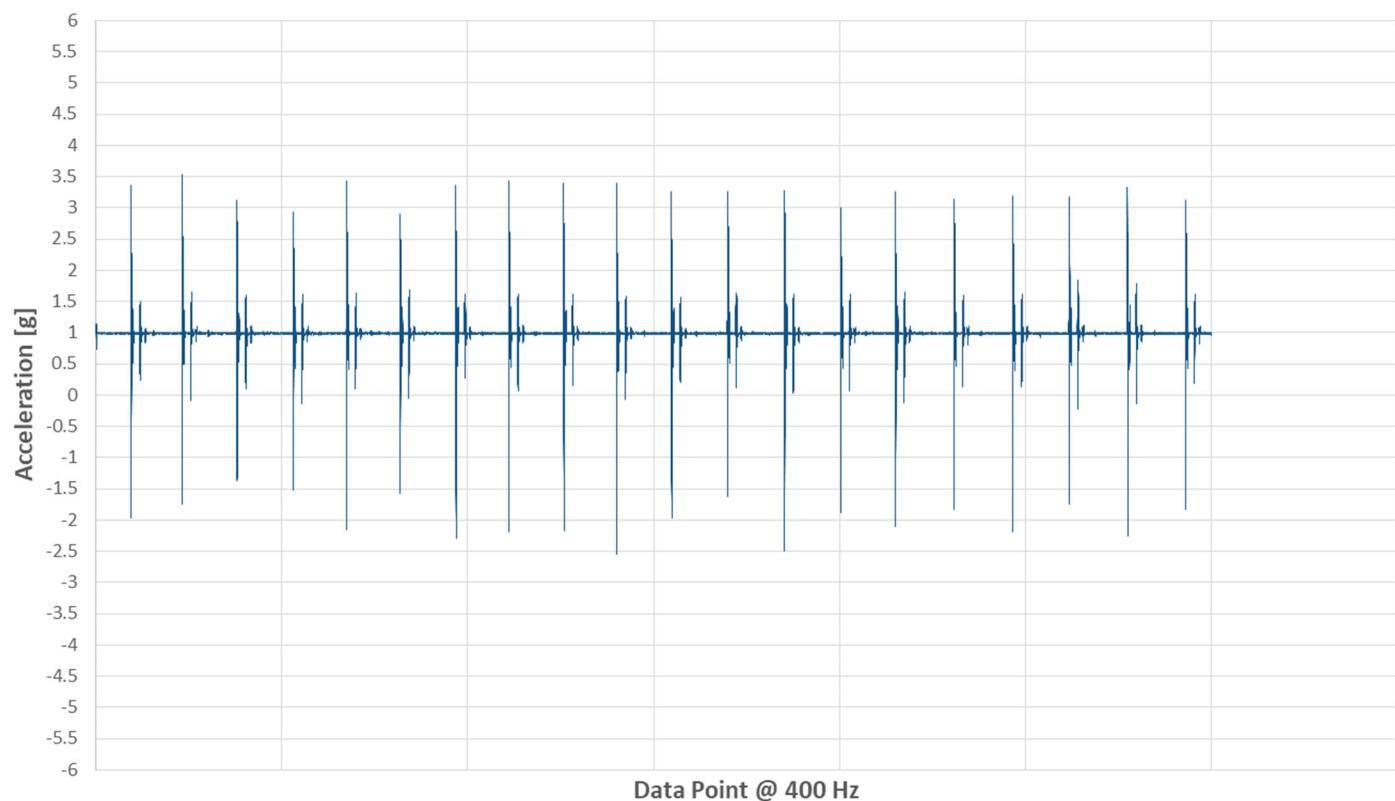




**Y Acceleration (Head to Toe) - Brunswick**



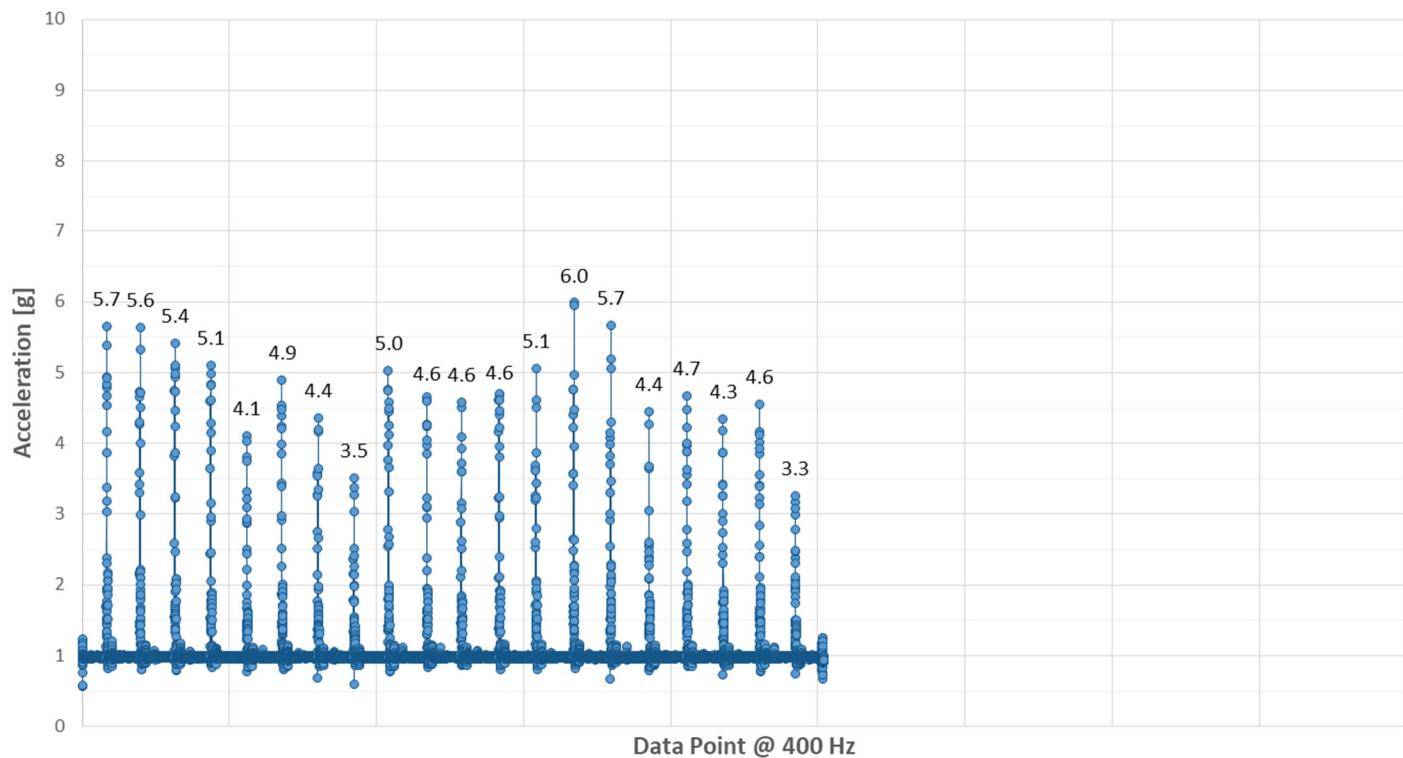
**Z Acceleration (Up and Down) - Brunswick**



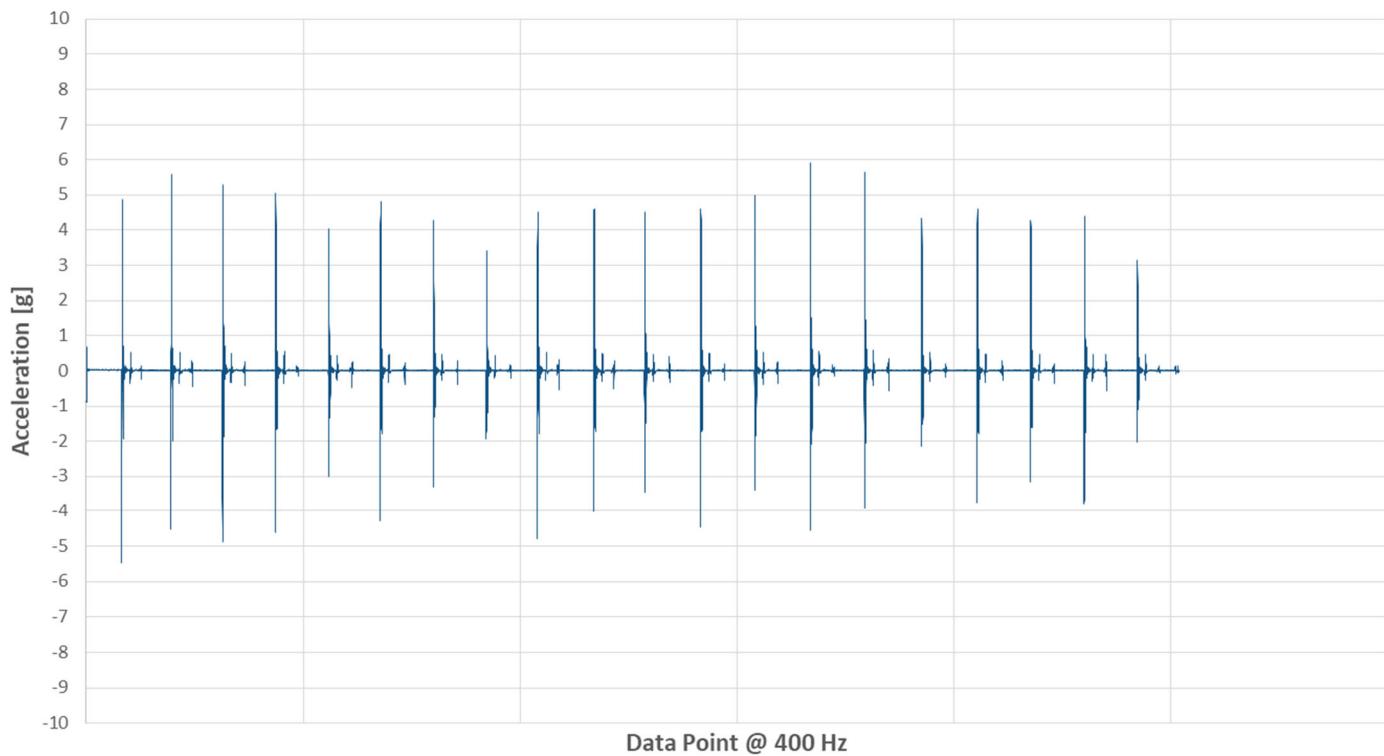


## TEST 3 – RECORE

Vector Magnitude Acceleration - Recore

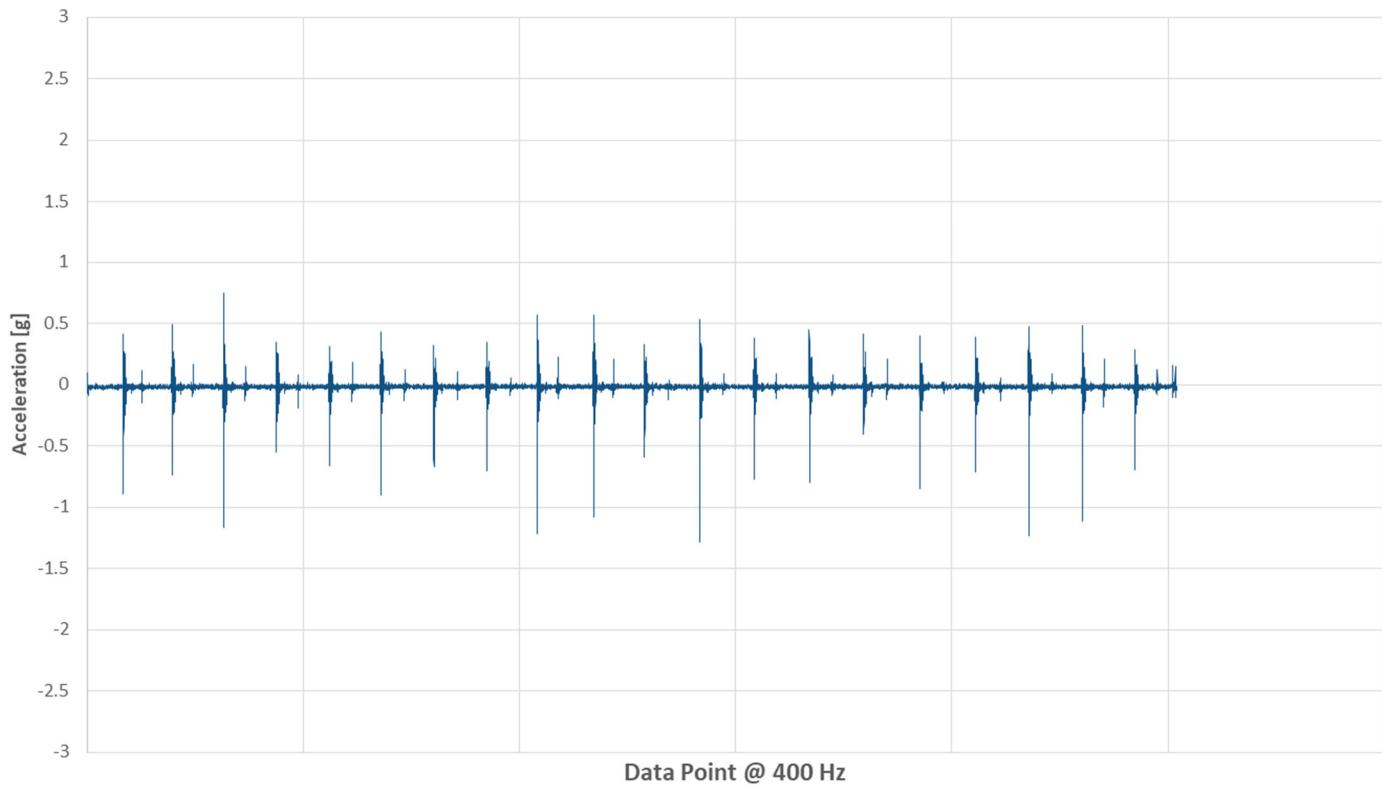


X Acceleration (Side to Side) - Recore

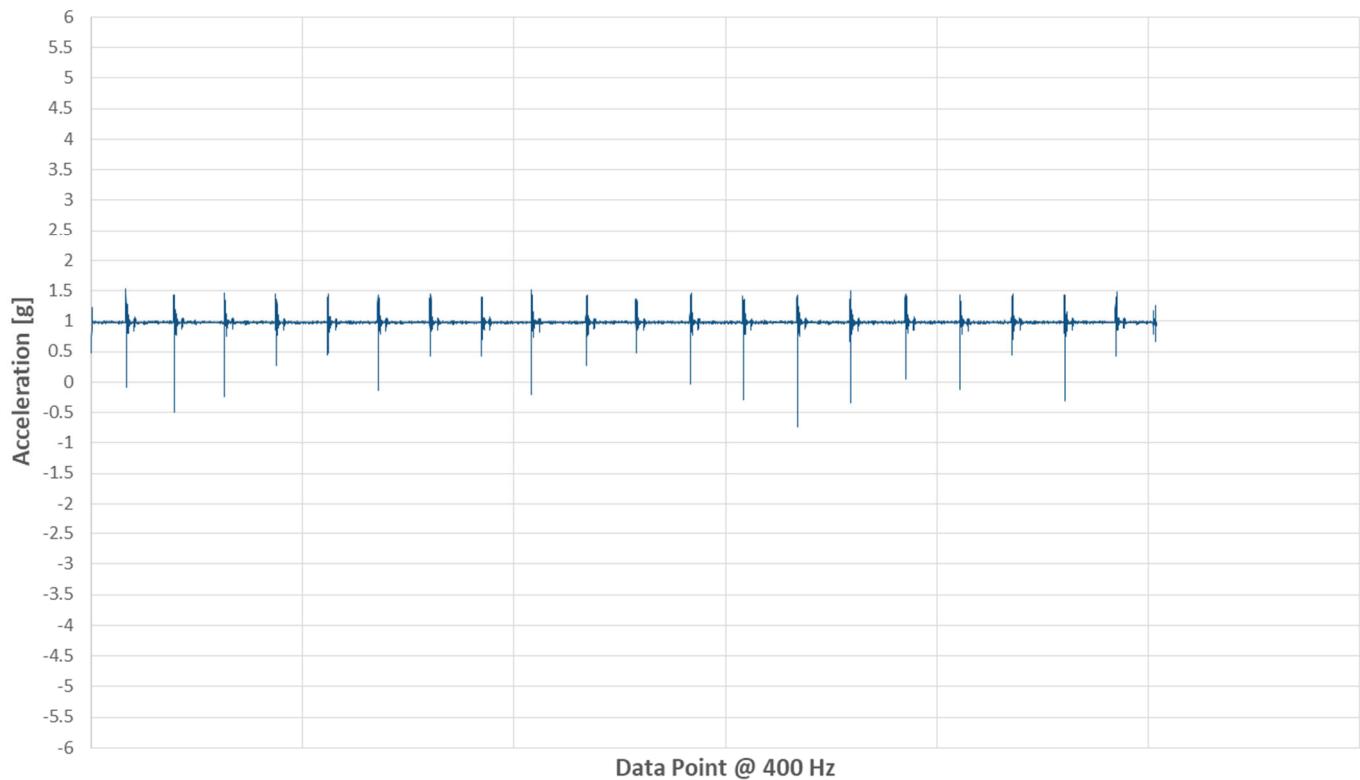




**Y Acceleration (Head to Toe) - Recore**



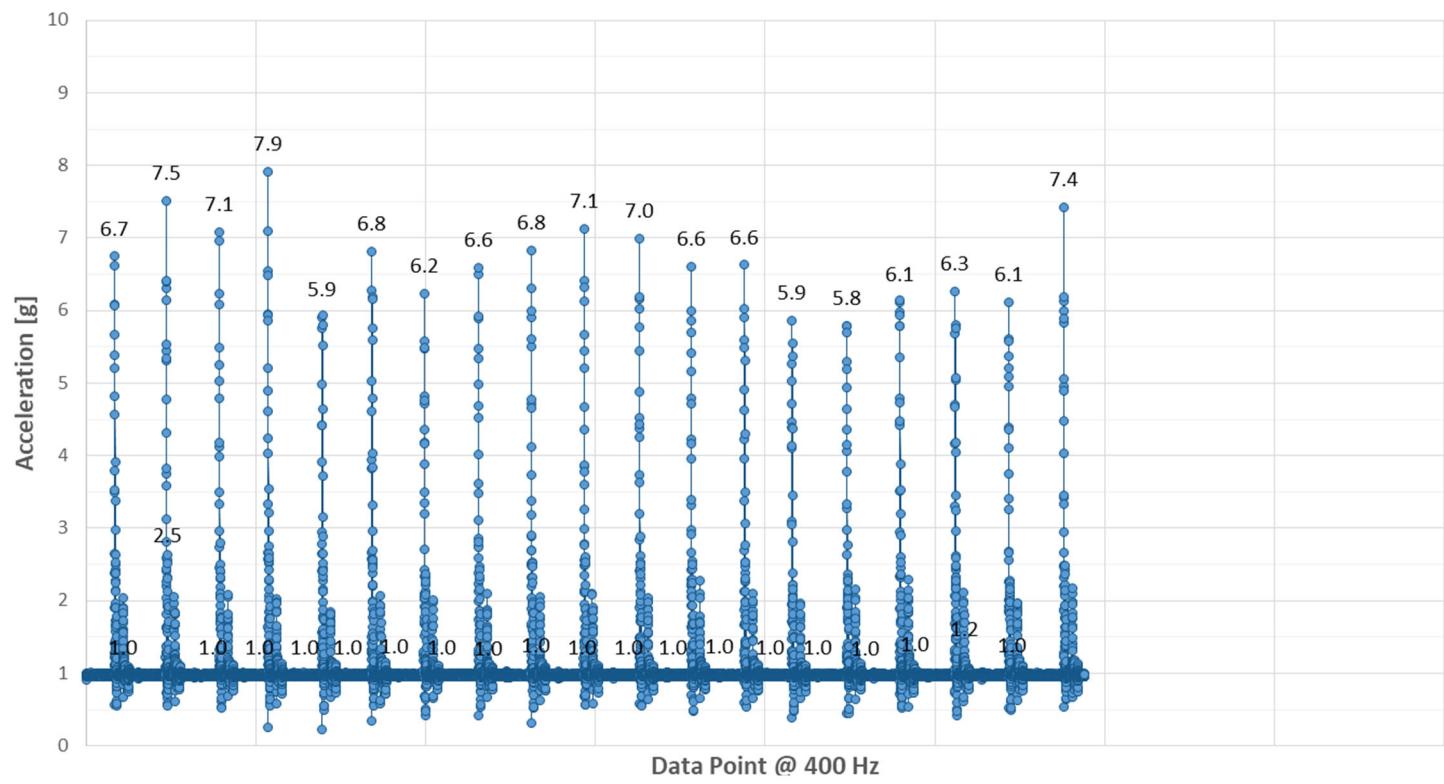
**Z Acceleration (Up and Down) - Recore**



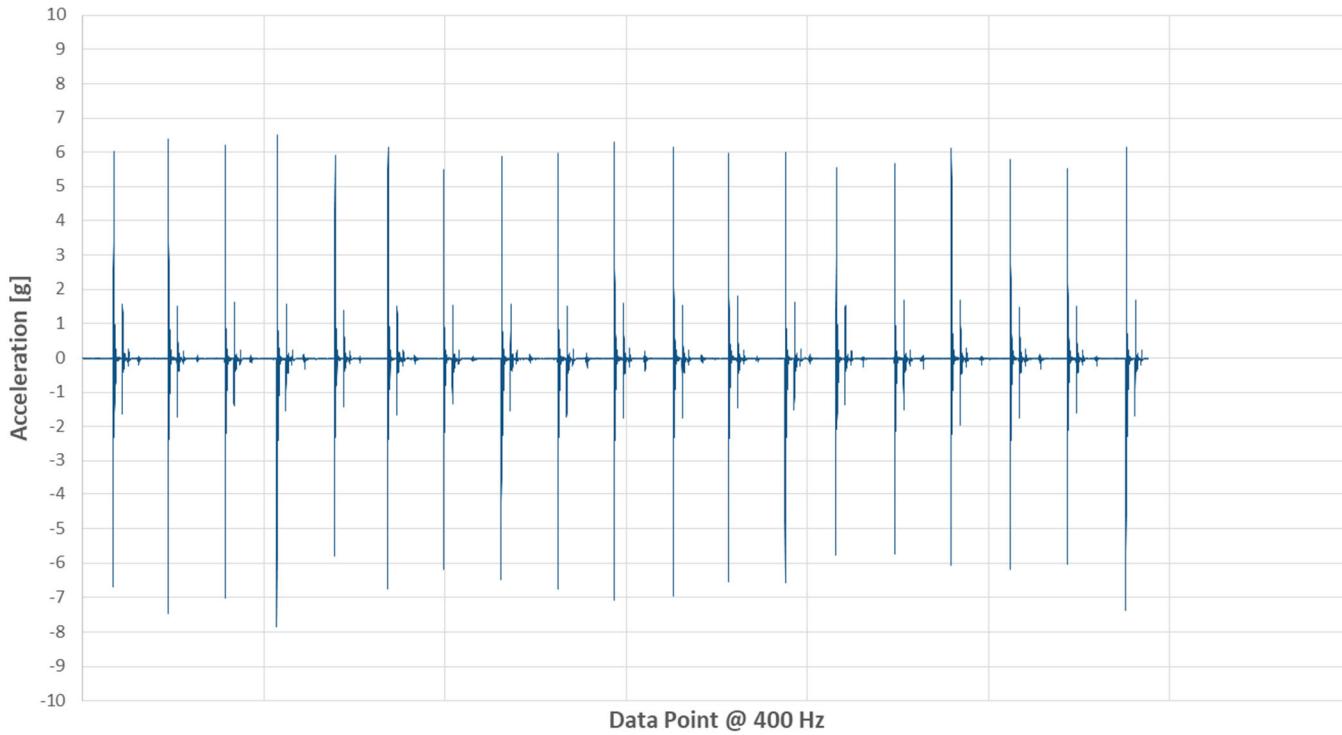


## TEST 3 – DORMEO

Vector Magnitude Acceleration - Dormeo

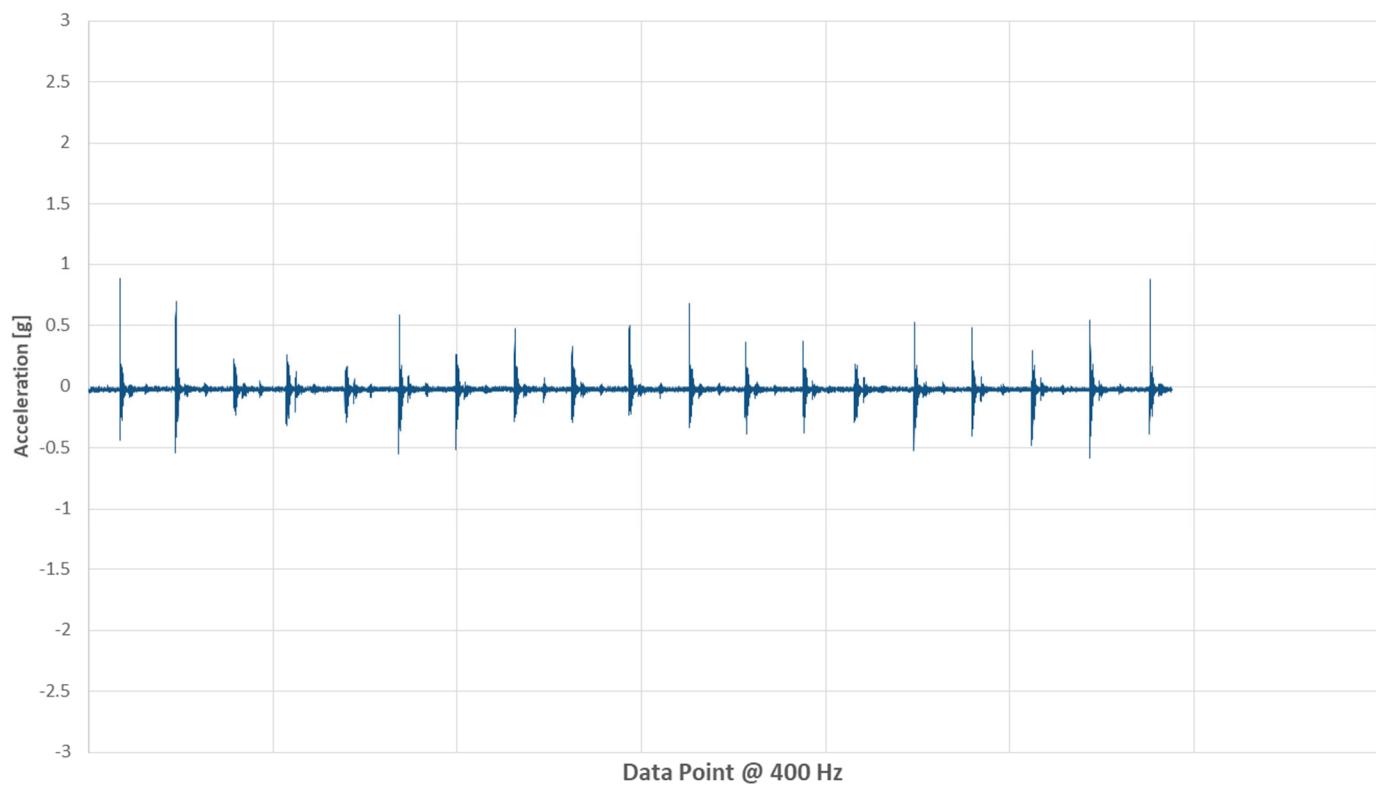


X Acceleration (Side to Side) - Dormeo

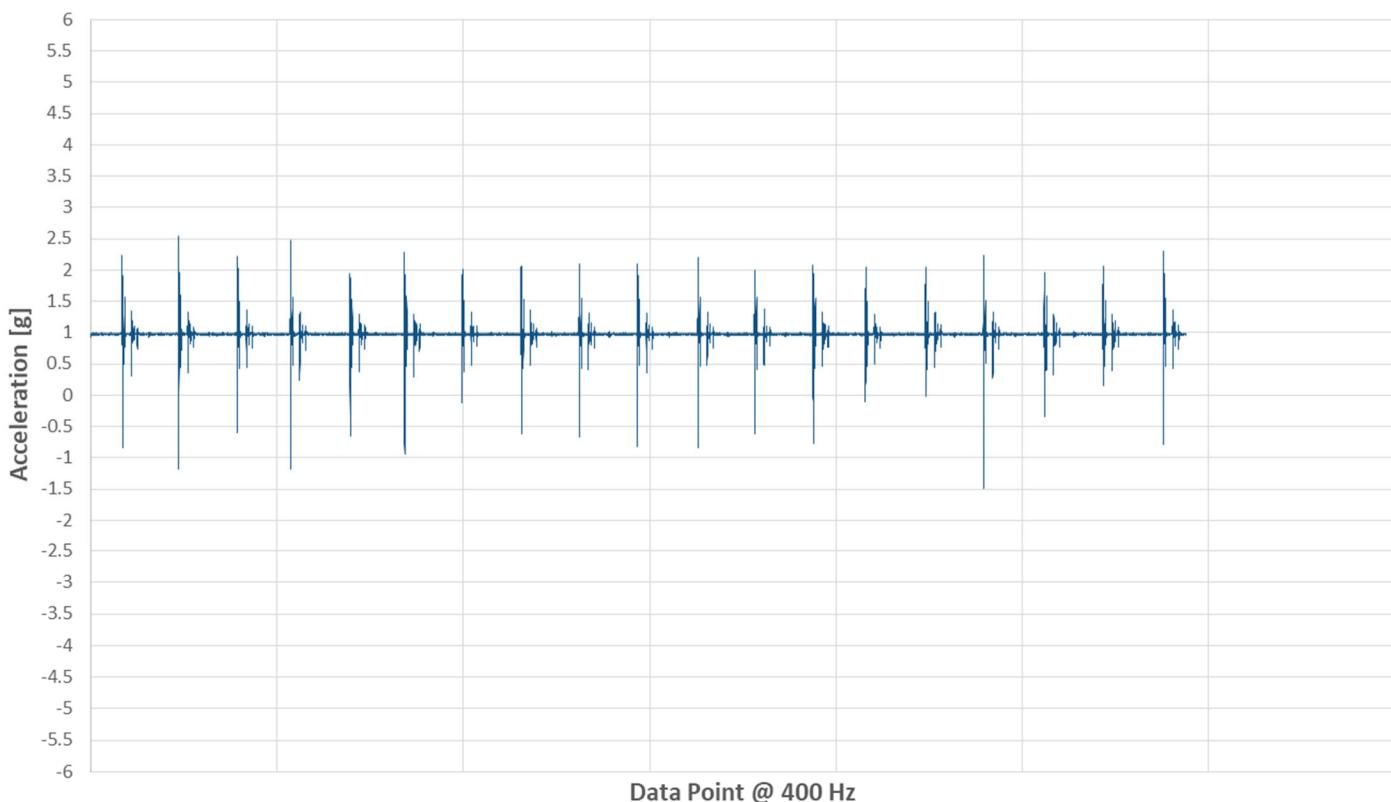




### Y Acceleration (Head to Toe) - Dormeo



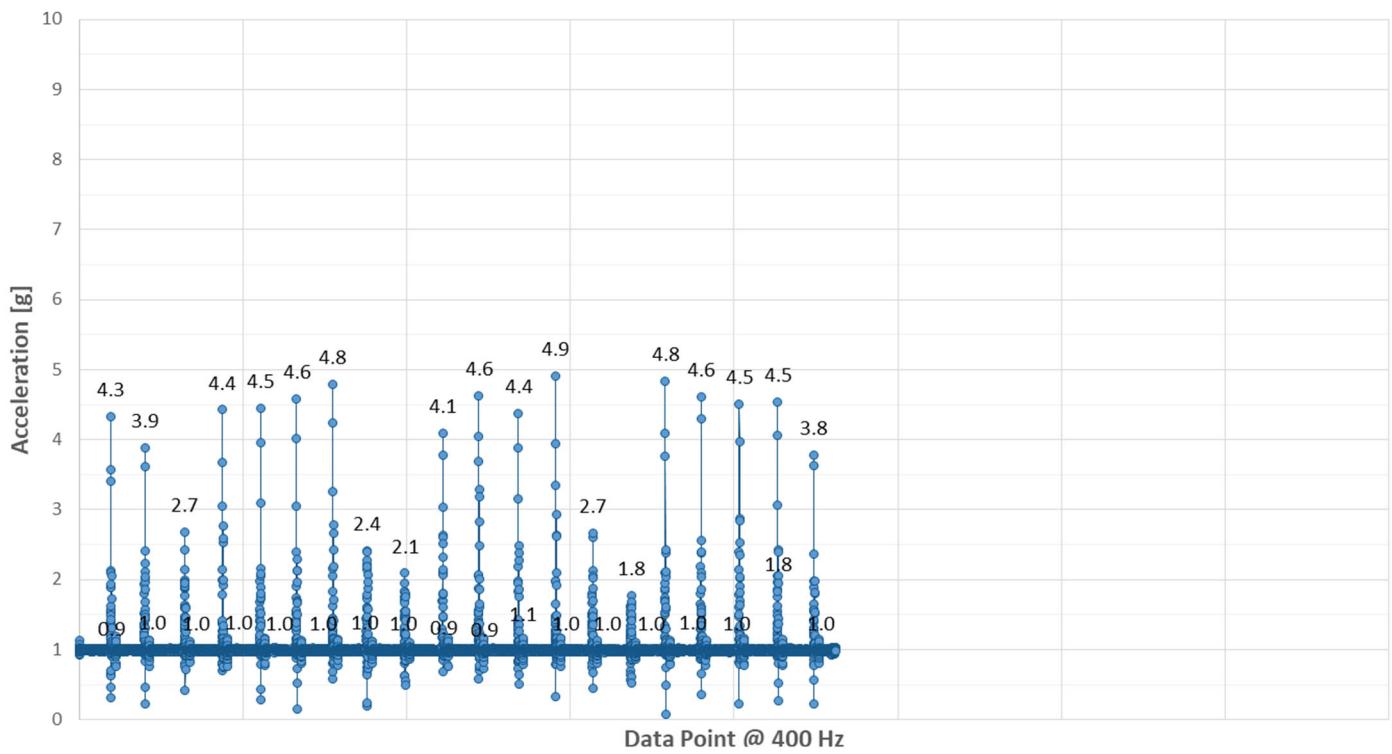
### Z Acceleration (Up and Down) - Dormeo



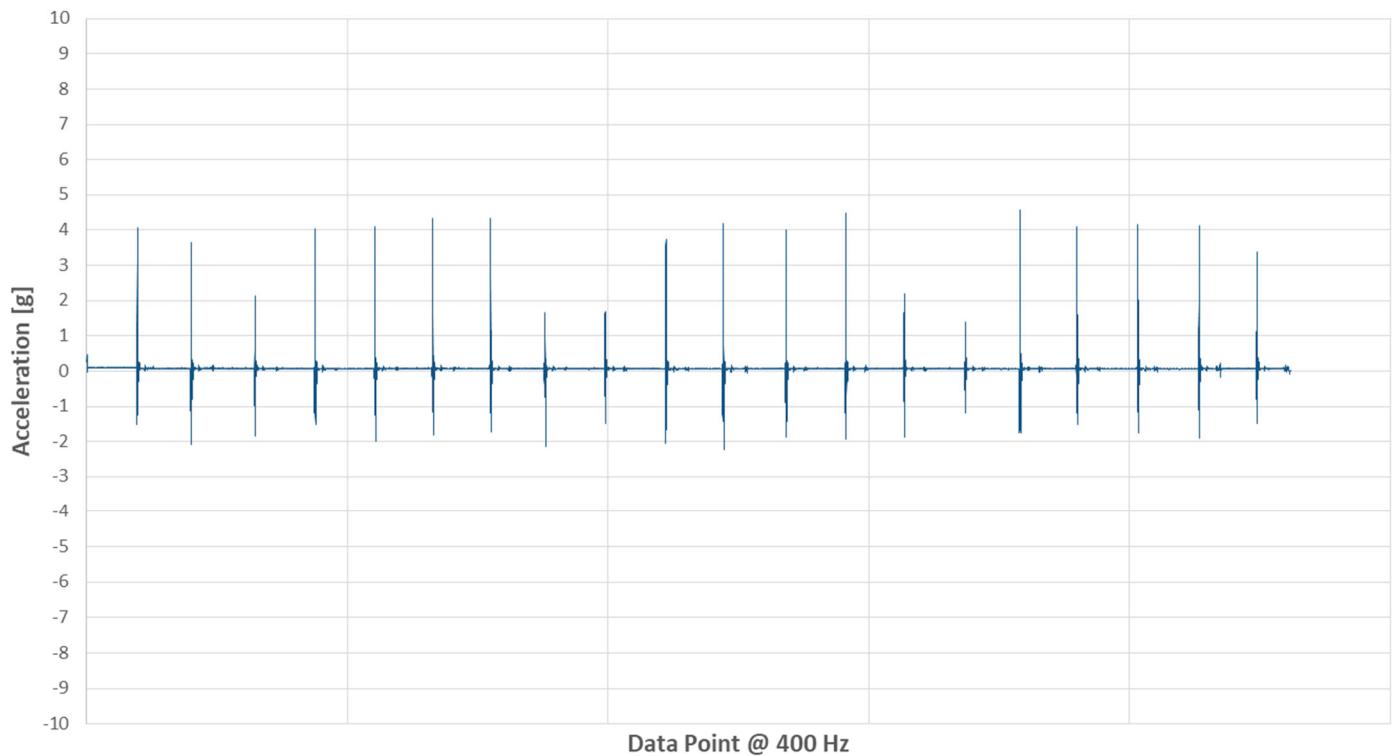


## TEST 3 – SILK + SNOW (V1)

Vector Magnitude Acceleration - Silk + Snow

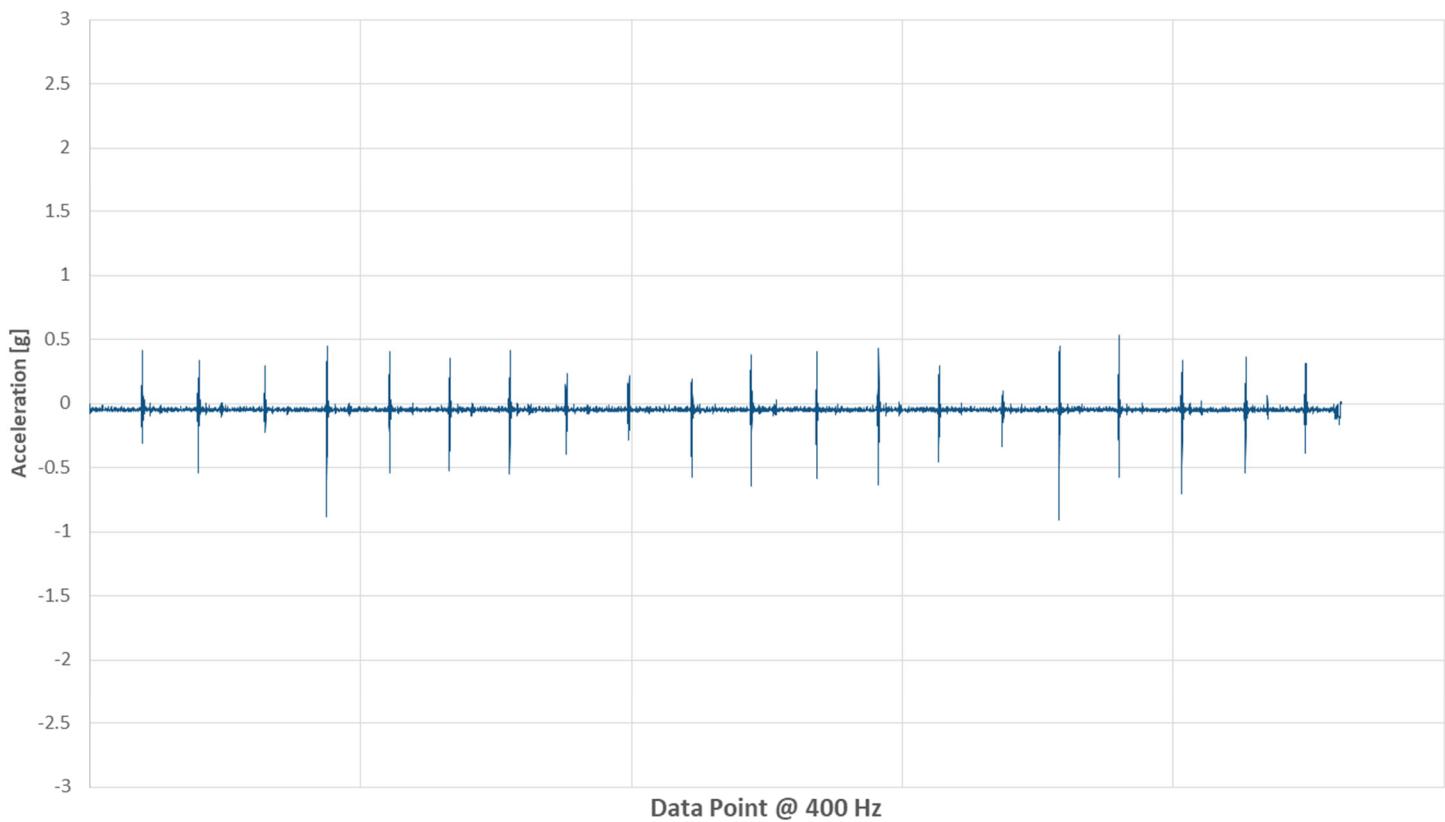


## X Acceleration (Side to Side) - Silk + Snow

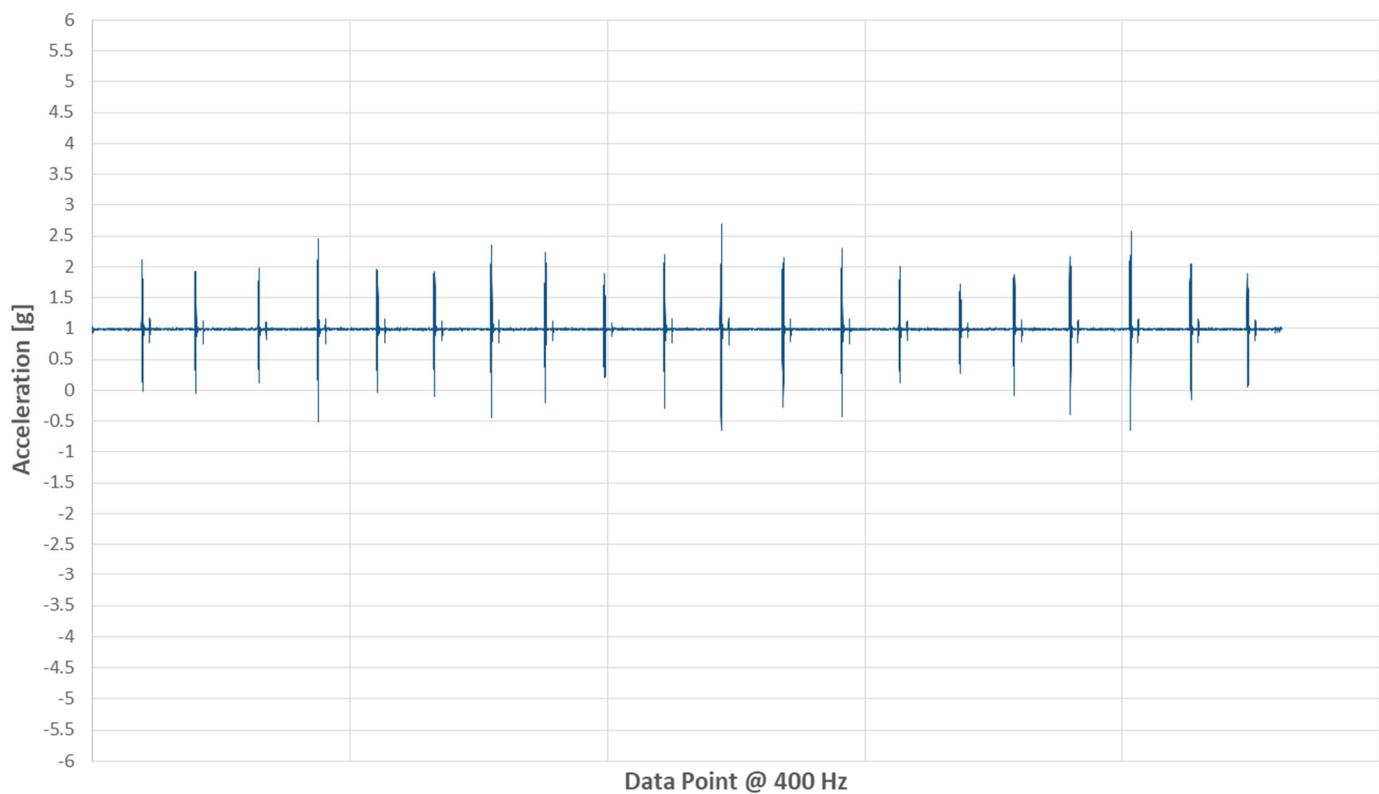




### Y Acceleration (Head to Toe) - Silk + Snow



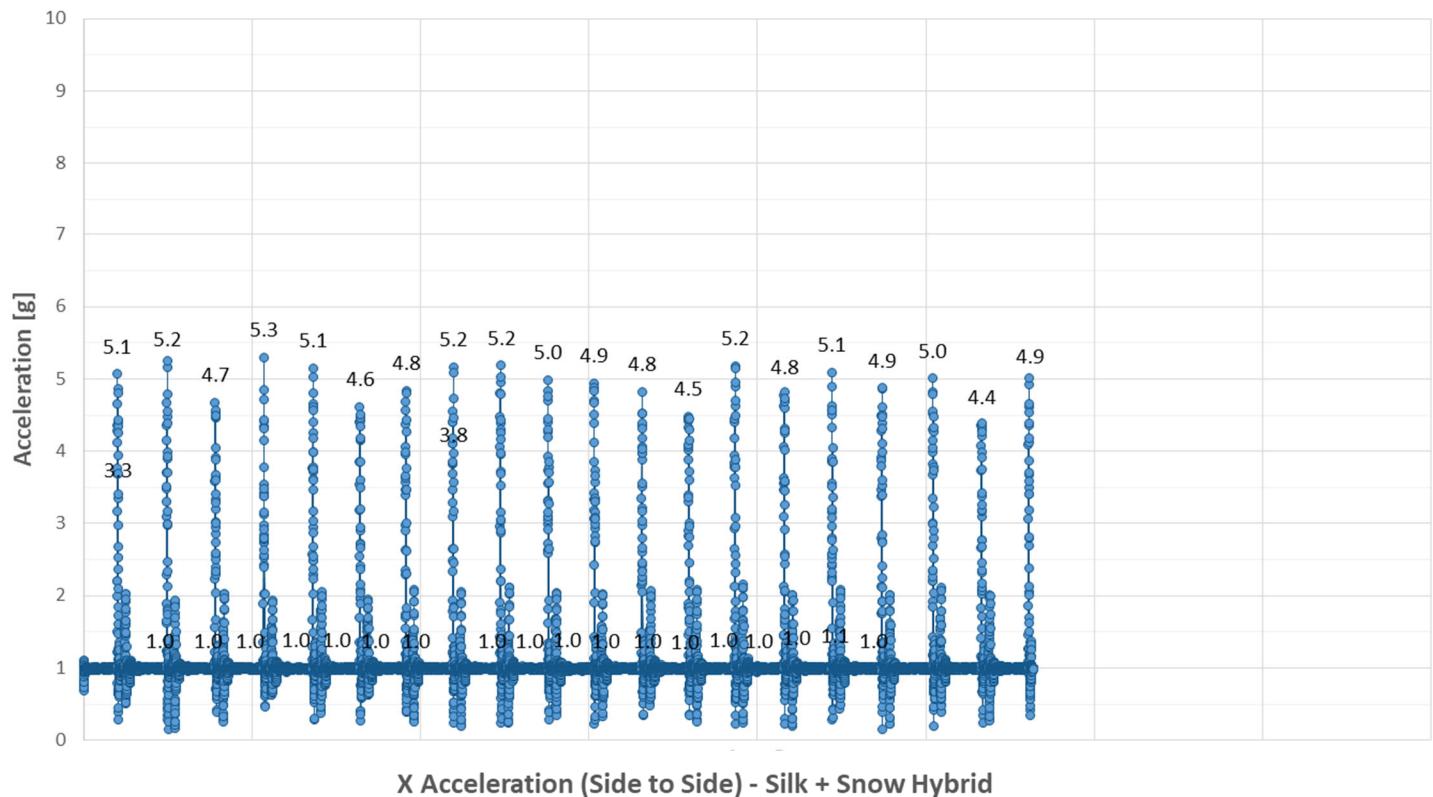
### Z Acceleration (Up and Down) - Silk + Snow



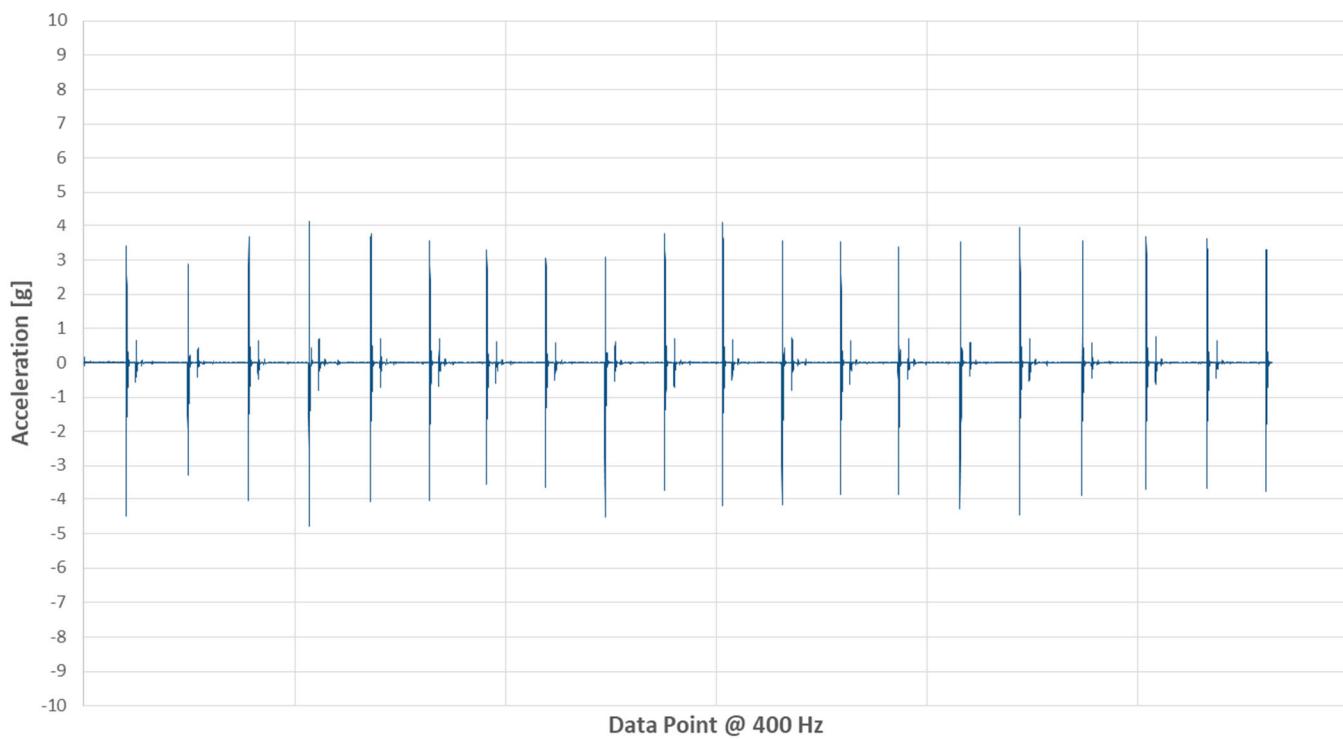


## TEST 3 – SILK + SNOW HYBRID (V1)

Vector Magnitude Acceleration - Silk + Snow Hybrid

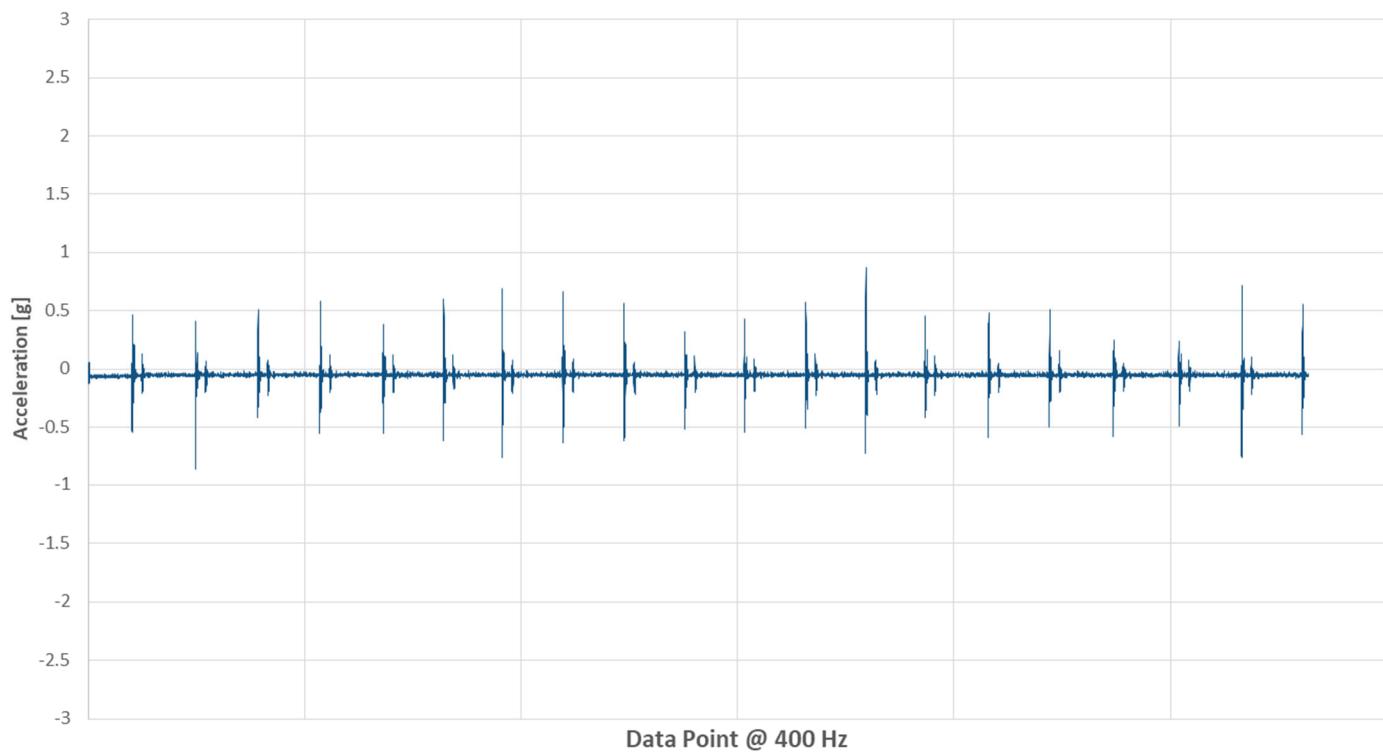


X Acceleration (Side to Side) - Silk + Snow Hybrid

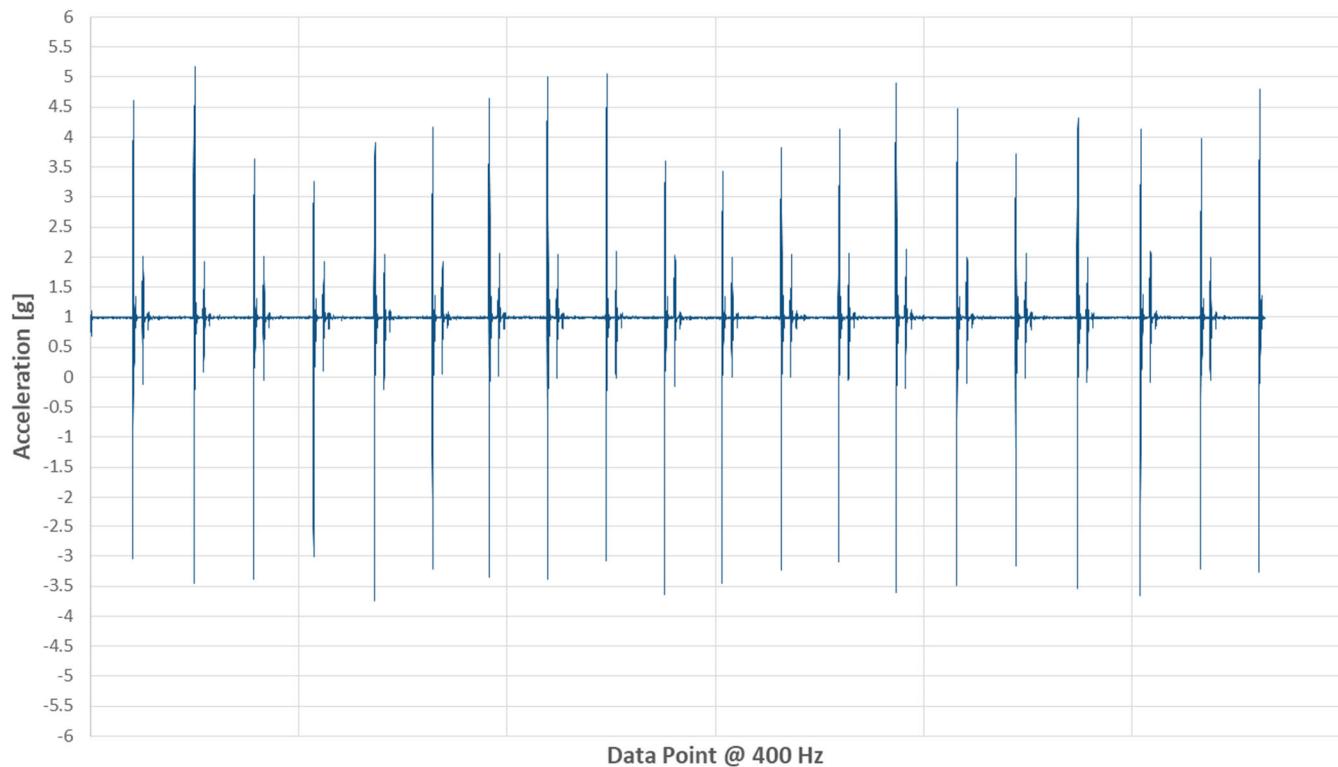




Y Acceleration (Head to Toe) - Silk + Snow Hybrid



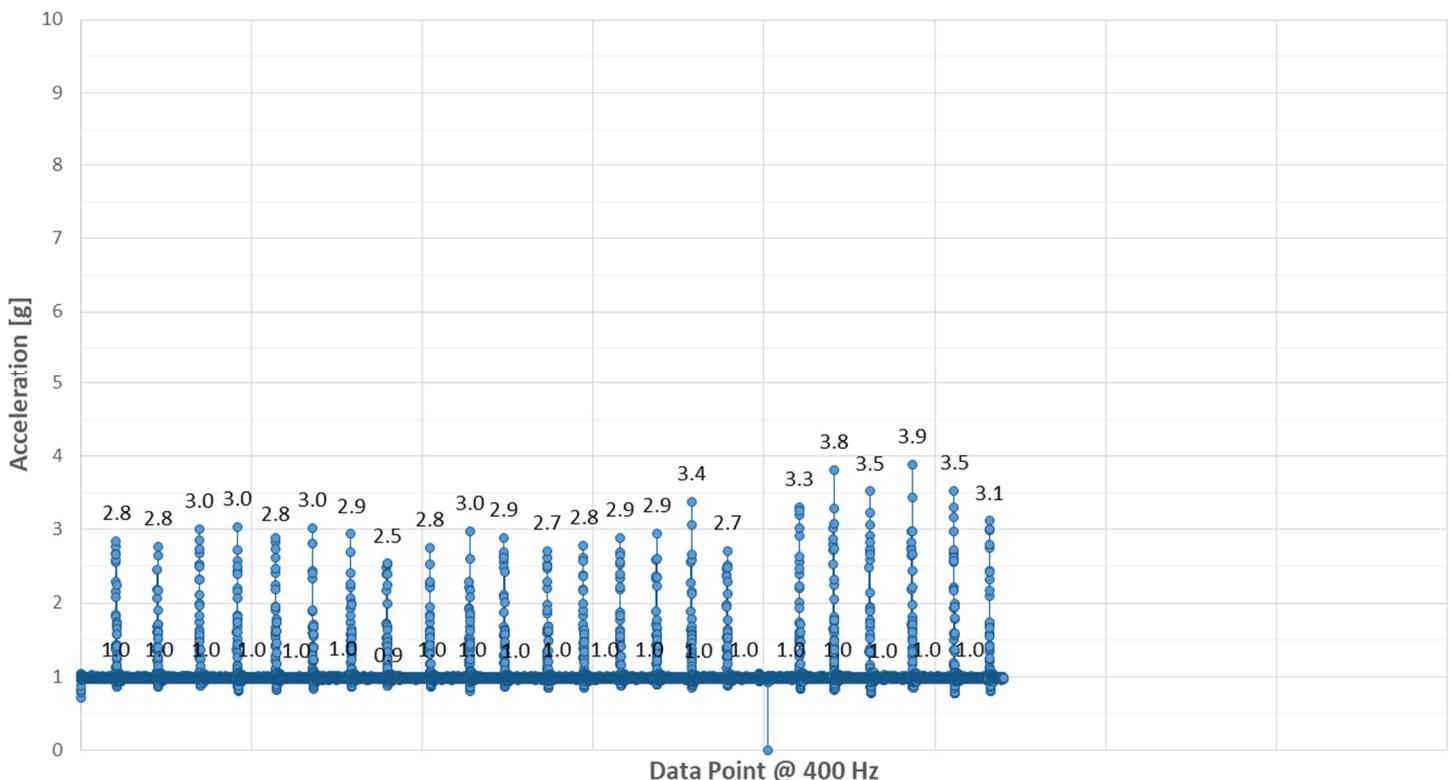
Z Acceleration (Up and Down) - Silk + Snow Hybrid



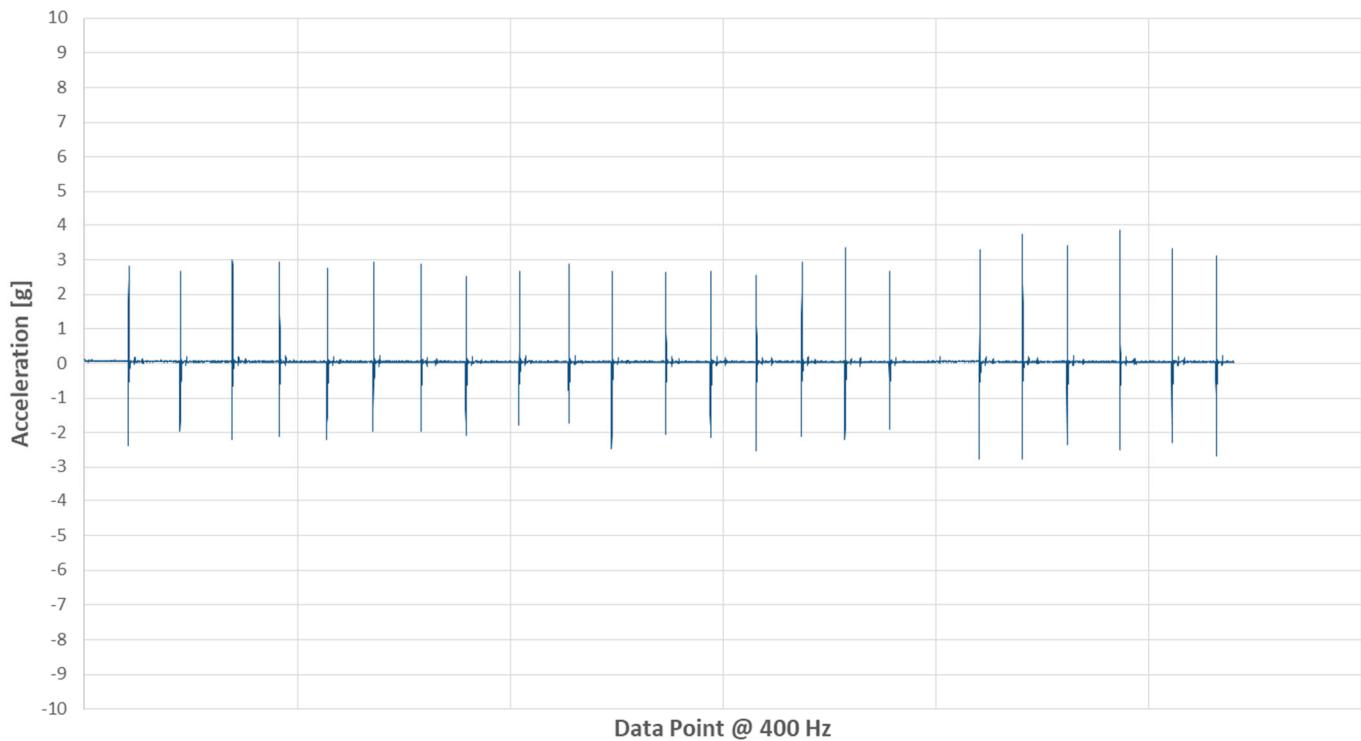


## **TEST 3 – NOVAFORM**

Vector Magnitude Acceleration - Novaform

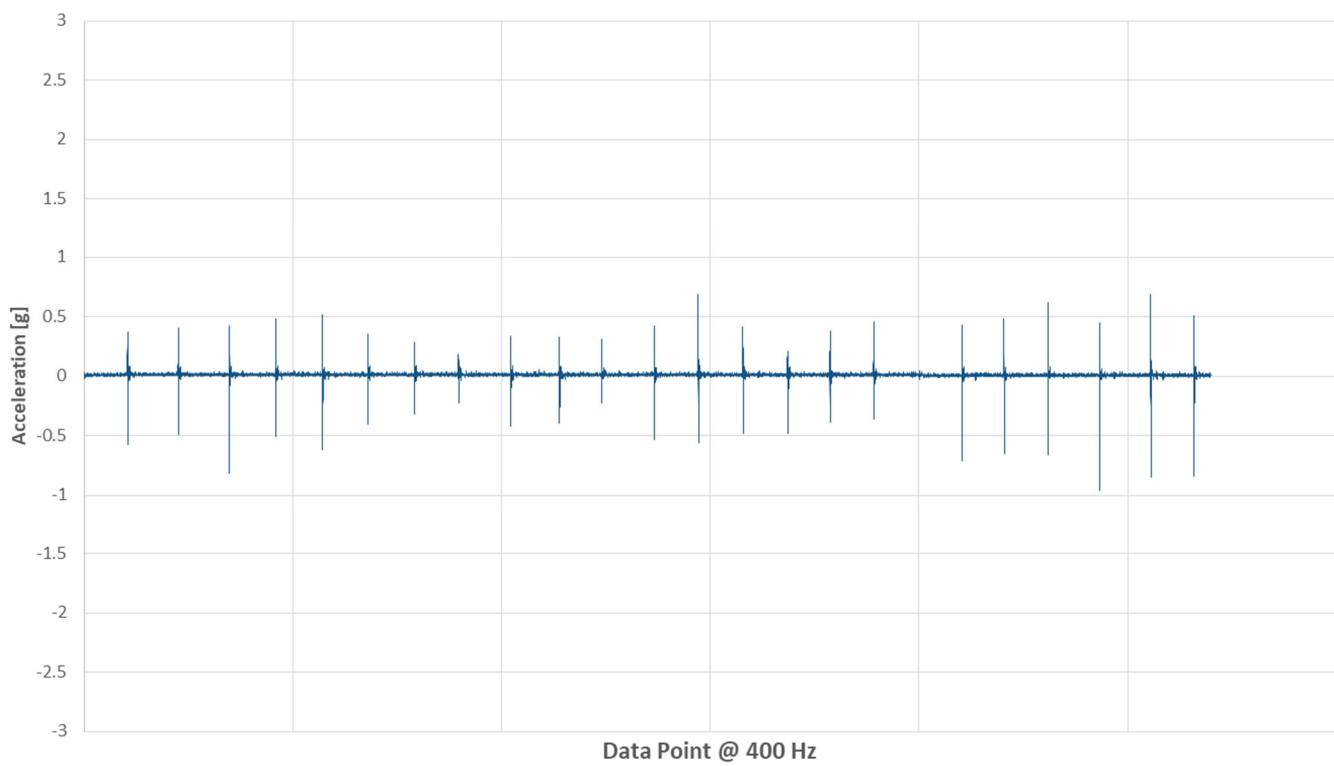


#### X Acceleration (Side to Side) - Novaform

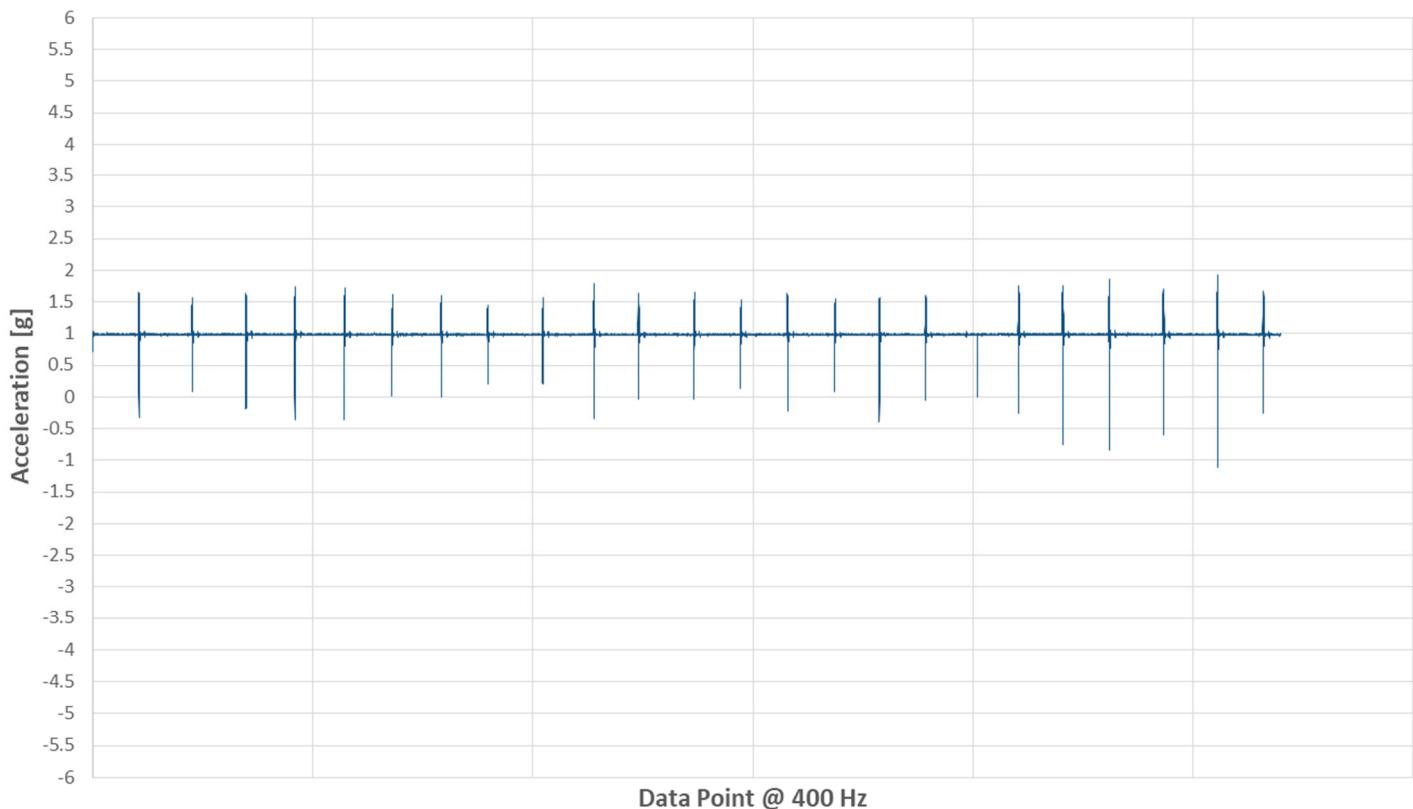




Y Acceleration (Head to Toe) - Novaform



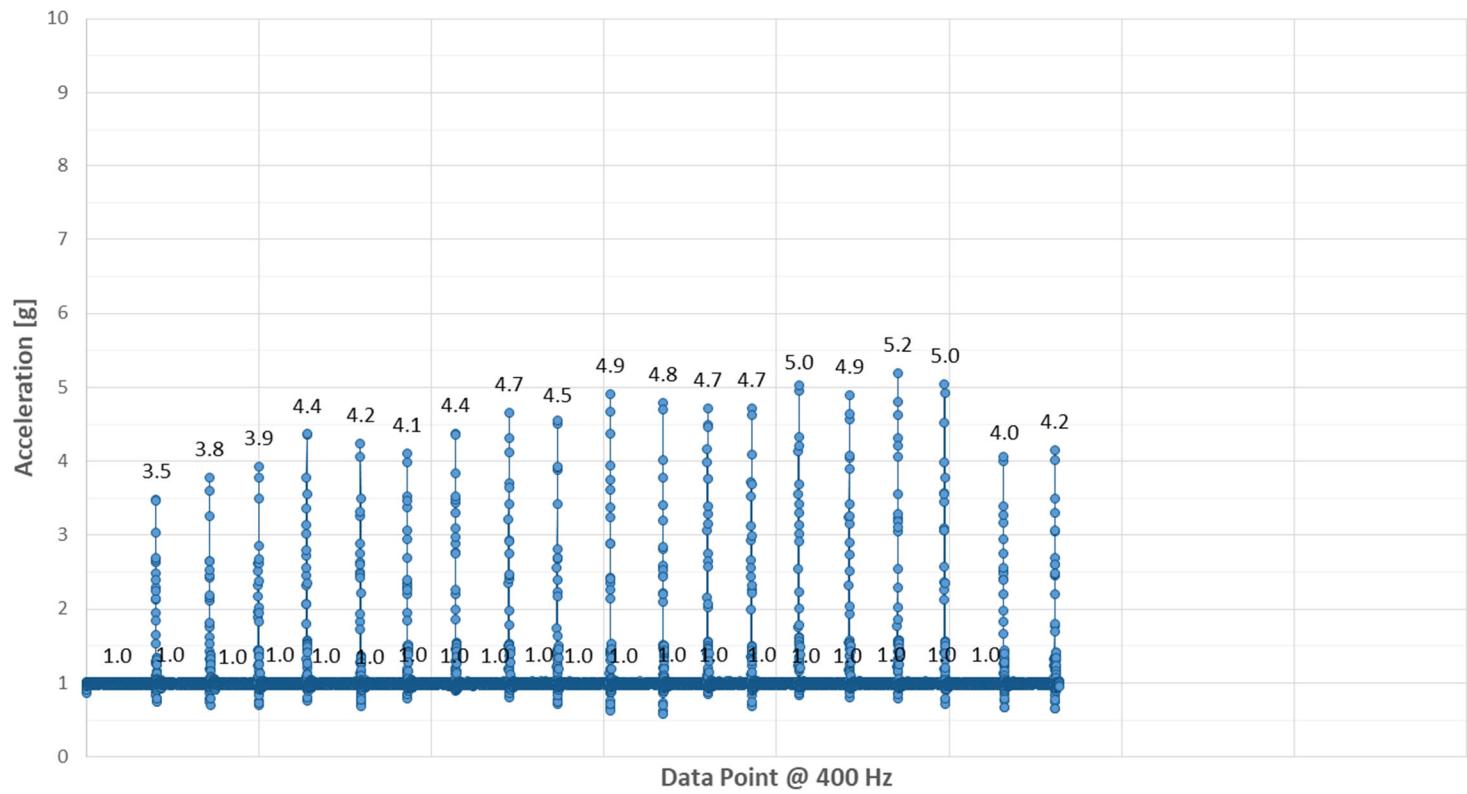
Z Acceleration (Up and Down) - Novaform



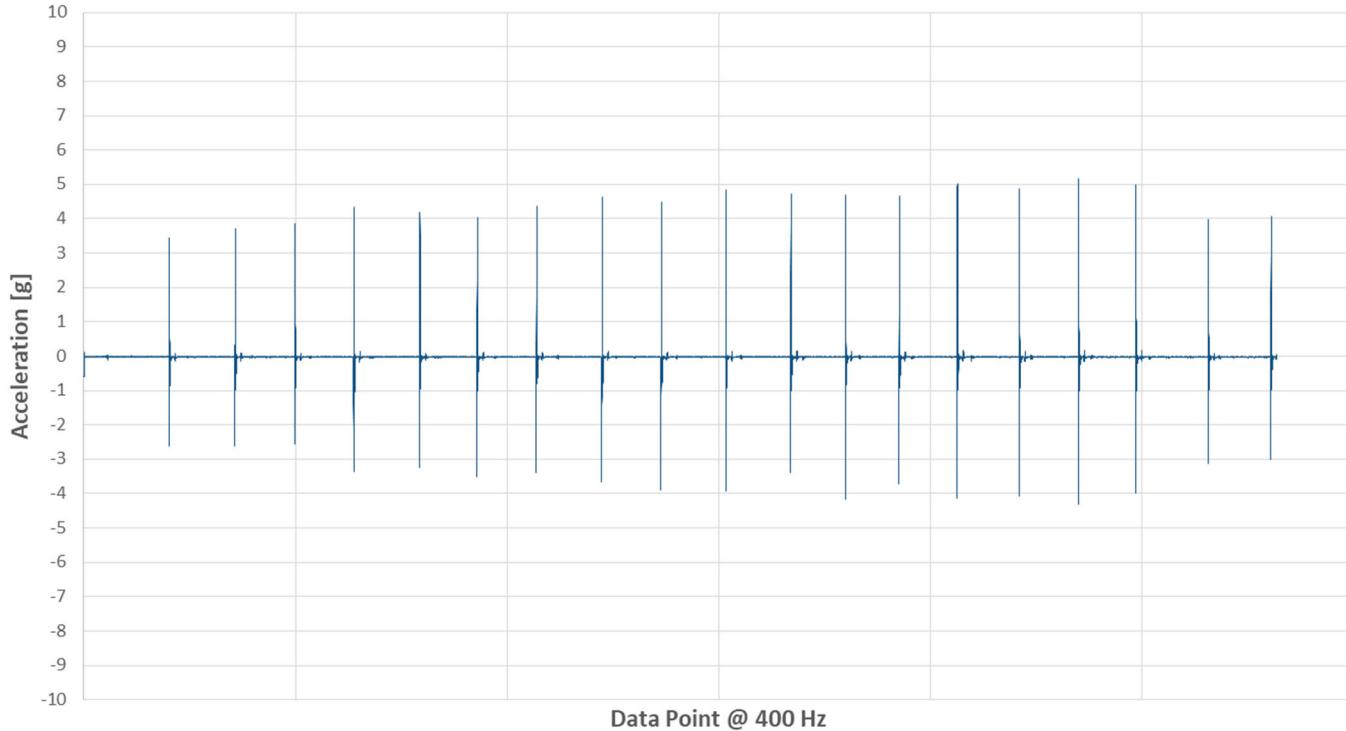


## TEST 3 – NECTAR

Vector Magnitude Acceleration - Nectar

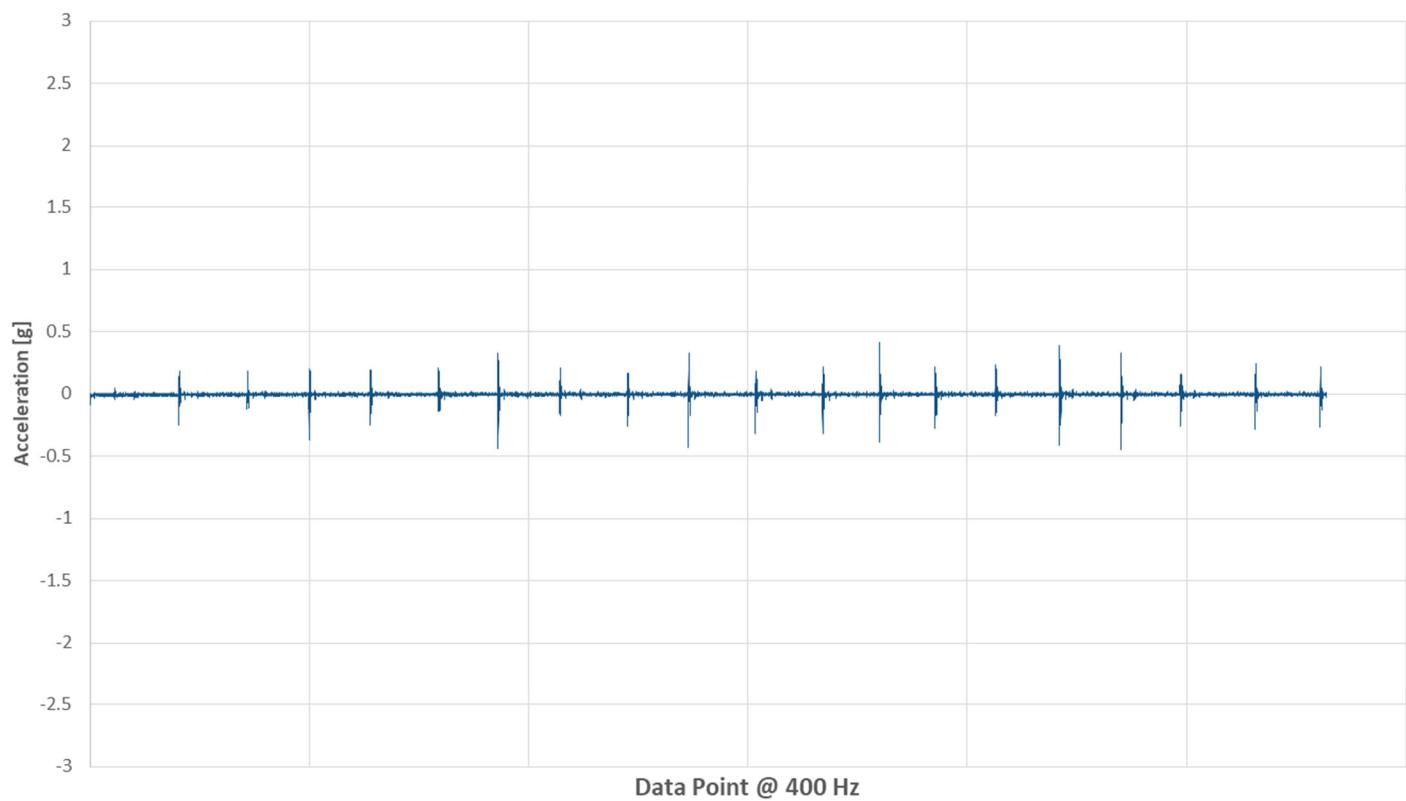


X Acceleration (Side to Side) - Nectar

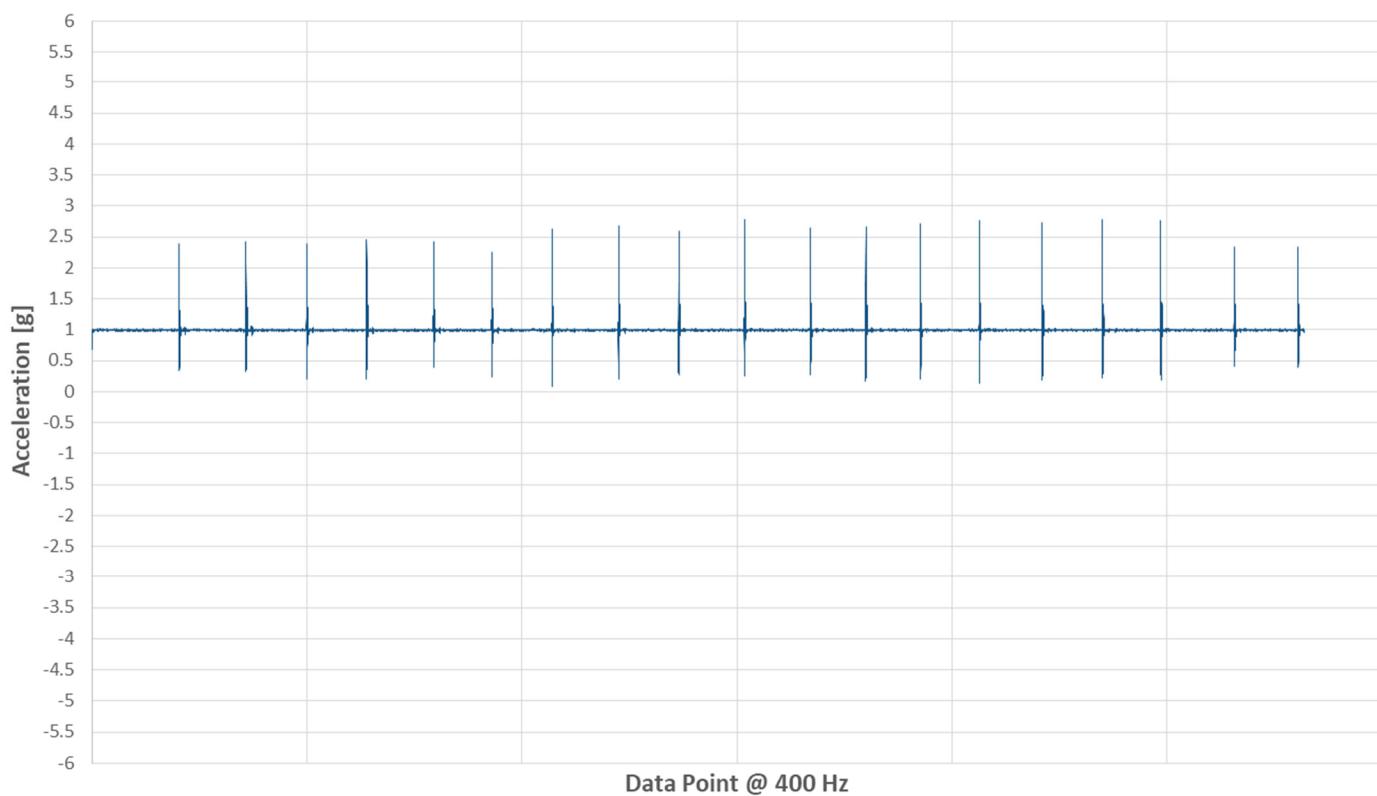




Y Acceleration (Head to Toe) - Nectar



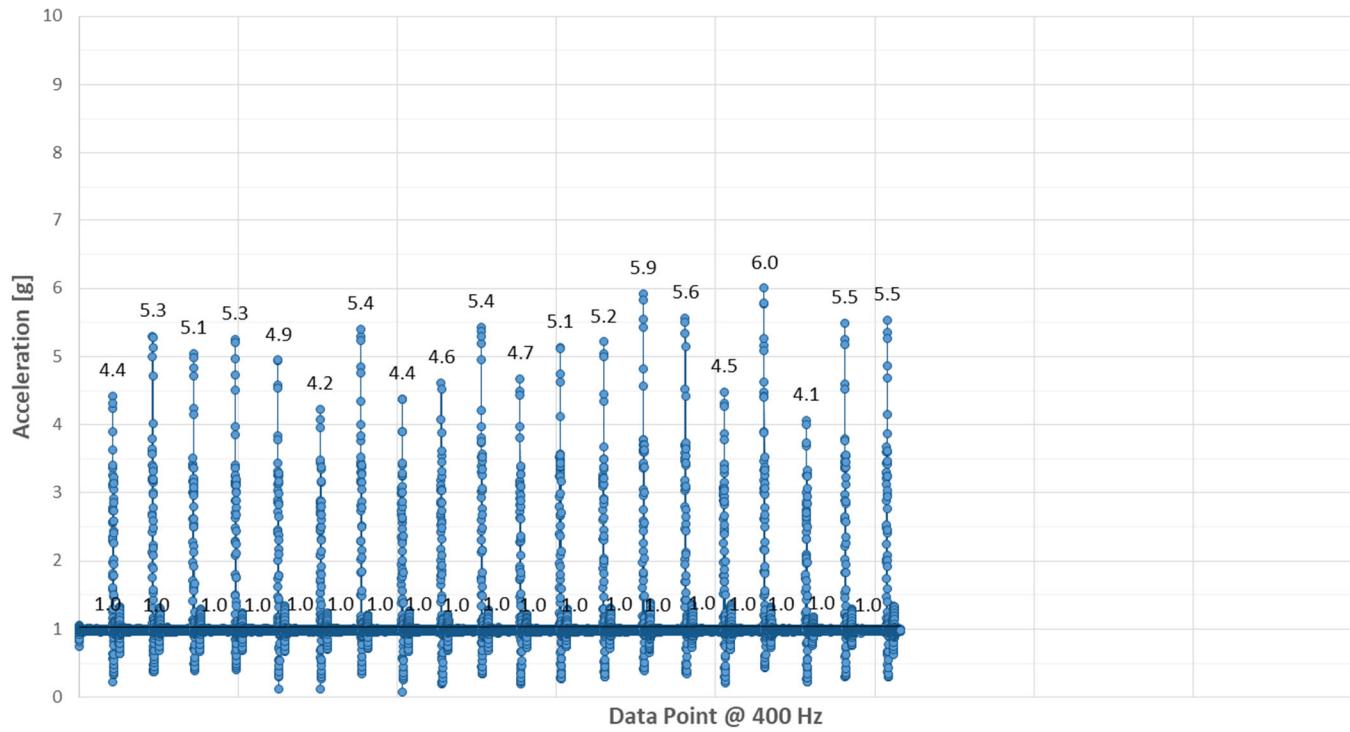
Z Acceleration (Up and Down) - Nectar



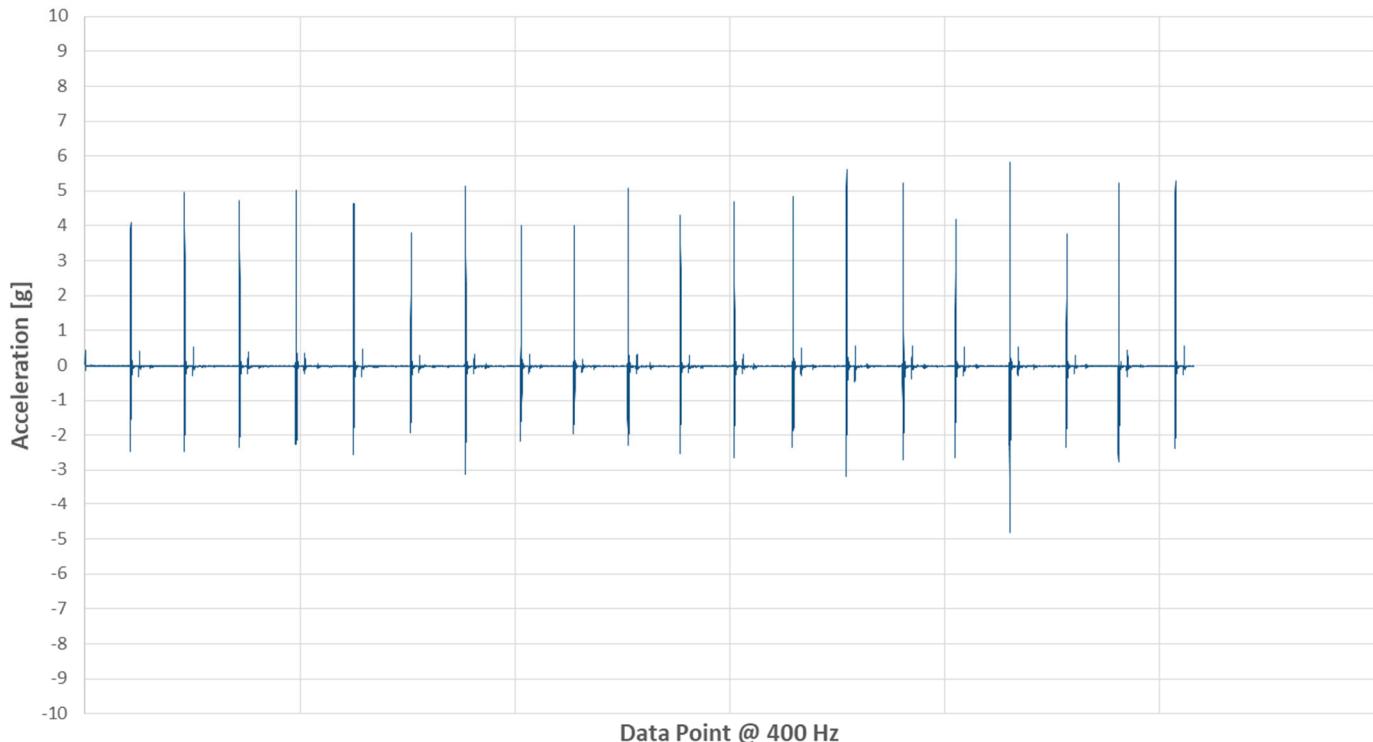


## TEST 3 – LOGAN & COVE MEDIUM

Vector Magnitude Acceleration - Logan & Cove Medium

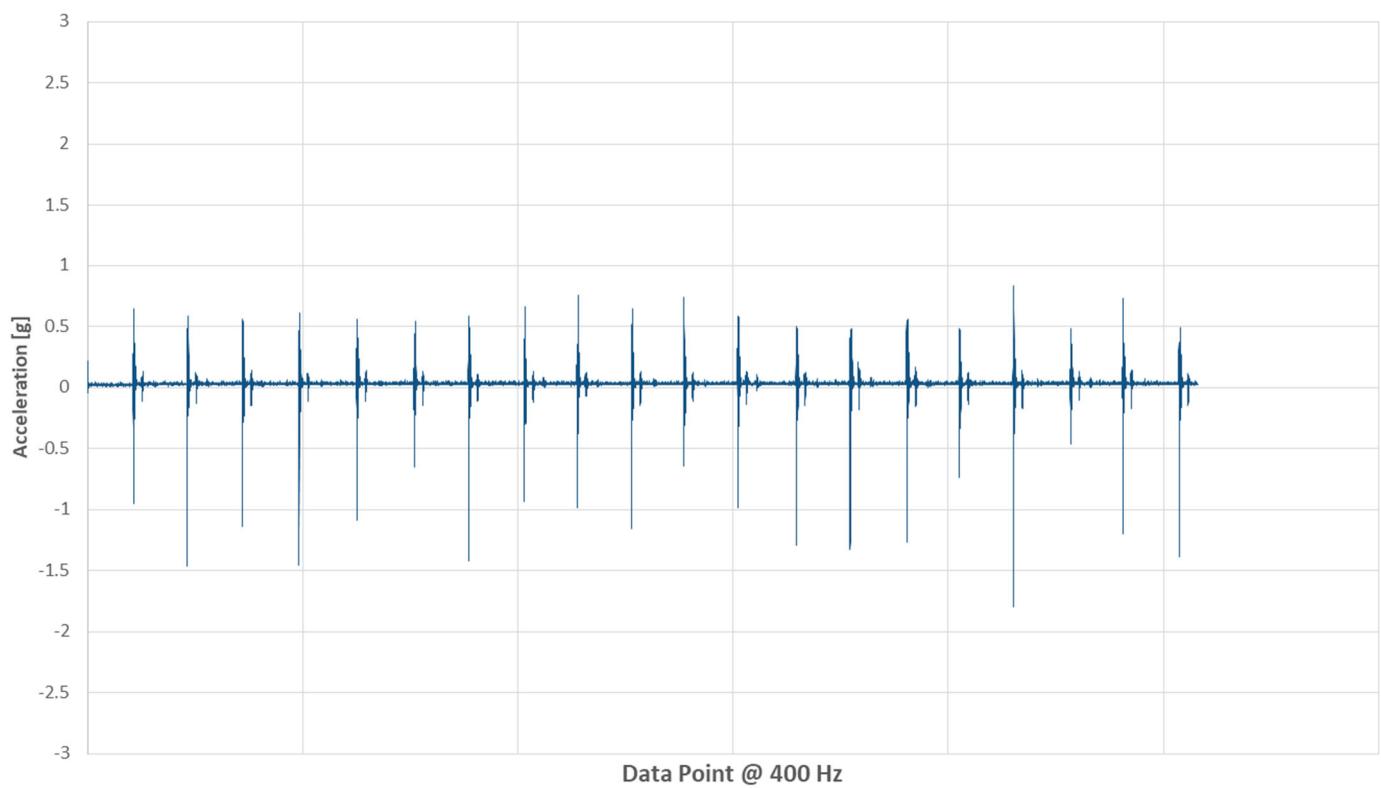


X Acceleration (Side to Side) - Logan & Cove Medium

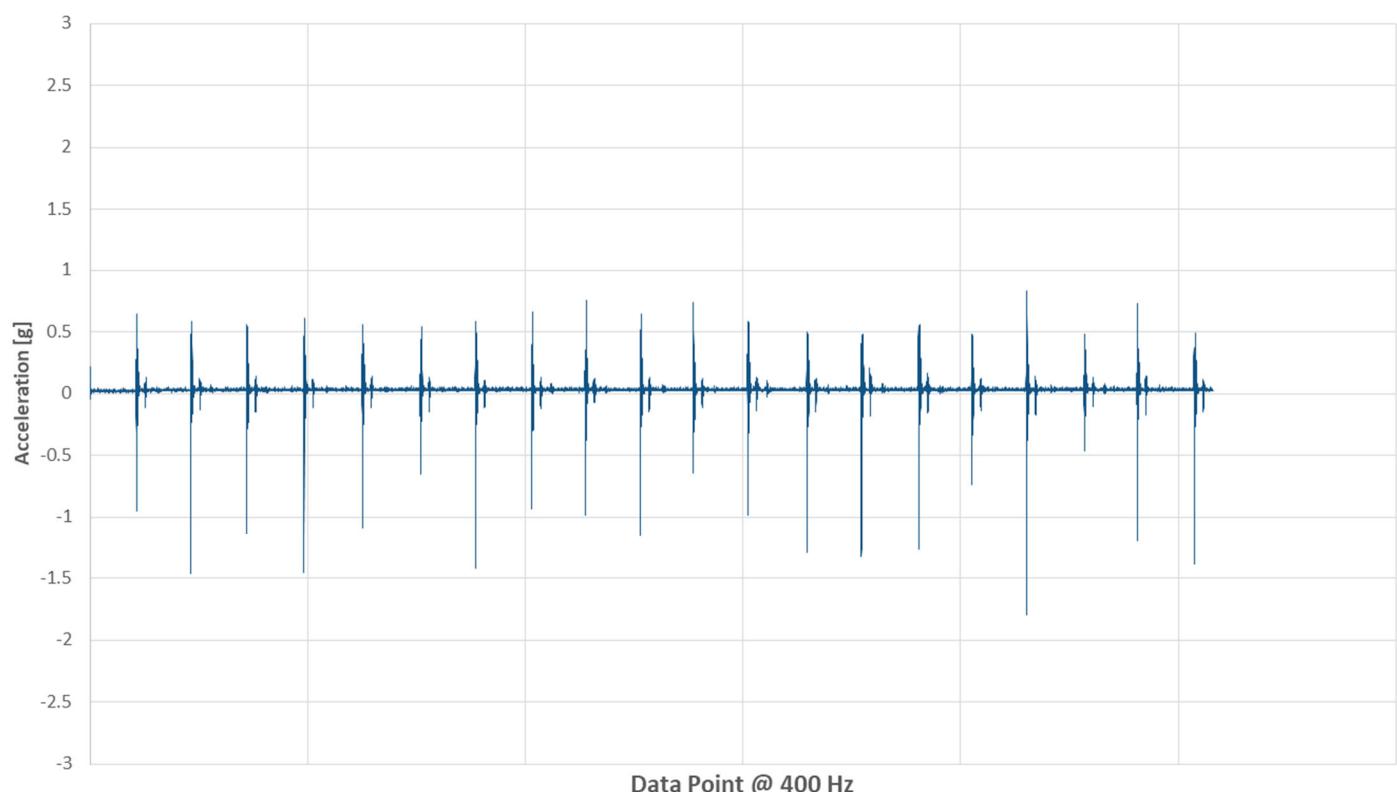




Y Acceleration (Head to Toe) - Logan & Cove Medium



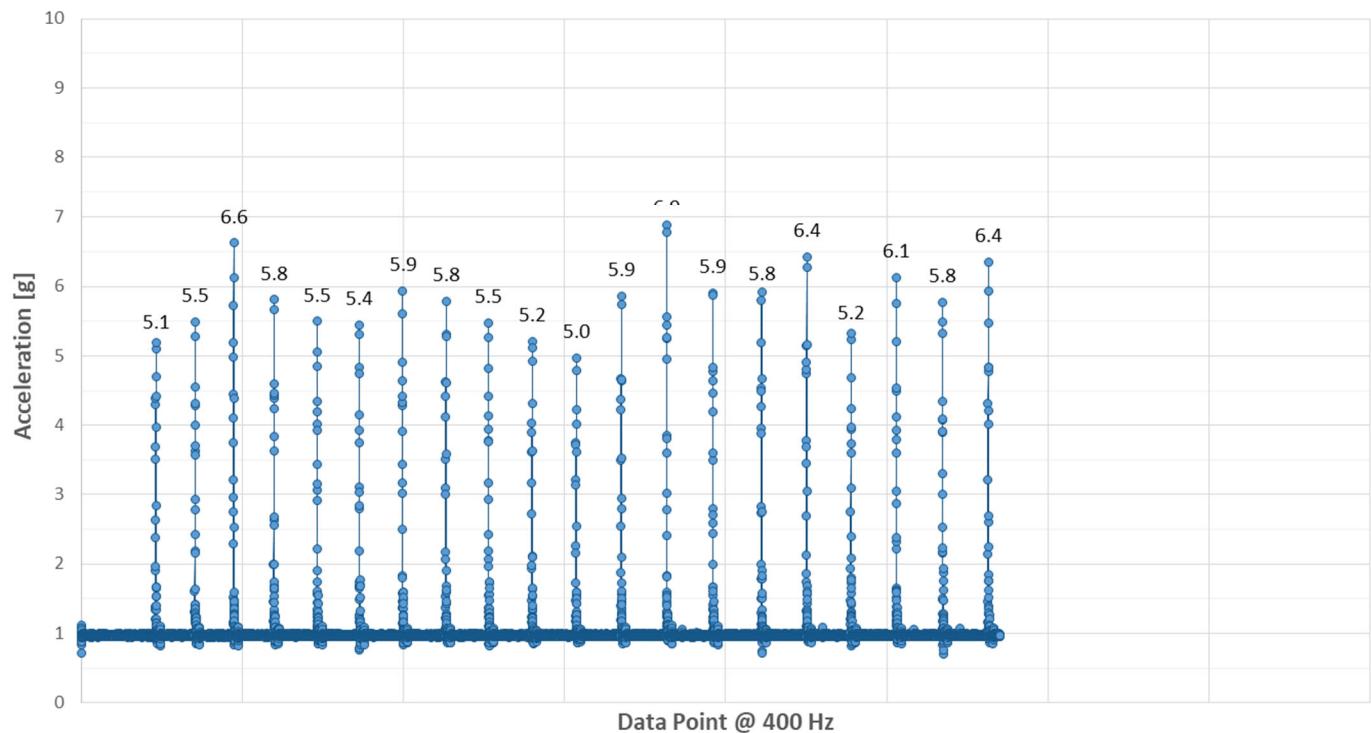
Y Acceleration (Head to Toe) - Logan & Cove Medium



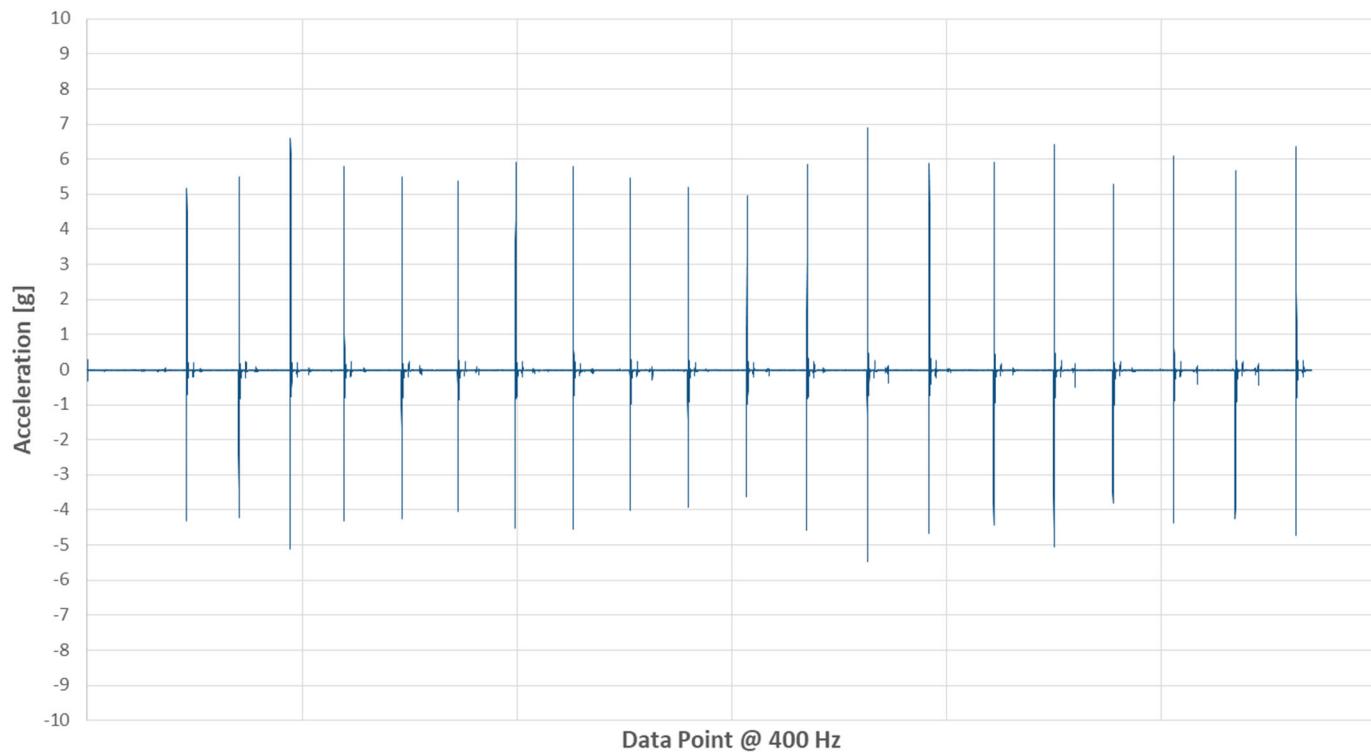


## TEST 3 – CASPER ESSENTIAL

Vector Magnitude Acceleration - Casper Essential

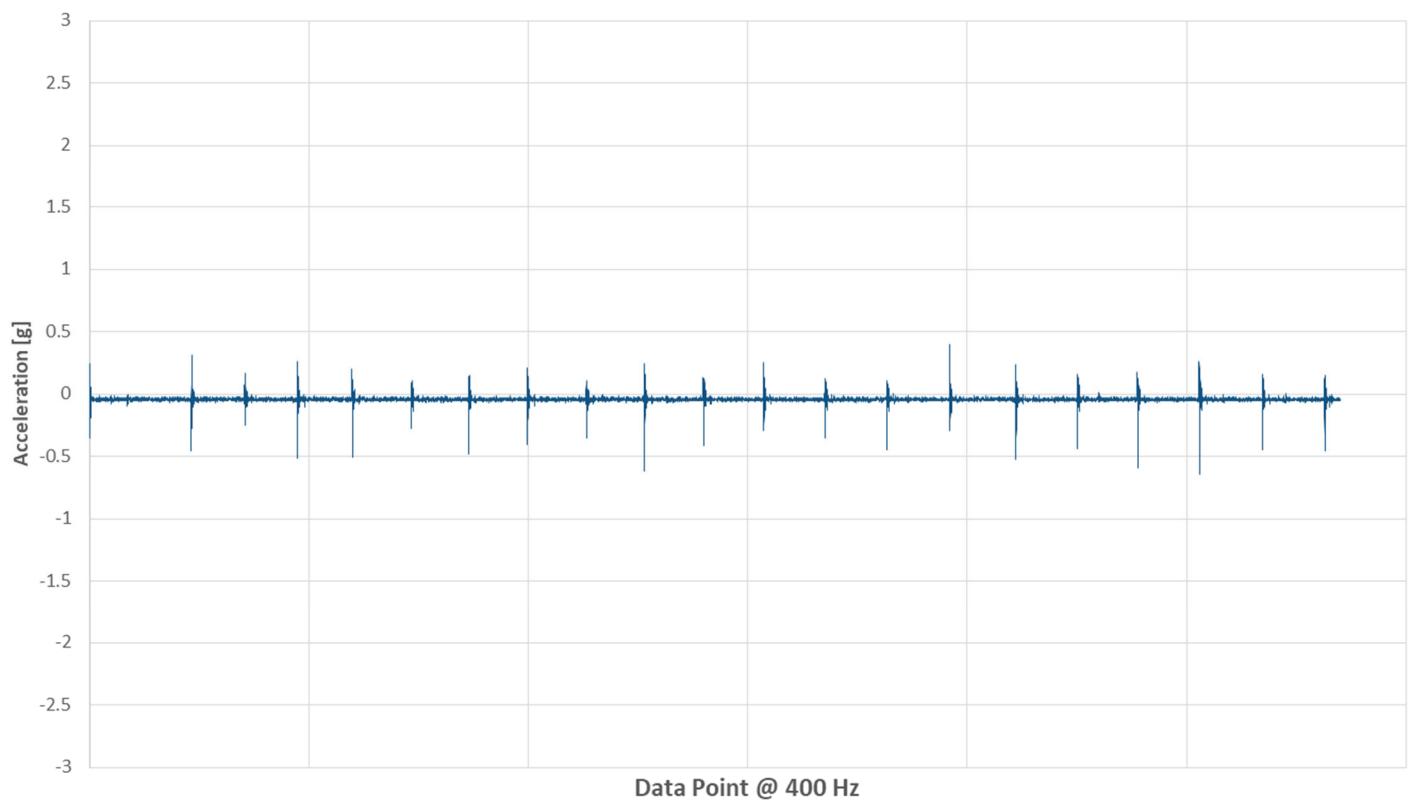


X Acceleration (Side to Side) - Casper Essential

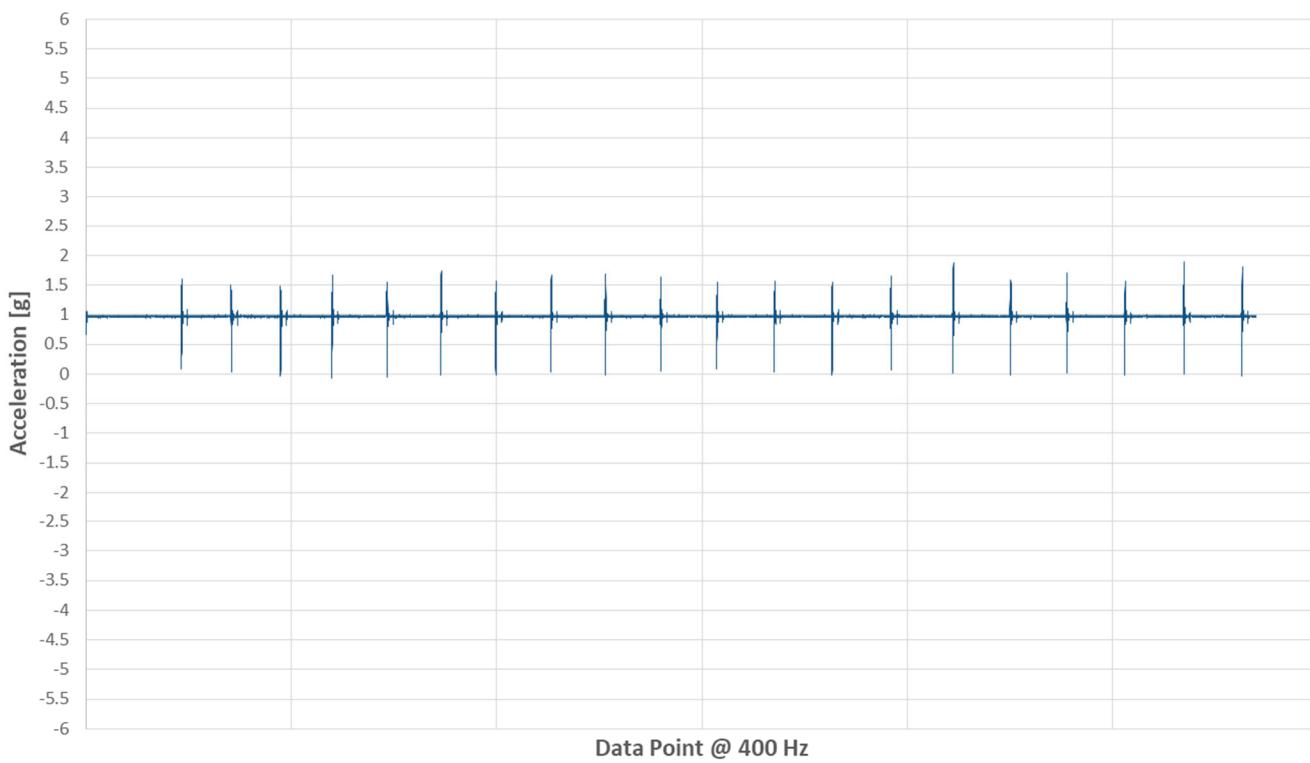




Y Acceleration (Head to Toe) - Casper Essential



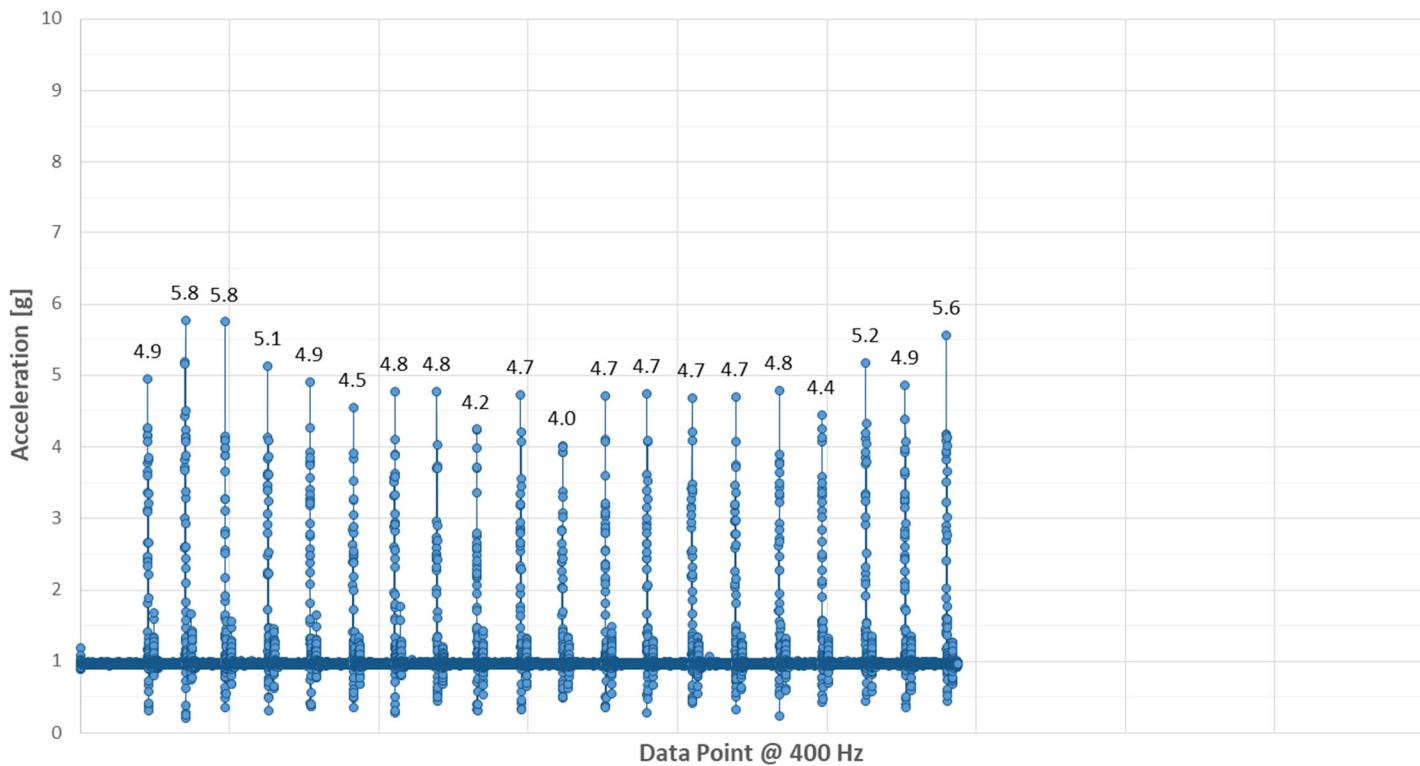
Z Acceleration (Up and Down) - Casper Essential



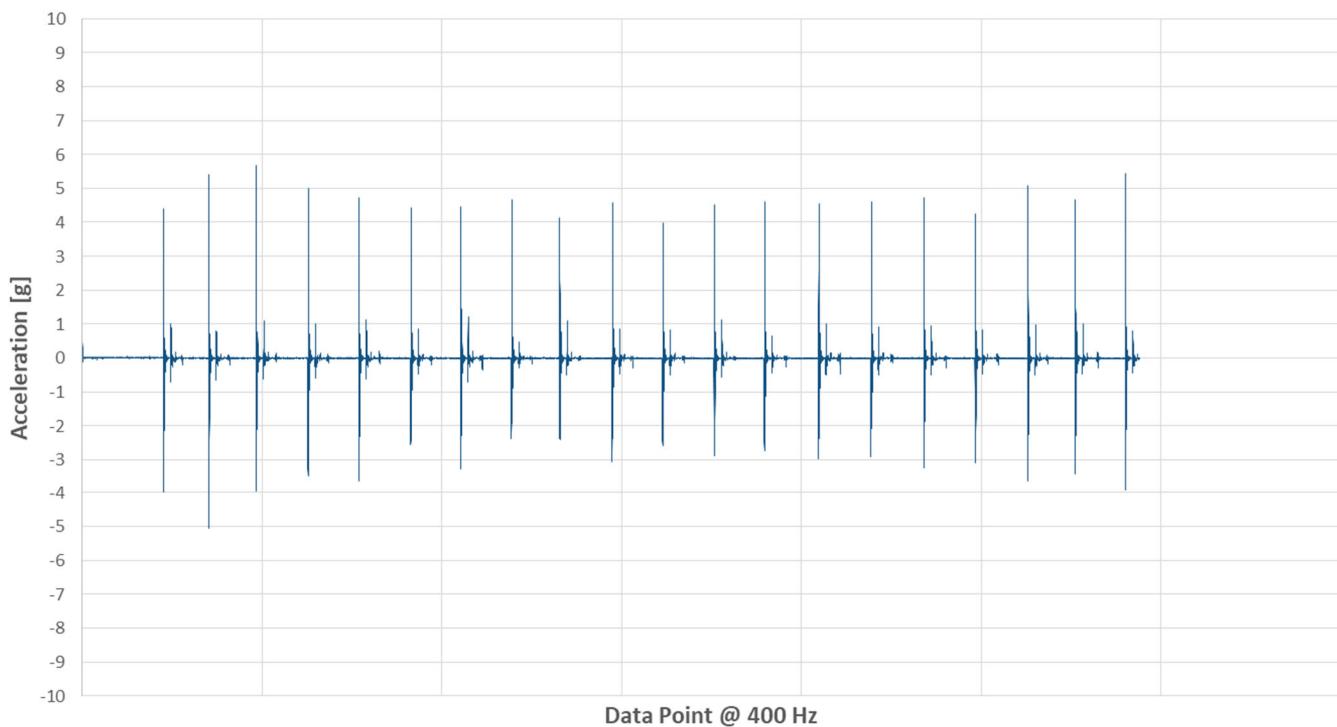


## TEST 3 – CASPER WAVE

Vector Magnitude Acceleration - Casper Wave

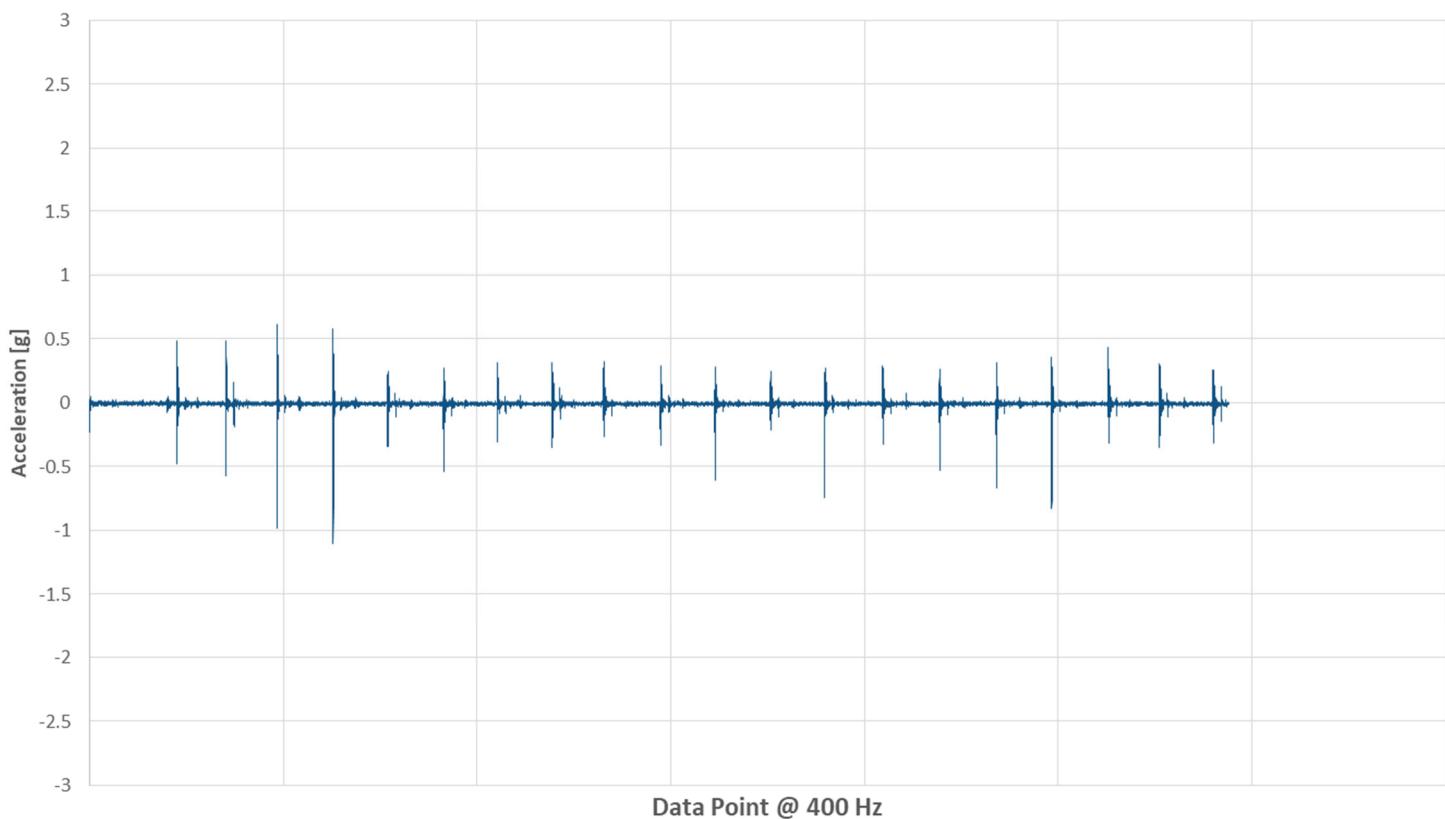


X Acceleration (Side to Side) - Casper Wave

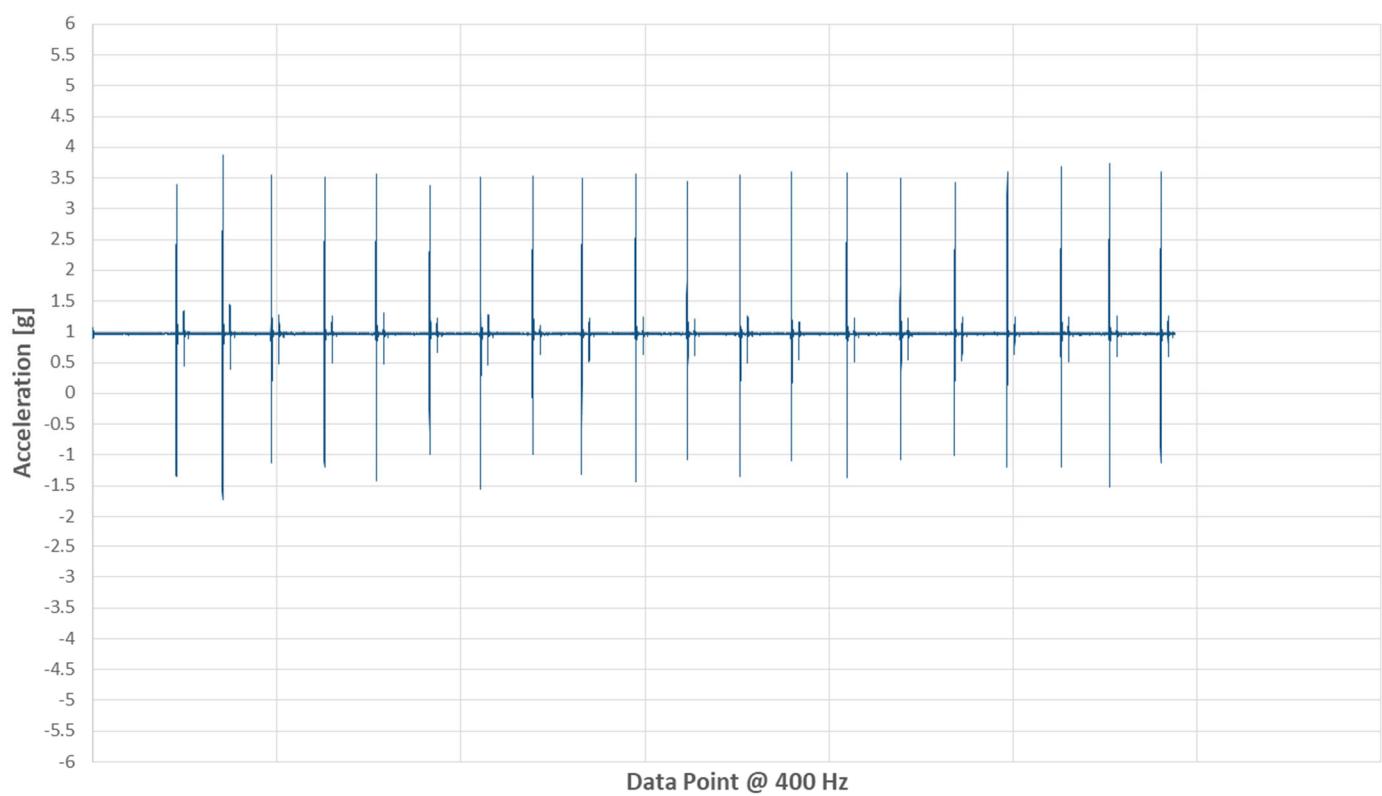




Y Acceleration (Head to Toe) - Casper Wave



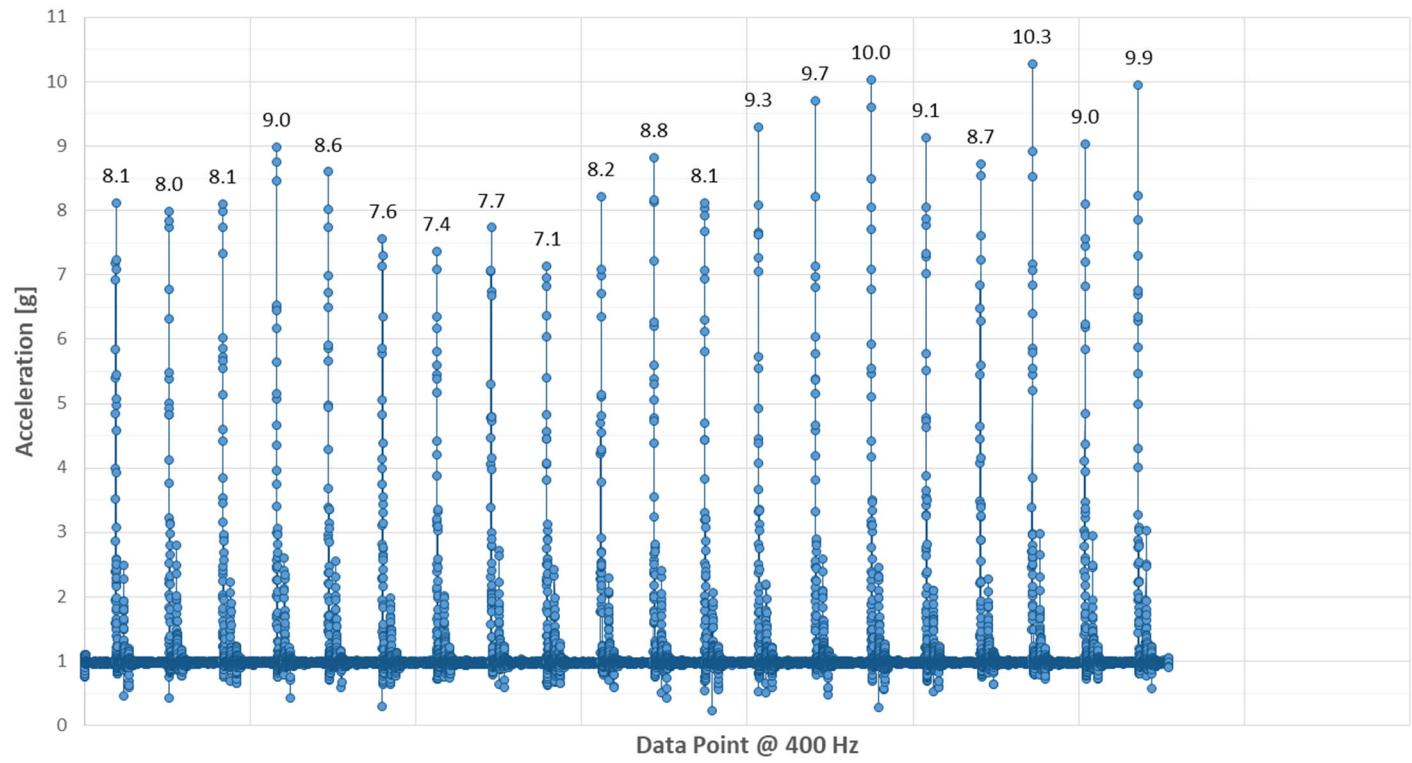
Z Acceleration (Up and Down) - Casper Wave





