

REPORT NUMBER: R&D-CAL-15-008

**VEHICLE TO FRONTAL BARRIER CRASH TEST IN SUPPORT OF NHTSA'S
FRONTAL RESEARCH PROGRAM**

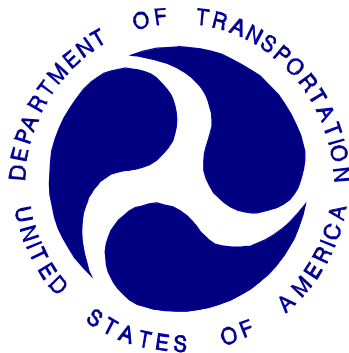
2016 Chevrolet Malibu

56.3 KPH RIGID BARRIER FRONTAL

TEST DATE: 1/13/2016

NHTSA No: M20160113

**CALSPAN CORPORATION
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FINAL REPORT SUBMITTED:

May 2, 2016

PREPARED FOR:

**U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Vehicle safety Research
1200 New Jersey Ave, SE
Room W46-446
Washington, DC 20590**

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Date: May 2, 2016

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Transportation Test Operations

Date: May 2, 2016

FINAL REPORT ACCEPTANCE BY VEHICLE SAFETY RESEARCH, OFFICE OF
STRUCTURAL AND RESTRAINTS RESEARCH DIVISION:

Date: _____

TOM, Vehicle Crash Testing
NHTSA, Office of Structures and Restraints Research
Date: _____

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16. Abstract A test was conducted in accordance with Contract DTNH22-14-D-00359 Task Order 0002. The test consisted of a 2016 Chevrolet Malibu four door sedan traveling at a target speed of 56.3 kph into a stationary flat frontal barrier wall. The test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at the Calspan Corporation's Transportation Test Operation's facility in Buffalo, New York on January 13, 2016. The vehicle's impact velocity was 56.51 KPH and the ambient temperature at the test vehicle at the time of impact was 22°C. The target vehicle post-test maximum crush was 563 mm. The test vehicle's occupant performance was as follows: <table border="1"> <thead> <tr> <th>Measurement Description</th> <th>Units</th> <th>Driver</th> <th>Front Passenger</th> <th>Rear Passenger</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>254.93</td> <td>168.85</td> <td>811.34</td> </tr> <tr> <td>Brain Injury Criterion (BrIC)</td> <td>N/A</td> <td>0.72</td> <td>0.60</td> <td></td> </tr> <tr> <td>Abdomen Deflection</td> <td>mm</td> <td>-65.05</td> <td></td> <td></td> </tr> <tr> <td>Resultant Acetabulum Force</td> <td>N</td> <td>1147.62</td> <td></td> <td></td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>-37.98</td> <td>-18.02</td> <td>-48.52</td> </tr> <tr> <td>Neck Injury Criteria (Nij)</td> <td>N/A</td> <td>0.69</td> <td>0.52</td> <td>1.12</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>1229.10</td> <td>669.65</td> <td>2662.68</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>-440.60</td> <td>-66.30</td> <td>-817.60</td> </tr> <tr> <td>Tibia Index</td> <td>N/A</td> <td>0.45</td> <td>0.56</td> <td></td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>-1488.74</td> <td>-71.33</td> <td>-196.07</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>-3033.25</td> <td>-108.19</td> <td>-185.45</td> </tr> </tbody> </table>					Measurement Description	Units	Driver	Front Passenger	Rear Passenger	Head Injury Criteria (HIC ₁₅)	N/A	254.93	168.85	811.34	Brain Injury Criterion (BrIC)	N/A	0.72	0.60		Abdomen Deflection	mm	-65.05			Resultant Acetabulum Force	N	1147.62			Maximum Chest Compression	mm	-37.98	-18.02	-48.52	Neck Injury Criteria (Nij)	N/A	0.69	0.52	1.12	Neck Tension	N	1229.10	669.65	2662.68	Neck Compression	N	-440.60	-66.30	-817.60	Tibia Index	N/A	0.45	0.56		Left Femur Force	N	-1488.74	-71.33	-196.07	Right Femur Force	N	-3033.25	-108.19	-185.45
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DISCLAIMER

The contents of this report relate only to the specific product evaluated under the specific test conditions, as defined within this report. The findings and conclusions are those of the author(s) and not necessarily those of Calspan Corporation. For the purposes of this report, Calspan Corporation provided test services only and was not involved with the consulting, design or manufacture of any product. Calspan Corporation does not endorse products or manufacturers. Further, Calspan Corporation (to include: any of its affiliates, parent companies or subsidiaries) assumes no liability associated with the contents of this report or the use of this report.

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Date: May 2, 2016

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SECTION 1
PURPOSE OF TEST

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

This 56.3 kph (35 mph) test vehicle into a rigid barrier is part of the Frontal Rigid Barrier Test a outlined in Contract No. DTNH22-14-D-00359 Task Order 0002. The purpose of this test is to obtain vehicle crashworthiness and occupant restraint system performance data for research purposes.

This test was conducted in accordance with the instructions set forth for a vehicle to rigid barrier impact, outlined in Contract No. DTNH22-14-D-00359 Task Order 0002. Data was obtained indicant of Federal Motor Vehicle Safety Standard FMVSS 208-Occupant Crash Protection, FMVSS 212 – Windshield Mounting, FMVSS 219 (partial) – Windshield Zone Intrusion, and FMVSS 301 – Fuel System Integrity, in addition to the requirements of Contract No. DTNH22-14-D-00359 Task Order 0002.

SECTION 2 SUMMARY OF TEST

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

A rigid fixed barrier was impacted by a 2016 Chevrolet Malibu four door sedan at a velocity of 56.51 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on January 13, 2016. Pre- and post-test photographs of the vehicle and dummies to document the test can be found in Appendix A. One real-time camera and 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet 6 of this report.

One 50% adult male THOR-M anthropomorphic test device (ATD) (Serial No. DL9207), was placed in the driver seating position according to dummy placement instructions specified in the THOR Seating Test Procedure, and one Part 572O 5th percentile female ATD with RibEye (Serial No. 324), was placed in the right-front passenger seating position at mid-track and positioned according to dummy placement instructions specified in the frontal NCAP laboratory test procedure. One Part 572O 5th percentile female ATD with RibEye (Serial No. 019) was also placed in the rear seating position (P3) and positioned according to dummy placement instructions specified in the Side MDB NCAP Laboratory Test Procedure.

Seat belt load cells were also on the driver's and passengers' shoulder and lap belts to measure the dummy's torso and pelvic section loading. In addition to seat belt load cells, belt movement sensors were utilized on both the driver and front passengers' seat belts to measure displacement. The driver (position 1) ATD (Serial No. DL9207), right-front passenger (position 2) ATD (Serial No. 324), and the rear passenger ATD (Serial No. 019) were calibrated previous to this test. Certification details, along with instrumentation calibration data, can be found in Appendix C of this report.

Two hundred and sixty eight (268) channels of data from the ATD's and test vehicle were collected using Kayser – Threde and DTS data acquisition systems. Appendix B contains dummy and vehicle response data plots.

There was 100% total windshield retention. There appeared to be no intrusion into the protected zone of the windshield during any portion of the impact event. The maximum static crush of the vehicle was 563 mm at C4 to the right of the vehicle's centerline. Full vehicle measurements are presented in Section 3 of this report.

SECTION 2 (CONTINUED)
SUMMARY OF TEST

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

All four vehicle doors remained closed and latched during the test. All doors remained operational after the impact event.

Structure observations include the following:

- Hood slightly bent inwards

The driver ATD's visible contact points were:

- Head contacted the frontal airbag
- Torso contacted the frontal airbag
- Left Knee contacted the Knee Airbag & Knee Bolster
- Right Knee contacted the Knee Airbag

The right front passenger ATD's visible contact points were:

- Head contacted the frontal airbag and headrest
- Knees contacted the knee airbag

The rear passenger ATD's visible contact points were:

- Head contacted the headrest

SECTION 2 (CONTINUED)
CRASH VEHICLE SUMMARY

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

Primary Impact Data

Measured Parameter	Units	Value
Test Vehicle Velocity at Impact	kph	56.51
Vehicle Test Weight	kg	1826
Vehicle Maximum Static Crush	mm	563
Number of Data Channels		268
Number of Real-Time Cameras		1
Number of High-Speed Cameras		16

GENERAL COMMENTS:

1. P1 (Driver) serial number – DL9207
2. P2 (Passenger) serial number – 324
3. P3 (Rear Passenger) serial number – 019

Data Anamolies:

- Driver Left Lower Tibia Z Force, Questionable spike at 42.5ms B-28
- Rear Passenger RibEye Left Rib 01 Displacement X, Questionable data 76.7ms to 100ms B-56
- Rear Passenger RibEye Left Rib 01 Displacement Y, Questionable data 76.7ms to 100ms B-56
- Rear Passenger RibEye Right Rib 05 Displacement X, Interference by Chest Pot and Abdominal Insert B-61
- Rear Passenger RibEye Right Rib 05 Displacement Y, Interference by Chest Pot and Abdominal Insert B-61
- Rear Passenger RibEye Right Rib 06 Displacement X, Interference by Chest Pot and Abdominal Insert B-62
- Rear Passenger RibEye Right Rib 06 Displacement Y, Interference by Chest Pot and Abdominal Insert B-62

PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2016 Chevrolet Malibu - M20160113 NHTSA No.: M20160113
 Test Program: NHTSA R&D Frontal Rigid Barrier Test Date: 1/13/2016

Driver: THOR Serial No. DL9207 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	HIC 15ms		Compute	254.93	
	Brain Injury Criteria (BrIC)		Compute	0.72	
	Head Rotational Velocity X	Deg/s	60	179.82	-282.95
	Head Rotational Velocity Y	Deg/s	60	931.23	-2244.63
	Head Rotational Velocity Z	Deg/s	60	474.34	-474.74
Neck	Upper Neck Z-axis Force	N	1000	1229.10	-440.60
	Upper Neck Y-axis Moment	Nm	Thortest	37.88	-20.04
Chest	Upper Left Resultant Chest Deflection	mm	Thortest	33.15	
	Upper Right Resultant Chest Deflection	mm	Thortest	37.98	
	Lower Left Resultant Chest Deflection	mm	Thortest	7.97	
	Lower Right Resultant Chest Deflection	mm	Thortest	22.43	
Abdomen	Lower Left X-axis Deflection	mm	Thortest	0.11	-62.20
	Lower Right X-axis Deflection	mm	Thortest	0.02	-65.05
Acetabulum	Left Acetabulum Resultant Force	N	Compute	1147.62	0.55
	Right Acetabulum Resultant Force	N	Compute	921.27	0.25
Femur	Left Femur Force, FZ	N	600	358.49	-1488.74
	Right Femur Force, FZ	N	600	564.53	-3033.25
Tibia	Left Upper Tibia, FZ	N	600	49.94	-1853.37
	Left Upper Tibia Index		Compute	0.37	
	Right Upper Tibia, FZ	N	600	313.69	-2555.46
	Right Upper Tibia Index		Compute	0.47	
	Left Lower Tibia, FZ	N	600	76.74	-2576.97
	Left Lower Tibia Index		Compute	0.33	
	Right Lower Tibia, FZ	N	600	204.53	-3423.73
	Right Lower Tibia Index		Compute	0.45	
Ankle	Left Ankle Rotation, RX	Deg	180	36.23	-2.86
	Left Ankle Rotation, RY	Deg	180	7.71	-14.34
	Left Ankle Dorsiflexion Moment, MY	Nm	Compute	22.55	-23.68
	Left Ankle In/Eversion Moment, MX	Nm	Compute	6.49	-61.76
	Right Ankle Rotation, RX	Deg	180	18.35	-5.02
	Right Ankle Rotation, RY	Deg	180	14.87	-18.33
	Right Ankle Dorsiflexion Moment, MY	Nm	Compute	28.95	-22.65
	Right Ankle In/Eversion Moment, MX	Nm	Compute	22.84	-45.04
Anomalies: None					

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: 2016 Chevrolet Malibu - M20160113 NHTSA No.: M20160113
 Test Program: NHTSA R&D Frontal Rigid Barrier Test Date: 1/13/2016

Right Front Passenger: HF Serial No. 324 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	15 ms HIC		Compute	168.85	
	Brain Injury Criteria (BrIC)		Compute	0.60	
Neck	Upper Neck Force Z	N	1000	669.65	-66.30
	Upper Neck Moment Y	Nm	600	20.74	-35.42
	NIJ		Compute	0.52	
Chest	Chest Potentiometer Deflection	mm	600		-16.05
	Left Ribeye 01 X-Axis Deflection	mm	600	0.24	-18.02
	Left Ribeye 02 X-Axis Deflection	mm	600	0.23	-17.01
	Left Ribeye 03 X-Axis Deflection	mm	600	0.25	-15.85
	Left Ribeye 04 X-Axis Deflection	mm	600	0.19	-14.80
	Left Ribeye 05 X-Axis Deflection	mm	600	0.18	-13.78
	Left Ribeye 06 X-Axis Deflection	mm	600	0.66	-12.20
	Right Ribeye 01 X-Axis Deflection	mm	600	0.26	-12.94
	Right Ribeye 02 X-Axis Deflection	mm	600	0.32	-11.05
	Right Ribeye 03 X-Axis Deflection	mm	600	0.29	-9.72
	Right Ribeye 04 X-Axis Deflection	mm	600	0.23	-8.28
	Right Ribeye 05 X-Axis Deflection	mm	600	0.95	-7.24
	Right Ribeye 06 X-Axis Deflection	mm	600	0.78	-6.04
	Overall Ribeye X-Axis Deflection	Mm	600	0.95	-18.02
	Chest Resultant Acceleration	g	Compute	36.62	
	Chest Resultant Acceleration, 3 ms clip	g	Compute	35.87	
	Pelvis Resultant Acceleration	g	Compute	48.69	
Femur	Left Femur Force, FZ	N	600	2086.86	-71.33
	Right Femur Force, FZ	N	600	1934.97	-108.19
Tibia	Left Upper Tibia, FZ	N	600	1417.56	-440.61
	Left Upper Tibia Index		Compute	0.41	
	Right Upper Tibia, FZ	N	600	1251.92	-197.66
	Right Upper Tibia Index		Compute	0.36	
	Left Lower Tibia, FZ	N	600	994.39 ⁽¹⁾	-407.48 ⁽¹⁾
	Left Lower Tibia Index		Compute	0.56 ⁽¹⁾	
	Right Lower Tibia, FZ	N	600	884.43	-275.82
	Right Lower Tibia Index		Compute	0.47	
Anomalies					
(1) Questionable spike at 42.5ms					

PRELIMINARY INJURY SUMMARY: Right Rear Passenger

Test Vehicle: 2016 Chevrolet Malibu - M20160113 NHTSA No.: M20160113
 Test Program: NHTSA R&D Frontal Rigid Barrier Test Date: 1/13/2016

Right Rear Passenger: HF Serial No. 019 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	15 ms HIC		Compute	811.34	
Neck	Upper Neck Force Z	N	1000	2662.68	-817.60
	Upper Neck Moment Y	Nm	600	22.69	-72.63
	NIJ		Compute	1.12	
Chest	Chest Potentiometer Deflection	mm	600		-40.82
	Left Ribeye 01 X-Axis Deflection	mm	600	0.25 ⁽²⁾	-84.30 ⁽²⁾
	Left Ribeye 02 X-Axis Deflection	mm	600	0.28	-43.64
	Left Ribeye 03 X-Axis Deflection	mm	600	0.26	-45.04
	Left Ribeye 04 X-Axis Deflection	mm	600	0.26	-46.90
	Left Ribeye 05 X-Axis Deflection	mm	600	0.24	-48.52
	Left Ribeye 06 X-Axis Deflection	mm	600	0.18	-47.56
	Right Ribeye 01 X-Axis Deflection	mm	600	0.22	-30.11
	Right Ribeye 02 X-Axis Deflection	mm	600	0.27	-28.16
	Right Ribeye 03 X-Axis Deflection	mm	600	0.24	-25.91
	Right Ribeye 04 X-Axis Deflection	mm	600	0.24	-23.15
	Right Ribeye 05 X-Axis Deflection	mm	600	19.73 ⁽³⁾	-92.46 ⁽³⁾
	Right Ribeye 06 X-Axis Deflection	mm	600	30.29 ⁽³⁾	-90.95 ⁽³⁾
	Overall Ribeye X-Axis Deflection	Mm	600	30.29 ⁽³⁾	-92.46 ⁽³⁾
	Chest Resultant Acceleration	g	Compute	51.50	
	Chest Resultant Acceleration, 3 ms clip	g	Compute	50.49	
	Pelvis Resultant Acceleration	g	Compute	59.15	
Pelvis	Left ASIS Force X	N	600	48.83	-3452.05
	Right ASIS Force X	N	600	39.50	-2911.86
Femur	Left Femur Force Z	N	600	1675.09	-196.07
	Right Femur Force Z	N	600	1602.55	-185.45
Anomalies (2) Questionable data 76.7ms to 100ms (3) Interference by Chest Pot and Abdominal Insert					

SECTION 3 DATA SHEETS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
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DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

VEHICLE INFORMATION

NHTSA No.	M20160113
Model Year	2016
Make	Chevrolet
Model	Malibu
Body Style	Four Door Sedan
VIN	1G11B5SA5GF120510
Body Color	Silver
Odometer Reading (km/mi)	196.3 km / 122 mi
Engine Displacement. (L)	2.5
Type/No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
All-Wheel Drive (AWD)	No
Traction Control System (TCS)	Yes

VEHICLE OPTIONS

Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	No
Other Optional Feature	-
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	Yes
Driver Torso/Pelvis Airbag	No
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Pass. Front Airbag	Yes
Pass. Curtain Airbag	Yes
Pass. Head/Torso Airbag	No
Pass. Torso Airbag	Yes
Pass. Torso/Pelvis Airbag	No
Pass. Pelvis Airbag	No
Pass. Knee Airbag	Yes
Driver Seat Belt Pretensioner	Yes
Pass. Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Pass. Load Limiter	Yes
Other Safety Restraint	-

Does owner's manual provide instructions to turn off automatic door locks?

No

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors LLC
Date of Manufacture	08/15

GWR (kg)	2006
GAWR Front (kg)	1027
GAWR Rear (kg)	979

VEHICLE SEATING AND WEIGHT CAPACITY

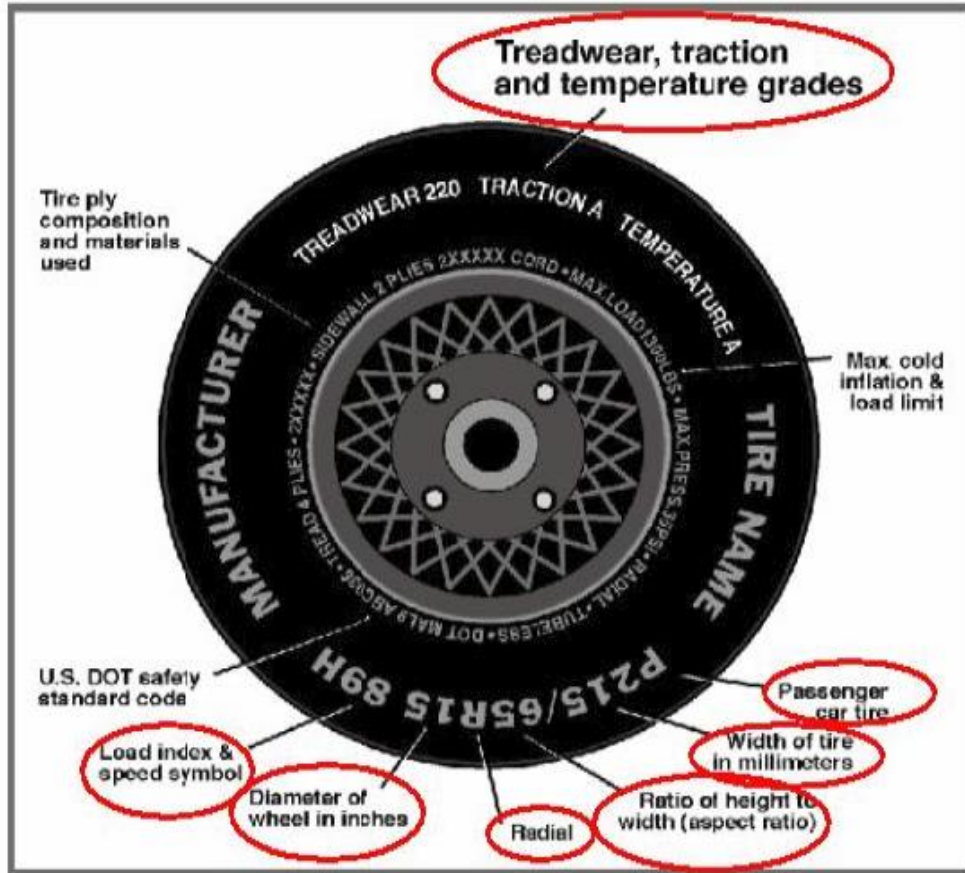
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	-	
Number of Occupants	2	3	-	5
Capacity Wt. (VCW) (kg)				420
Cargo Wt. (RCLW) (kg)				79.8

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

Collect items circled in red, tire manufacturer, and tire name.



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P215/55R16	P215/55R16
Tire Size on Vehicle	P215/55R16	P215/55R16
Tire Manufacturer	Continental	Continental
Tire Model	ContiProContact	ContiProContact
Treadwear	540	540
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	94S	94S
Tire Material	Rubber	Rubber
DOT Safety Code Right	6YX8BN42115	6YX8BN42115
DOT Safety Code Left	6YX8BN42115	6YX8BN42115

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	478	317		533	388	
Right	kg	462	285		493	412	
Ratio	%	61	39		50.2	43.8	
Totals	kg	940	602	1542	1026	800	1826

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1542
Weight of 1 THOR & 2 HIII 5 th Females	kg	211
Rated Cargo/Luggage Weight (RCLW)	kg	79.8
Calculated Vehicle Target Weight (TVTW)	kg	1832.8

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	713	722	721	733	1008
As Tested	mm	707	712	686	692	1198
Post Test	mm	757	784	686	702	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2736
Total Vehicle Length at Left Side	mm	4696
Total Vehicle Length at Centerline	mm	4871
Total Vehicle Length at Right Side	mm	4695
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	61
Amount of Stoddard Solvent in Fuel Tank	L	58.3

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Rear bumper, bumper skin, trunk lid, muffler, trunk carpeting, rear speaker,
 Rear door window, pump kit, and tail light.

DATA SHEET NO.1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Units	Pre-Test
1	Total Length	mm	4871
2	Total Width	mm	1817
3*	Bumper Top Height	mm	564
4*	Bumper Bottom Height	mm	422
5*	Longitudinal Member Top Height	mm	613
6	Distance Between Longitudinal Members	mm	1075
7	Longitudinal Member Width	mm	84
8*	Engine Top Height	mm	848
9*	Engine Bottom Height	mm	230
10	Engine and Gearbox Width	mm	568
11	Front Bumper-Engine Distance	mm	654
12*	Front Shock Absorber Fixing Height	mm	930
13*	Bonnet Leading Edge Height	mm	889
14	Front Shock Absorber Fixing Width	mm	1189
15	Front Bumper – Front Axle Distance	mm	993
16	Front Axle – A Pillar Distance	mm	509
17	A-Pillar – B-Pillar Distance	mm	1104
18	B-Pillar – Rear Axle Distance	mm	1123
19	B-Pillar – C-Pillar Distance	mm	1068
20*	Roof Sill Bottom Height	mm	1391
21*	Roof Sill Top Height	mm	1431
22*	Floor Sill Bottom Height	mm	355
23*	Floor Sill Top Height	mm	426

*Note: Height measurements are in reference to the ground.

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

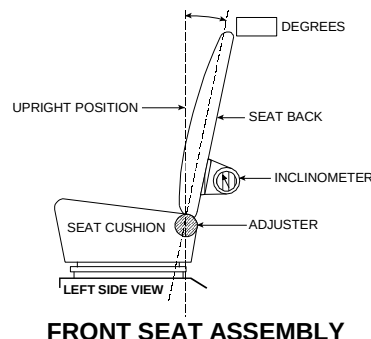
NHTSA No.: M20160113
 Test Date: 1/13/2016

NORMAL DESIGN RIDING POSITION

For adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.

Driver seat: The driver seat back was positioned according to the Nominal Design Riding position listed in FORM 1 and THOR Seating Procedure.

Passenger Seat: The passenger seat back was positioned according to the Nominal Design Riding position listed in FORM 1 and THOR Seating Procedure.



	Deg.
Driver Seat Back Angle	10.0
Passenger Seat Back Angle	21.4
Rear Passenger Seat Back Angle	22.7

SEAT FORE/AFT POSITIONS

Describe the method used of determining seat fore/aft positions.

The driver's seat was positioned at its lowest position and at the mid-point of fore/aft travel.

The passenger's seat was positioned at the mid-point of fore/aft travel.

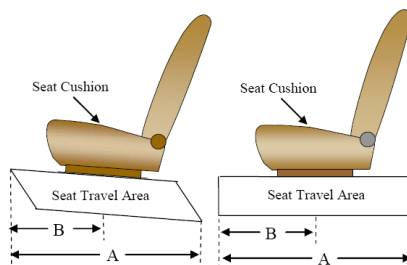
	Total Fore/Aft Travel	Placed in Position #
Driver Seat	246	125
Passenger Seat	244	122
Rear Passenger Seat	FIXED	FIXED

SEAT BELT UPPER ANCHORAGES

Describe the method of positioning seat belt upper anchorages. Belt anchorages were moved along the full range of motion, and marked on the B-Pillar to their respective possible positions.

Photographic evidence can be found in Appendix A of this report. Zero is defined as the upper-most position.

	Total # of Positions	Placed in Position #
Driver Seat	5	0
Passenger Seat	5	0
Rear Passenger Seat	FIXED	FIXED



DATA SHEET NO. 2 (CONTINUED)
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

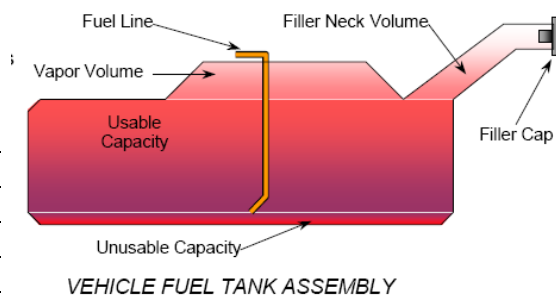
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	62.8
Usable Capacity of "Optional Tank"	
93% of Usable Capacity	58.3
Actual Amount of Solvent Used	58.3
1/3 of Usable Capacity	20.9

FUEL PUMP

Describe the fuel system - what type of fuel pump, details about how it operates, etc.

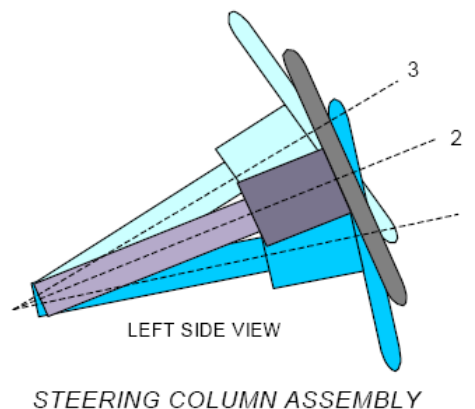
Fuel evacuated according to the specifications provided by the manufacturer in Form 1. Electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the right rear wheel.



STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. Describe how this measurement was taken.

The steering wheel was adjusted to the midpoint of tilt angle range and the midpoint of the telescoping travel (if applicable)



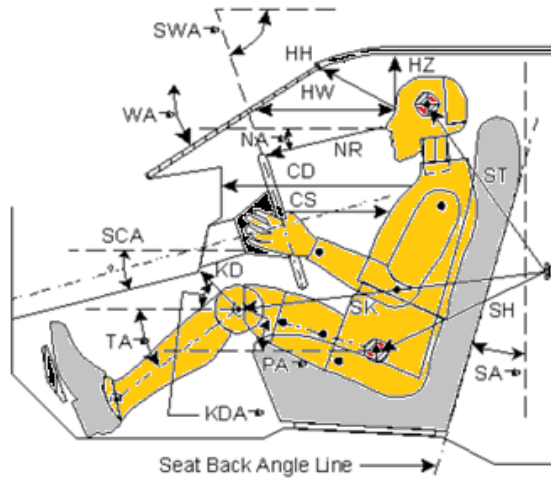
STEERING COLUMN POSITIONS

	Tilt (degrees)	Fore/Aft Position (mm)
Lowermost position No. 1	19.65	
Geometric center position No. 2	21.7	
Uppermost position No. 3	23.8	
Telescoping Steering Wheel Travel		55
Test Position	21.7	27.5

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

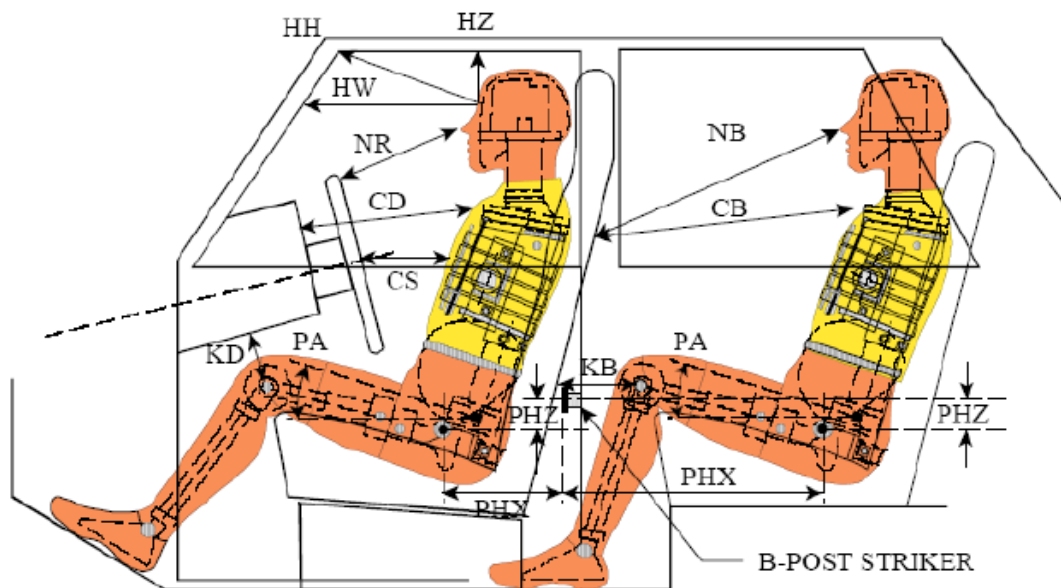


Code	Measurement Description	Driver (Serial # THOR DL9207)		Front Passenger (Serial # 324)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		28.1		
SWA°	Steering Wheel Angle		22.0		
SCA°	Steering Column Angle		68.0		
SA°	Seat Back Angle (on headrest post)		10.0		21.4
HZ	Head to Roof (Z)	215	90	299	90
HH	Head to Header	516	14.3	439	32.9
HW	Head to Windshield	805	0	860	0
NR	Nose to Rim	583	13.5	618	23.7
CD	Chest to Dash	643		585	
CS	Chest to Steering Hub	460	3.5		
RA	Rim to Abdomen	257	0		
KDL	Left Knee to Dash	179	32.0	275	34.4
KDR	Right Knee to Dash	184	27.5	270	31.6
PA°	Pelvic Angle		34.5		21.5
TA°	Tibia Angle		33.6		33.8
SK	Striker to Knee	552	-4.7	501	-10.8
ST	Striker to Head	507	78.4	401	-85.7
SH	Striker to H-Point	206	-45.0	234	-46.2
HAX°	Head Angle (X)		0.0		
HAY°	Head Angle (Y)		-2.9		
TAX°	T6 Angle (X)		-0.2		
TAY°	T6 Angle (Y)		27.1		
TAX°	T1 (X)		-0.1		
TAY°	T1 (Y)		5.9		
TAX°	T12 (X)		0.0		
TAY°	T12 (Y)		36.0		
PAX°	Pelvis (X)		0.3		
PAY°	Pelvis (Y)		34.5		

DATA SHEET NO. 3 (CONTINUED)
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016



LEFT SIDE VIEW

NOTE: 2-DOOR VEHICLE SHOWN.
 REAR DUMMY PHX & PHZ
 MEASUREMENTS FOR A 4-DOOR
 VEHICLE WOULD USE THE C-POST
 STRIKER AS A REFERENCE POINT

Code	Measurement Description	Rear Passenger (Serial # 019)	
		Length (mm)	Angle (°)
SA°	Seat Back Angle (on headrest post)		22.7
HZ	Head to Roof (Z)	291	
NB	Nose to Seatback	521	
CB	Chest to Seatback	537	
KDL	Left Knee to Seatback	248	19.3
KDR	Right Knee to Seatback	255	18.1
PAX°	Pelvic Tilt Angle (X-axis)		0.4
PAY°	Pelvic Tilt Angle (Y-axis)		20.8
PHX	Hip Point to Striker (X-Axis)	216	
PHZ	Hip Point to Striker (Z-Axis)	262	

DATA SHEET NO.3 (CONTINUED) **DUMMY CMM MEASUREMENTS**

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

MEASUREMENT LOCATIONS

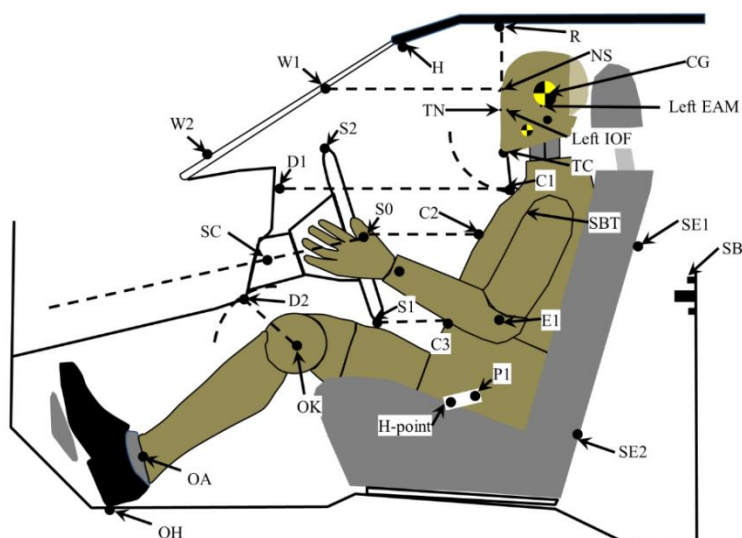


DIAGRAM #1

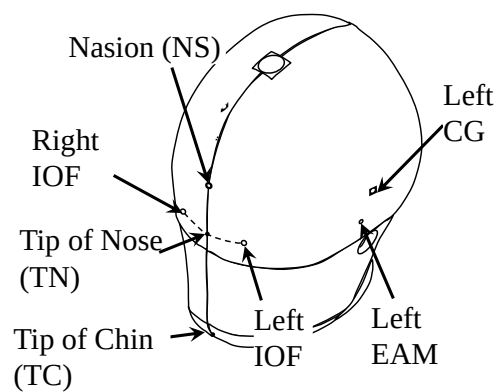


DIAGRAM #2

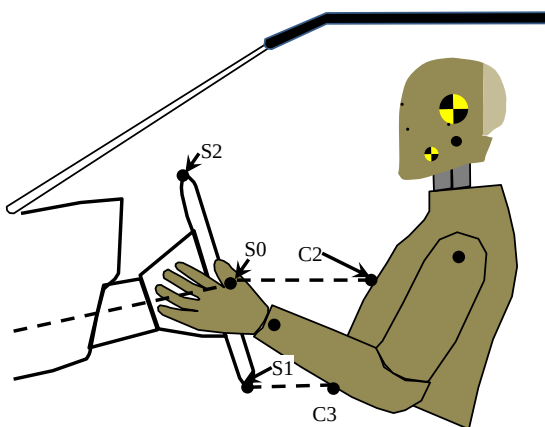


DIAGRAM #3

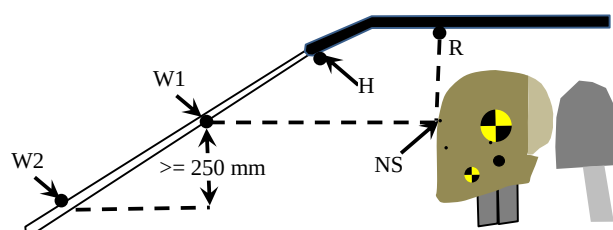


DIAGRAM #4

DATA SHEET NO.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

DRIVER MEASUREMENT PONITS

Description	Units	Driver		
		X	Y	Z
Tip of Striker	mm	2379	-797	-9
Top of Head Restraint	mm	2131	-366	-578
Outboard Head Restraint Post	mm	2068	-448	-315
Head CG	mm	2277	-442	-506
Nasion	mm	2372	-365	-510
Tip of Nose	mm	2372	-367	-474
Tip of Chin	mm	2366	-364	-375
LEAM	mm	2284	-437	-477
LIOF	mm	2368	-398	-473
RIOF	mm	2368	-335	-471
Outboard Elbow	mm	2584	-604	-144
H-Point	mm	2525	-702	137
Center of H-Point Tool	mm	2450	-625	109
Left Knee	mm	2929	-570	36
Right Knee	mm	2935	-270	35
Left Ankle	mm	3279	-569	269
Right Heel	mm	3316	-552	401
Left Heel	mm	3317	-190	423
W1 – Upper Windshield	mm	3175	-365	-509
W2 – Lower Windshield	mm	3363	-365	-409
Header	mm	2867	-366	-647
Head to Roof	mm	2372	-364	-724
C1- Upper Chest	mm	2418	-364	-242
C2 – Mid Chest	mm	2436	-366	-215
C3 – Lower Chest	mm	2539	-366	-60
S2 – Top Steering Wheel Rim	mm	2937	-365	-380
S1 – Lower Steering Wheel Rim	mm	2806	-365	-60
SC – Steering Column	mm	3080	-458	-148
D1 – Dash Point	mm	2896	-366	-242
D2 – Knee Bolster	mm	3089	-573	-52
SE1 – Seatback Point	mm	2030	-363	-289
SE2 – Seatback Point	mm	2264	-366	229
Left Front Outboard Seat Anchor Bolt	mm	2345	-789	-24
Left Rear Outboard Seat Anchor Bolt	mm	2351	-791	16

Reference point: Origin at rear centerline of vehicle. Vertical coordinate point for origin determined with contact of vehicle structure by 10mm deep block moved downward along front edge of a level. The level is positioned perpendicular to ground and in contact with rear centerline of the vehicle.

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

FRONT PASSENGER MEASUREMENT POINTS

Description	Units	Front Passenger		
		X	Y	Z
Tip of Striker	mm	2380	798	-12
Top of Head Restraint	mm	2262	370	-557
Outboard Head Restraint Post	mm	2181	457	-355
Head CG	mm	2410	440	-412
Bridge of Nose	mm	2501	370	-411
Tip of Nose	mm	2523	370	-380
Tip of Chin	mm	2509	371	-307
Outboard Shoulder Bolt	mm	2386	532	-170
Outboard Elbow	mm	2462	597	36
H-Point	mm	2542	635	157
Center of H-Point Tool	mm	2455	626	125
Left Knee	mm	2872	493	82
Right Knee	mm	2870	331	84
Left Ankle	mm	3125	308	318
Right Ankle	mm	3133	471	314
Left Heel	mm	3142	303	416
Right Heel	mm	3138	469	413
W1 – Upper Windshield	mm	3367	371	-409
W2 – Lower Windshield	mm	3498	370	-338
Header	mm	2868	370	-650
Head up to Roof	mm	2503	371	-712
C1 - Upper Chest	mm	2499	371	-176
D1 - Dash Point	mm	3165	370	-176
D2 - Dash Bolster	mm	3119	497	-39
SE1 - Seat Back Point	mm	2137	370	-334
SE2 - Seat Back Point	mm	2265	370	215
Right Front Outboard Seat Anchor Bolt	mm	2807	596	362
Right Rear Outboard Seat Anchor Bolt	mm	2407	595	390

Reference point: Origin at rear centerline of vehicle. Vertical coordinate point for origin determined with contact of vehicle structure by 10mm deep block moved downward along front edge of a level. The level is positioned perpendicular to ground and in contact with rear centerline of the vehicle.

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

Description	Units	Rear Passenger		
		X	Y	Z
Tip of Striker	mm	1443	800	-106
Top of Head Restraint	mm	1275	355	-526
Outboard Head Restraint Post	mm	1248	437	-387
Head CG	mm	1493	420	-406
Bridge of Nose	mm	1589	356	-408
Tip of Nose	mm	1610	356	-379
Tip of Chin	mm	1595	357	-305
Outboard Shoulder Bolt	mm	1483	505	-169
Outboard Elbow	mm	1578	586	23
H-Point	mm	1659	136	156
Center of H-Point Tool	mm	1573	148	125
Left Knee	mm	1999	308	82
Right Knee	mm	2002	479	85
Left Ankle	mm	2192	275	359
Right Ankle	mm	2184	436	372
Left Heel	mm	2124	236	441
Right Heel	mm	2122	419	447
Head up to Roof	mm	1592	355	-698
C1 - Upper Chest	mm	1604	356	-171
D1 - Dash Point	mm	2169	356	-172
D2 - Dash Bolster	mm	2234	458	-9
SE1 - Seat Back Point	mm	1251	351	-246
SE2 - Seat Back Point	mm	1380	351	91

Reference point: Origin at rear centerline of vehicle. Vertical coordinate point for origin determined with contact of vehicle structure by 10mm deep block moved downward along front edge of a level. The level is positioned perpendicular to ground and in contact with rear centerline of the vehicle.

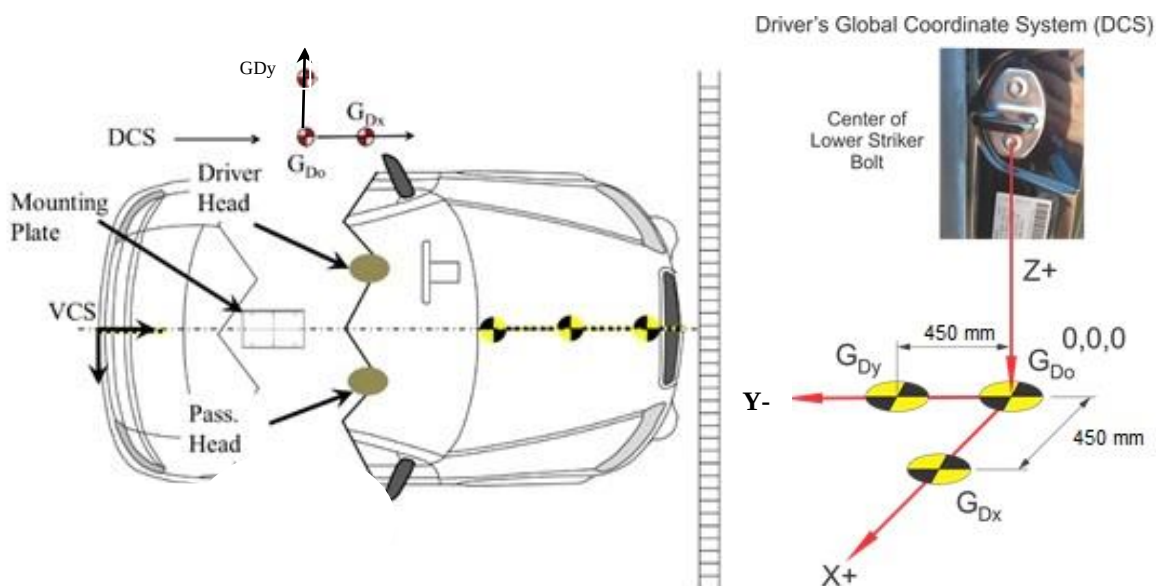
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO.3 (CONTINUED) DUMMY CMM MEASUREMENTS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

DRIVER GLOBAL COORDINATE SYSTEM



Driver ATD Measurement Points

Measurement Points	Units	Measurements (mm)		
		X	Y	Z
Head CG	mm	-74	333	-1193
Nasion	mm	20	410	-1199
Tip of Nose	mm	20	409	-1163
Tip of Chin	mm	14	412	-1064
LEAM	mm	-68	338	-1165
LIOF	mm	16	378	-1161
RIOF	mm	16	441	-1160

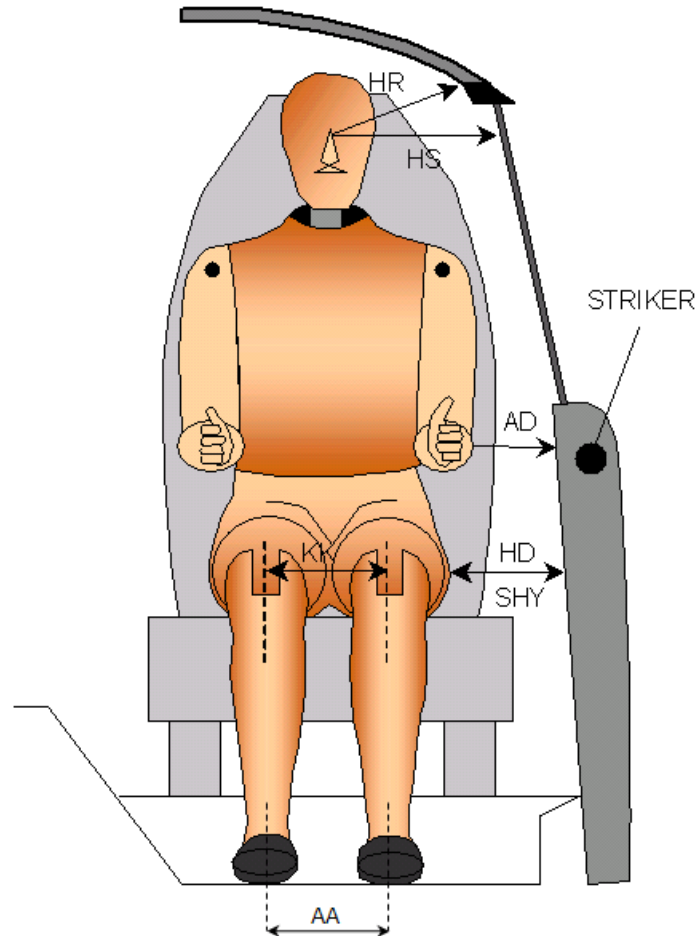
Reference point: Located on the ground (GD_0) which is in line with the bottom striker bolt.

- +X – From GD_0 to the front of the vehicle
- +Y – From GD_0 to the right side of the vehicle
- +Z – From GD_0 into the ground

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

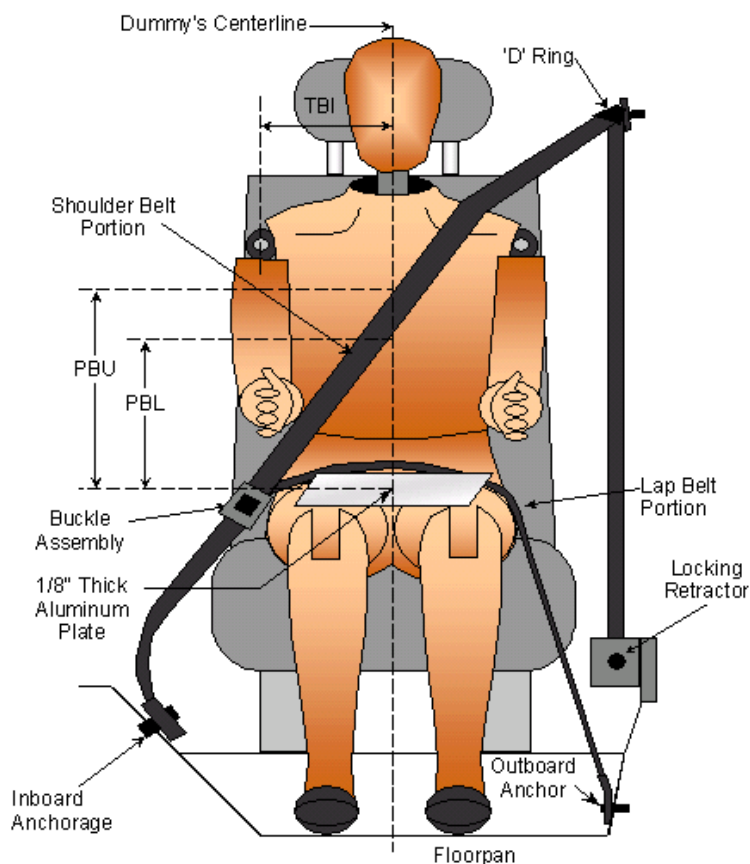


Code	Description	Units	Driver	Front Passenger	Rear Passenger
AD	Arm to Door	mm	128	108	100
HD	H-Point to Door	mm	119	185	191
HR	Head to Side Header	mm	190	263	248
HS	Head to Side Window	mm	350	377	392
KK	Knee to Knee	mm	347	166	165
SHY	Striker to H-Point (Y Direction)	mm	225	280	315
AA	Ankle to Ankle	mm	343	164	168

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger	Rear Pass.
PBU — Top surface of reference to belt upper edge	mm	345	295	265
PBL — Top surface of reference to belt lower edge	mm	270	220	190

BELT LENGTH DATA

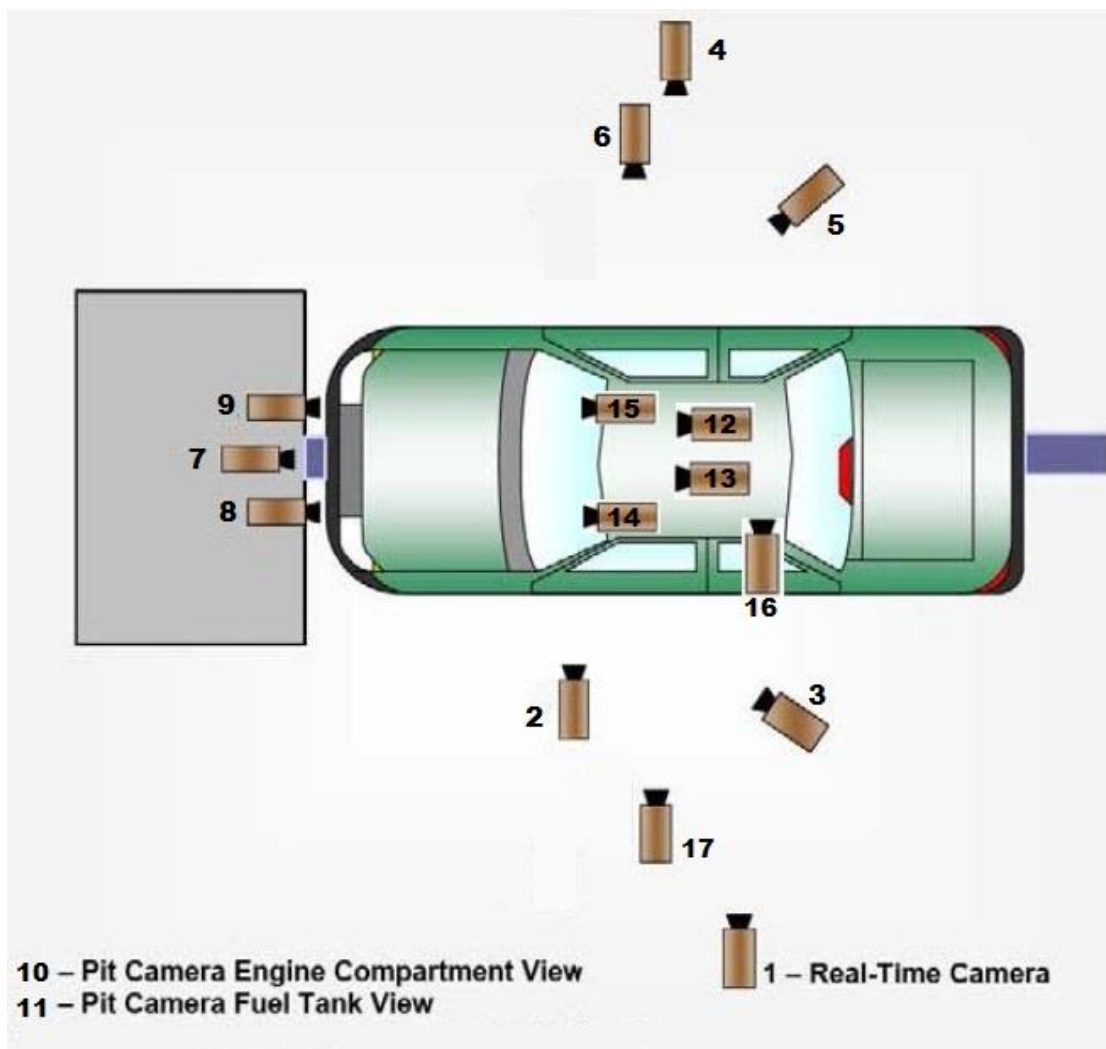
Measurement Description	Units	Driver	Passenger	Rear Pass.
Shoulder belt length as measured on ATD	mm	775	790	810
Lap Belt Length as measured on ATD	mm	560	480	470
Remainder of belt on reel	mm	1065	1130	1150
Total belt length for continuous webbing systems	mm	2400	2400	2430

DATA SHEET NO. 6
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

HORIZONTAL LOCATION



DATA SHEET NO. 6 (CONTINUED)
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side	--	--	--	Zoom	30
2	Left Front Half	-1179	-9001	-1522	50	1000
3	Left Angle	-2451	-2861	-2220	24	1000
4	Right Overall	-1972	9067	-1158	24	1000
5	Right Angle	-2608	2994	-2140	24	1000
6	Right Front Half	-1234	6821	-1186	28	1000
7	Windshield	954	0	-3505	20	1000
8	Driver Windshield	-395	600	-2051	12.5	1000
9	Passenger Windshield	-395	-600	-2051	12.5	1000
10	Pit Front	-776	0	2102	13	1000
11	Pit Rear	-2488	0	2102	13	1000
12	Onboard Driver Airbag	-2756	-60	-1242	12.5	1000
13	Onboard Passenger Airbag	-2756	60	-1242	12.5	1000
14	Onboard Driver Toepan	-1730	-332	-245	6.5	1000
15	Onboard Front Passenger Toepan	-1816	345	-245	6.5	1000
16	Onboard Rear Passenger Side View	-3030	-476	-900	8	1000
17	Left Overall	-2242	-8593	-1336	24	1000

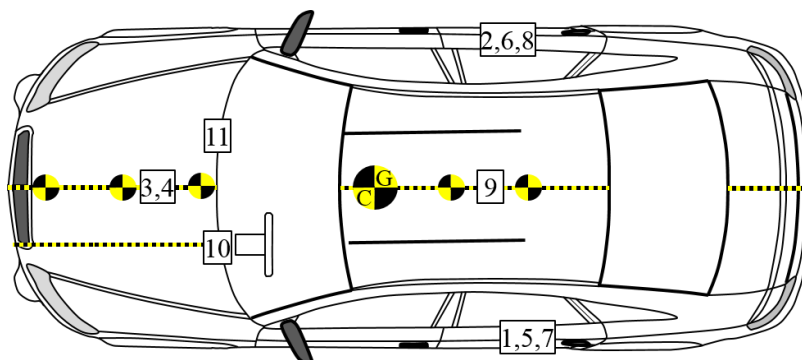
Reference Point:

- +X – Forward of impact plane
- +Y – Right of monorail center
- +Z – into ground

DATA SHEET NO. 7 **VEHICLE INSTRUMENTATION DATA**

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016



VEHICLE INSTRUMENTATION PRE-TEST LOCATIONS

No.	Instrumentation Location	Axes	Units	Measurements (mm)		
				X	Y	Z
1	Left Rear Seat Cross Member	X,Z	mm	2010	-504	403
2	Right Rear Seat Cross Member	X,Z	mm	2013	520	422
3	Top of Engine	X	mm	4025	-120	-125
4	Bottom of Engine	X	mm			
5	Left Sill	X,Y	mm	2058	-669	402
6	Right Sill	X,Y	mm	2063	671	385
7	Left Rear Seat Cross Member Redundant	X,Z	mm	2011	-513	404
8	Right Rear Seat Cross Member Redundant	X,Z	mm	2012	499	415
9	Linear Acceleration & Angular Rate Sensor	X	mm	2126	0	289
		Y	mm	2114	11	289
		Z	mm	2115	0	287
10	Driver Toe Pan	X,Y,Z	mm	3591	-355	236
11	Front Passenger Toe Pan	X,Y,Z	mm	3564	305	276

Reference point: Origin at rear centerline of vehicle. Vertical coordinate point for origin determined with contact of vehicle structure by 10 mm deep block moved downward along front edge of a level. The level is positioned perpendicular to ground and in contact with rear centerline of vehicle.

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

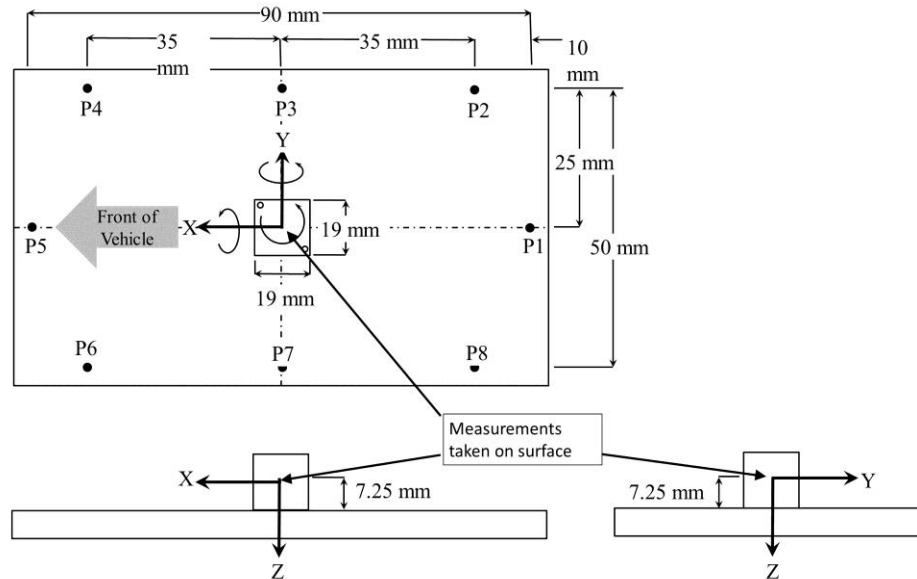
DATA SHEET NO. 7 (CONTINUED)

VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

ANGULAR RATE SENSOR



VEHICLE COORDINATE SYSTEM					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	2126	0	289
ACC-2	Accelerometer CG – Y Direction	mm	2114	11	289
ACC-3	Accelerometer CG – Z Direction	mm	2115	0	287
M1	Mounting Bolt 1	mm	2107	-8	287
M2	Mounting Bolt 2	mm	2122	7	287
P1	Plate Point 1	mm	2070	0	302
P2	Plate Point 2	mm	2080	25	301
P3	Plate Point 3	mm	2115	25	301
P4	Plate Point 4	mm	2150	25	301
P5	Plate Point 5	mm	2160	0	302
P6	Plate Point 6	mm	2150	-25	302
P7	Plate Point 7	mm	2115	-25	302
P8	Plate Point 8	mm	2079	-25	302

Reference point: Origin at rear centerline of vehicle. Vertical coordinate point for origin determined with contact of vehicle structure by 10mm deep block moved downward along front edge of a level. The level is positioned perpendicular to ground and in contact with rear centerline of the vehicle.

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

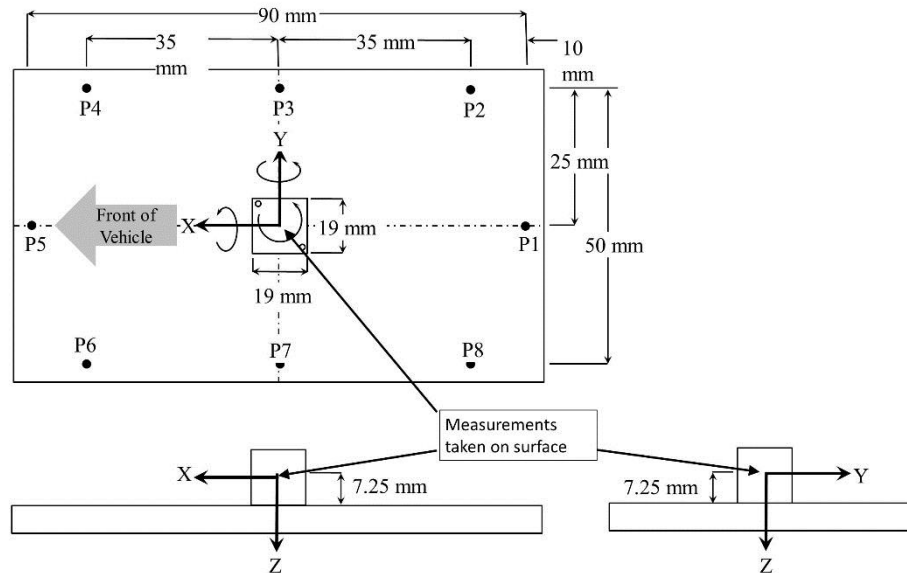
DATA SHEET NO. 7 (CONTINUED)

VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

ANGULAR RATE SENSOR



DRIVER GLOBAL COORDINATE SYSTEM					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	-225	785	-404
ACC-2	Accelerometer CG – Y Direction	mm	-236	795	-404
ACC-3	Accelerometer CG – Z Direction	mm	-236	784	-406
M1	Mounting Bolt 1	mm	-244	777	-405
M2	Mounting Bolt 2	mm	-228	792	-406
P1	Plate Point 1	mm	-281	785	-390
P2	Plate Point 2	mm	-271	810	-391
P3	Plate Point 3	mm	-236	809	-392
P4	Plate Point 4	mm	-201	809	-392
P5	Plate Point 5	mm	-191	784	-391
P6	Plate Point 6	mm	-201	759	-390
P7	Plate Point 7	mm	-236	760	-390
P8	Plate Point 8	mm	-271	760	-390

Reference point: Located on the ground (GD_0) which is in line with the bottom striker bolt.

- +X – From GD_0 to the front of the vehicle
- +Y – From GD_0 to the right side of the vehicle
- +Z – From GD_0 into the ground

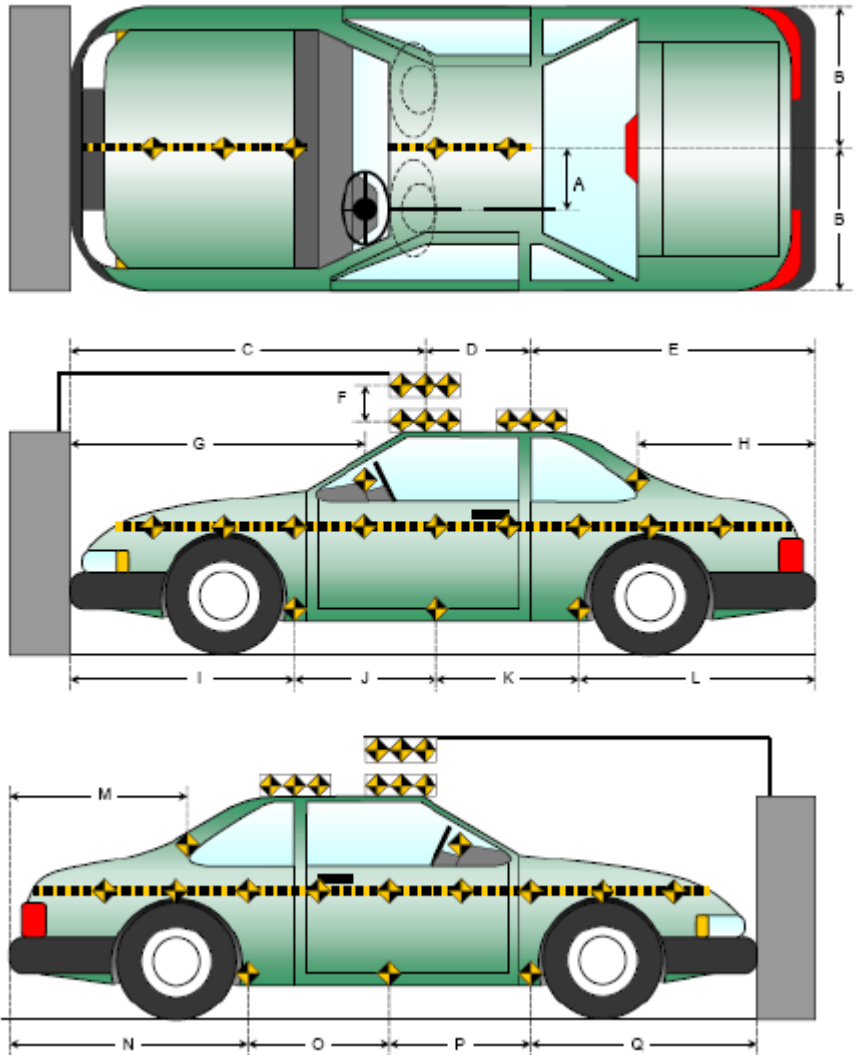
DATA SHEET NO. 8 **PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2015 Chevrolet Malibu
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

Item	Value
A	328
B	908
C	2792
D	608
E	1455
F	178
G	1820
H	920
I	1439
J	904
K	951
L	1561
M	917
N	1565
O	950
P	900
Q	1440

All units in millimeters



DATA SHEET NO. 9
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	108
Passenger Dummy Accelerometers	74
Rear Passenger Dummy Accelerometers	46
Vehicle Structure Accelerometers	40
Total	268

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	5
High-Speed Off-board	11
Real-Time Panning	1
Total	17

DATA SHEET NO. 10
POST TEST OBSERVATIONS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Right Front Passenger	Rear Passenger
Dummy Type/Serial No.	DL9207	324	019
Lower Leg Type	LX		
Lower Leg Serial No.	LX0045/LX0046		
Head Contact	Front Airbag	Front Airbag & Headrest	Headrest
Upper Torso Contact	Front Airbag	Front Airbag	None
Lower Torso Contact	None	None	None
Left Knee Contact	Knee Bolster/Knee Airbag	Knee Airbag	None
Right Knee Contact	Knee Airbag	Knee Airbag	None

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Right Front Passenger	Rear Passenger
Locked/Unlocked Doors	Unlocked	Unlocked	Unlocked
Front Door Opening	Closed & Operational	Closed & Operational	Closed & Operational
Rear Door Opening	Closed & Operational	Closed & Operational	Closed & Operational
Seat Track Shift (mm)	0	0	0
Seat Back Failure	No	No	No
Glazing Damage	None	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Remained in Good Condition
Windshield Damage	Remained in Good Condition
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	802
Center	mm	779
Right Side	mm	802
Average	mm	801

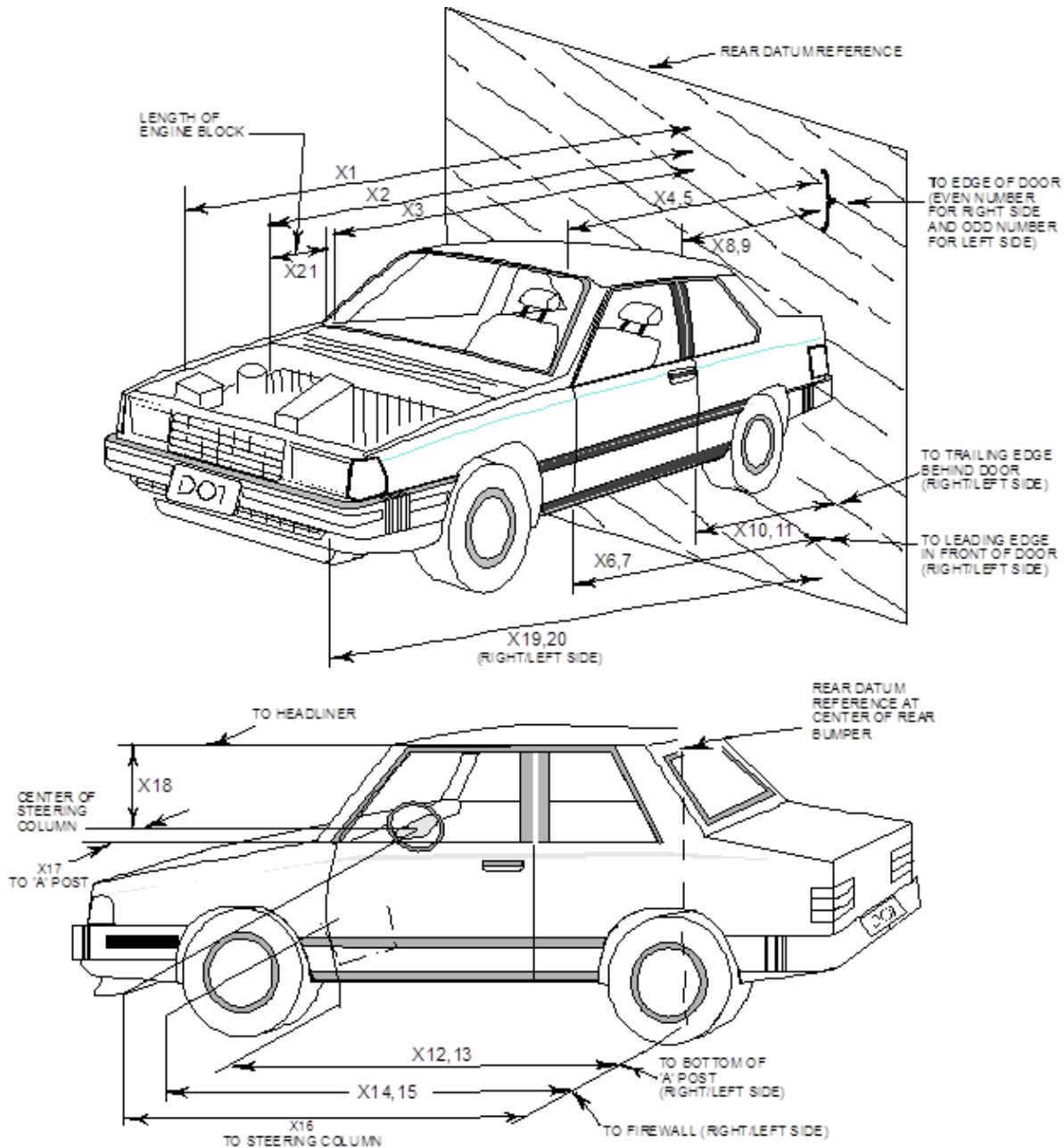
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver (Occupant 1)		Right Front Passenger (Occupant 2)		Rear Passenger (Occupant 3)	
	Installed	Deployed	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes	No	N/A
Curtain Airbag	Yes	Yes	Yes	Yes	Yes	Yes
Torso Airbag	Yes	No	Yes	No	No	N/A
Knee Airbag	Yes	Yes	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	Yes	Yes	No	N/A
Other						

DATA SHEET NO. 11 **VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016



DATA SHEET NO. 11 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4871	4309	-562
2	Rear Surface of Vehicle (RSOV) to Front of Engine	mm	4217	3998	-219
3	RSOV to Firewall	mm	3751	3725	-26
4	RSOV to Upper Leading Edge of Right Door	mm	3373	3376	3
5	RSOV to Upper Leading Edge of Left Door	mm	3373	3376	2
6	RSOV to Lower Leading Edge of Right Door	mm	3349	3352	2
7	RSOV to Lower Leading Edge of Left Door	mm	3350	3352	2
8	RSOV to Upper Trailing Edge of Right Door	mm	2273	2276	2
9	RSOV to Upper Trailing Edge of Left Door	mm	2272	2274	2
10	RSOV to Lower Trailing Edge of Right Door	mm	2307	2308	1
11	RSOV to Lower Trailing Edge of Left Door	mm	2307	2309	1
12	RSOV to Bottom of "A" Post of Right Side	mm	3402	3405	3
13	RSOV to Bottom of "A" Post of Left Side	mm	3404	3404	0
14	RSOV to Firewall, Right Side	mm	3777	3778	1
15	RSOV to Firewall, Left Side	mm	3779	3776	-3
16	RSOV to Steering Column	mm	2894	2916	23
17	Center of Steering Column to "A" Post	mm	297	291	-6
18	Center of Steering Column to Headliner	mm	418	418	0
19	RSOV to Right Side of Front Bumper	mm	4765	4267	-498
20	RSOV to Left Side of Front Bumper	mm	4765	4294	-470
21	Length of Engine Block	mm	242	242	0
RD	RSOV to Right Side of Dash Panel	mm	3057	3052	-6
CD	RSOV to Center of Dash Panel	mm	3121	3119	-3
LD	RSOV to Left Side of Dash Panel	mm	3050	3051	1

UR* = Unrecoverable Data Point

DATA SHEET NO. 12
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

VEHICLE INFORMATION

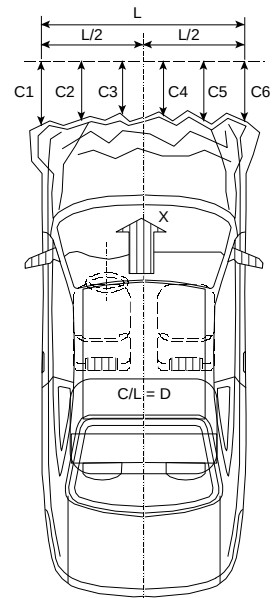
VIN: 1G11B5SA5GF120510 Wheelbase (mm): 2736
Vehicle Size Category: Passenger Test Weight (kg): 1826

ACCELEROMETER DATA

Accelerometer Locations: As Described in Data Sheet No. 7
Cal. Procedure/Interval: Calspan Procedure / 6 month
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (kph): 56.51
Velocity Change (kph): 56.51

CRUSH PROFILE

Collision Deformation Classification: 12FDEW3
Midpoint of Damage: C4
Damage Region Length (mm): 1342
Impact Mode: Frontal Barrier



Crush Measurements: Bumper Cover

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4605	4283	322
C2	Crush zone 2 at left side	mm	4774	4259	515
C3	Crush zone 3 at left side	mm	4843	4286	557
C4	Crush zone 4 at right side	mm	4843	4280	563
C5	Crush zone 5 at right side	mm	4776	4233	543
C6	Crush zone 6 at right side	mm	4606	4249	357
L	C1 to C6	mm	1342	1476	-134
	Logitudinal horizontal distance from the tip of the front bumper to the base of the windshield	mm	1,219	655	564

Reference point: Origin at rear centerline of vehicle. Vertical coordinate point for origin determined with contact of vehicle structure by 10mm deep block moved downward along front edge of a level. The level is positioned perpendicular to ground and in contact with rear centerline of the vehicle.

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

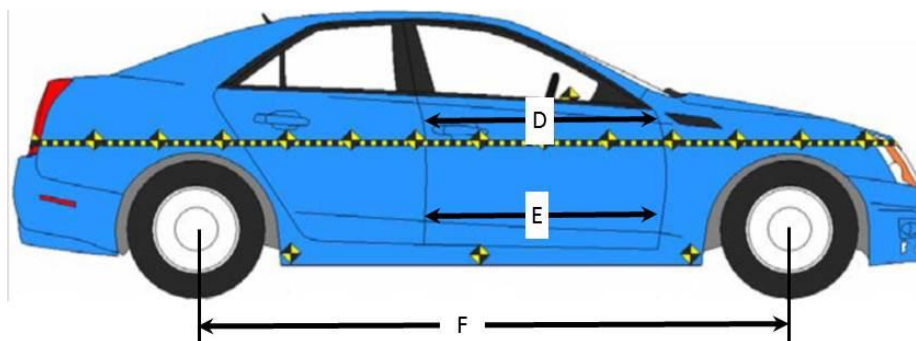
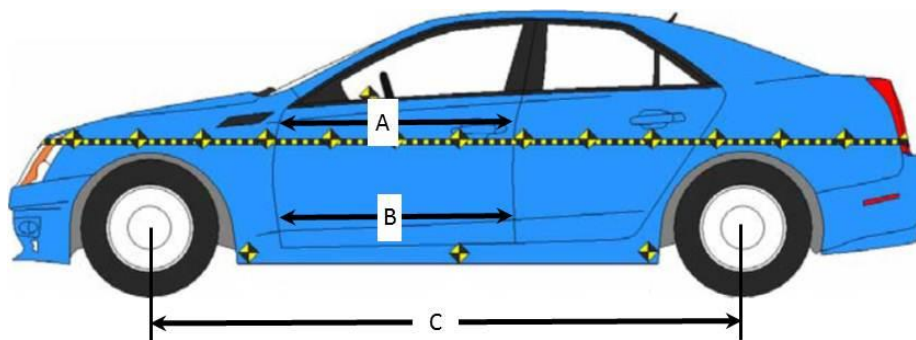
NHTSA No.: M20160113
 Test Date: 1/13/2016

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	982	981	1
B	Left Side Lower	mm	788	788	0
D	Right Side Upper	mm	980	980	0
E	Right Side Lower	mm	785	785	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2736	2666	-70
F	Right Side Wheelbase	mm	2736	2647	-89



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

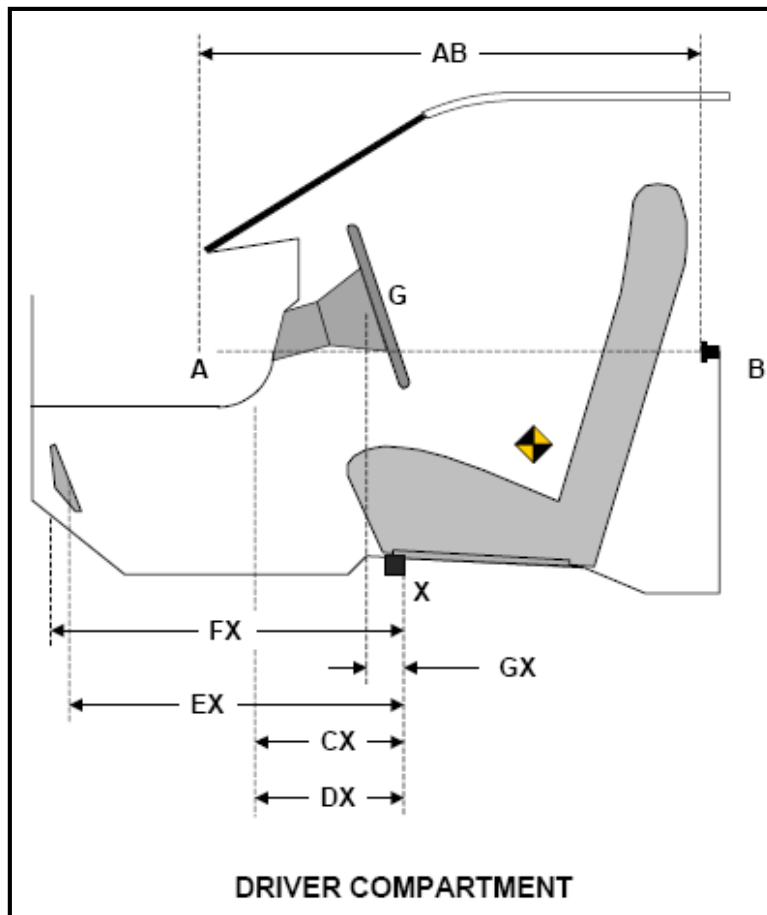
Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	766	766	0
CX	Left Knee Bolster to X	mm	289	288	-1
DX	Right Knee Bolster to X	mm	277	277	0
EX	Brake Pedal to X	mm	579	543	-36
FX	Foot Rest to X	mm	639	629	-10
GX	Center of Steering Column Wheel Hub to X	mm	71	91	20

X = Front of Seat Track (Stationary)



DATA SHEET NO. 14
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016

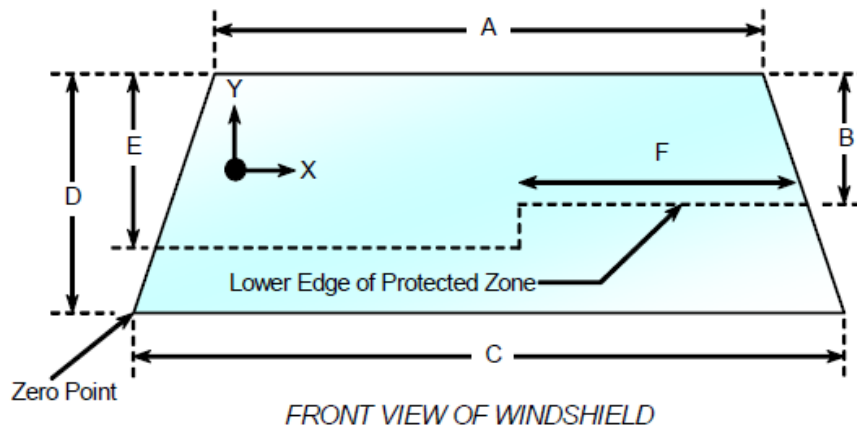
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicles not equipped with occupant passive restraints and 50% for each side of the windshield for vehicles which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2100	2100	100
Right Side	2100	2100	100
Total	4200	4200	100



Item	Units	Value
A	mm	1206
B	mm	496
C	mm	1438
D	mm	778
E	mm	491
F	mm	511

AREAS OF PROTECTED ZONE FAILURES

A. Provide coordinates of the area that the protected zone was penetrated more than .25 inches by a vehicle component other than one that is normally in contact with the windshield.

- No penetration

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component.

- No Penetration

X	Y

DATA SHEET NO. 14 (CONTINUED)
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Ambient Temperature at Test Vehicle Time of Impact: 21° C

Test Time: 1:46 PM

Stoddard Solvent Spillage Measurements

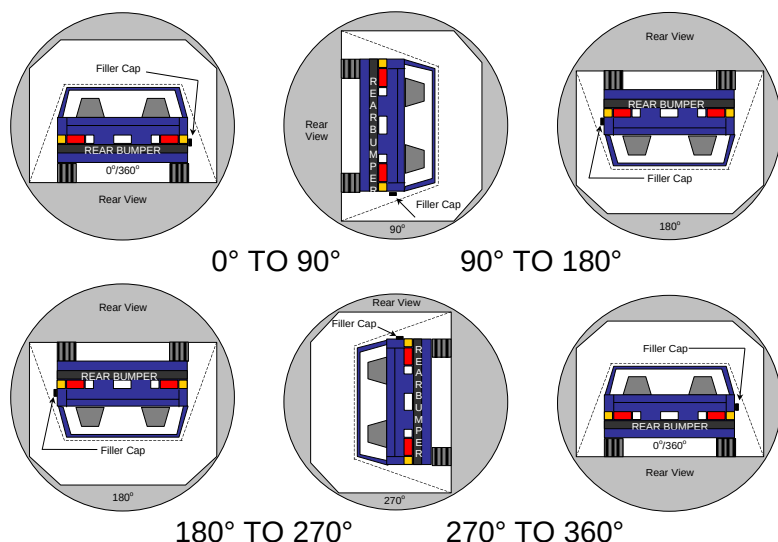
A.	From impact until vehicle motion ceases: (Maximum allowable = 1 oz.)	<u>0</u>	oz
B.	For the 5-minute period after motion ceases: (Maximum allowable = 5 oz.	<u>0</u>	oz
C.	For the following 25 minutes: (Maximum allowable = 1 oz./minute	<u>0</u>	oz
D.	Spillage	<u>0</u>	oz

DATA SHEET NO. 15

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2016 Chevrolet Malibu four door sedan
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
 Test Date: 1/13/2016



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.

2. The position hold time at each position is 300 seconds (minimum).

3. Details of Stoddard Solvent spillage: None

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	74	300	374
90° to 180°	65	300	365
180° to 270°	62	300	362
270° to 360°	65	300	365

FMVSS 301 SPILLAGE TABLE

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

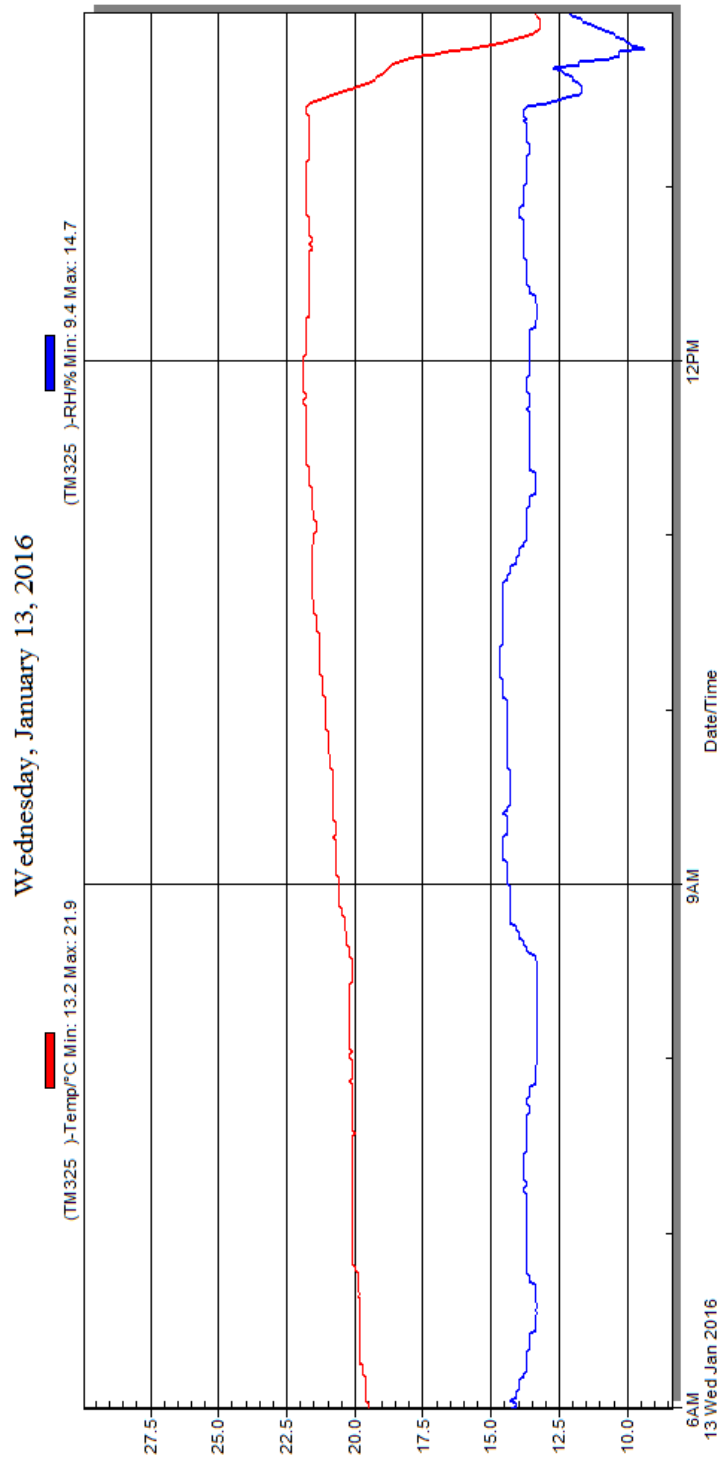
SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

DATA SHEET NO. 16
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2016 Chevrolet Malibu four door sedan
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20160113
Test Date: 1/13/2016



Temperature Stabilization Chart/Data

APPENDIX A
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Photo Not Applicable

Figure A-1: Load Cell Location

Photo Not Applicable

Figure A-2: Rigid Barrier Frontal Wall



Figure A-3: Manufacturer's Label

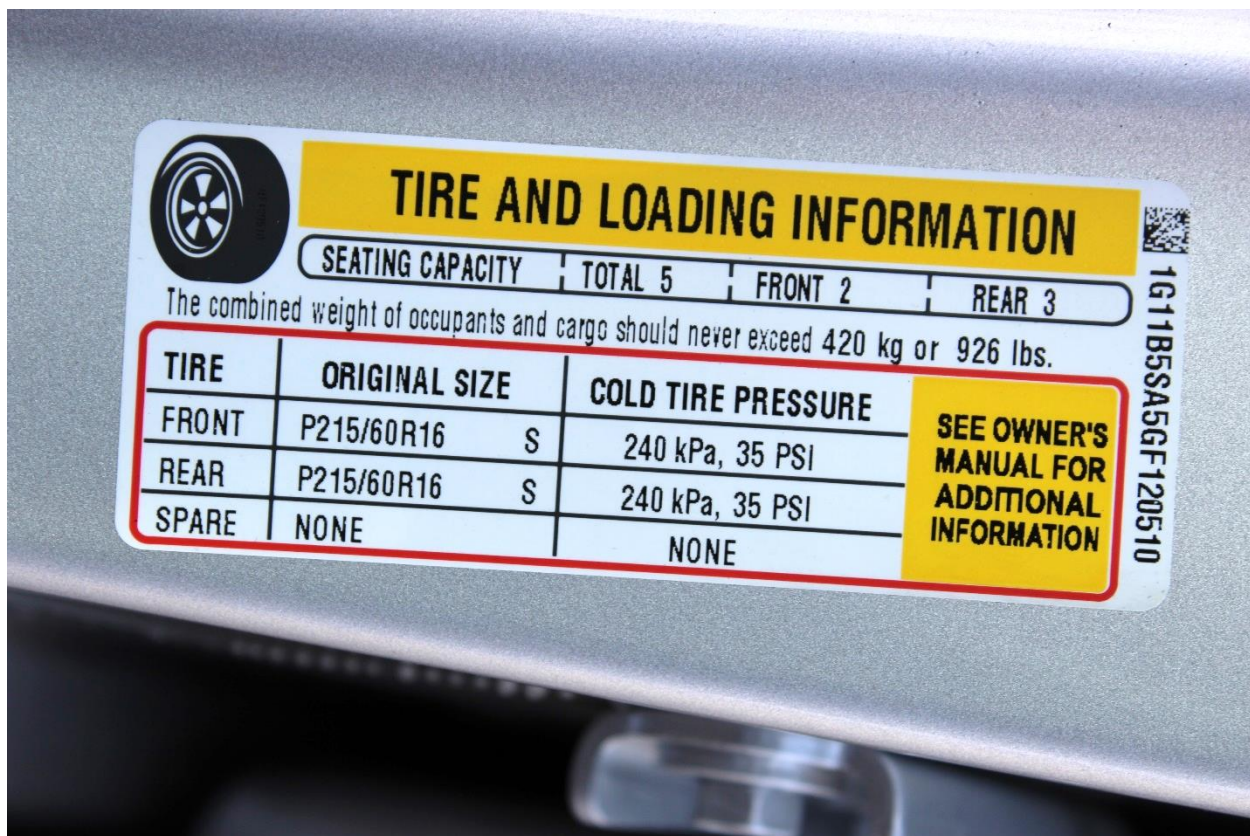


Figure A-4: Tire Placard



Figure A-5: 2016 Chevrolet Malibu Frontal As Delivered



Figure A-6: Left Rear 3/4 View, As Received



Figure A-7: Pre-Test Front View of Test Vehicle



Figure A-8: Post-Test Front View of Test Vehicle



Figure A-9: Pre-Test Left View of Test Vehicle



Figure A-10: Post-Test Left View of Test Vehicle



Figure A-11: Pre-Test Right View of Test Vehicle



Figure A-12: Post-Test Right View of Test Vehicle



Figure A-13: Pre-Test Right Front 3/4 View

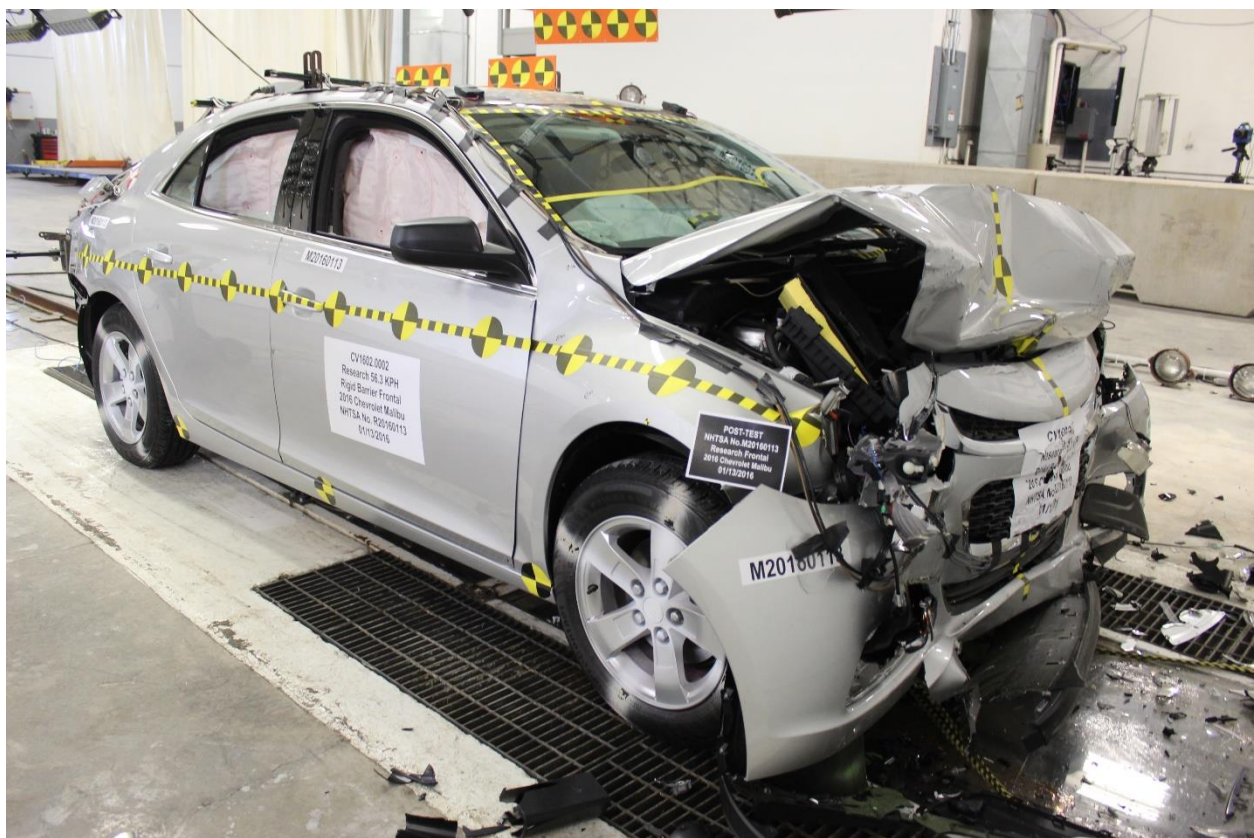


Figure A-14: Post-Test Right Front 3/4 View



Figure A-15: Pre-Test Left Rear 3/4 View



Figure A-16: Post-Test Left Rear 3/4 View



Figure A-17: Pre-Test Windshield View



Figure A-18: Post-Test Windshield View



Figure A-19: Pre-Test Engine Compartment View



Figure A-20: Post-Test Engine Compartment View



Figure A-21: Pre-Test Fuel Filler Cap View



Figure A-22: Post-Test Fuel Filler Cap View

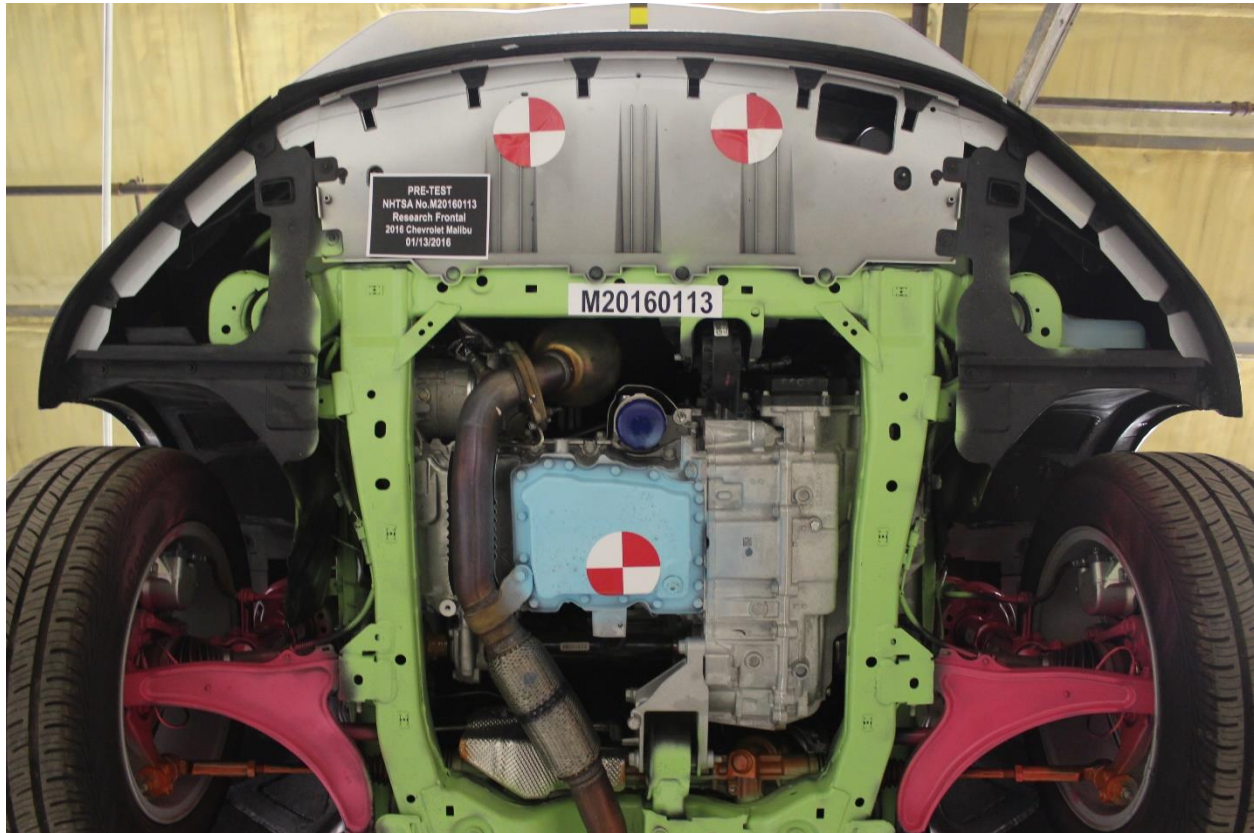


Figure A-23: Pre-Test Front Underbody View



Figure A-24: Post-Test Front Underbody View



Figure A-25: Pre-Test Rear Underbody View



Figure A-26: Post-Test Rear Underbody View



Figure A-27: Pre-Test Dummy Cable Routing

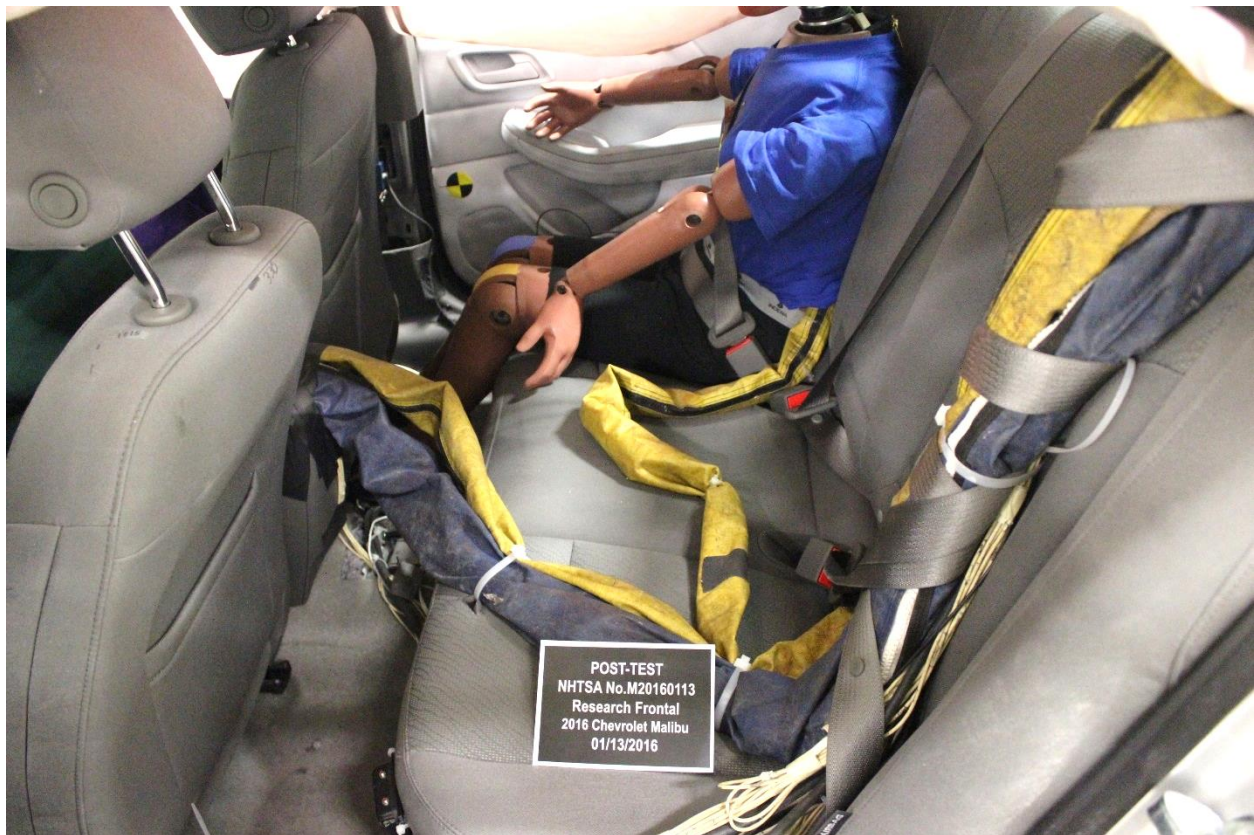


Figure A-28: Post-Test Dummy Cable Routing



Figure A-29: Pre-Test Driver Dummy Front View



Figure A-30: Post-Test Driver Dummy Front View



Figure A-31: Pre-Test Driver Dummy Window View



Figure A-32: Post-Test Driver Dummy Window View



Figure A-33: Pre-Test Driver Dummy and Vehicle Interior View



Figure A-34: Post-Test Driver Dummy and Vehicle Interior View

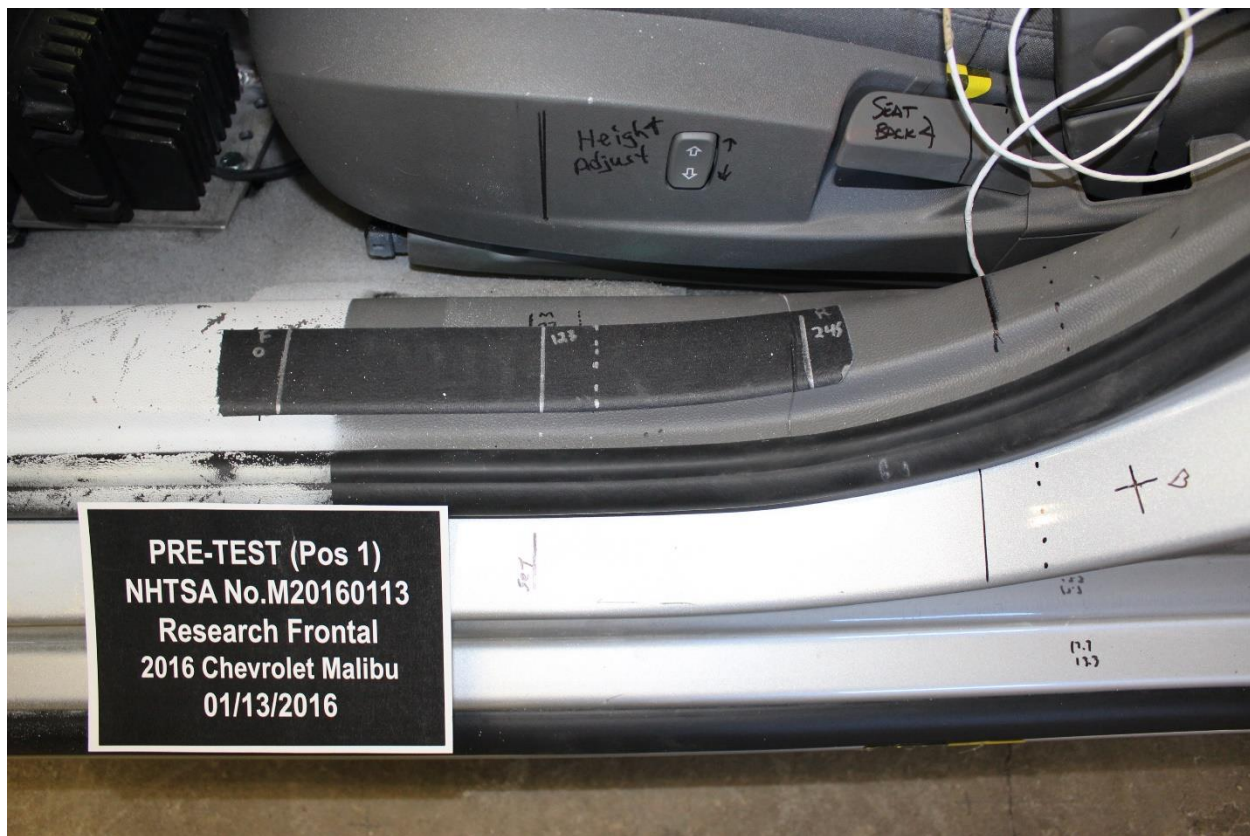


Figure A-35: Pre-Test Driver's Seat Fore-Aft Markings



Figure A-36: Post-Test Driver's Seat Fore-Aft Markings



Figure A-37: Pre-Test View of Belt Anchorage for Driver Dummy



Figure A-38: Post-Test View of Belt Anchorage for Driver Dummy



Figure A-39: Pre-Test Driver Dummy Feet

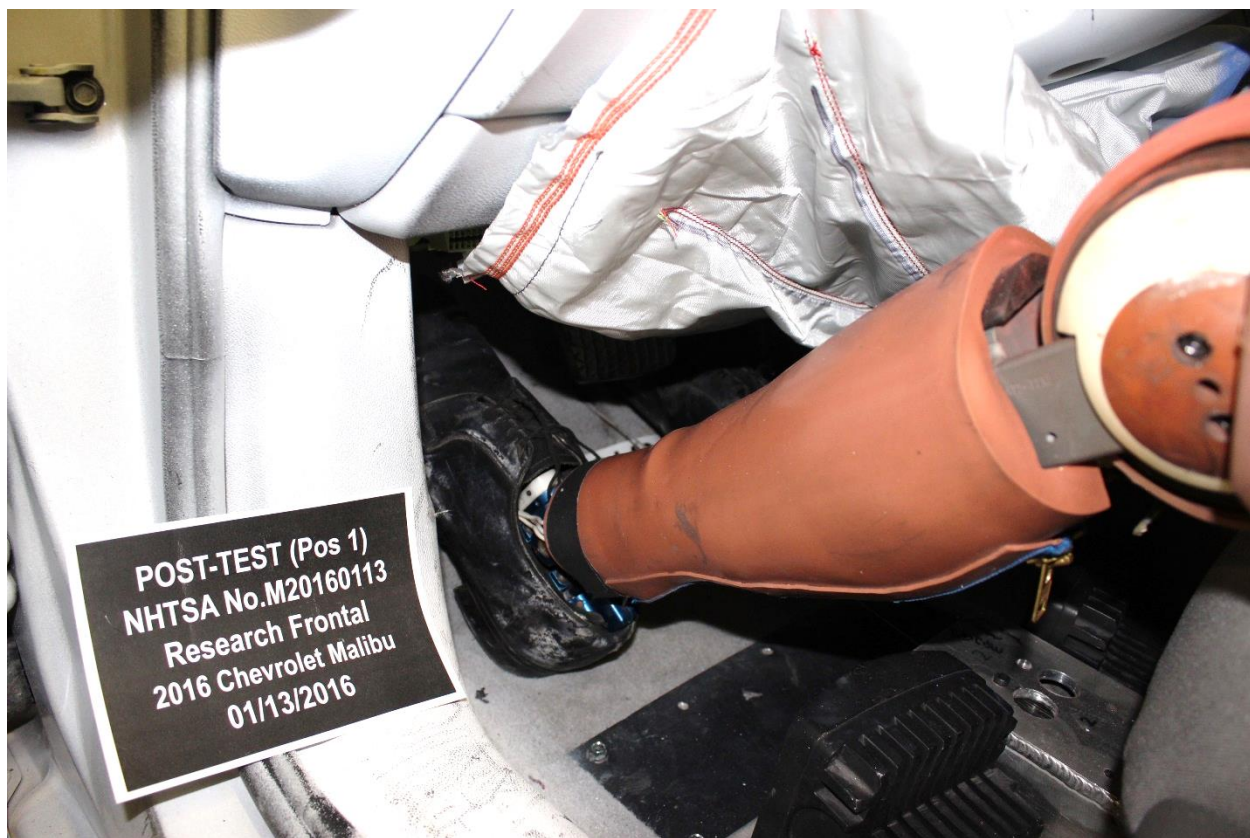


Figure A-40: Post-Test Driver Dummy Feet



Figure A-41: Pre-Test Driver's Side Knee Bolster



Figure A-42: Post-Test Driver's Side Knee Bolster



Figure A-43: Pre-Test Driver's Side Floorpan



Figure A-44: Post-Test Driver's Side Floorpan



Figure A-45: Post-Test Driver Dummy Face

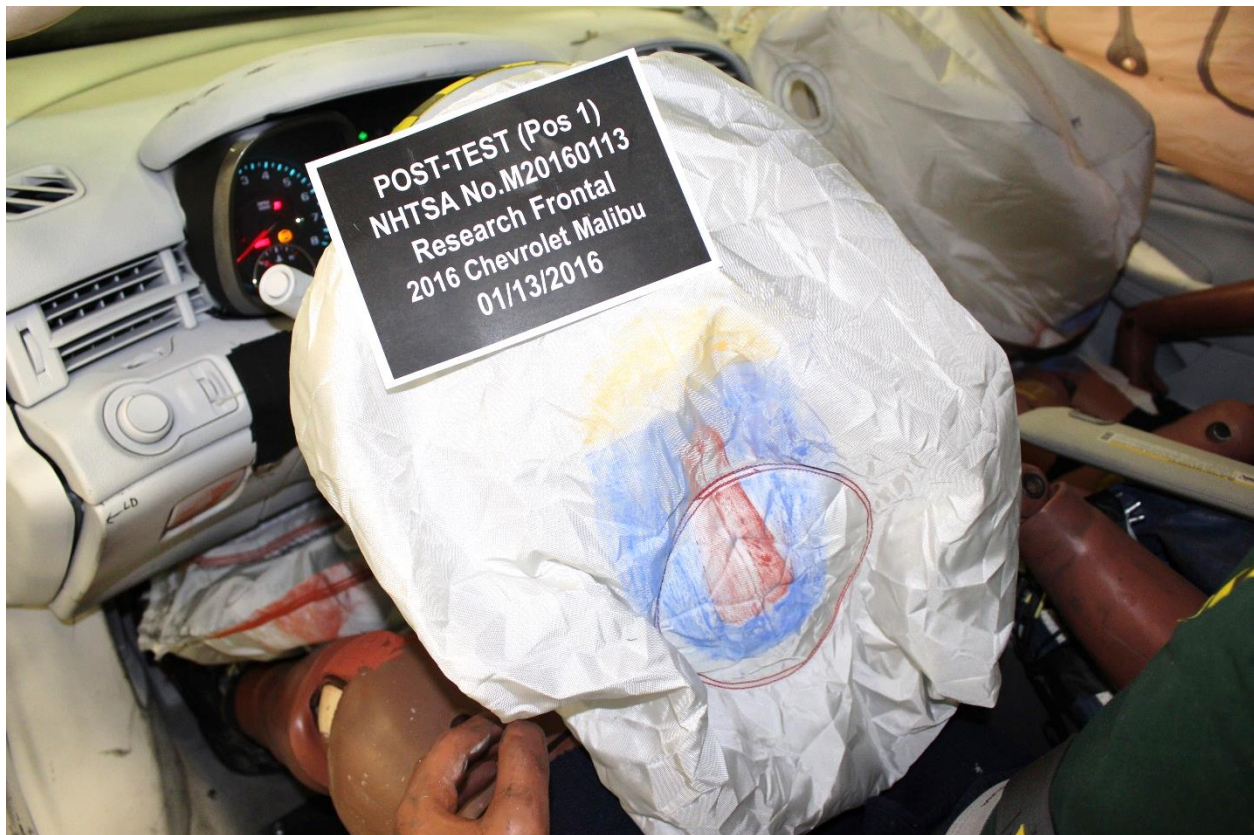


Figure A-46: Post-Test Driver Dummy Contact With Airbag



Figure A-47: Post-Test Driver Dummy Contact With Headrest



Figure A-48: Pre-Test View of the Steering Wheel



Figure A-49: Post-Test View of the Steering Wheel



Figure A-50: Pre-Test Passenger Dummy Front View

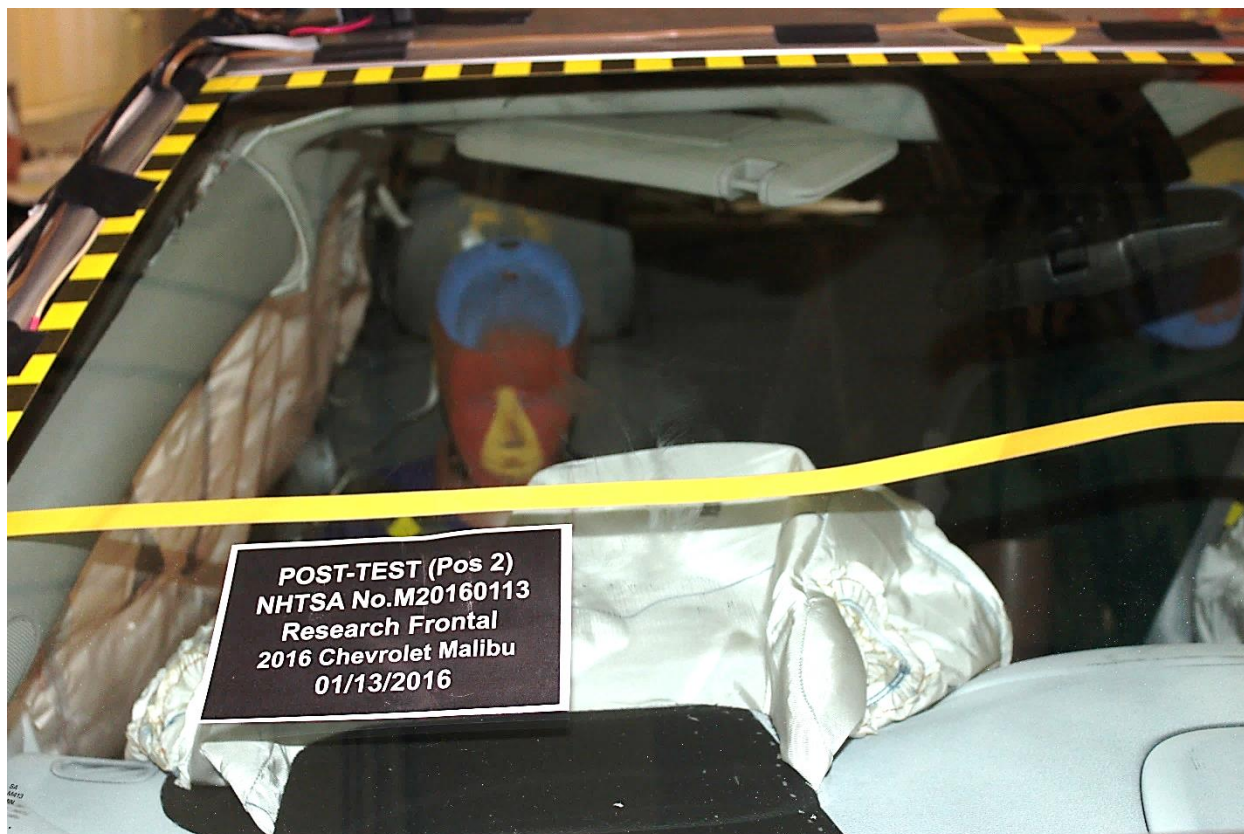


Figure A-51: Post-Test Passenger Dummy Front View



Figure A-52: Pre-Test Passenger Dummy Window View



Figure A-53: Post-Test Passenger Dummy Window View



Figure A-54: Pre-Test Passenger Dummy and Vehicle Interior View



Figure A-55: Post-Test Passenger Dummy and Vehicle Interior View



Figure A-56: Pre-Test Passenger's Seat Fore-Aft Markings

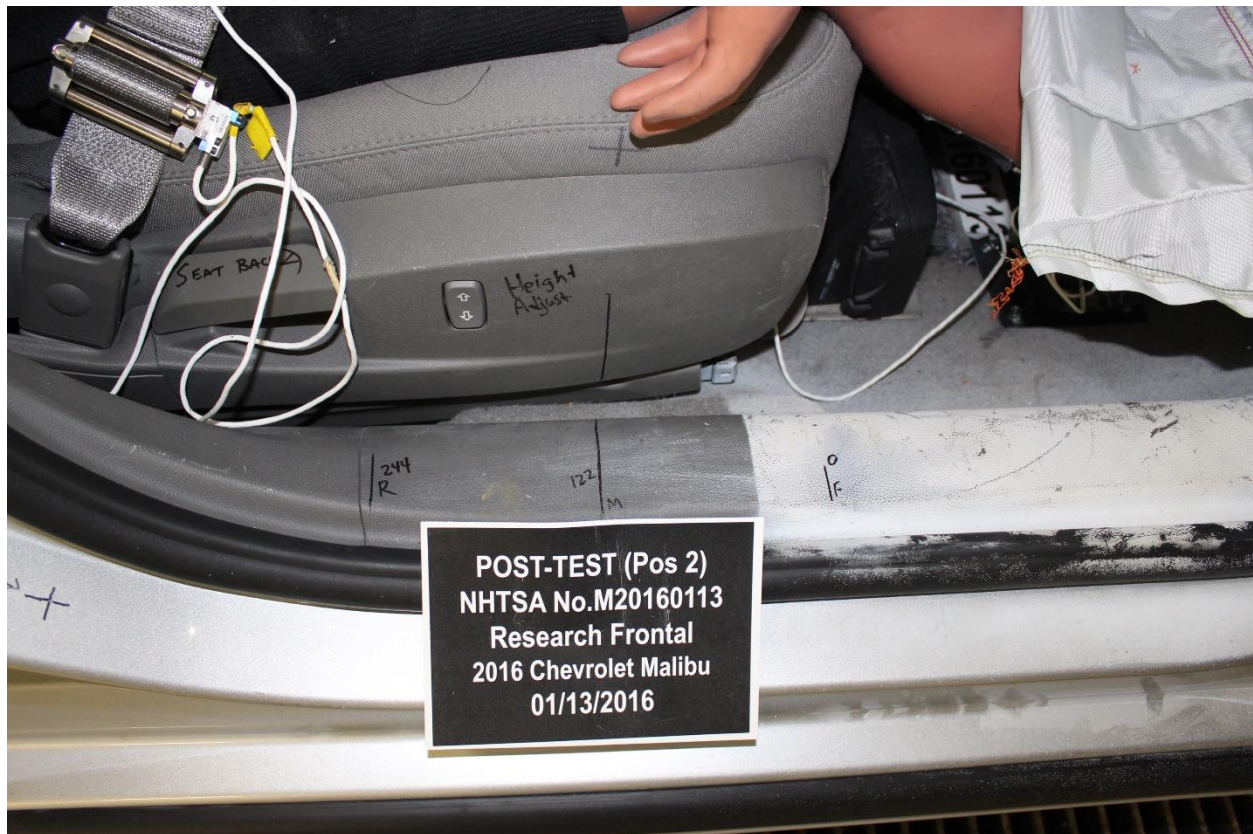


Figure A-57: Post-Test Passenger's Seat Fore-Aft Markings

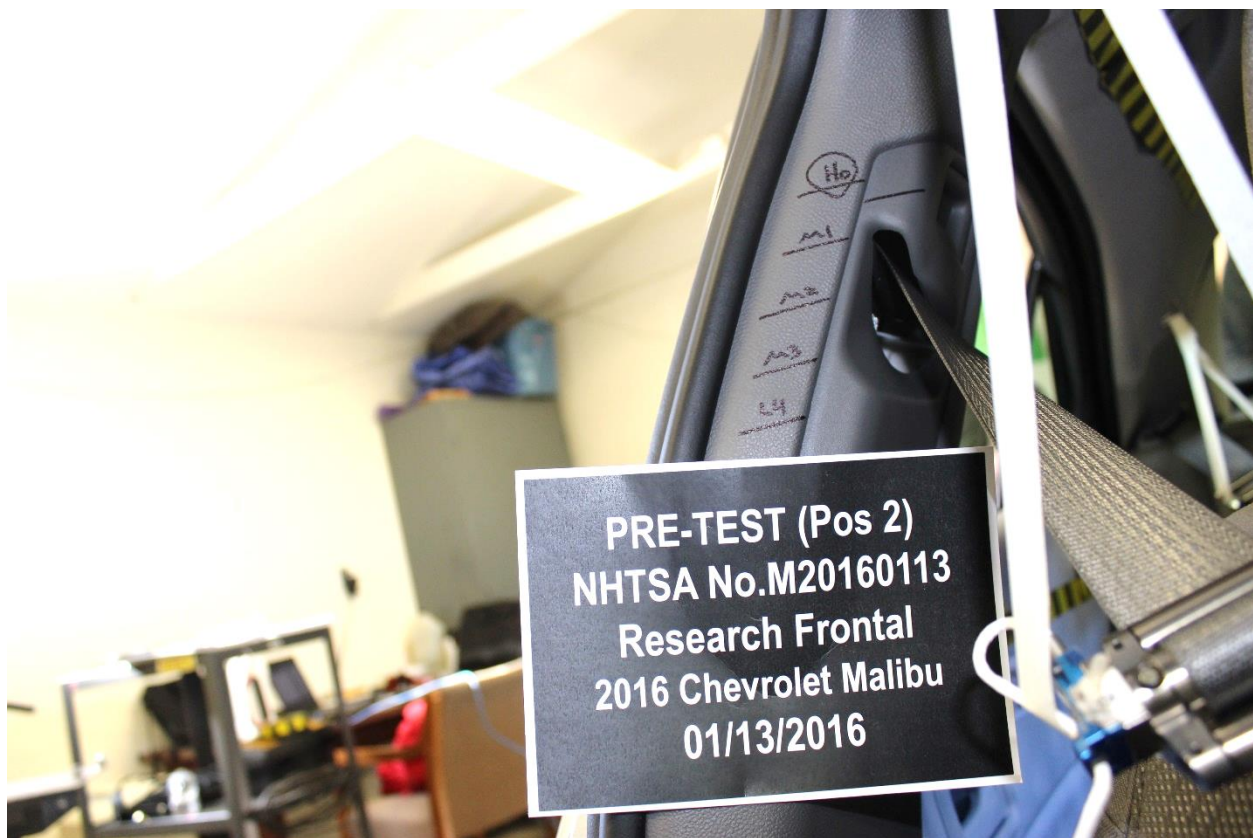


Figure A-58: Pre-Test View of Belt Anchorage for Passenger Dummy



Figure A-59: Post-Test View of Belt Anchorage for Passenger Dummy



Figure A-60: Pre-Test Passenger Dummy Feet



Figure A-61: Post-Test Passenger Dummy Feet



Figure A-62: Pre-Test Passenger's Side Knee Bolster



Figure A-63: Post-Test Passenger's Side Knee Bolster



Figure A-64: Pre-Test Passenger's Side Floorpan

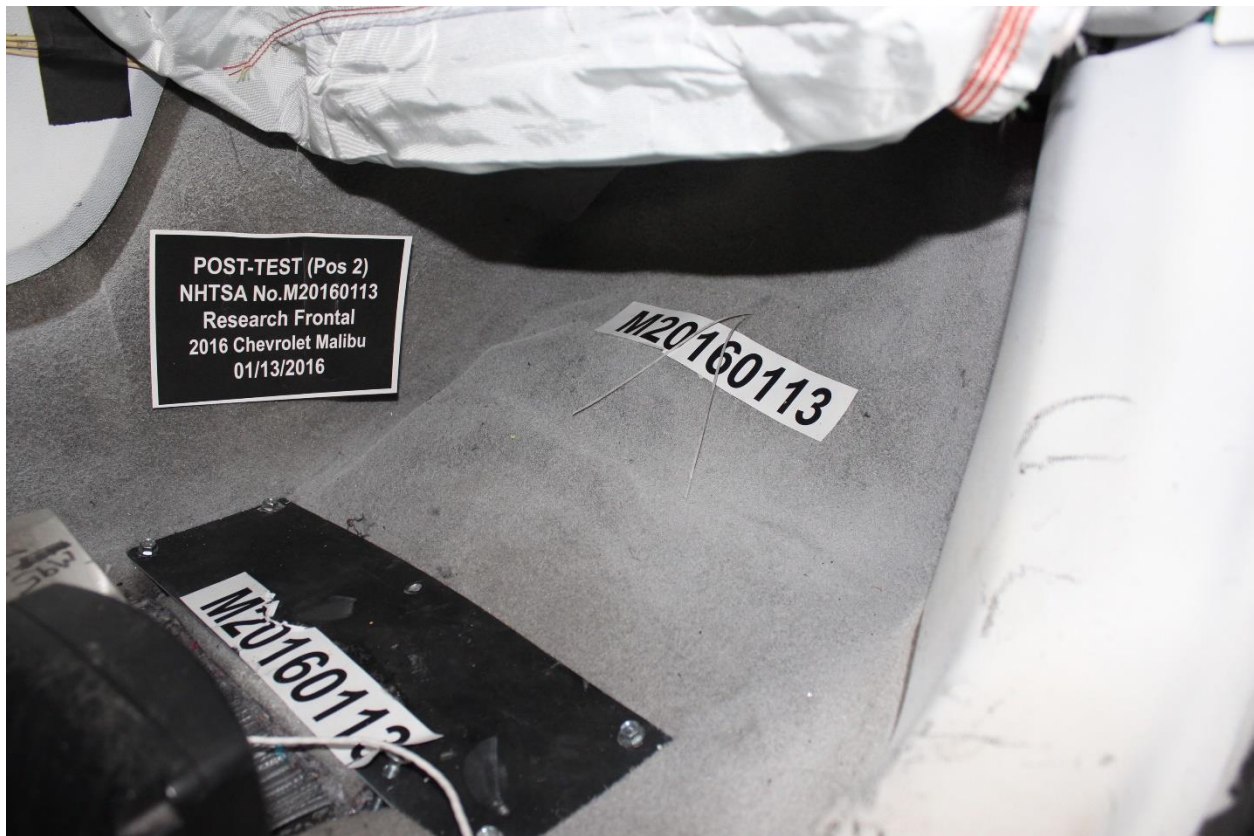


Figure A-65: Post-Test Passenger's Side Floorpan



Figure A-66: Post-Test Passenger Dummy Face



Figure A-67: Post-Test Passenger Dummy Contact With Airbag



Figure A-68: Post-Test Passenger Dummy Contact With Headrest



Figure A-69: Photograph of Ballast Installed in Vehicle

Photo Not Applicable

Figure A-70: Post-Test Stoddard Solvent Spillage Location View, If Required



Figure A-71: Post-Test Speed Trap Read-Out



Figure A-72: Vehicle at 0° on Static Rollover Device

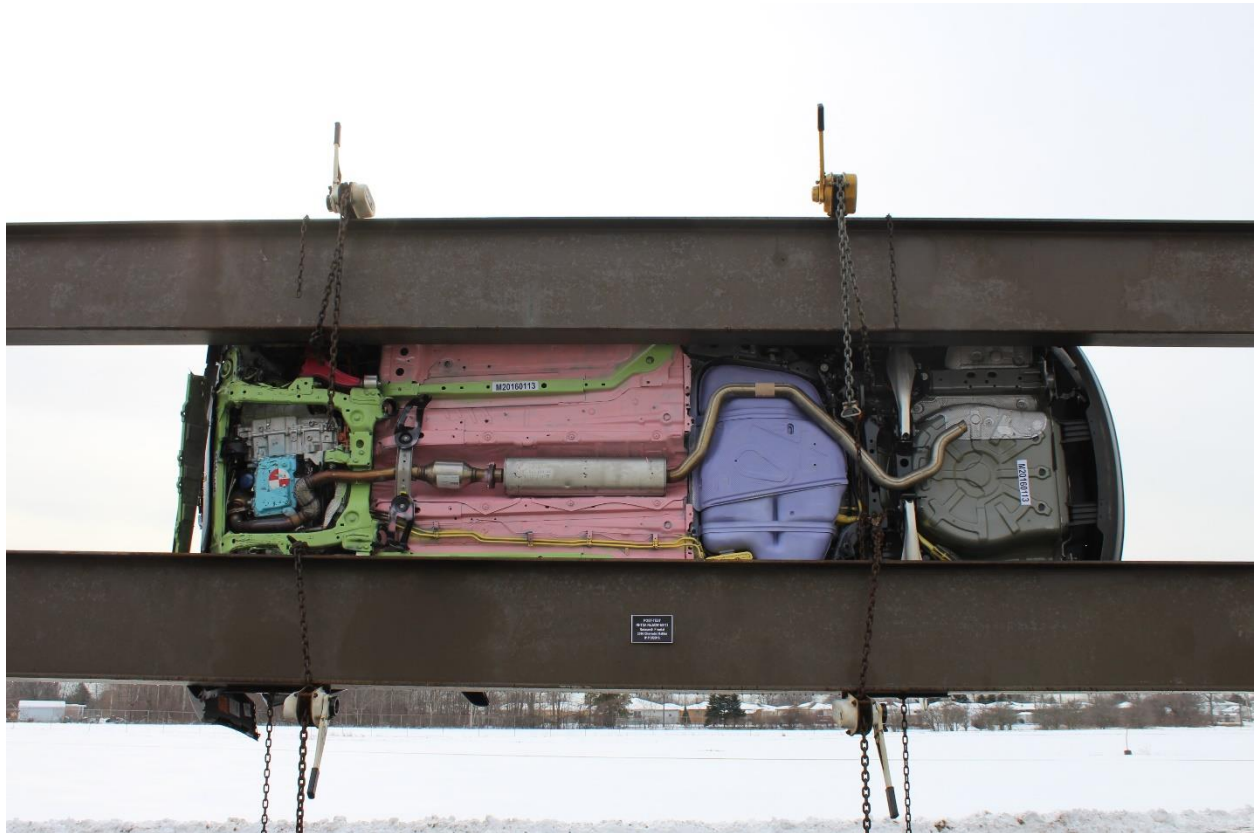


Figure A-73: Vehicle at 90° on Static Rollover Device



Figure A-74: Vehicle at 180° on Static Rollover Device



Figure A-75: Vehicle at 270° on Static Rollover Device



Figure A-76: Vehicle at 360° on Static Rollover Device



Figure A-77: 2015 Chevrolet Malibu Frontal Impact Event

CHEVROLET

2016 MALIBU LIMITED 1LS

EXTERIOR: SILVER ICE METALLIC
INTERIOR: JET BLACK / TITANIUM

ENGINE, ECOTEC 2.5L DOHC
TRANSMISSION, 6-SPD AUTOMATIC

STANDARD EQUIPMENT

ITEMS LISTED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE (SVP).

- CHEVROLET COMPLETE CARE
- SEE WWW.CHEVY.COM OR DEALER FOR TERMS, DETAILS & LIMITS
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- 4-WHEEL TIRE ROTATION
- 27 POINT INSPECTION
- 3 YR/36,000 MILES BUMPER-TO-BUMPER WARRANTY
- 5 YR/60,000 MILES POWERTRAIN LIMITED WARRANTY
- ROADSIDE ASSISTANCE
- COURTESY TRANSPORTATION

MECHANICAL

- ENGINE, ECOTEC 2.5L DOHC
- 4-CYL DI VVT, INTAKE VVL & AUTO STOP/START
- TAPSHIFT MANUAL SHIFT CONTROL
- POWER STEERING, ELECTRIC
- CRUISE CONTROL

SAFETY & SECURITY

- AIRBAGS, DRIVER & PASSENGER
- FRONTAL AND KNEE
- FRT/RR HEAD CURTAIN & SIDE
- STABILITRAK-STABILITY CONTROL SYSTEM W/ TRACTION CONTROL
- ANTILOCK BRAKE SYSTEM, 4 WHEEL DISC
- THEFT DETERRENT SYSTEM
- SAFETY BELTS, 3 POINT, ALL SEATING POSITIONS INCLUDING FRONT SAFETY BELT PRETENSIONERS
- CHILD LOCKS, REAR DOORS & WINDOWS
- DAYTIME RUNNING LAMPS
- HEADLAMP CONTROL, AUTO ON/OFF
- TIRE PRESSURE MONITOR SYSTEM
- TIRE REPAIR KIT

EXTERIOR

- DURALIFE (TM) BRAKE ROTORS
- HEADLAMPS, HALOGEN

INTERIOR

- POWER WINDOWS, FRONT & REAR WITH EXPRESS DOWN
- POWER DOOR LOCKS W/ REMOTE KEYLESS ACCESS
- FRONT BUCKET SEATS
- SEAT ADJUSTER, DRIVER 4-WAY MANUAL, 2-WAY POWER VERTICAL
- SEAT ADJUSTER, FRONT PASSENGER 4-WAY MANUAL
- 2-WAY POWER VERTICAL STEERING COLUMN, TILT & TELESCOPIC
- STEERING WHEEL CONTROLS, AUDIO AND CRUISE
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TOTAL OPTIONS	\$0.00
TOTAL VEHICLE & OPTIONS	\$22,565.00
DESTINATION CHARGE	\$25.00
TOTAL VEHICLE PRICE*	\$23,390.00

EPA DOT Fuel Economy and Environment

Fuel Economy

27 MPG combined city/hwy

24 city 34 highway

3.7 gallons per 100 miles

Annual fuel cost \$1,650

Fuel Economy & Greenhouse Gas Rating (range only)

1 6 10

Smog Rating (range only)

1 6 10

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 24 MPG and costs \$8,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.30 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

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GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score ★★★★★

Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Crash Type	Driver Passenger	Frontal	Side	Rollover
Frontal Crash	★★★★★	★★★★★	★★★★★	★★★★★
Side Crash	★★★★★	★★★★★	★★★★★	★★★★★
Rollover	★★★★★	★★★★★	★★★★★	★★★★★

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4236

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 65% MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 20%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE: FINAL ASSEMBLY POINT: KANSAS CITY, KS U.S.A. COUNTRY OF ORIGIN: ENGINE: UNITED STATES TRANSMISSION: UNITED STATES

ORDER AND SOURCE: TRAILER CODE: CHASSIS NO. 12000 VIN: 1G11B5SA6G120510 REGISTER CHEVROLET, INC. PO BOX 128 THOMPSONTOWN, PA 17094-0128

UL 1AG2741077

Figure A-78: Monroney Label Photograph



Figure A-79: Pre-Test Rear Passenger Dummy Front view

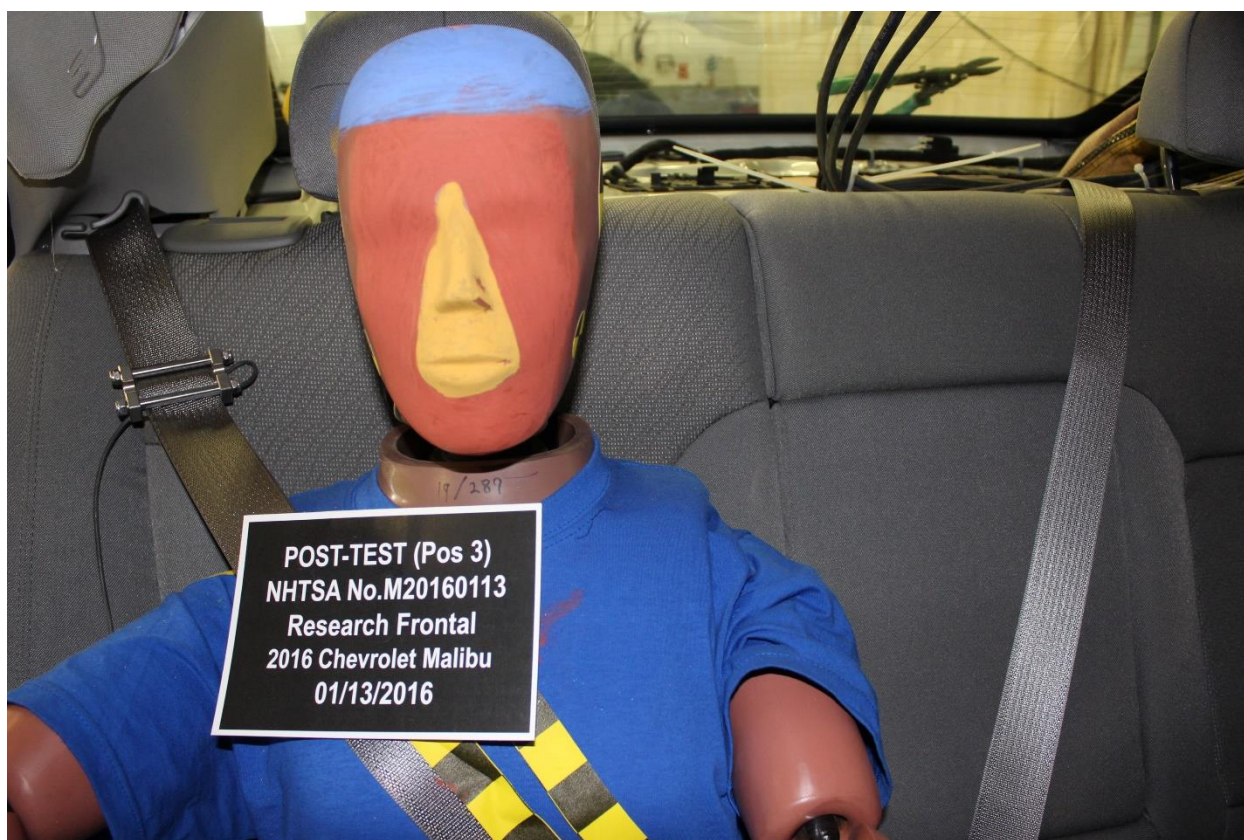


Figure A-80: Post-Test Rear Passenger Dummy Front view



Figure A-81: Pre-Test Rear Passenger Dummy Window View



Figure A-82: Post-Test Rear Passenger Dummy Window View



Figure A-83: Pre-Test Rear Passenger Dummy and Vehicle Interior View



Figure A-84: Post-Test Rear Passenger Dummy and Vehicle Interior View



Figure A-85: Pre-Test Rear Passenger Seat Fore-Aft Markings

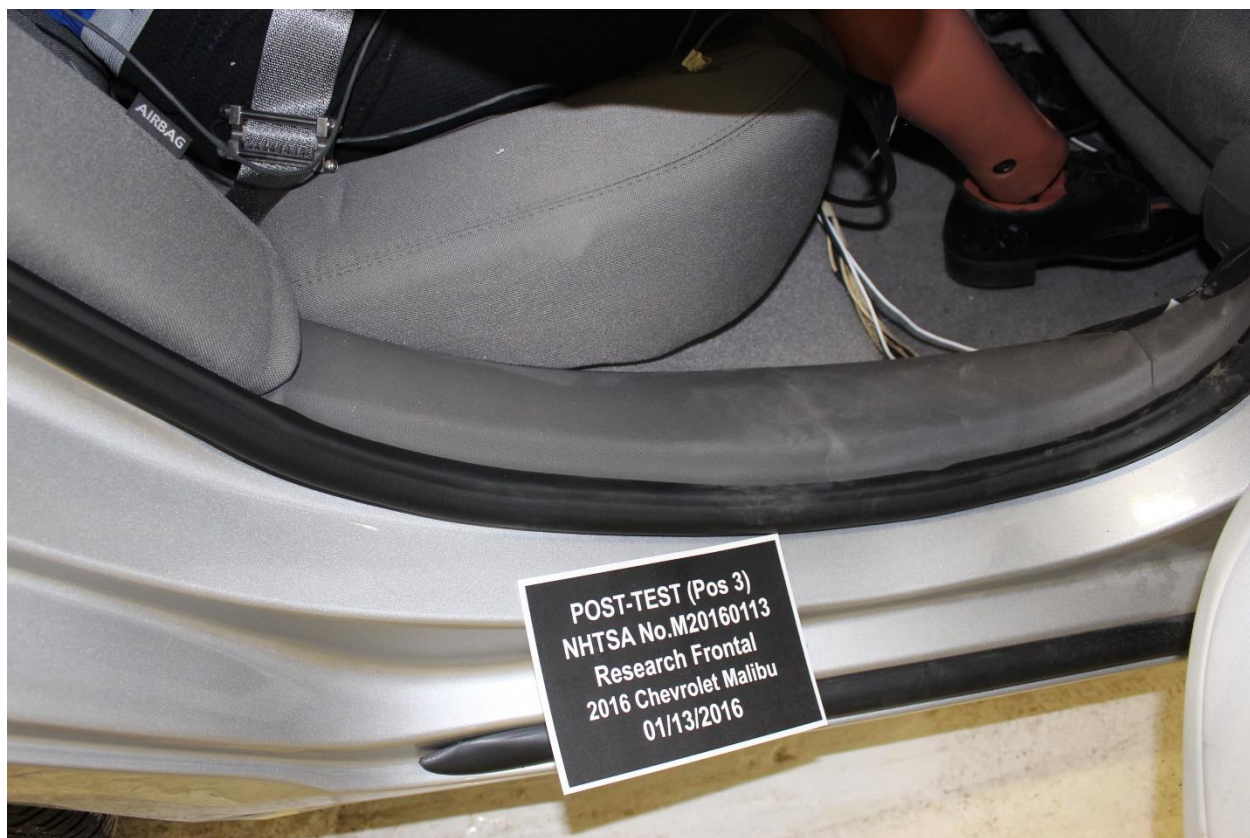


Figure A-86: Post-Test Rear Passenger Seat Fore-Aft Markings



Figure A-87: Pre-Test View of Belt Anchorage for Rear Passenger Dummy



Figure A-88: Post-Test View of Belt Anchorage for Rear Passenger Dummy



Figure A-89: Pre-Test Rear Passenger Dummy Feet



Figure A-90: Post-Test Rear Passenger Dummy Feet



Figure A-91: Pre-Test Rear Passenger Dummy Knee and Seatback View



Figure A-92: Post-Test Rear Passenger Dummy Knee Contact with Seatback



Figure A-93: Pre-Test Rear Passenger's Side Floorpan



Figure A-94: Post-Test Rear Passenger's Side Floorpan



Figure A-95: Post-Test Rear Passenger Dummy Face

Photo Not Applicable

Figure A-96: Post-Test Rear Passenger Dummy Contact with Airbag

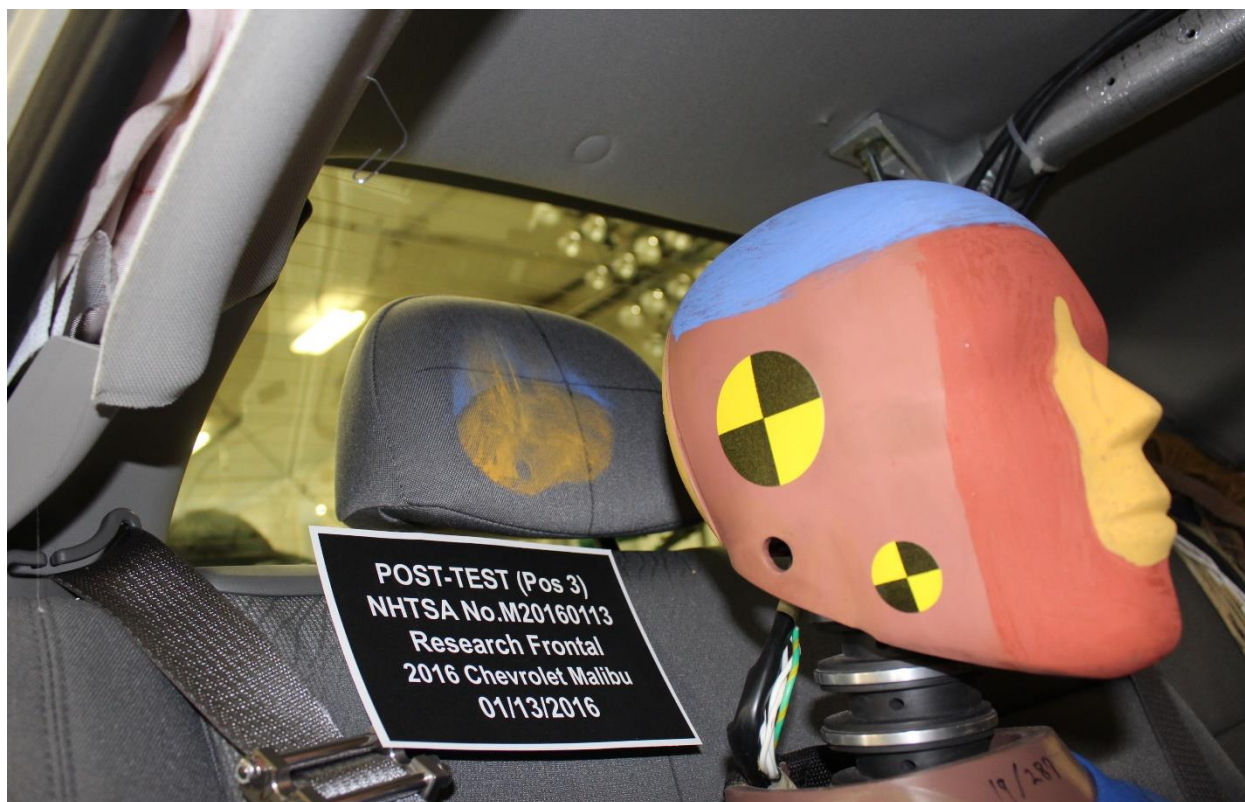


Figure A-97: Post-Test Rear Passenger dummy Contact with Headrest

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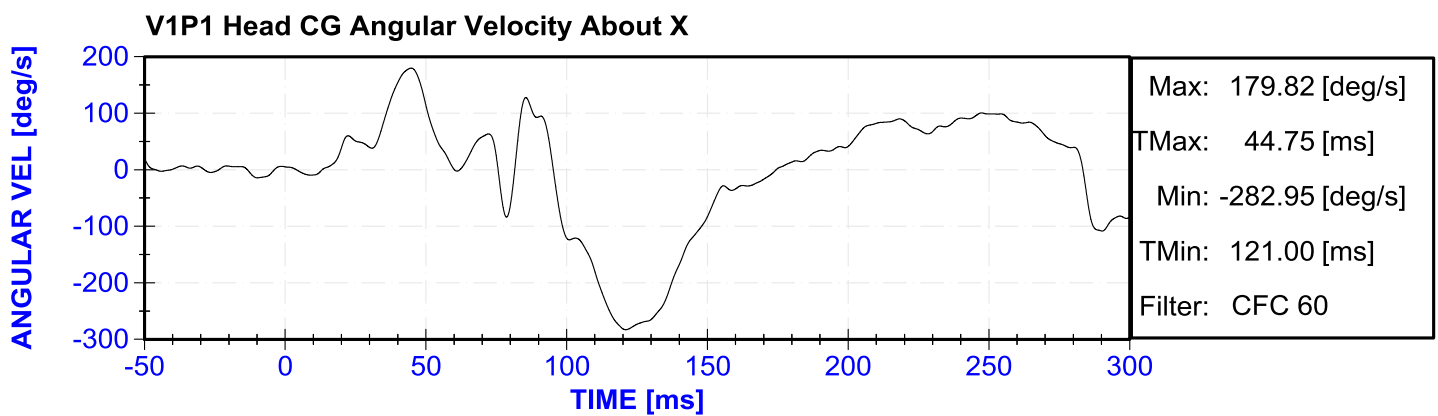
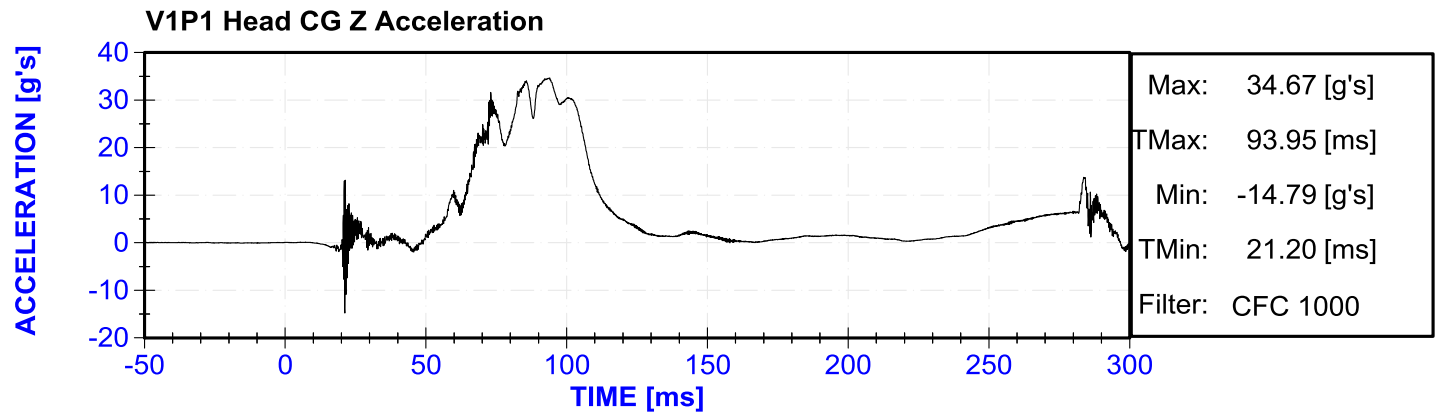
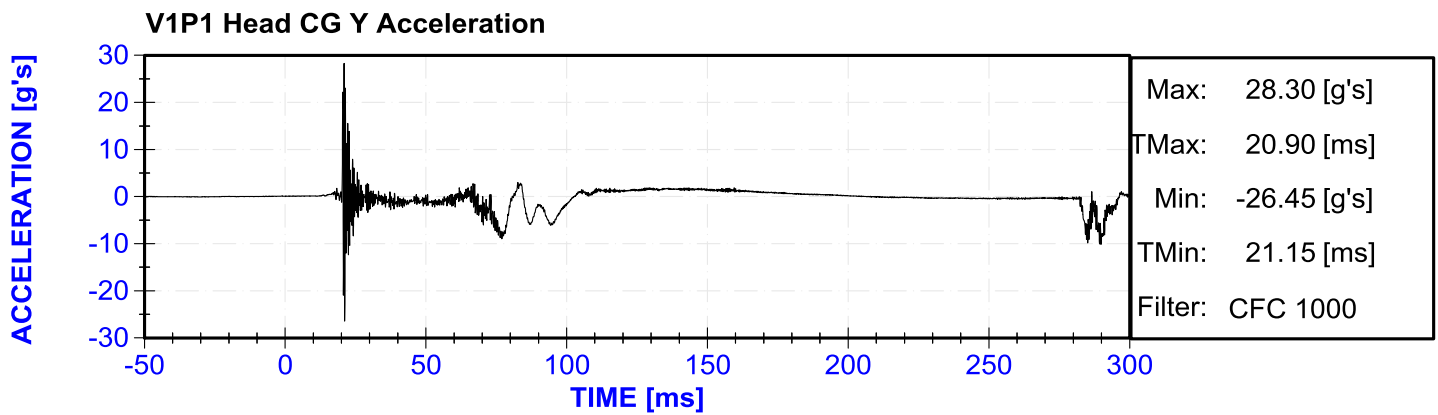
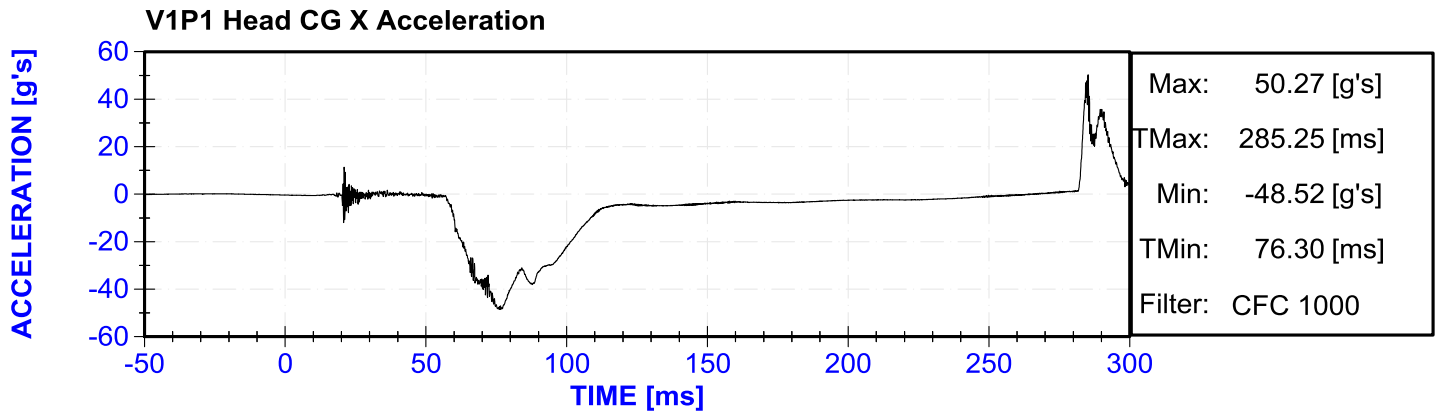
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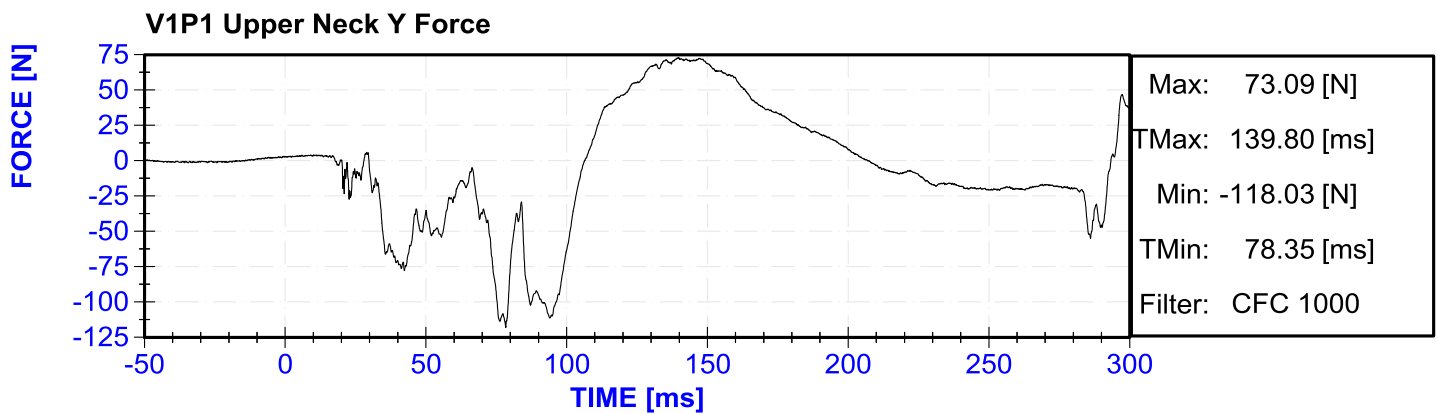
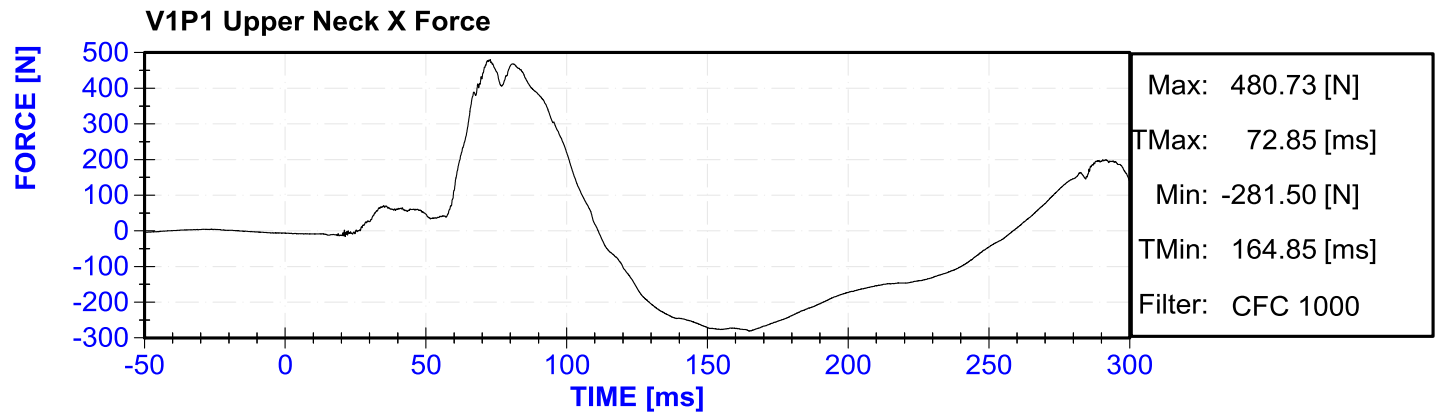
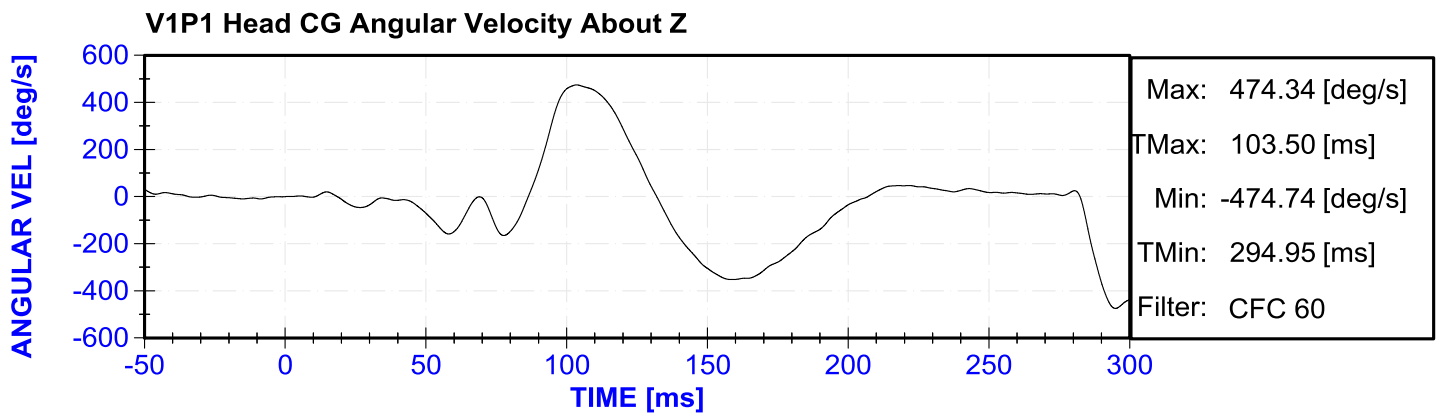
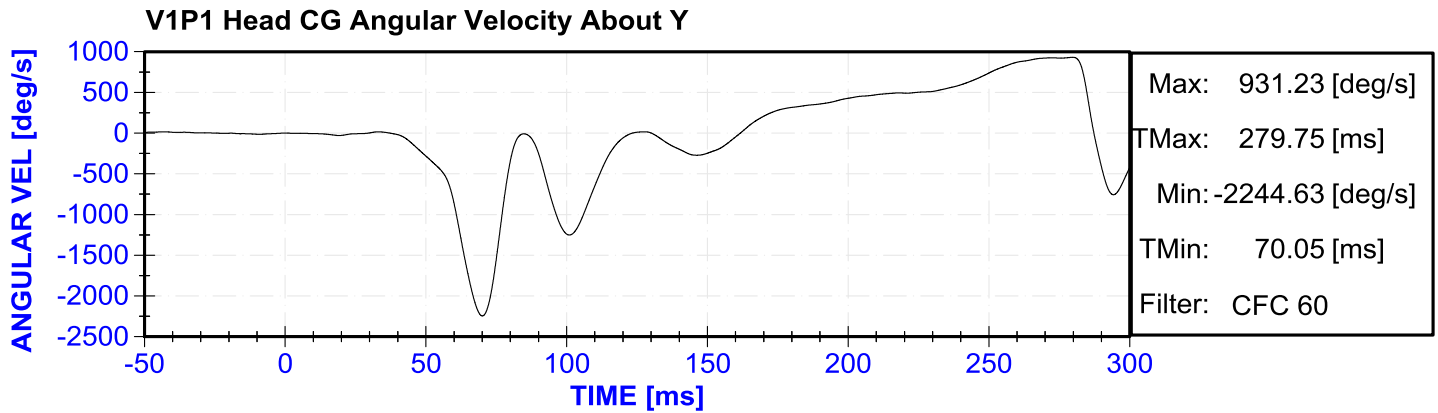
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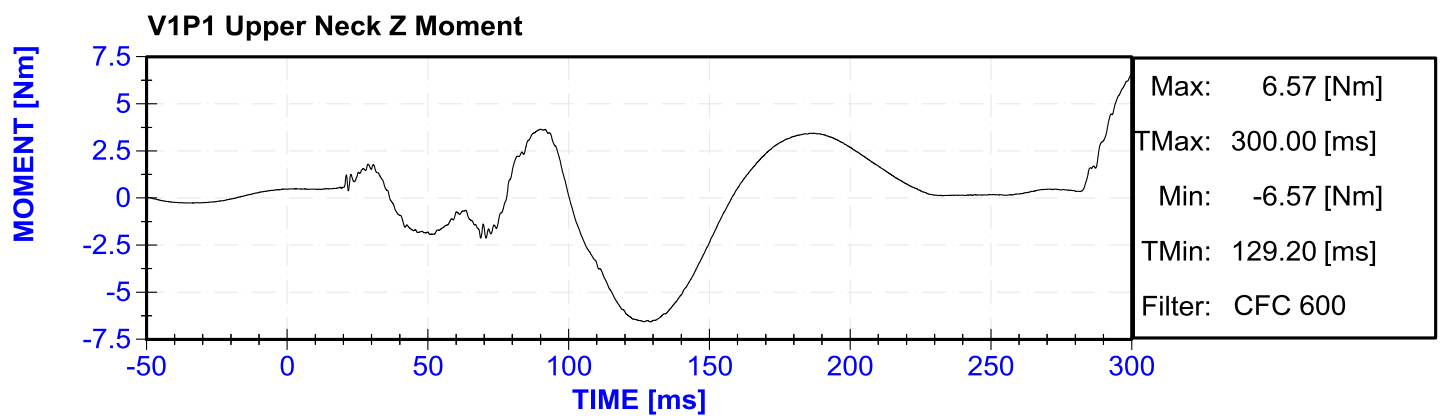
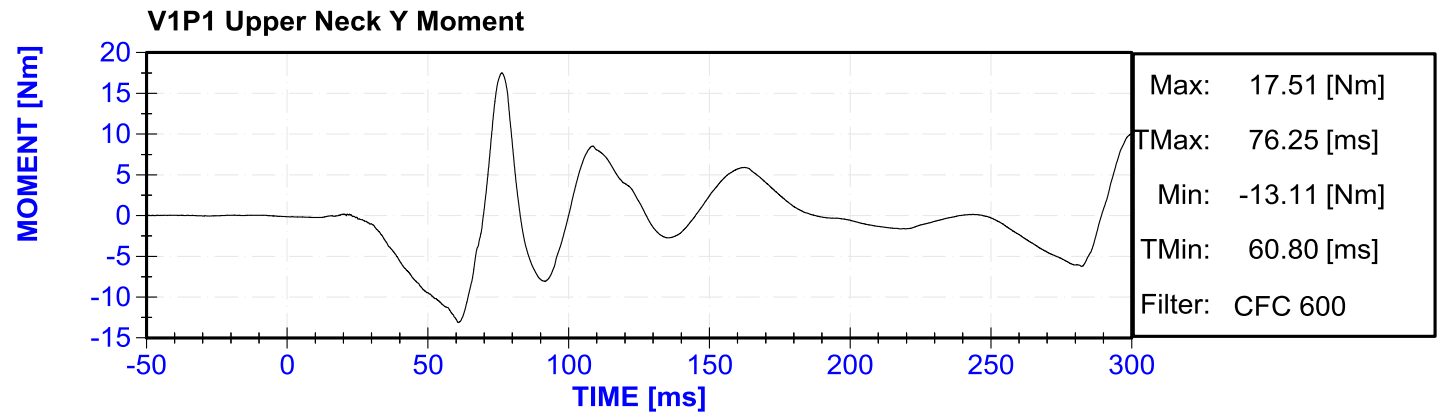
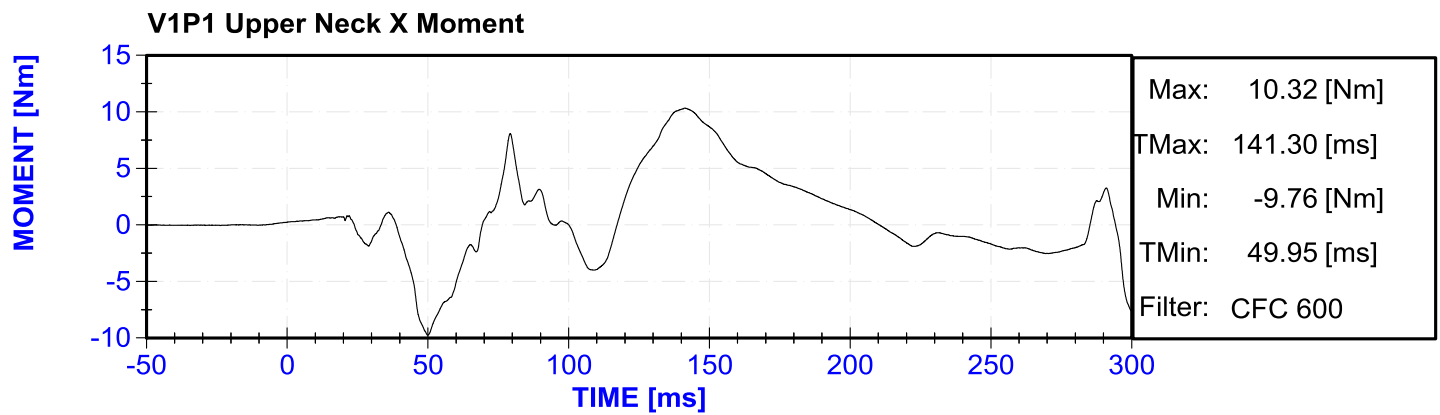
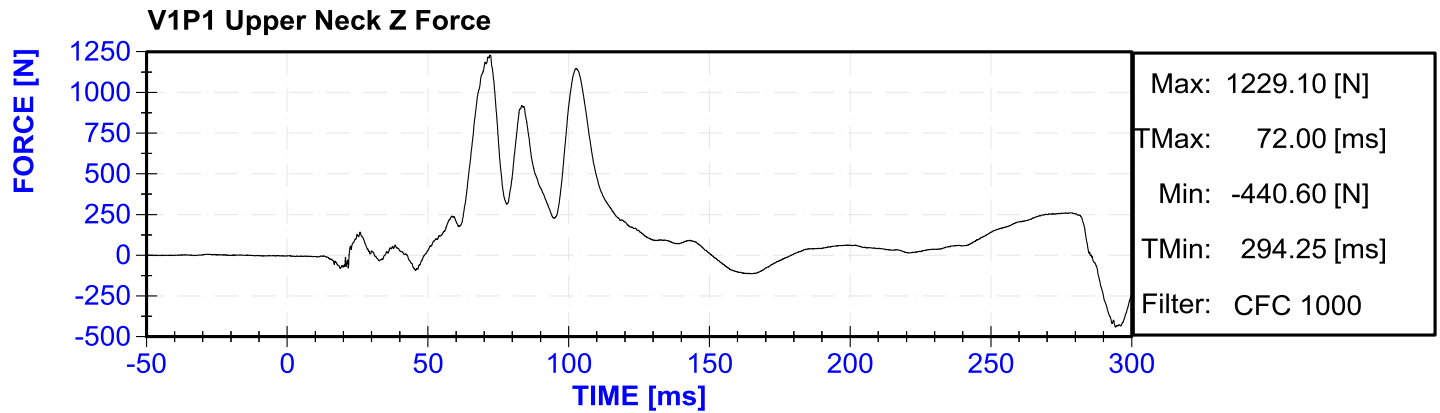
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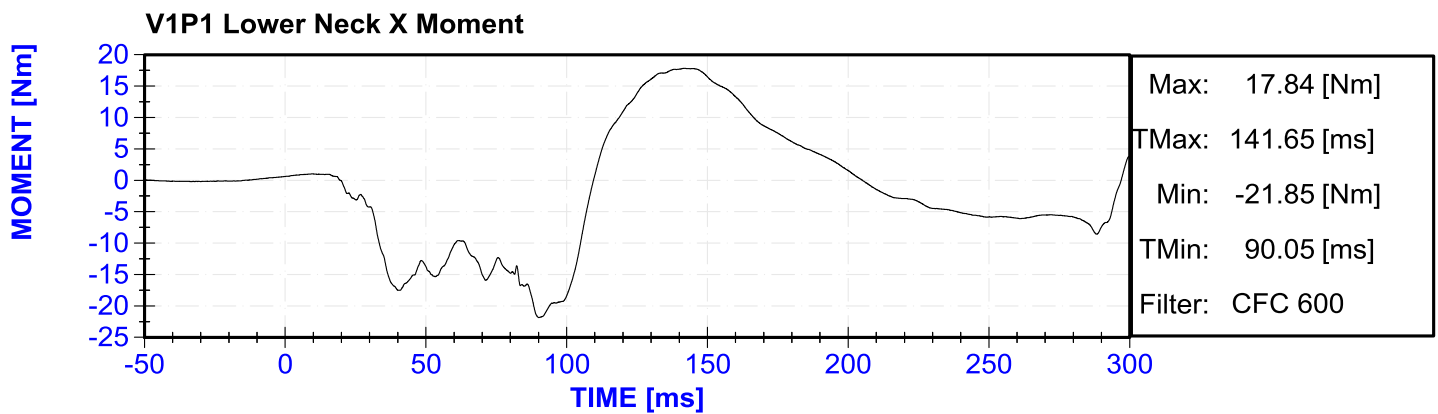
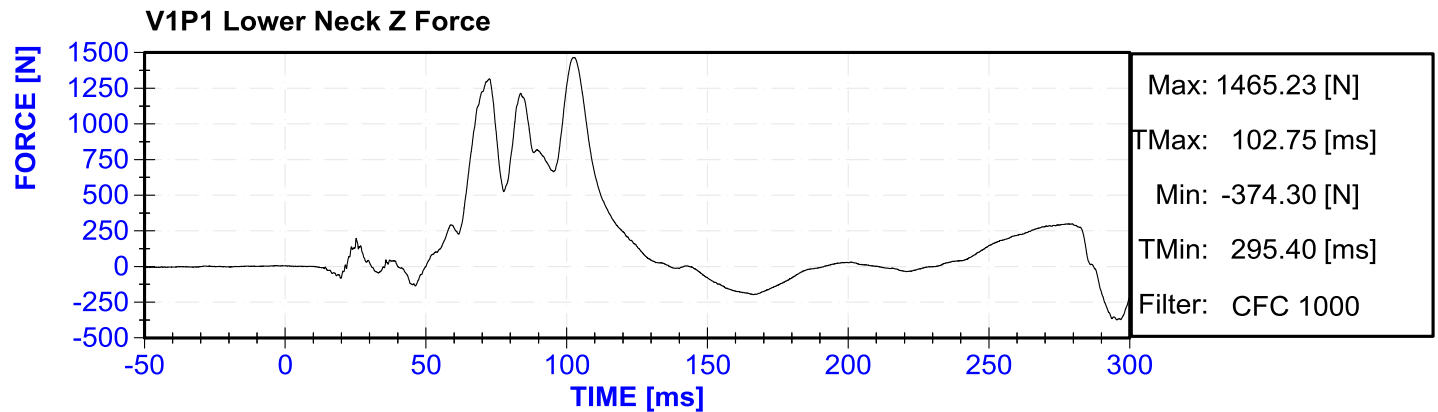
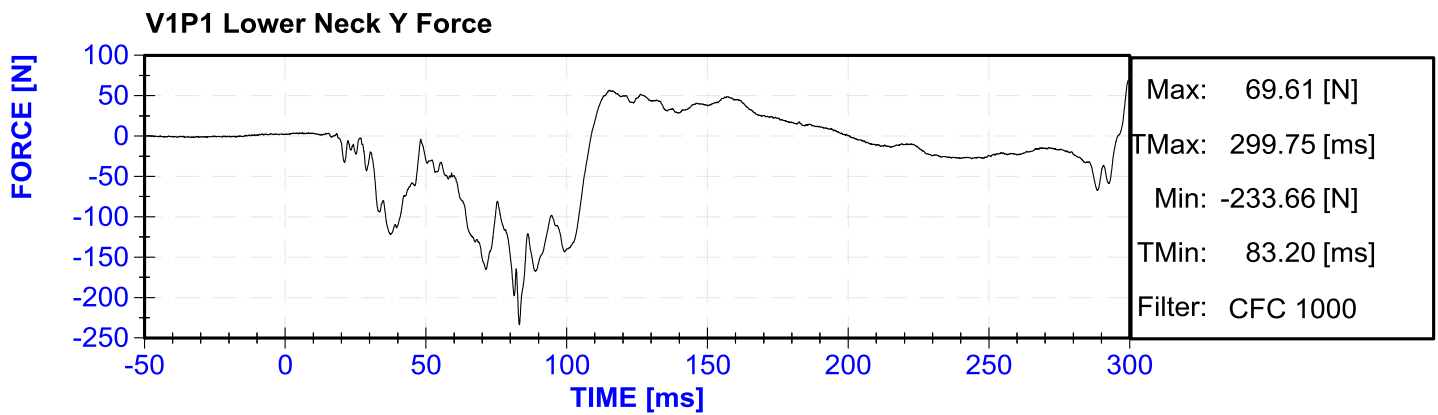
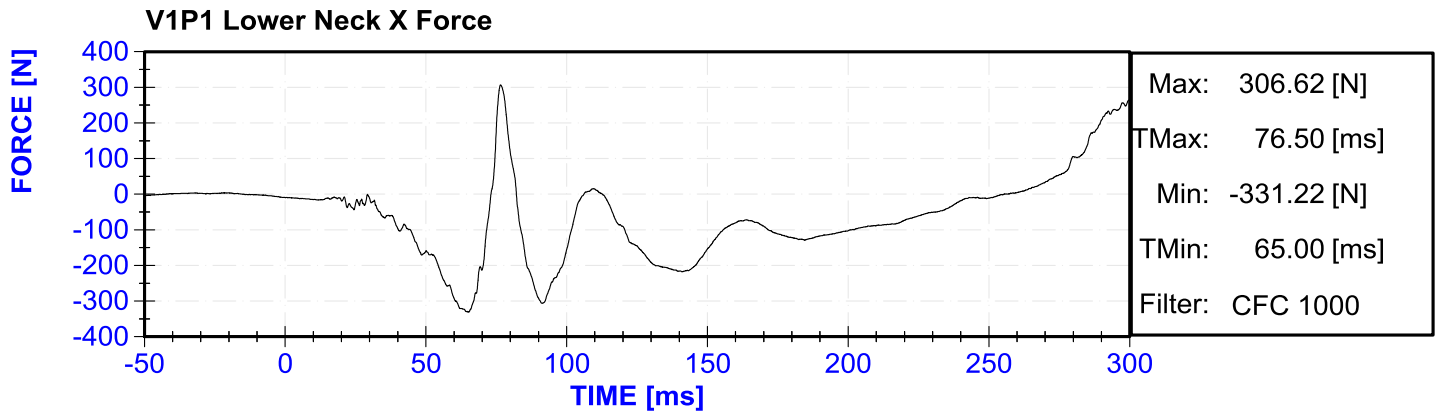
Plot 215	V1P3 Ribs Right 05 X Displacement	B-61
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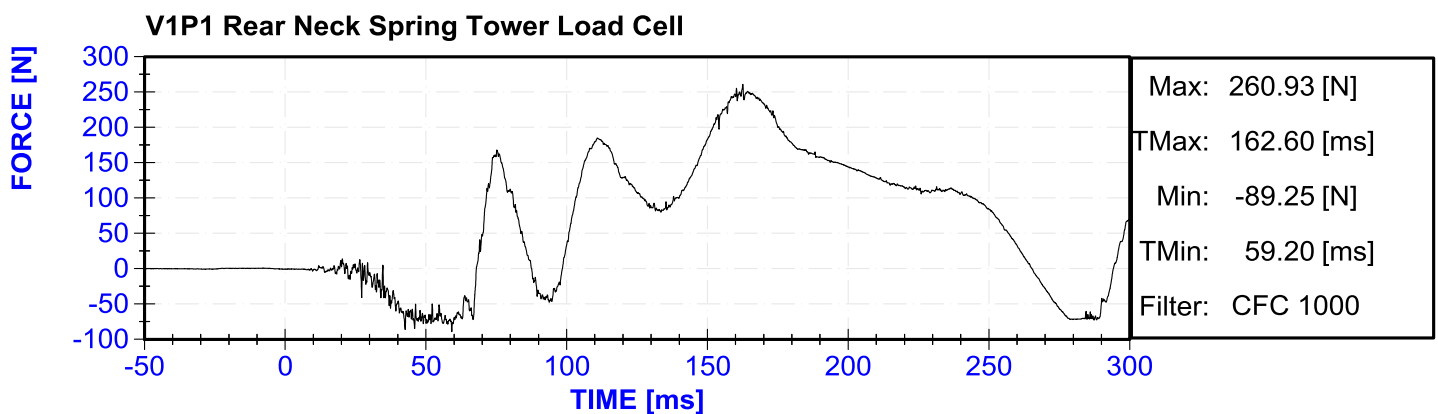
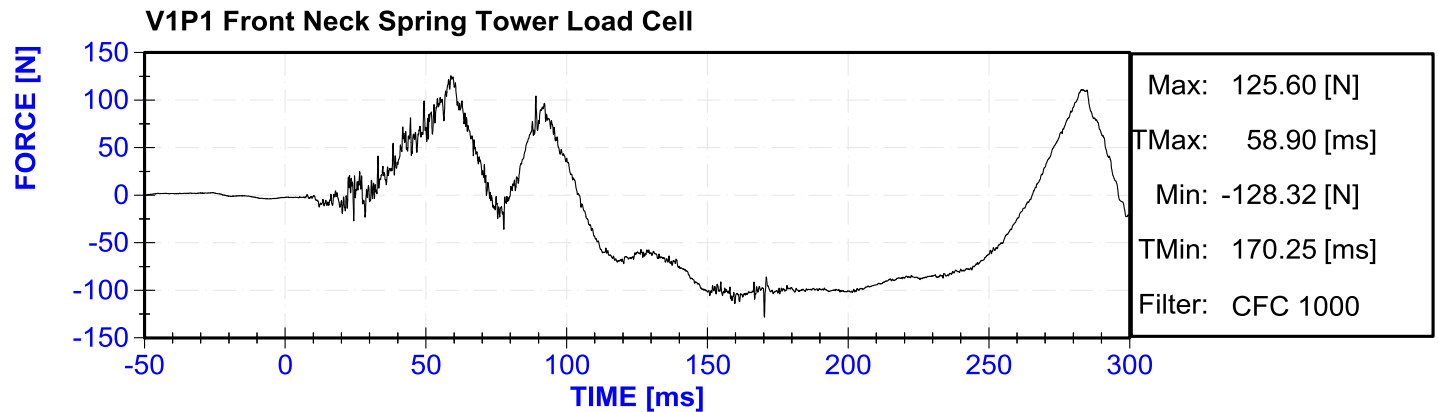
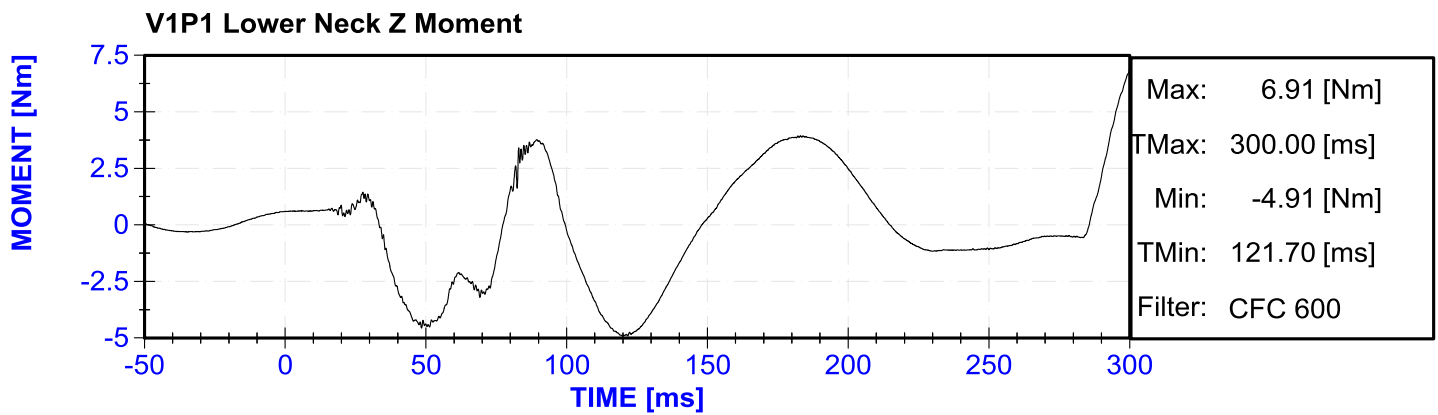
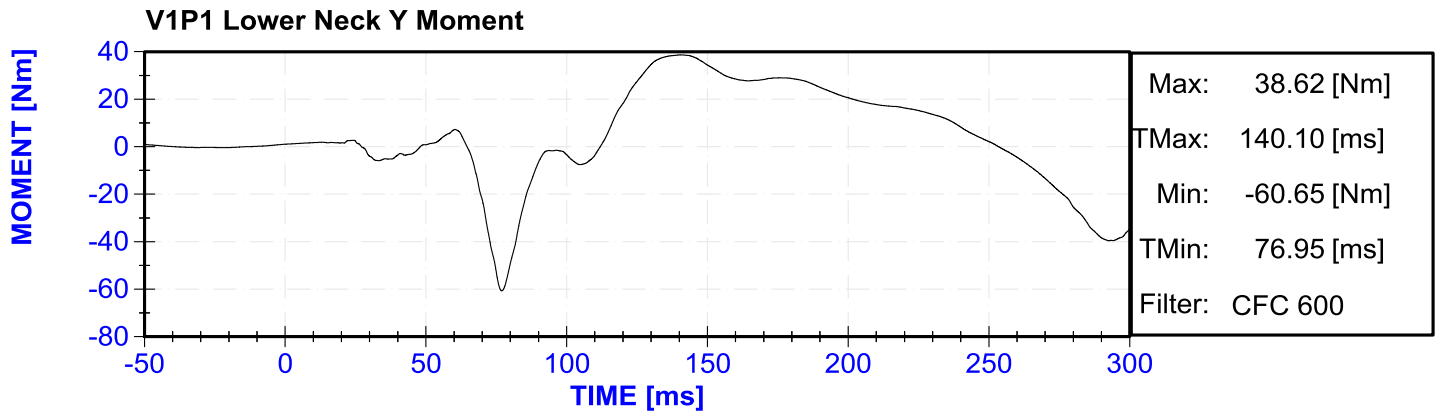
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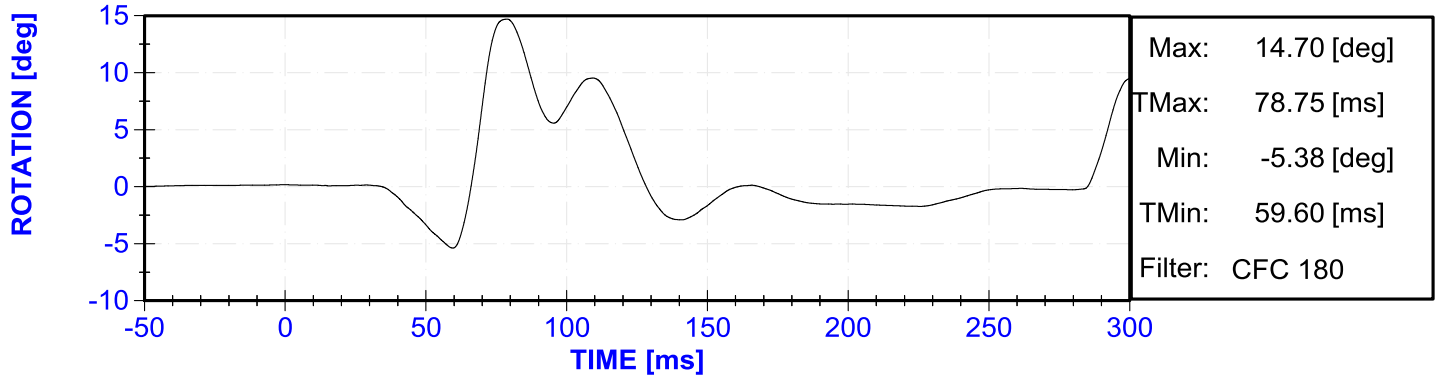




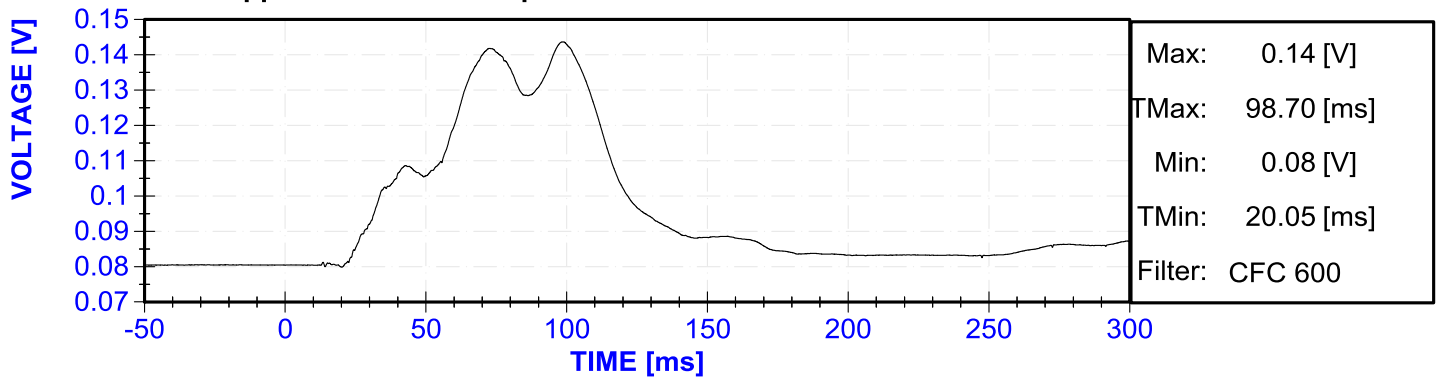




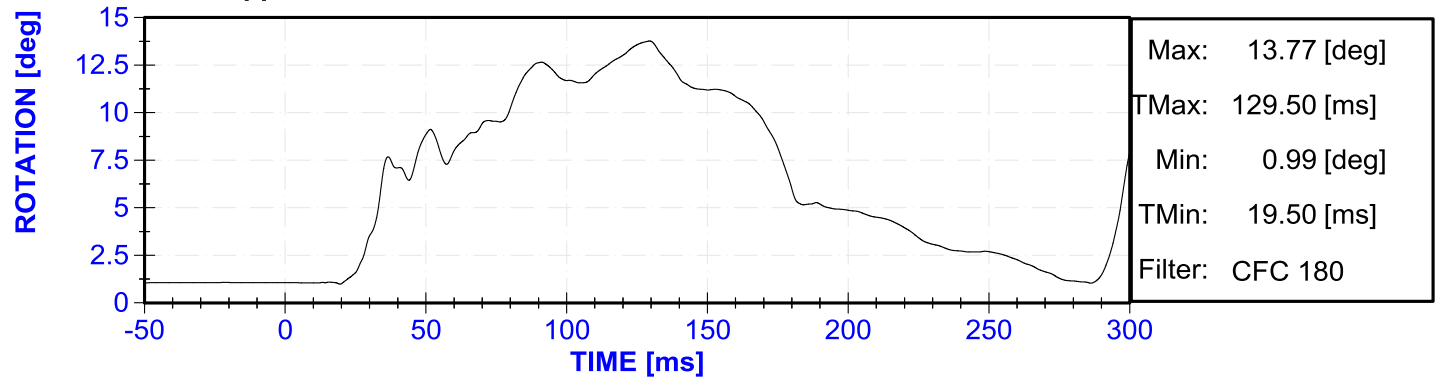
V1P1 Occipital Condyle Rotation Potentiometer