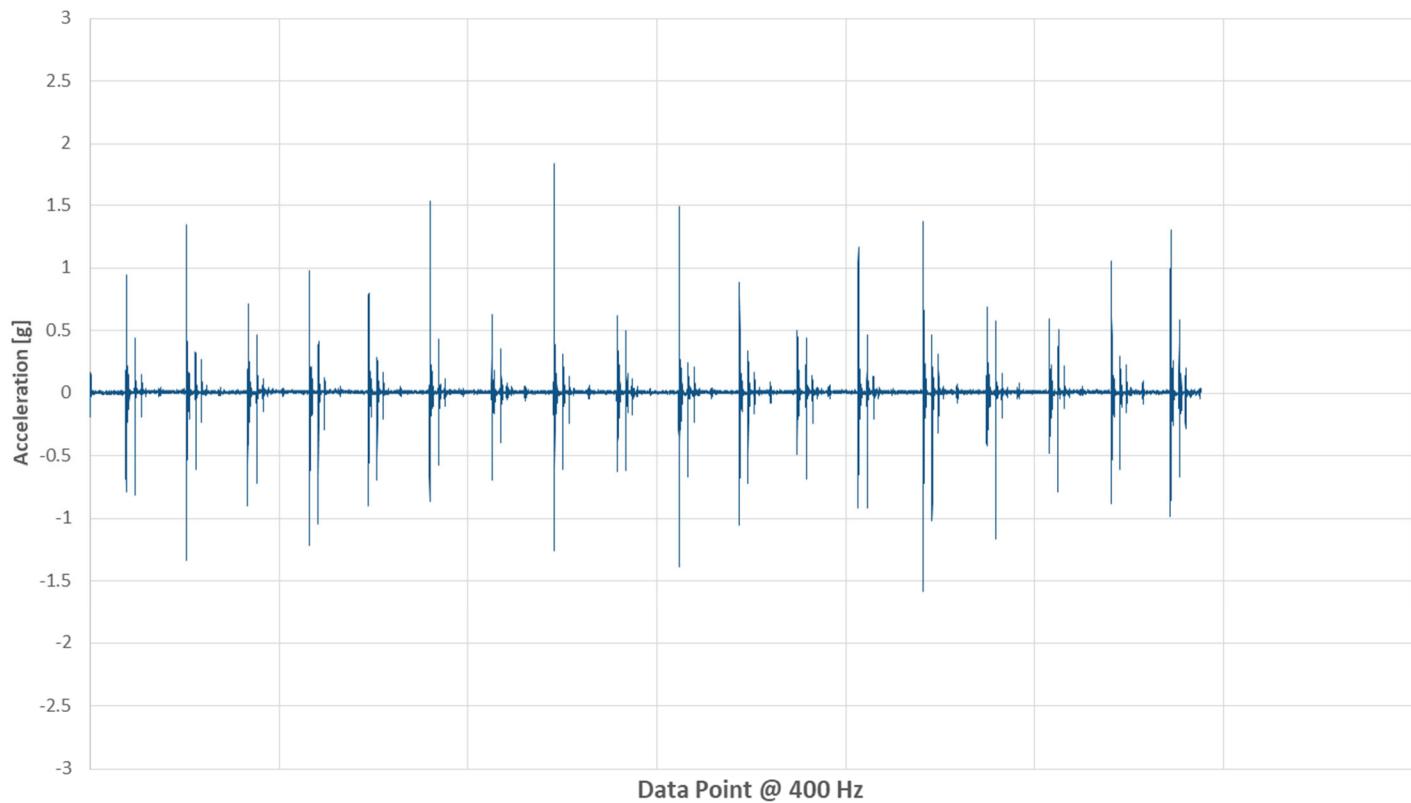
## TEST 3 – IKEA FOAM

Vector Magnitude Acceleration - IKEA Foam

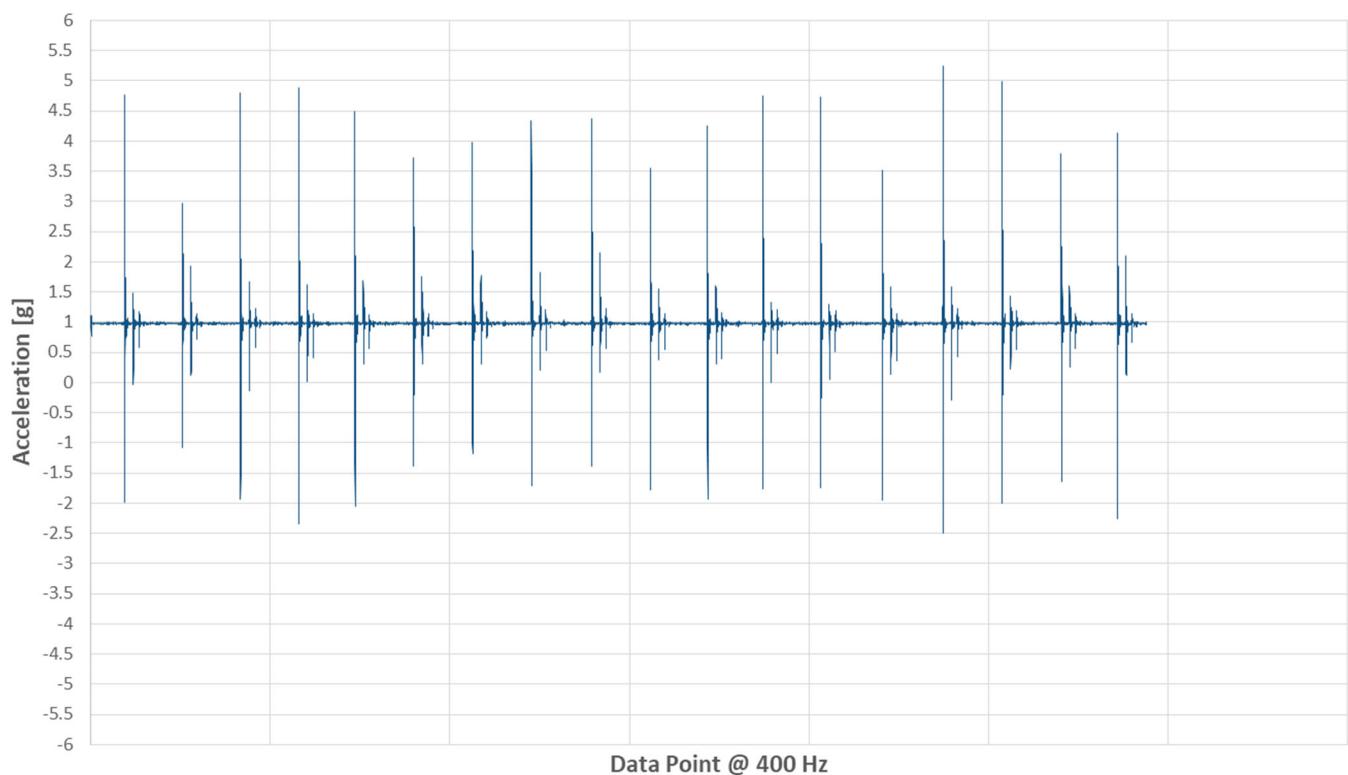




Y Acceleration (Head to Toe) - IKEA Foam



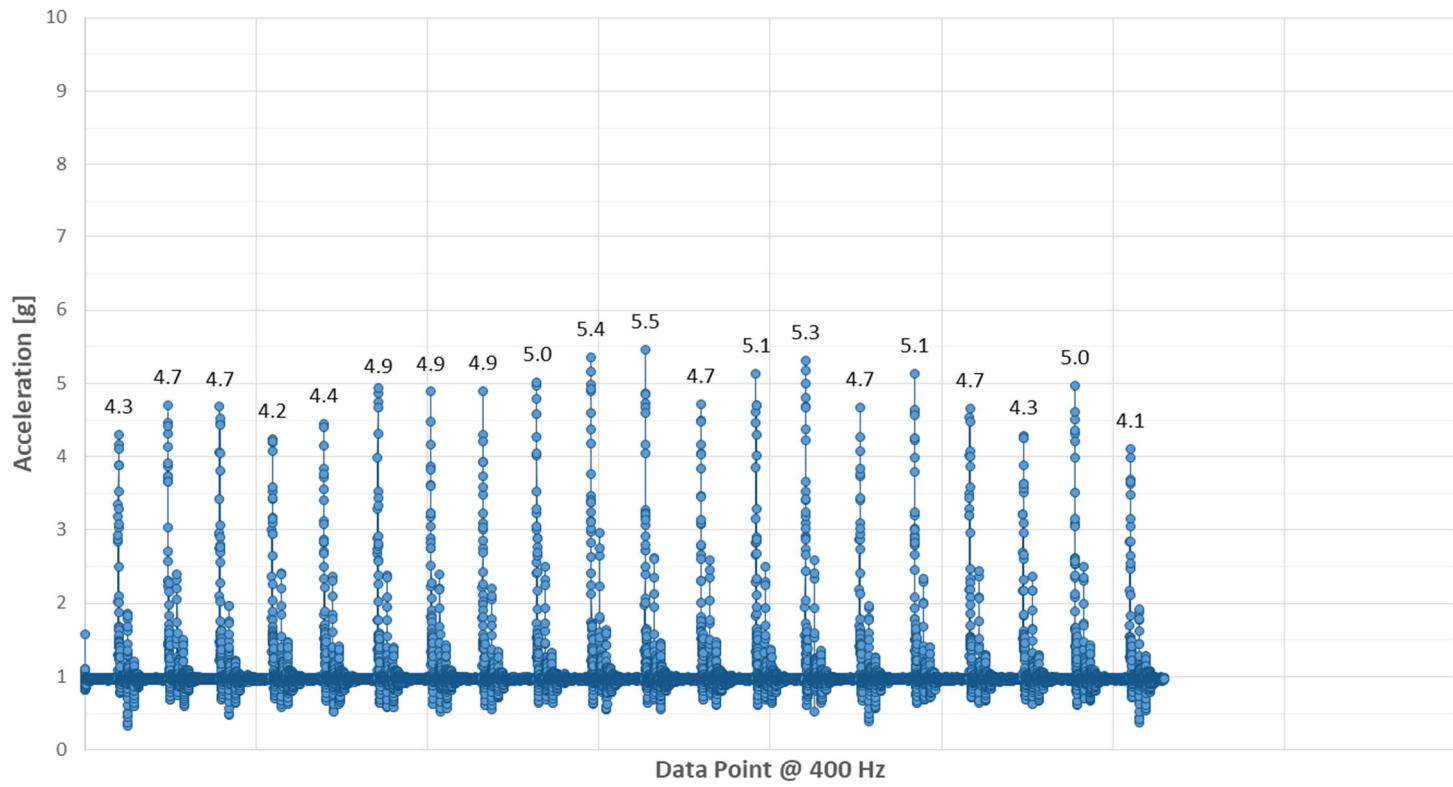
Z Acceleration (Up and Down) - IKEA Foam



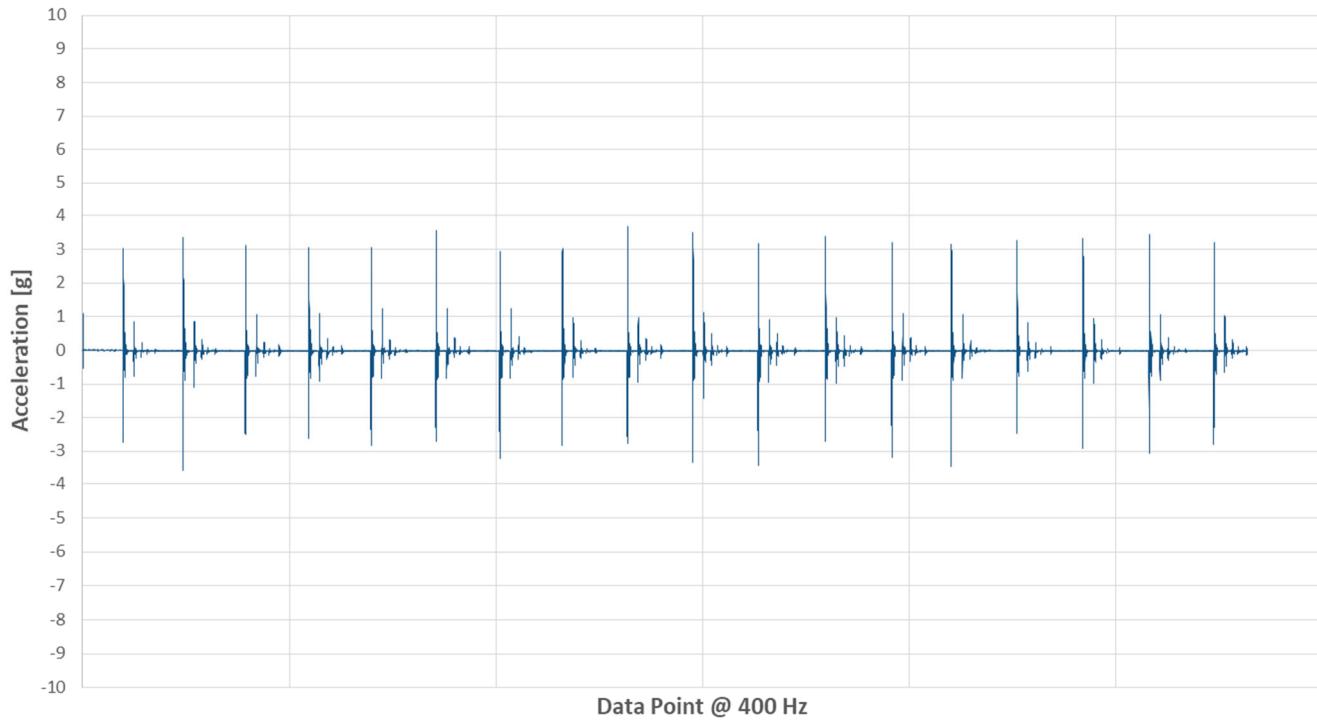


## TEST 3 – IKEA SPRING

Vector Magnitude Acceleration - IKEA Spring

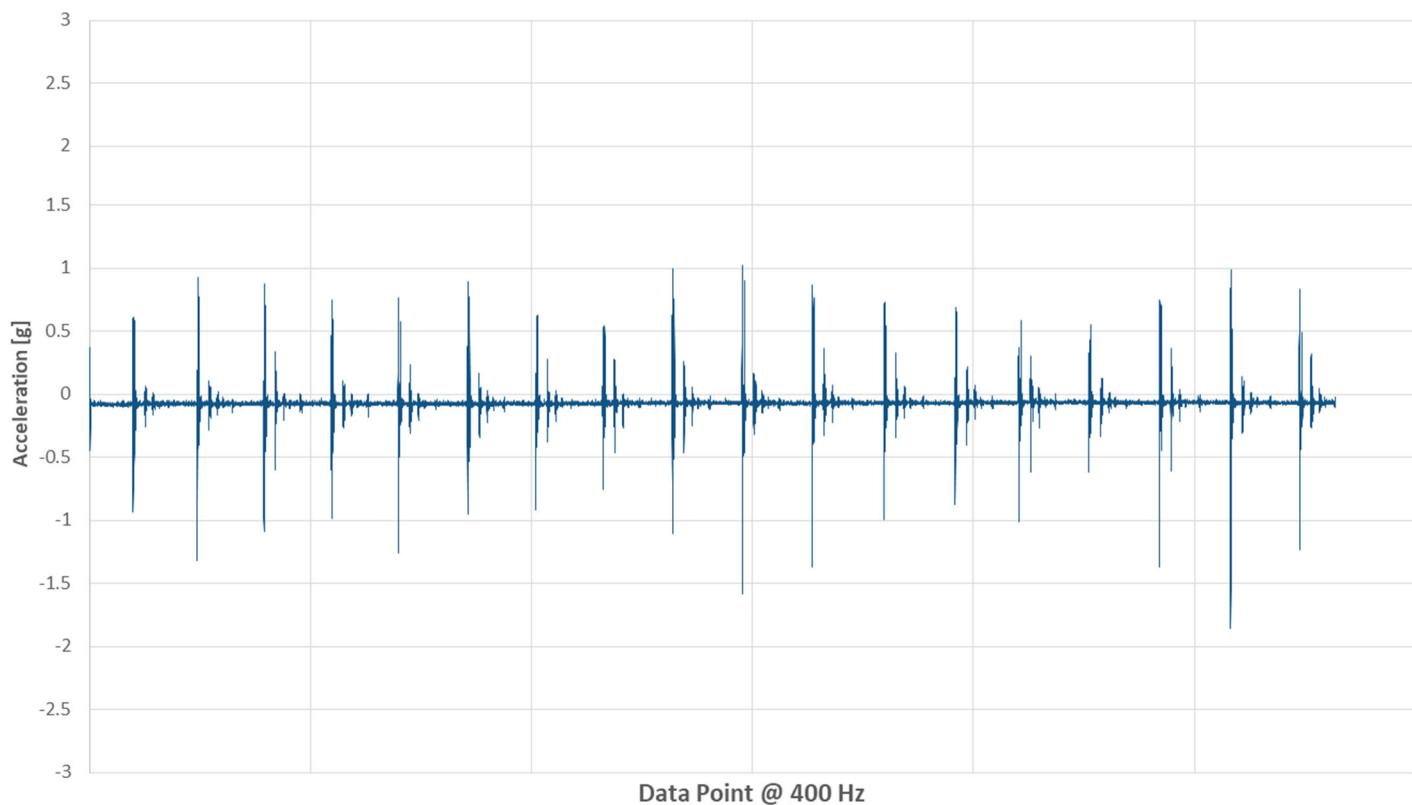


X Acceleration (Side to Side) - IKEA Spring

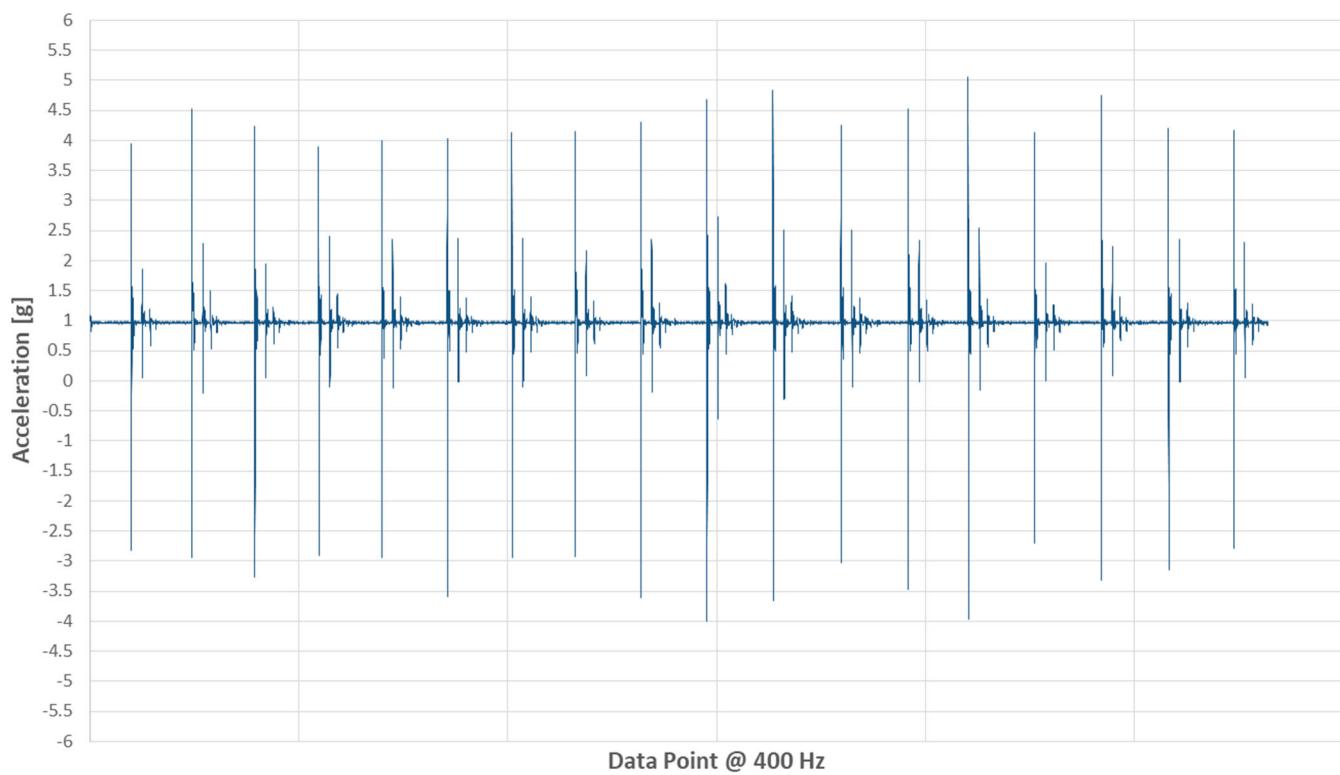




Y Acceleration (Head to Toe) - IKEA Spring



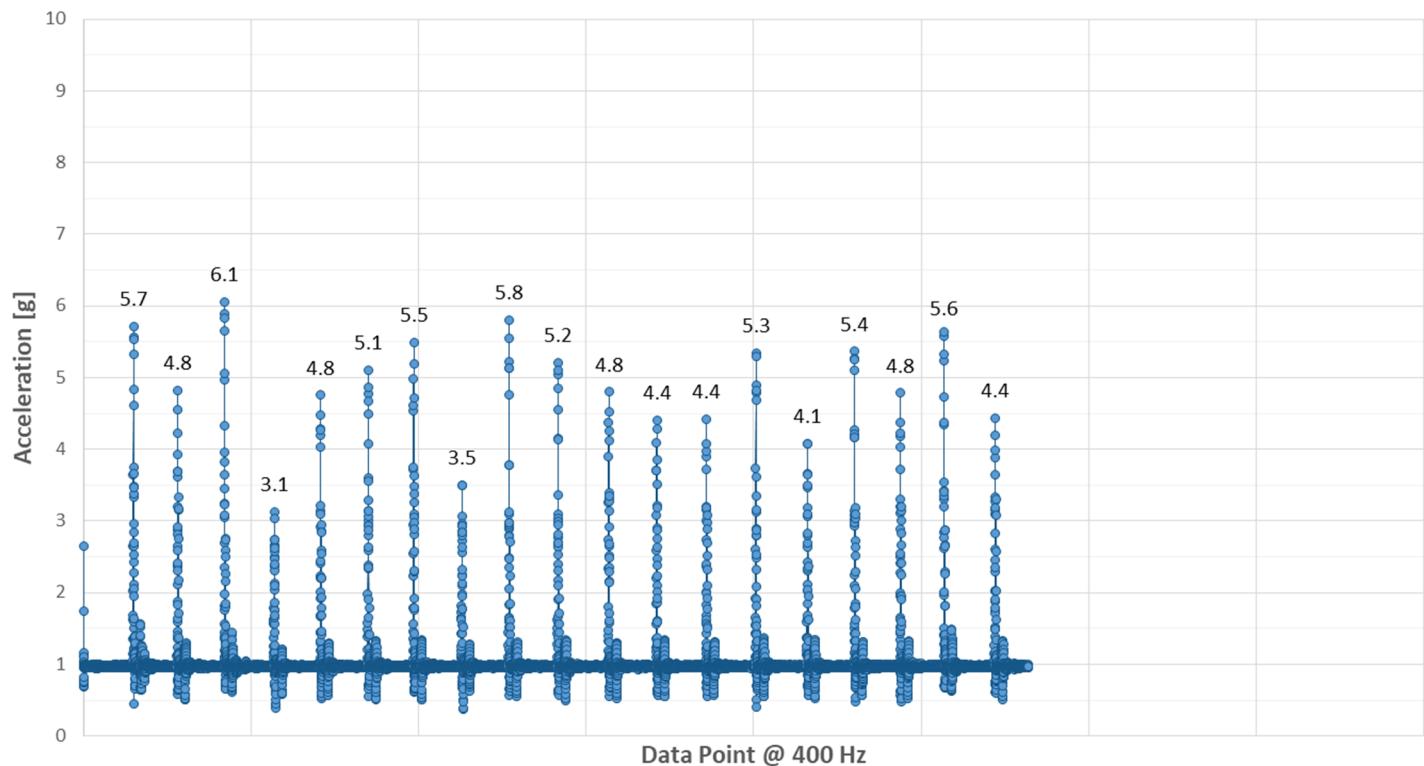
Z Acceleration (Up and Down) - IKEA Spring



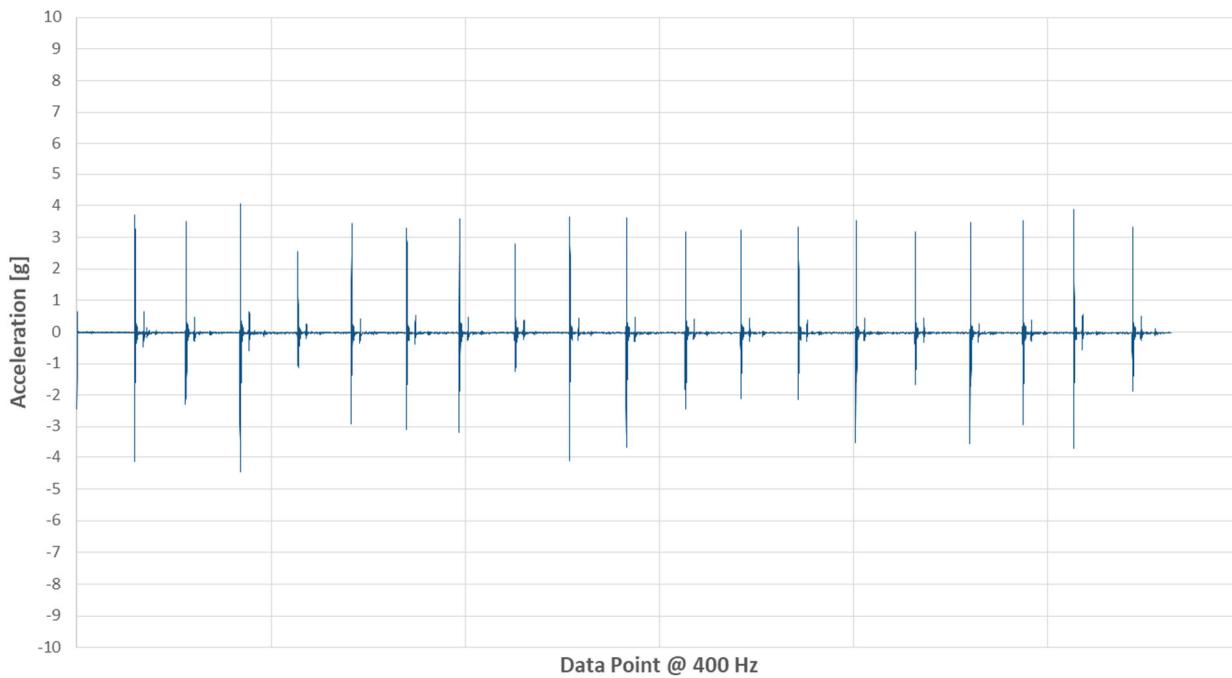


## TEST 3 – KINGSDOWN

Vector Magnitude Acceleration - Kingsdown

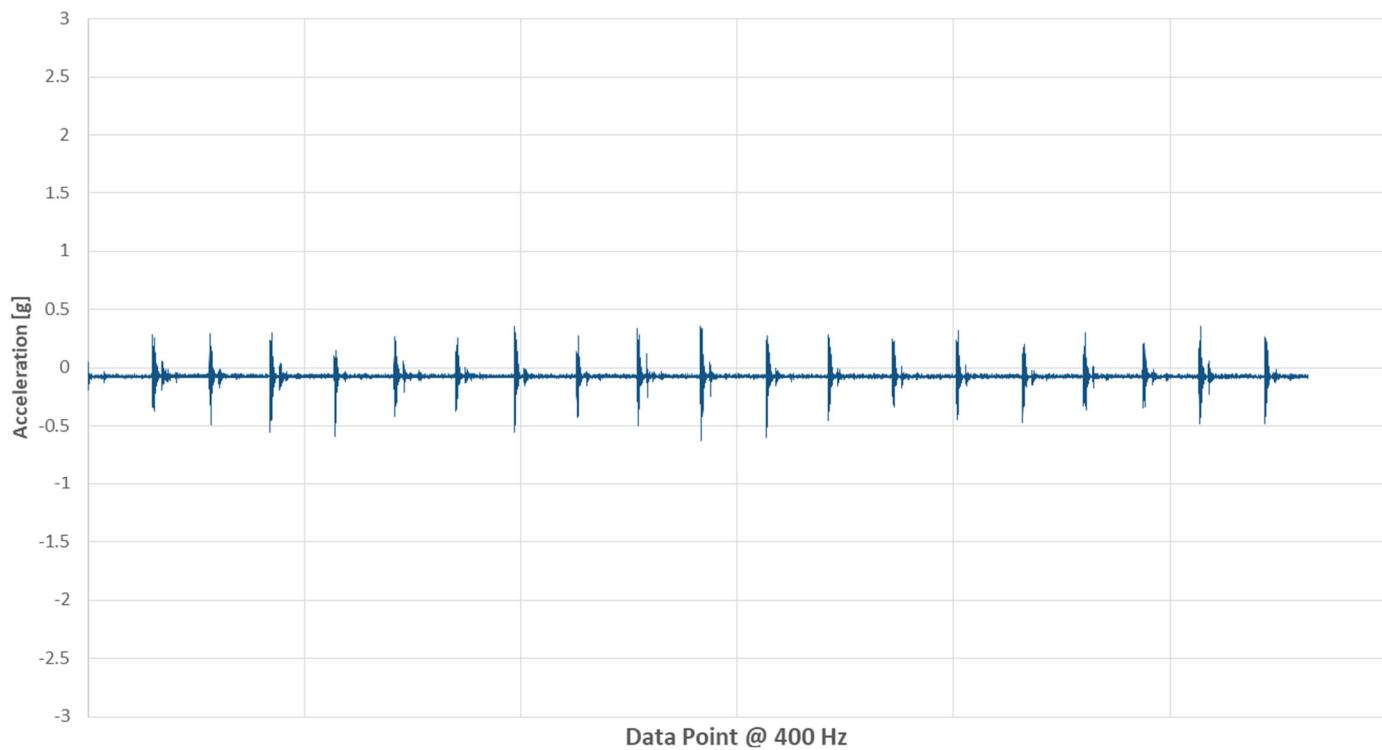


X Acceleration (Side to Side) - Kingsdown

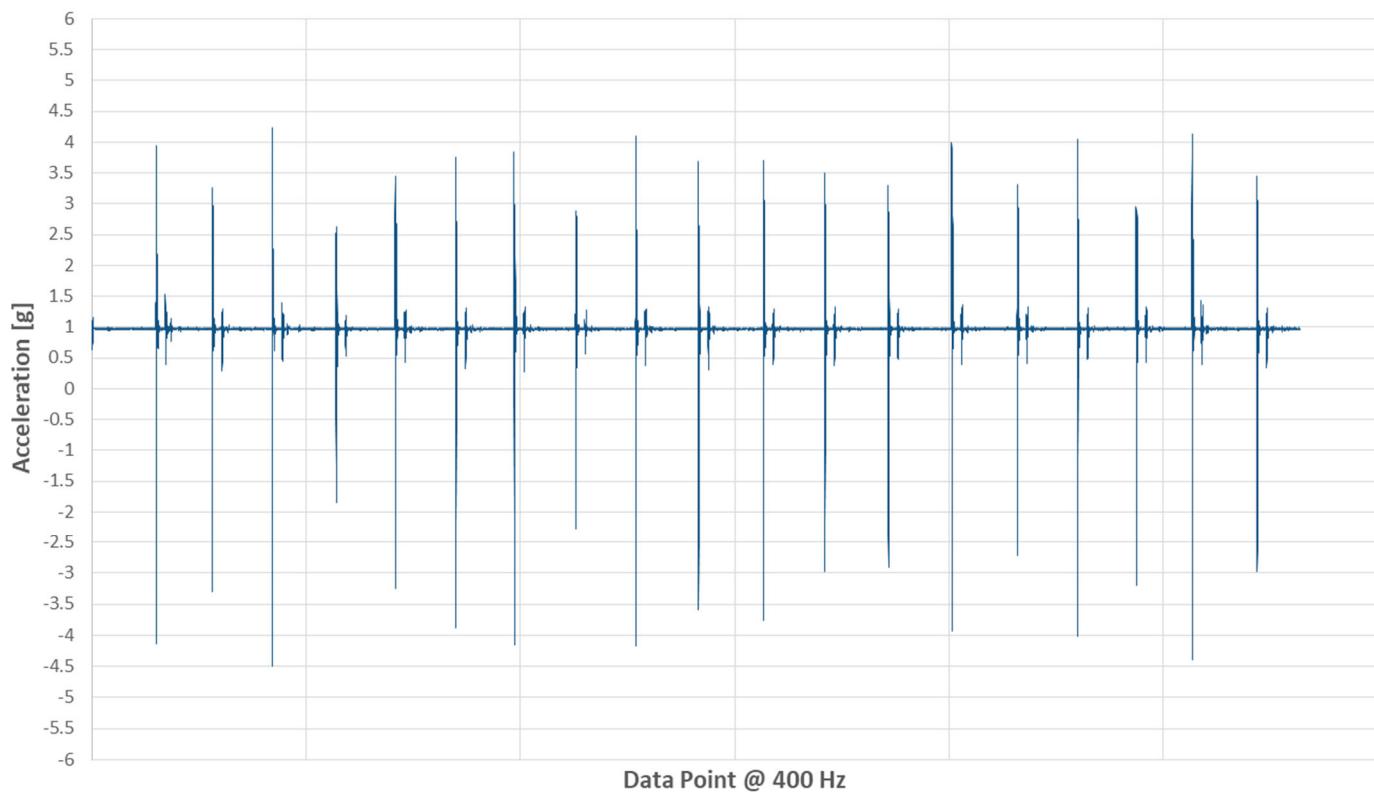




Y Acceleration (Head to Toe) - Kingsdown



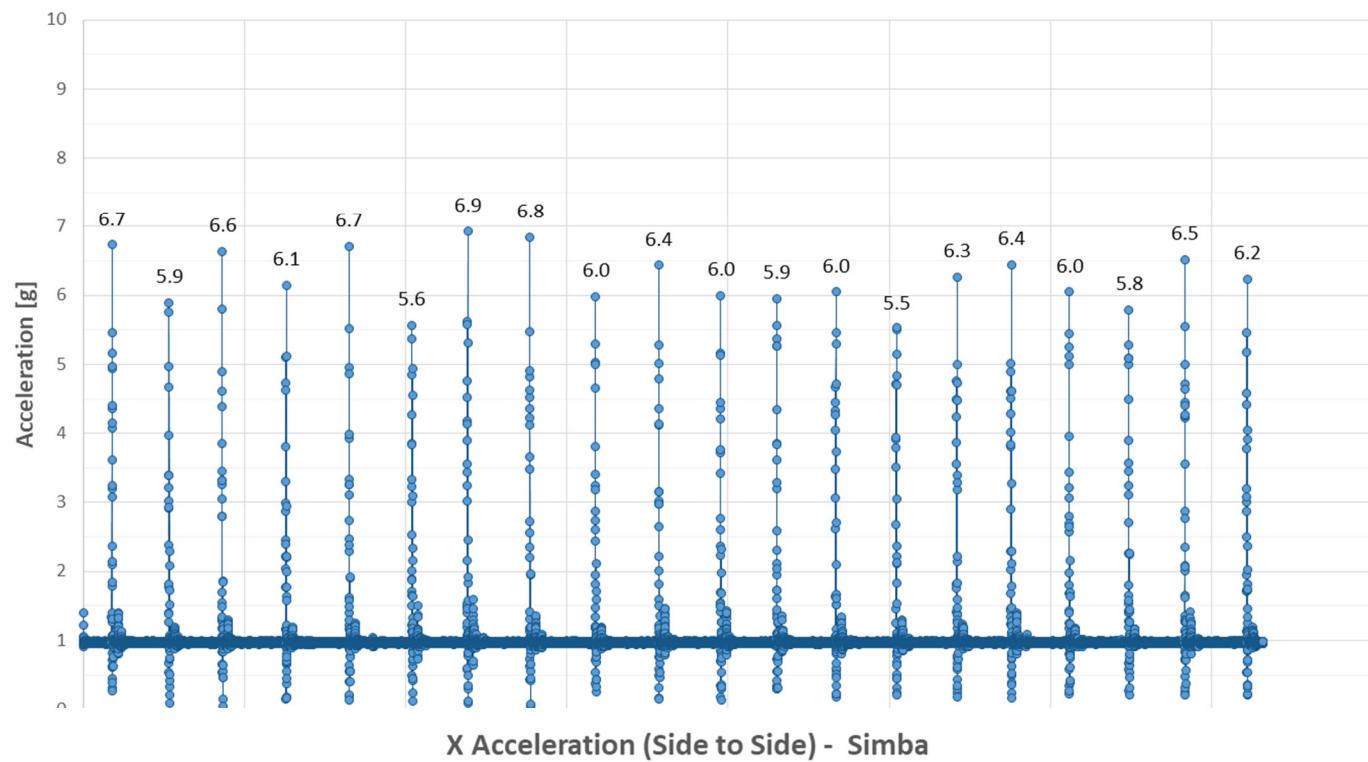
Z Acceleration (Up and Down) - Kingsdown



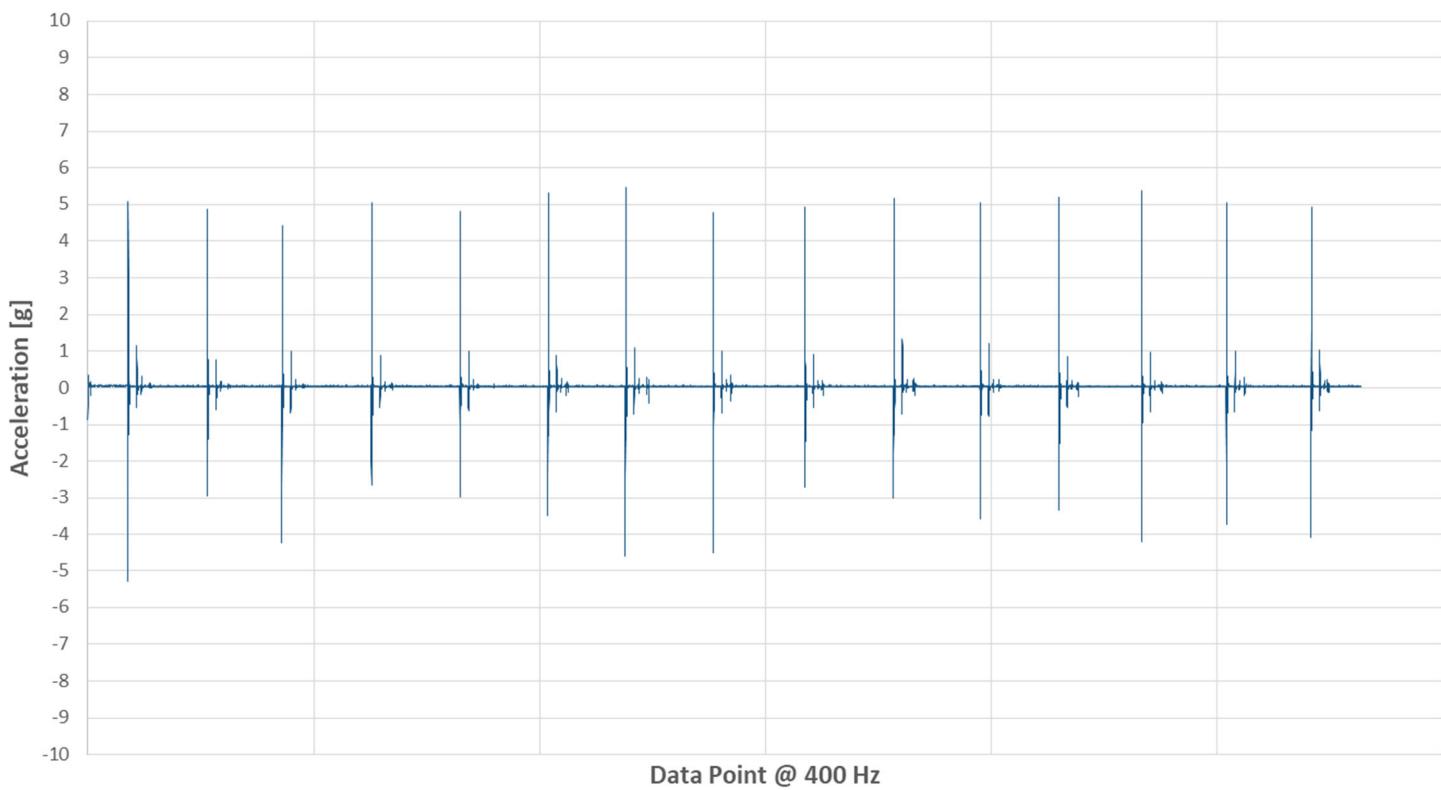


## TEST 3 – SIMBA

Vector Magnitude Acceleration - Simba



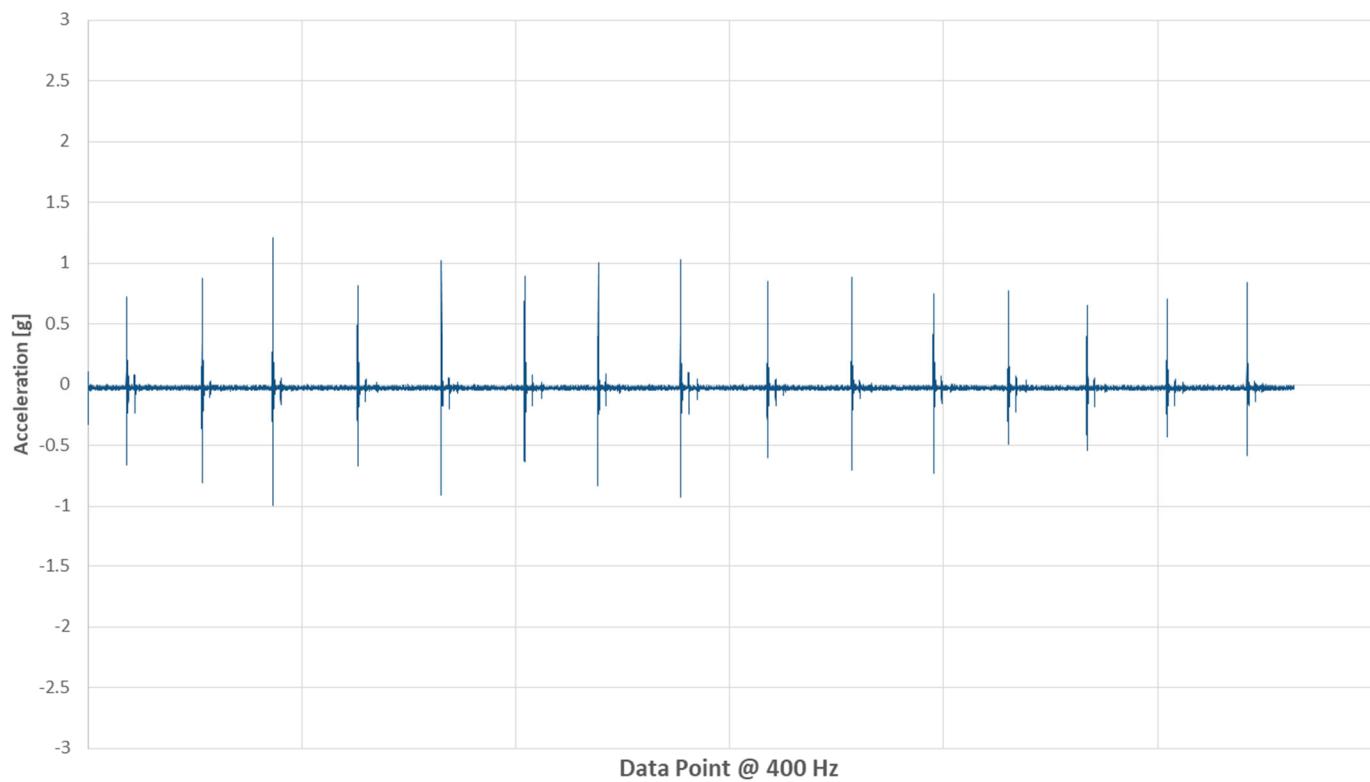
X Acceleration (Side to Side) - Simba



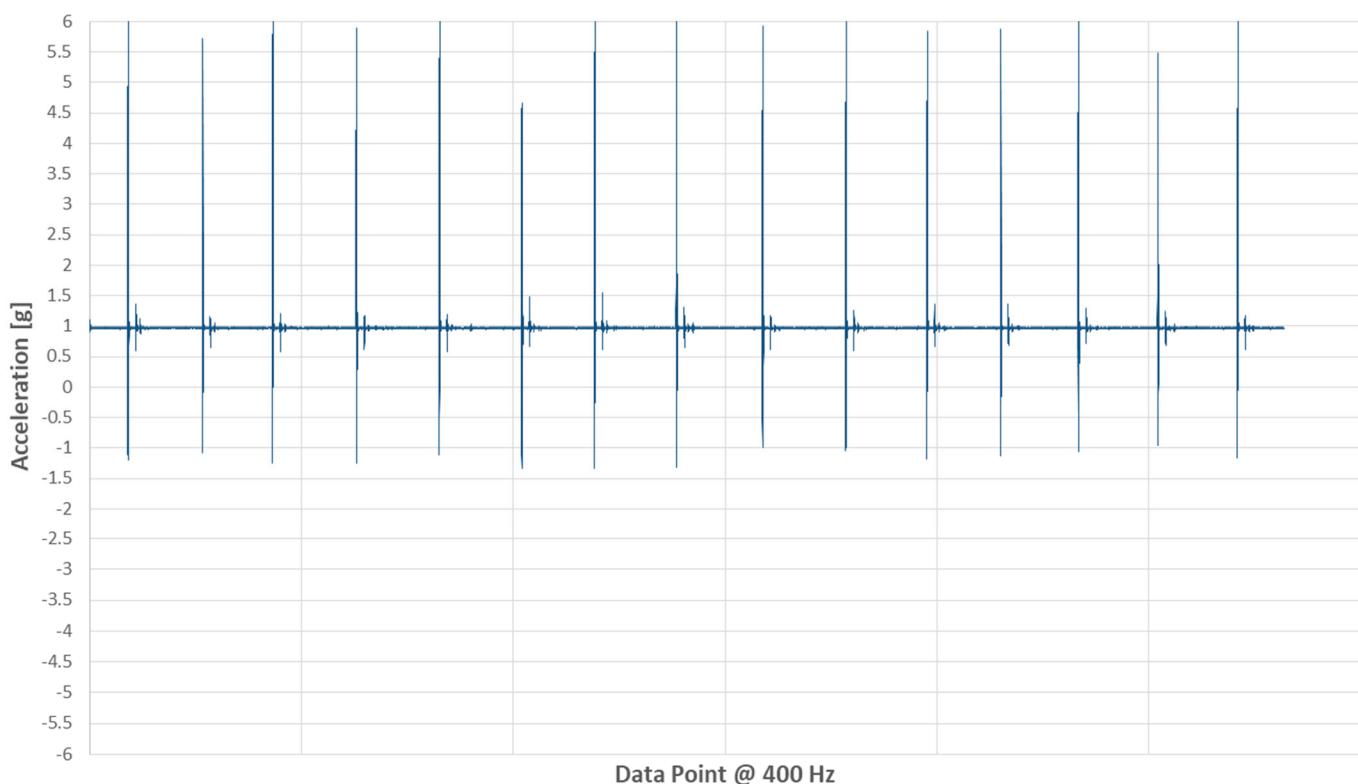
Data Point @ 400 Hz



**Y Acceleration (Head to Toe) - Simba**



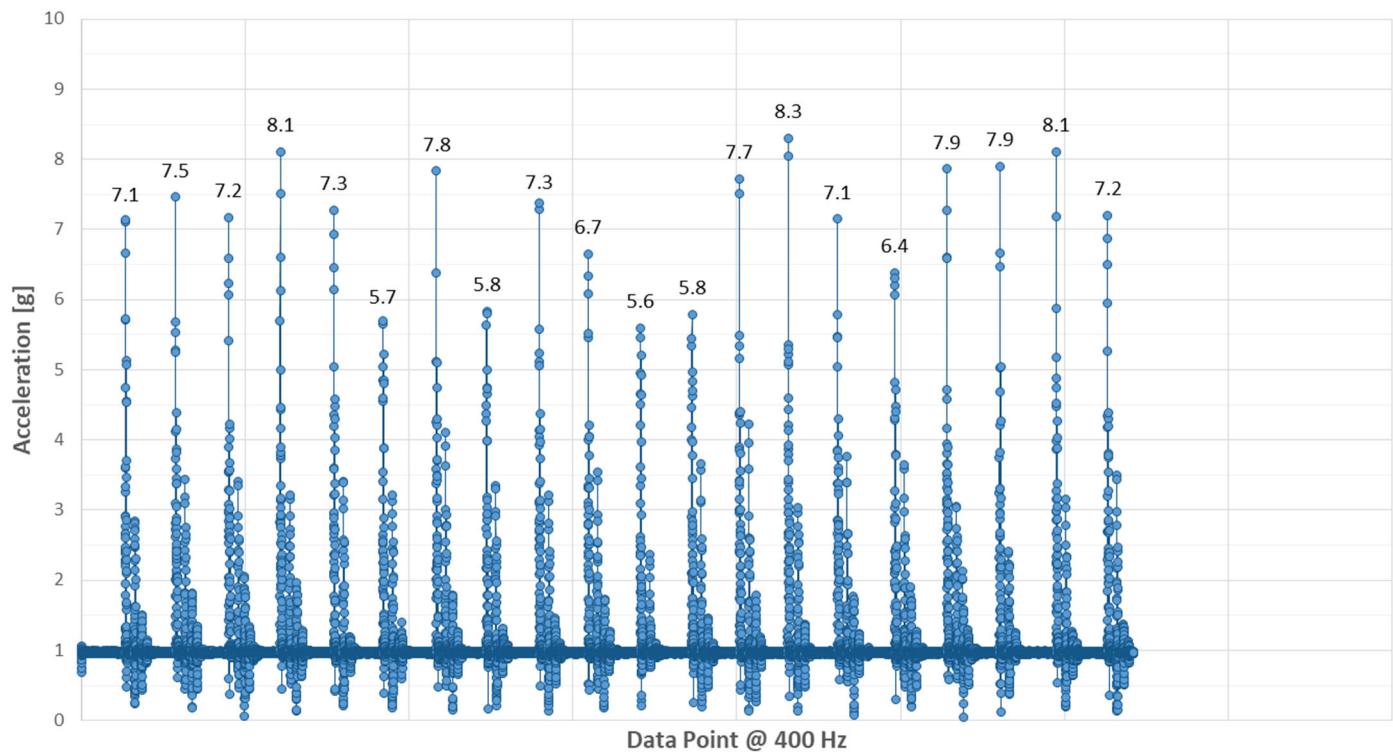
**Z Acceleration (Up and Down) - Simba**



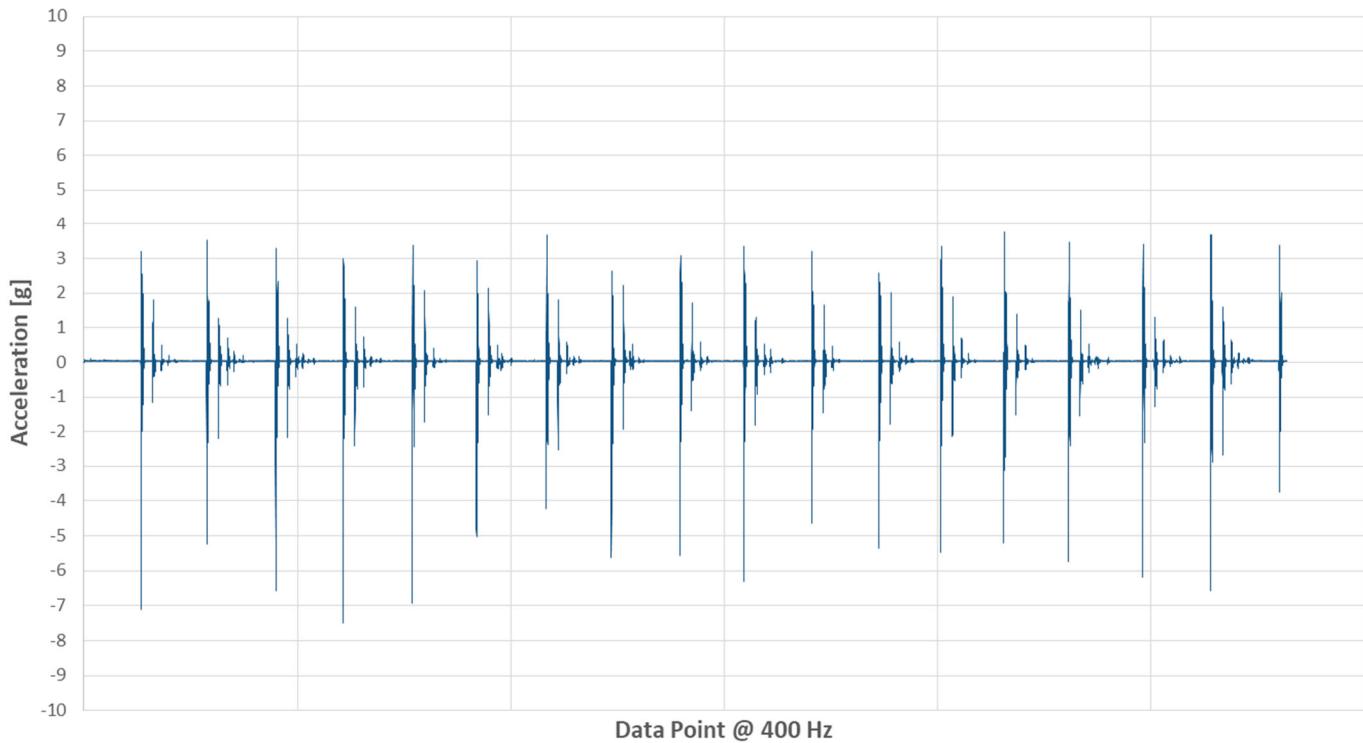


## TEST 3 – SPA SENSATIONS

Vector Magnitude Acceleration - Spa Sensations

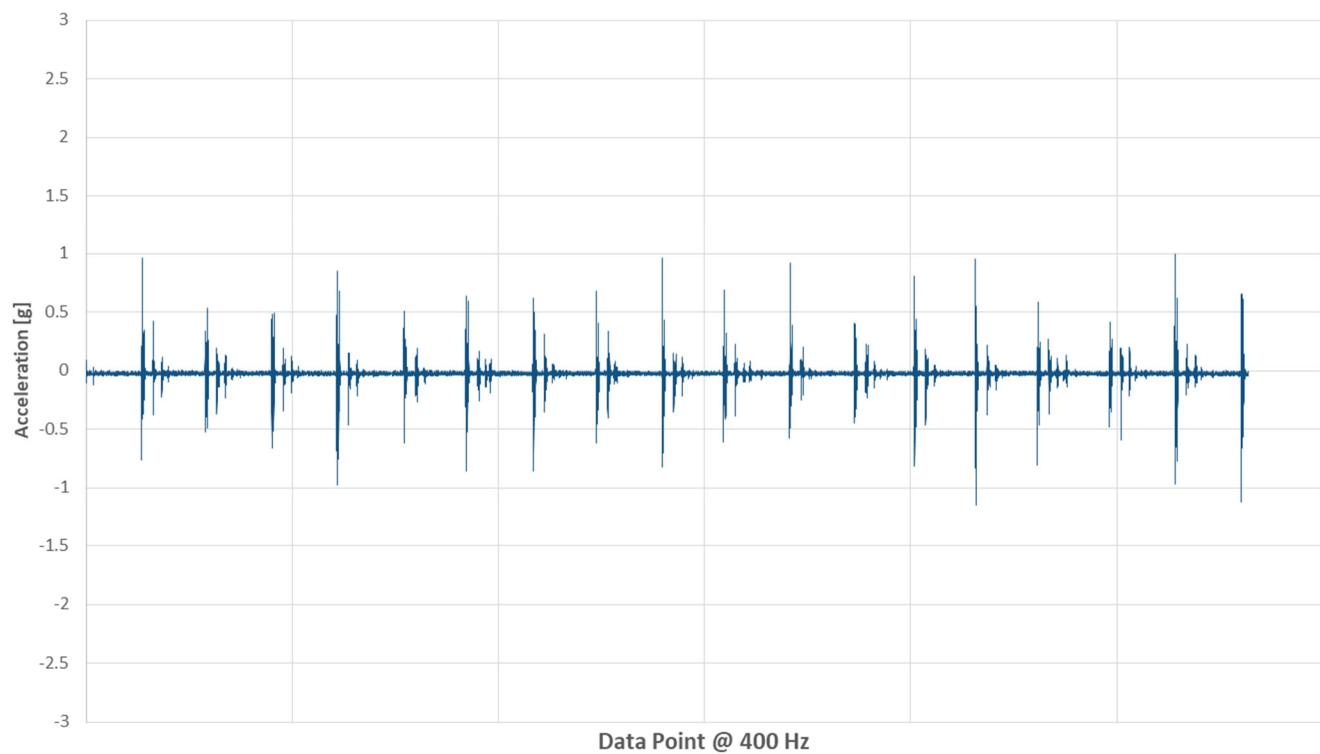


X Acceleration (Side to Side) - Spa Sensations

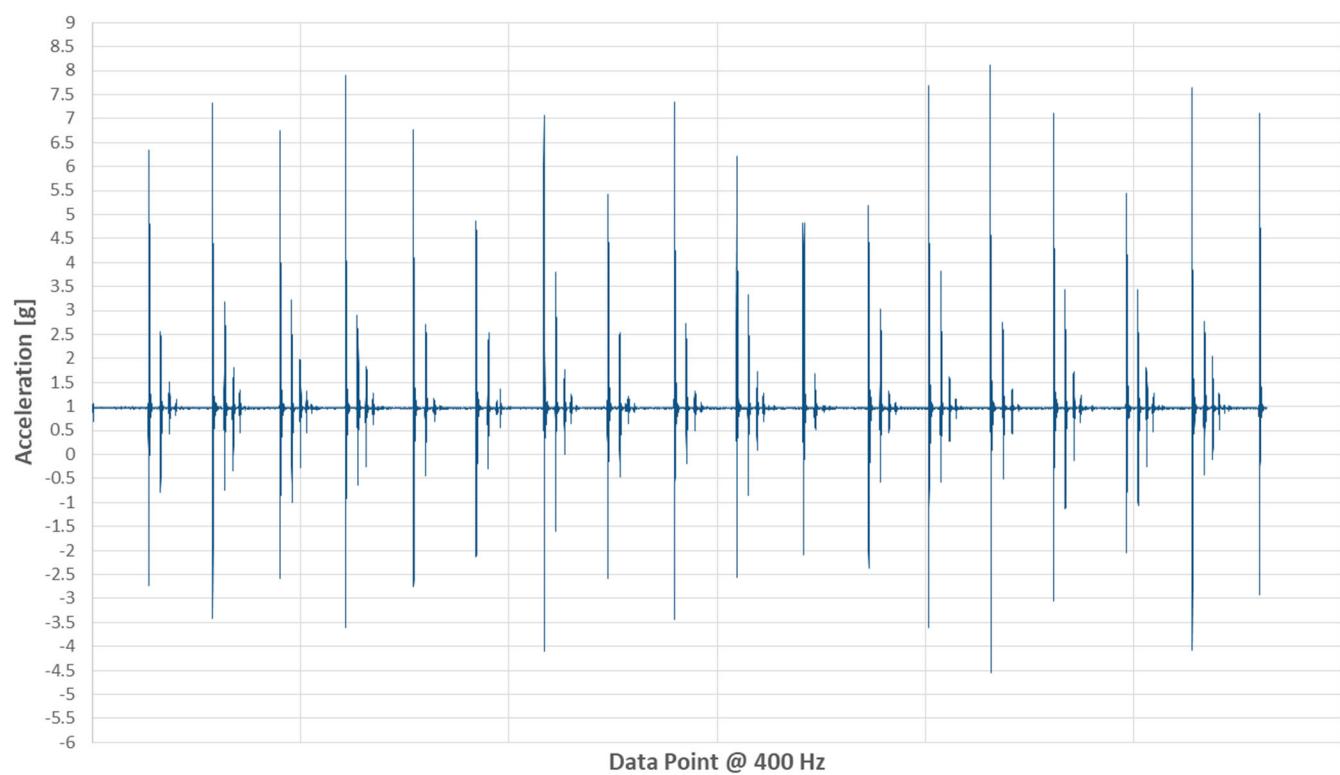




**Y Acceleration (Head to Toe) - Spa Sensations**



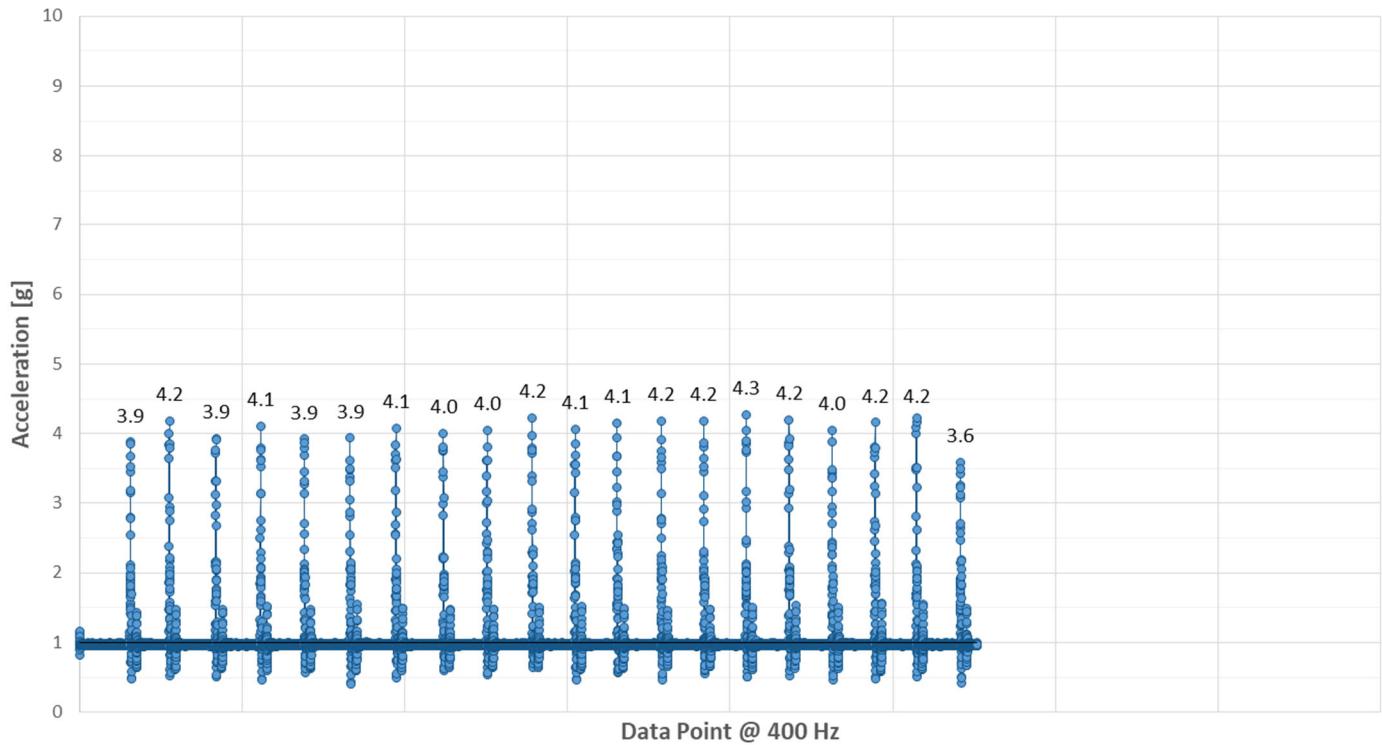
**Z Acceleration (Up and Down) - Spa Sensations**



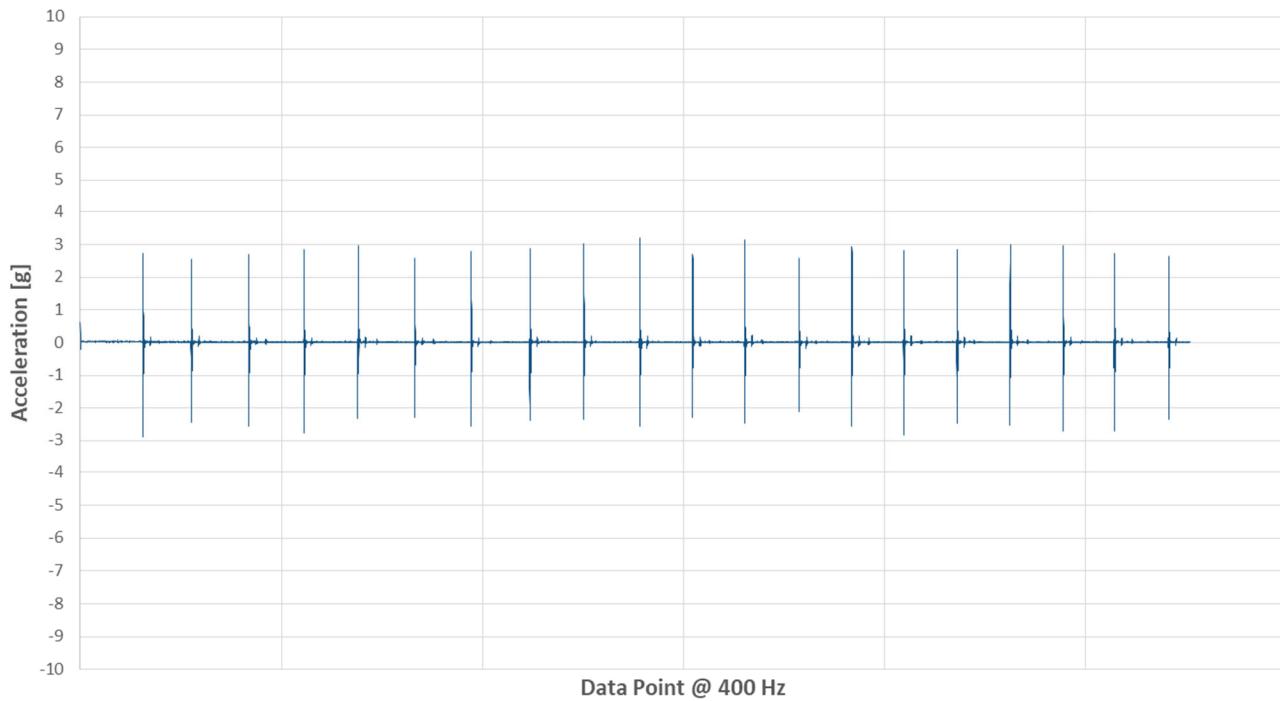


## TEST 3 – STEARNS & FOSTER

Vector Magnitude Acceleration - Stearns & Foster

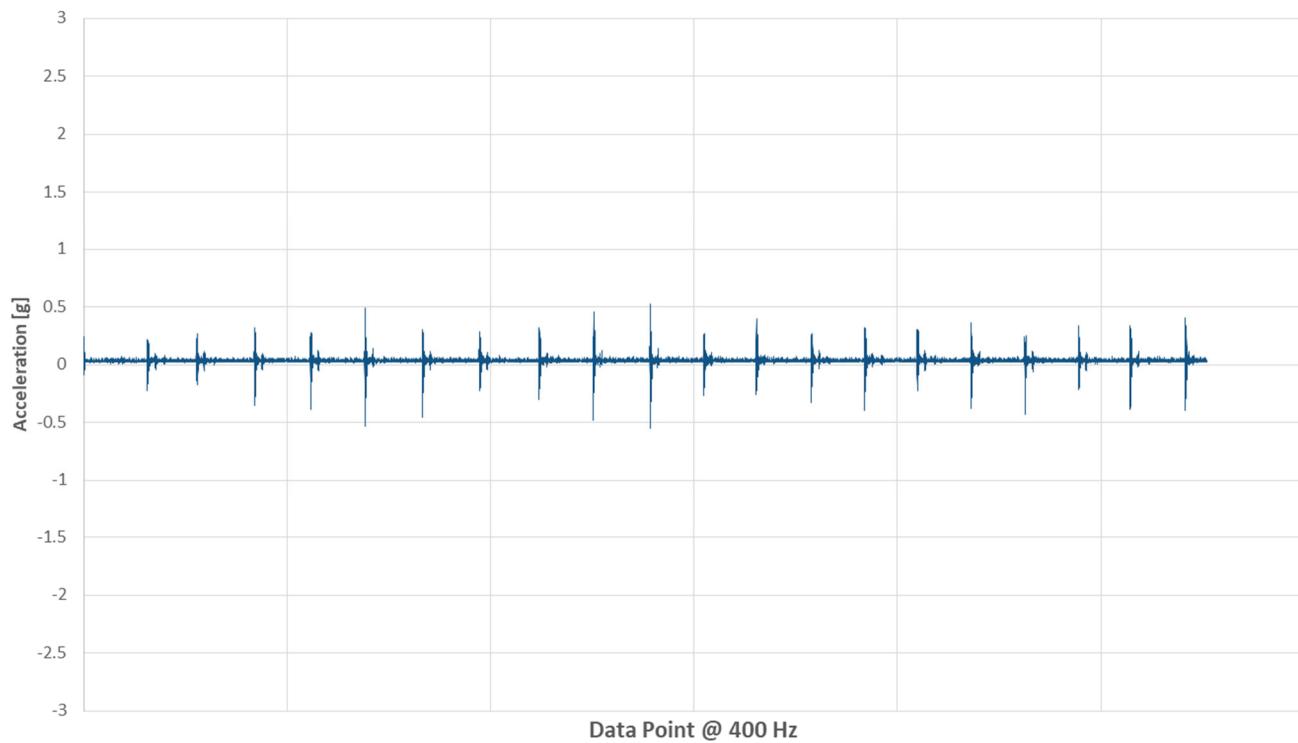


X Acceleration (Side to Side) - Stearns & Foster

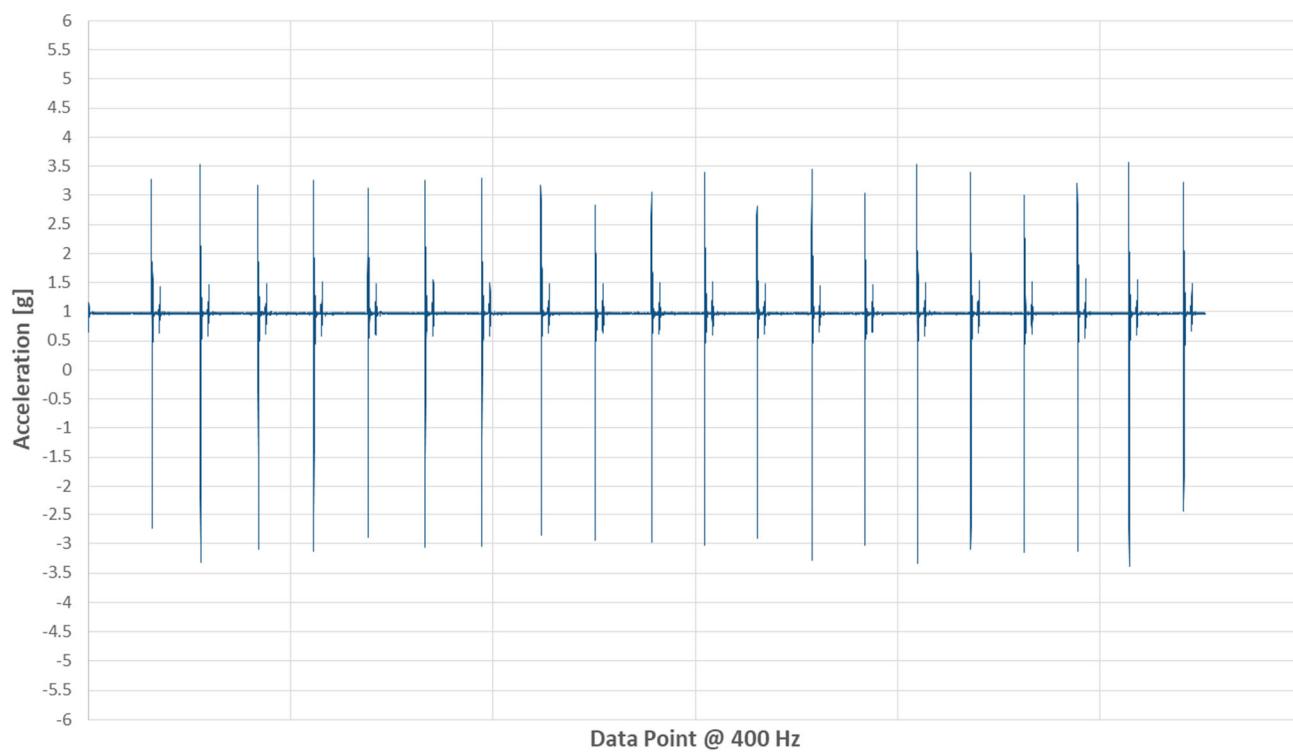




Y Acceleration (Head to Toe) - Stearns & Foster



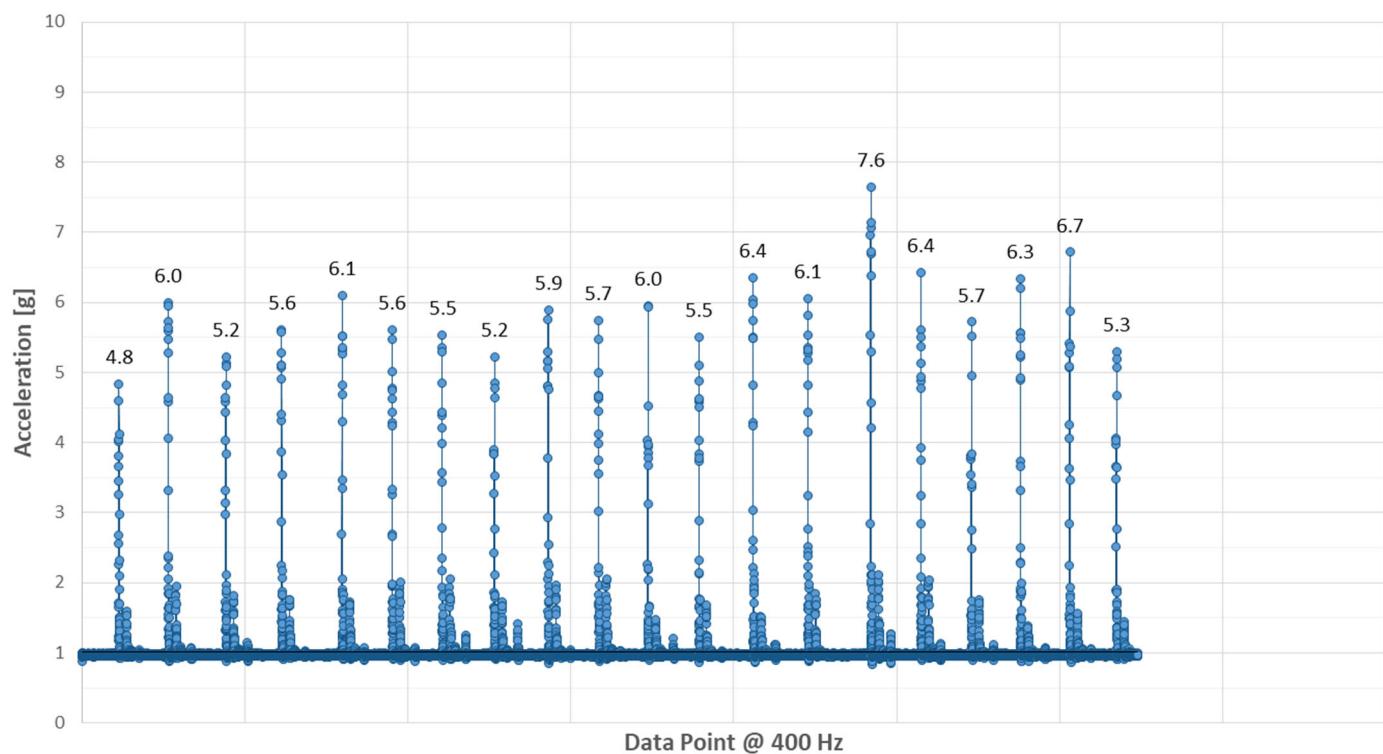
Z Acceleration (Up and Down) - Stearns & Foster



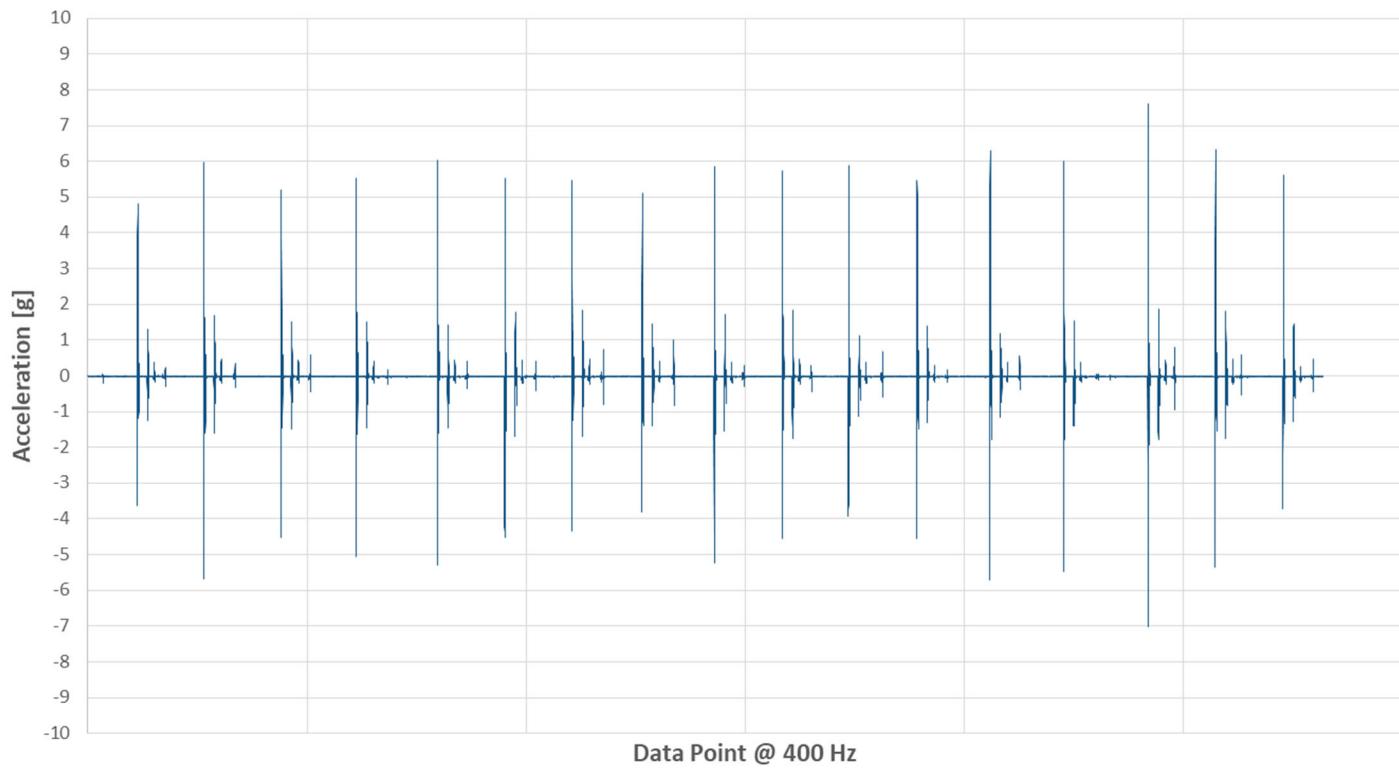


## TEST 2 – STRUCTURE

Vector Magnitude Acceleration - Structube

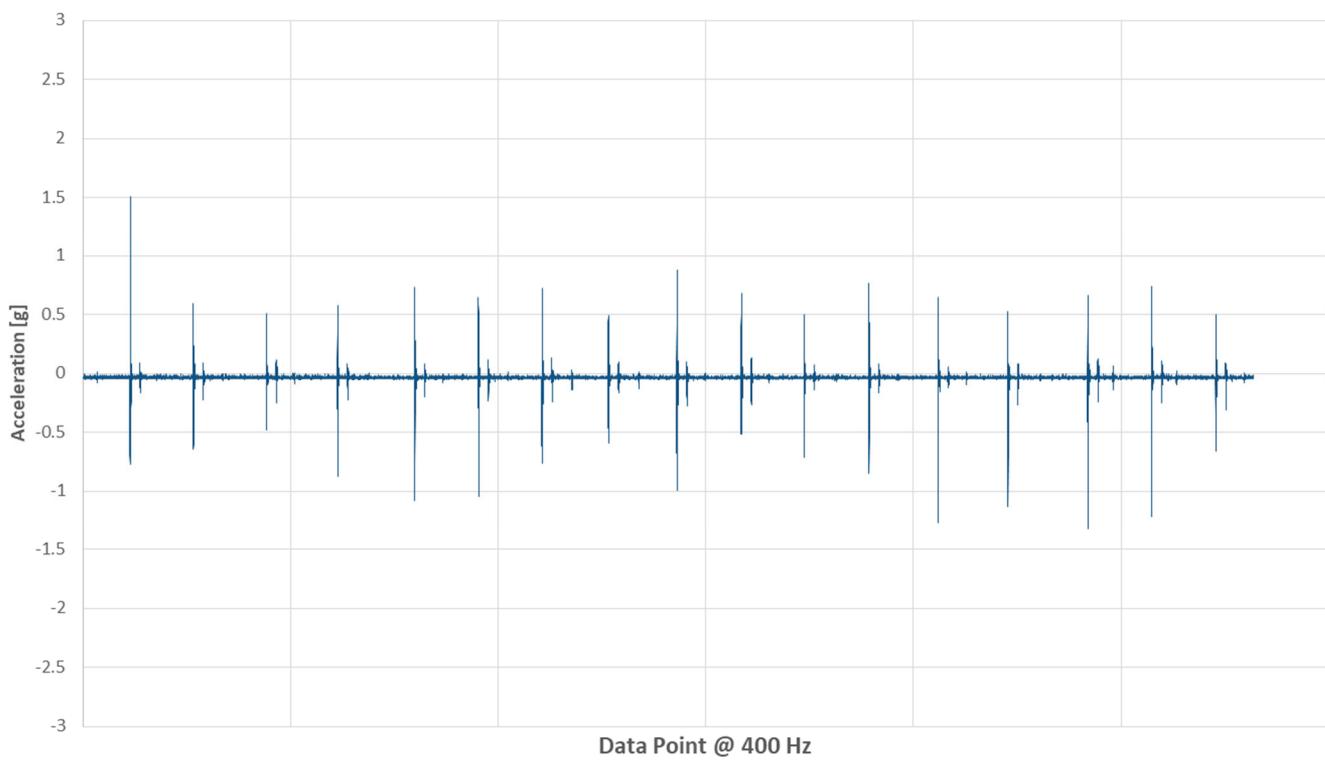


X Acceleration (Side to Side) - Structube

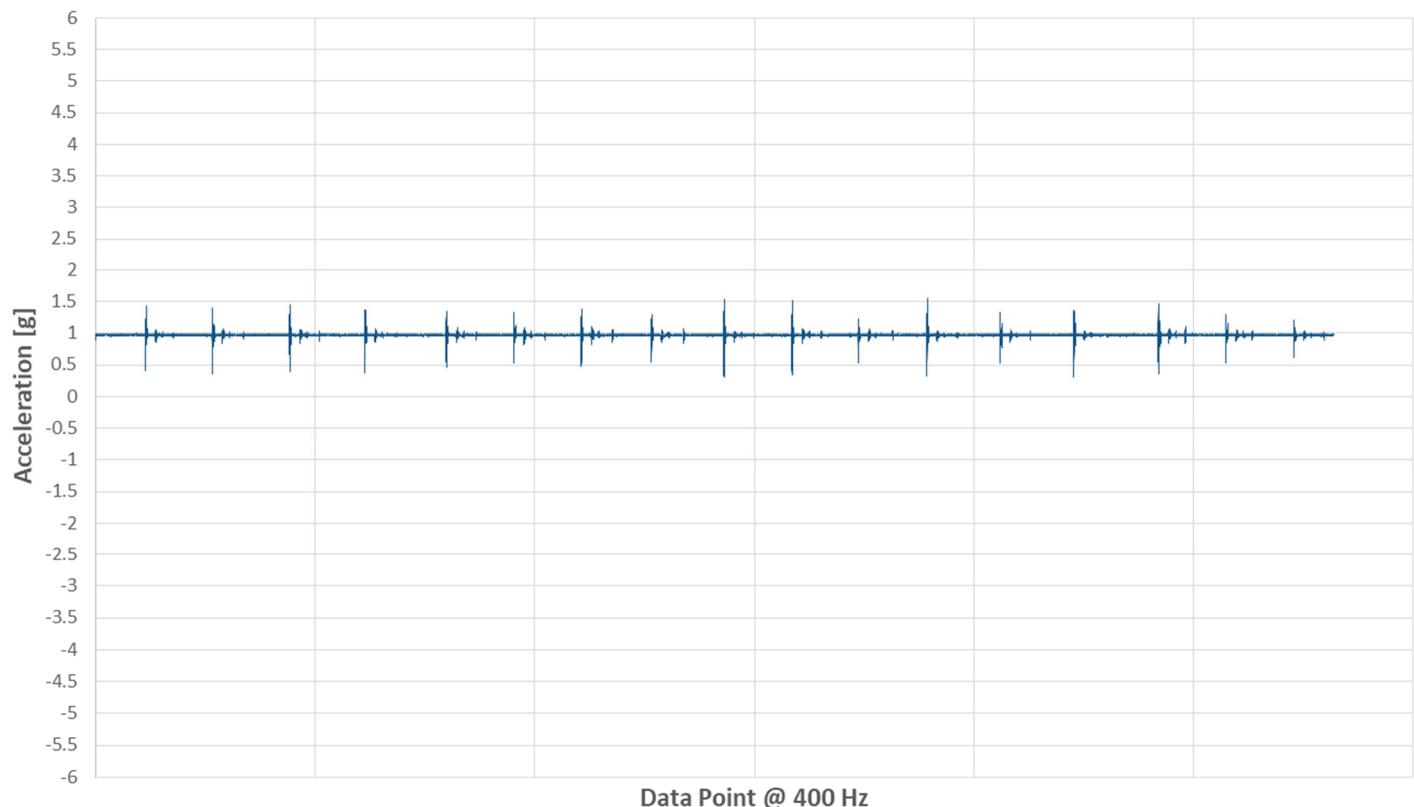




Y Acceleration (Head to Toe) - Structube



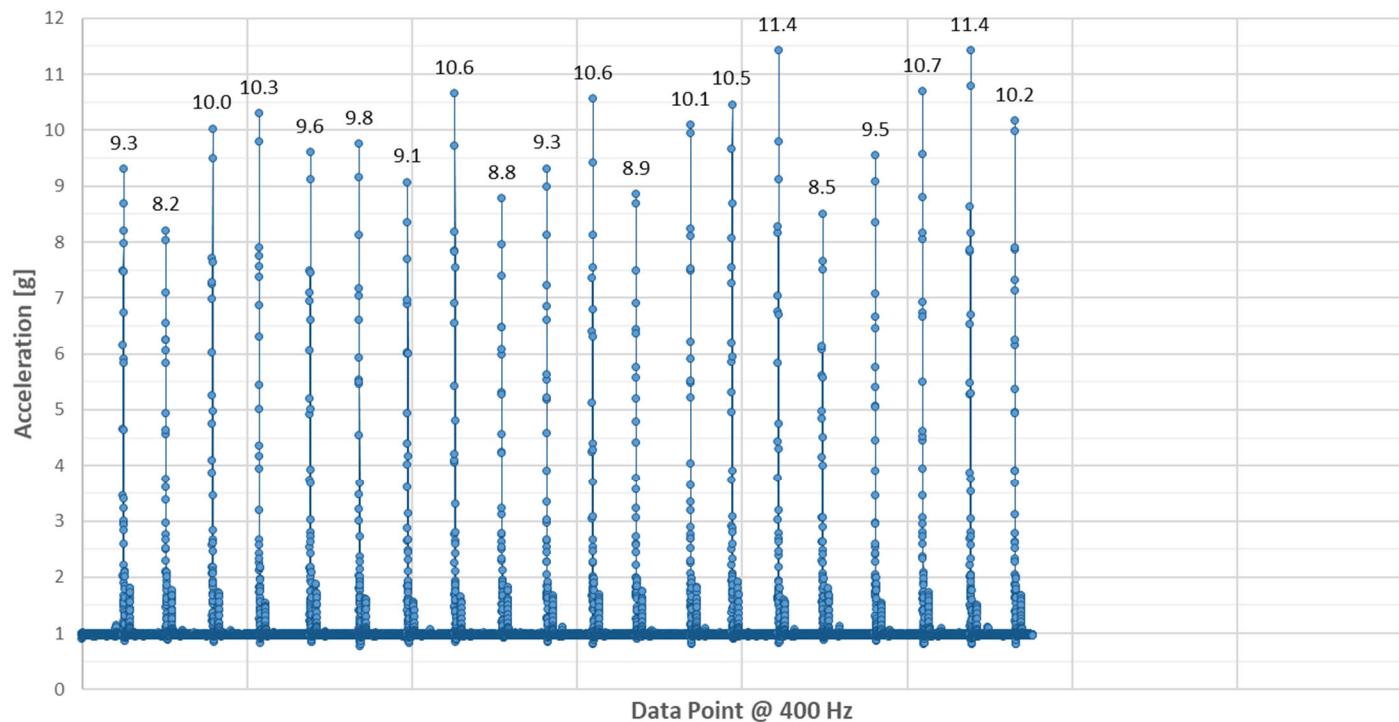
Z Acceleration (Up and Down) - Structube



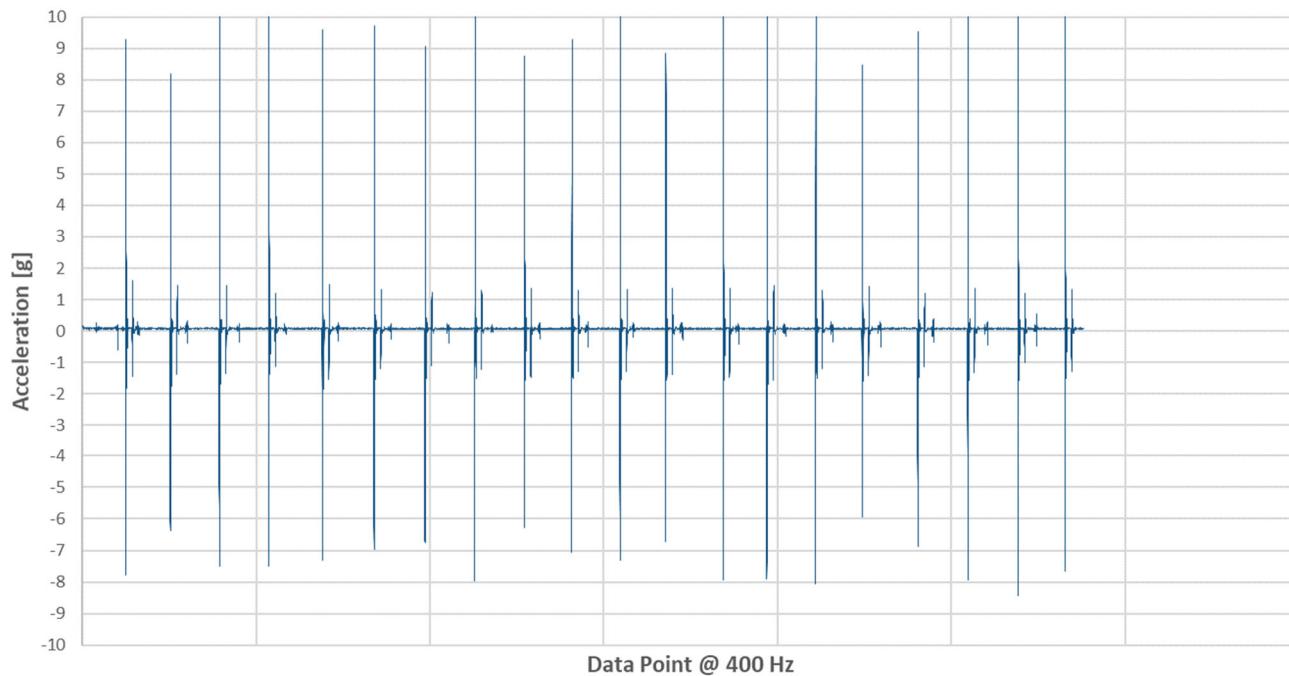


## TEST 3 – PERFECTSENSE

Vector Magnitude Acceleration - PerfectSense

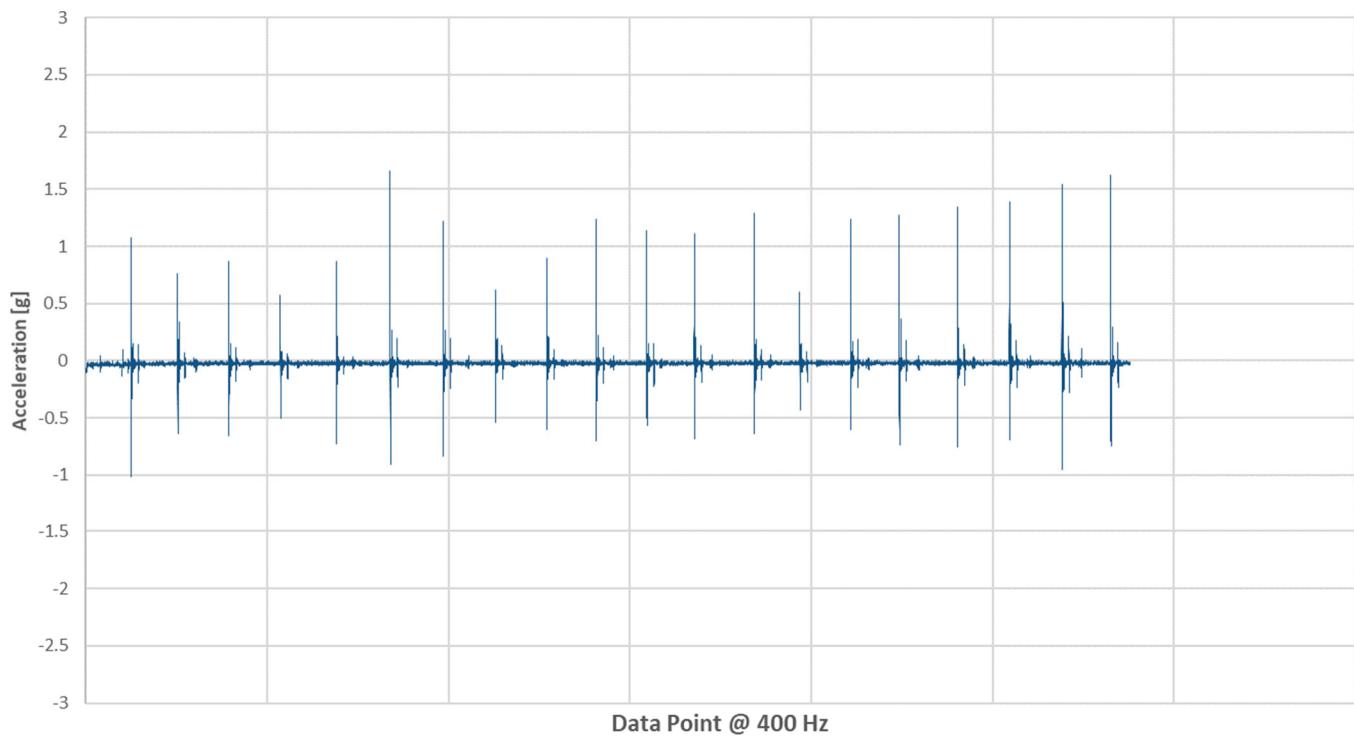


X Acceleration (Side to Side) - PerfectSense

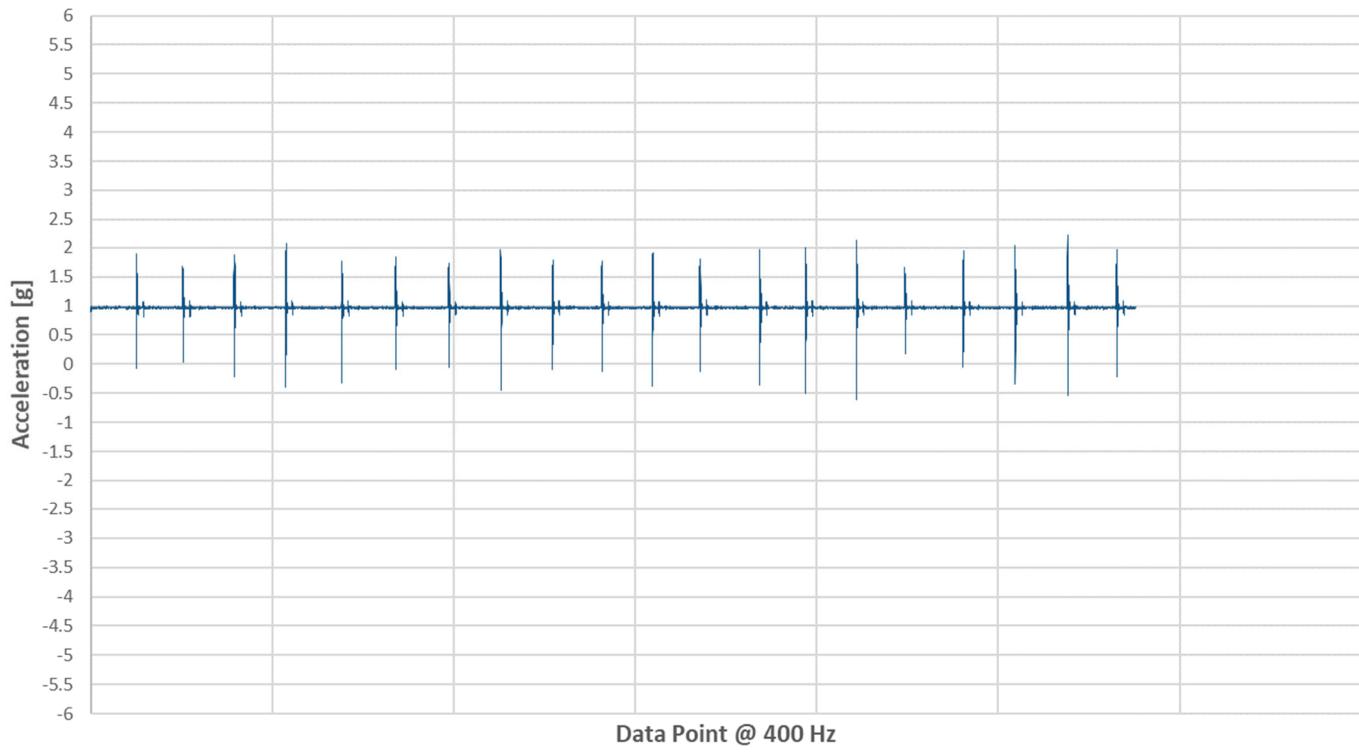




Y Acceleration (Head to Toe) - PerfectSense



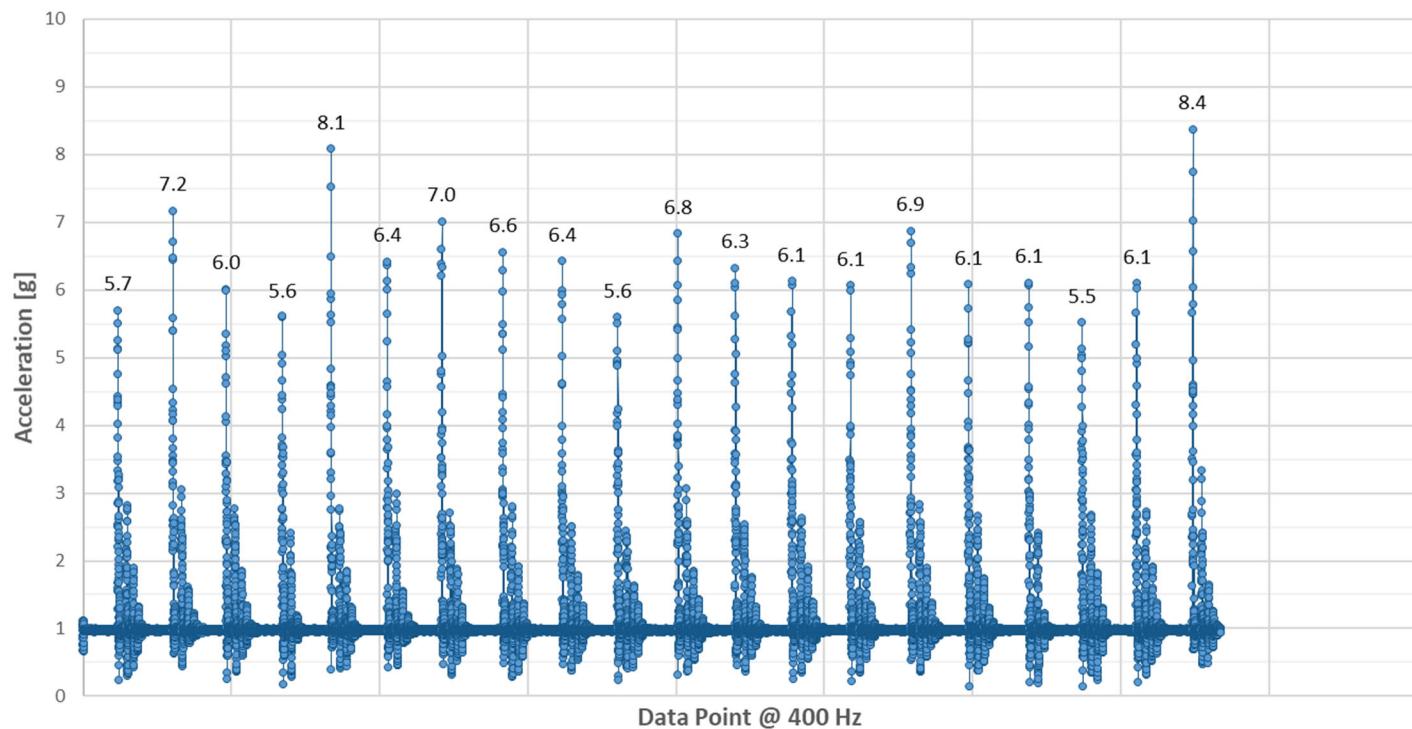
Z Acceleration (Up and Down) - PerfectSense



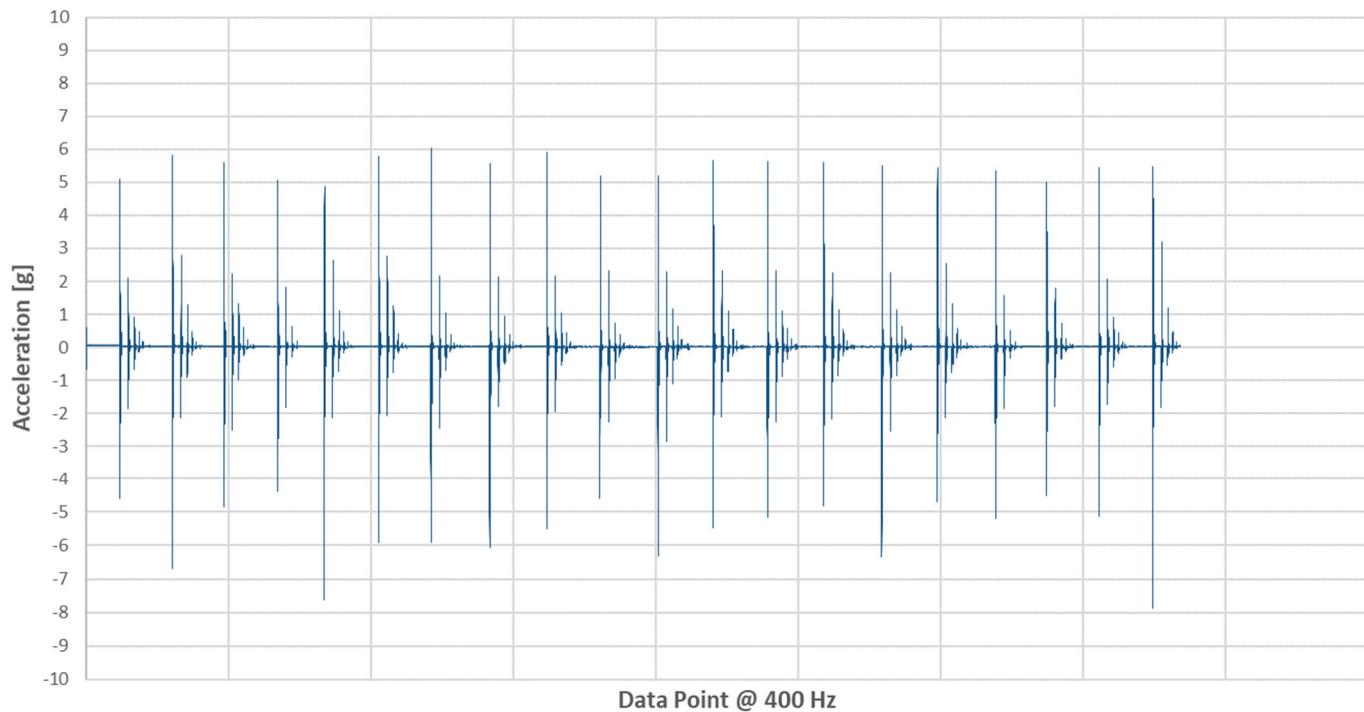


## TEST 3 – SPRINGWALL

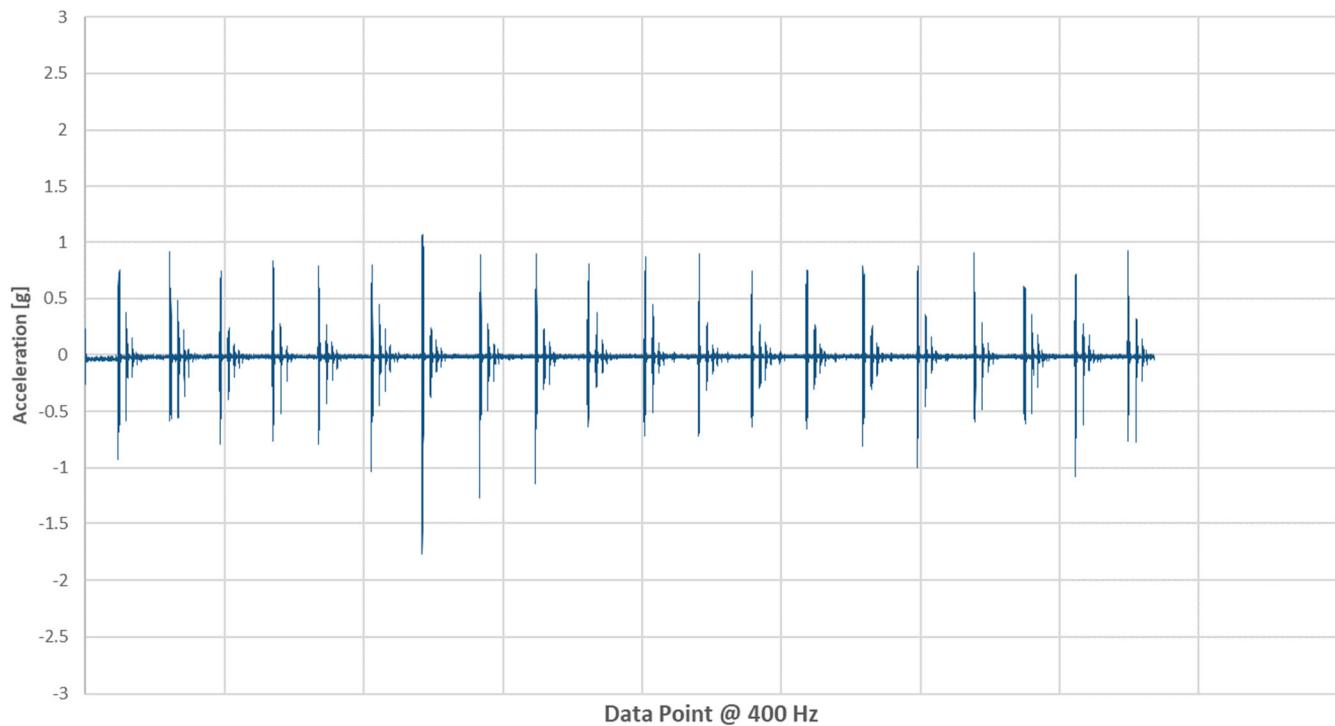
Vector Magnitude Acceleration - Springwall



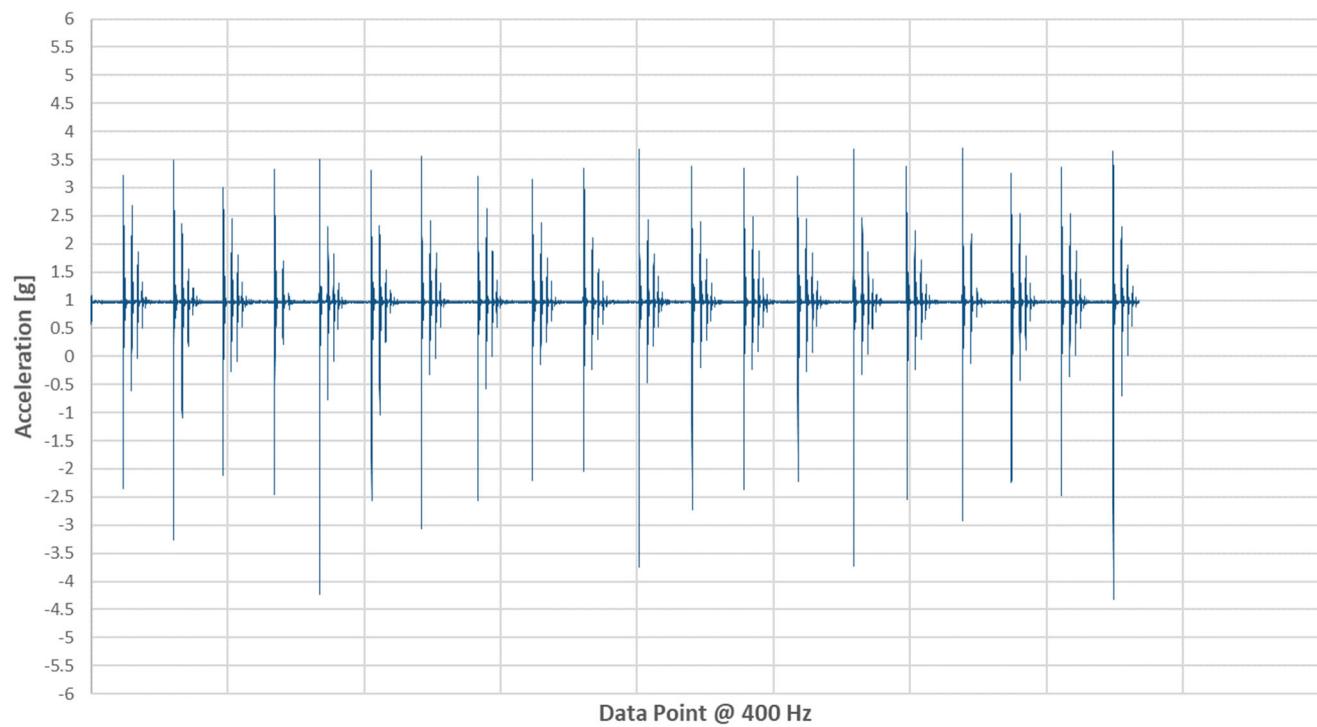
X Acceleration (Side to Side) - Springwall



Y Acceleration (Head to Toe) - Springwall



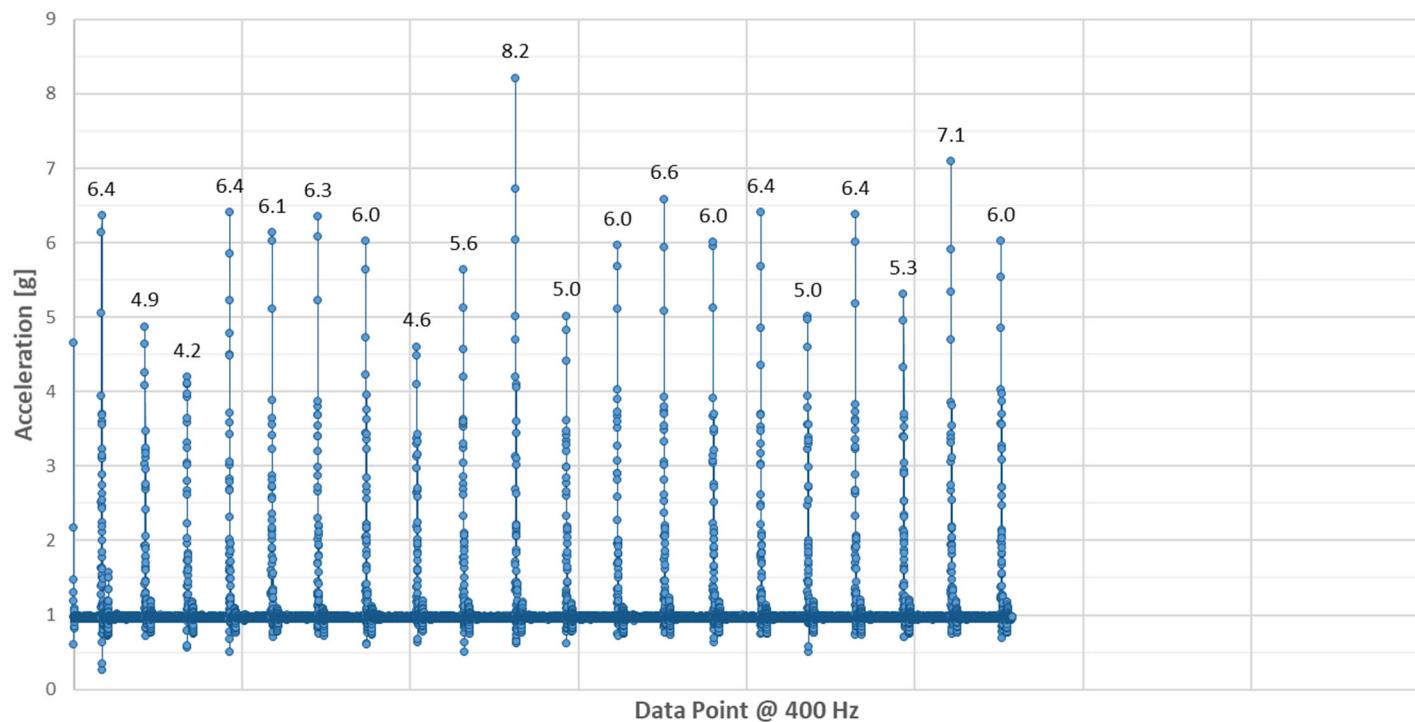
Z Acceleration (Up and Down) - Springwall



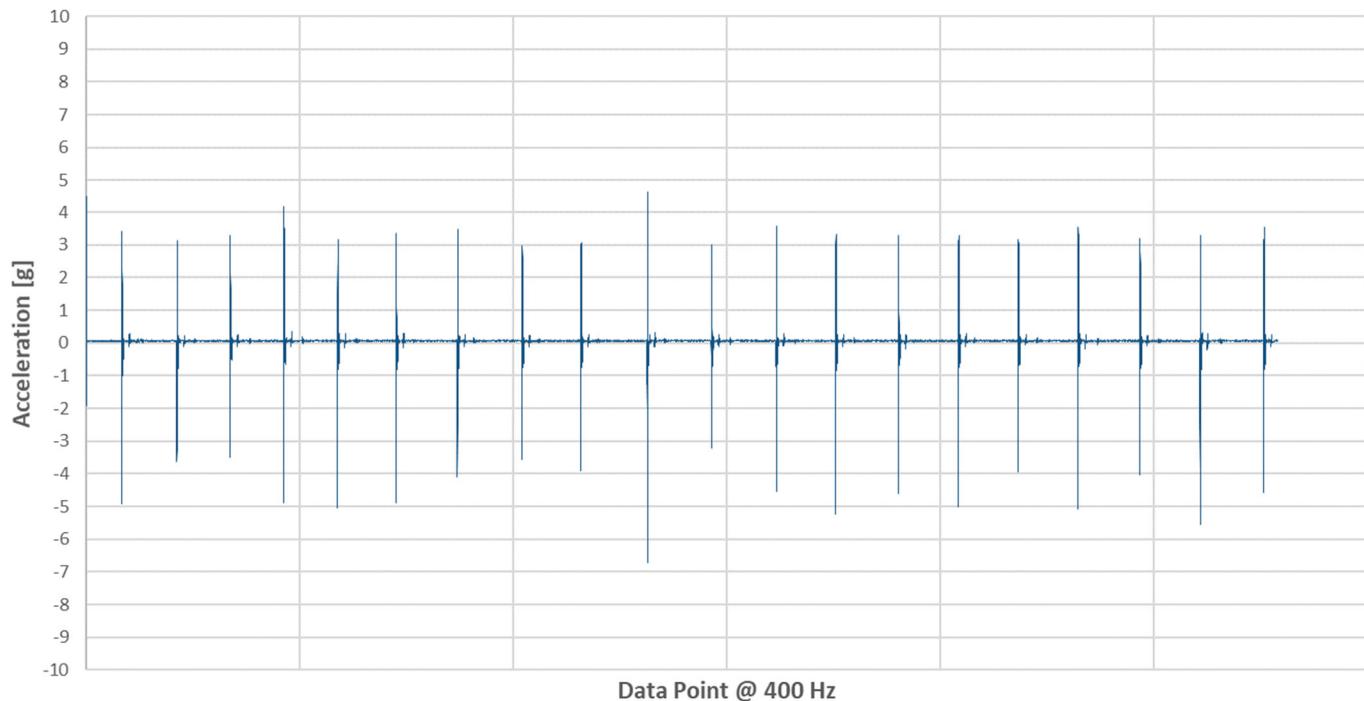


## TEST 3 – GOTTA SLEEP (OMG)

Vector Magnitude Acceleration - Gotta Sleep (OMG)

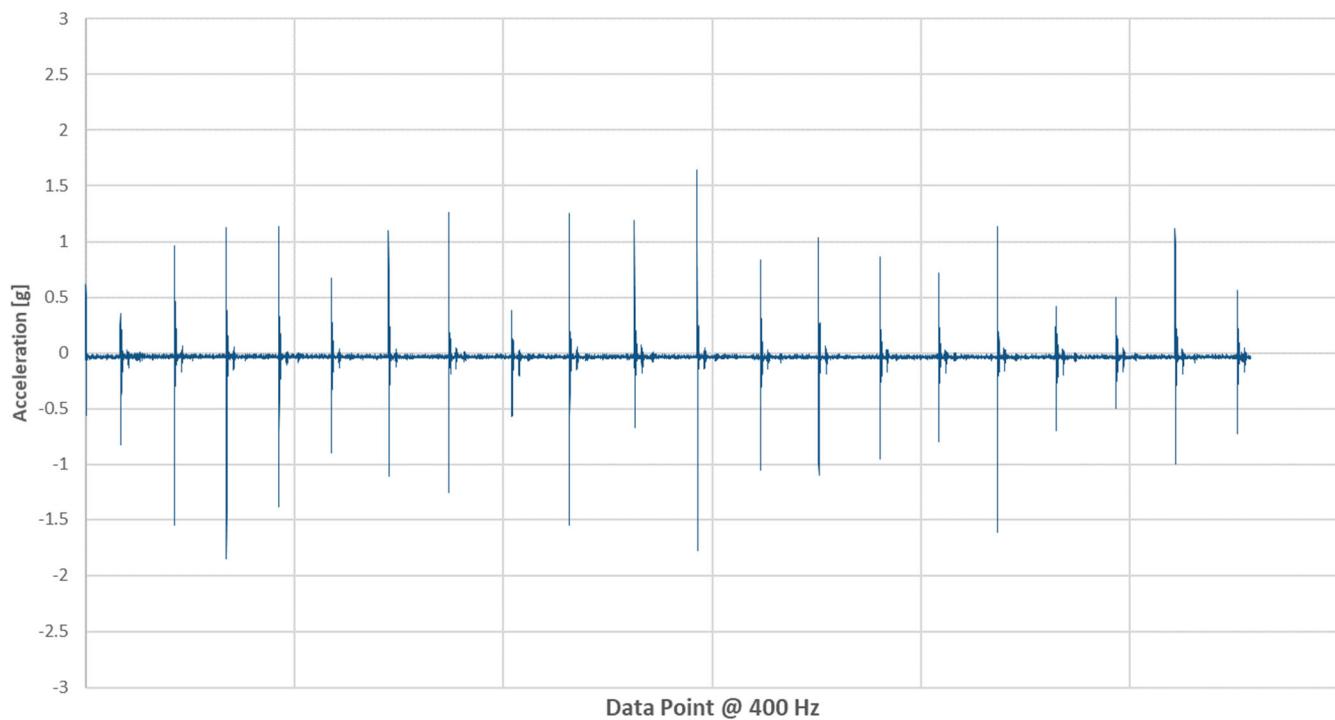


X Acceleration (Side to Side) - Gotta Sleep (OMG)

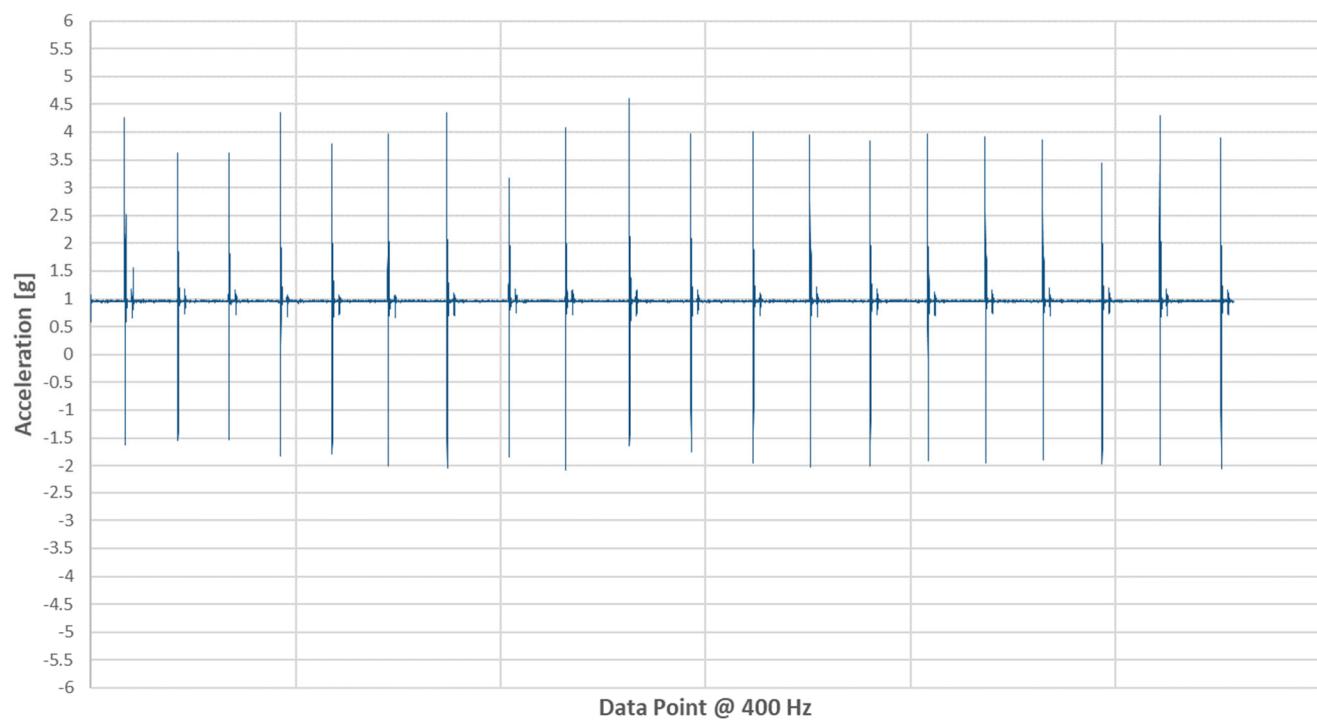




Y Acceleration (Head to Toe) - Gotta Sleep (OMG)



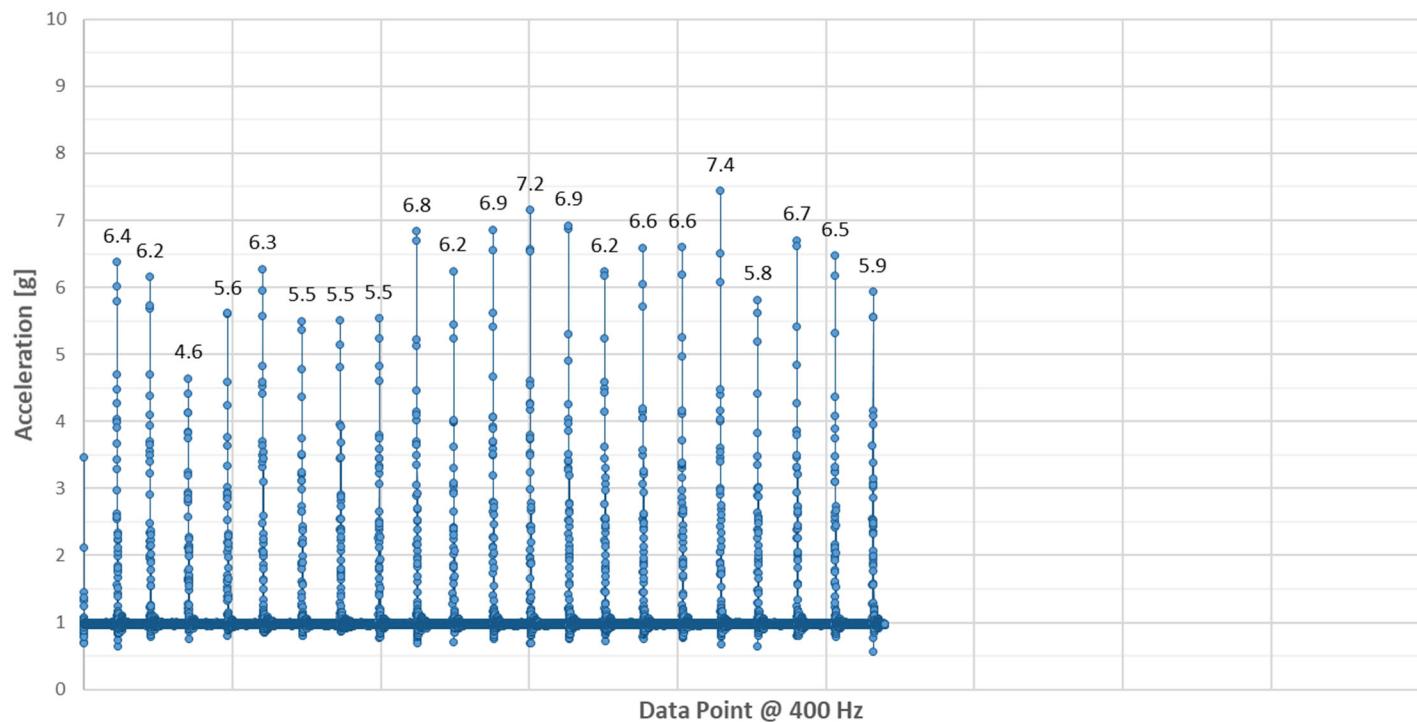
Z Acceleration (Up and Down) - Gotta Sleep (OMG)



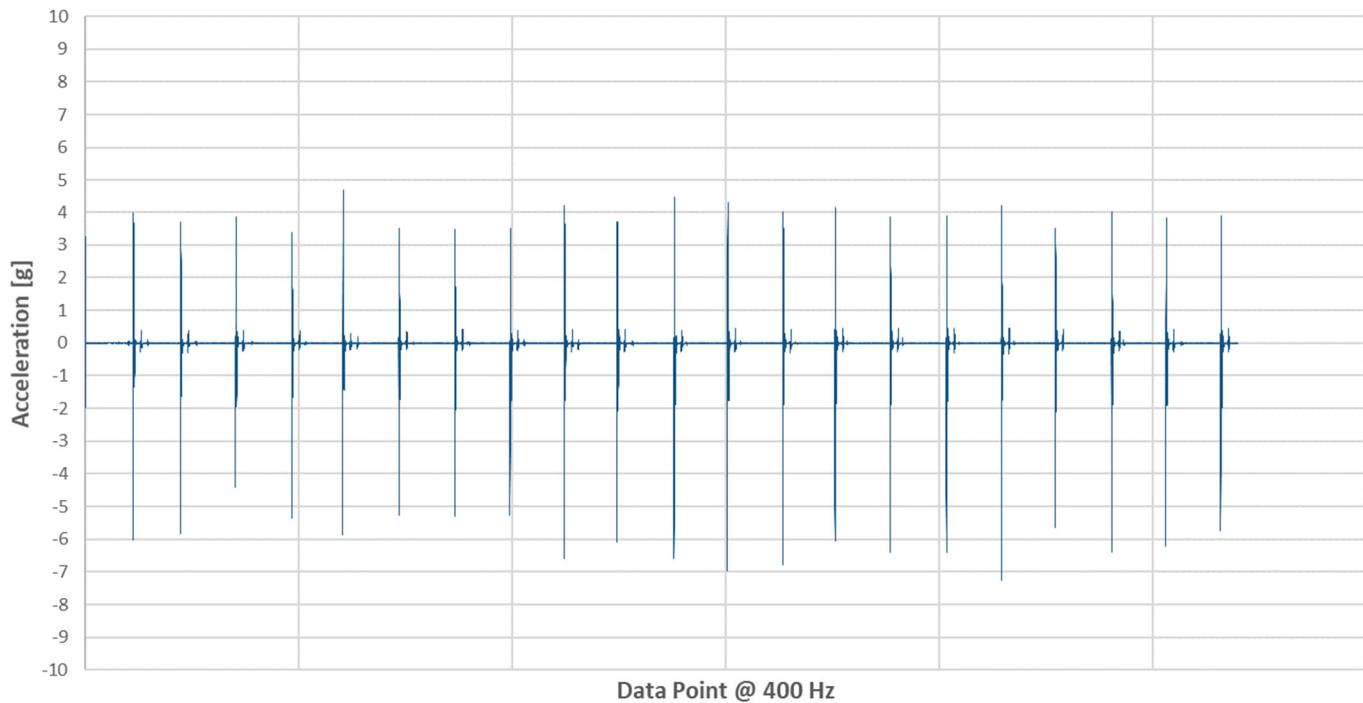


## TEST 3 – JUNO

Vector Magnitude Acceleration - Juno

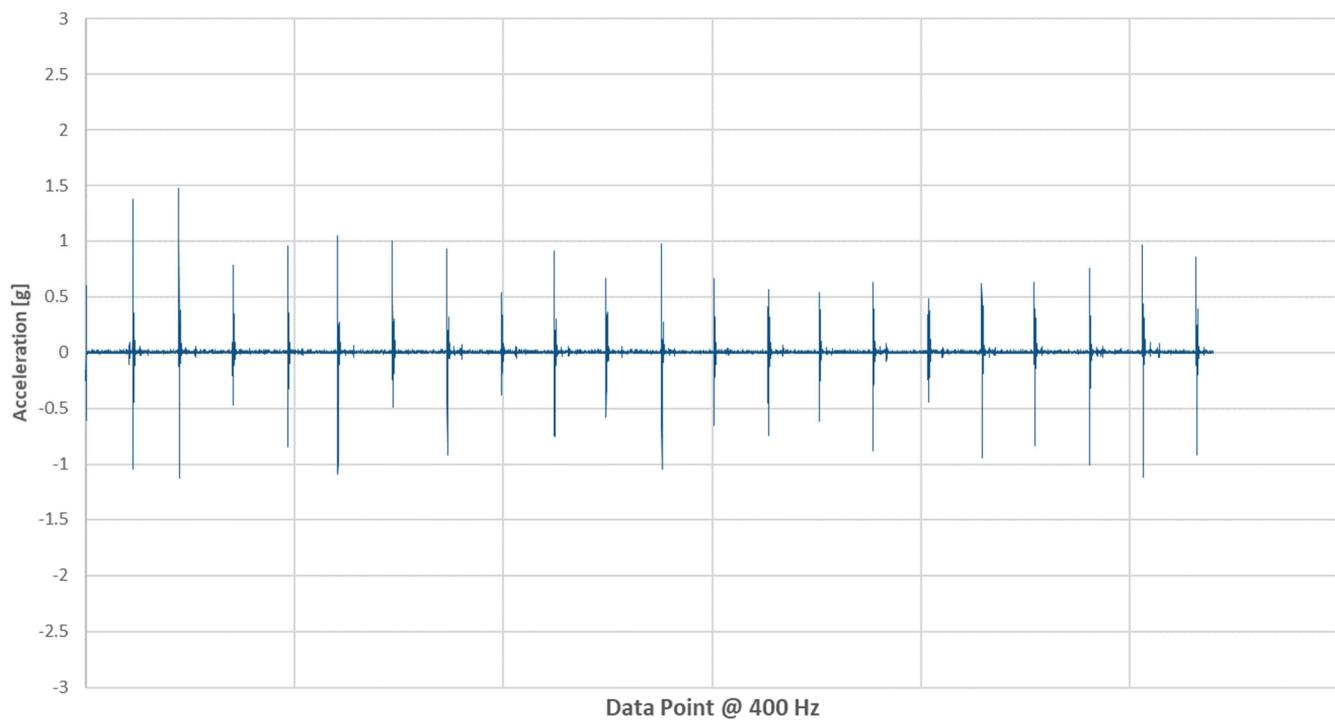


X Acceleration (Side to Side) - Juno

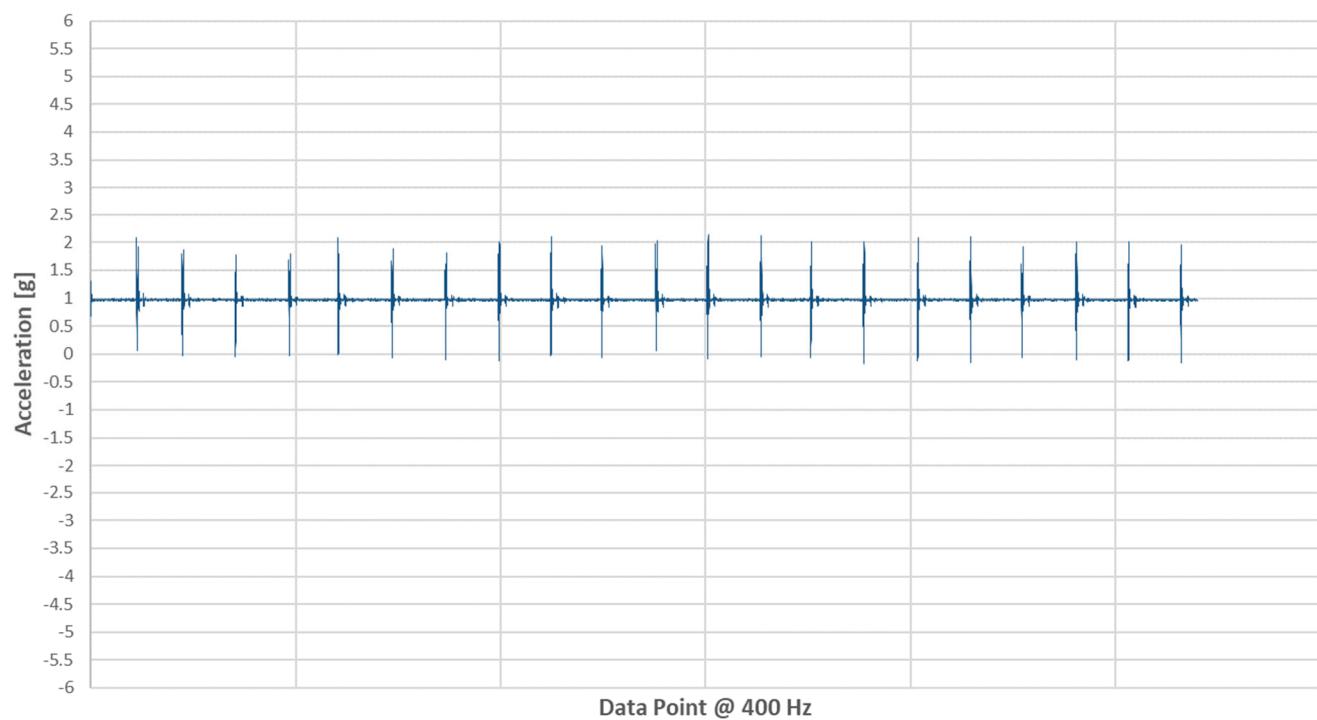




Y Acceleration (Head to Toe) - Juno



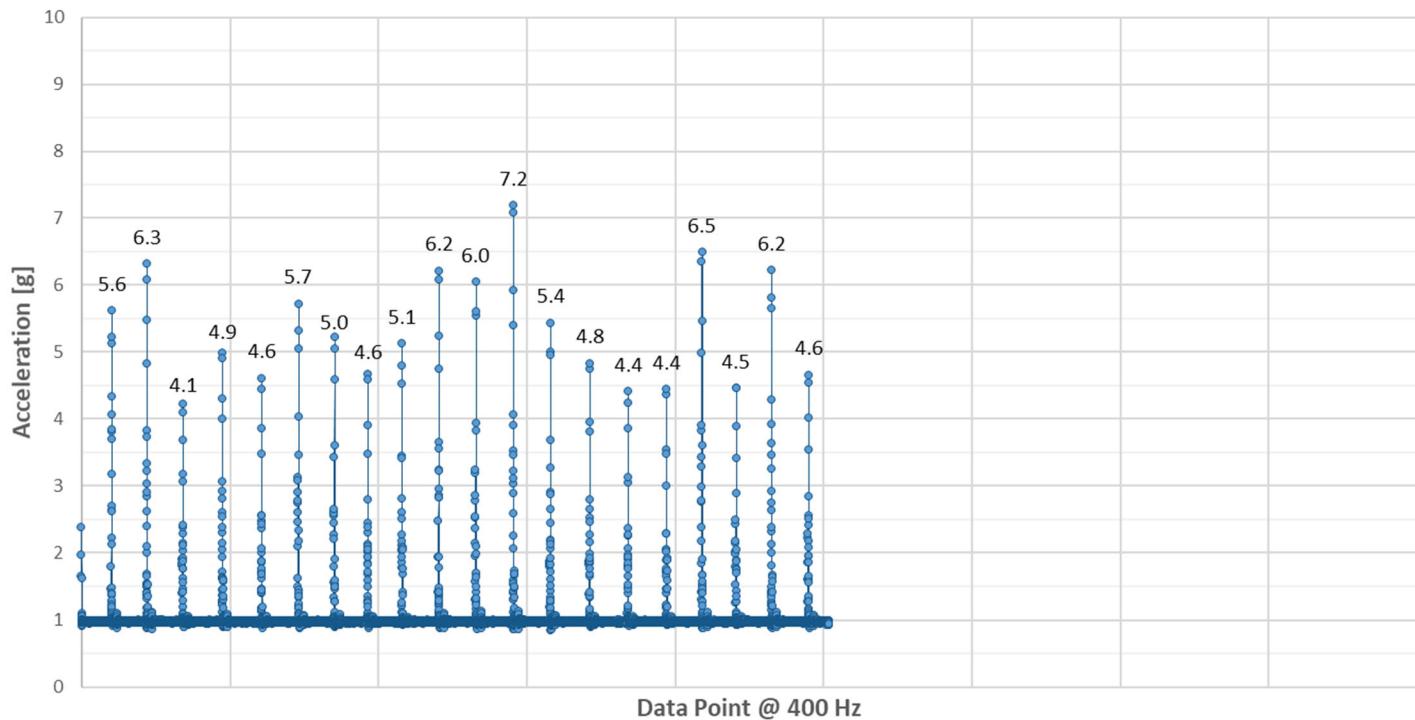
Z Acceleration (Up and Down) - Juno



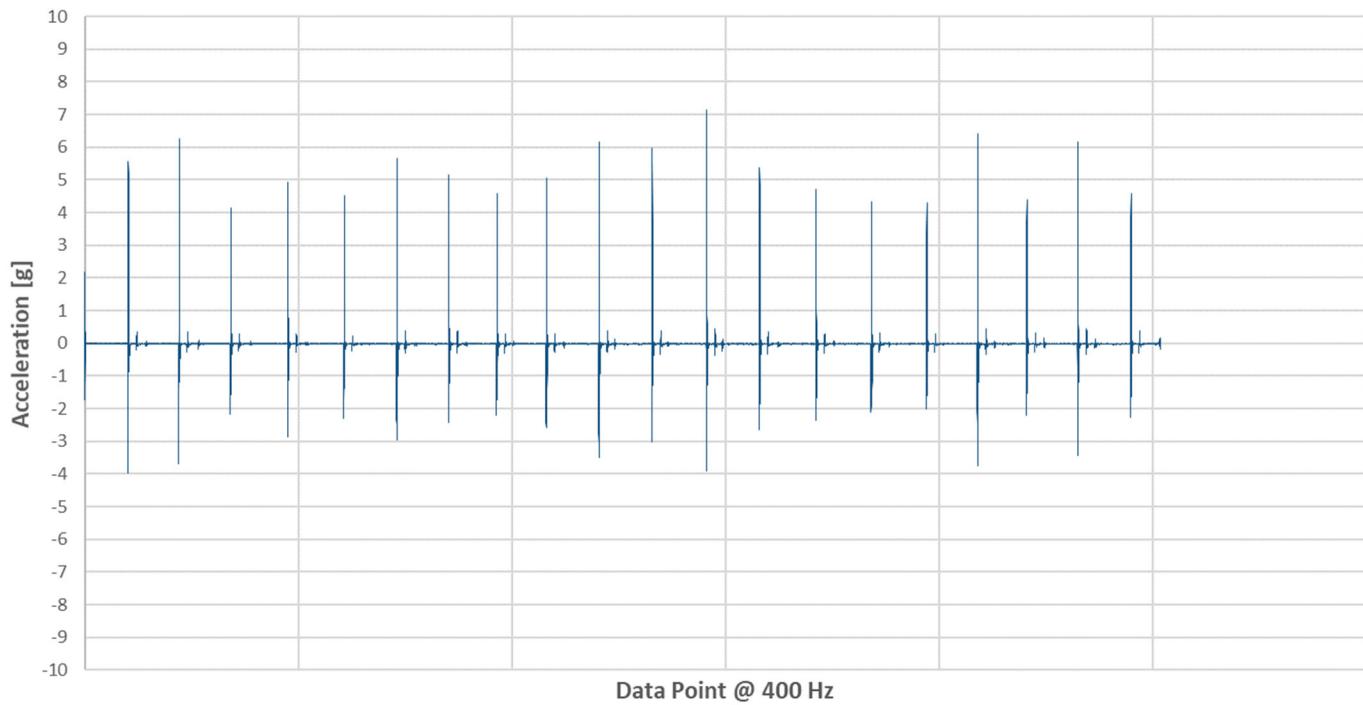


## TEST 3 – MIRA

Vector Magnitude Acceleration - Mira

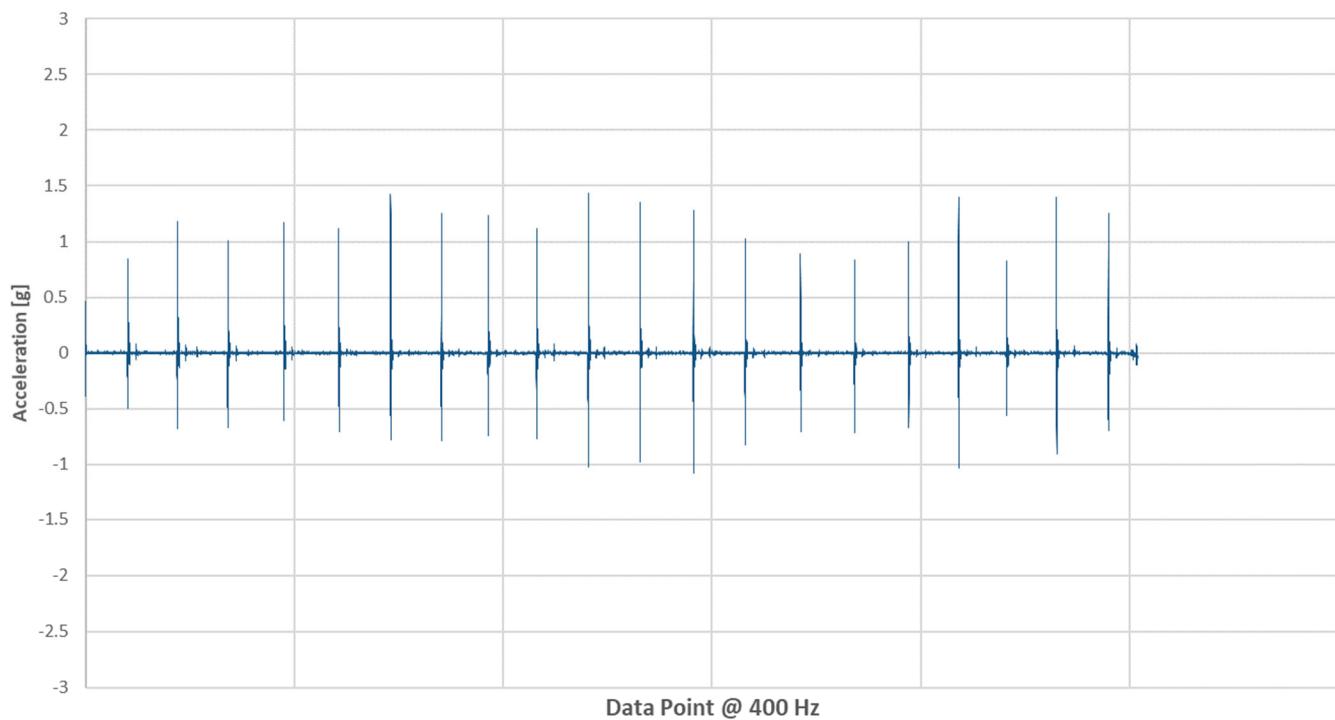


X Acceleration (Side to Side) - Mira

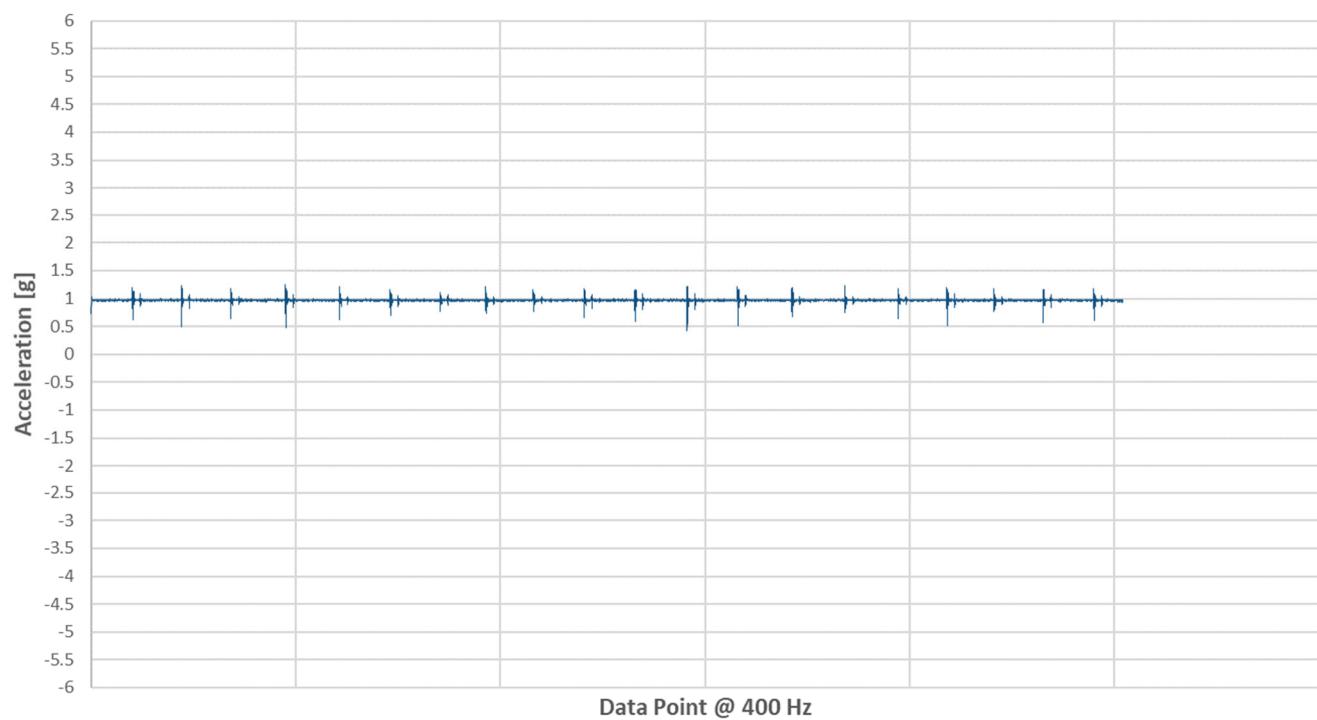




Y Acceleration (Head to Toe) - Mira



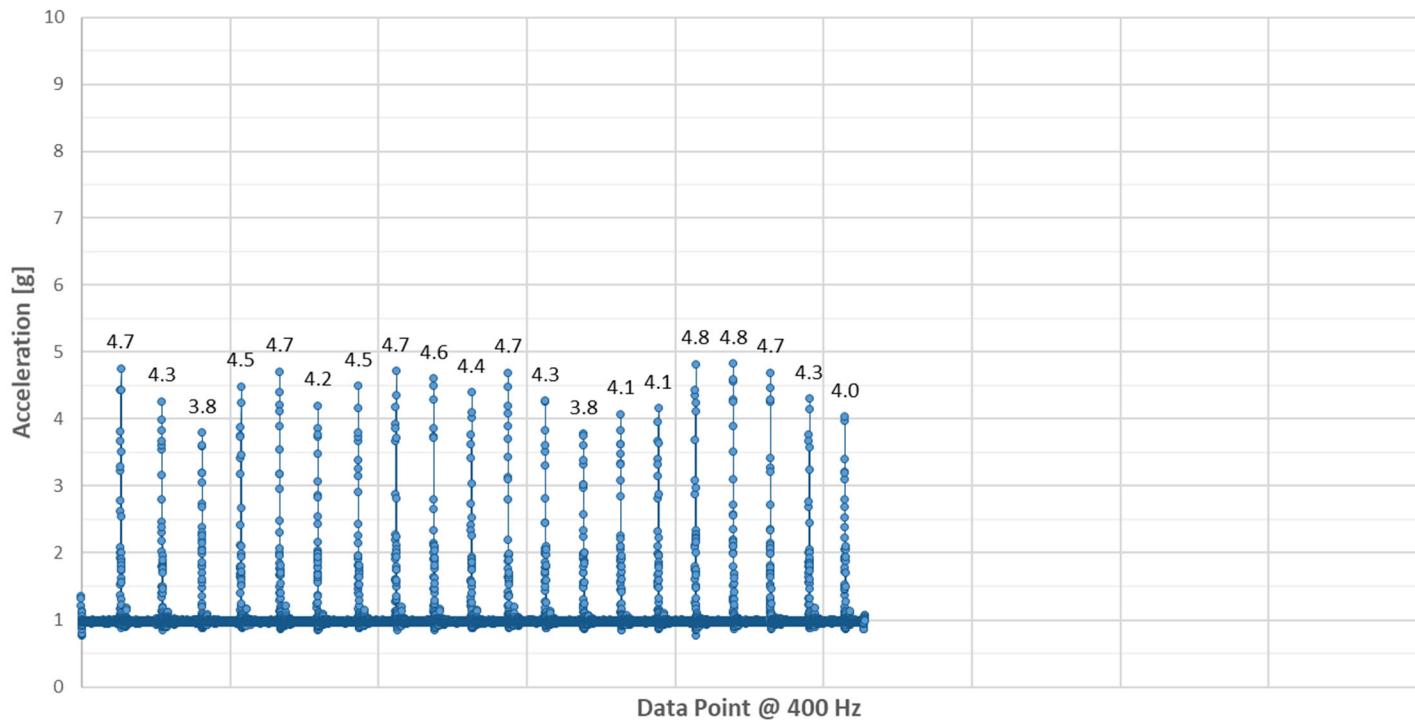
Z Acceleration (Up and Down) - Mira



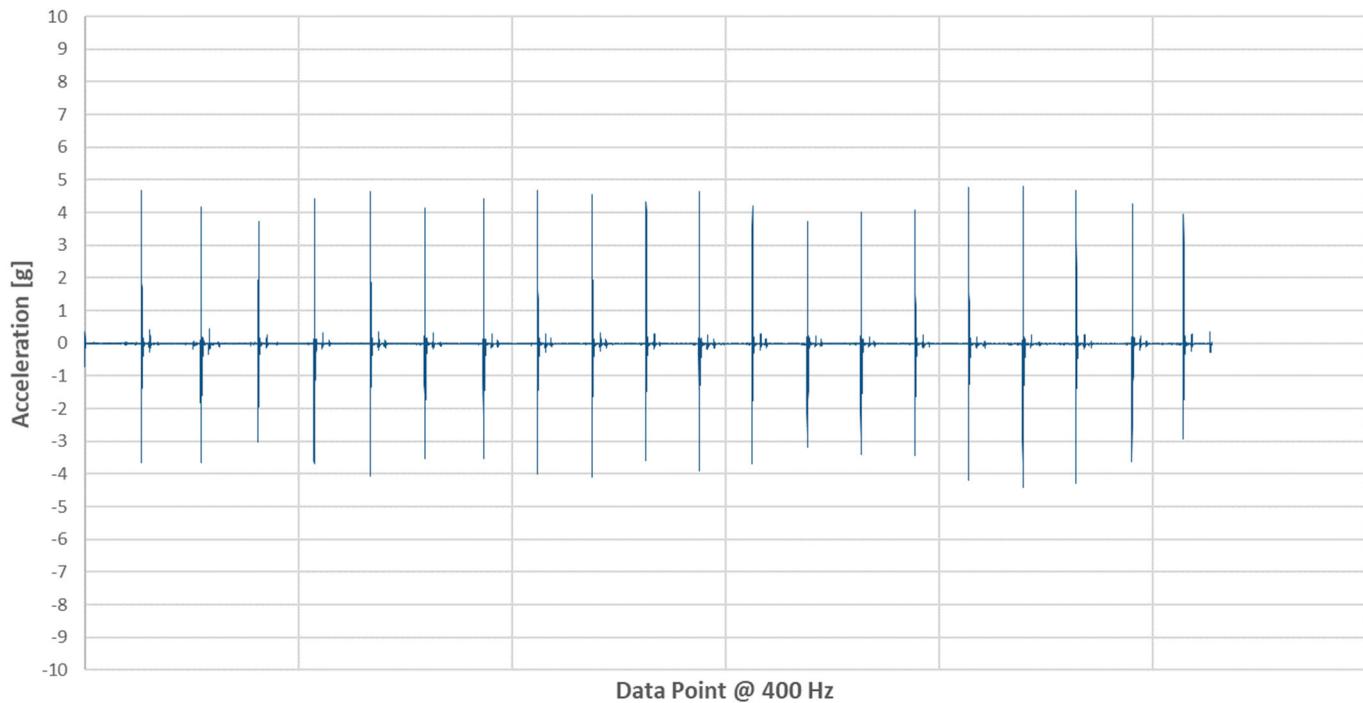


## TEST 3 – SERTA CHINOOK

Vector Magnitude Acceleration - Serta Chinook

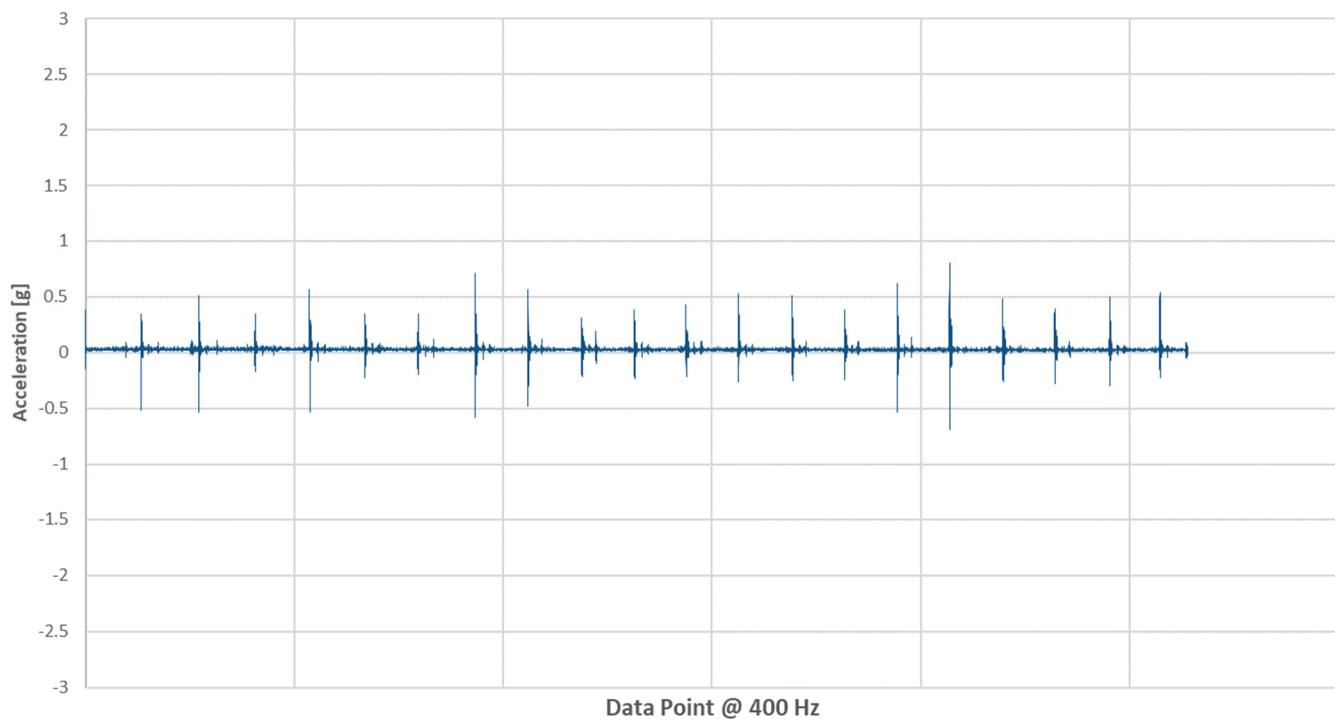


X Acceleration (Side to Side) - Serta Chinook

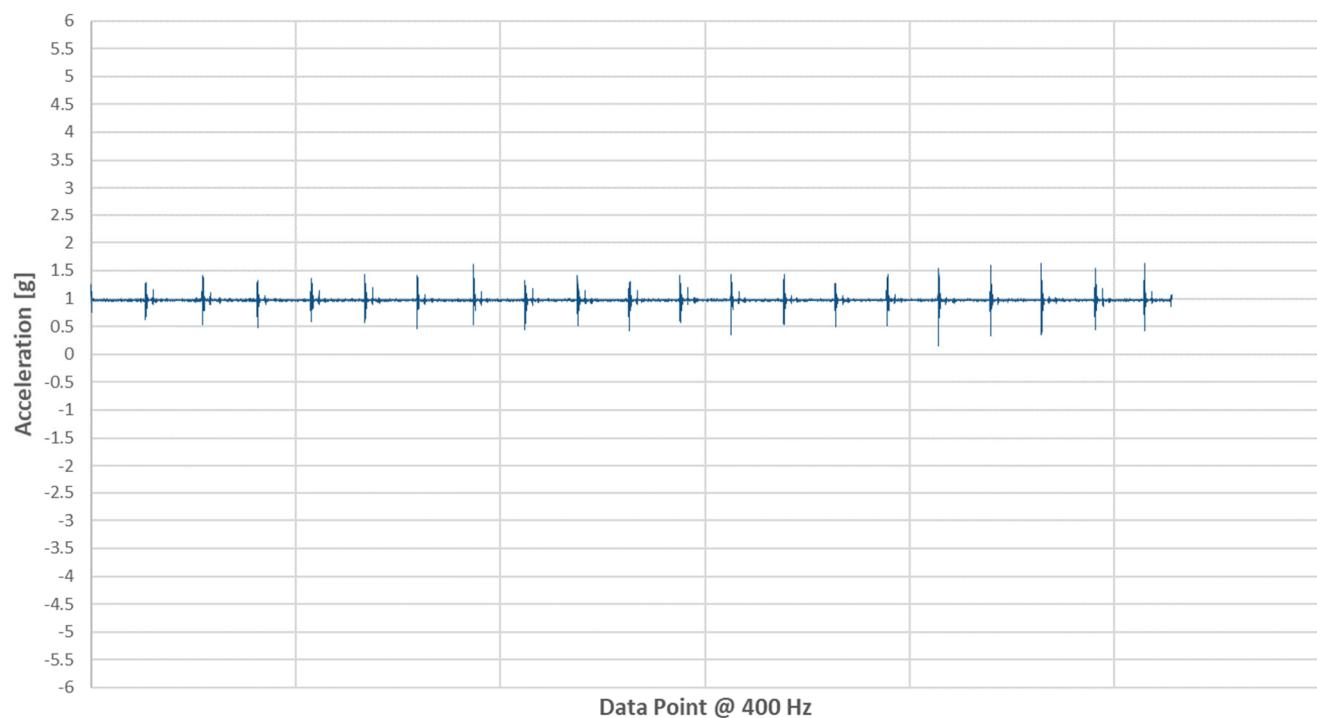




Y Acceleration (Head to Toe) - Serta Chinook



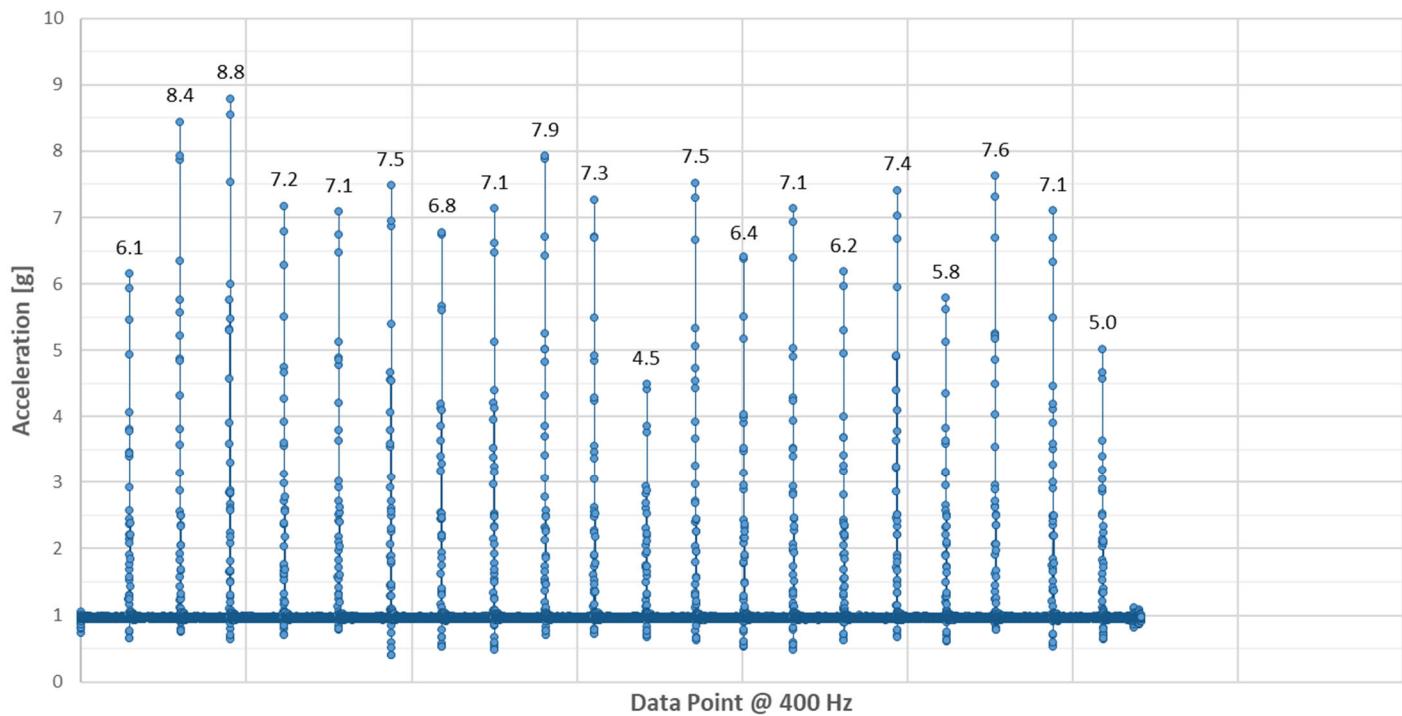
Z Acceleration (Up and Down) - Serta Chinook



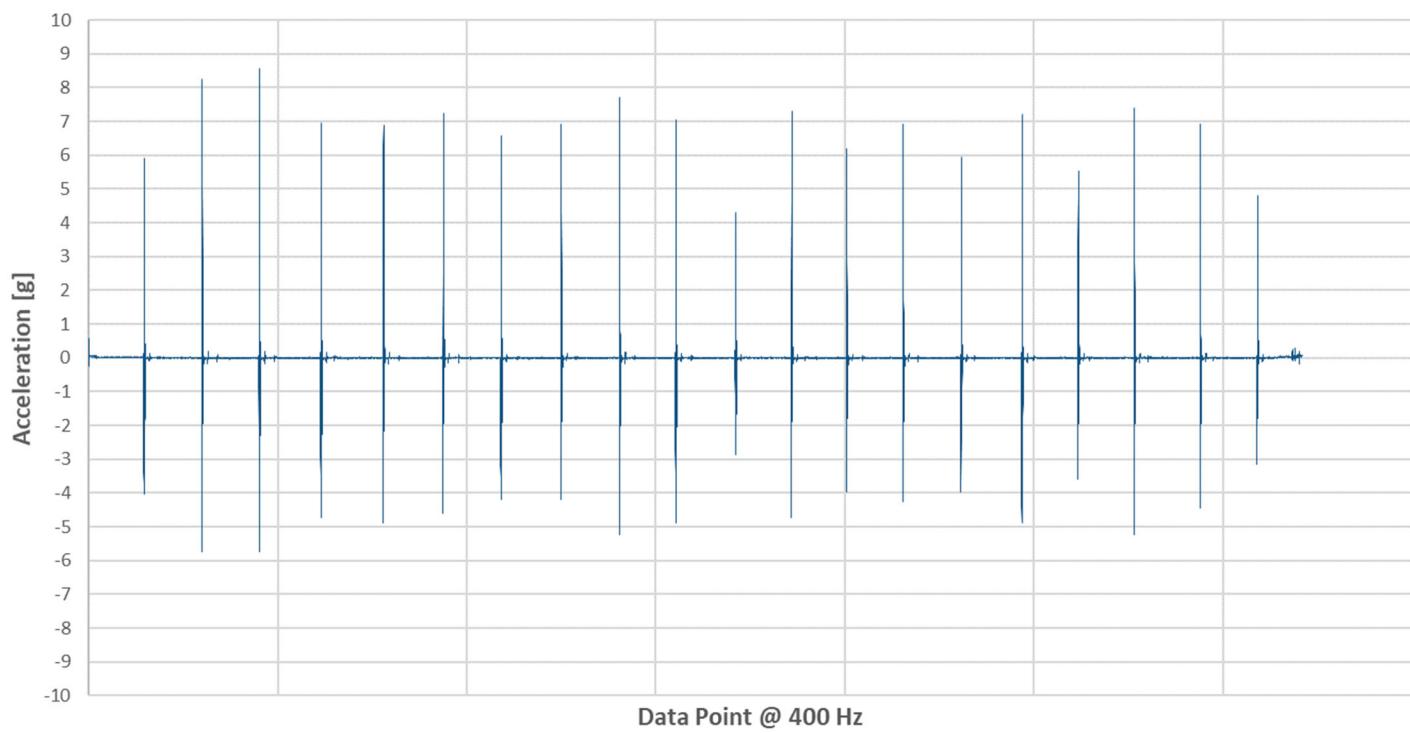


## TEST 3 – PENNY

Vector Magnitude Acceleration - Penny

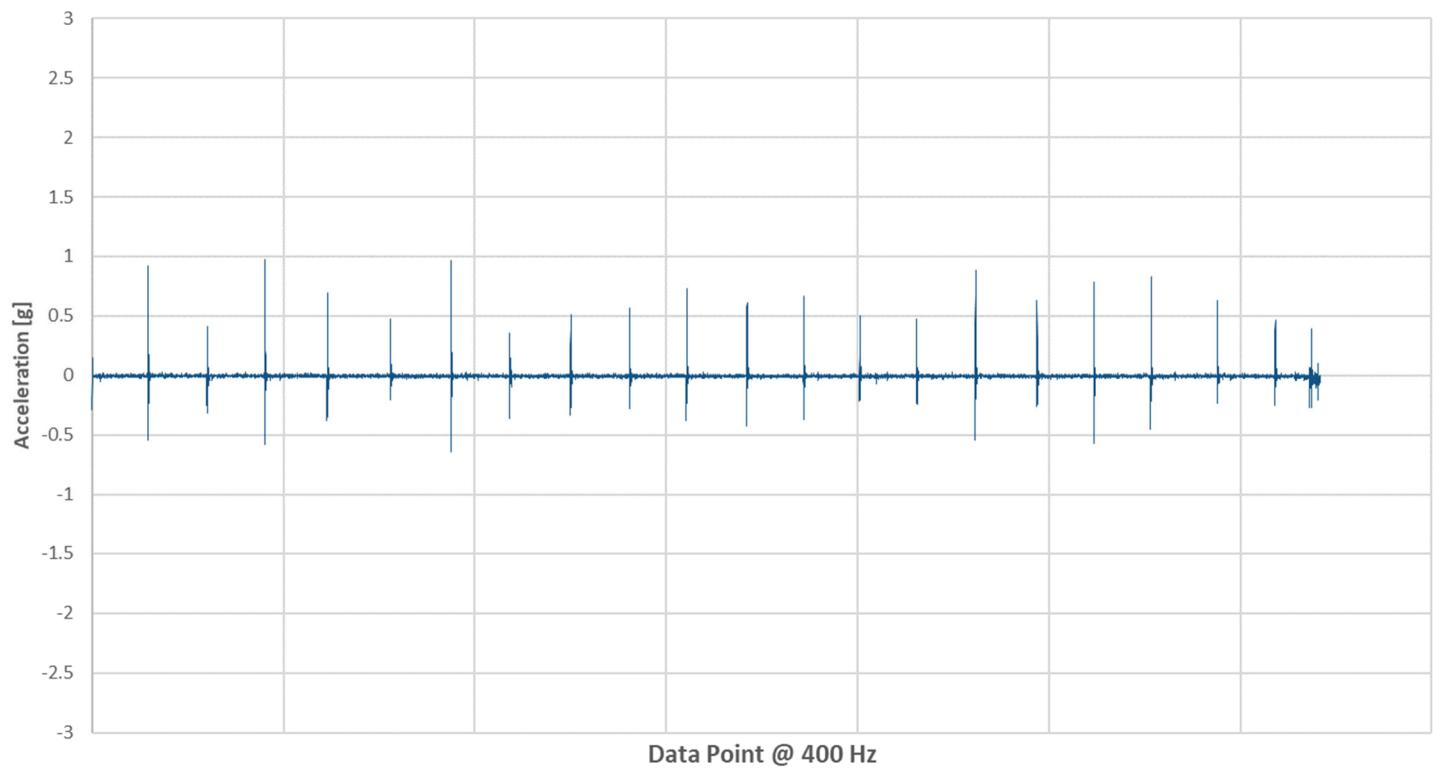


X Acceleration (Side to Side) - Penny

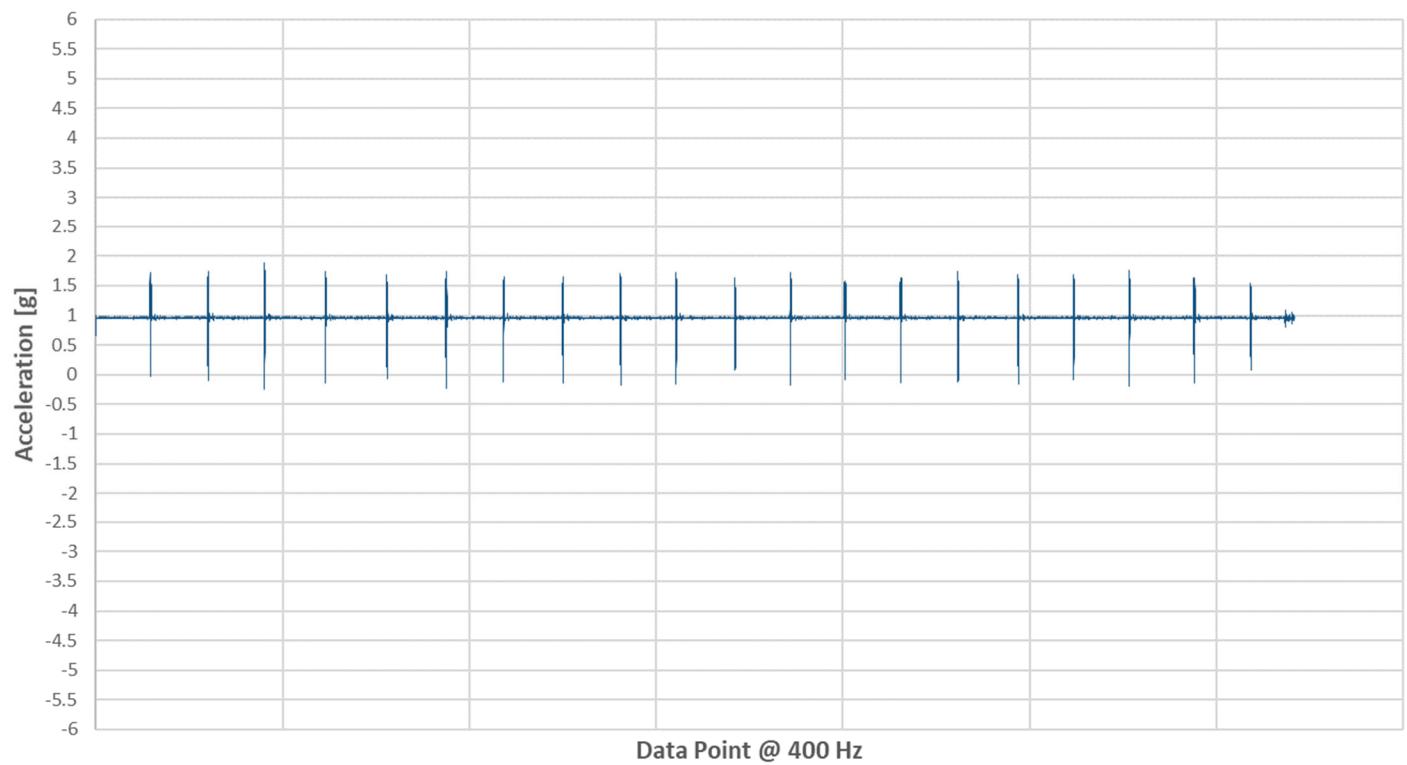




Y Acceleration (Head to Toe) - Penny



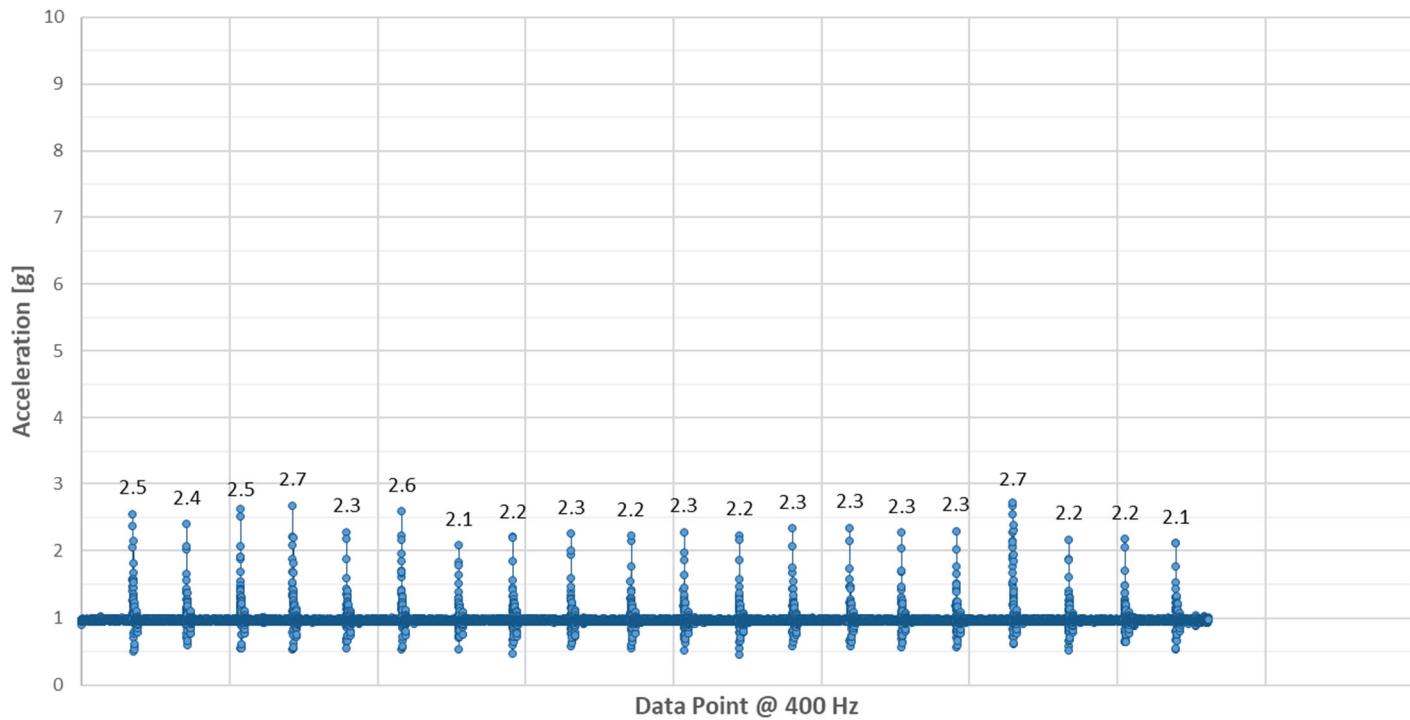
Z Acceleration (Up and Down) - Penny



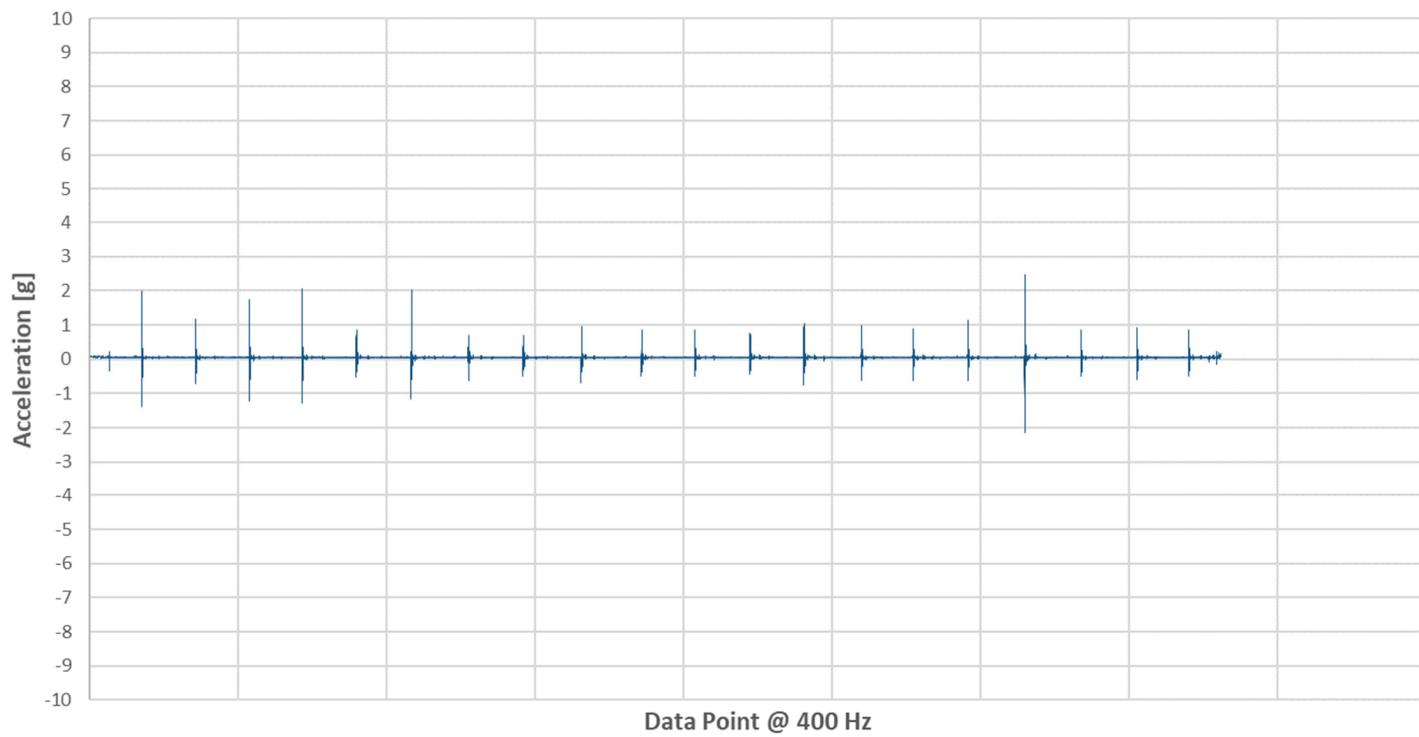


## TEST 3 –APOLLO

Vector Magnitude Acceleration - Apollo

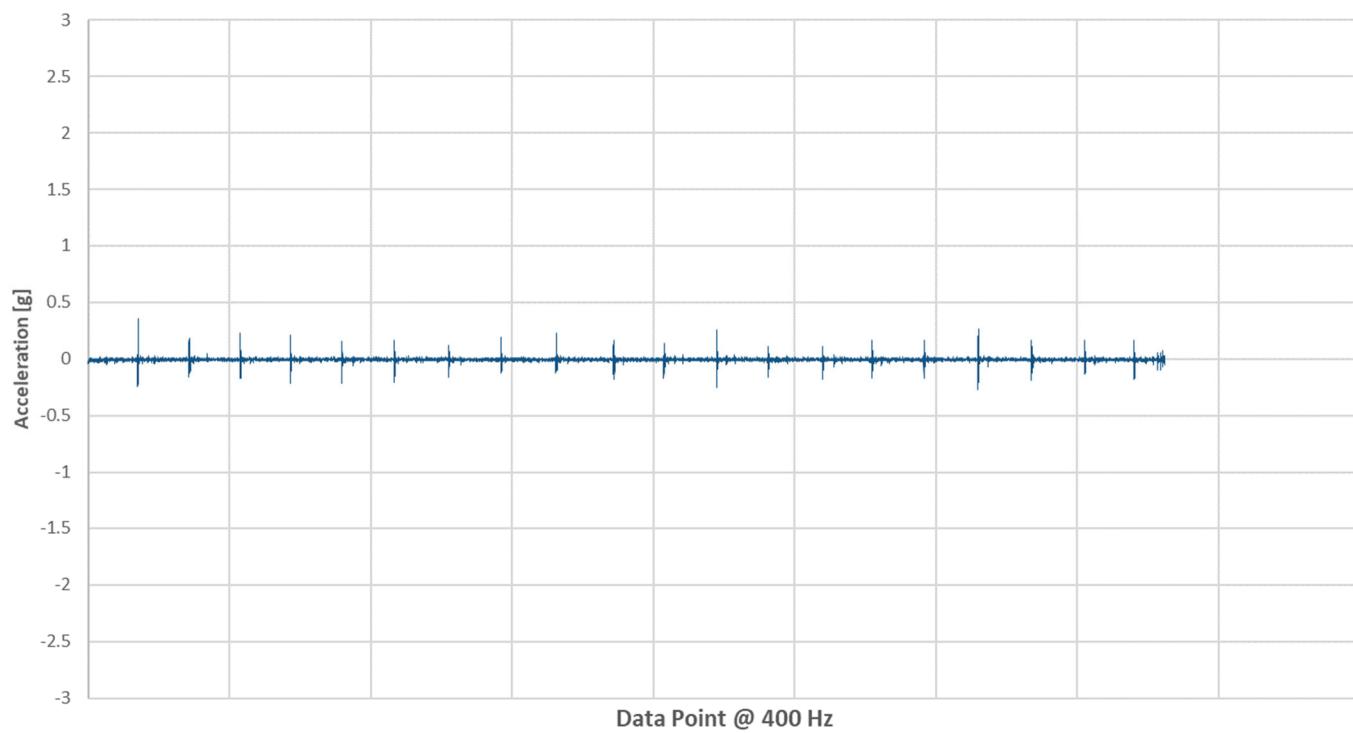


X Acceleration (Side to Side) - Apollo

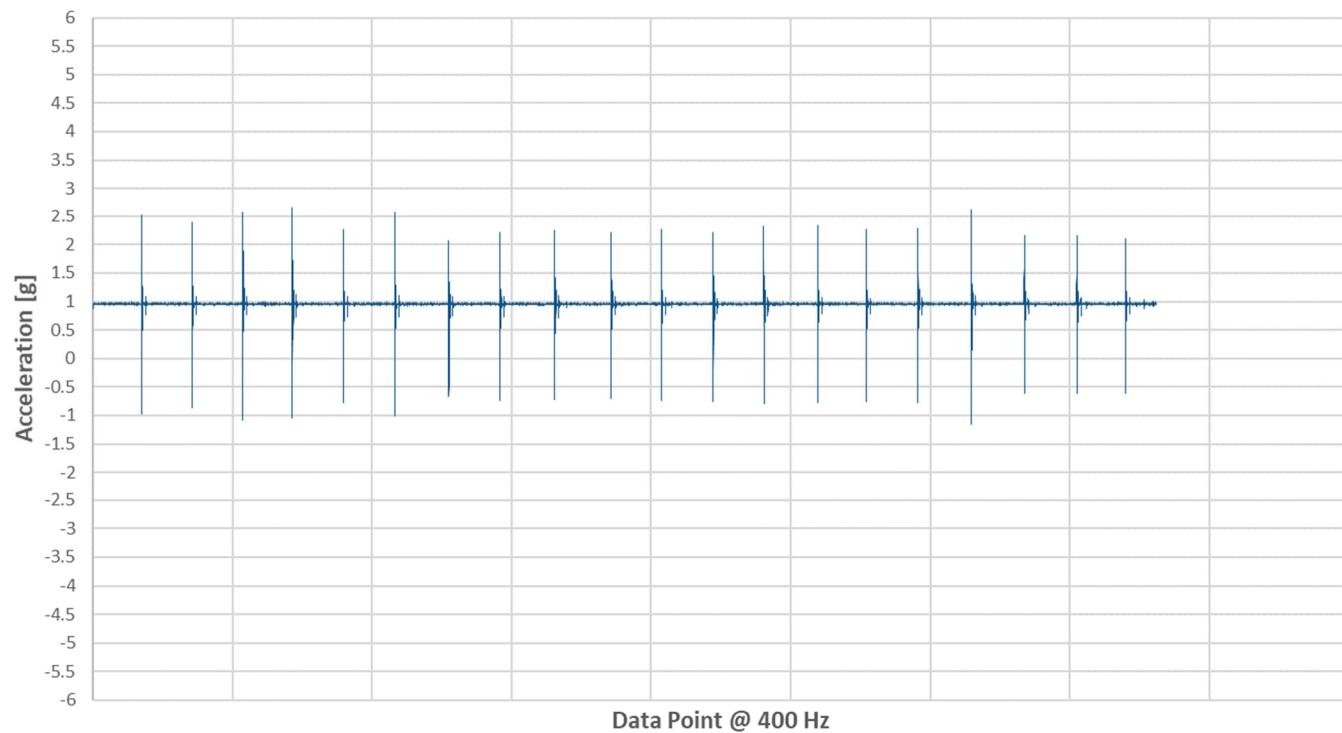




Y Acceleration (Head to Toe) - Apollo



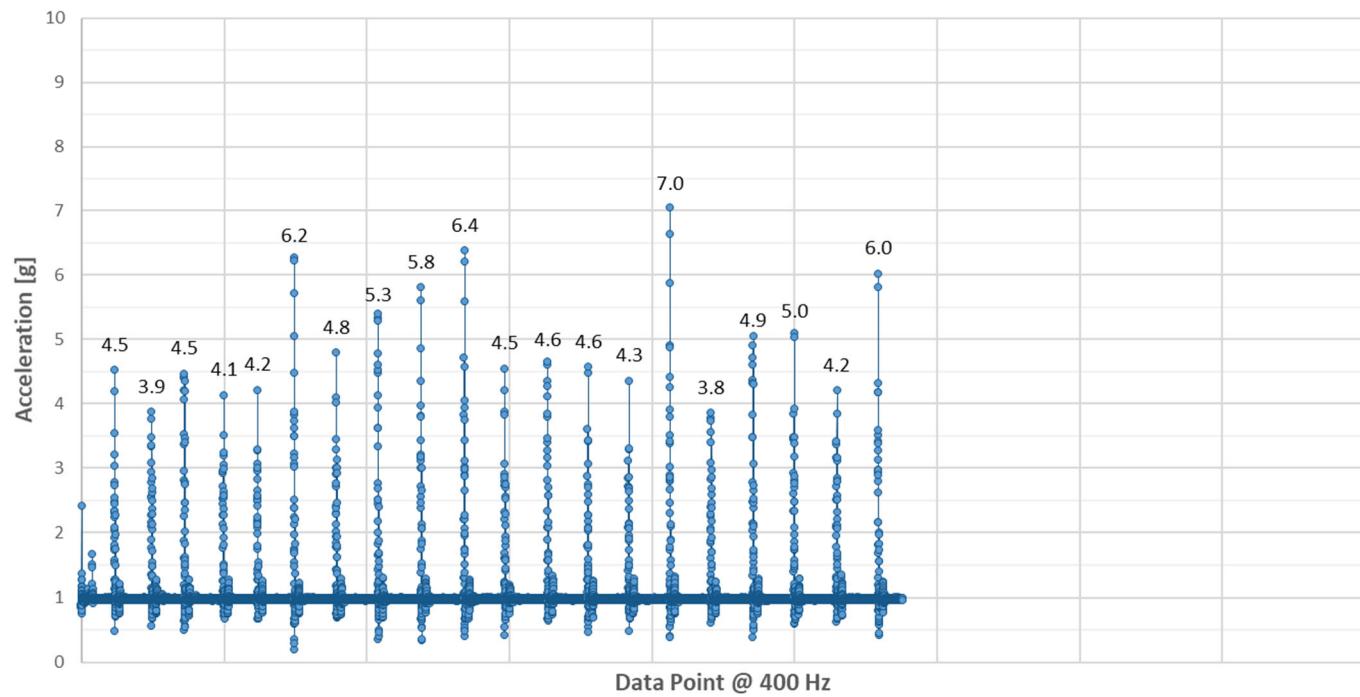
Z Acceleration (Up and Down) - Apollo



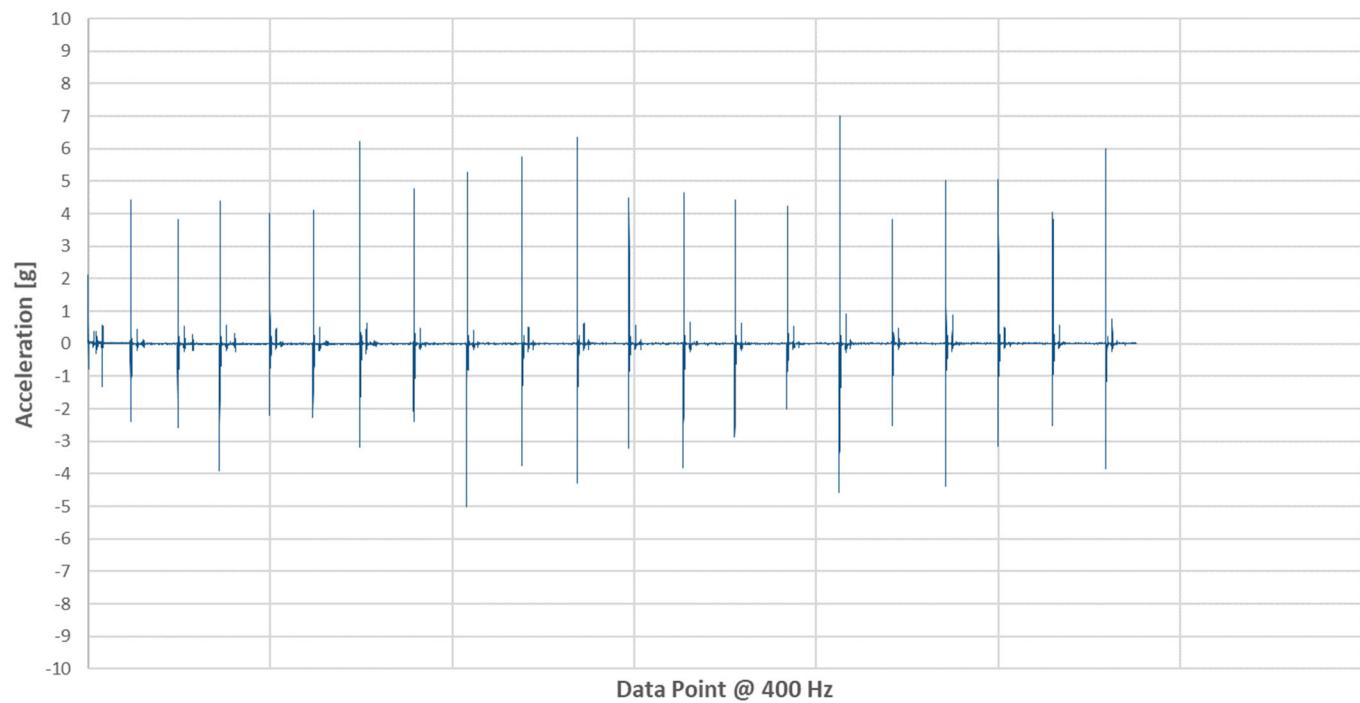


## TEST 3 –EMMA

Vector Magnitude Acceleration - Emma

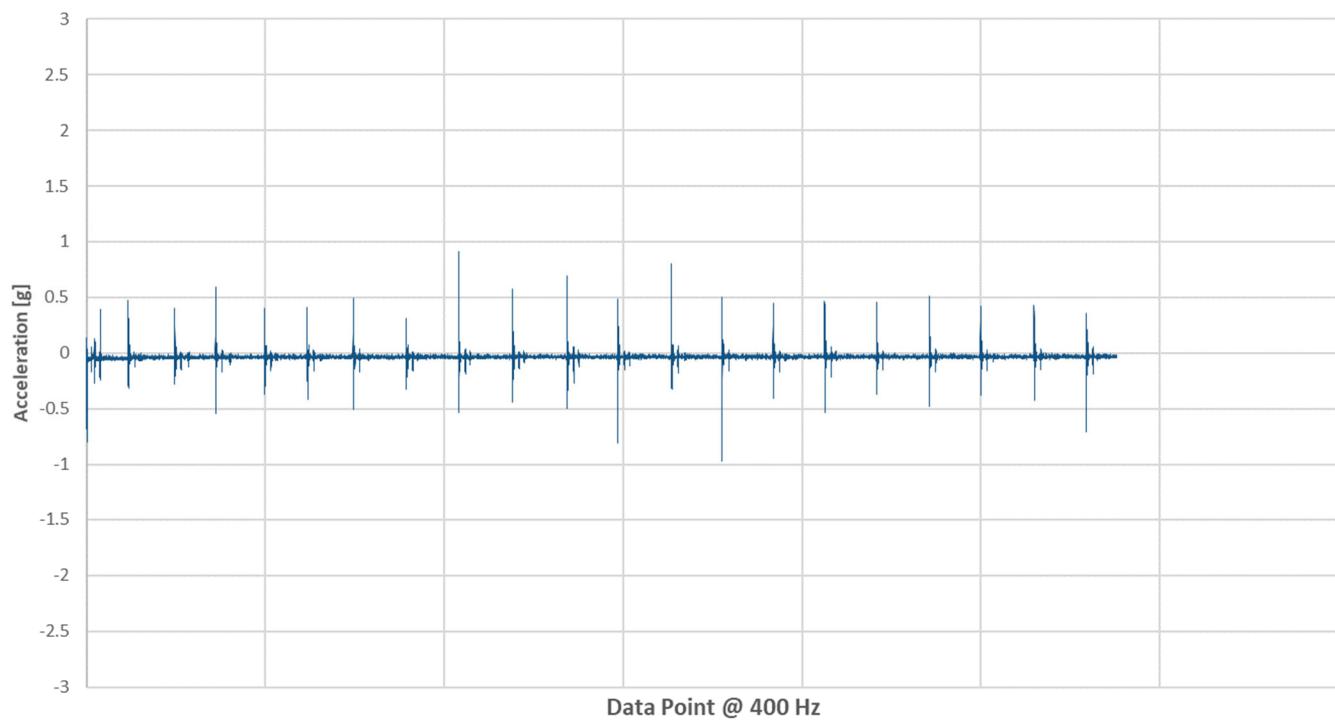


X Acceleration (Side to Side) - Emma

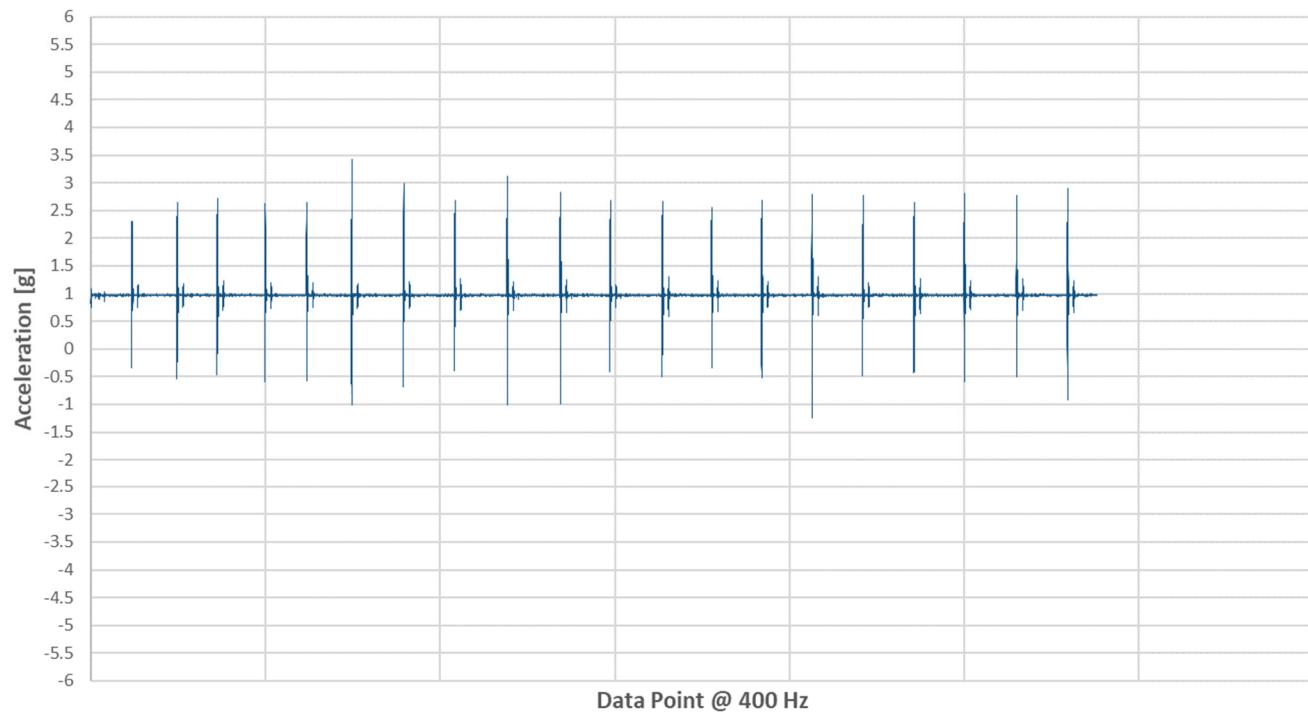




Y Acceleration (Head to Toe) - Emma



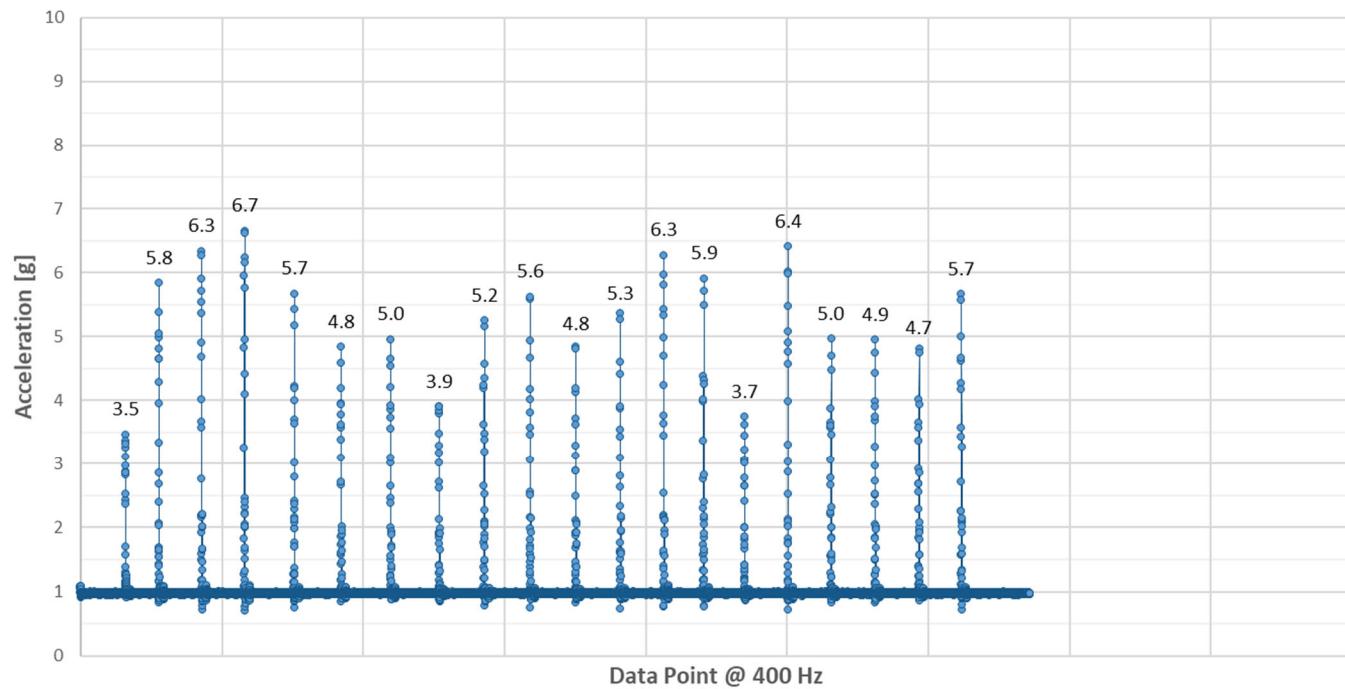
Z Acceleration (Up and Down) - Emma



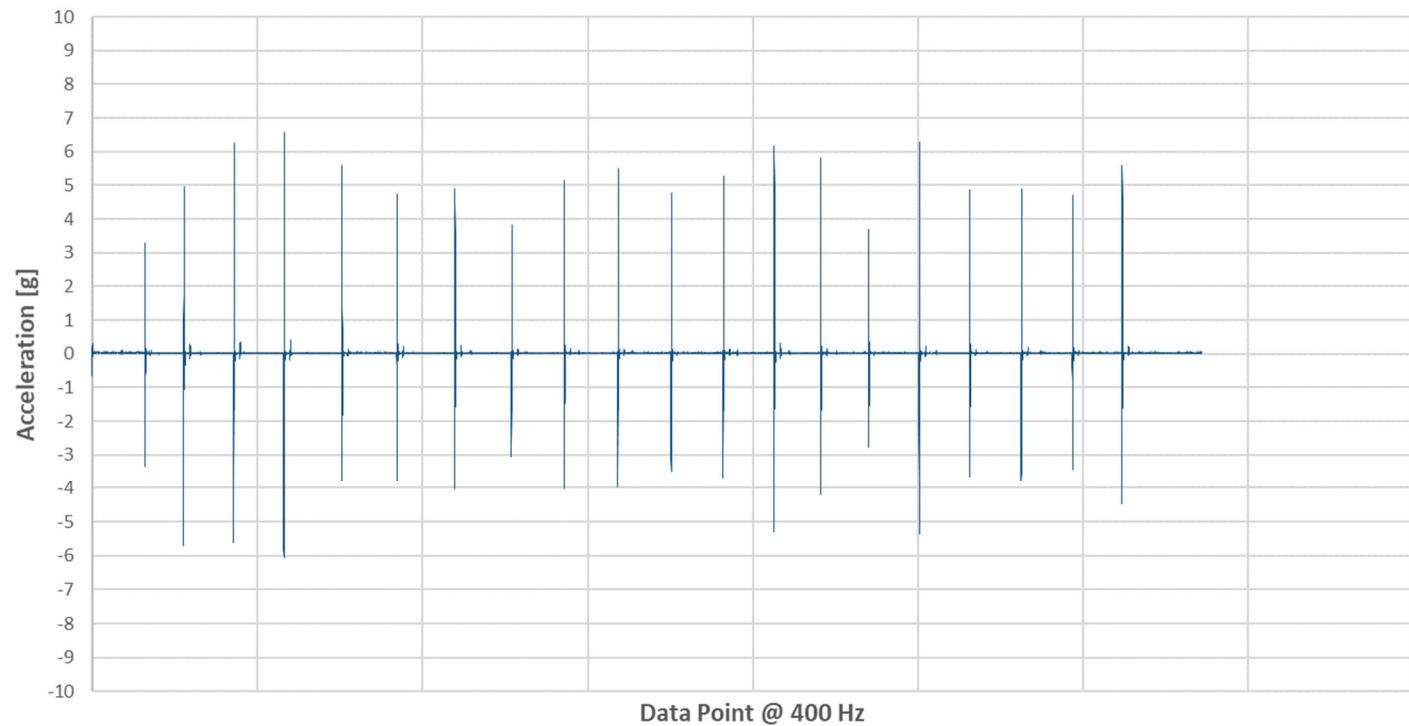


## TEST 3 –CASPER ESSENTIAL (V2)

Vector Magnitude Acceleration - Casper Essential (V2)

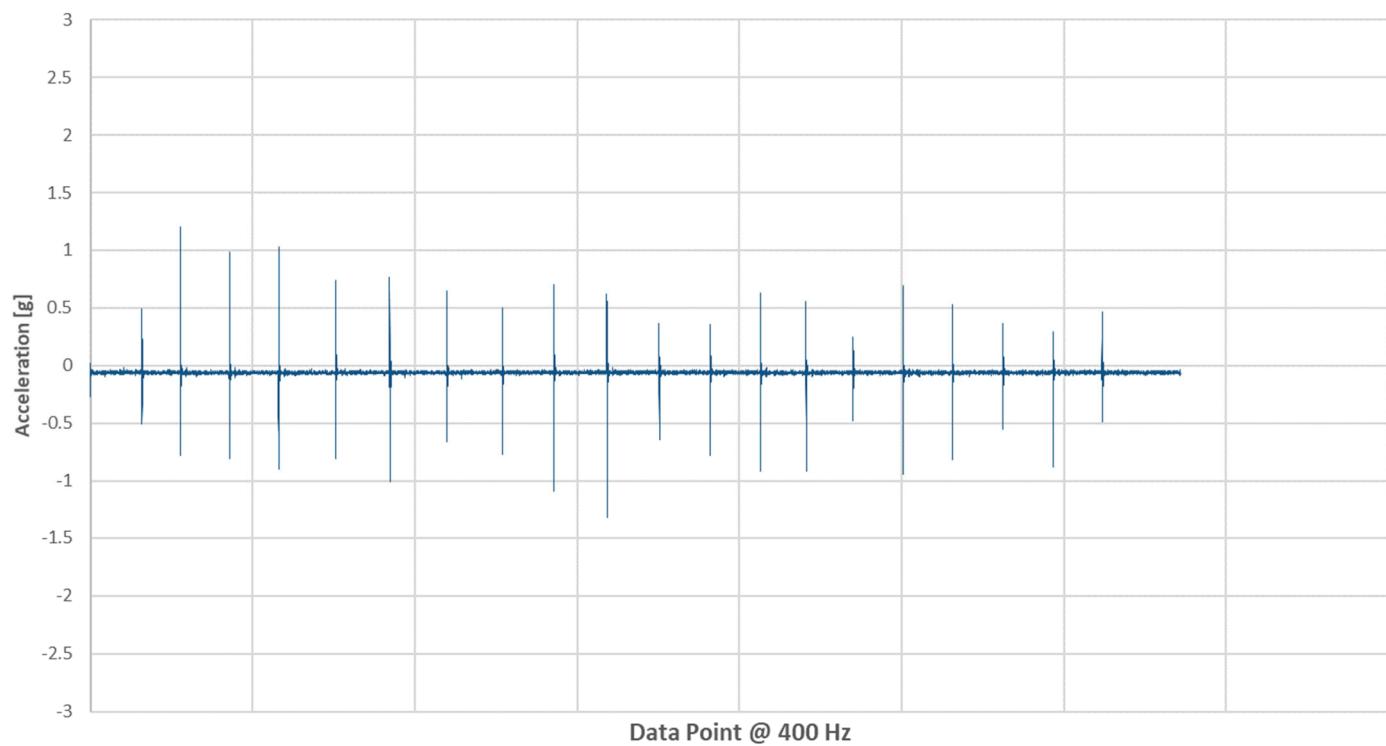


X Acceleration (Side to Side) - Casper Essential (V2)

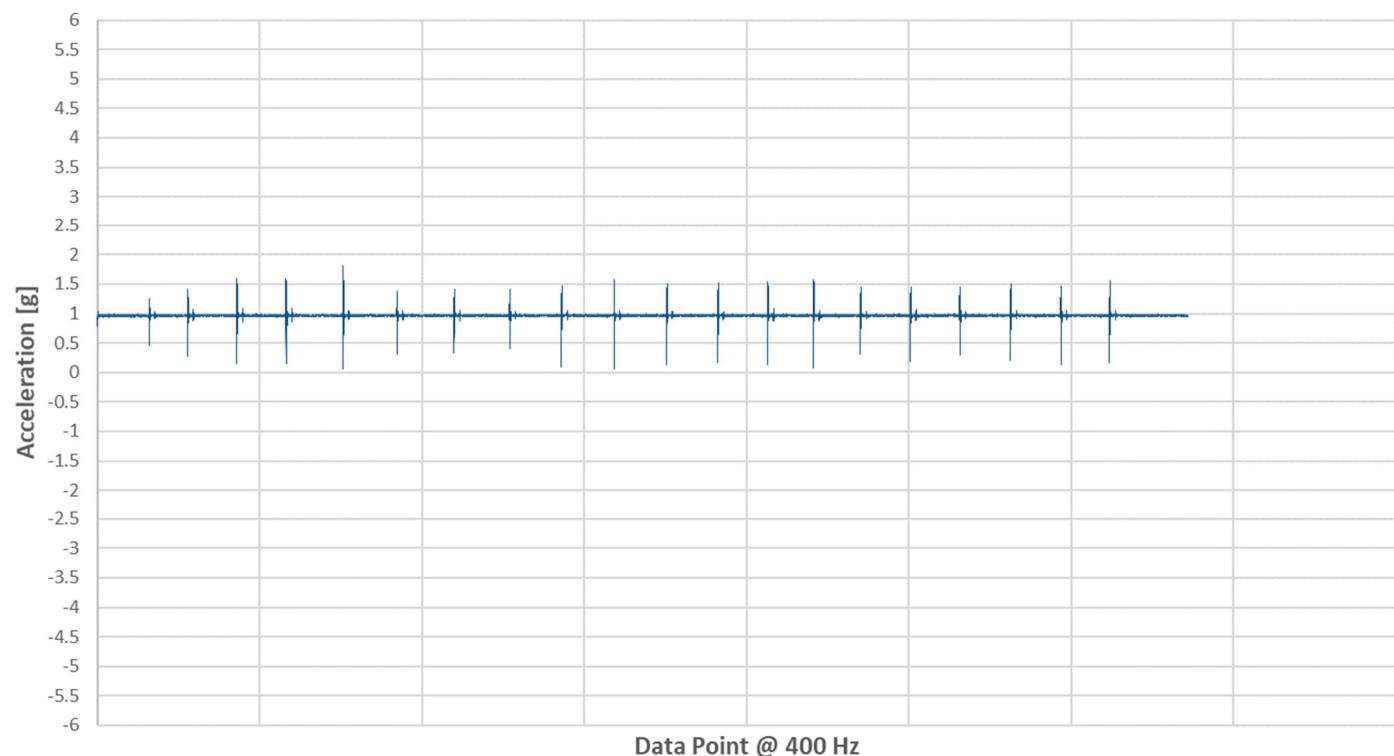




Y Acceleration (Head to Toe) - Casper Essential (V2)



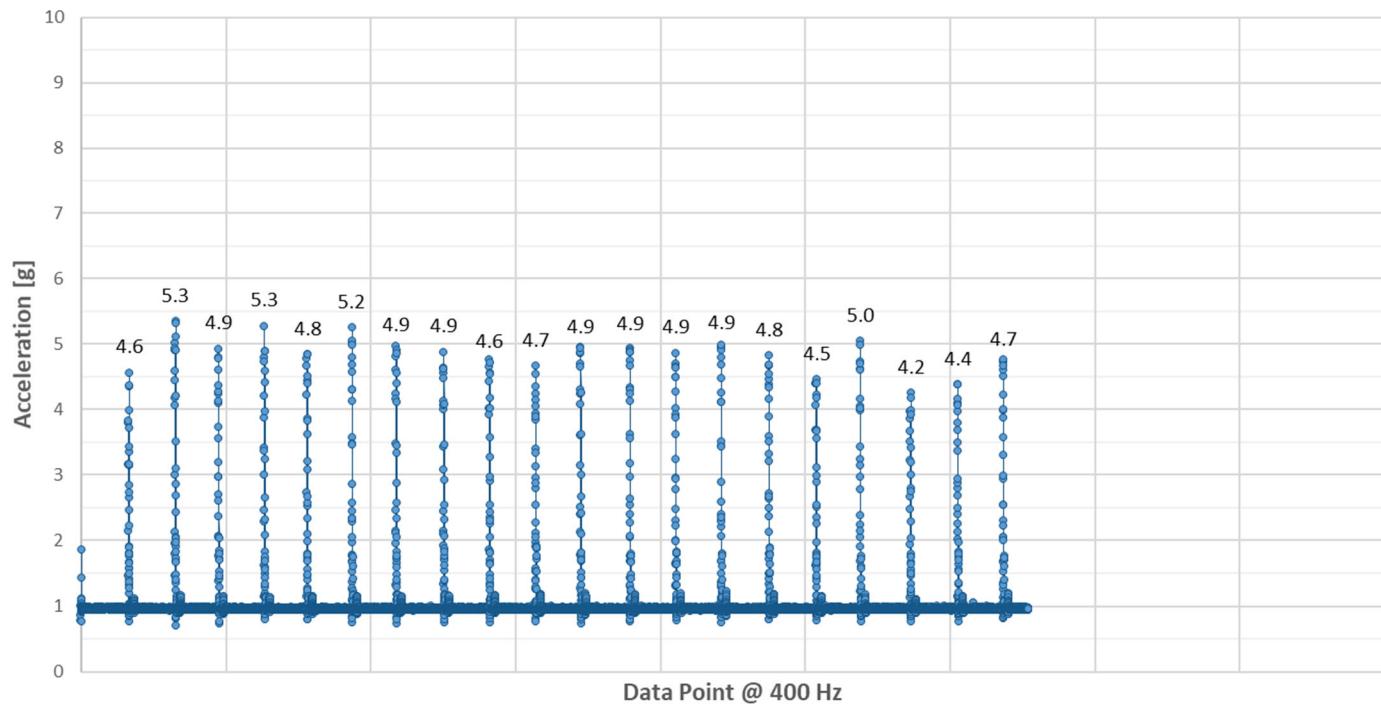
Z Acceleration (Up and Down) - Casper Essential (V2)



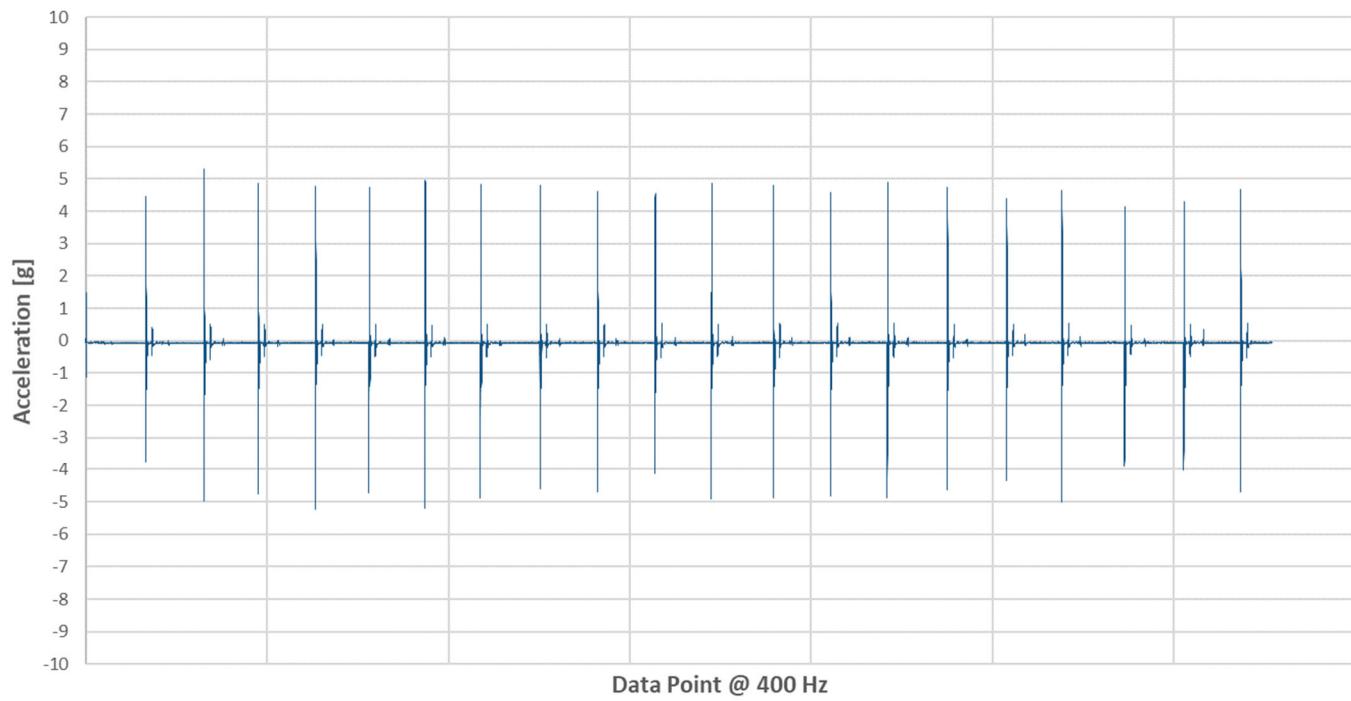


## TEST 3 –CASPER (V3)

Vector Magnitude Acceleration - Casper (V3)

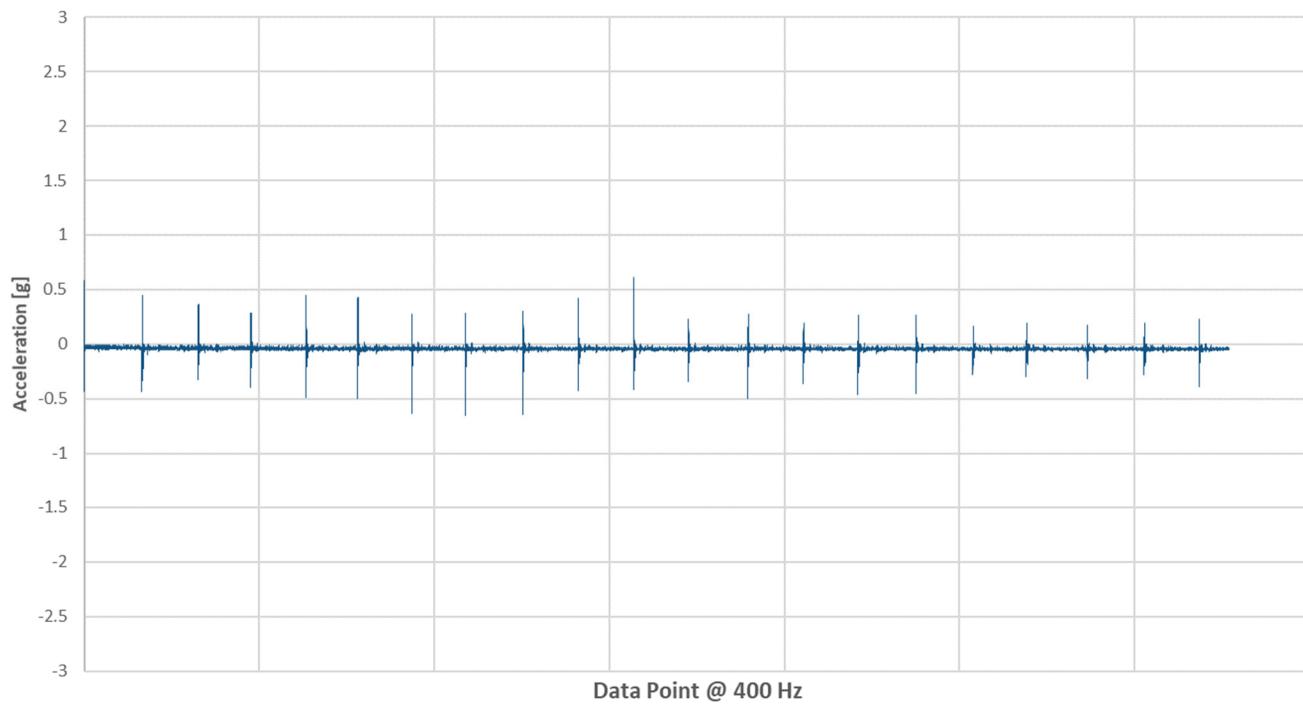


X Acceleration (Side to Side) - Casper (V3)

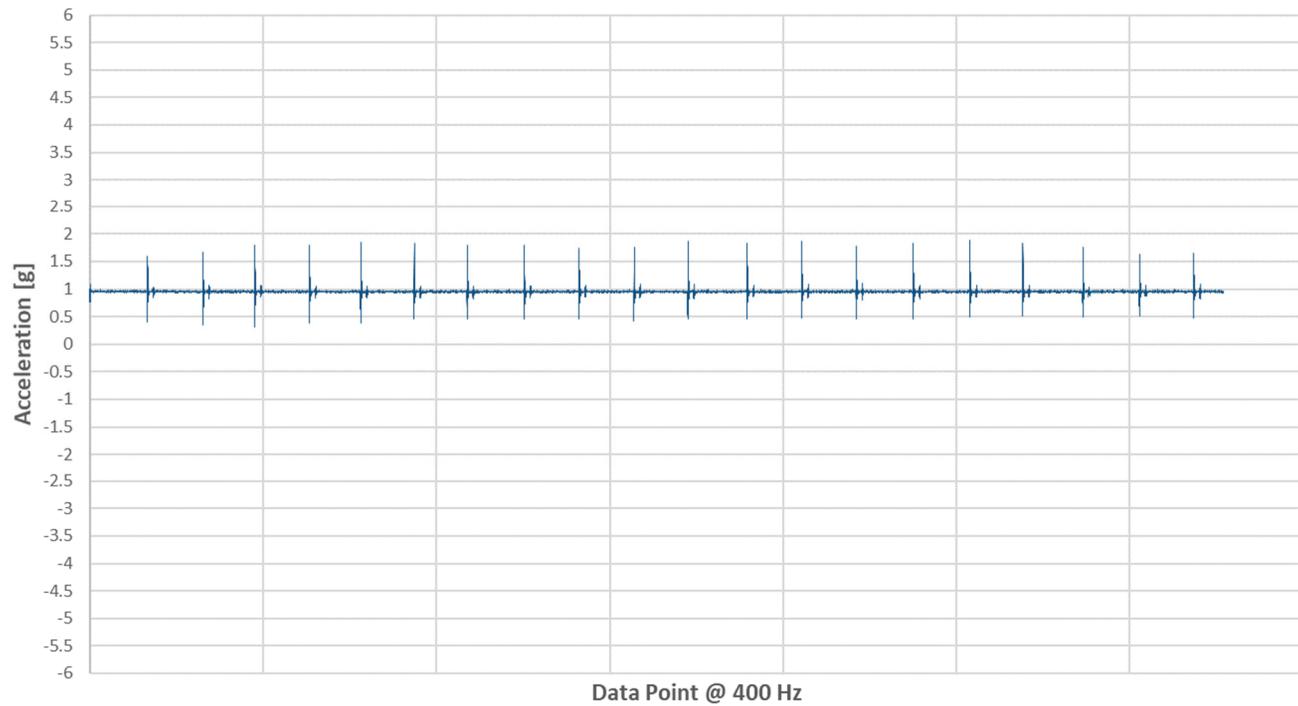




Y Acceleration (Head to Toe) - Casper (V3)



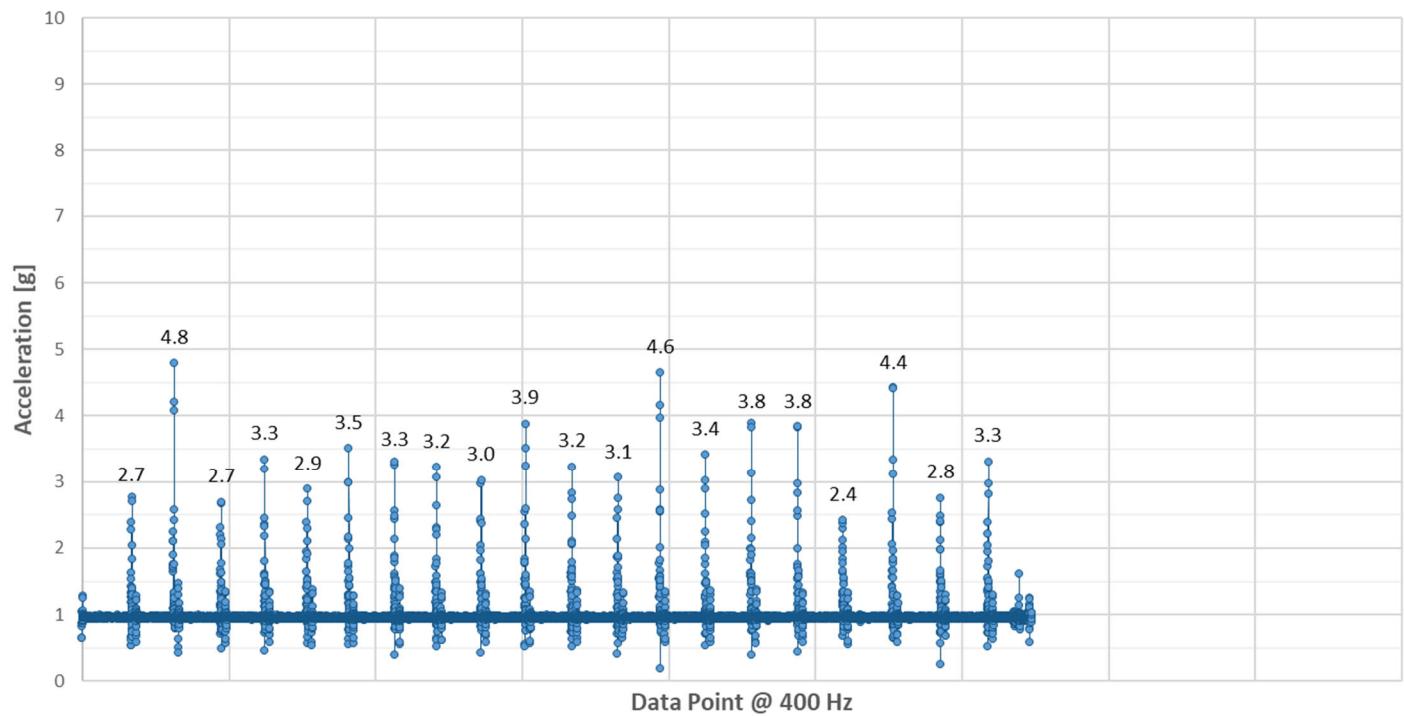
Z Acceleration (Up and Down) - Casper (V3)



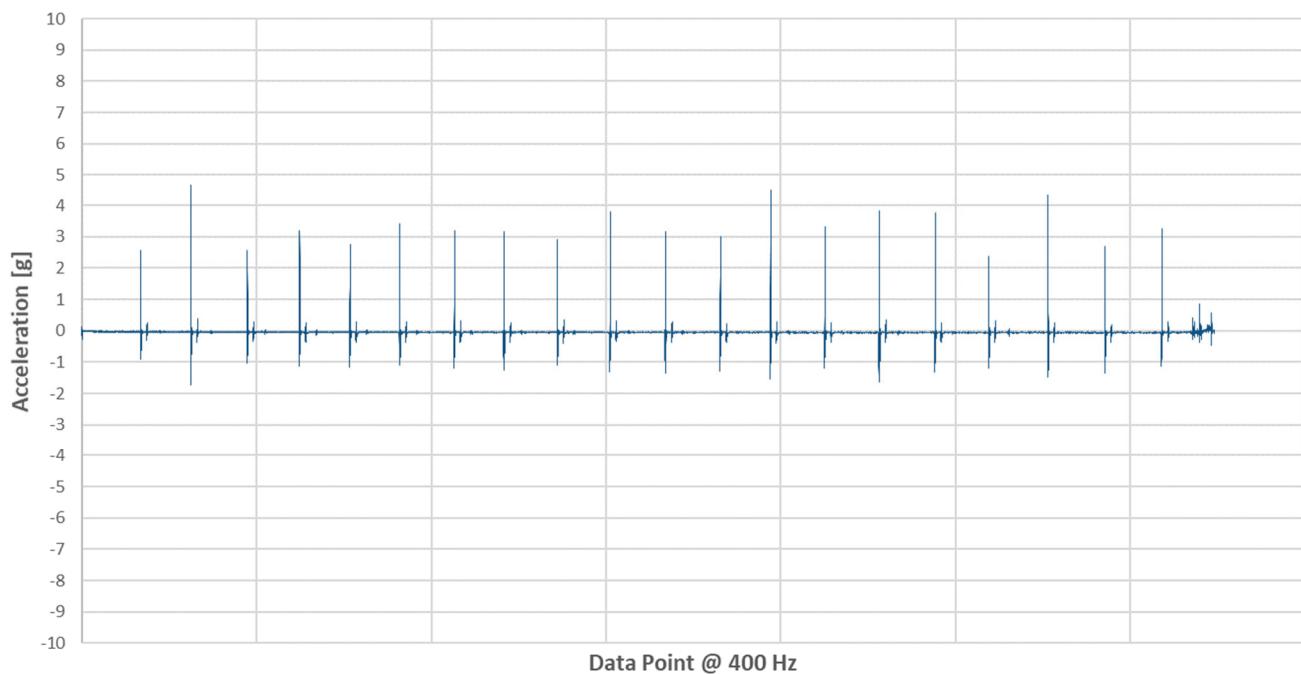


## TEST 3 – MIRA (V2)

Vector Magnitude Acceleration - Mira (V2)

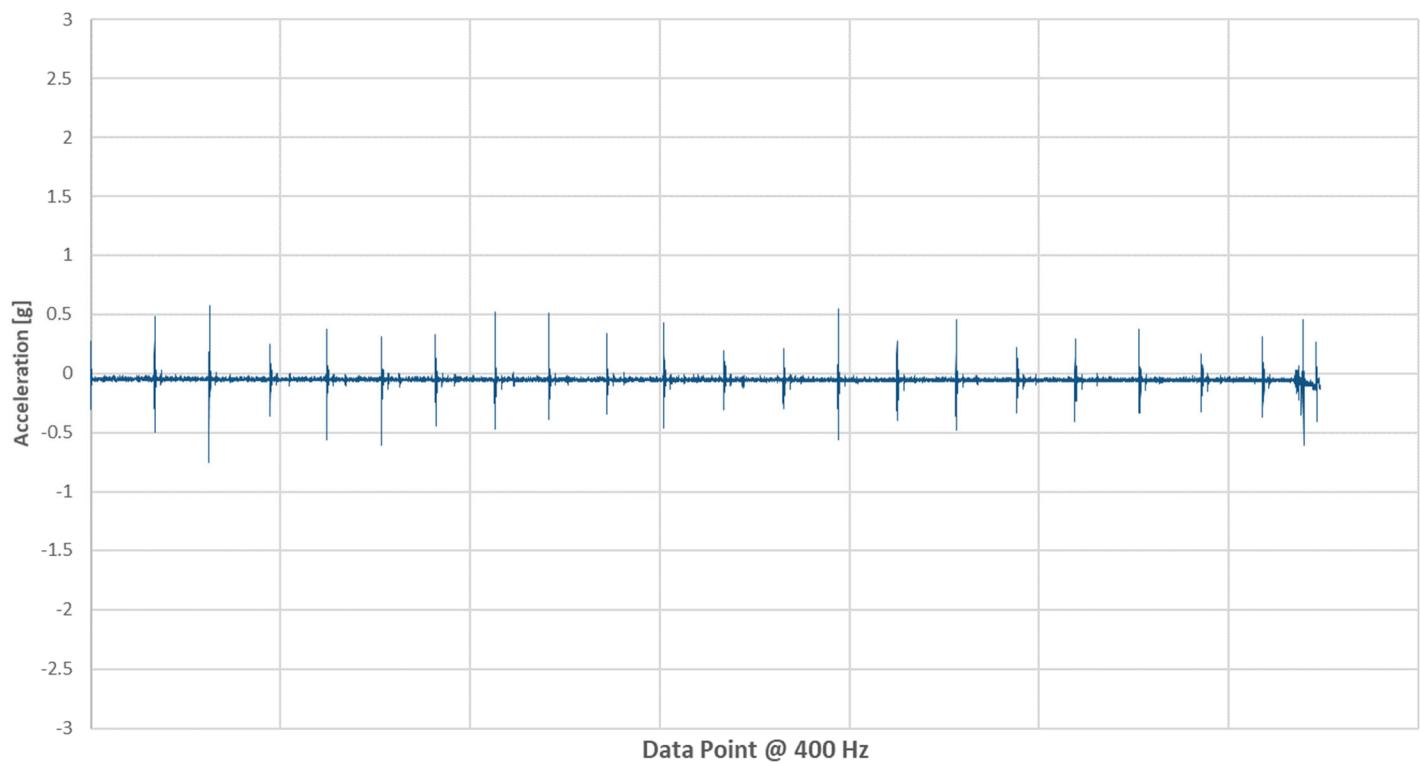


X Acceleration (Side to Side) - Mira (V2)

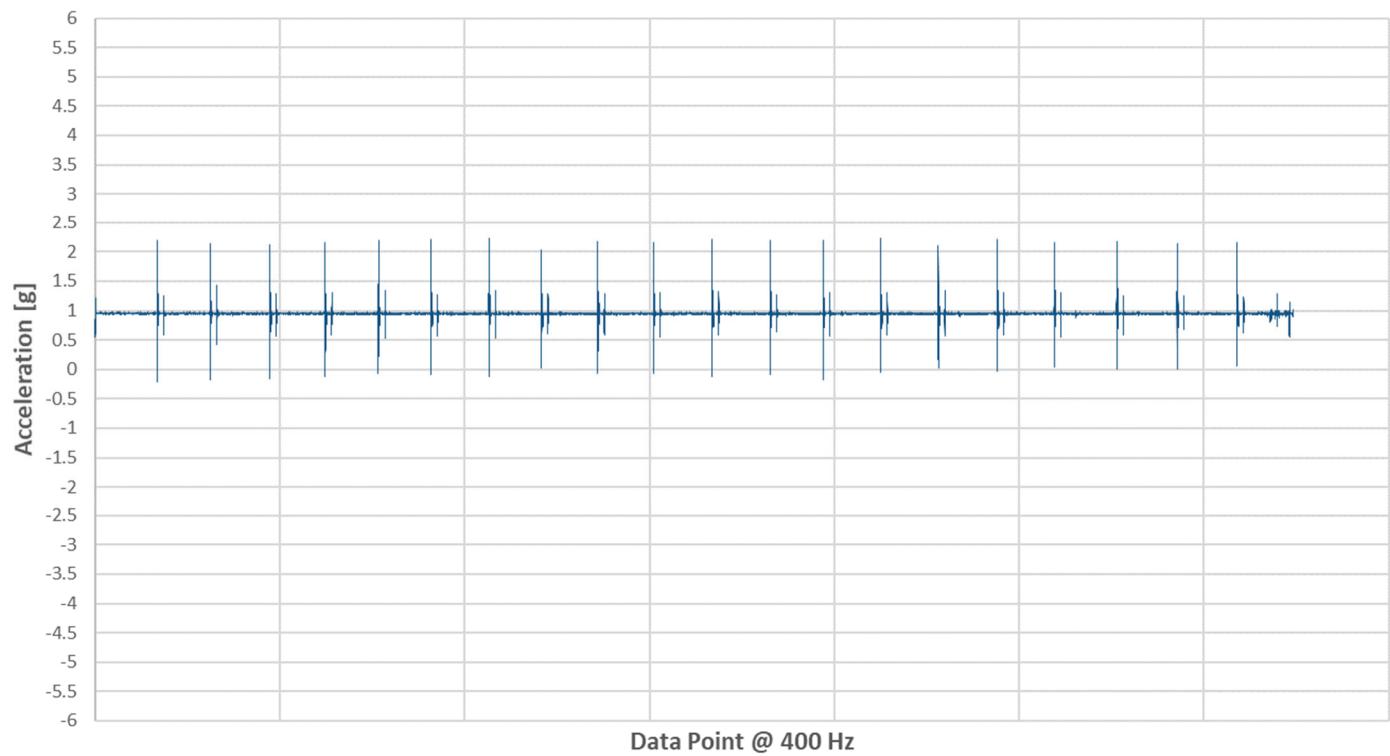




Y Acceleration (Head to Toe) - Mira (V2)



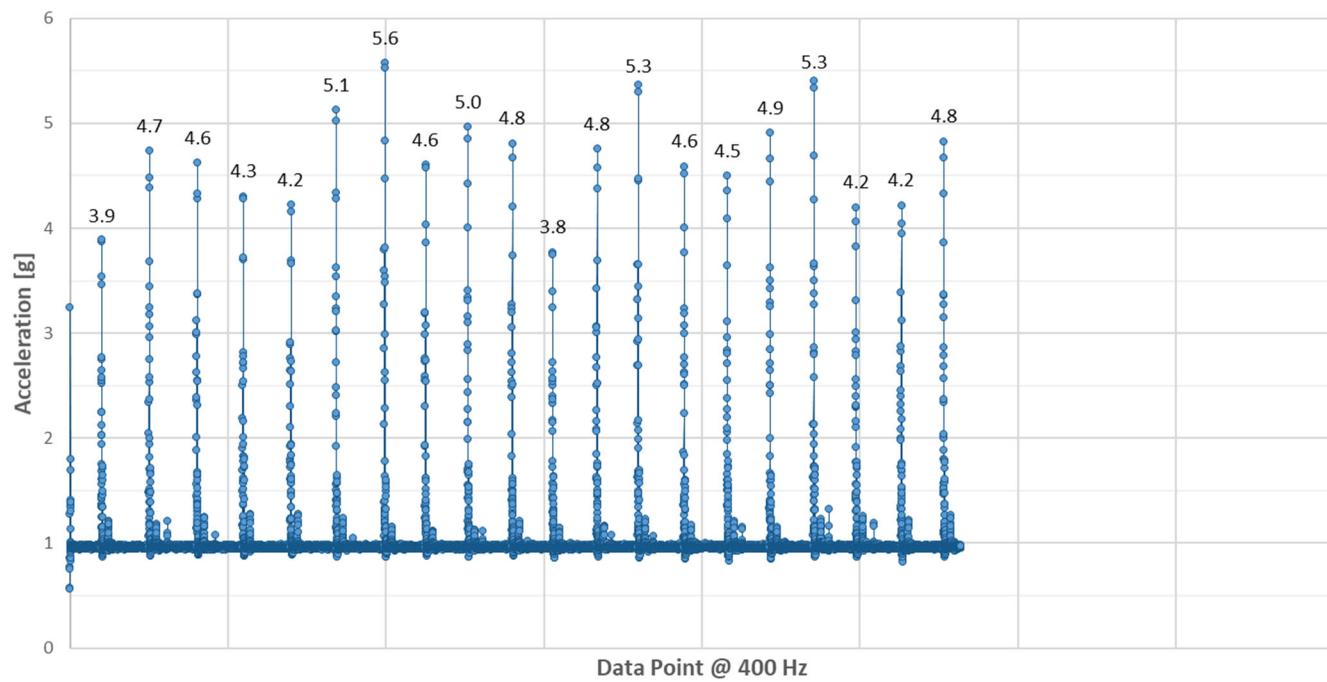
Z Acceleration (Up and Down) - Mira (V2)