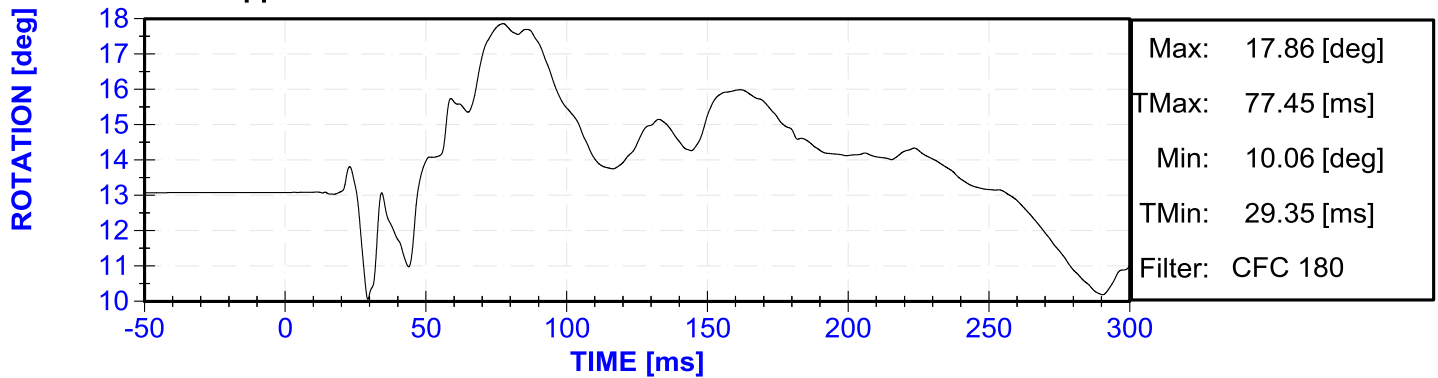
V1P1 Upper Left DGIR X Displacement

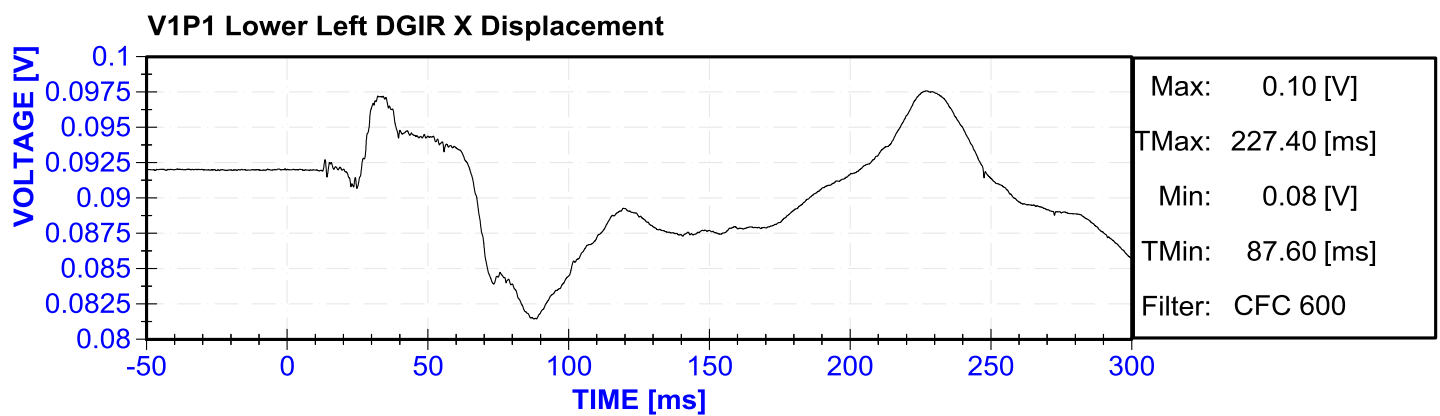
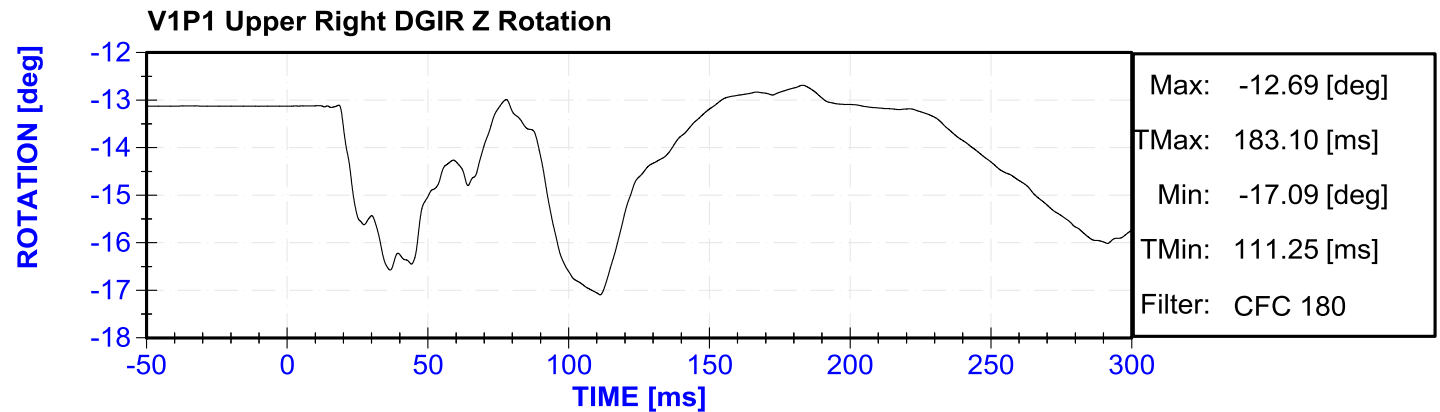
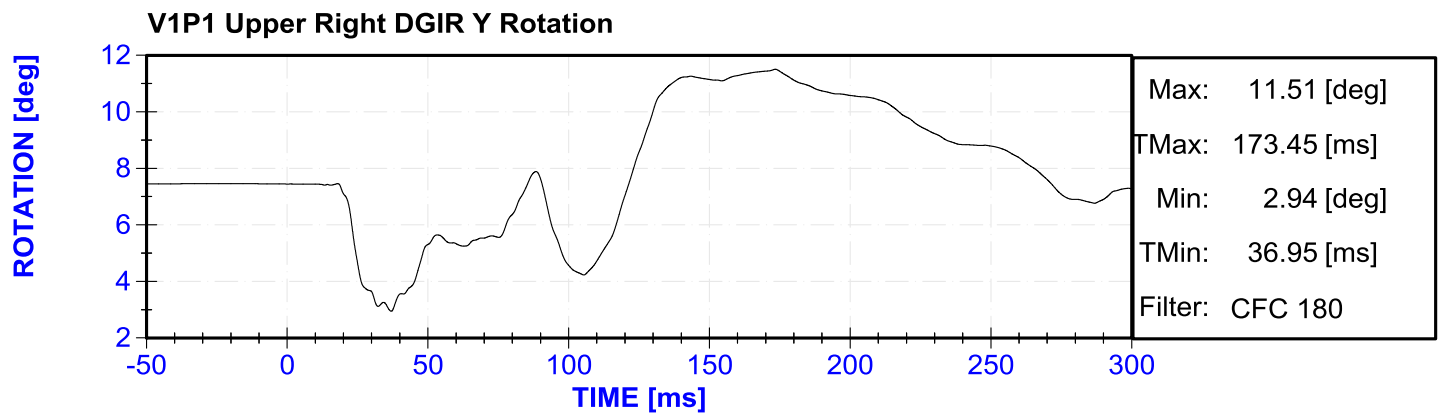
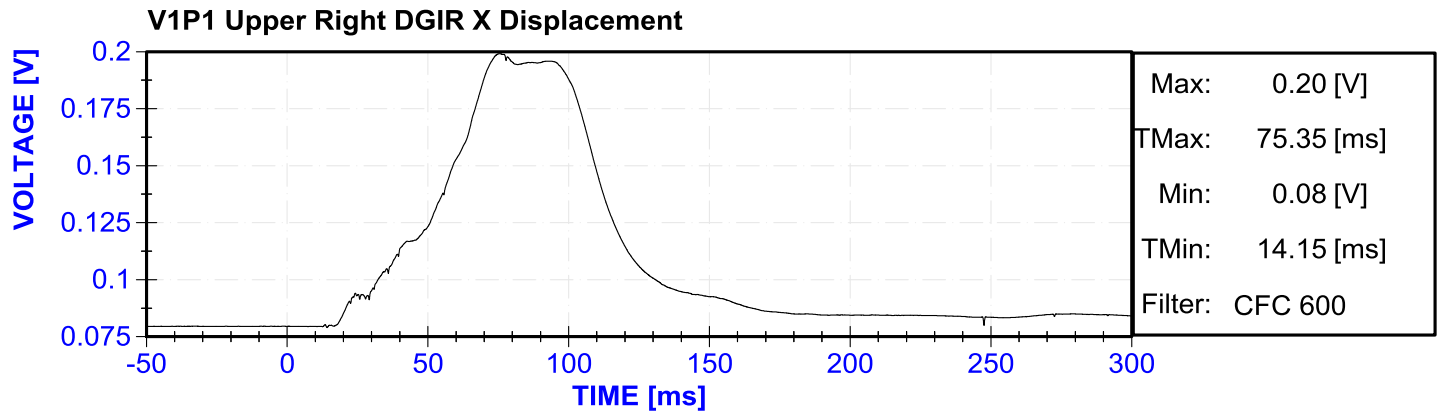


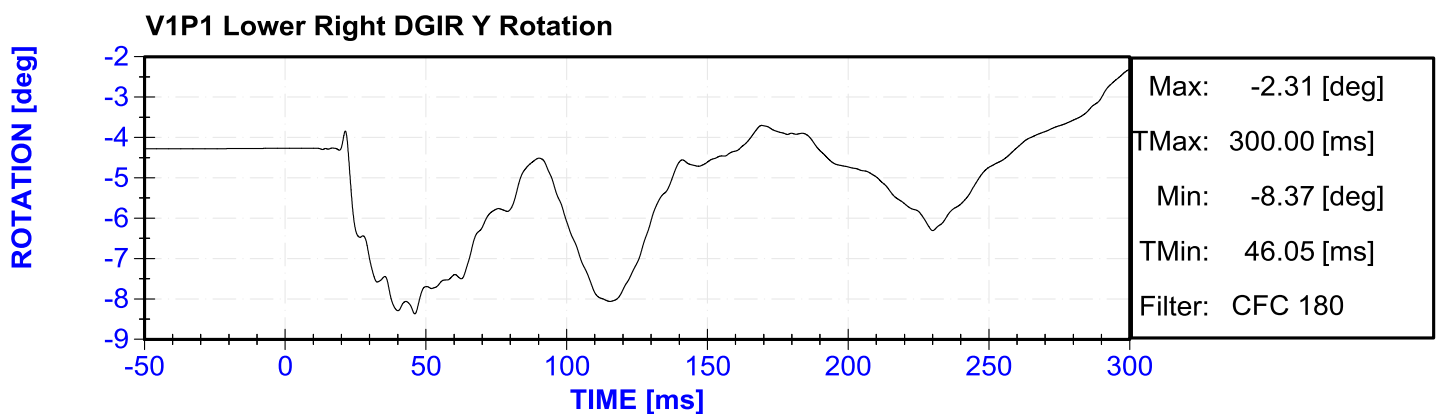
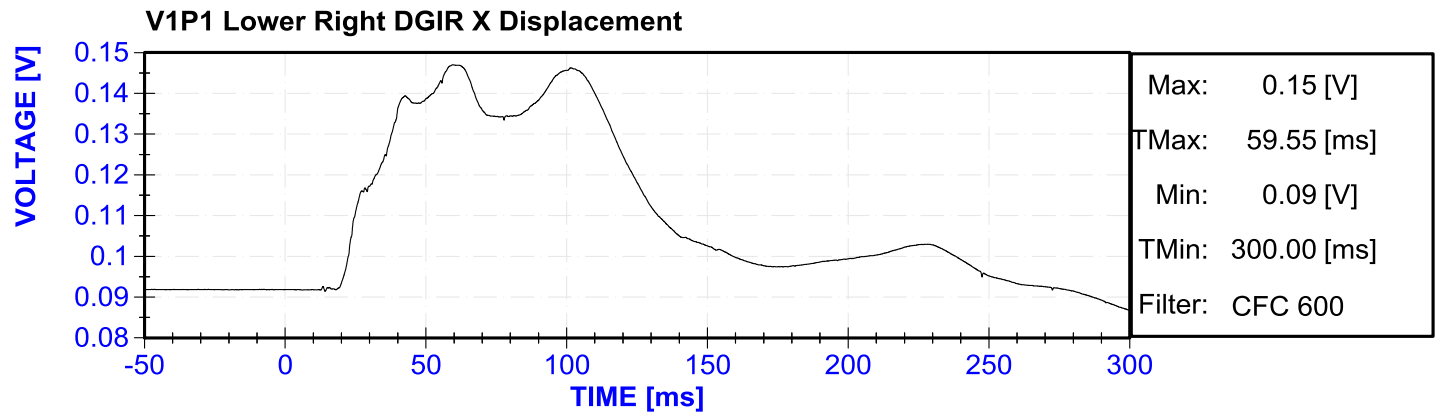
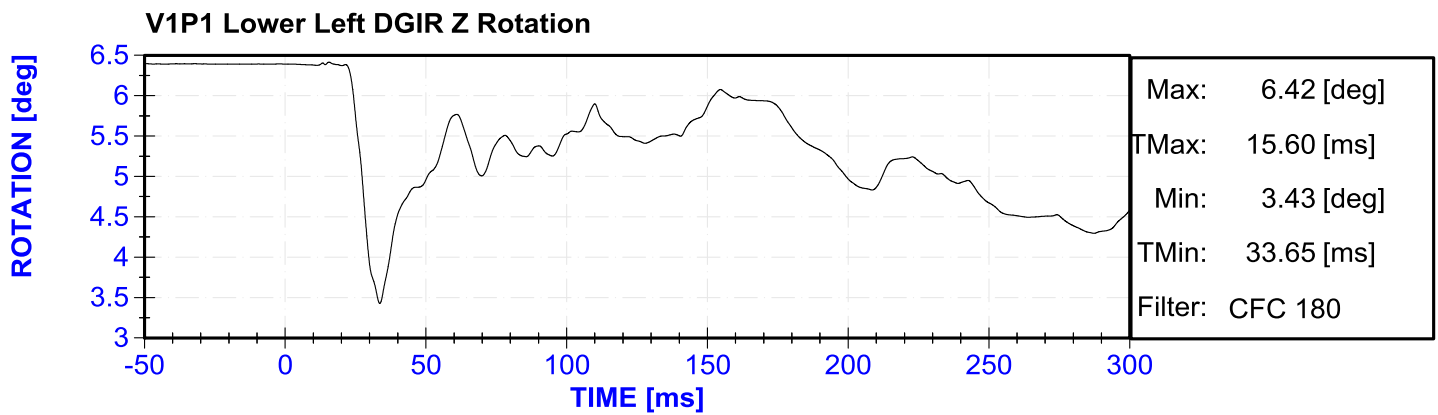
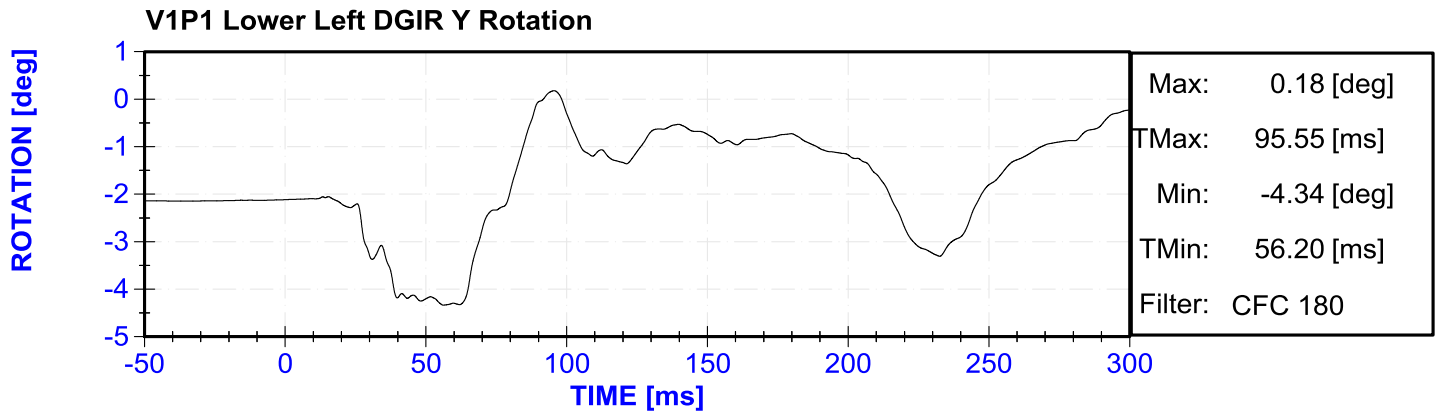
V1P1 Upper Left DGIR Y Rotation

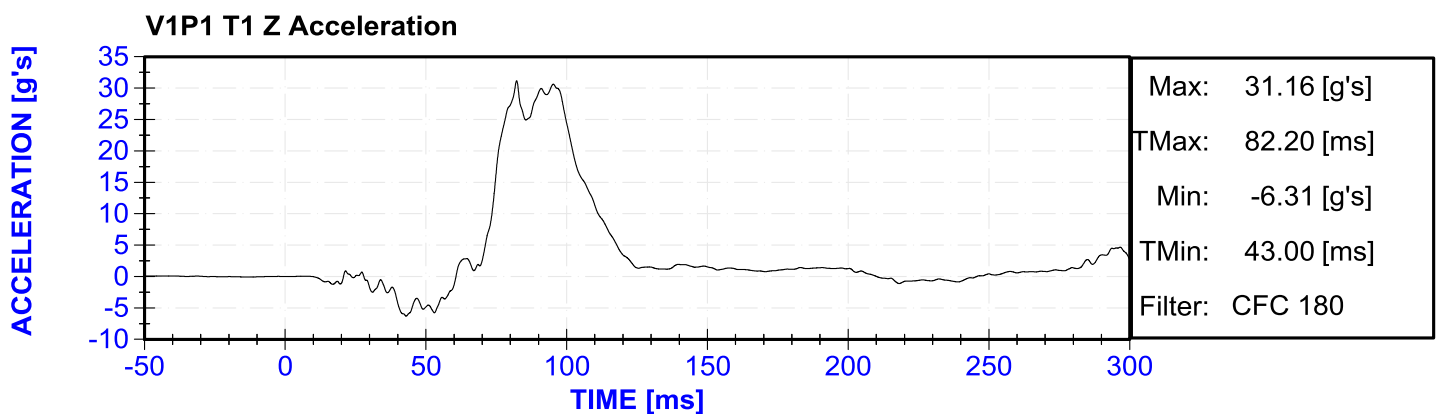
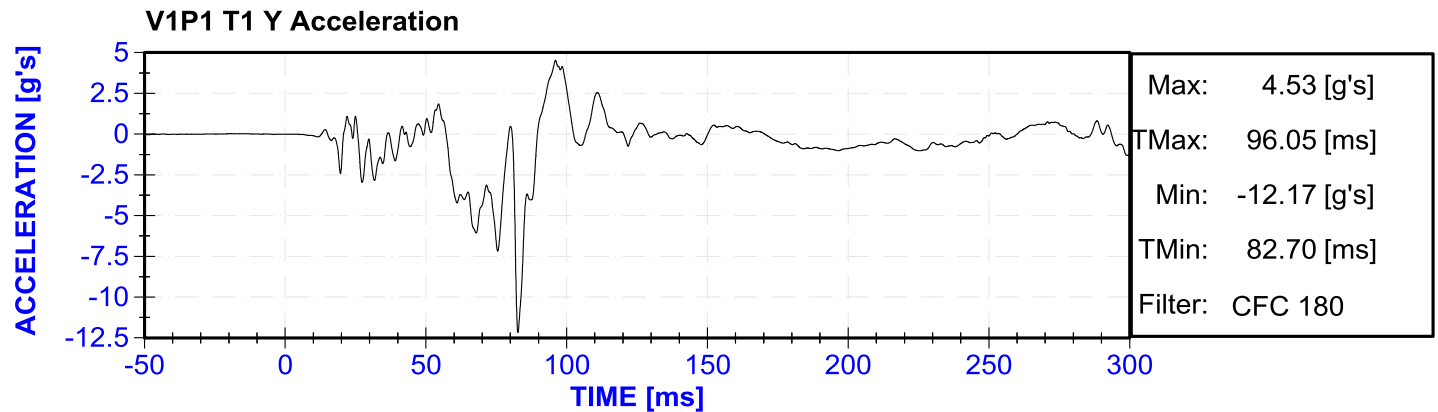
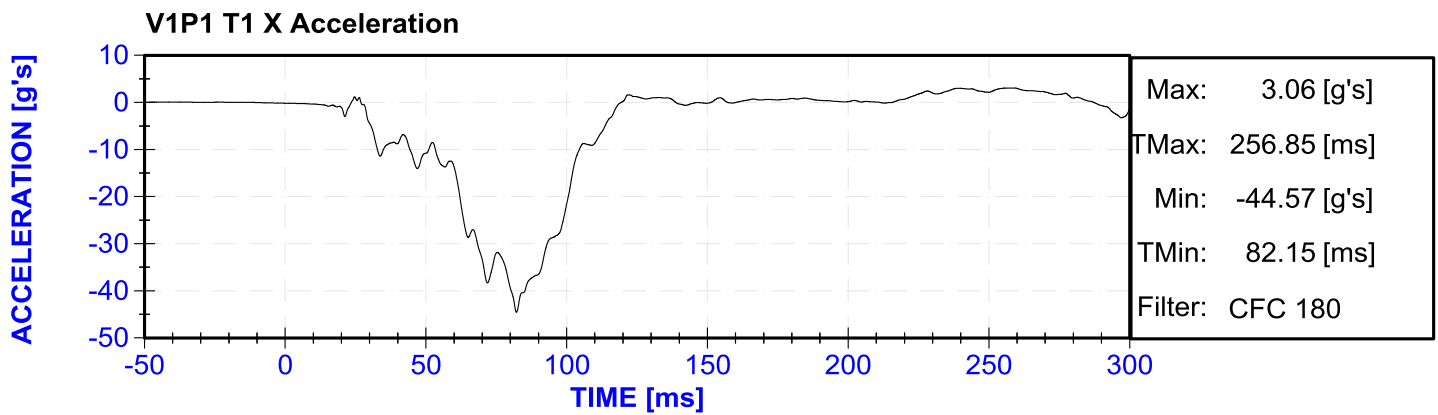
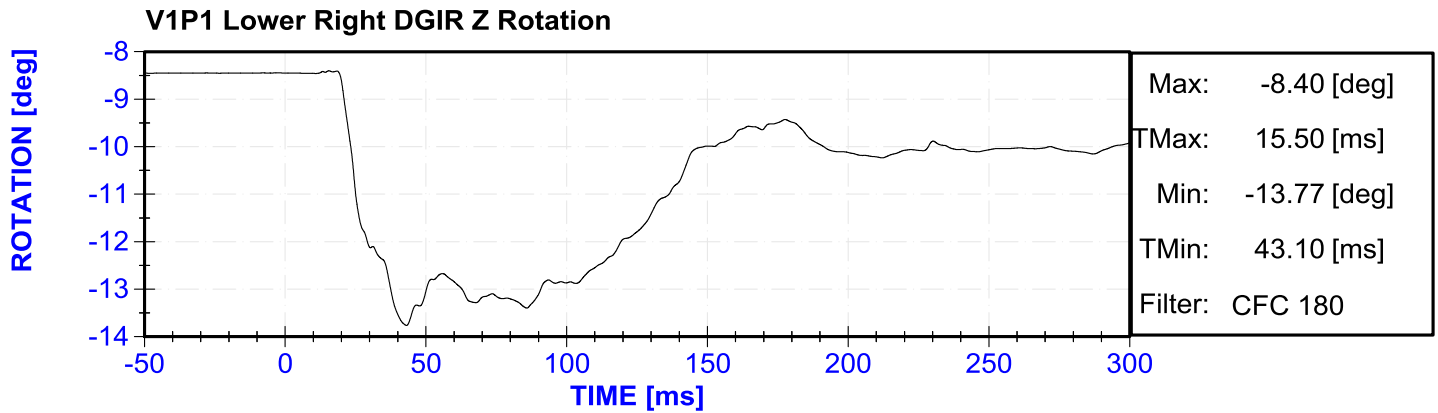


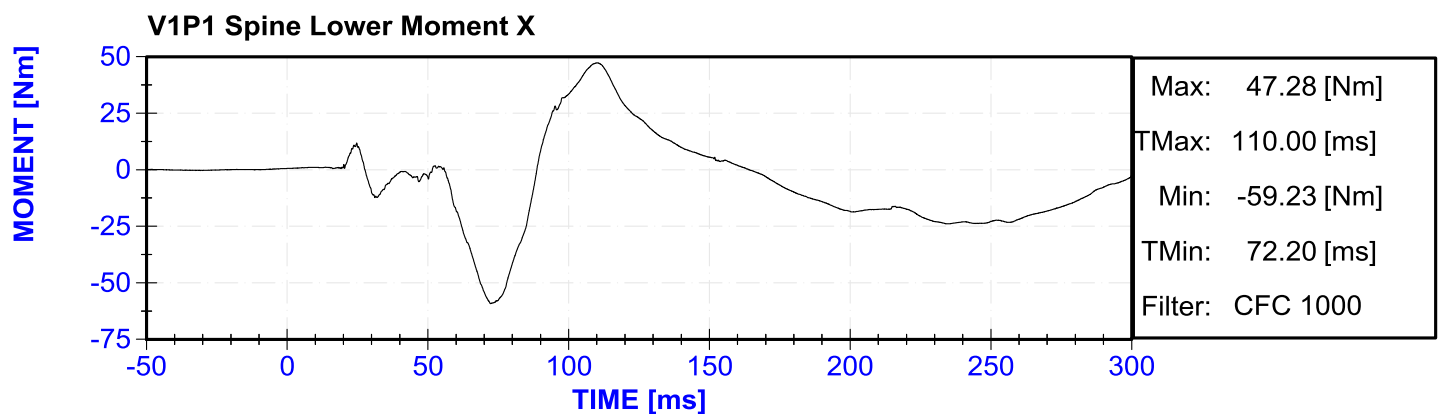
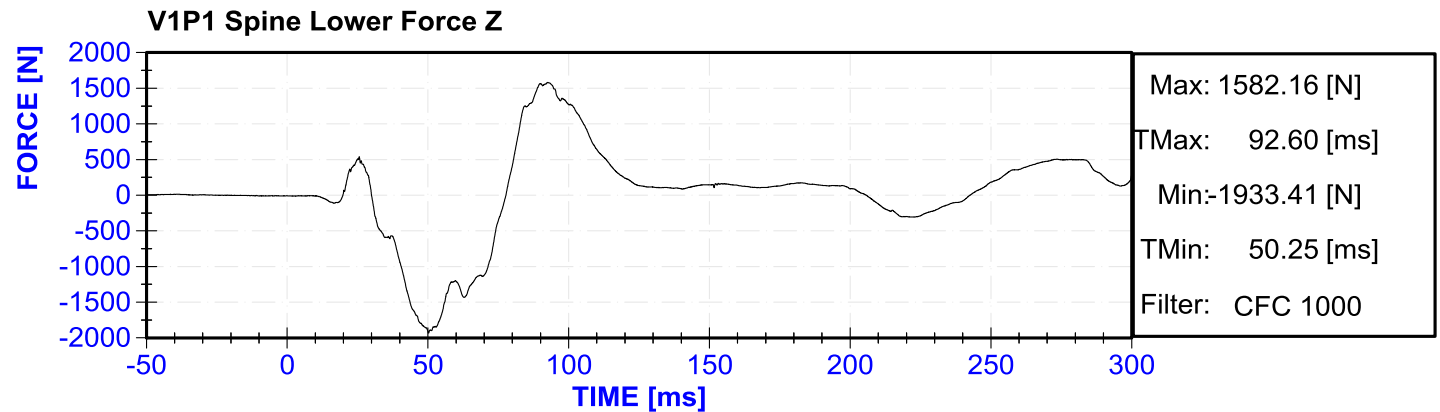
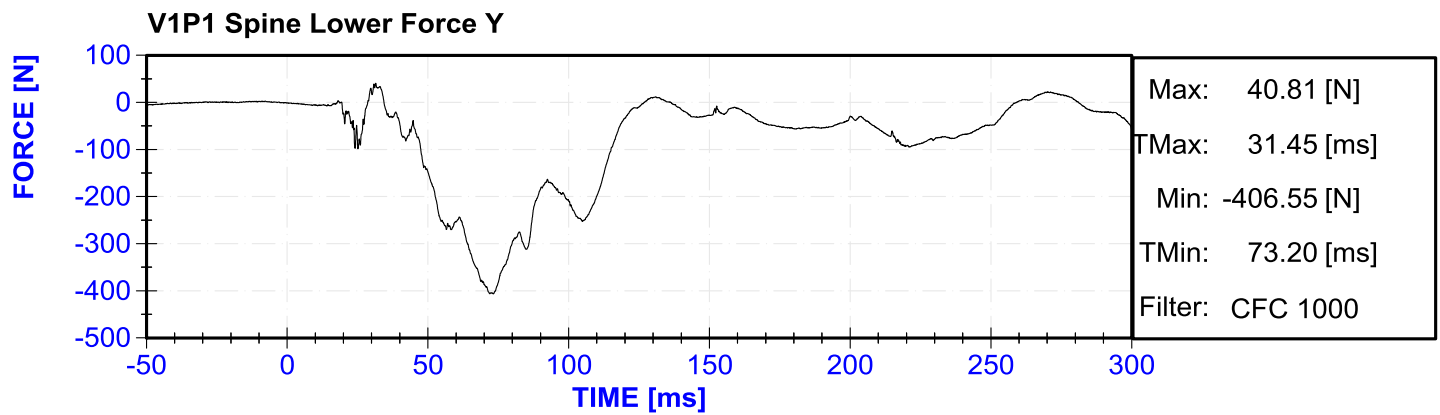
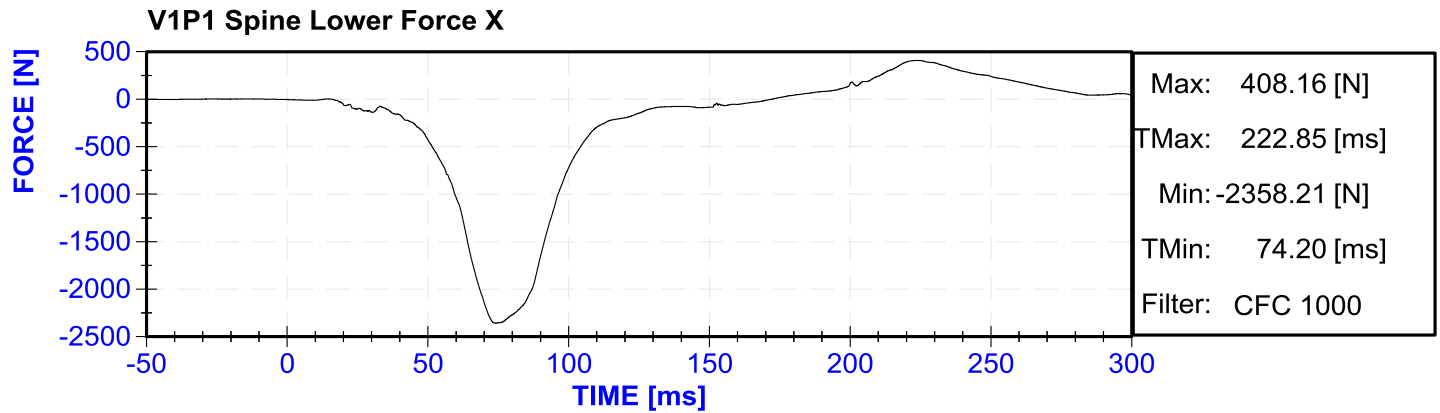
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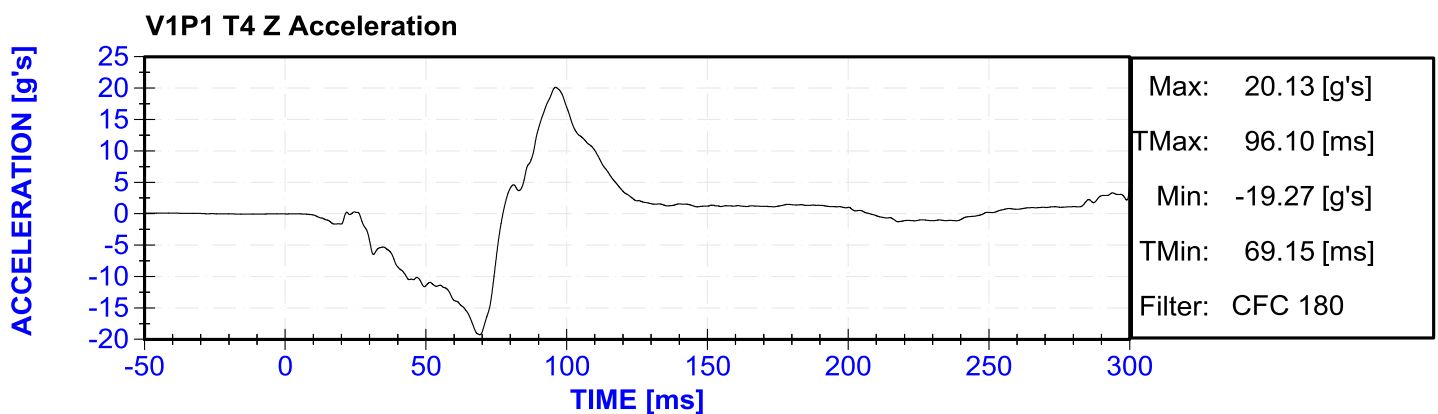
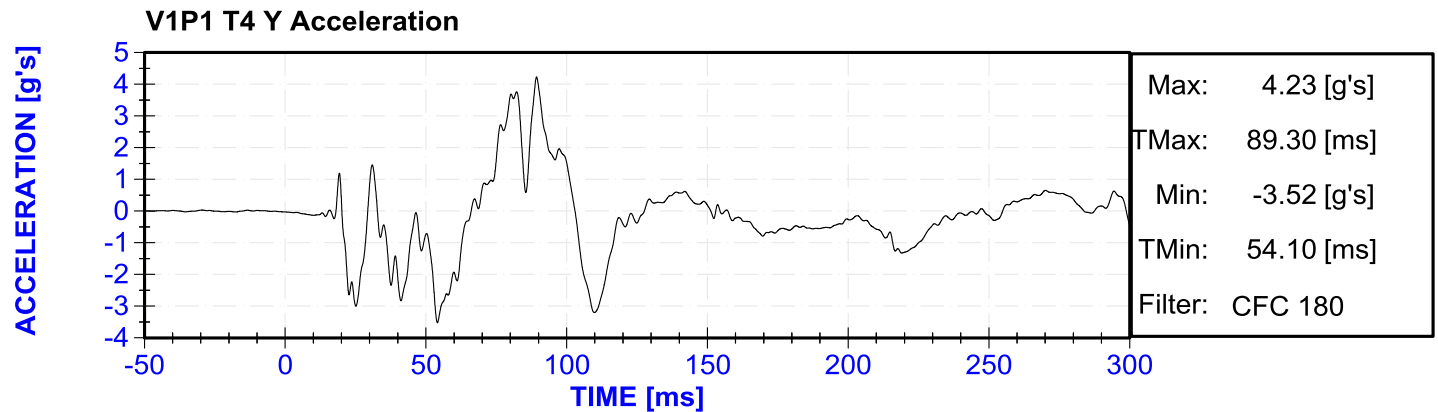
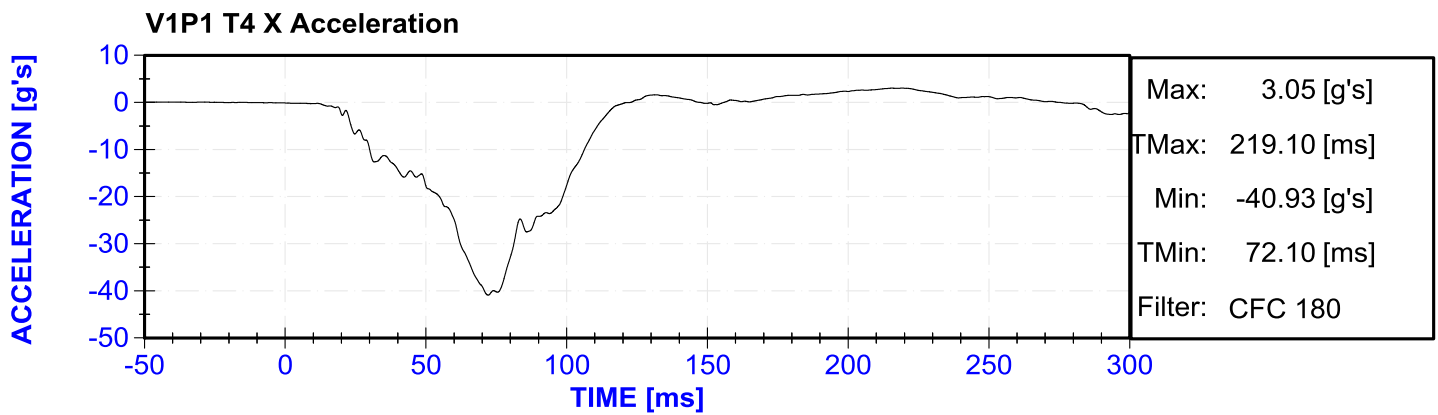
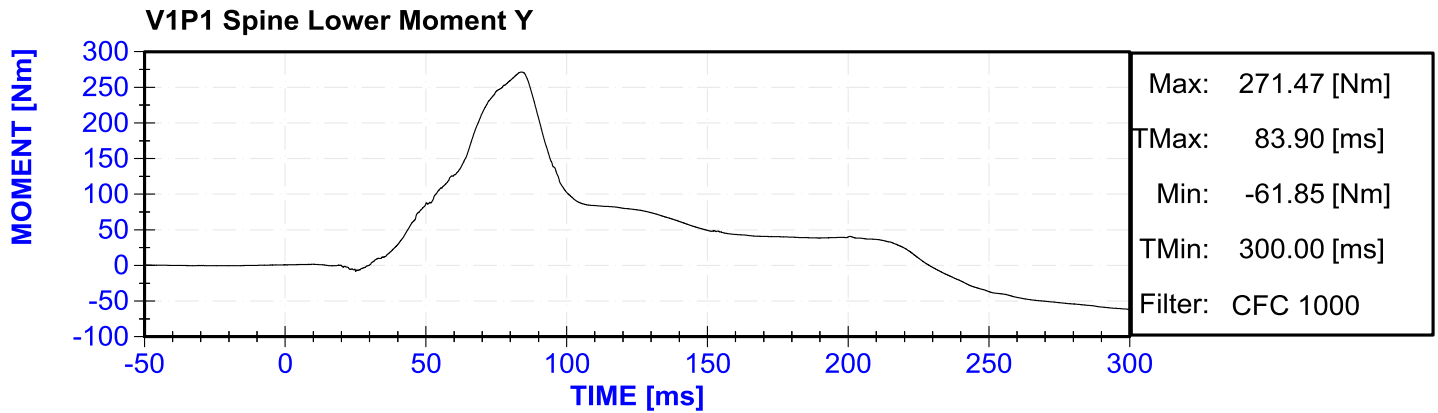




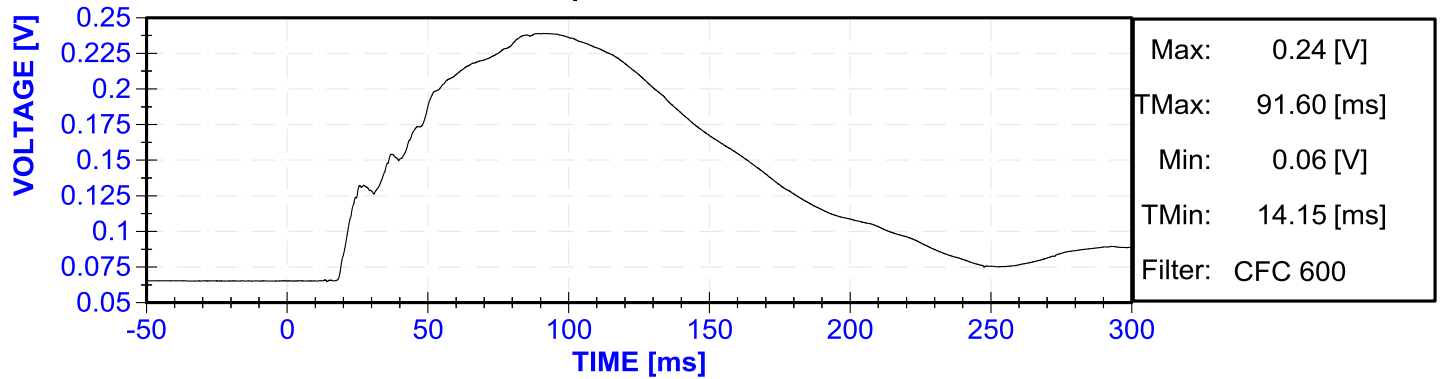




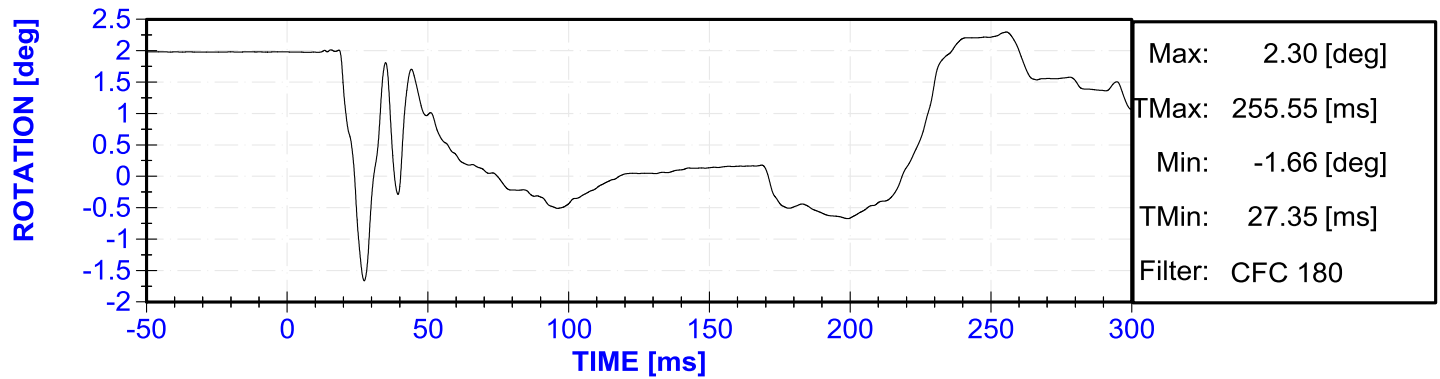




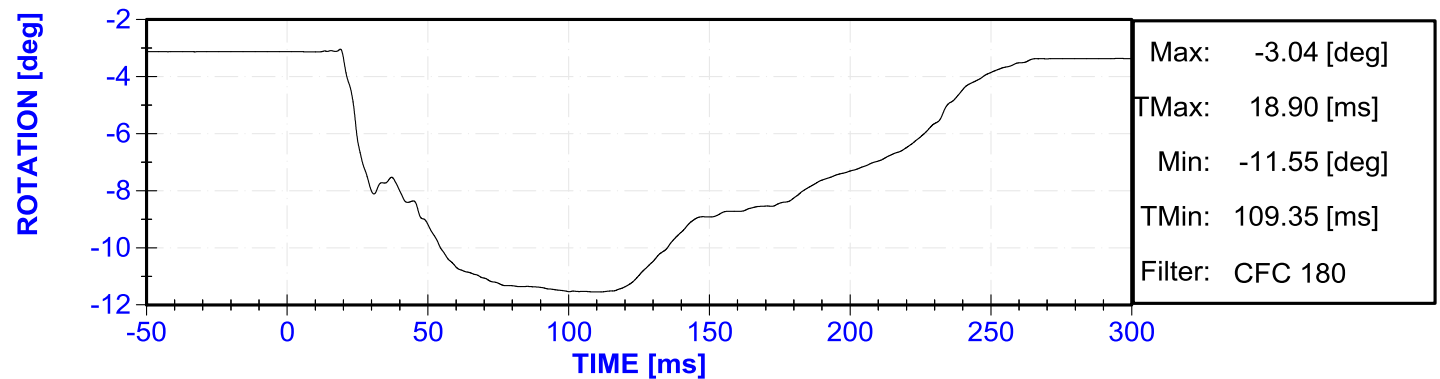
V1P1 Abdomen Left DGIR X Displacement



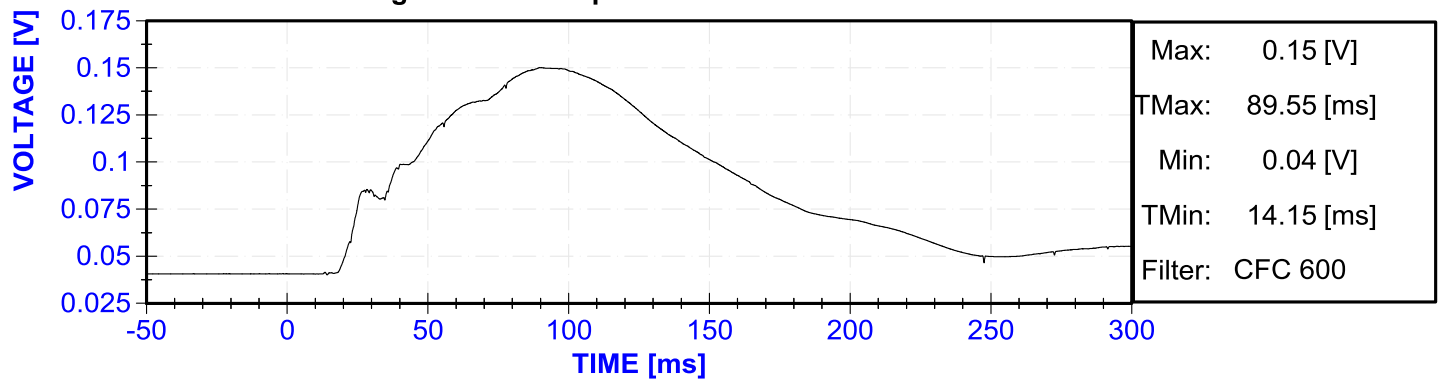
V1P1 Abdomen Left DGIR Y Rotation

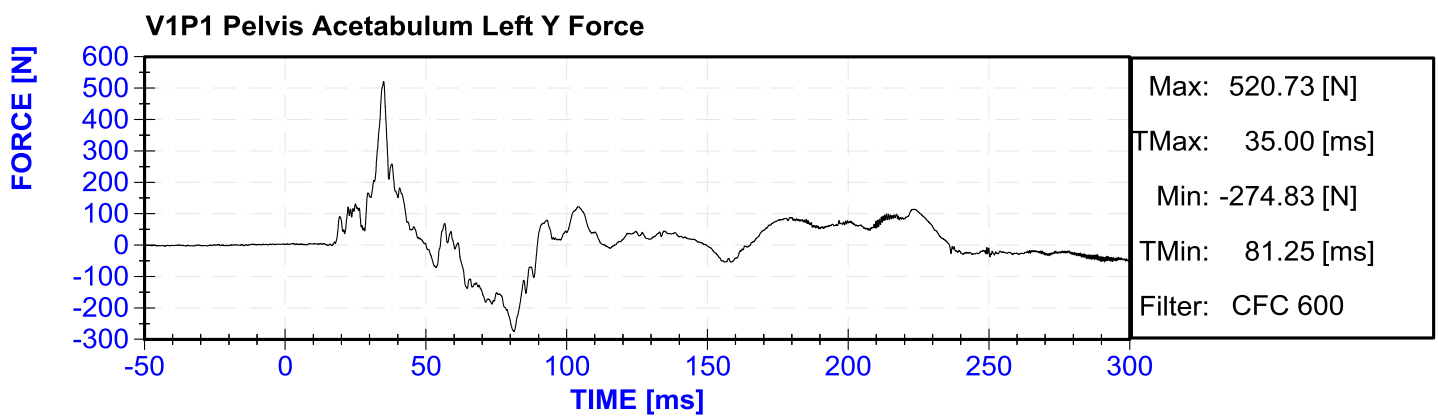
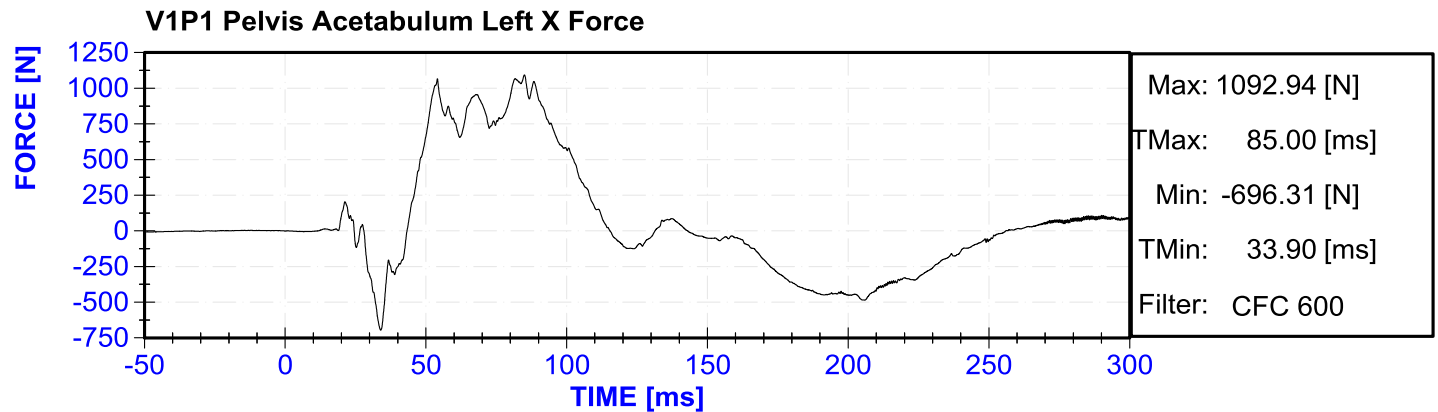
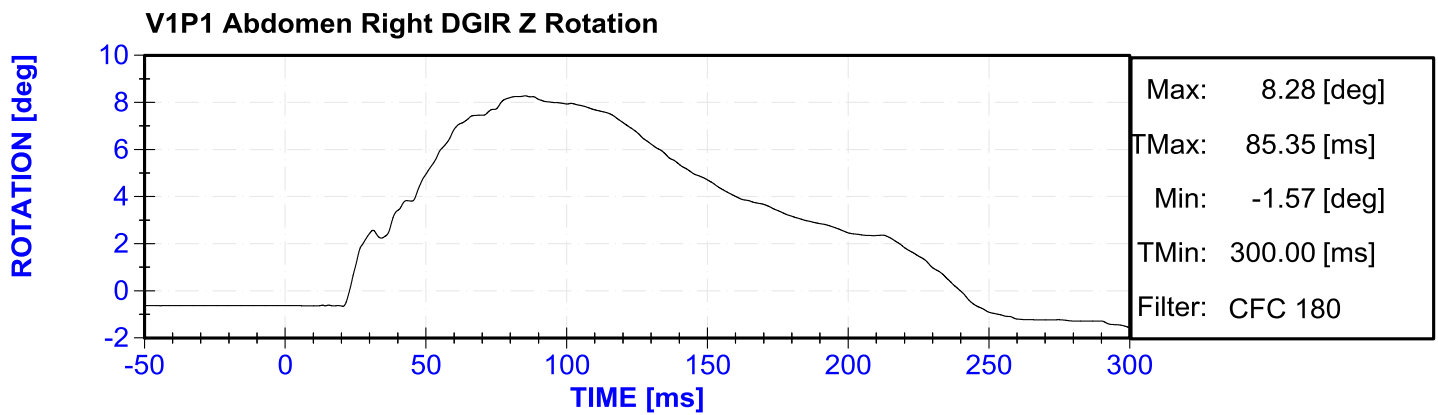
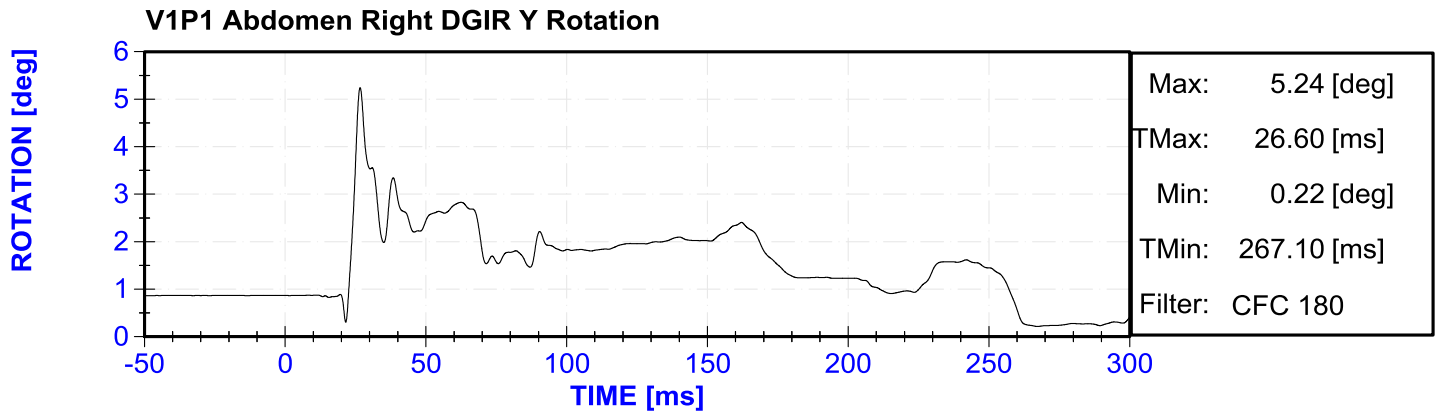


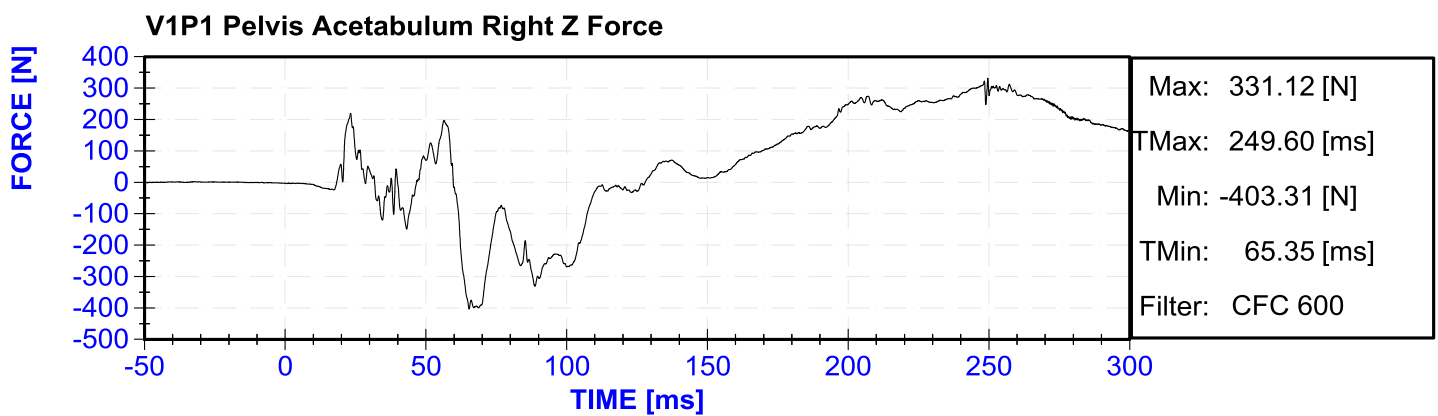
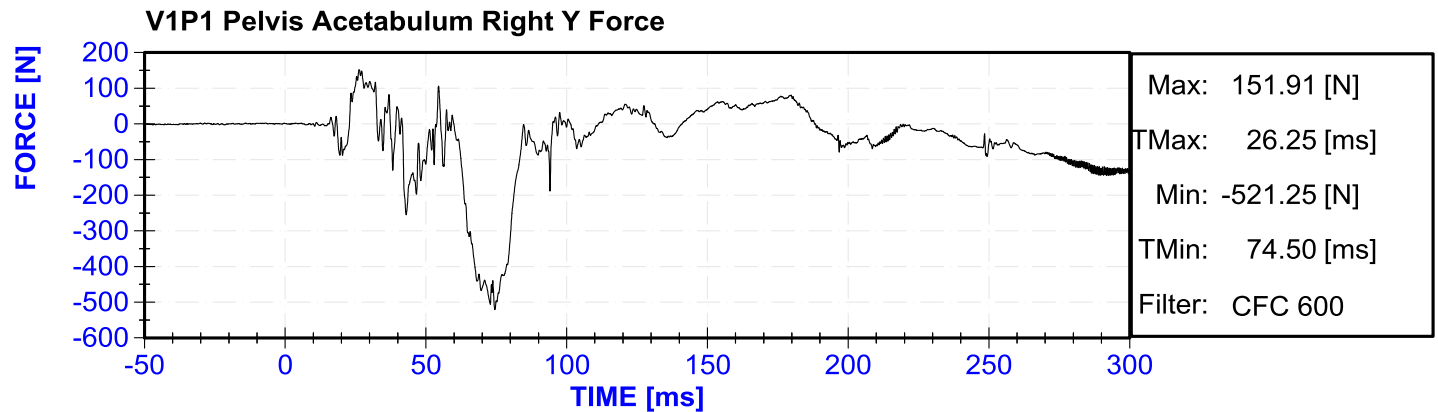
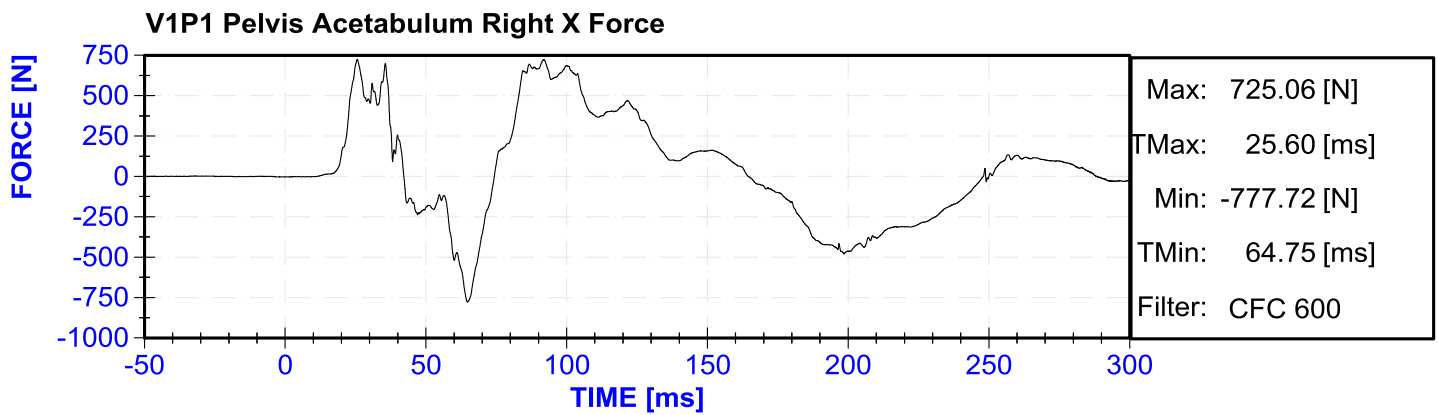
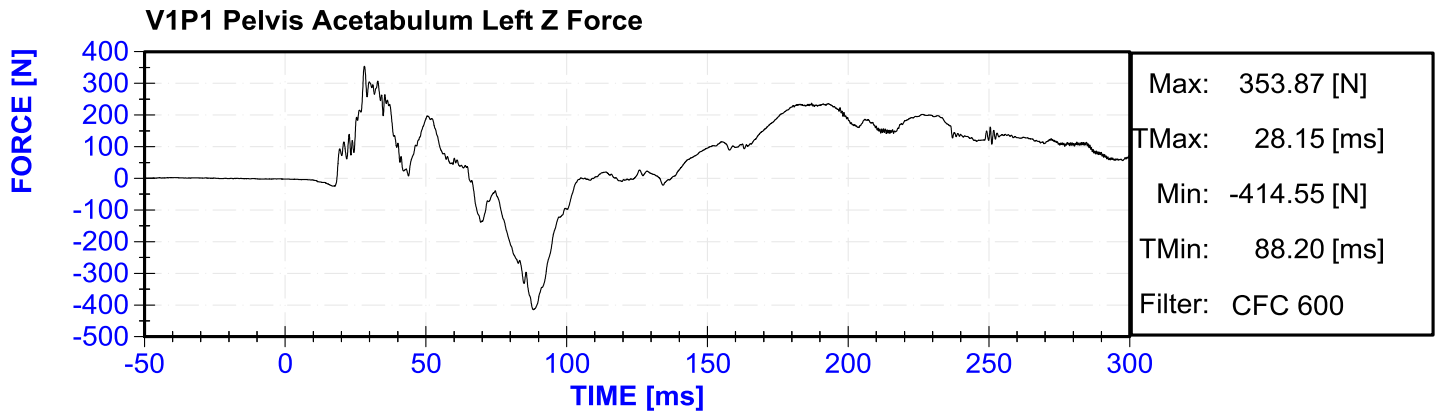
V1P1 Abdomen Left DGIR Z Rotation

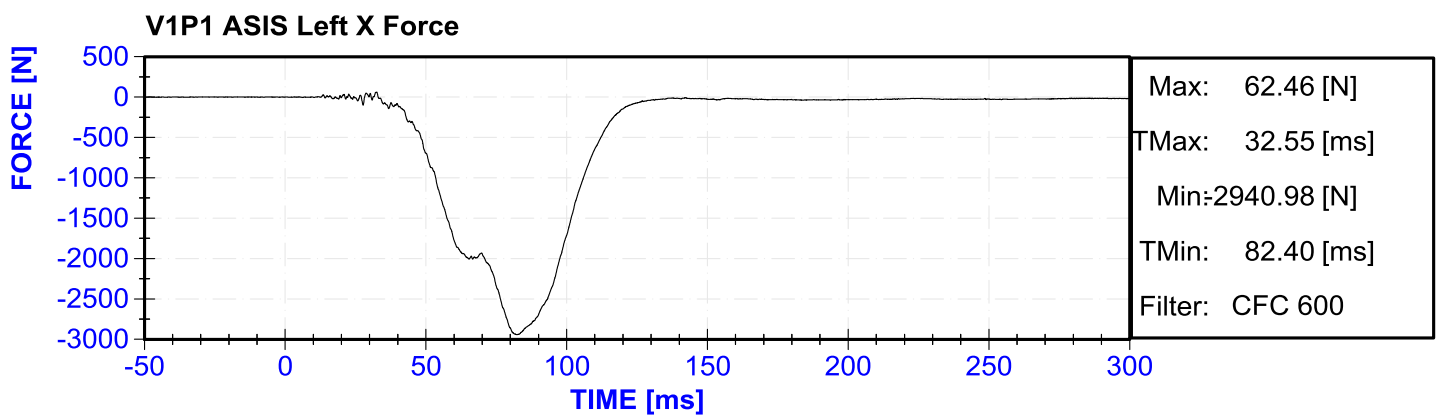
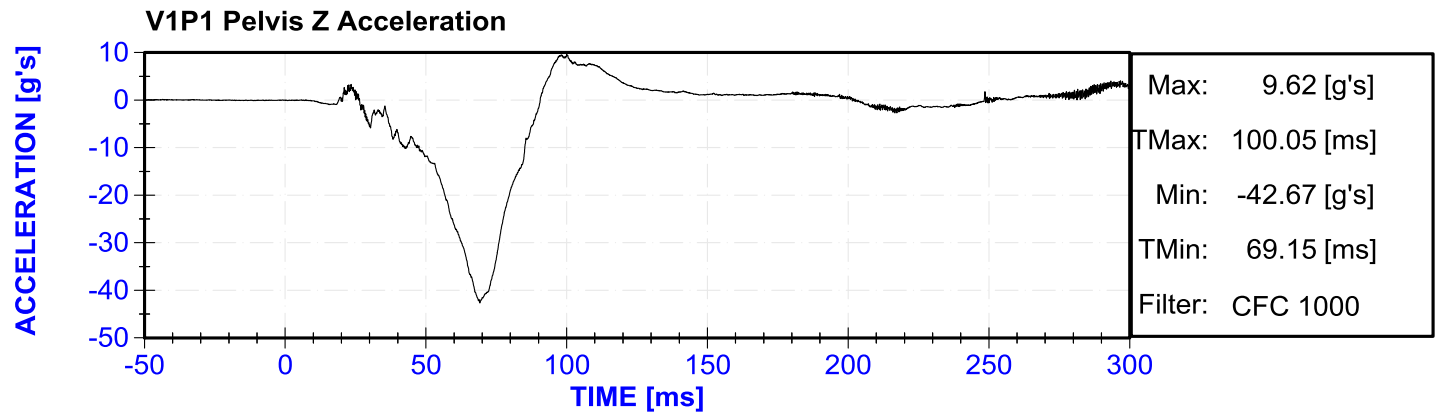
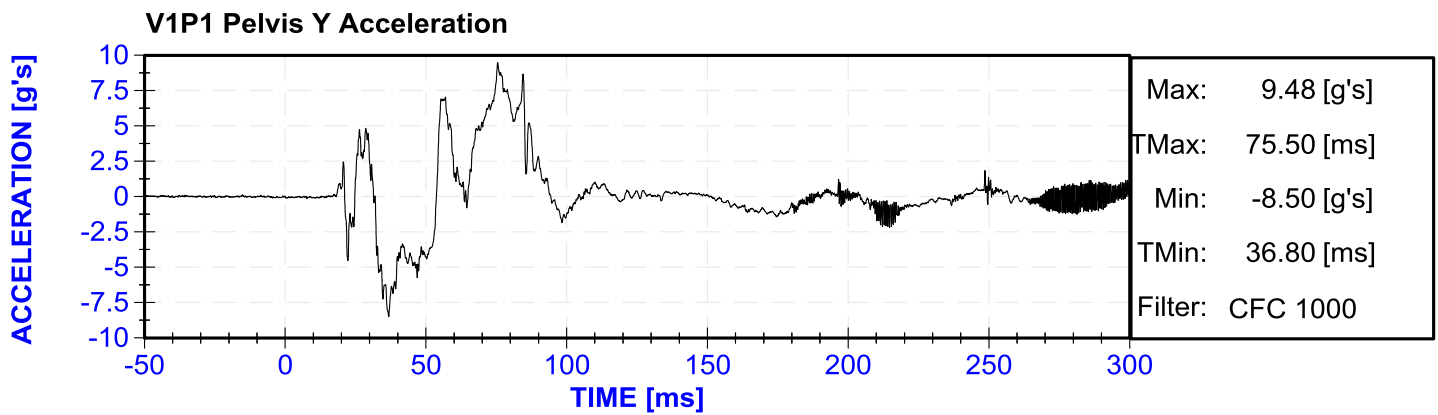
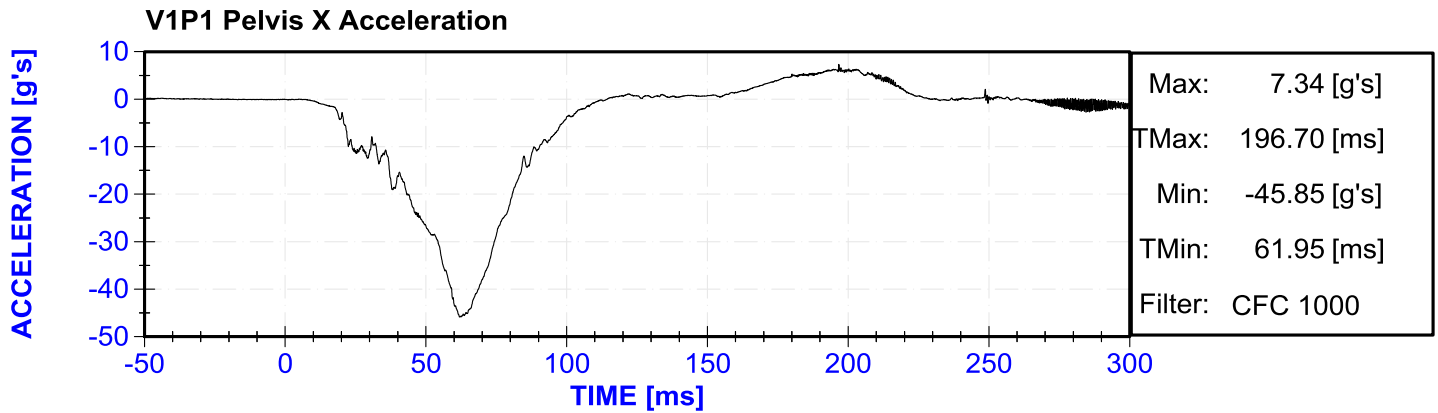


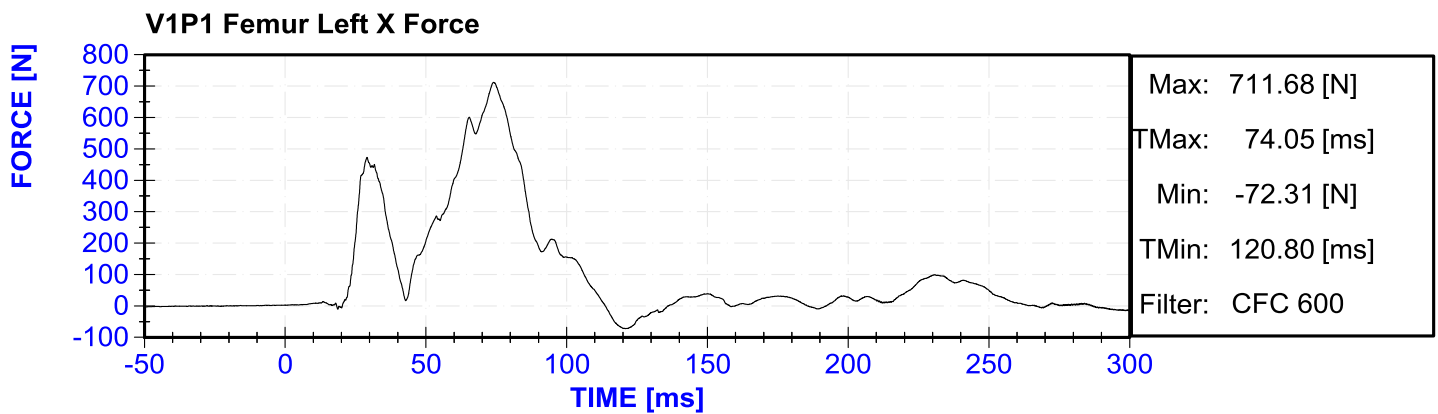
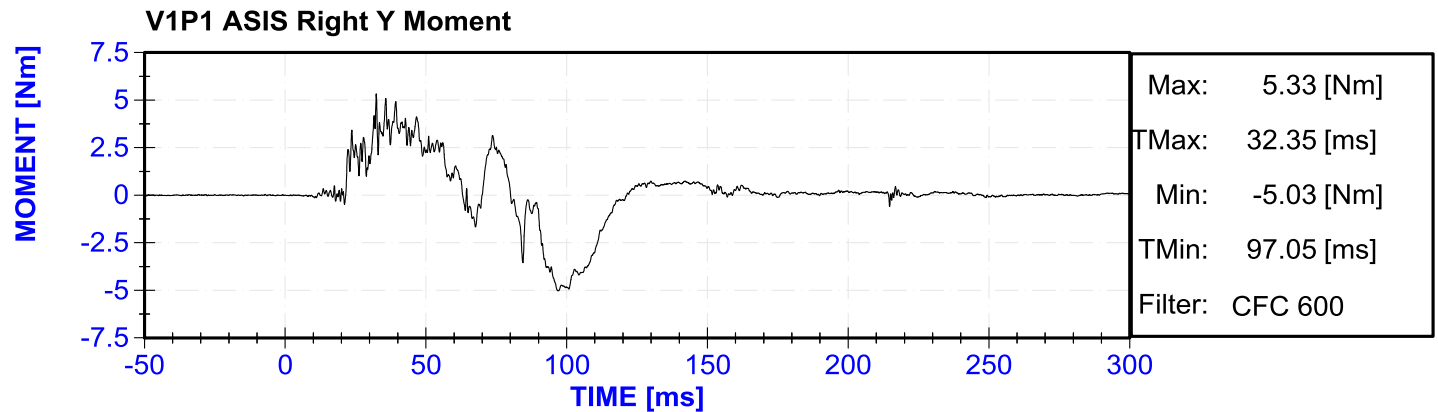
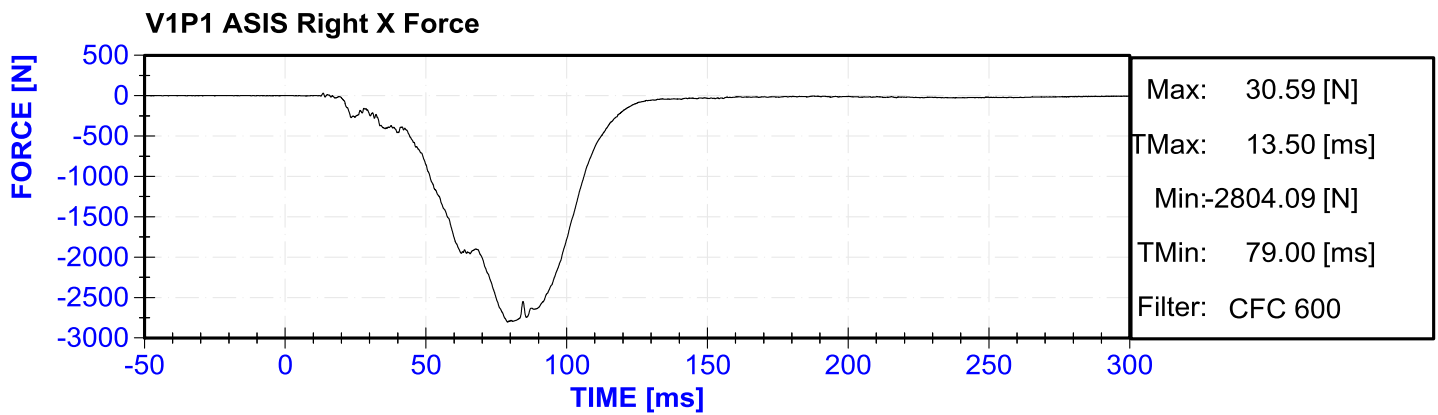
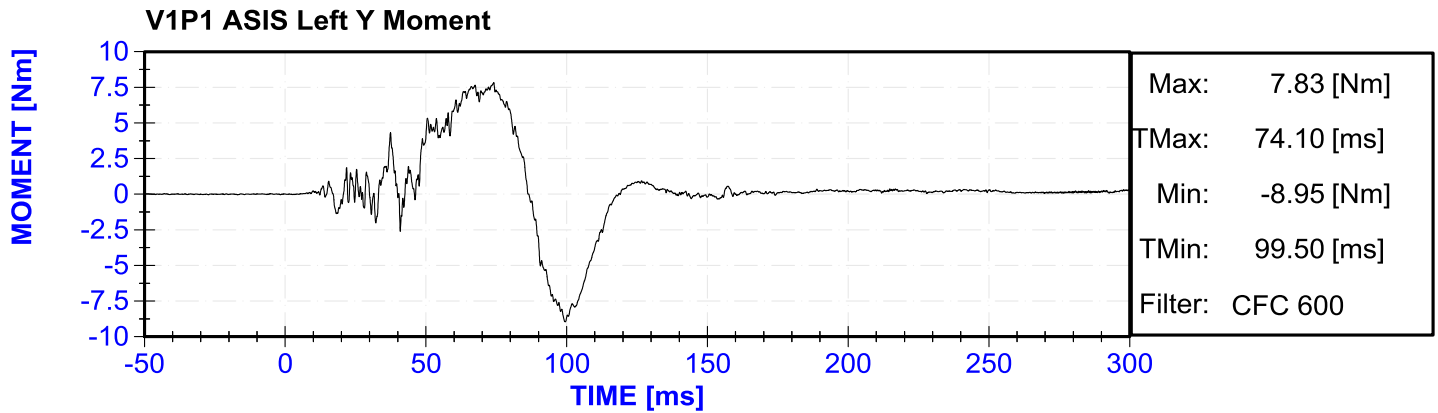
V1P1 Abdomen Right DGIR X Displacement

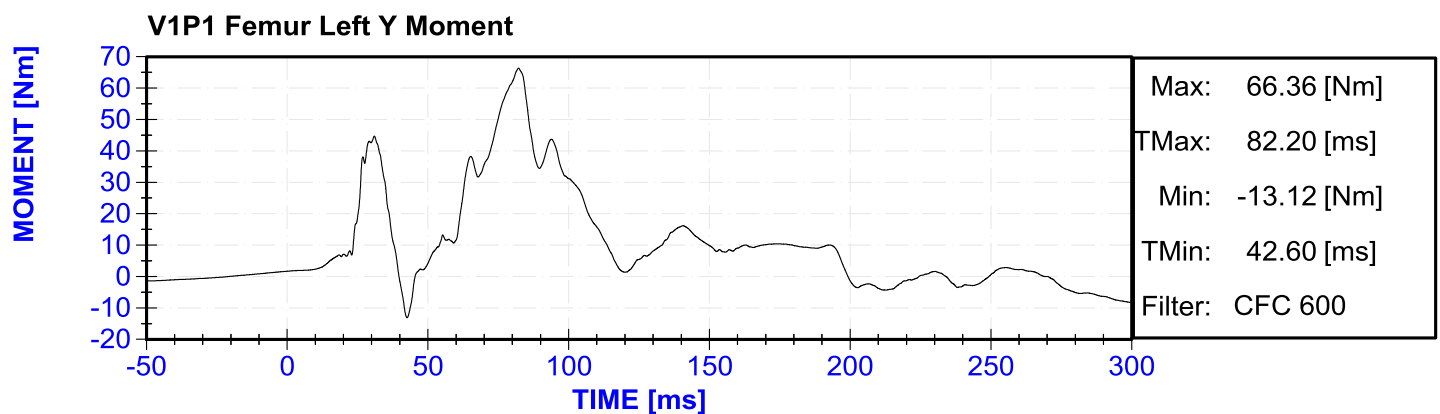
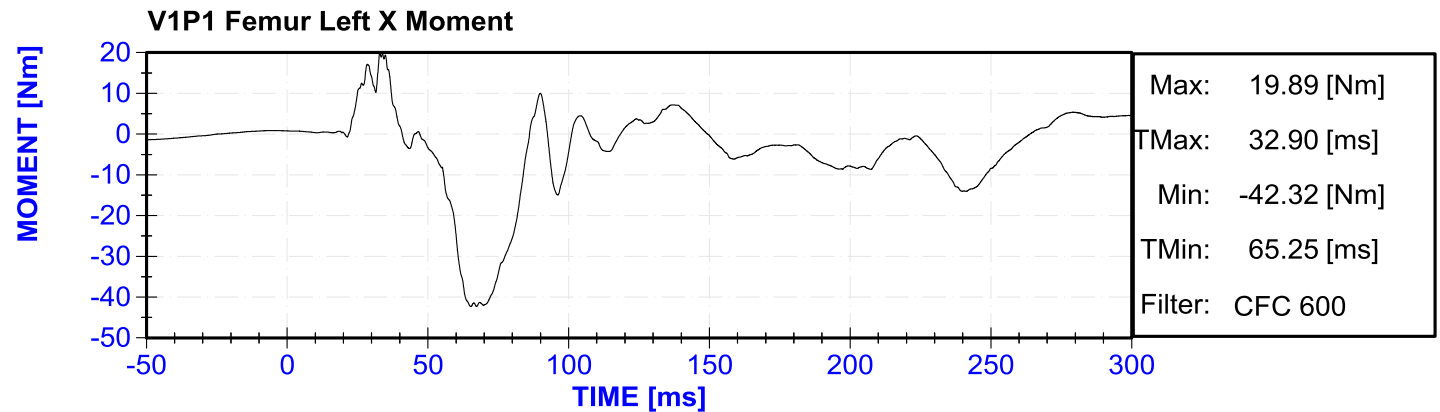
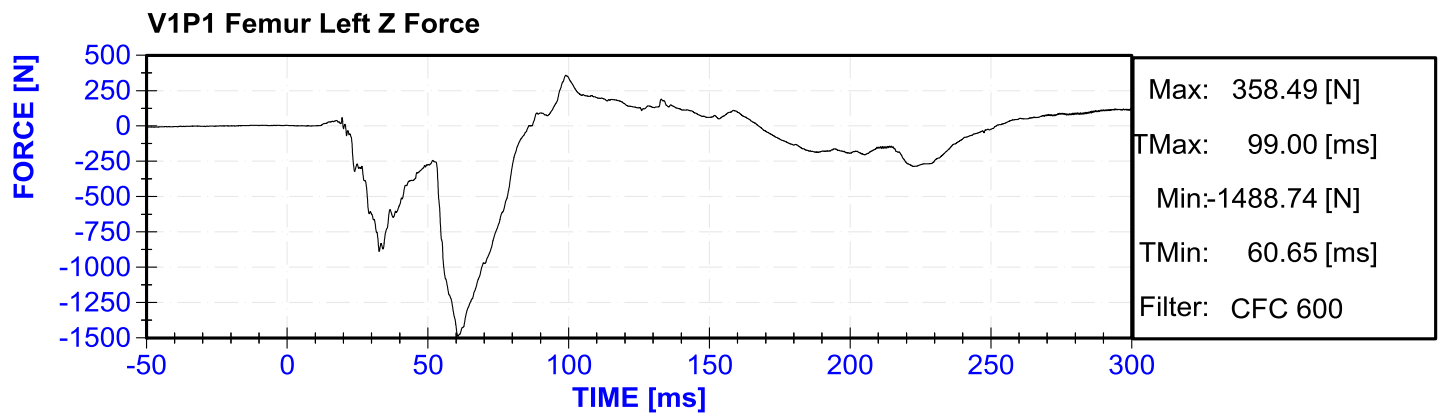
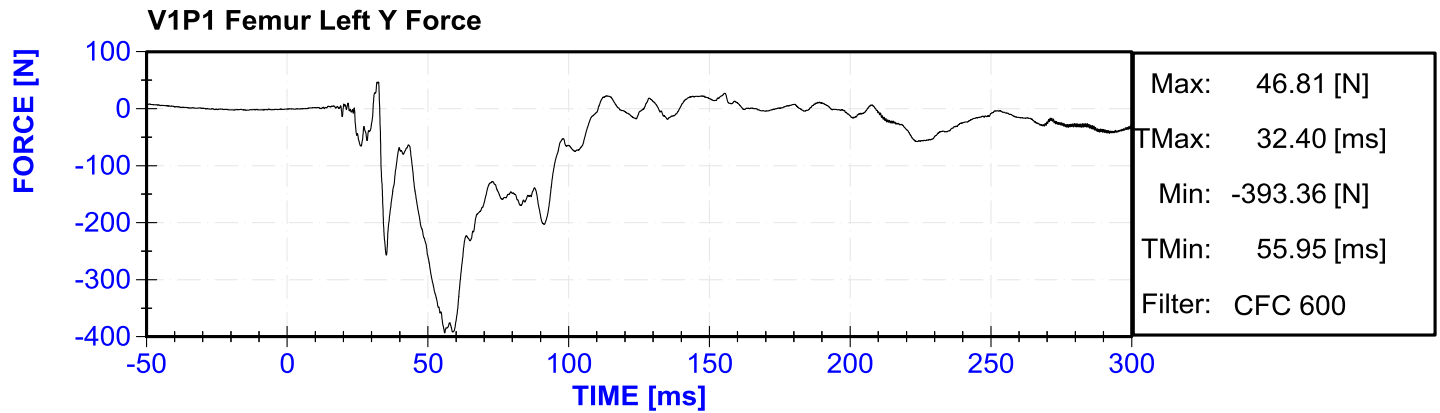


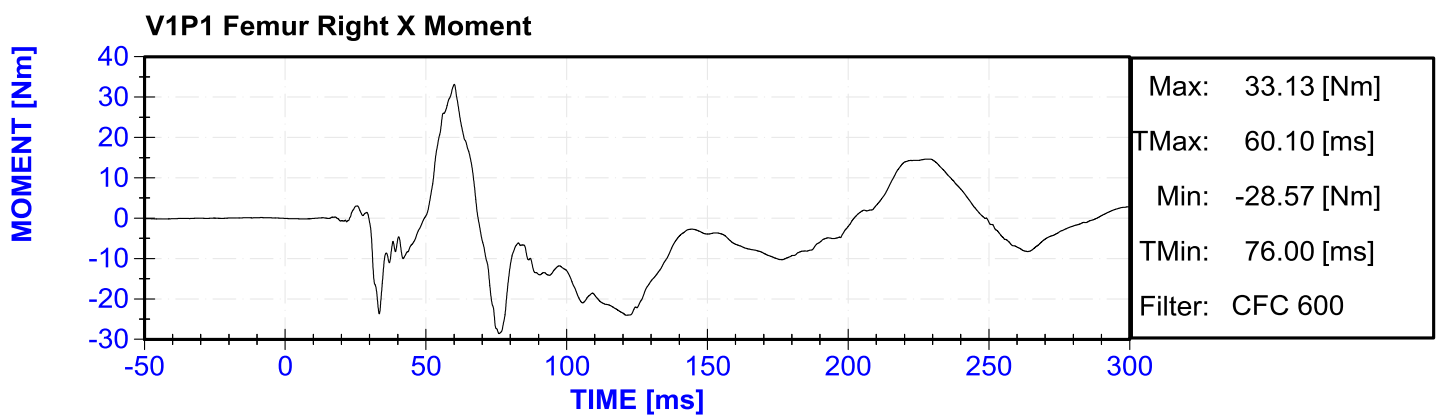
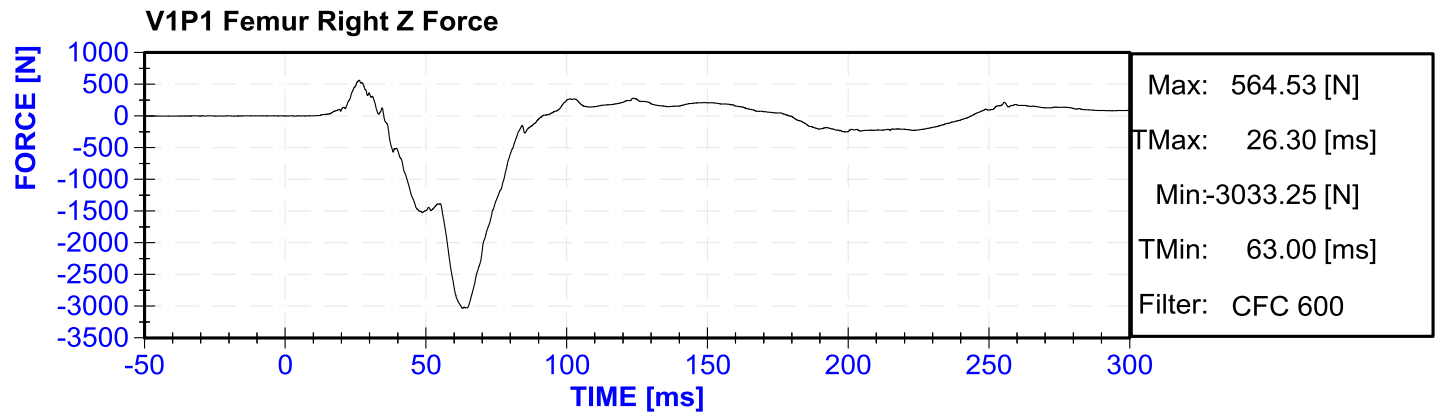
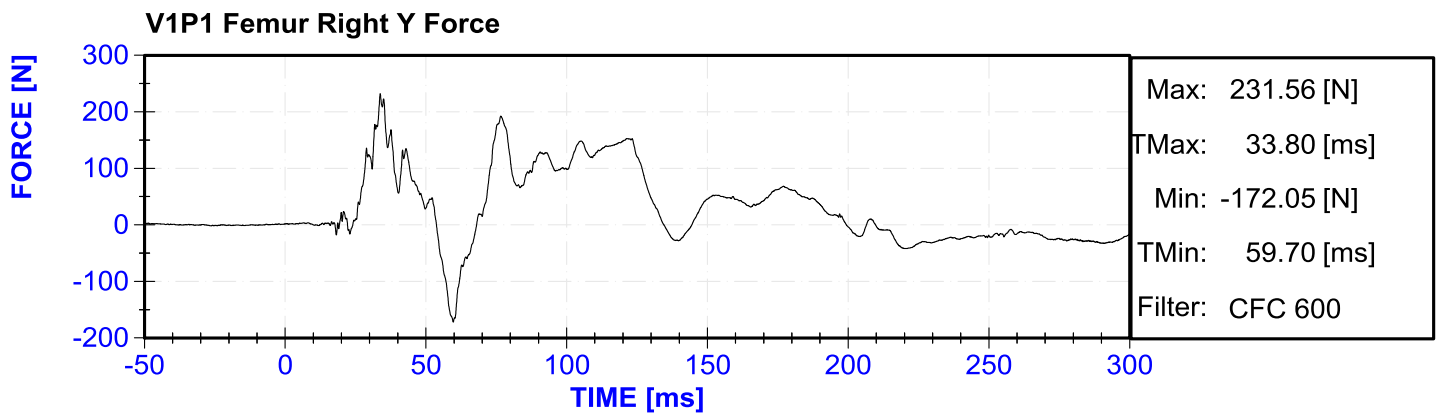
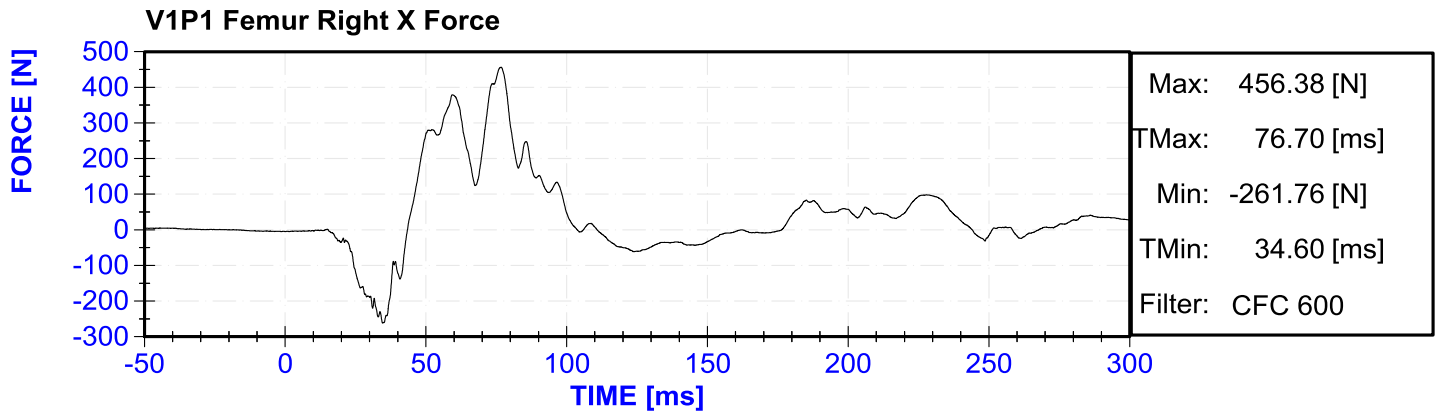


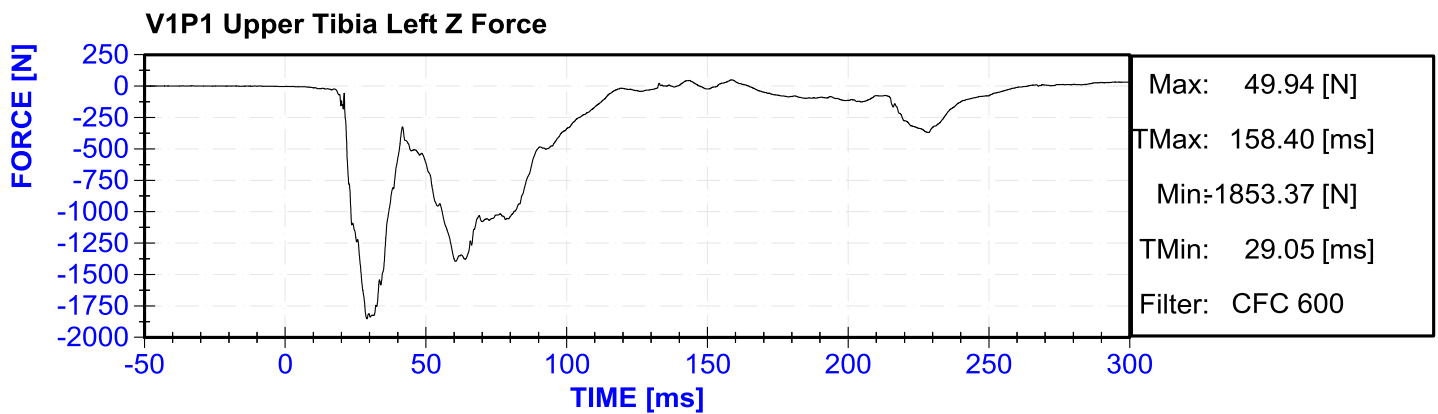
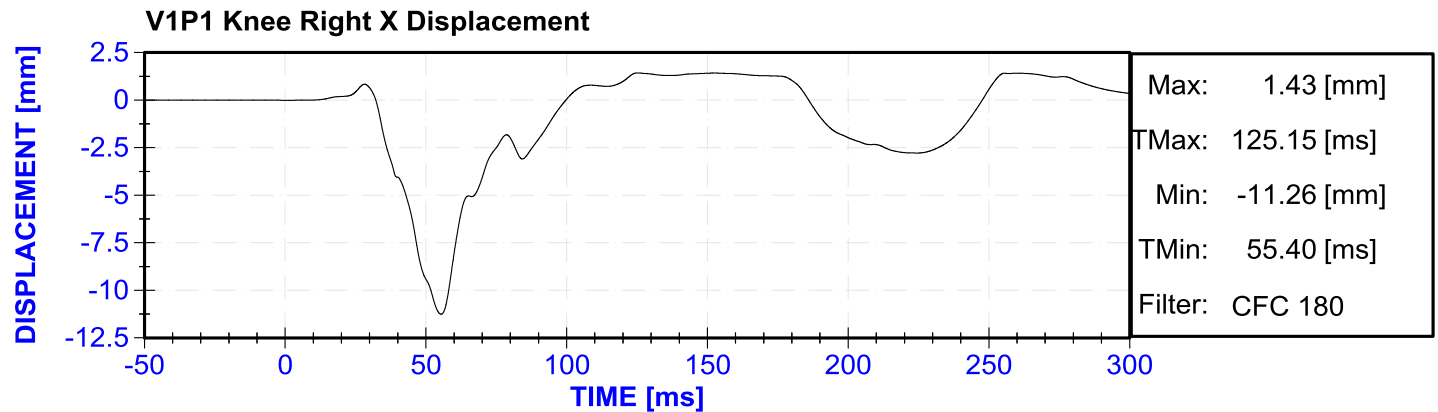
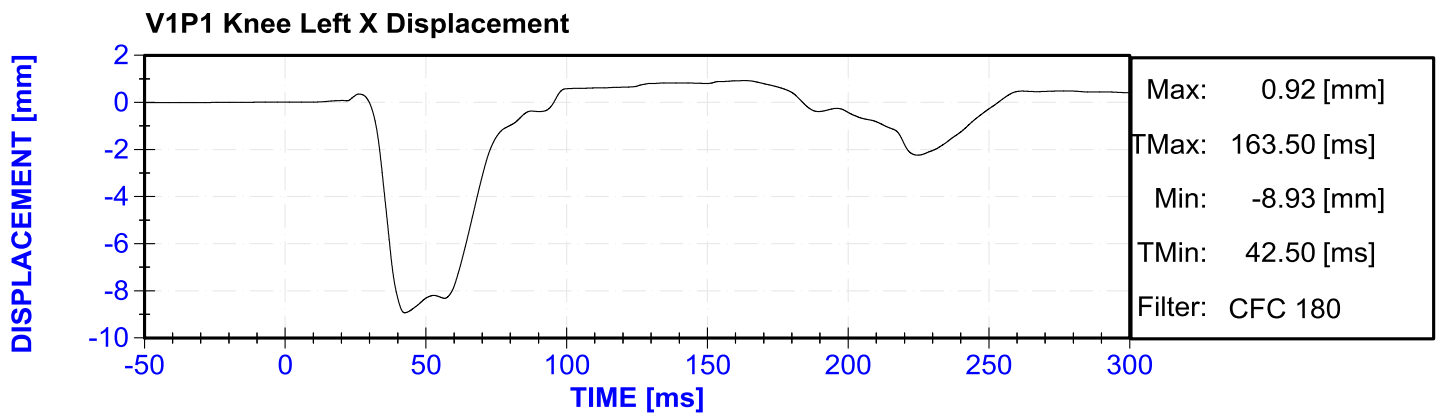
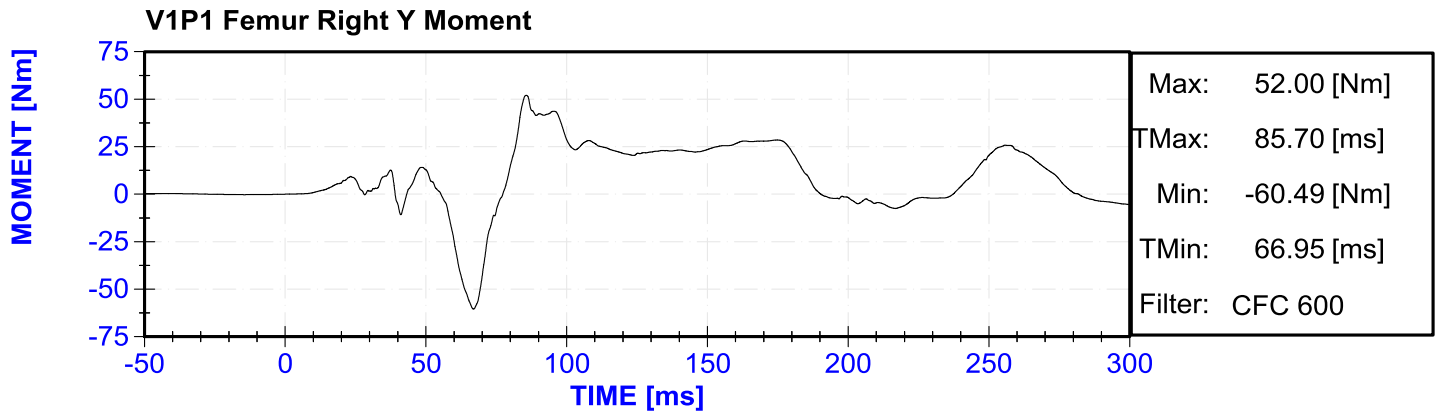


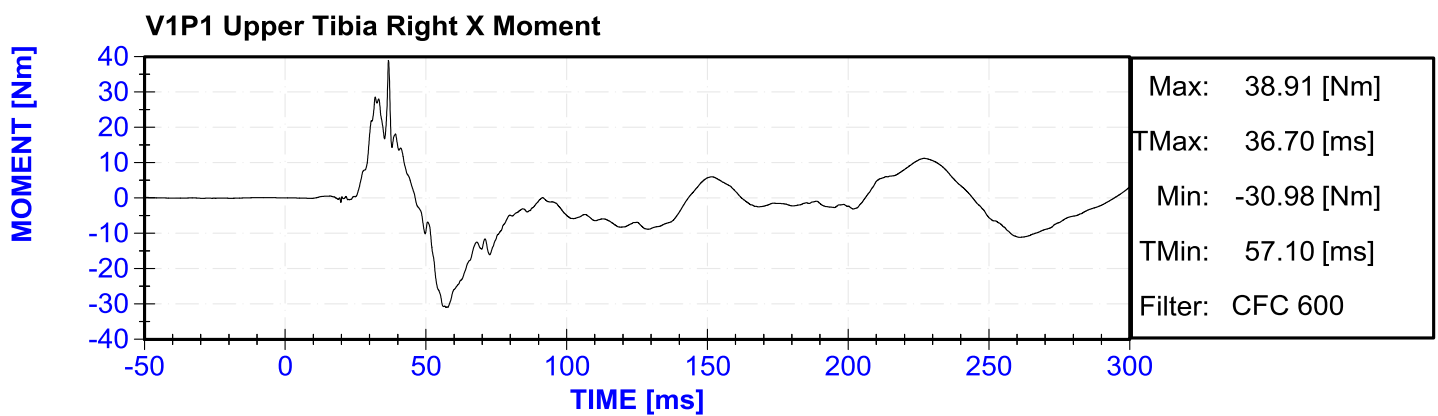
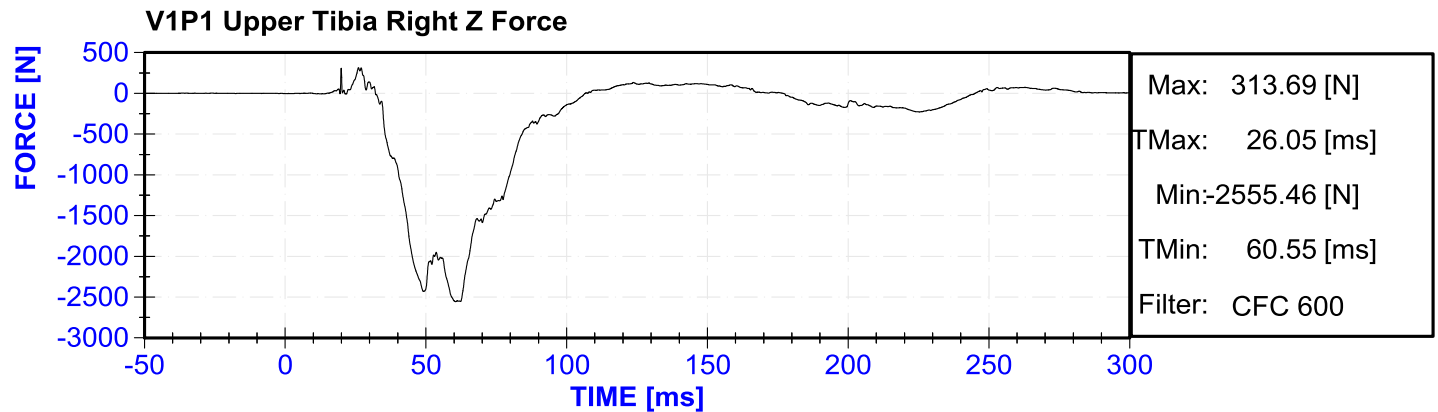
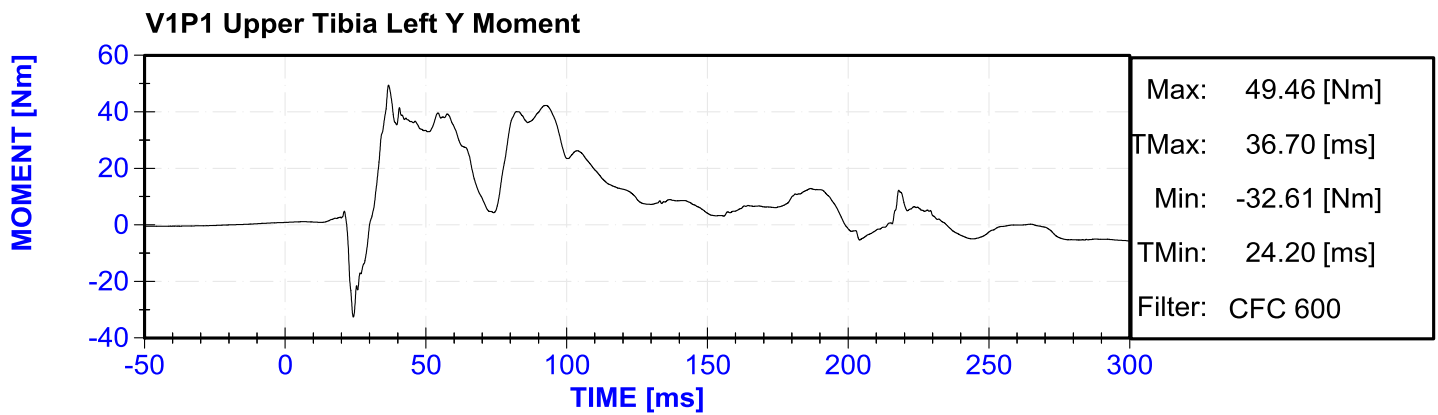
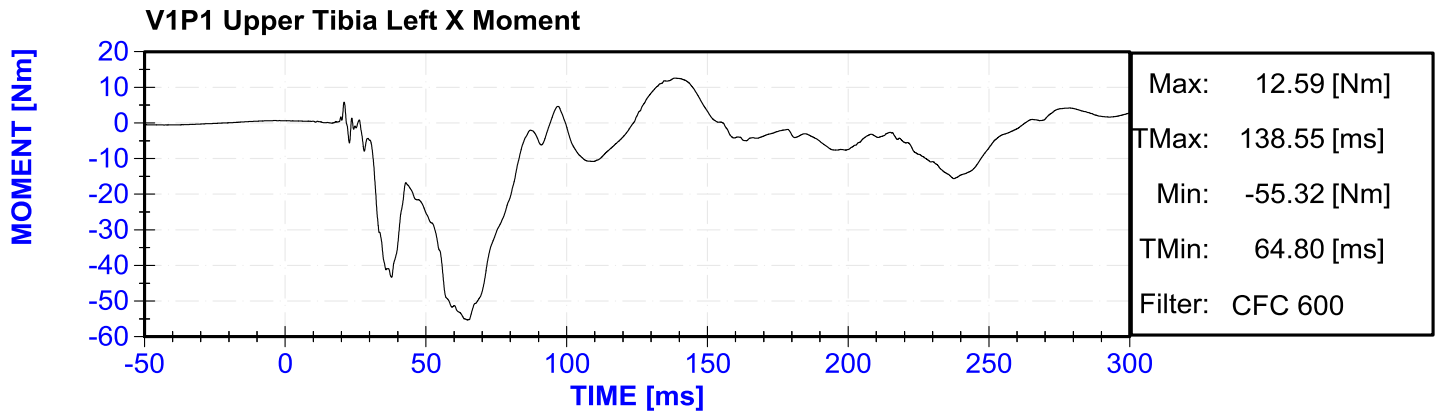


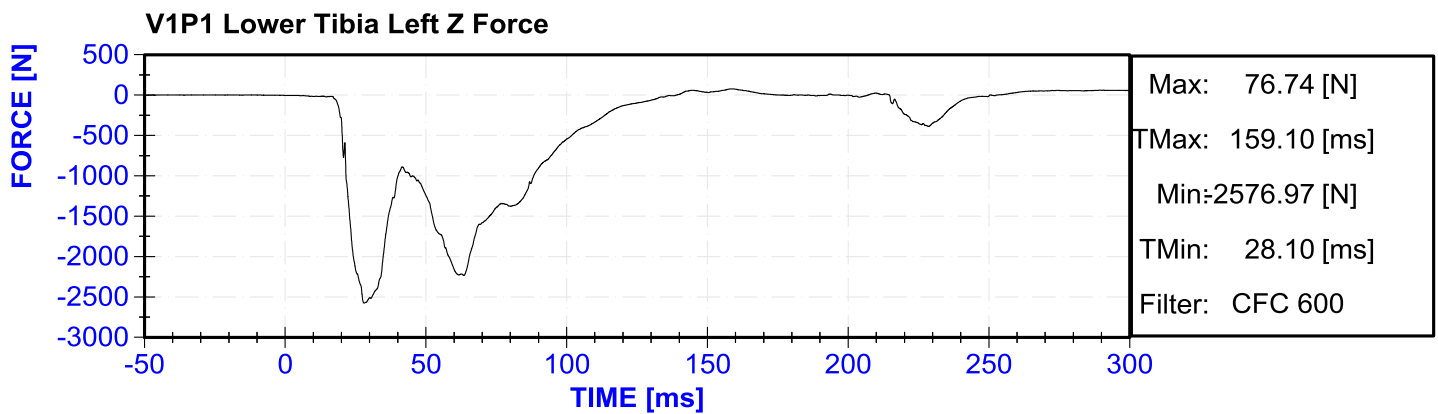
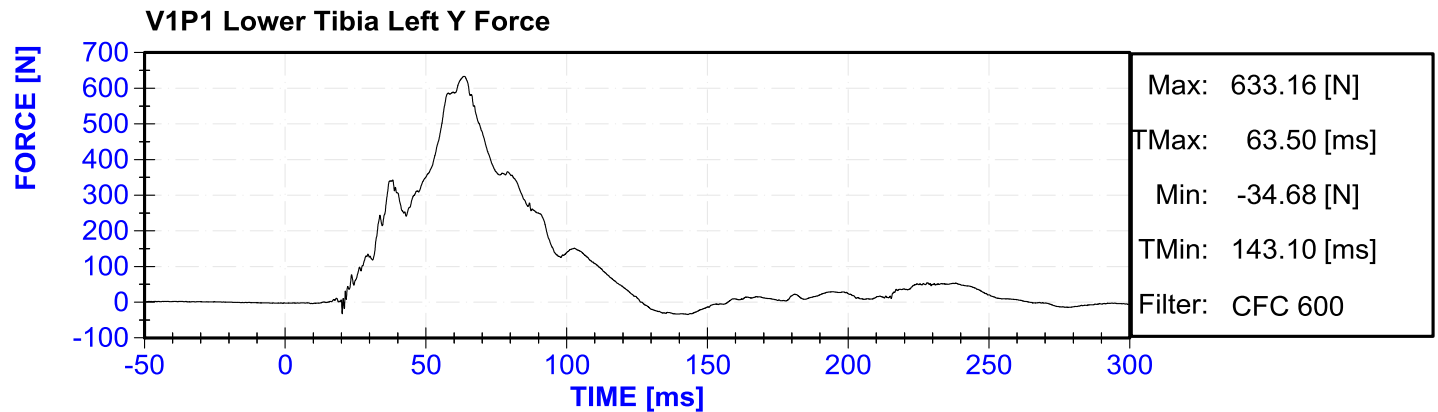
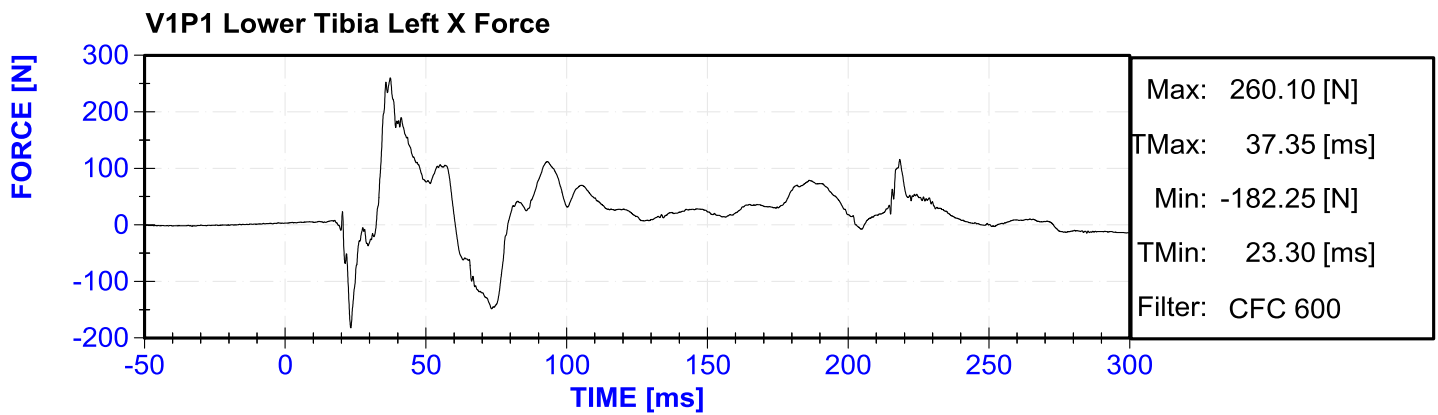
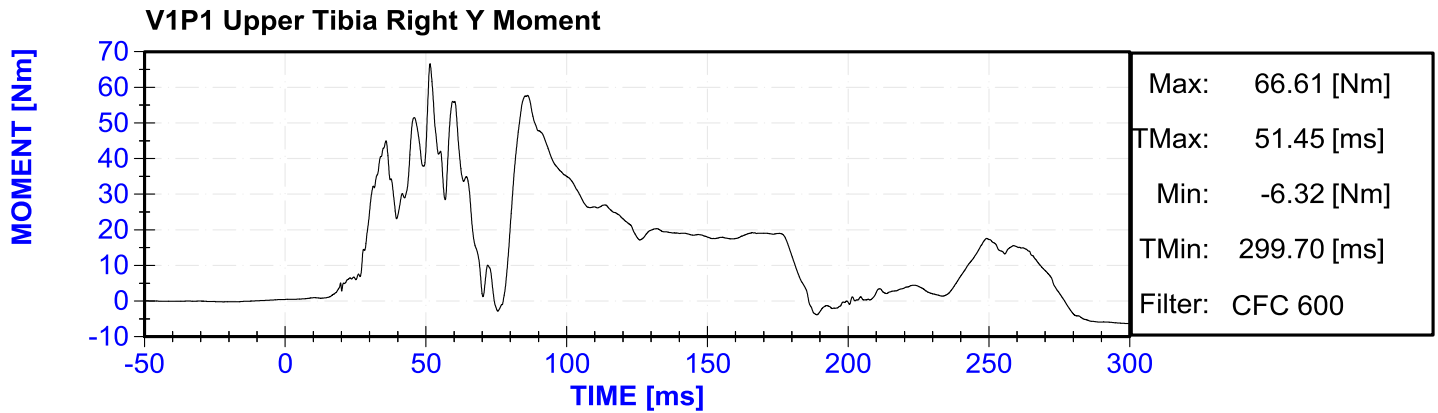


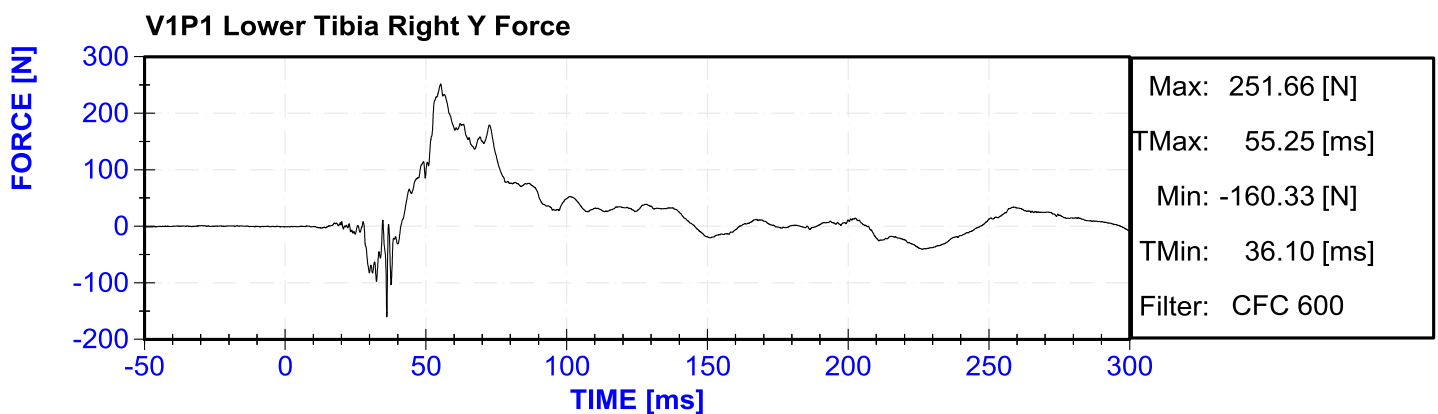
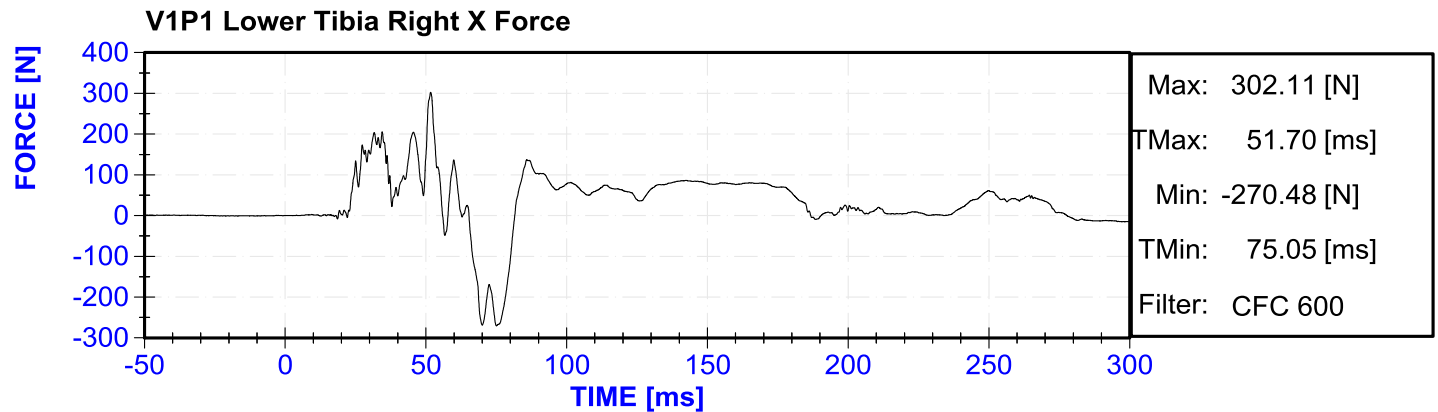
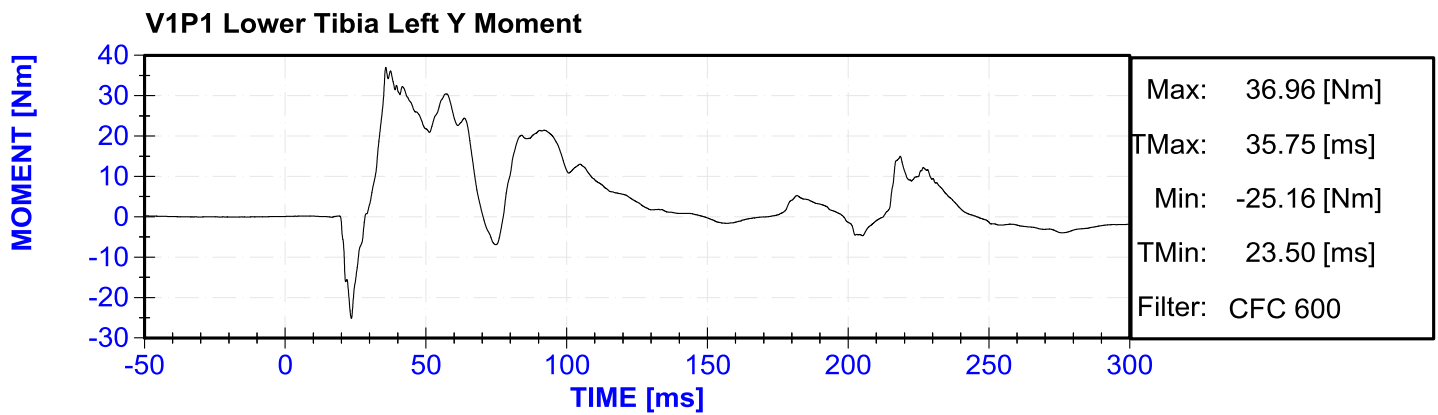
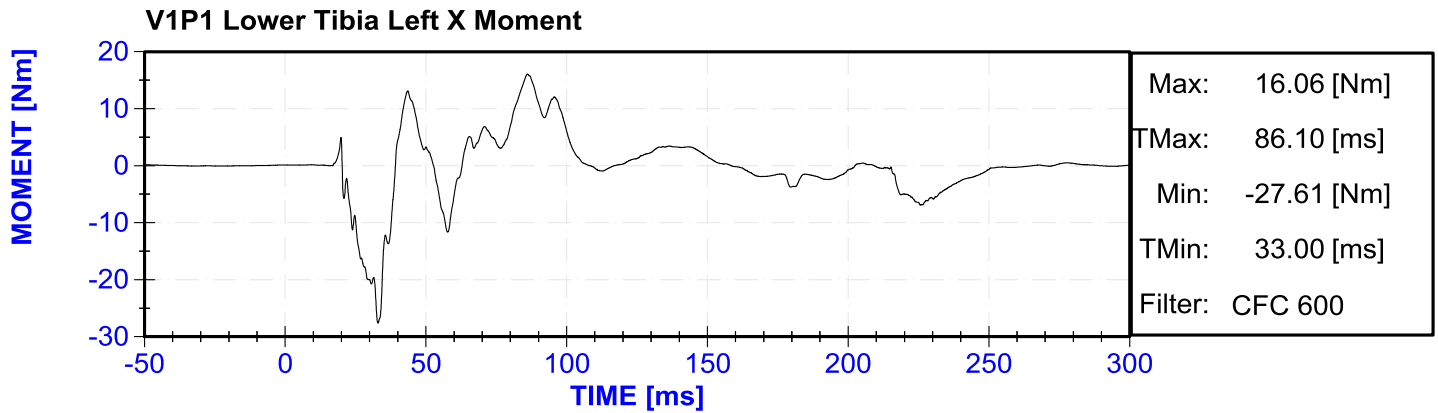


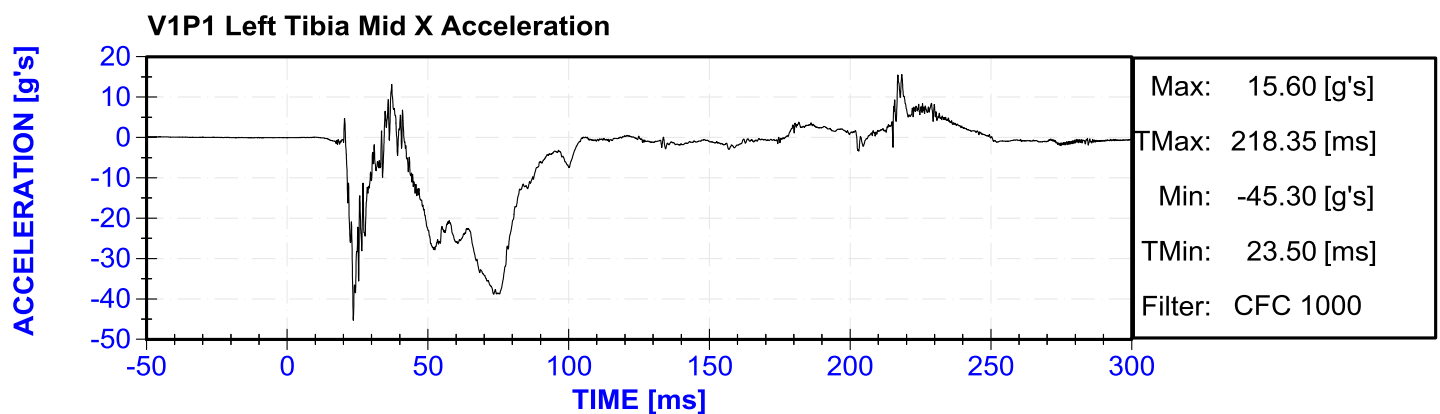
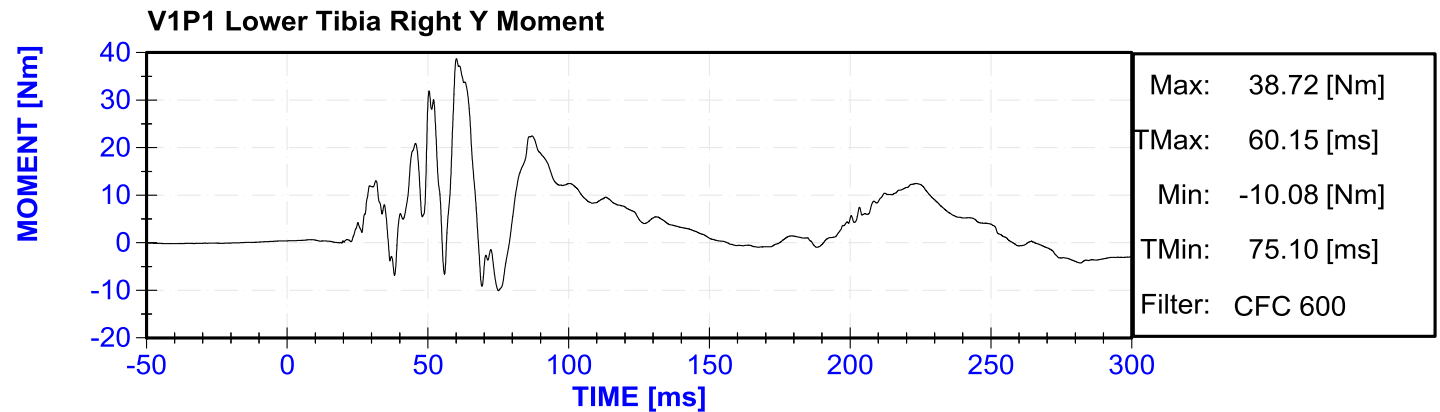
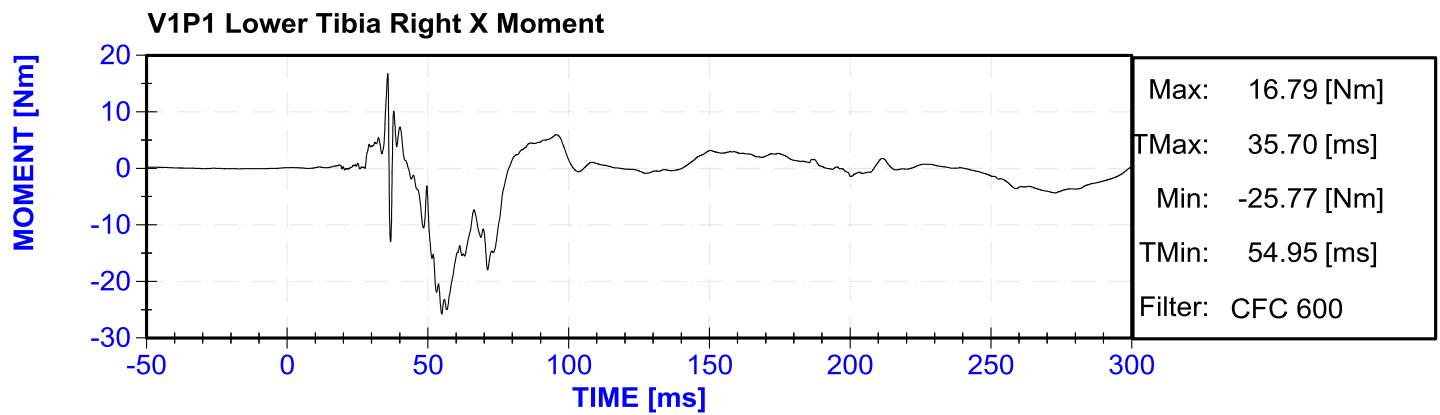
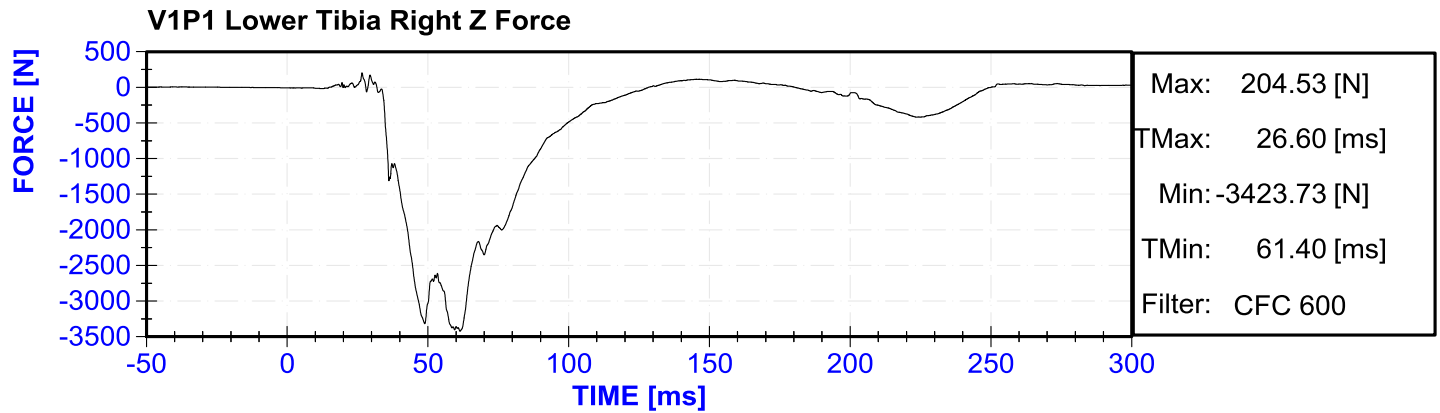


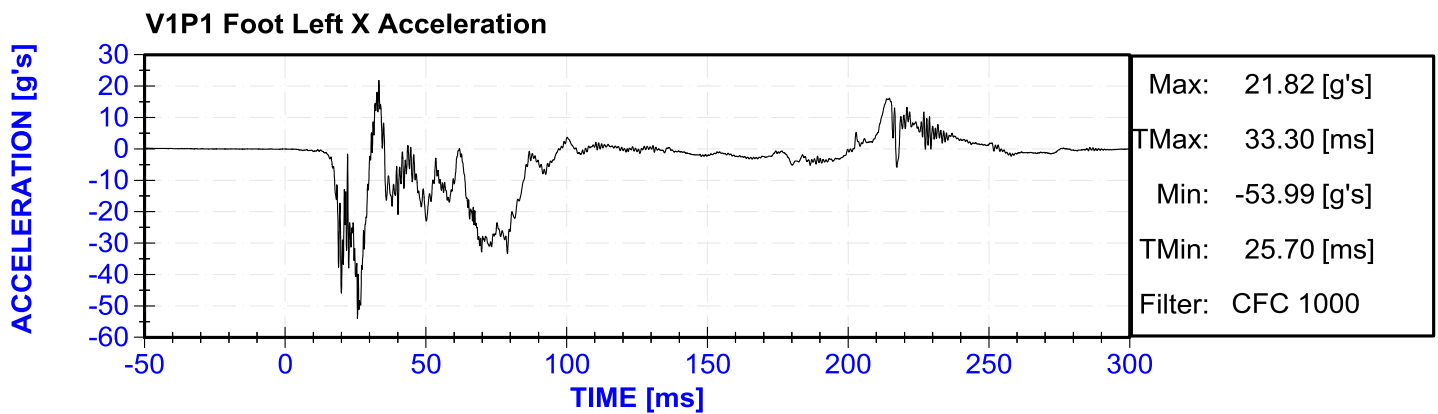
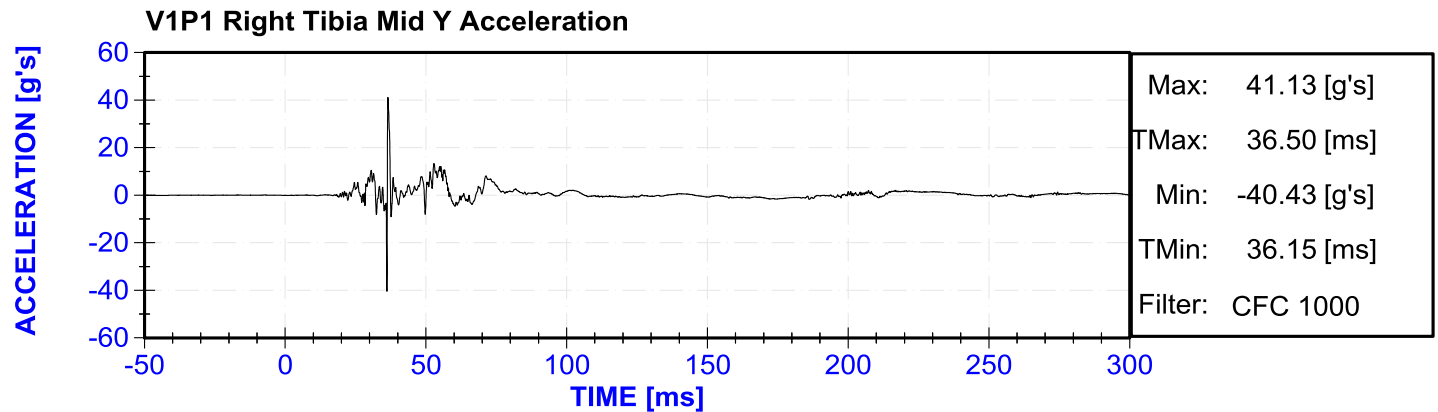
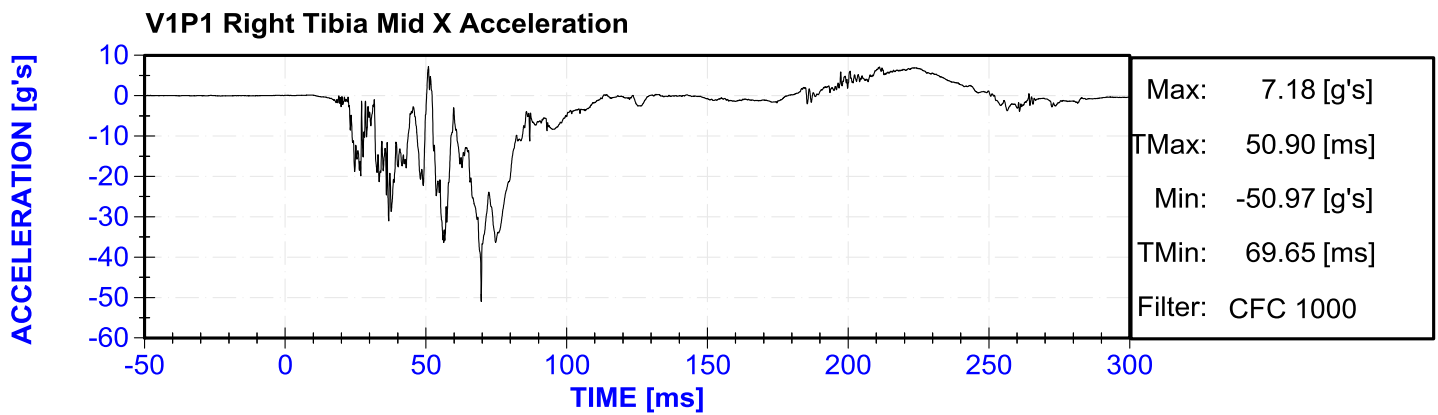
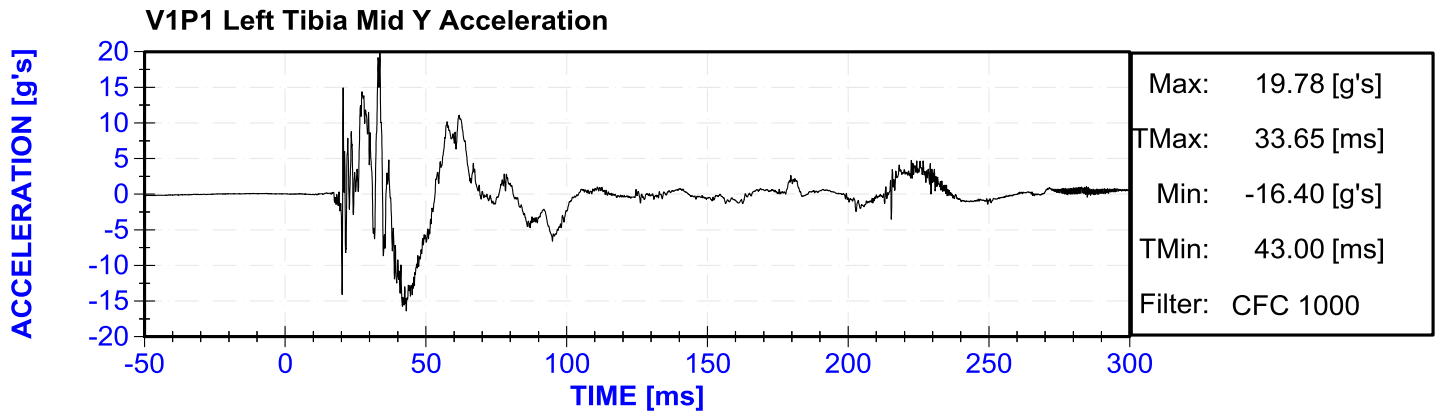


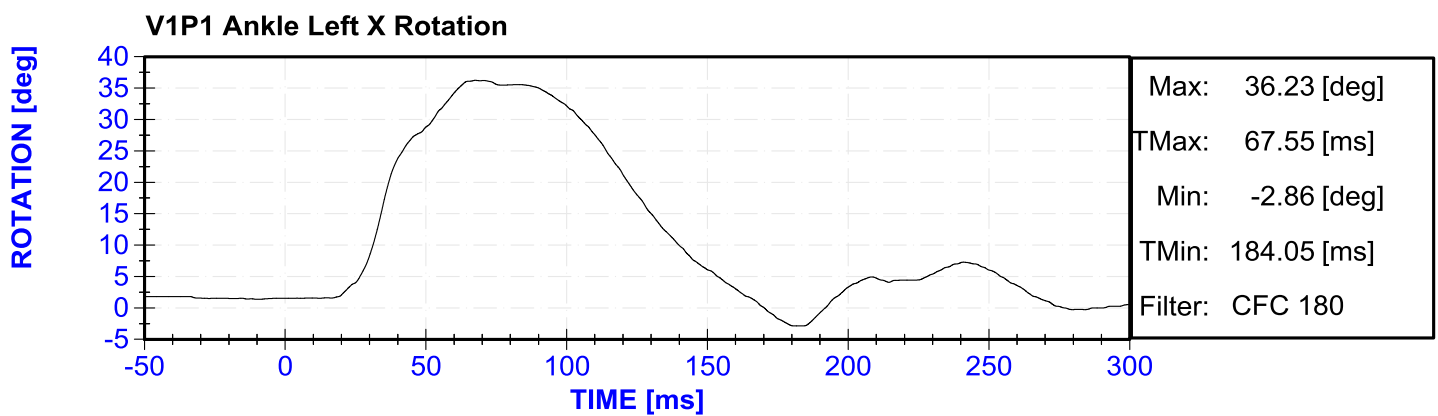
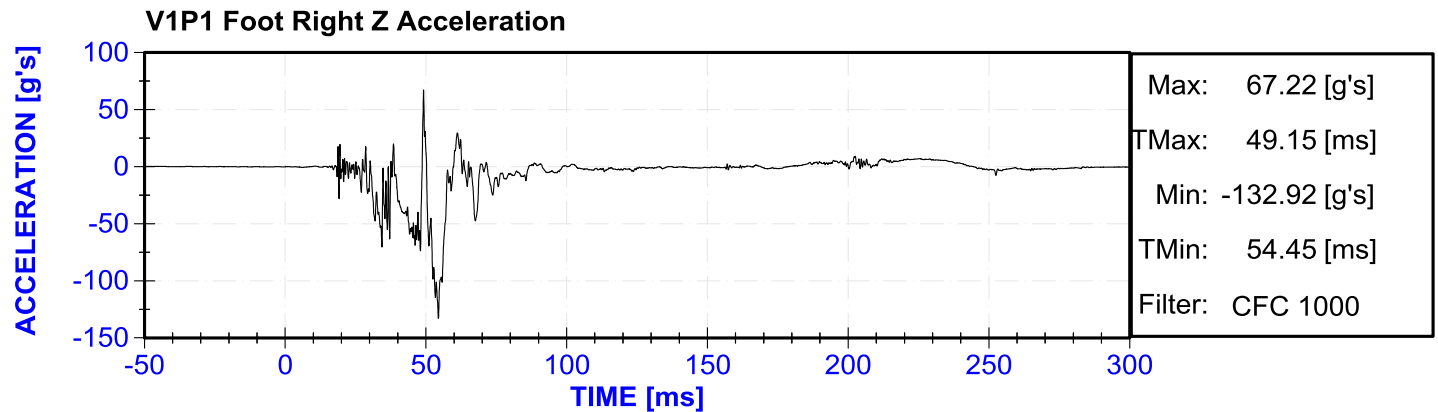
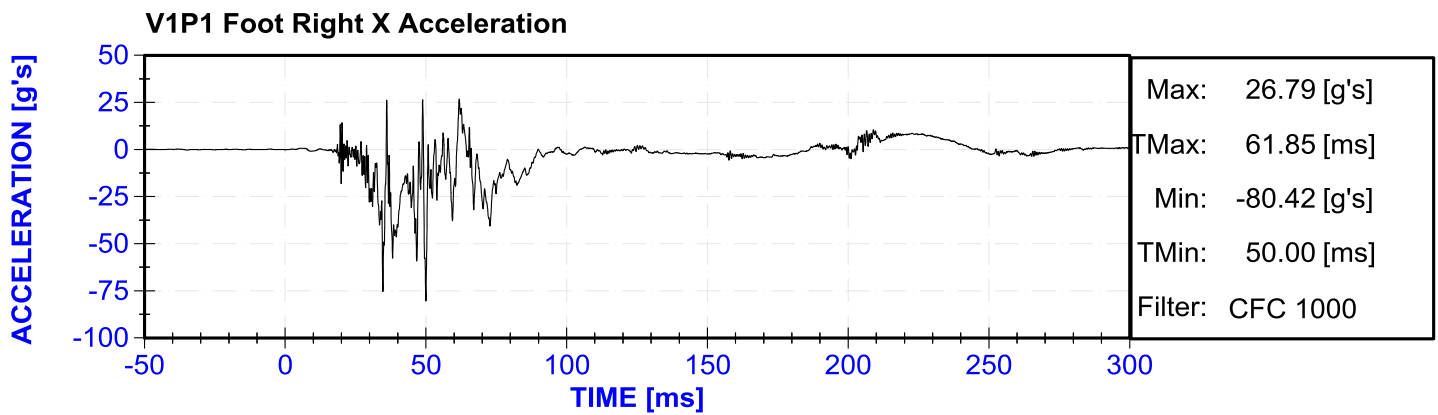
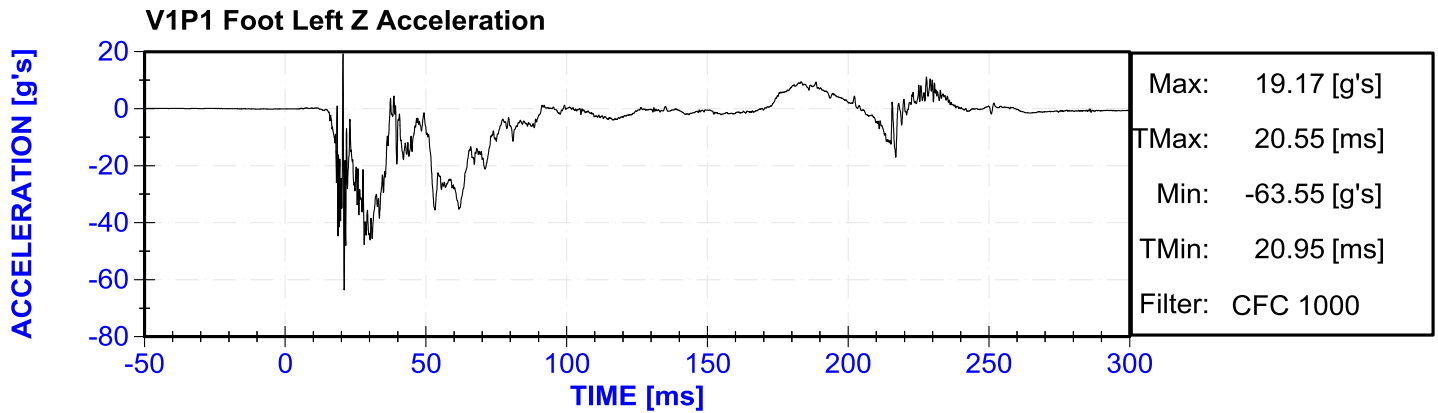


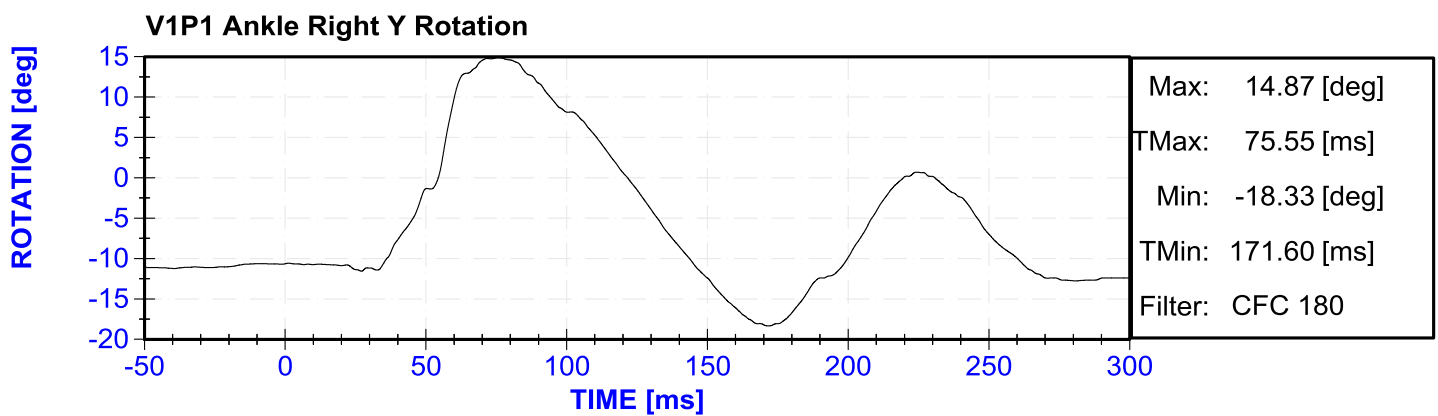
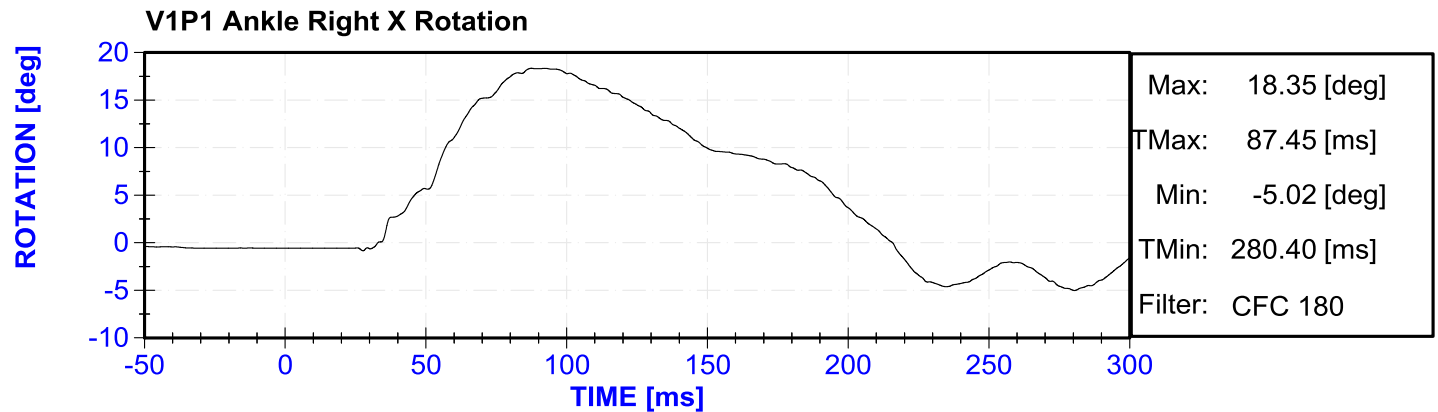
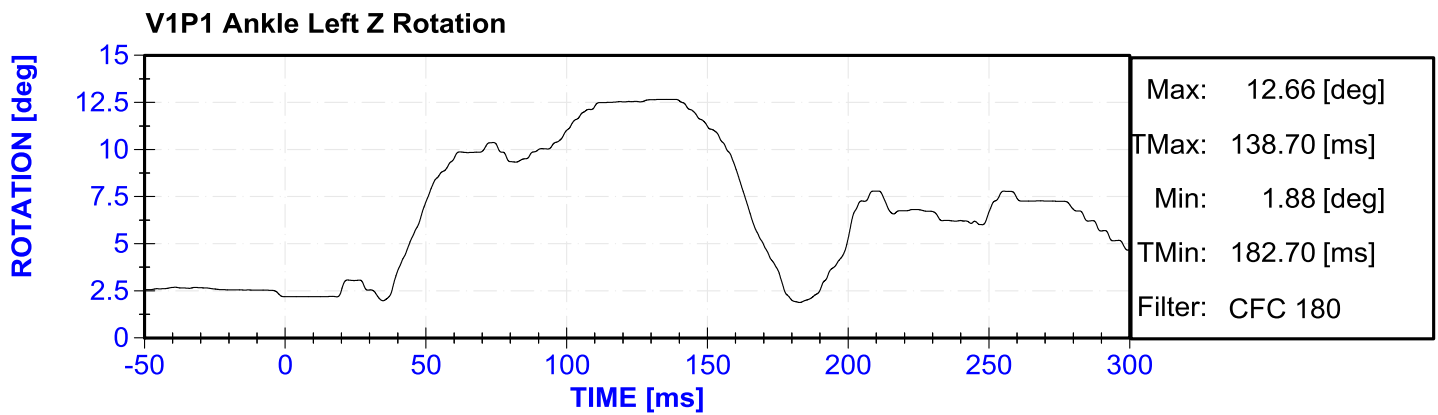
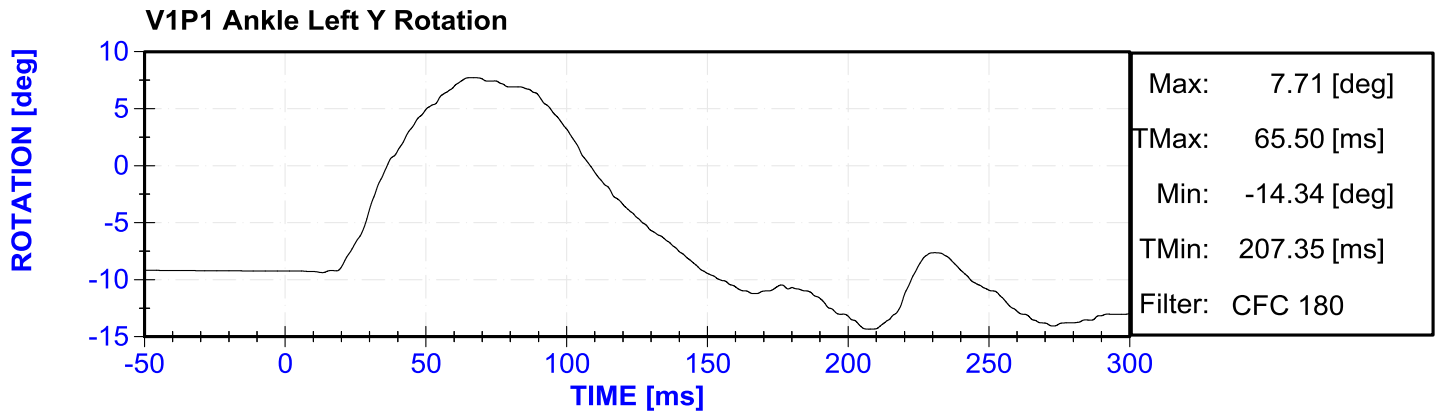


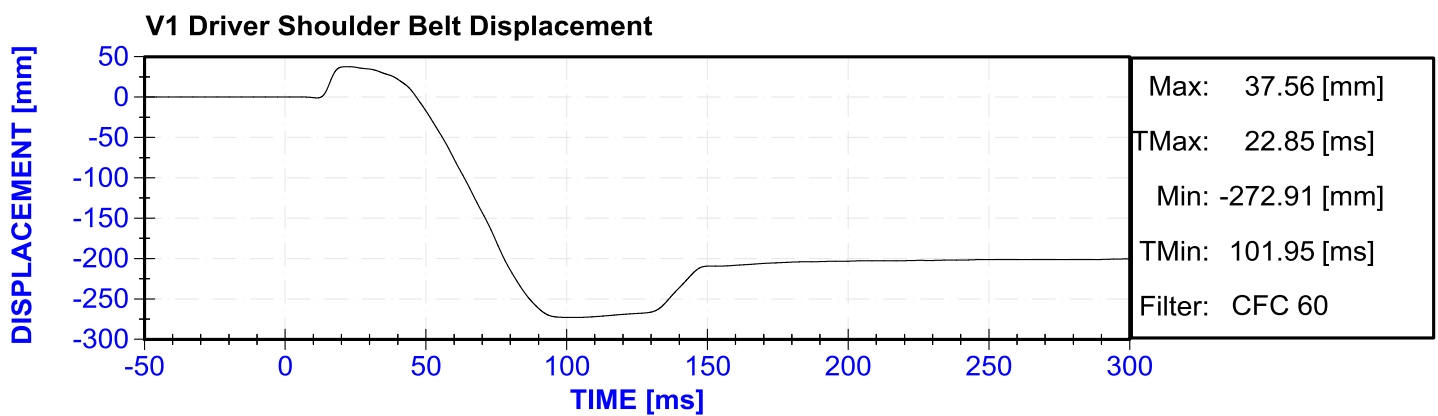
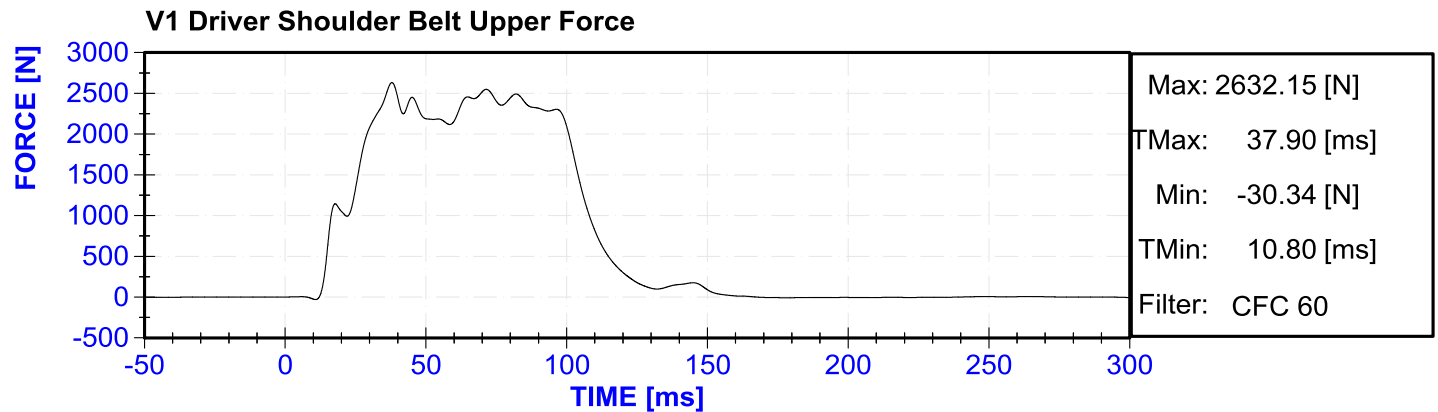
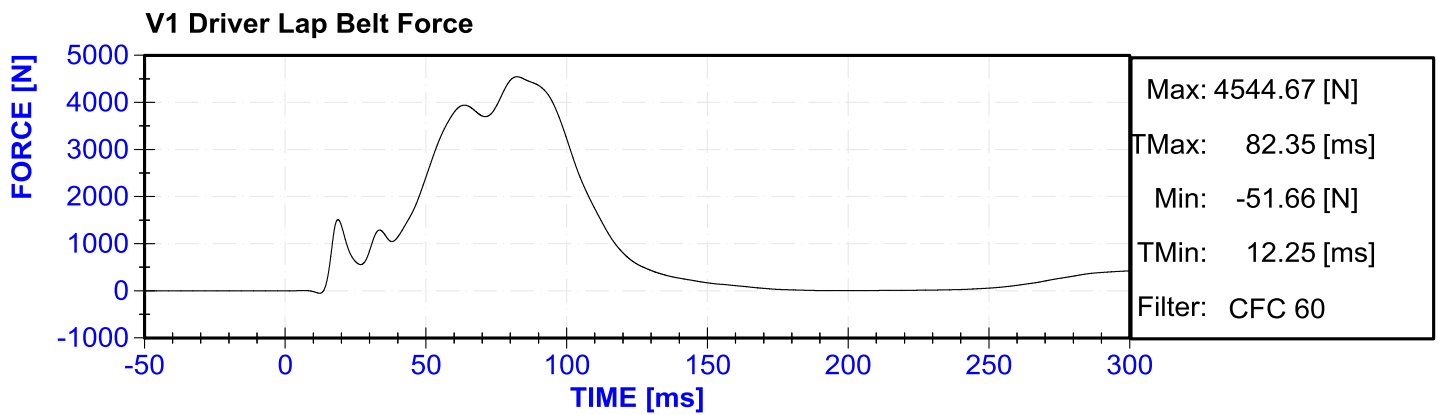
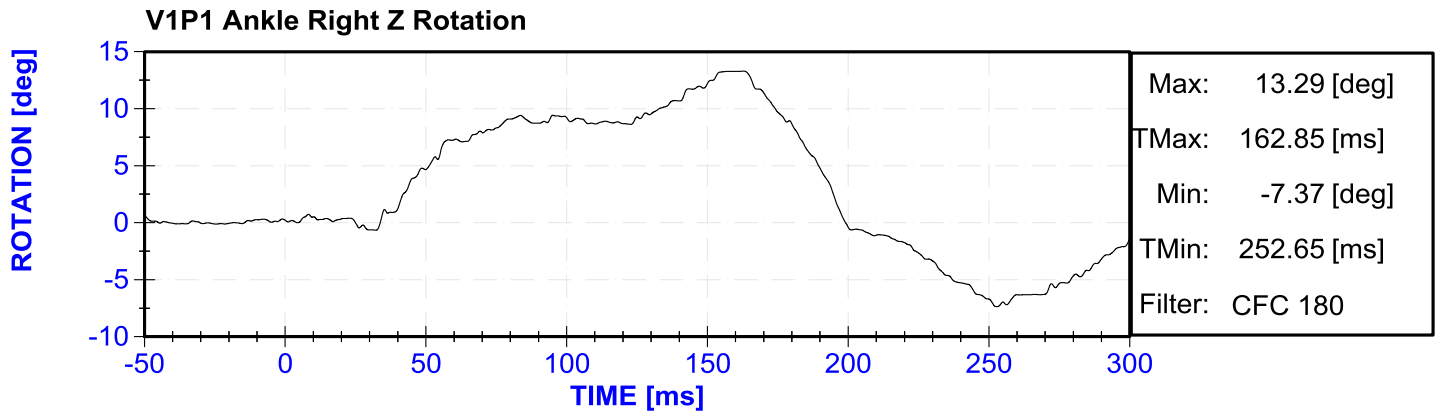


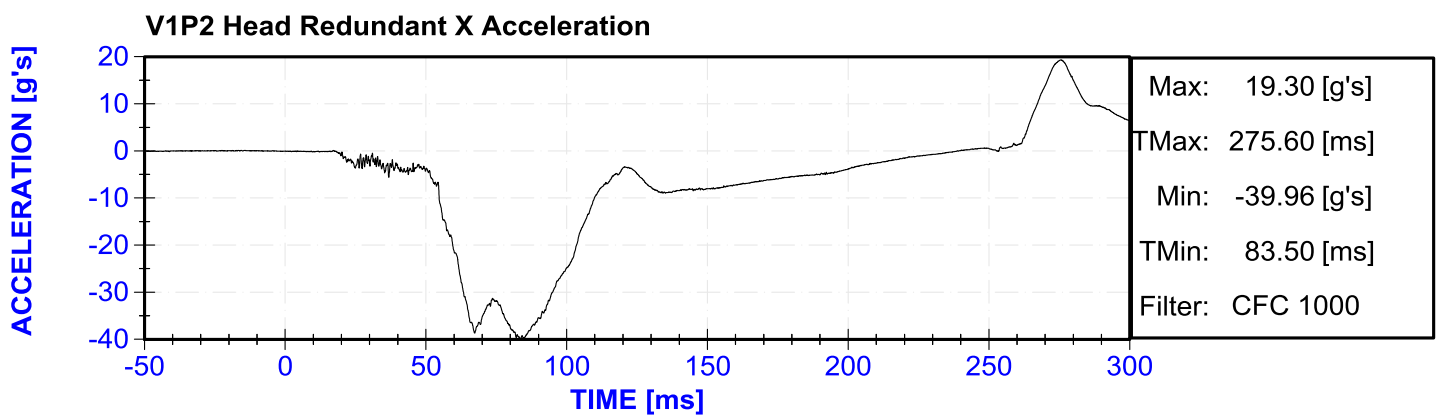
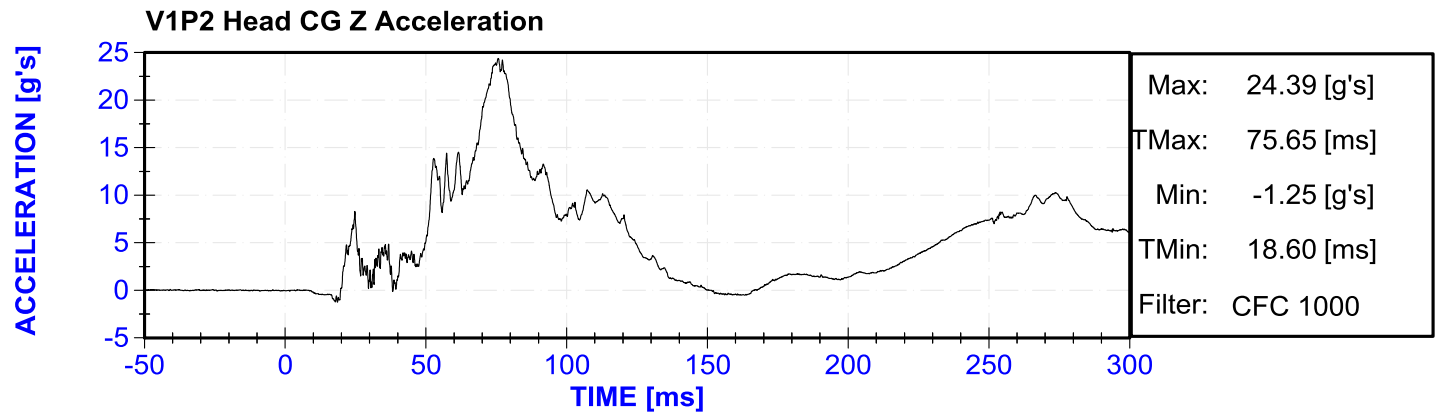
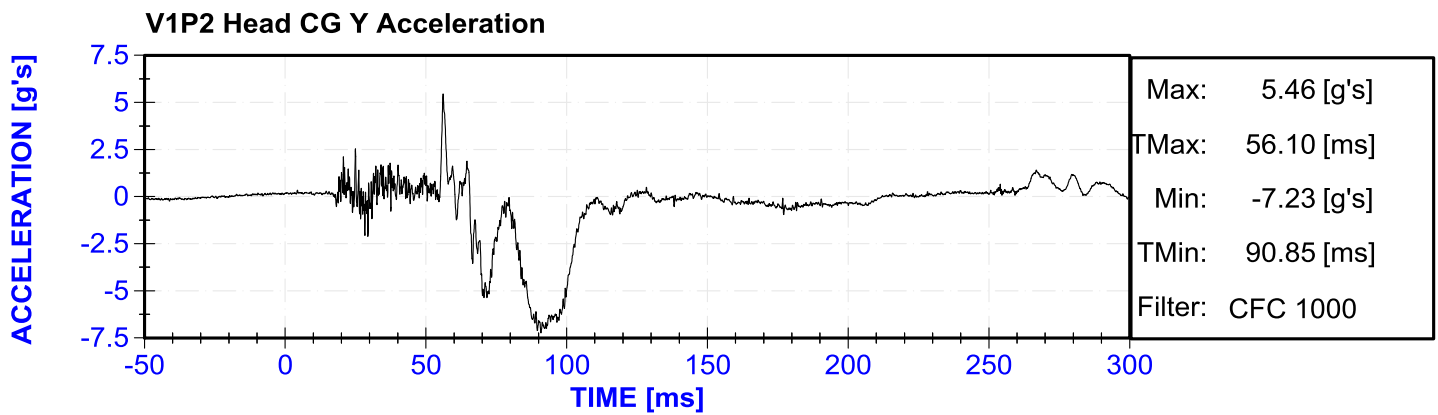
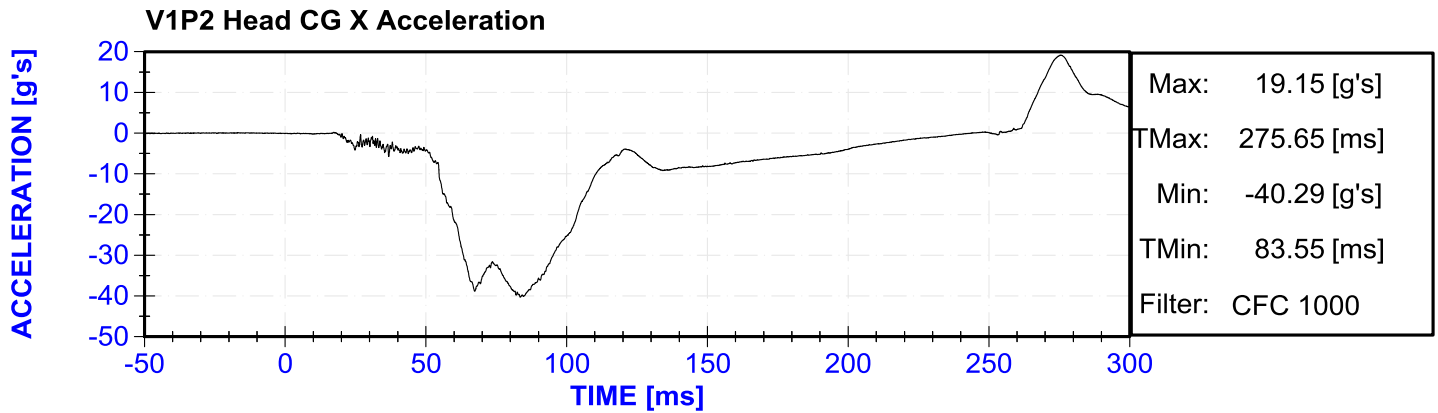


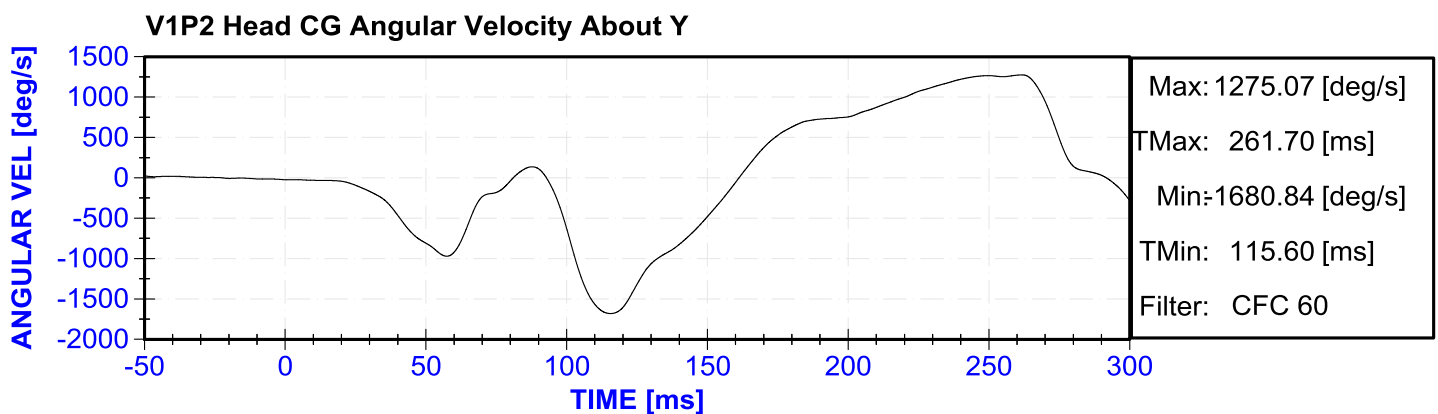
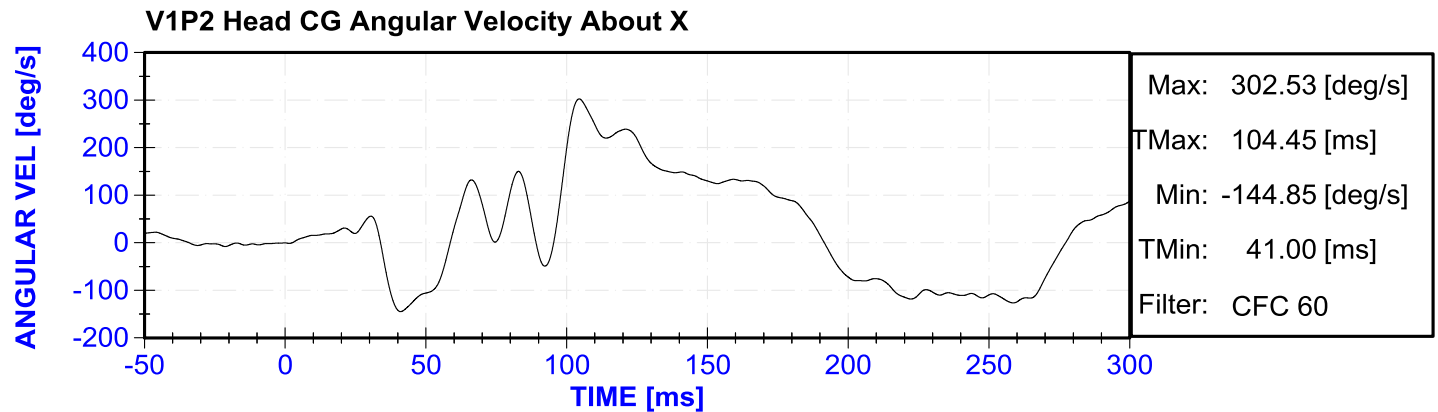
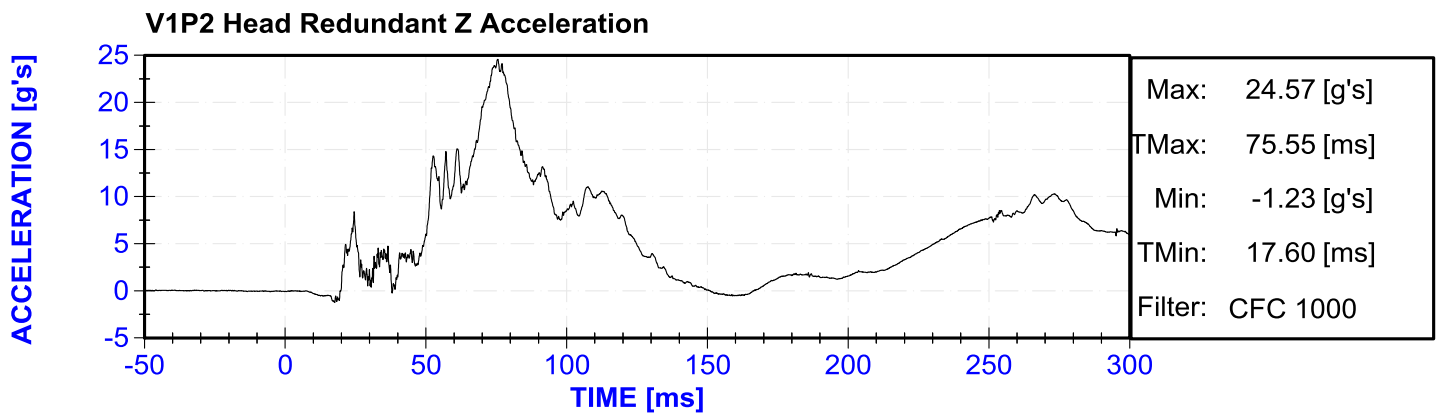
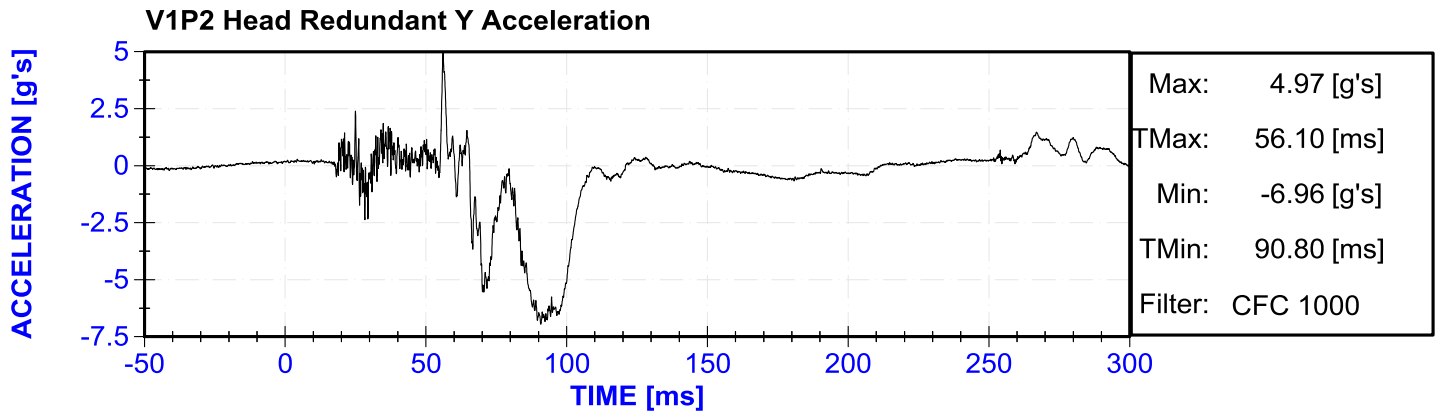


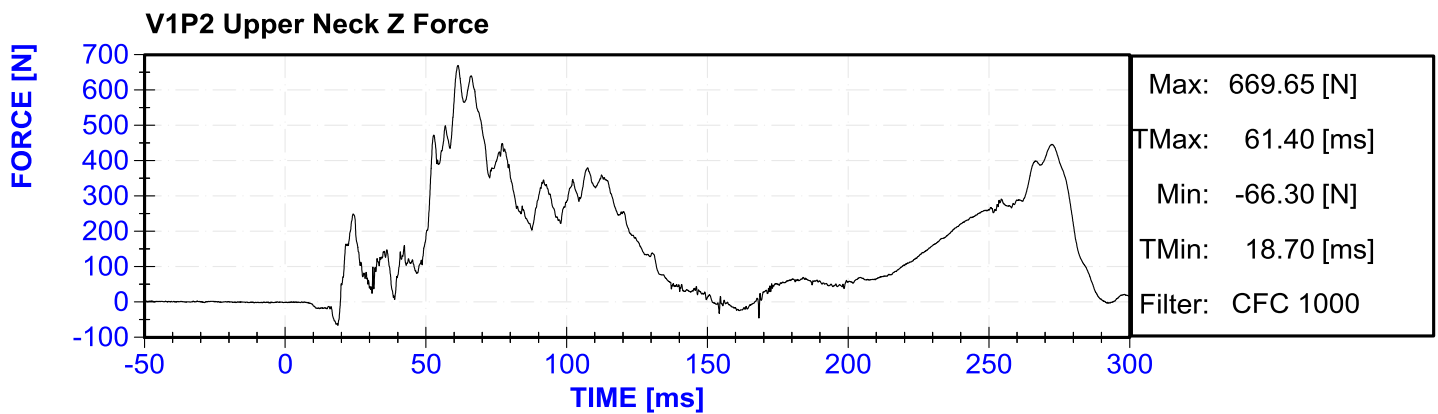
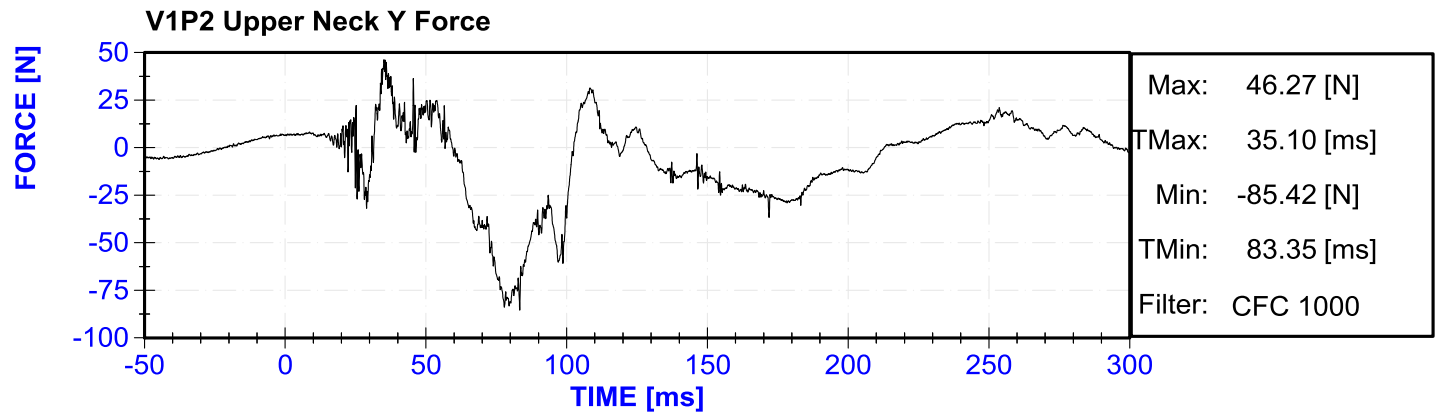
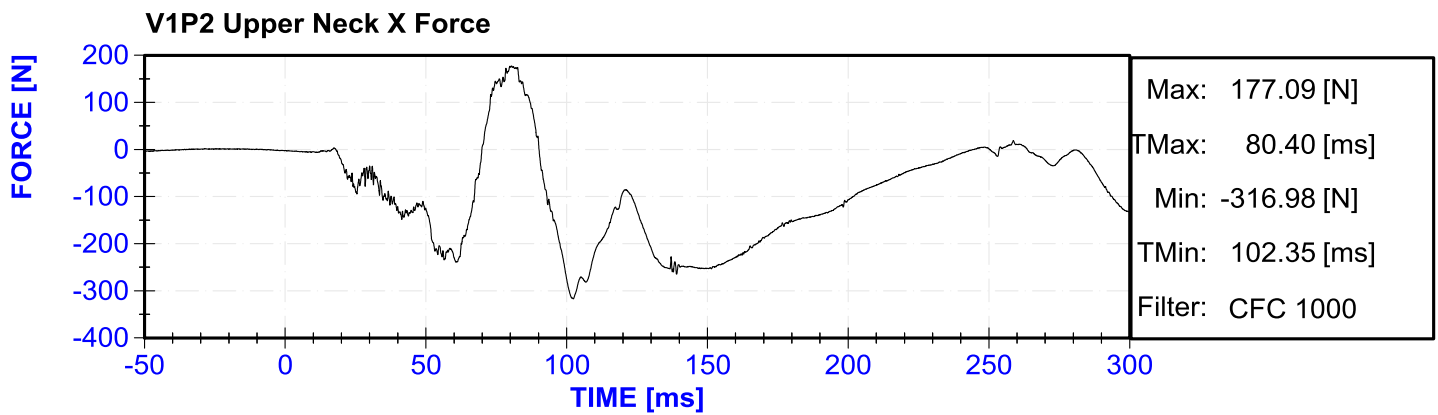
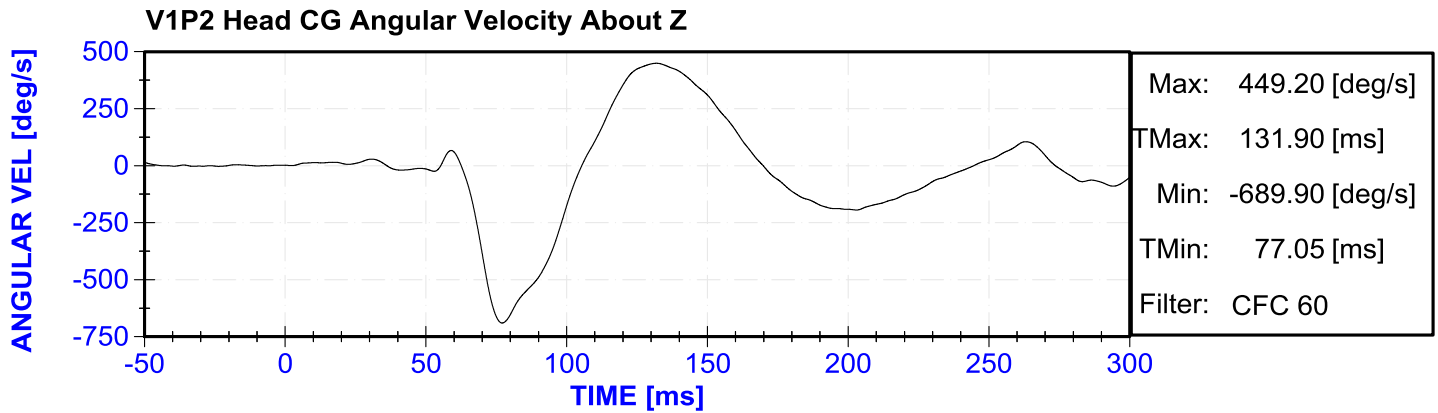


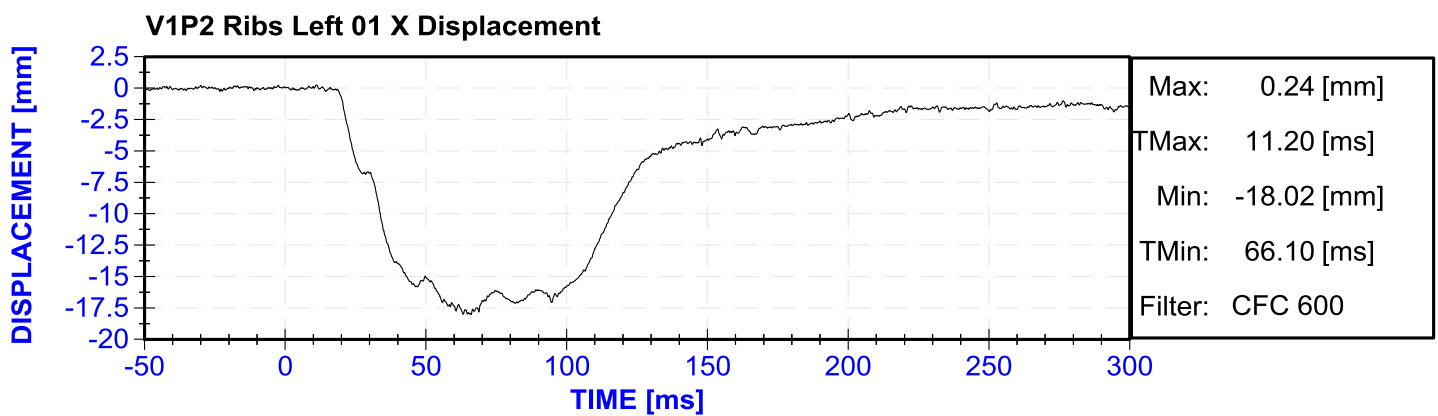
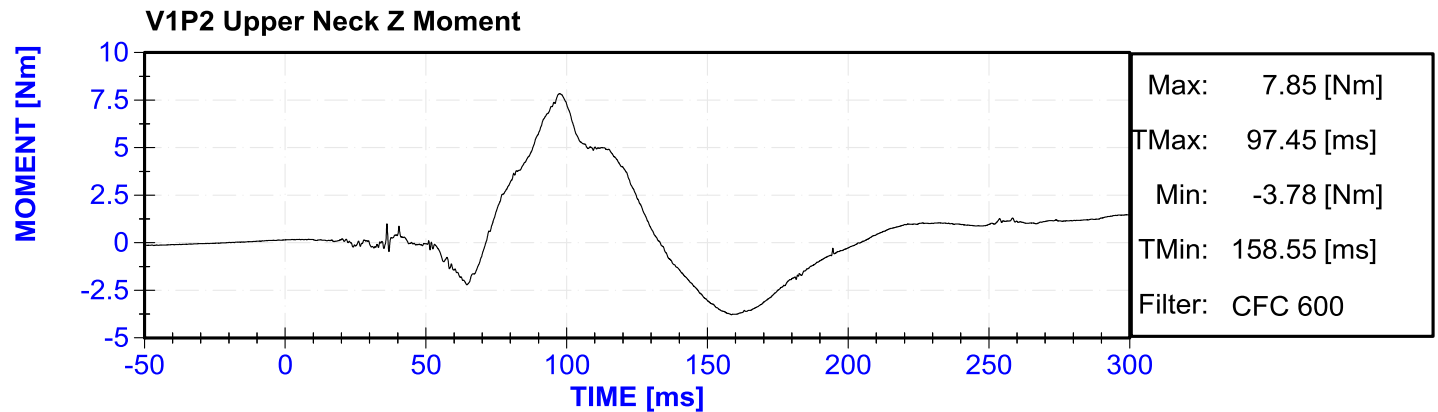
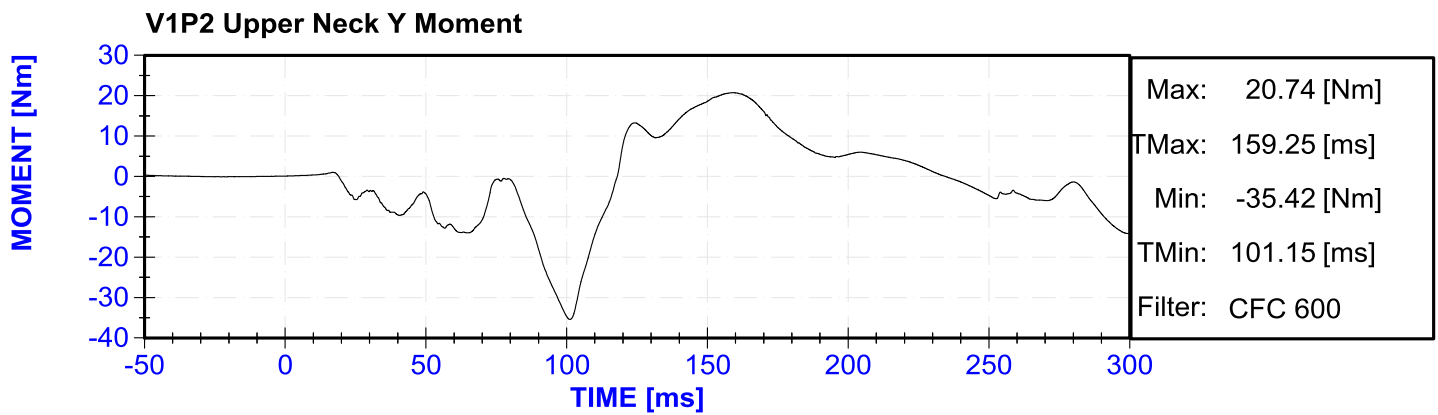
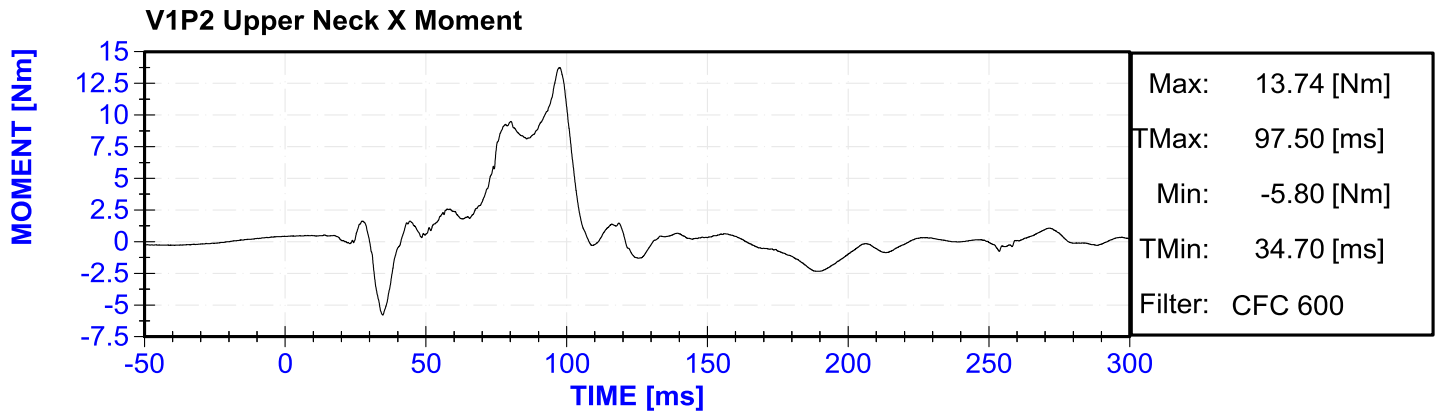


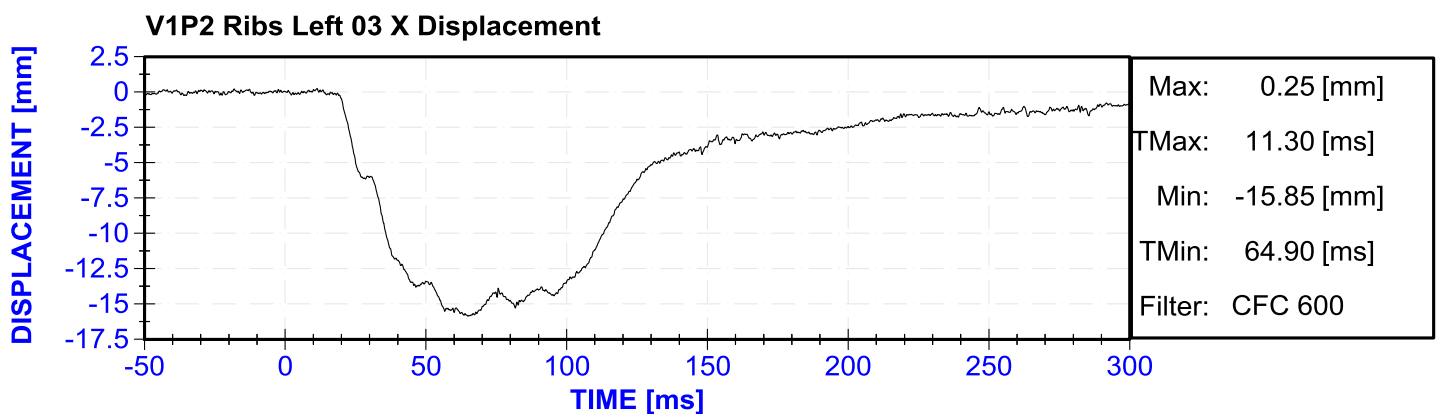
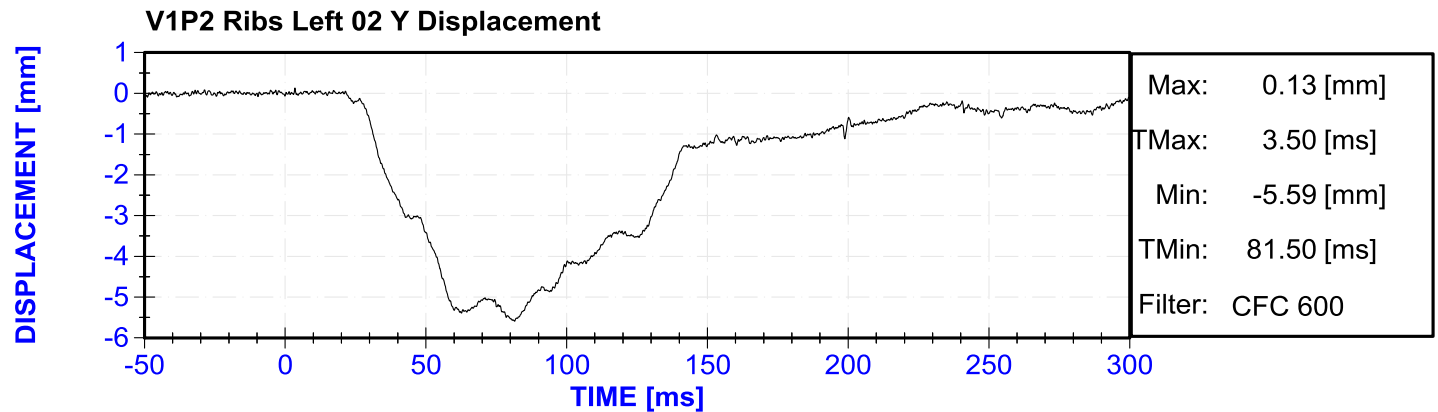
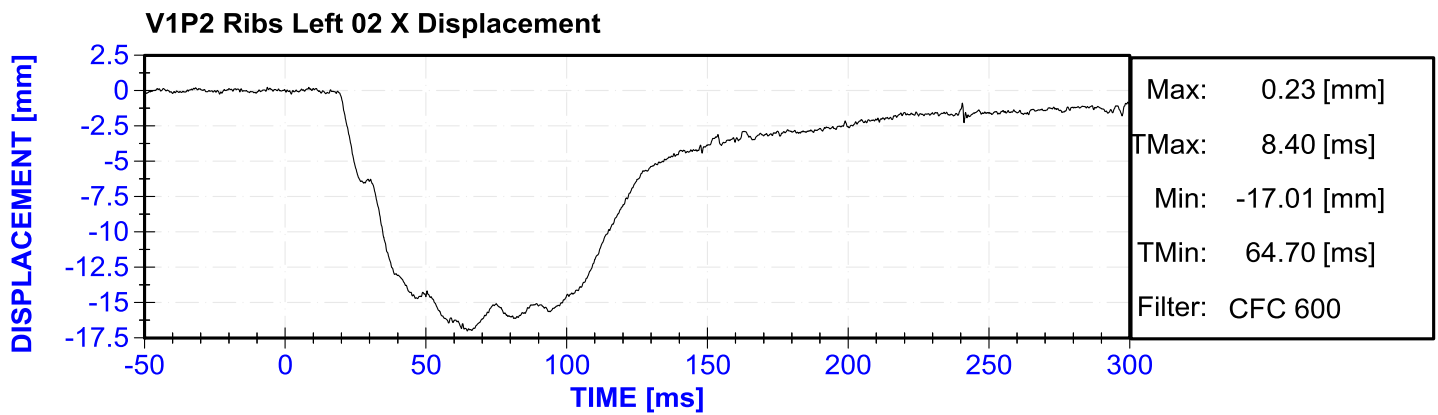
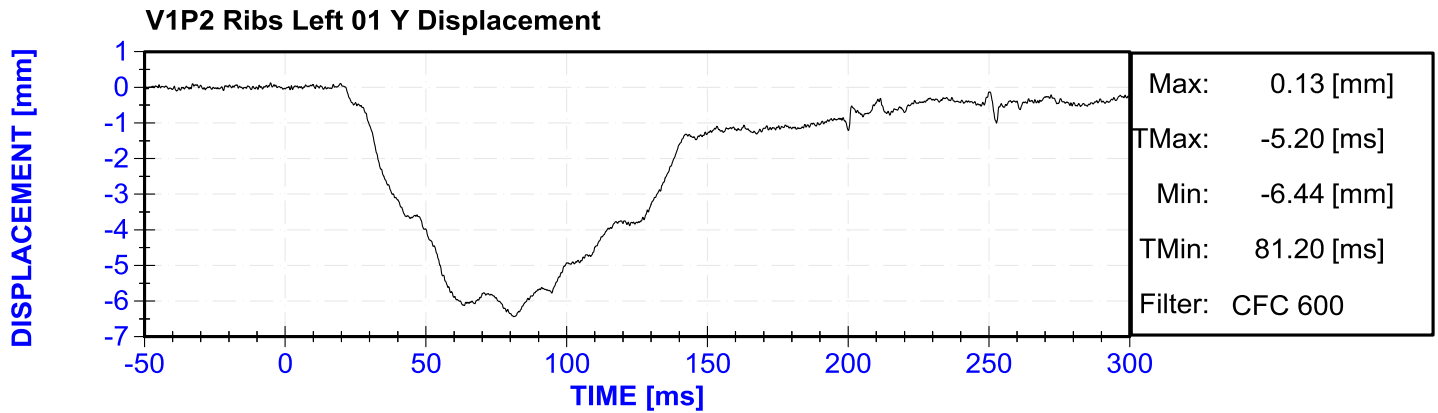