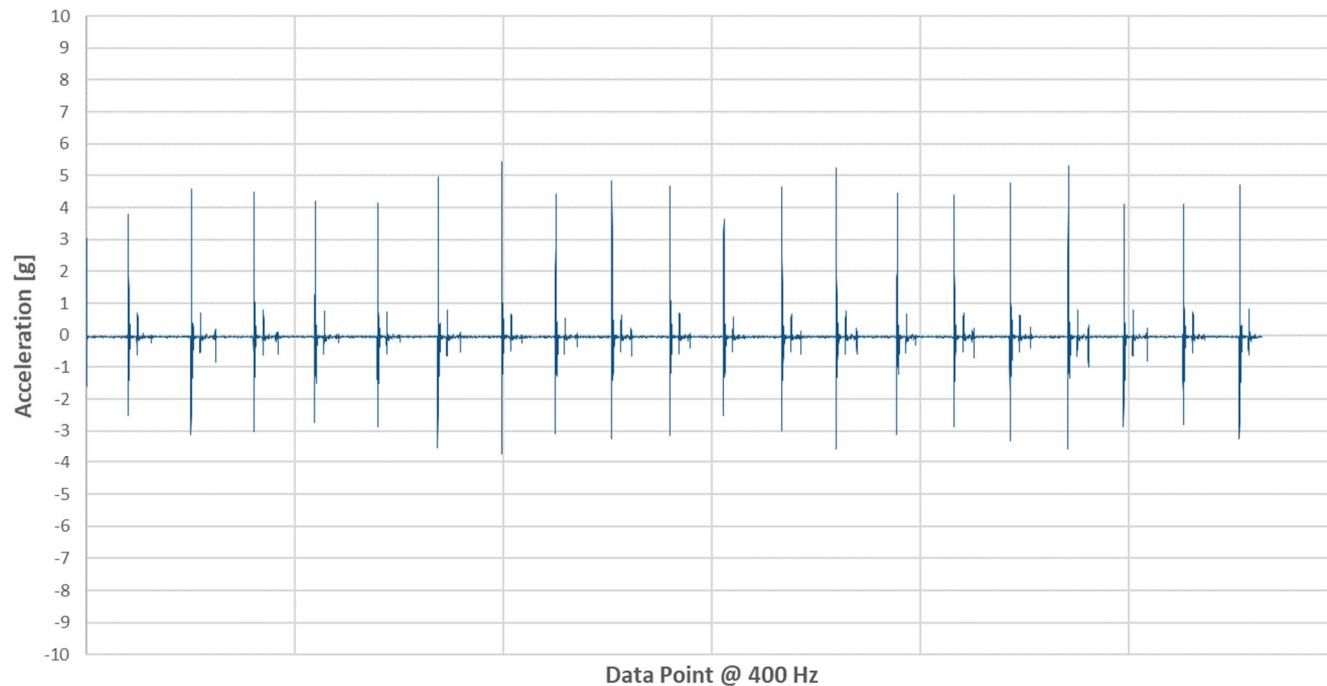


## TEST 3 – CASPER (V4)

Vector Magnitude Acceleration - Casper (V4)

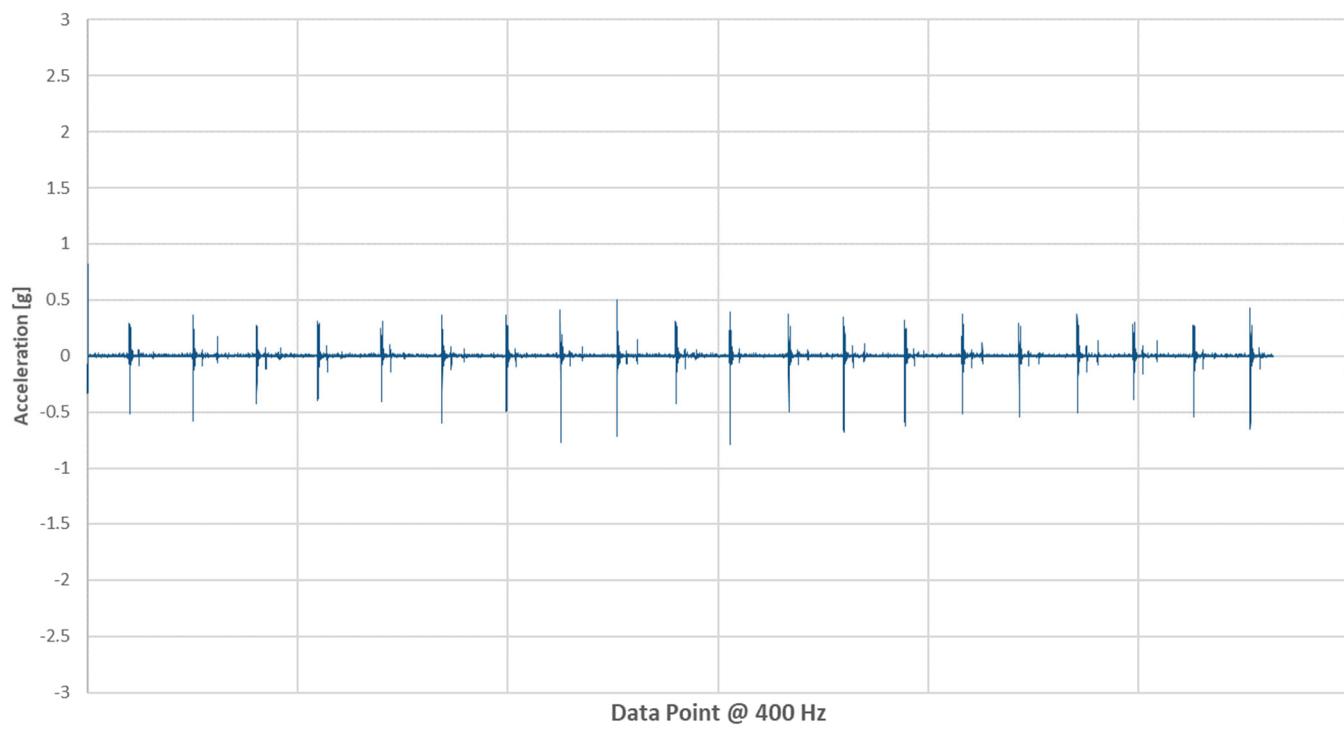


X Acceleration (Side to Side) - Casper (V4)

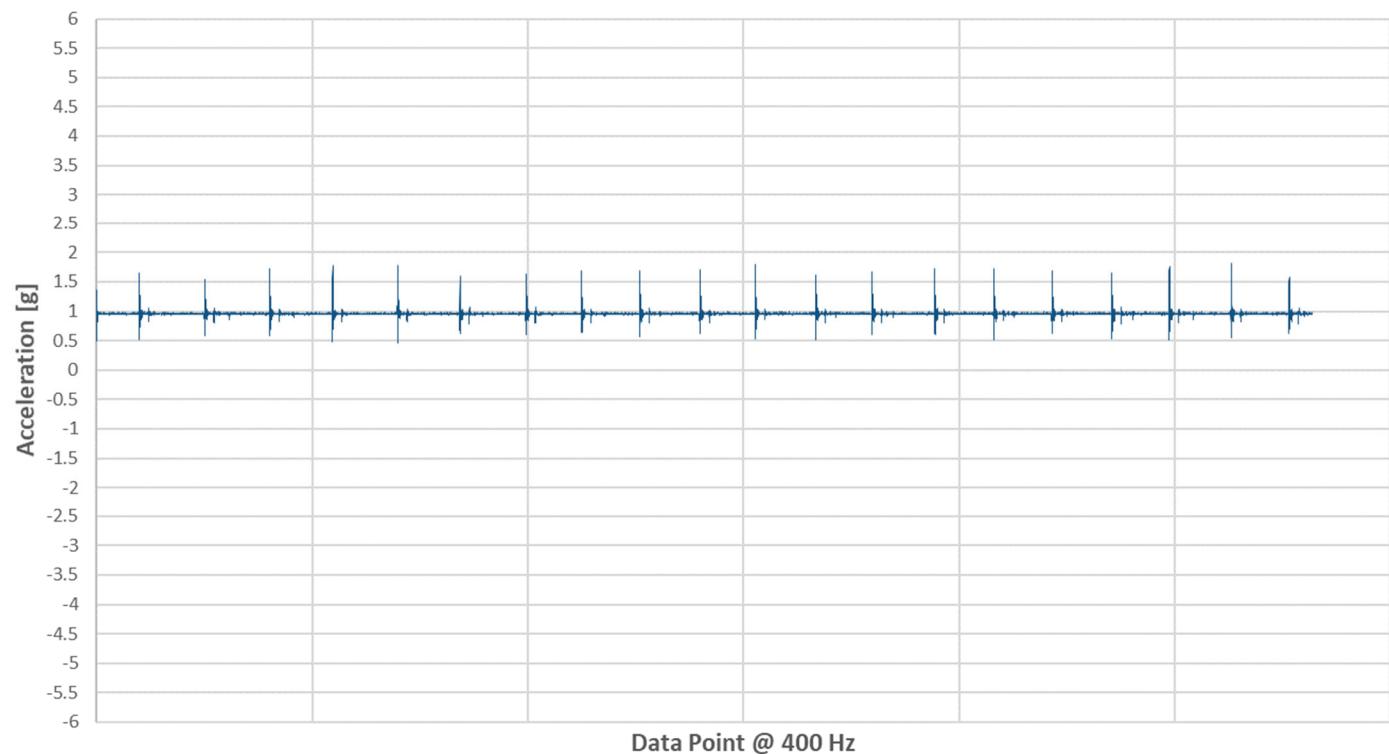




Y Acceleration (Head to Toe) - Casper (V4)



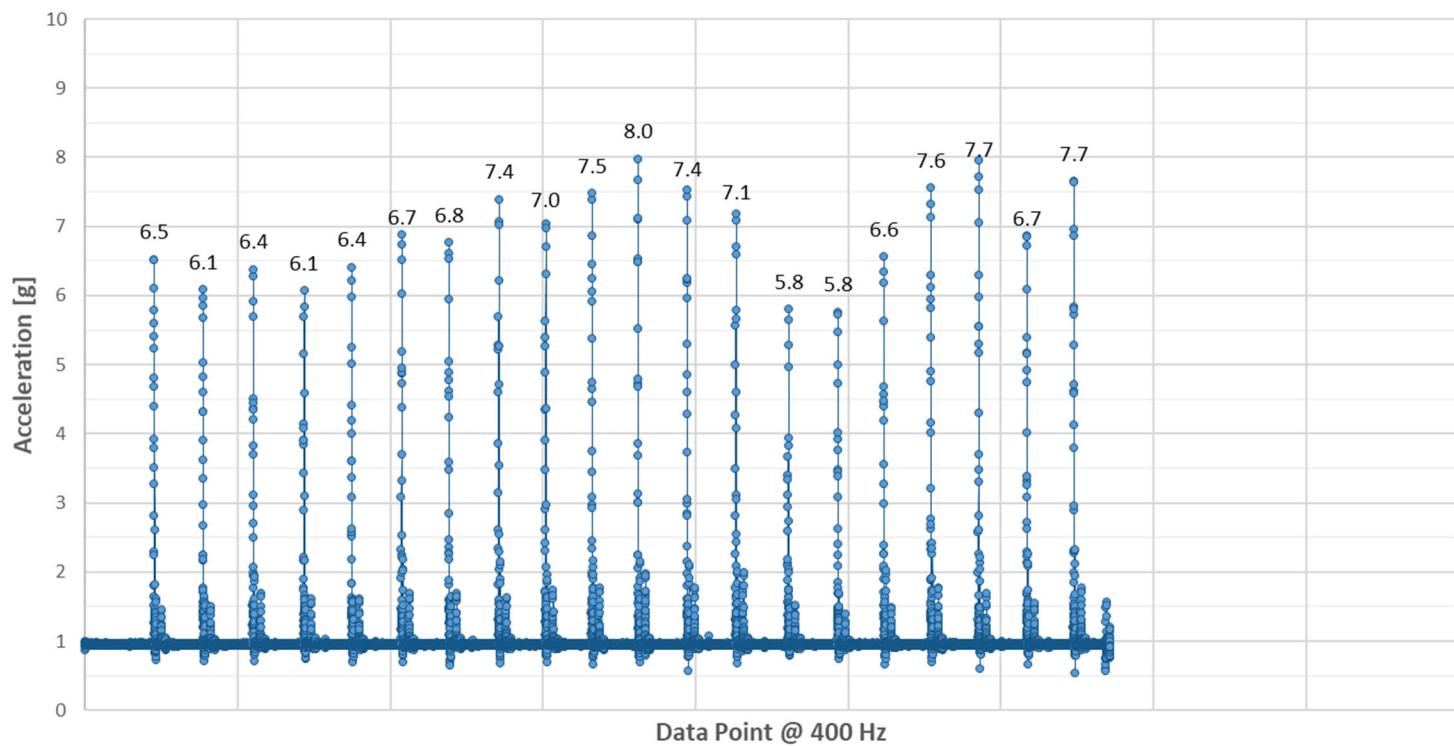
Z Acceleration (Up and Down) - Casper (V4)



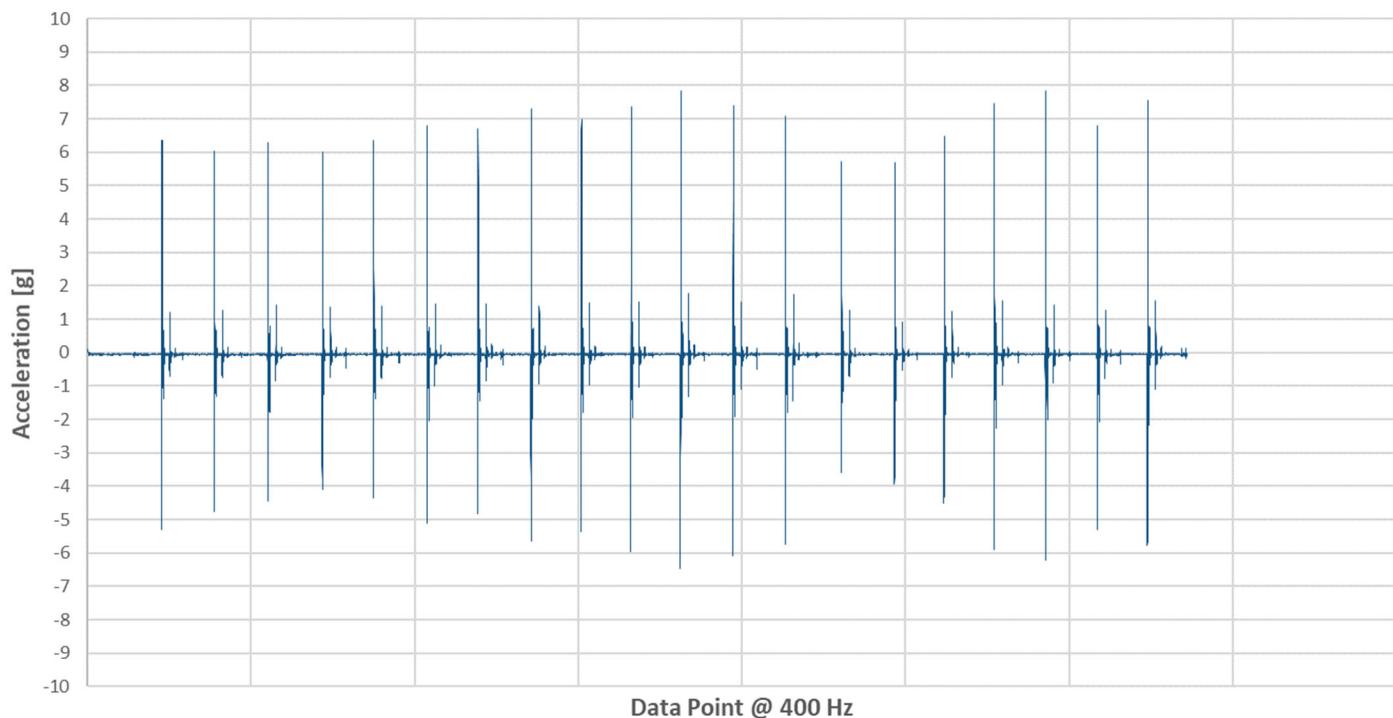


## TEST 3 – CASPER ELEMENT

Vector Magnitude Acceleration - Casper Element

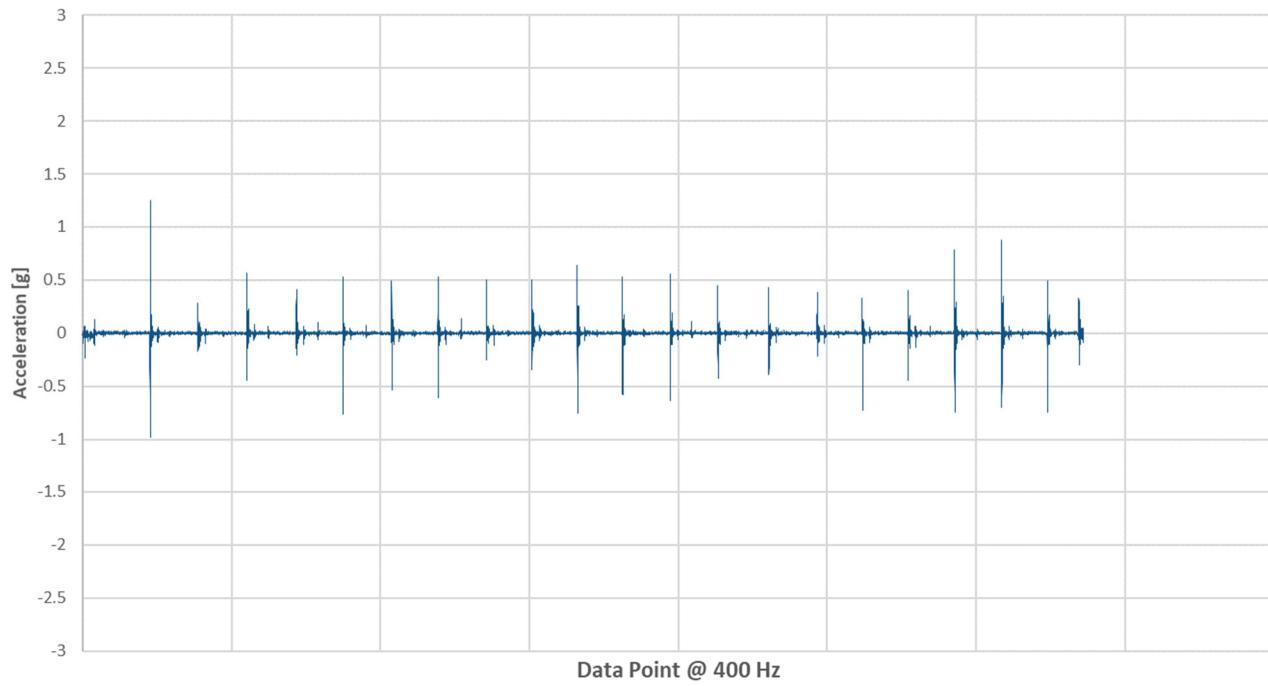


X Acceleration (Side to Side) - Casper Element

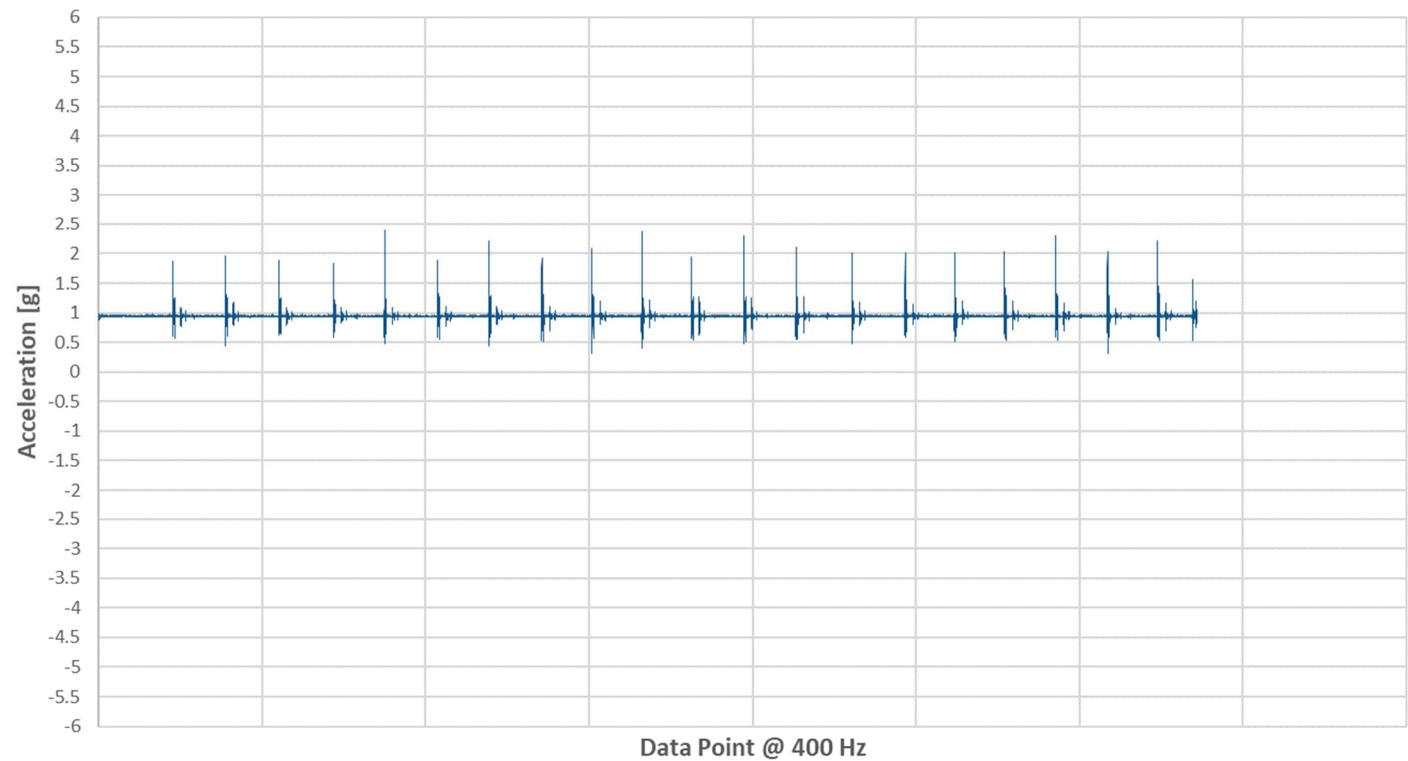




Y Acceleration (Head to Toe) - Casper Element



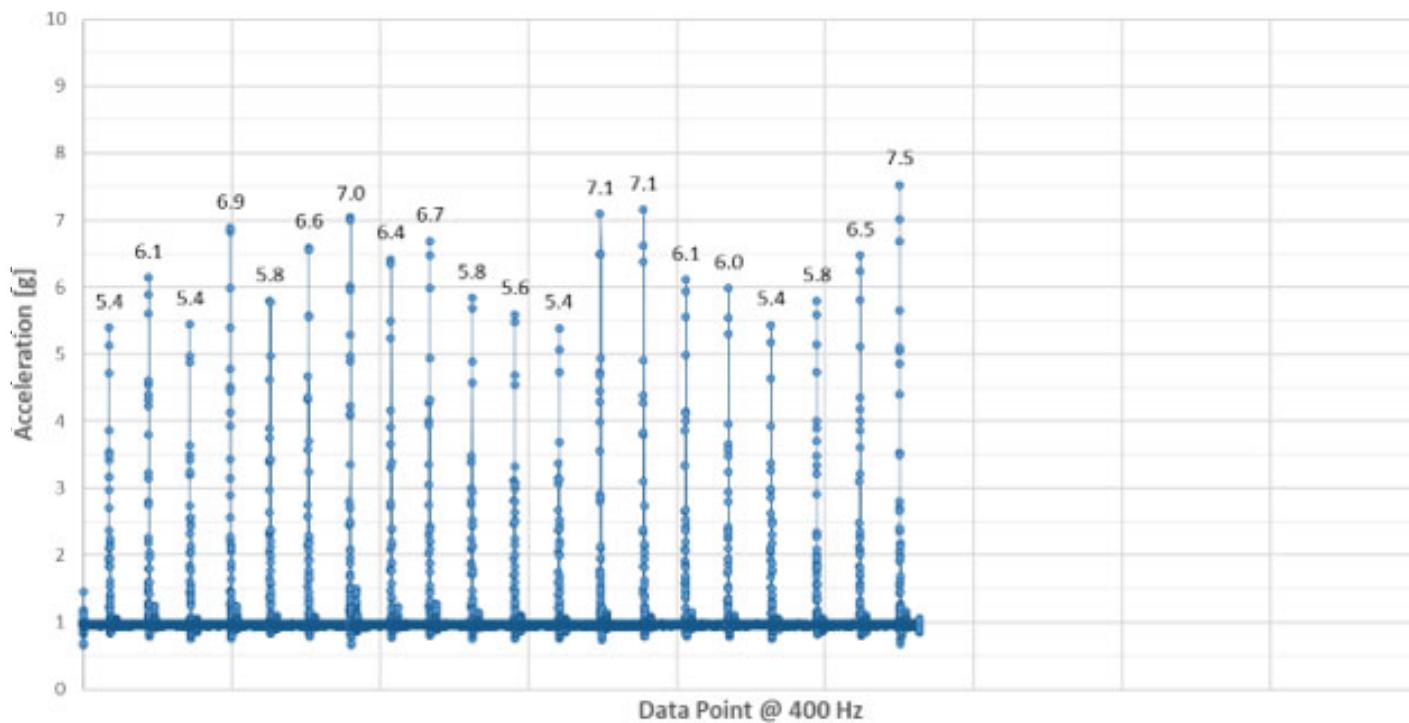
Z Acceleration (Up and Down) - Casper Element



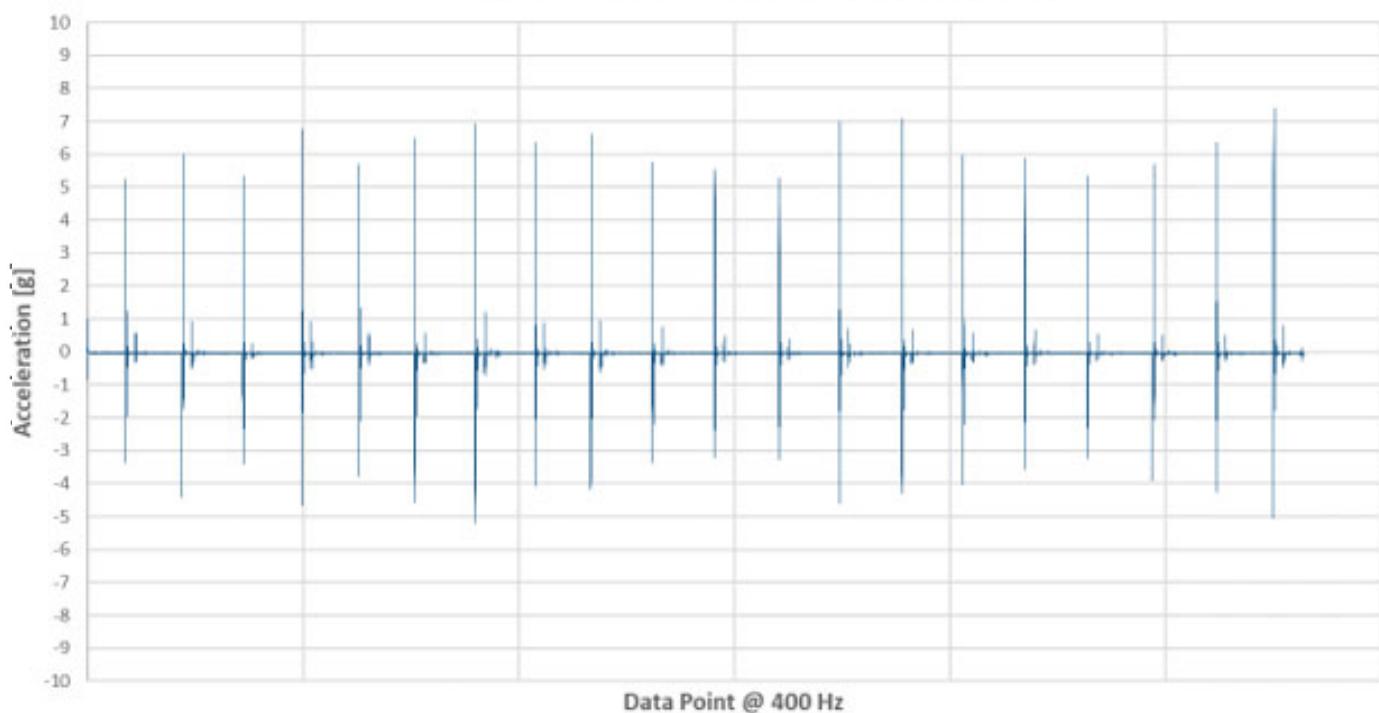


## TEST 3 – HAVEN REJUVENATE

Vector Magnitude Acceleration Haven Rejuvenate

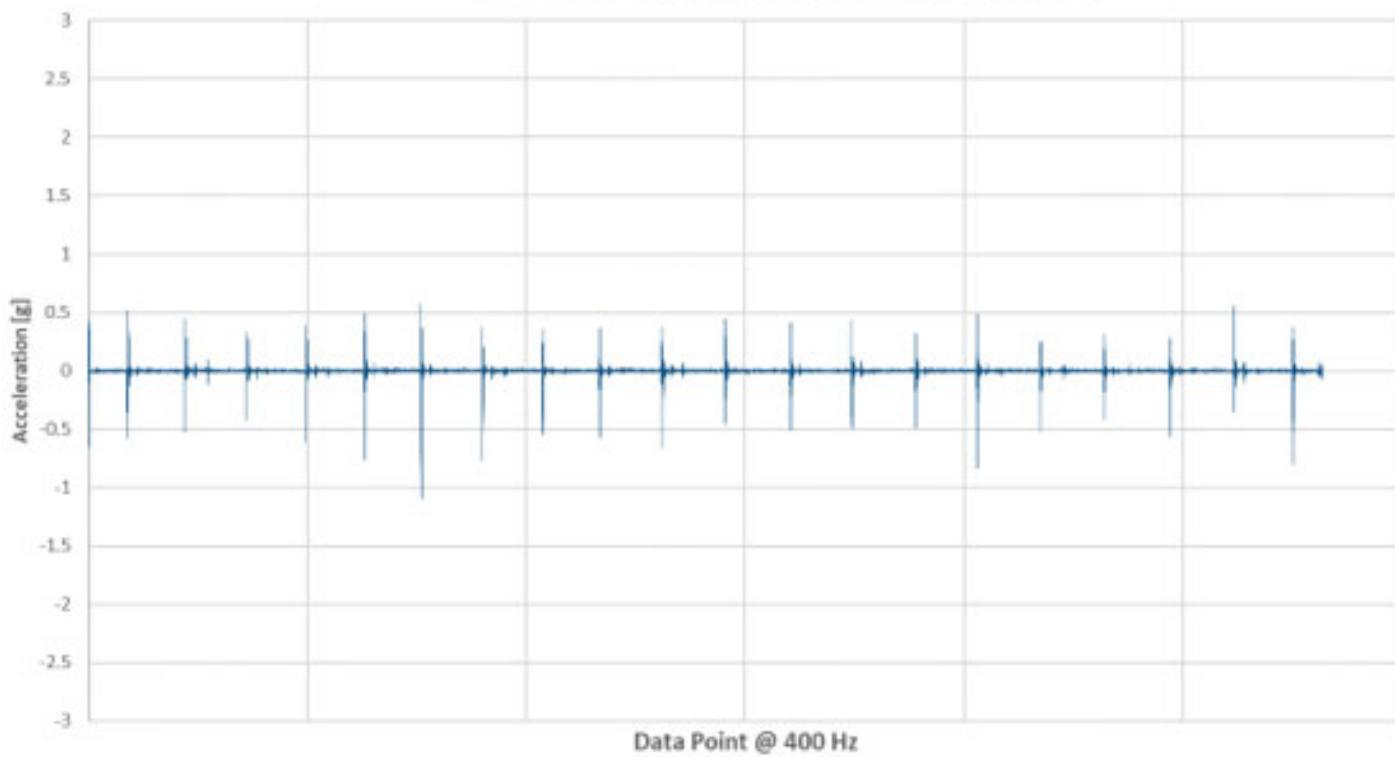


X Acceleration (Side to Side) - Haven Rejuvenate

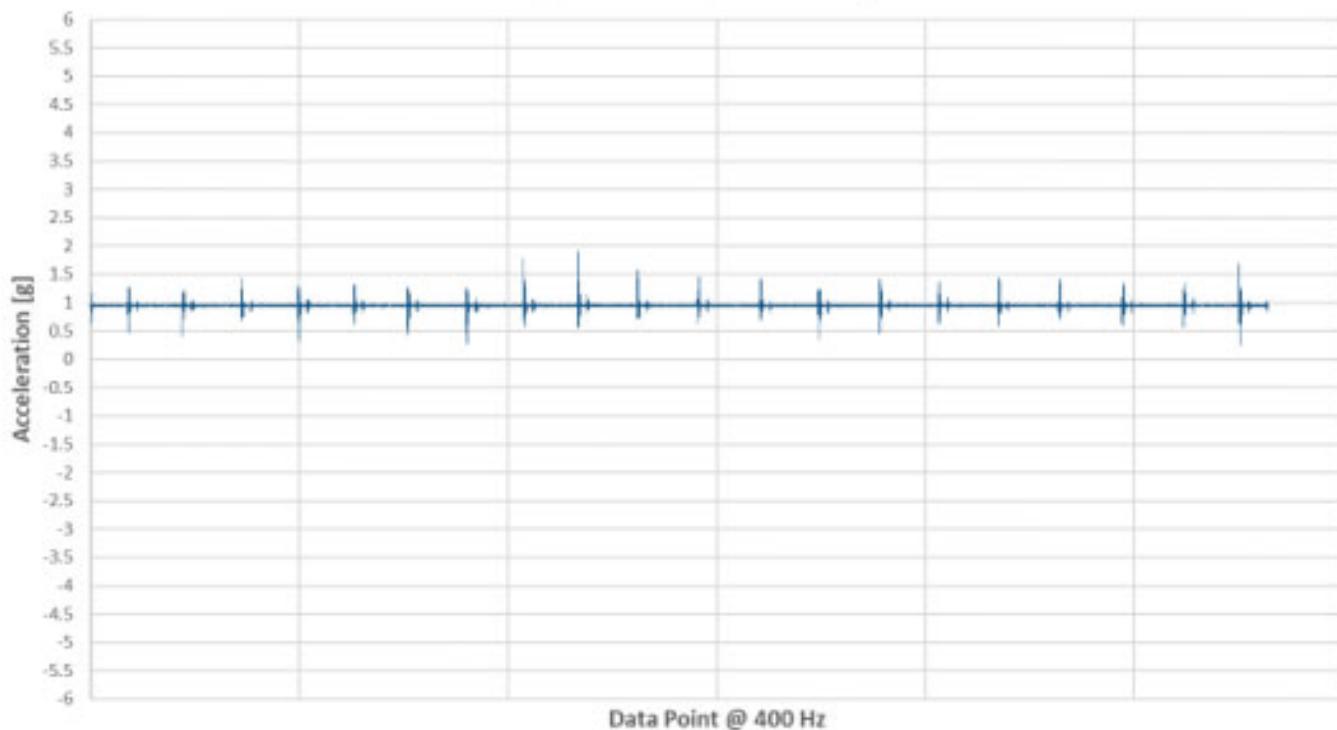




Y Acceleration (Head to Toe) - Haven Rejuvenate



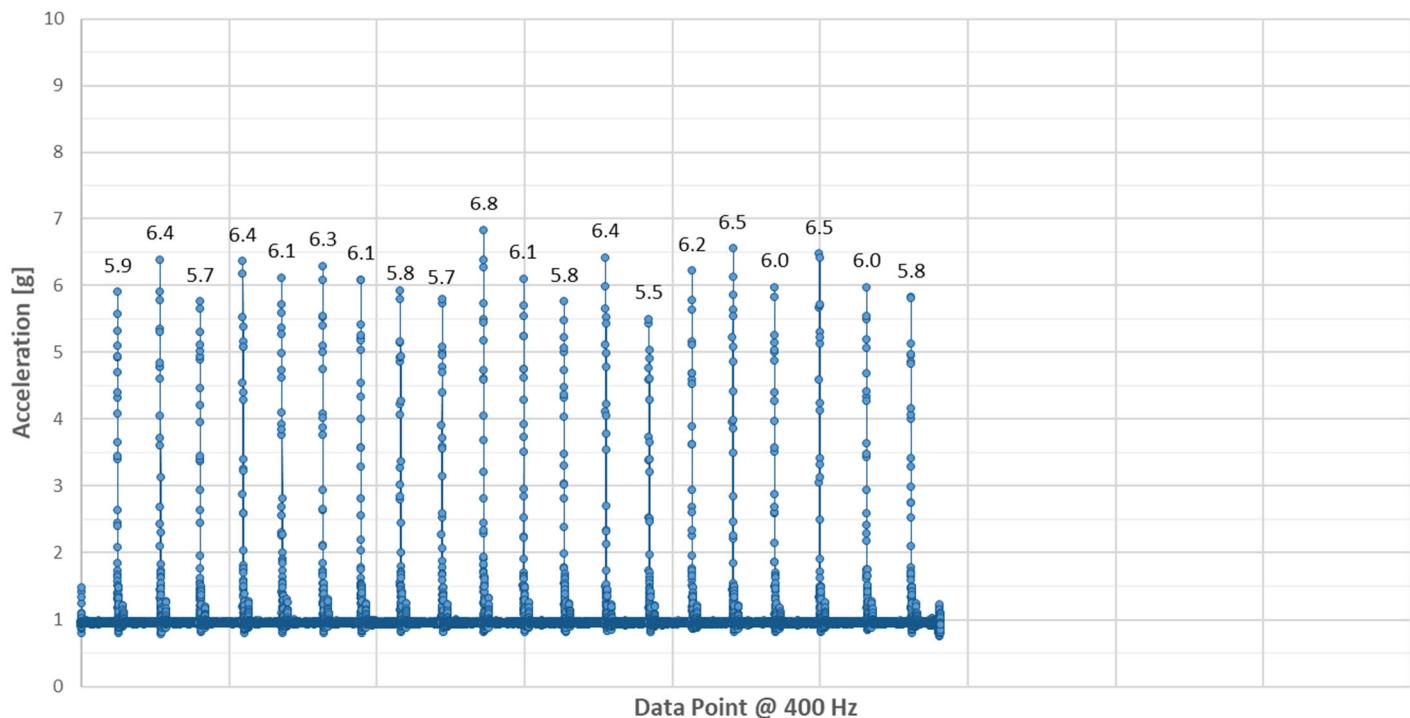
Z Acceleration (Up and Down) - Haven Rejuvenate



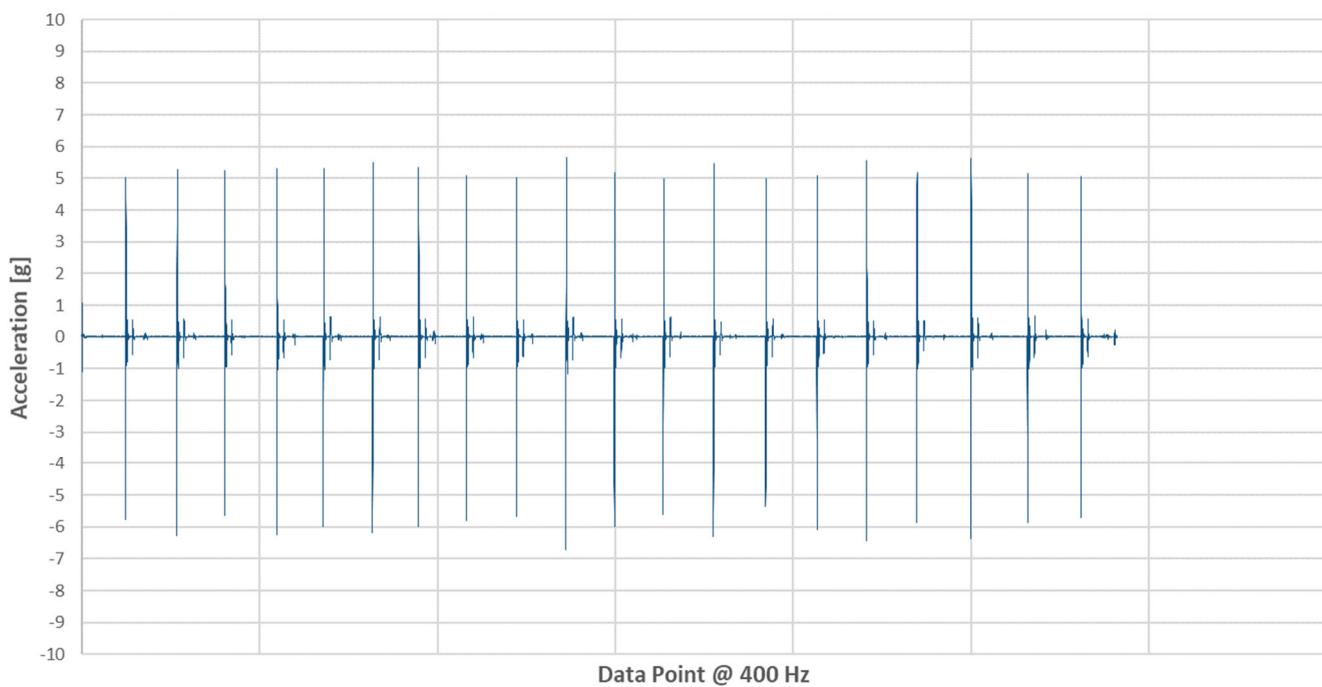


## TEST 3 – PUFFY (V2)

Vector Magnitude Acceleration - Puffy (V2)

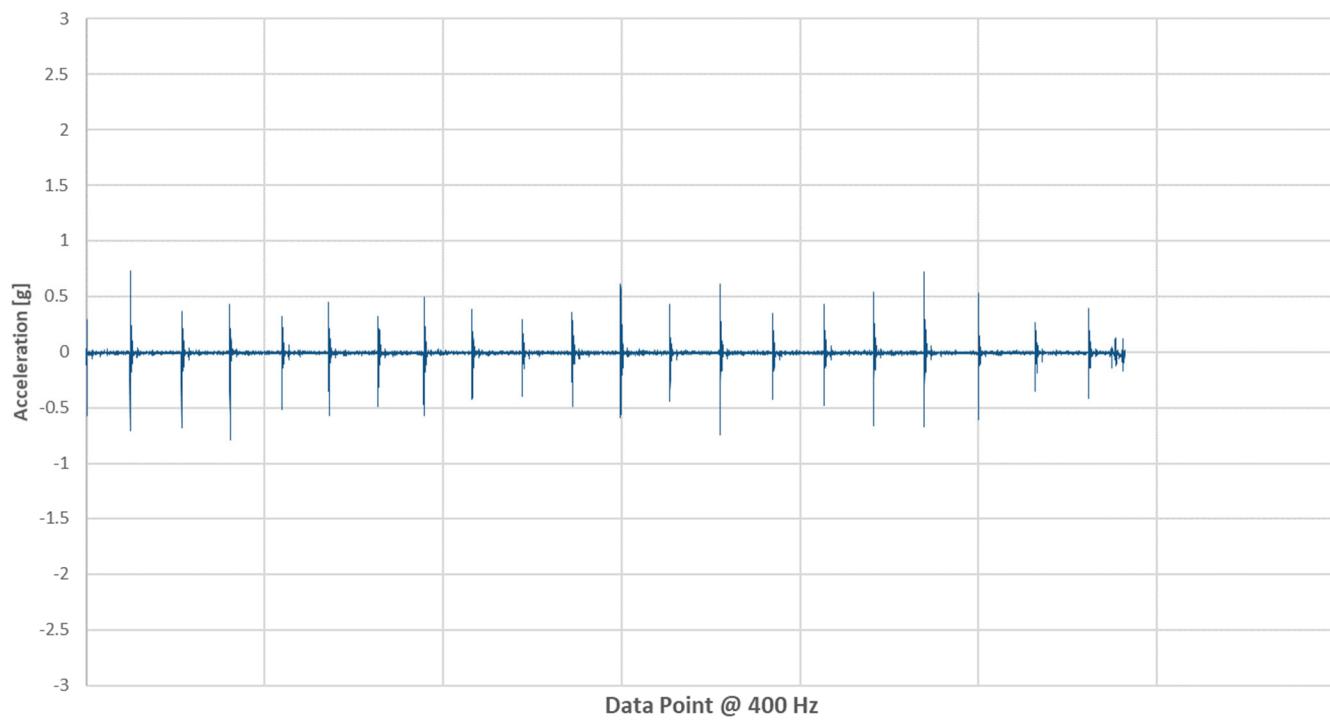


X Acceleration (Side to Side) - Puffy (V2)

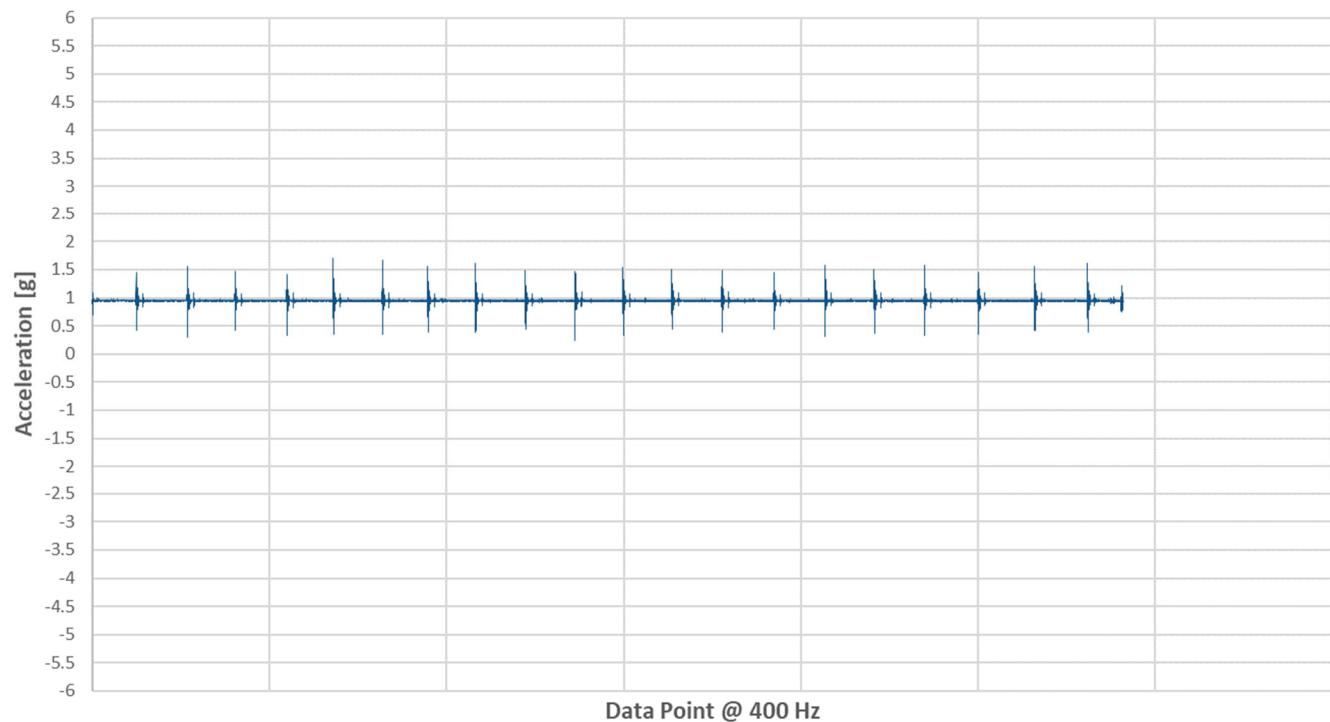




Y Acceleration (Head to Toe) - Puffy (V2)



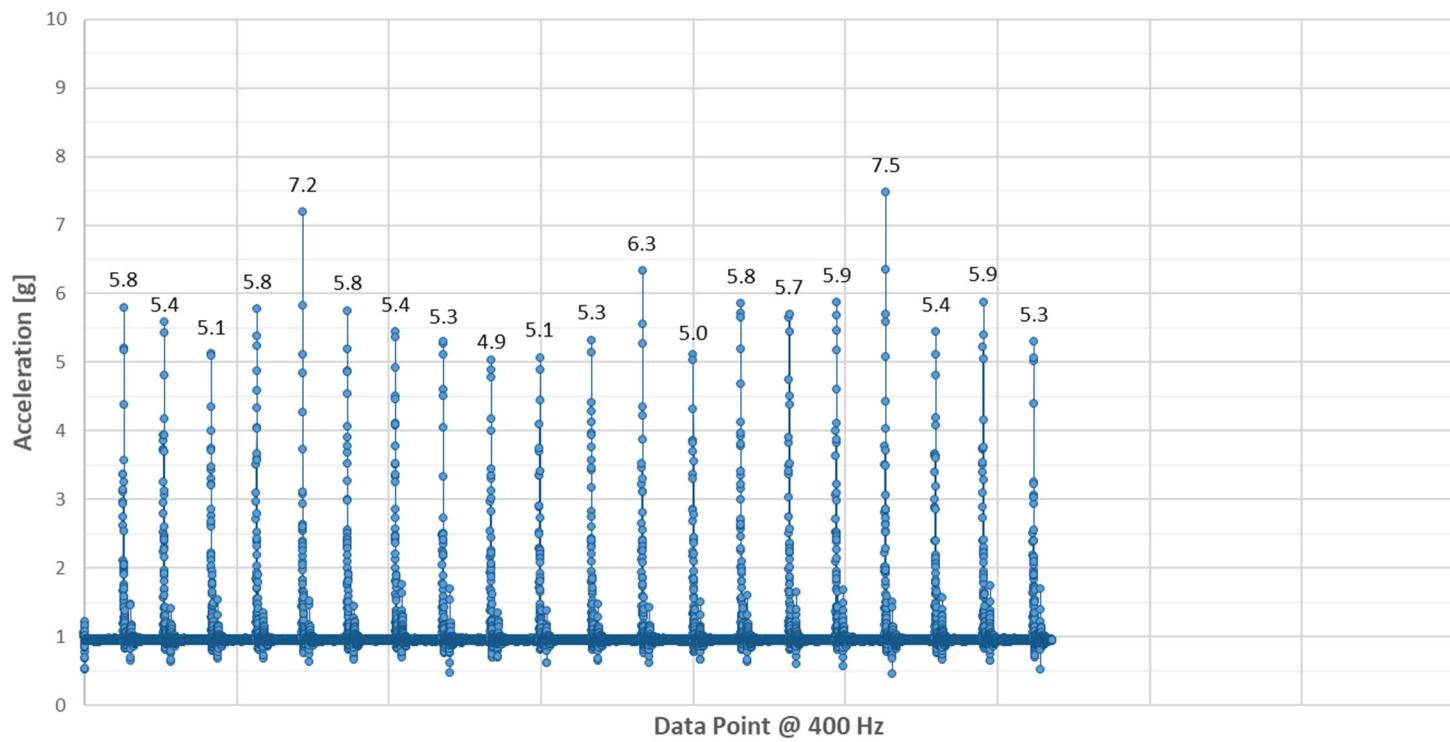
Z Acceleration (Up and Down) - Puffy (V2)



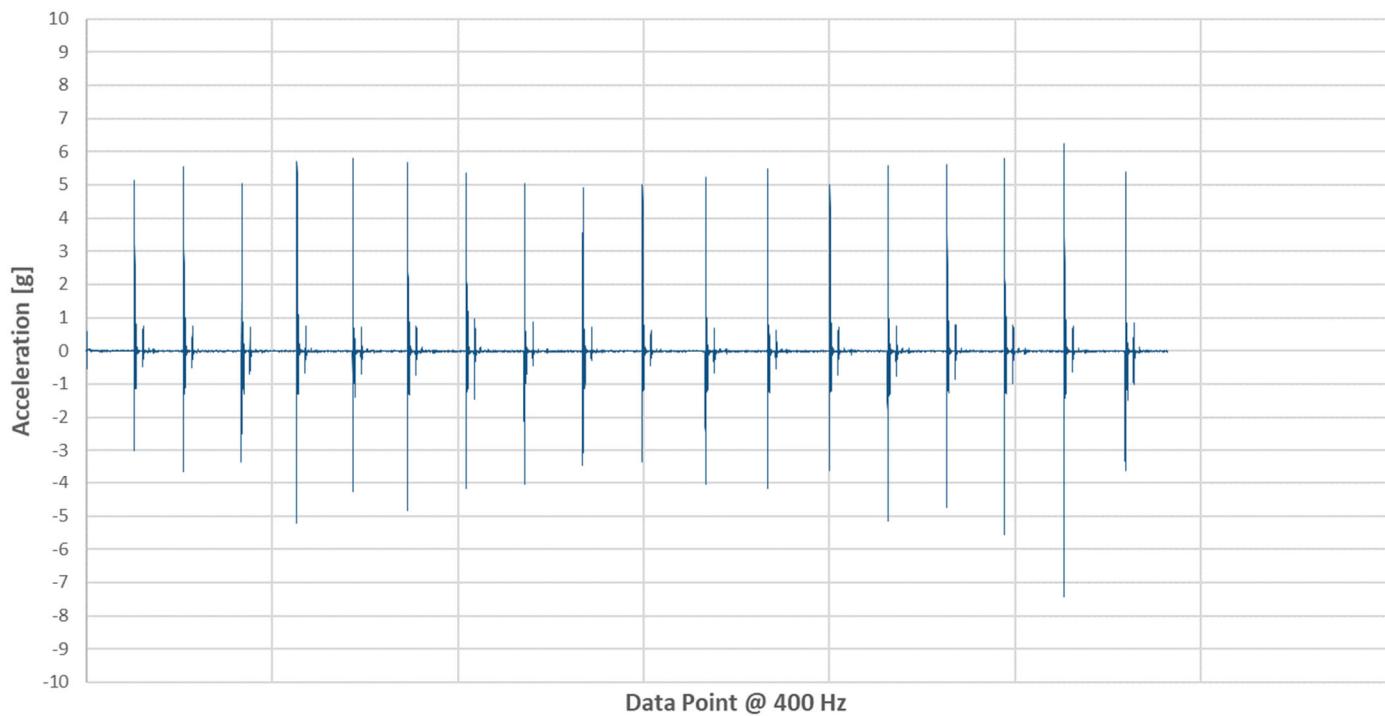


## TEST 3 – SIMBA (V2)

Vector Magnitude Acceleration - Simba (V2)

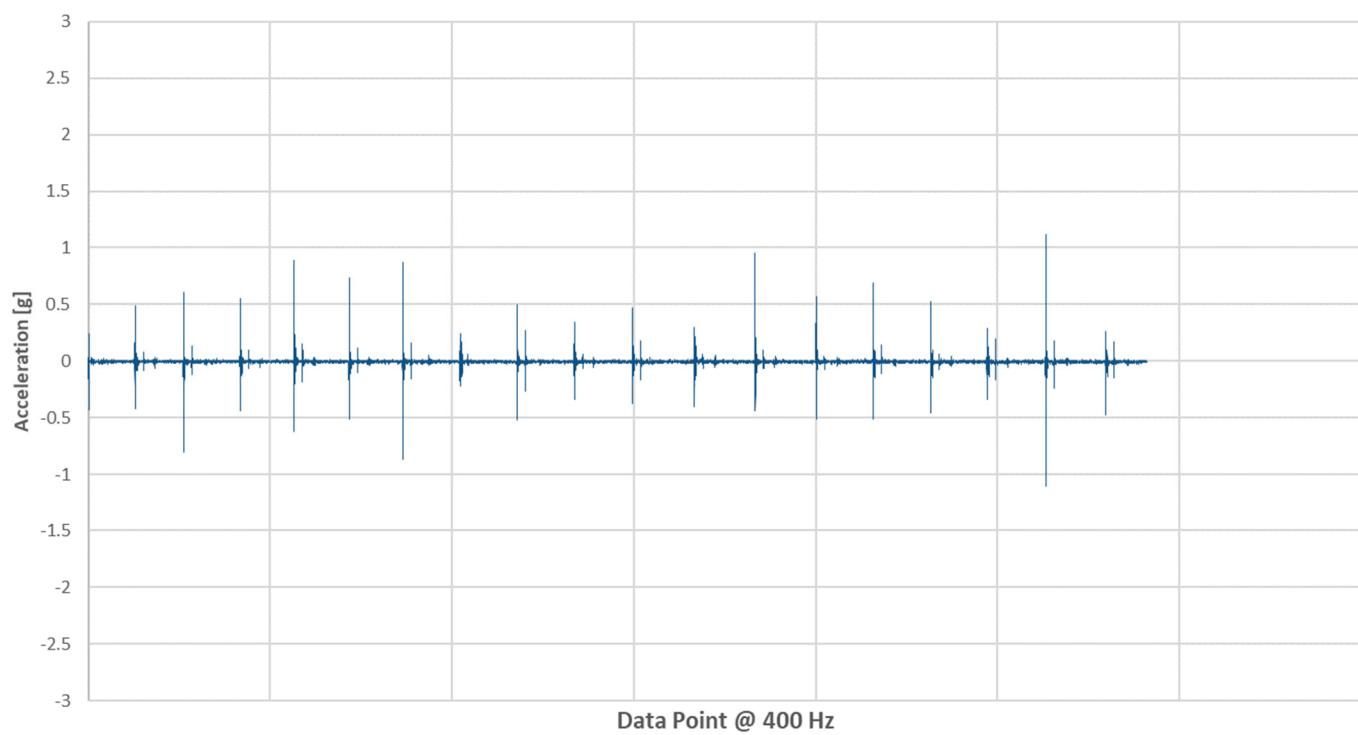


X Acceleration (Side to Side) - Simba (V2)

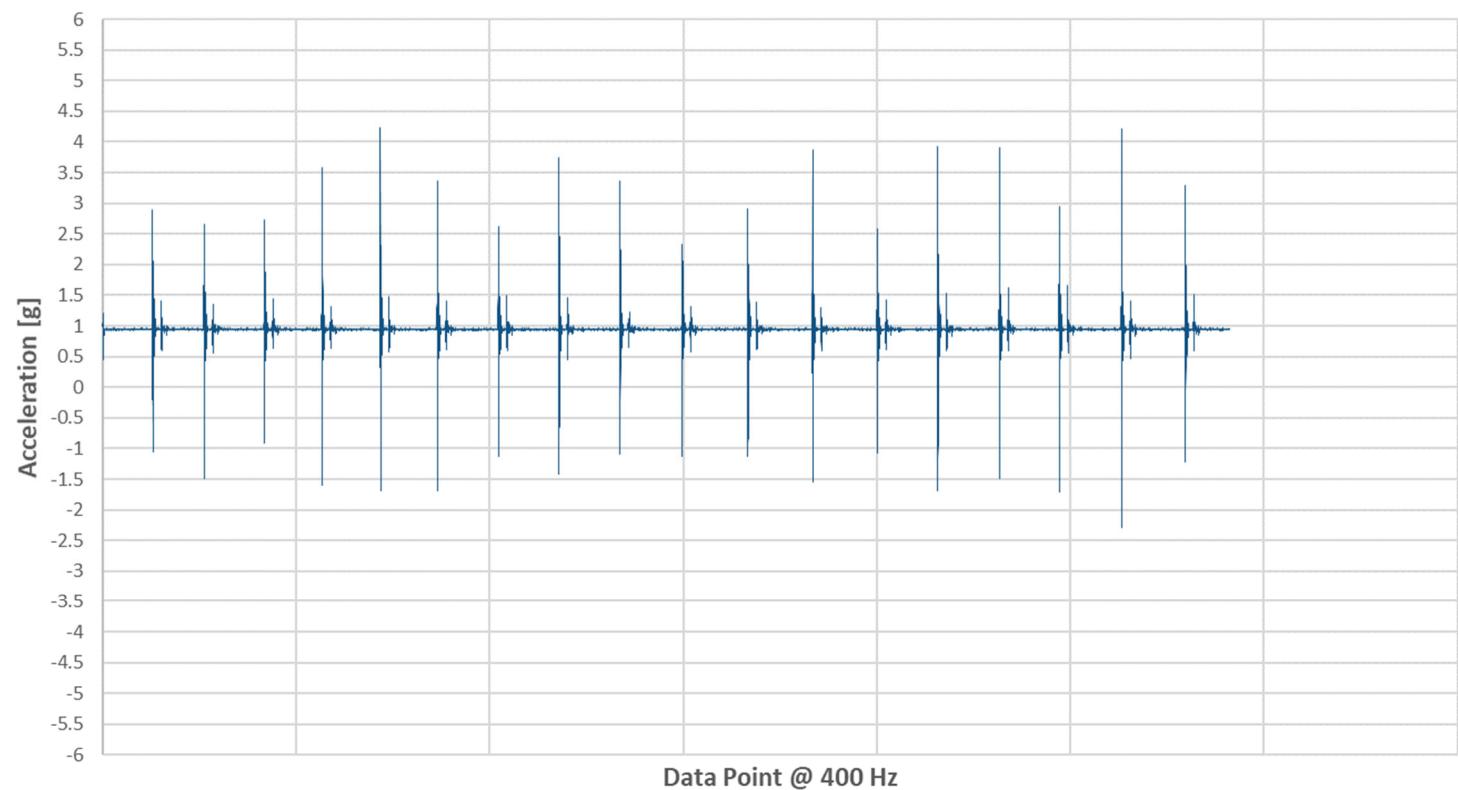




Y Acceleration (Head to Toe) - Simba (V2)



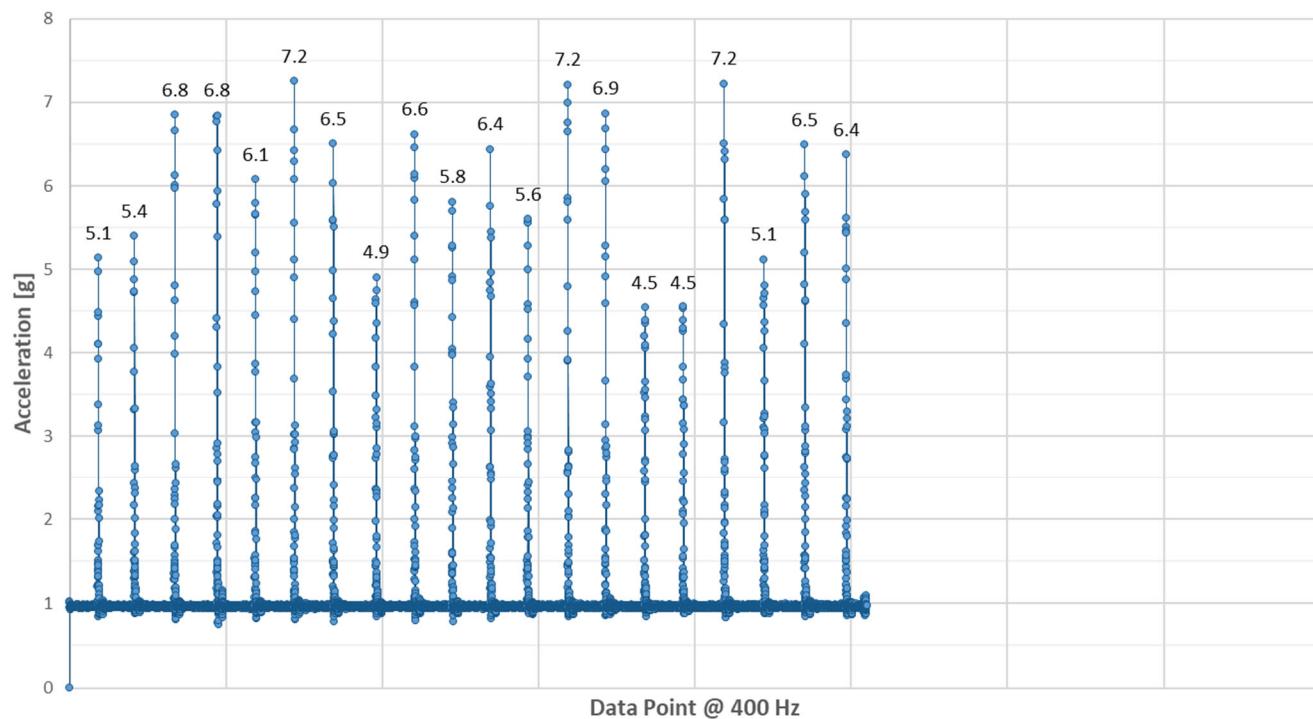
Z Acceleration (Up and Down) - Simba (V2)



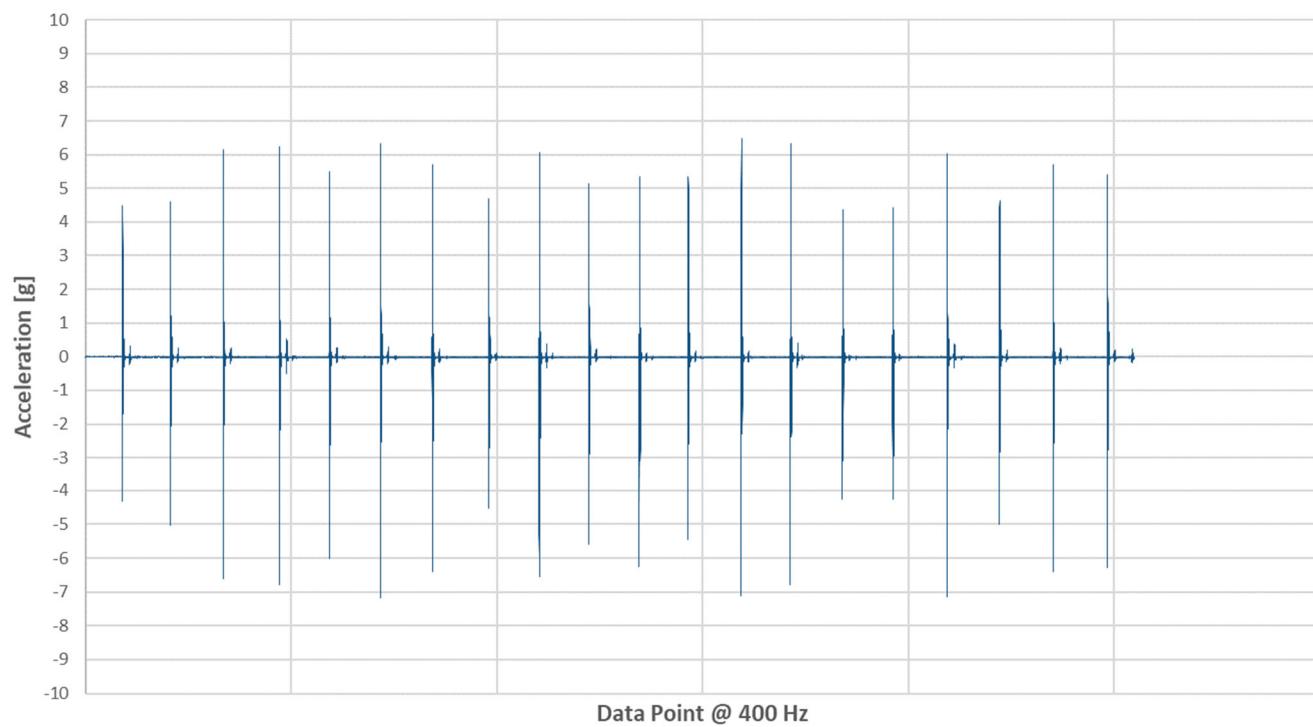


## TEST 3 – CHERRY

Vector Magnitude Acceleration - Cherry

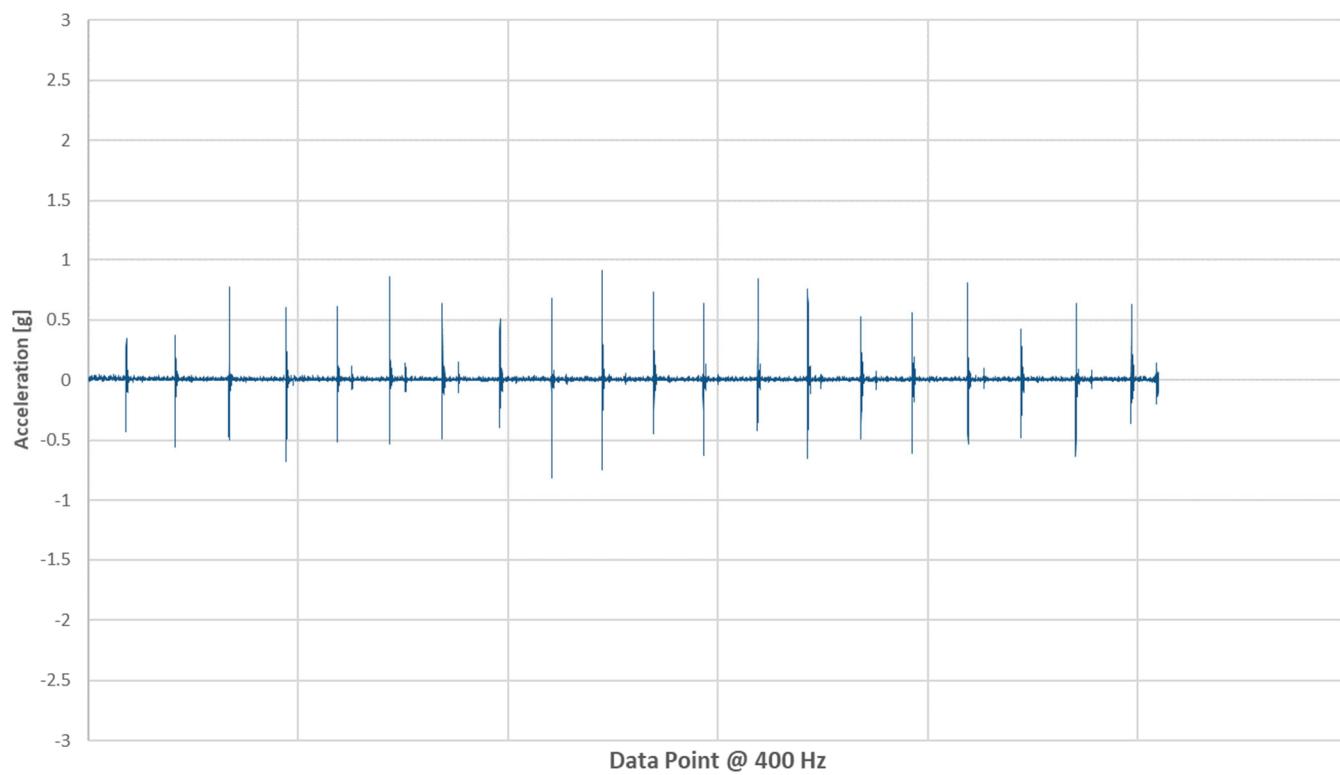


X Acceleration (Side to Side) - Cherry

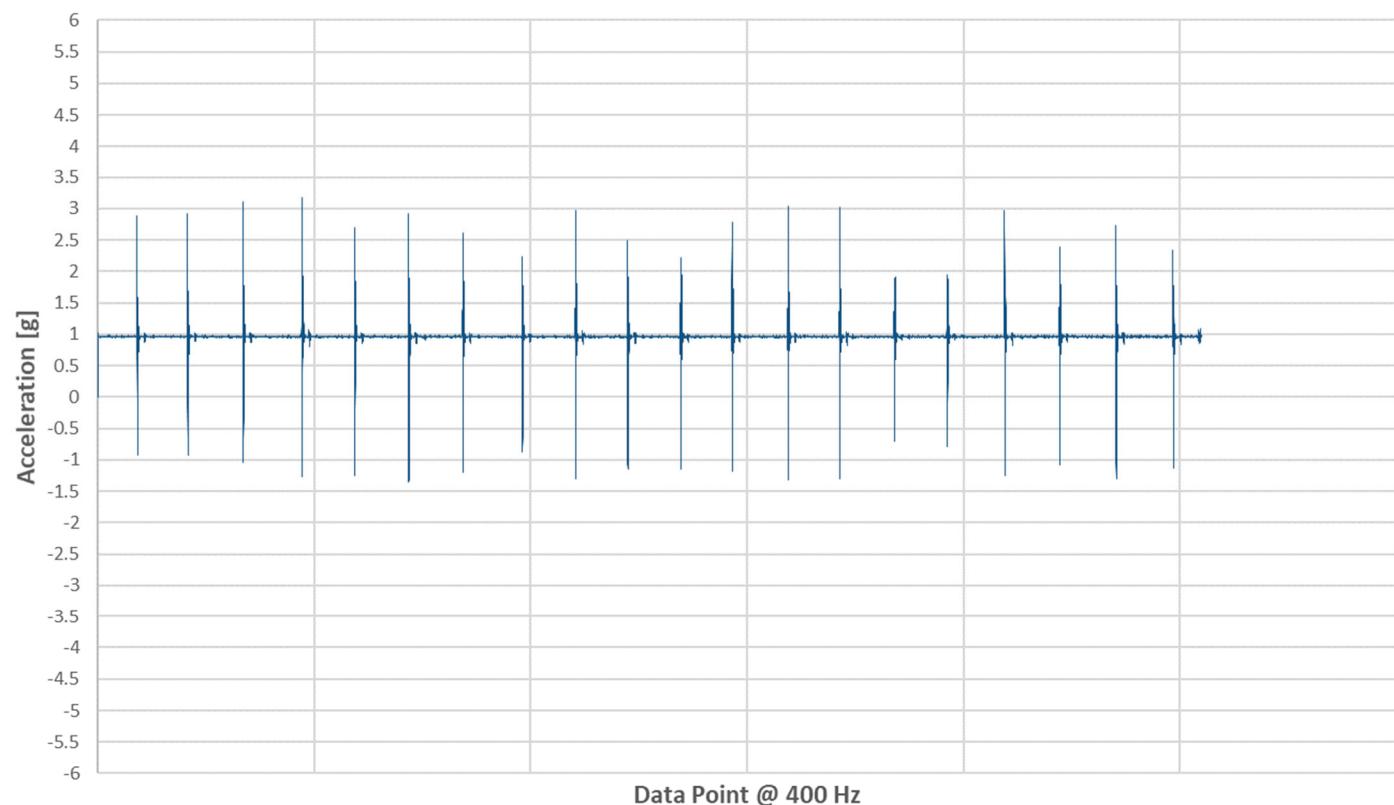




Y Acceleration (Head to Toe) - Cherry



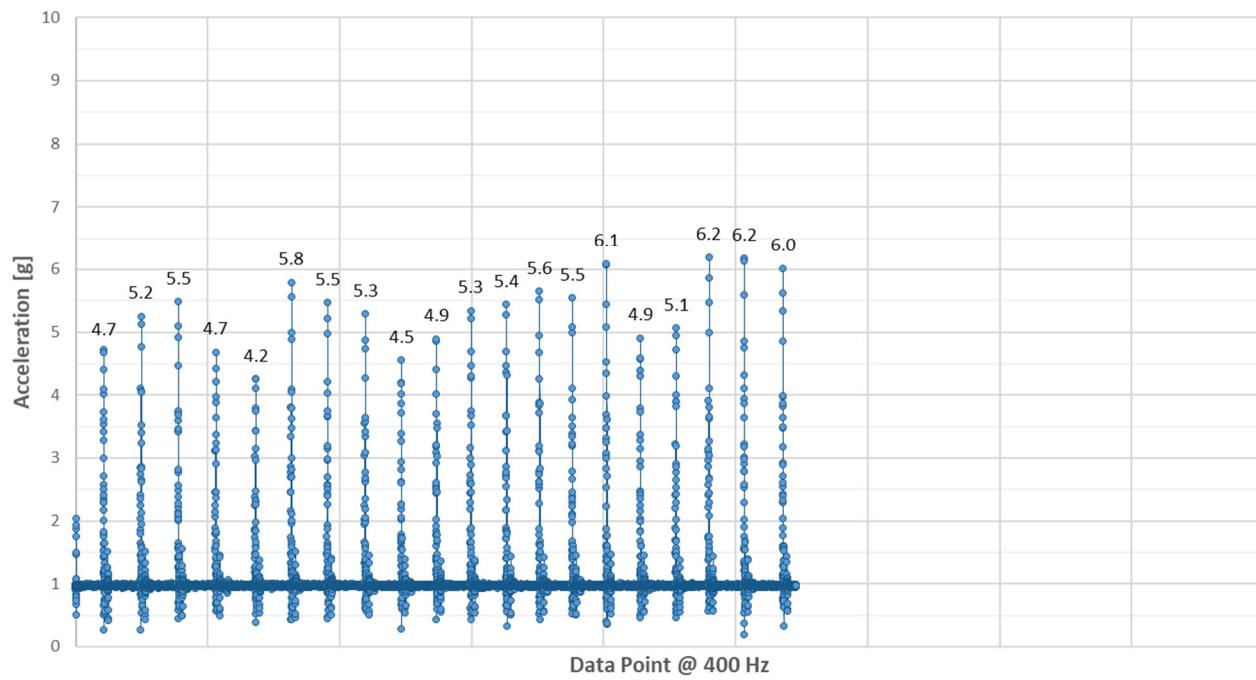
Z Acceleration (Up and Down) - Cherry



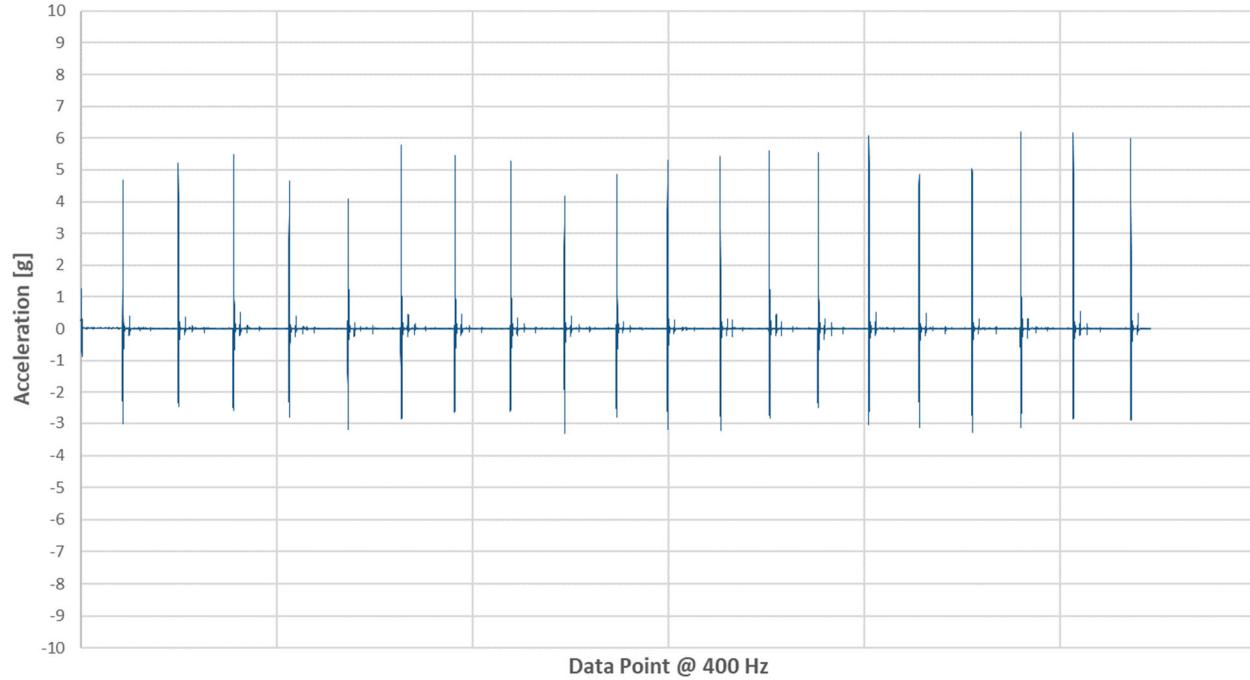


## TEST 3 – BLOOM RIVER

Vector Magnitude Acceleration - Bloom River

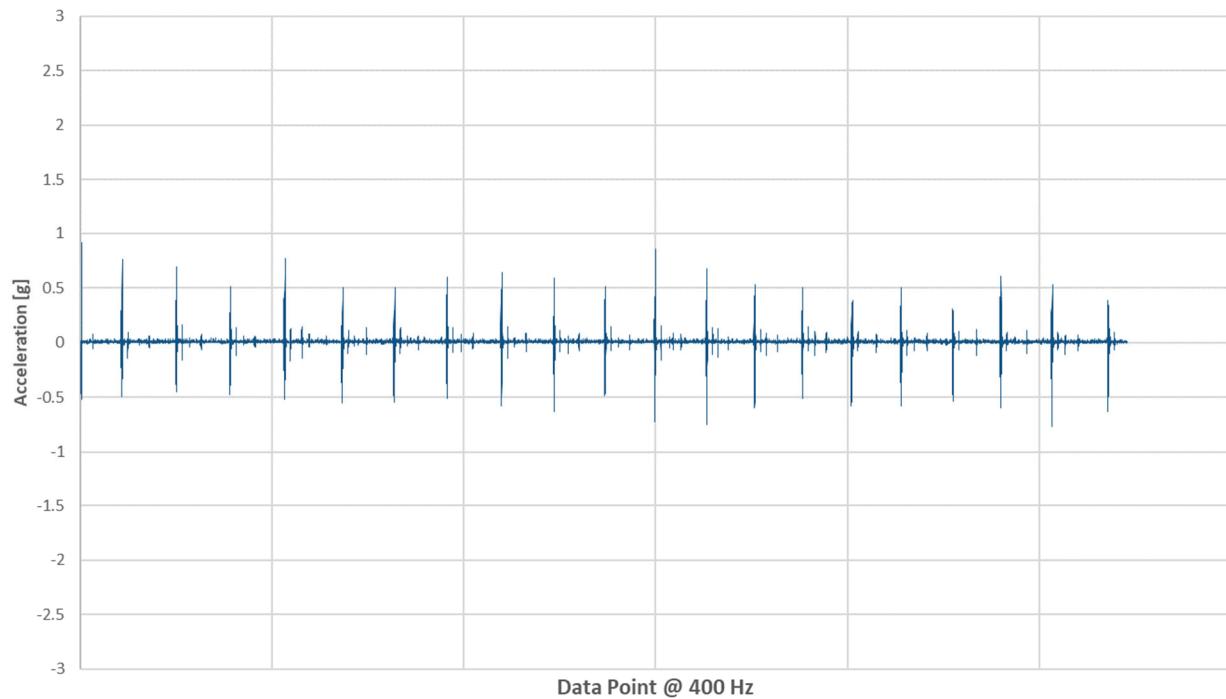


X Acceleration (Side to Side) - Bloom River

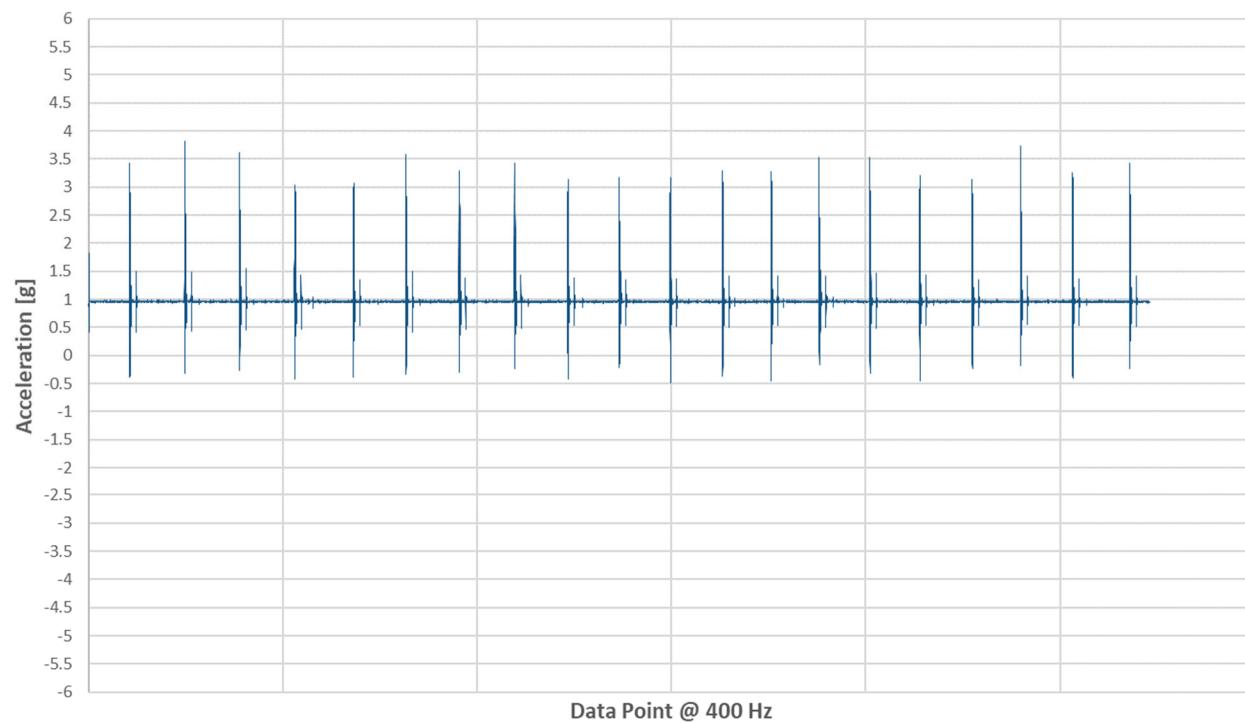




Y Acceleration (Head to Toe) - Bloom River

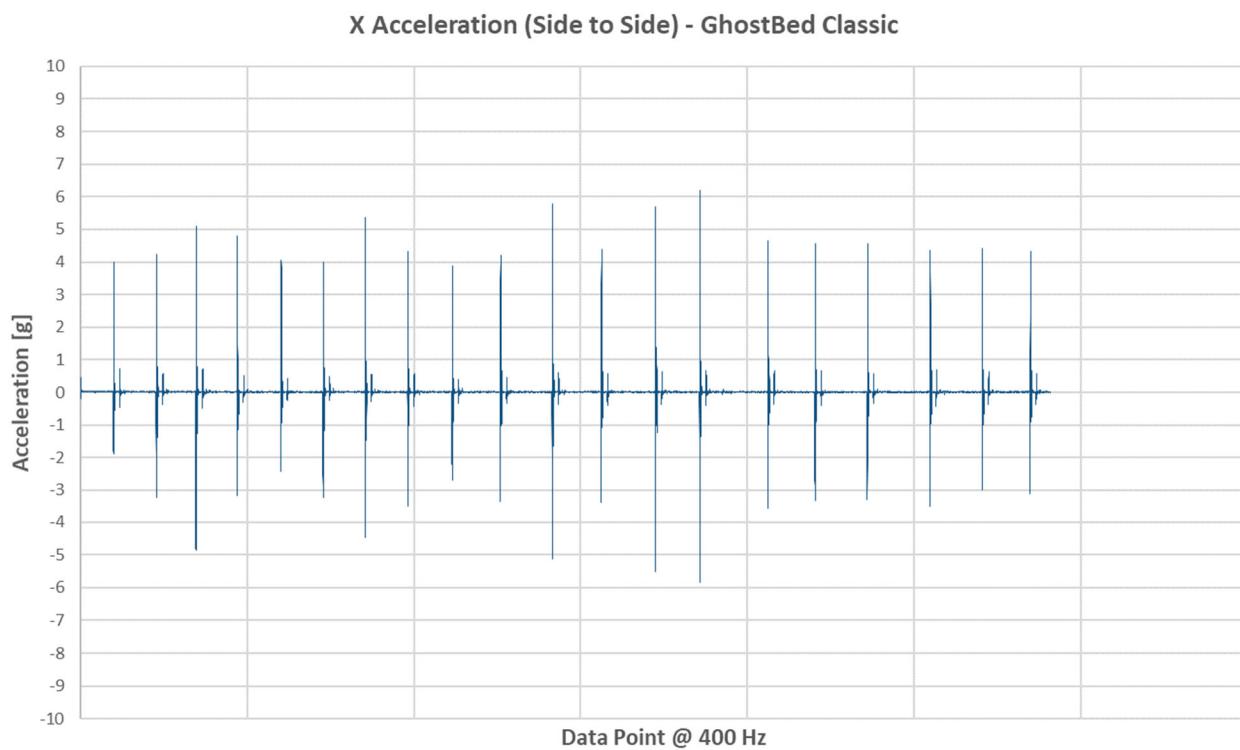
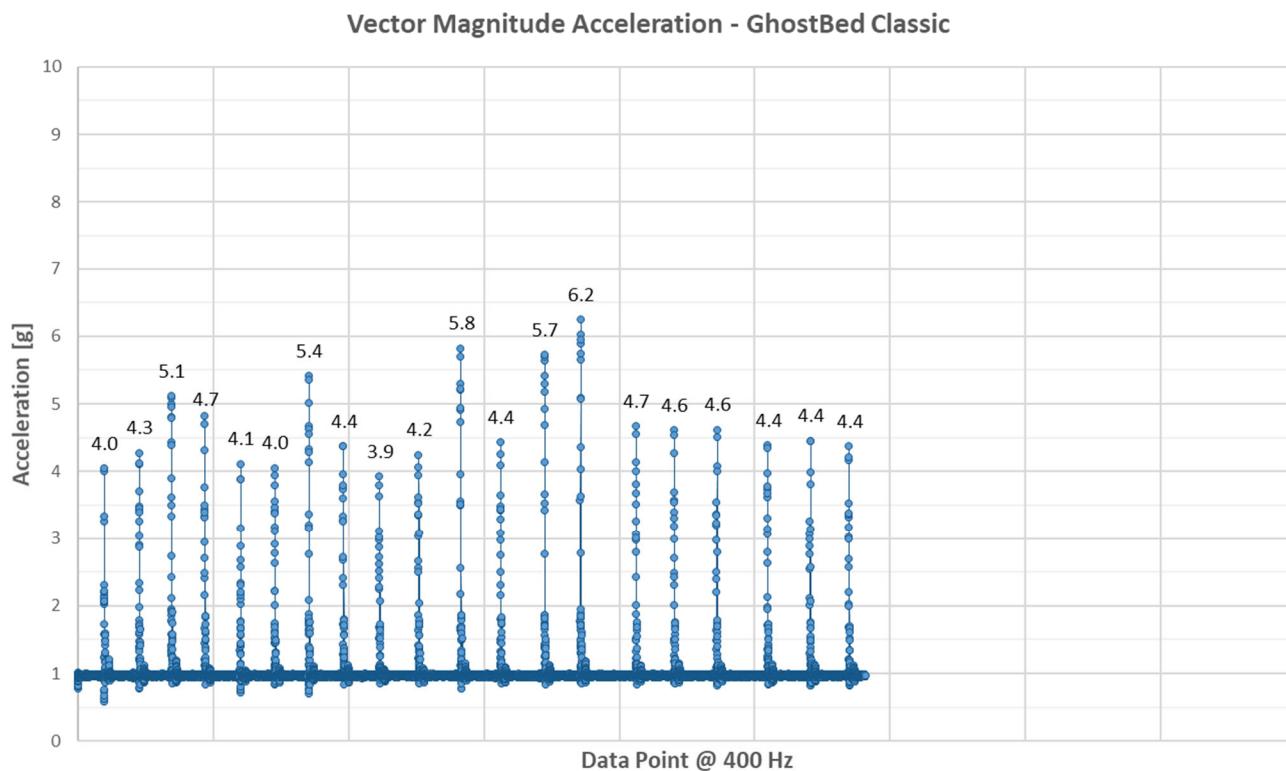


Z Acceleration (Up and Down) - Bloom River



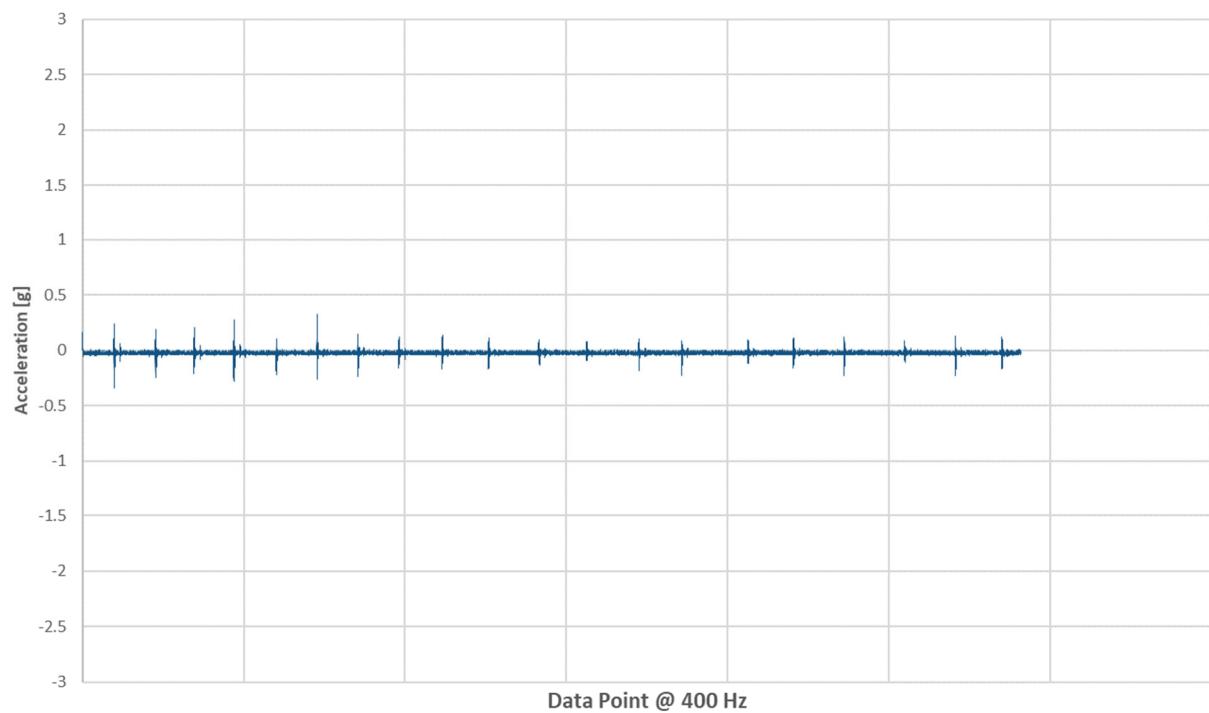


## TEST 3 – GHOSTBED CLASSIC

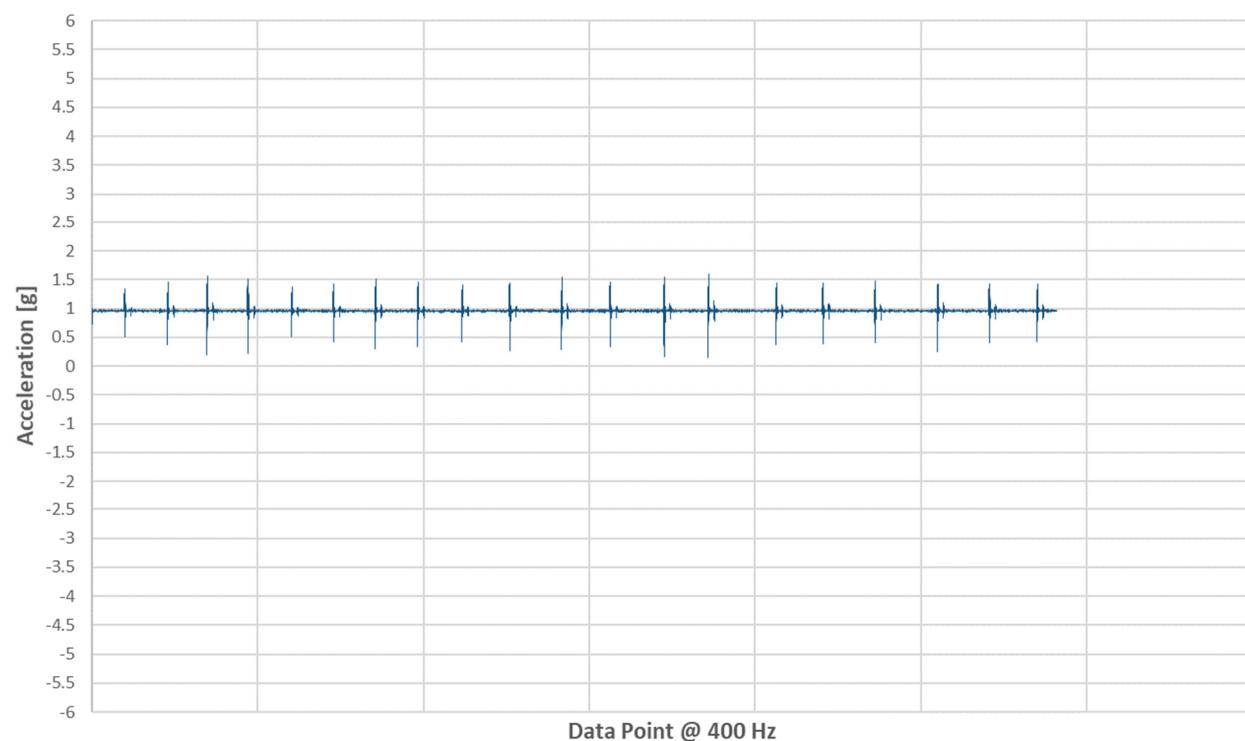




Y Acceleration (Head to Toe) - GhostBed Classic



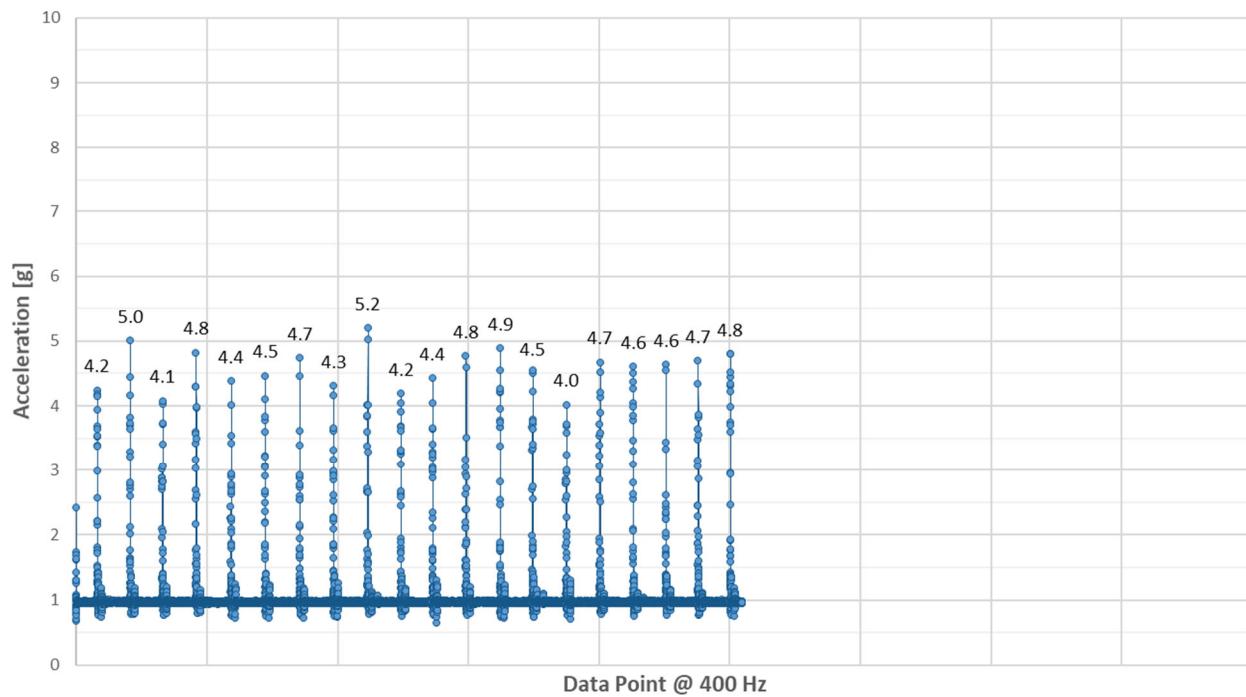
Z Acceleration (Up and Down) - GhostBed Classic



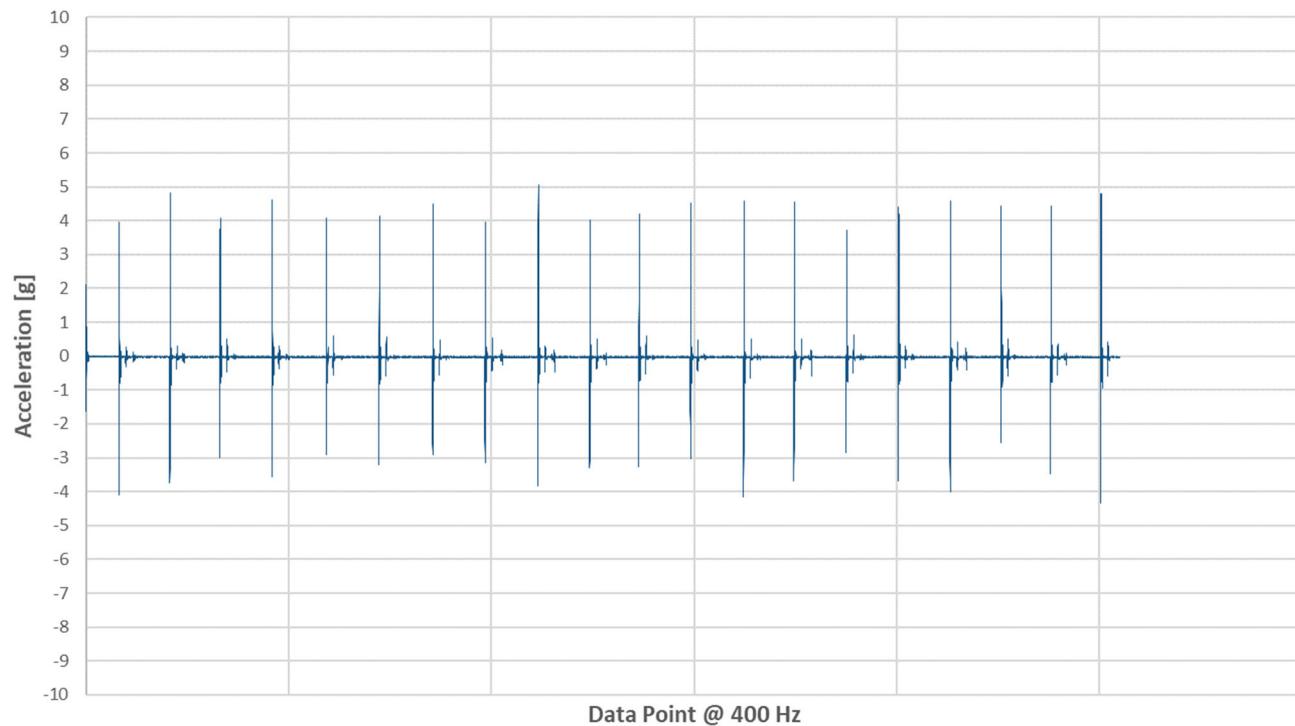


## TEST 3 – PUFFY LUX

Vector Magnitude Acceleration - Puffy Lux

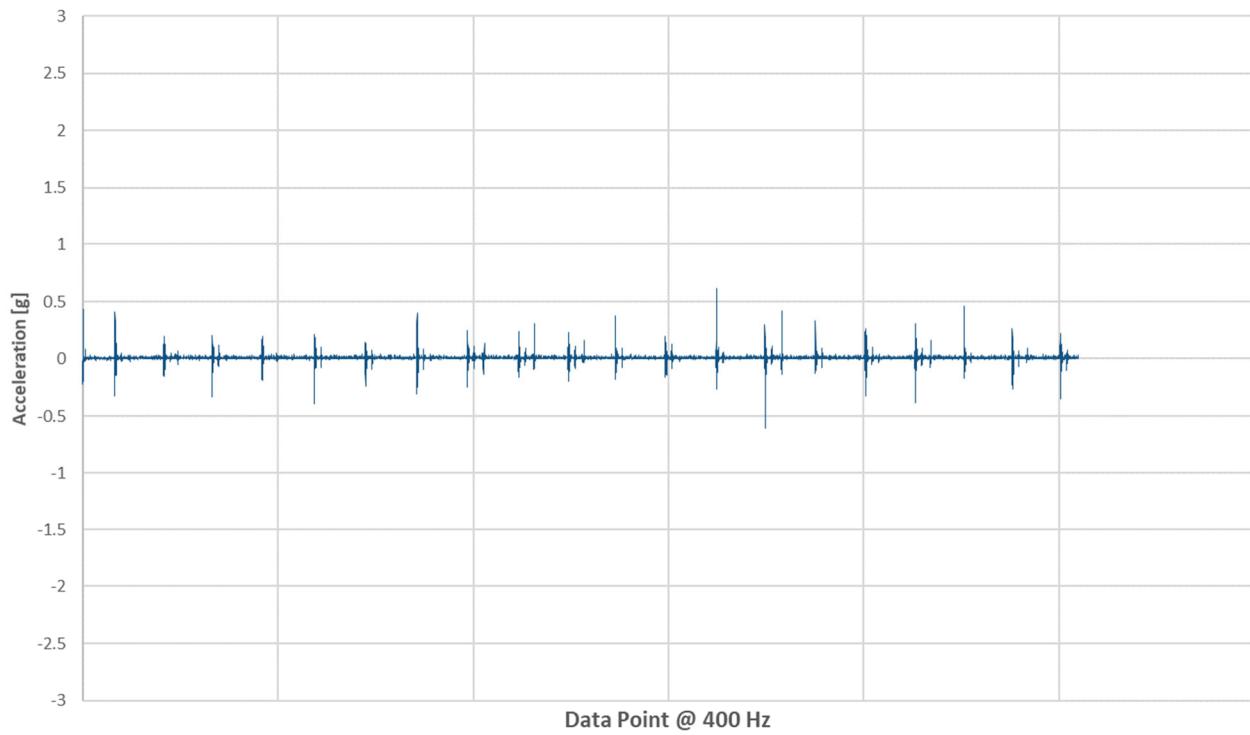


X Acceleration (Side to Side) - Puffy Lux

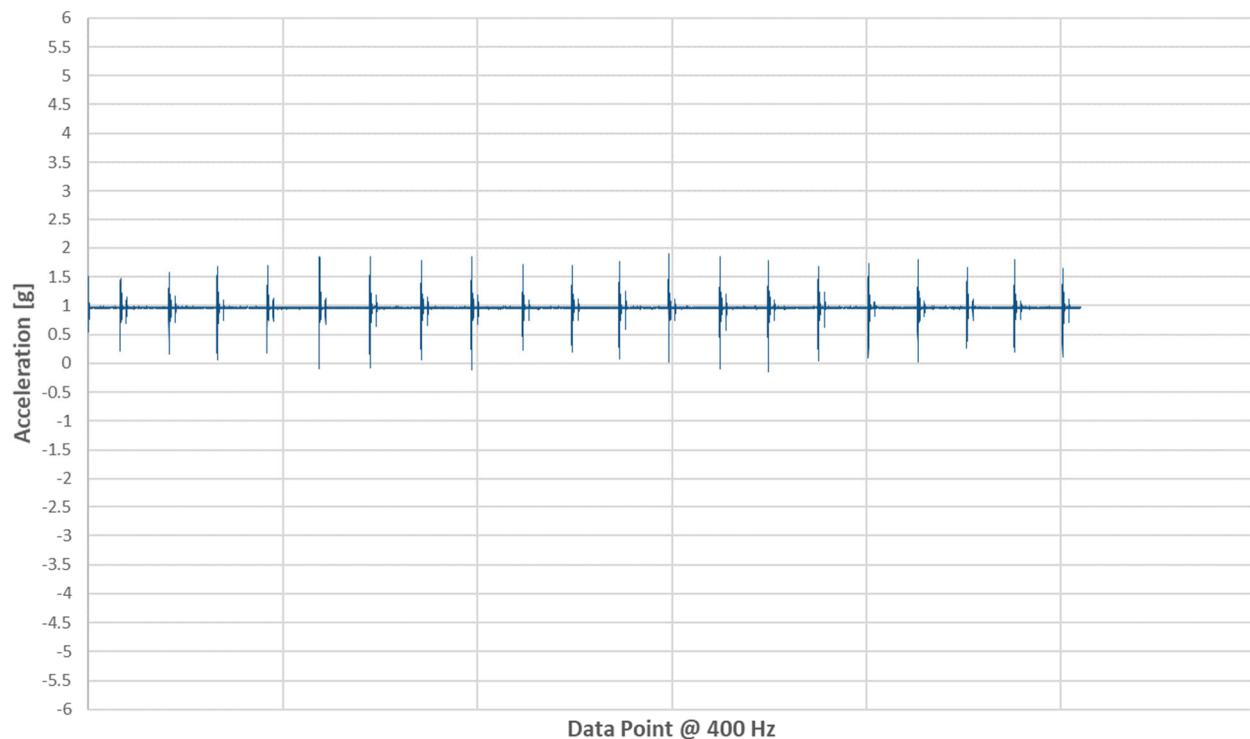




Y Acceleration (Head to Toe) - Puffy Lux



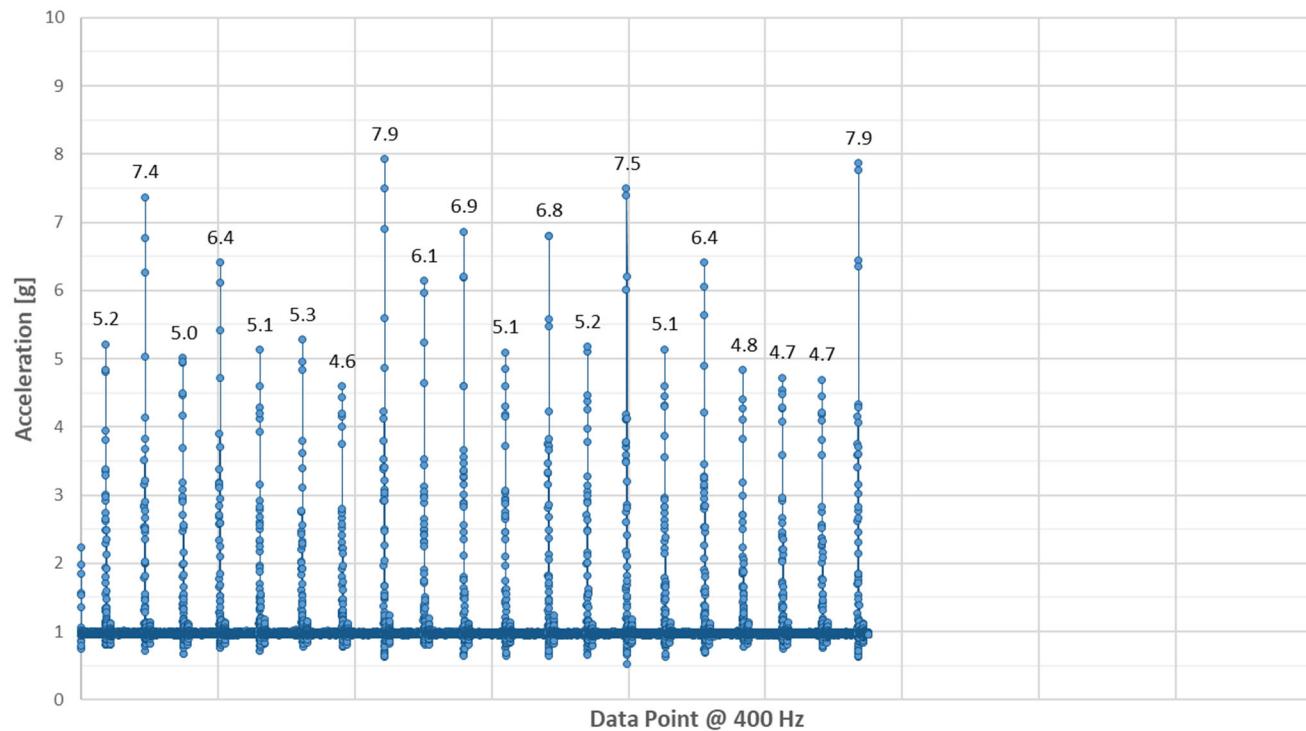
Z Acceleration (Up and Down) - Puffy Lux



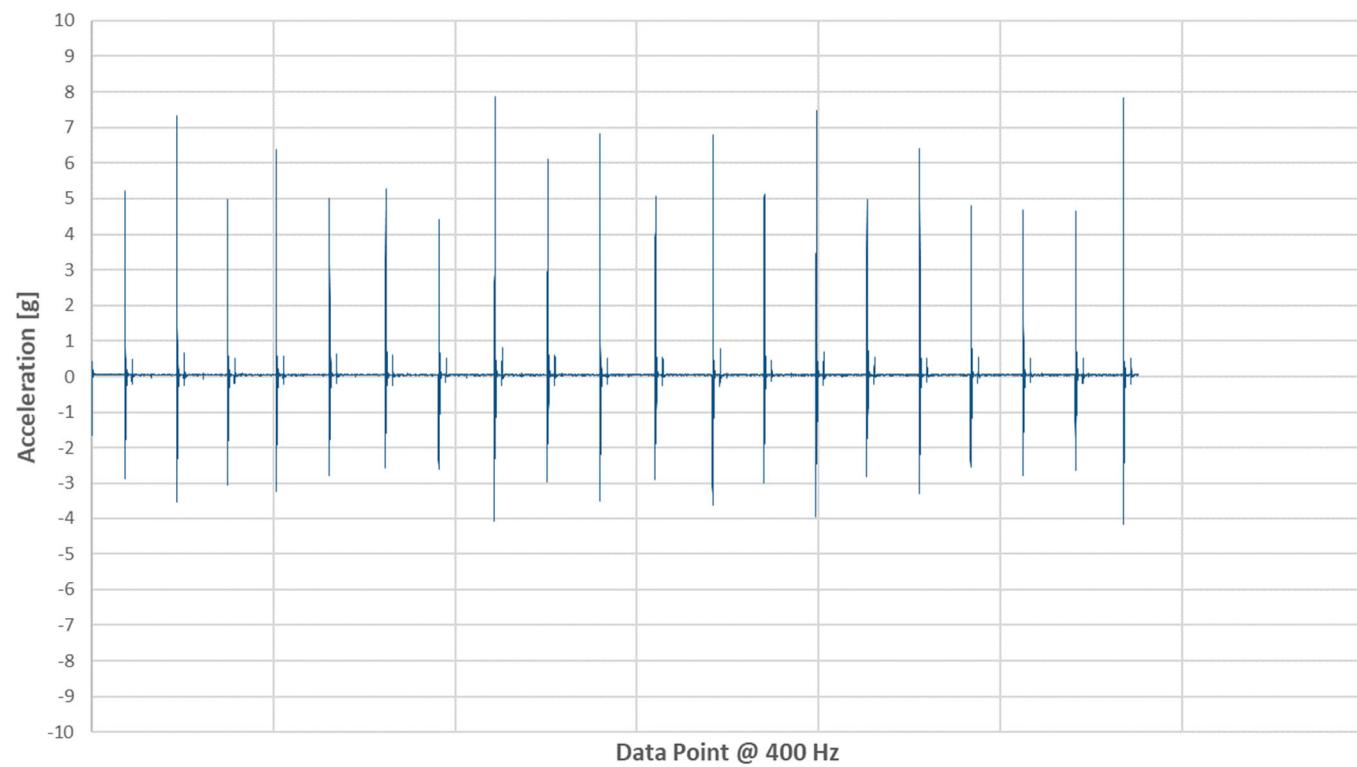


## TEST 3 – TUFT & NEEDLE (V2)

Vector Magnitude Acceleration - Tuft & Needle (V2)

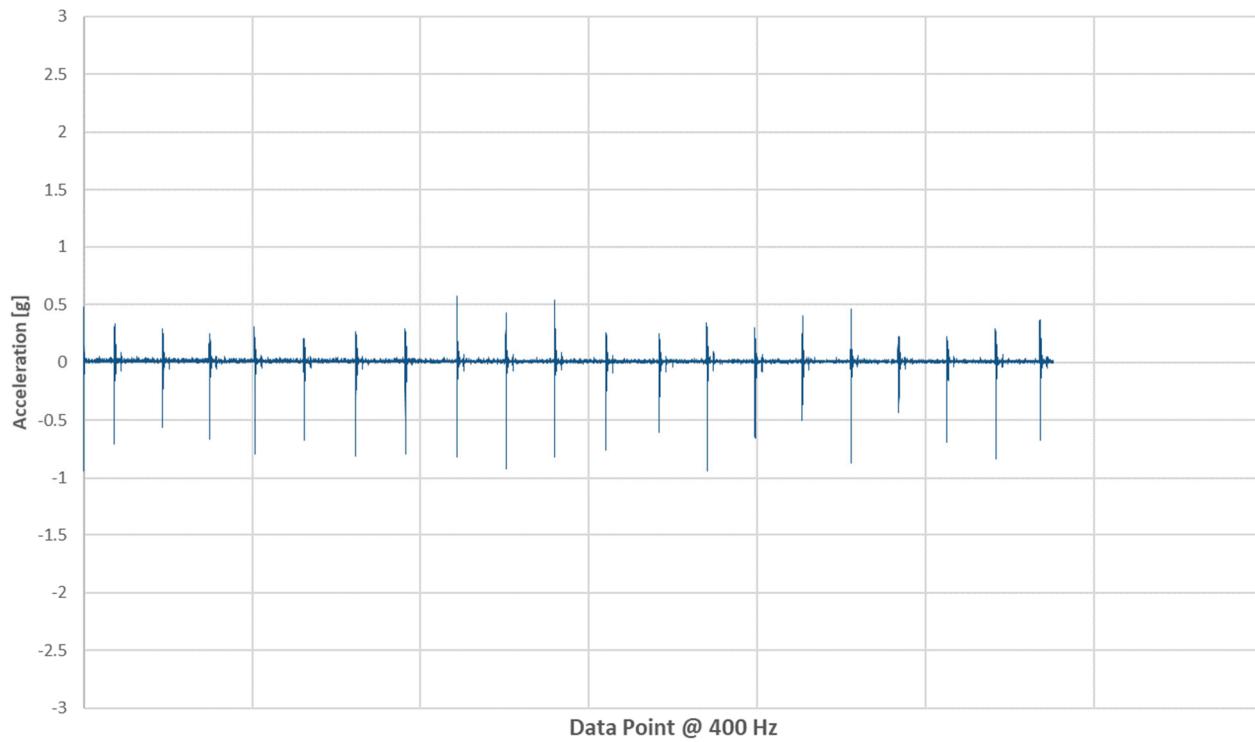


X Acceleration (Side to Side) - Tuft & Needle (V2)

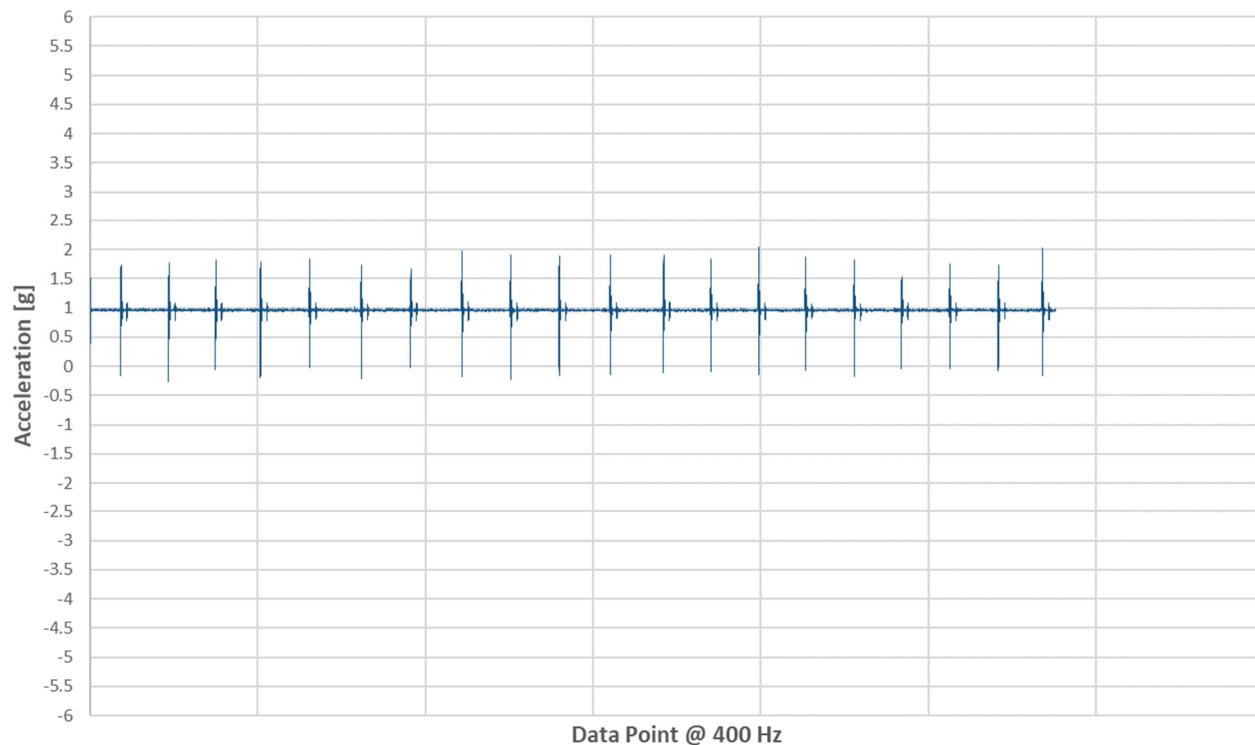




**Y Acceleration (Head to Toe) - Tuft & Needle (V2)**



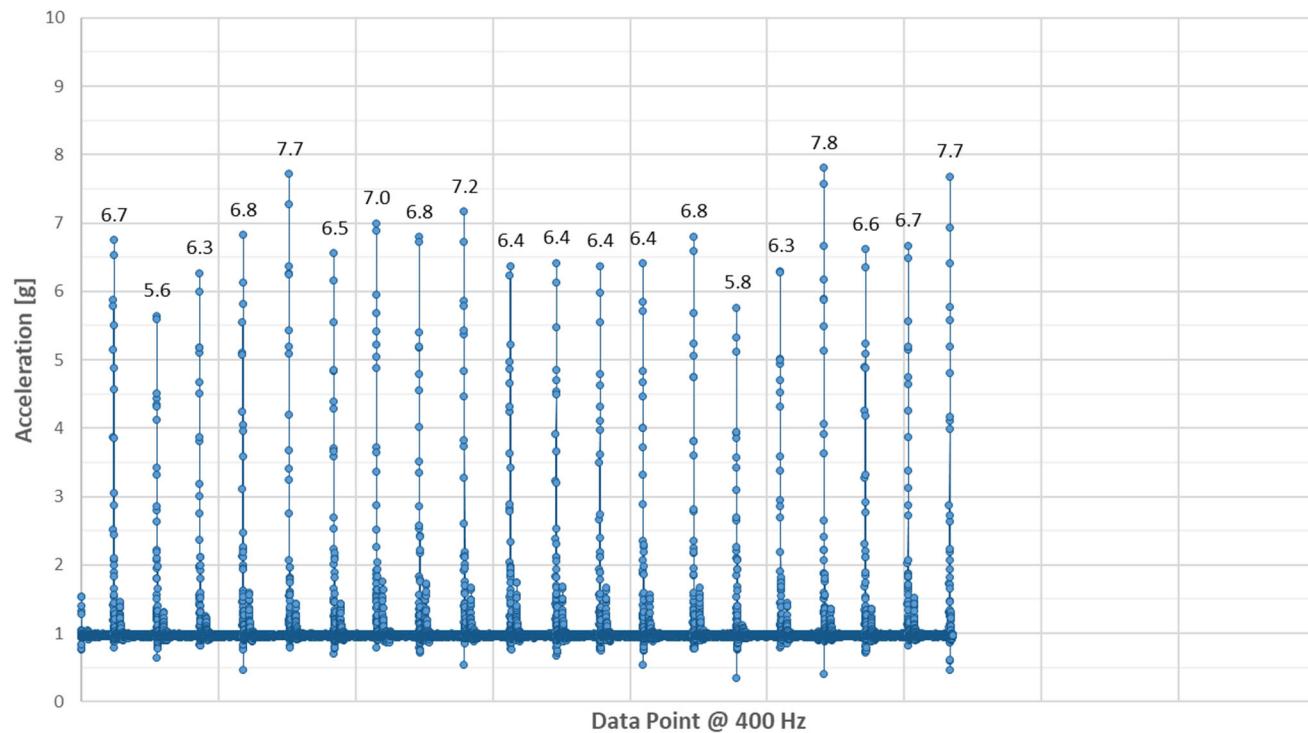
**Z Acceleration (Up and Down) - Tuft & Needle (V2)**