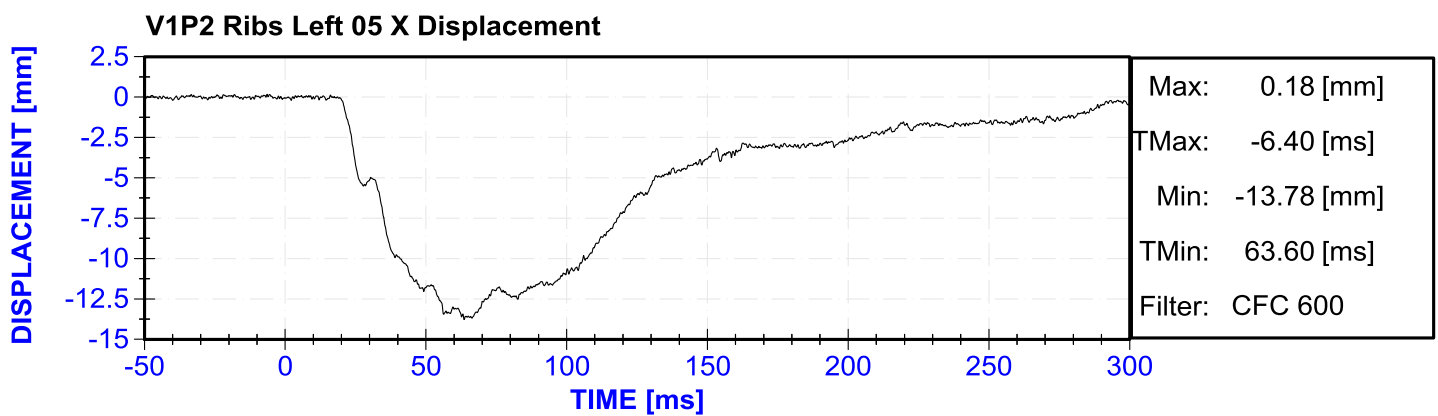
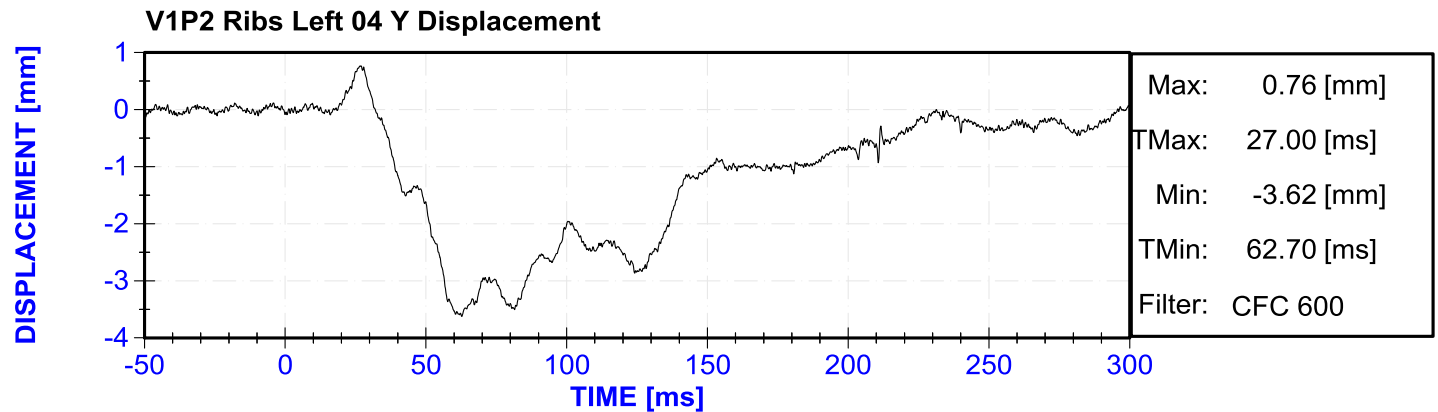
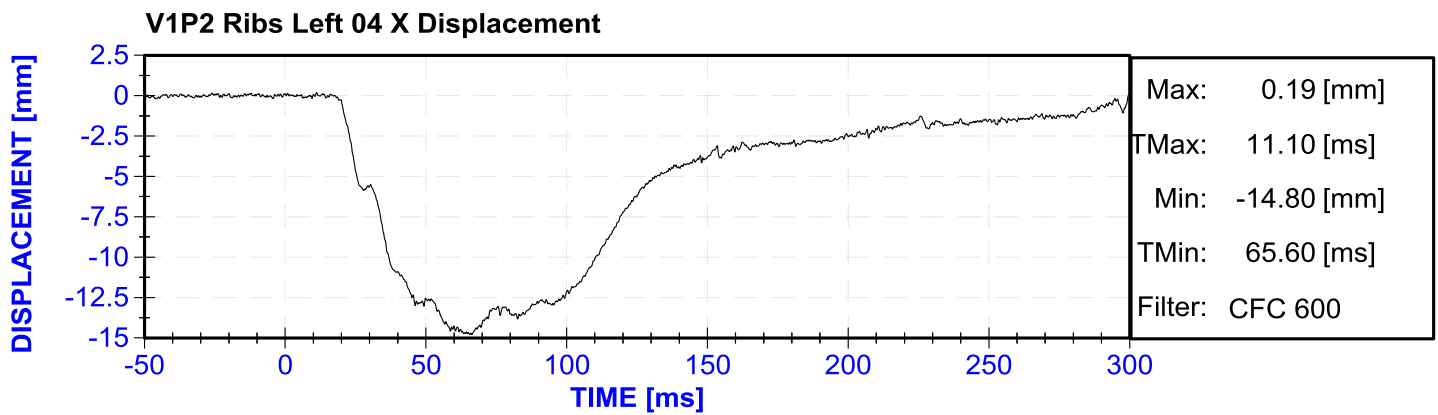
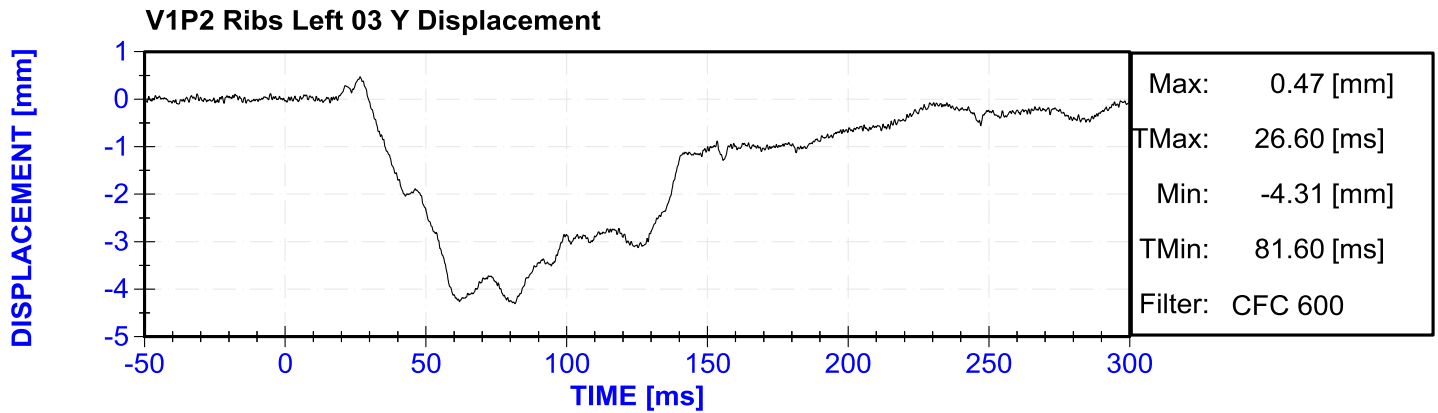


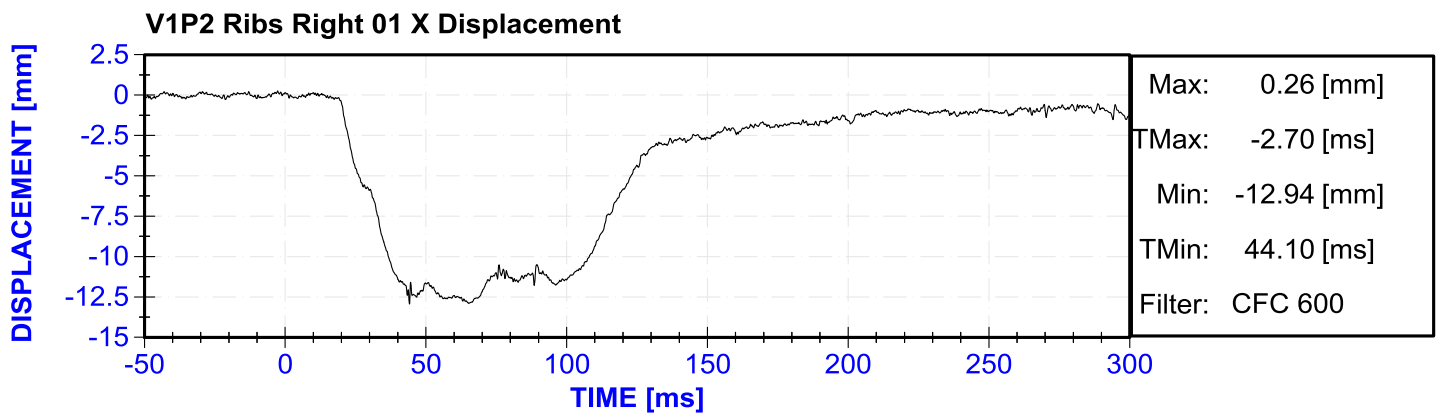
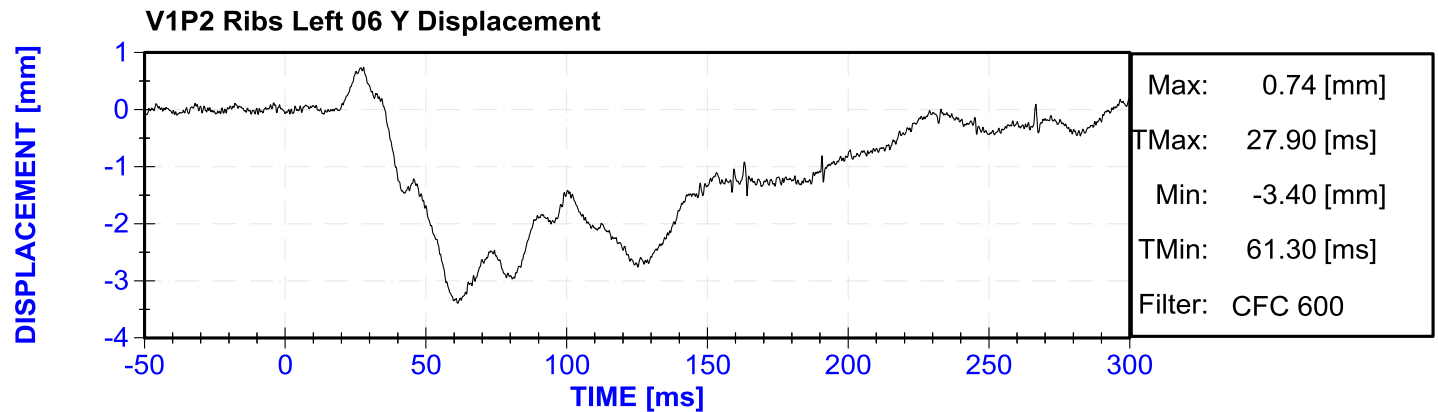
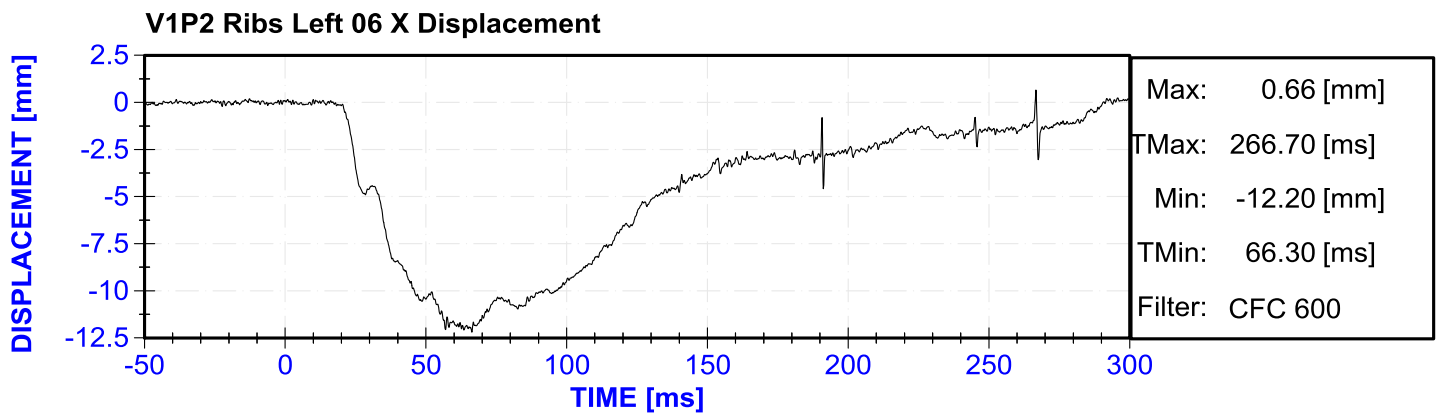
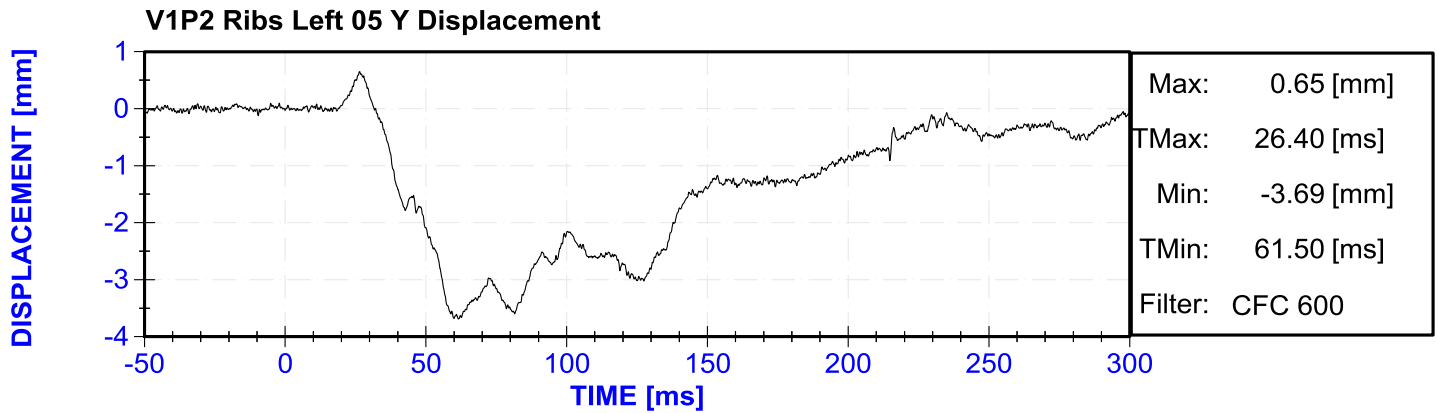


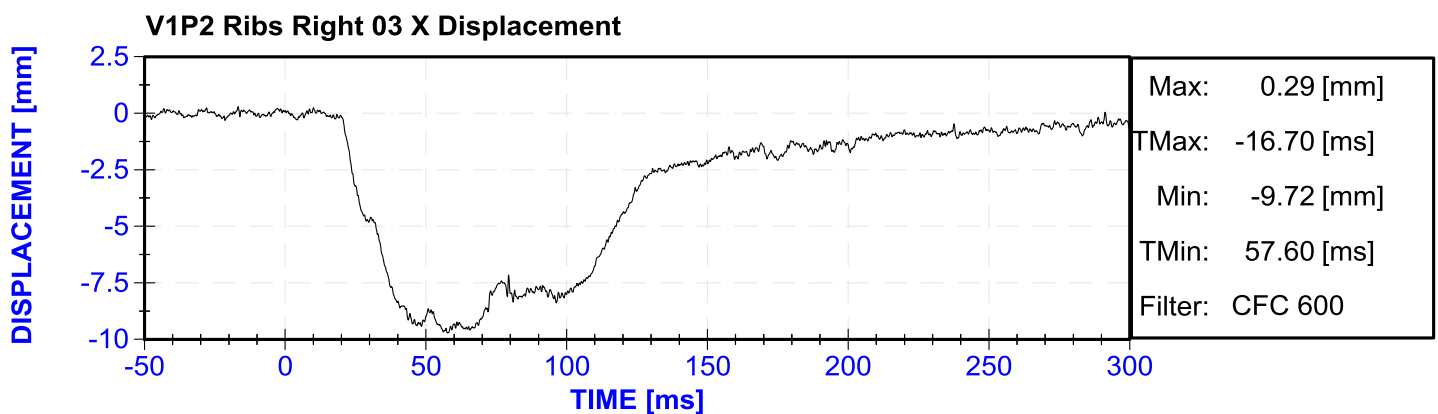
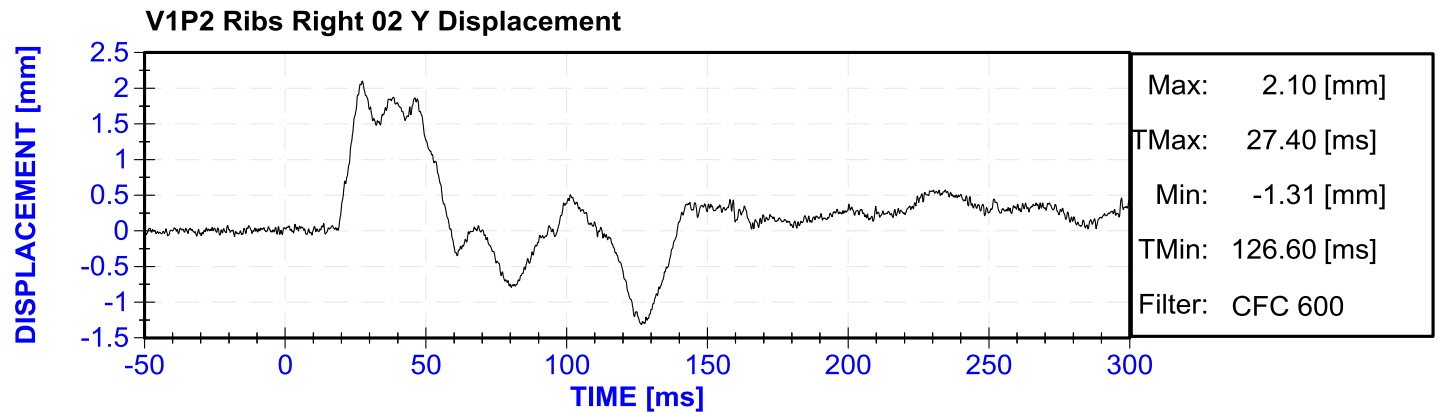
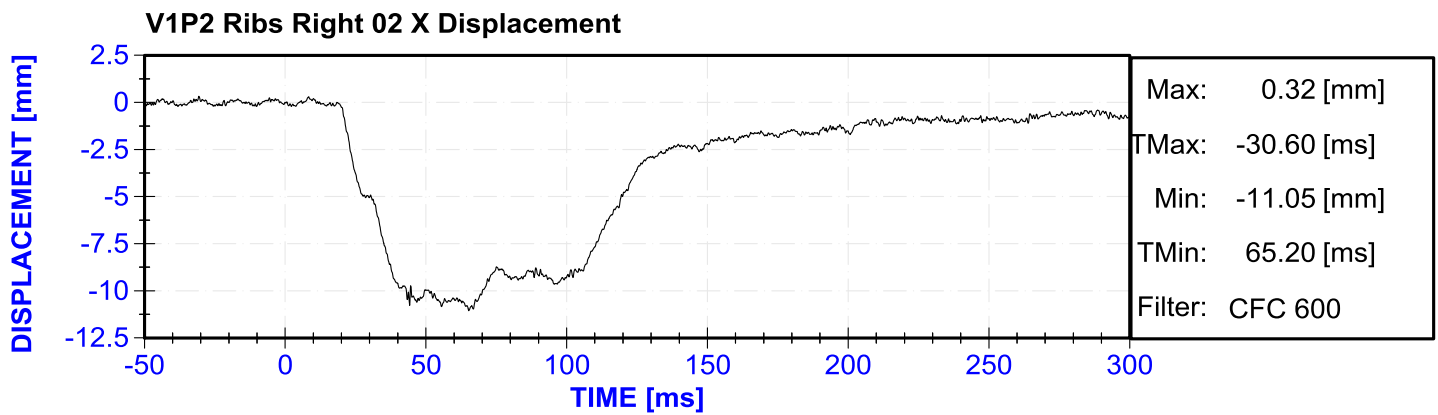
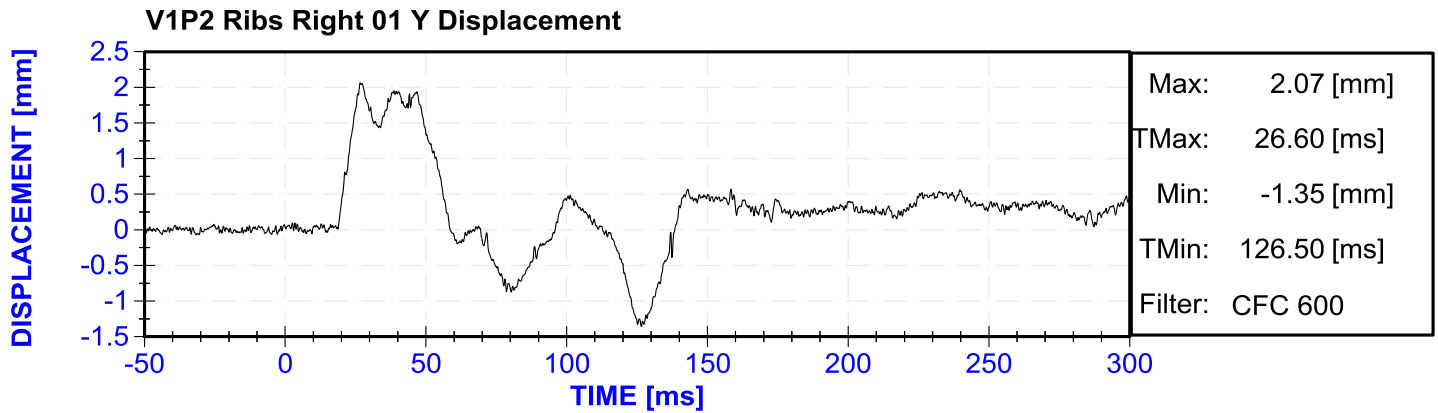


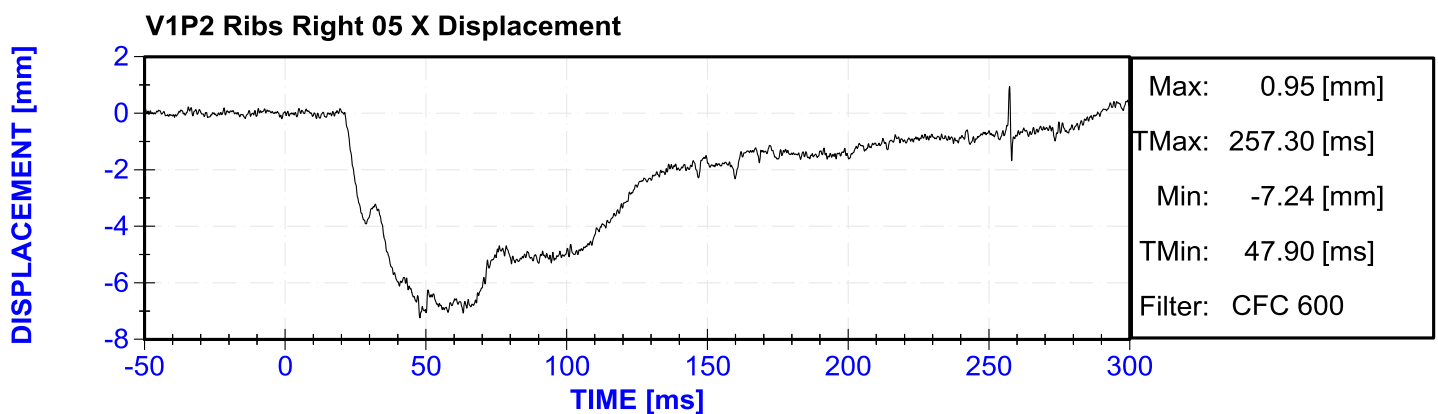
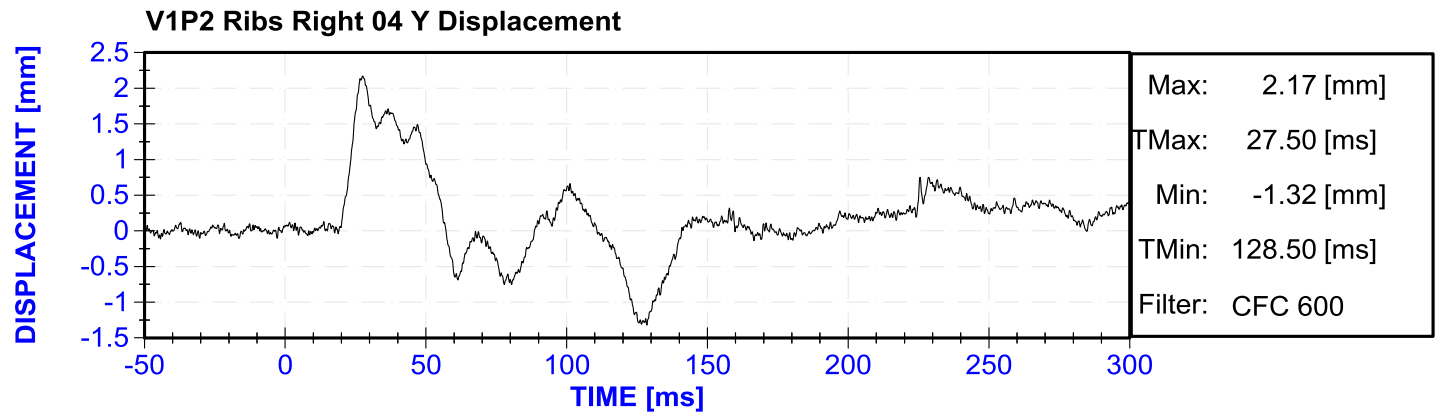
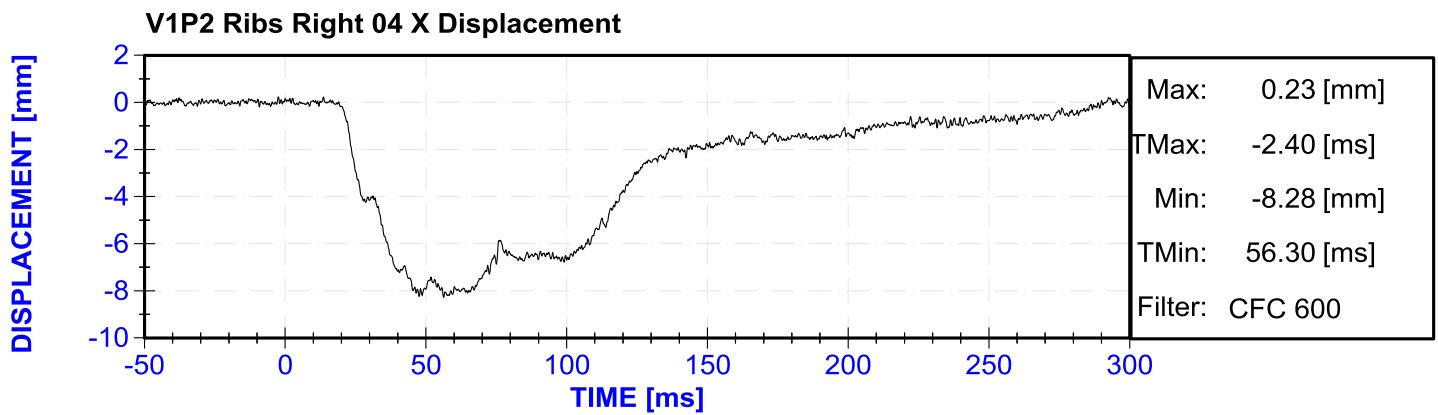
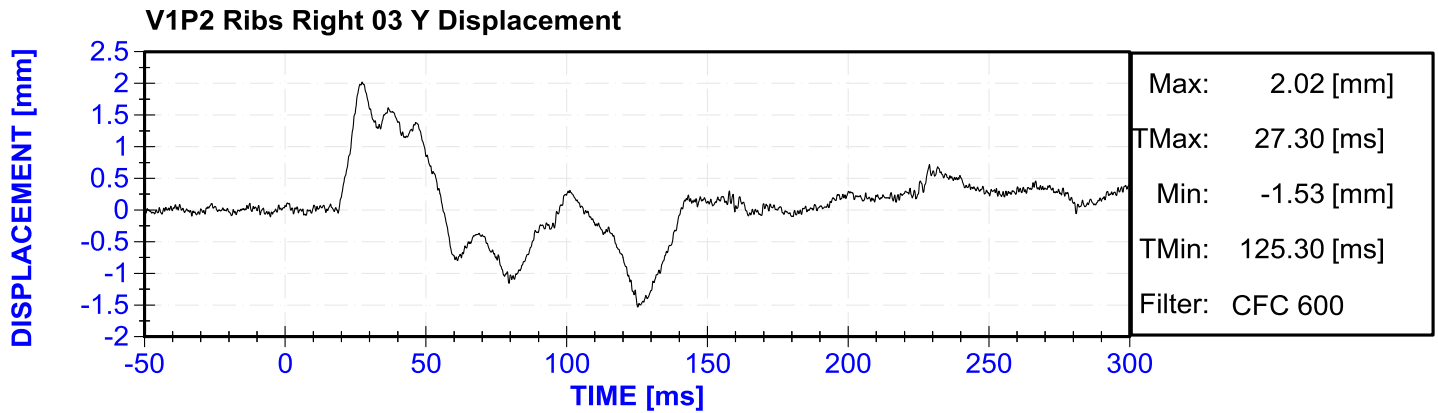


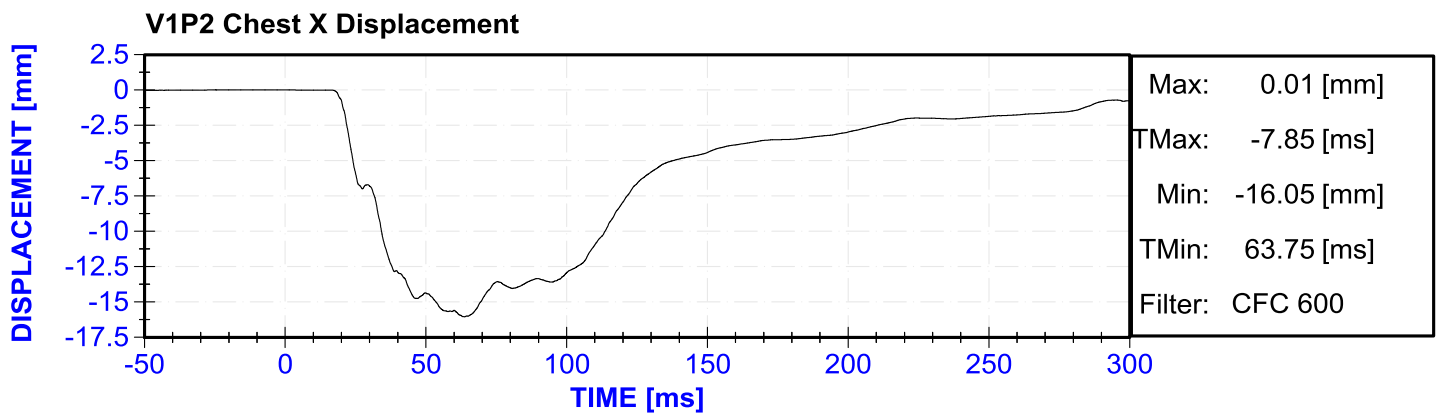
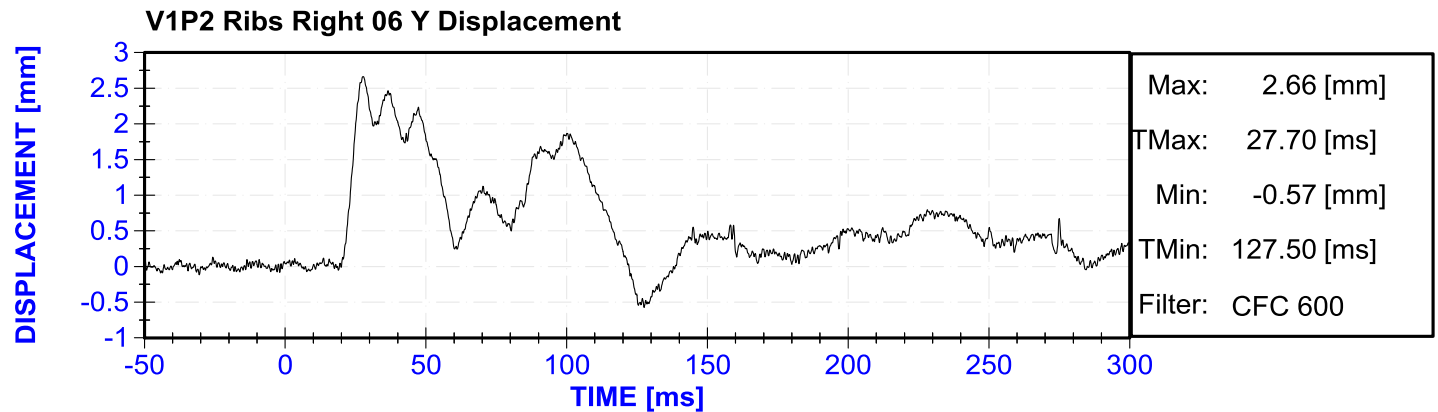
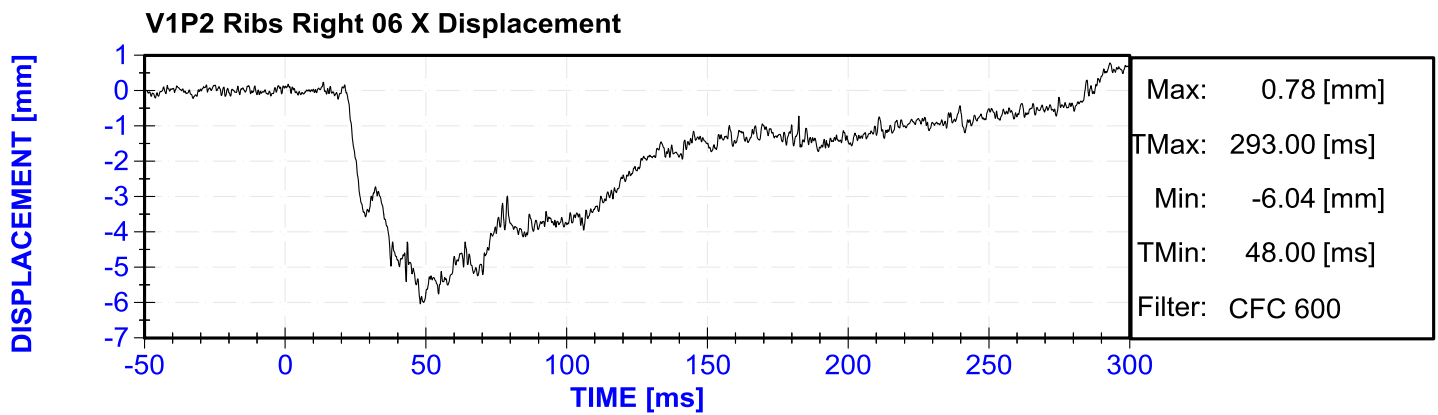
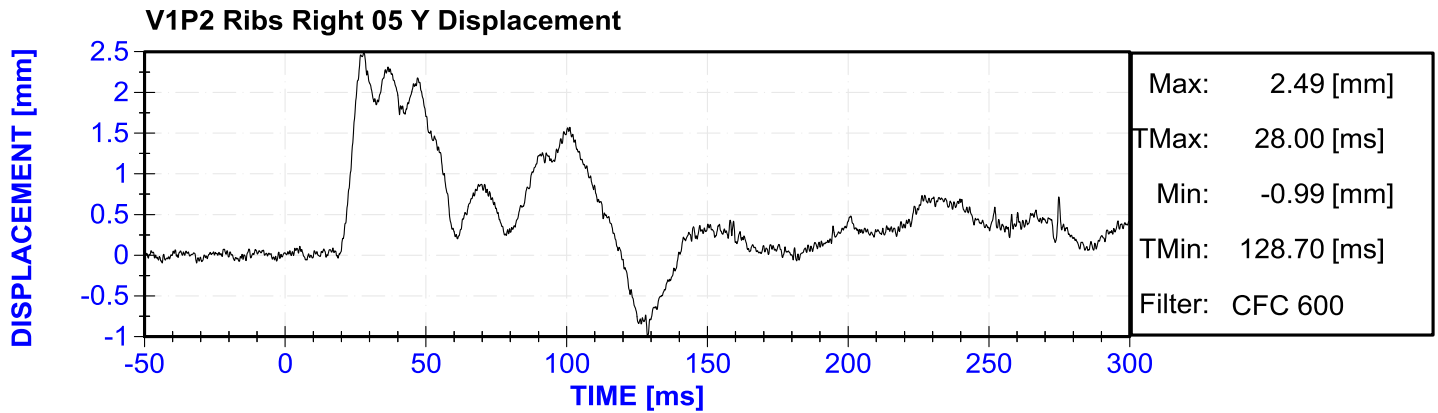


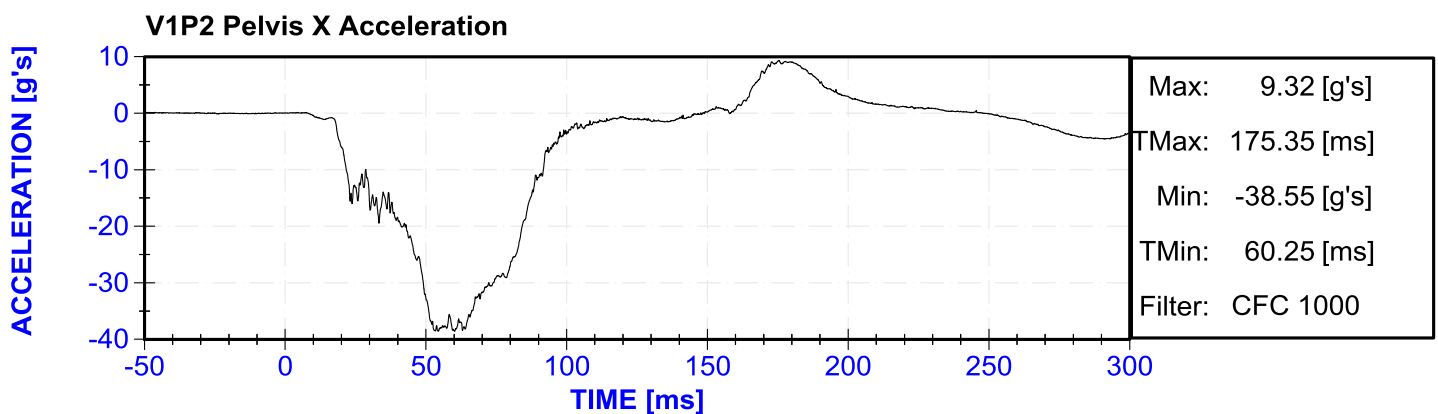
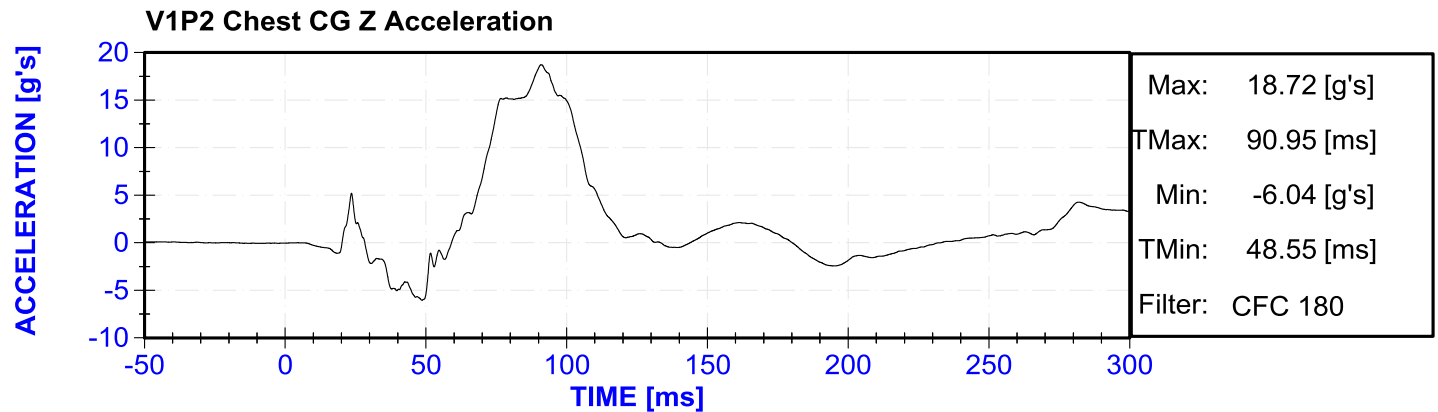
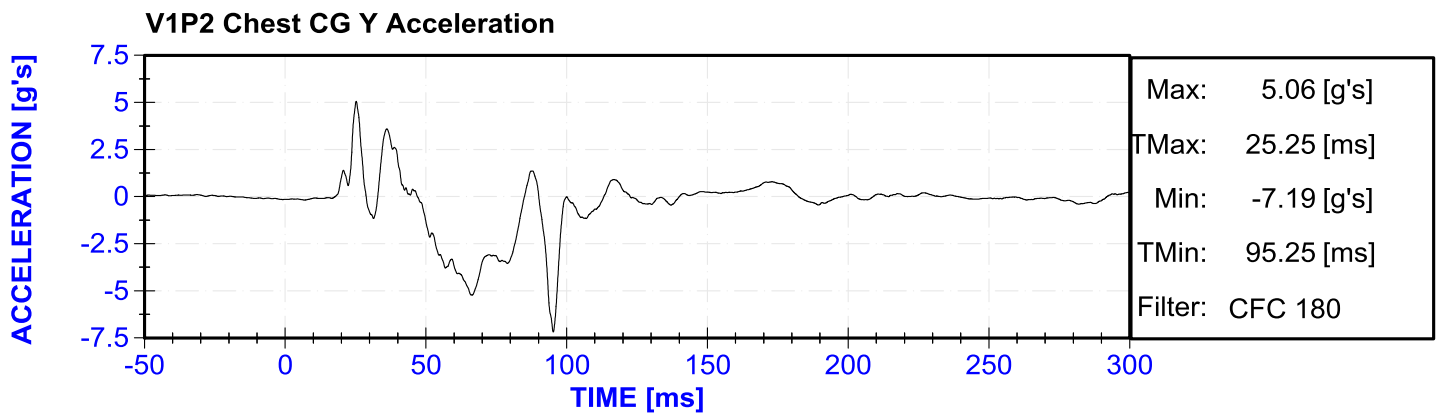
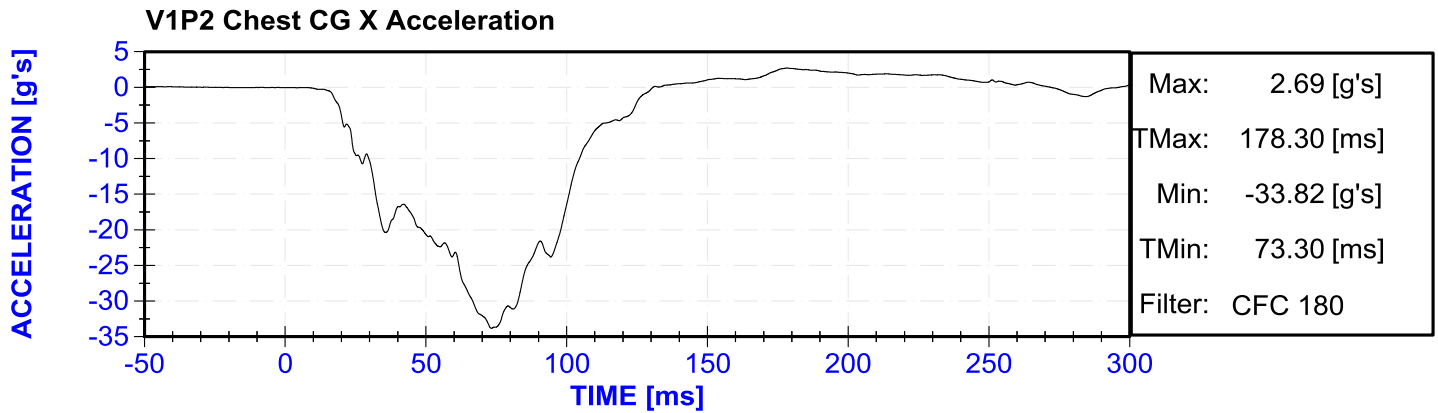


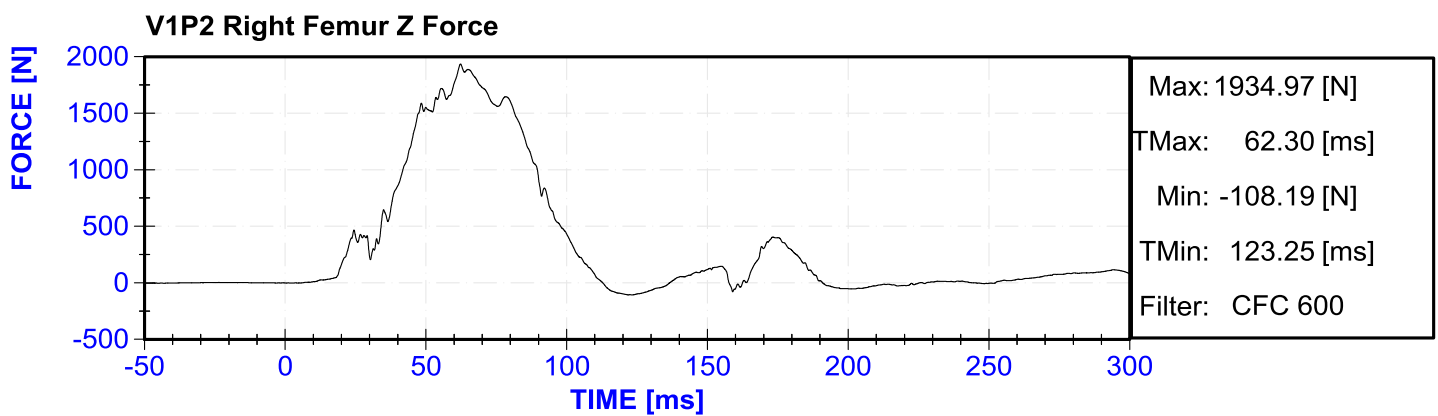
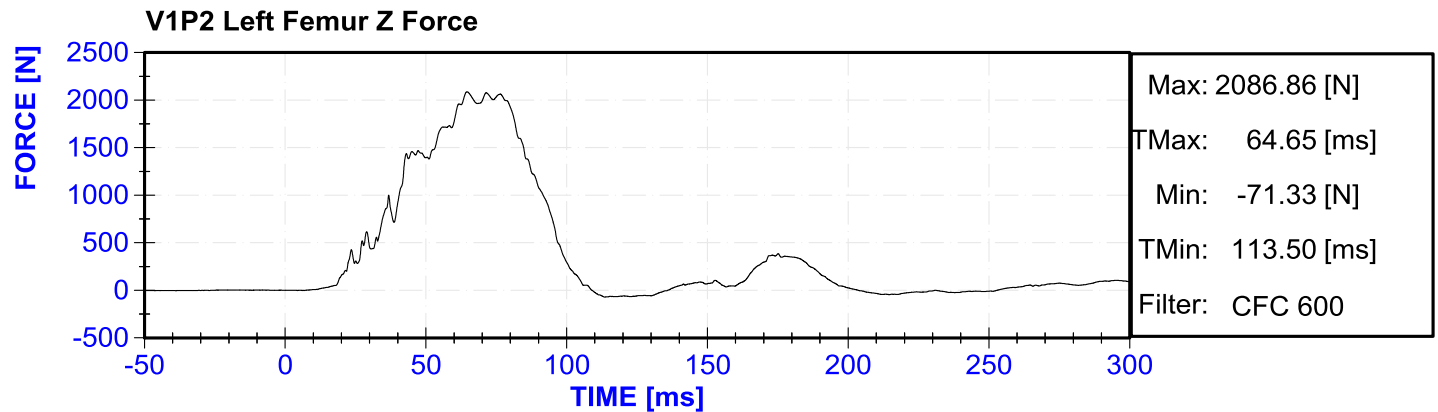
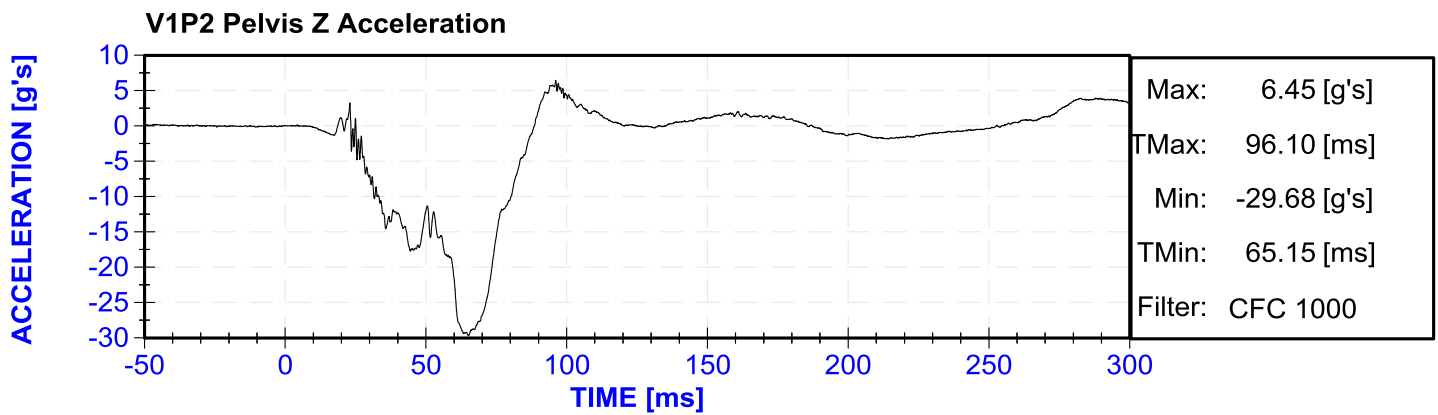
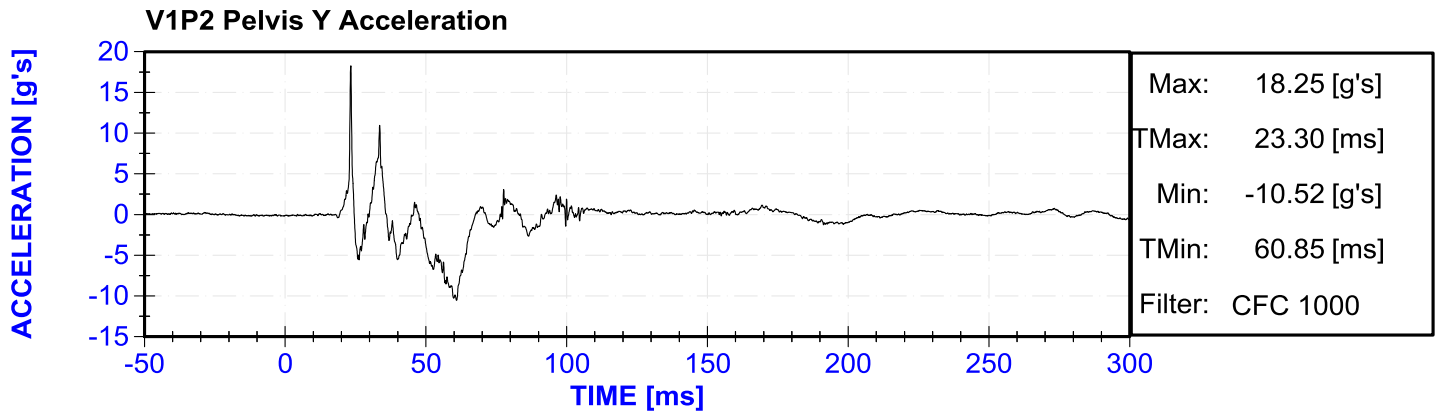


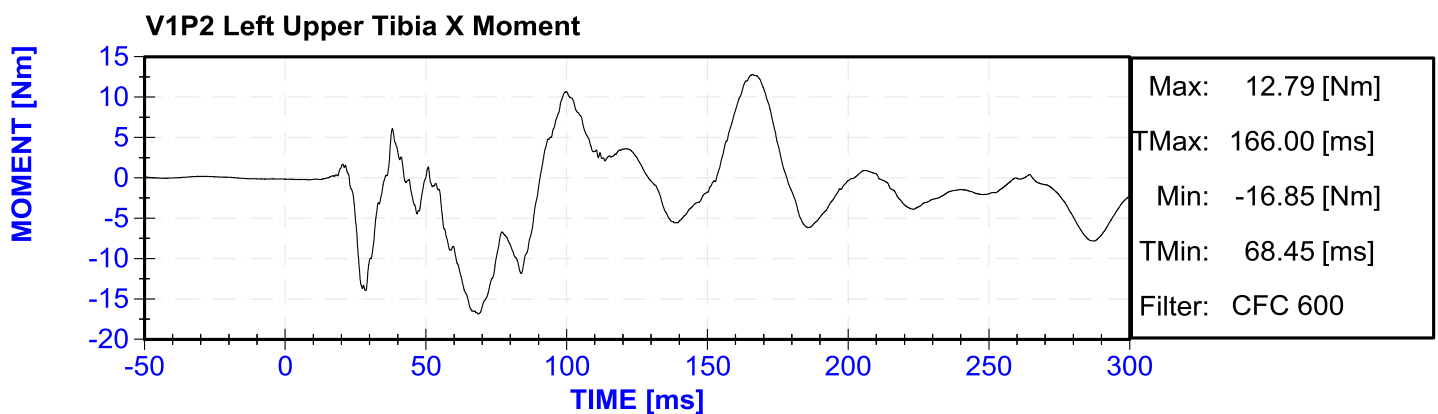
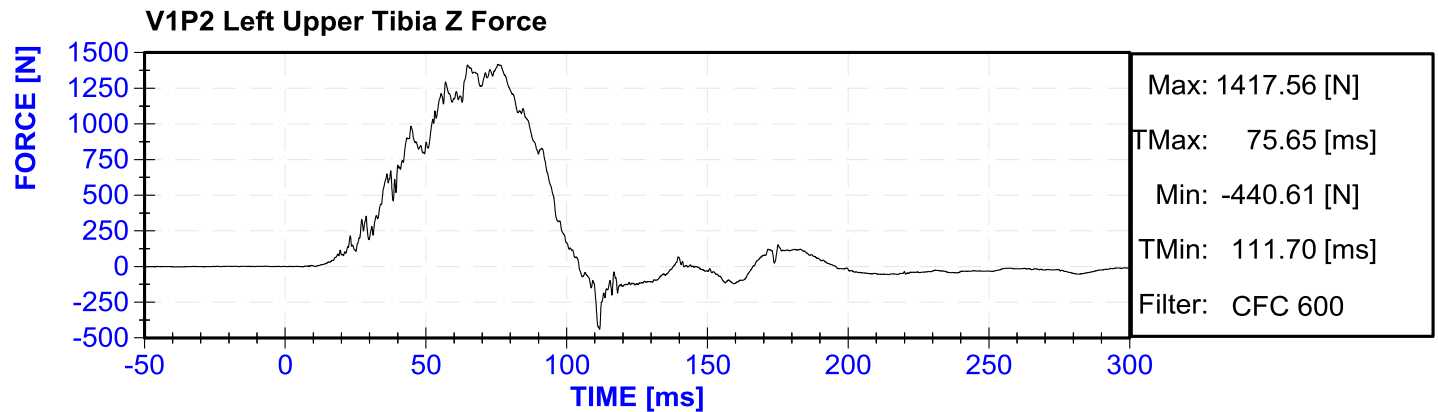
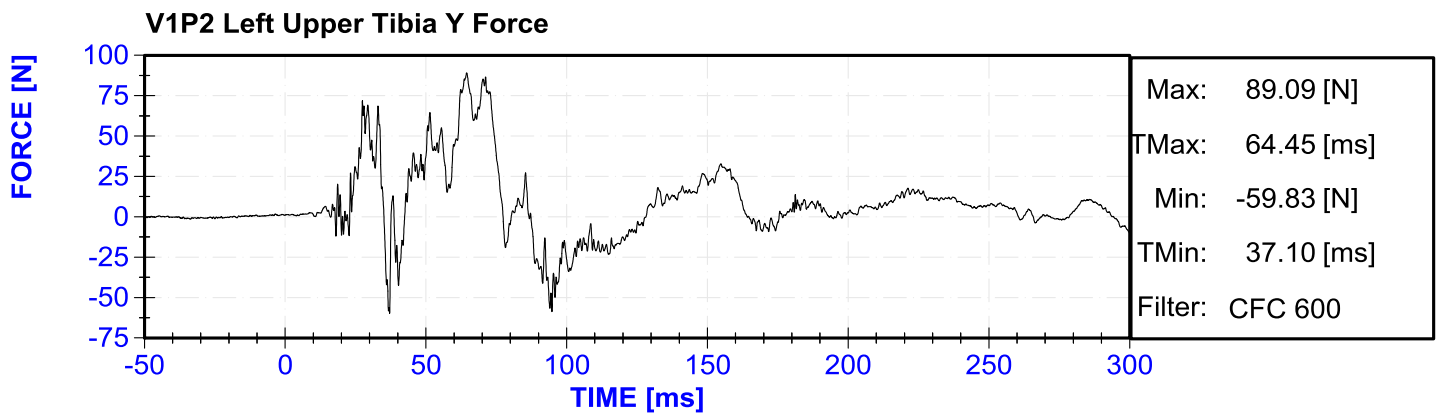
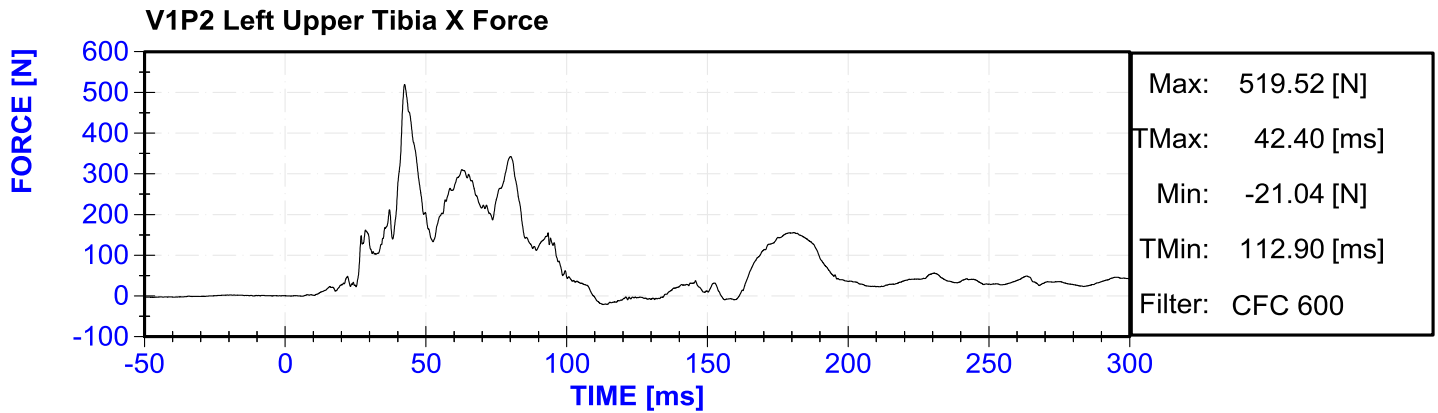


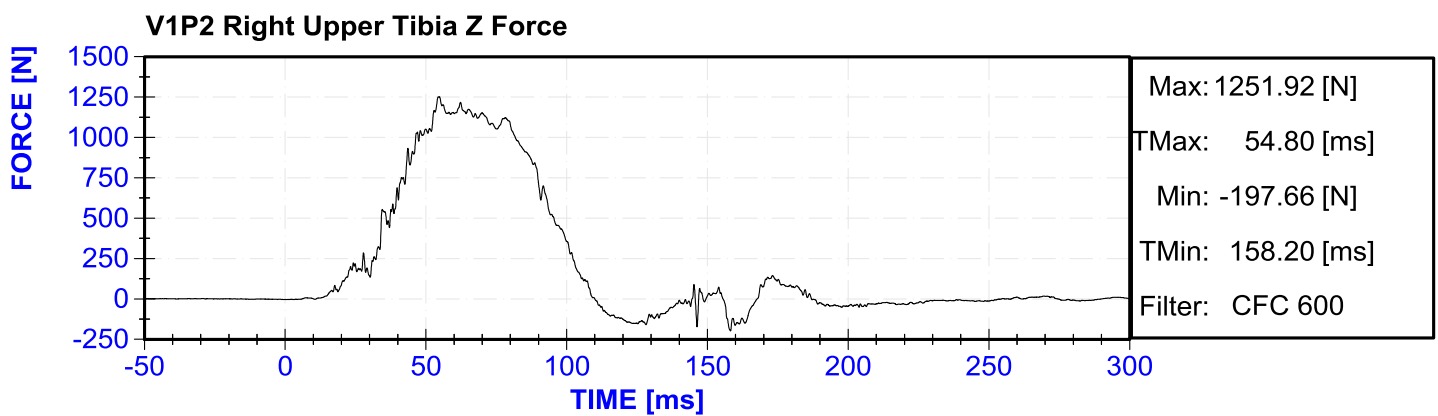
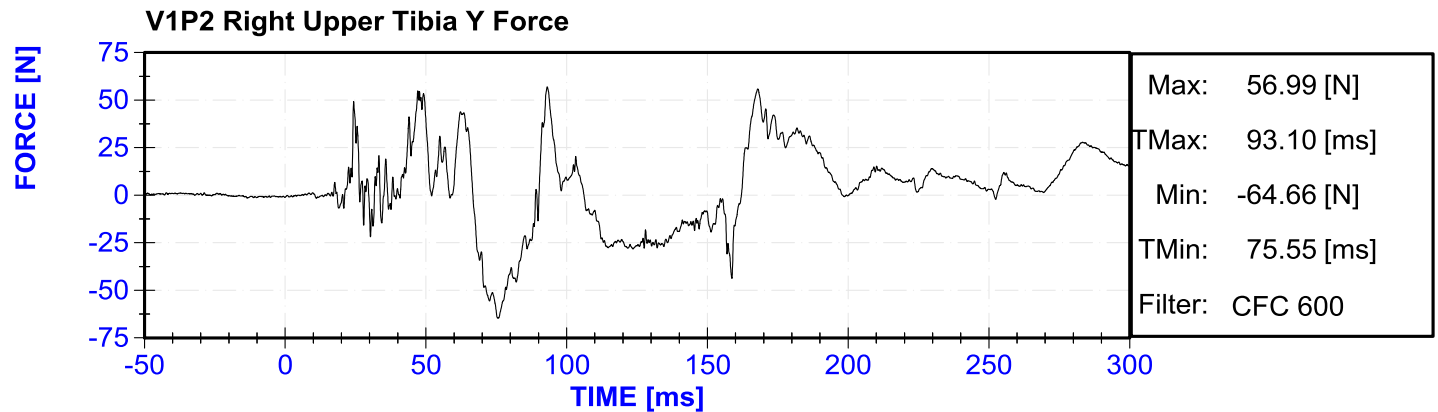
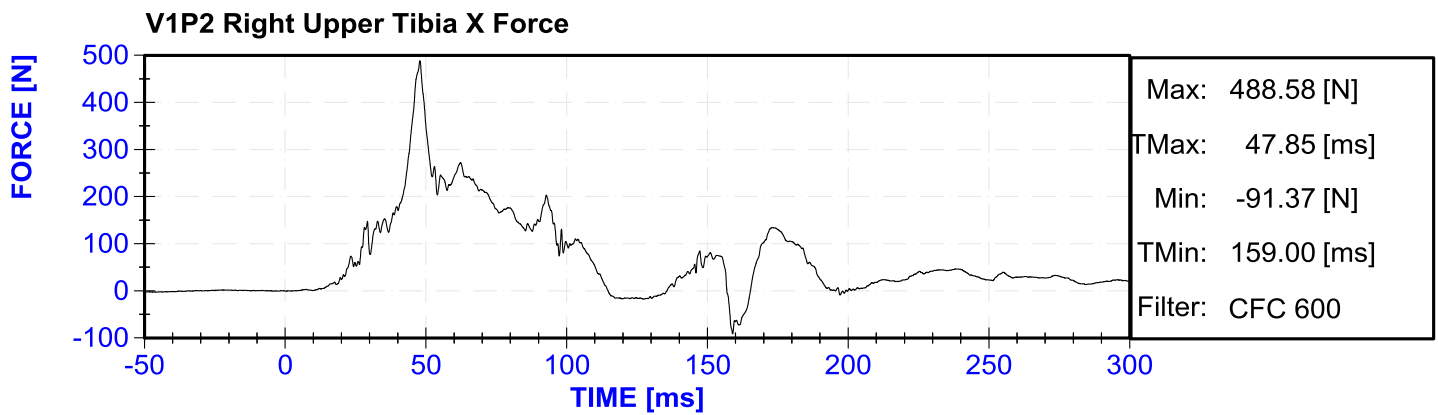
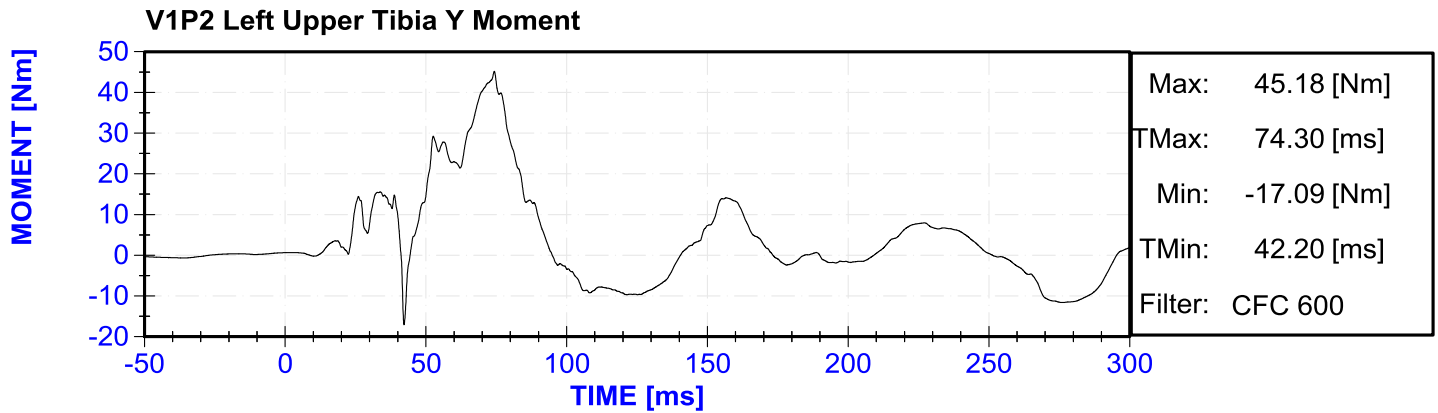


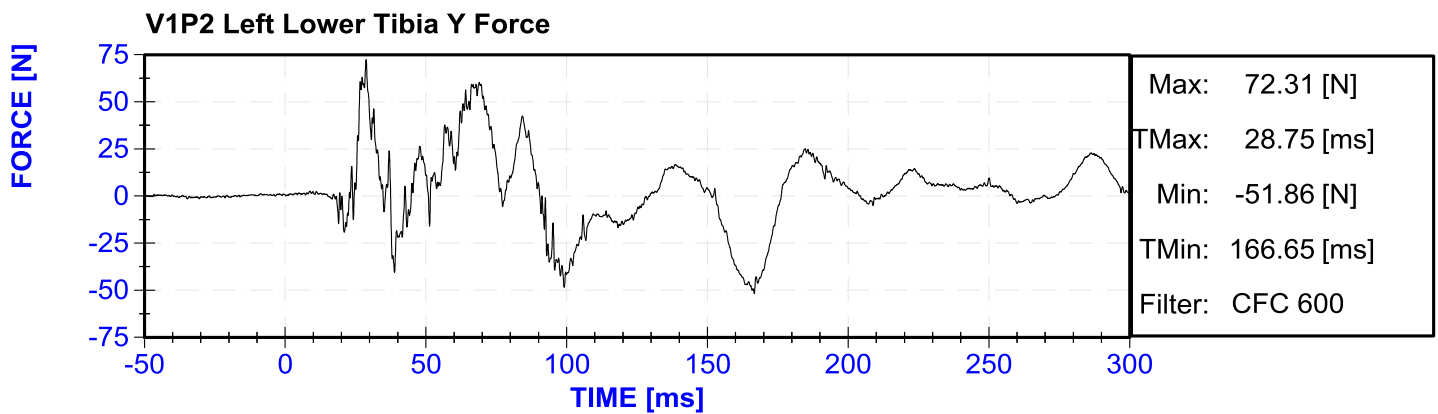
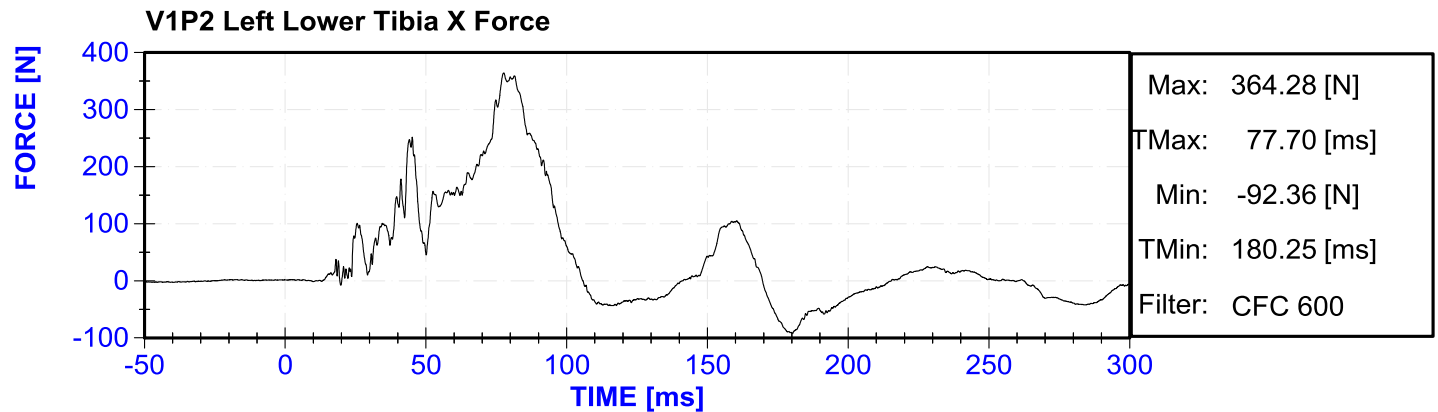
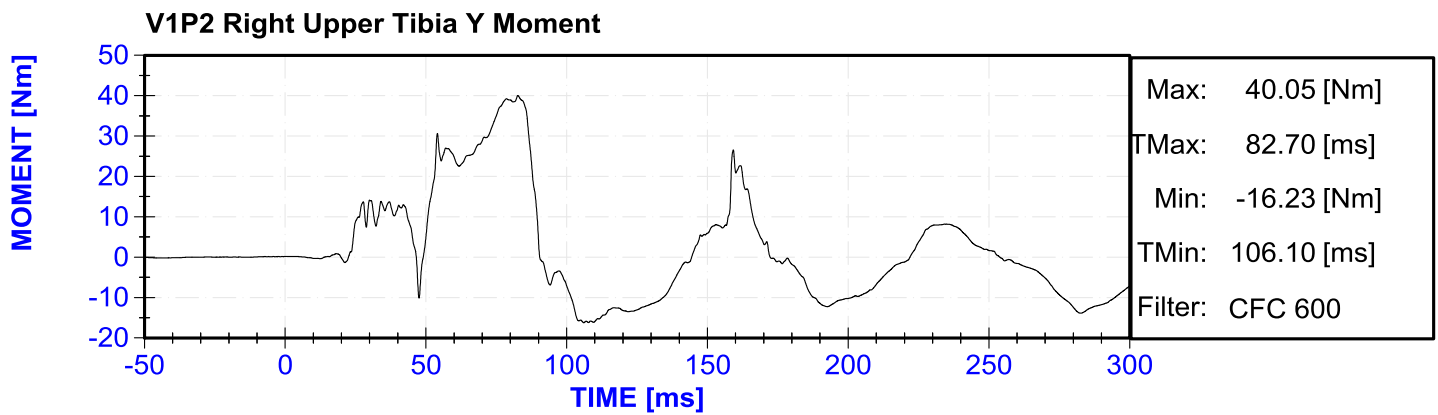
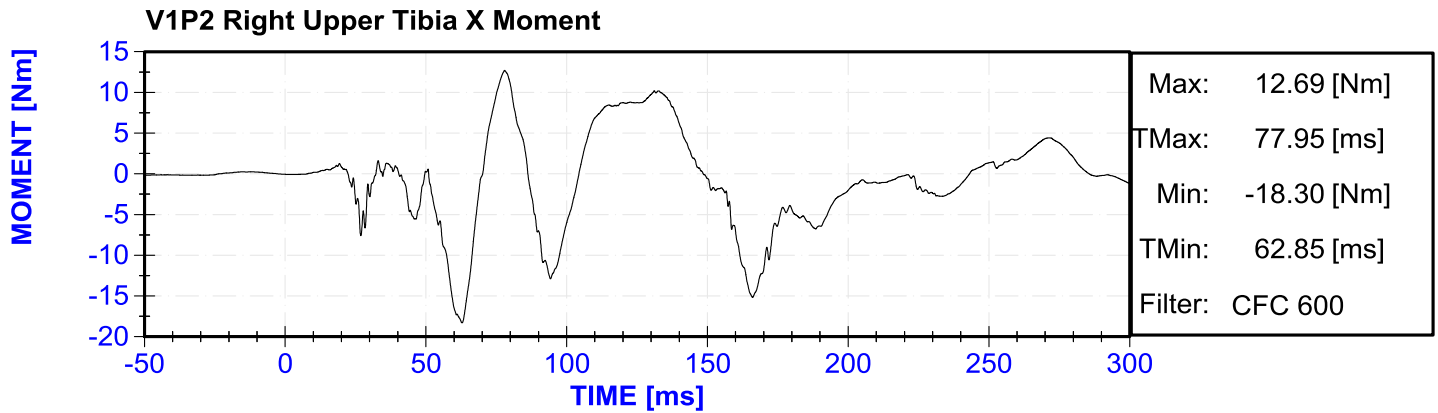


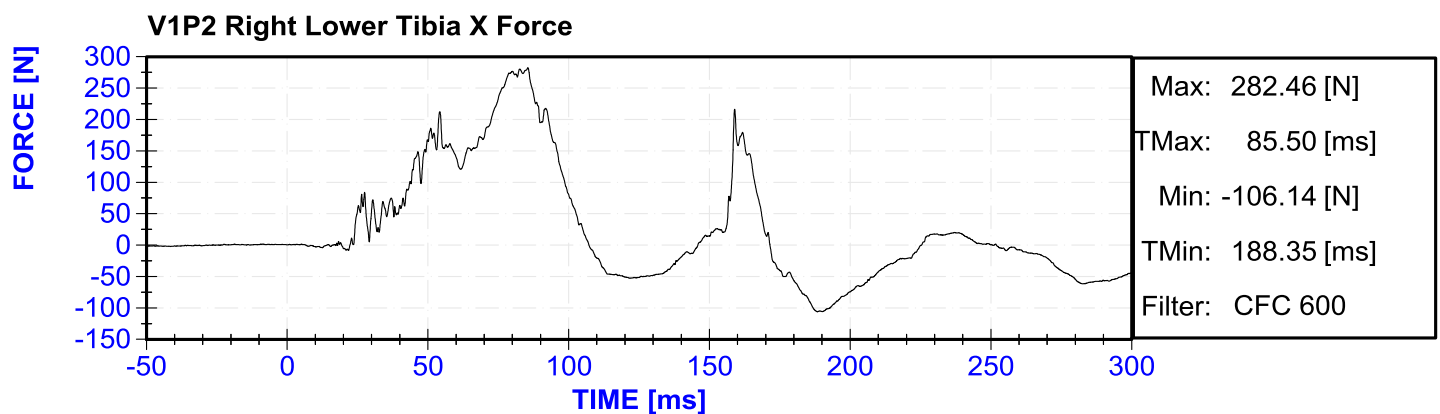
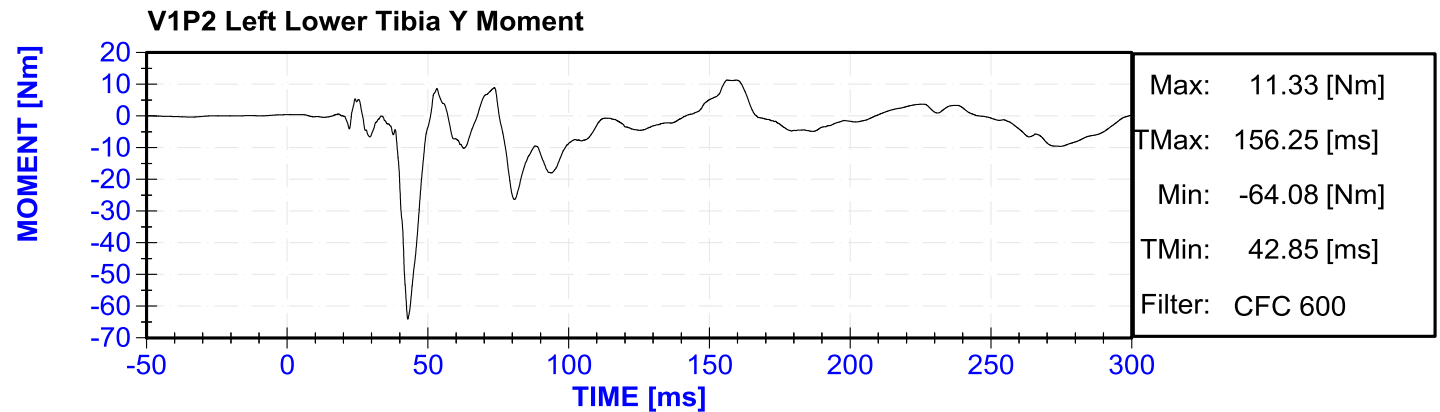
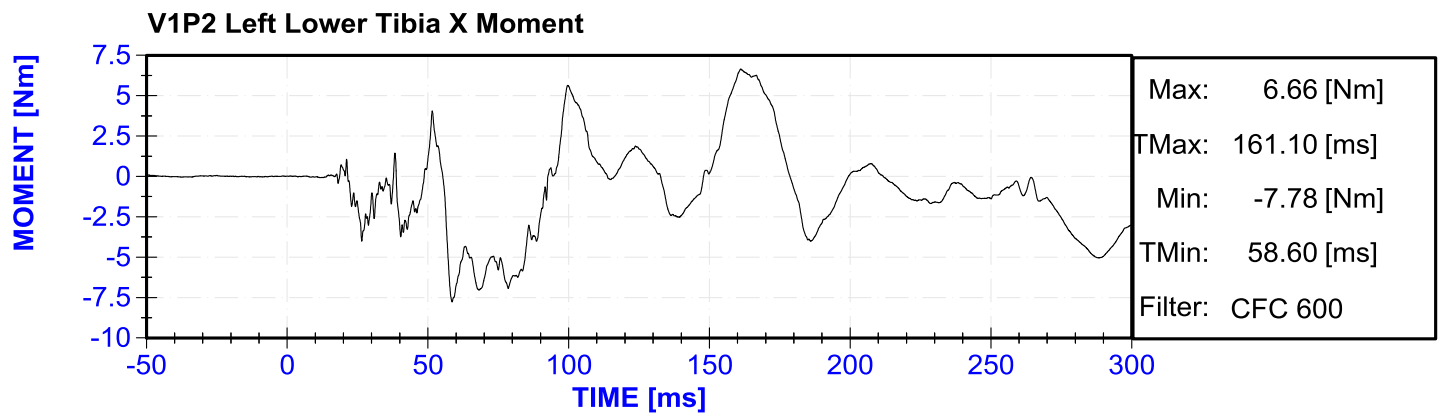
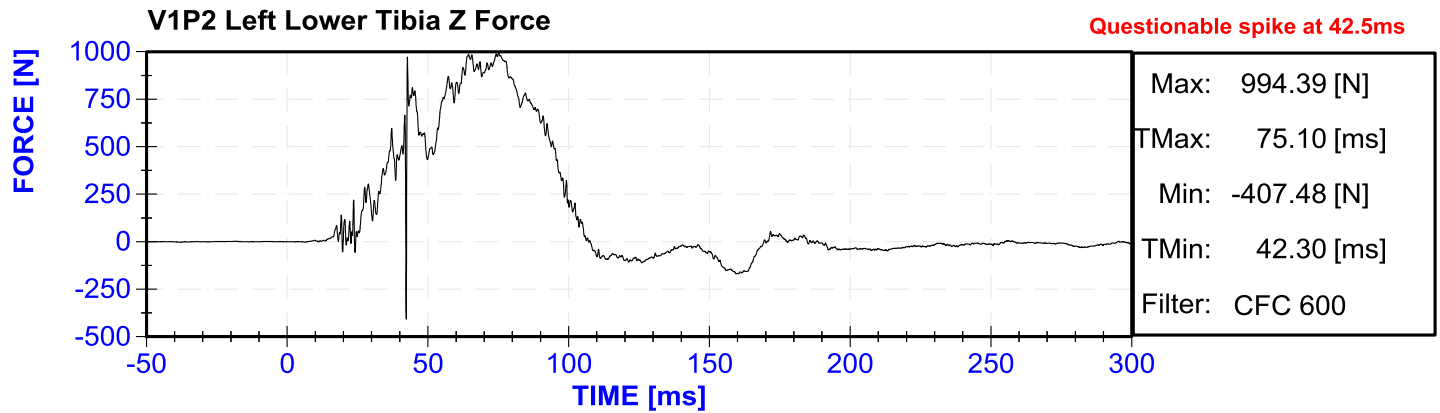


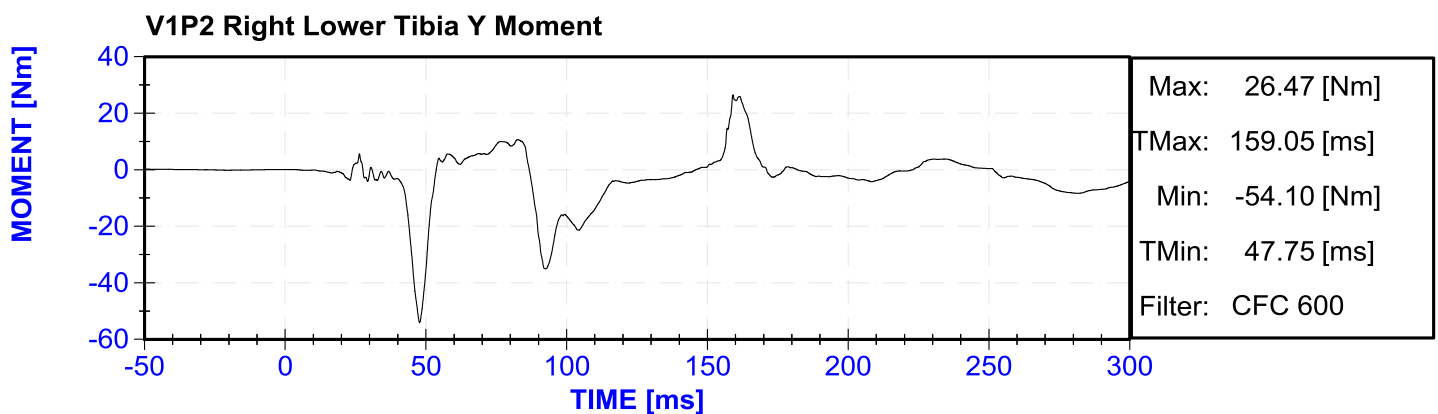
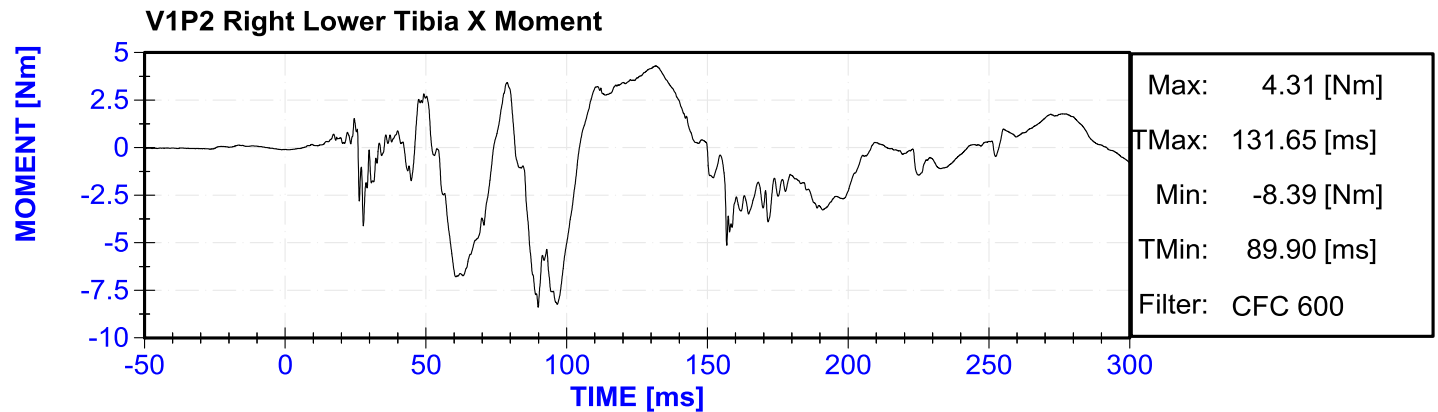
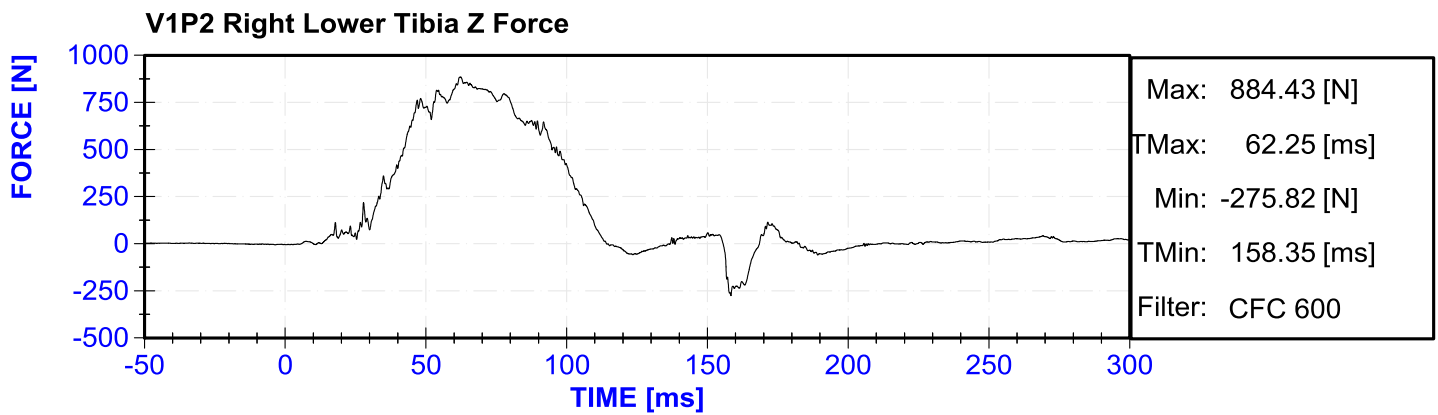
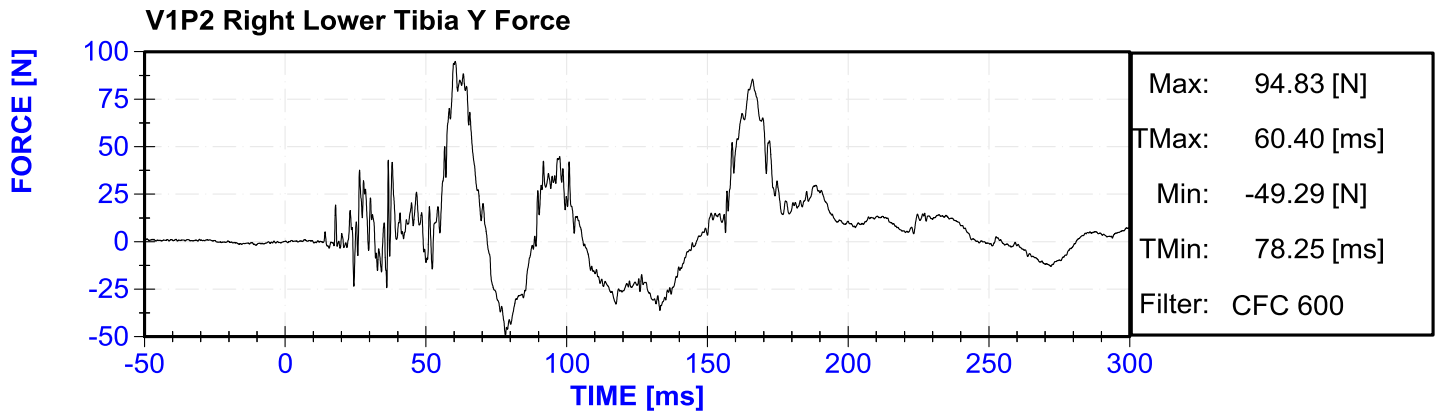


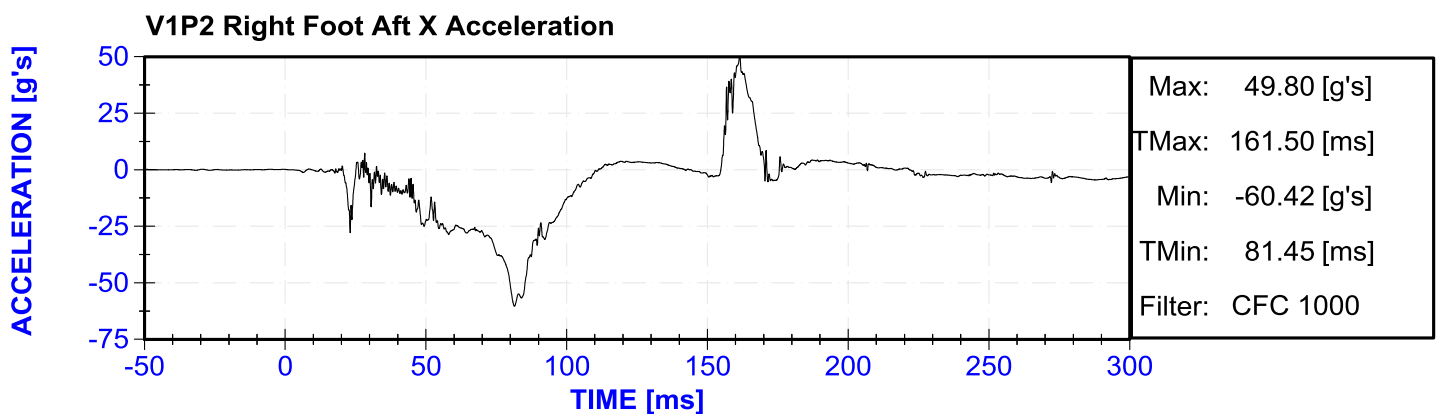
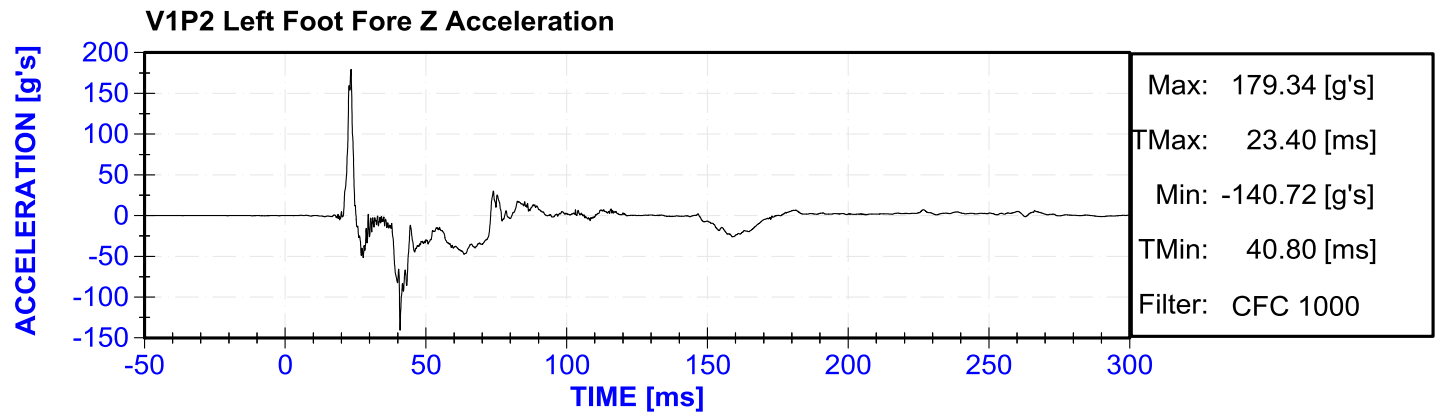
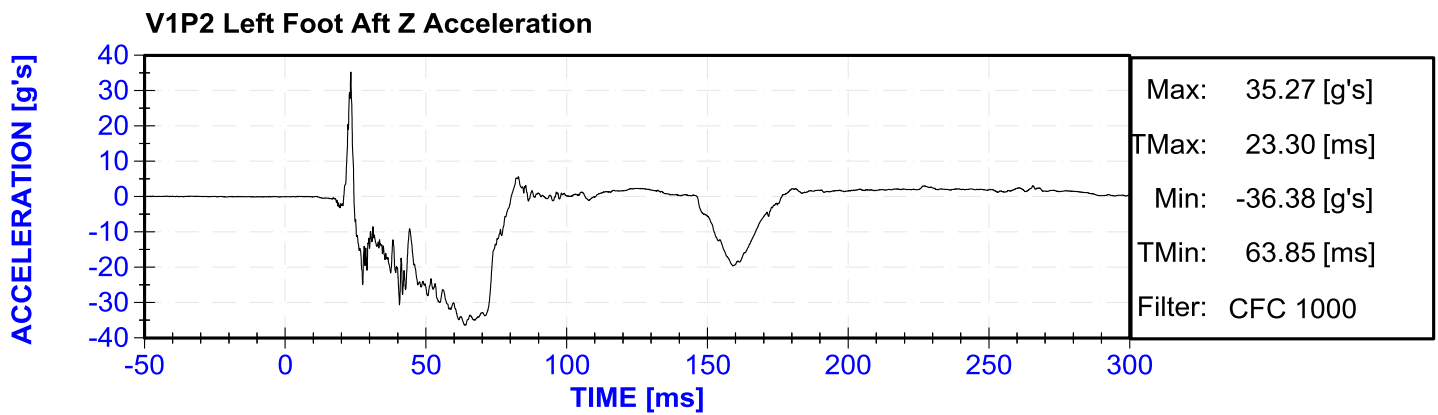
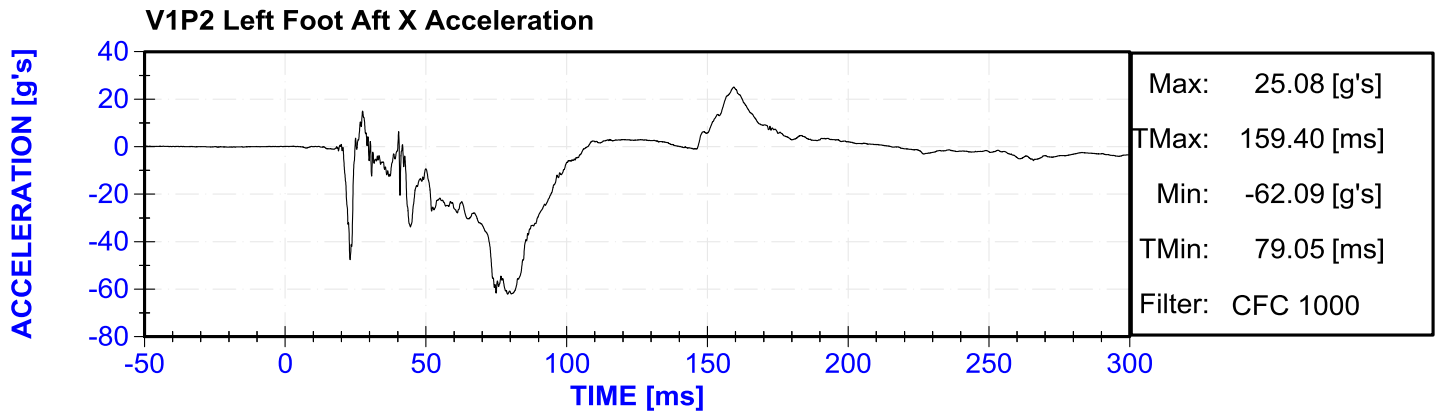


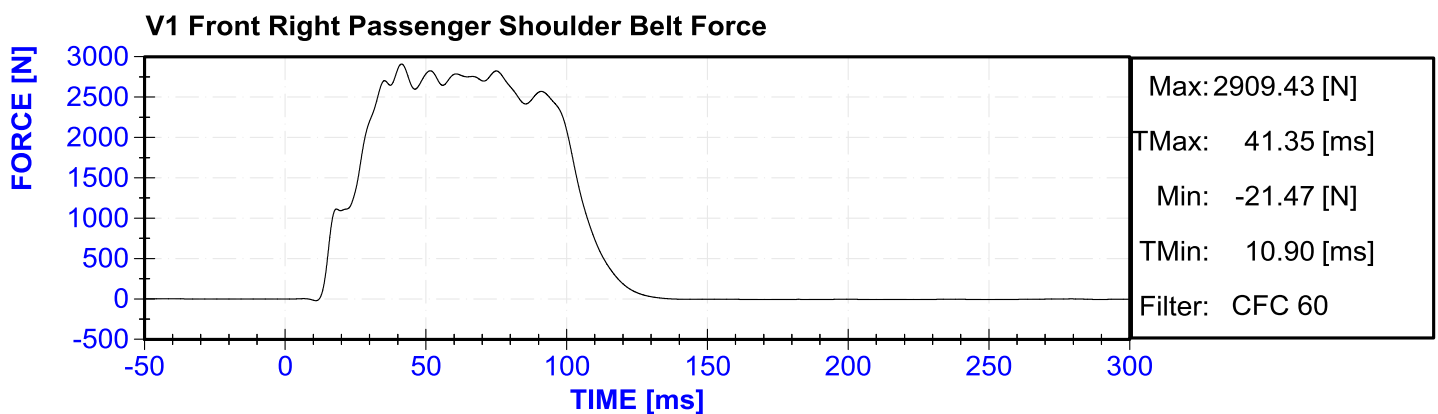
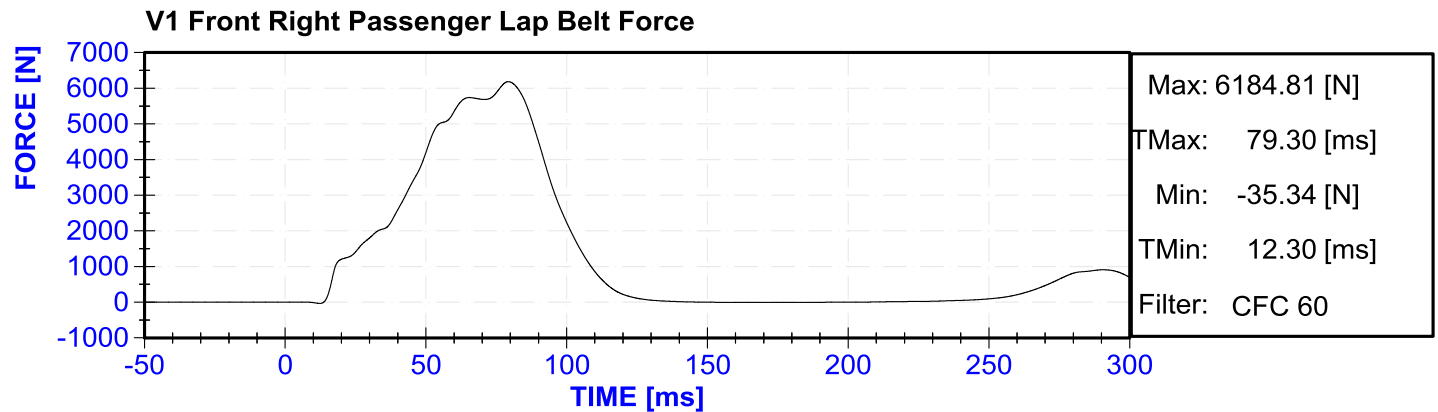
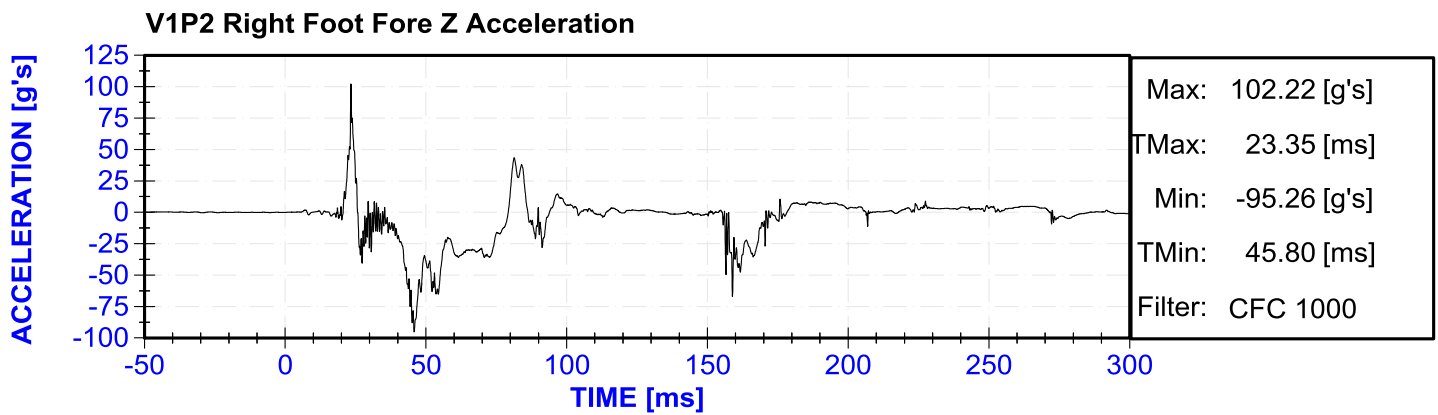
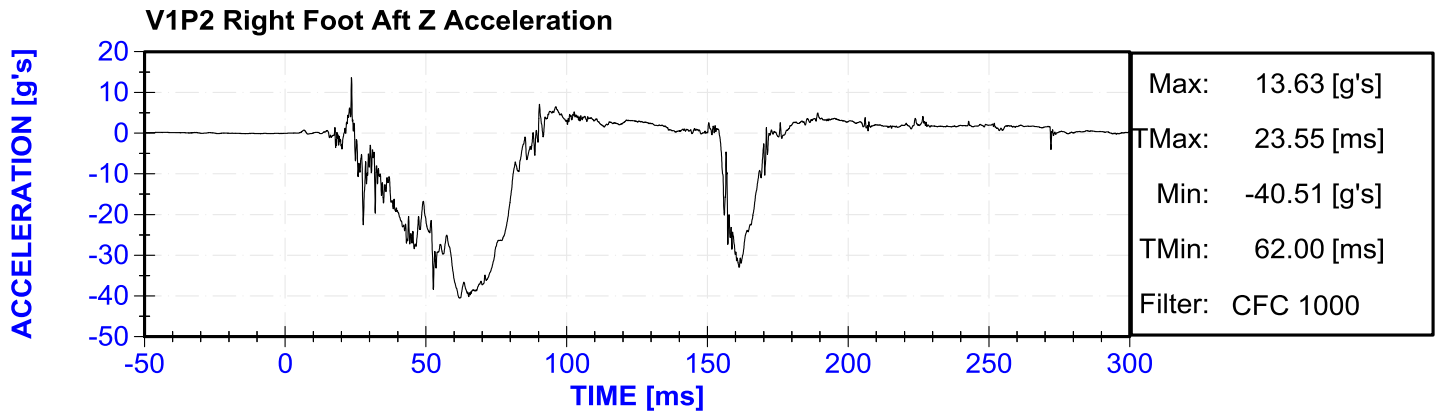




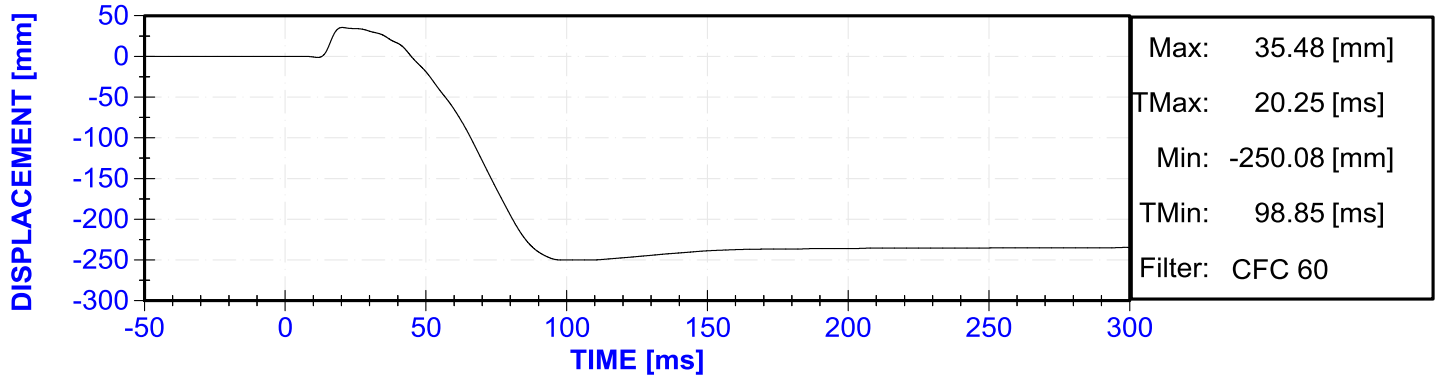




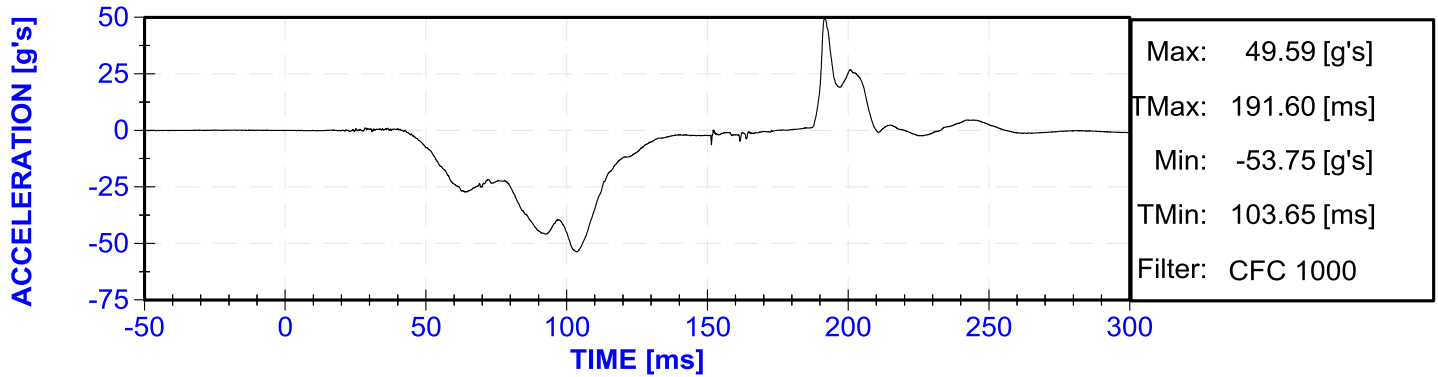




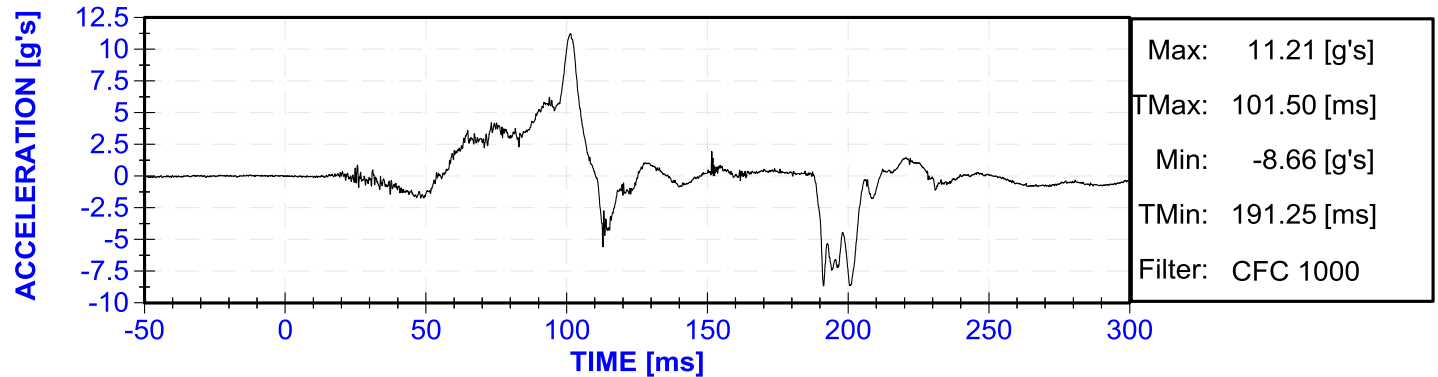
V1 Front Right Passenger Shoulder Belt Displacement



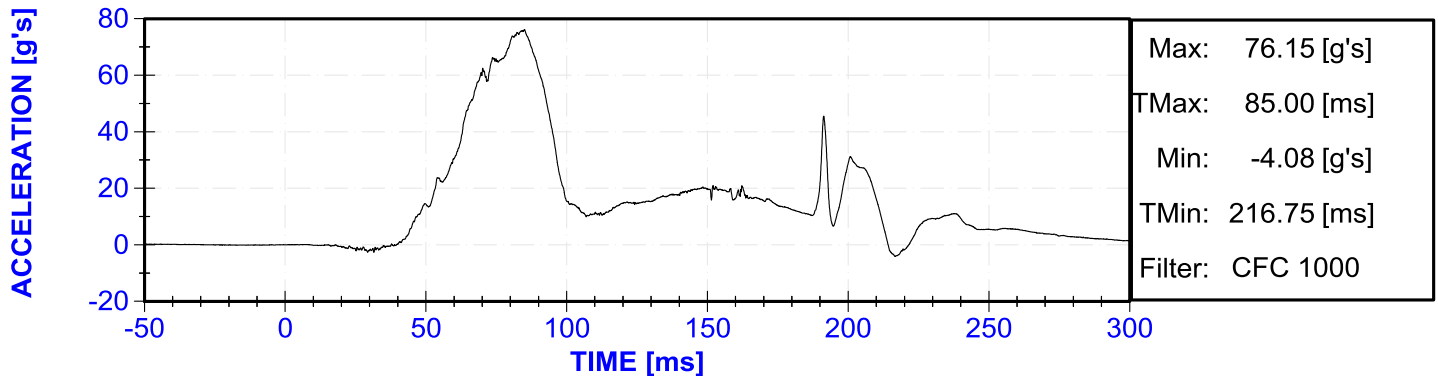
V1P3 Head CG X Acceleration

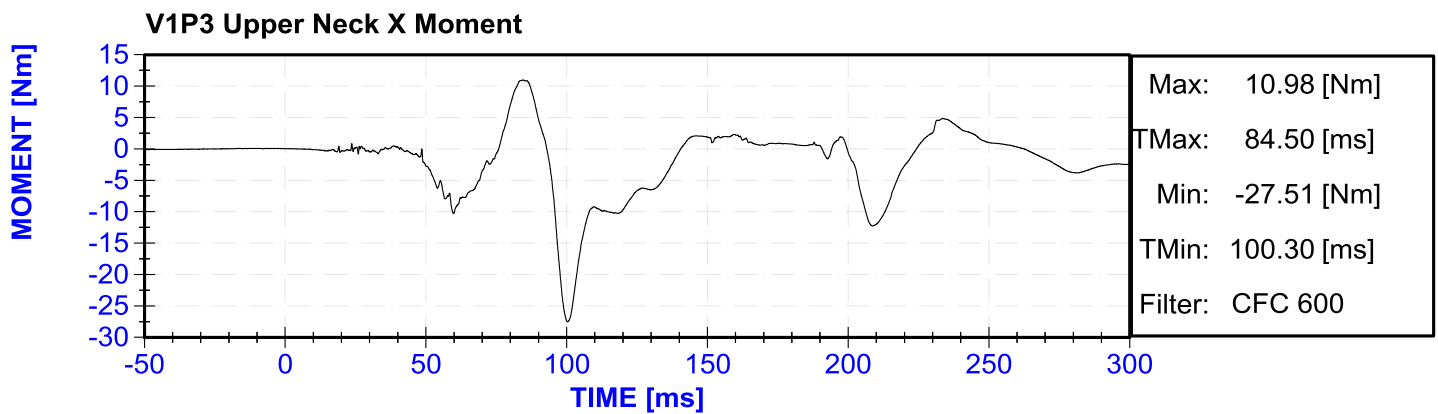
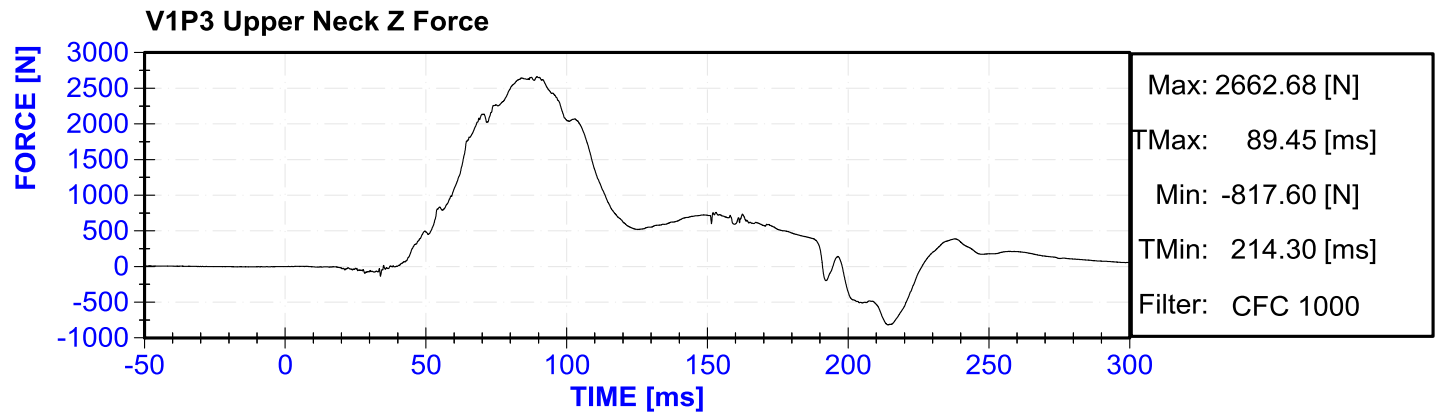
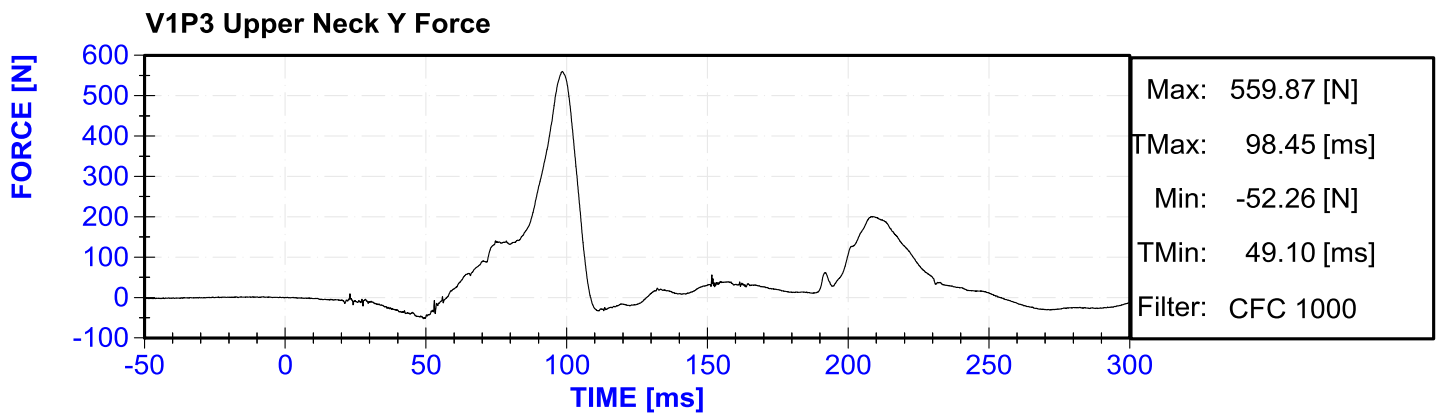
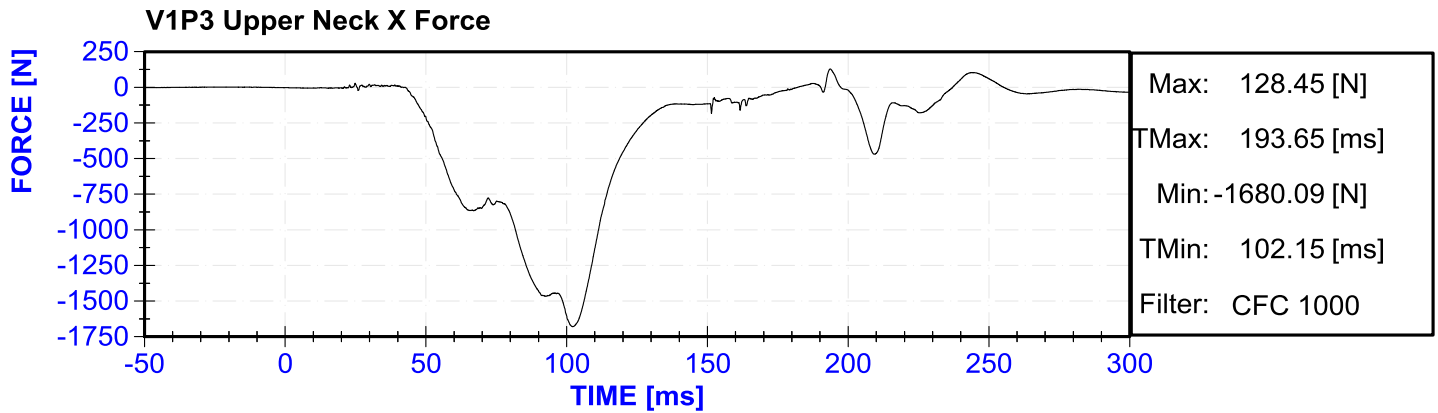


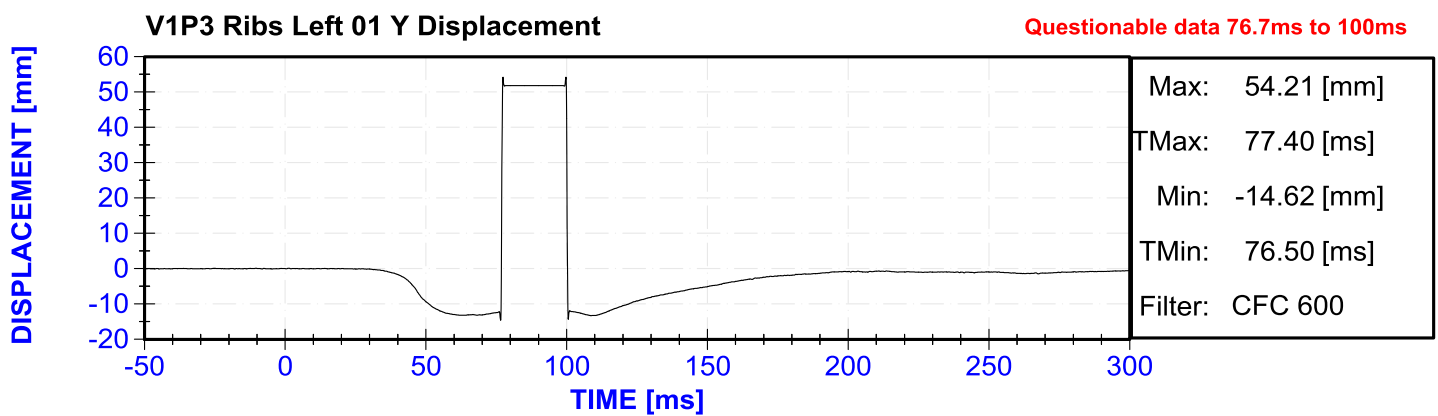
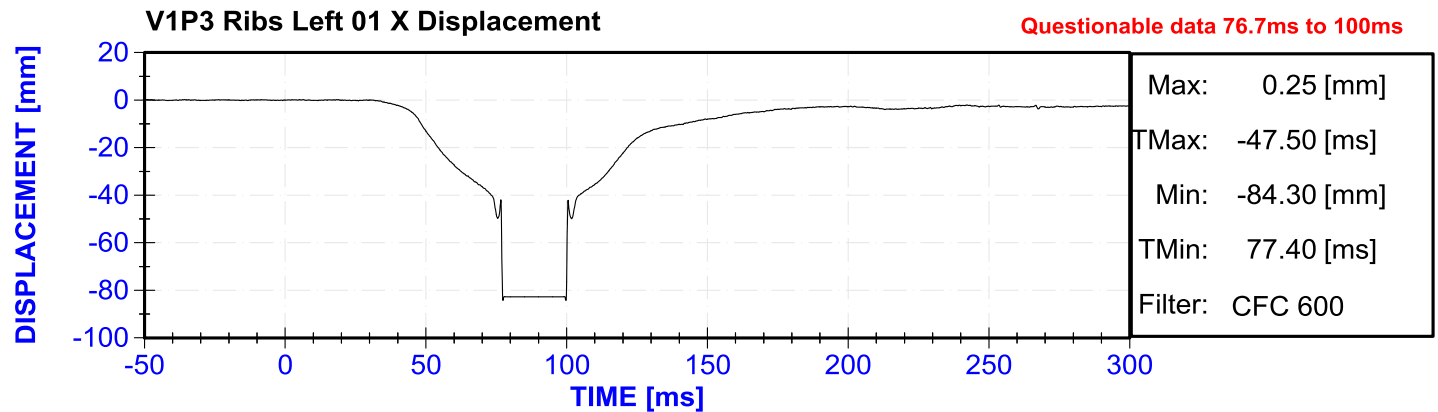
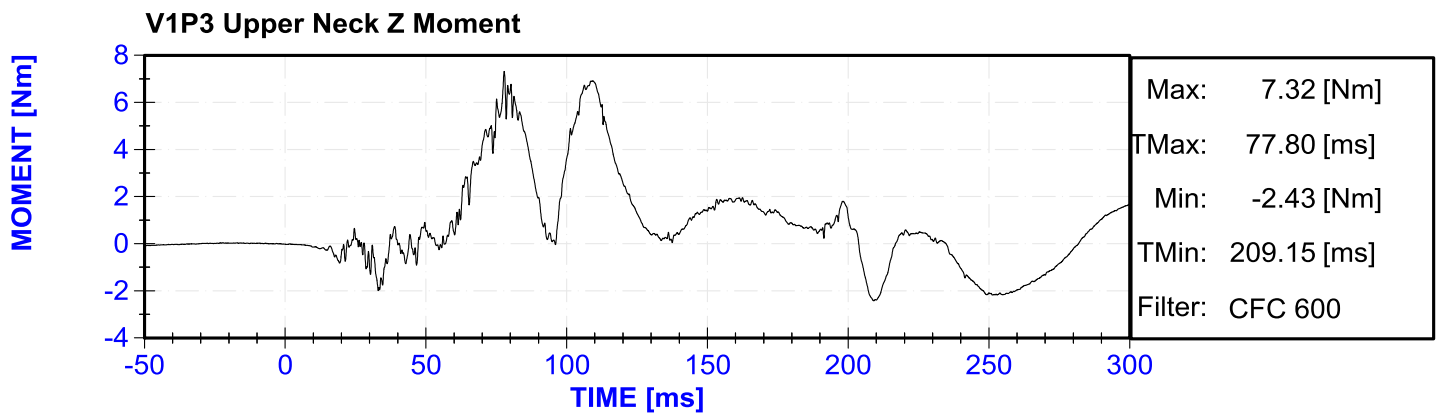
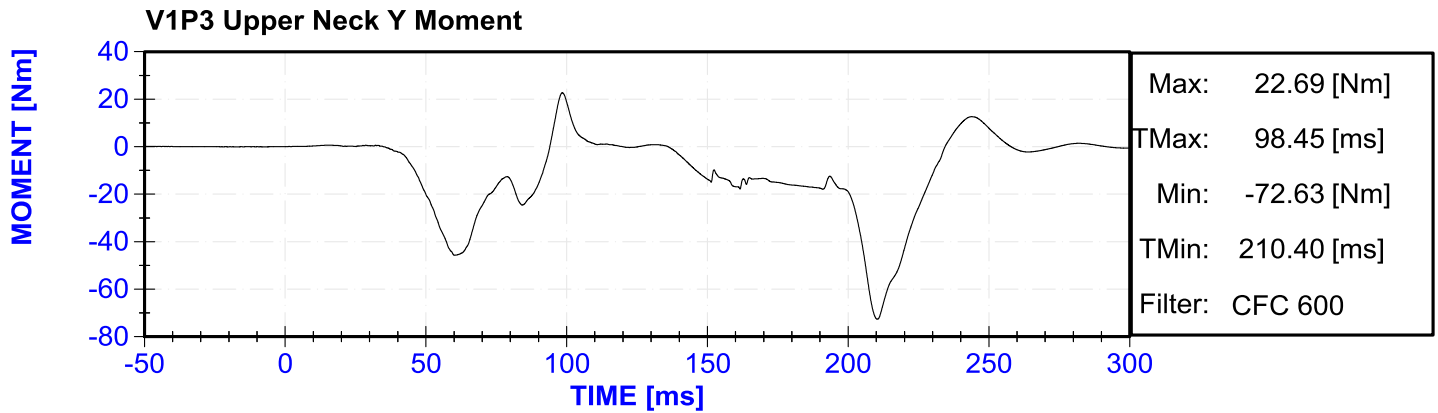
V1P3 Head CG Y Acceleration

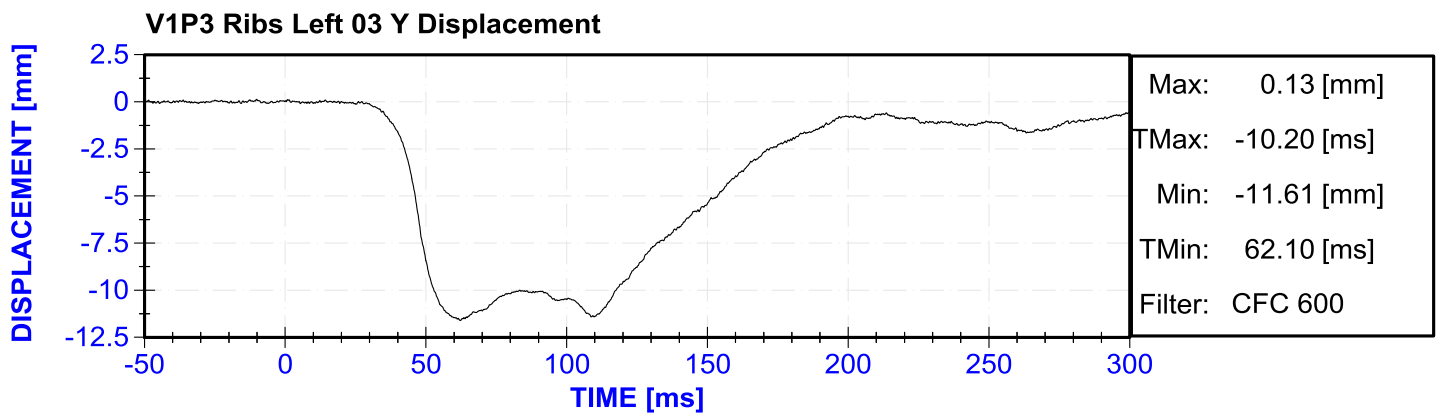
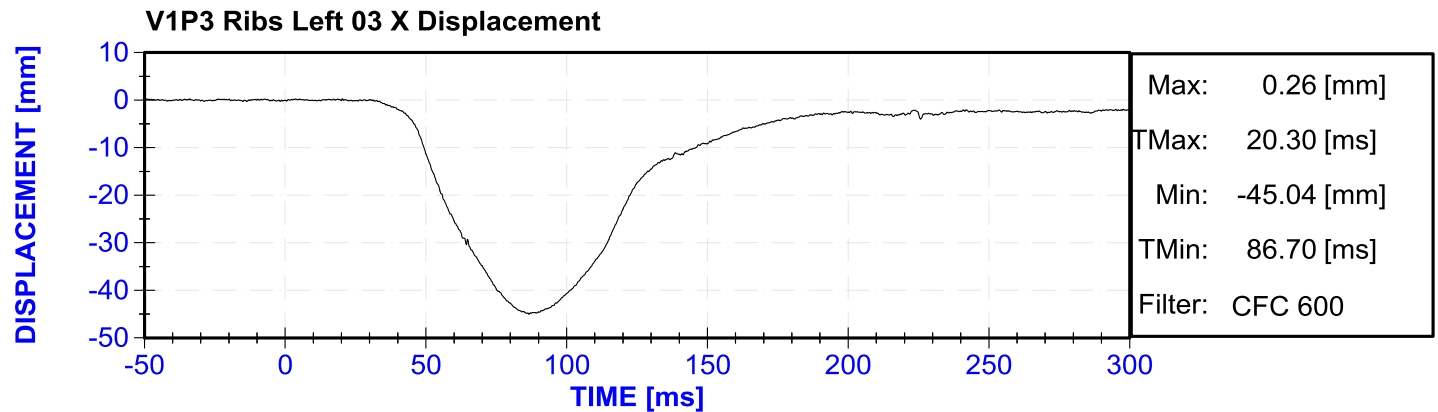
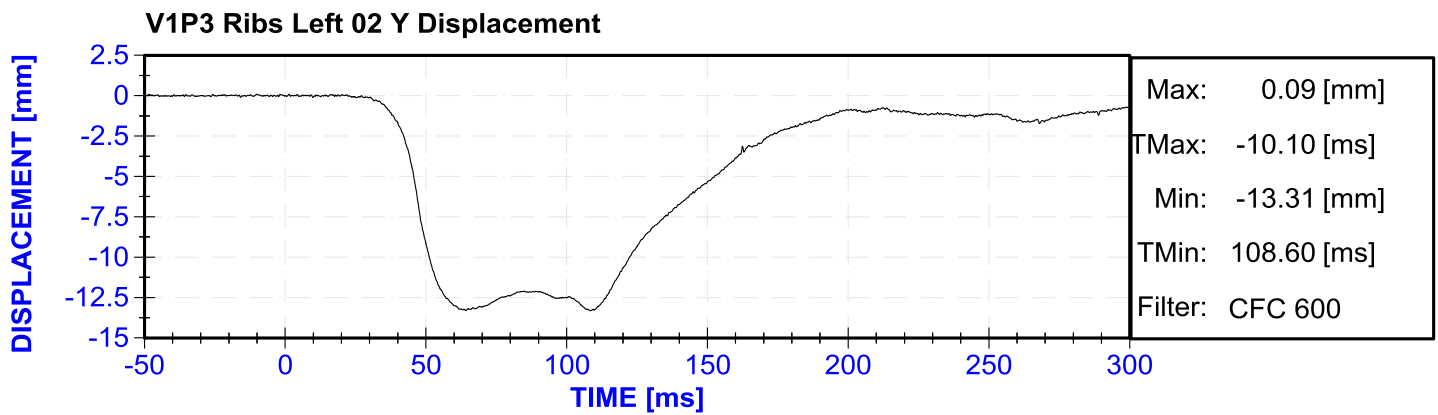
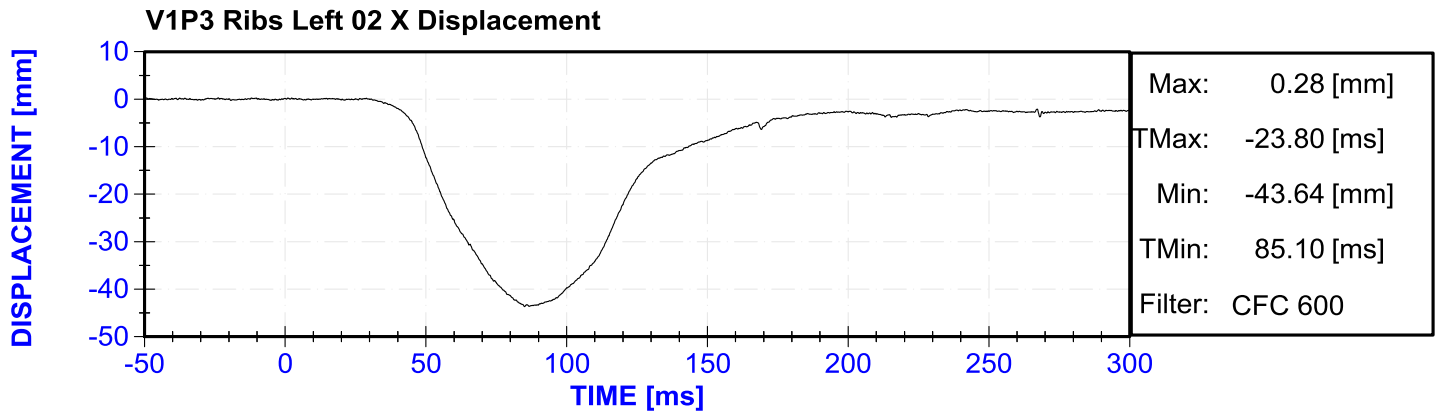


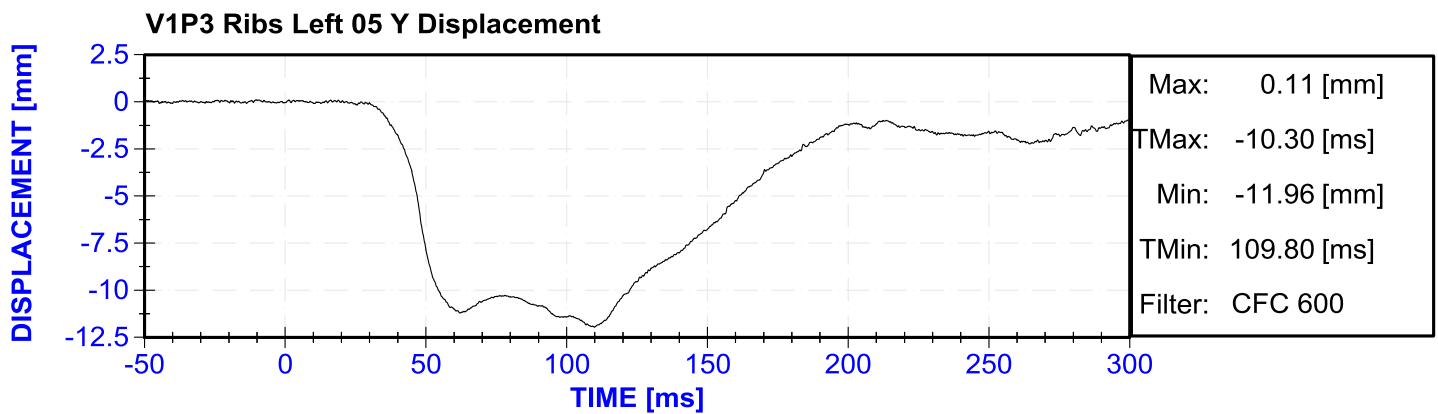
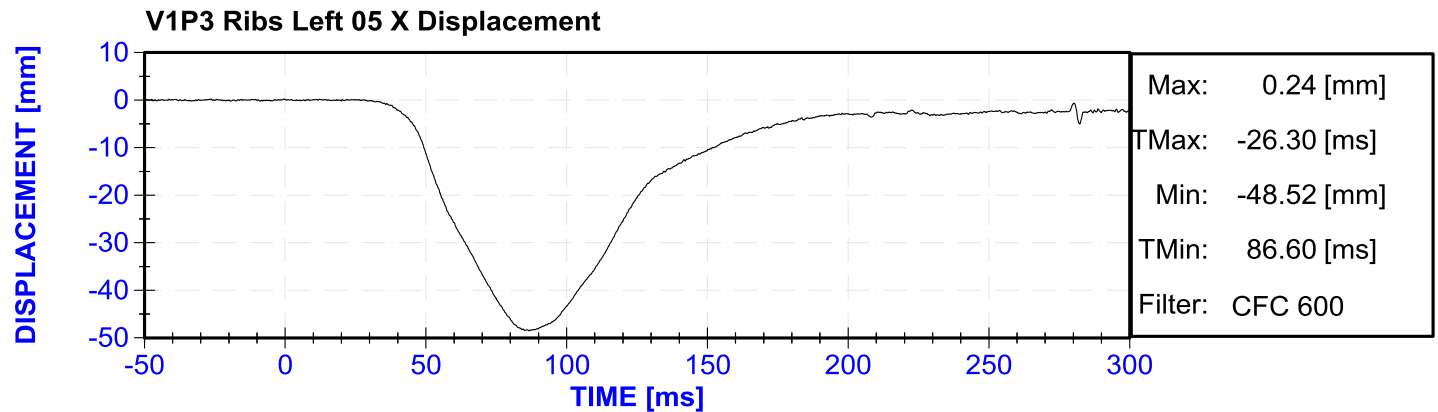
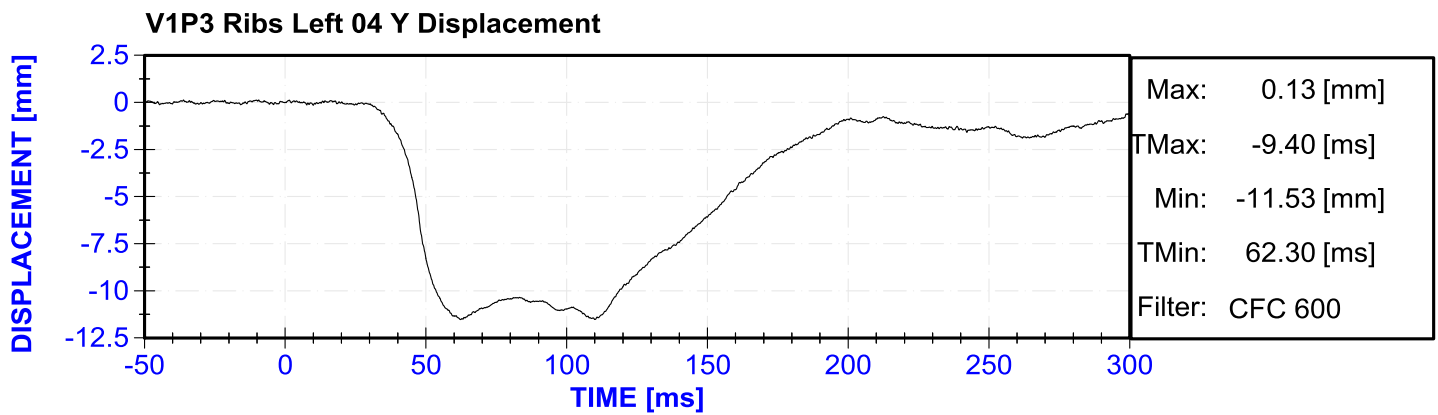
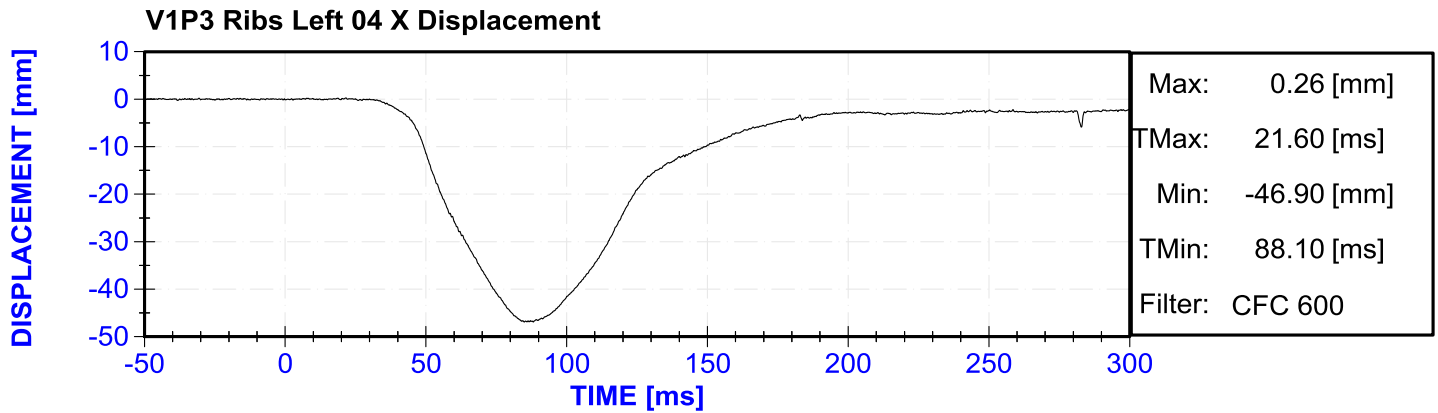
V1P3 Head CG Z Acceleration

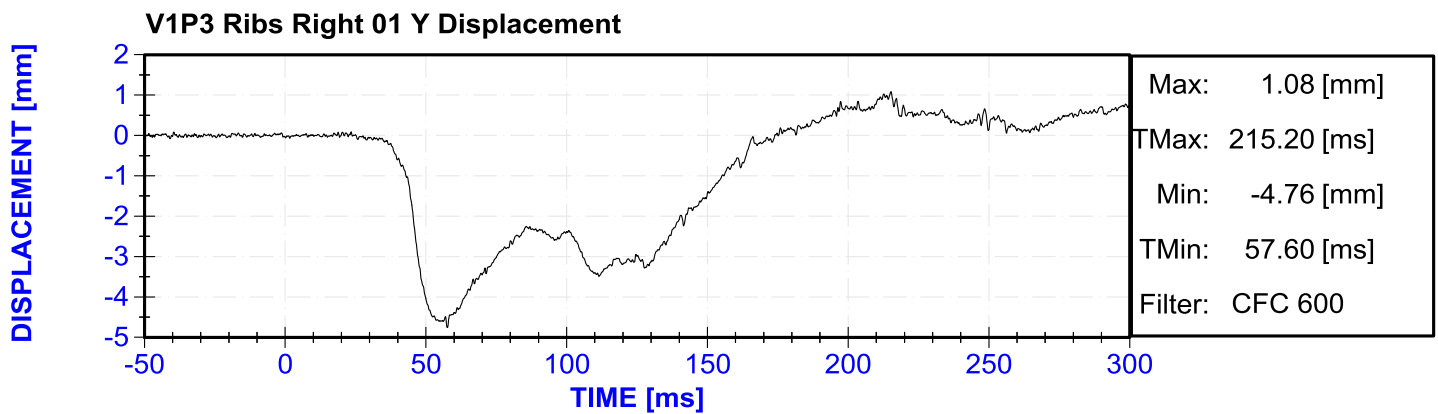
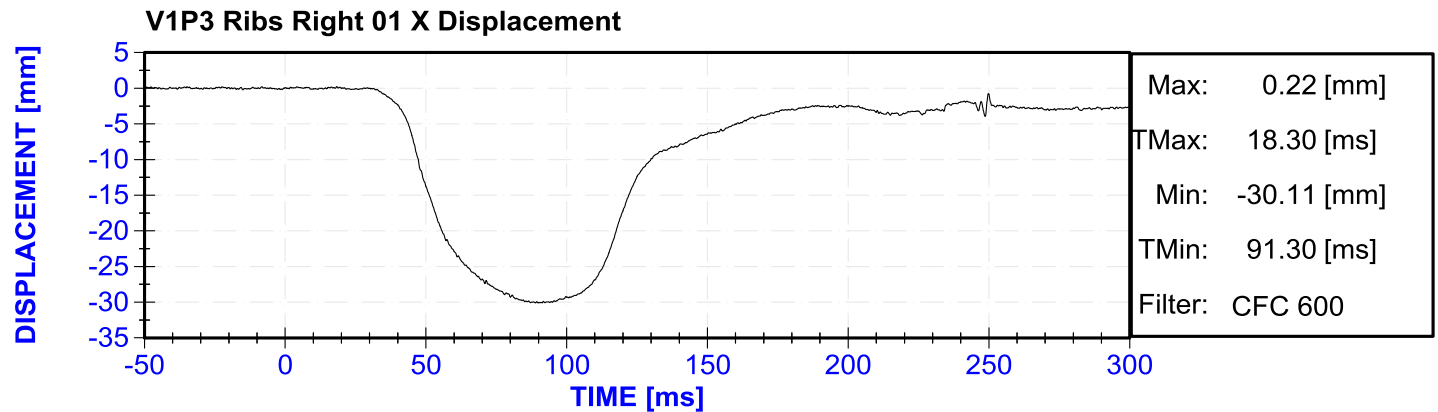
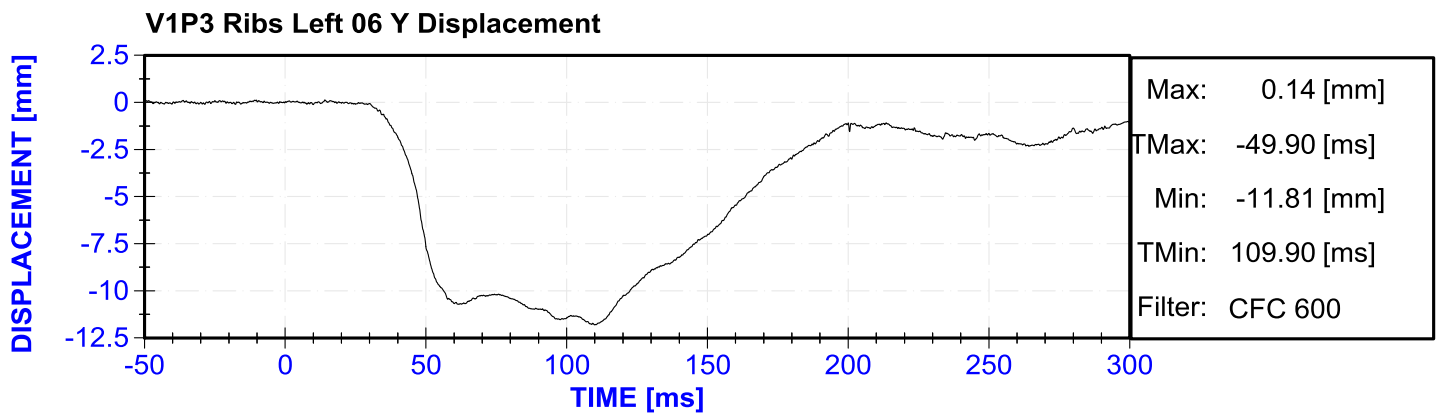
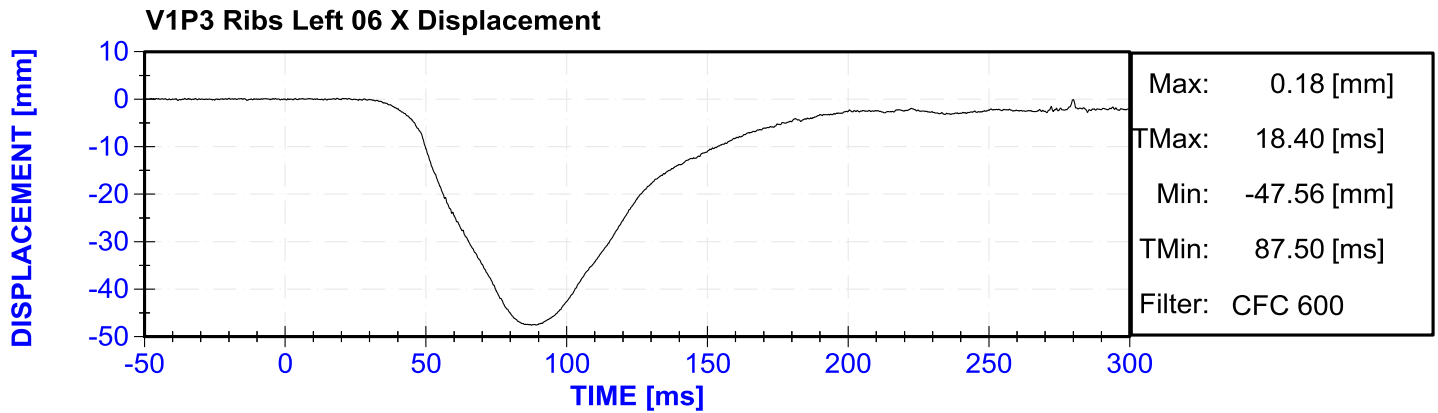


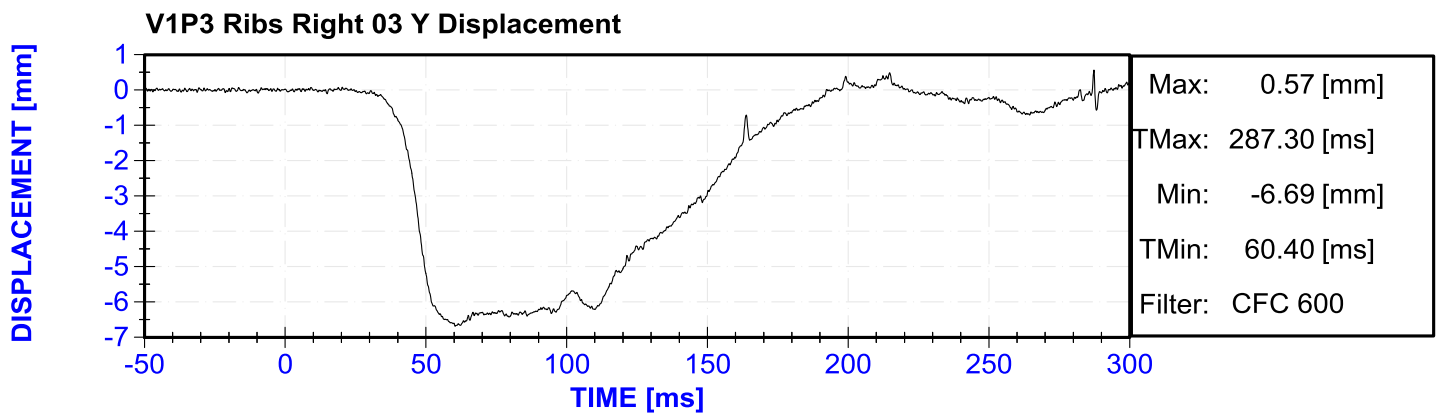
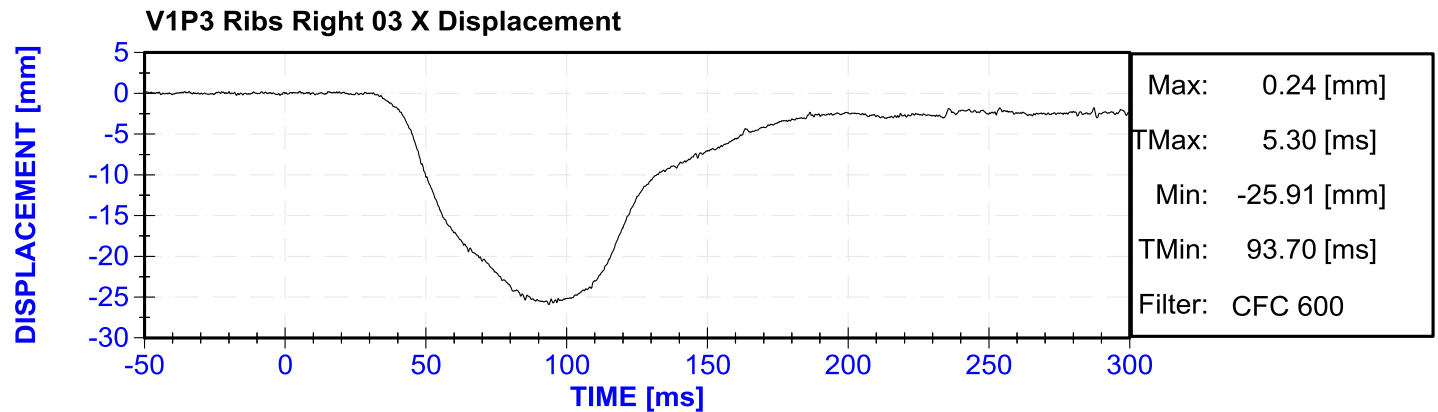
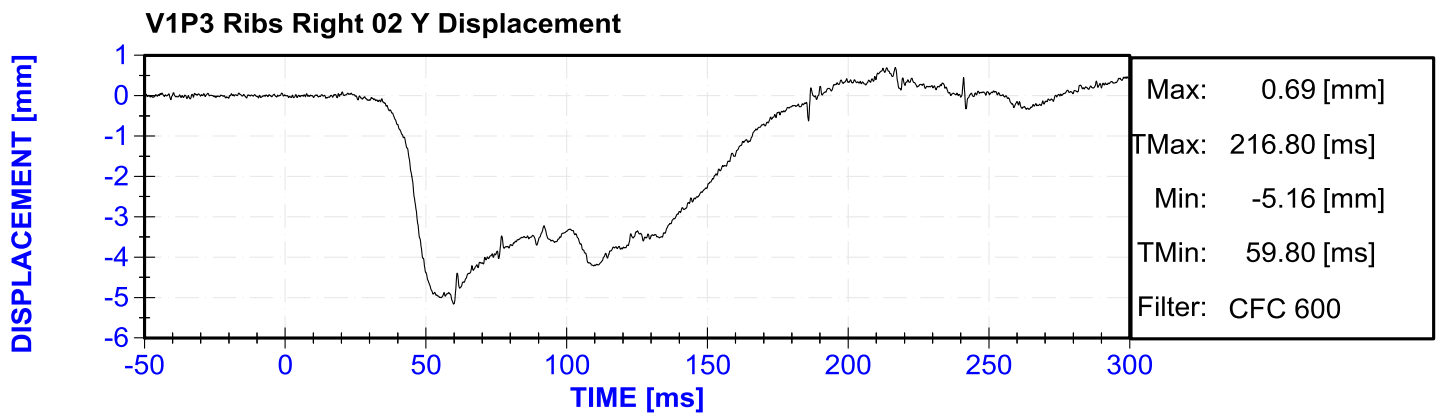
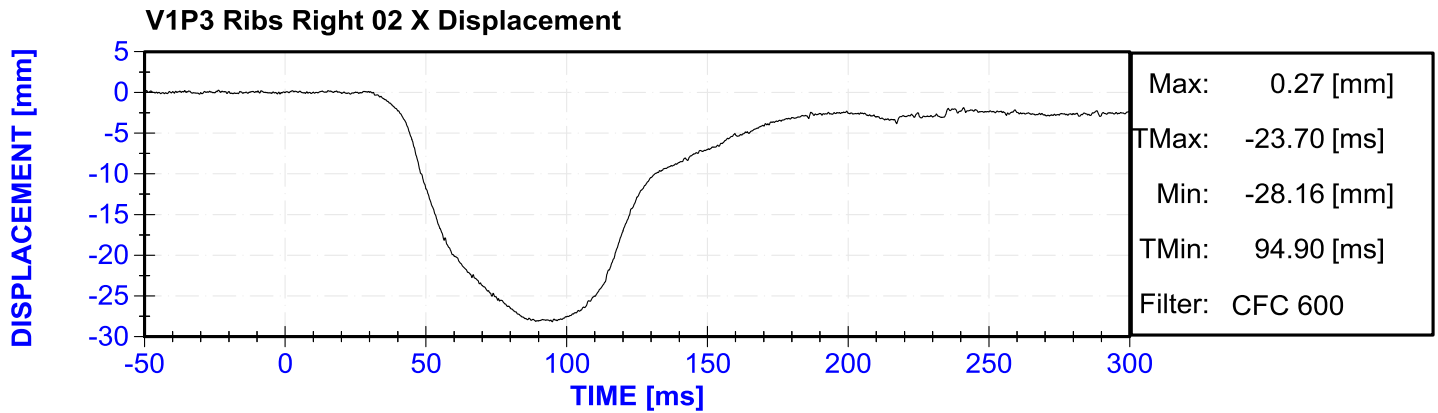


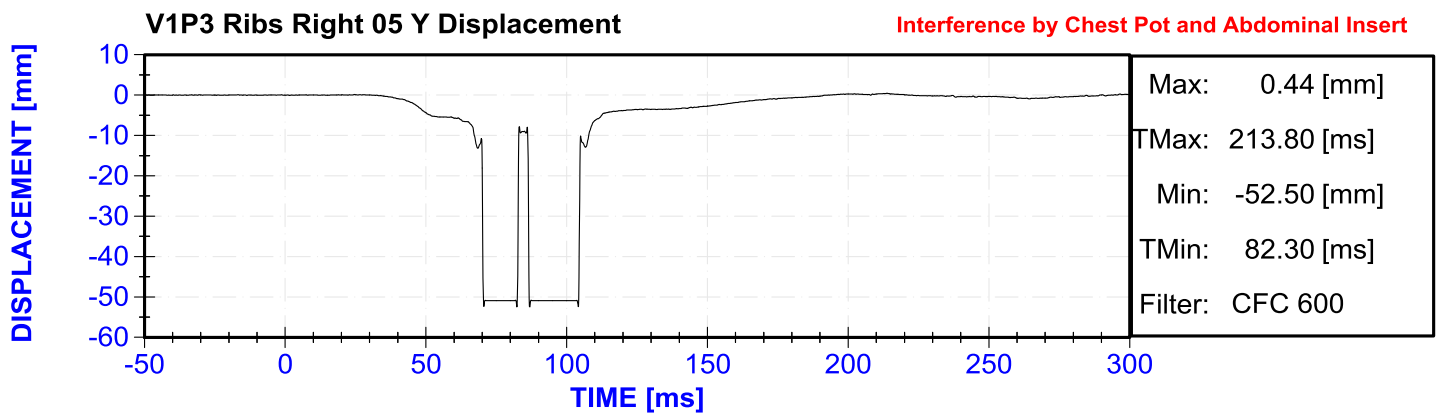
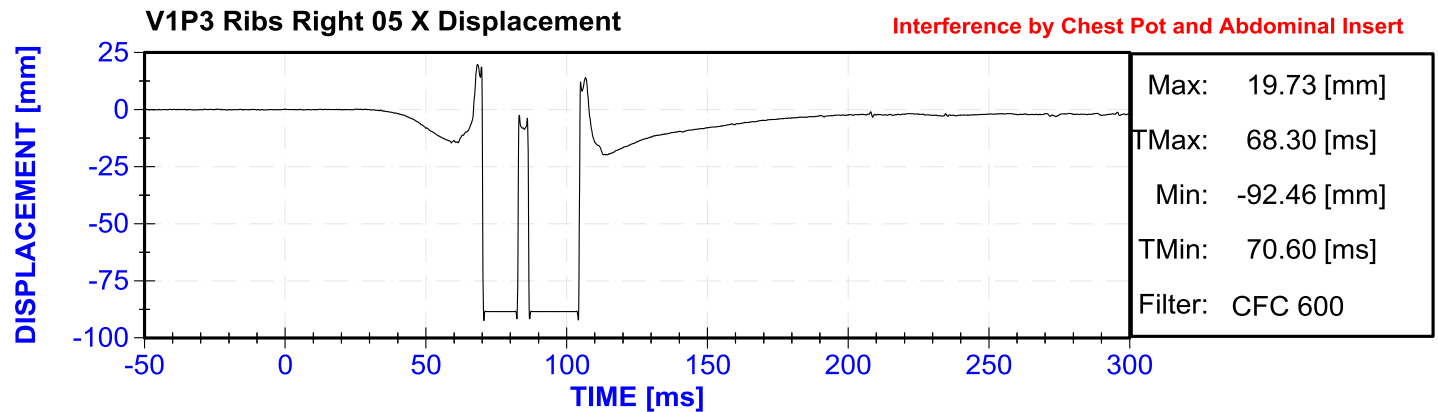
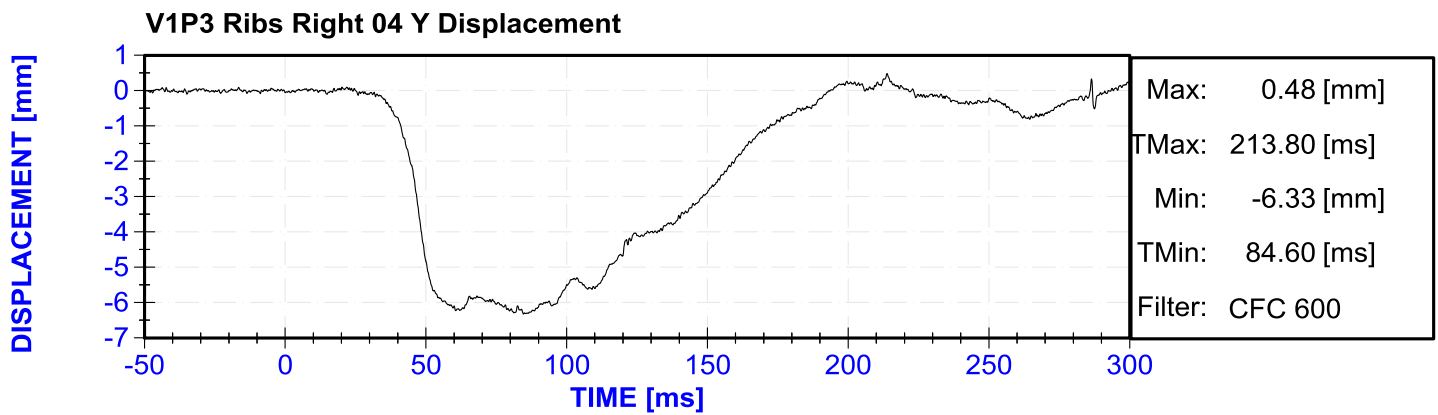
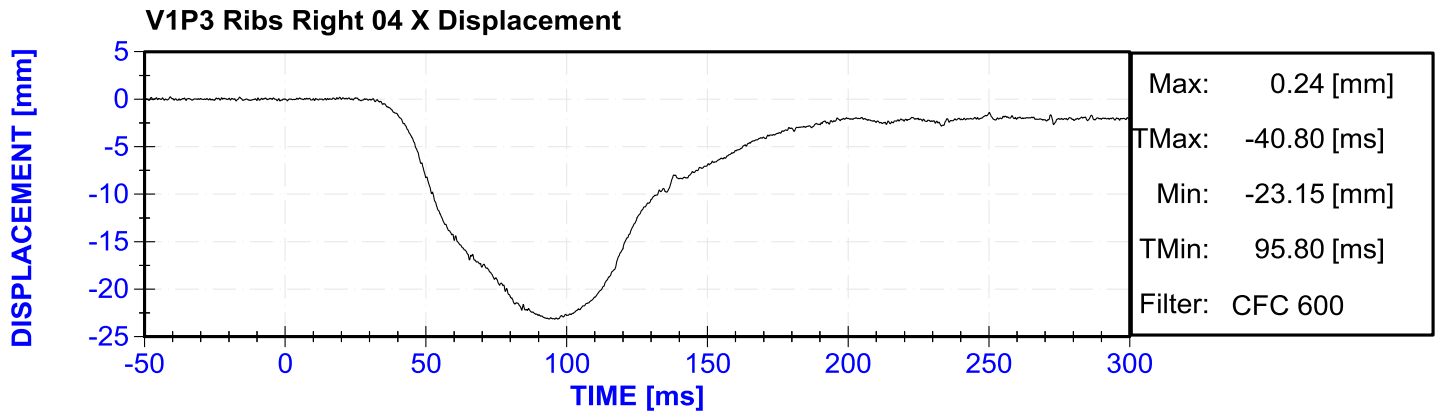


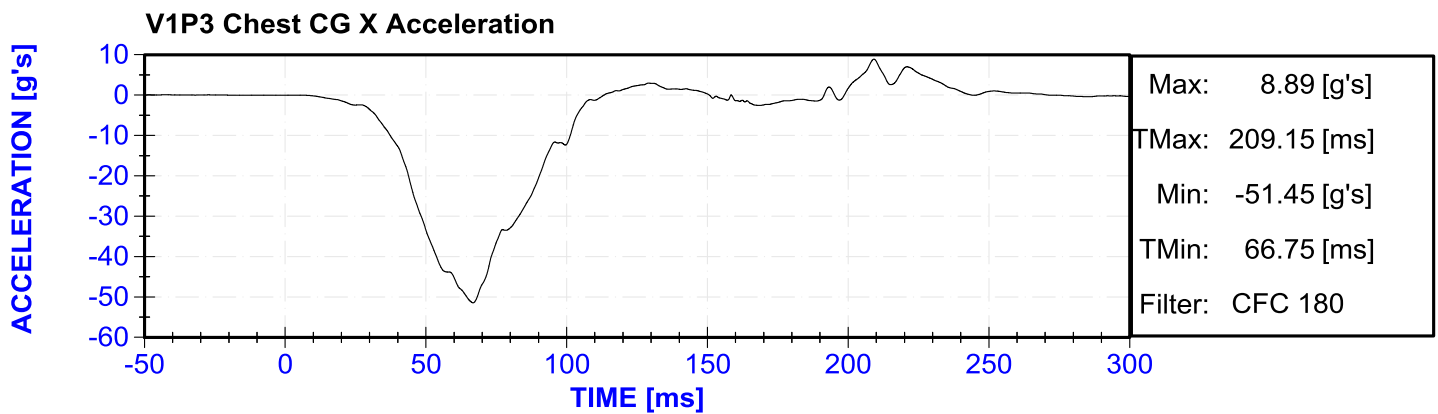
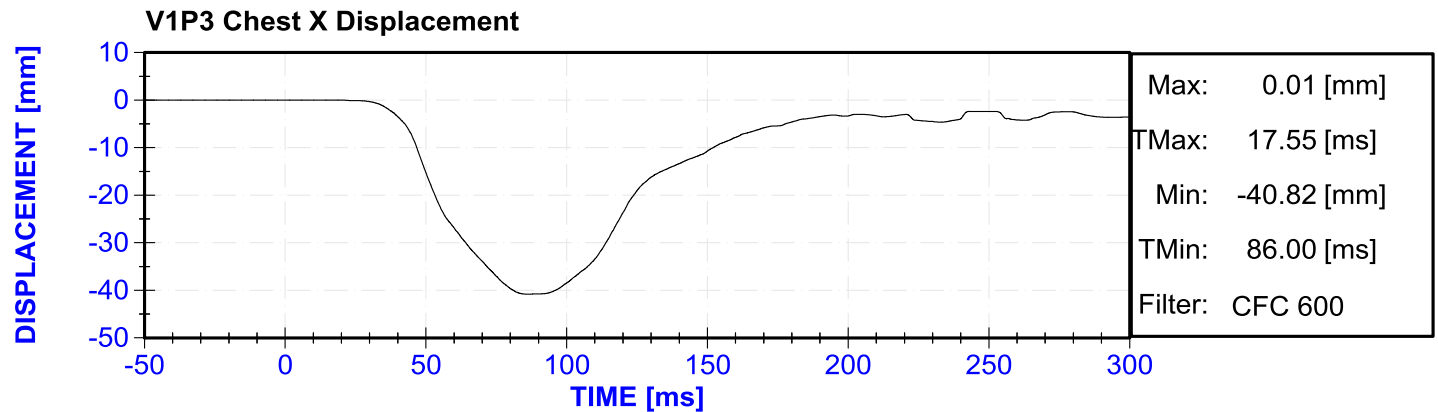
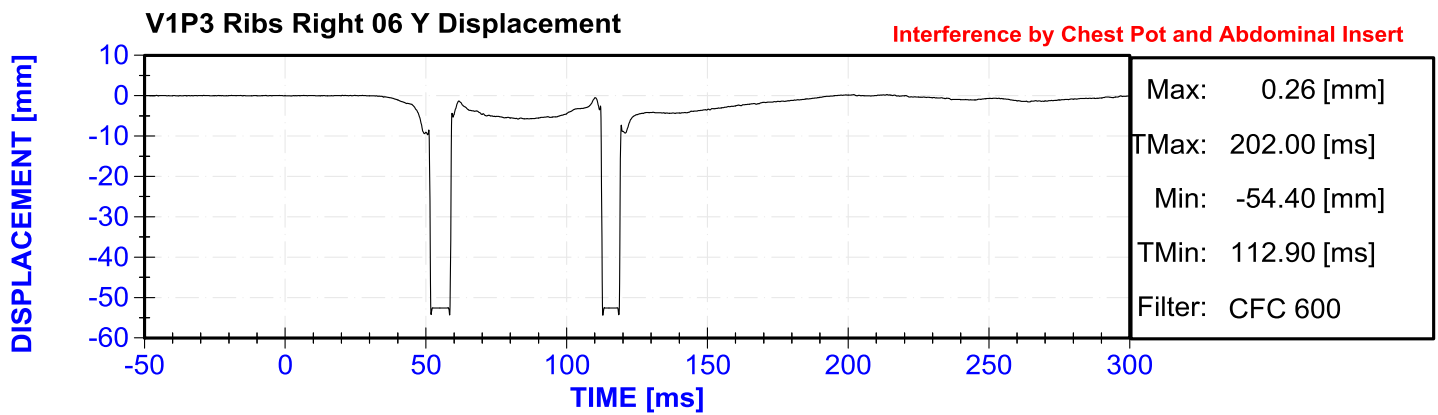
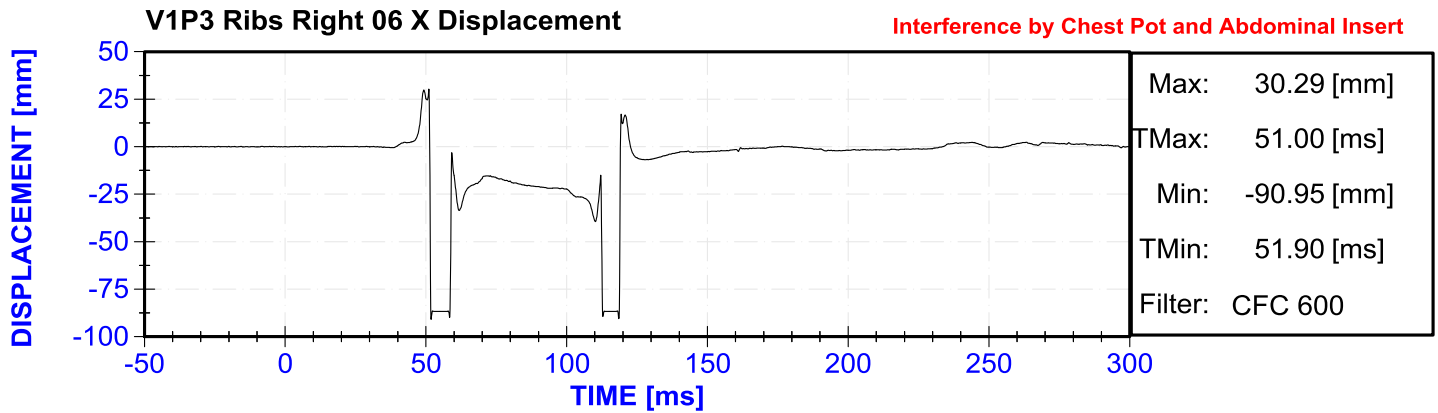


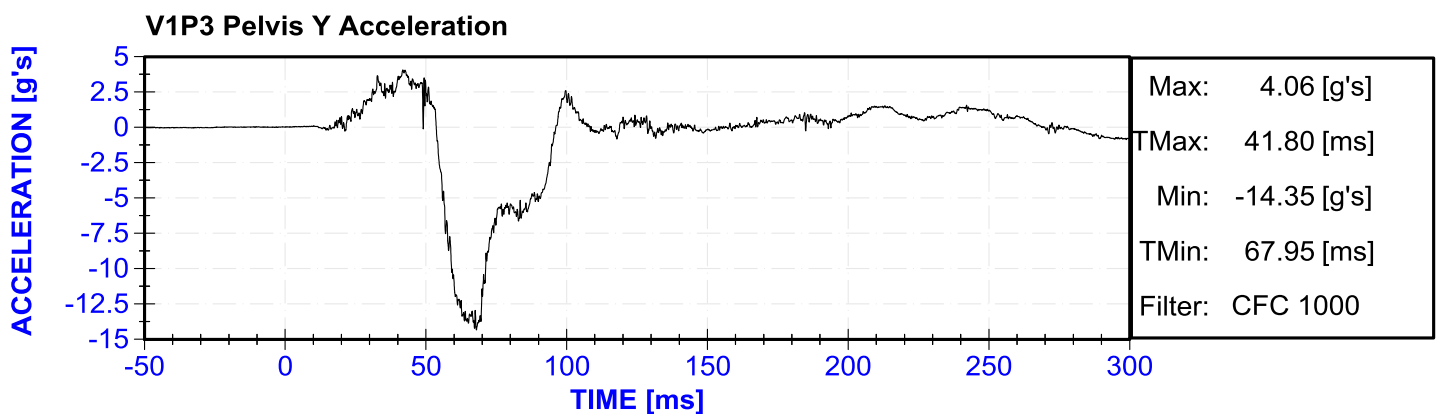
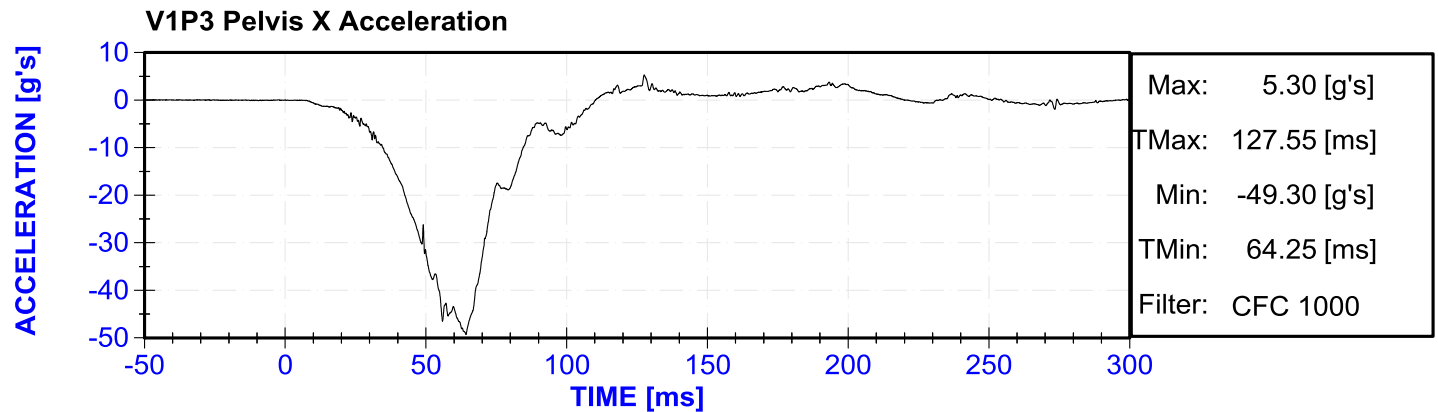
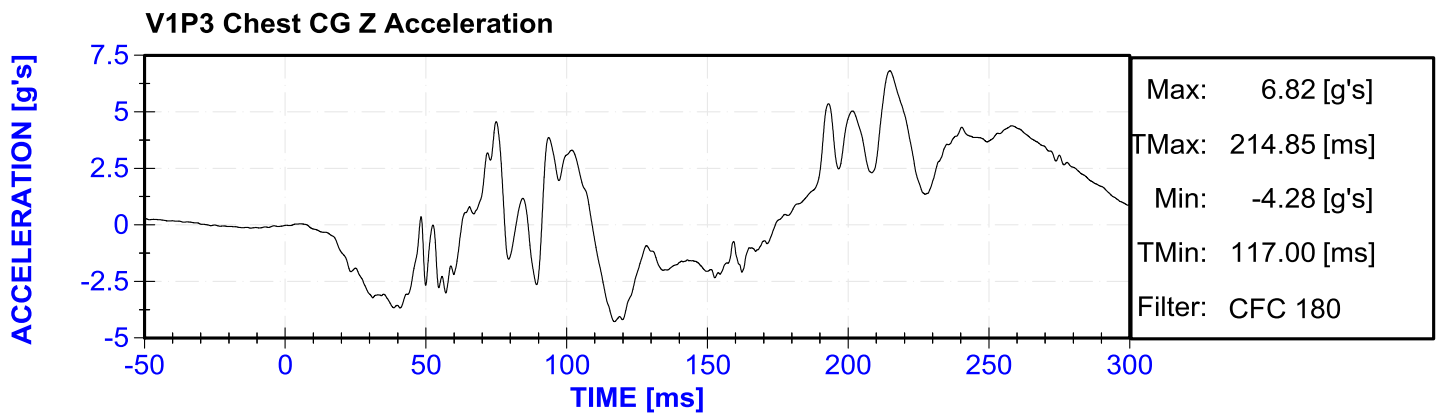
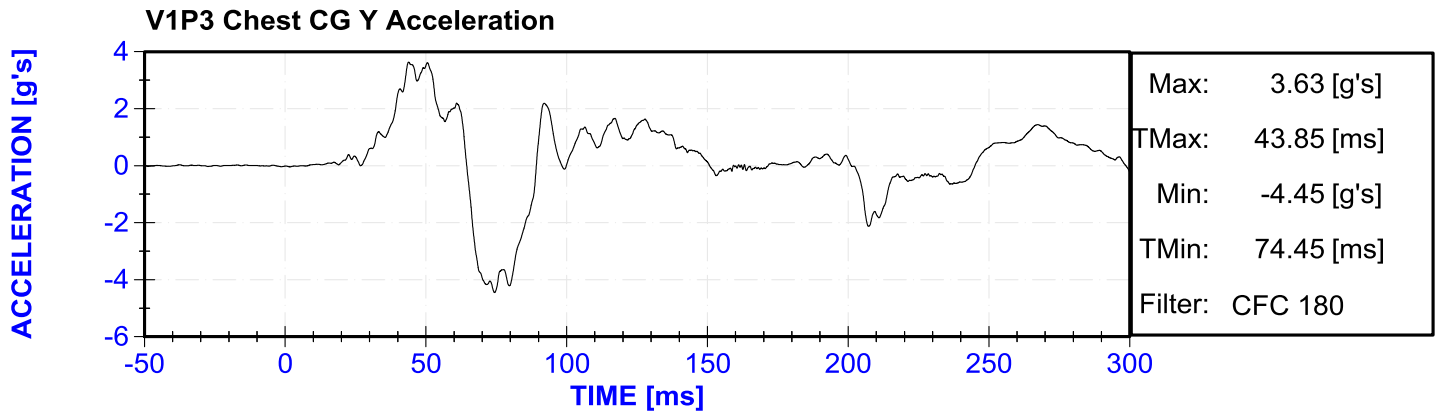


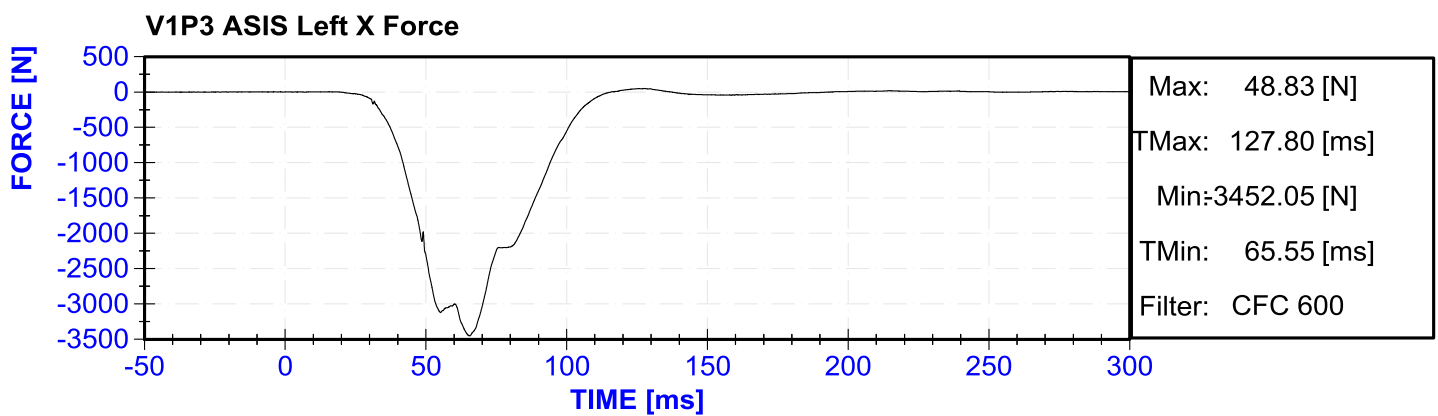
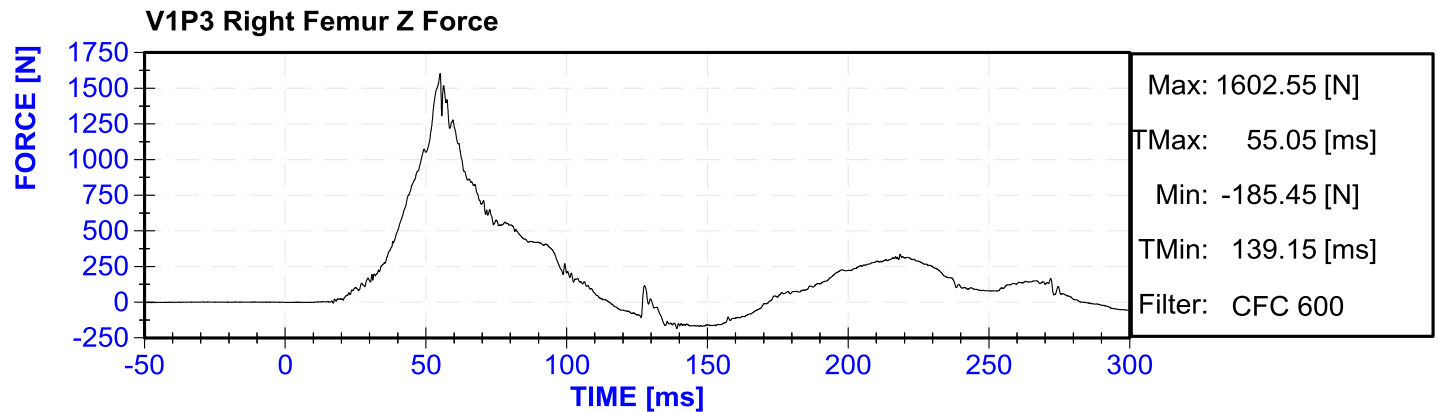
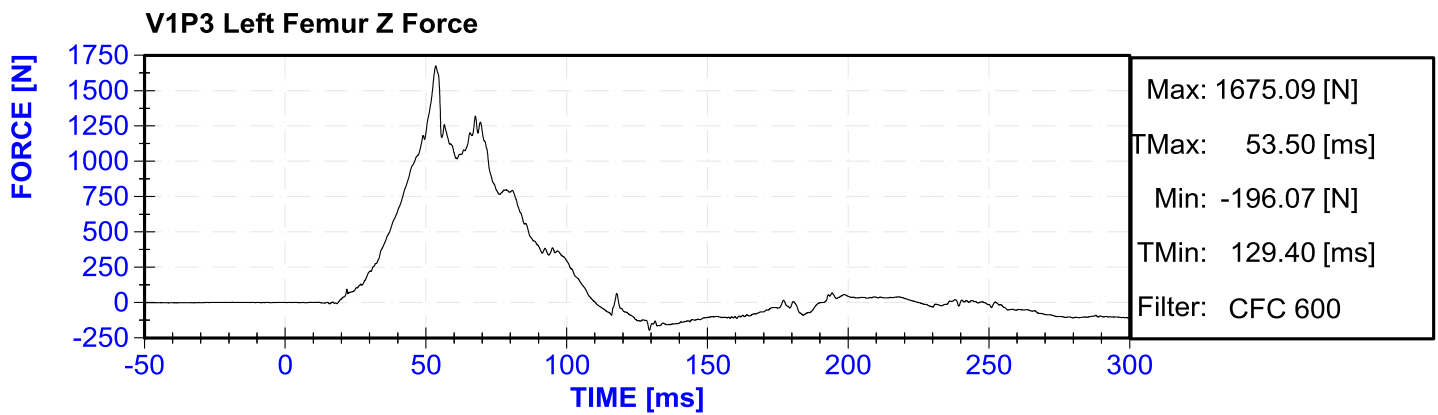
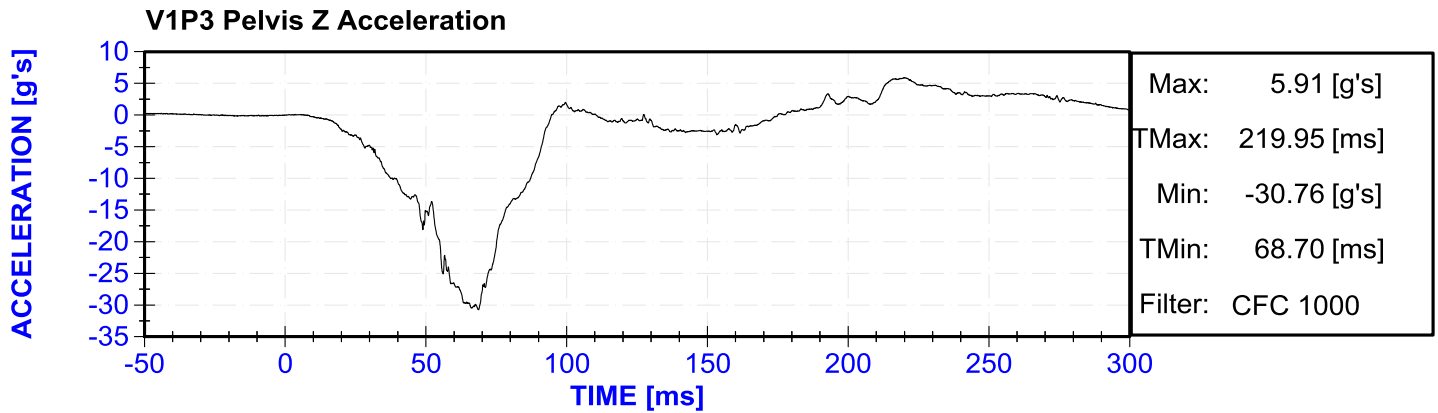


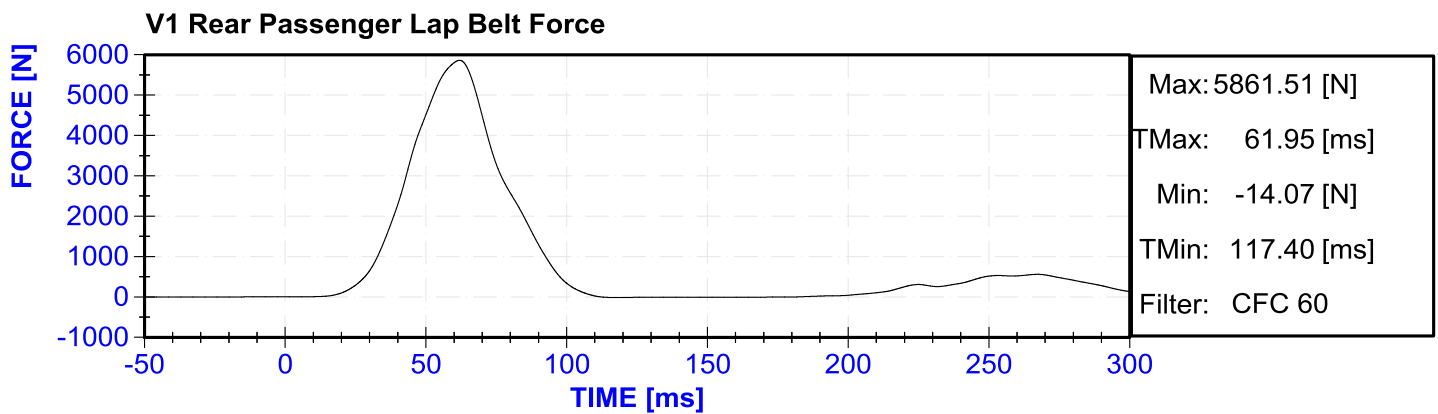
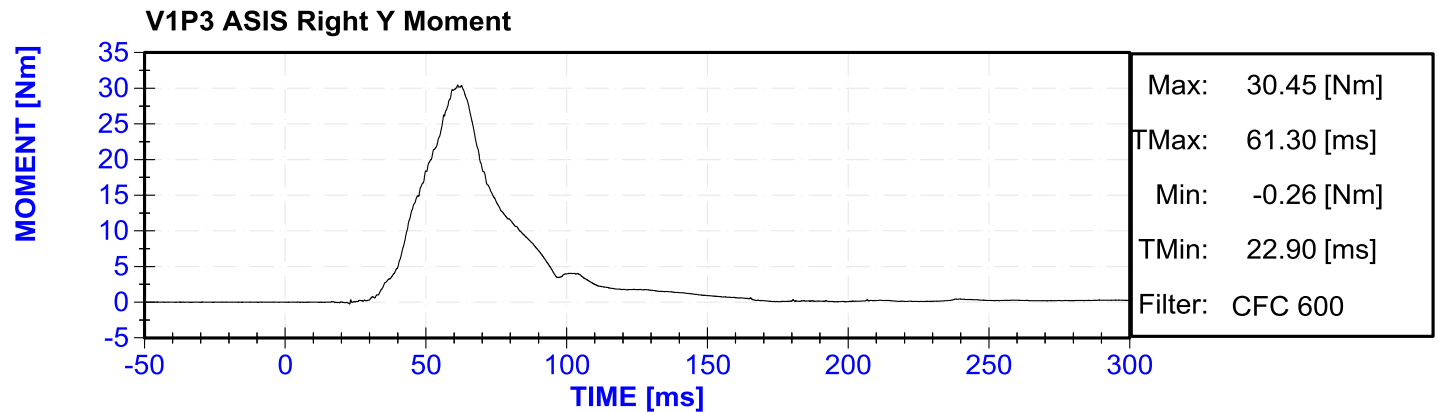
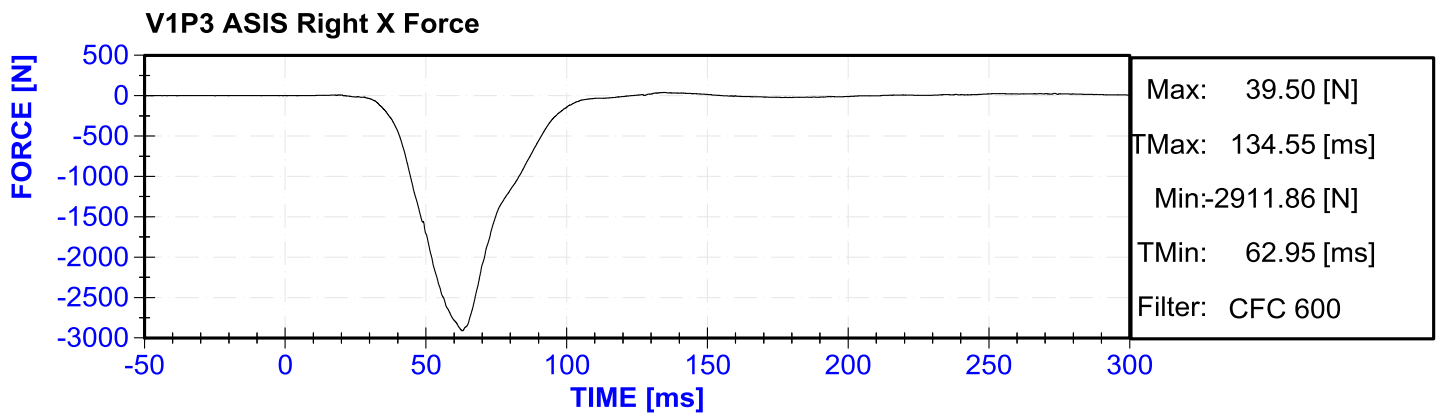
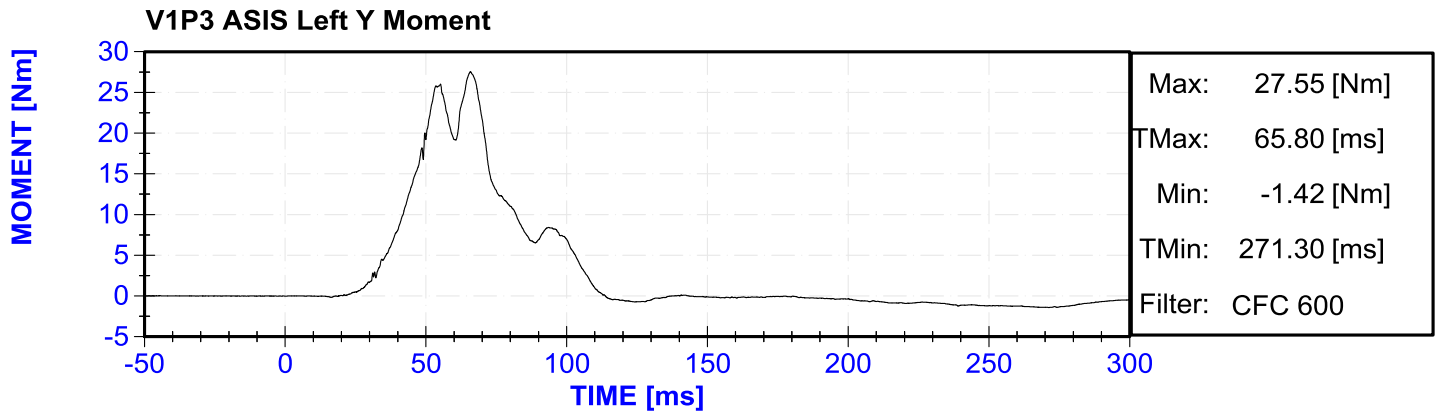