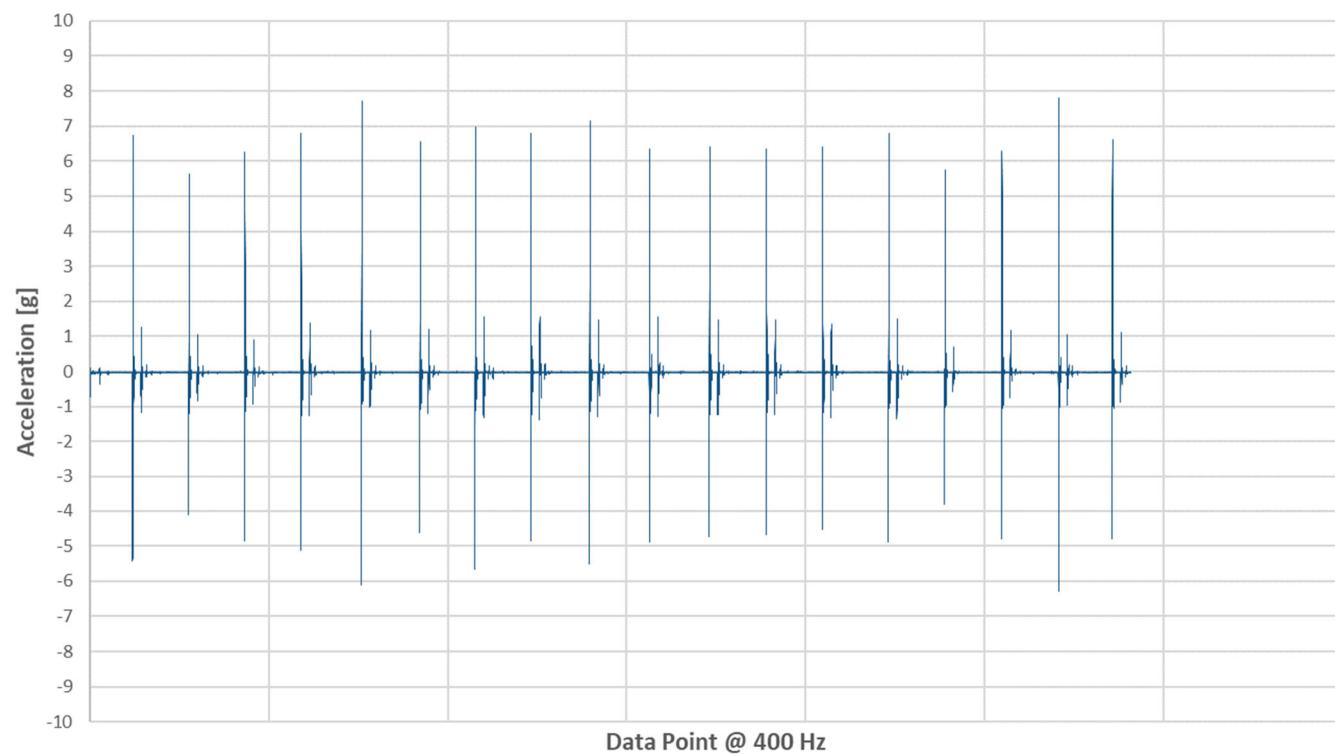


## TEST 3 – SEALY COCOON

Vector Magnitude Acceleration - Sealy Cocoon

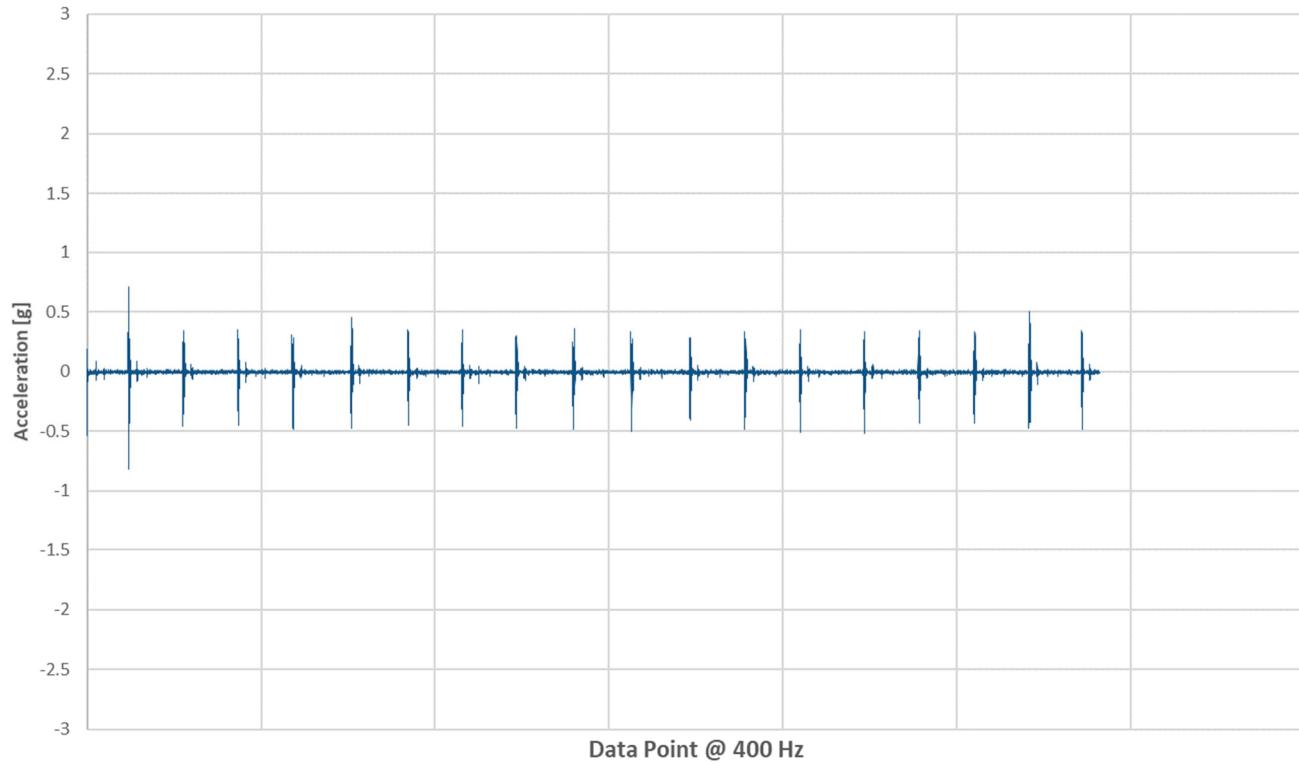


X Acceleration (Side to Side) - Sealy Cocoon

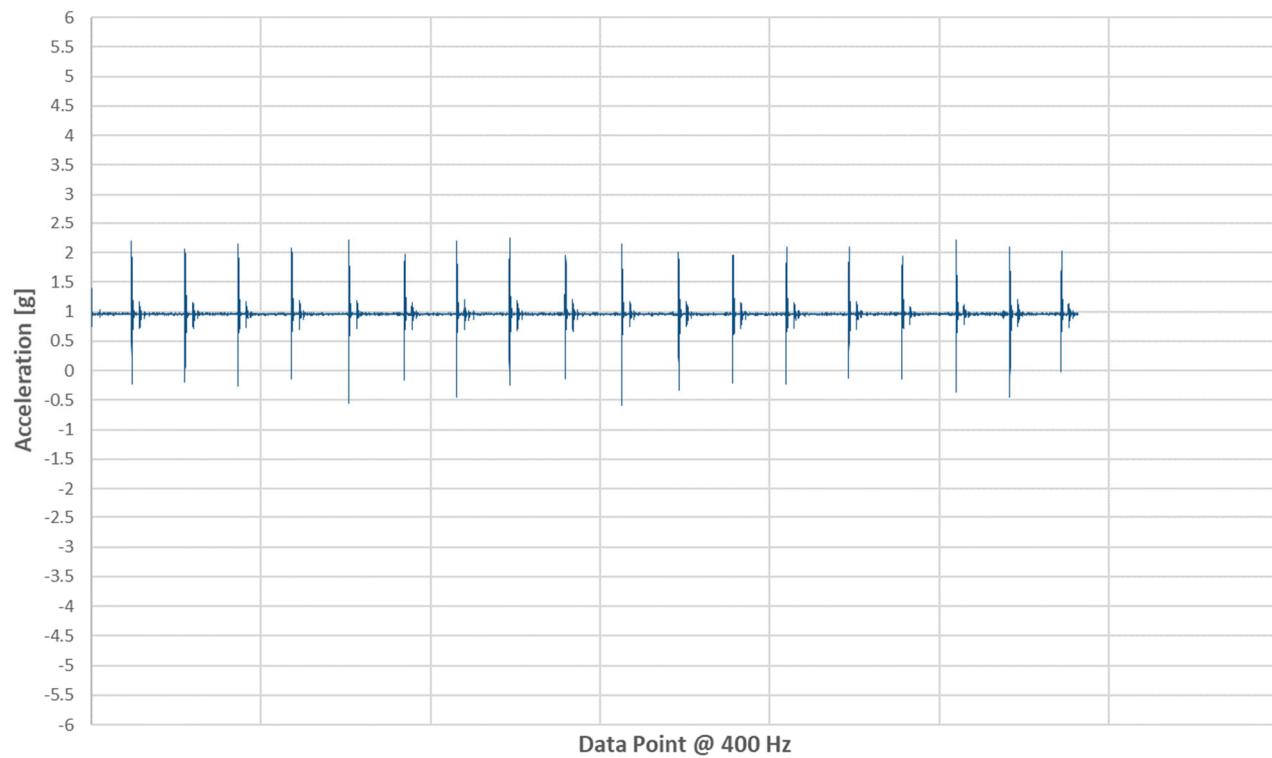




Y Acceleration (Head to Toe) - Sealy Cocoon



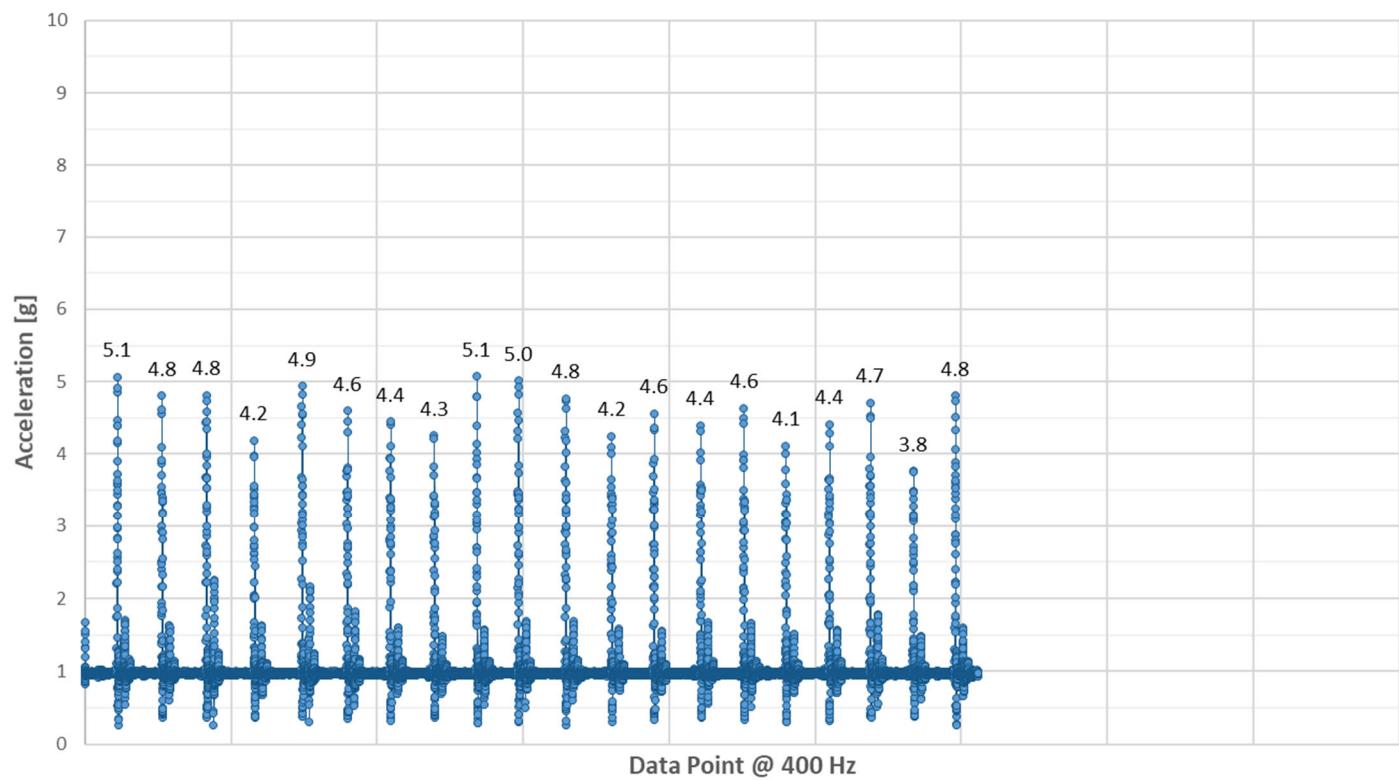
Z Acceleration (Up and Down) - Sealy Cocoon



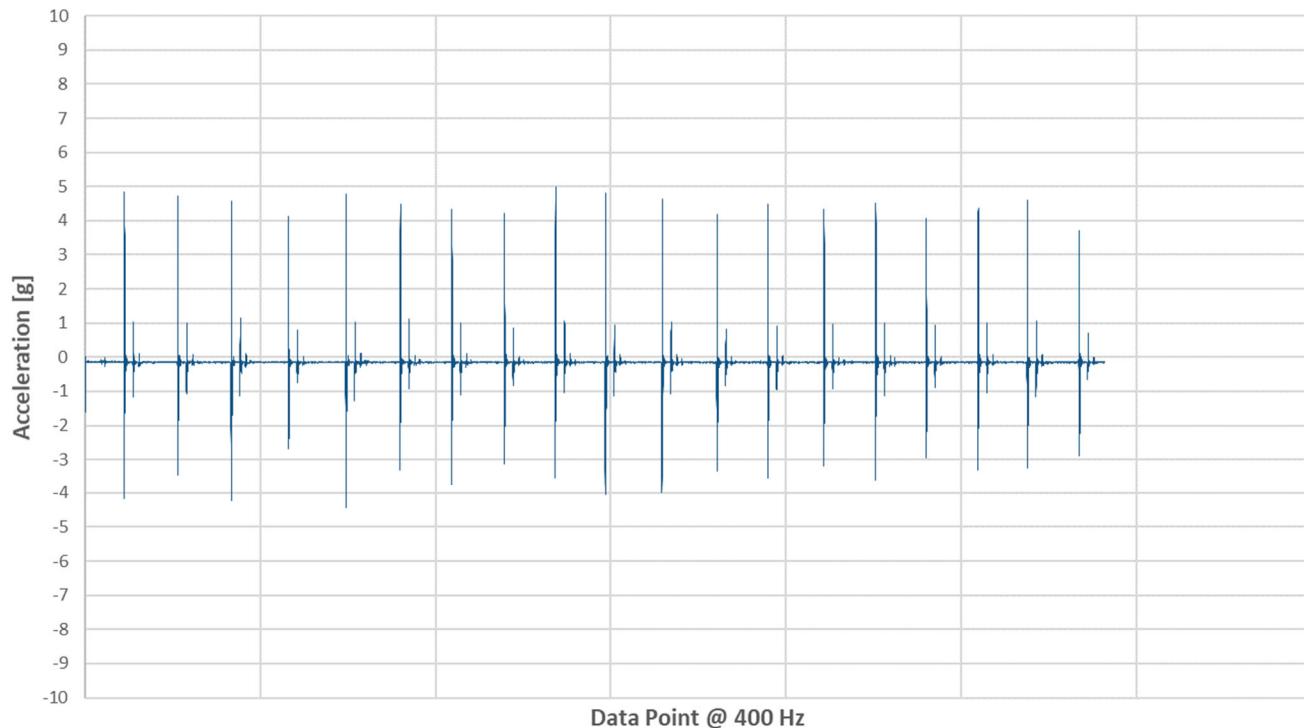


## TEST 3 – HAVEN LUX HYBRID

Vector Magnitude Acceleration - Haven Lux Hybrid

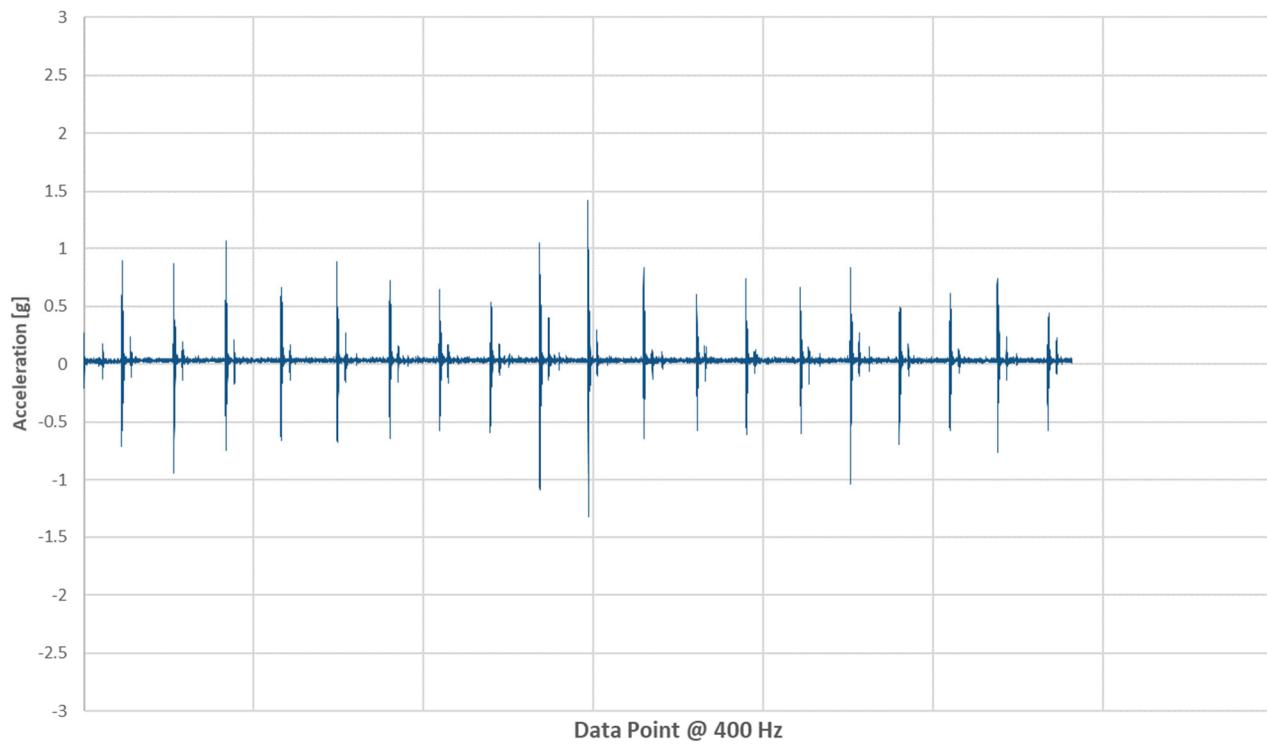


X Acceleration (Side to Side) - Haven Lux Hybrid

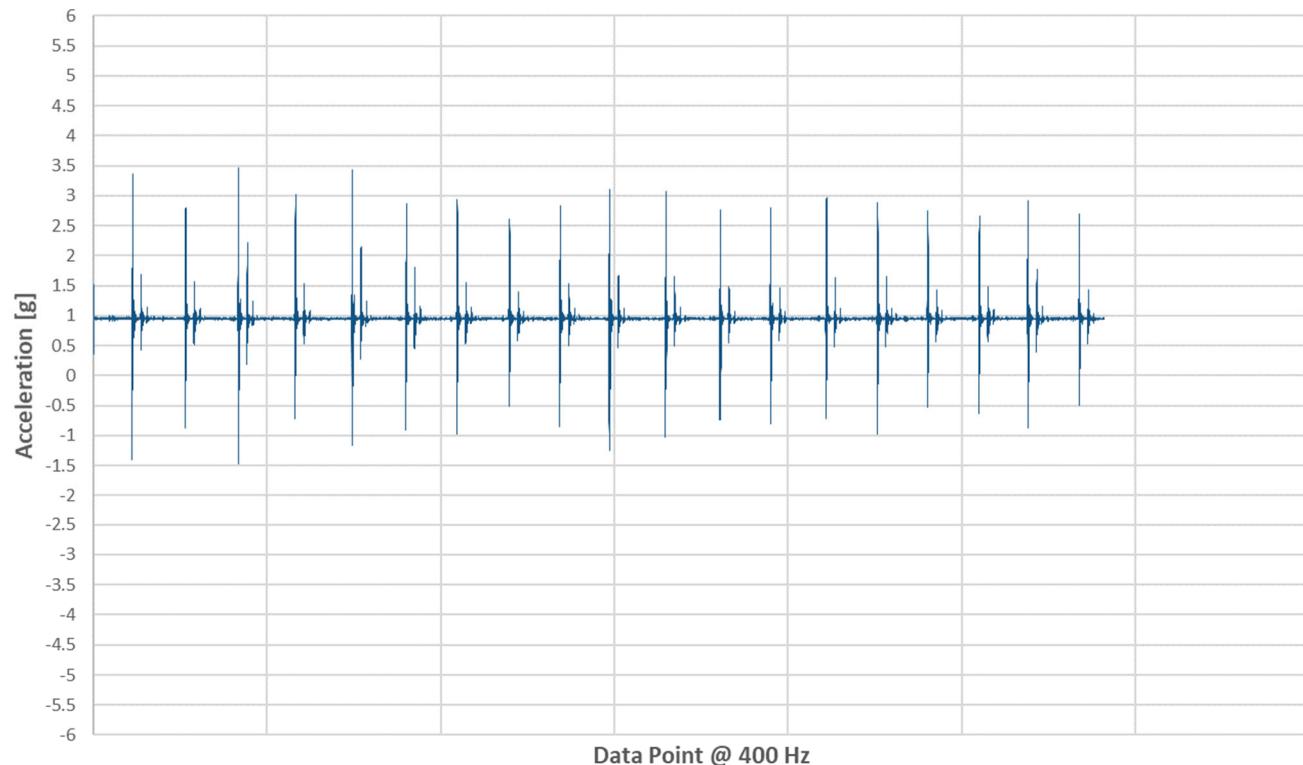




Y Acceleration (Head to Toe) - Haven Lux Hybrid

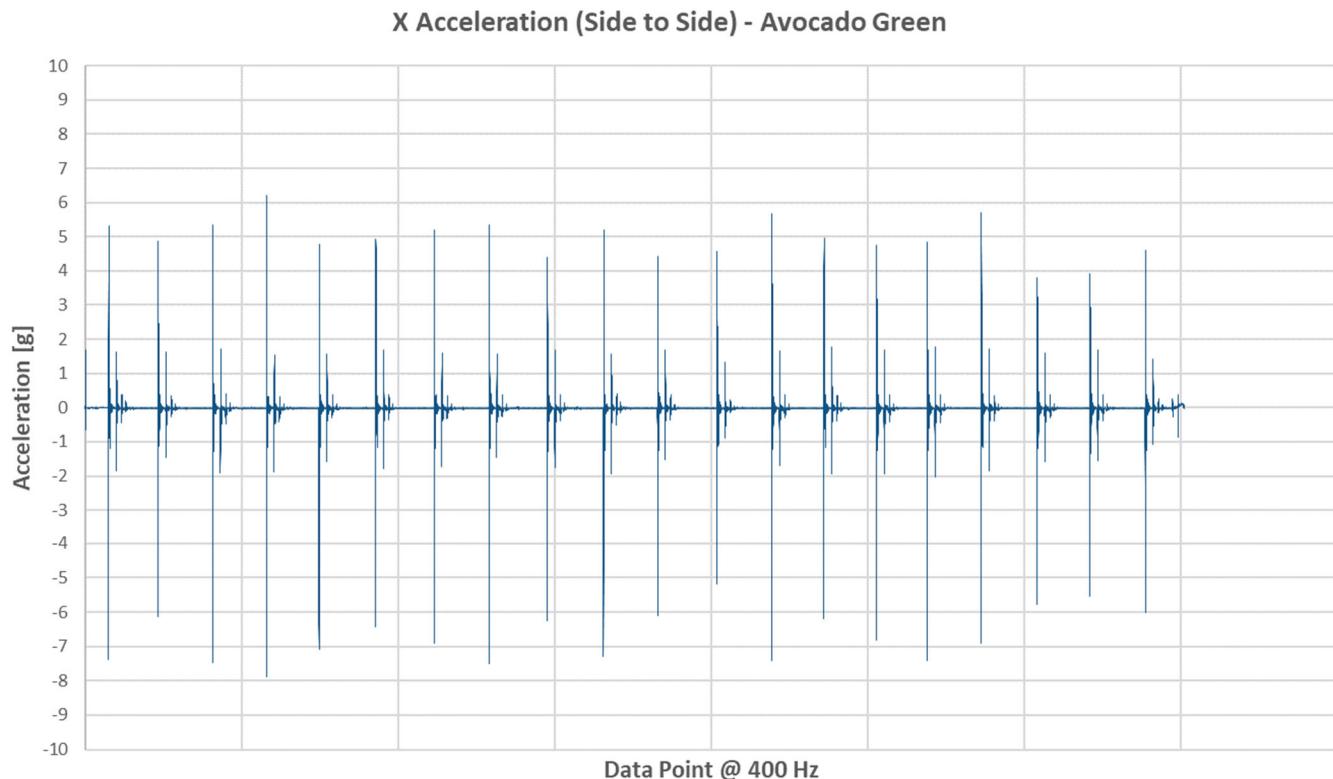
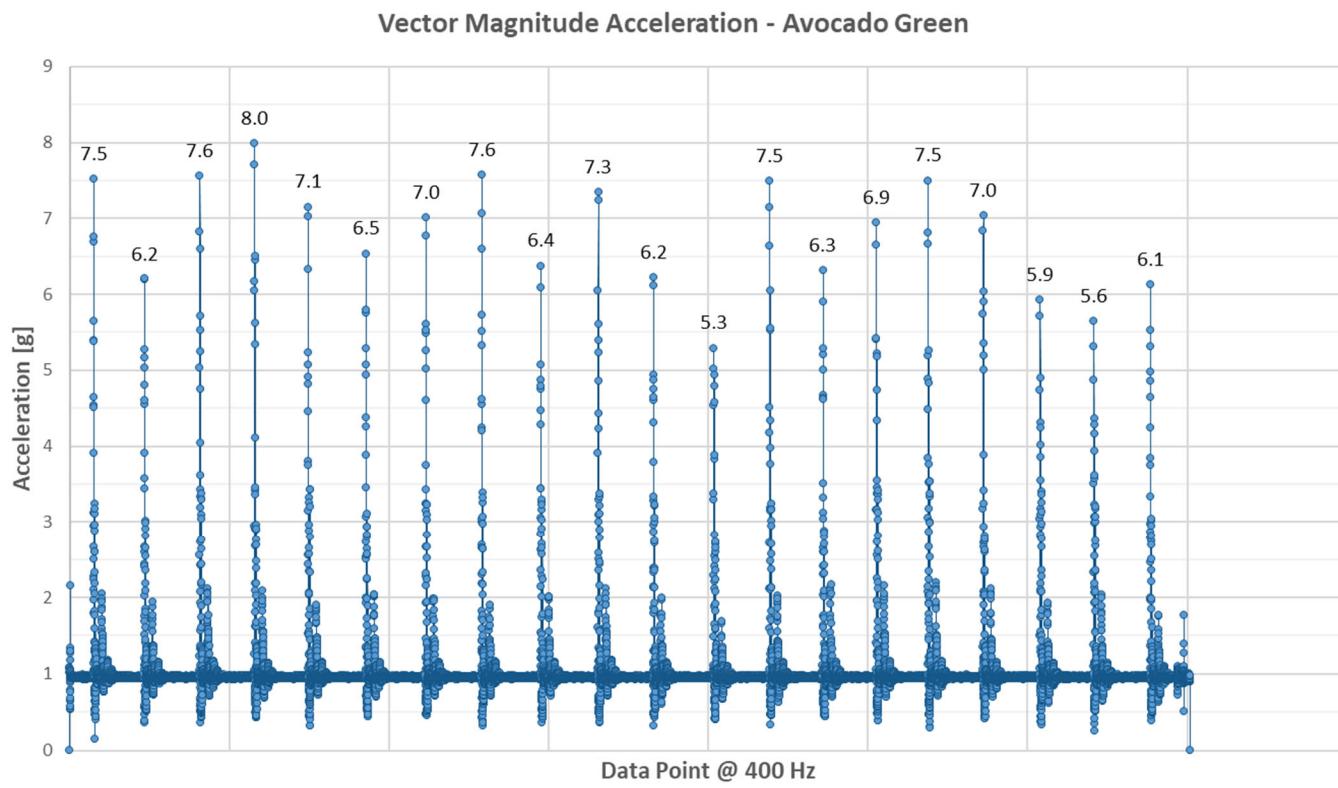


Z Acceleration (Up and Down) - Haven Lux Hybrid



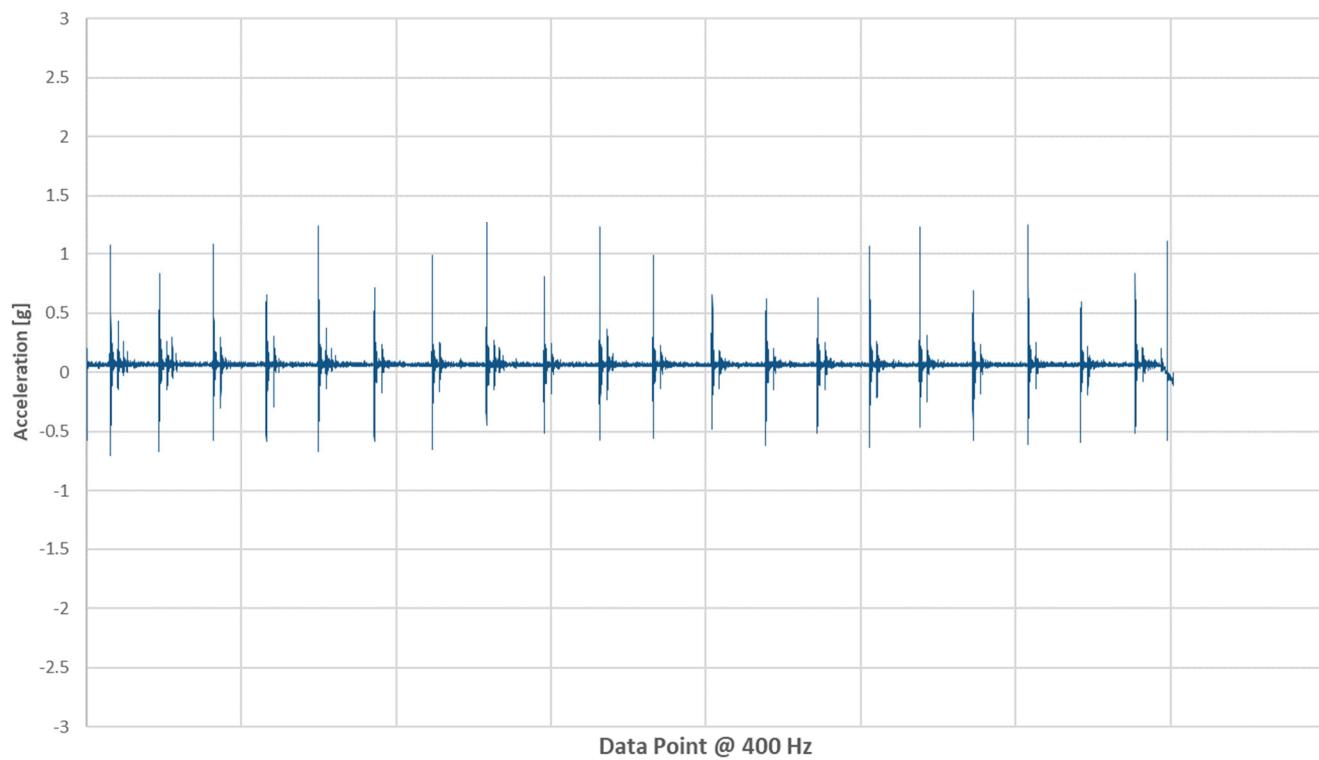


## TEST 3 – AVACADO GREEN

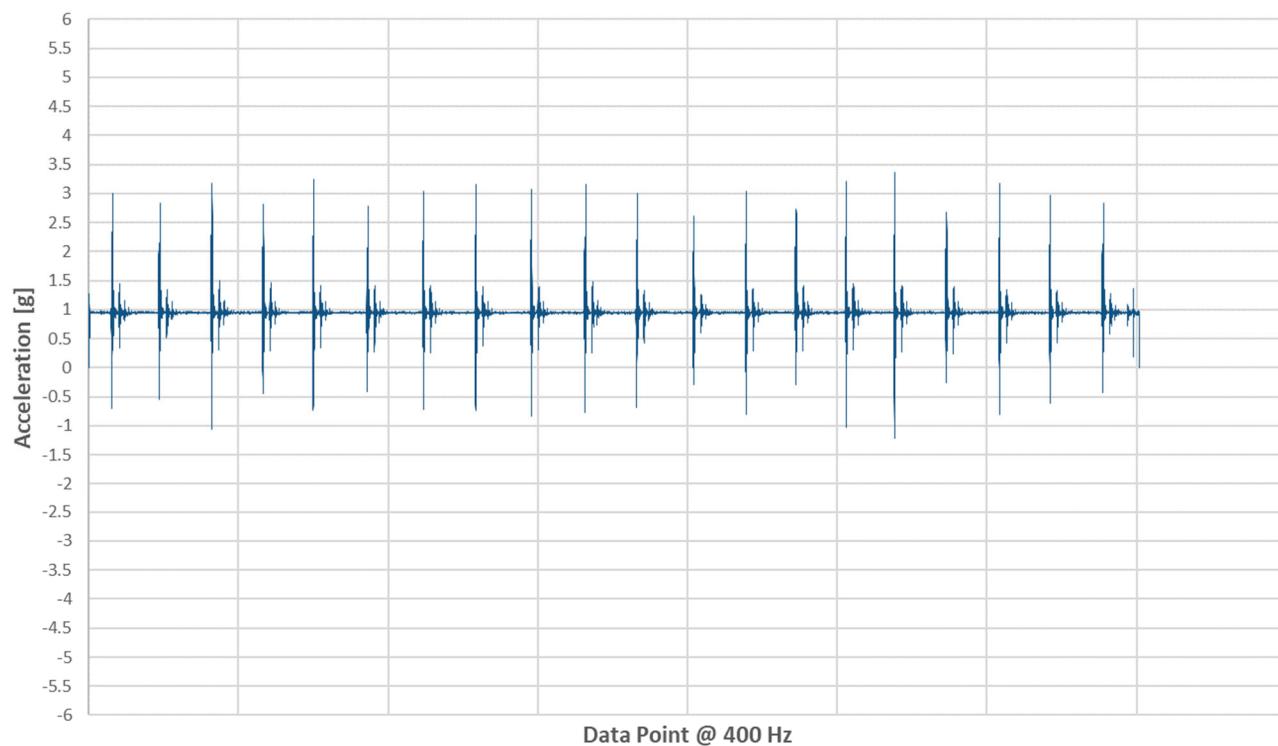




Y Acceleration (Head to Toe) - Avocado Green



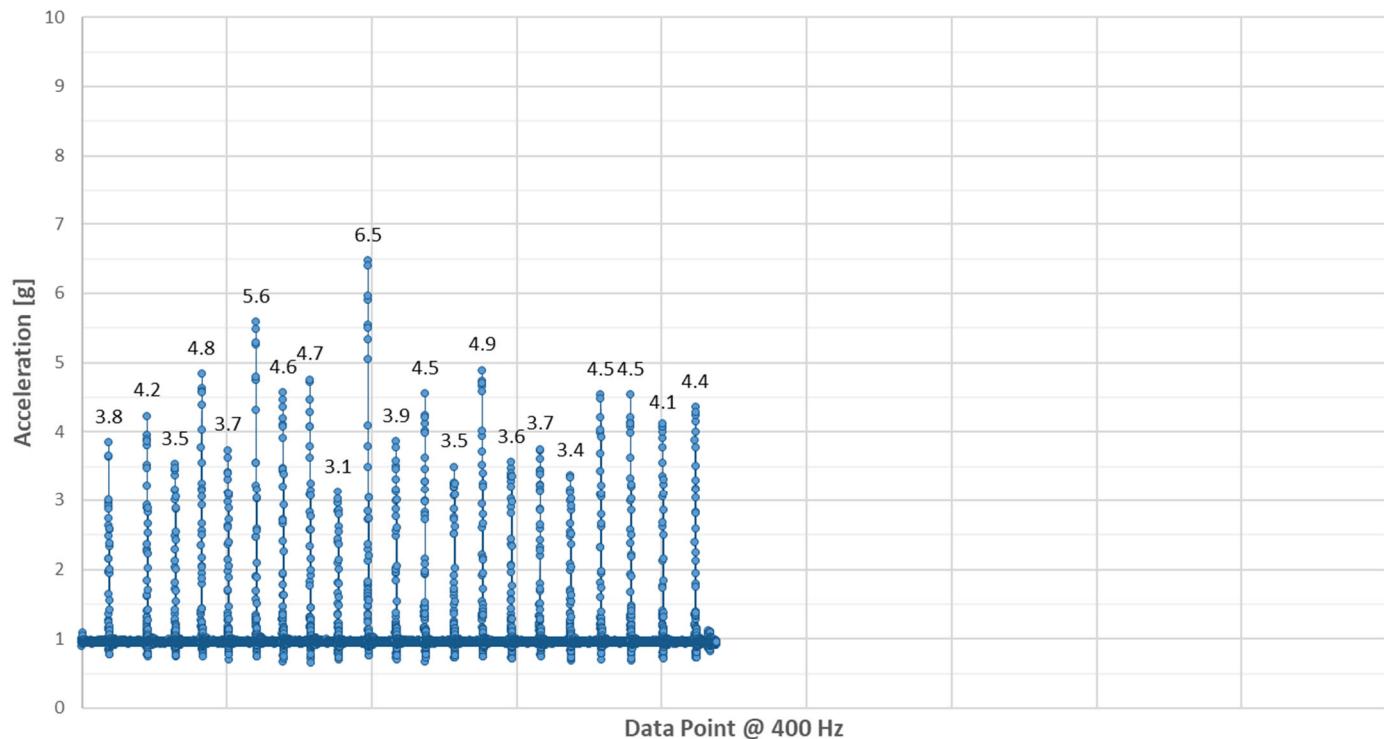
Z Acceleration (Up and Down) - Avocado Green



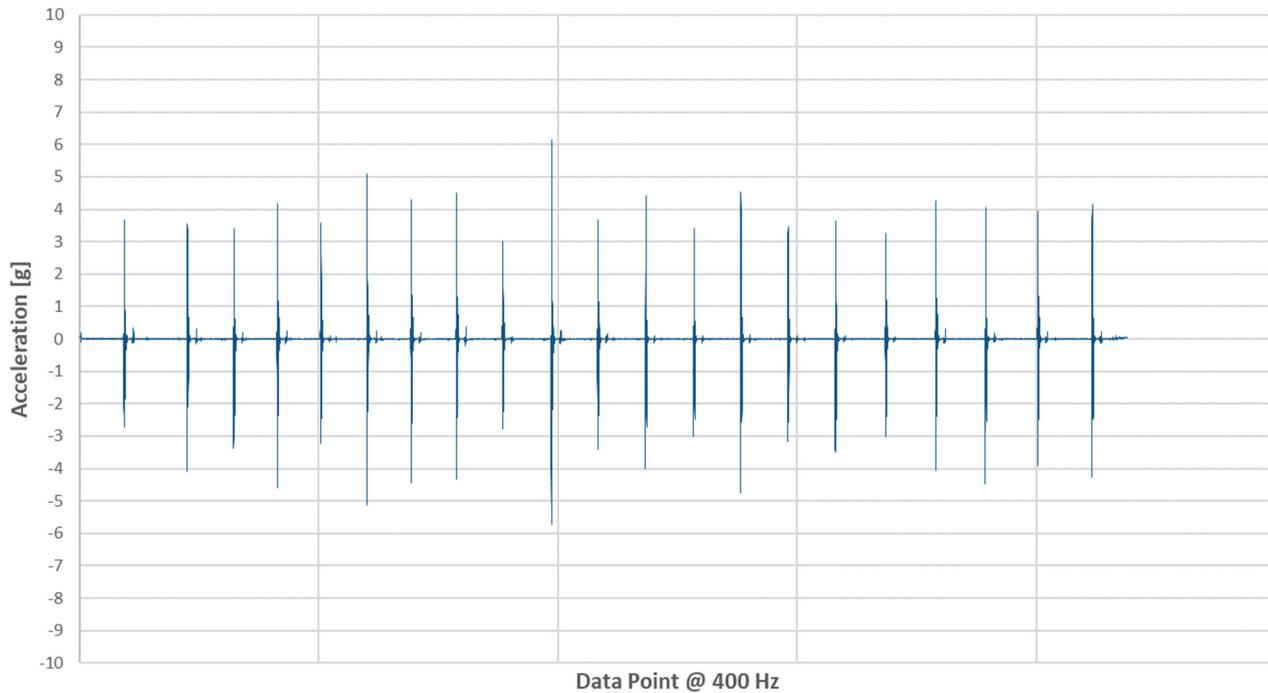


## TEST 3 – FULL MOON

Vector Magnitude Acceleration - Full Moon

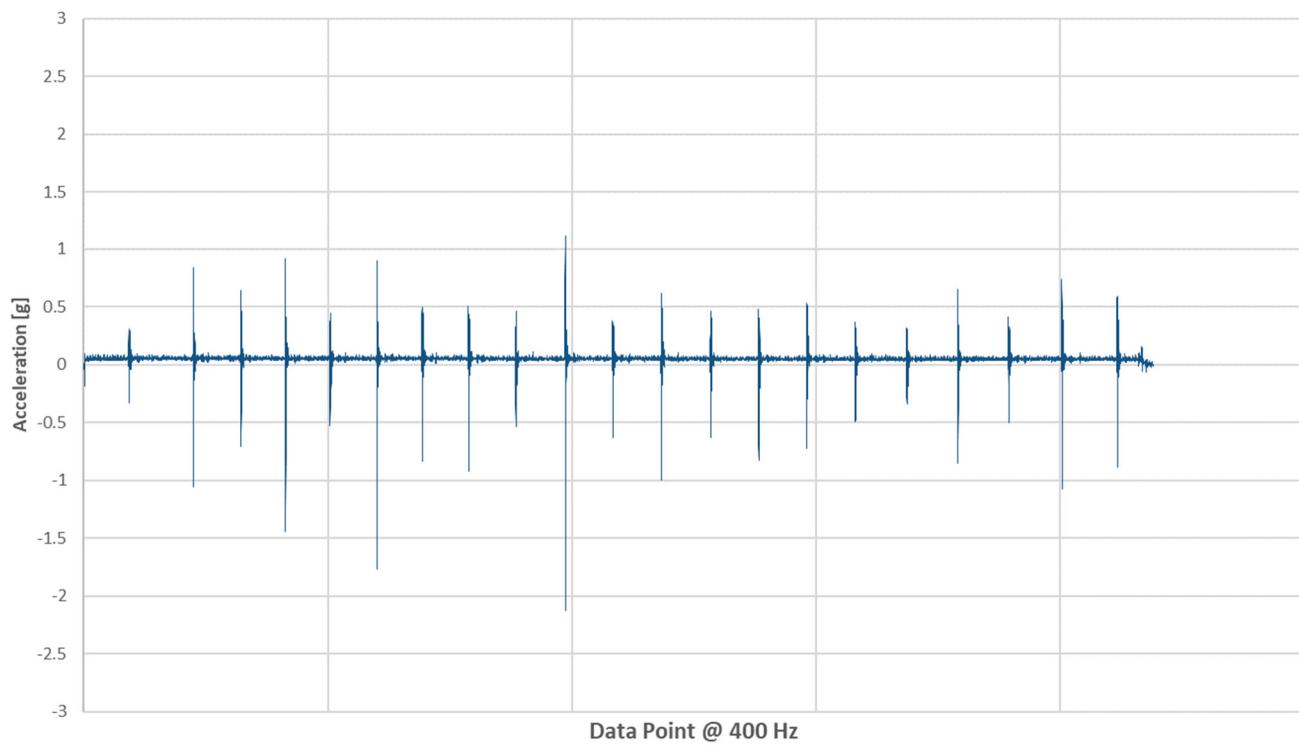


X Acceleration (Side to Side) - Full Moon

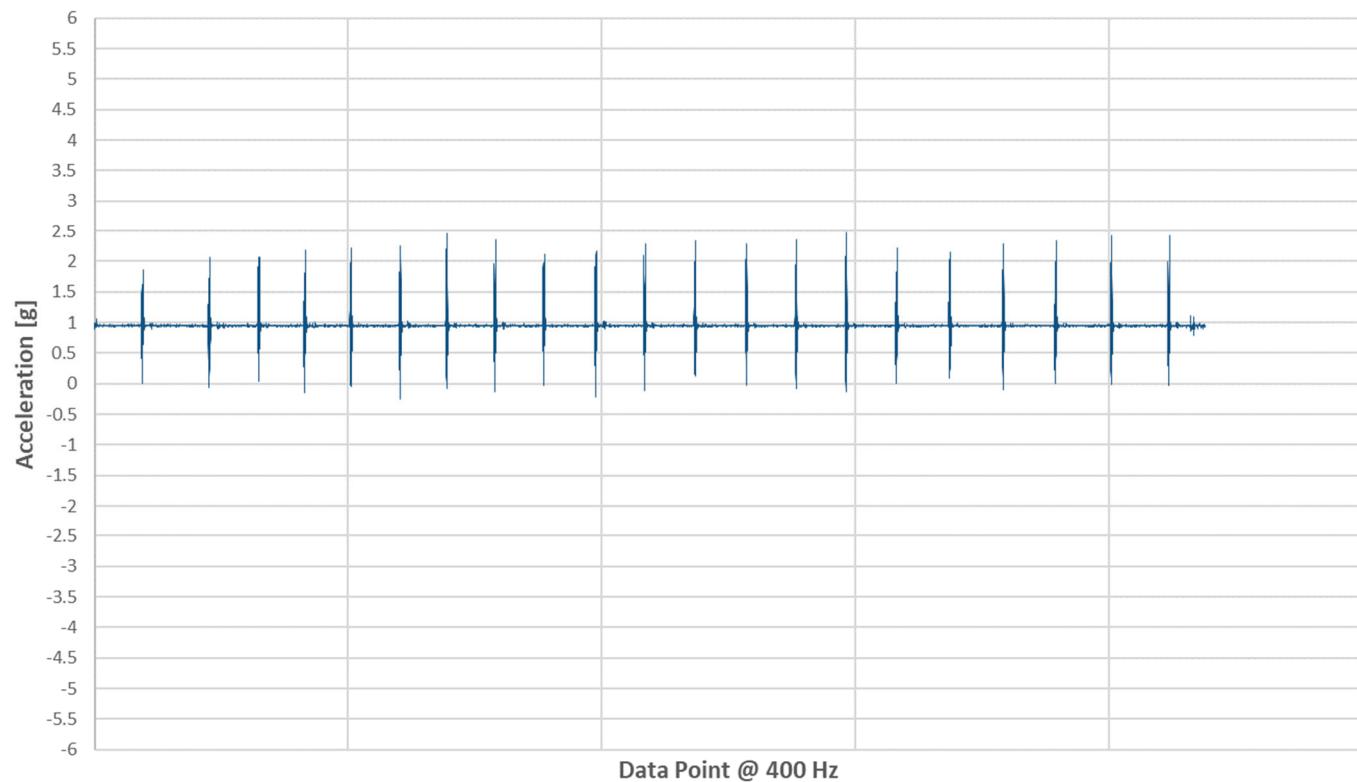




Y Acceleration (Head to Toe) - Full Moon



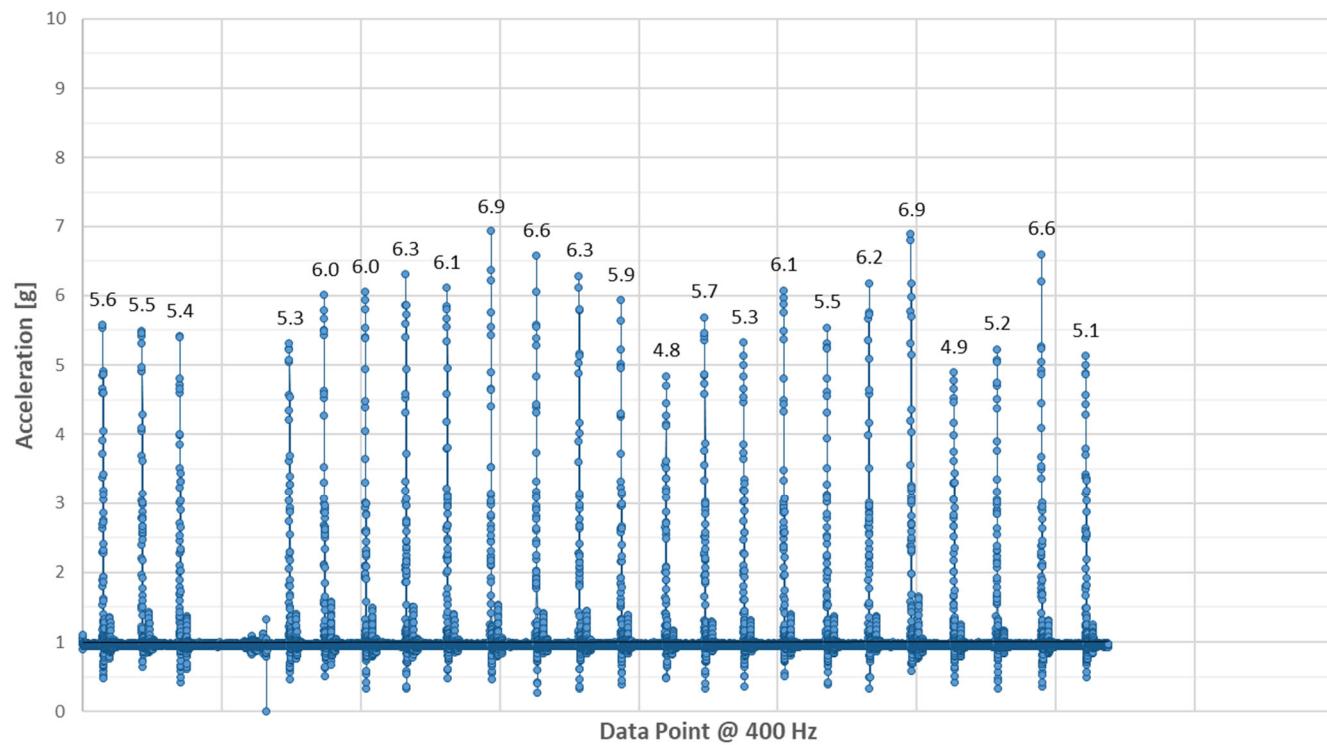
Z Acceleration (Up and Down) - Full Moon



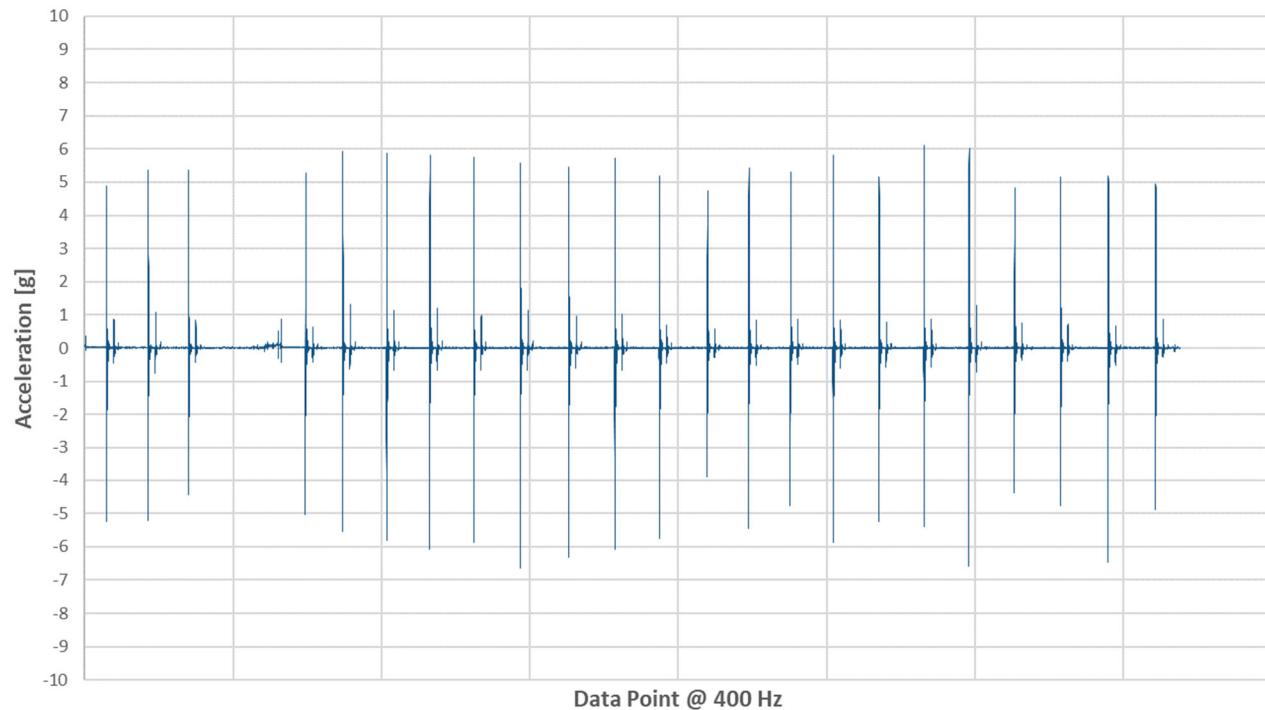


## TEST 3 – HELIX MIDNIGHT

Vector Magnitude Acceleration - Helix Midnight

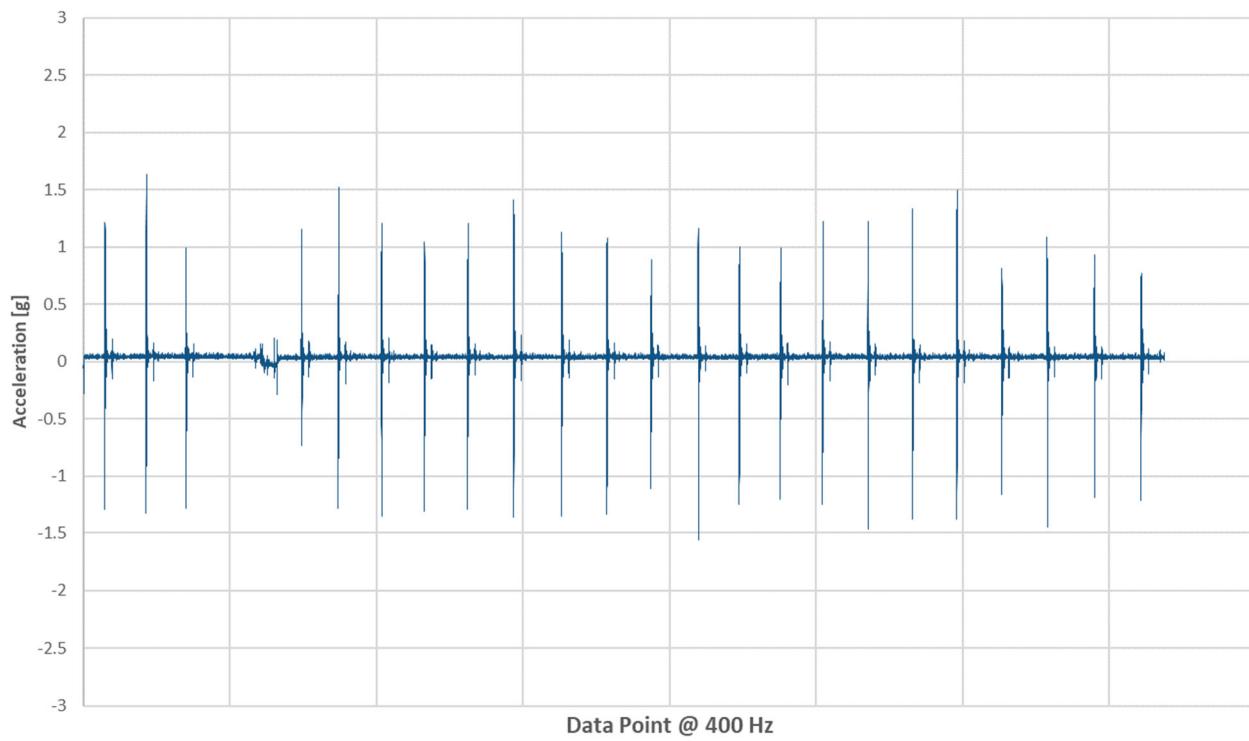


X Acceleration (Side to Side) - Helix Midnight

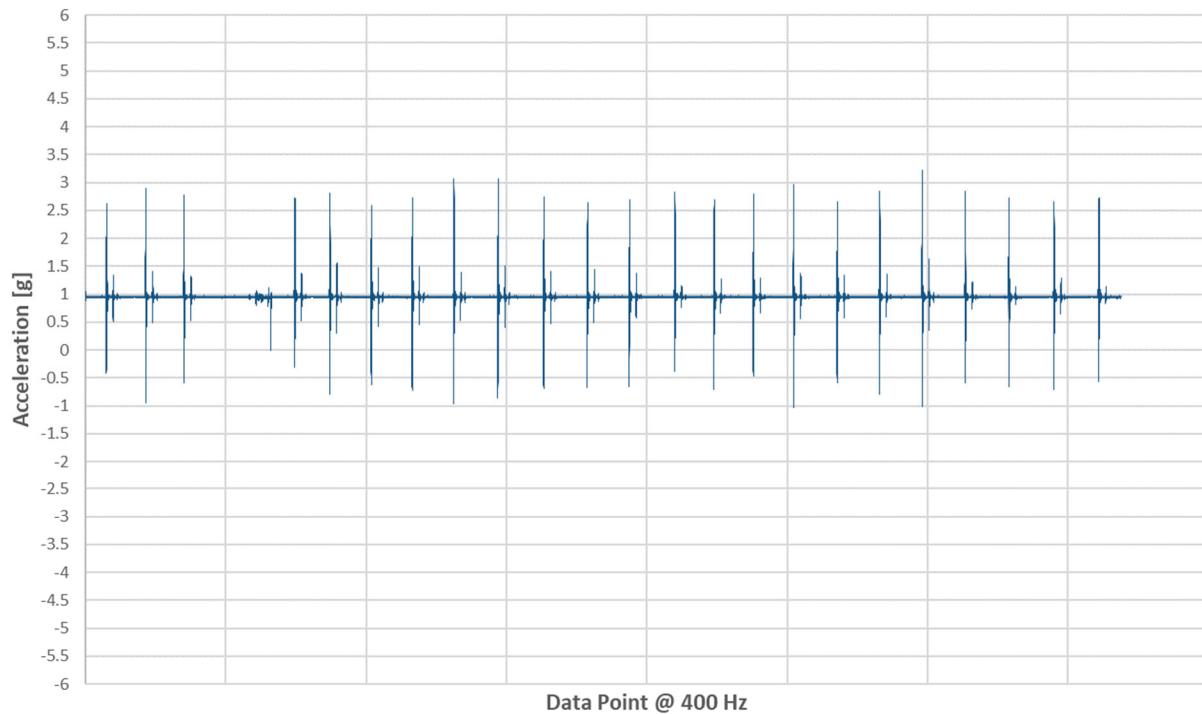


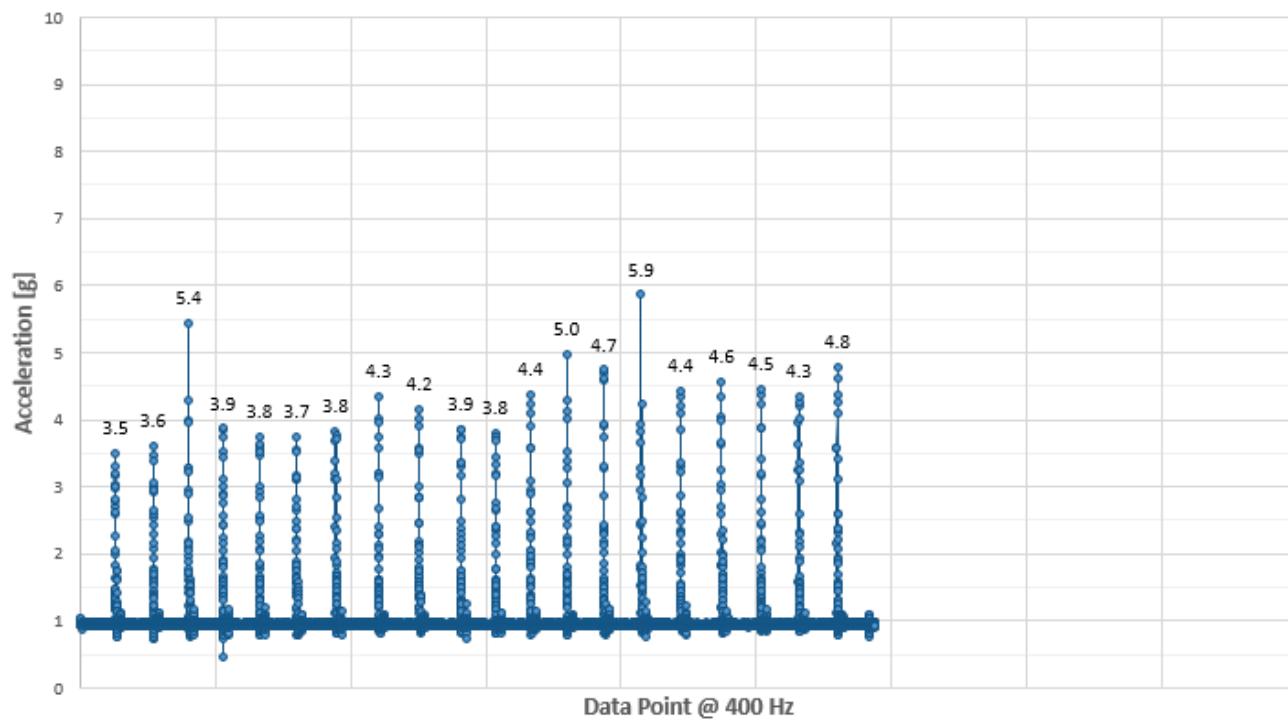
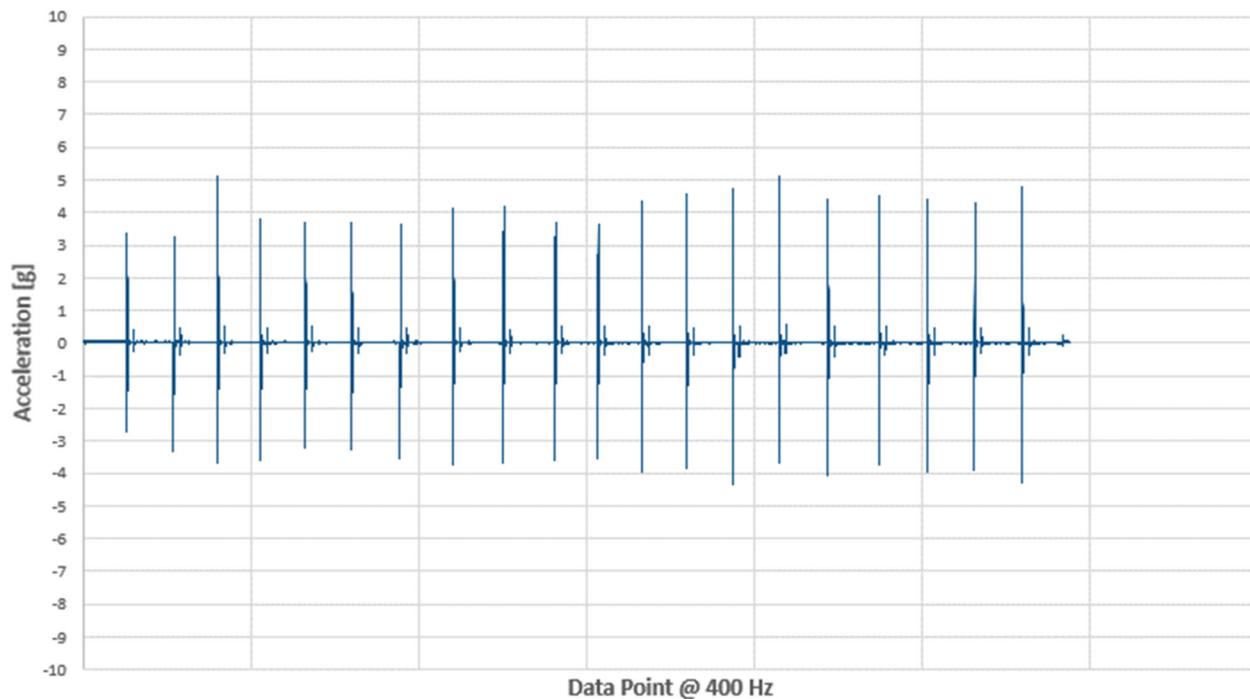


Y Acceleration (Head to Toe) - Helix Midnight



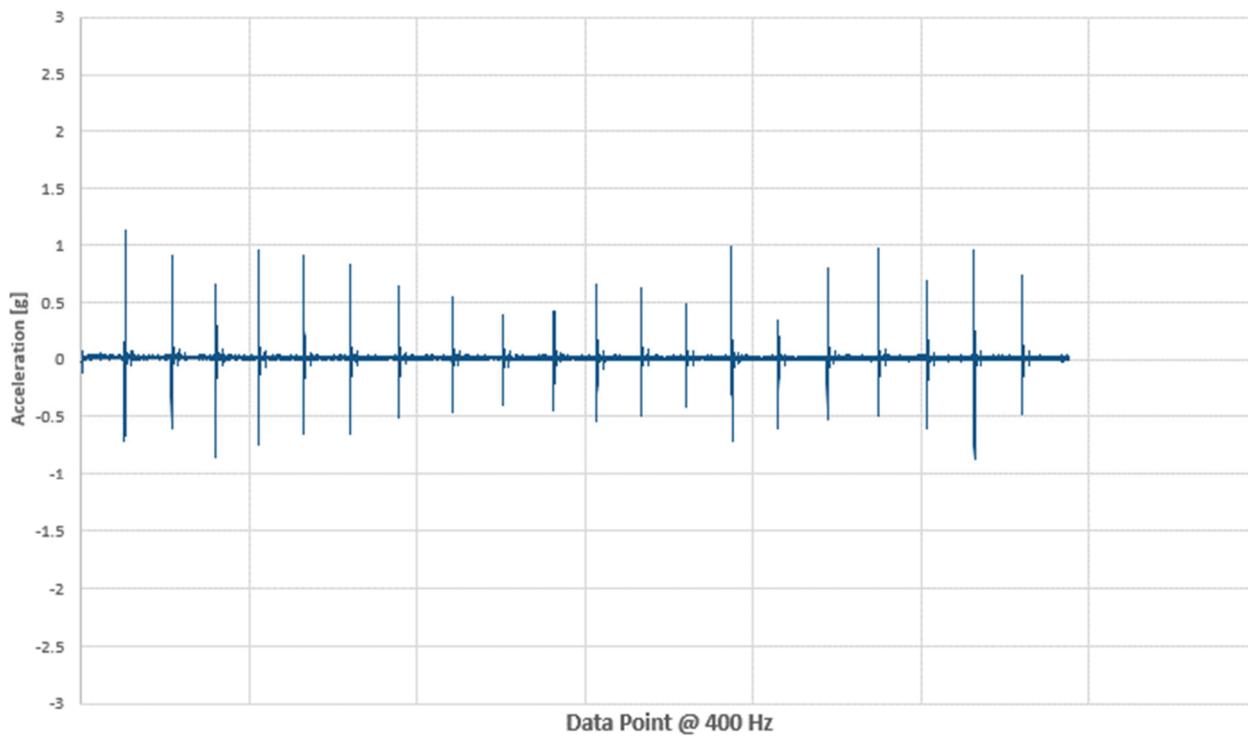
Z Acceleration (Up and Down) - Helix Midnight



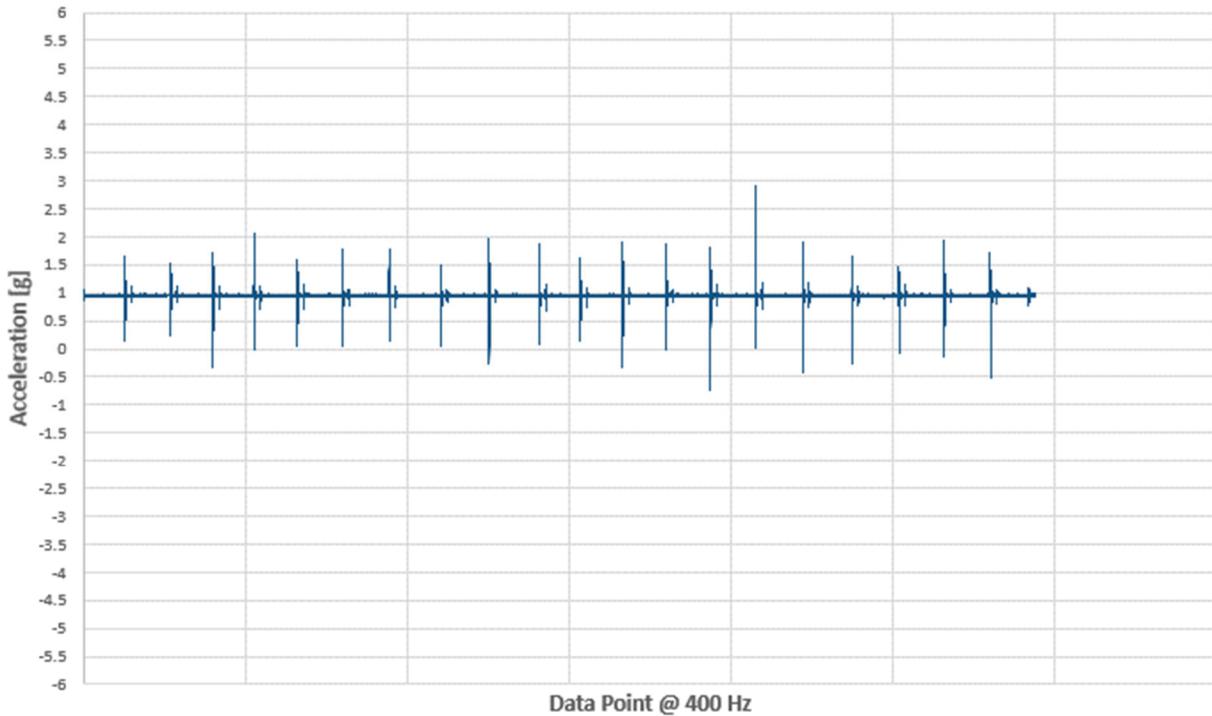
**TEST 3 – LULL****Vector Magnitude Acceleration - Lull****X Acceleration (Side to Side) - Lull**



Y Acceleration (Head to Toe) - Lull



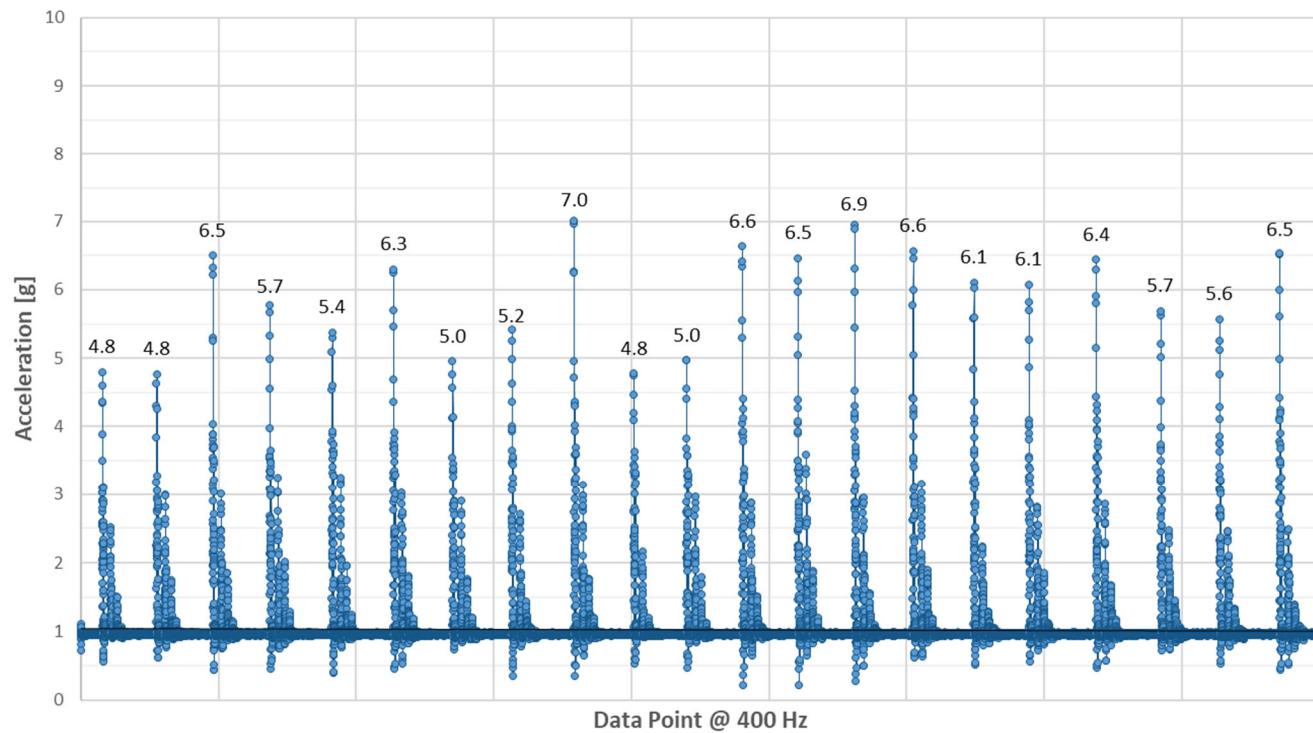
Z Acceleration (Up and Down) - Lull



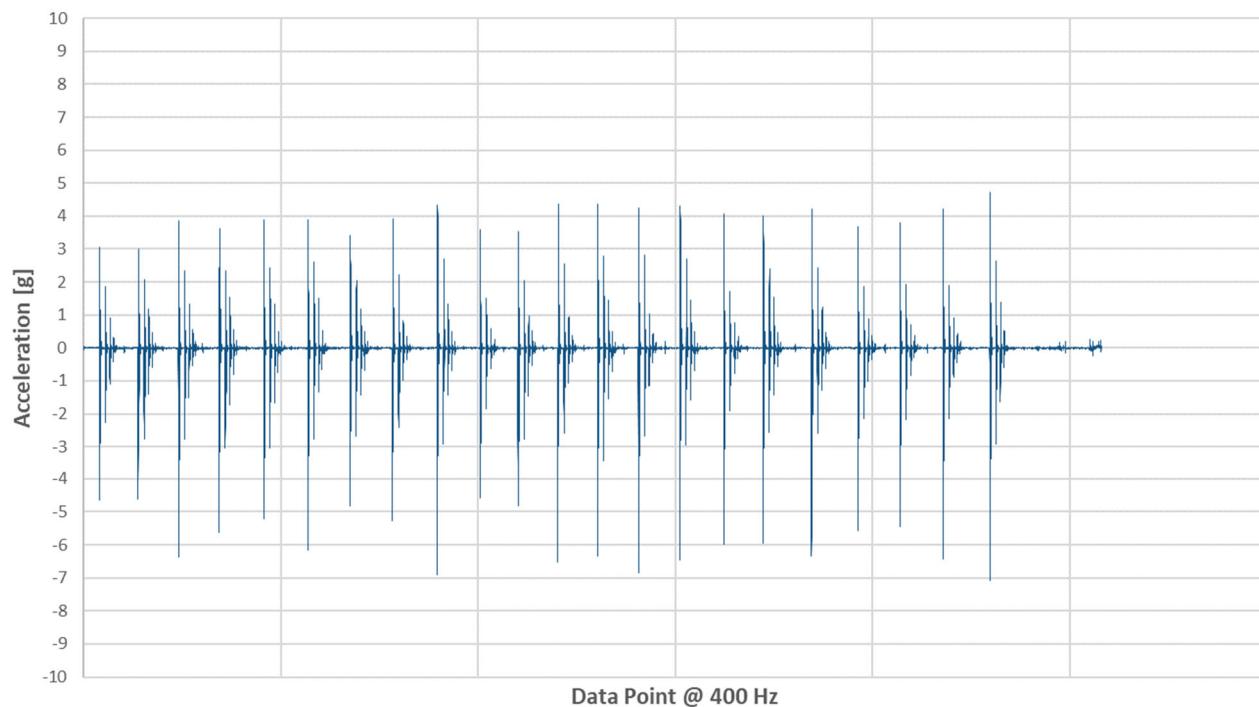


## TEST 3 – PURPLE HYBRID

Vector Magnitude Acceleration - Purple Hybrid

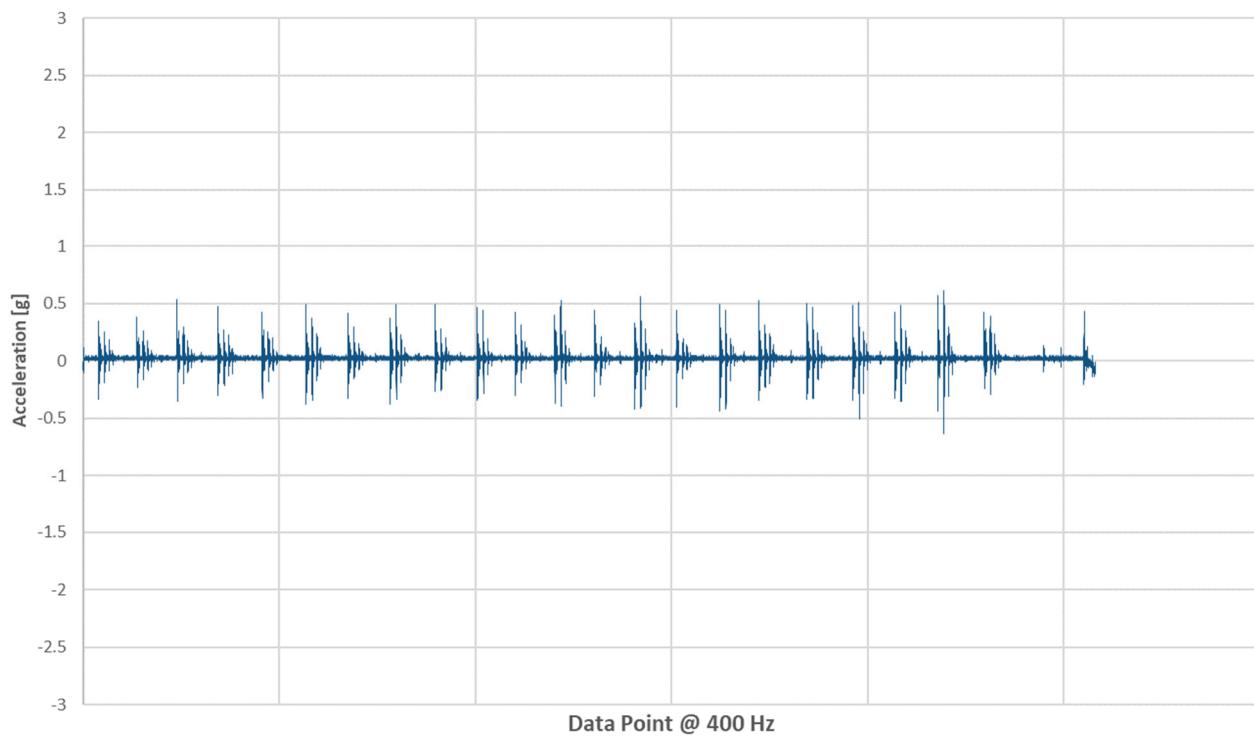


X Acceleration (Side to Side) - Purple Hybrid

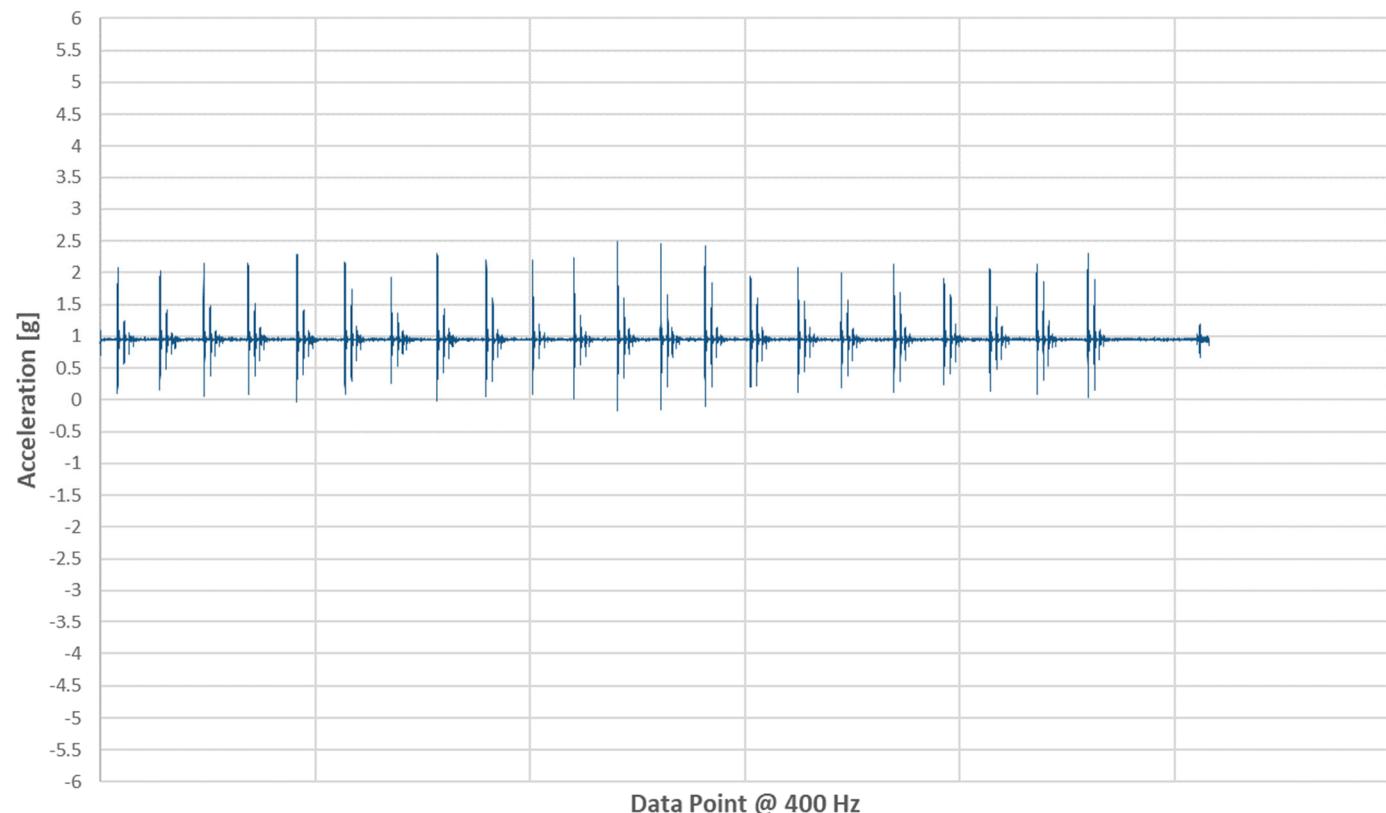




Y Acceleration (Head to Toe) - Purple Hybrid



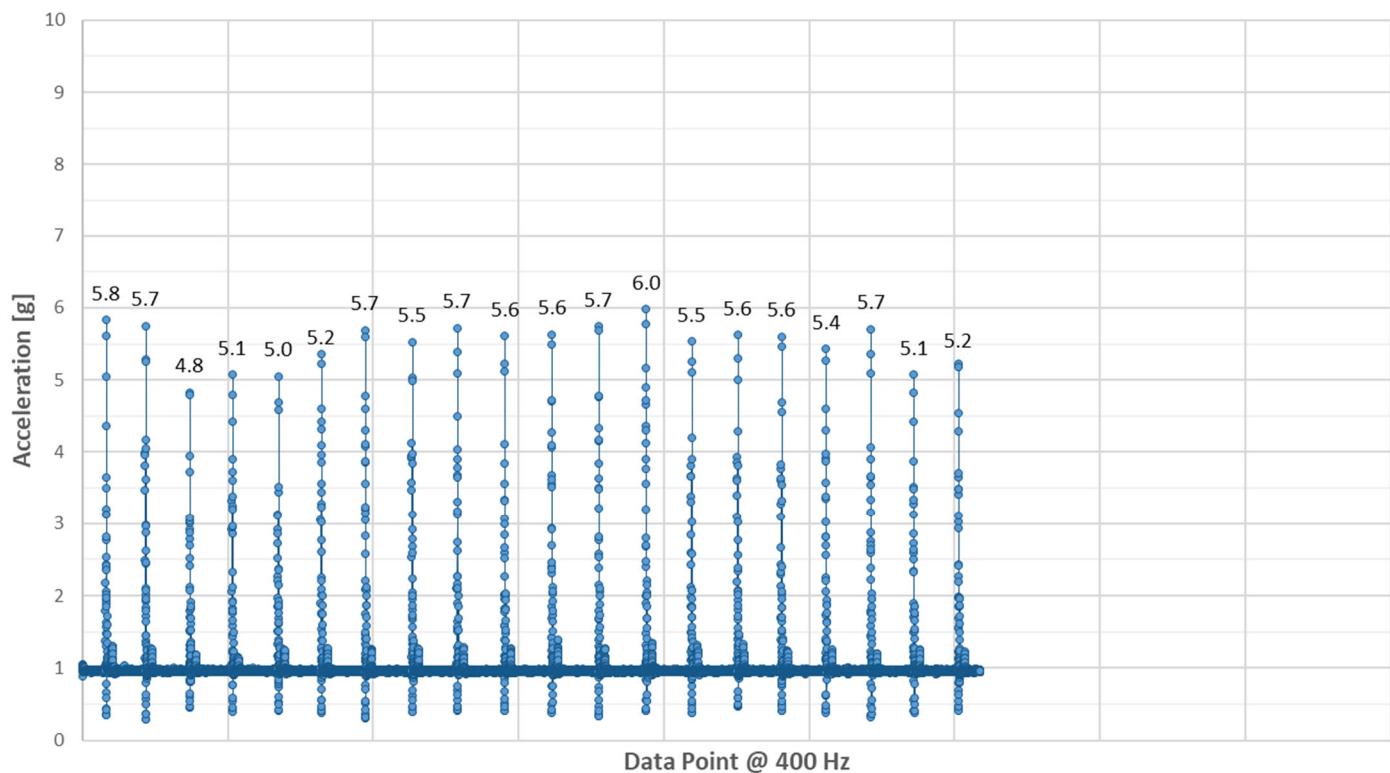
Z Acceleration (Up and Down) - Purple Hybrid



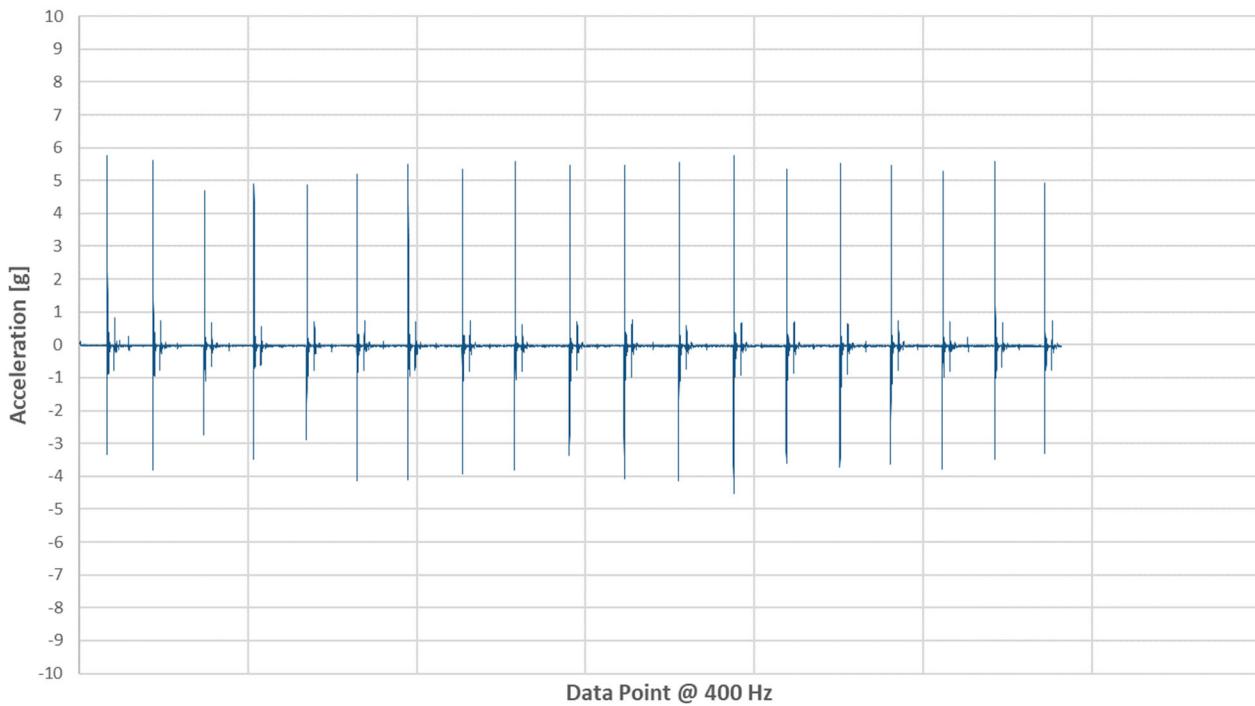


## TEST 3 – PURPLE PLUS

Vector Magnitude Acceleration - Purple Plus

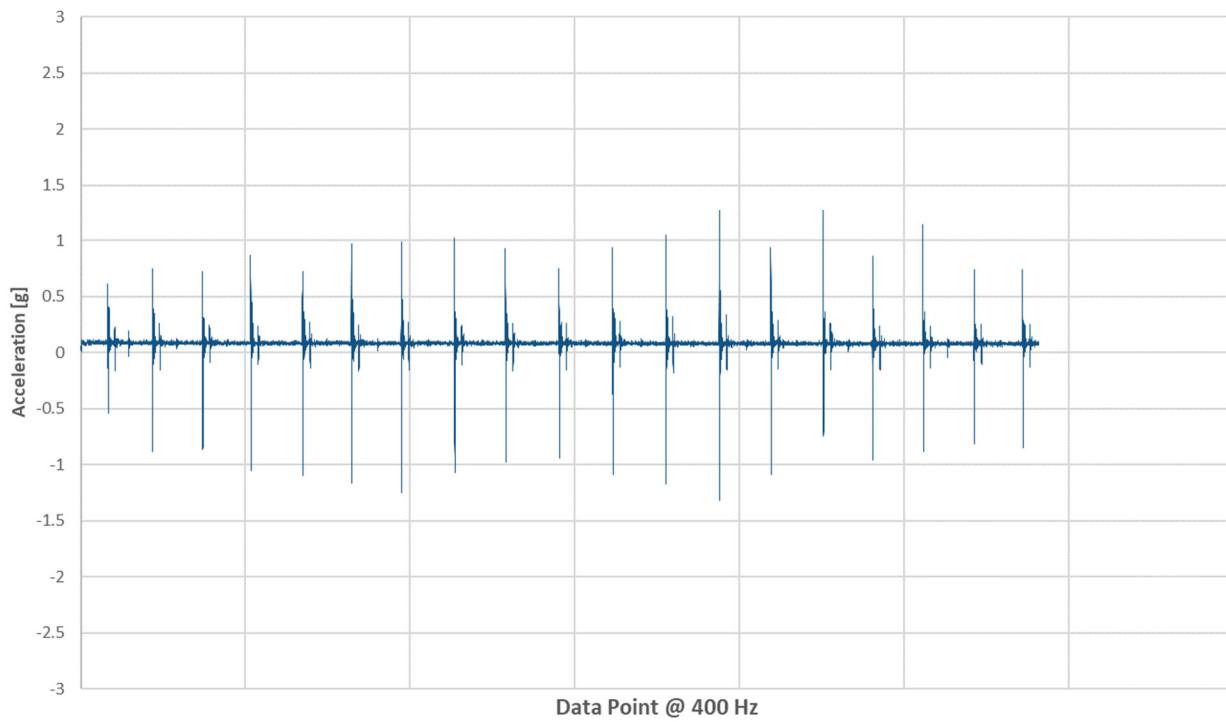


X Acceleration (Side to Side) - Purple Plus

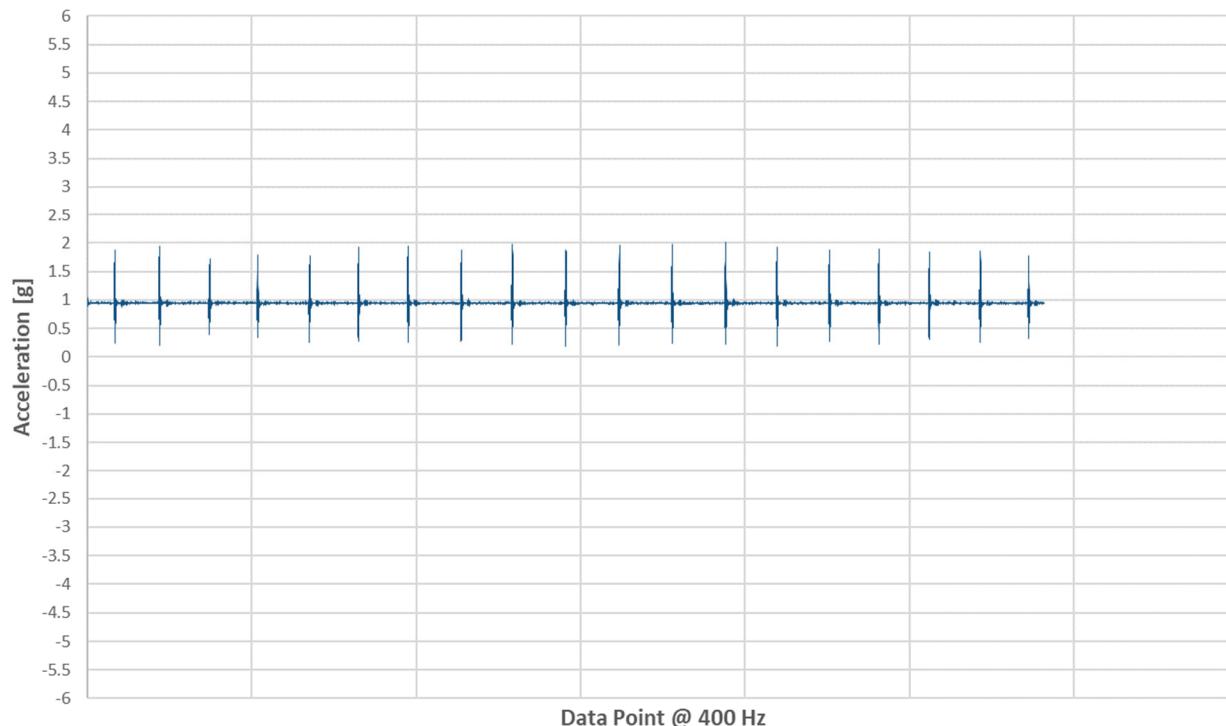




Y Acceleration (Head to Toe) - Purple Plus



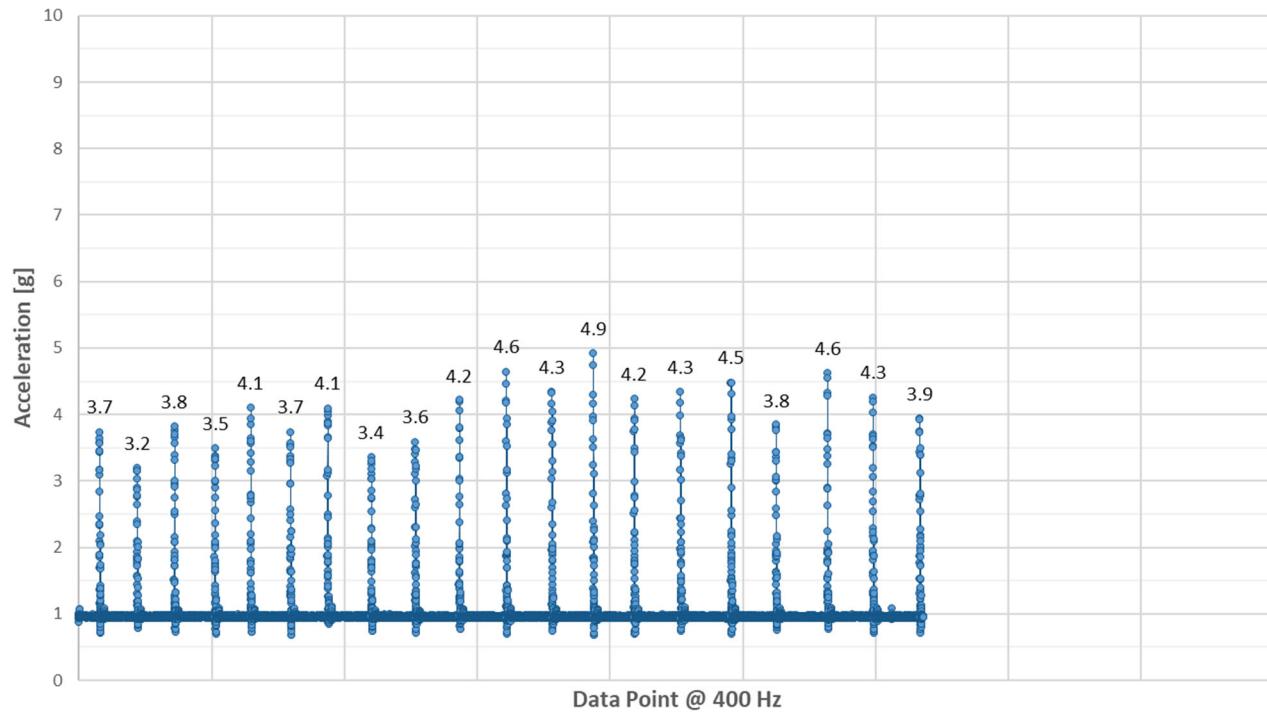
Z Acceleration (Up and Down) - Purple Plus



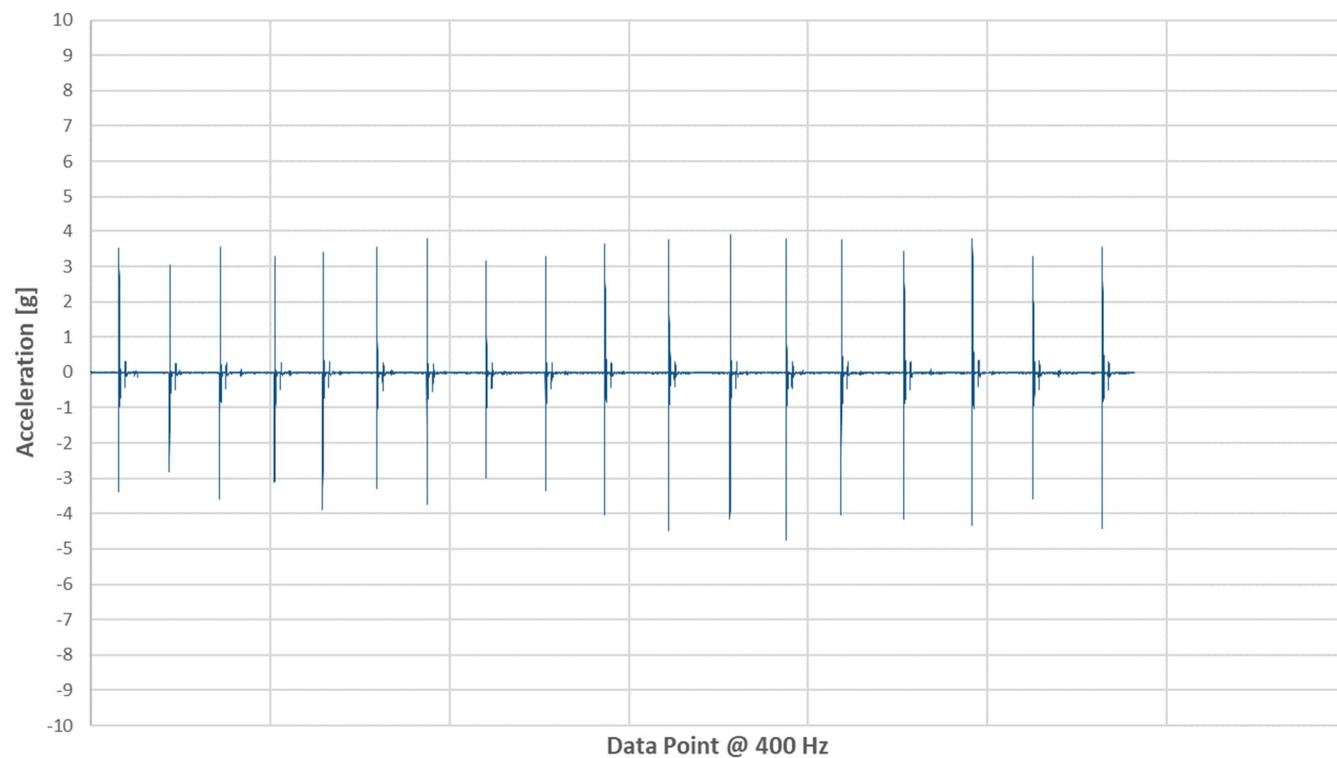


## TEST 3 – SILK & SNOW (V2)

Vector Magnitude Acceleration - Silk & Snow (V2)

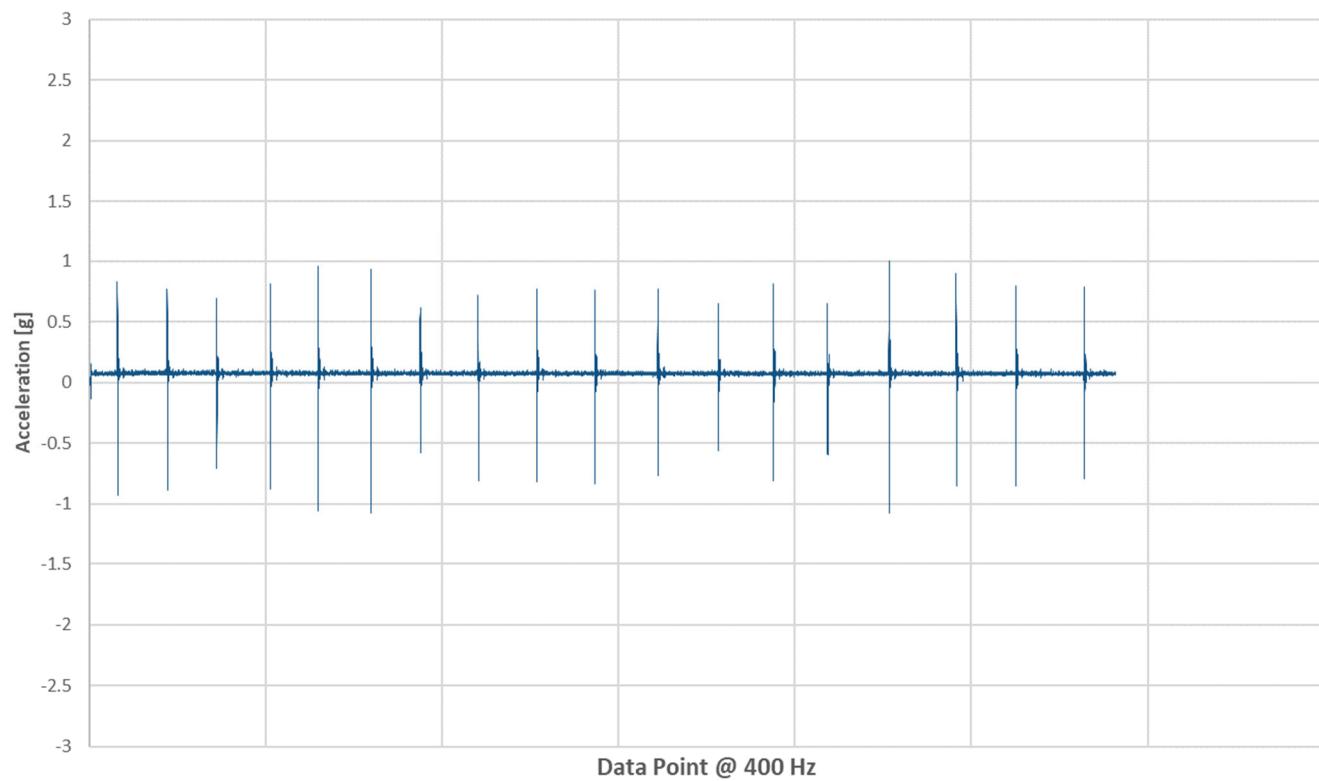


X Acceleration (Side to Side) - Silk & Snow (V2)

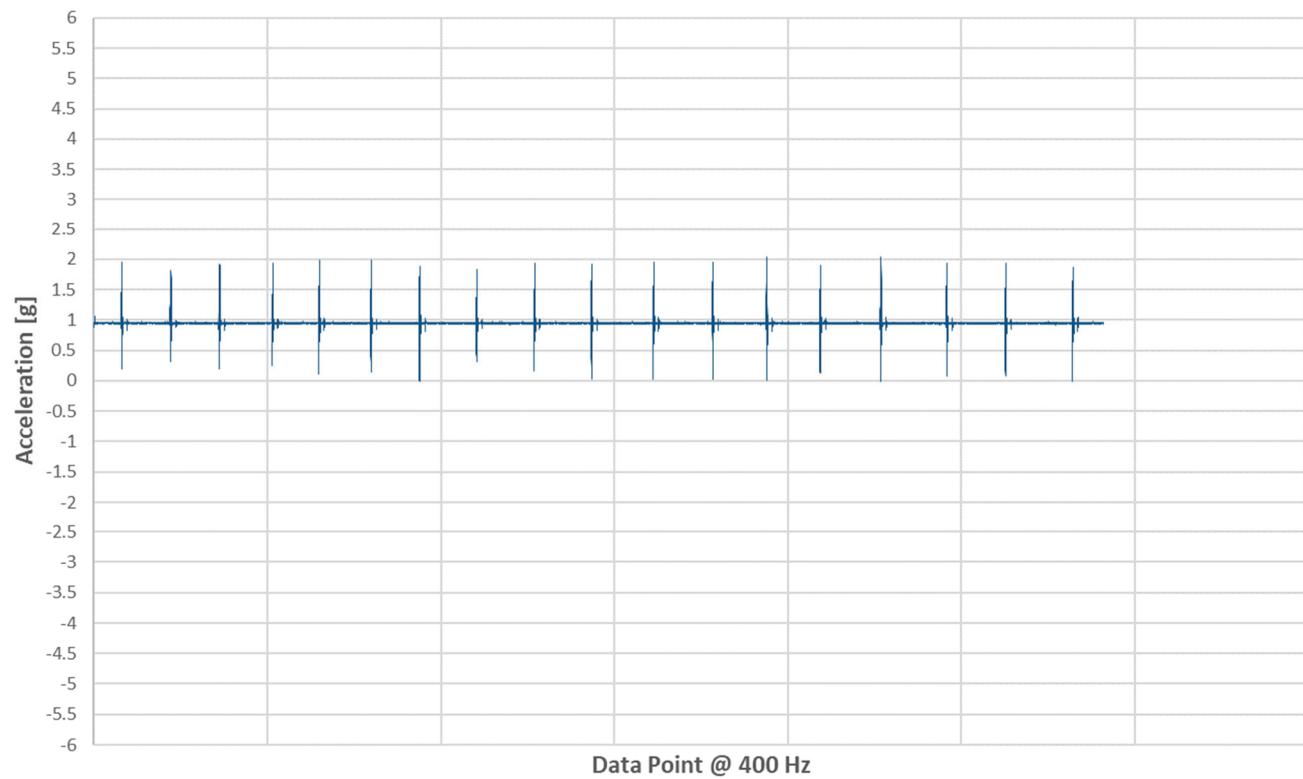




Y Acceleration (Head to Toe) - Silk & Snow (V2)



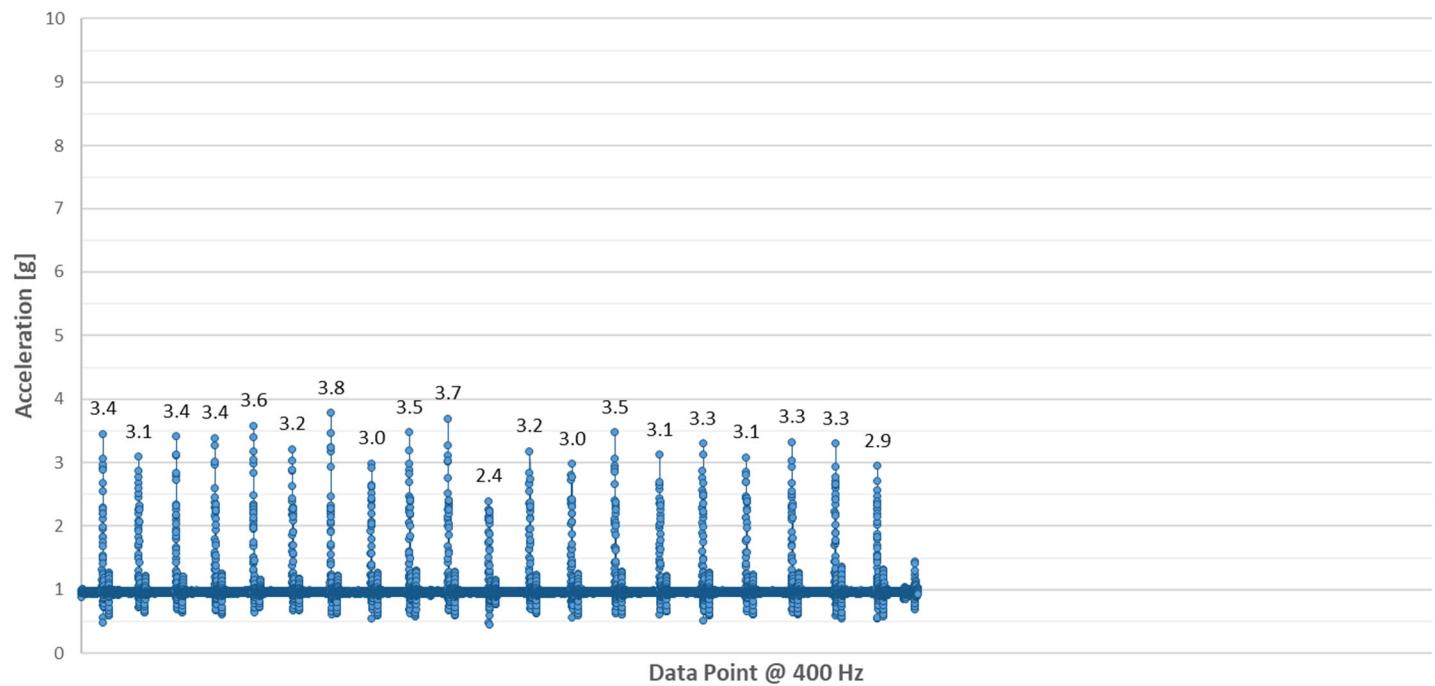
Z Acceleration (Up and Down) - Silk & Snow (V2)



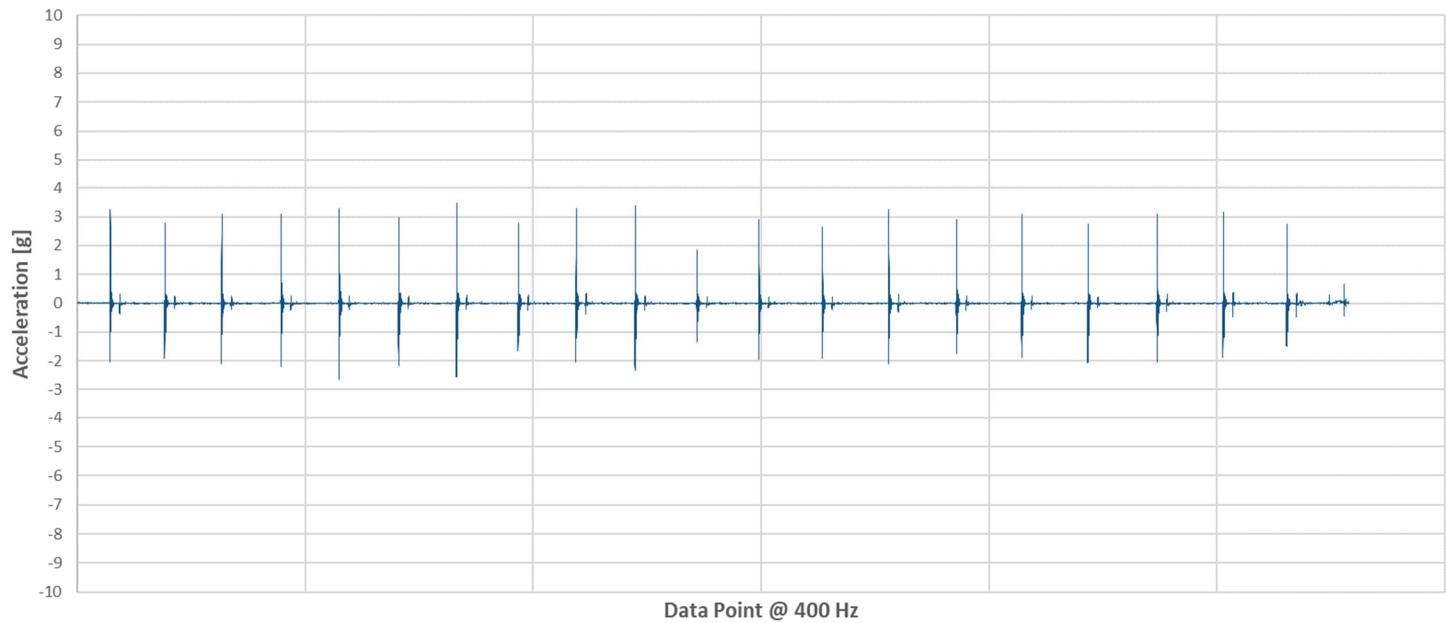


## TEST 3 – SILK & SNOW HYBRID (V2)

Vector Magnitude Acceleration - Silk & Snow Hybrid (V2)

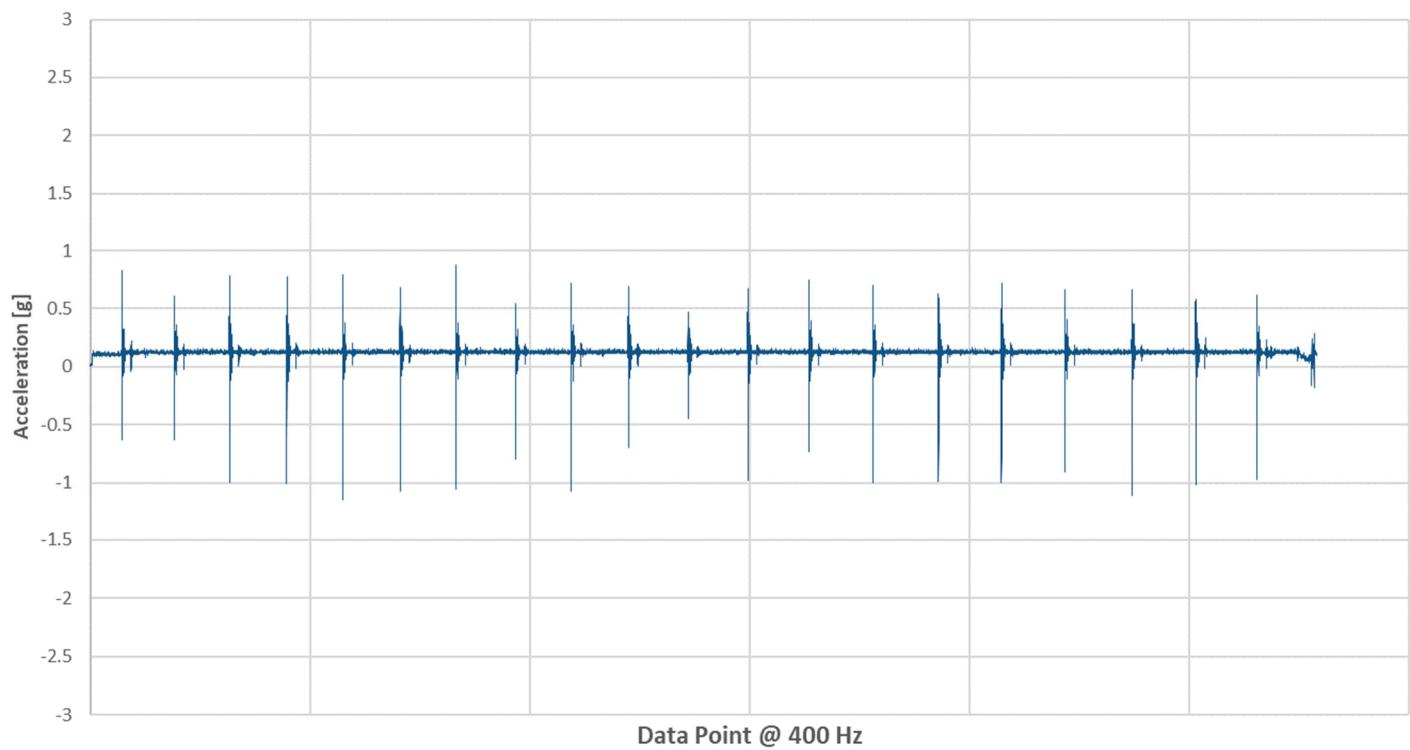


X Acceleration (Side to Side) - Silk & Snow Hybrid (V2)

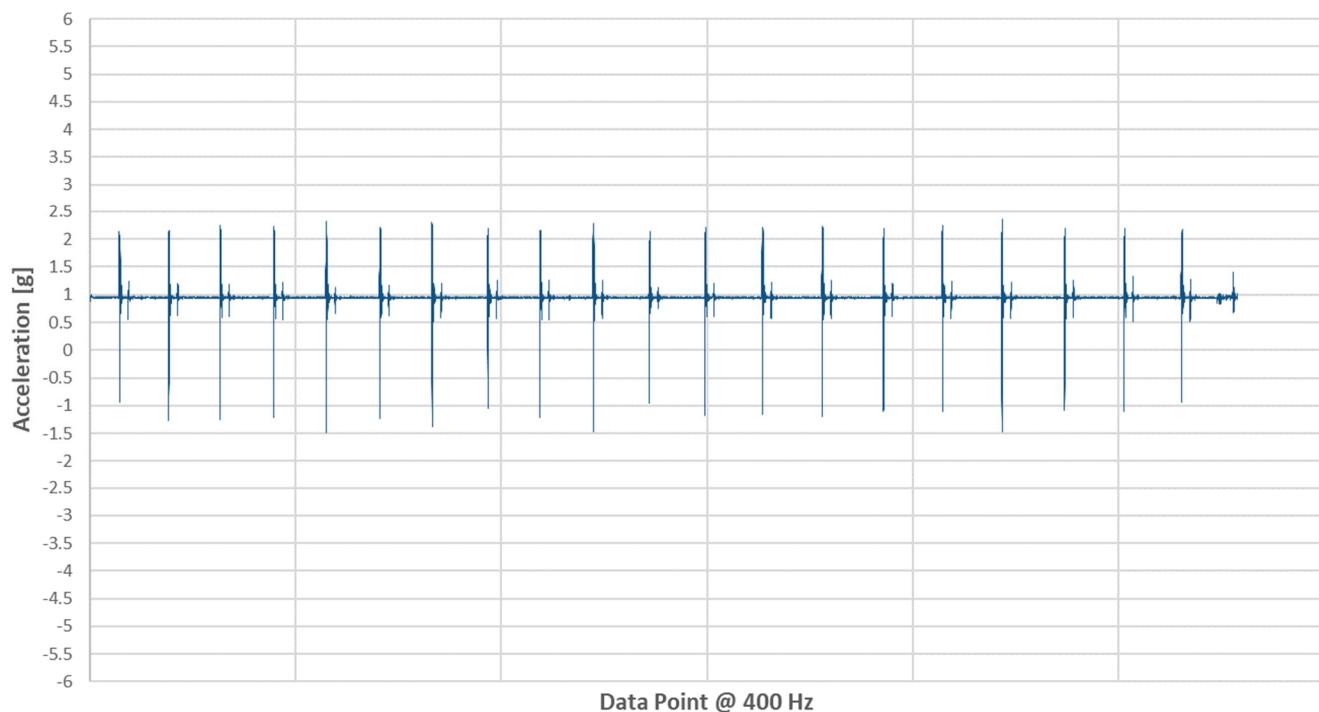




Y Acceleration (Head to Toe) - Silk & Snow Hybrid (V2)



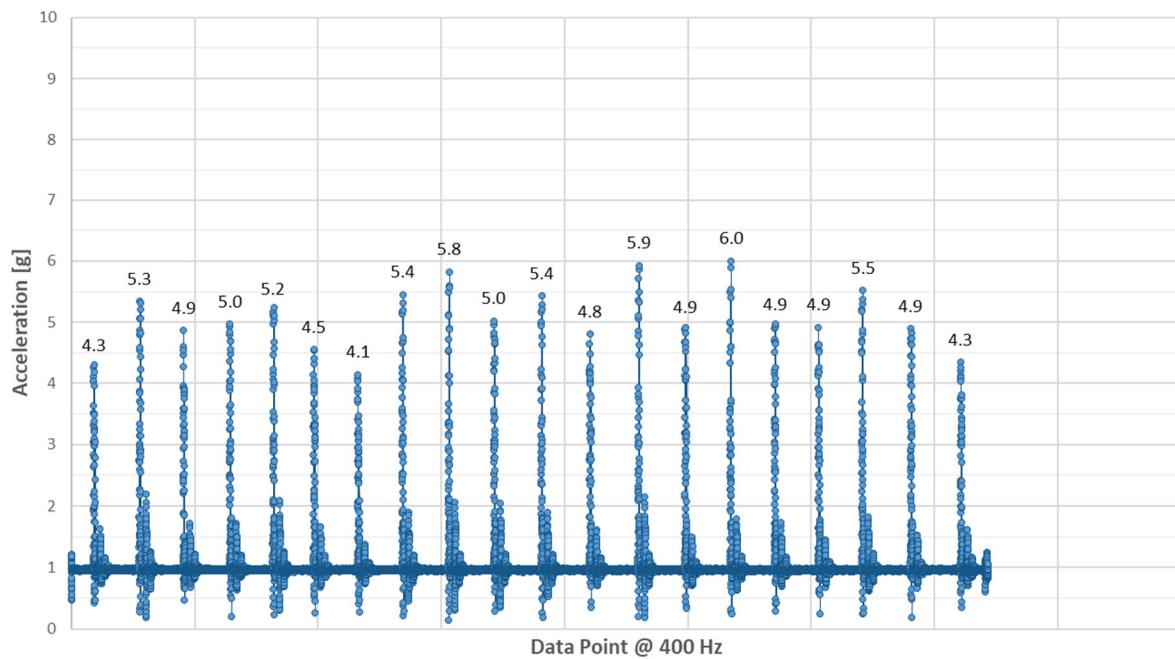
Z Acceleration (Up and Down) - Silk & Snow Hybrid (V2)