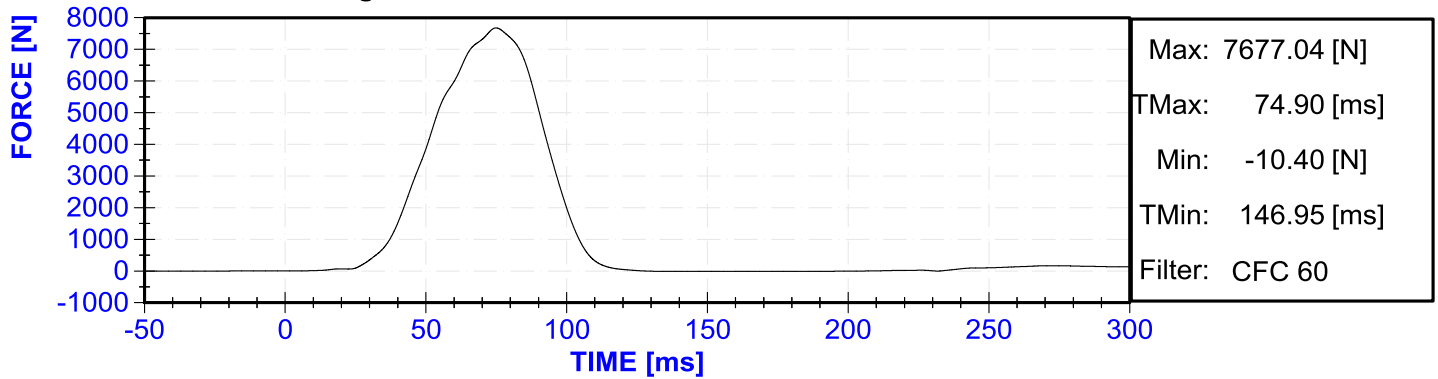




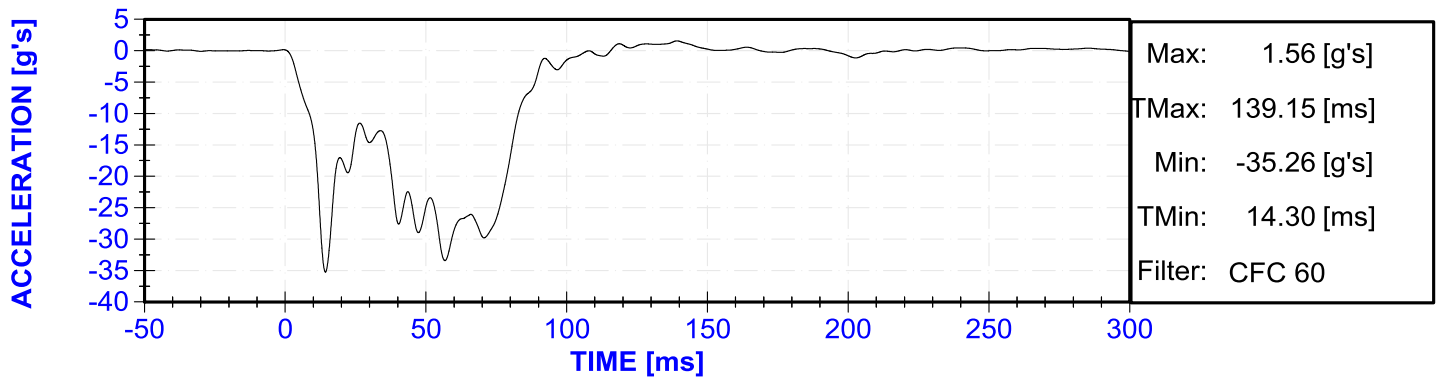




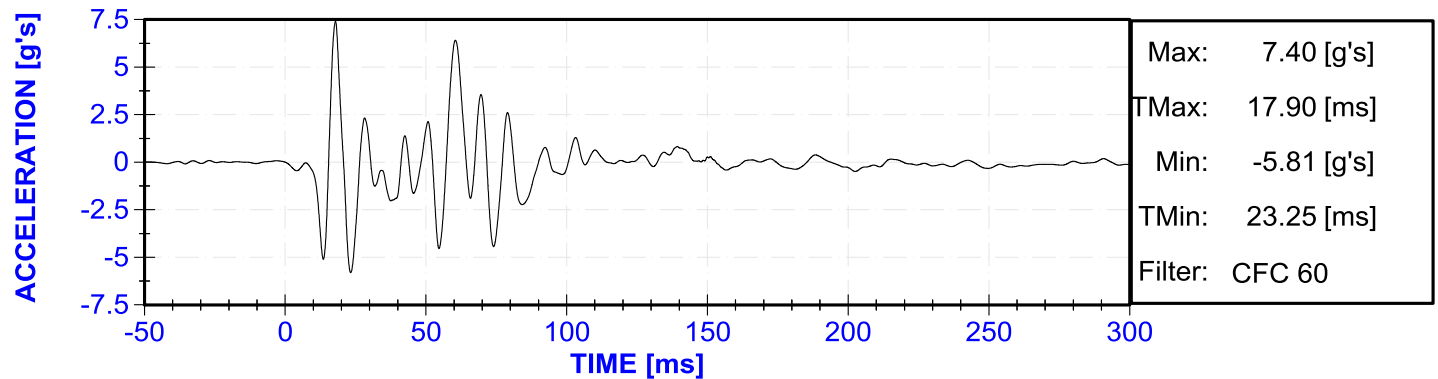
V1 Rear Passenger Shoulder Belt Force



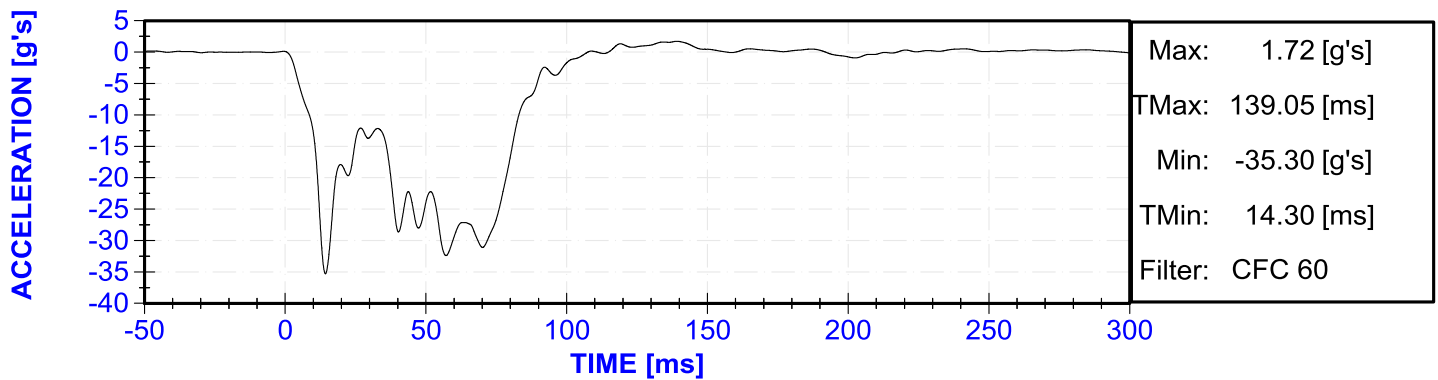
V1 Left Rear Sill X Acceleration

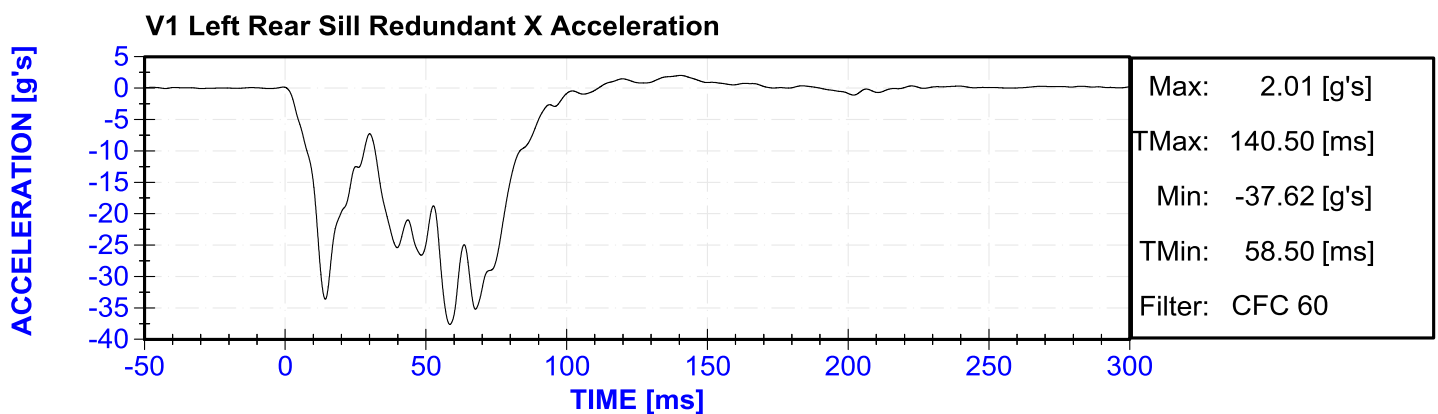
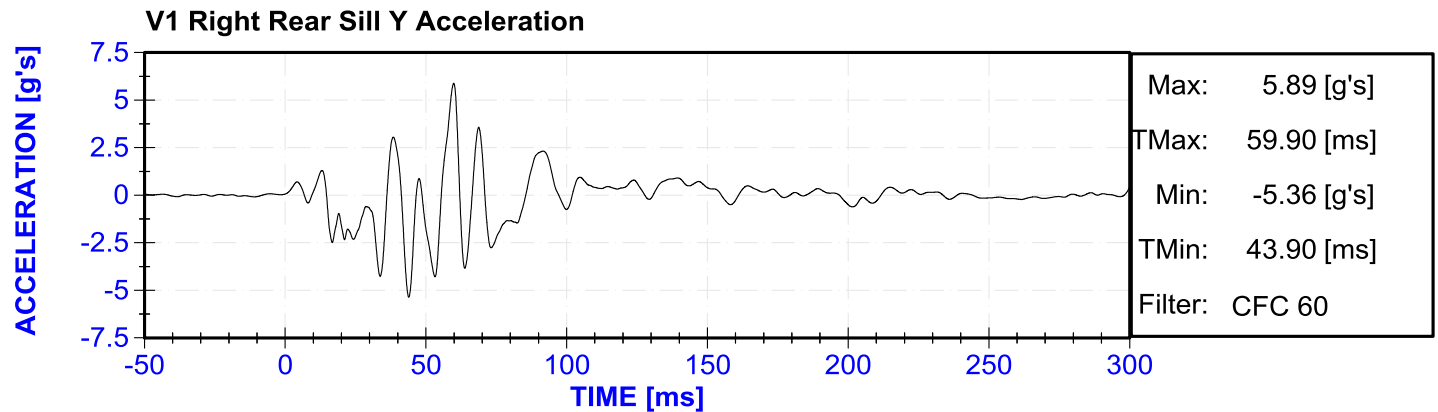
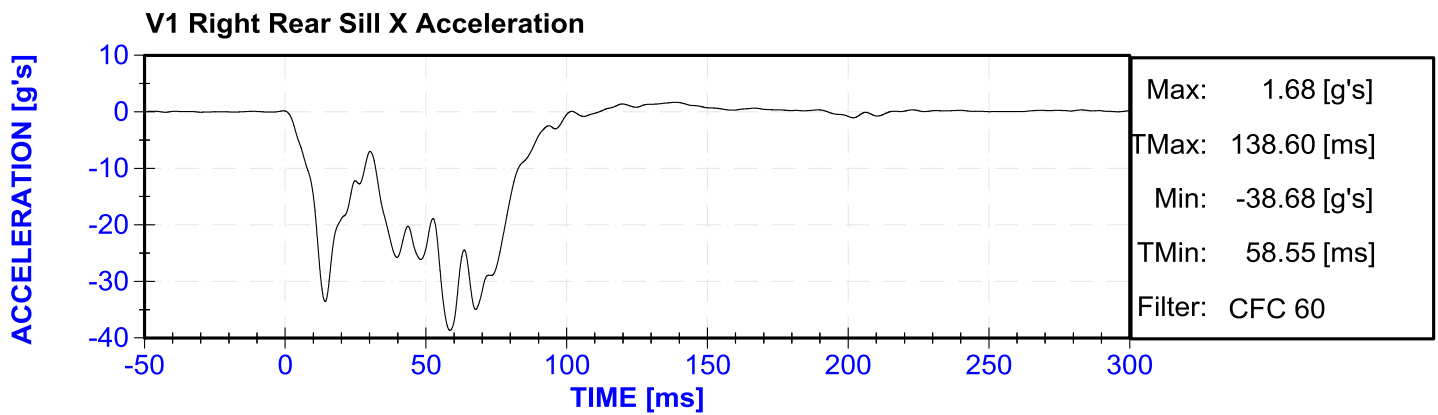
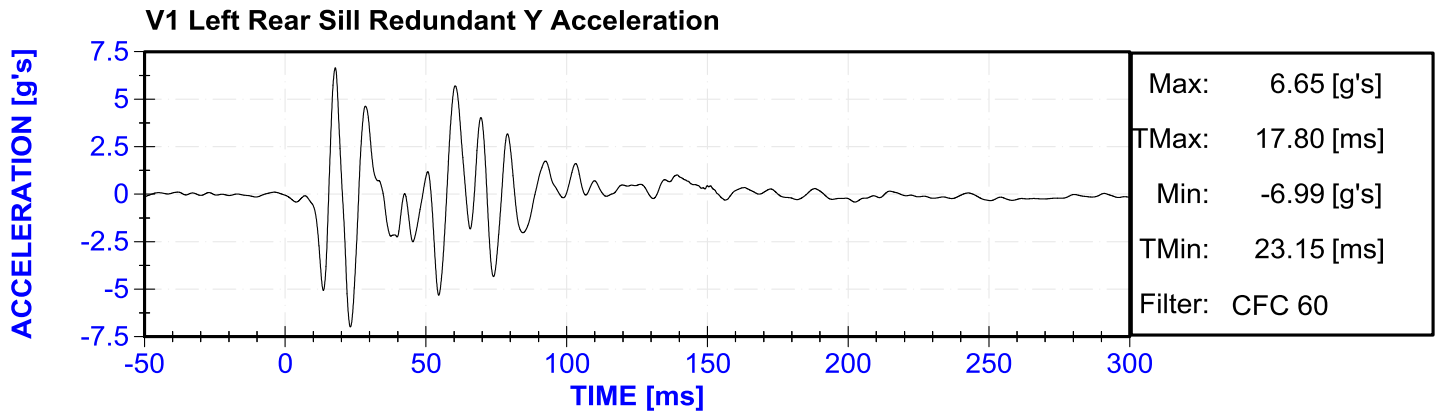


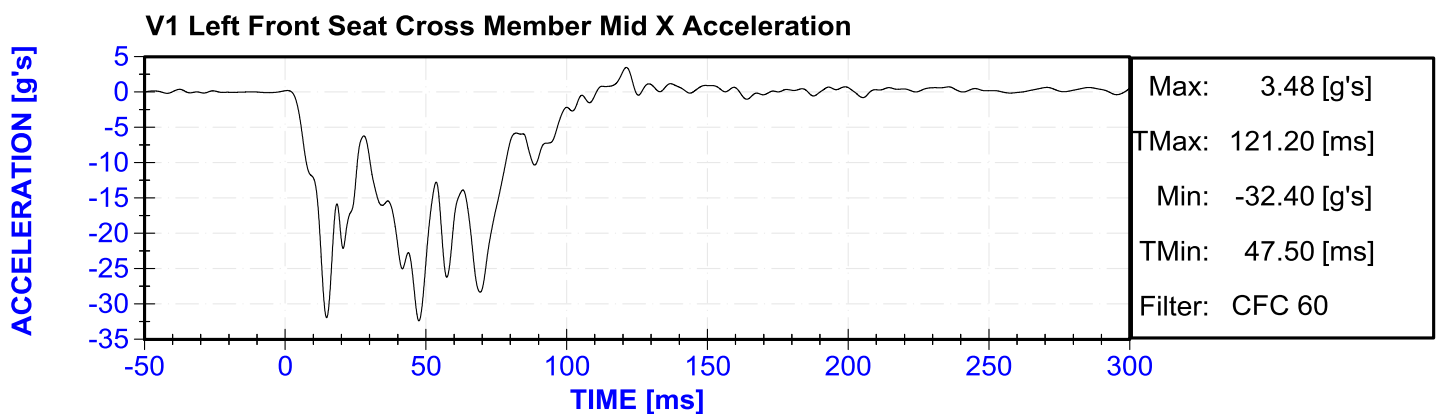
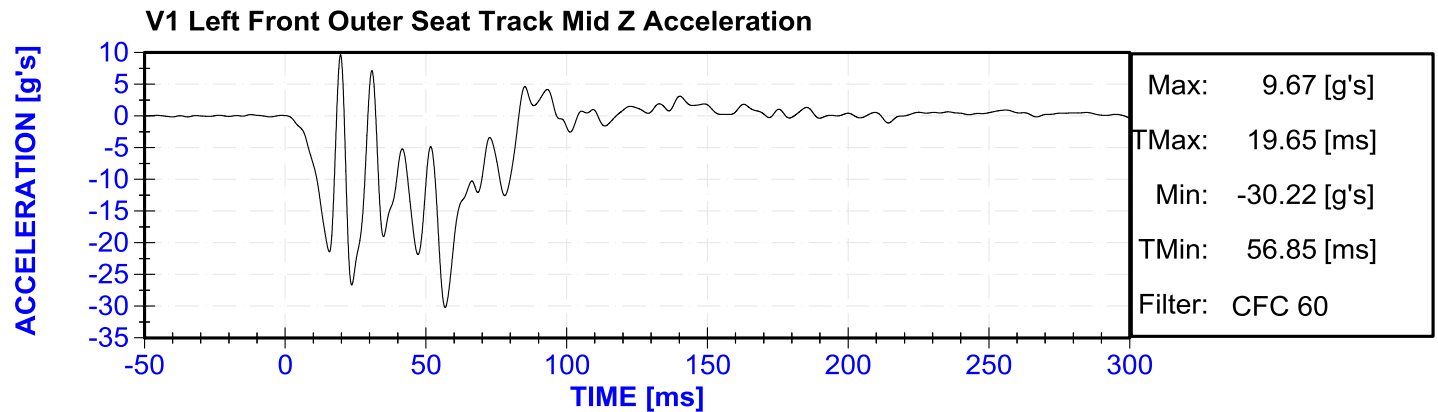
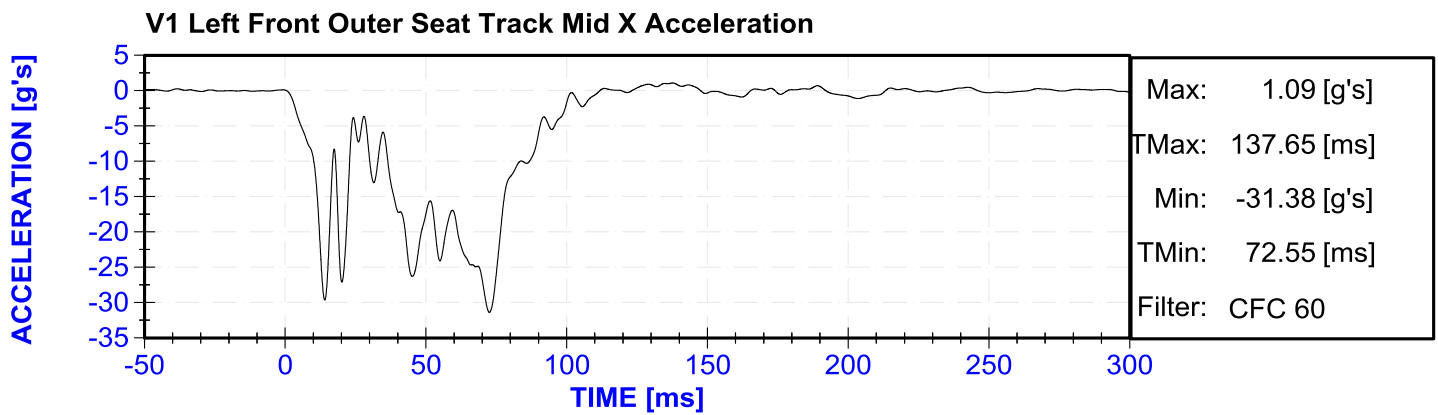
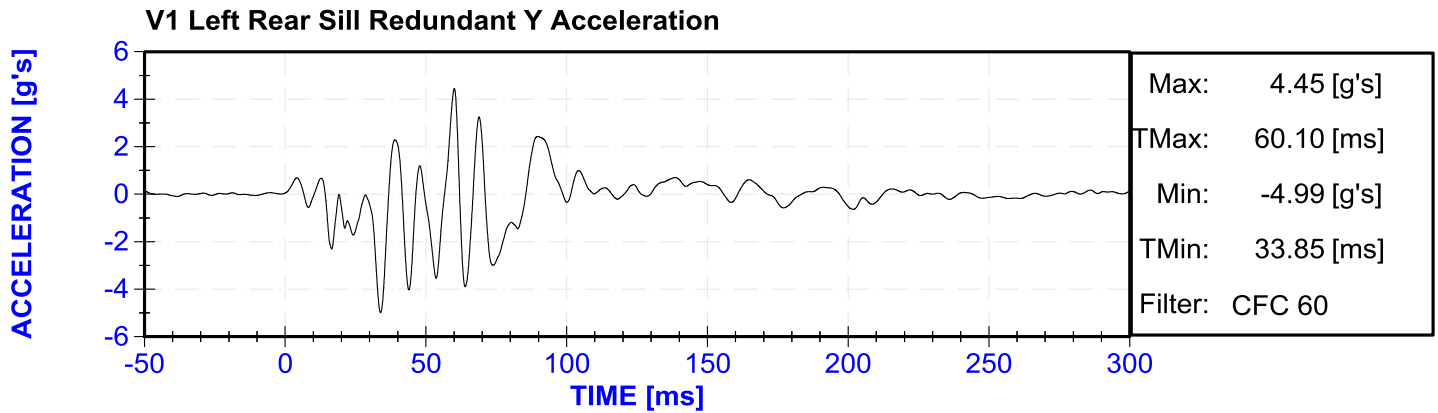
V1 Left Rear Sill Y Acceleration

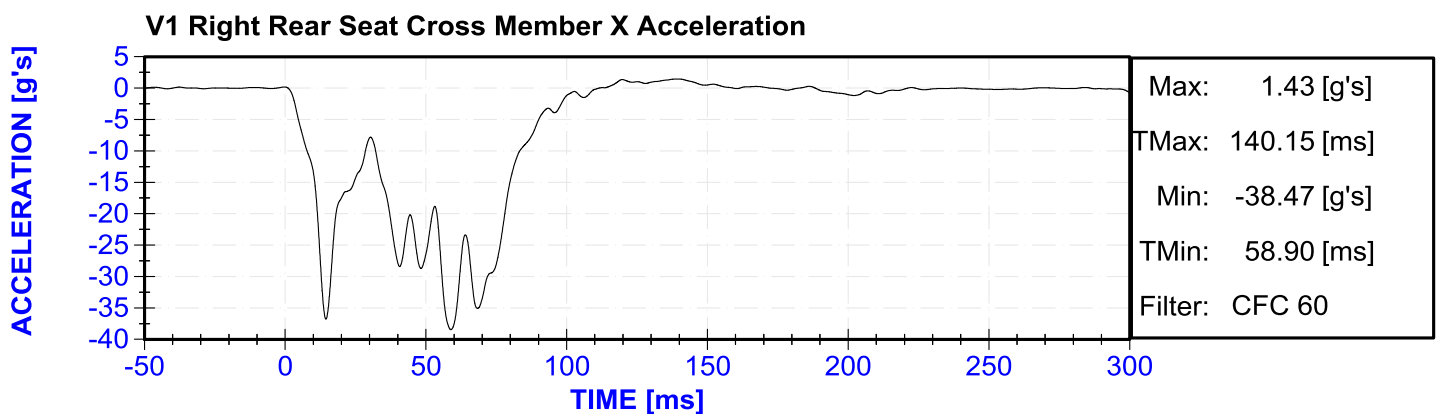
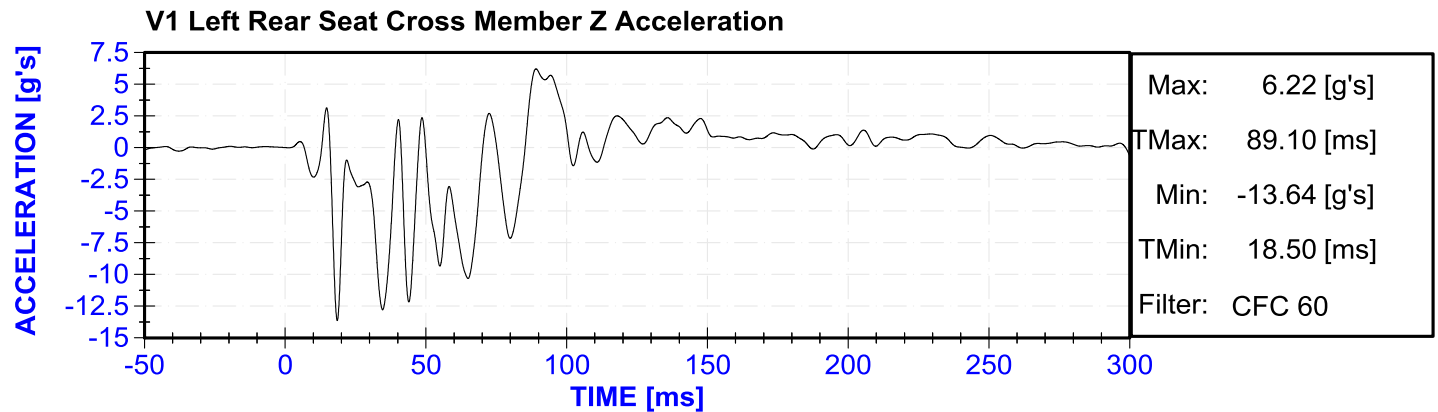
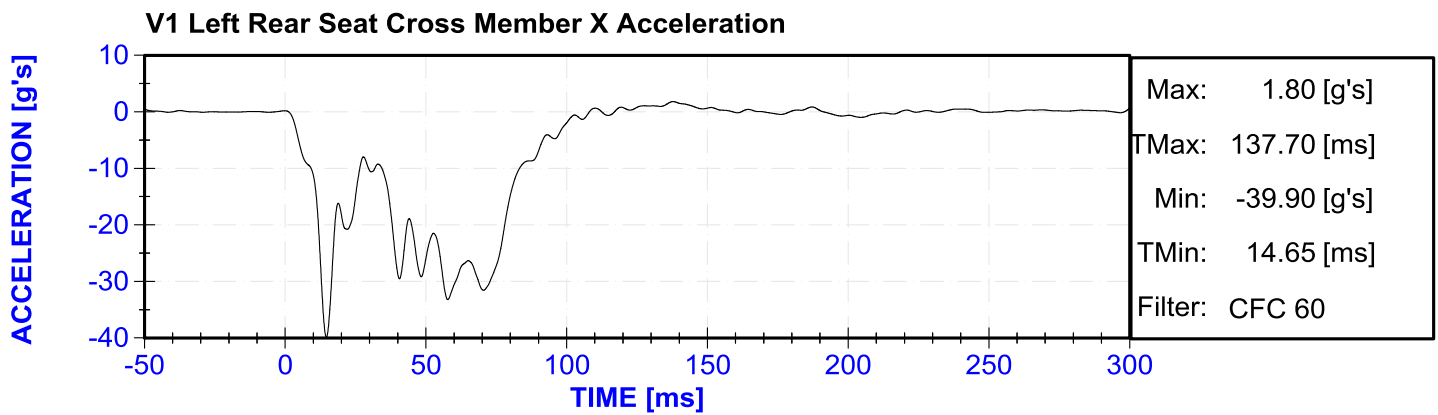
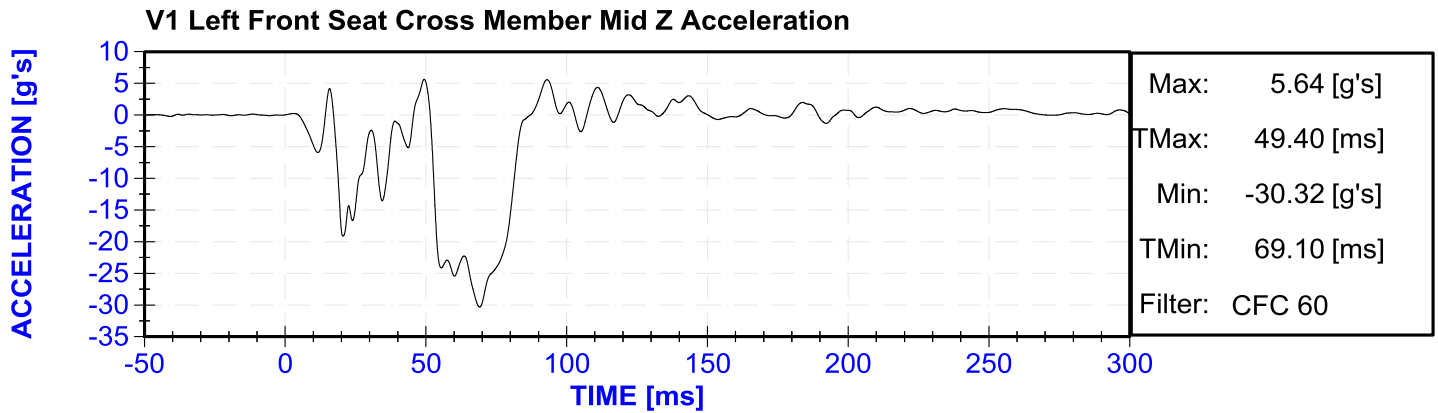


V1 Left Rear Sill Redundant X Acceleration

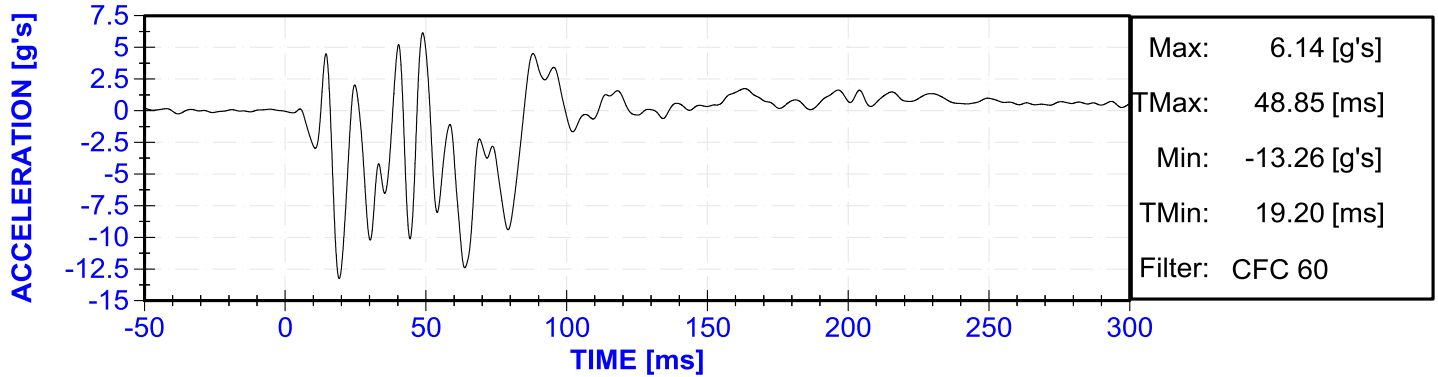




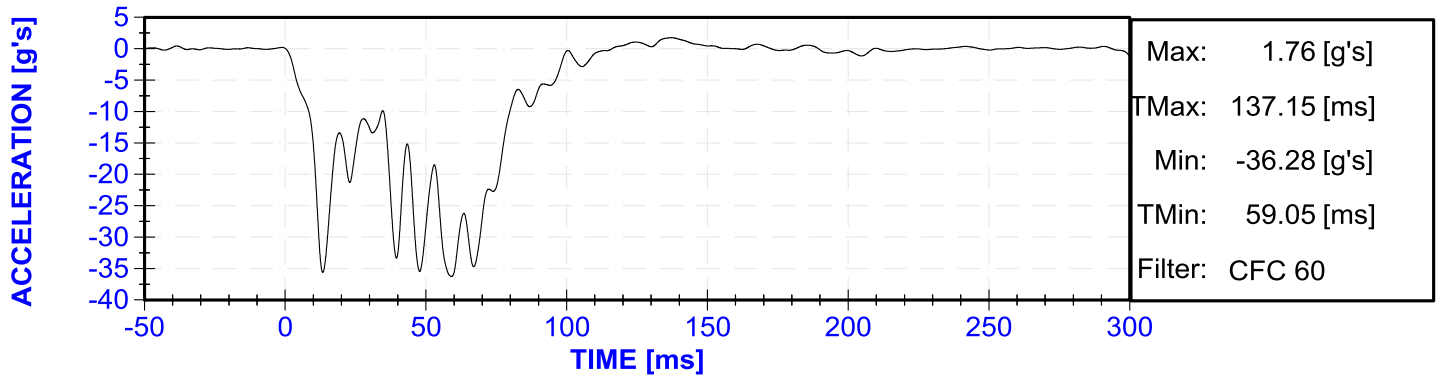




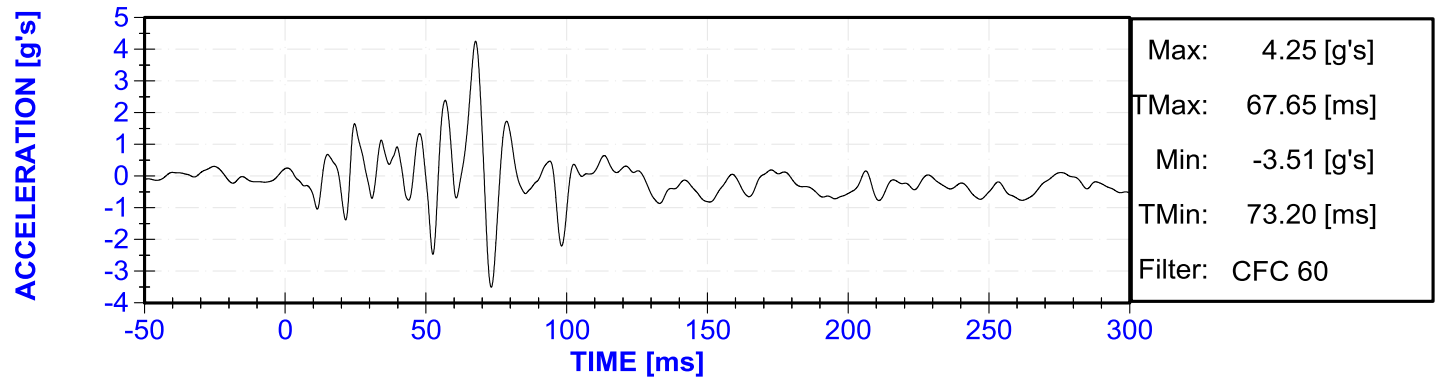
V1 Right Rear Seat Cross Member Z Acceleration



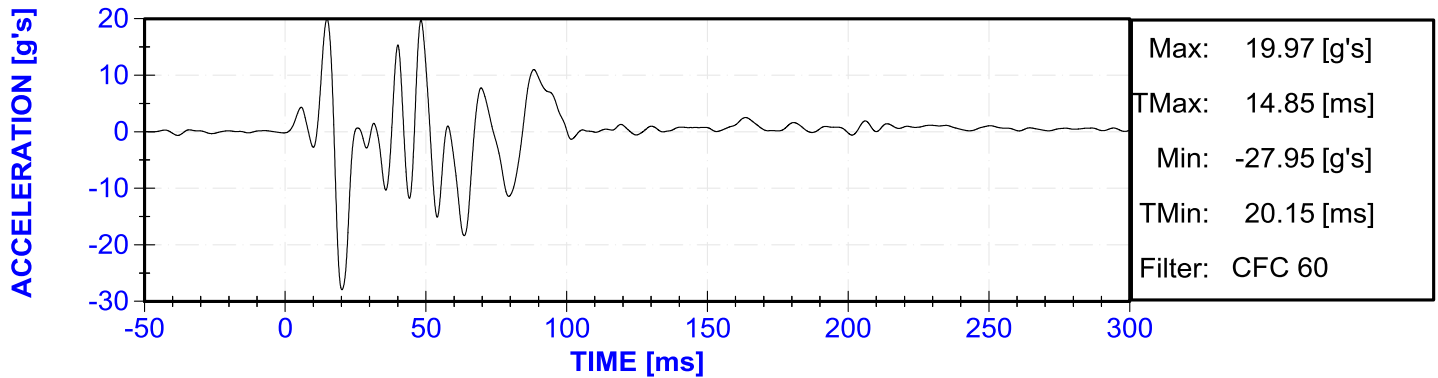
V1 Vehicle CG X Acceleration

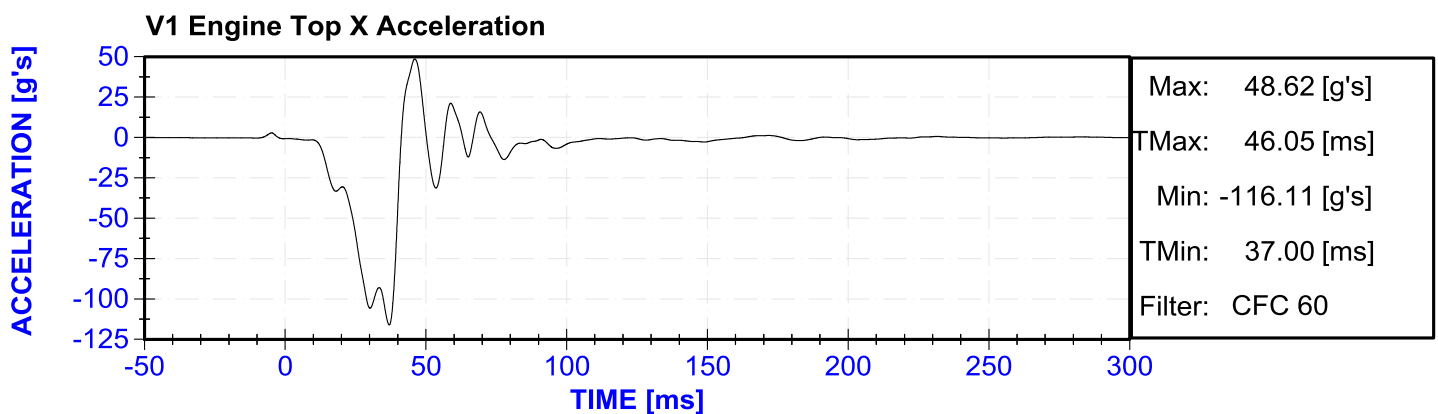
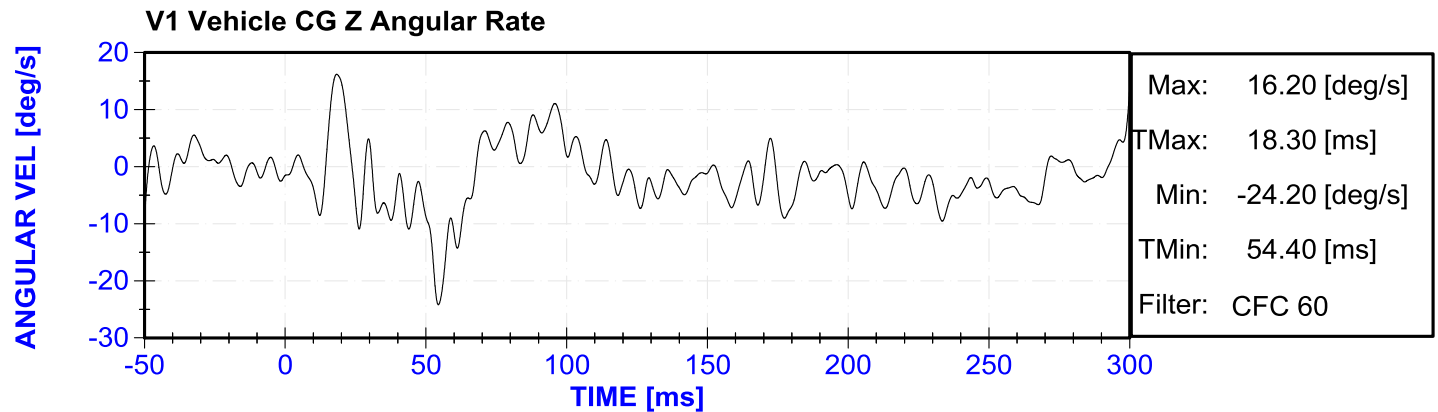
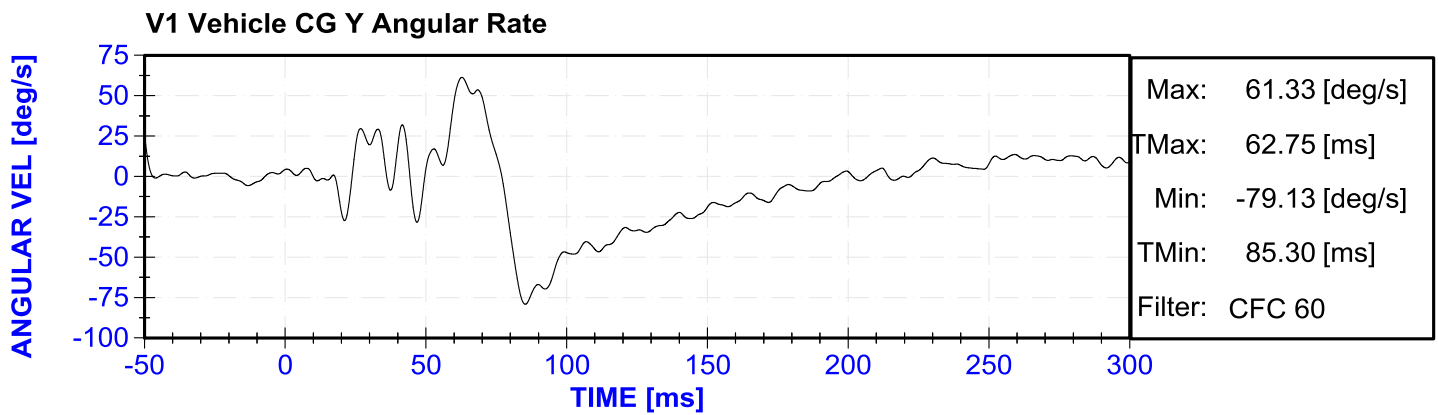
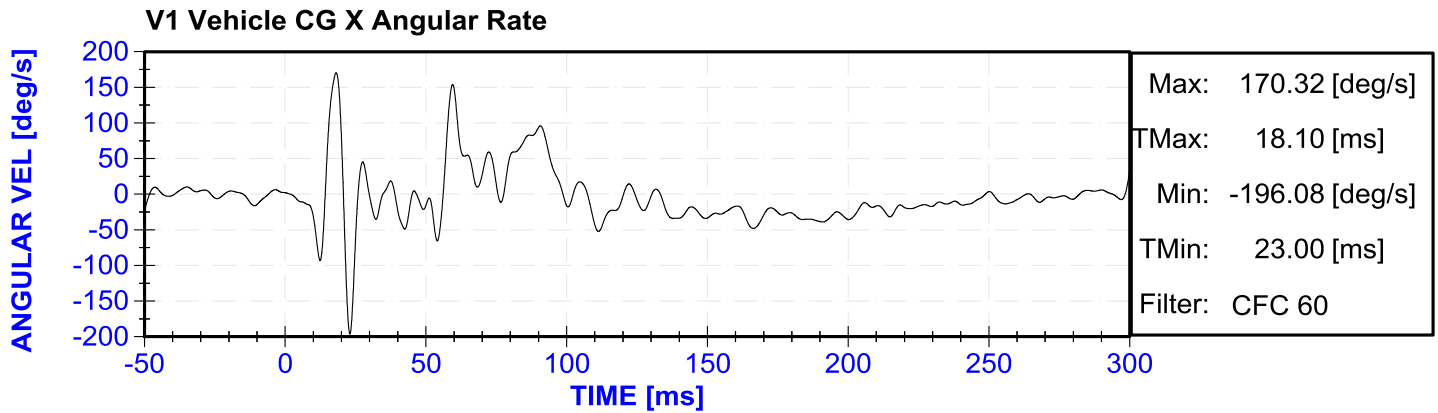


V1 Vehicle CG Y Acceleration

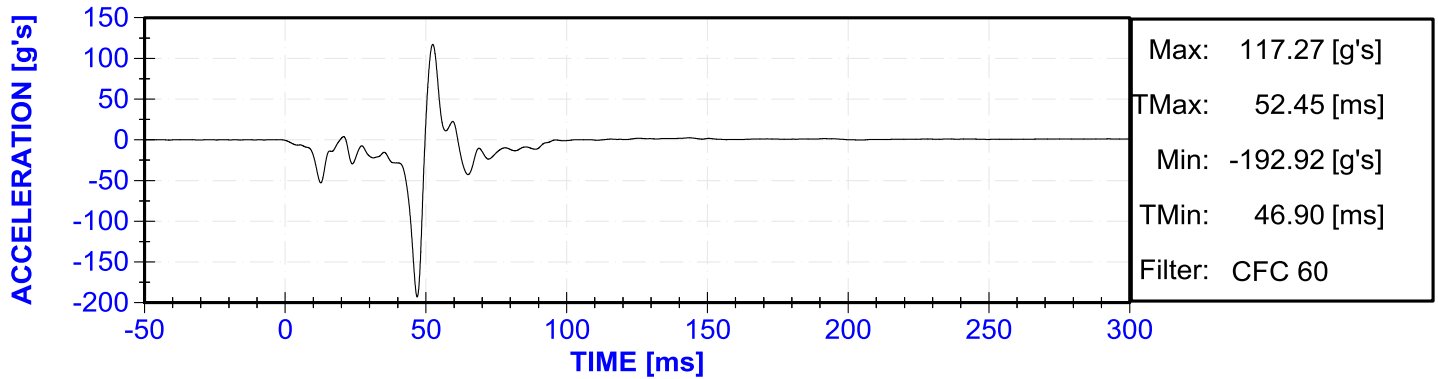


V1 Vehicle CG Z Acceleration

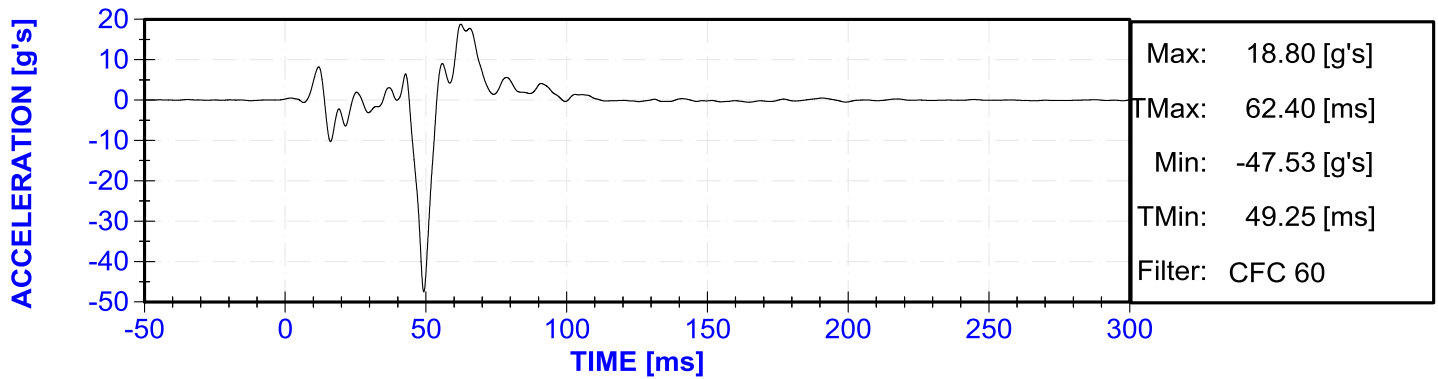




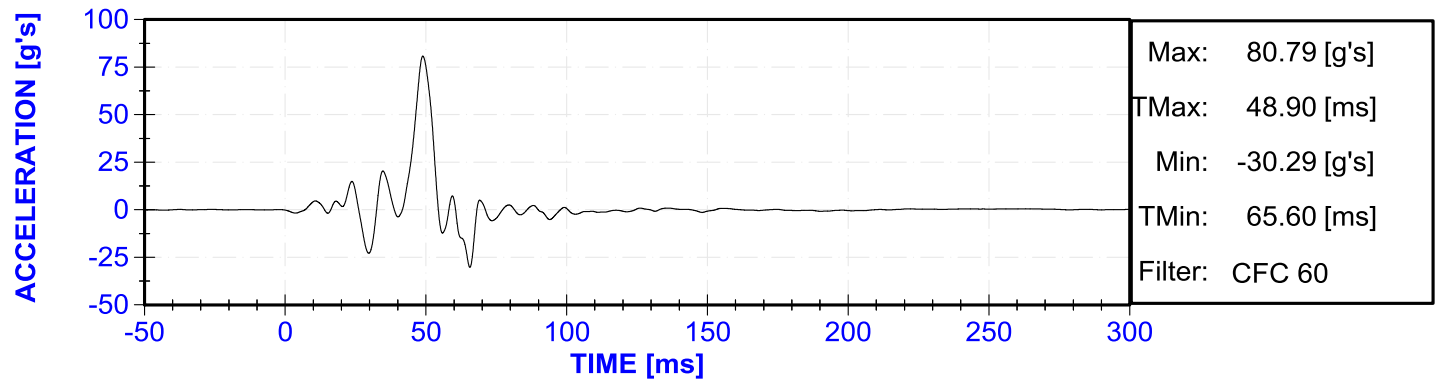
V1 Driver Floor Pan X Acceleration



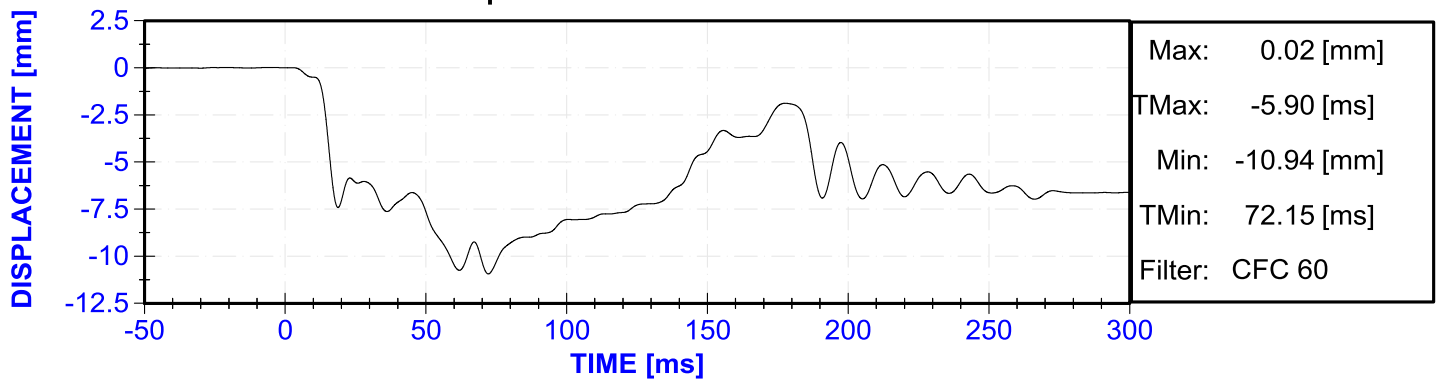
V1 Driver Floor Pan Y Acceleration

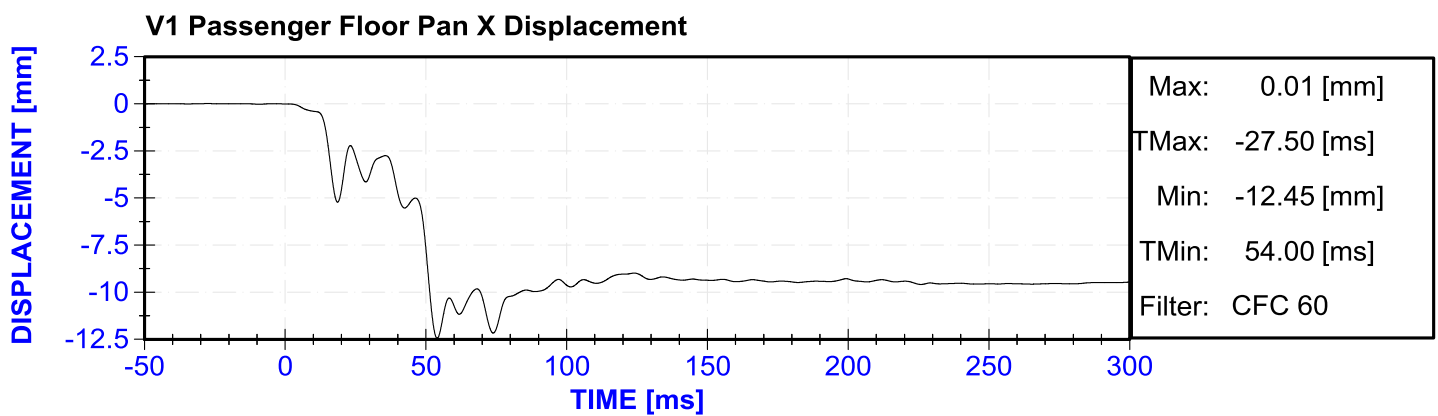
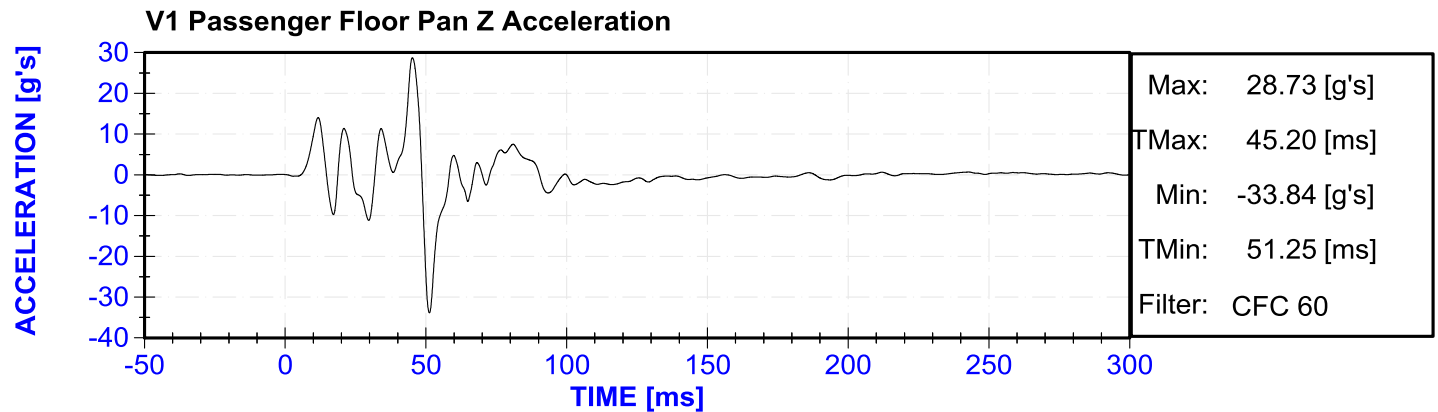
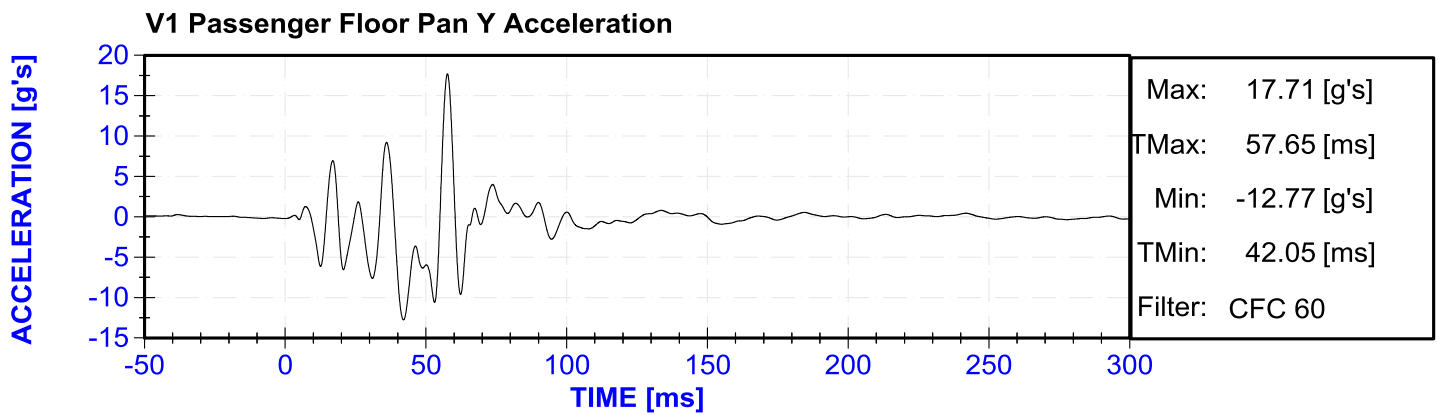
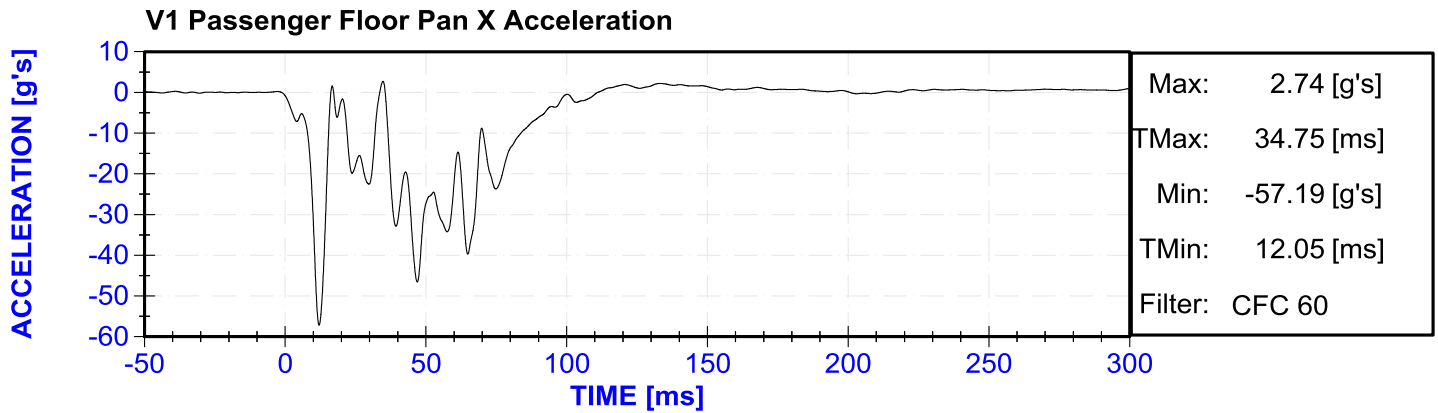


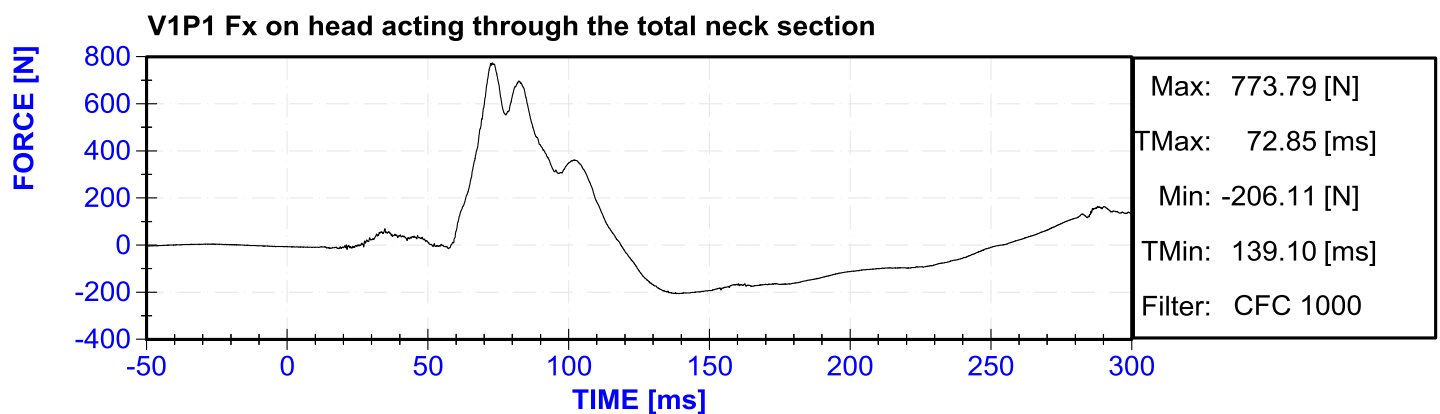
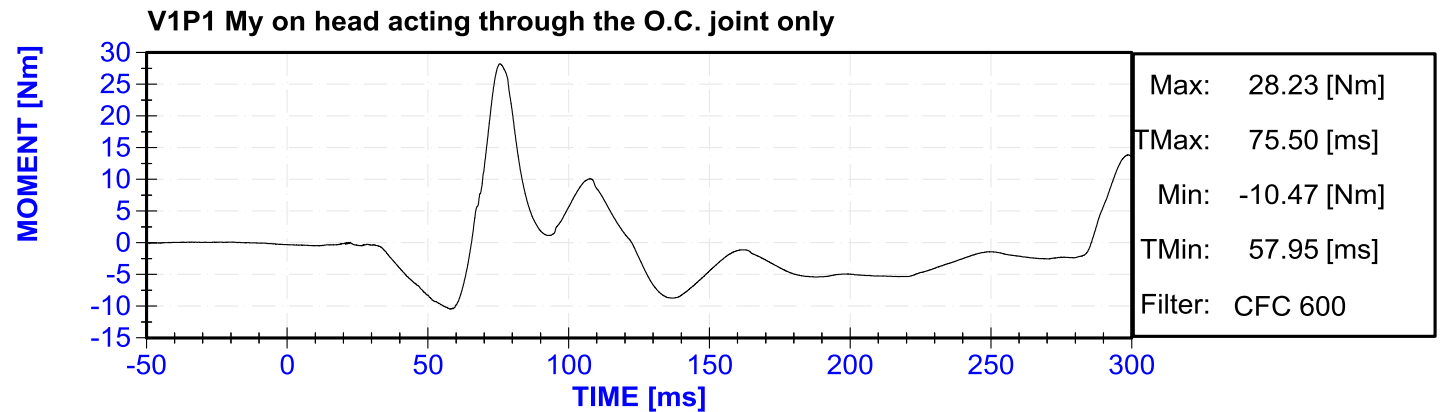
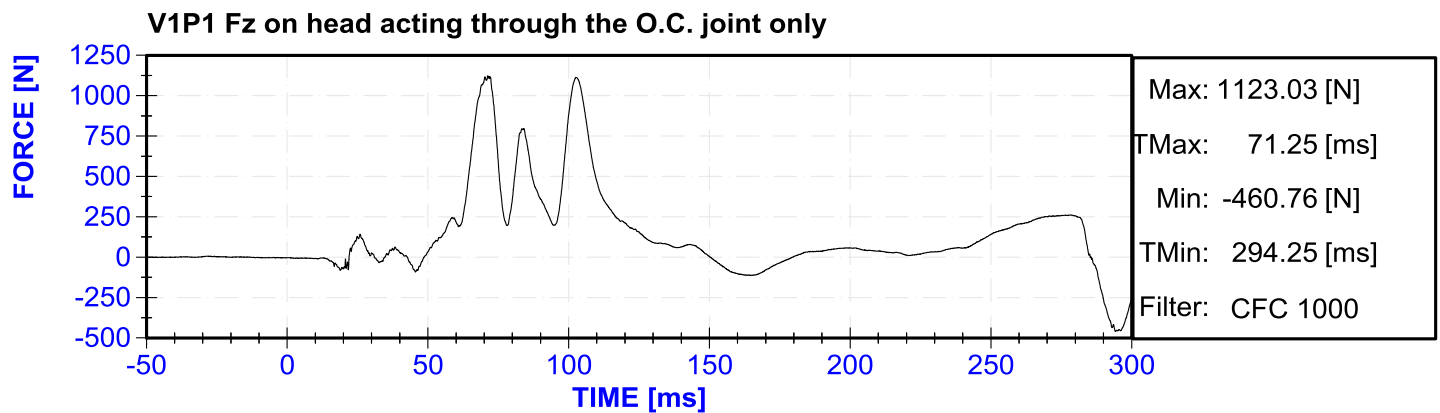
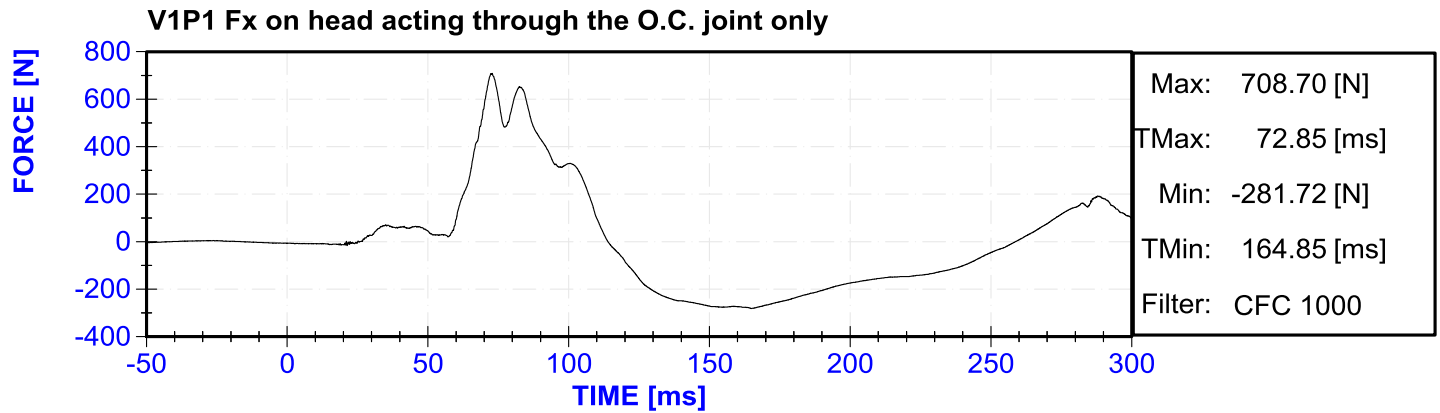
V1 Driver Floor Pan Z Acceleration

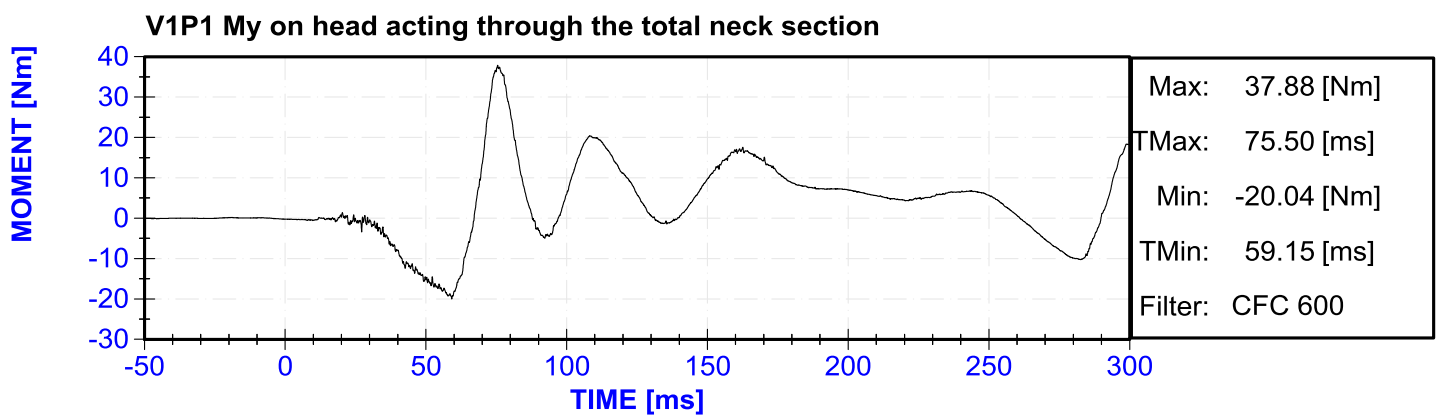
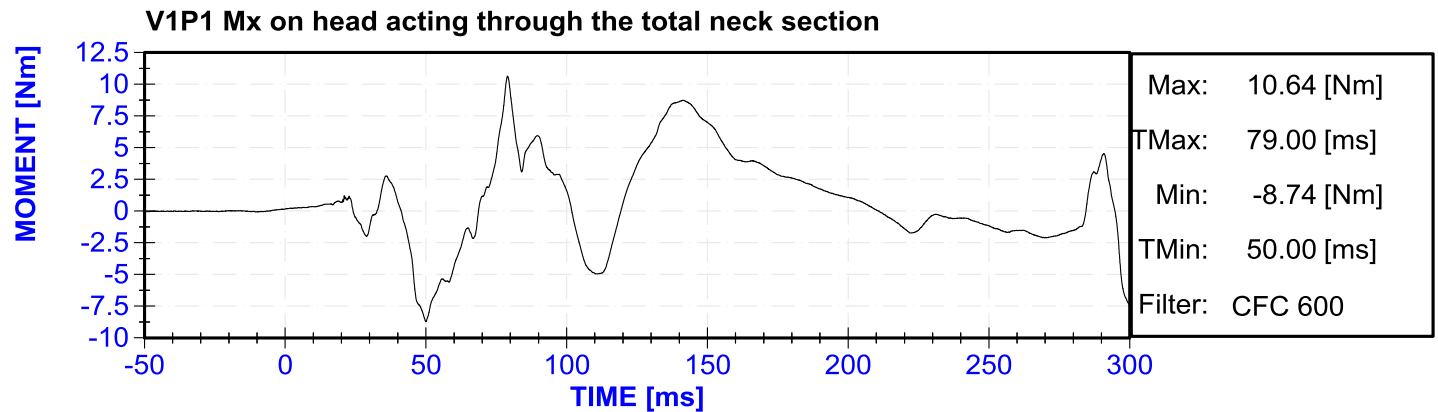
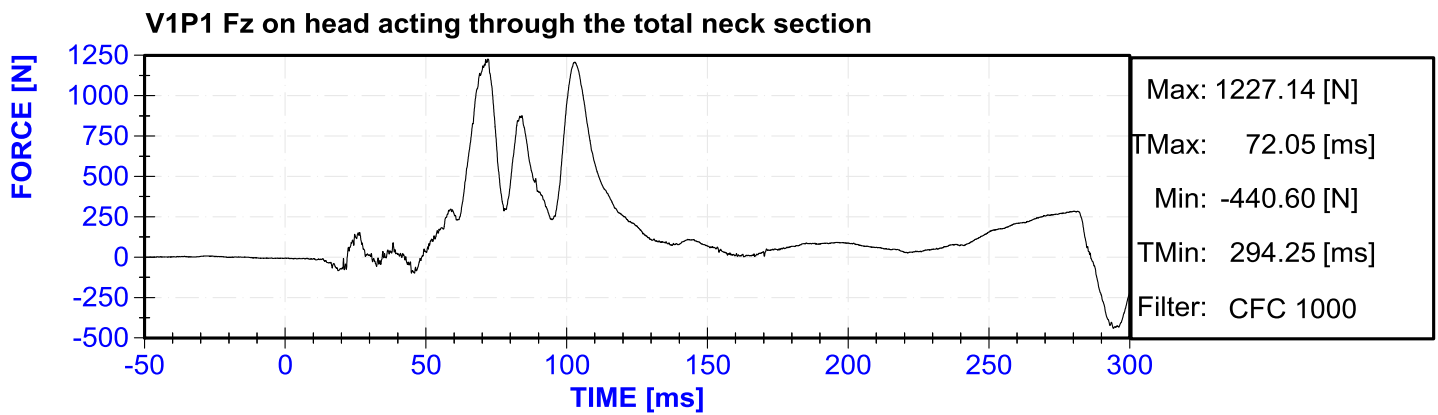
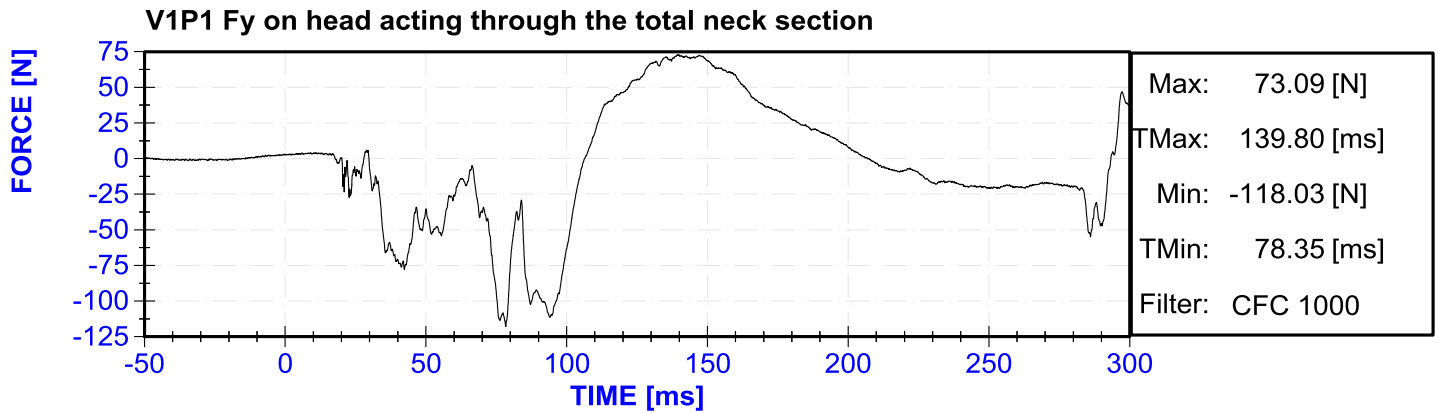


V1 Driver Floor Pan X Displacement

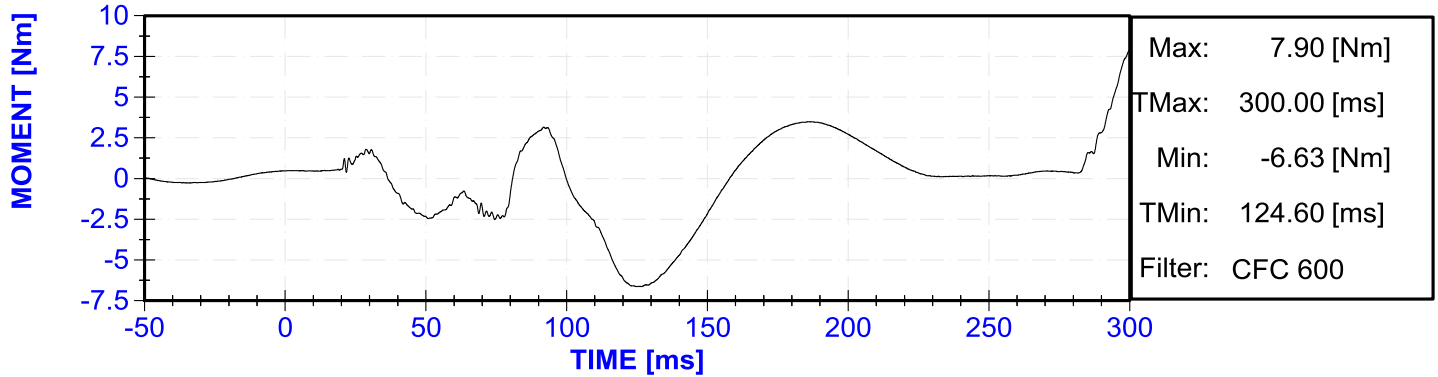




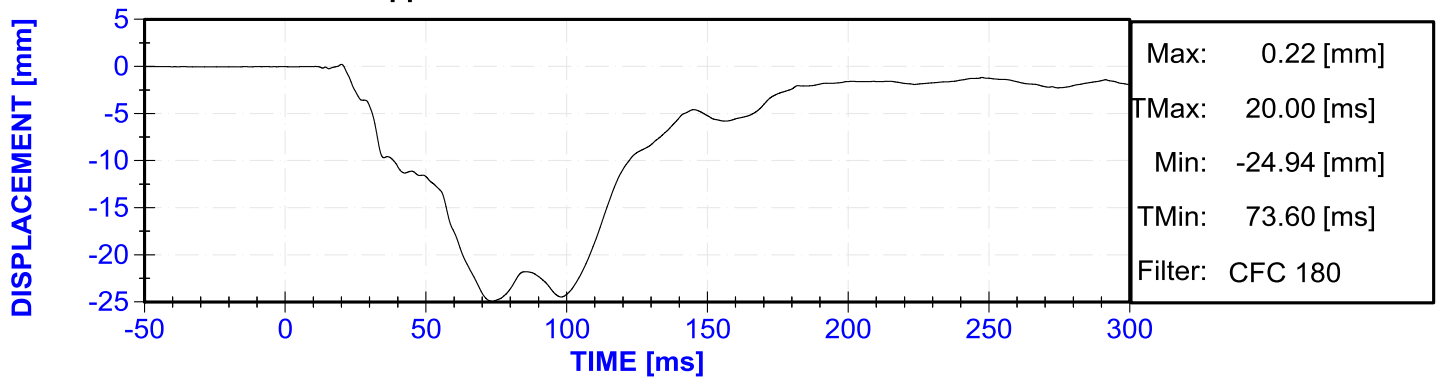




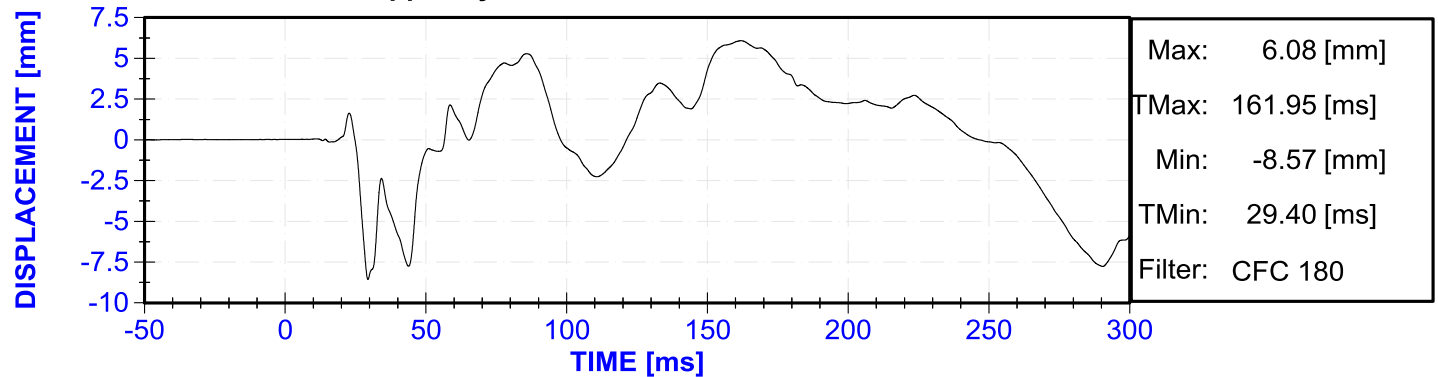
V1P1 Mz on head acting through the total neck section



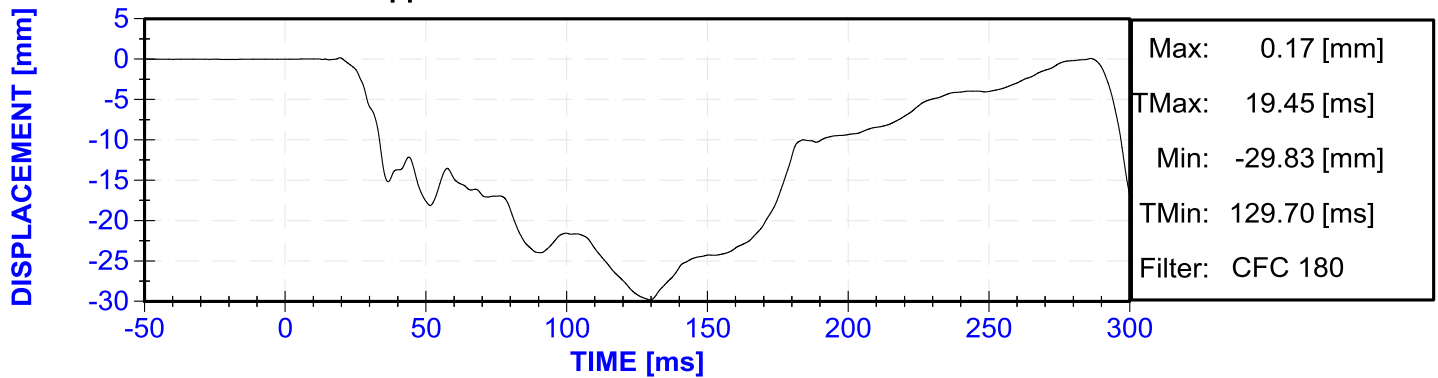
V1P1 Chest Left Upper Dx

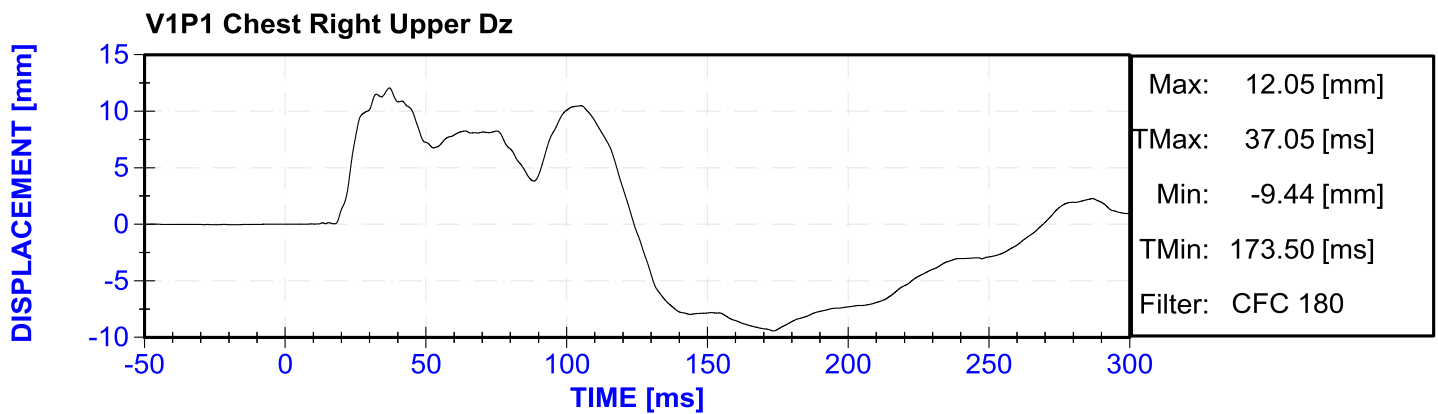
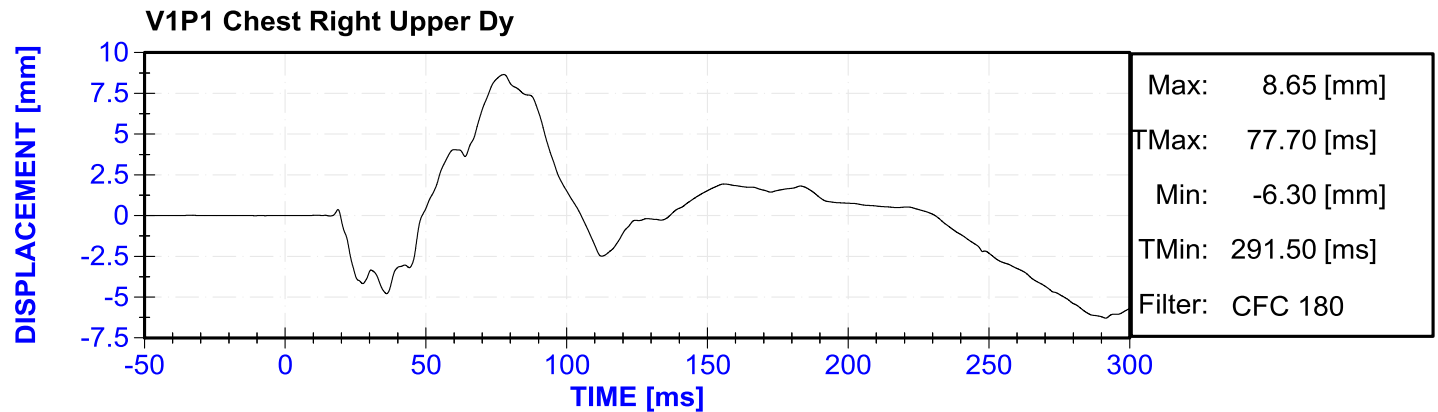
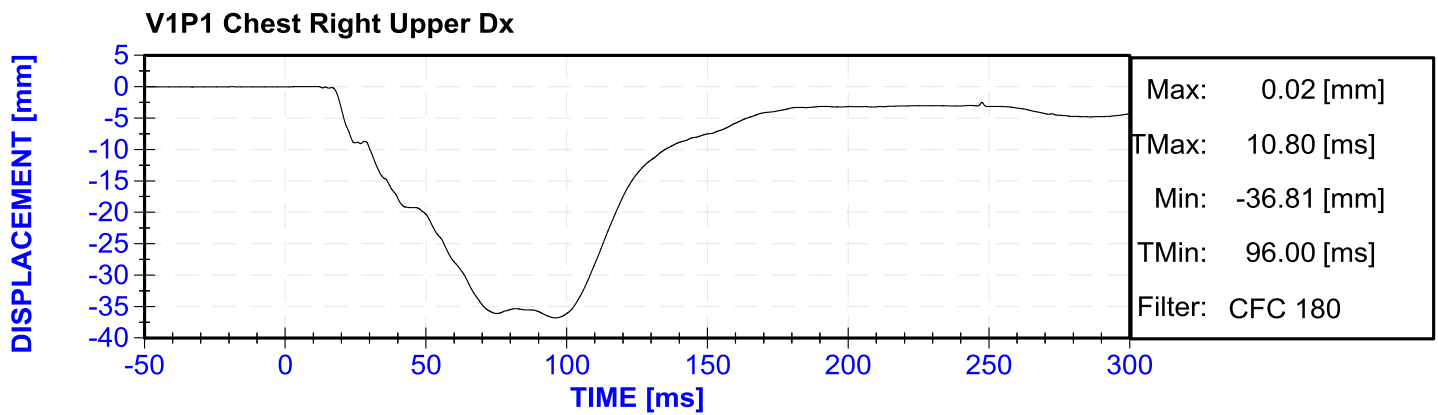
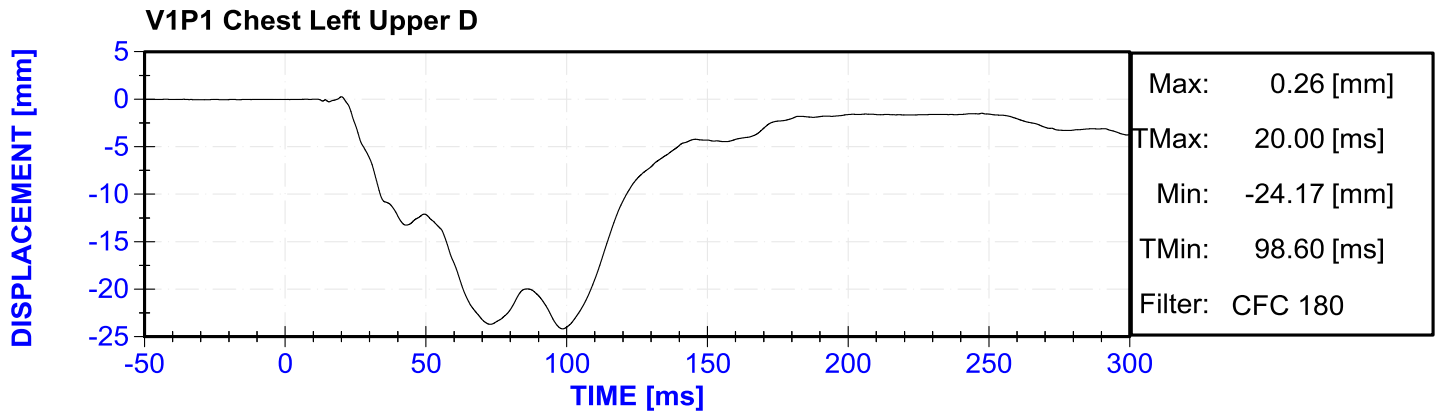


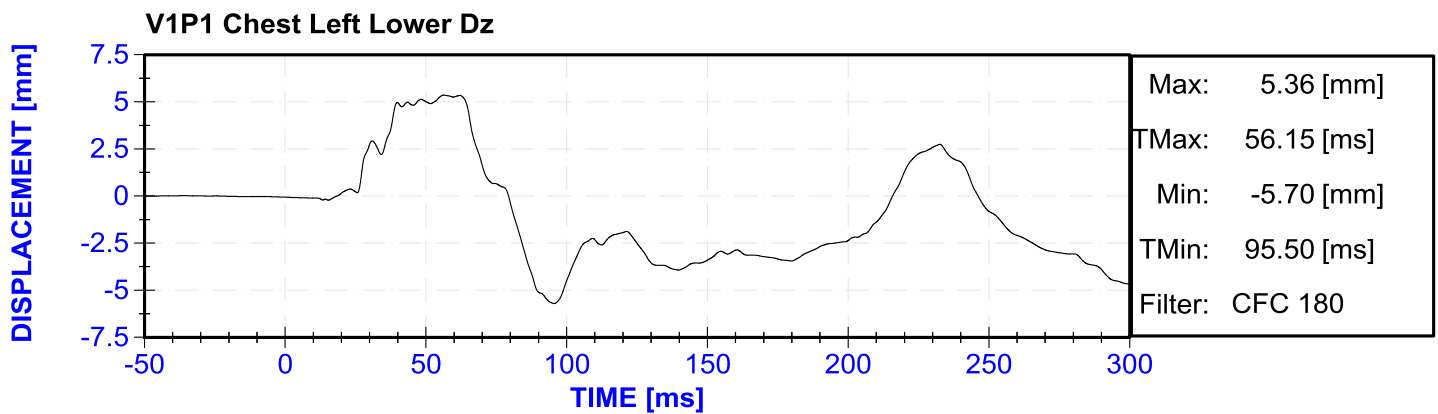
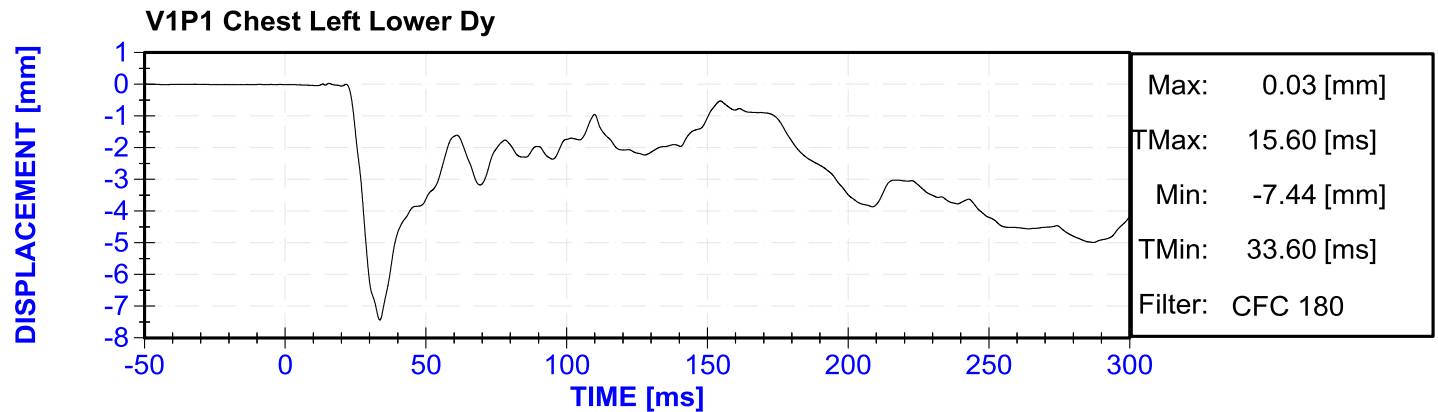
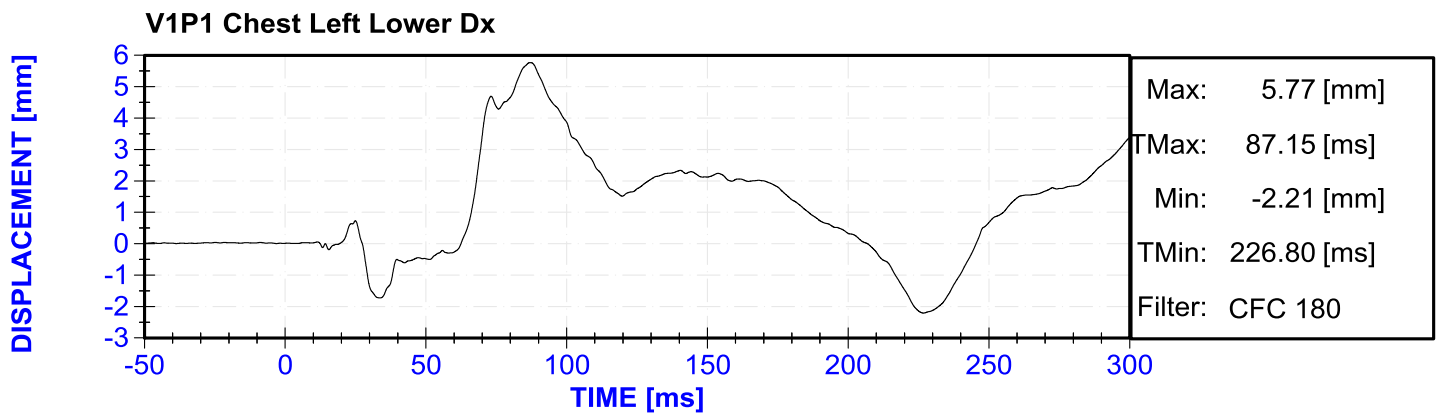
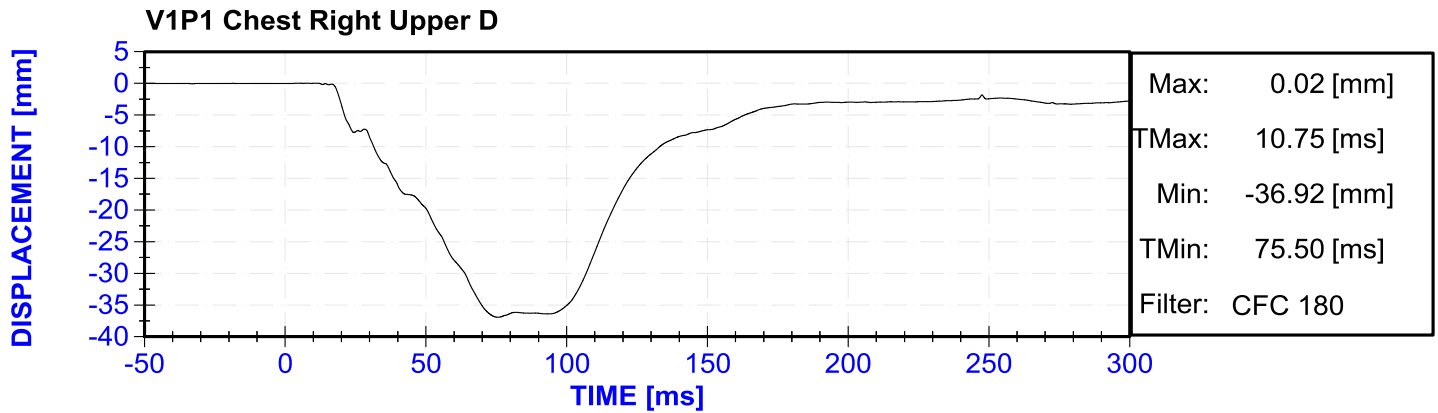
V1P1 Chest Left Upper Dy