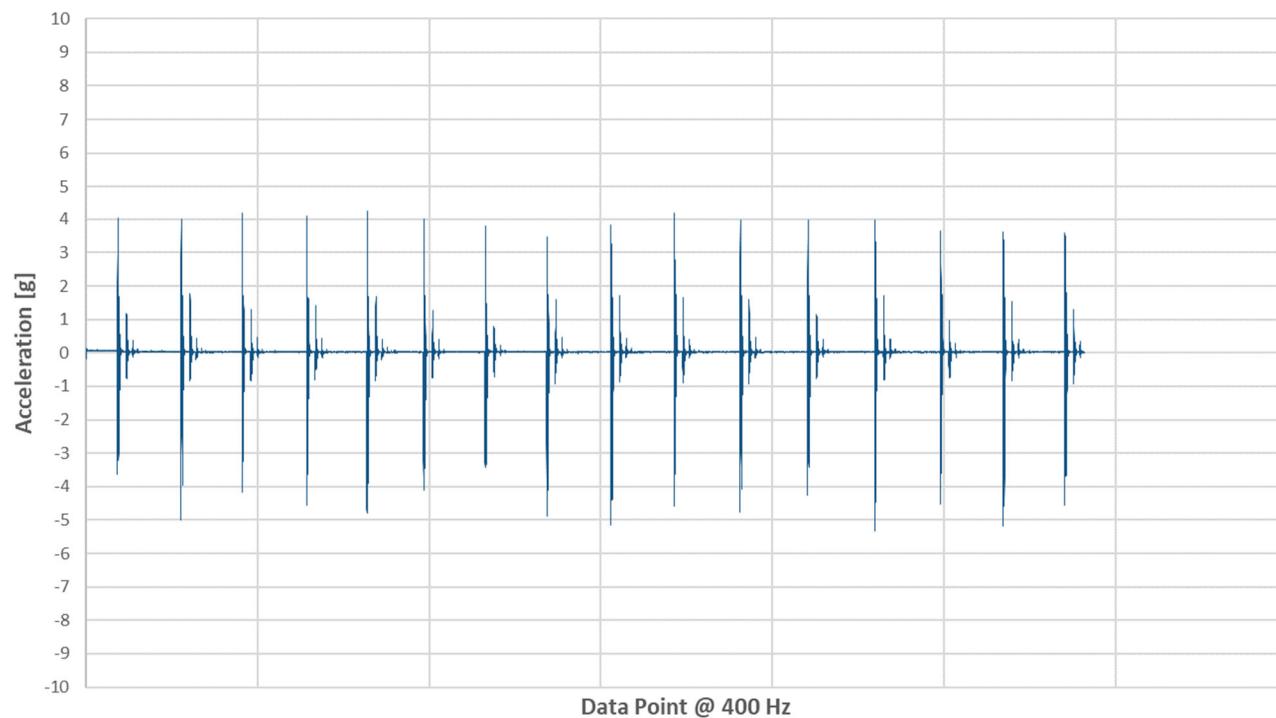


## TEST 3 – SILK & SNOW ORGANIC

Vector Magnitude Acceleration - Silk & Snow Organic

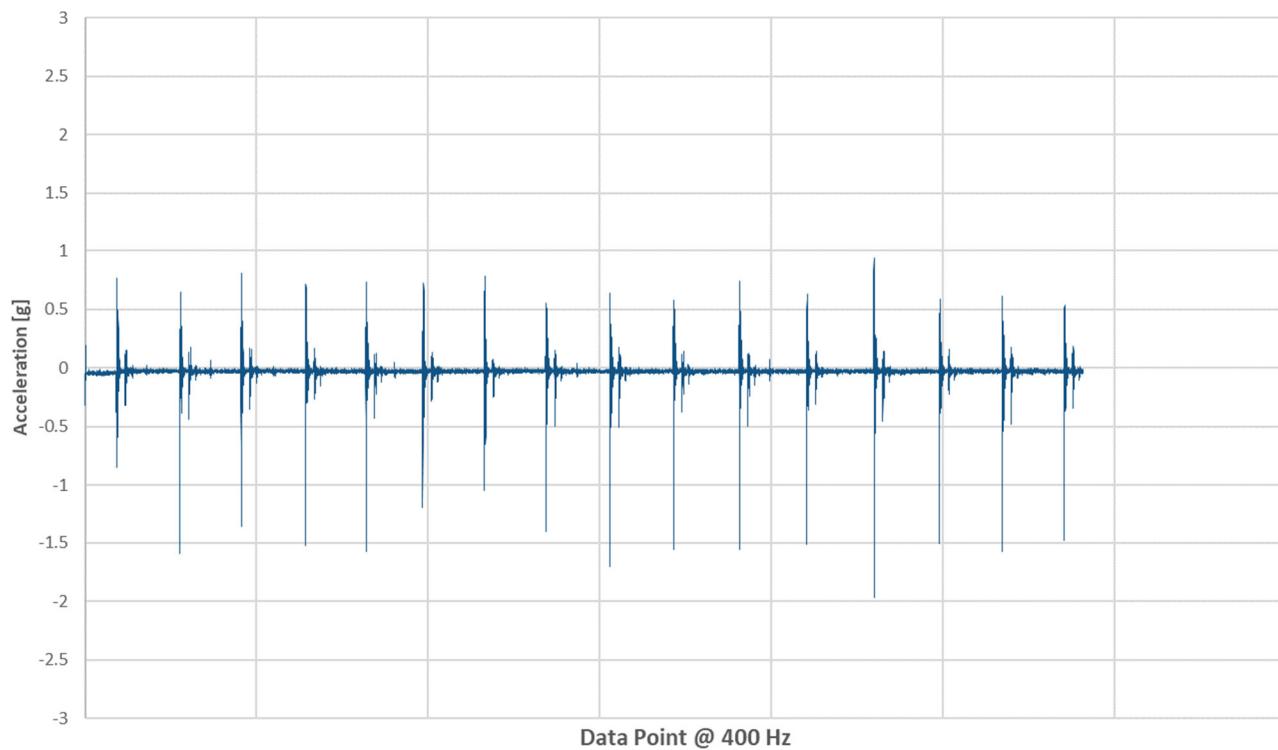


X Acceleration (Side to Side) - Silk & Snow Organic

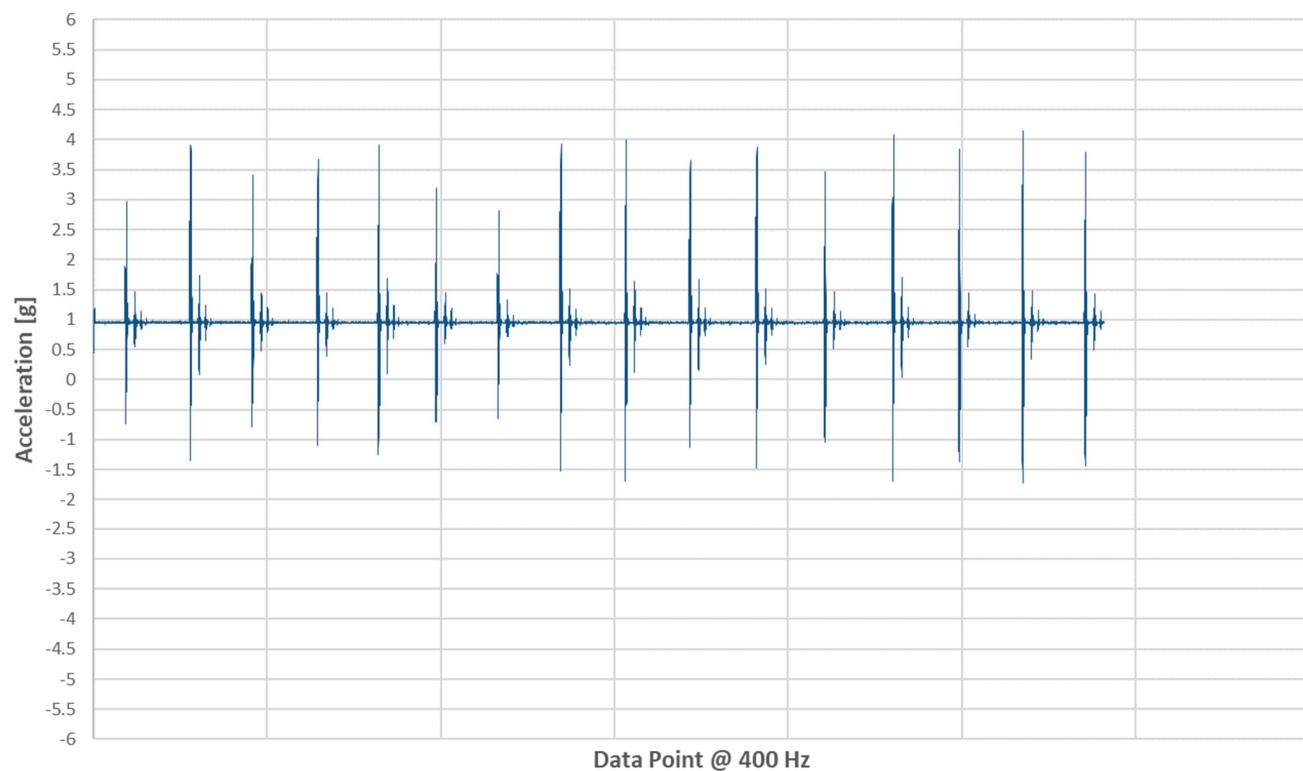




Y Acceleration (Head to Toe) - Silk & Snow Organic

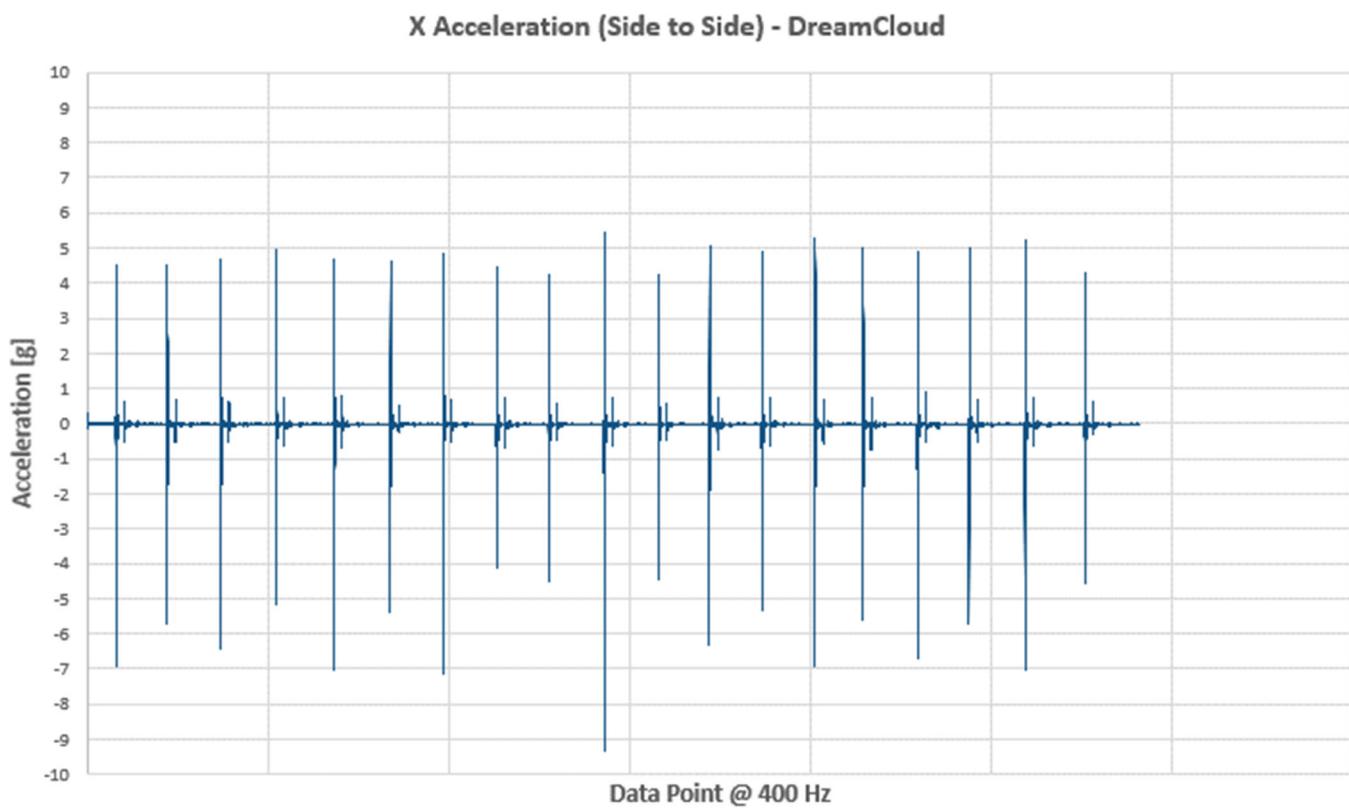
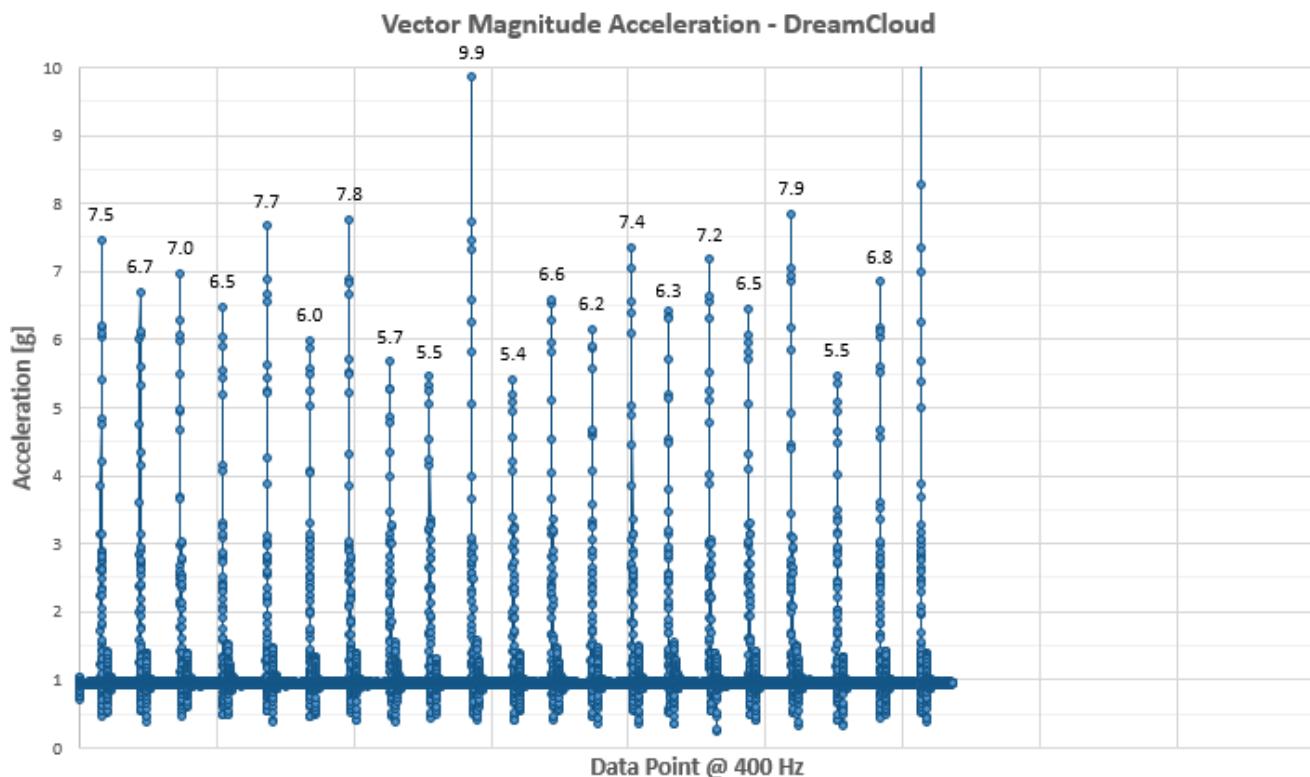


Z Acceleration (Up and Down) - Silk & Snow Organic



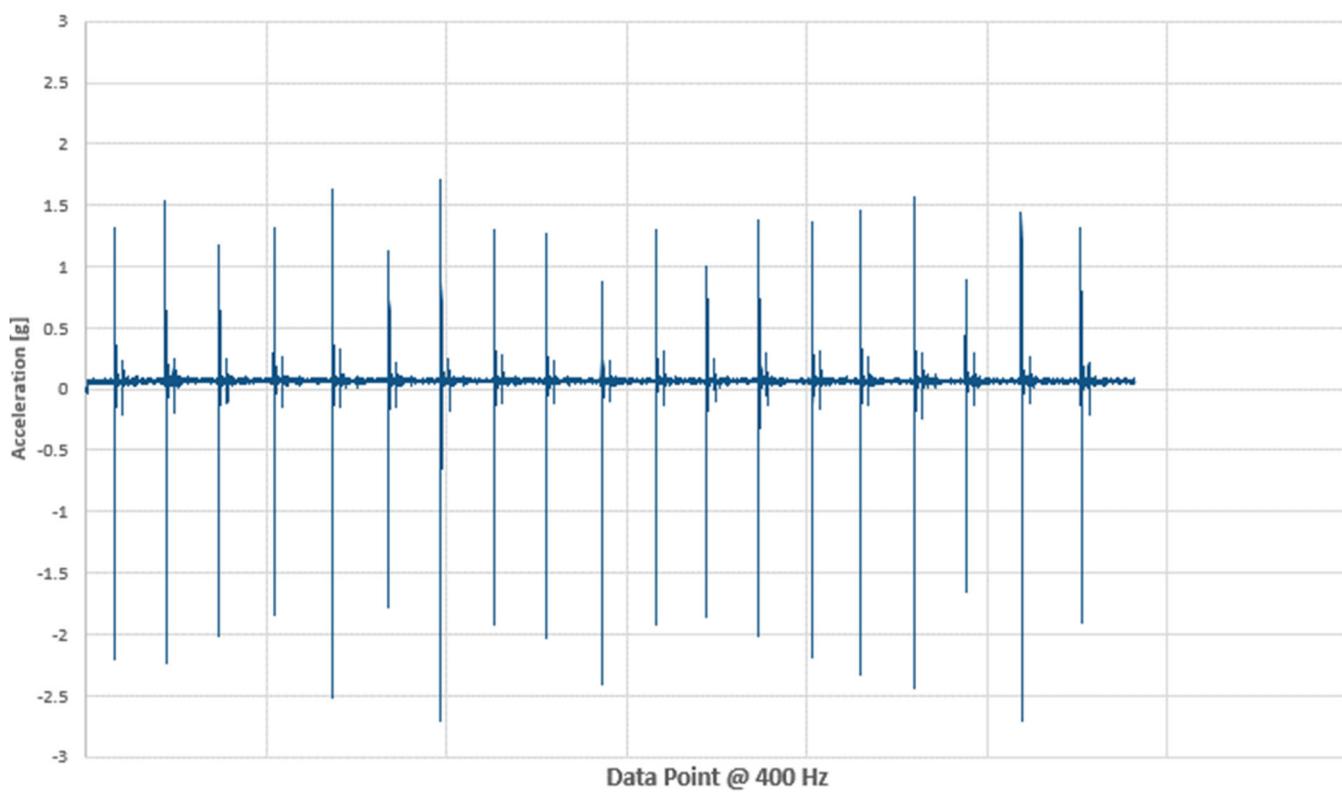


## TEST 3 – DREAMCLOUD

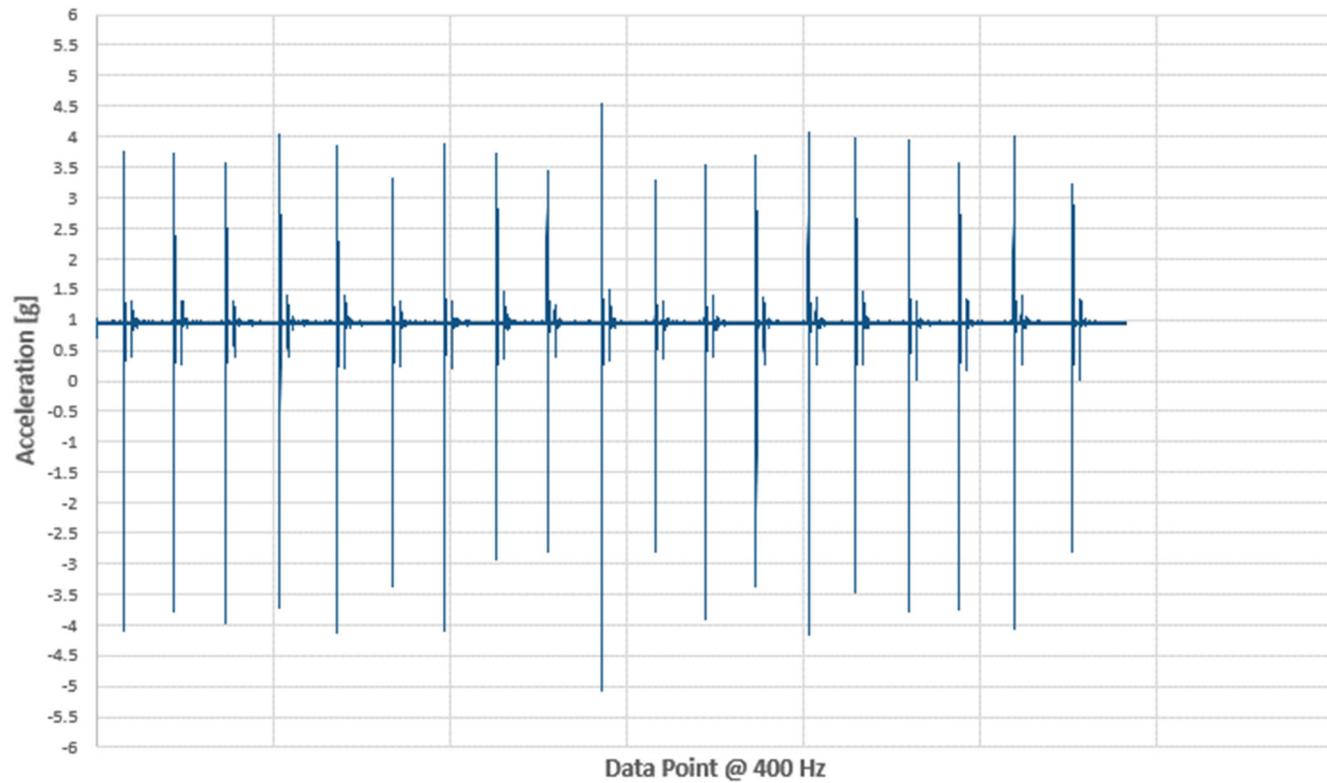




Y Acceleration (Head to Toe) - DreamCloud

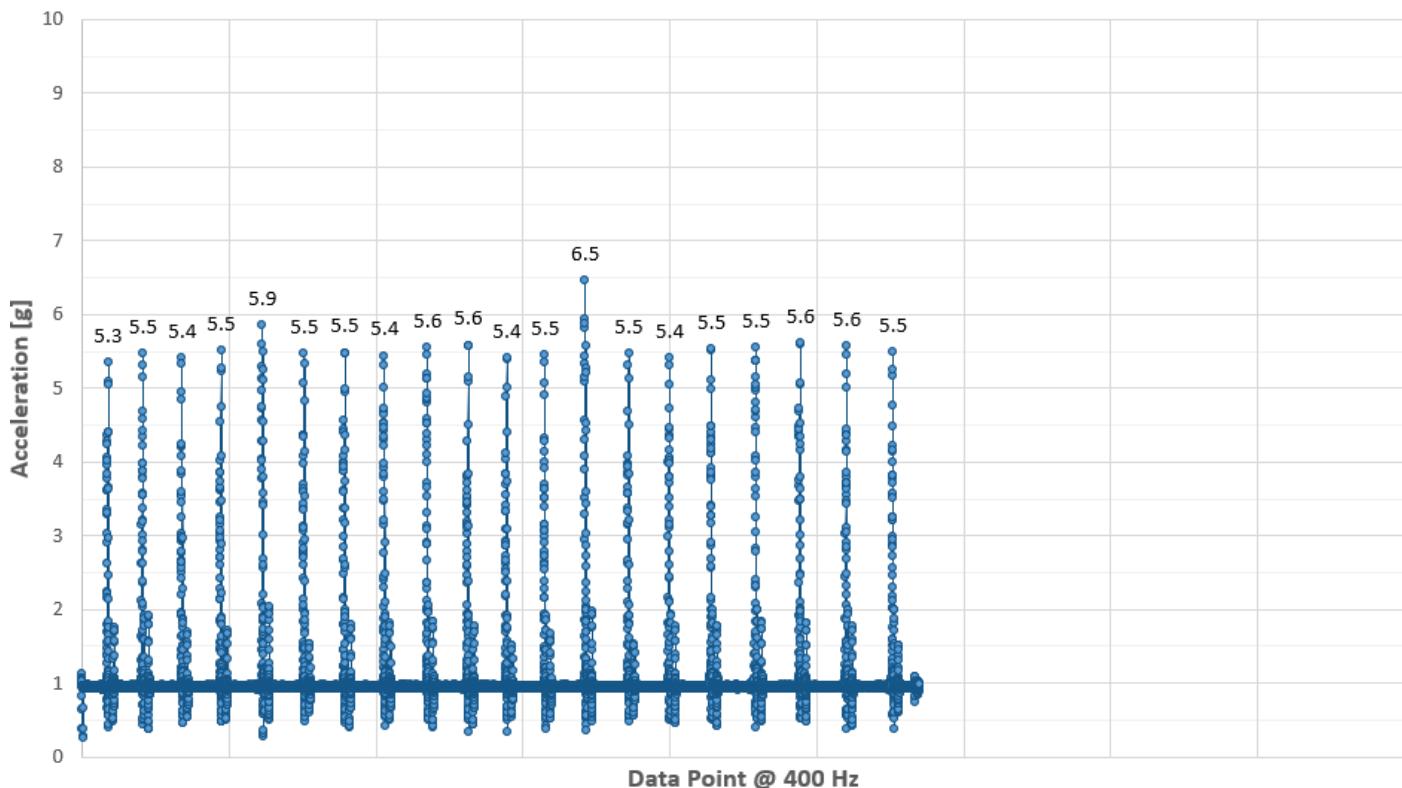


Z Acceleration (Up and Down) - DreamCloud

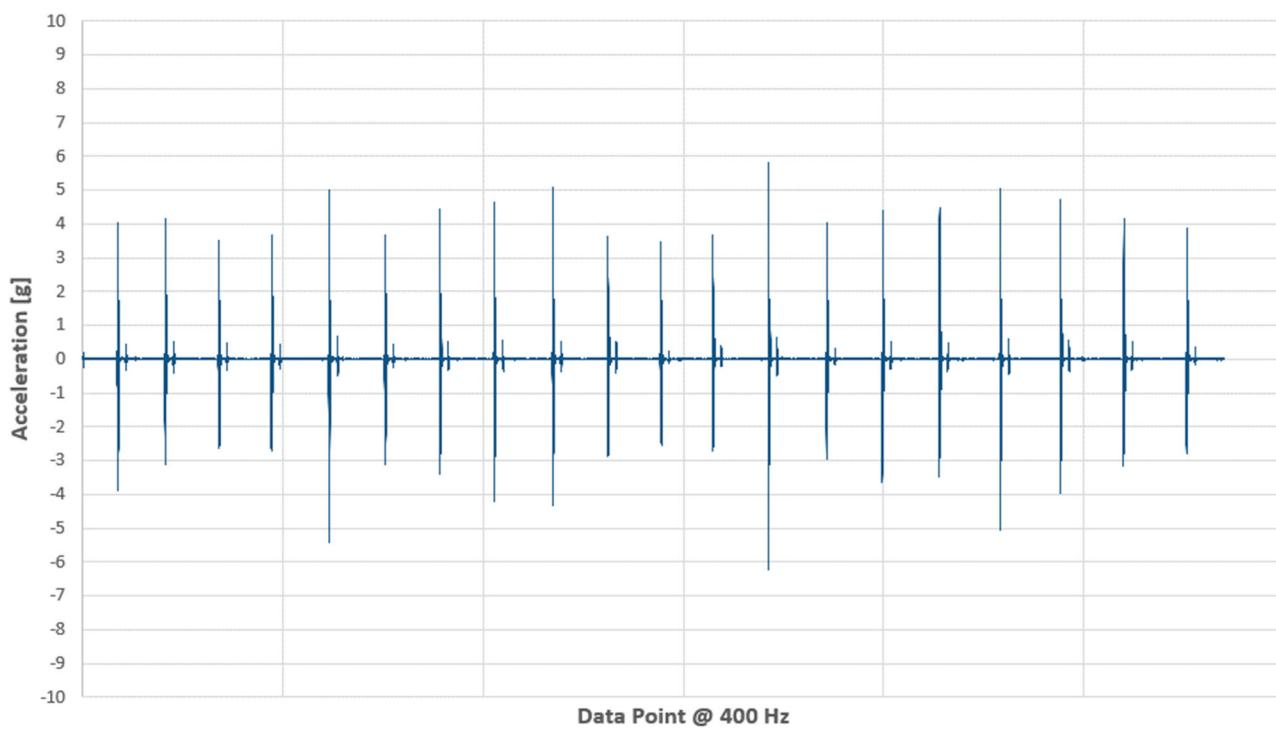


## TEST 3 – WINKBED

Vector Magnitude Acceleration - WinkBed

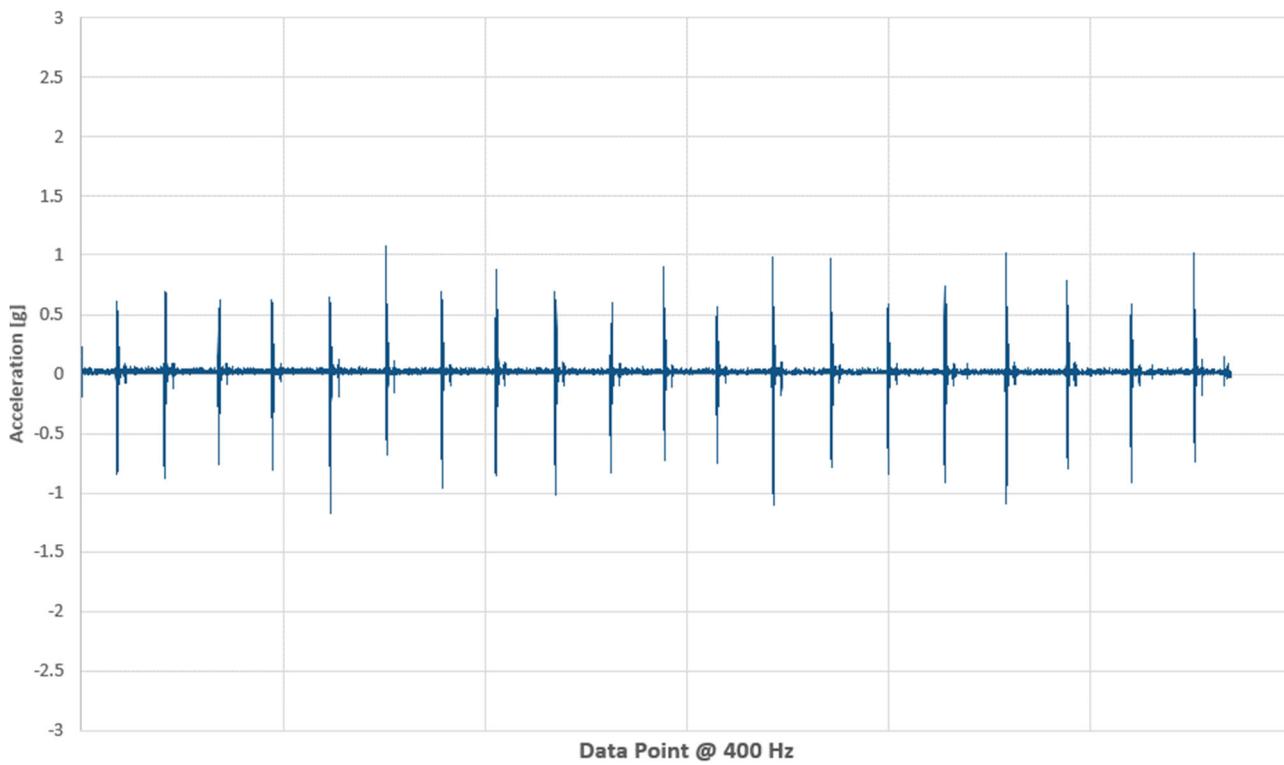


X Acceleration (Side to Side) - WinkBed

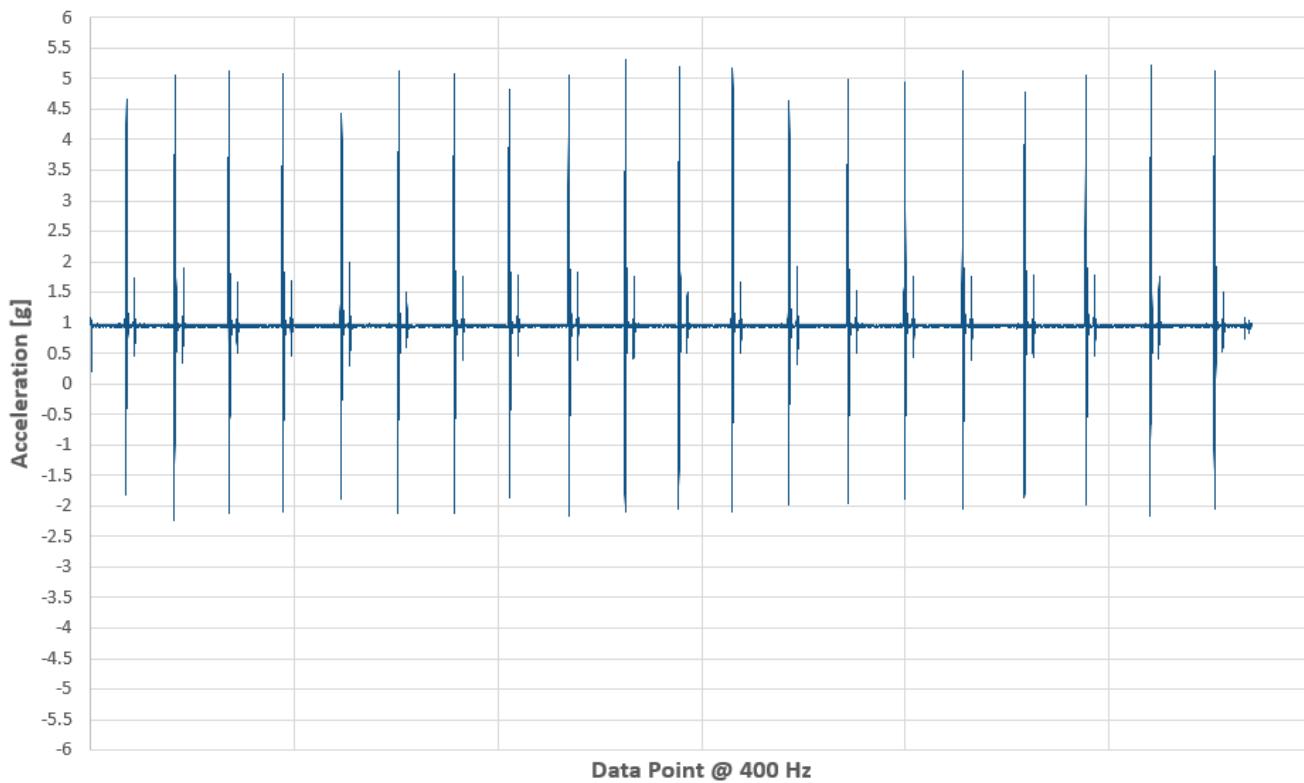




Y Acceleration (Head to Toe) - WinkBed



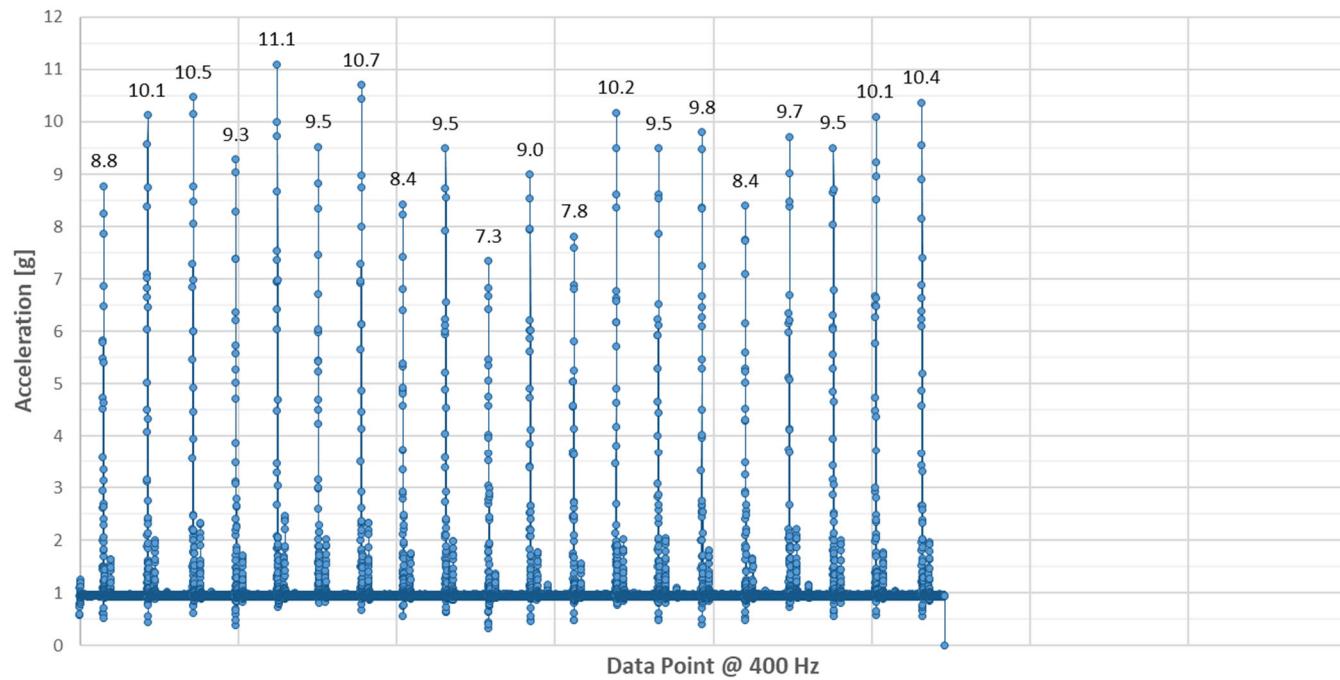
Z Acceleration (Up and Down) - WinkBed



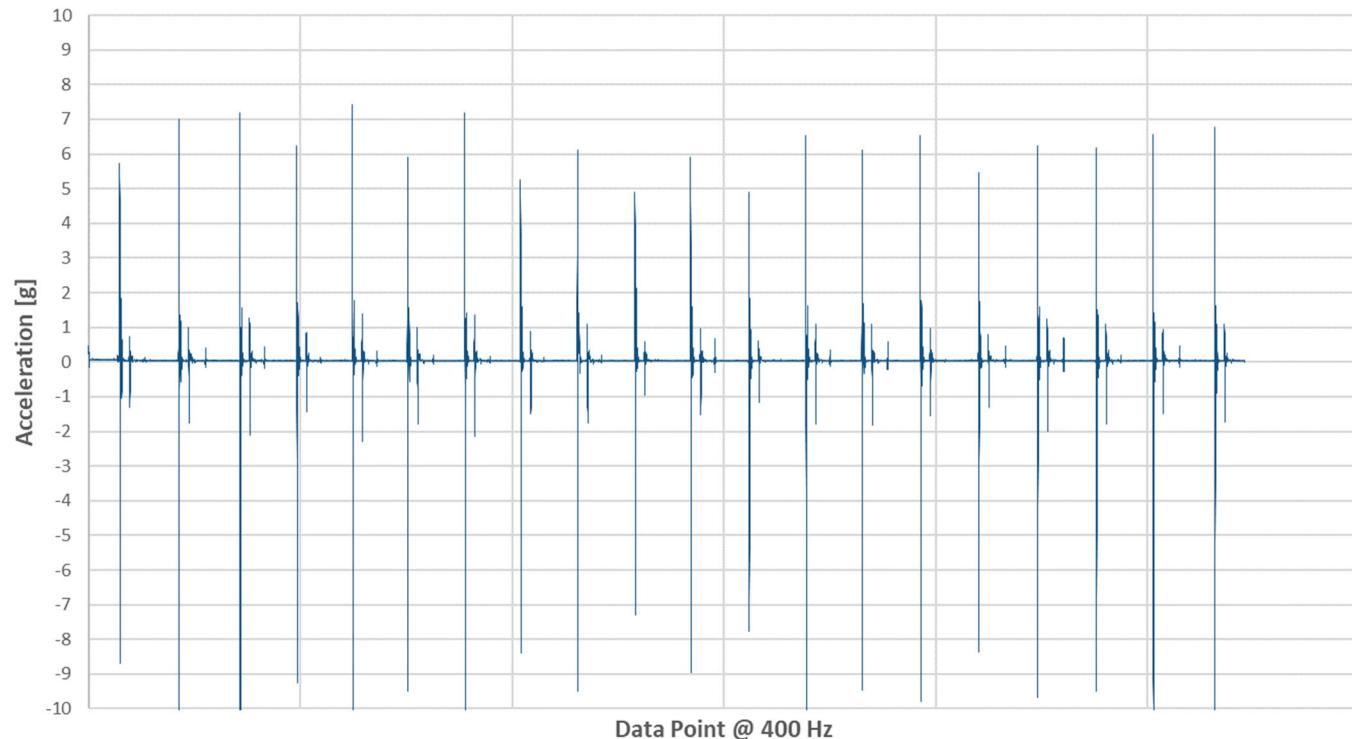


## TEST 3 – CASPER HYBRID

Vector Magnitude Acceleration - Casper Hybrid

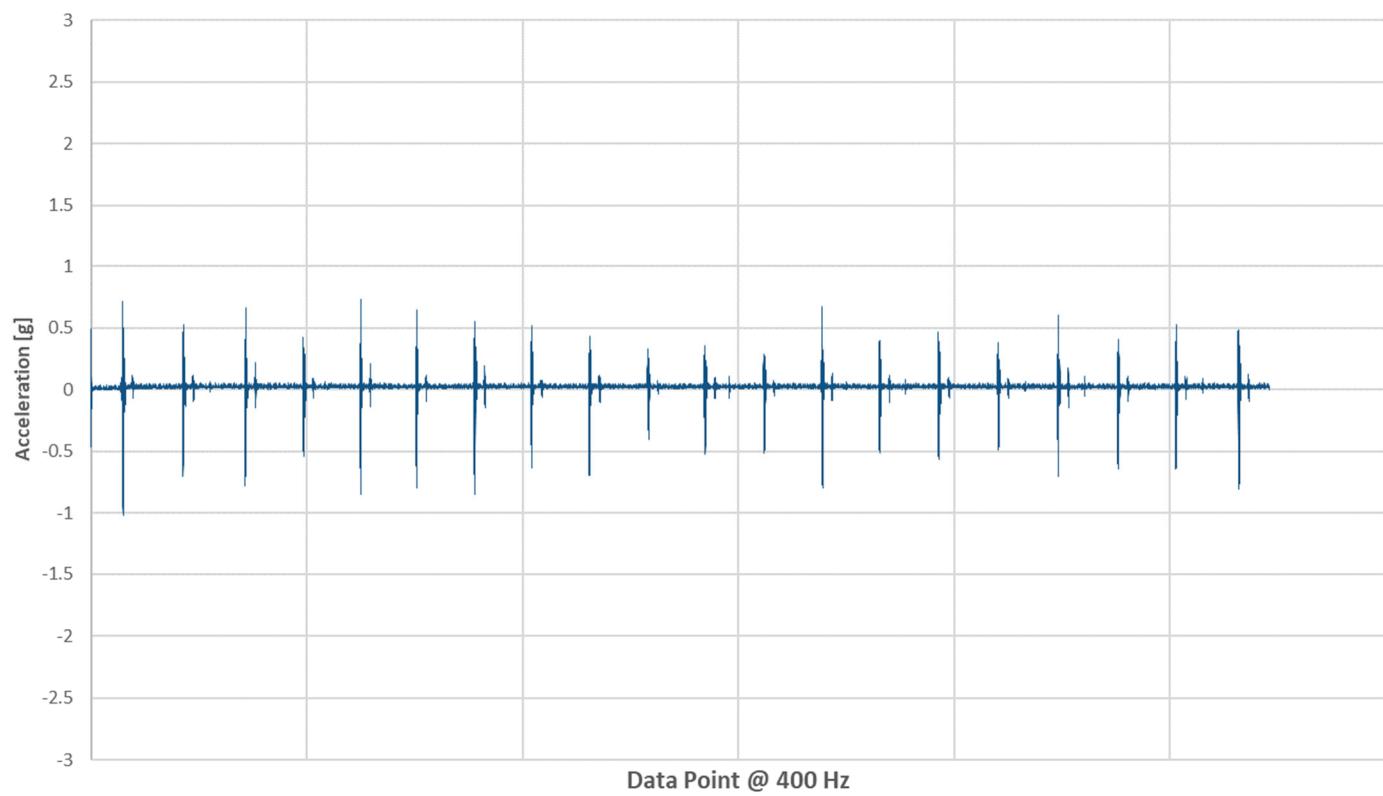


X Acceleration (Side to Side) - Casper Hybrid

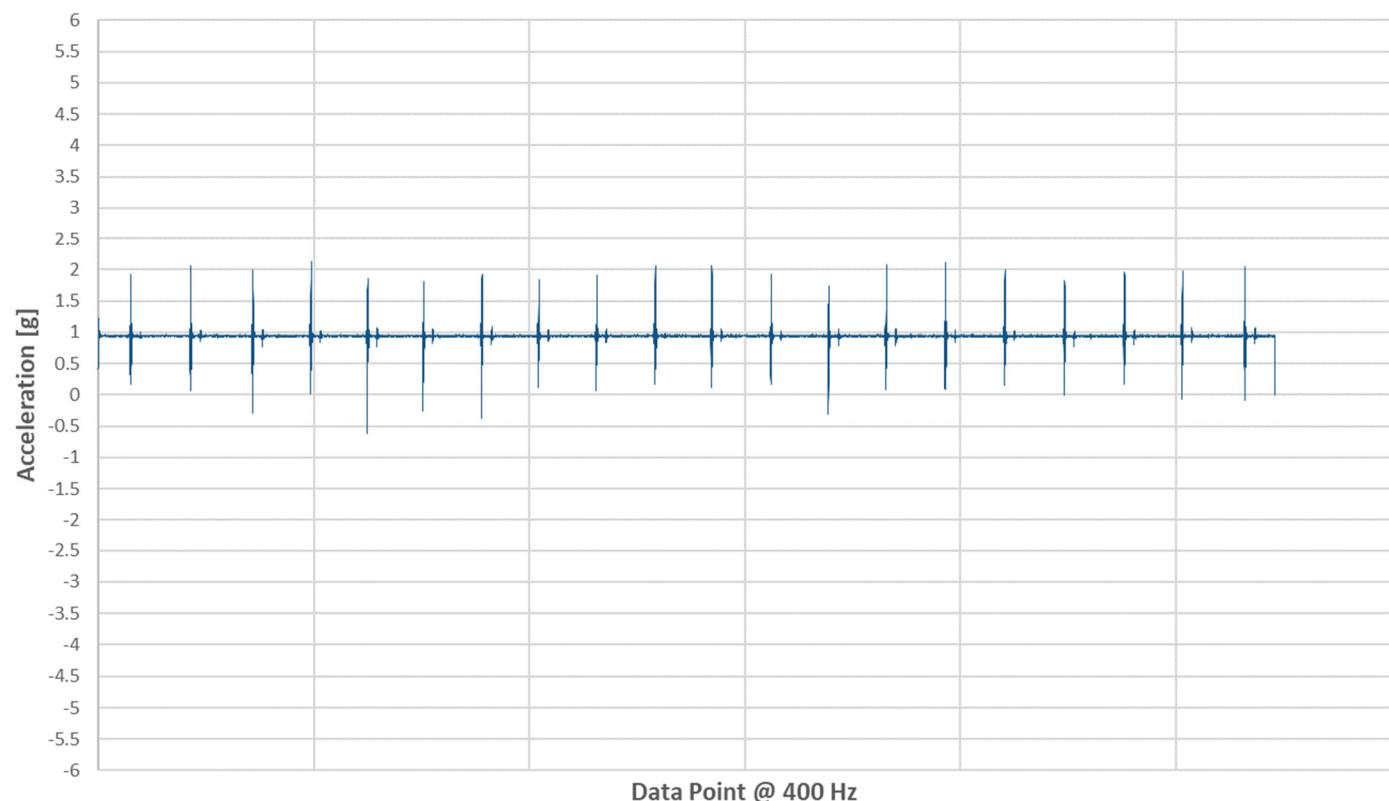




Y Acceleration (Head to Toe) - Casper Hybrid



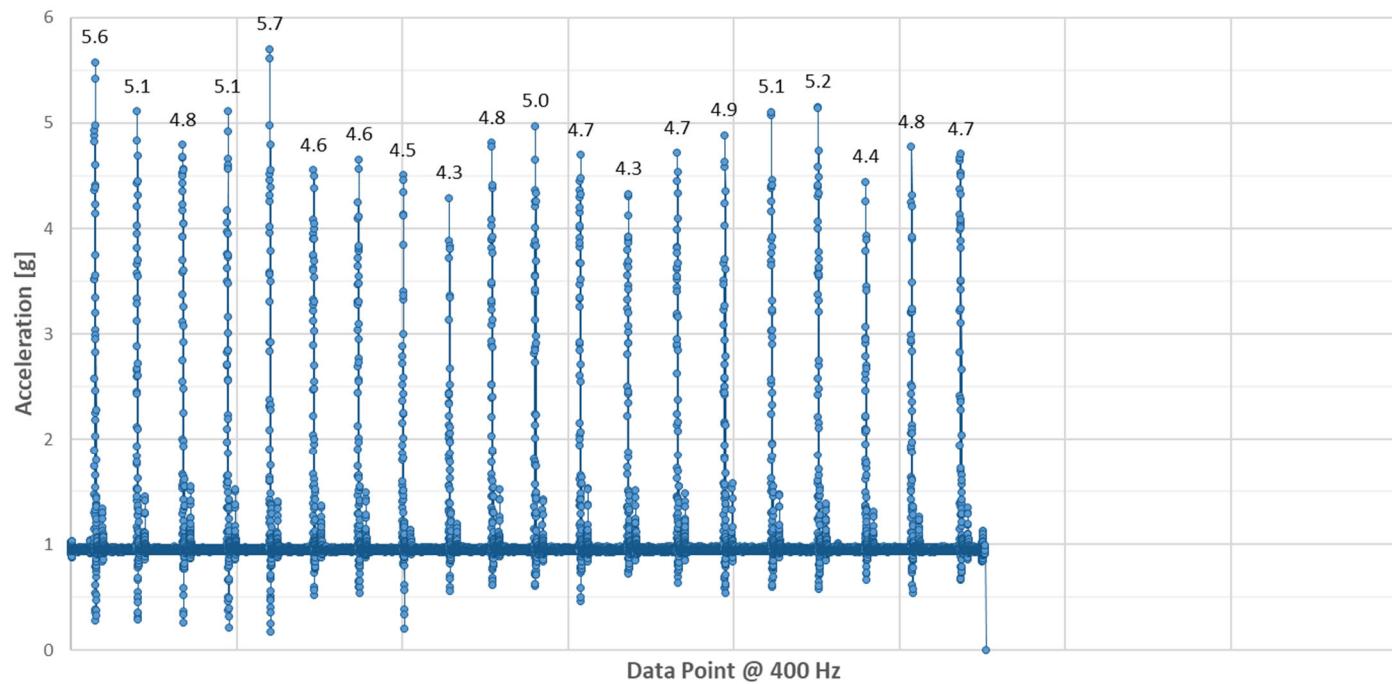
Z Acceleration (Up and Down) - Casper Hybrid



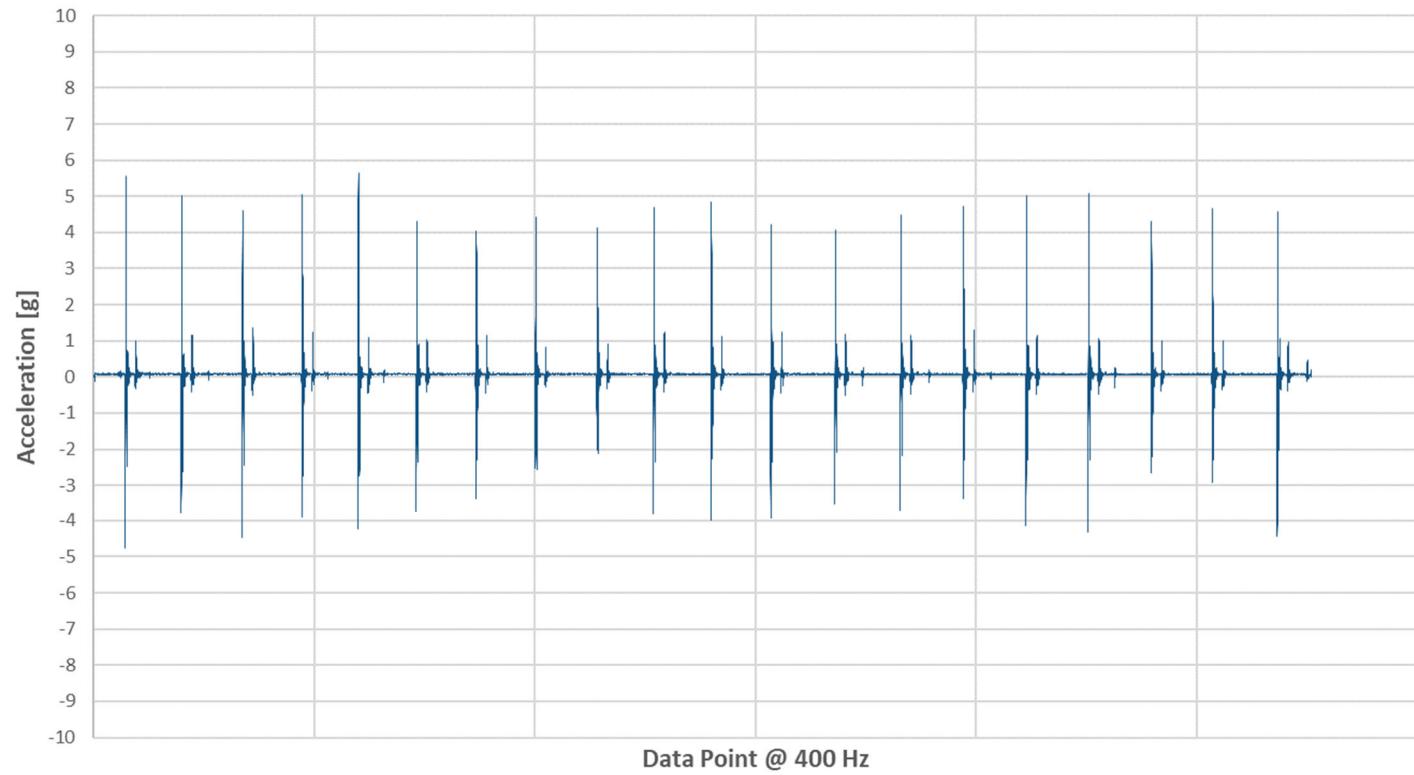


## TEST 3 – CASPER NOVA

Vector Magnitude Acceleration - Casper Nova

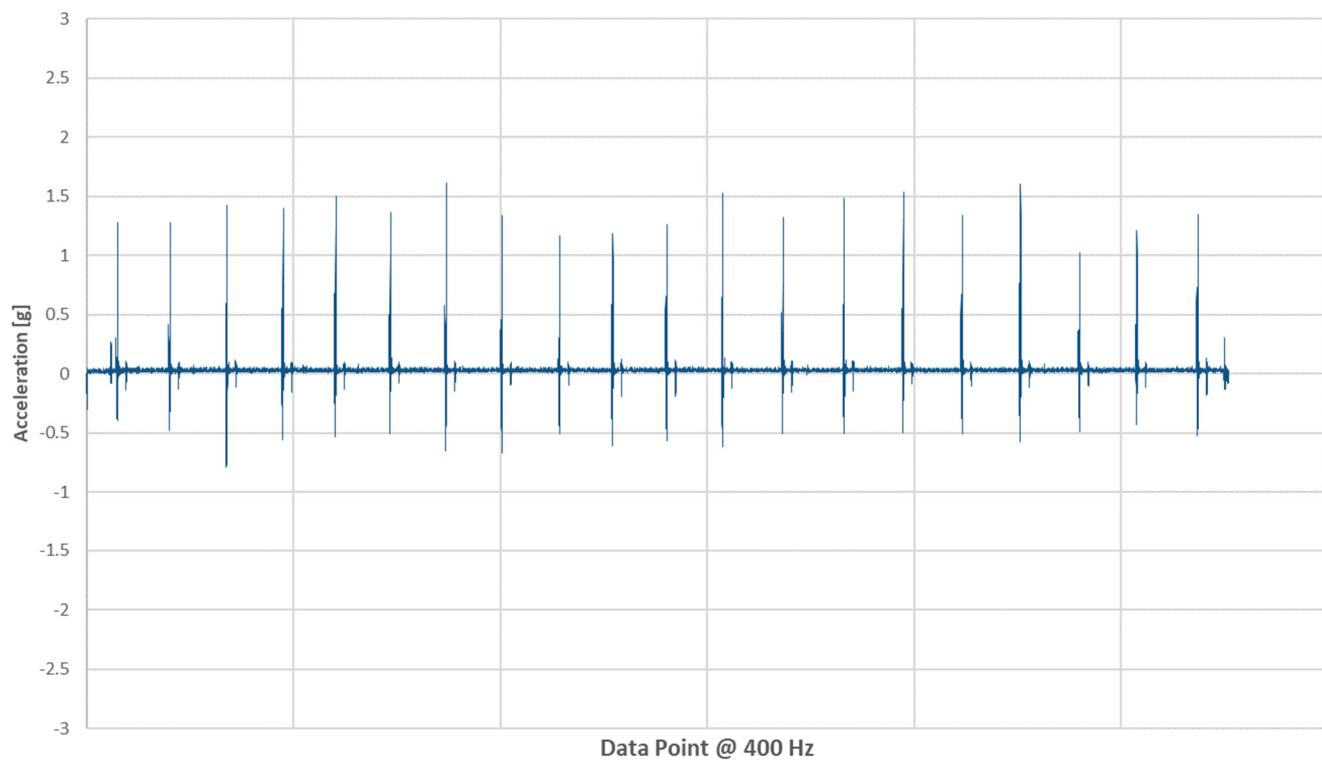


X Acceleration (Side to Side) - Casper Nova

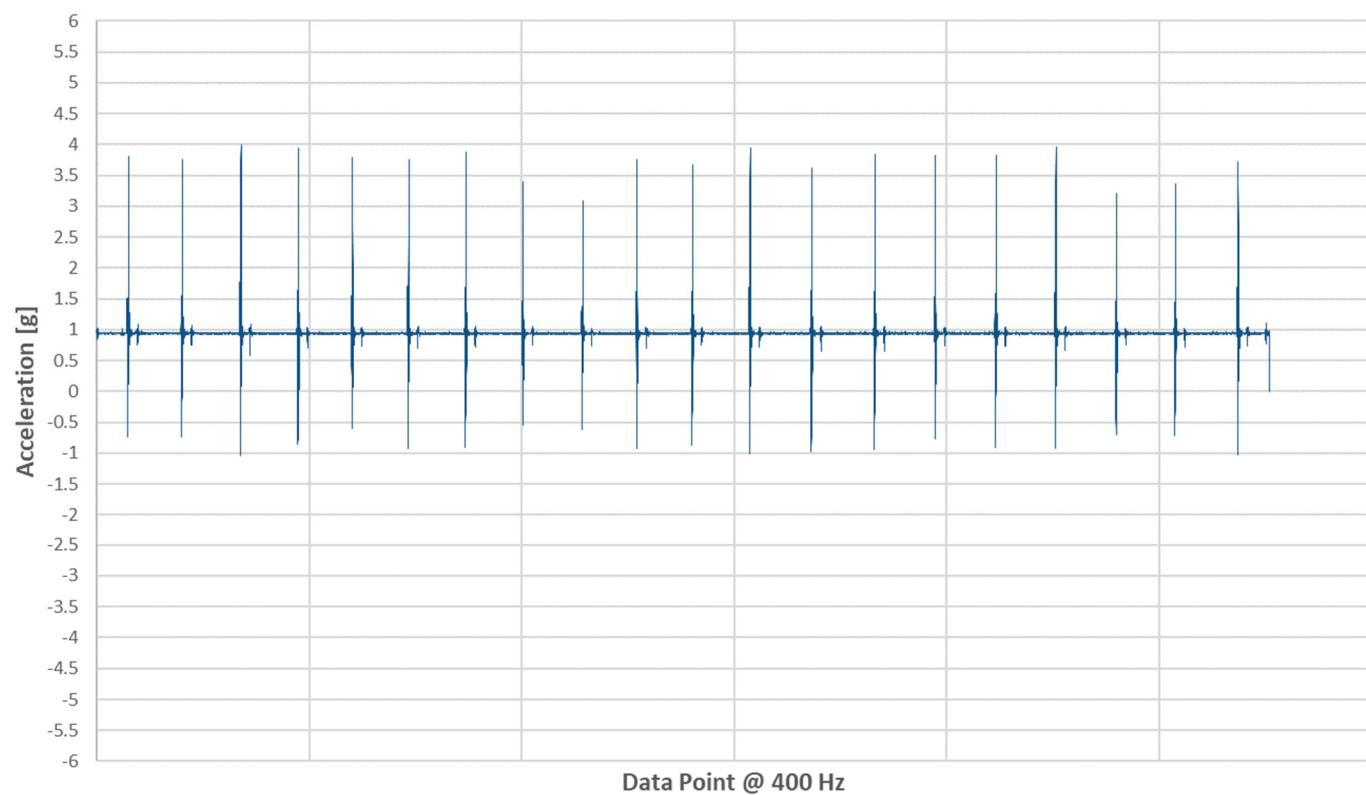




Y Acceleration (Head to Toe) - Casper Nova



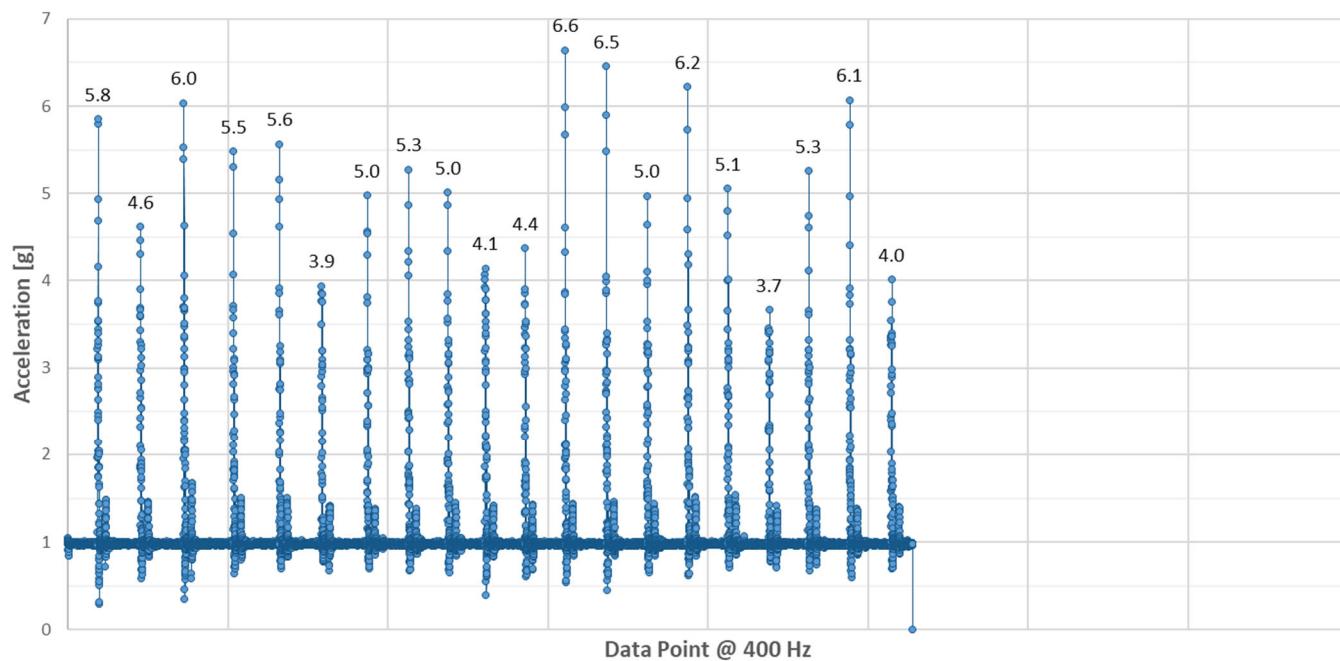
Z Acceleration (Up and Down) - Casper Nova



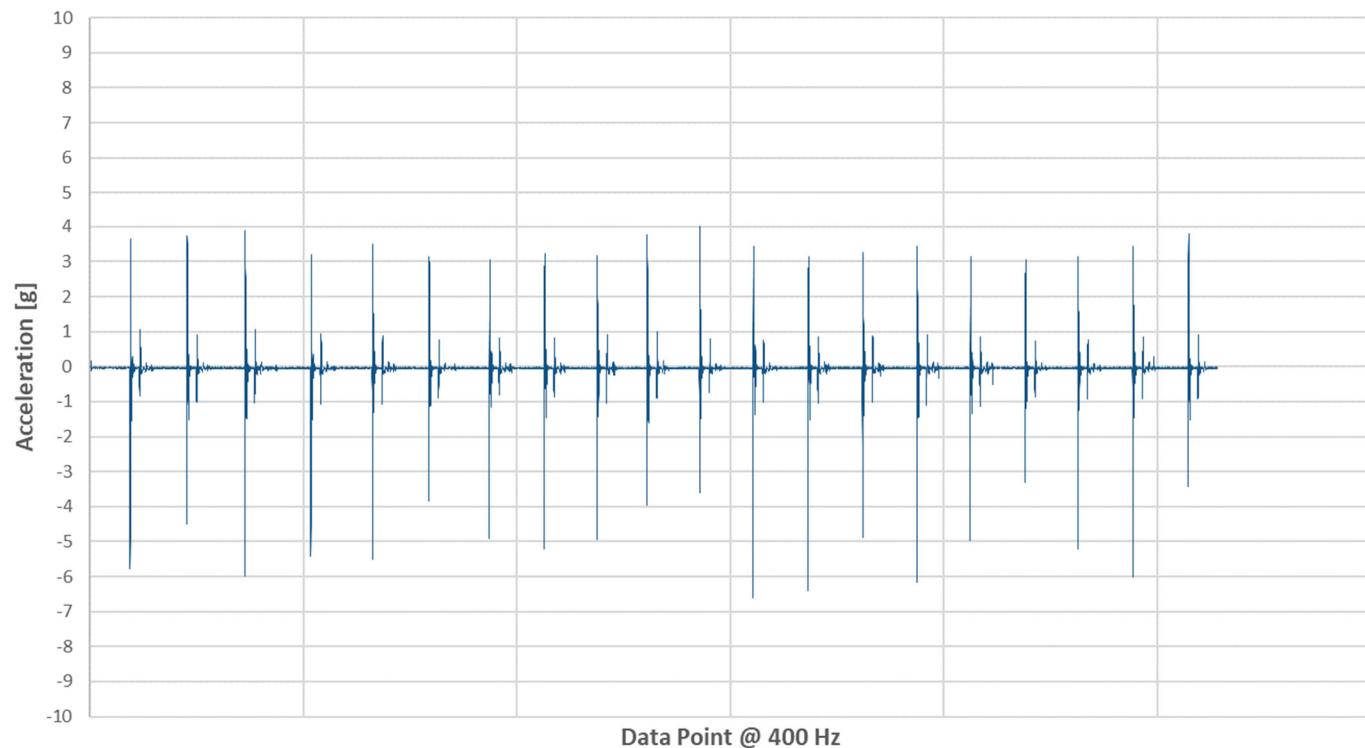


## TEST 3 – CASPER WAVE HYBRID

Vector Magnitude Acceleration - Casper Wave Hybrid

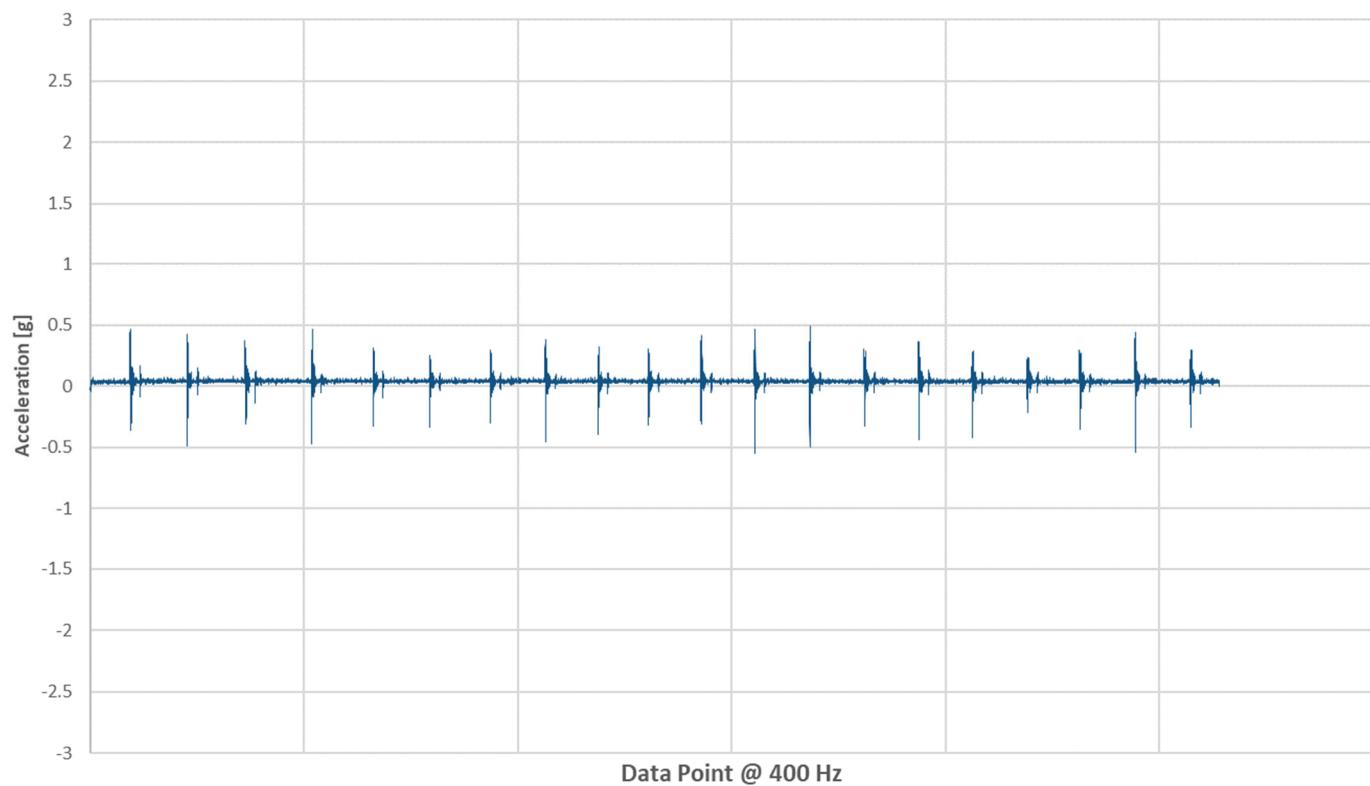


X Acceleration (Side to Side) - Casper Wave Hybrid

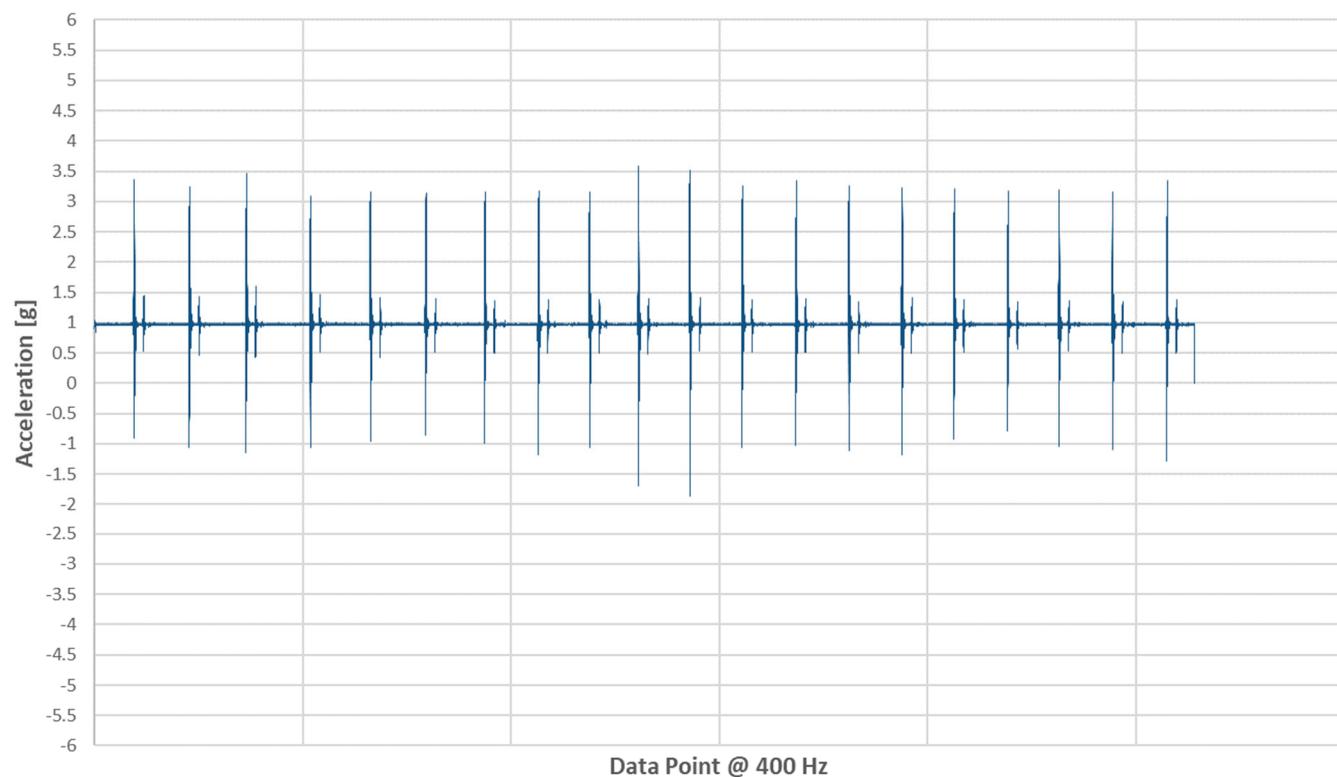




Y Acceleration (Head to Toe) - Casper Wave Hybrid



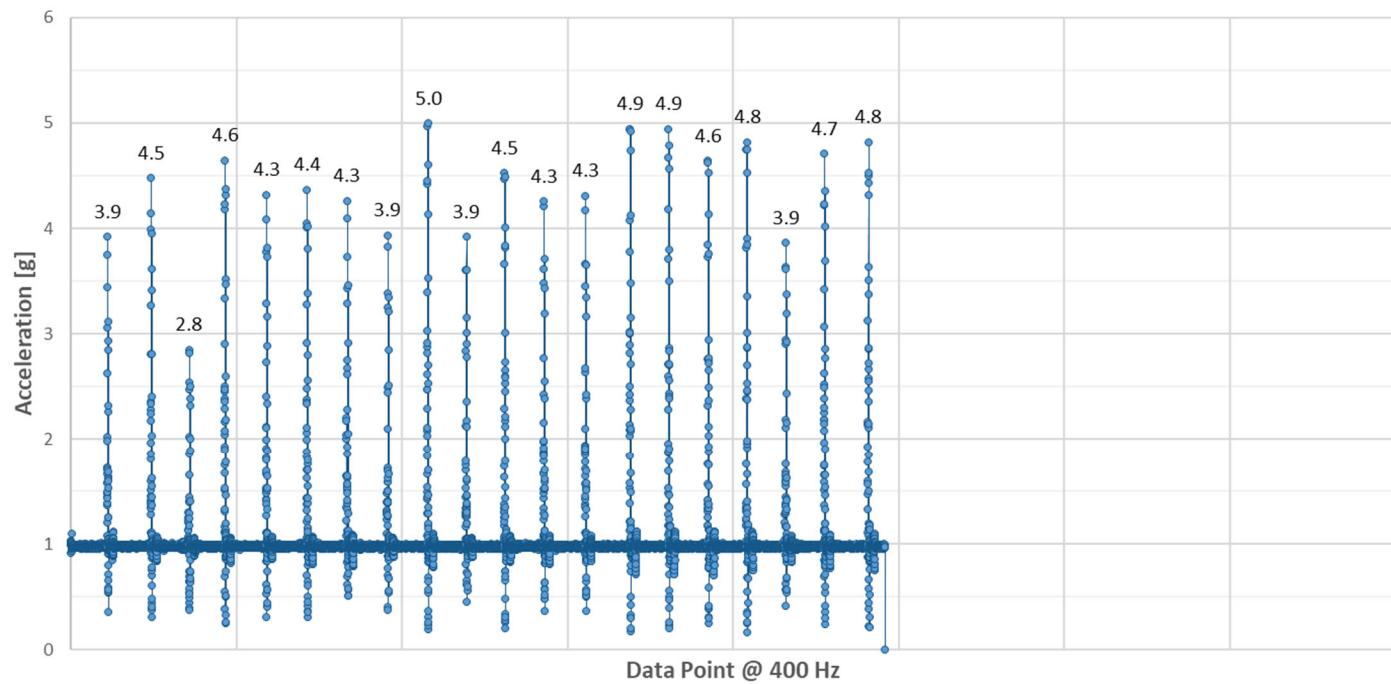
Z Acceleration (Up and Down) - Casper Wave Hybrid



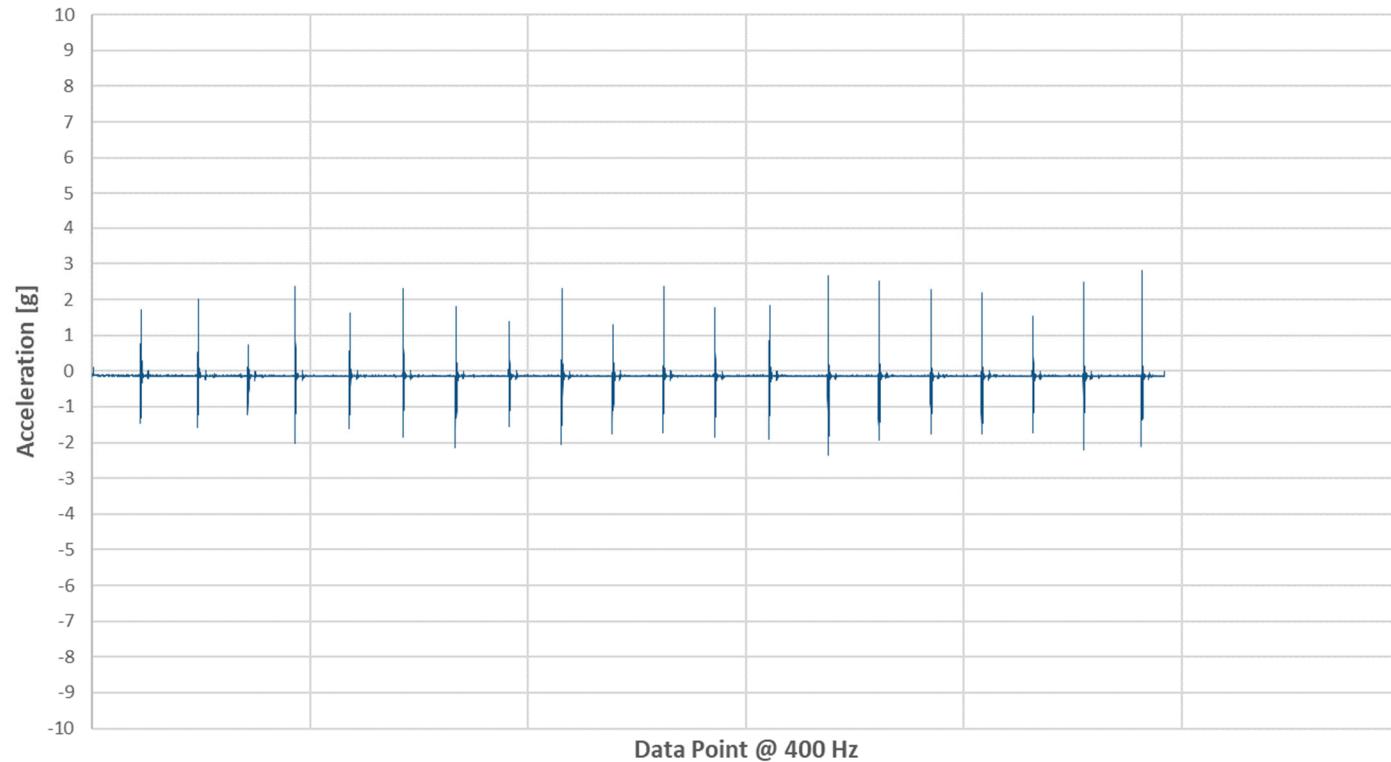


## TEST 3 – GHOSTBED LUXE

Vector Magnitude Acceleration - GhostBed Luxe

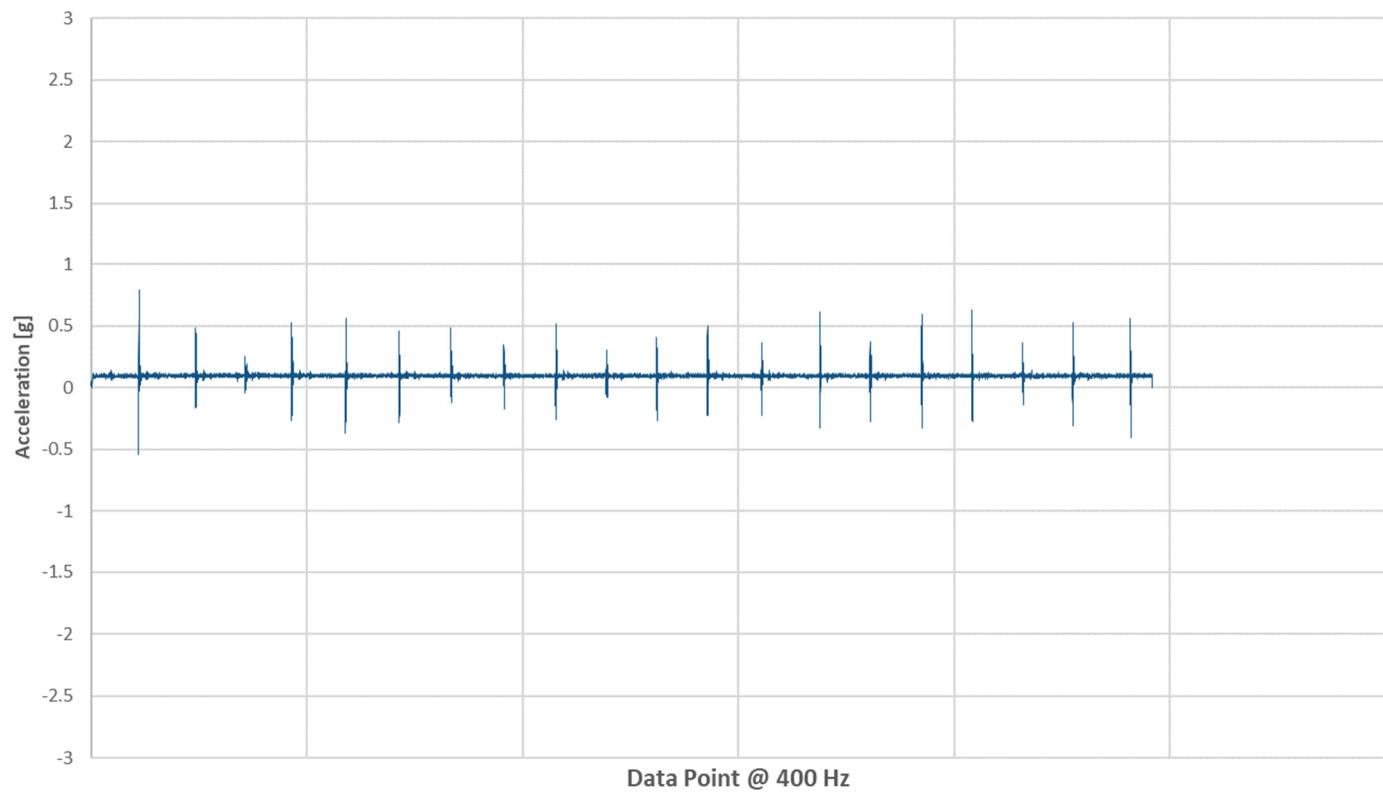


X Acceleration (Side to Side) - GhostBed Luxe

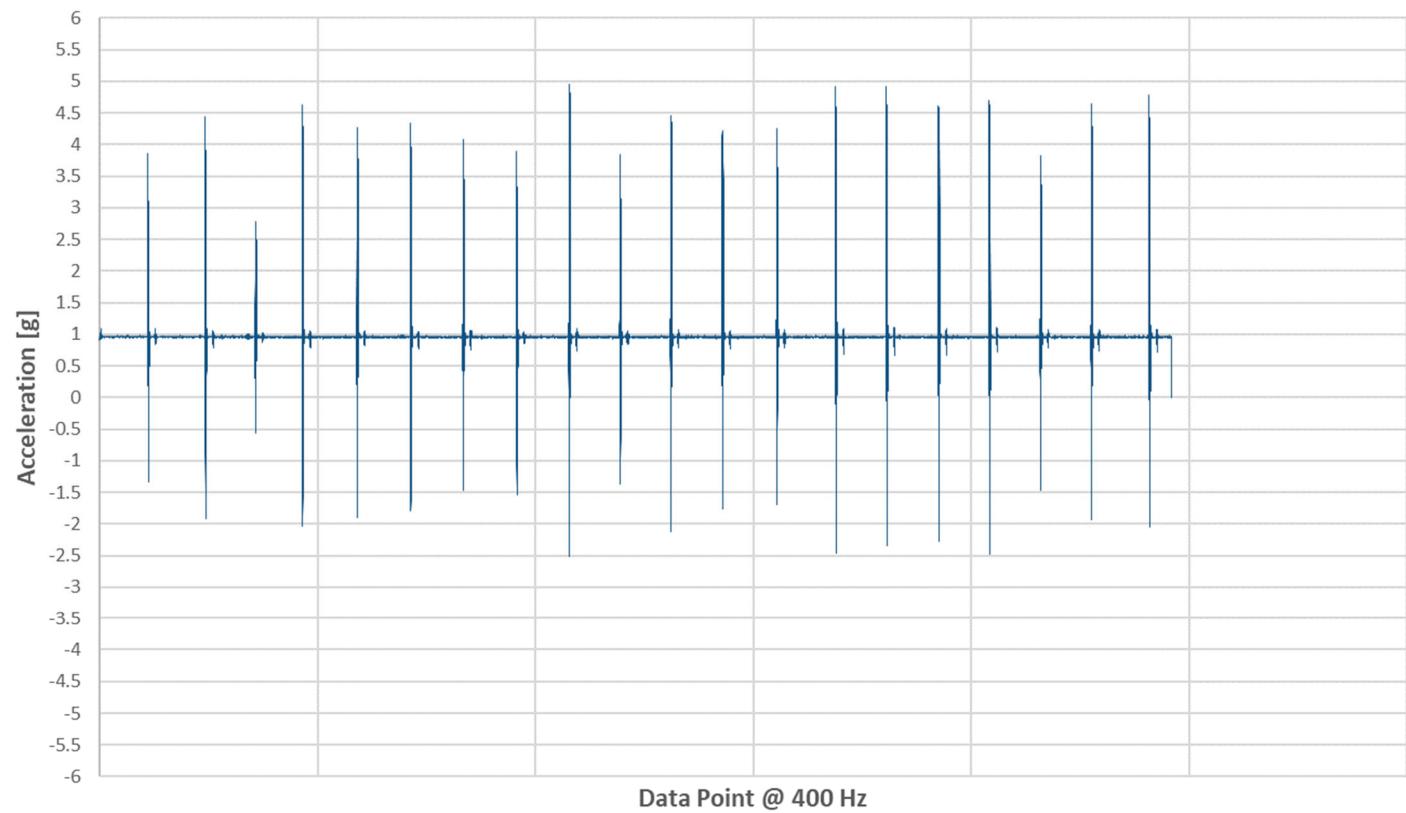




Y Acceleration (Head to Toe) - GhostBed Luxe



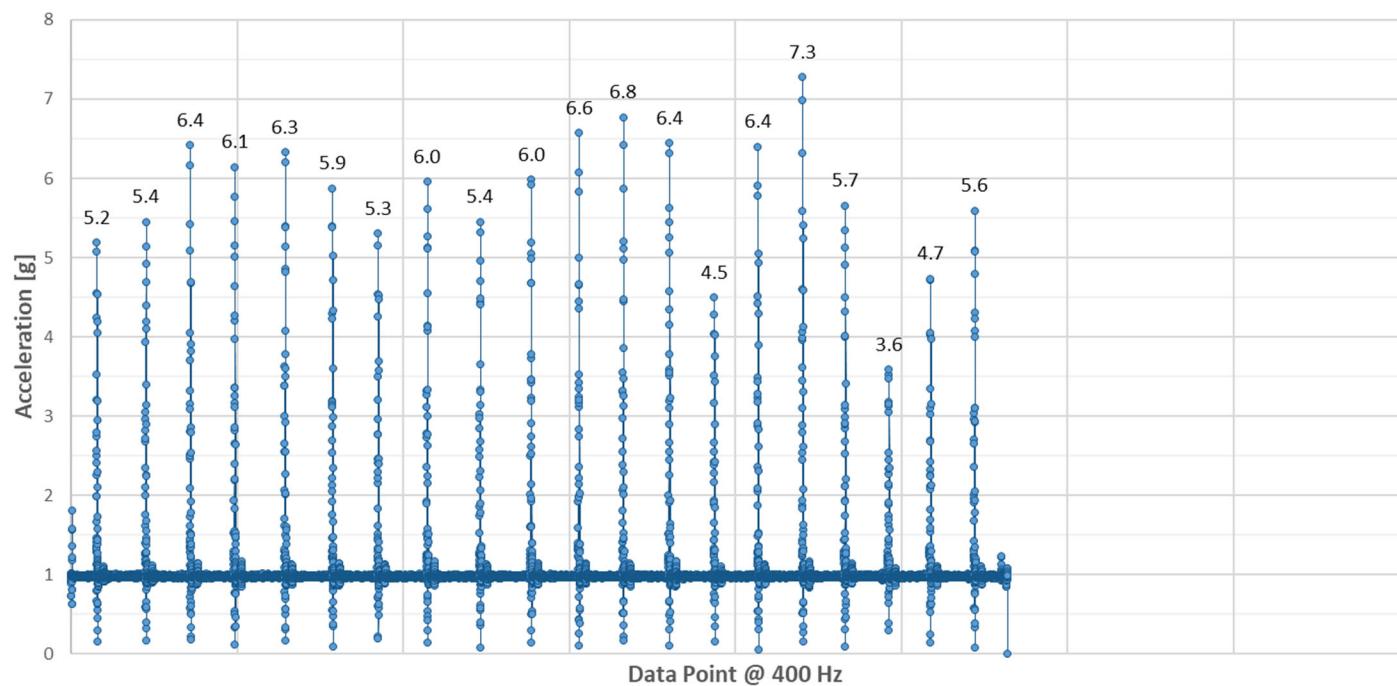
Z Acceleration (Up and Down) - GhostBed Luxe



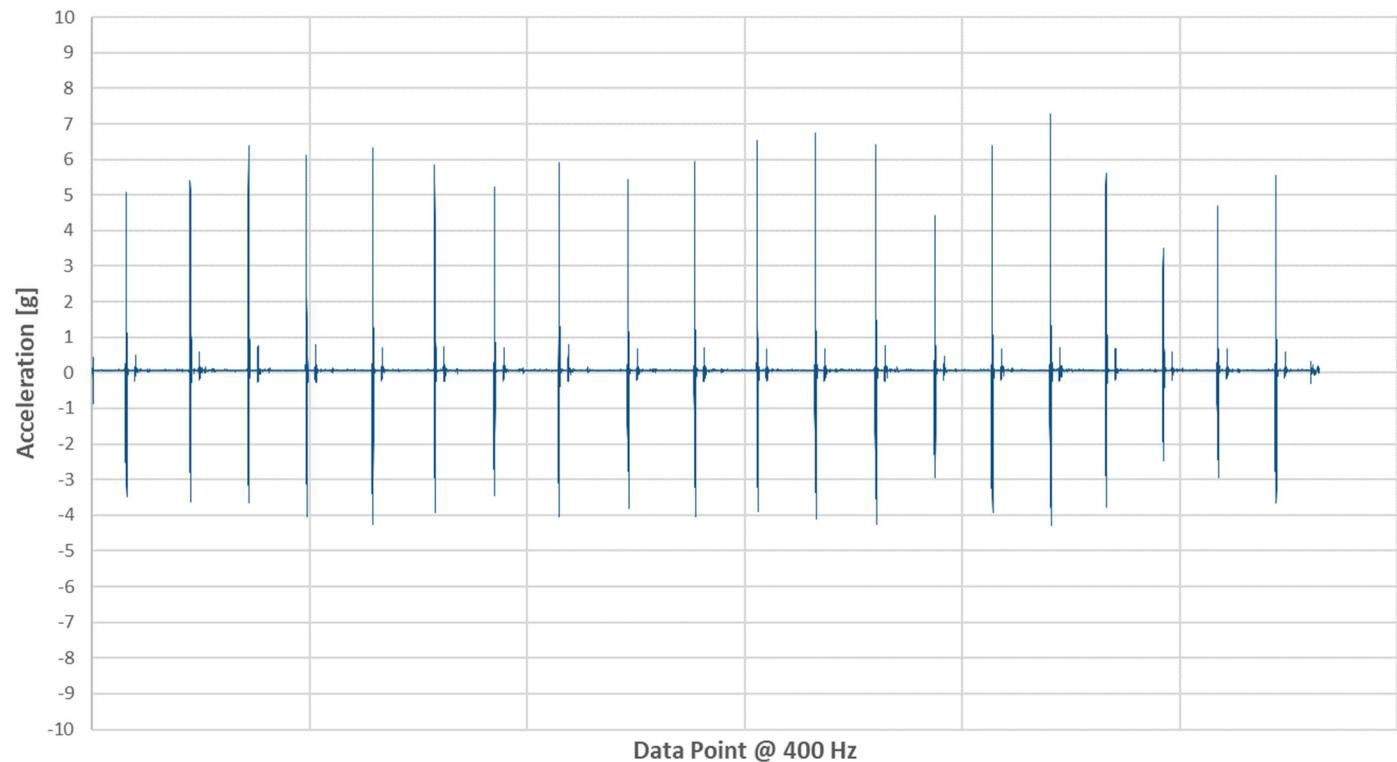


## TEST 3 – LAYLA (FIRM) (V2)

Vector Magnitude Acceleration - Layla (Firm) (V2)

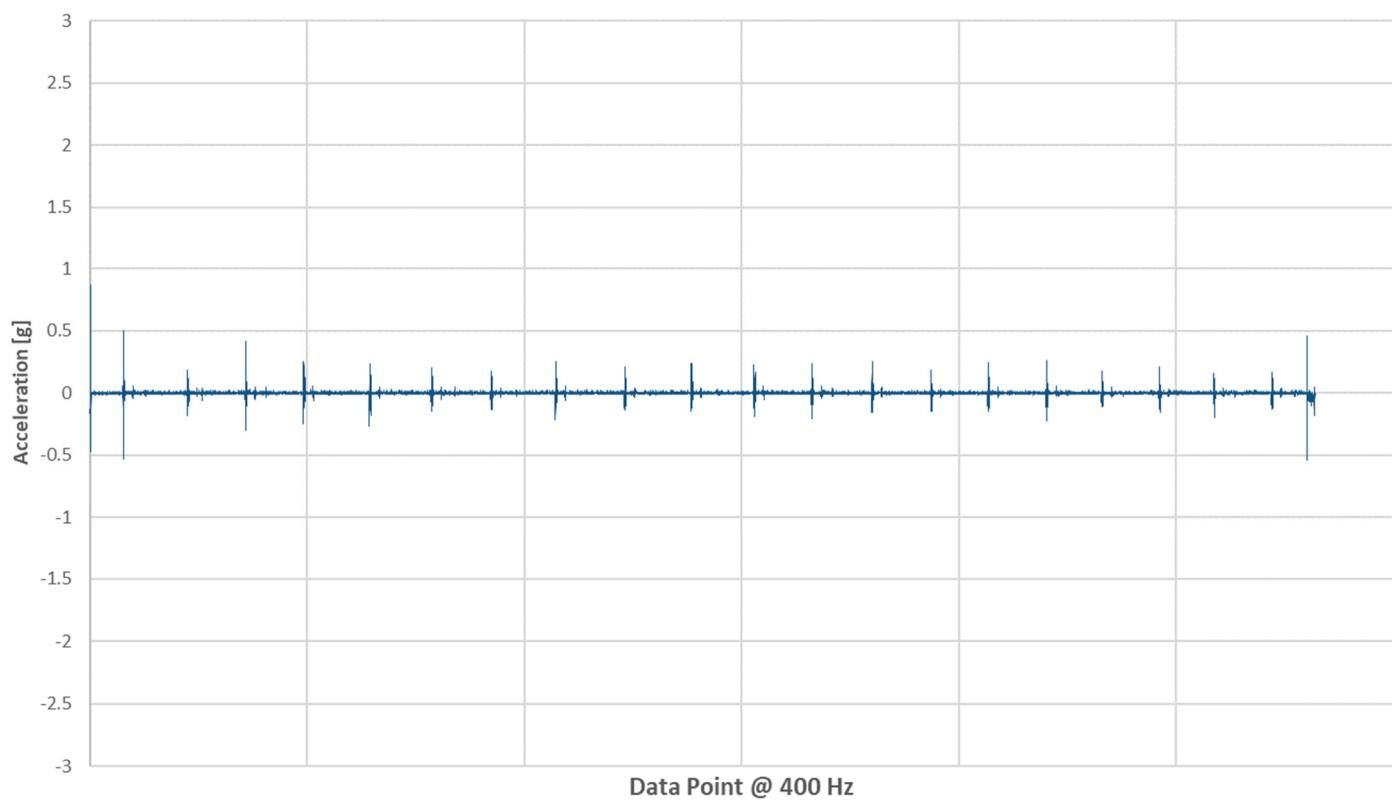


X Acceleration (Side to Side) - Layla (Firm) (V2)

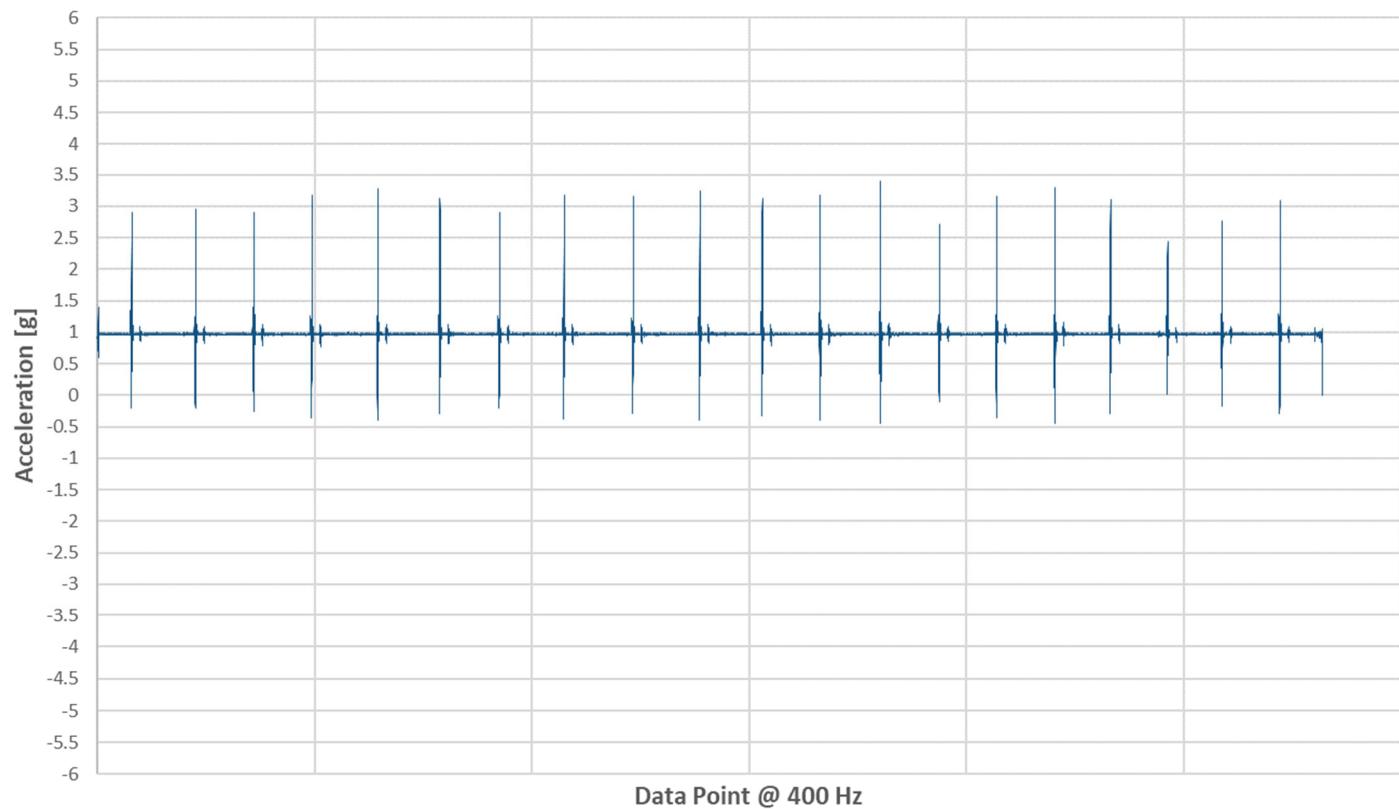




Y Acceleration (Head to Toe) - Layla (Firm) (V2)



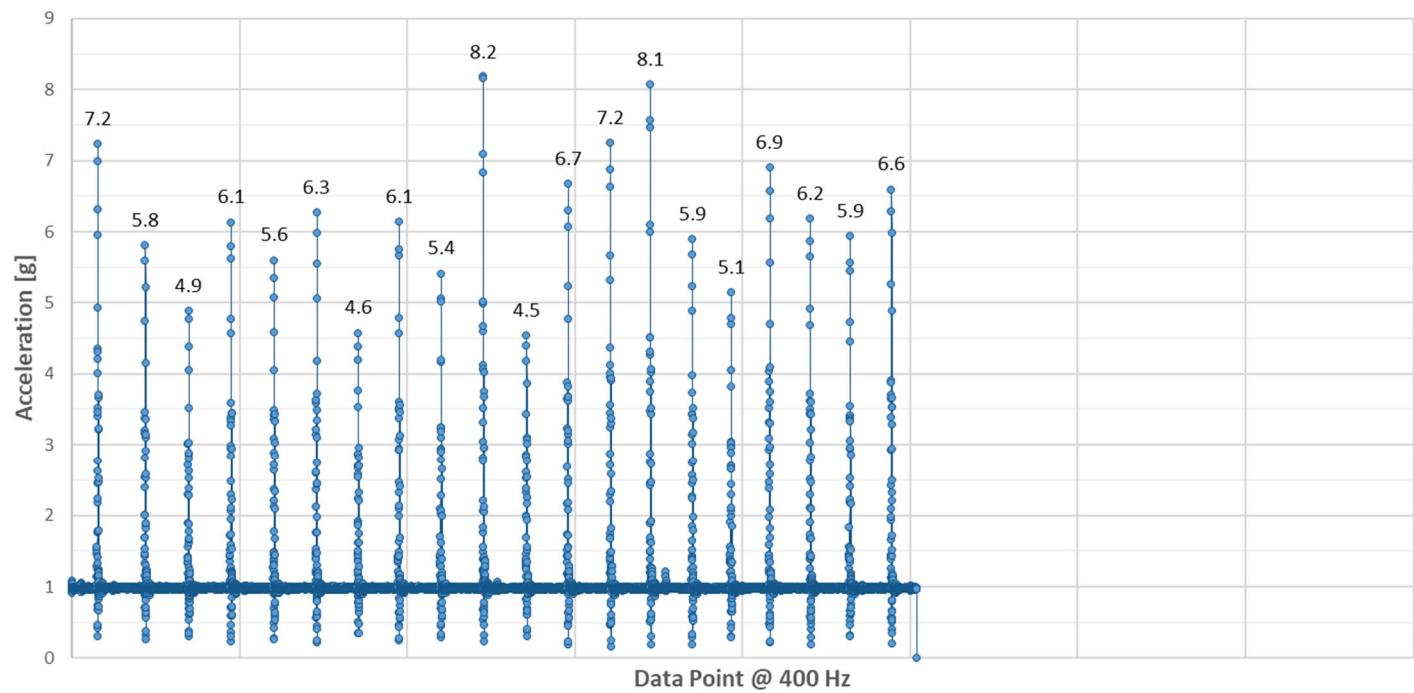
Z Acceleration (Up and Down) - Layla (Firm) (V2)



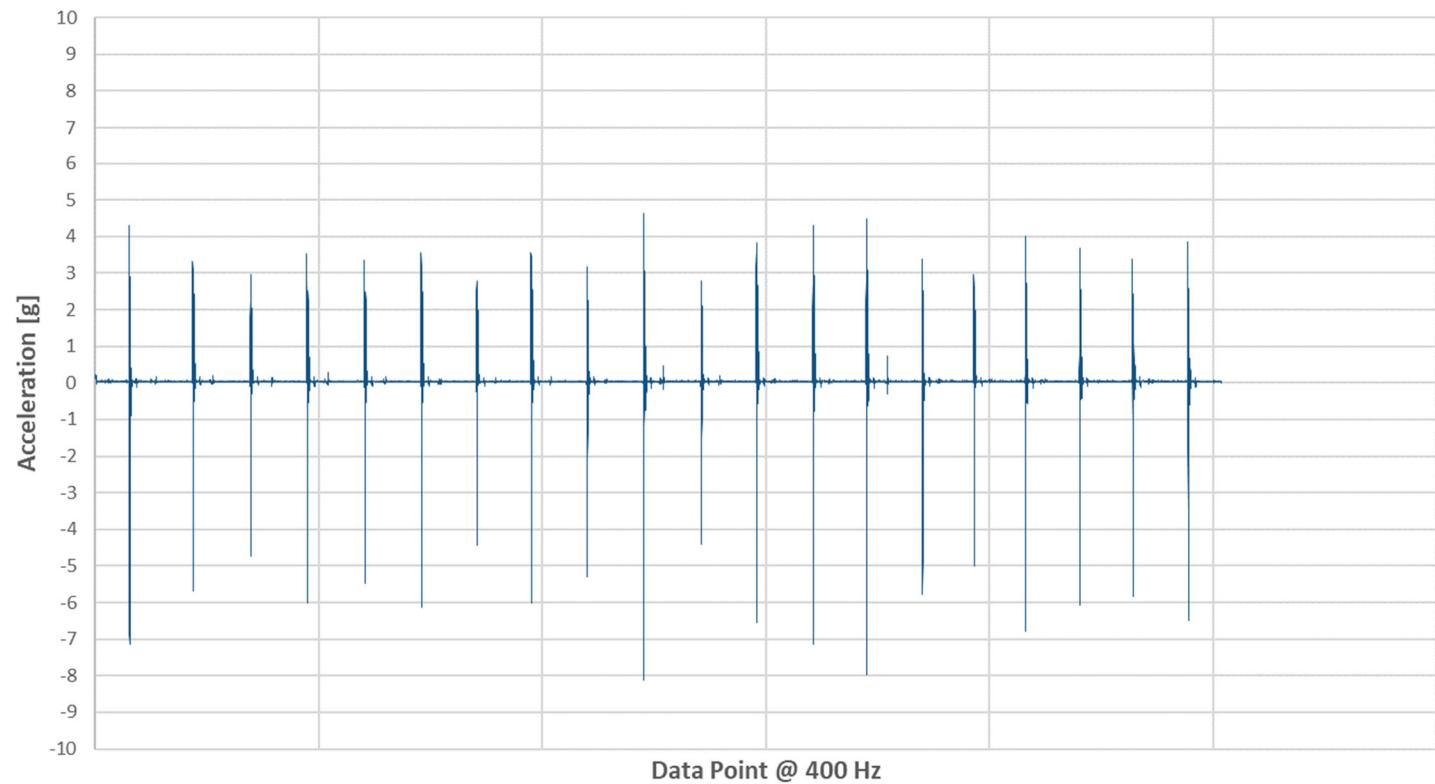


## TEST 3 – LAYLA (SOFT) (V2)

Vector Magnitude Acceleration - Layla (Soft) (V2)

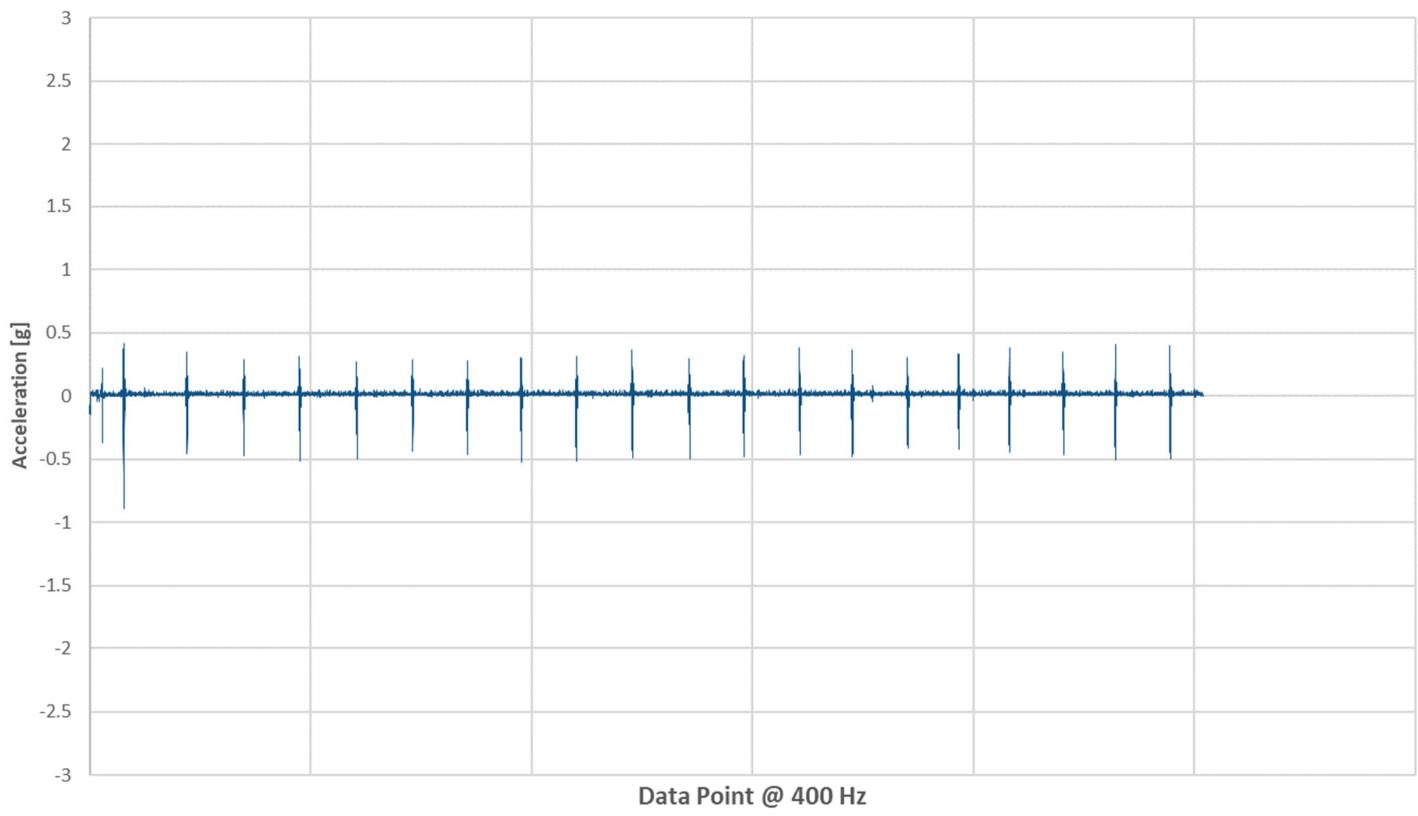


X Acceleration (Side to Side) - Layla (Soft) (V2)

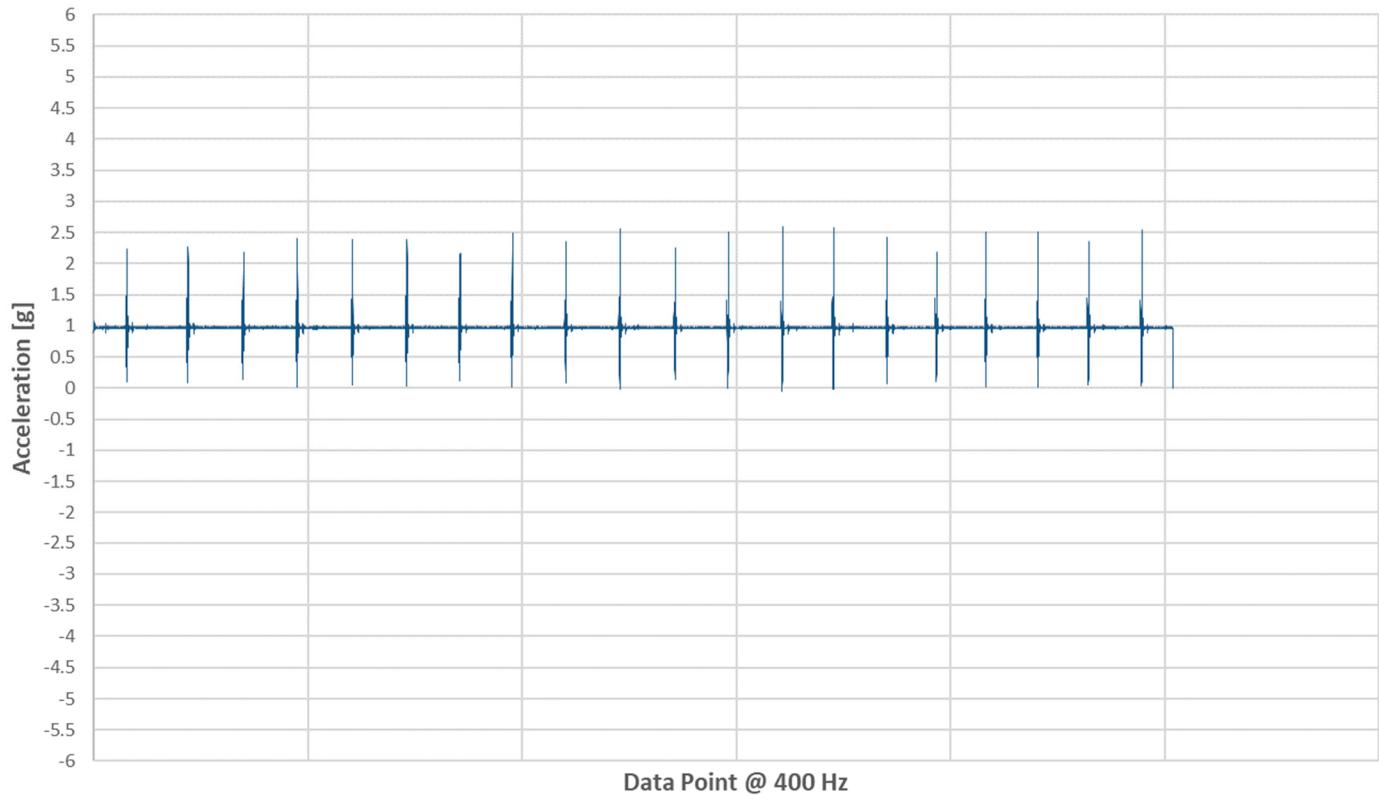




Y Acceleration (Head to Toe) - Layla (Soft) (V2)



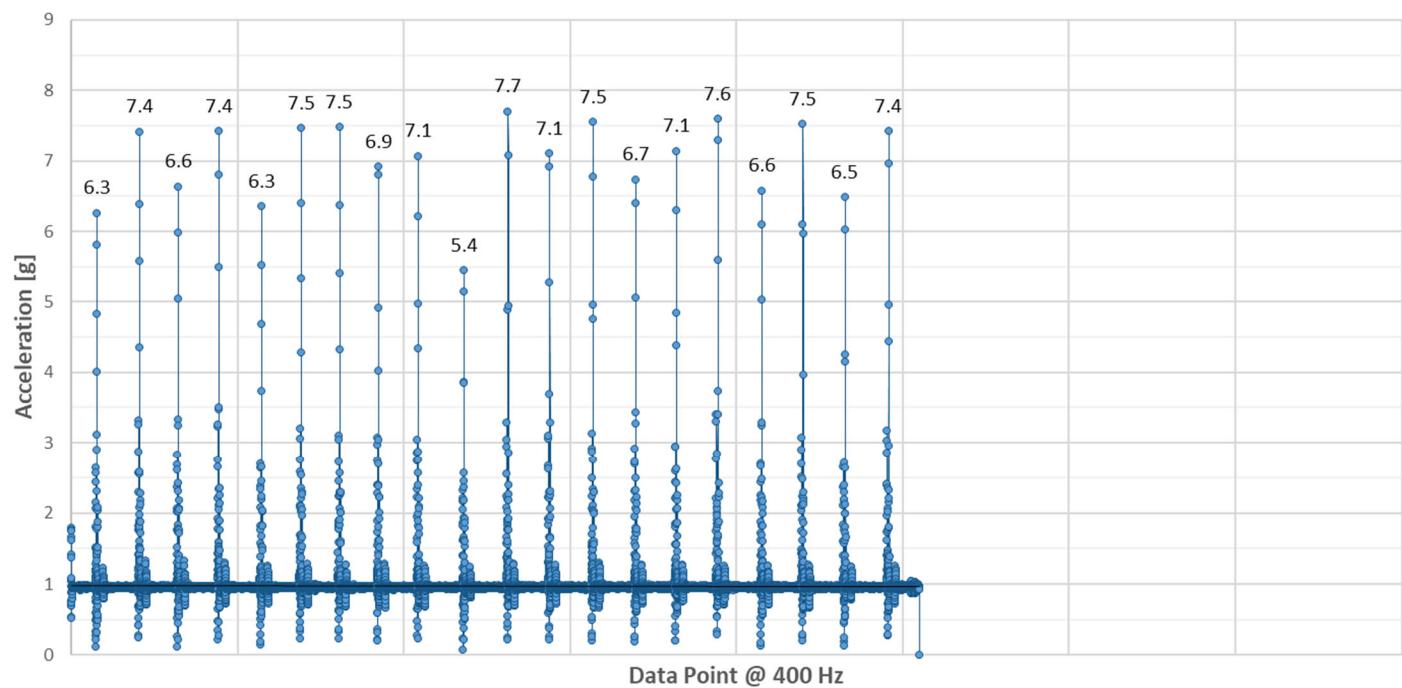
Z Acceleration (Up and Down) - Layla (Soft) (V2)



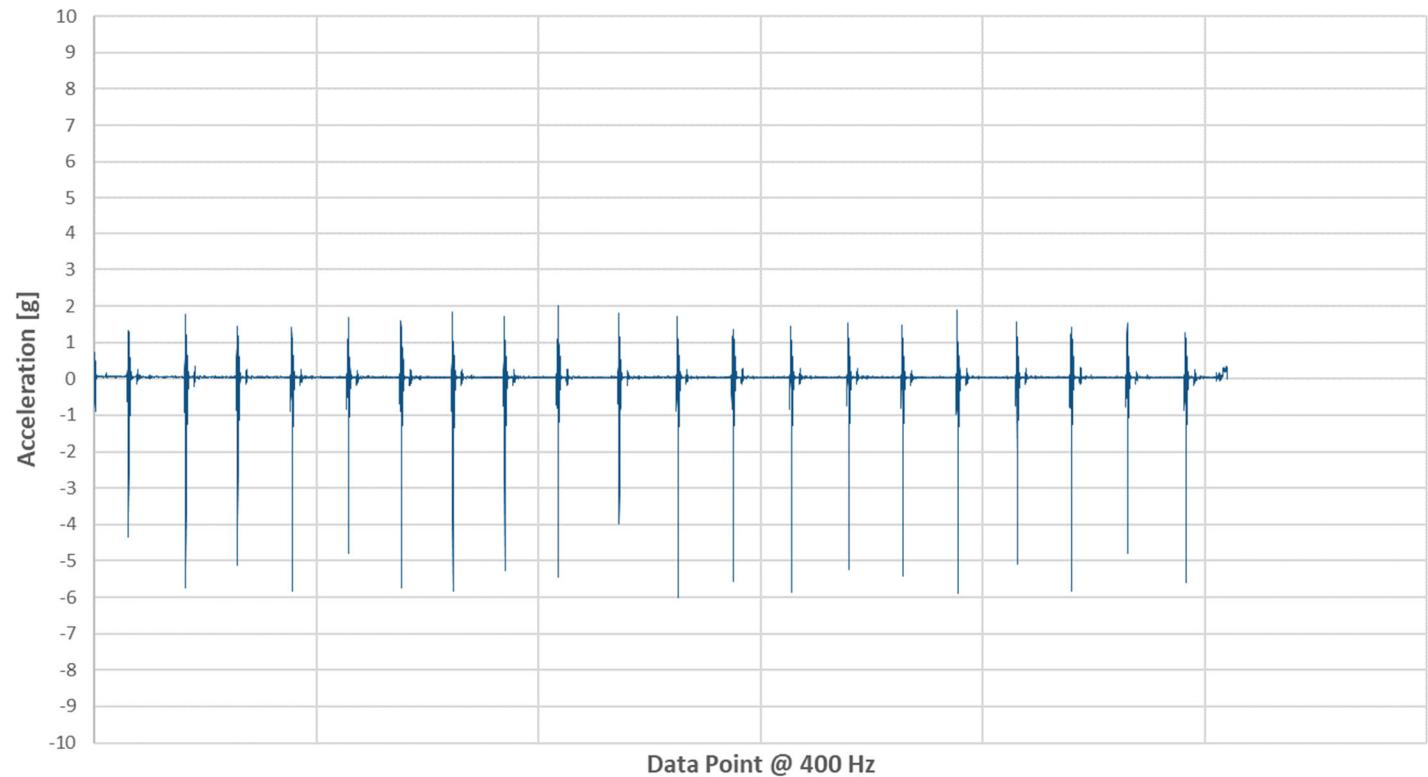


## TEST 3 – LAYLA HYBRID (FIRM)

Vector Magnitude Acceleration - Layla Hybrid (Firm)

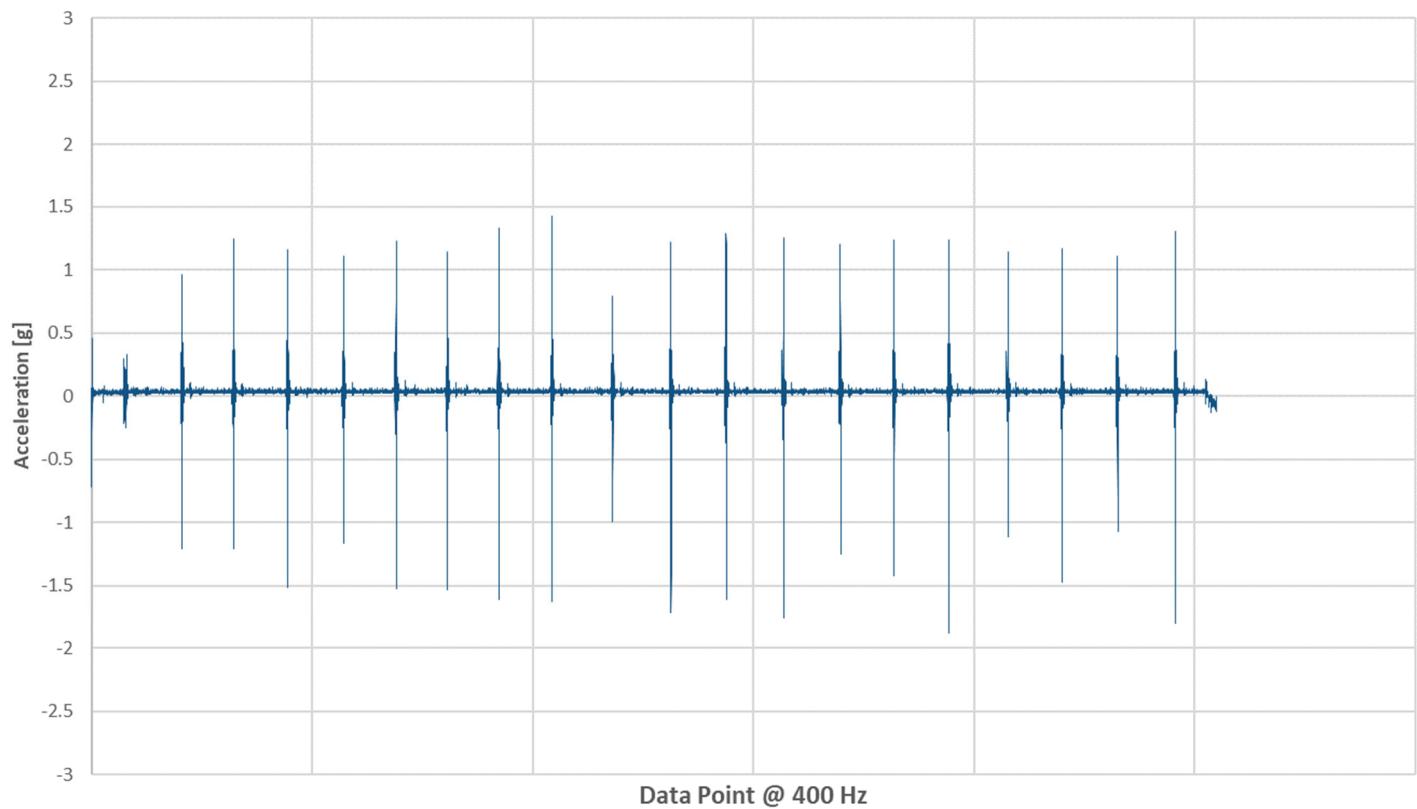


X Acceleration (Side to Side) - Layla Hybrid (Firm)

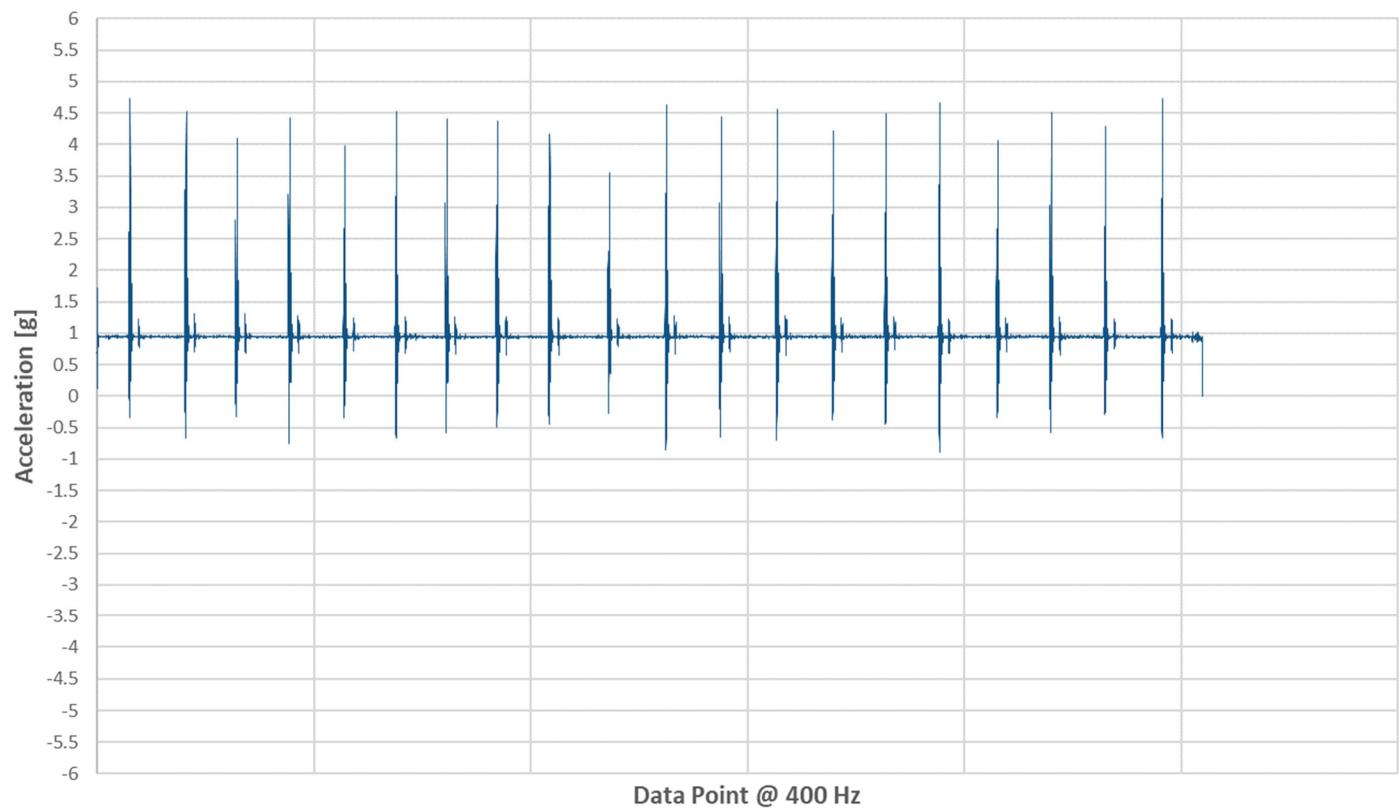




Y Acceleration (Head to Toe) - Layla Hybrid (Firm)



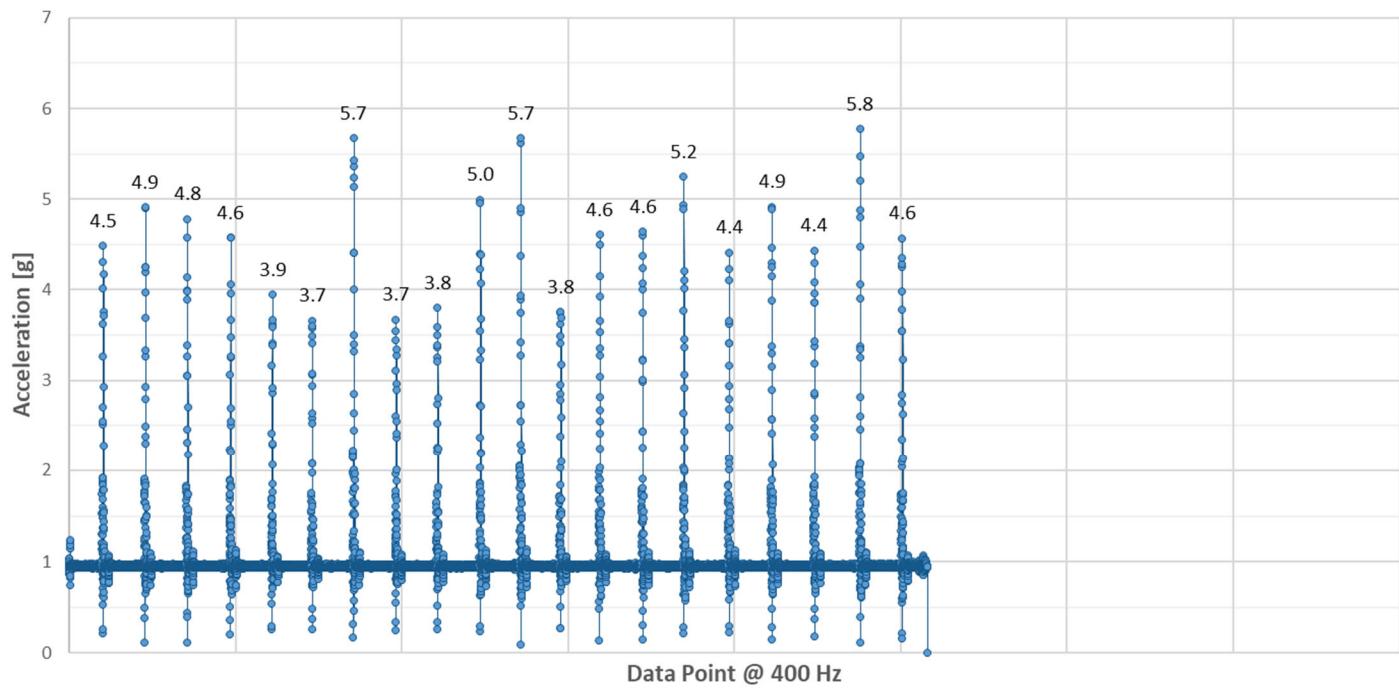
Z Acceleration (Up and Down) - Layla Hybrid (Firm)



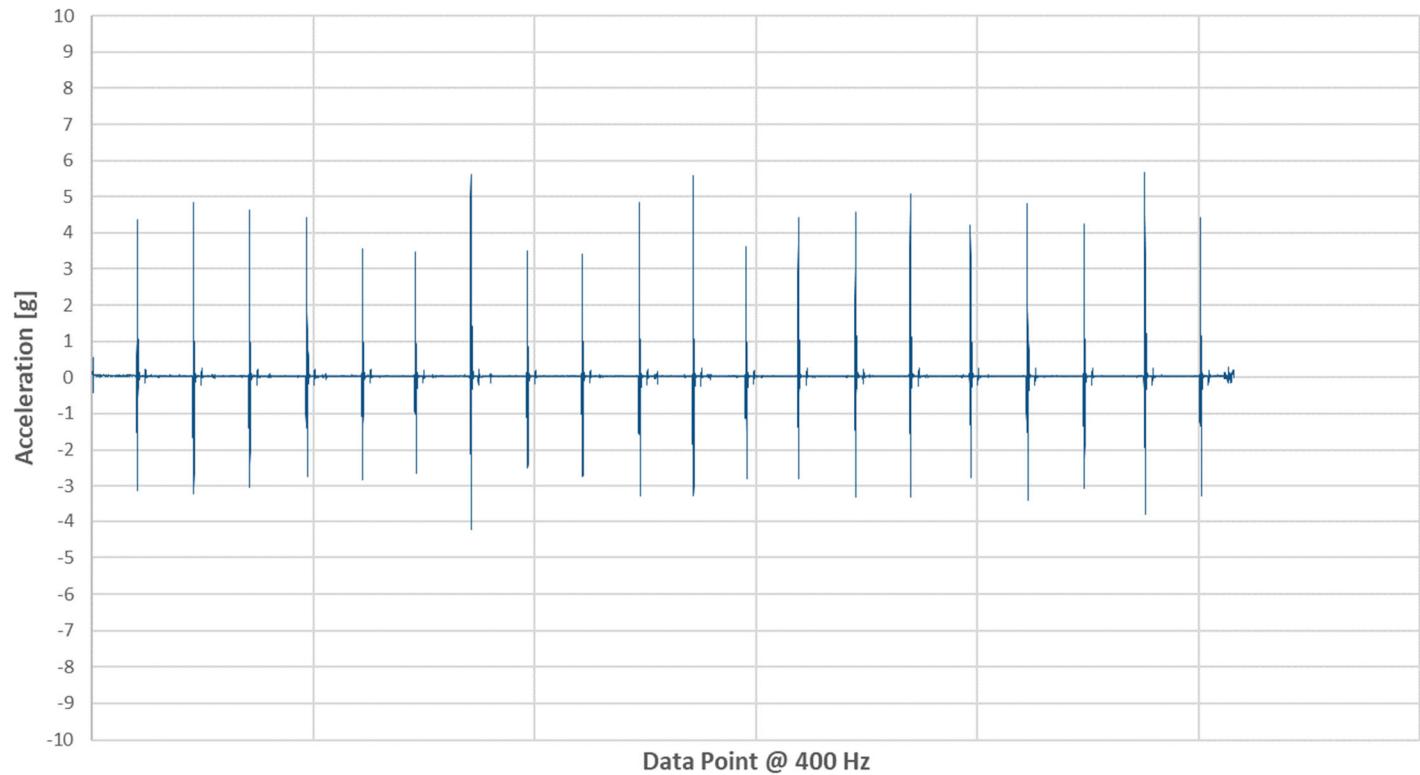


## TEST 3 – LAYLA HYBRID (SOFT)

Vector Magnitude Acceleration - Layla Hybrid (Soft)

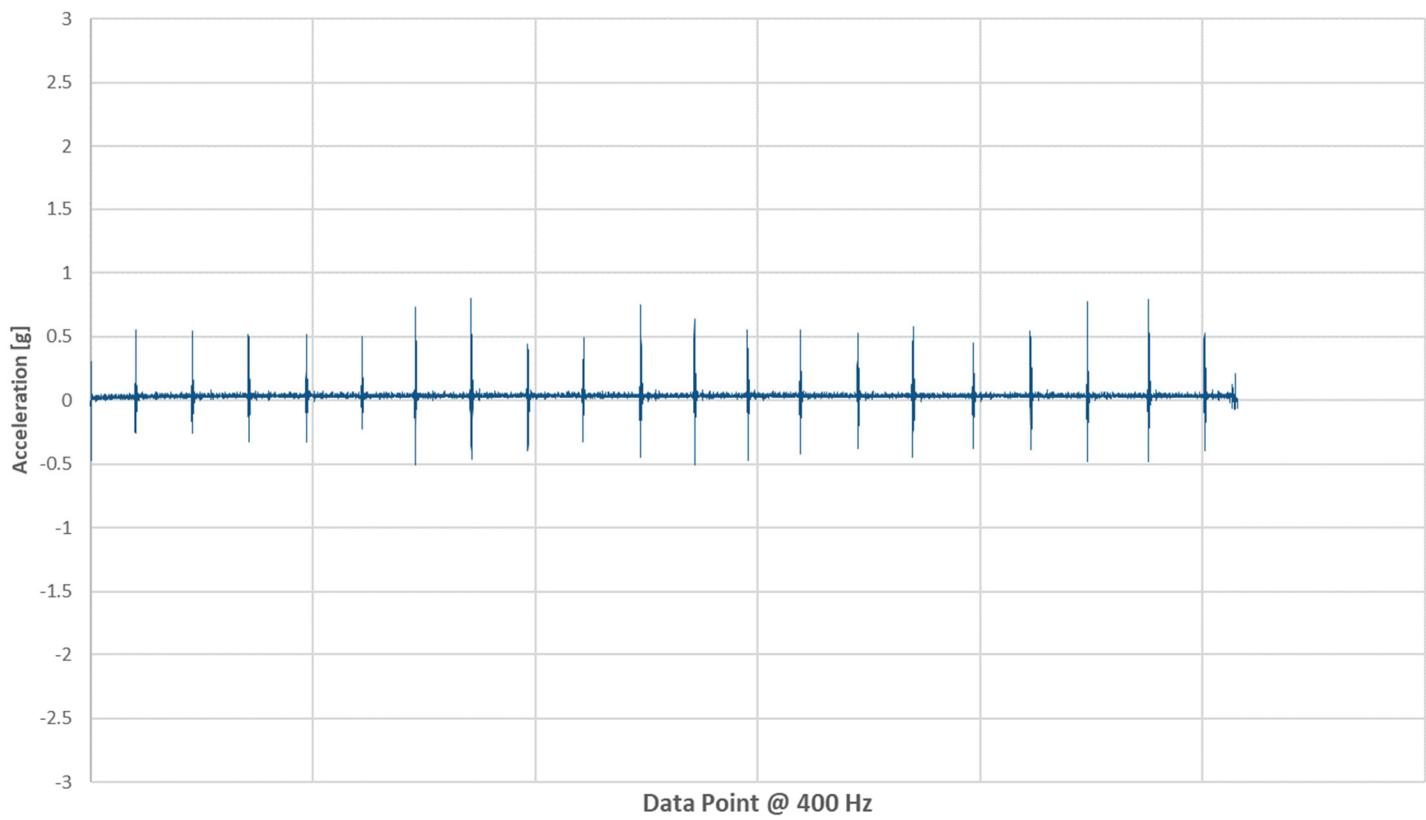


X Acceleration (Side to Side) - Layla Hybrid (Soft)

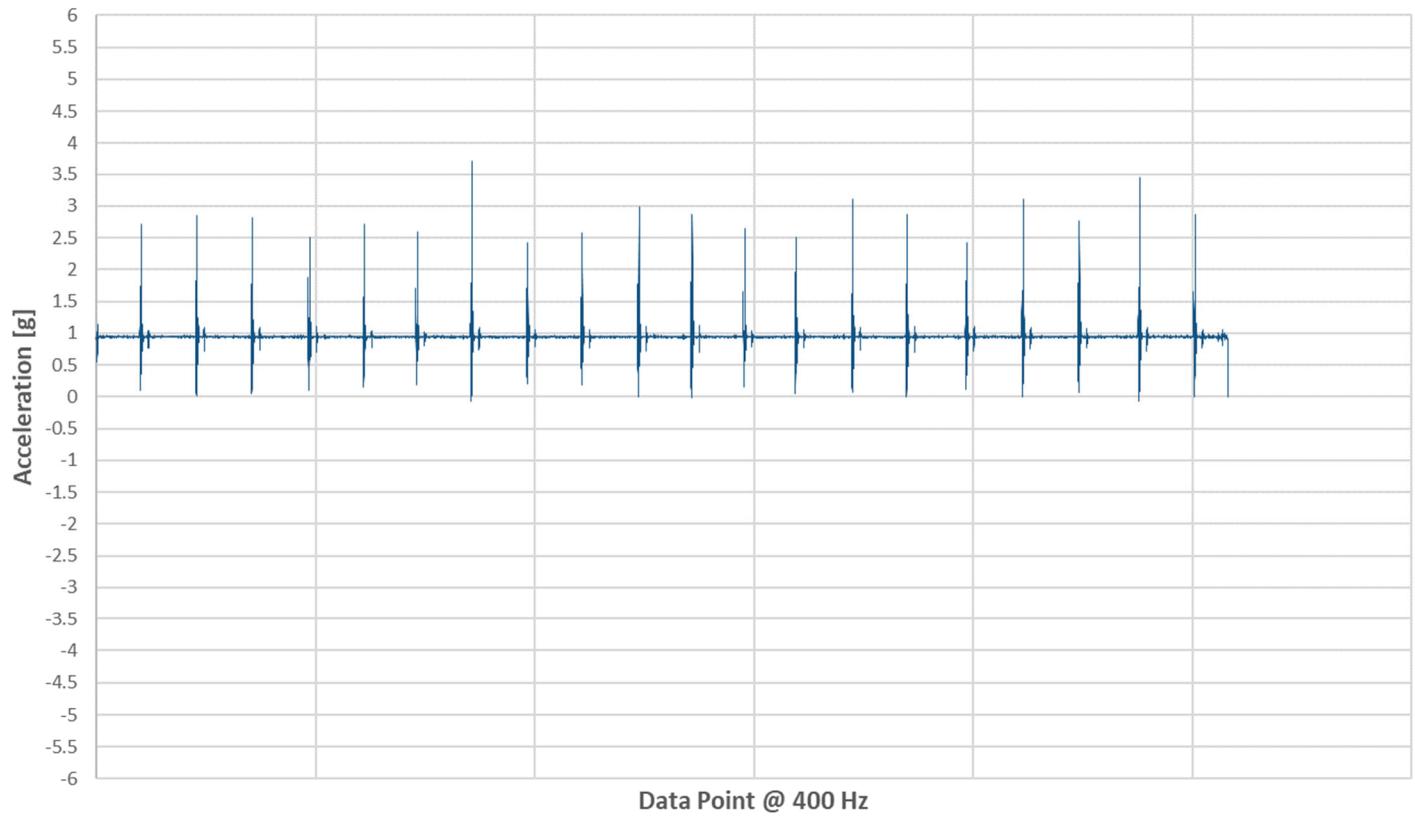




Y Acceleration (Head to Toe) - Layla Hybrid (Soft)



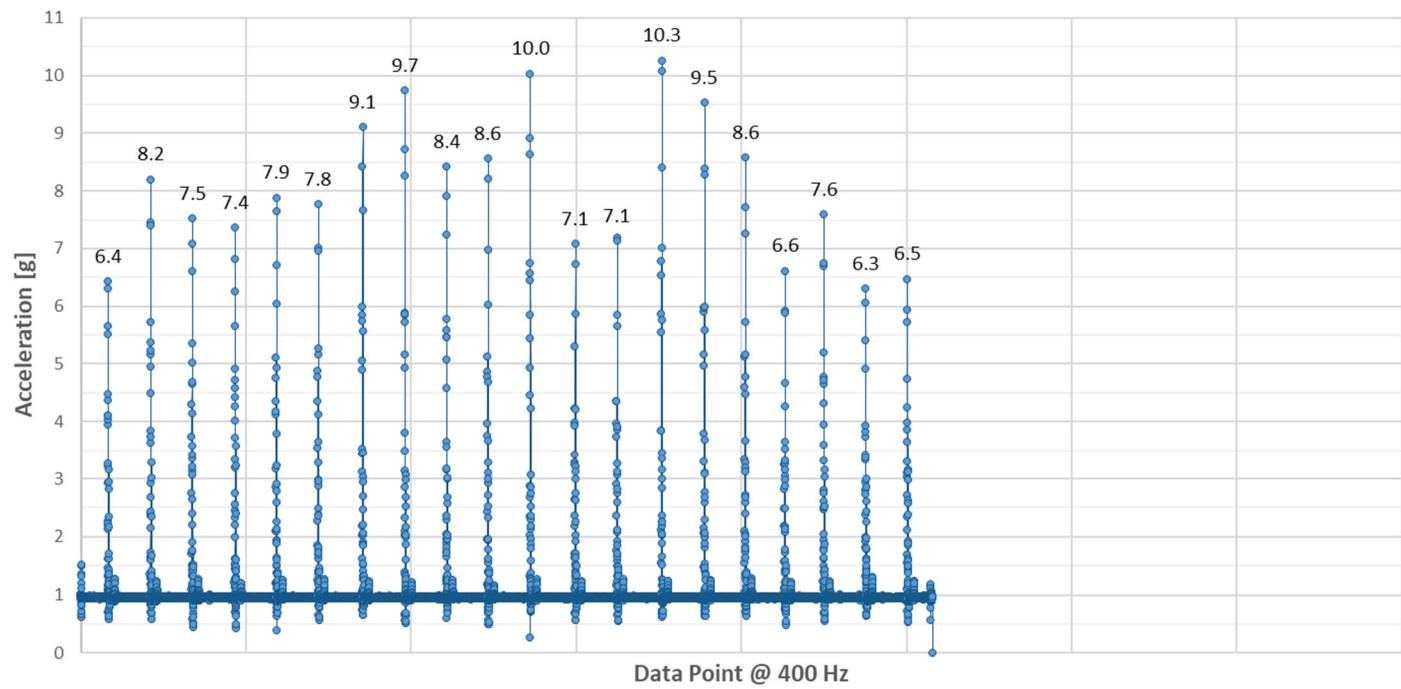
Z Acceleration (Up and Down) - Layla Hybrid (Soft)



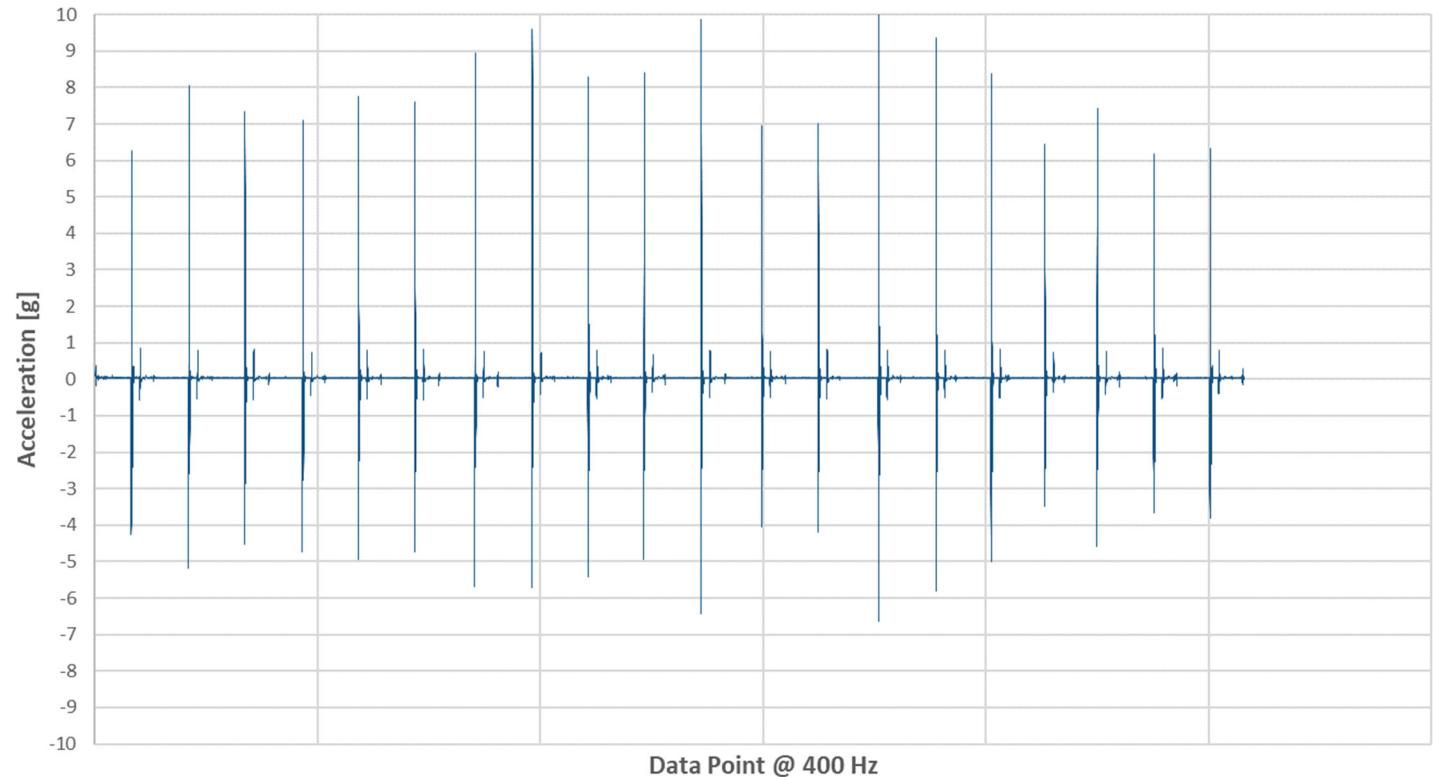


## TEST 3 –LEESA (V2)

Vector Magnitude Acceleration - Leesa (V2)

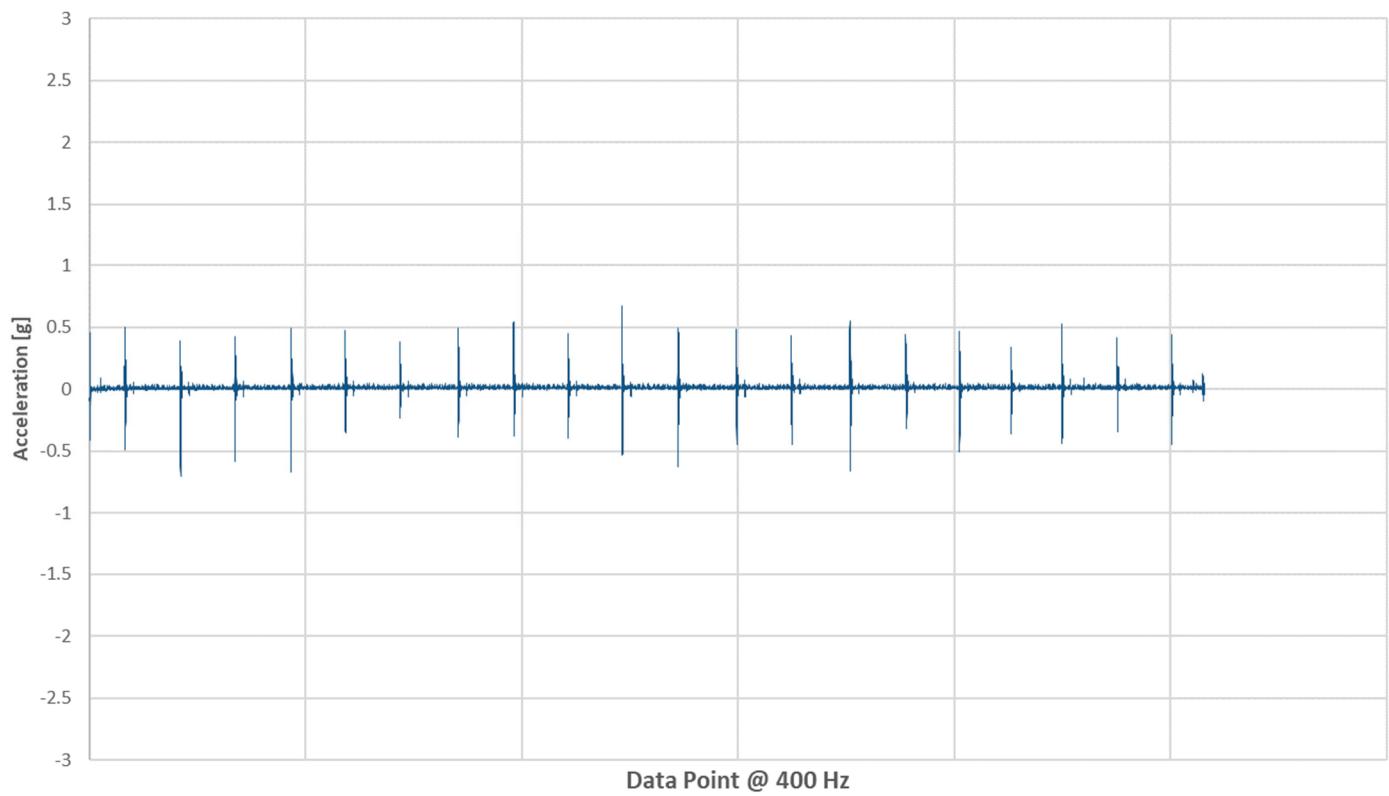


X Acceleration (Side to Side) - Leesa (V2)

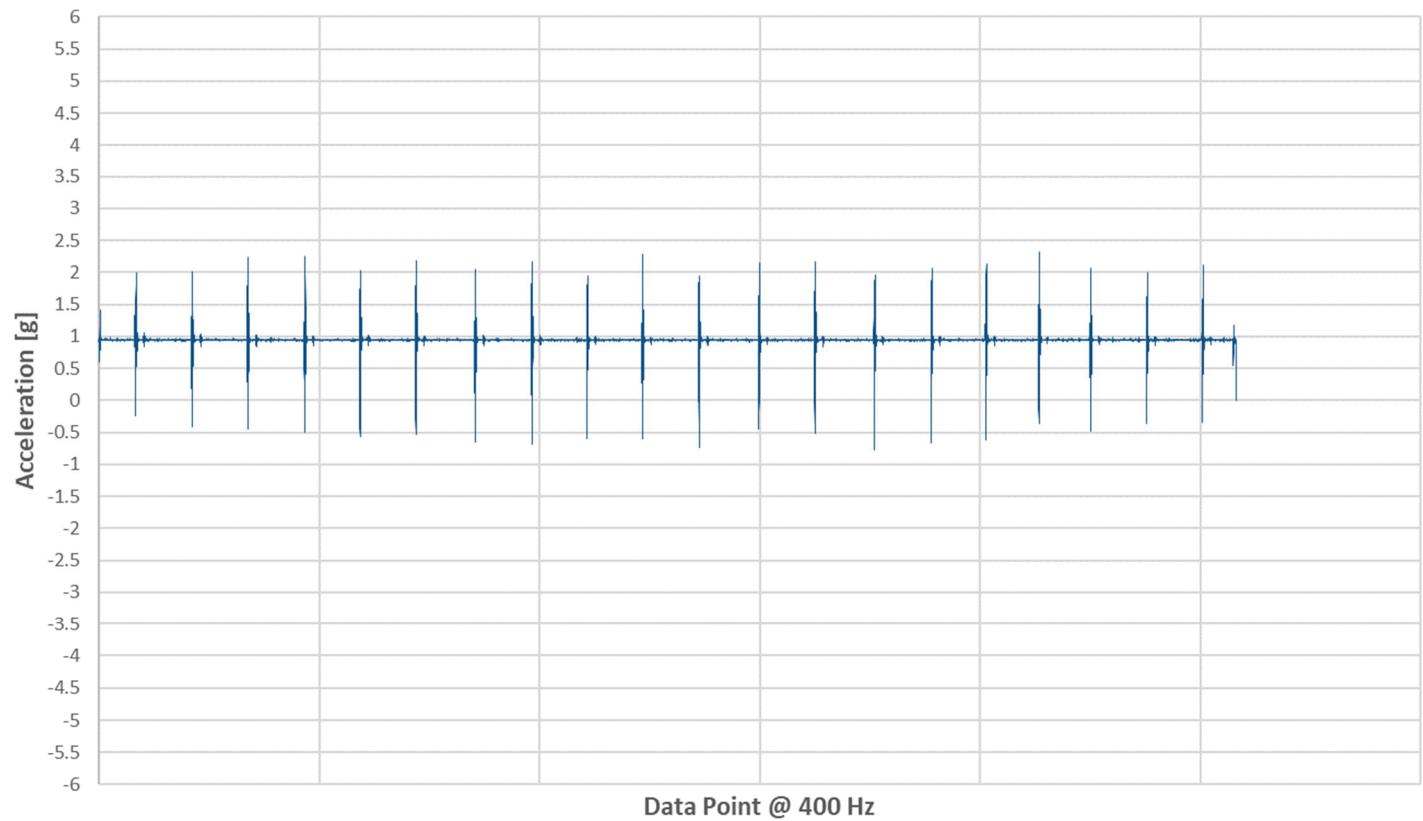




Y Acceleration (Head to Toe) - Leesa (V2)



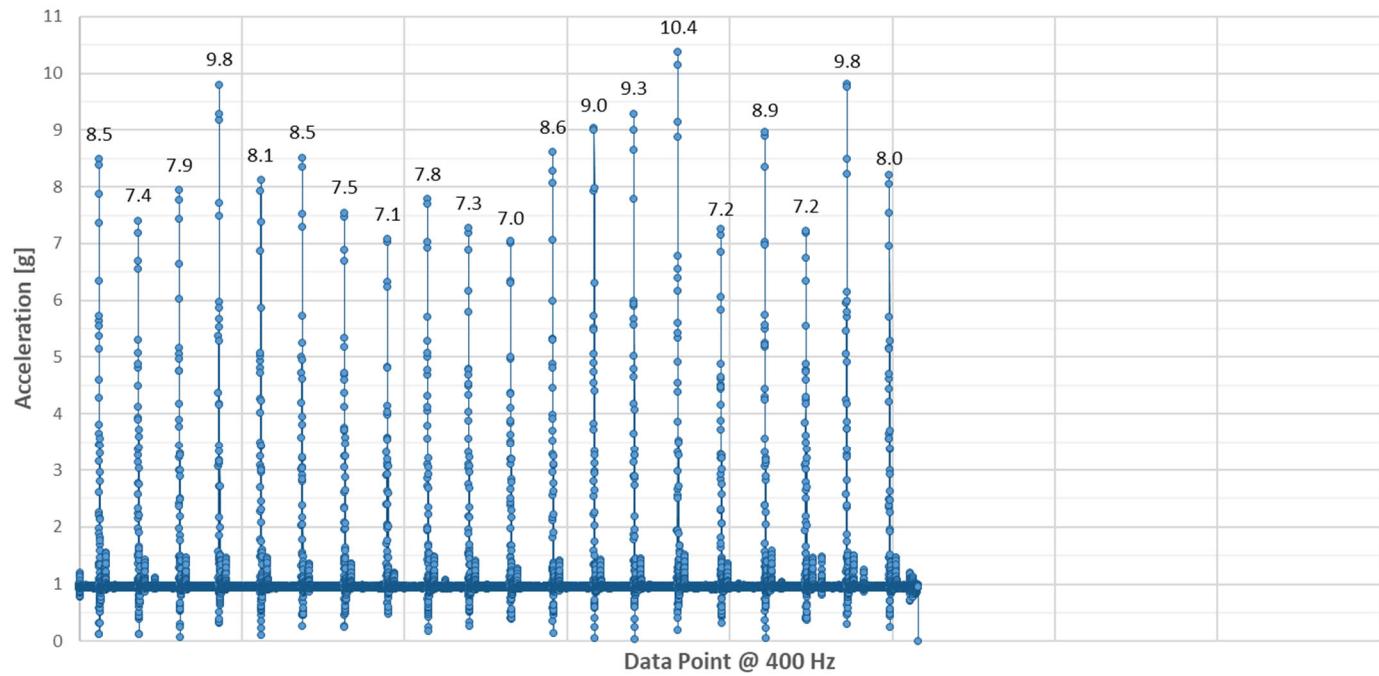
Z Acceleration (Up and Down) - Leesa (V2)



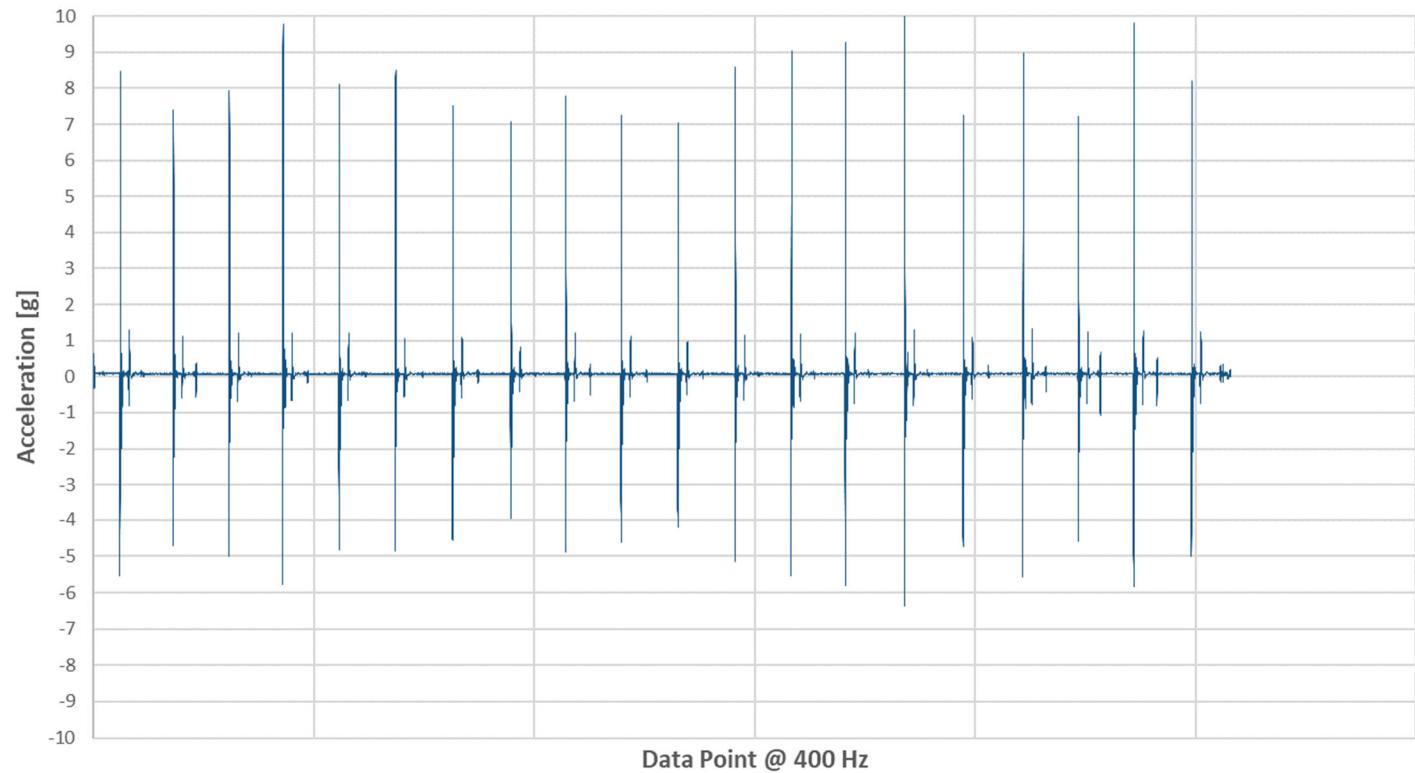


## TEST 3 –NECTAR (V2)

Vector Magnitude Acceleration - Nectar (V2)

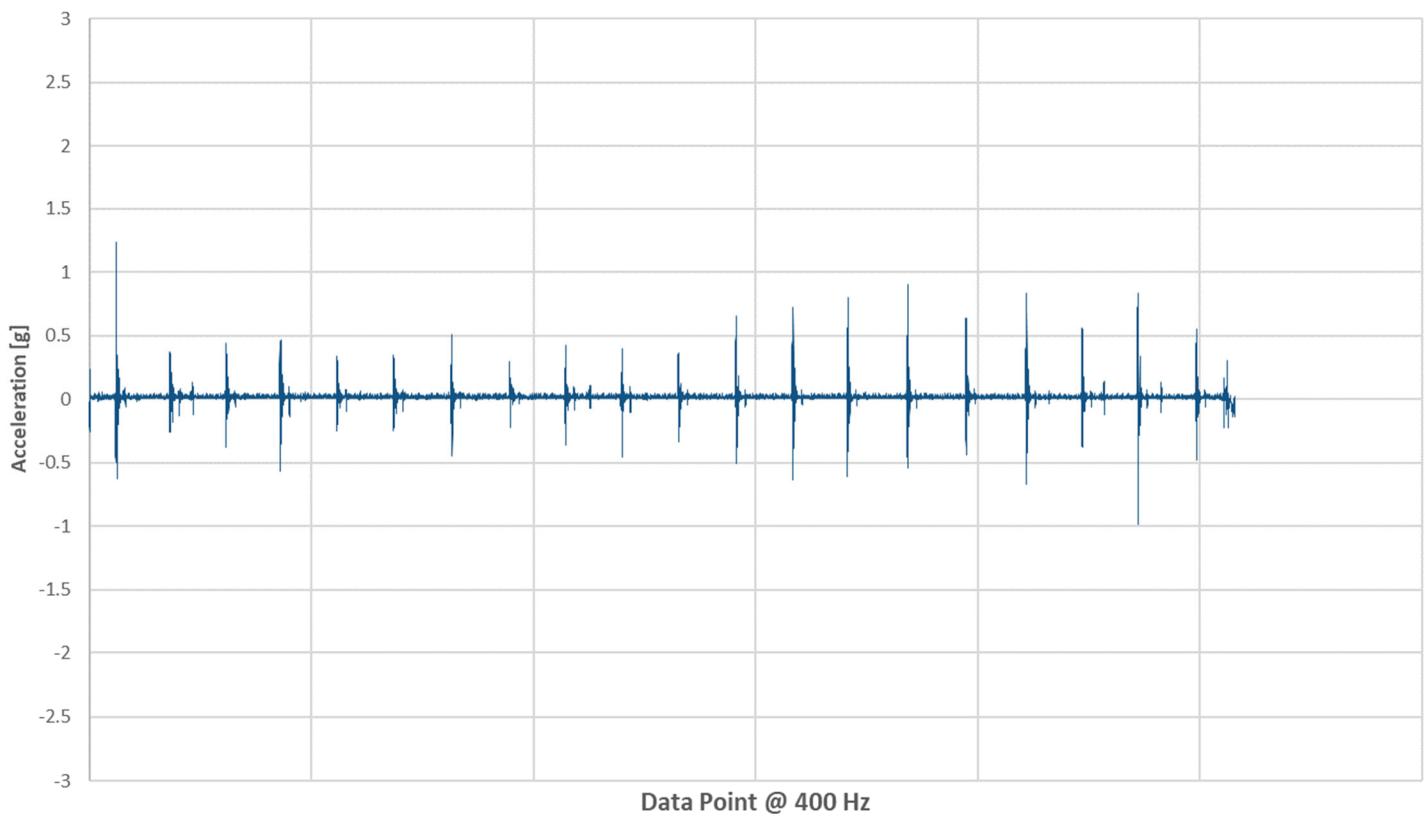


X Acceleration (Side to Side) - Nectar (V2)

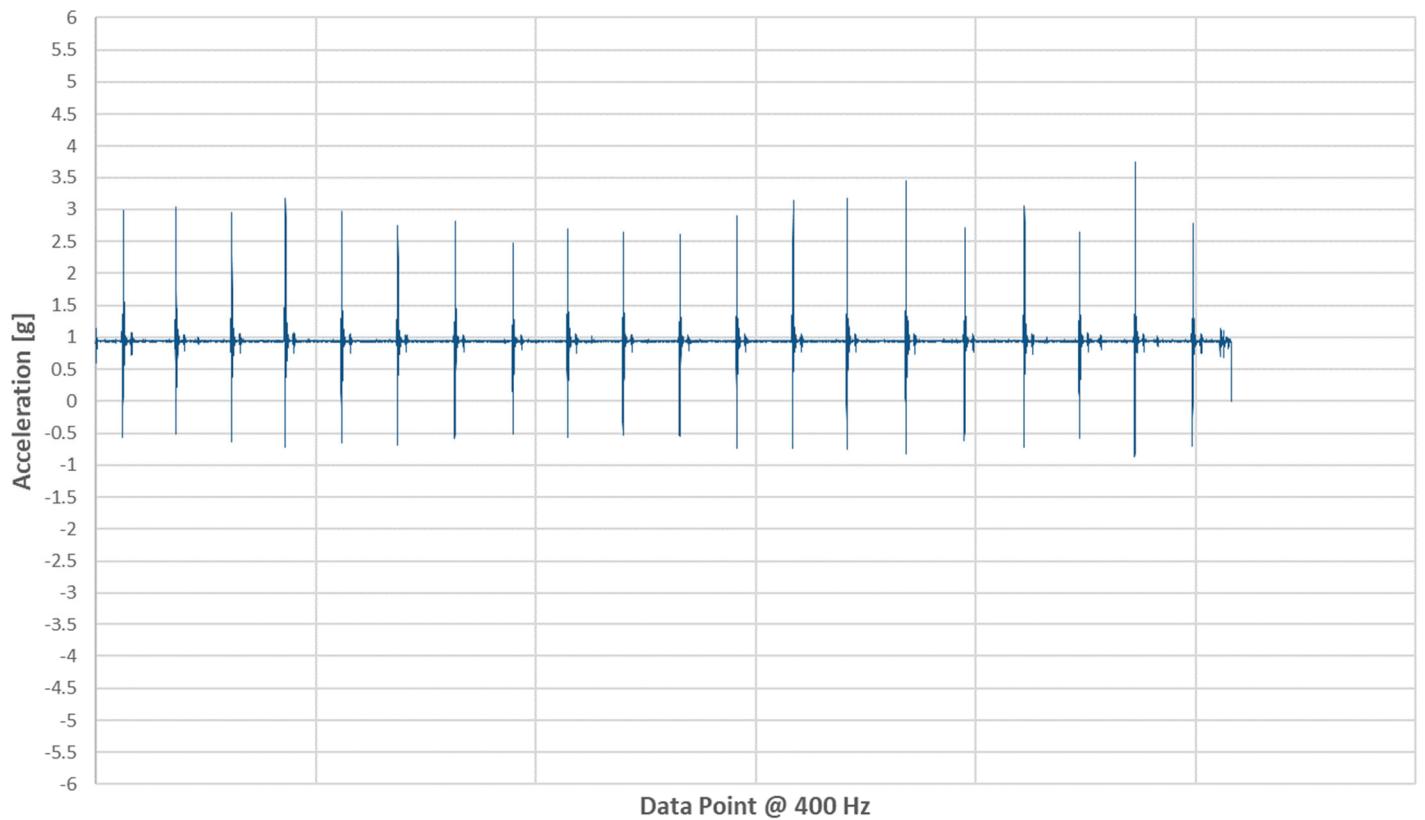




Y Acceleration (Head to Toe) - Nectar (V2)



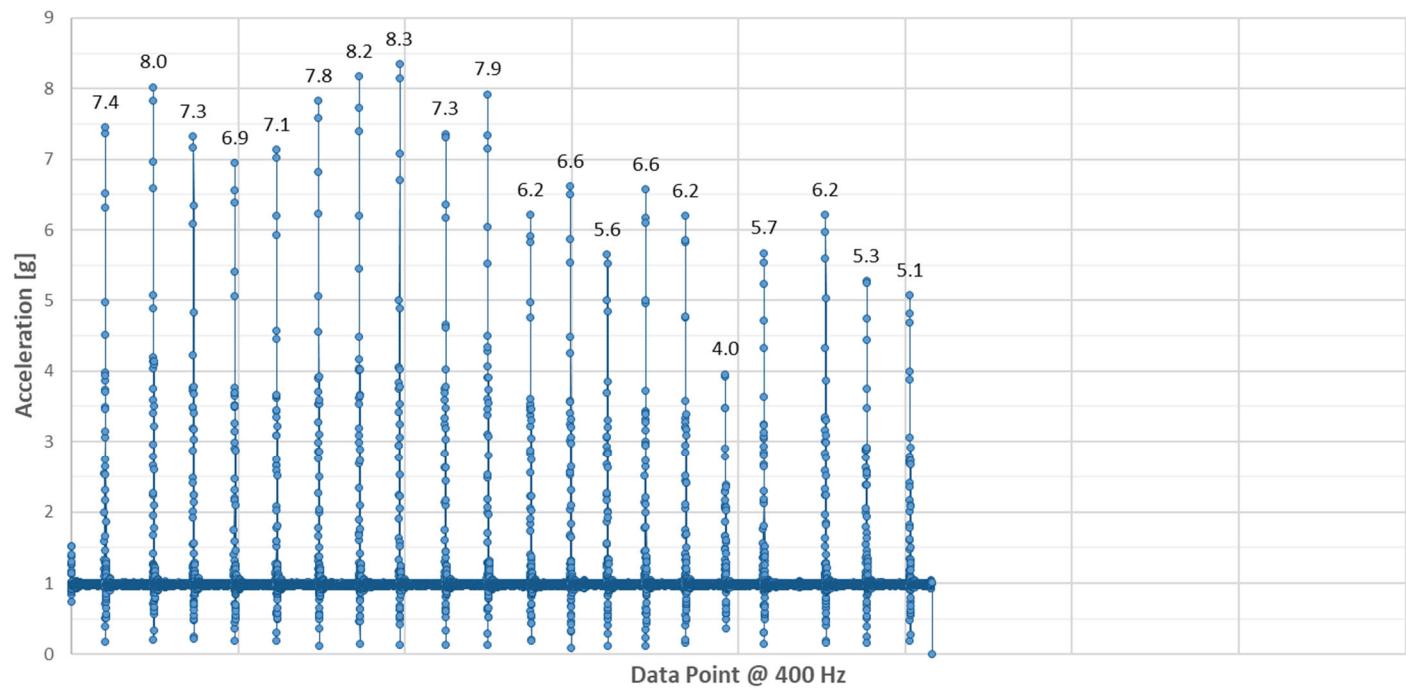
Z Acceleration (Up and Down) - Nectar (V2)



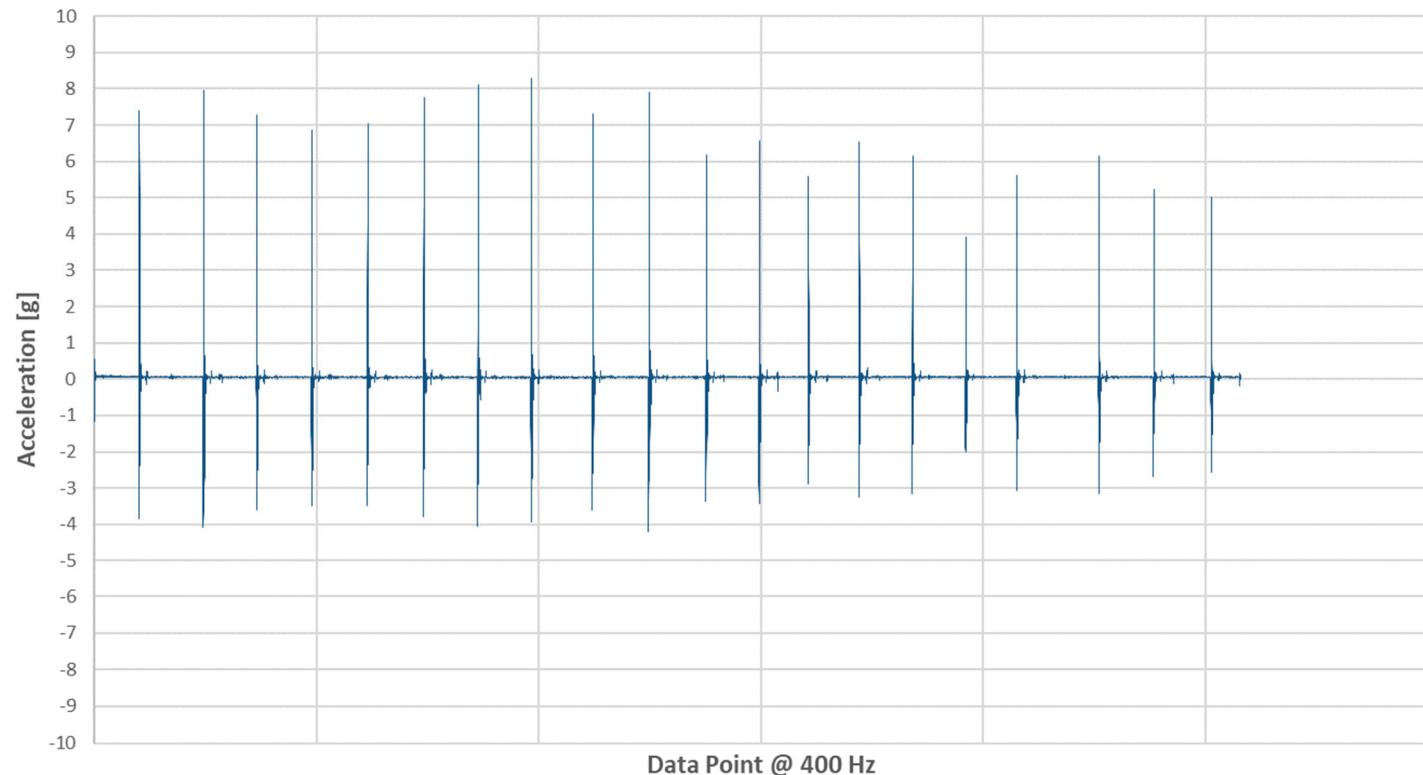


## TEST 3 –NECTAR PREMIER

Vector Magnitude Acceleration - Nectar Premier

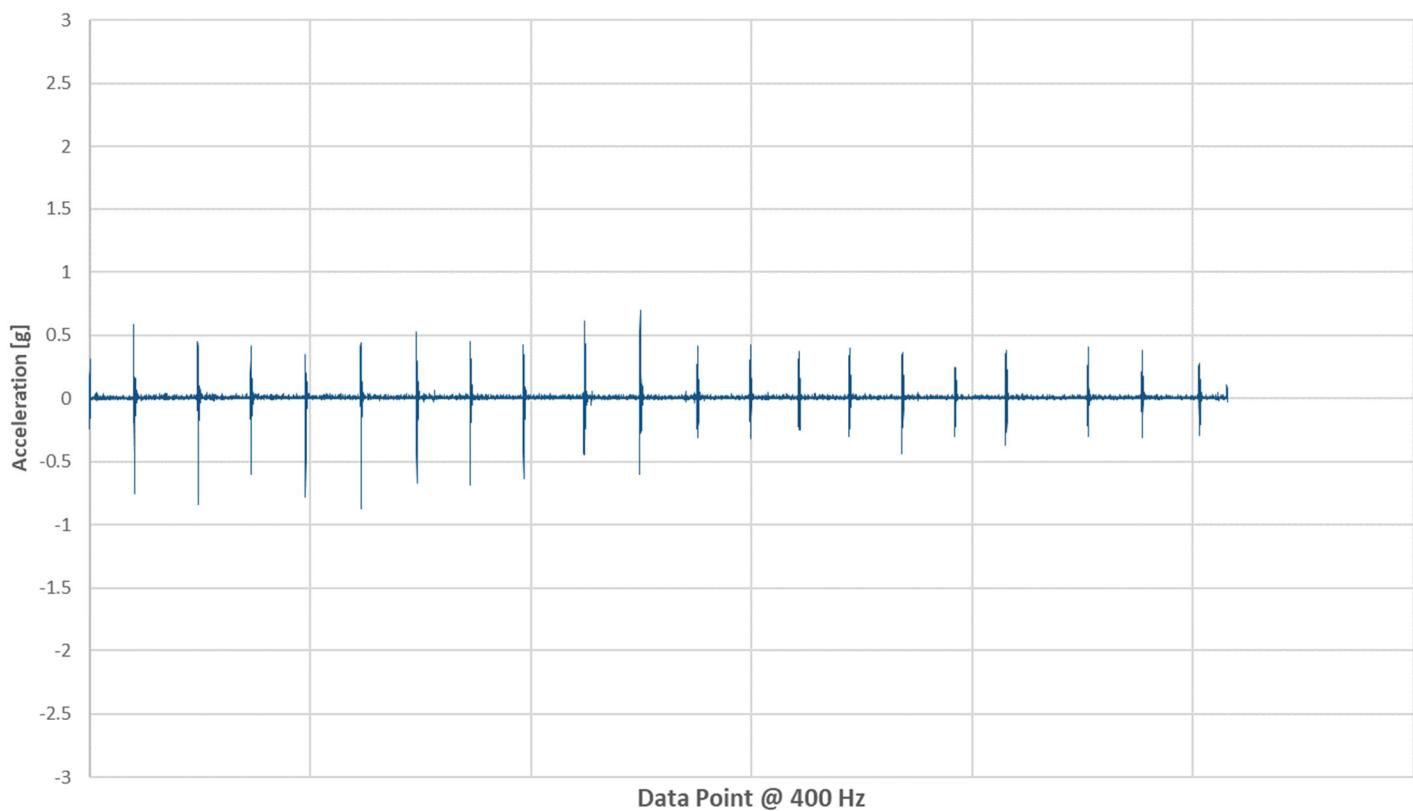


X Acceleration (Side to Side) - Nectar Premier

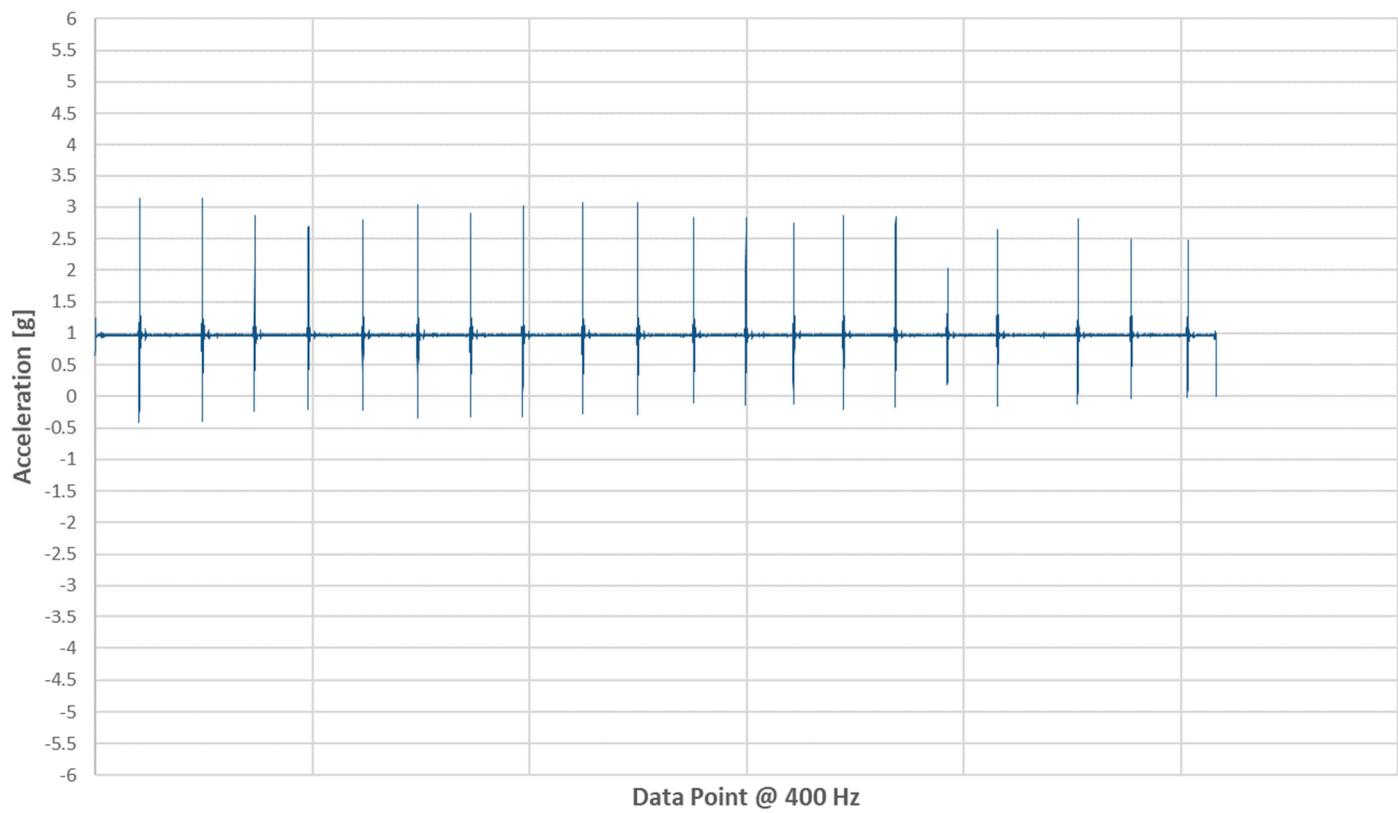




Y Acceleration (Head to Toe) - Nectar Premier



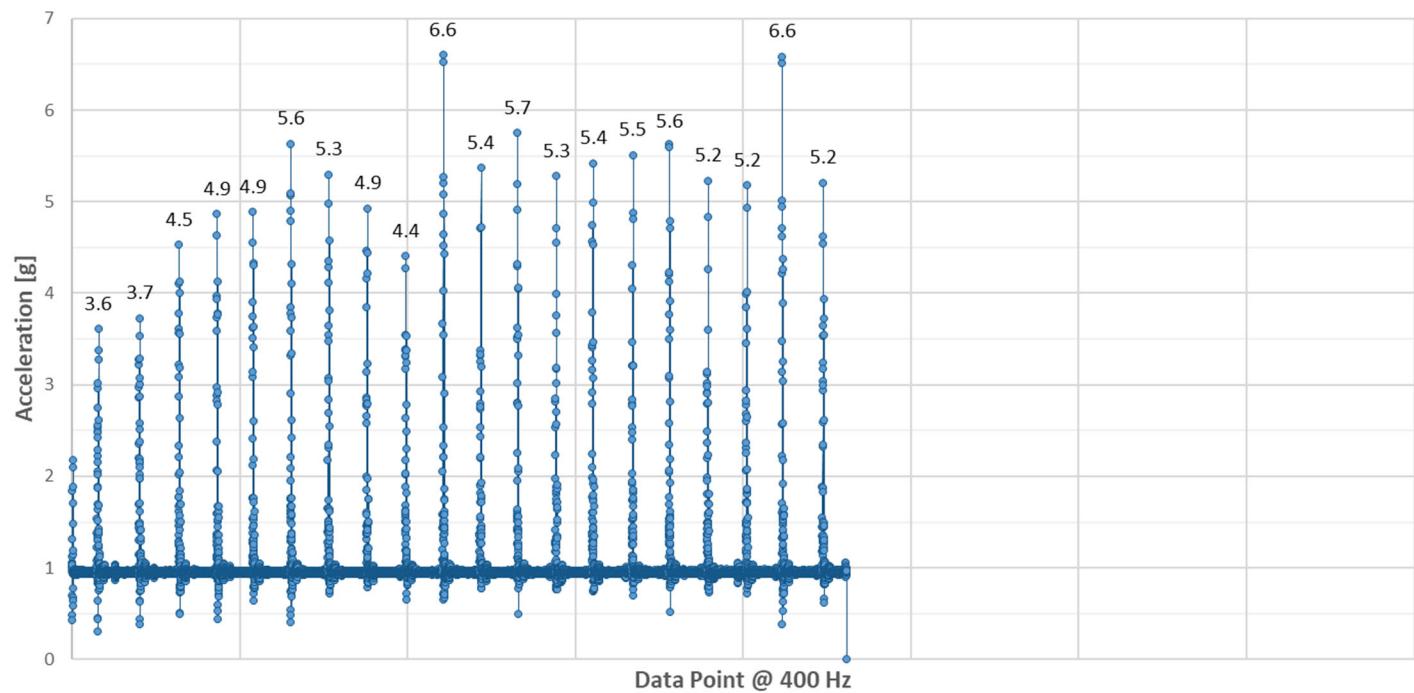
Z Acceleration (Up and Down) - Nectar Premier



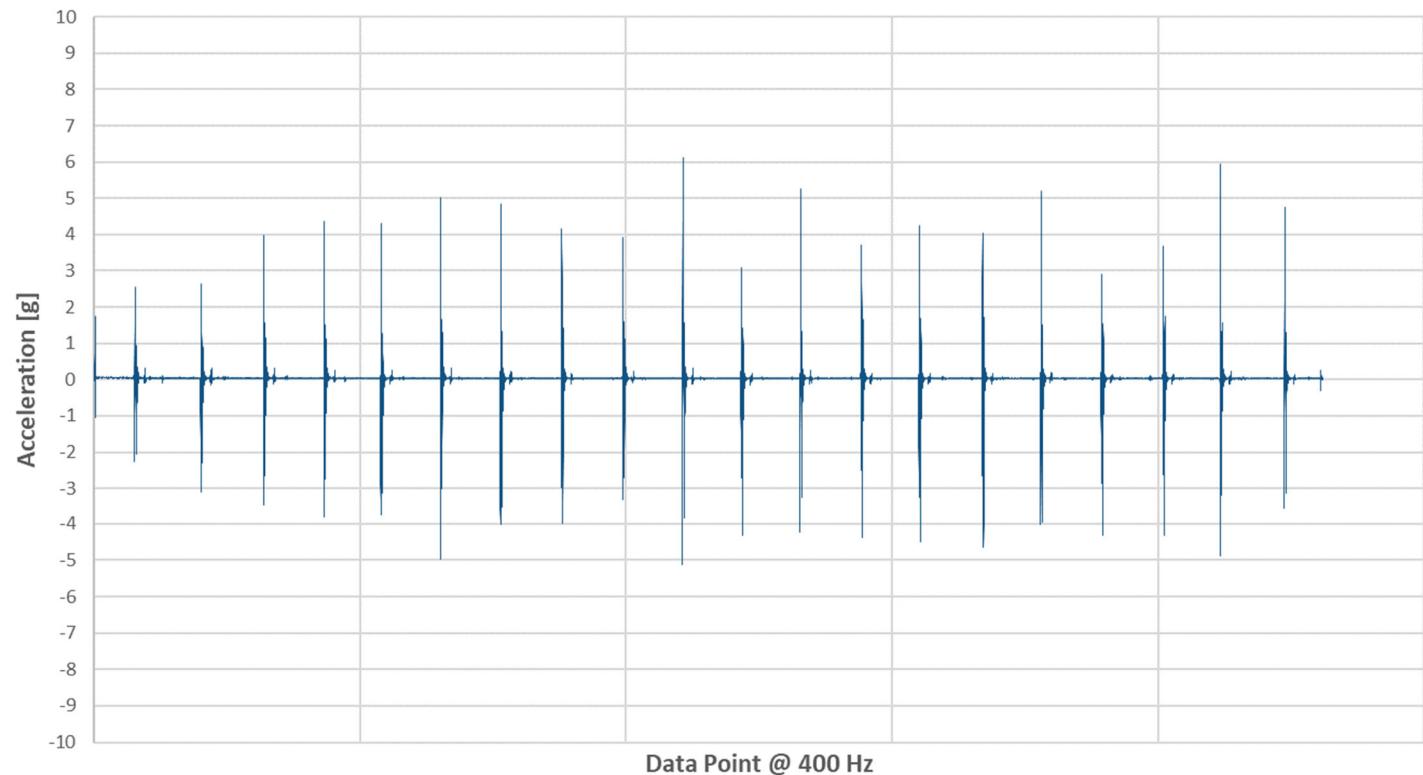


## TEST 3 –NOLAH

Vector Magnitude Acceleration - Nolah

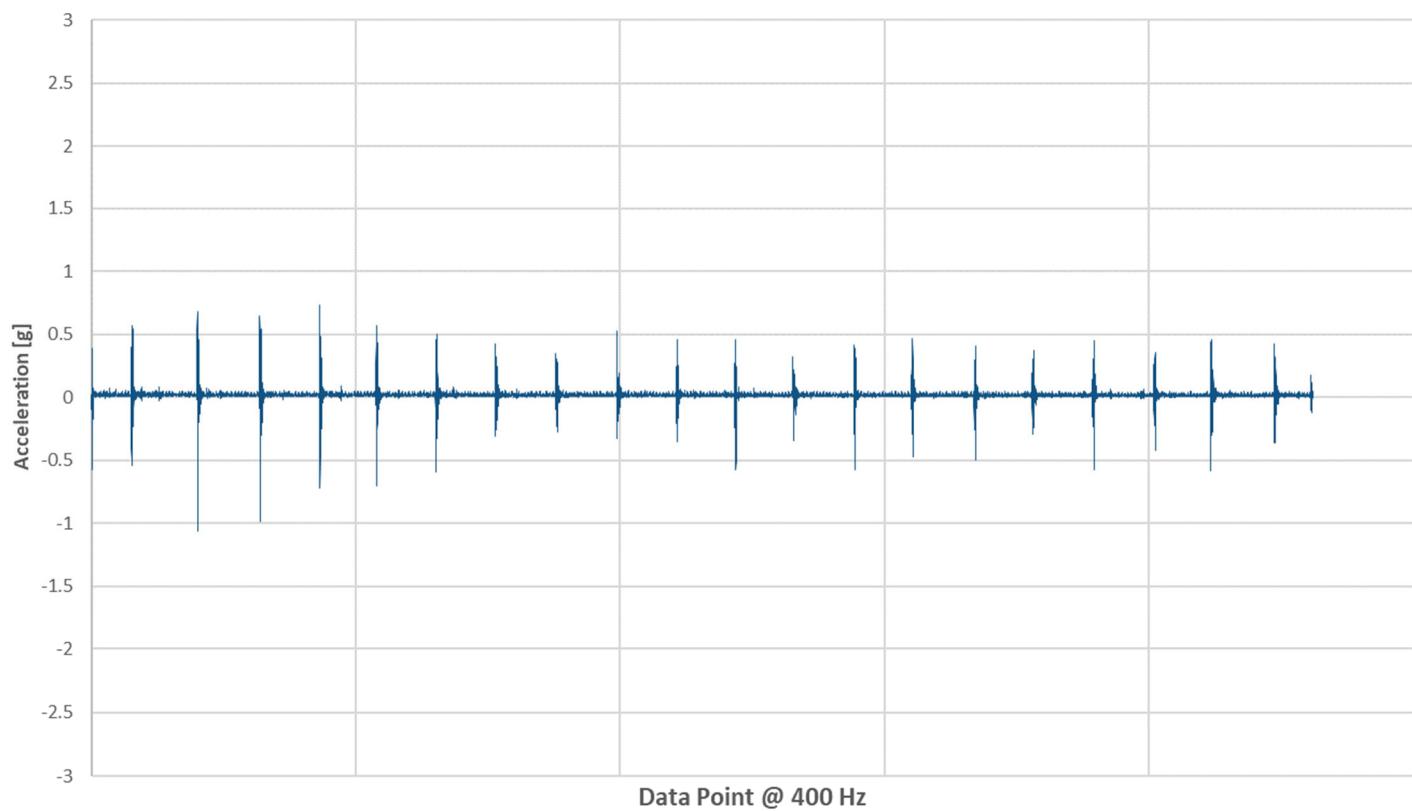


X Acceleration (Side to Side) - Nolah

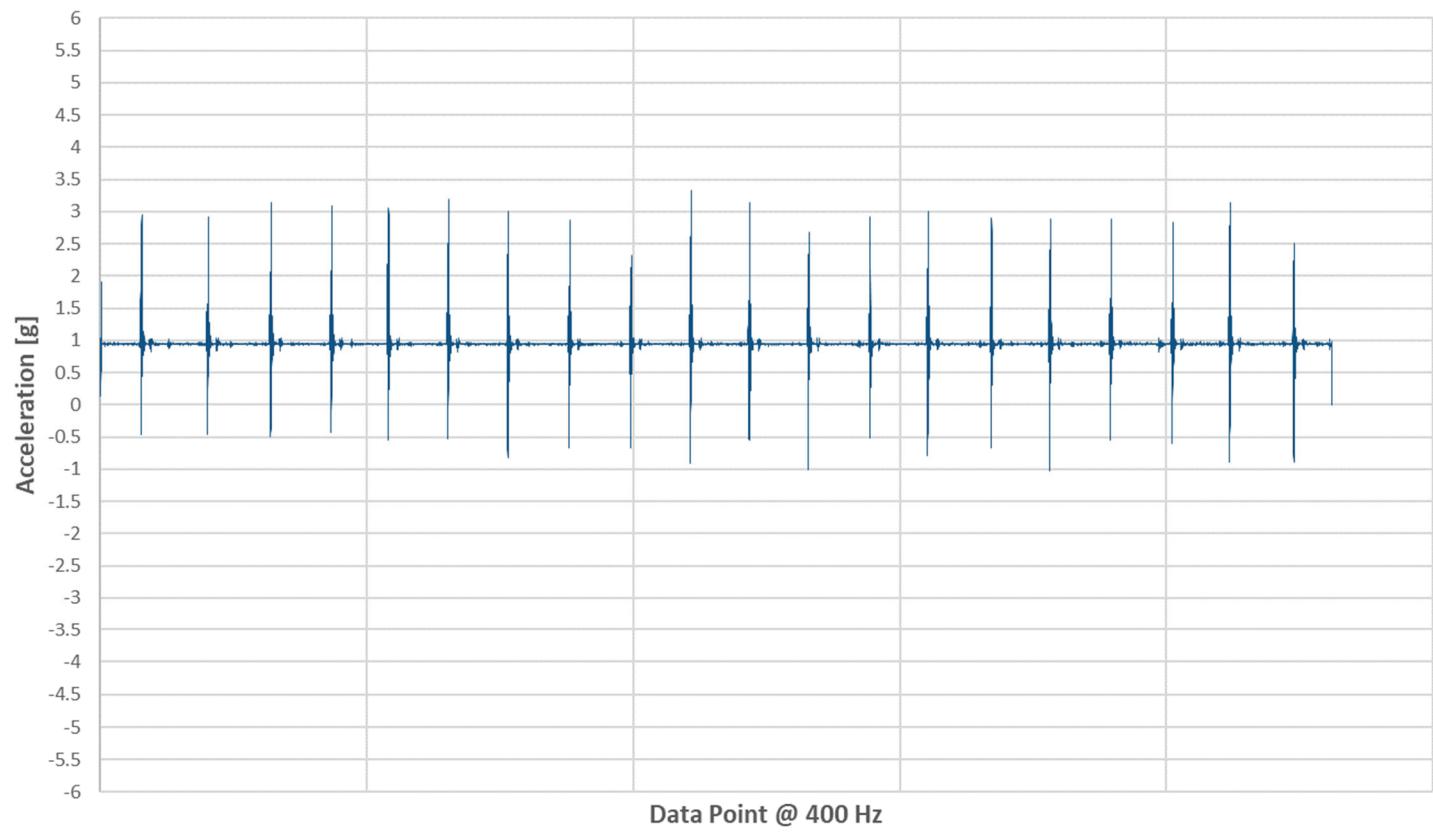




Y Acceleration (Head to Toe) - Nolah



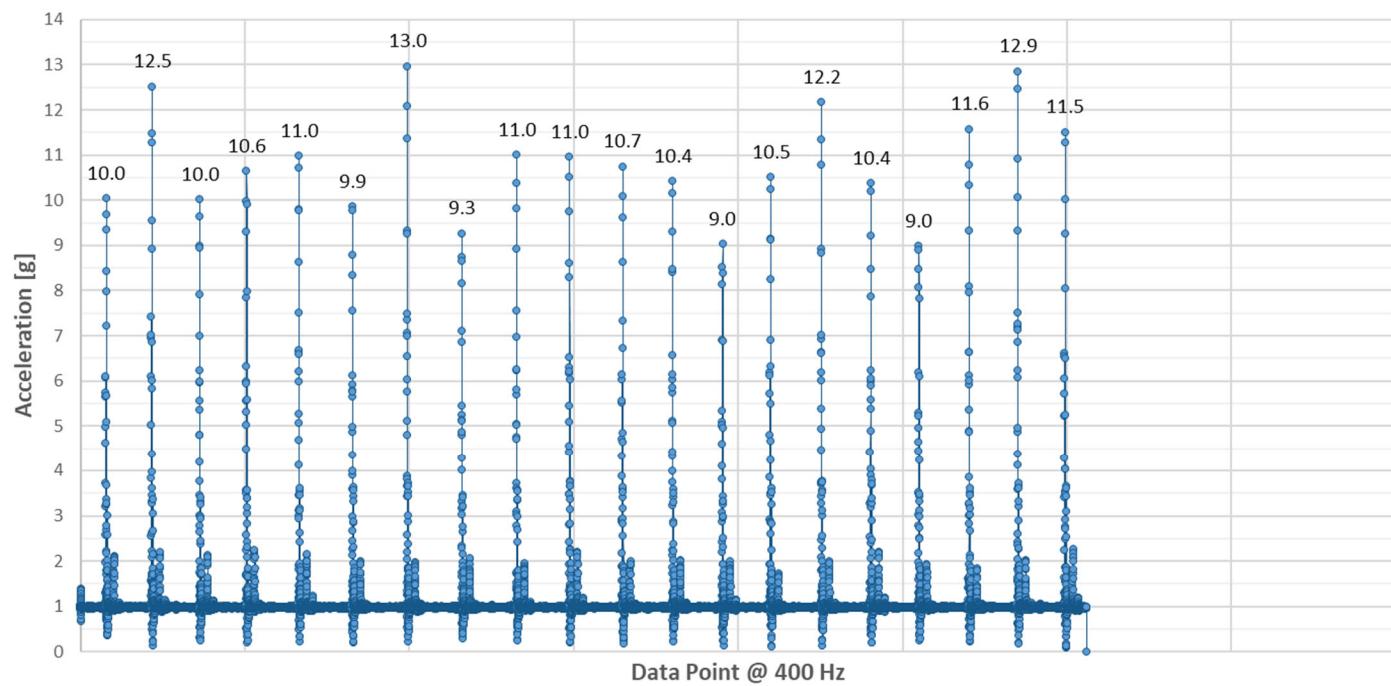
Z Acceleration (Up and Down) - Nolah



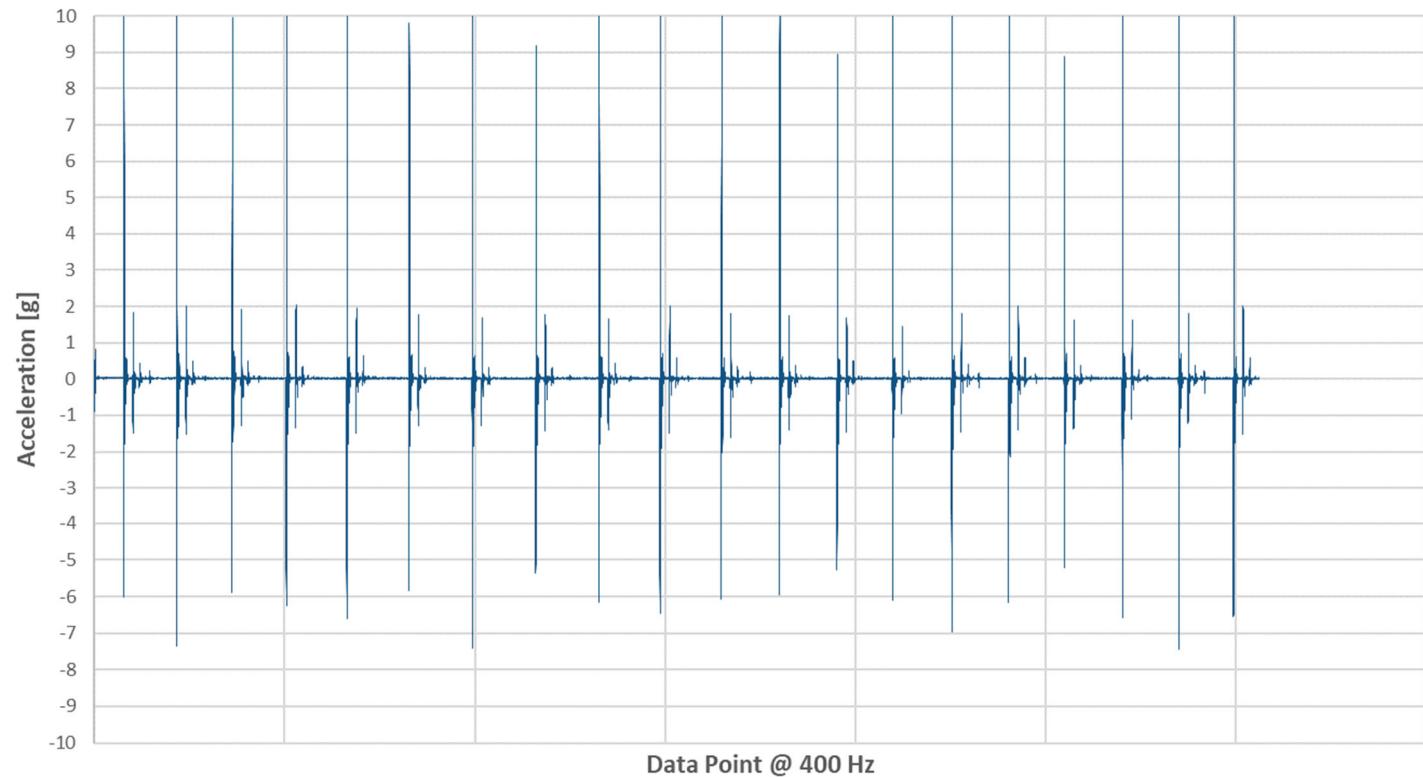


## TEST 3 –PURPLE (V2)

Vector Magnitude Acceleration - Purple (V2)

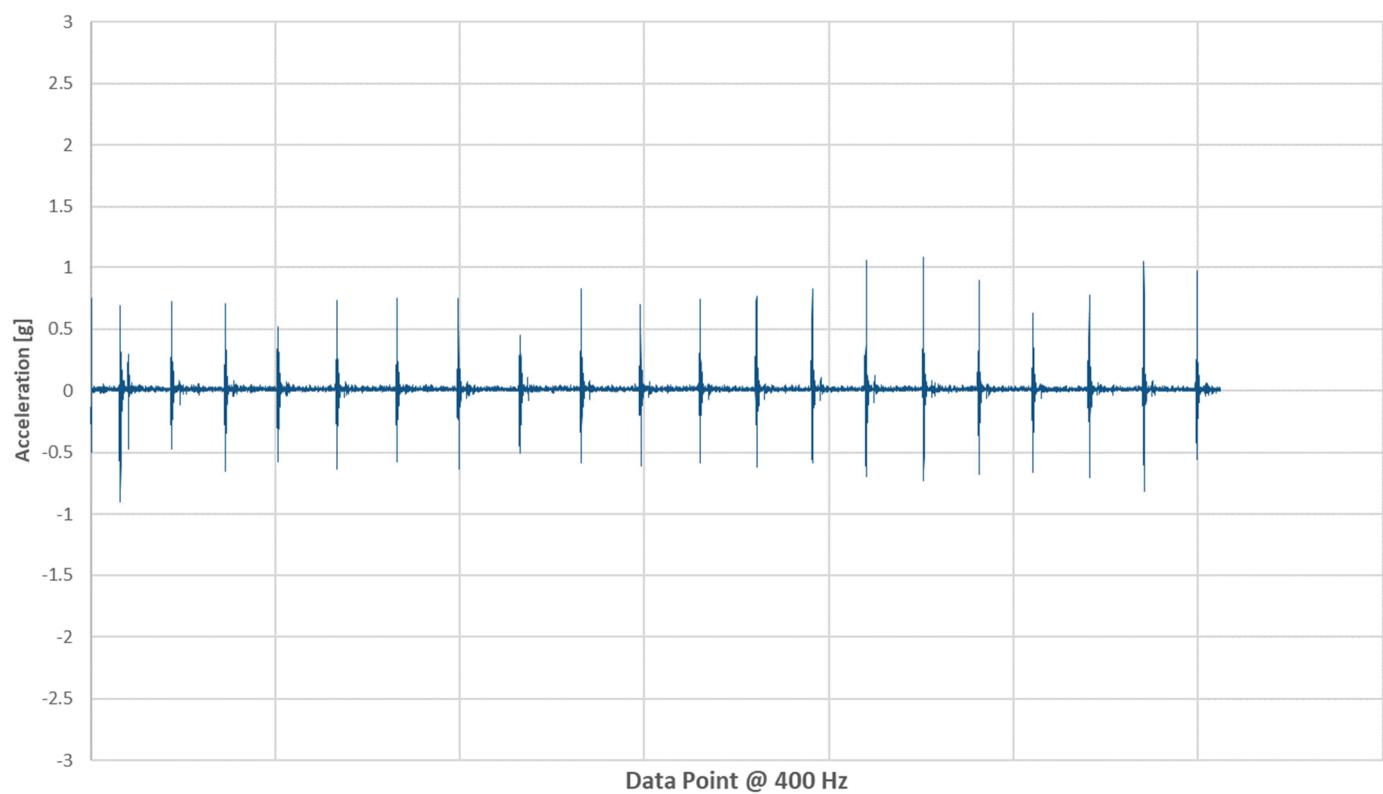


X Acceleration (Side to Side) - Purple (V2)

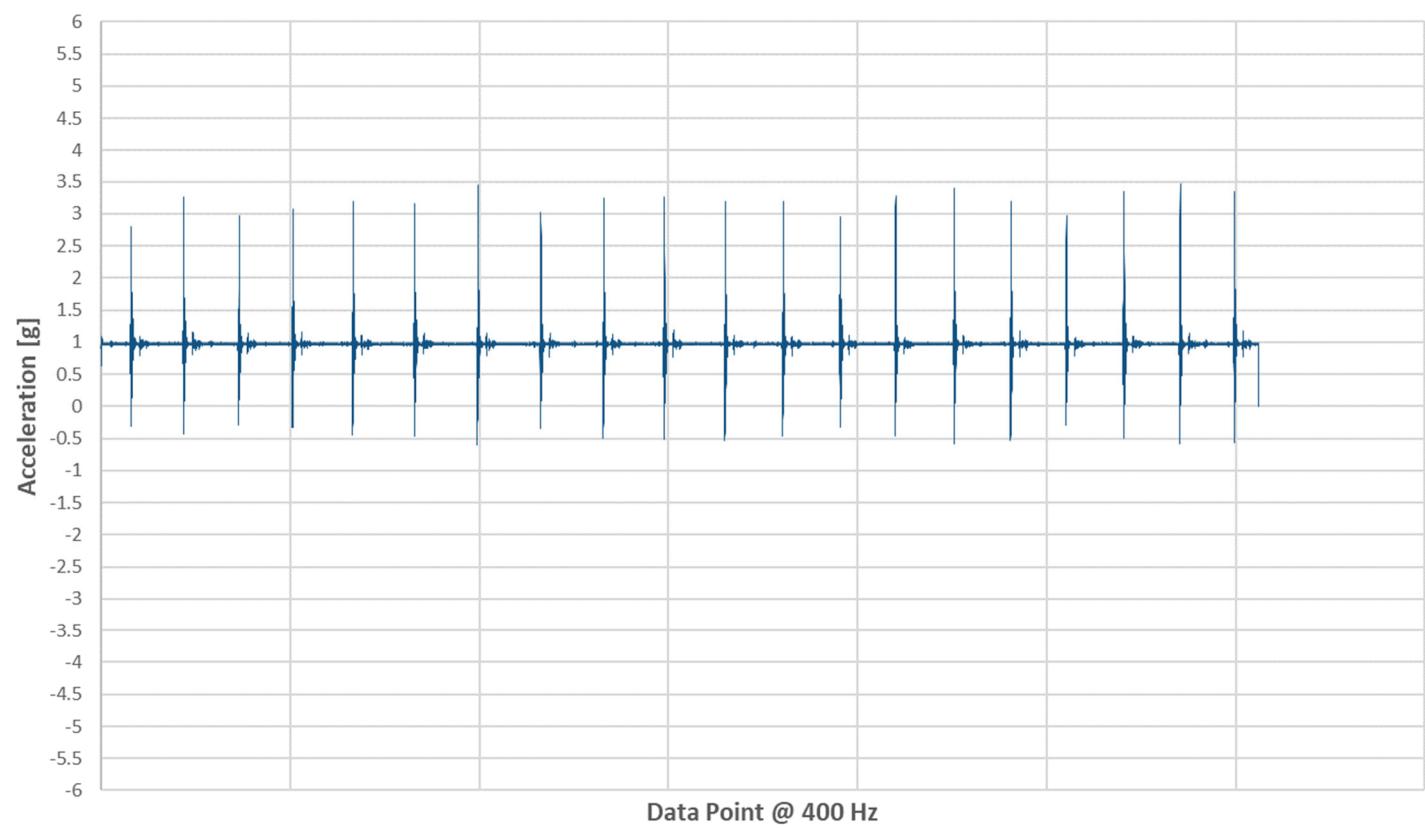




Y Acceleration (Head to Toe) - Purple (V2)



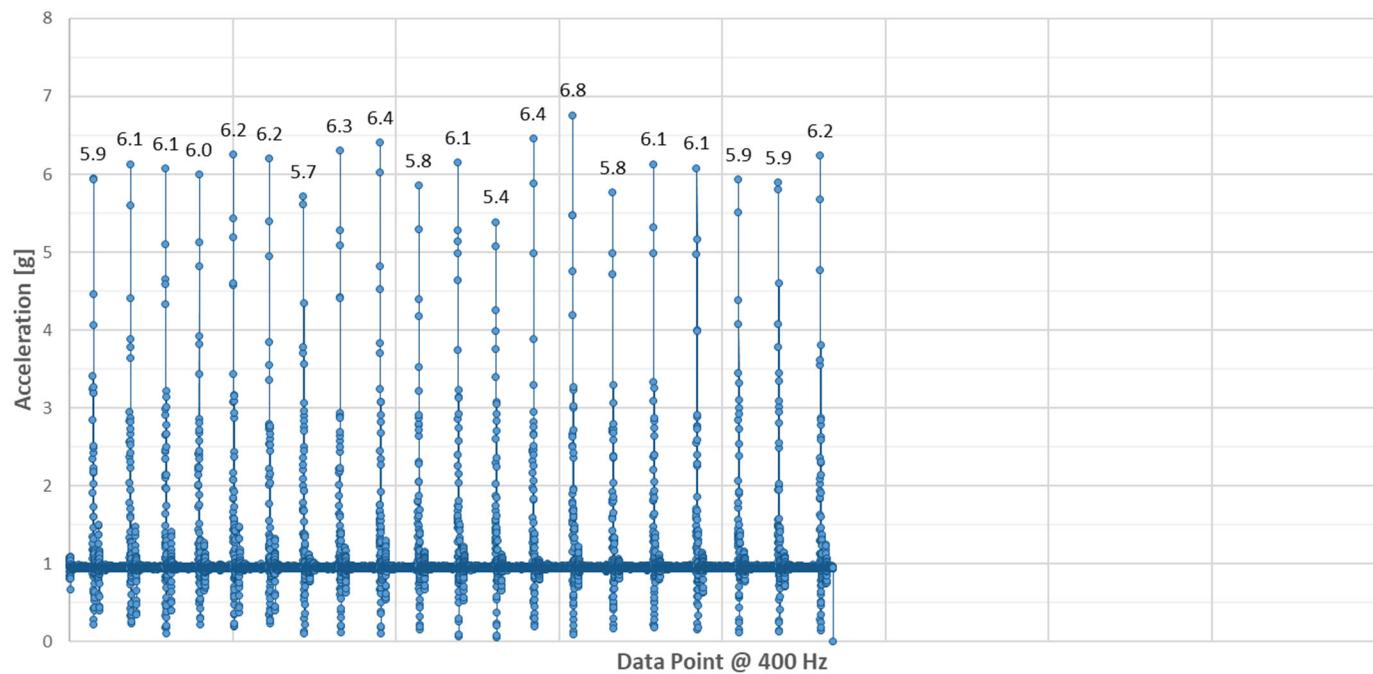
Z Acceleration (Up and Down) - Purple (V2)



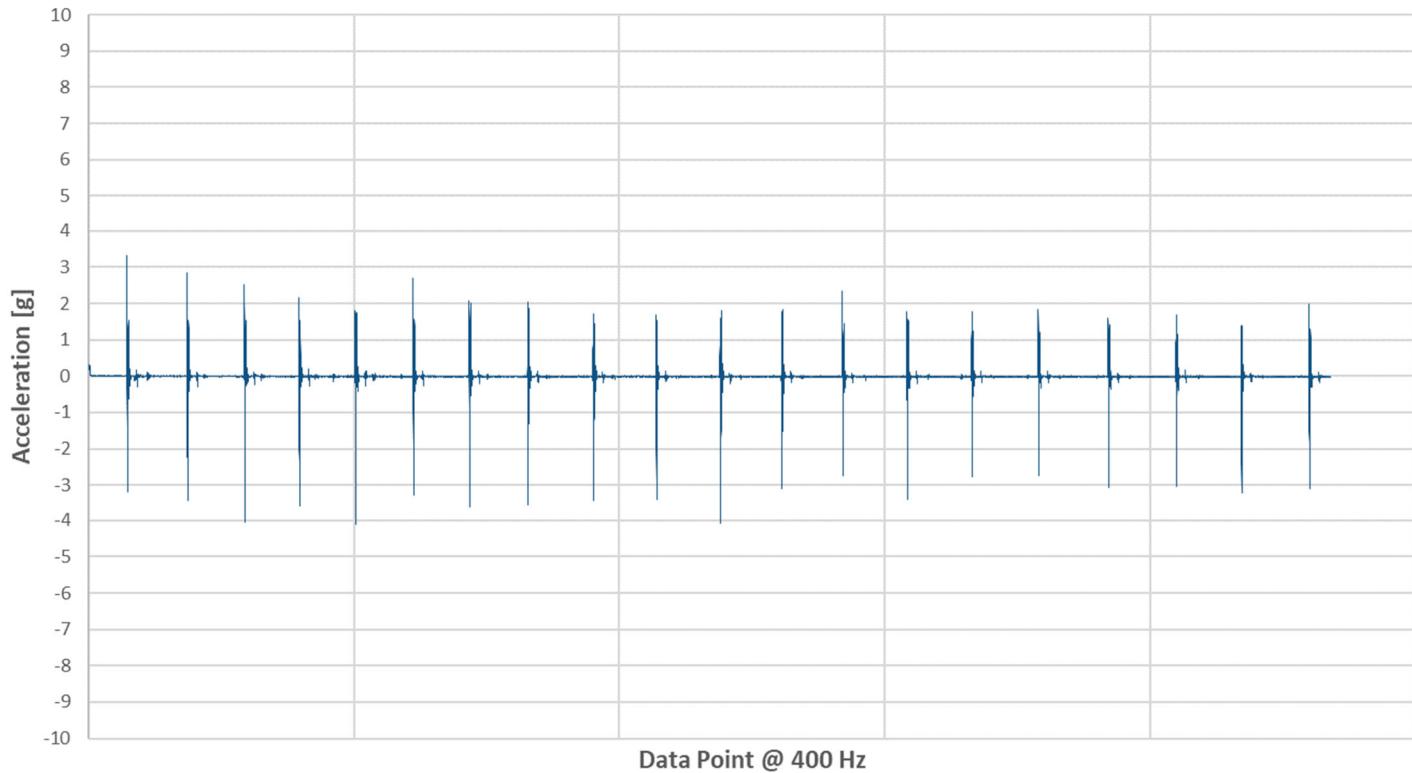


## TEST 3 –SAATVA LOOM & LEAF

Vector Magnitude Acceleration - Saatva Loom & Leaf

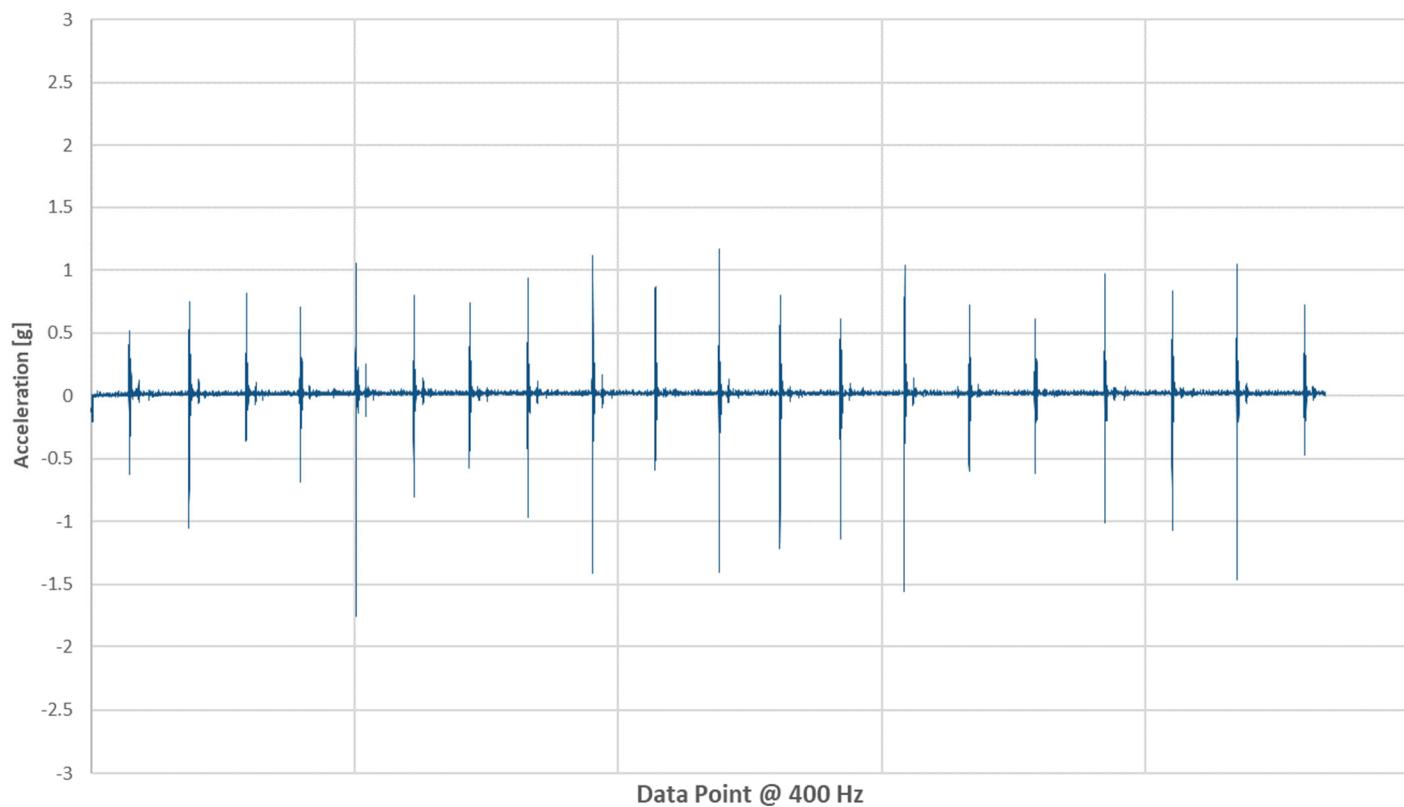


X Acceleration (Side to Side) - Saatva Loom & Leaf

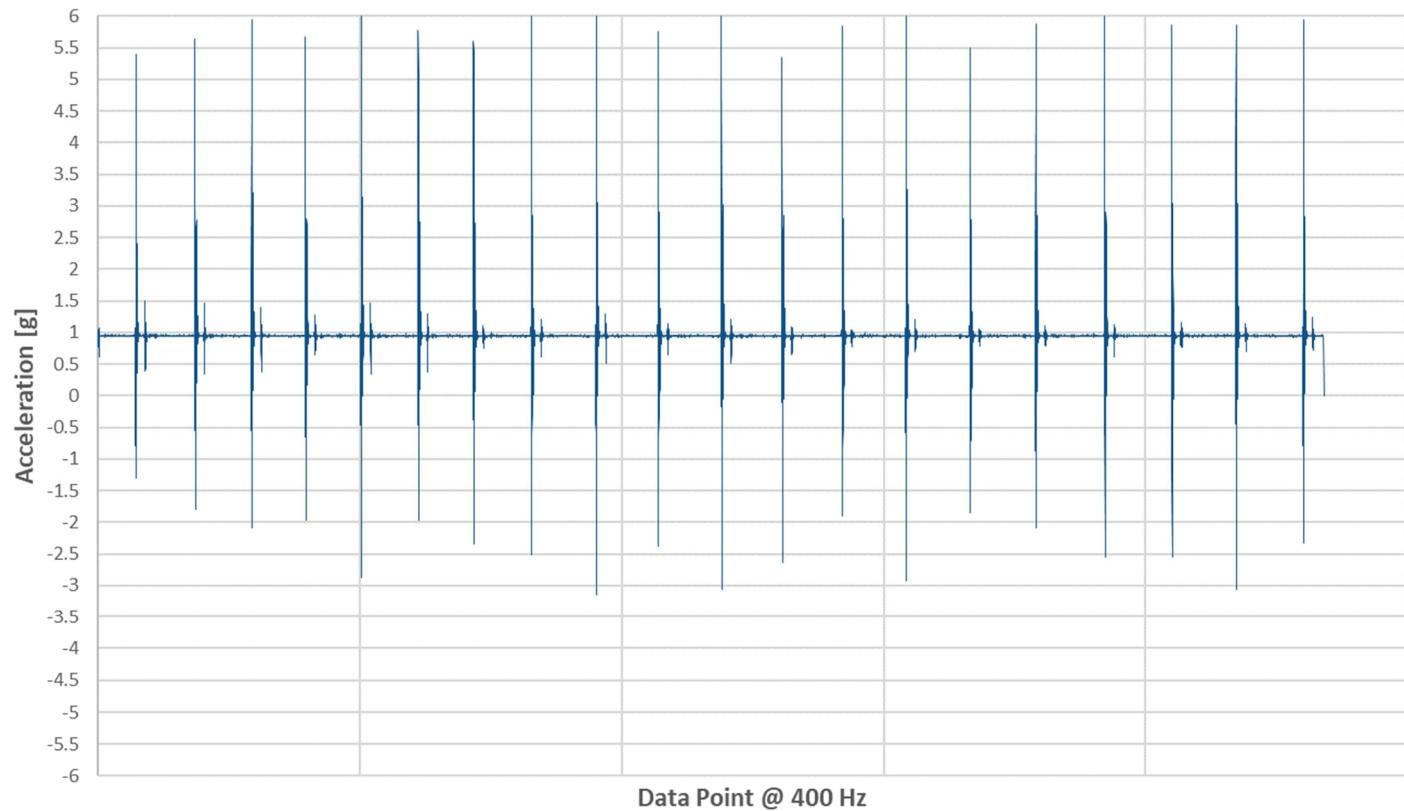




Y Acceleration (Head to Toe) - Saatva Loom & Leaf



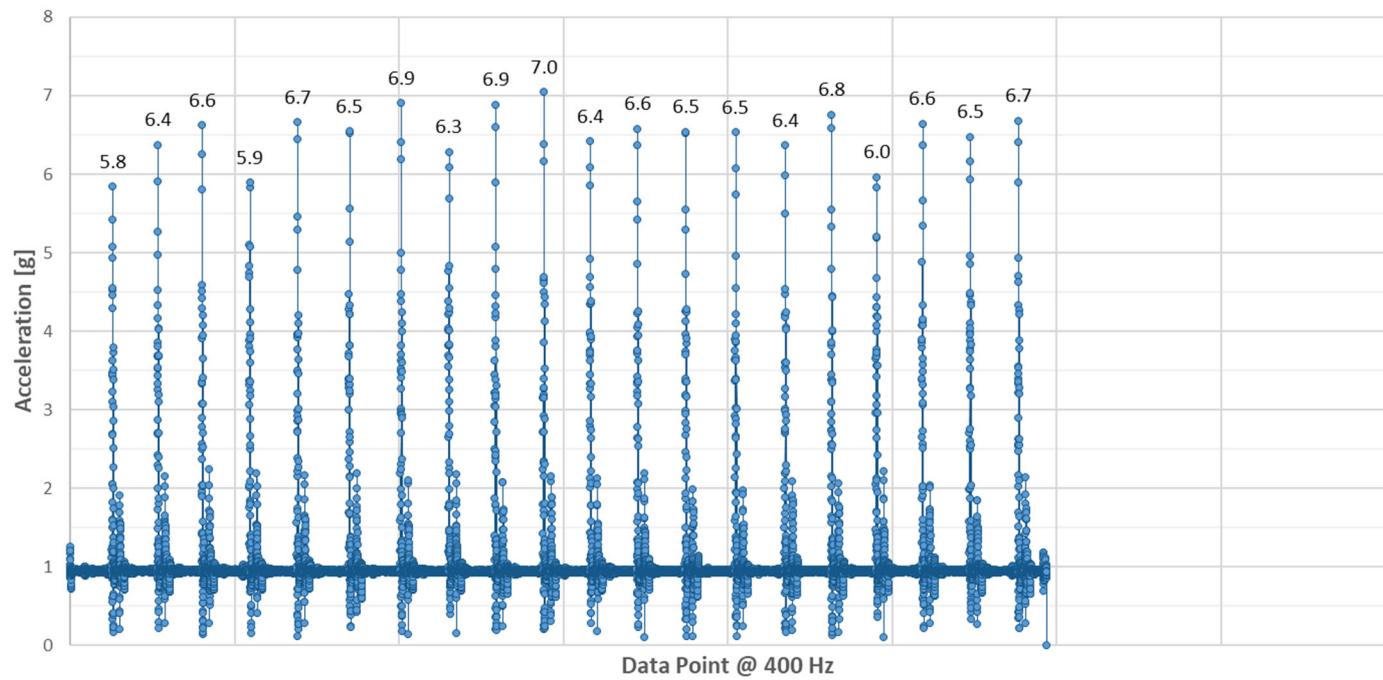
Z Acceleration (Up and Down) - Saatva Loom & Leaf



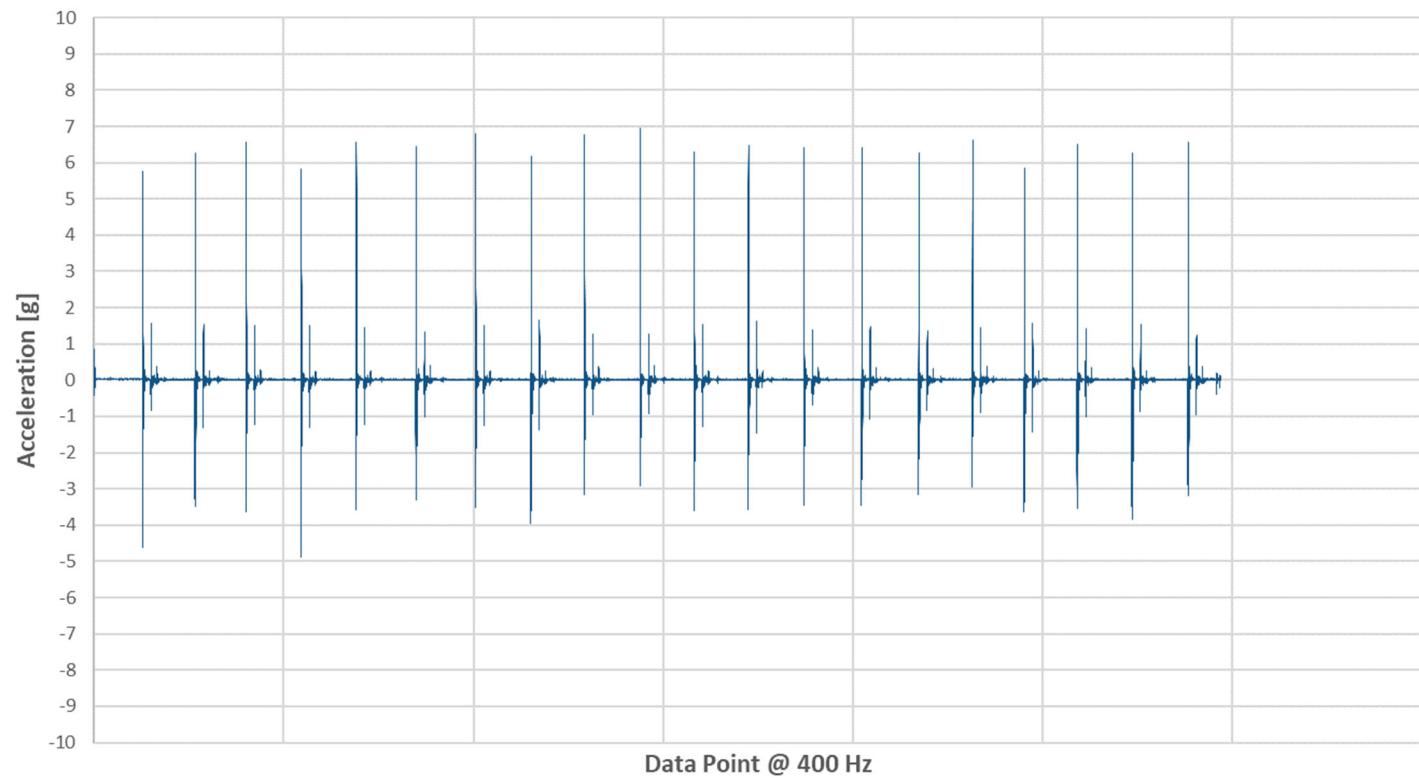


## TEST 3 –SAATVA ZENHAVEN

Vector Magnitude Acceleration - Saatva Zenhaven

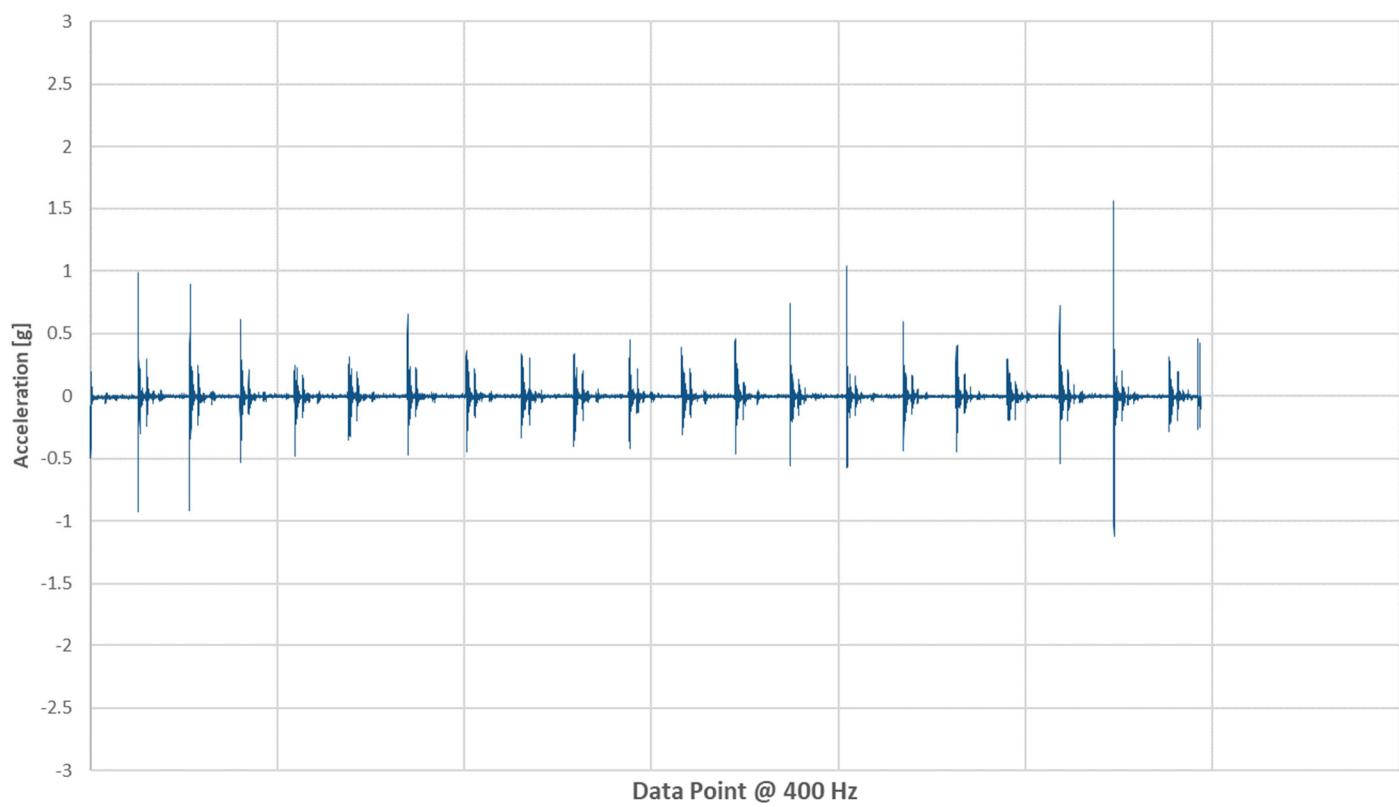


X Acceleration (Side to Side) - Saatva Zenhaven

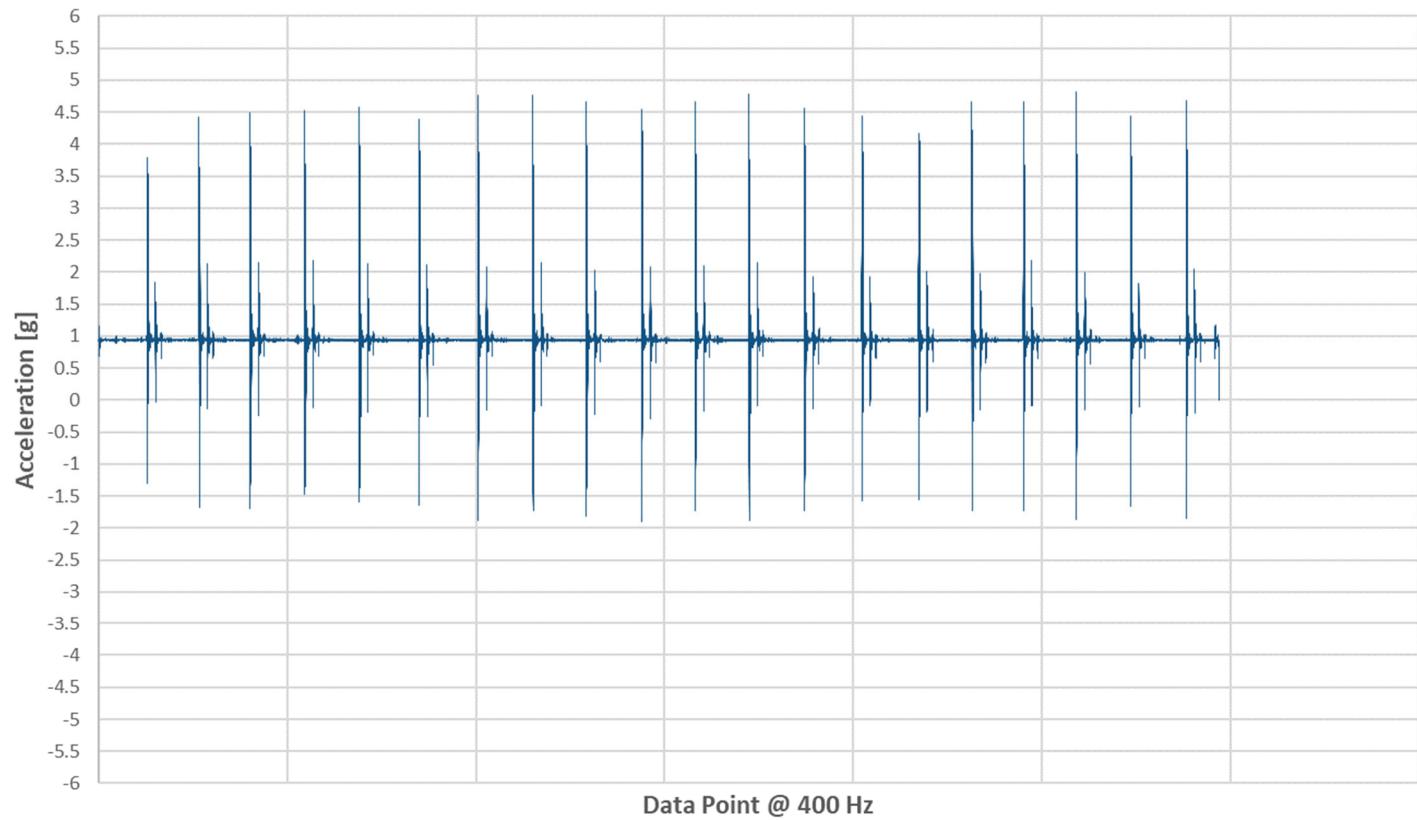




Y Acceleration (Head to Toe) - Saatva Zenhaven



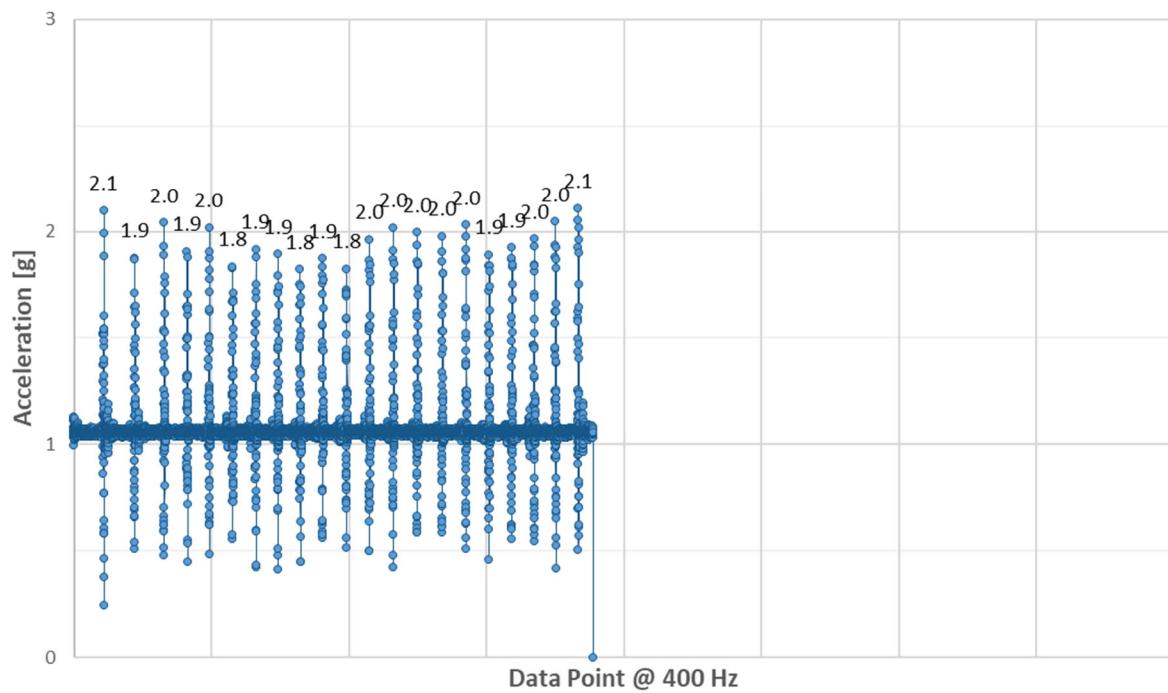
Z Acceleration (Up and Down) - Saatva Zenhaven



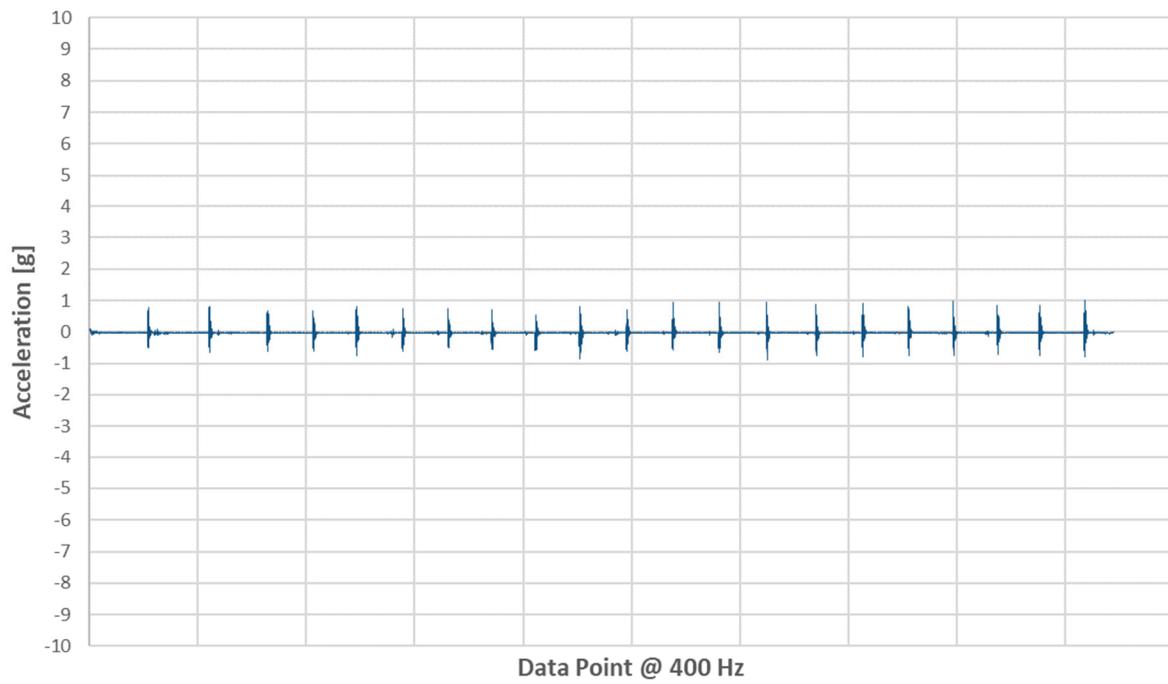


## TEST 3 –DOUGLAS ALPINE

Vector Magnitude Acceleration - Douglas Alpine

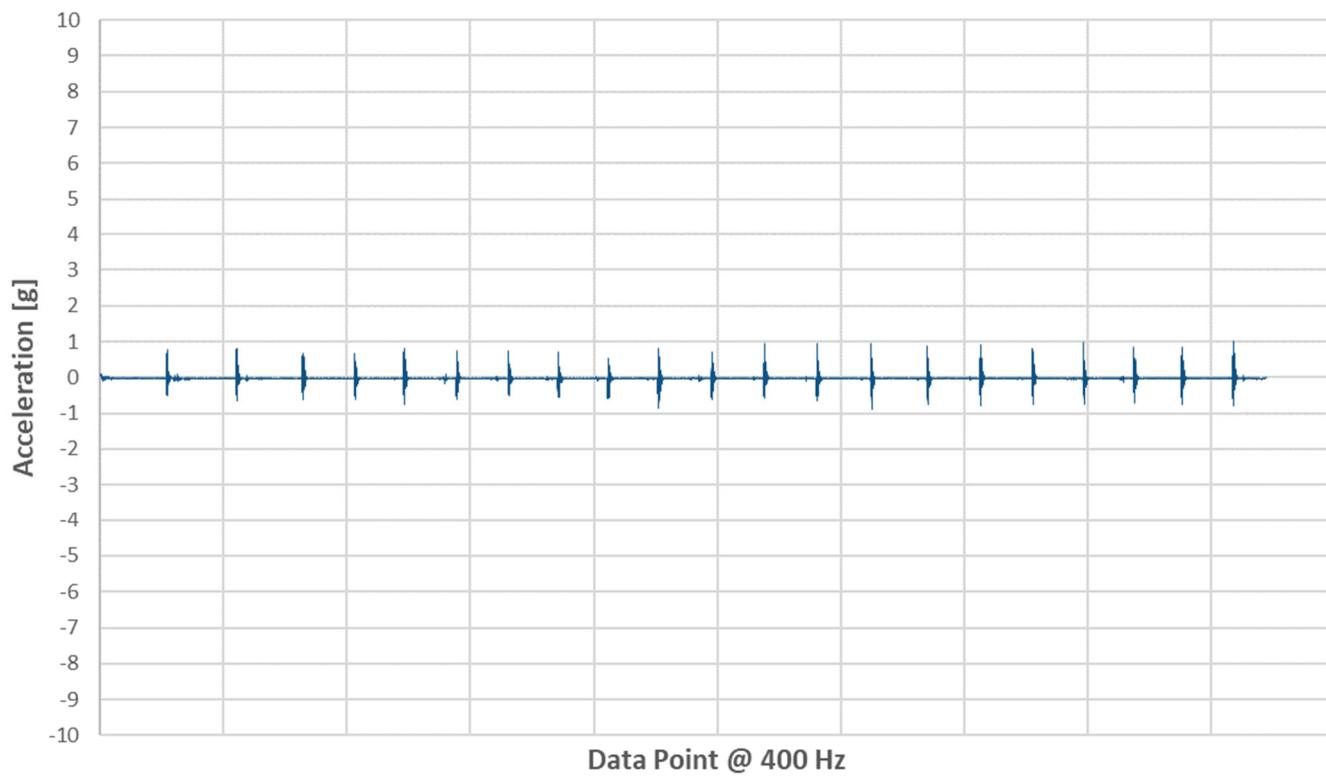


X Acceleration (Side to Side) - Douglas Alpine

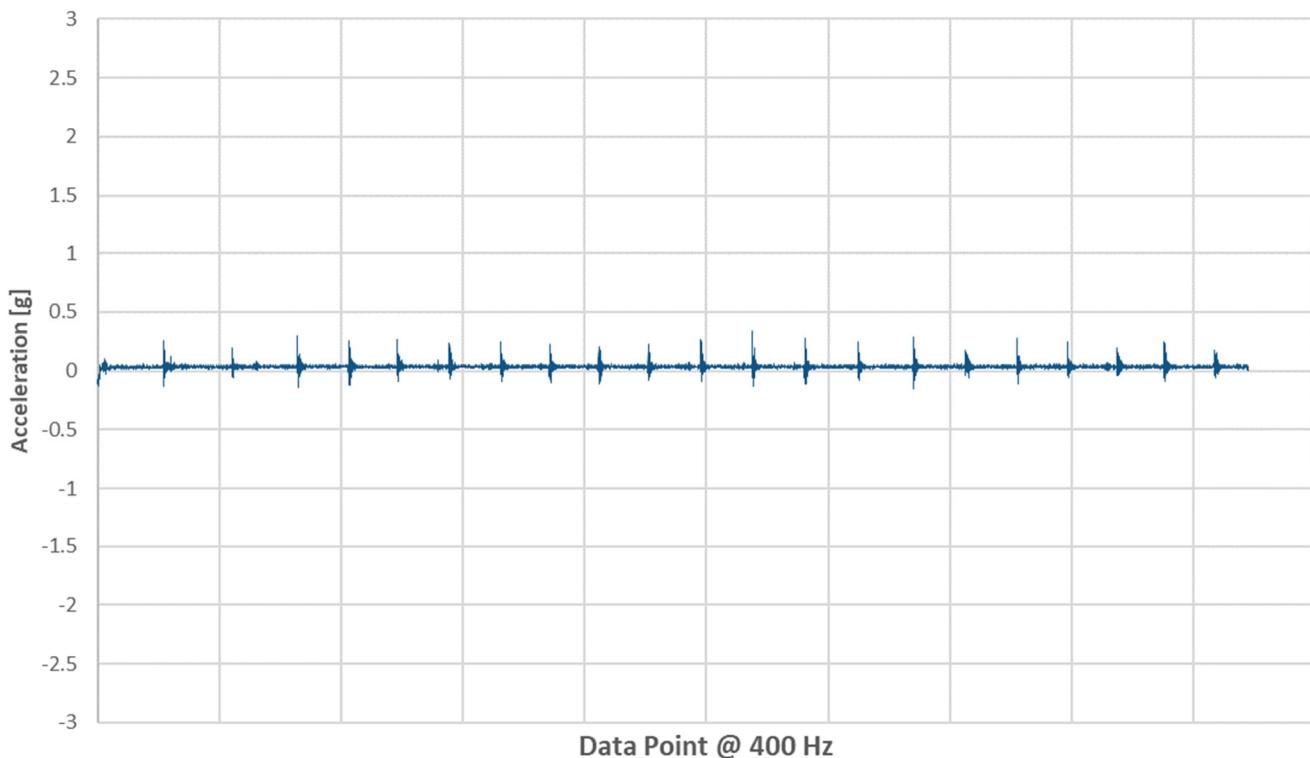




X Acceleration (Side to Side) - Douglas Alpine



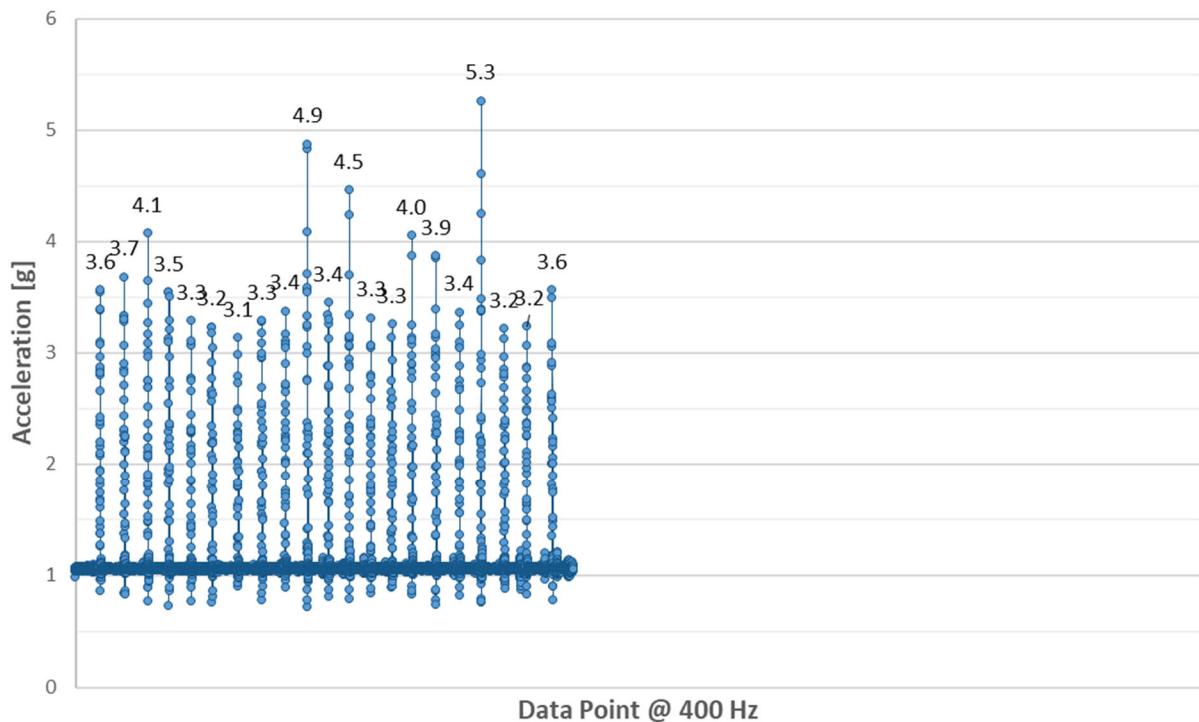
Y Acceleration (Head to Toe) - Douglas Alpine



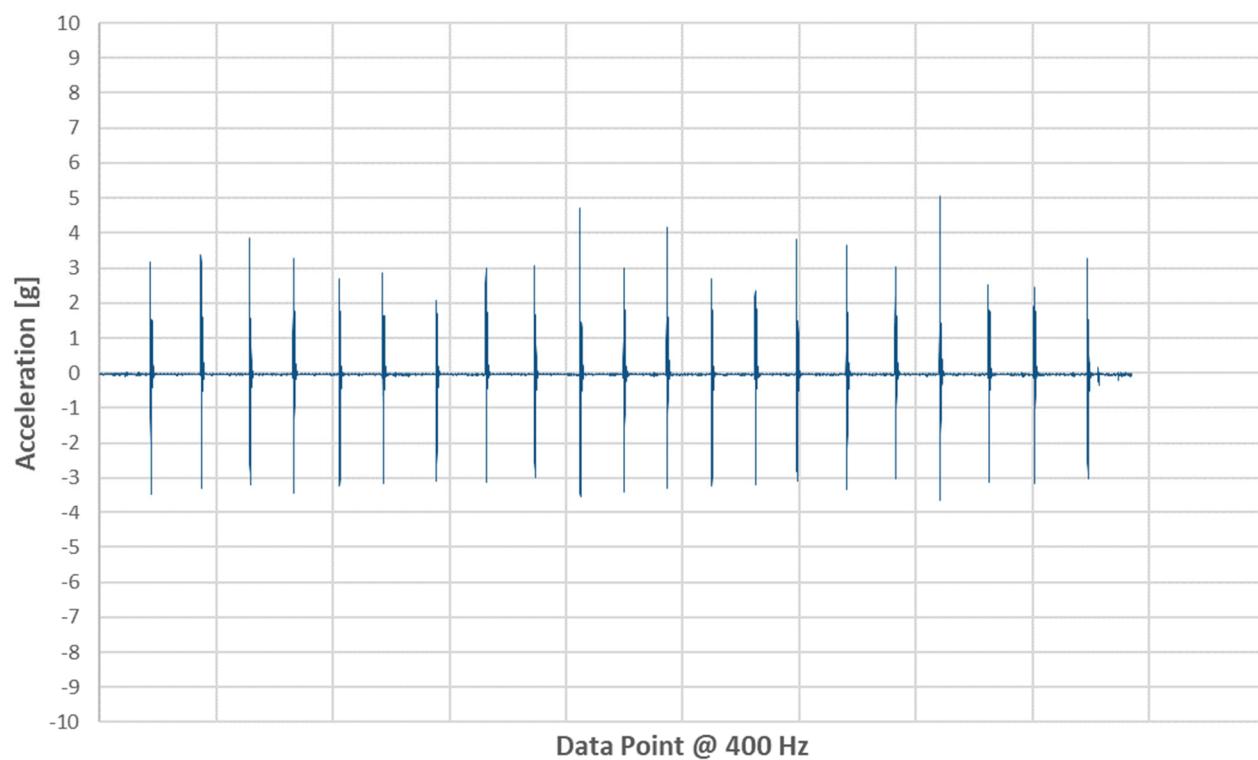


## TEST 3 –SEALY COCOON CLASSIC

Vector Magnitude Acceleration - Sealy Cocoon Classic

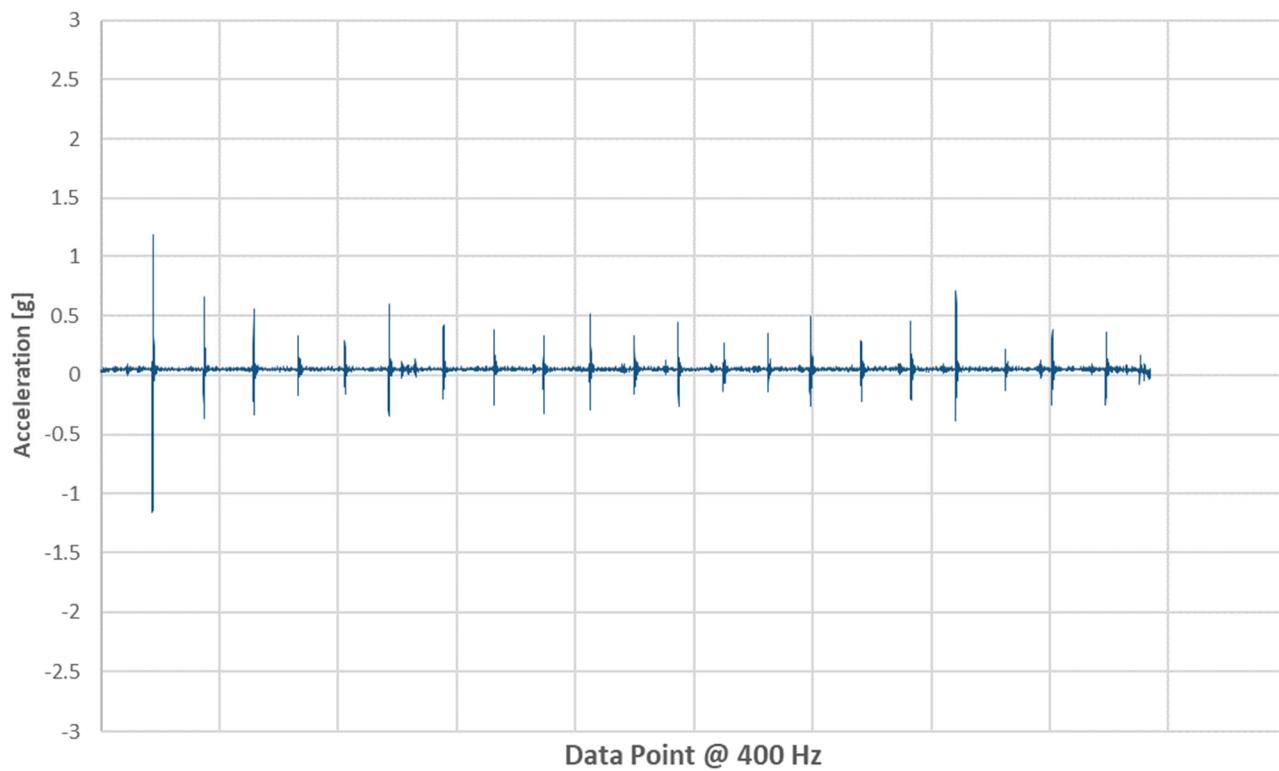


X Acceleration (Side to Side) - Sealy Cocoon Classic

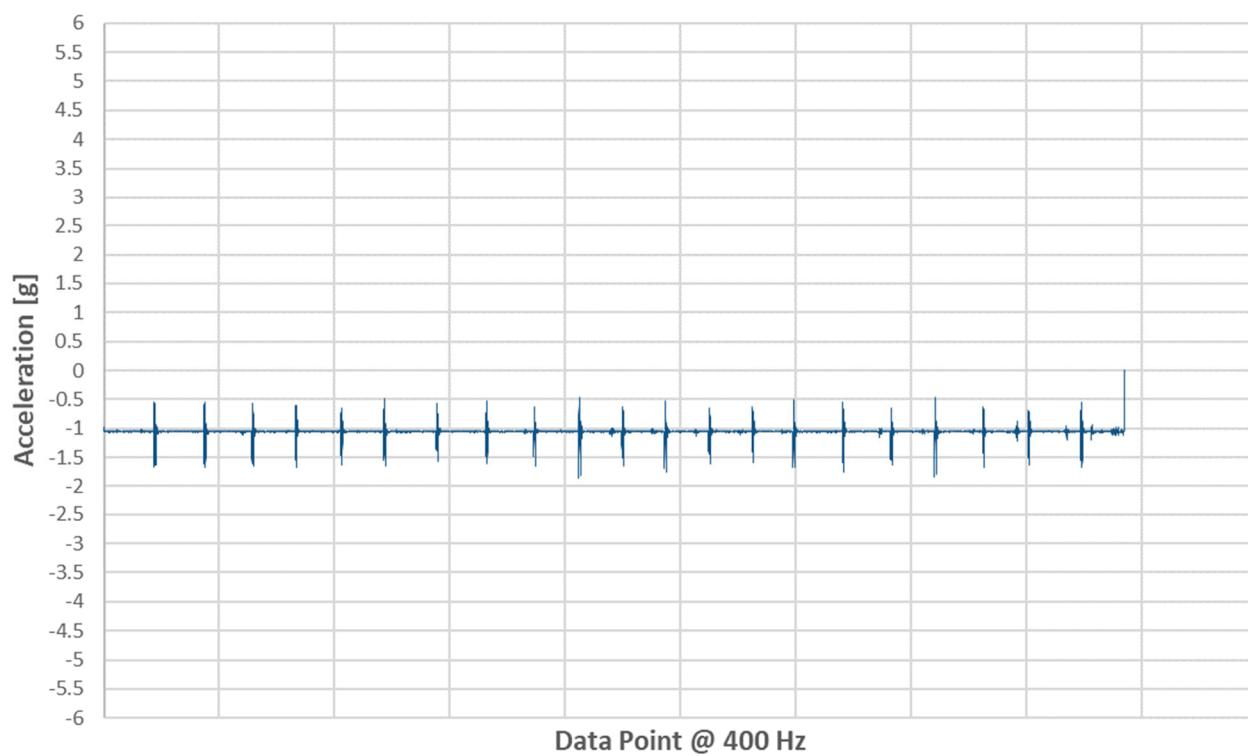




Y Acceleration (Head to Toe) - Sealy Cocoon Classic



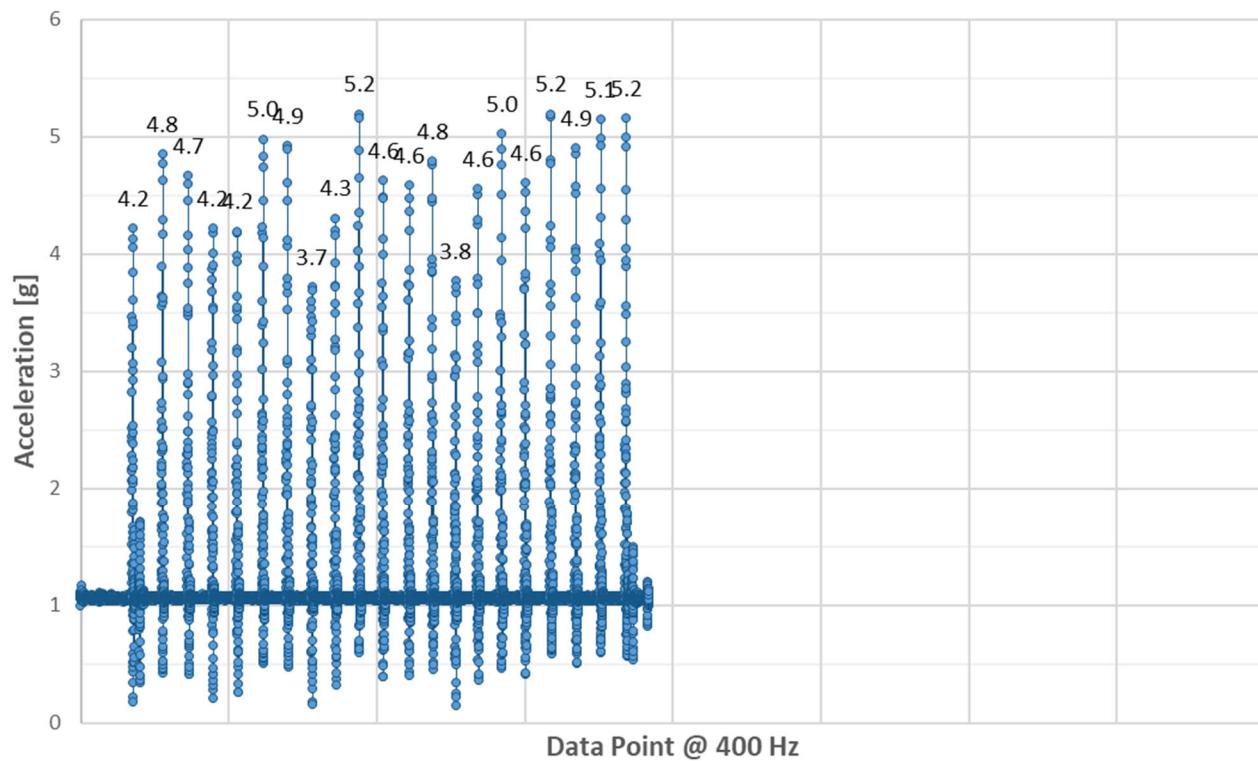
Z Acceleration (Up and Down) - Sealy Cocoon Classic



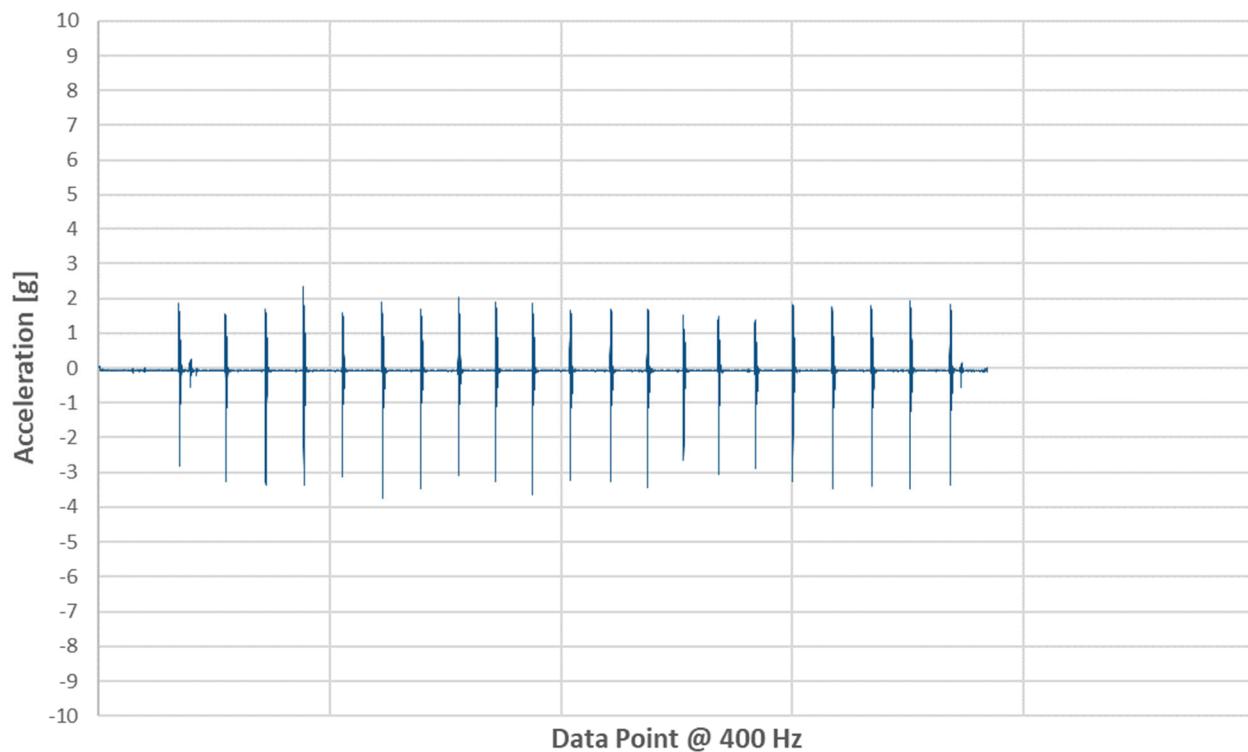


## TEST 3 –HUSH

Vector Magnitude Acceleration - Hush

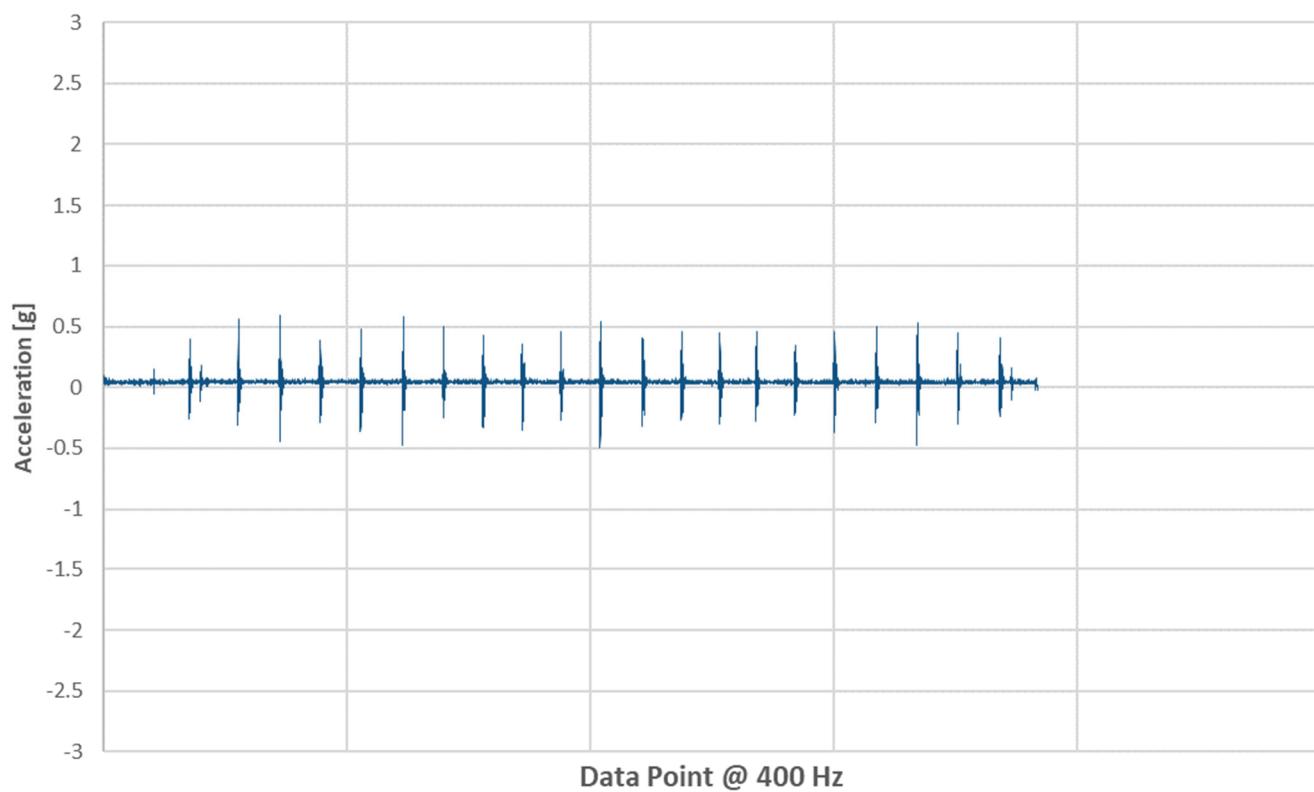


X Acceleration (Side to Side) - Hush

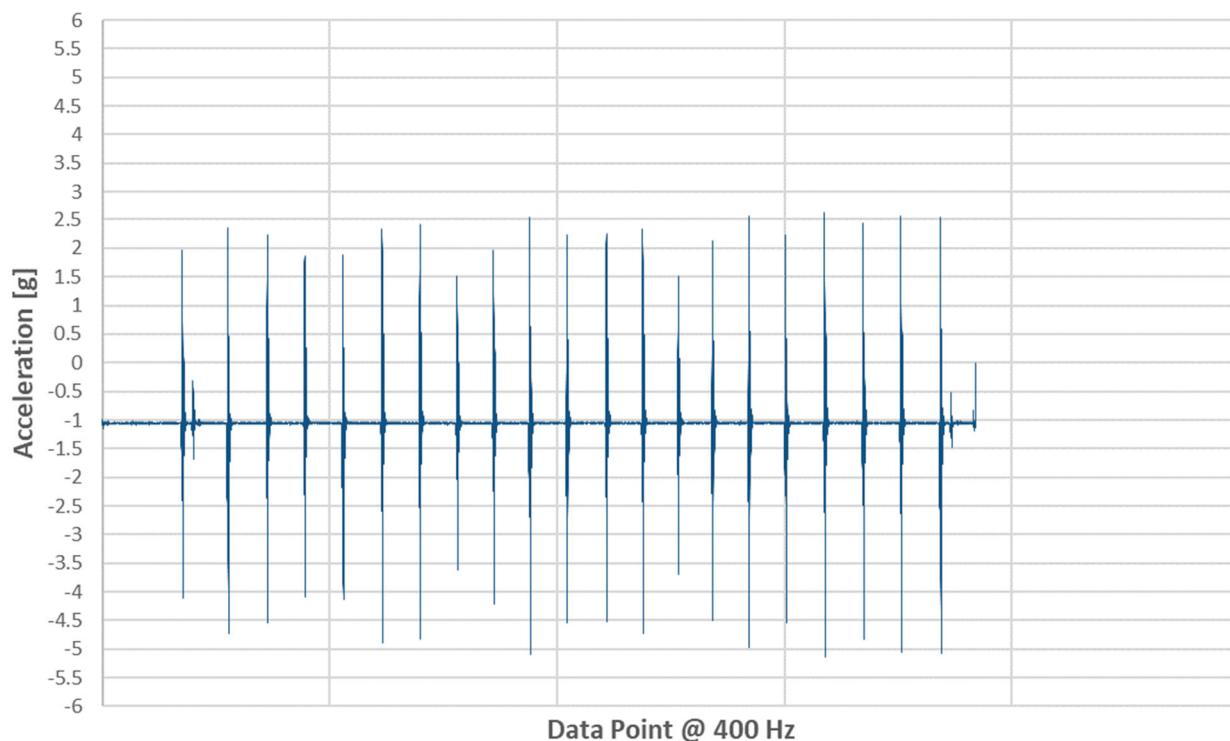




Y Acceleration (Head to Toe) - Hush



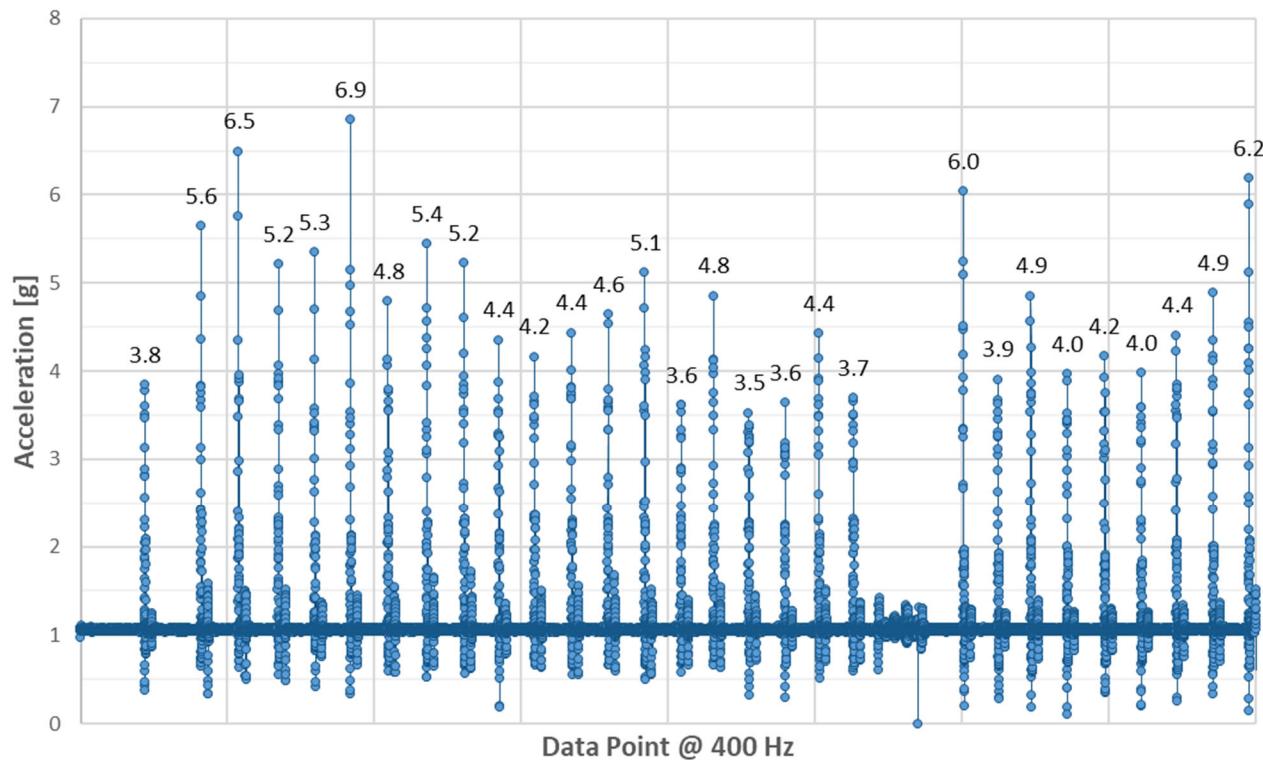
Z Acceleration (Up and Down) - Hush



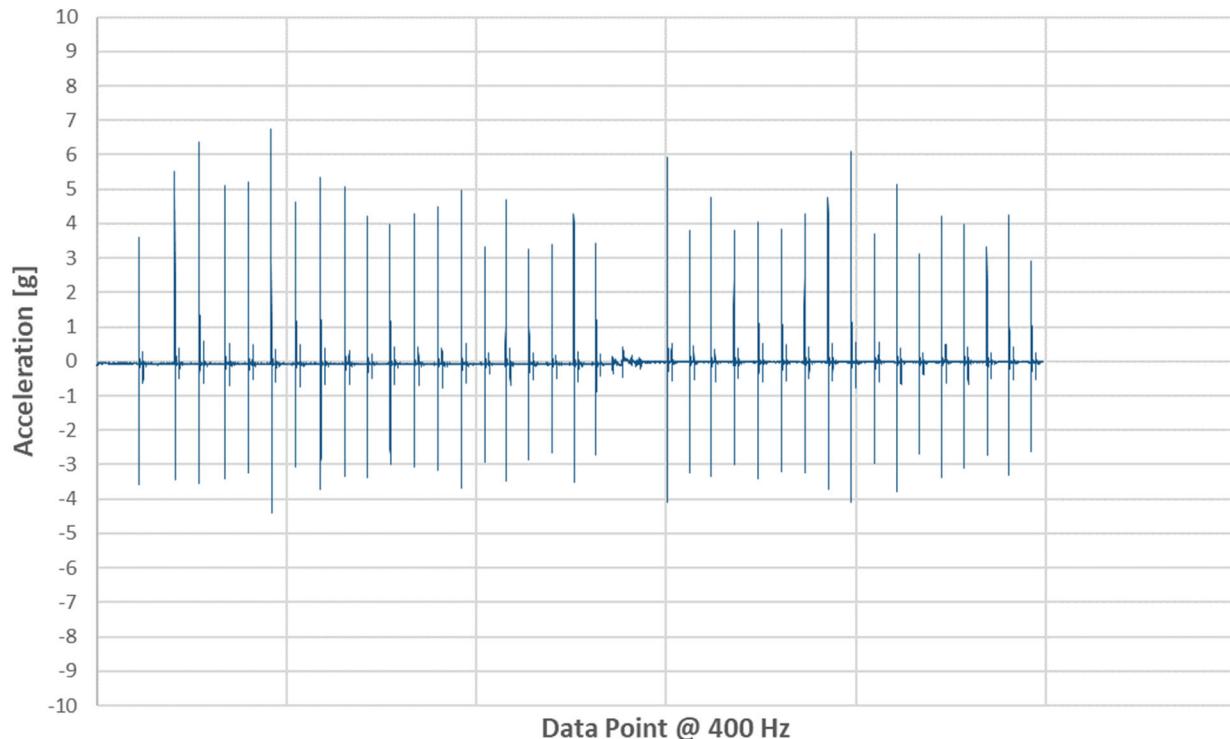


## TEST 3 –ENDY HYBRID

Vector Magnitude Acceleration - Endy Hybrid

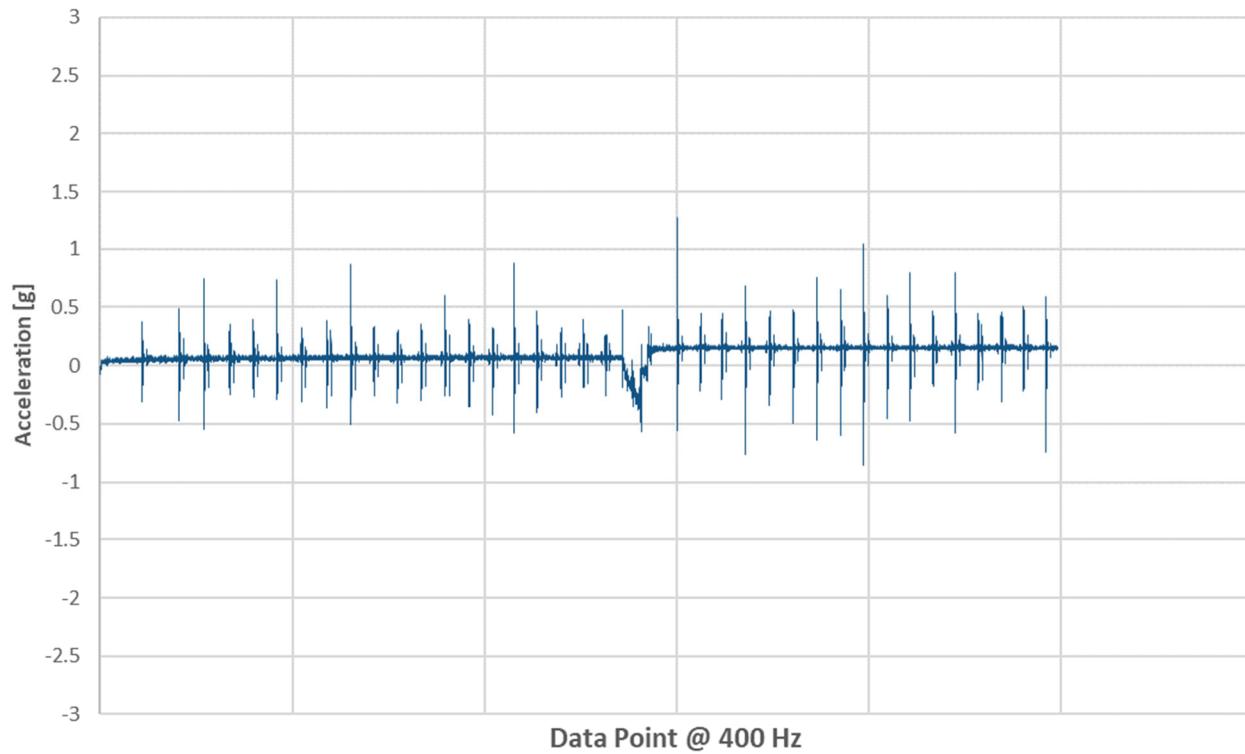


X Acceleration (Side to Side) - Endy Hybrid

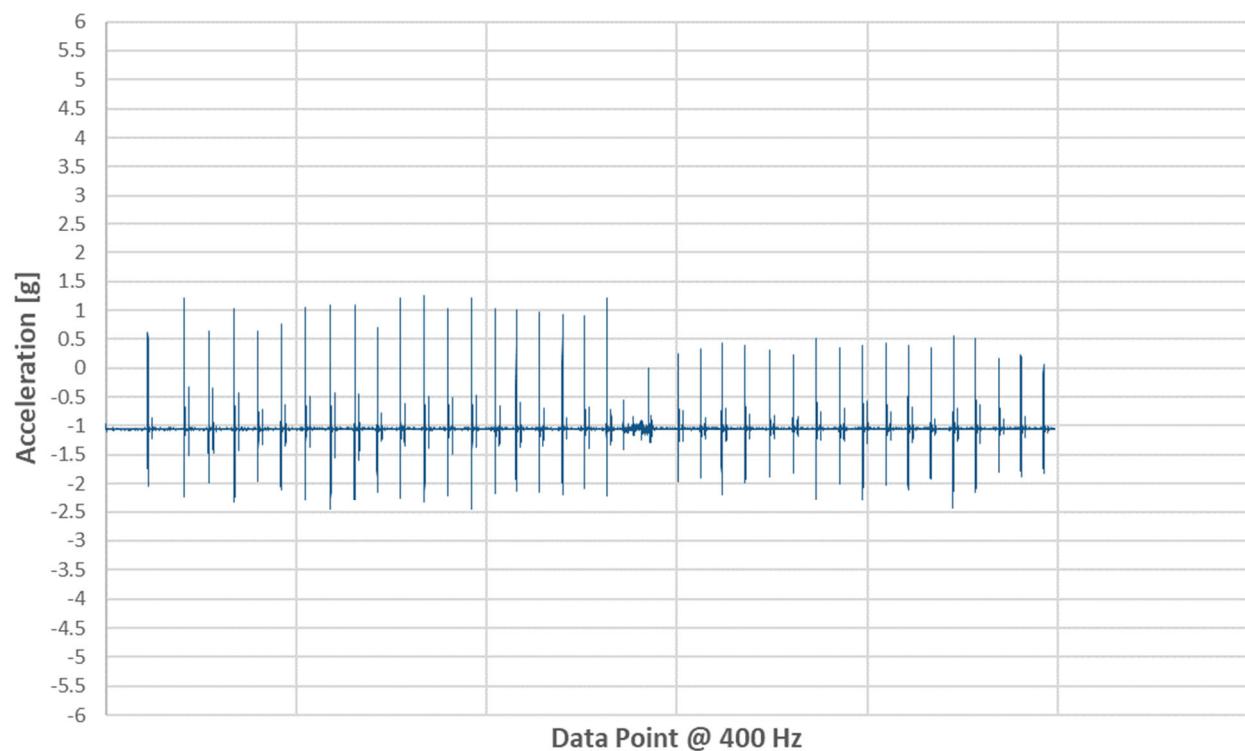




Y Acceleration (Head to Toe) - Endy Hybrid



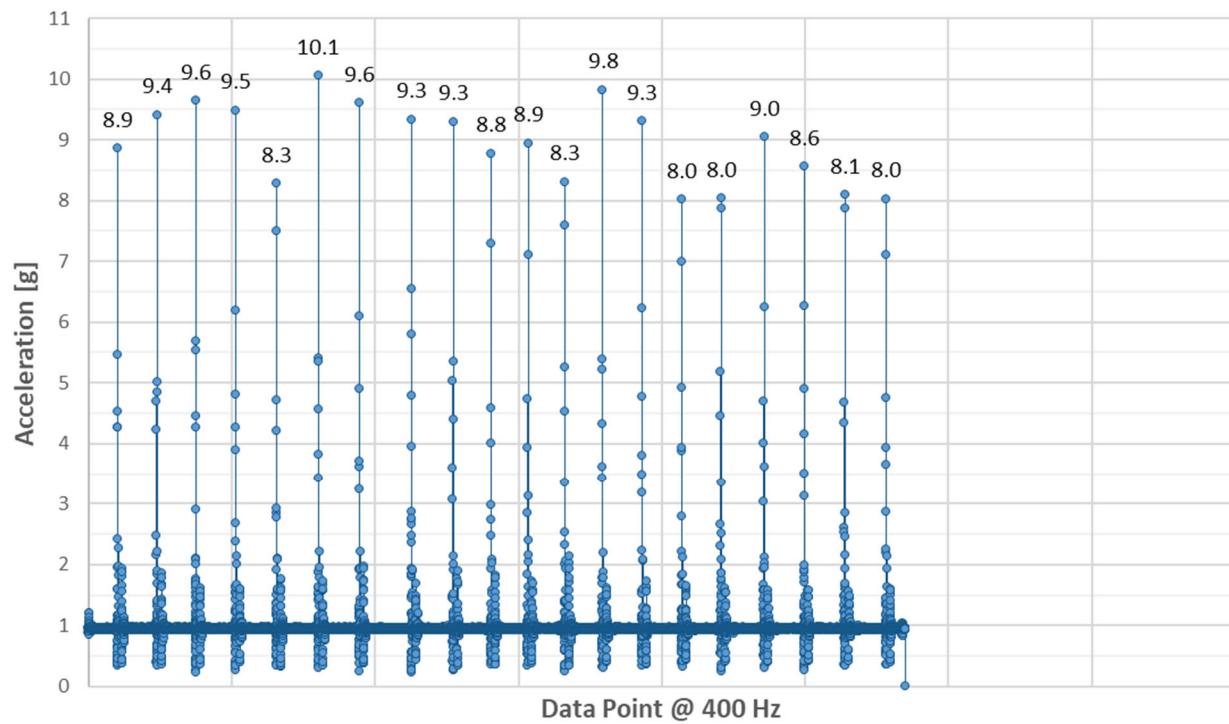
Z Acceleration (Up and Down) - Endy Hybrid



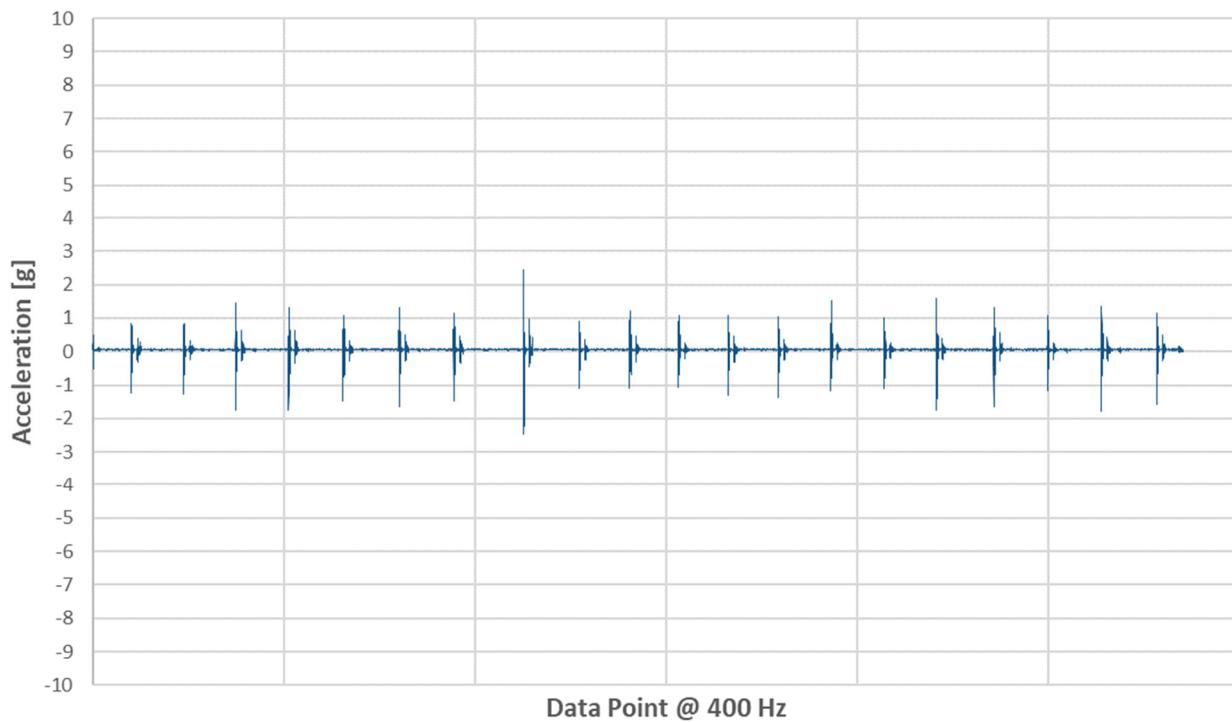


## TEST 3 –TEMPUR-CLOUD

Vector Magnitude Acceleration - TEMPUR-Cloud

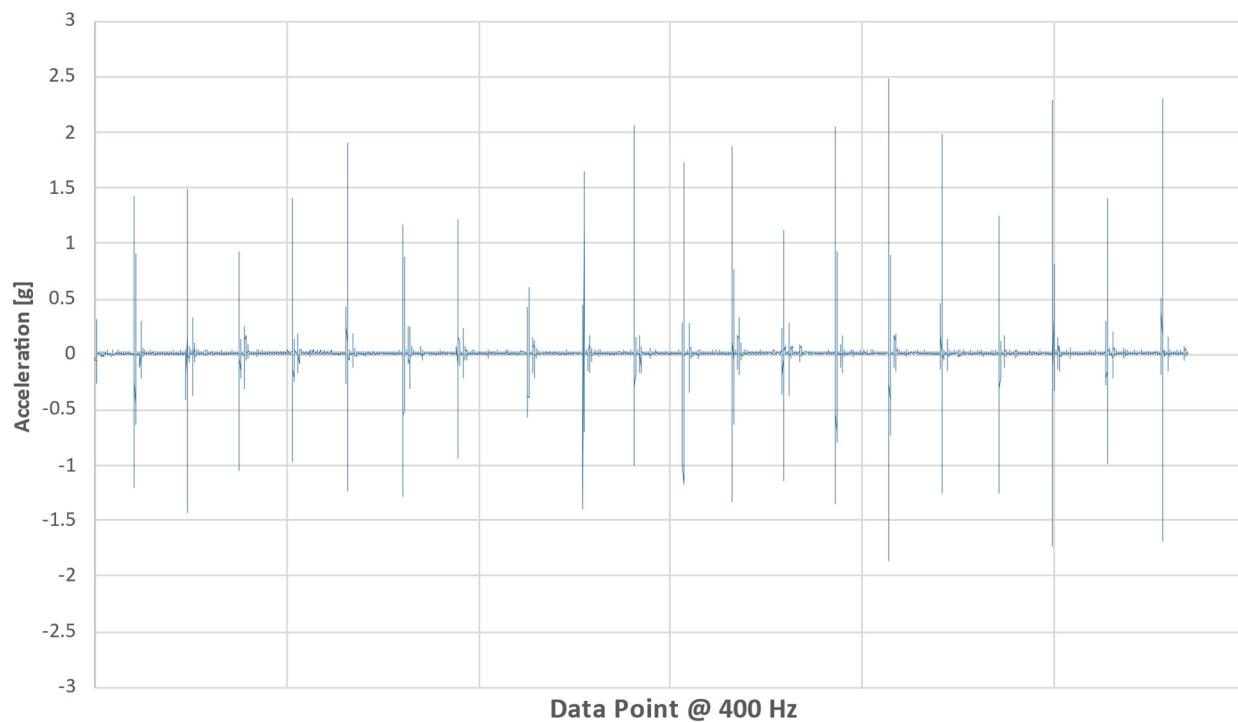


X Acceleration (Side to Side) - TEMPUR-Cloud

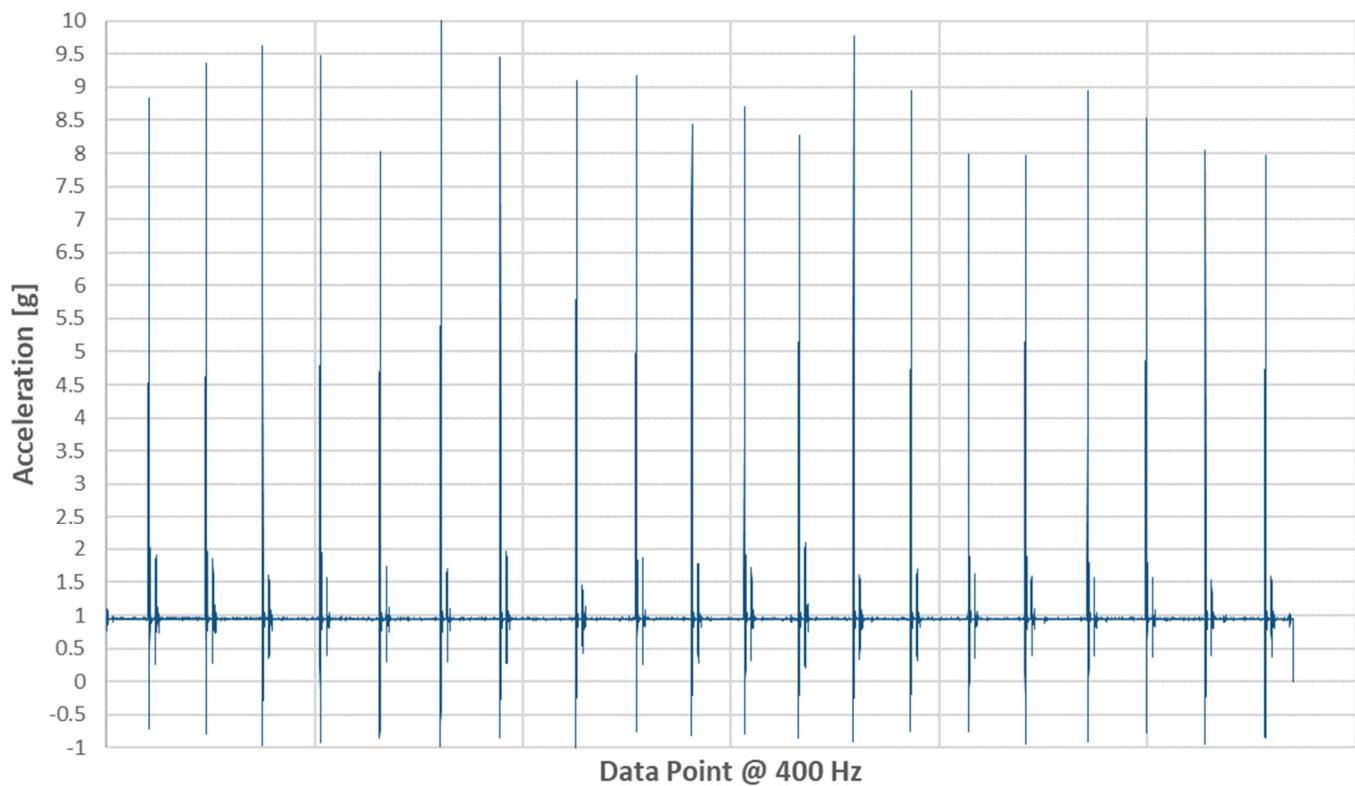




Y Acceleration (Head to Toe) - TEMPUR-Cloud



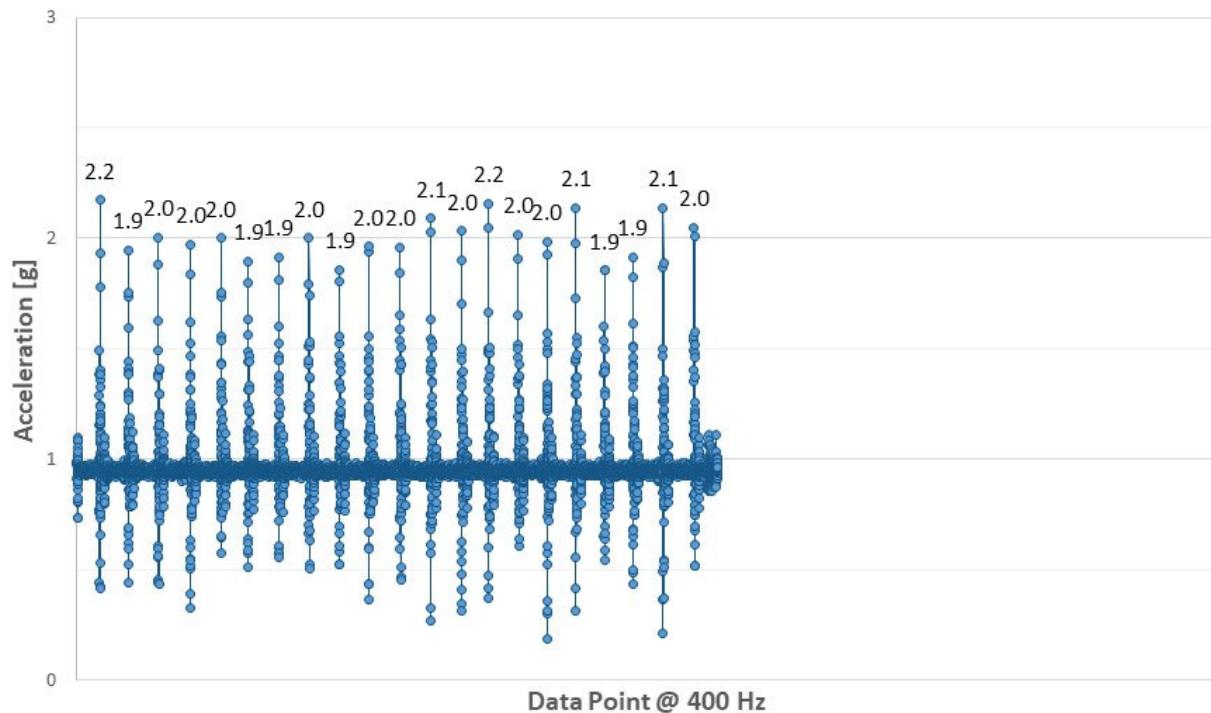
Z Acceleration (Up and Down) - TEMPUR-Cloud



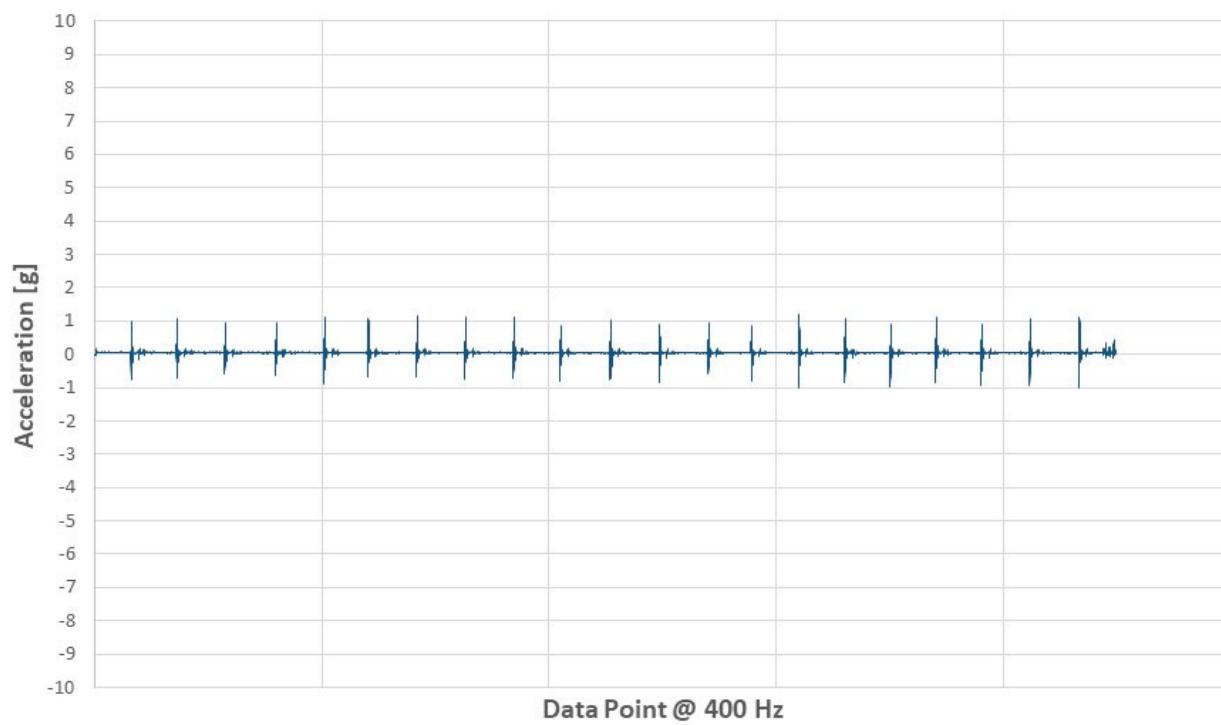


## TEST 3 –DOUGLAS SUMMIT

Vector Magnitude Acceleration - Douglas Summit

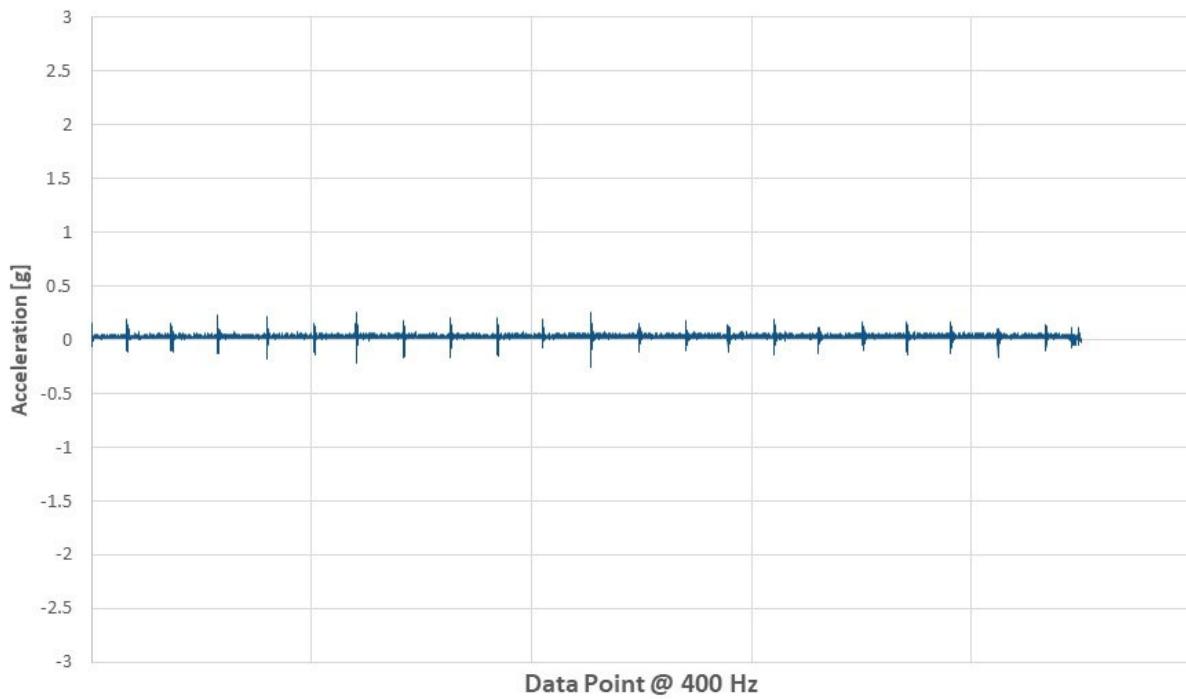


X Acceleration (Side to Side) - Douglas Summit

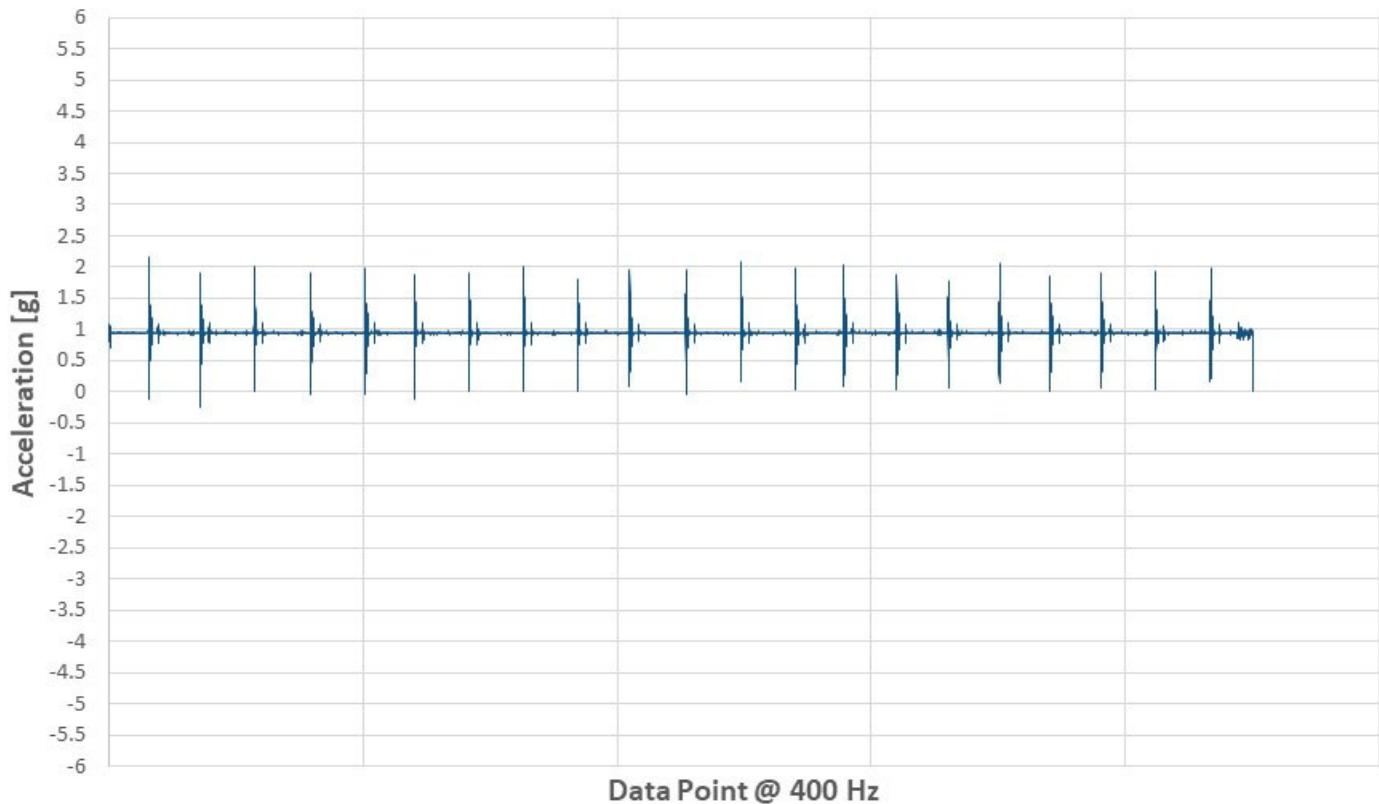




Y Acceleration (Head to Toe) - Douglas Summit



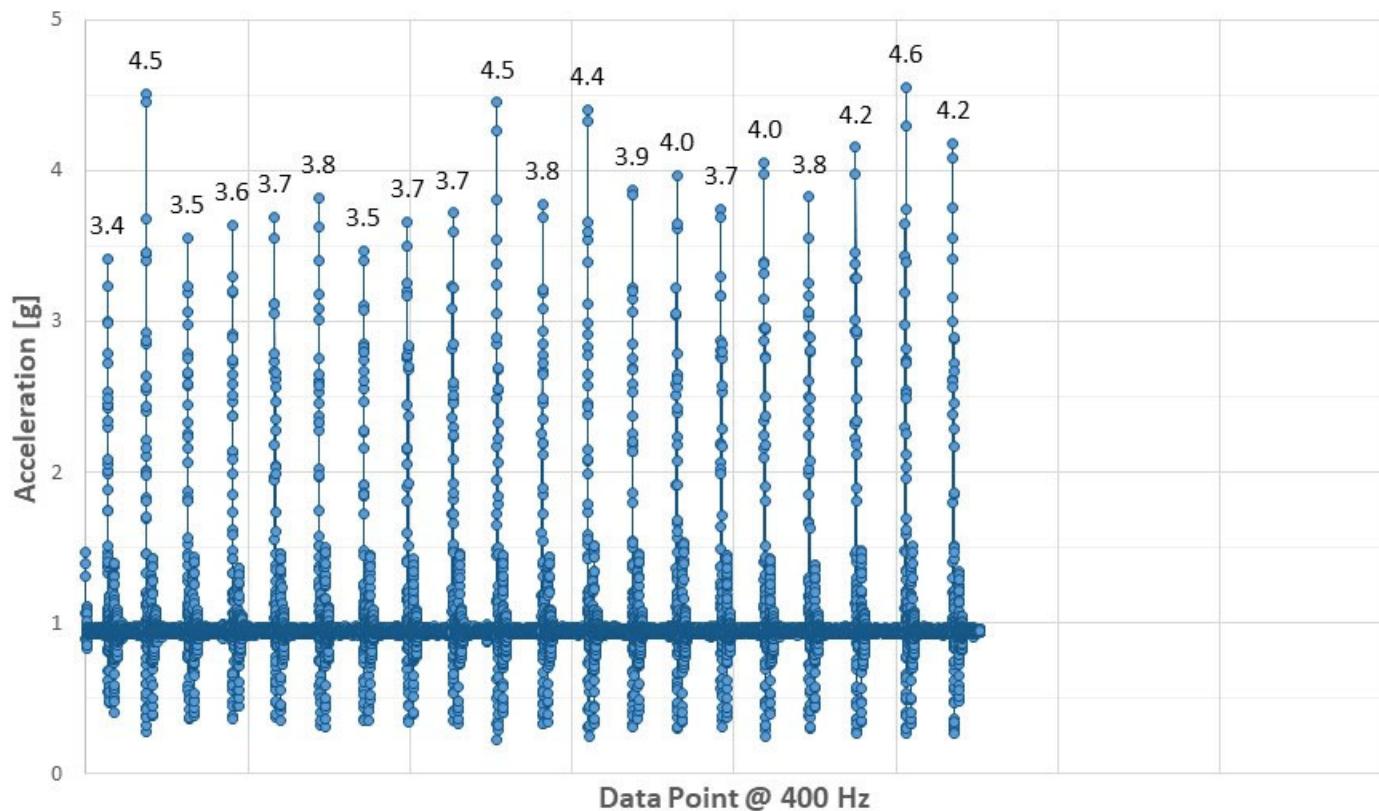
Z Acceleration (Up and Down) - Douglas Summit



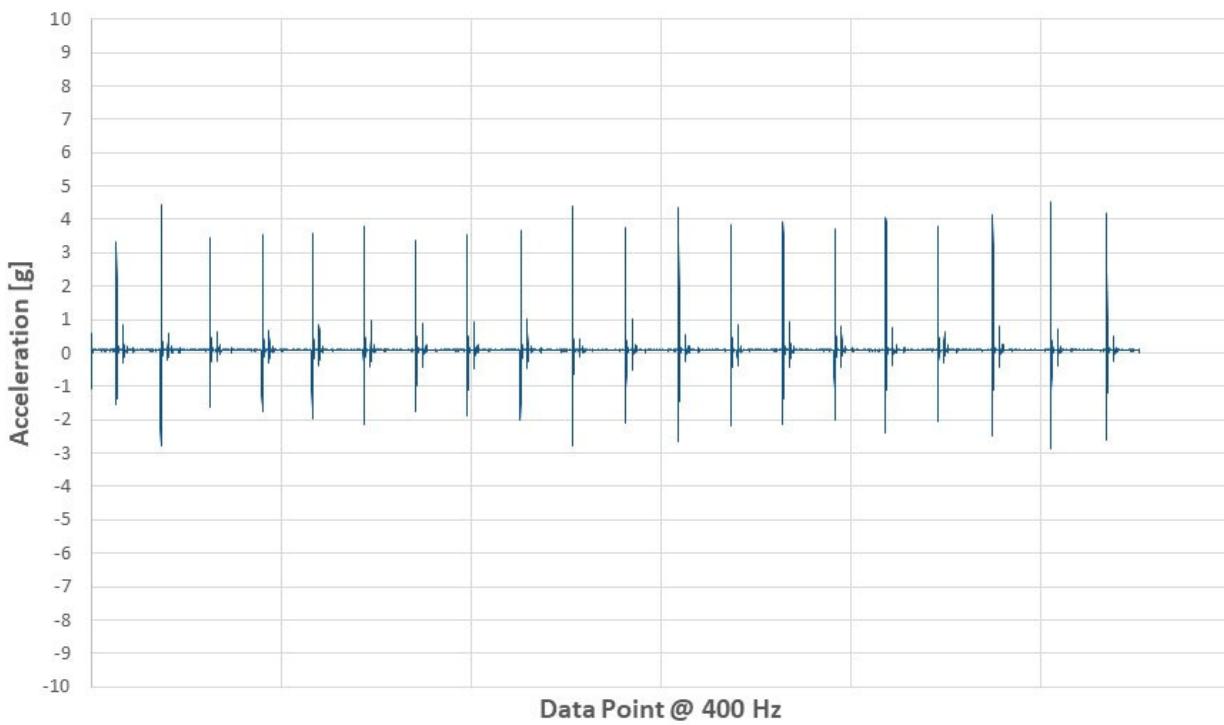


## TEST 3 –IKEA MATRAND

Vector Magnitude Acceleration - IKEA Matrand

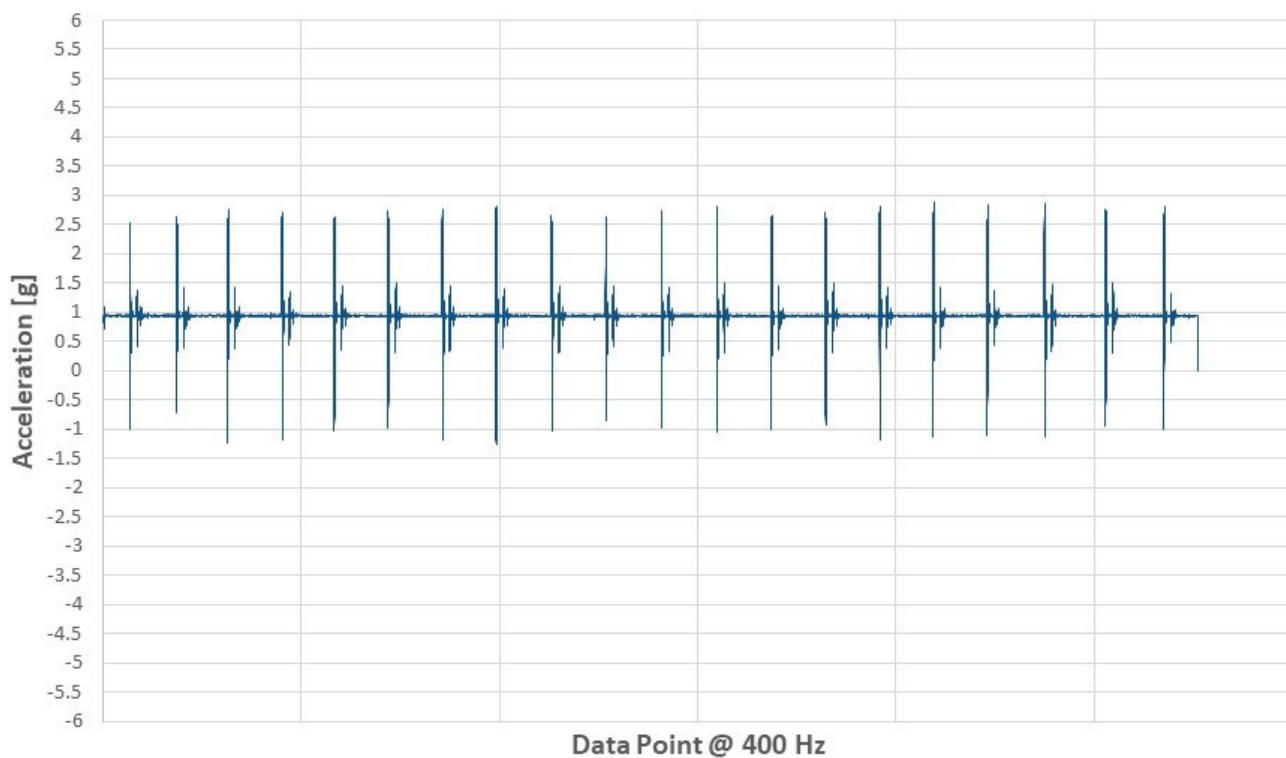


X Acceleration (Side to Side) - IKEA Matrand

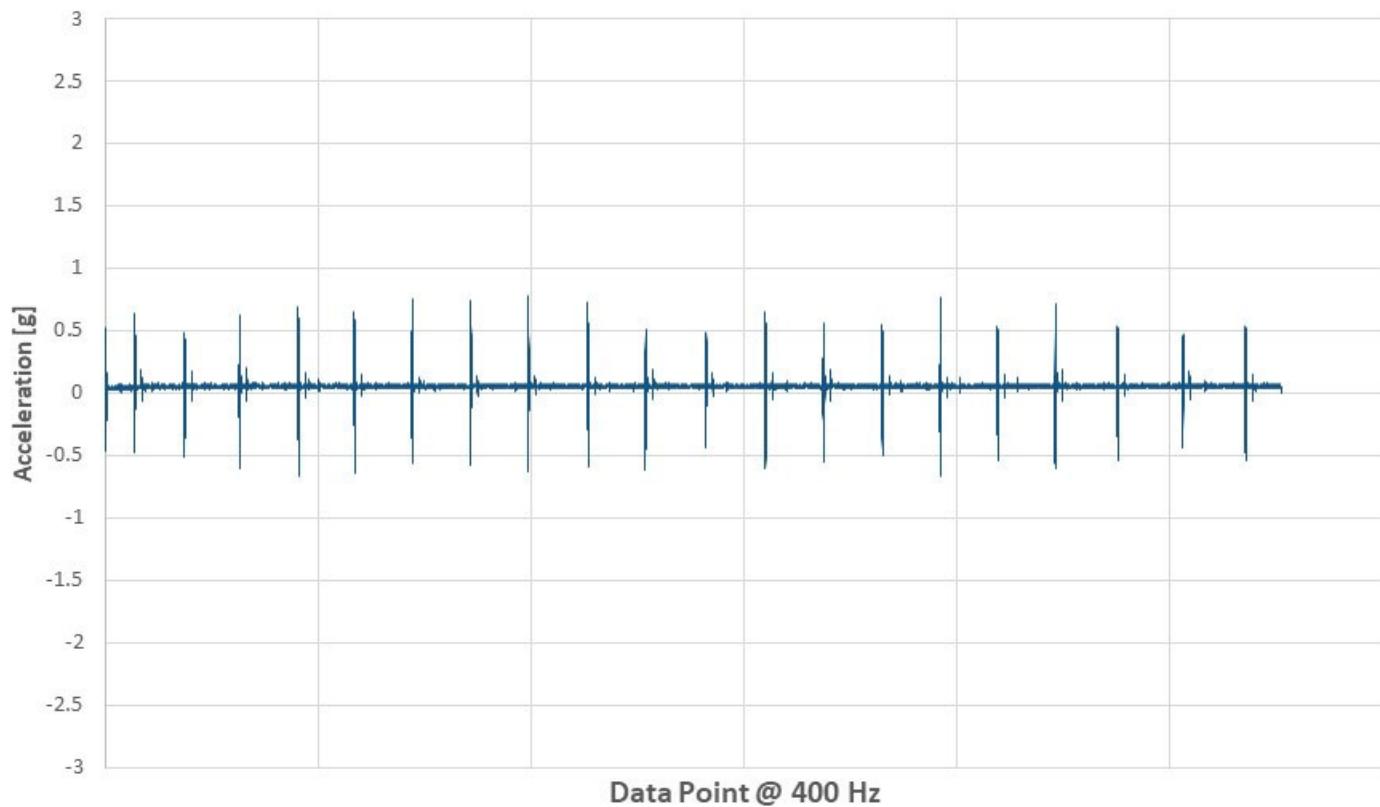




Z Acceleration (Up and Down) - IKEA Matrand



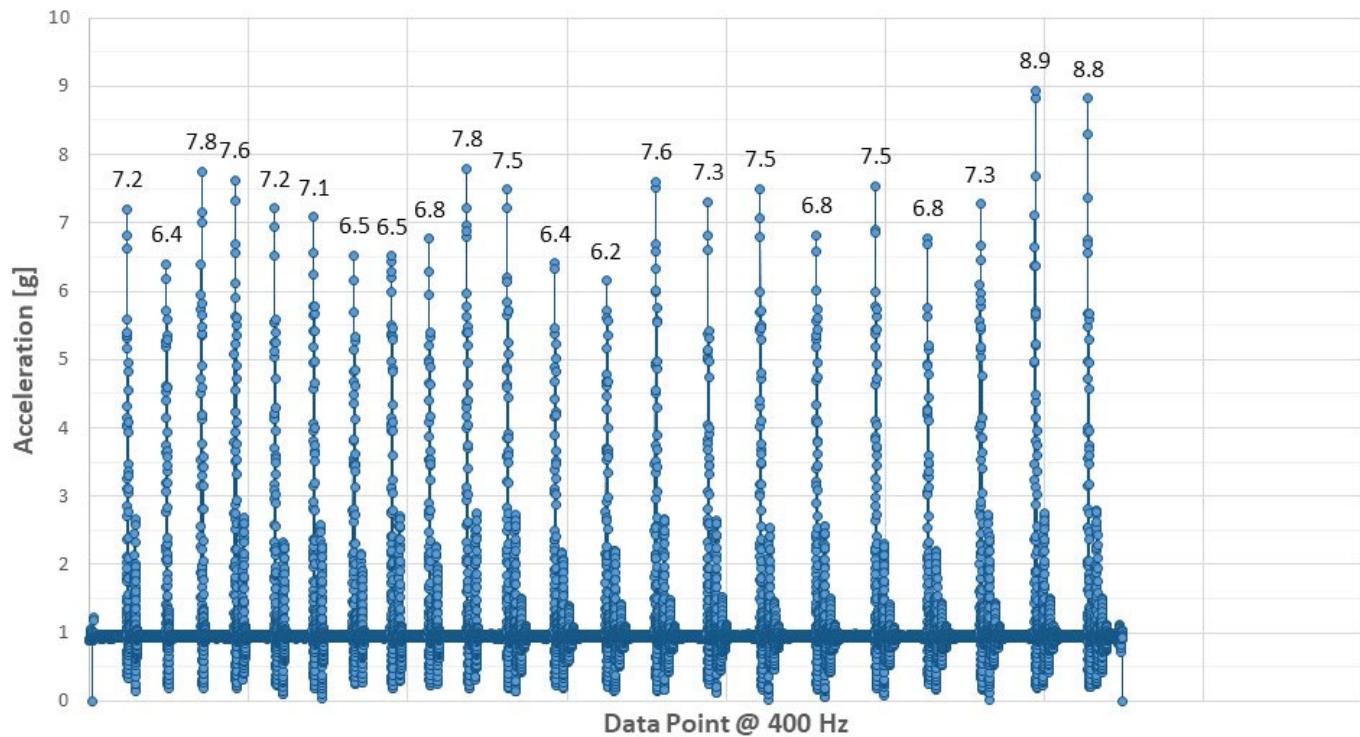
Y Acceleration (Head to Toe) - IKEA Matrand



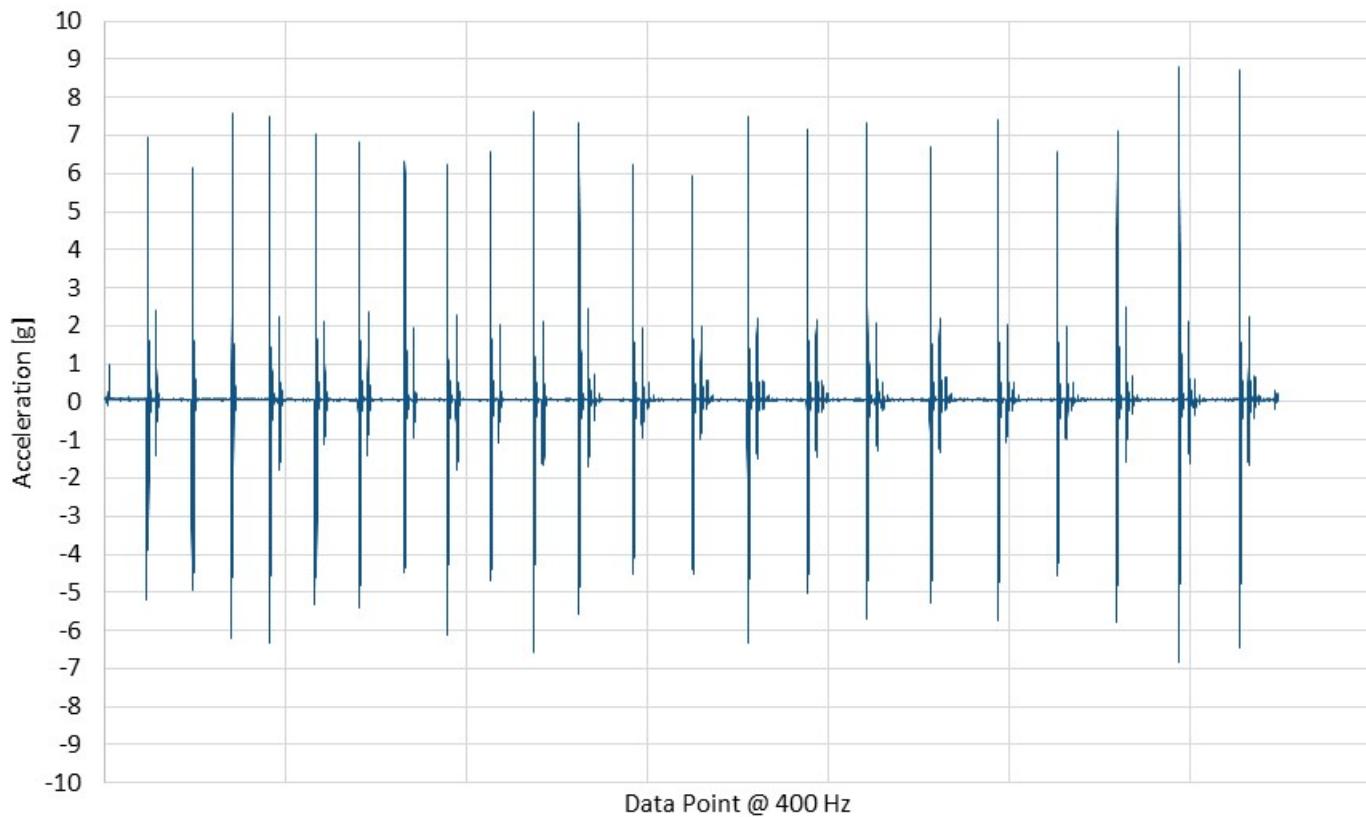


## TEST 3 –PARACHUTE

Vector Magnitude Acceleration - Parachute

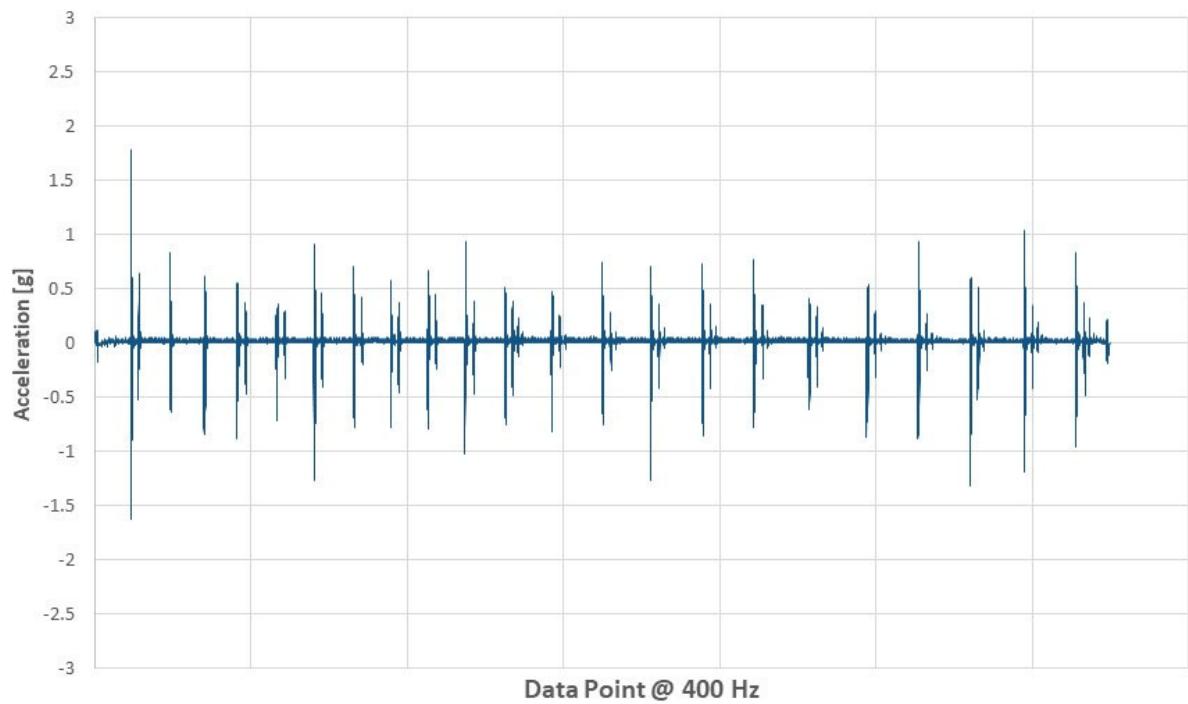


X Acceleration (Side to Side) - Parachute

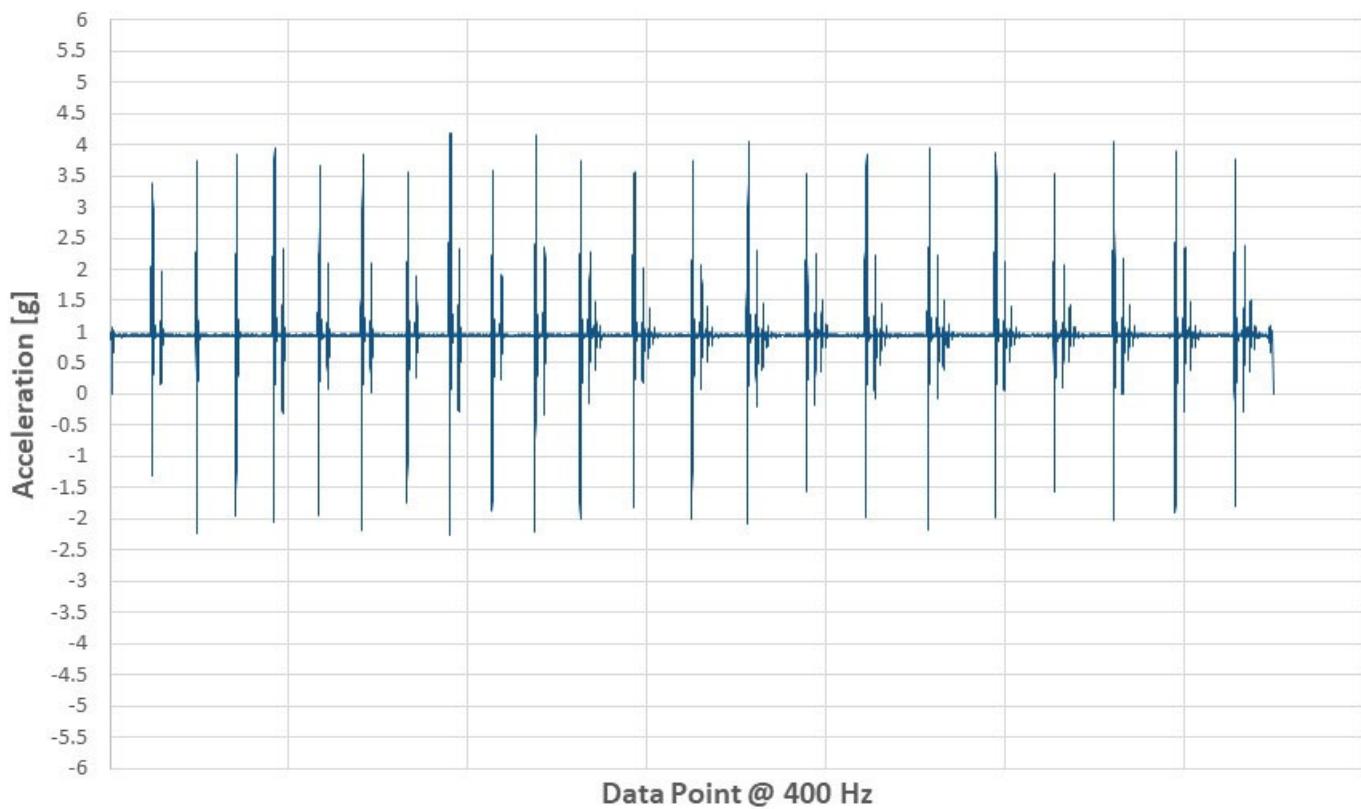




Y Acceleration (Head to Toe) - Parachute



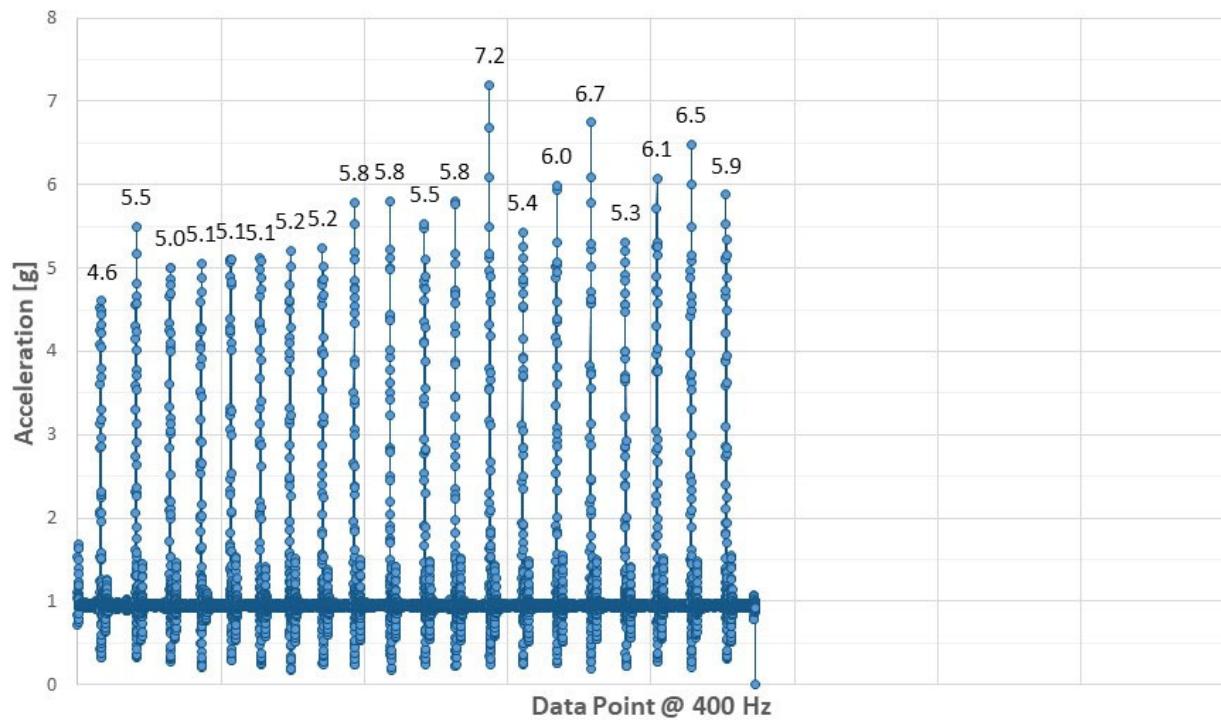
Z Acceleration (Up and Down) - Parachute



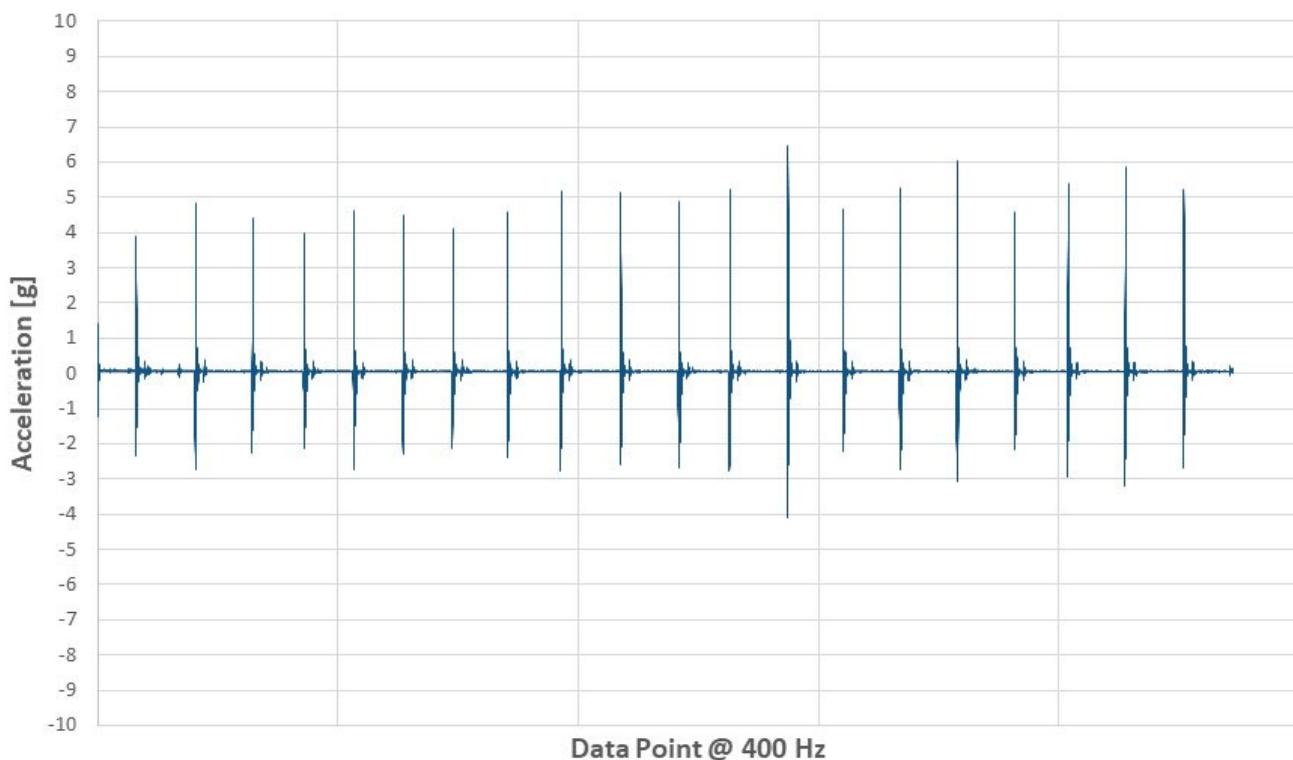


## TEST 3 –ALLSWELL

Vector Magnitude Acceleration - Allswell

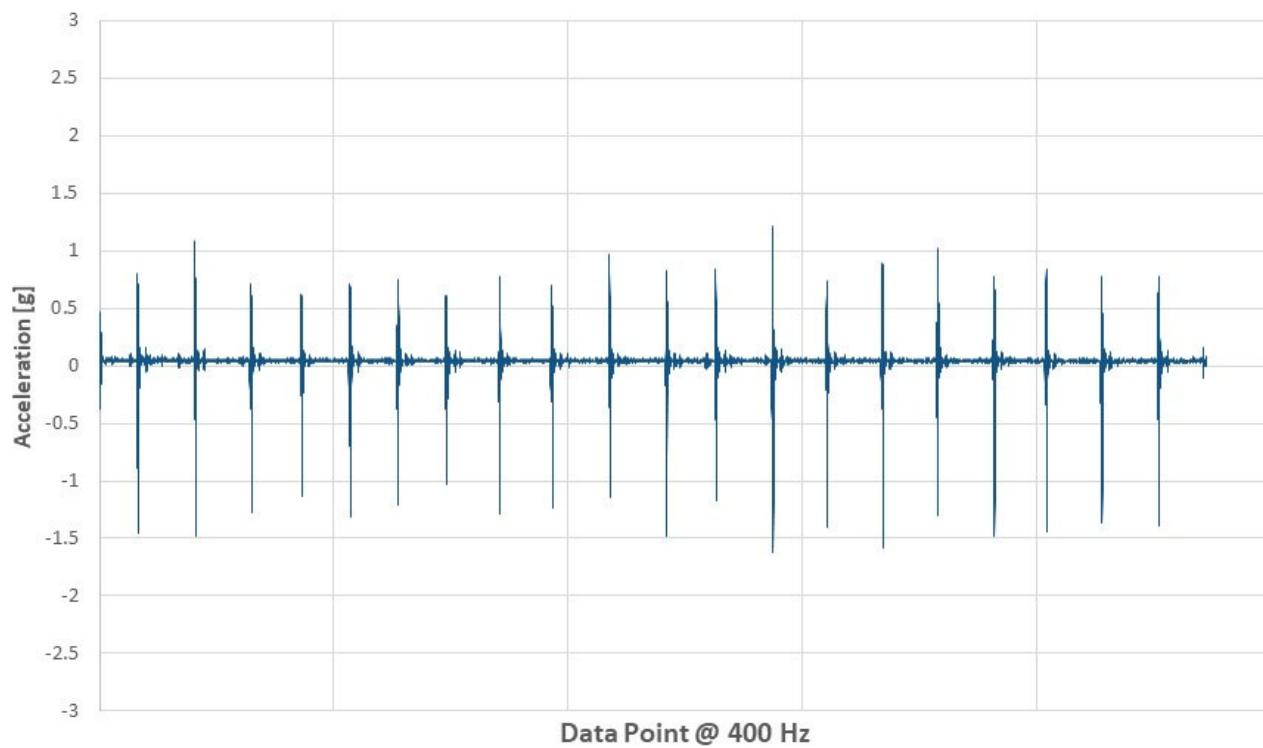


X Acceleration (Side to Side) - Allswell

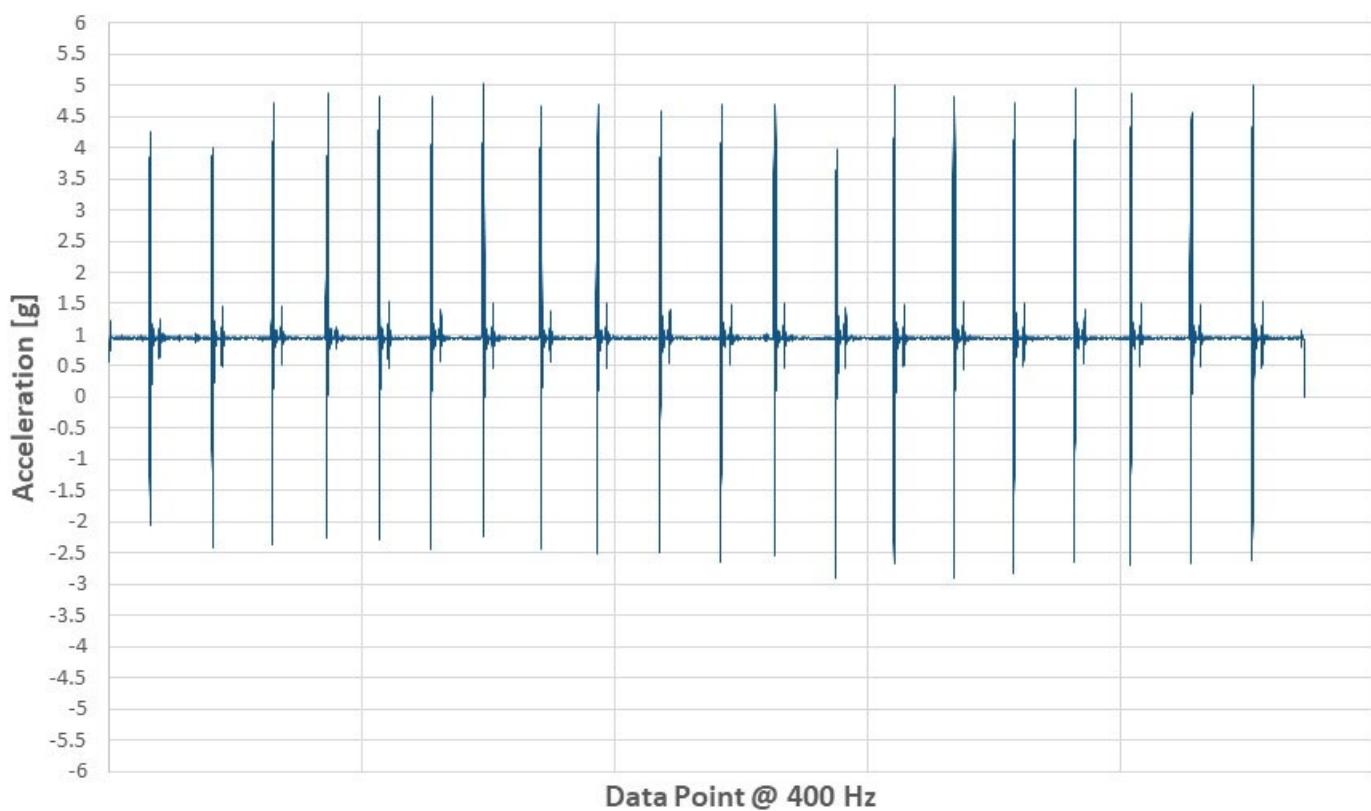




Y Acceleration (Head to Toe) - Allswell



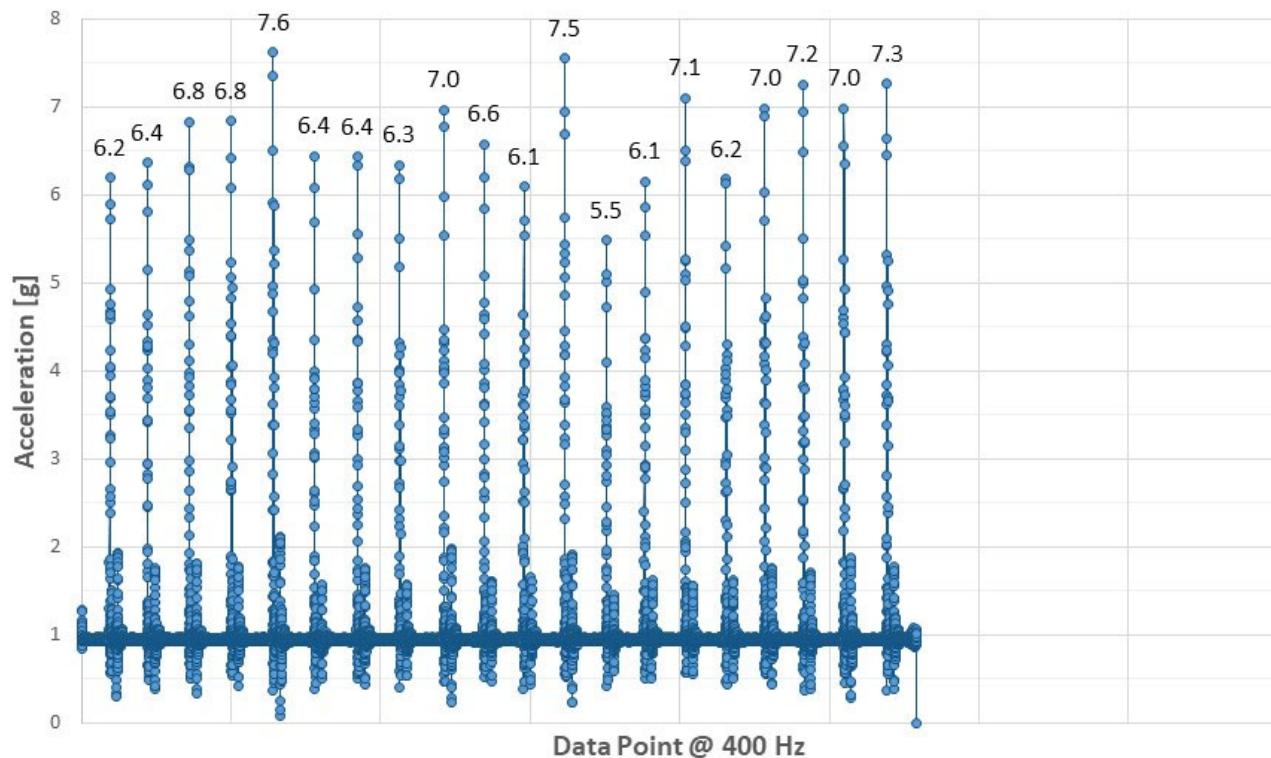
Z Acceleration (Up and Down) - Allswell



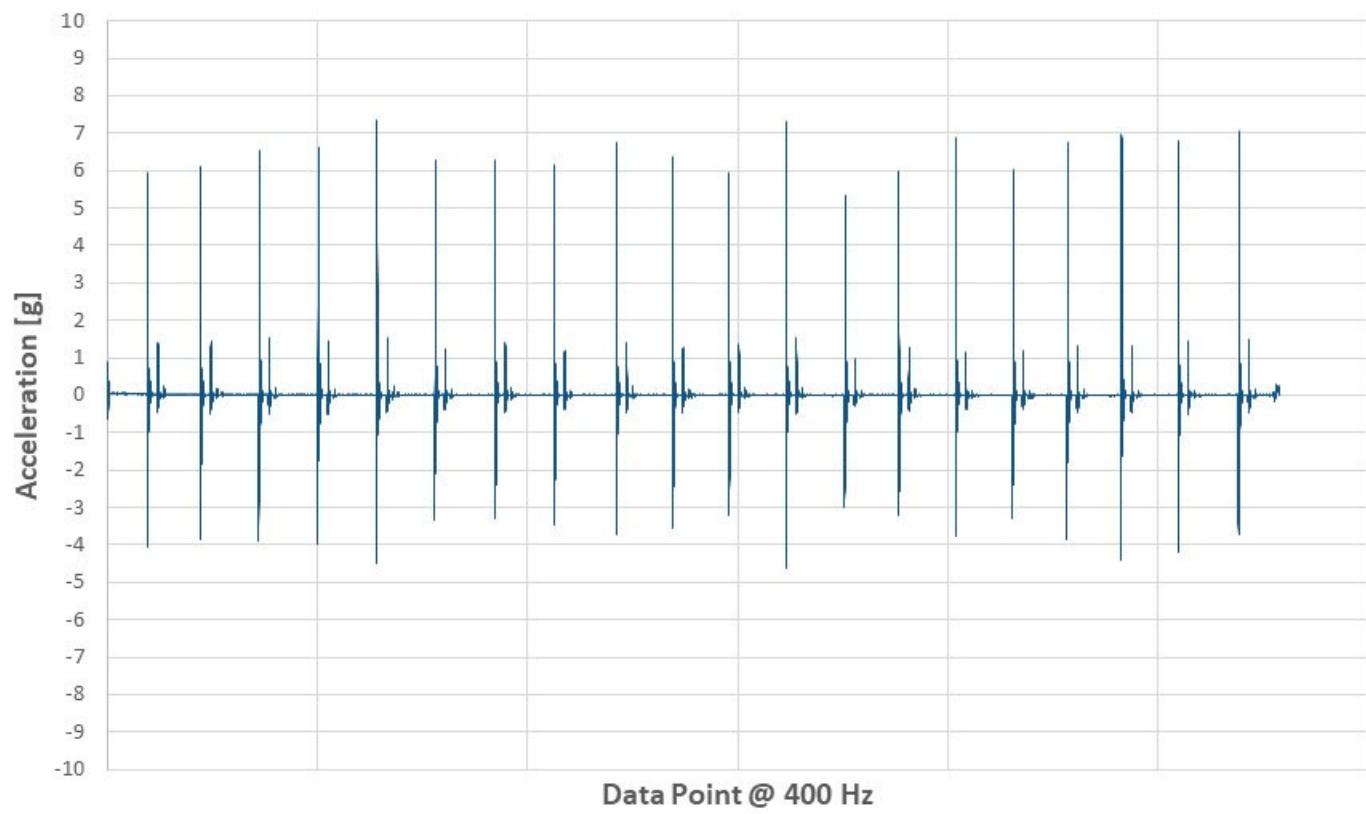


## TEST 3 –BROOKLYN

Vector Magnitude Acceleration - Brooklyn

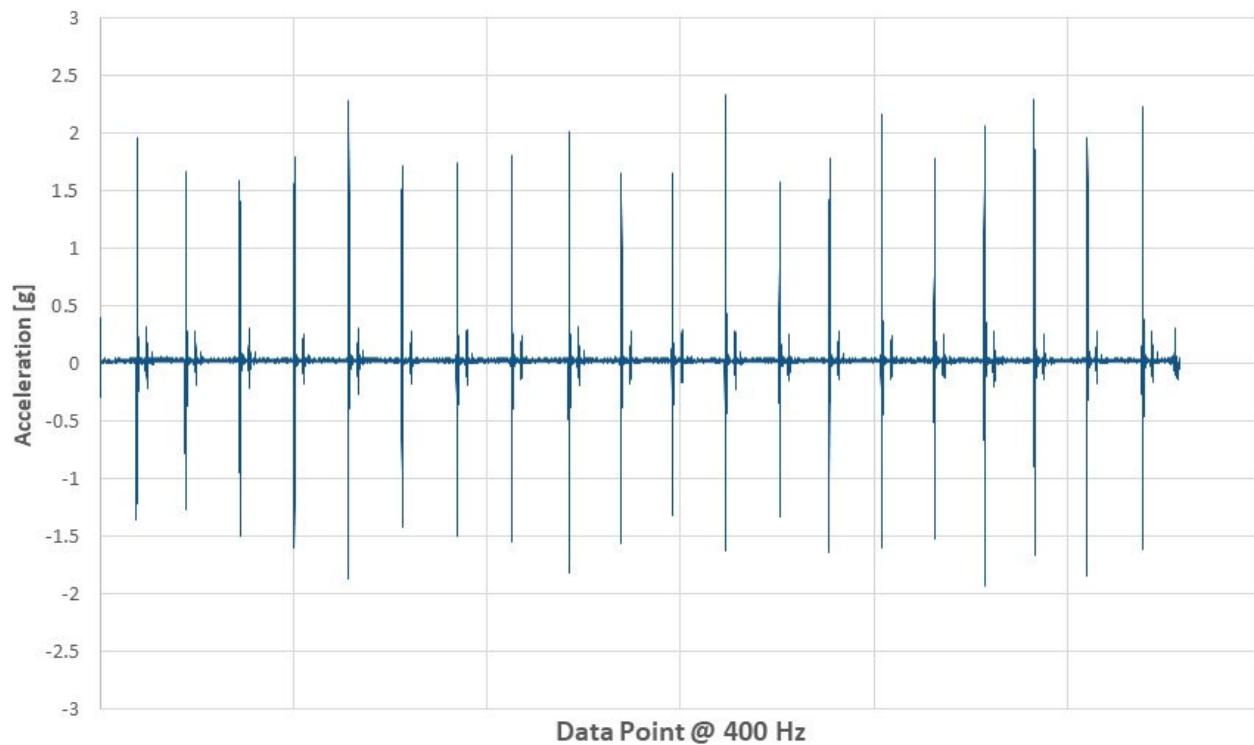


X Acceleration (Side to Side) - Brooklyn

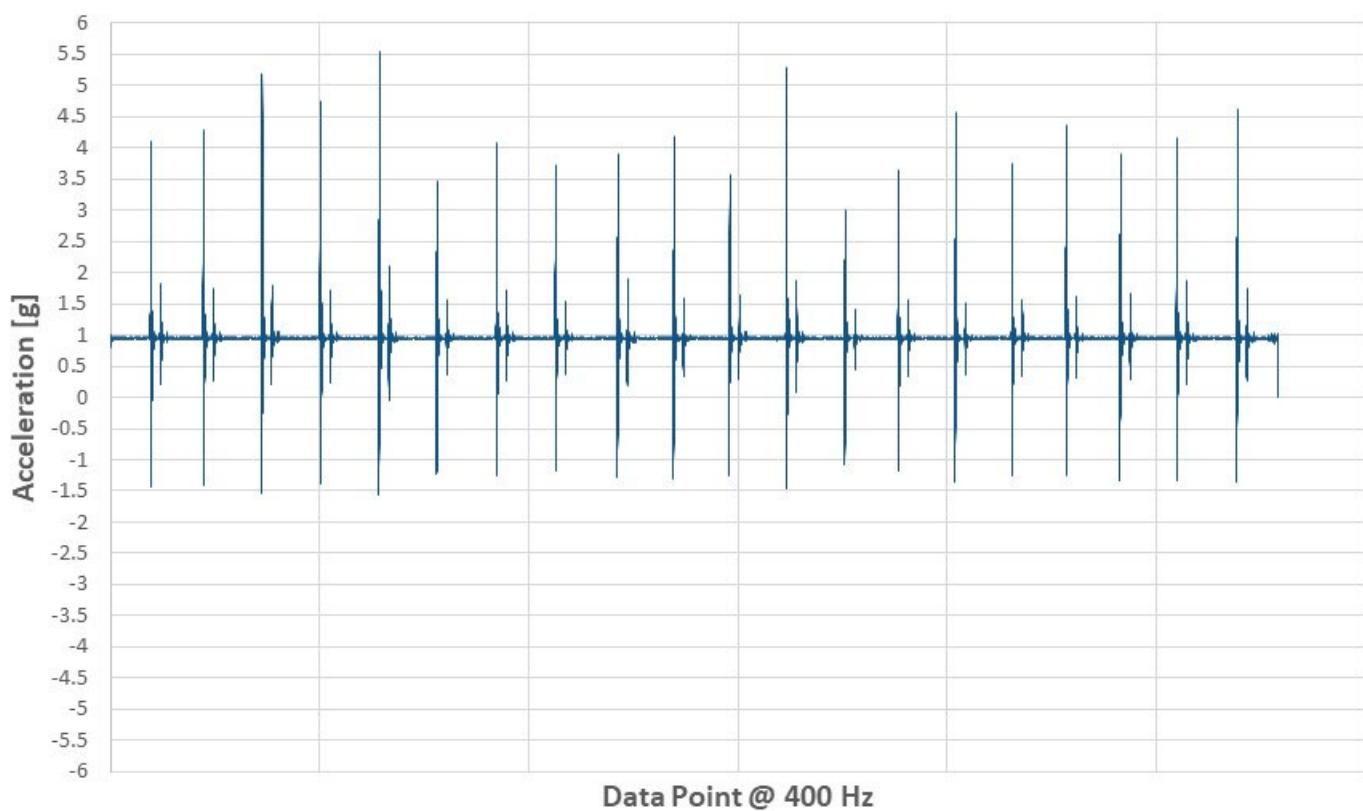




Y Acceleration (Head to Toe) - Brooklyn



Z Acceleration (Up and Down) - Brooklyn





## APPENDIX B

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## Mattress-Reviews.com Testing Methodology

### **Goal:**

To gather relative performance data from two or more different queen-sized mattresses to provide basis for comparison, grading, and discussion.

### **Equipment:**

- Reference Load 1: plastic 5 gallon water cooler bottle – size: ~ 10.75" diameter X ~ 19.5" height; weight 42.3 lbs.
- Reference Load 2: spherical medicine ball - size: ~ 9" diameter; weight 10 lbs.
- Tape measure.
- Masking tape.
- Metal ruler.
- 4-foot piece of aluminium,  $\frac{1}{4}$  inch thick.
- Calibrated accelerometer.
- A DSLR video camera.

### **General Test Conditions:**

- Measure temperature and humidity in a room and verify it falls within the range of a normal house (18°C - 24°C / 25% - 50%). Measure and record temperature and humidity before each test.
- Lay the test mattress on a flat concrete floor such that the top and sides are unobstructed.

**Test #1: Mattress Firmness (or “sinkage”):**

**Overview and Objective:** Apply Reference Load 1 to the center of each subject mattress and measure the vertical displacement of each to establish their respective positions on a firmness (or “sinkage”) scale. A low relative vertical displacement shall indicate a firmer mattress, while a high relative vertical displacement shall indicate a softer mattress.

**Procedure:**

1. Find the “approximate centre” of a given mattress sample:
  - a. Place 2 straight lines (tensioned string-lines or straight measuring tape), each from one corner of the mattress to the diametrically opposite corner (e.g. top right to bottom left and top left to bottom right).
  - b. Mark the intersection point of each straight line reference with masking tape - this is the “approximate center” of the mattress.
2. Place Reference Load 1 on the mattress, such that a point halfway between the top and bottom extremes of the water bottle lies on the marked approximate center of the mattress; and that the spout of the water bottom faces the foot of the bed, such that the sides of the water bottle are parallel to the sides of the mattress.
3. Wait 30 seconds for the water cooler bottle to entirely stop moving to allow the system to settle to a static state.
4. Place a 4-foot piece of  $\frac{1}{4}$  inch thick aluminium across the surface of the mattress. The long side of the aluminium piece shall run parallel to the foot of the mattress. The metal shall rest beneath the spout of the bottle without touching the bottle.
5. Using a tape measure or metal ruler, measure and record the distance between the bottom of the spout and the metal level immediately below it, without noticeably distorting the shape of the mattress at the measurement point.

## Test #2 Edge Supportiveness:

**Overview and Objective:** Apply Reference Load 1 to the edge each subject mattress and to measure the resultant vertical displacement of each to establish their respective positions on an “edge supportiveness” scale. A low relative vertical displacement shall indicate a mattress with more edge support, while a high relative vertical displacement shall indicate a mattress with less edge support.

### Procedure:

1. Find the “approximate middle” of the foot of a given mattress sample:
  - a. Measure the length of the top-facing edge of the foot of the subject mattress.
  - b. Divide the measurement by 2 and mark this point with masking tape - this is the “approximate middle” of the foot of the mattress.
  - c. Measure the height of the mattress at this point.
2. Place Reference Load 1 on the mattress such that a predetermined point of the water bottle lies on the marked “approximate middle” of the mattress edge, and that the sides of the water bottle are parallel to the sides of the mattress. The long edge of the water bottle shall be parallel to the long side of the mattress.
  - a. This predetermined point of the water bottle is where the spout of the water bottle begins. That is, there shall be 16 inches of the 19-inch water bottle lying ‘behind’ the edge of the mattress (i.e. on the mattress). The 3-inch spout shall extend off the edge of the mattress.
3. Wait 30 seconds for the water cooler bottle to entirely stop moving to allow the system to settle to a static state.
4. Measure the distance between the bottom of the spout and the floor (**variable X**).
5. Add the height of the mattress (see step 1c) to 4.25 inches (**variable Y**).
6. **Y minus X = vertical displacement.**

**Test #3 Motion Isolation:**

**Overview and Objective:** Apply a reference impulse to the top side of each subject mattress, representative of human movement on the mattress, and measure the resultant peak acceleration of a calibrated accelerometer placed on the mattress a fixed distance away from the epicenter of the impulse to establish their respective positions on a “motion isolation” scale. A high resultant peak acceleration shall indicate less motion isolation, while a low resultant peak acceleration shall indicate more motion isolation.

**Procedure:**

1. Find two “Sleep Points” on a given mattress sample:
  - a. Measure the width of the mattress and divide by 3 (the “Edge Distance”).
  - b. Measure the length of the mattress and divide by 2 (the “Center Distance”).
  - c. Find the first point lying Center Distance from the foot of the bed and Edge Distance from one the side of the bed and mark this point with masking tape - this is the first Sleep Point.
  - d. Repeat the above step for the other side of the bed - this is the second Sleep Point.
2. Center a calibrated accelerometer on the mattress.
3. Drop a 10 lbs sphere (9” diameter) on the second Sleep Point on the mattress from a height of 39” above the mattress surface.
4. Wait 5 seconds and record the peak acceleration experienced by the accelerometer.
5. Repeat 20 times and take an average.

**Test #4 Bounciness:**

**Overview and Objective:** Drop a 10lb sphere (9" diameter) from a fixed distance on to the top side of each subject mattress and measure the resultant peak rebound height on its first bounce. A high resultant peak rebound height shall indicate more bounciness, while a low resultant peak height shall indicate less bounciness.

**Procedure:**

1. Find the "Approximate Centre" of a given mattress sample:
  - a. Place 2 straight lines (tensioned string-lines or straight measuring tape), each from one corner of the mattress to the diametrically opposite corner (e.g. top right to bottom left and top left to bottom right).
  - b. Mark the intersection point of each straight line reference with masking tape - this is the "approximate center" of the mattress.
2. Suspend a 10lb sphere (9" diameter) such that it is centered 39" directly above the Approximate Center.
3. Suspend a measurement scale, such as a measuring tape, vertically above the mattress such that it touches the mattress at a point 9" away from the Approximate Center towards the foot of the bed.
4. Wait 1 minute for the system to reach relative static equilibrium.
5. Release the sphere such that it lands on the Approximate center of the mattress.
6. Place the DSLR video camera, mounted on a static tripod located 6" from the mid-point of the foot of the bed such that its line of sight is parallel to the top surface of the mattress, and that it is focussed on the vertically suspended measurement scale.
7. Wait 1 minute for the system to reach static equilibrium.
8. Begin recording on the video camera.
9. Release the sphere and wait 5 seconds.
10. Review the video and determine the maximum rebound point - that is, the point on the scale reached by the bottom of the weight on its first rebound (if it rebounds).
11. Repeat 3 times and take an average.