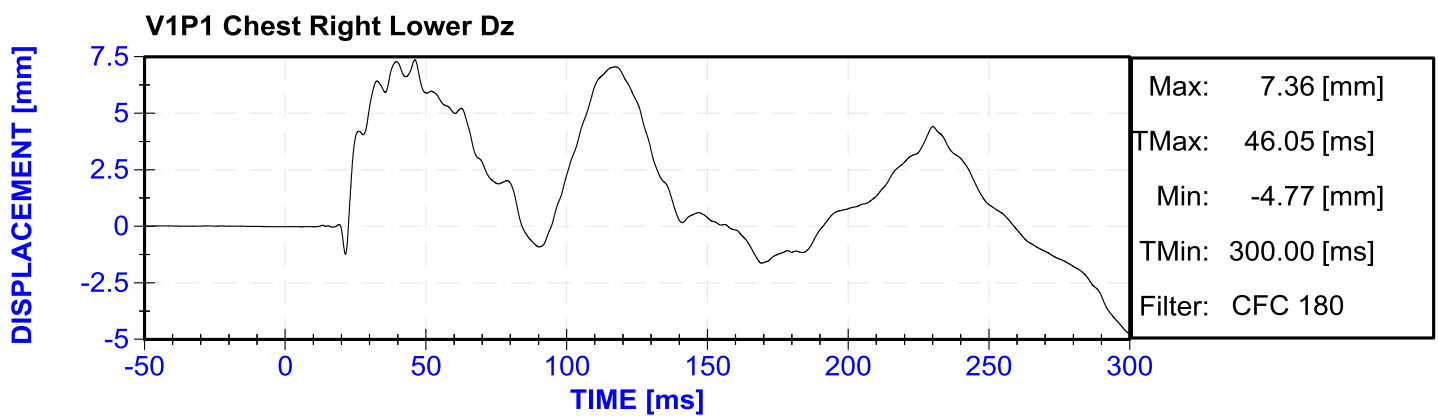
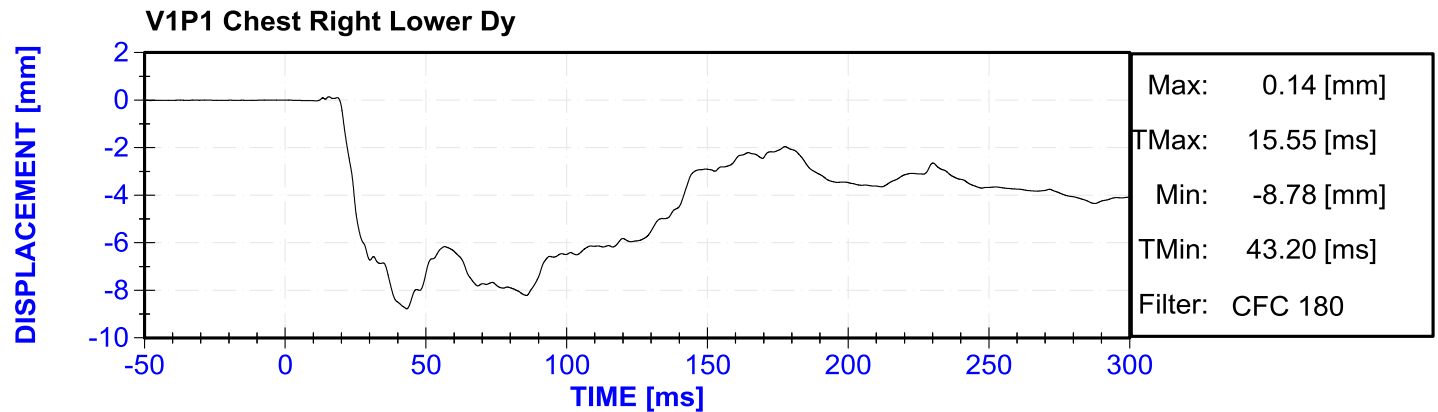
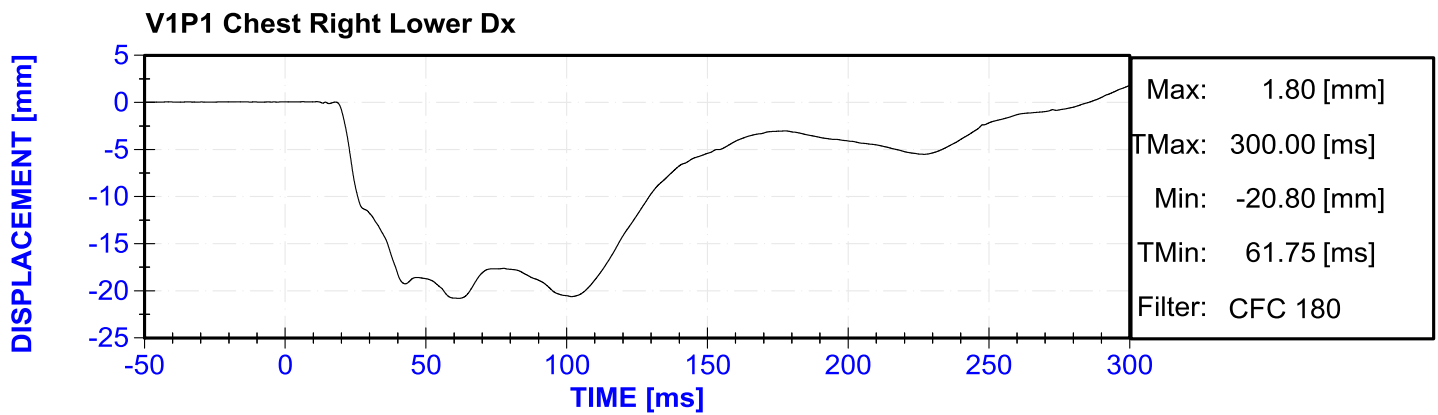
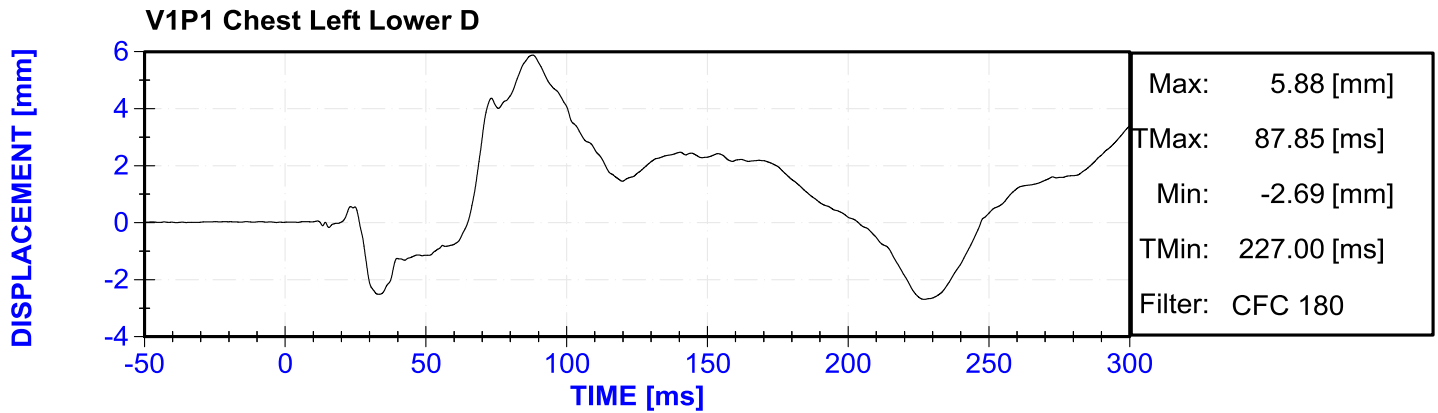


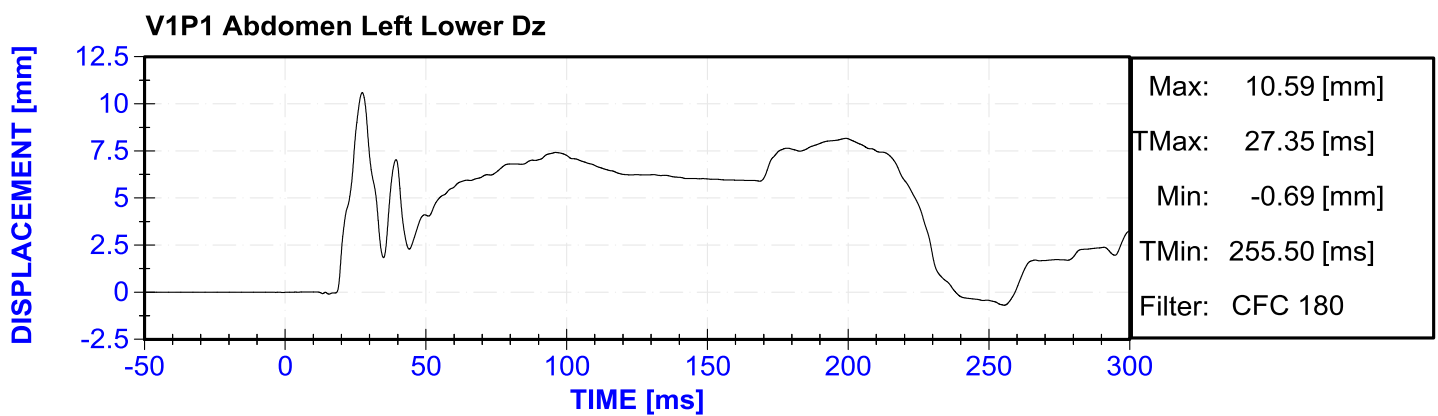
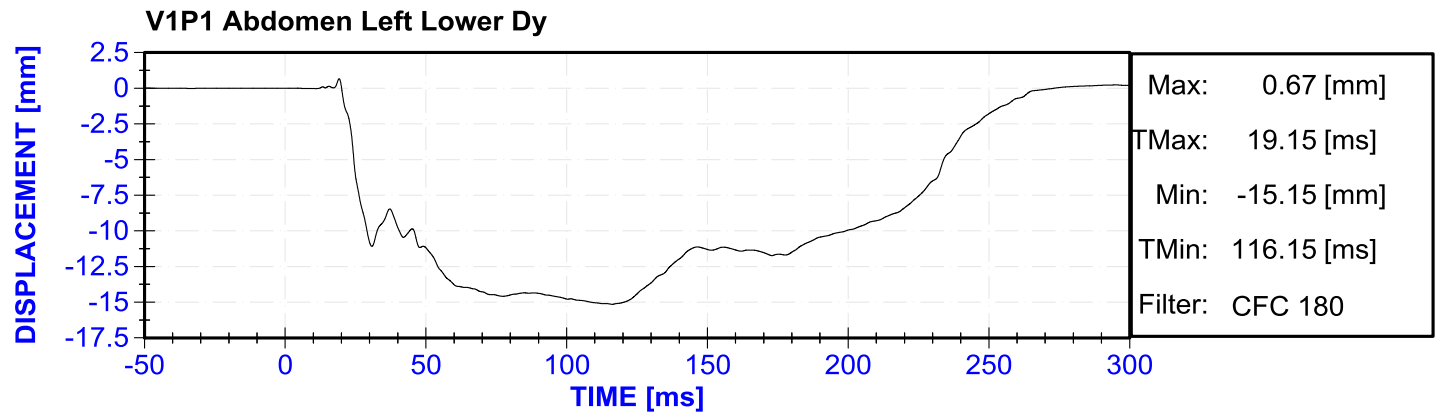
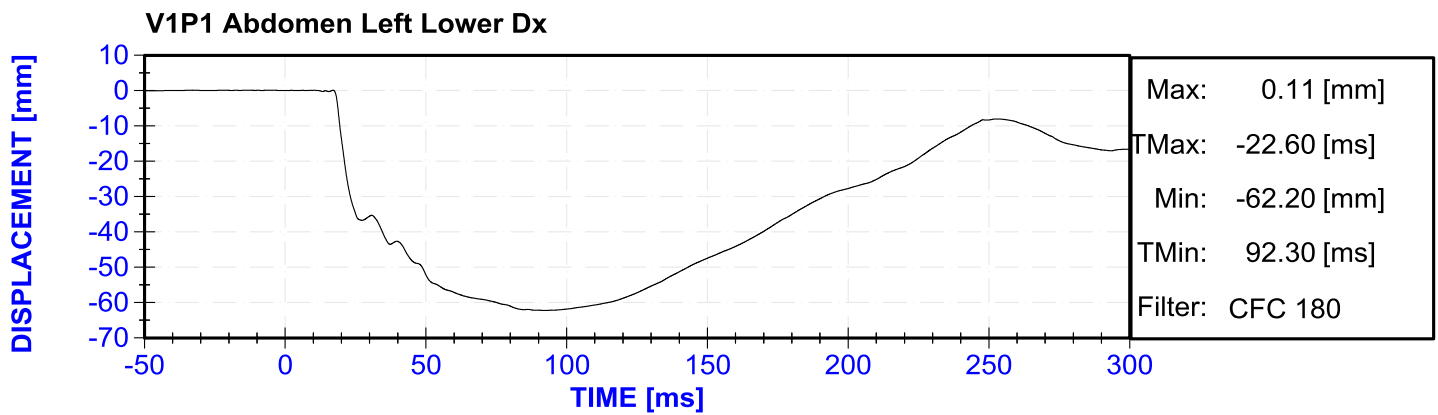
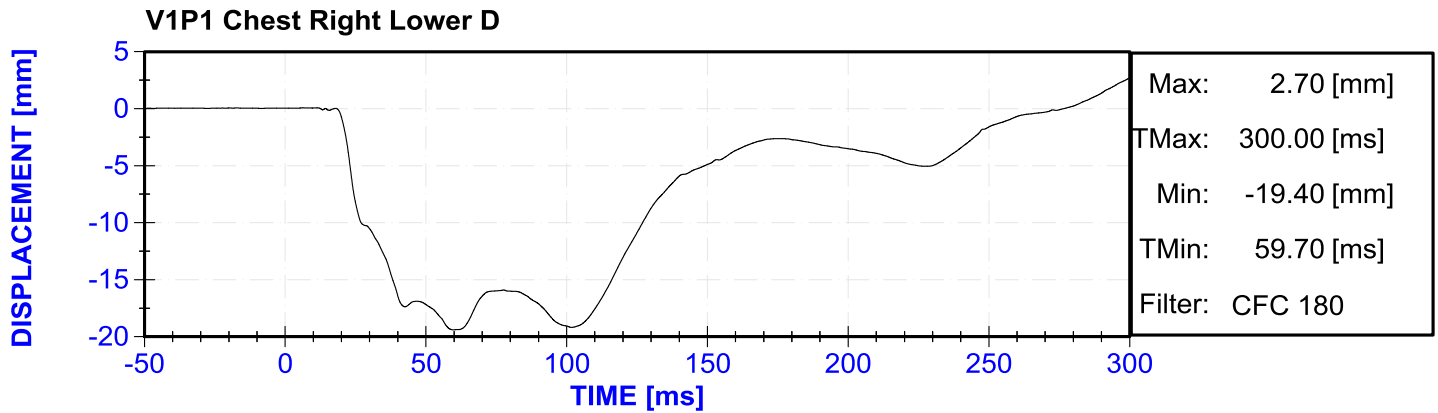
V1P1 Chest Left Upper Dz

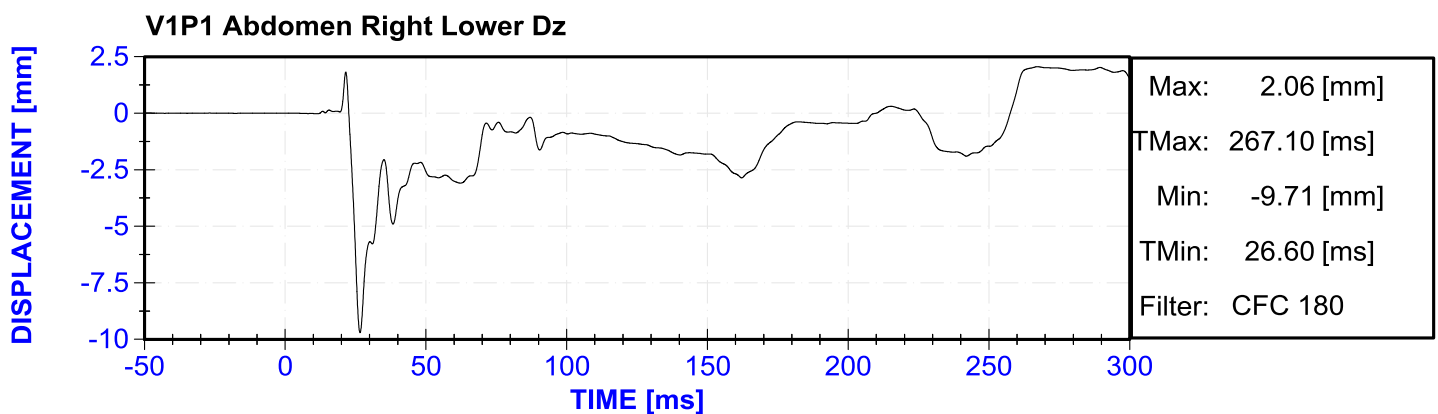
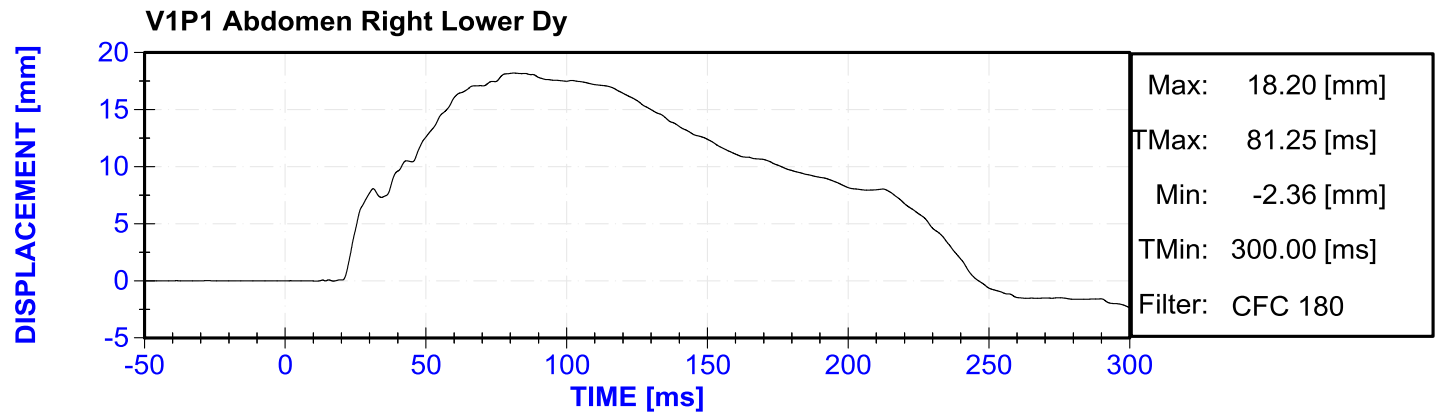
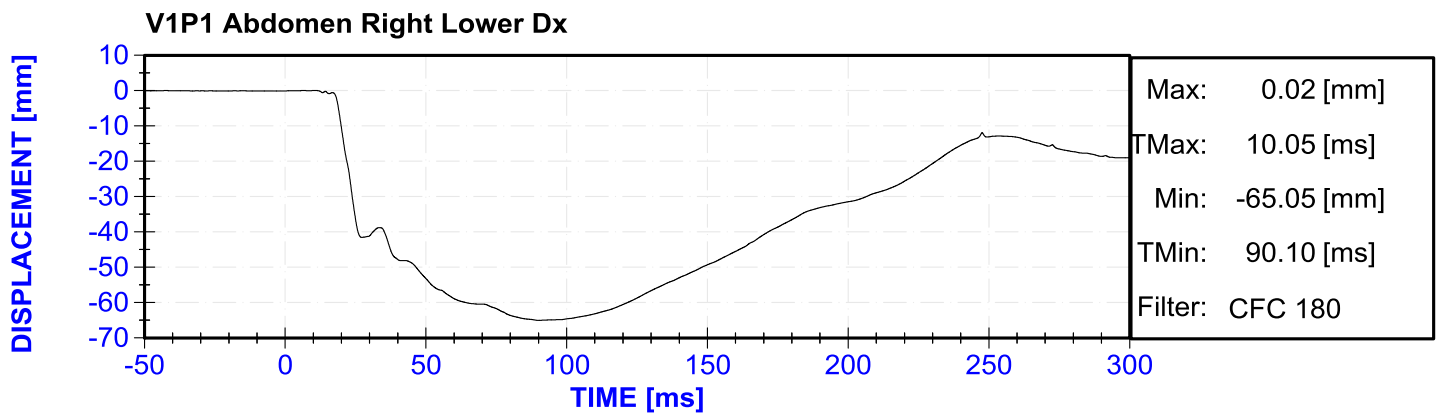
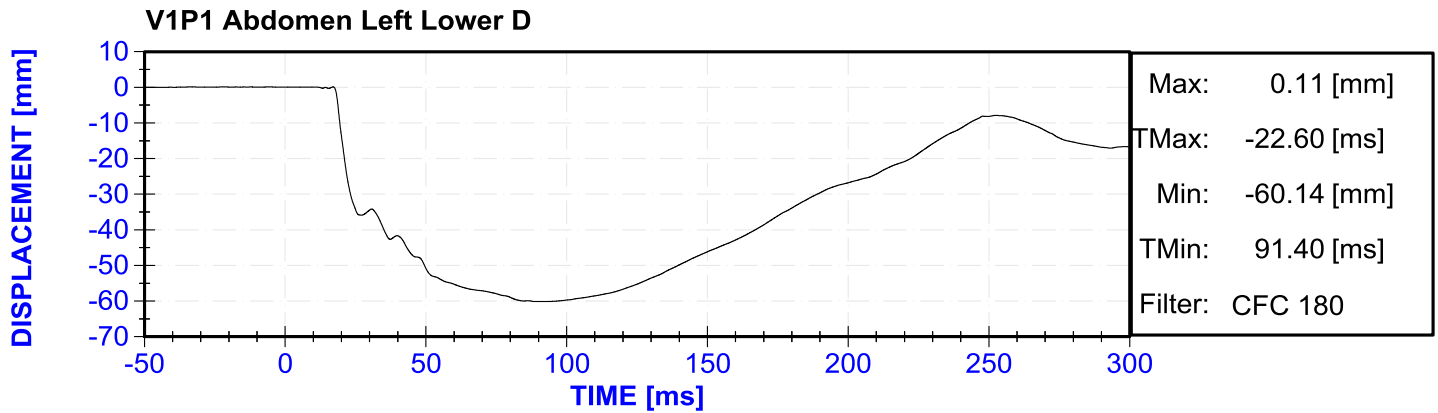


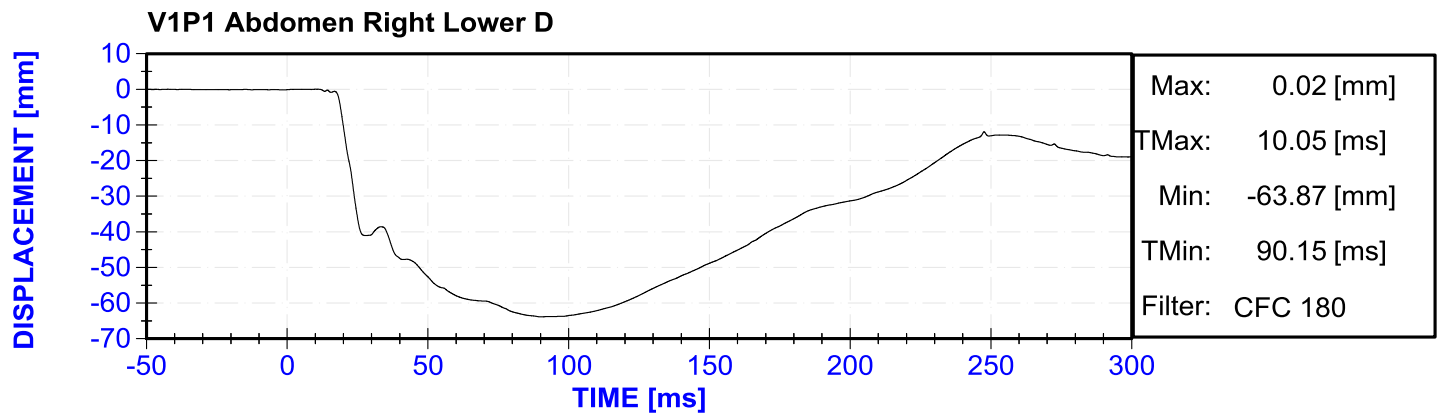












APPENDIX C

PART 572 E/O DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA SHEETS

Table C-1: Dummy Information

TYPE	SERIAL NUMBER
THOR-M 50 TH Male	DL9207
5 th Female	324
5 th Female	019

Table C-2: THOR IR-TRACC Initial Set-Up Information

THOR – M S/N: DL9207		
IR-TRACC Location	IR-TRACC Exponent	IR-TRACC Slope
Upper Left Thorax Dx	-0.43199	36.9703
Upper Right Thorax Dx	-0.48860	29.8982
Lower Left Thorax Dx	-0.45268	35.3389
Lower Right Thorax Dx	-0.43502	37.4827
Left Abdomen Dx	-0.34061	66.5336
Right Abdomen Dx	-0.50000	26.8025

Table C- 3: THOR Dummy Initial Set-Up Information

THOR – M S/N: DL9207					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	P82183	2000	0.017690000	mV/V/g
Head CG Ay	Endevco	P81384	2000	0.017600000	mV/V/g
Head CG Az	Endevco	P81797	2000	0.019350000	mV/V/g
Head Wx	DTS	ARS4740	18000	0.091430000	mV/deg/sec
Head Wy	DTS	ARS4737	18000	0.095640000	mV/deg/sec
Head Wz	DTS	ARS4073	18000	0.093760000	mV/deg/sec
Skull Spring Front Fz	Humanetics	DO9740	4448.2	0.000512814	mV/V/N
Skull Spring Rear Fz	Humanetics	DO9741	4448.2	0.000508183	mV/V/N
Condyle Pot Ry	Humanetics	DK5911	180	3.021000000	mV/V/deg
Upper Neck Fx	Humanetics	DP3956	8896.4	0.000224158	mV/V/N
Upper Neck Fy	Humanetics	DP3956	8896.4	0.000227755	mV/V/N
Upper Neck Fz	Humanetics	DP3956	13344.7	0.000085255	mV/V/N
Upper Neck Mx	Humanetics	DP3956	282.5	0.005819469	mV/V/Nm
Upper Neck My	Humanetics	DP3956	282.5	0.005983009	mV/V/Nm
Upper Neck Mz	Humanetics	DP3956	282.5	0.009425133	mV/V/Nm
Lower Neck Fx	Humanetics	DP4780	13344.7	0.000173709	mV/V/N
Lower Neck Fy	Humanetics	DP4780	13344.7	0.000174489	mV/V/N

Lower Neck Fz	Humanetics	DP4780	13344.7	0.000070575	mV/V/N
Lower Neck Mx	Humanetics	DP4780	451.9	0.004108210	mV/V/Nm
Lower Neck My	Humanetics	DP4780	451.9	0.004146714	mV/V/Nm
Lower Neck Mz	Humanetics	DP4780	226	0.006740265	mV/V/Nm
T1 Ax	Endevco	P79630	2000	0.020870000	mV/V/g
T1 Ay	Endevco	P78880	2000	0.019820000	mV/V/g
T1 Az	Endevco	P82758	2000	0.018610000	mV/V/g
Upper Left Thorax Dx	Humanetics	DS6355			
Upper Left Thorax Ry	Humanetics	DI2382	180	2.978800000	mV/V/deg
Upper Left Thorax Rz	Humanetics	DI2383	180	3.007300000	mV/V/deg
Upper Right Thorax Dx	Humanetics	DJ2613			
Upper Right Thorax Ry	Humanetics	DI7753	180	3.035900000	mV/V/deg
Upper Right Thorax Rz	Humanetics	DI7752	180	3.052400000	mV/V/deg
Lower Left Thorax Dx	Humanetics	DS6353			
Lower Left Thorax Ry	Humanetics	DM4781	180	3.001400000	mV/V/deg
Lower Left Thorax Rz	Humanetics	DS4092	180	3.072500000	mV/V/deg
Lower Right Thorax Dx	Humanetics	DS6354			
Lower Right Thorax Ry	Humanetics	DM4776	180	3.004900000	mV/V/deg
Lower Right Thorax Rz	Humanetics	DM4777	180	2.994700000	mV/V/deg
T6 Ax	Endevco	P49229	2000	0.018010000	mV/V/g
T6 Ay	Endevco	P49215	2000	0.016950000	mV/V/g
T6 Az	Endevco	P52122	2000	0.017050000	mV/V/g
Thoracic Spine Fx	Humanetics	DP2984	13344.7	0.000146365	mV/V/N
Thoracic Spine Fy	Humanetics	DP2984	13344.7	0.000147107	mV/V/N
Thoracic Spine Fz	Humanetics	DP2984	17792.9	0.000060193	mV/V/N
Thoracic Spine Mx	Humanetics	DP2984	677.9	0.002146039	mV/V/Nm
Thoracic Spine My	Humanetics	DP2984	903.9	0.001914371	mV/V/Nm
T12 Ax	Endevco	P74936	2000	0.017350000	mV/V/g
T12 Ay	Endevco	P74937	2000	0.017230000	mV/V/g
T12 Az	Endevco	P52005	2000	0.019870000	mV/V/g
Abdomen Left Dx	Humanetics	DQ2303			
Abdomen Left Ry	Humanetics	DS8363	150	3.024100000	mV/V/deg
Abdomen Left Rz	Humanetics	DS8361	150	3.047400000	mV/V/deg
Abdomen Right Dx	Humanetics	DM2641			
Abdomen Right Ry	Humanetics	DS4094	150	3.012300000	mV/V/deg
Abdomen Right Rz	Humanetics	DS4121	150	3.021800000	mV/V/deg
Acetabulum Right Fx	Humanetics	DP3835	22241.1	0.000118506	mV/V/N
Acetabulum Right Fy	Humanetics	DP3835	13344.7	0.000059342	mV/V/N
Acetabulum Right Fz	Humanetics	DP3835	13344.7	0.000161173	mV/V/N
Acetabulum Left Fx	Humanetics	DP4639	22241.1	0.000121280	mV/V/N
Acetabulum Left Fy	Humanetics	DP4639	13344.7	0.000059432	mV/V/N
Acetabulum Left Fz	Humanetics	DP4639	13344.7	0.000165871	mV/V/N
Pelvis Ax	Endevco	P83434	2000	0.017540000	mV/V/g
Pelvis Ay	Endevco	P82752	2000	0.018310000	mV/V/g
Pelvis Az	Endevco	P80296	2000	0.019410000	mV/V/g
ASIS Right Fx	Humanetics	DP5091	13000	0.000065215	mV/V/N
ASIS Right My	Humanetics	DP5091	325	0.003697538	mV/V/Nm

ASIS Left Fx	Humanetics	DP5092	13000	0.000067323	mV/V/N
ASIS Left My	Humanetics	DP5092	325	0.003688923	mV/V/Nm
Femur Left Fx	Denton	DM4975	15000	0.000143700	mV/V/N
Femur Left Fy	Denton	DM4975	15000	0.000143600	mV/V/N
Femur Left Fz	Denton	DM4975	15000	0.000072700	mV/V/N
Femur Left Mx	Denton	DM4975	350	0.006601400	mV/V/Nm
Femur Left My	Denton	DM4975	350	0.006642000	mV/V/Nm
Femur Left Mz	Denton	DM4975	300	0.008961300	mV/V/Nm
Femur Right Fx	Denton	DM4976	15000	0.000142600	mV/V/N
Femur Right Fy	Denton	DM4976	15000	0.000142900	mV/V/N
Femur Right Fz	Denton	DM4976	15000	0.000072200	mV/V/N
Femur Right Mx	Denton	DM4976	350	0.006505700	mV/V/Nm
Femur Right My	Denton	DM4976	350	0.006488900	mV/V/Nm
Femur Right Mz	Denton	DM4976	300	0.008811600	mV/V/Nm
Upper Tibia Fx	Denton	97	11120	0.00017270	mv/v/N
Upper Tibia Fz	Denton	97	11120	0.00009330	mv/v/N
Upper Tibia Mx	Denton	97	395	0.00733320	mv/v/Nm
Upper Tibia My	Denton	97	395	0.00739800	mv/v/Nm
Lower Tibia Fx	Denton	121	11100	0.00017510	mv/v/N
Lower Tibia Fy	Denton	121	11100	0.00017180	mv/v/N
Lower Tibia Fz	Denton	121	11100	0.00009580	mv/v/N
Lower Tibia Mx	Denton	121	395	0.00739650	mv/v/Nm
Lower Tibia My	Denton	121	395	0.00744720	mv/v/Nm
Ankle Rx	Contelec	0523	180	3.17860	mv/v/deg
Ankle Ry	Contelec	0524	180	3.19060	mv/v/deg
Ankle Rz	Contelec	0525	180	3.18790	mv/v/deg
Knee Dx	Space Age	C2102639B	33	24.09410	mv/v/mm
Leg Ax	Endevco	P77996	2000	0.01803	mv/v/g
Leg Ay	Endevco	P64094	2000	0.02214	mv/v/g
Foot Ax	Endevco	P80271	2000	0.02100	mv/v/g
Foot Ay	Endevco	P74950	2000	0.01782	mv/v/g
Foot Az	Endevco	P51684	2000	0.01953	mv/v/g
Achilles Fz	Denton	136	4448	0.000257800	mv/V/N
Upper Tibia Fx	Denton	75	11120	0.00017350	mv/v/N
Upper Tibia Fz	Denton	75	11120	0.00009520	mv/v/N
Upper Tibia Mx	Denton	75	395	0.00749000	mv/v/Nm
Upper Tibia My	Denton	75	395	0.00747580	mv/v/Nm
Lower Tibia Fx	Denton	166	11100	0.00017560	mv/v/N
Lower Tibia Fy	Denton	166	11100	0.00017130	mv/v/N
Lower Tibia Fz	Denton	166	11100	0.00009950	mv/v/N
Lower Tibia Mx	Denton	166	395	0.00742480	mv/v/Nm
Lower Tibia My	Denton	166	395	0.00737260	mv/v/Nm
Ankle Rx	Contelec	0528	180	3.20220	mv/v/deg
Ankle Ry	Contelec	0526	180	3.15530	mv/v/deg

Ankle Rz	Contelec	0527-1	180	3.16060	mv/v/deg
Knee Dx	Space Age	021033	30	23.25080	mv/v/mm
Leg Ax	Endevco	P82744	2000	0.01827	mv/v/g
Leg Ay	Endevco	P82322	2000	0.01726	mv/v/g
Foot Ax	Endevco	P74976	2000	0.01784	mv/v/g
Foot Ay	Endevco	P83340	2000	0.02038	mv/v/g
Foot Az	Endevco	P83339	2000	0.01990	mv/v/g
Achilles Fz	Denton	129	4448	0.000278100	mv/V/N

Table C- 4: 5th Female Dummy Initial Set-Up Information

5 th Female S/N: 324					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	AC-P72219	2000	0.017320001	mV/V/g
Head CG Ax	Endevco	AC-P49160	2000	0.016579999	mV/V/g
Head CG Ax	Endevco	AC-P78168	2000	0.017820001	mV/V/g
Head CG RAx	Endevco	AC-P49438	2000	0.019560001	mV/V/g
Head CG RAY	Endevco	AC-P82323	2000	0.018110000	mV/V/g
Head CG RAz	Endevco	AC-P74784	2000	0.017210001	mV/V/g
Head Wx	DTS	LC-2254 Fx	18000	0.000190700	mV/V/sec
Head Wy	DTS	LC-2254 Fy	18000	0.000185600	mV/V/sec
Head Wz	DTS	LC-2254 Fz	18000	0.000099100	mV/V/sec
Upper Neck Fx	Denton	LC-2254 Mx	8896.4	0.005778900	mV/V/N
Upper Neck Fy	Denton	LC-2254 My	8896.4	0.005884700	mV/V/N
Upper Neck Fz	Denton	LC-2254 Mz	13344.6	0.008229600	mV/V/N
Upper Neck Mx	Denton	ARS-5931	282.5	0.093230003	mV/V/Nm
Upper Neck My	Denton	ARS-4714	282.5	0.094490002	mV/V/Nm
Upper Neck Mz	Denton	ARS-6635	282.5	0.098429999	mV/V/Nm
Chest Ax	Endevco	AC-P83431	2000	0.017900000	mV/V/g
Chest Ay	Endevco	AC-P84365	2000	0.019450001	mV/V/g
Chest Az	Endevco	AC-P84472	2000	0.019229999	mV/V/g
Chest Dx	Servo	DS-CST324	54	1.752399956	mV/V/deg
Pelvis Ax	Endevco	AC-ACCE6	2000	0.023119999	mV/V/g
Pelvis Ay	Endevco	AC-AGT82	2000	0.019800000	mV/V/g
Pelvis Az	Endevco	AC-J19561	2000	0.026219999	mV/V/g
Femur Right Fz	Denton	LC-1702 Fz	13340	0.000109400	mV/V/N
Femur Left Fz	Denton	LC-1714 Fz	13340	0.000108200	mV/V/N
Upper Tibia Right Fx	Denton	LC-372 Fx	11120.55	0.000171412	mV/V/N
Upper Tibia Right Fy	Denton	LC-372 Fy	11120.55	0.000170342	mV/V/N
Upper Tibia Right Fz	Denton	LC-372 Fz	11120.55	0.000092600	mV/V/N
Upper Tibia Right Mx	Denton	LC-372 Mx	395.4467	0.007423756	mV/V/Nm

Upper Tibia Right My	Denton	LC-372 My	395.4467	0.007387342	mV/V/Nm
Lower Tibia Right Fx	Denton	LC-405 Fx	11120.55	0.000174398	mV/V/N
Lower Tibia Right Fy	Denton	LC-405 Fy	11120.55	0.000178211	mV/V/N
Lower Tibia Right Fz	Denton	LC-405 Fz	11120.55	0.000093900	mV/V/N
Lower Tibia Right Mx	Denton	LC-405 Mx	395.4467	0.007600771	mV/V/Nm
Lower Tibia Right My	Denton	LC-405 My	395.4467	0.007638450	mV/V/Nm
Upper Tibia Left Fx	Denton	LC-484 Fx	11120.55	0.000172159	mV/V/N
Upper Tibia Left Fy	Denton	LC-484 Fy	11120.55	0.000170585	mV/V/N
Upper Tibia Left Fz	Denton	LC-484 Fz	11120.55	0.000098900	mV/V/N
Upper Tibia Left Mx	Denton	LC-484 Mx	395.4467	0.007399480	mV/V/Nm
Upper Tibia Left My	Denton	LC-484 My	395.4467	0.007426791	mV/V/Nm
Lower Tibia Left Fx	Denton	LC-397 Fx	11120.55	0.000174299	mV/V/N
Lower Tibia Left Fy	Denton	LC-397 Fy	11120.55	0.000178453	mV/V/N
Lower Tibia Left Fz	Denton	LC-397 Fz	11120.55	0.000095000	mV/V/N
Lower Tibia Left Mx	Denton	LC-397 Mx	395.4467	0.007559047	mV/V/Nm
Lower Tibia Left My	Denton	LC-397 My	395.4467	0.007546908	mV/V/Nm
Right Toe Az	Endevco	AC-P77601	2000	0.019200001	mV/V/g
Right Foot Ax	Endevco	AC-P80250	2000	0.020280000	mV/V/g
Right Foot Az	Endevco	AC-P63954	2000	0.021530001	mV/V/g
Left Toe Az	Endevco	AC-P82324	2000	0.017890001	mV/V/g
Left Foot Ax	Endevco	AC-P58708	2000	0.017799999	mV/V/g
Left Foot Az	Endevco	AC-P64109	2000	0.019409999	mV/V/g
RibEye Rib Deflection System	Boxboro	108	N/A	N/A	N/A

Table C- 5: 5th Female Dummy Initial Set-Up Information

5 th Female S/N: 019					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	AC-P79591	2000	0.023450000	mV/V/g
Head CG Ay	Endevco	AC-P49181	2000	0.016900000	mV/V/g
Head CG Az	Endevco	AC-P49214	2000	0.018500001	mV/V/g
Upper Neck Fx	Denton	LC-2184 Fx	8896.4	0.000186800	mV/V/N
Upper Neck Fy	Denton	LC-2184 Fy	8896.4	0.000182300	mV/V/N
Upper Neck Fz	Denton	LC-2184 Fz	13344.6	0.000098100	mV/V/N
Upper Neck Mx	Denton	LC-2184 Mx	282.5	0.005686400	mV/V/Nm
Upper Neck My	Denton	LC-2184 My	282.5	0.005715100	mV/V/Nm
Upper Neck Mz	Denton	LC-2184 Mz	282.5	0.008202000	mV/V/Nm
Chest Ax	Endevco	AC-P80261	2000	0.020690000	mV/V/g
Chest Ay	Endevco	AC-P80259	2000	0.019980000	mV/V/g
Chest Az	Endevco	AC-P80254	2000	0.020050000	mV/V/g
Chest Ds	Servo	DS-FEM019	54	1.831499976	mV/V/deg
Pelvis Ax	Endevco	AC-P83343	2000	0.019850000	mV/V/g

Pelvis Ay	Endevco	AC-P49439	2000	0.019120000	mV/V/g
Pelvis Az	Endevco	AC-P82757	2000	0.018490000	mV/V/g
ASIS Left Fx	Denton	LC-1396 Fz	8896.4	0.000107900	mV/V/N
ASIS Left My	Denton	LC-1527 Fz	225.9	0.000106300	mV/V/Nm
ASIS Right Fx	Denton	LC-79 Fx	8896.4	0.000185400	mV/V/N
ASIS Right My	Denton	LC-79 My	225.9	0.005273300	mV/V/Nm
Left Femur Fz	Denton	LC-76 Fx	13340	0.000185200	mV/V/N
Right Femur Fz	Denton	LC-76 My	13340	0.005243000	mV/V/N
RibEye Rib Deflection System	Boxboro	107	N/A	N/A	N/A

Table 5 – THOR IR-TRACC Polarity

In order to reduce the risk of damage to instrumentation, it is recommended that the 3D IR-TRACC units are not disconnected from the rib cage to conduct the polarity test. An alternate procedure for checking the IR-TRACC polarity is described below.

1. Using the data acquisition system control software, open a live view of each channel. If possible, view the DX, RY, and RZ components of a given quadrant simultaneously.
2. Record the initial reading of each channel
3. Perform the following motions on each of the four rib attachment locations and two abdomen attachment locations (specified by the hexagonal bolt attaching the blue ribs).
 - a. DX: Push inward (front-to-back). The IR-TRACC tube voltage should increase.
 - b. RY: Push downward (head-to-pelvis). The Y-axis potentiometer reading should decrease.
 - c. RZ: Push rightward (left-to-right). The Z-axis potentiometer should increase.
4. Record the final reading of each channel
5. If the “Measured” value (increase or decrease) does not match the “Expected” value, the polarity of the channel must be inverted.

THOR DL9207

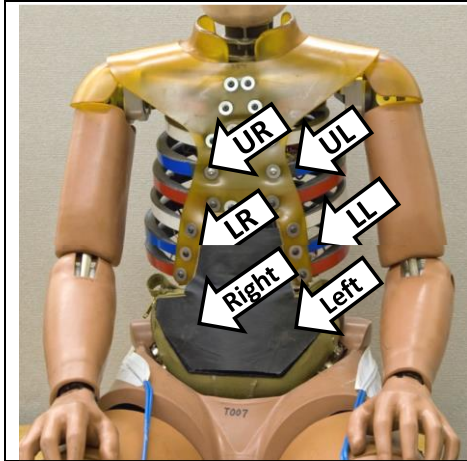


Figure 1. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

Channel	Motion
DX	Push inward
RY	Push upward
RZ	Push rightward

Upper Right Thorax				Upper Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.12625	+	+	DX (V)	0.14208	+	+
RY (Deg)	8.1864	+	+	RY (Deg)	3.5479	+	+
RZ (Deg)	-8.7763	+	+	RZ (Deg)	11.9783	+	+
Lower Right Thorax				Lower Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.07354	+	+	DX (V)	0.08948	+	+
RY (Deg)	0.77097	+	+	RY (Deg)	3.7068	+	+
RZ (Deg)	-6.8798	+	+	RZ (Deg)	7.1676	+	+
Abdomen Right				Abdomen Left			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	N/A	+	+	DX (V)	N/A	+	+
RY (Deg)	N/A	+	+	RY (Deg)	N/A	+	+
RZ (Deg)	N/A	+	+	RZ (Deg)	N/A	+	+

THOR Inspection Checklist

Date: 1/11/2016		
NHTSA Representative: Tim Keon		
Inspection Reporter: Matt Goehle		
Inspection type (check one): ☒ Pre-Test ☐ Post-Test		
Dummy S/N: DL9207	Legs S/N: LX0045/LX0046	
Dummy Description: THOR-M 50th Male		
Date of last Certification: 12/23/2015		
Tests conducted since last inspection: M20165306 - 2016 Honda Fit	Since last certification: M20165306 - 2016 Honda Fit	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> None		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> None		
<u>Equipment delivered to Borrower:</u> THOR DL9207 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 6 IRTraccs 12 Rotational Pots 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC	<i>Continued</i> 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers 2 Knee Sliders 1 Neck Skin 1 Neck Foam 1 Tiltview Interface Cable 4 Tilt Sensors 1 H-Point Tool 1 Tool Box 1 Laptop	

Note: New Damage is Noted in Red

HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	
NECK	
Y / N	Neck cables slide freely through holes in neck plates
Y / N	Neck cables show no sign of fraying, broken strands, or kinking
Y / N	No evidence of de-bonding between neck pucks and plates
Y / N	No evidence of de-bonding or permanent compression in neck soft stop assemblies Front of the neck is missing the soft stop
	
Y / N	Neck securely attached to upper neck load cell
Y / N	Neck securely attached to lower neck load cell
Y / N	Neck pitch change joint mechanism mating teeth are engaged
OTHER	
SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of de-bonding, tearing, or permanent compression of posterior soft stops Damage to both the left and right shoulder soft stops. The left shoulder is missing one.
	Left:  Right: 
OTHER	
SPINE	
Y / N	No evidence of de-bonding between thoracic spine flex joint and metal plates
Y / N	No evidence of de-bonding between lumbar spine flex joint and metal plates
Y / N	Lumbar spine pitch change joint mechanism mating teeth are engaged
OTHER	
THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of de-bonding between rib damping material and ribs
Y / N	IRTRACCs securely attached to anterior ribs
Y / N	IRTRACCs securely attached to double gimbals, spine
Y / N	Urethane bib is securely attached to ribs with no sign of tearing or washer penetration
Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)
OTHER	

ABDOMEN	
Y / N	No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper
Y / N	Upper abdomen insert securely attached to spine
Y / N	Upper abdomen insert shows no evidence of permanent set
Y / N	No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper Multiple tears and broken stitches in lower abdomen bag. The upper and lower abdomen bags appear to be from THOR SN007
	       
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
OTHER	
PELVIS	
Y / N	Pelvis flesh fits securely over pelvis bones
Y / N	H-point tool fits securely into hole on both sides of pelvis
OTHER	
FEMUR	
Y / N	Acetabular load cells firmly attached
Y / N	Femur load cells firmly attached
Y / N	No evidence of deformation of knee slider bump stop
Y / N	No cuts, tears, or scuffing of knee flesh Right knee flesh torn
	

OTHER	Left femur flesh is separating from zipper. We placed gaffer's tape across zipper to prevent further damage. 	
LOWER EXTREMITY (LX)		
Y / N	Rotational potentiometers in ankle securely attached	
Y / N	Achilles tendon provides resistance to dorsiflexion	
Y / N	No evidence of de-bonding, tearing, or permanent compression of ankle soft stops	
Y / N	No cuts, tears, or scuffing of leg flesh Left lower leg flesh is torn near zipper. We placed gaffer's tape around the flesh to prevent further damage. 	
OTHER		
JACKET		
Y / N	Rib stiffeners show no sign of permanent deformation	
Y / N	No evidence of tears or holes in jacket fabric, Velcro, or zippers The chest jacket has two tears near the middle:  	
OTHER		

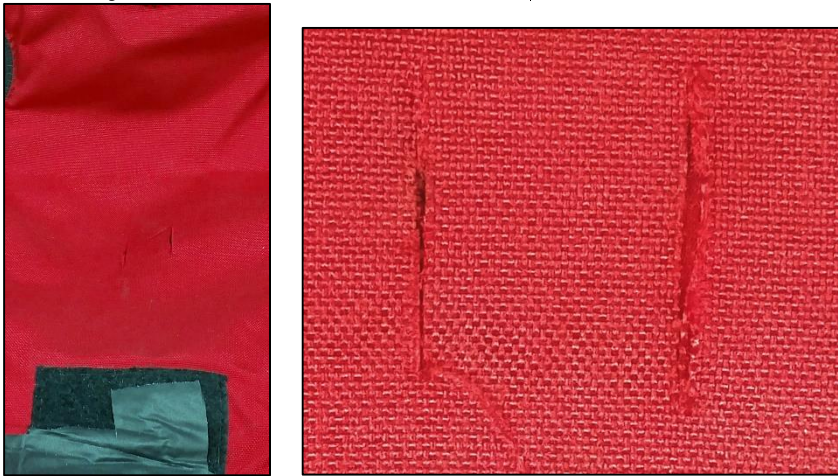
THOR Inspection Checklist

Date: 1/13/2016	
NHTSA Representative: Tim Keon	
Inspection Reporter: Matt Goehle	
Inspection type (check one): ☐ Pre-Test ☒ Post-Test	
Dummy S/N: DL9207	Legs S/N: LX0045/LX0046
Dummy Description: THOR-M 50th Male	
Date of last Certification: 12/23/2015	
Tests conducted since last inspection: M20160113-2016 Chevrolet Malibu	Since last certification: M20165306 - 2016 Honda Fit M20160113 – 2016 Chevrolet Malibu
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 13TIBILELOHFFOZP, Left Lower Tibia Z Force, Questionable spike at 42.5ms, SN:LC-405 Fz	
<u>Physical evidence of damage:</u> None New	
<u>Anecdotal evidence of damage:</u> None	
<u>Equipment delivered to Borrower:</u> THOR DL9207 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 6 IRTraccs 12 Rotational Pots 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC	<i>Continued</i> 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers 2 Knee Sliders 1 Neck Skin 1 Neck Foam 1 Tiltview Interface Cable 4 Tilt Sensors 1 H-Point Tool 1 Tool Box 1 Laptop

Note: New Damage is Noted in Red

HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	
NECK	
Y / N	Neck cables slide freely through holes in neck plates
Y / N	Neck cables show no sign of fraying, broken strands, or kinking
Y / N	No evidence of de-bonding between neck pucks and plates
Y / N	No evidence of de-bonding or permanent compression in neck soft stop assemblies Front of the neck is missing the soft stop
	
Y / N	Neck securely attached to upper neck load cell
Y / N	Neck securely attached to lower neck load cell
Y / N	Neck pitch change joint mechanism mating teeth are engaged
OTHER	
SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of de-bonding, tearing, or permanent compression of posterior soft stops Damage to both the left and right shoulder soft stops. The left shoulder is missing one.
	Left:  Right: 
OTHER	
SPINE	
Y / N	No evidence of de-bonding between thoracic spine flex joint and metal plates
Y / N	No evidence of de-bonding between lumbar spine flex joint and metal plates
Y / N	Lumbar spine pitch change joint mechanism mating teeth are engaged
OTHER	
THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of de-bonding between rib damping material and ribs
Y / N	IRTRACCs securely attached to anterior ribs
Y / N	IRTRACCs securely attached to double gimbals, spine
Y / N	Urethane bib is securely attached to ribs with no sign of tearing or washer penetration
Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)
OTHER	

ABDOMEN	
Y / N	No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper
Y / N	Upper abdomen insert securely attached to spine
Y / N	Upper abdomen insert shows no evidence of permanent set
Y / N	No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper Multiple tears and broken stitches in lower abdomen bag. The upper and lower abdomen bags appear to be from THOR SN007
	       
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
OTHER	
PELVIS	
Y / N	Pelvis flesh fits securely over pelvis bones
Y / N	H-point tool fits securely into hole on both sides of pelvis
OTHER	
FEMUR	
Y / N	Acetabular load cells firmly attached
Y / N	Femur load cells firmly attached
Y / N	No evidence of deformation of knee slider bump stop
Y / N	No cuts, tears, or scuffing of knee flesh Right knee flesh torn
	

OTHER	Left femur flesh is separating from zipper. We placed gaffer's tape across zipper to prevent further damage. 
LOWER EXTREMITY (LX)	
Y / N	Rotational potentiometers in ankle securely attached
Y / N	Achilles tendon provides resistance to dorsiflexion
Y / N	No evidence of de-bonding, tearing, or permanent compression of ankle soft stops
Y / N	No cuts, tears, or scuffing of leg flesh Left lower leg flesh is torn near zipper. We placed gaffer's tape around the flesh to prevent further damage. 
OTHER	
JACKET	
Y / N	Rib stiffeners show no sign of permanent deformation
Y / N	No evidence of tears or holes in jacket fabric, Velcro, or zippers The chest jacket has two tears near the middle: 
OTHER	

ATD 324: Pre-Test Inspection**5th Female Inspection Checklist**

Date: 1/11/2016		
NHTSA Representative: Tim Keon		
Inspection Reporter: Matt Goehle		
Inspection type (check one): ☒ Pre-Test ☐ Post-Test		
Dummy S/N: 324		
Dummy Description: Hybrid 3 – 5th Female		
Date of last Certification: 1/5/2016		
<u>Tests conducted since last inspection:</u> M20165306-2016 Honda Fit	<u>Since last certification:</u> M20165306-2016 Honda Fit	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> None		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> None		
<u>Equipment delivered to Borrower:</u> Hybrid 3 5th Female 1 RibEye rib displacement system 1 RibEye trunk box 1 RibEye power cable 1 RibEye trigger cable 1 Ethernet cable 1 RibEye software and manual disk 9 Accelerometers 1 Upper neck load cell 2 ASIS load cells 2 Femur load cells		

Note: New Damage is Noted in Red

HEAD	
Y / N	Ballast secure
Y / N	General appearance Minor cuts and scuffing
	
OTHER	
NECK	
Y / N	Rubber is not cracked or broken
Y / N	Upper neck bracket is firmly attached to the lower neck bracket
Y / N	The condyle joint is tight
Y / N	Nodding blocks are not cracked, broken, or out of position
OTHER	
SPINE/PELVIS	
Y / N	Rubber is not cracked or broken
Y / N	Pelvis is not broken or damaged
OTHER	
THORAX/ABDOMEN	
Y / N	Ribs are intact and straight
Y / N	Rib supports are intact and straight
Y / N	Rib damping material not separated or cracked
Y / N	Rubber bumpers in place
Y / N	Abdomen is not deformed
Y / N	Abdomen is not cracked or broken
OTHER	Abdomen flock paper modification before test:  After test: 

KNEES	
Y / N	Skin is not torn
Y / N	Inserts are in good condition and the proper position
Y / N	Slider wires are intact
Y / N	Slider rubber returns to “at rest” position
OTHER	
LIMBS	
Y / N	Arms have normal movement and adjustment
Y / N	Arm flesh is in good condition
Y / N	Legs have normal movement and adjustment
Y / N	Leg flesh is in good condition Small cuts at top of tibia flesh:
	
Y / N	Feet are in good condition
OTHER	
INSTRUMENTATION	
Y / N	Chest pot shaft is straight
Y / N	Slider arm is riding in track
Y / N	RibEye system (if equipped) has no physically broken wires or equipment
Y / N	Transducer cables are not torn or exposing shield
Y / N	Accelerometer mounts are all secure
Y / N	LEMO connectors are straight and securely fit into acquisition hardware
OTHER	

ATD 324: Post-Test Inspection

5th Female Inspection Checklist

Date: 1/13/2016	
NHTSA Representative: Tim Keon	
Inspection Reporter: Matt Goehle	
Inspection type (check one): ☐ Pre-Test ☒ Post-Test	
Dummy S/N: 324	
Dummy Description: Hybrid 3 – 5th Female	
Date of last Certification: 1/5/2016	
<u>Tests conducted since last inspection:</u> M20160113 – 2016 Chevrolet Malibu	<u>Since last certification:</u> M20165306-2016 Honda Fit M20160113 – 2016 Chevrolet Malibu
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> None	
<u>Physical evidence of damage:</u> None New	
<u>Anecdotal evidence of damage:</u> None	
<u>Equipment delivered to Borrower:</u> Hybrid 3 5th Female 1 RibEye rib displacement system 1 RibEye trunk box 1 RibEye power cable 1 RibEye trigger cable 1 Ethernet cable 1 RibEye software and manual disk 9 Accelerometers 1 Upper neck load cell 2 ASIS load cells 2 Femur load cells	

Note: New Damage is Noted in Red

HEAD	
Y / N	Ballast secure
Y / N	General appearance Minor cuts and scuffing
	
OTHER	
NECK	
Y / N	Rubber is not cracked or broken
Y / N	Upper neck bracket is firmly attached to the lower neck bracket
Y / N	The condyle joint is tight
Y / N	Nodding blocks are not cracked, broken, or out of position
OTHER	
SPINE/PELVIS	
Y / N	Rubber is not cracked or broken
Y / N	Pelvis is not broken or damaged
OTHER	
THORAX/ABDOMEN	
Y / N	Ribs are intact and straight
Y / N	Rib supports are intact and straight
Y / N	Rib damping material not separated or cracked
Y / N	Rubber bumpers in place
Y / N	Abdomen is not deformed
Y / N	Abdomen is not cracked or broken
OTHER	
KNEES	
Y / N	Skin is not torn
Y / N	Inserts are in good condition and the proper position
Y / N	Slider wires are intact
Y / N	Slider rubber returns to “at rest” position
OTHER	
LIMBS	
Y / N	Arms have normal movement and adjustment
Y / N	Arm flesh is in good condition
Y / N	Legs have normal movement and adjustment
Y / N	Leg flesh is in good condition Small cuts at top of tibia flesh:
	
Y / N	Feet are in good condition
OTHER	

INSTRUMENTATION	
Y / N	Chest pot shaft is straight
Y / N	Slider arm is riding in track
Y / N	RibEye system (if equipped) has no physically broken wires or equipment
Y / N	Transducer cables are not torn or exposing shield
Y / N	Accelerometer mounts are all secure
Y / N	LEMO connectors are straight and securely fit into acquisition hardware
OTHER	

ATD 019: Pre-Test Inspection

5th Female Inspection Checklist

Date: 1/11/2016		
NHTSA Representative: Tim Keon		
Inspection Reporter: Matt Goehle		
Inspection type (check one): ☒ Pre-Test ☐ Post-Test		
Dummy S/N: 019		
Dummy Description: Hybrid 3 – 5th Female		
Date of last Certification: 1/5/2016		
Tests conducted since last inspection: M20165306 - 2016 Honda Fit	Since last certification: M20165306 - 2016 Honda Fit	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> • 16RIBS01LEHFDSXP,RibEye Left Rib 01 Displacement X, Questionable data 64.8ms to 112ms • 16RIBS01LEHFDSYP,RibEye Left Rib 01 Displacement Y, Questionable data 64.8ms to 112ms • 16RIBS05LEHFDSXP,RibEye Left Rib 05 Displacement X, Interference by Chest Pot and Abdominal Insert • 16RIBS05LEHFDSYP,RibEye Left Rib 05 Displacement Y, Interference by Chest Pot and Abdominal Insert • 16RIBS06LEHFDSXP,RibEye Left Rib 06 Displacement X, Interference by Chest Pot and Abdominal Insert • 16RIBS06LEHFDSYP,RibEye Left Rib 06 Displacement Y, Interference by Chest Pot and Abdominal Insert • 16RIBS04RIHFDSXP,RibEye Right Rib 04 Displacement X, Interference by Chest Pot and Abdominal Insert • 16RIBS05RIHFDSXP,RibEye Right Rib 05 Displacement X, Interference by Chest Pot and Abdominal Insert • 16RIBS05RIHFDSYP,RibEye Right Rib 05 Displacement Y, Interference by Chest Pot and Abdominal Insert • 16RIBS06RIHFDSXP,RibEye Right Rib 06 Displacement X, Interference by Chest Pot and Abdominal Insert • 16RIBS06RIHFDSYP,RibEye Right Rib 06 Displacement Y, Interference by Chest Pot and Abdominal Insert		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> None		
<u>Equipment delivered to Borrower:</u> Hybrid 3 5th Female 1 RibEye rib displacement system 1 RibEye trunk box 1 RibEye power cable 1 RibEye trigger cable 1 Ethernet cable 1 RibEye software and manual disk 9 Accelerometers 1 Upper neck load cell 2 ASIS load cells 2 Femur load cells		

Note: New Damage is Noted in Red

HEAD	
Y / N	Ballast secure
Y / N	General appearance Minor scuffing
OTHER	
NECK	
Y / N	Rubber is not cracked or broken Minor scuffing
Y / N	Upper neck bracket is firmly attached to the lower neck bracket
Y / N	The condyle joint is tight
Y / N	Nodding blocks are not cracked, broken, or out of position
OTHER	
SPINE/PELVIS	
Y / N	Rubber is not cracked or broken
Y / N	Pelvis is not broken or damaged
OTHER	
THORAX/ABDOMEN	
Y / N	Ribs are intact and straight
Y / N	Rib supports are intact and straight
Y / N	Rib damping material not separated or cracked
Y / N	Rubber bumpers in place
Y / N	Abdomen is not deformed
Y / N	Abdomen is not cracked or broken
OTHER	Abdomen flock paper modification before test:  After test: 
KNEES	
Y / N	Skin is not torn
Y / N	Inserts are in good condition and the proper position
Y / N	Slider wires are intact
Y / N	Slider rubber returns to “at rest” position
OTHER	

LIMBS	
Y / N	Arms have normal movement and adjustment
Y / N	Arm flesh is in good condition
Y / N	Legs have normal movement and adjustment
Y / N	Leg flesh is in good condition Right tibia flesh has minor cut at bottom front
	
Y / N	Feet are in good condition
OTHER	
INSTRUMENTATION	
Y / N	Chest pot shaft is straight
Y / N	Slider arm is riding in track
Y / N	RibEye system (if equipped) has no physically broken wires or equipment
Y / N	Transducer cables are not torn or exposing shield
Y / N	Accelerometer mounts are all secure
Y / N	LEMO connectors are straight and securely fit into acquisition hardware
OTHER	

ATD 019: Post-Test Inspection

5th Female Inspection Checklist

Date: 1/13/2016	
NHTSA Representative: Tim Keon	
Inspection Reporter: Matt Goehle	
Inspection type (check one): ☐ Pre-Test ☒ Post-Test	
Dummy S/N: 019	
Dummy Description: Hybrid 3 – 5th Female	
Date of last Certification: 1/5/2016	
Tests conducted since last inspection: M20160113 – 2016 Chevrolet Malibu	Since last certification: M20165306 - 2016 Honda Fit M20160113 – 2016 Chevrolet Malibu
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> • 16RIBS01LEHFDSXP,RibEye Left Rib 01 Displacement X, Questionable data 76.7ms to 100ms • 16RIBS01LEHFDSYP,RibEye Left Rib 01 Displacement Y, Questionable data 76.7ms to 100ms • 16RIBS05RIHFDSXP,RibEye Right Rib 05 Displacement X, Interference by Chest Pot and Abdominal Insert • 16RIBS05RIHFDSYP,RibEye Right Rib 05 Displacement Y, Interference by Chest Pot and Abdominal Insert • 16RIBS06RIHFDSXP,RibEye Right Rib 06 Displacement X, Interference by Chest Pot and Abdominal Insert • 16RIBS06RIHFDSYP,RibEye Right Rib 06 Displacement Y, Interference by Chest Pot and Abdominal Insert	
<u>Physical evidence of damage:</u> None New	
<u>Anecdotal evidence of damage:</u> None	
<u>Equipment delivered to Borrower:</u> Hybrid 3 5th Female 1 RibEye rib displacement system 1 RibEye trunk box 1 RibEye power cable 1 RibEye trigger cable 1 Ethernet cable 1 RibEye software and manual disk 9 Accelerometers 1 Upper neck load cell 2 ASIS load cells 2 Femur load cells	

Note: New Damage is Noted in Red

HEAD	
Y / N	Ballast secure
Y / N	General appearance Minor scuffing
OTHER	
NECK	
Y / N	Rubber is not cracked or broken Minor scuffing
Y / N	Upper neck bracket is firmly attached to the lower neck bracket
Y / N	The condyle joint is tight
Y / N	Nodding blocks are not cracked, broken, or out of position
OTHER	
SPINE/PELVIS	
Y / N	Rubber is not cracked or broken
Y / N	Pelvis is not broken or damaged
OTHER	
THORAX/ABDOMEN	
Y / N	Ribs are intact and straight
Y / N	Rib supports are intact and straight
Y / N	Rib damping material not separated or cracked
Y / N	Rubber bumpers in place
Y / N	Abdomen is not deformed
Y / N	Abdomen is not cracked or broken
OTHER	
KNEES	
Y / N	Skin is not torn
Y / N	Inserts are in good condition and the proper position
Y / N	Slider wires are intact
Y / N	Slider rubber returns to “at rest” position
OTHER	
LIMBS	
Y / N	Arms have normal movement and adjustment
Y / N	Arm flesh is in good condition
Y / N	Legs have normal movement and adjustment
Y / N	Leg flesh is in good condition Right tibia flesh has minor cut at bottom front
	
Y / N	Feet are in good condition
OTHER	
INSTRUMENTATION	
Y / N	Chest pot shaft is straight
Y / N	Slider arm is riding in track
Y / N	RibEye system (if equipped) has no physically broken wires or equipment
Y / N	Transducer cables are not torn or exposing shield
Y / N	Accelerometer mounts are all secure
Y / N	LEMO connectors are straight and securely fit into acquisition hardware
OTHER	

Test Data/Sensor Repair Notes

DUMMY CALIBRATIONS

50% ADULT MALE THOR DL9207 DUMMY CALIBRATIONS

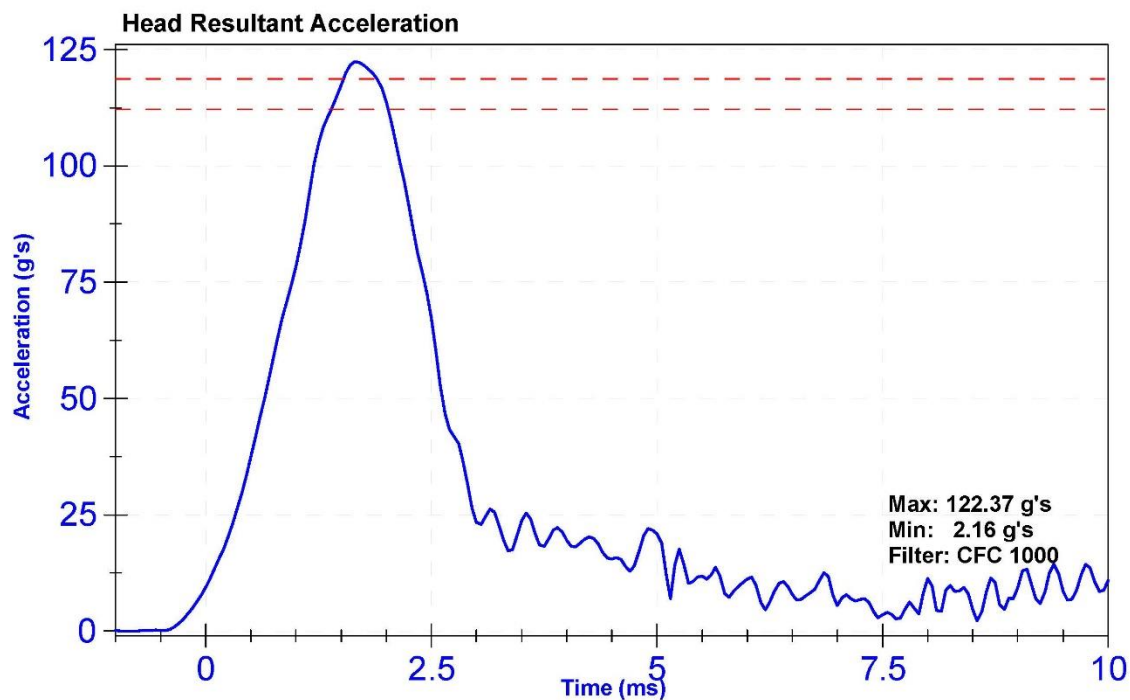
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

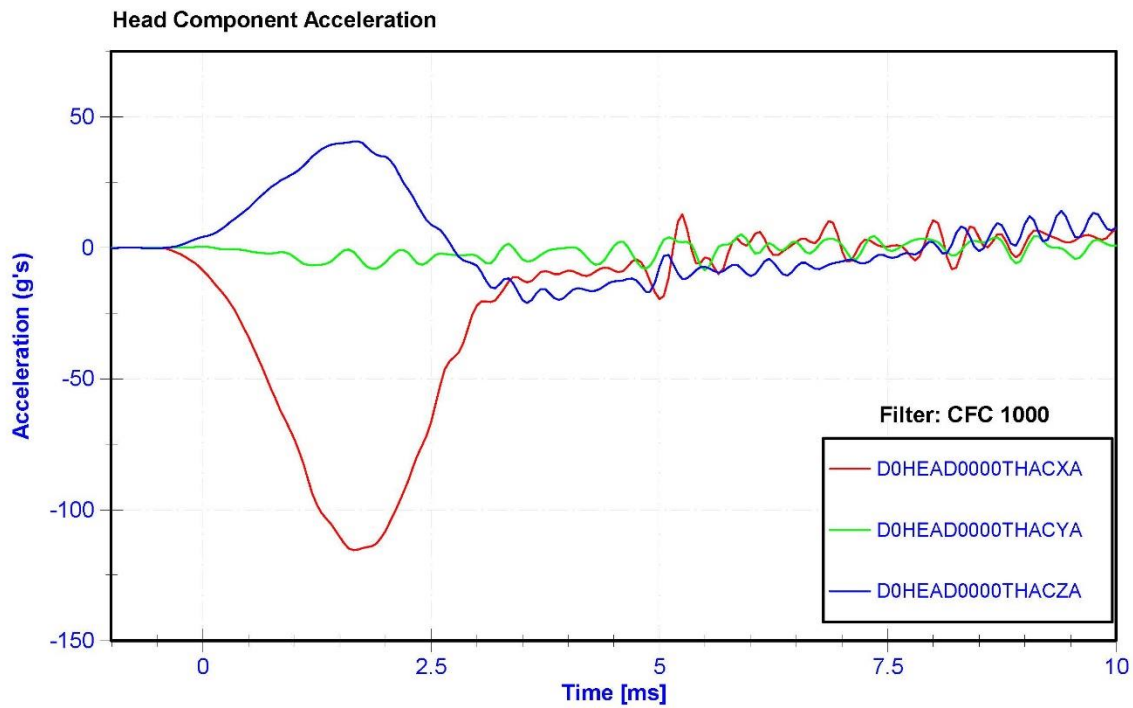
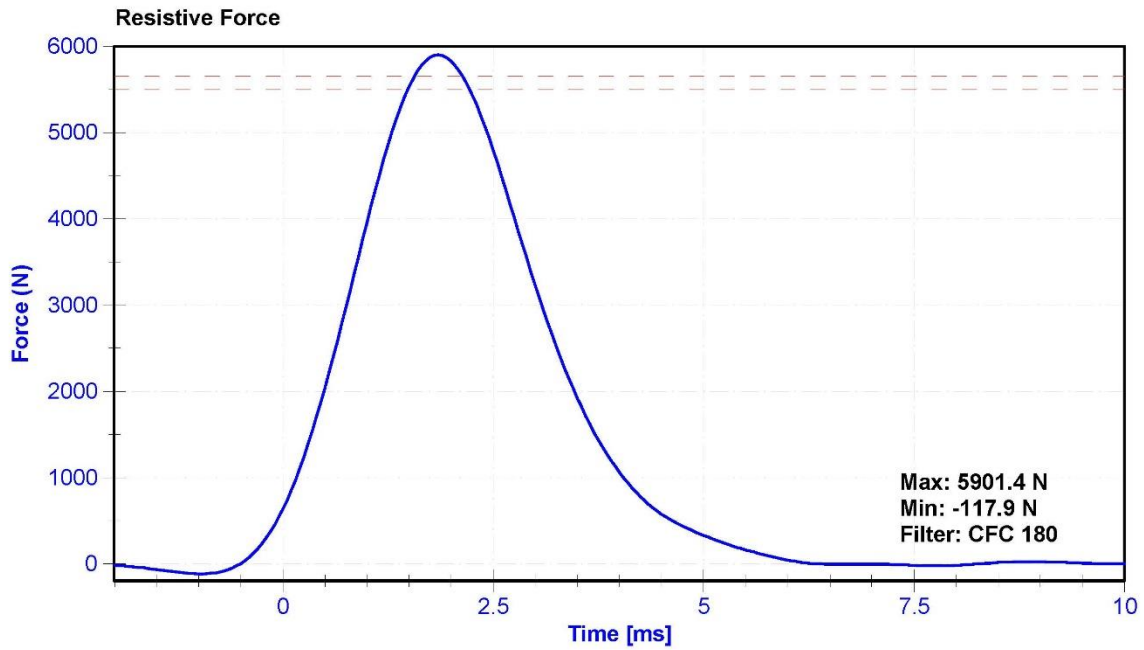
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	17.7	Pass
Impact Velocity	1.95	2.05	m/s	2.020	Pass
Probe Force	5498	5660	N	5901.4	Fail
Resultant Acceleration	112.2	118.7	g's	122.37	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Head X Accel	Endevco 7264	AC-P82183	4/3/2015	4/2/2016
Head Y Accel	Endevco 7264	AC-P81384	4/3/2015	4/2/2016
Head Z Accel	Endevco 7264	AC-P81797	4/3/2015	4/2/2016
Probe Accel	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016





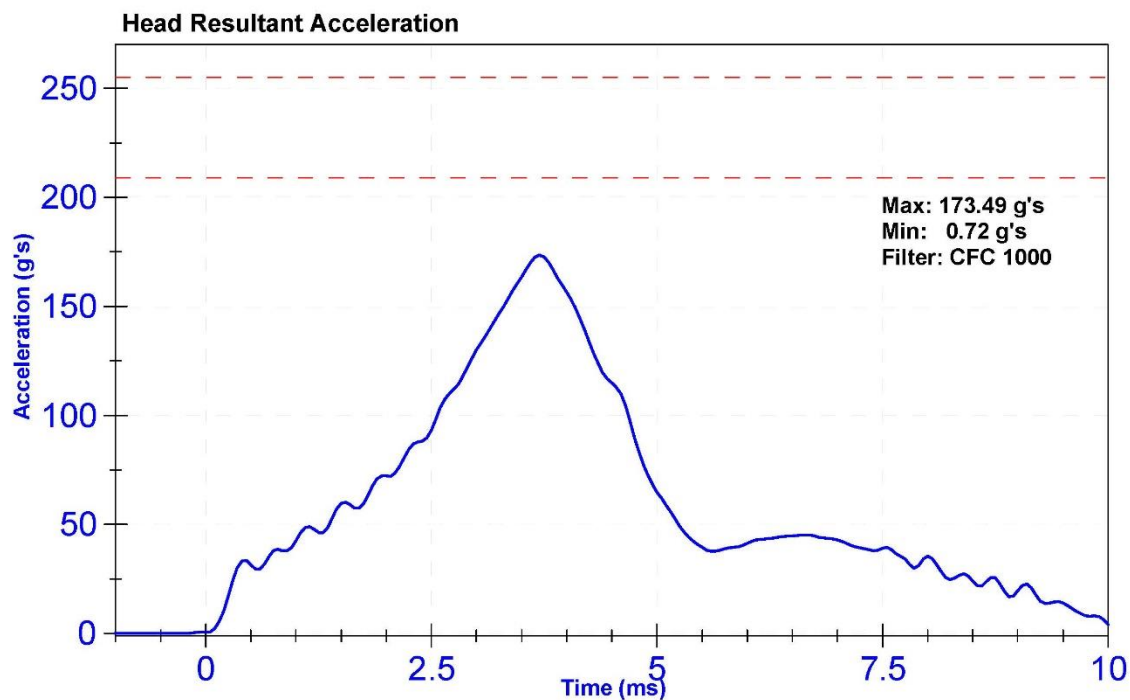
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

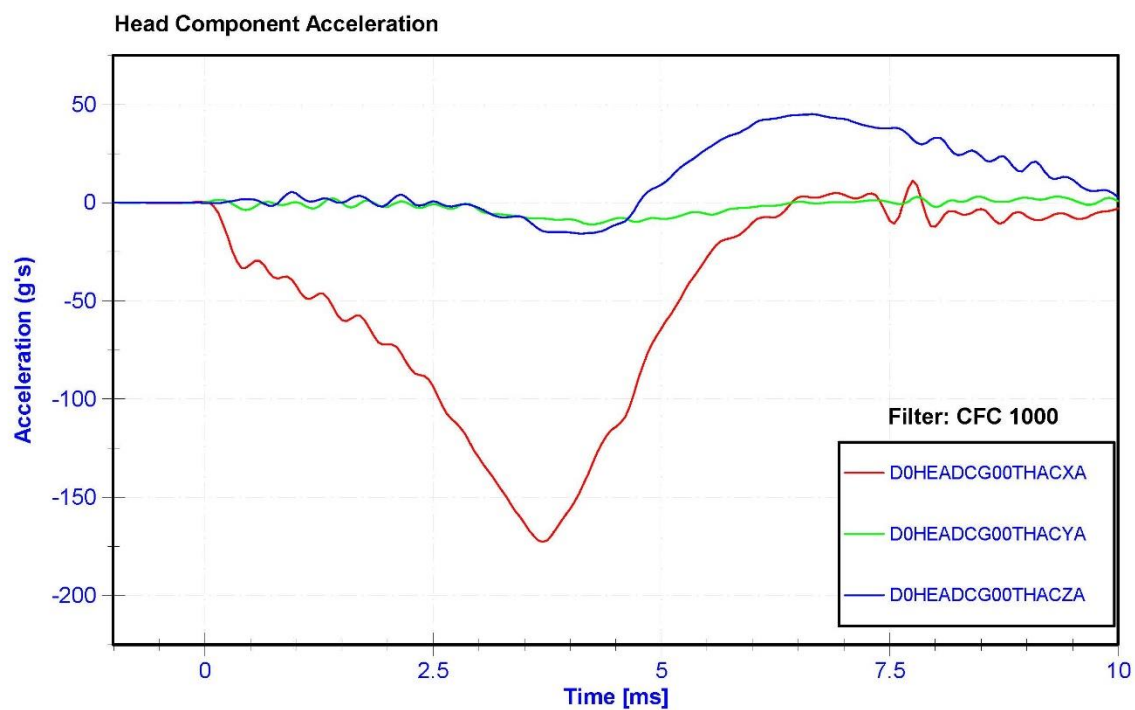
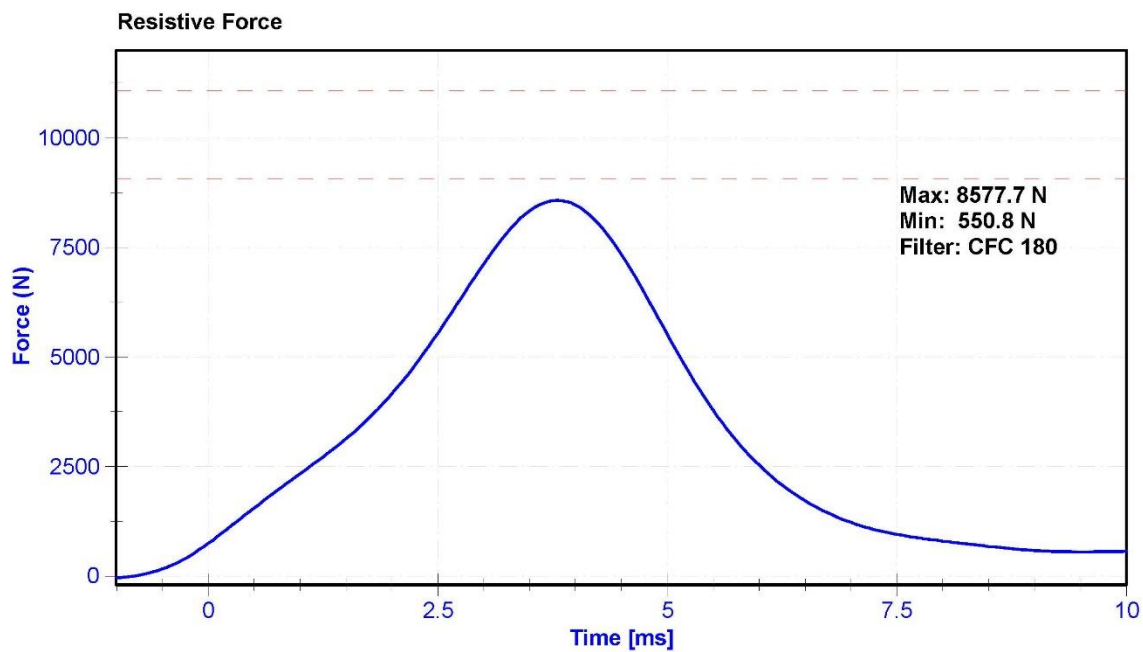
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	20.7	Pass
Impact Velocity	6.68	6.78	m/s	6.699	Pass
Probe Force	9067	11082	N	8577.7	Fail
Resultant Acceleration	209	255	g's	173.5	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Head X Accel	Endevco 7264	AC-P82183	4/3/2015	4/2/2016
Head Y Accel	Endevco 7264	AC-P81384	4/3/2015	4/2/2016
Head Z Accel	Endevco 7264	AC-P81797	4/3/2015	4/2/2016
Probe Accel	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016





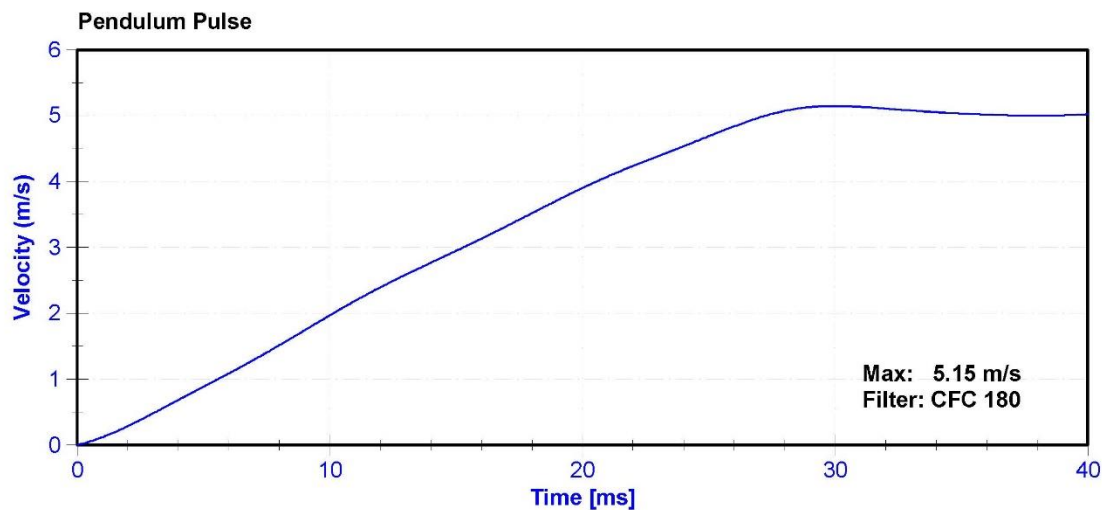
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

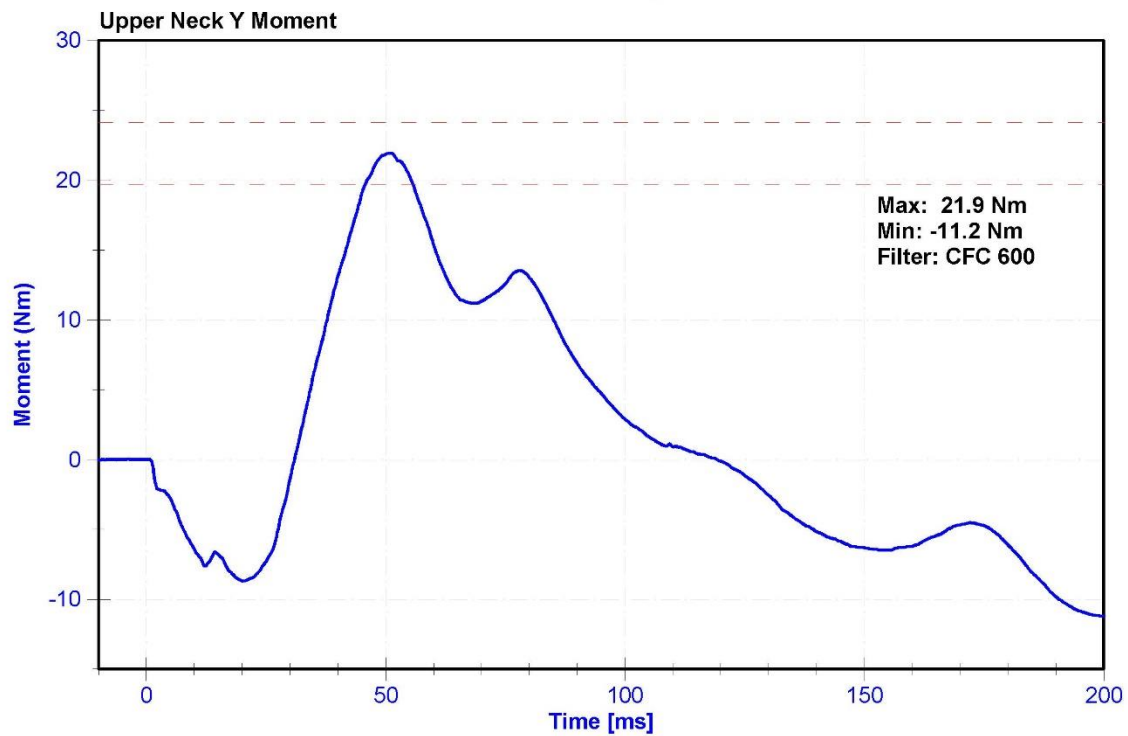
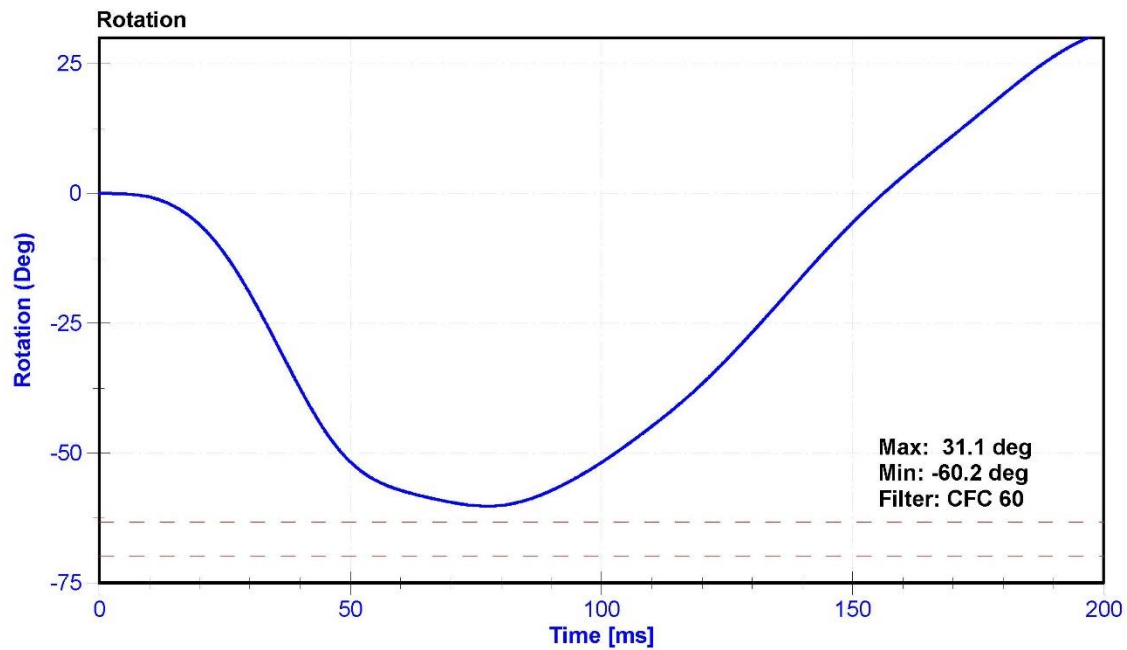
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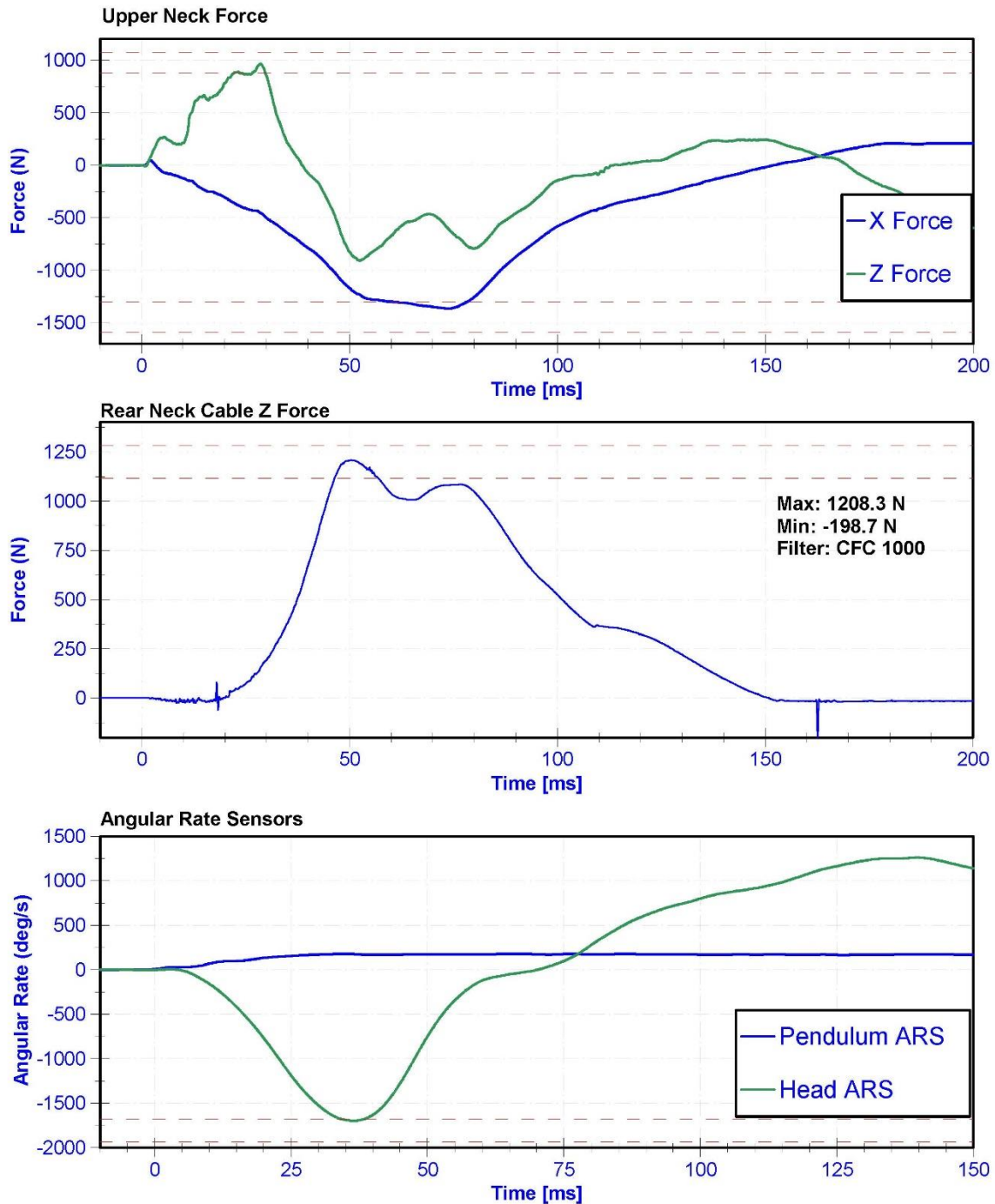
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	33.0	Pass
Velocity	4.95	5.05	m/s	4.985	Pass
Pendulum Impulse at 8ms	1.49	1.85	m/s	1.515	Pass
Pendulum Impulse at 16ms	3.08	3.86	m/s	3.134	Pass
Pendulum Impulse at 24ms	4.48	5.26	m/s	4.536	Pass
Peak Upper Neck Y Moment	19.7	24.1	Nm	21.94	Pass
Peak Upper Neck X Force	-1592	-1302	N	-1364.0	Pass
Maximum Upper Neck Z Force	877	1072	N	965.4	Pass
First Peak Rear Neck Cable Force	1115	1282	N	1208.3	Pass
Peak Head Y Angular Rate	-1935	-1675	deg/s	-1696.4	Pass
Peak Head Y Rotation	-69.9	-63.3	deg	-60.20	Fail
Rotation Decay Time to Zero	83.0	86.2	ms	78.70	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 10380J14	LC-DP3956 Fx	3/5/2015	3/4/2016
Rear Neck Cable Load Cell	Humanetics 10386J14	LC-DO9741	3/6/2015	3/5/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head Y ARS	DTS ARS-18K	ARS-4737	3/30/2015	3/29/2016







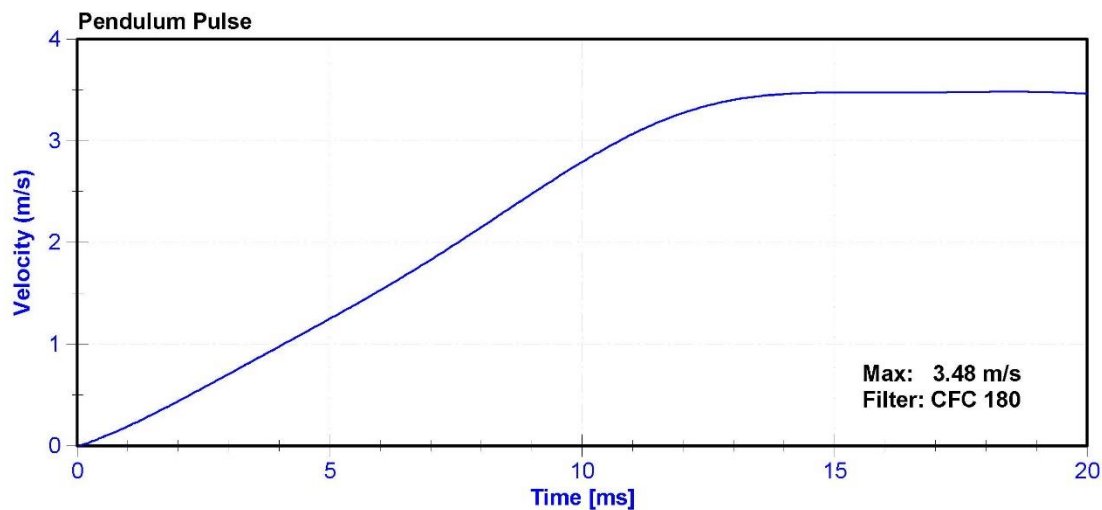
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

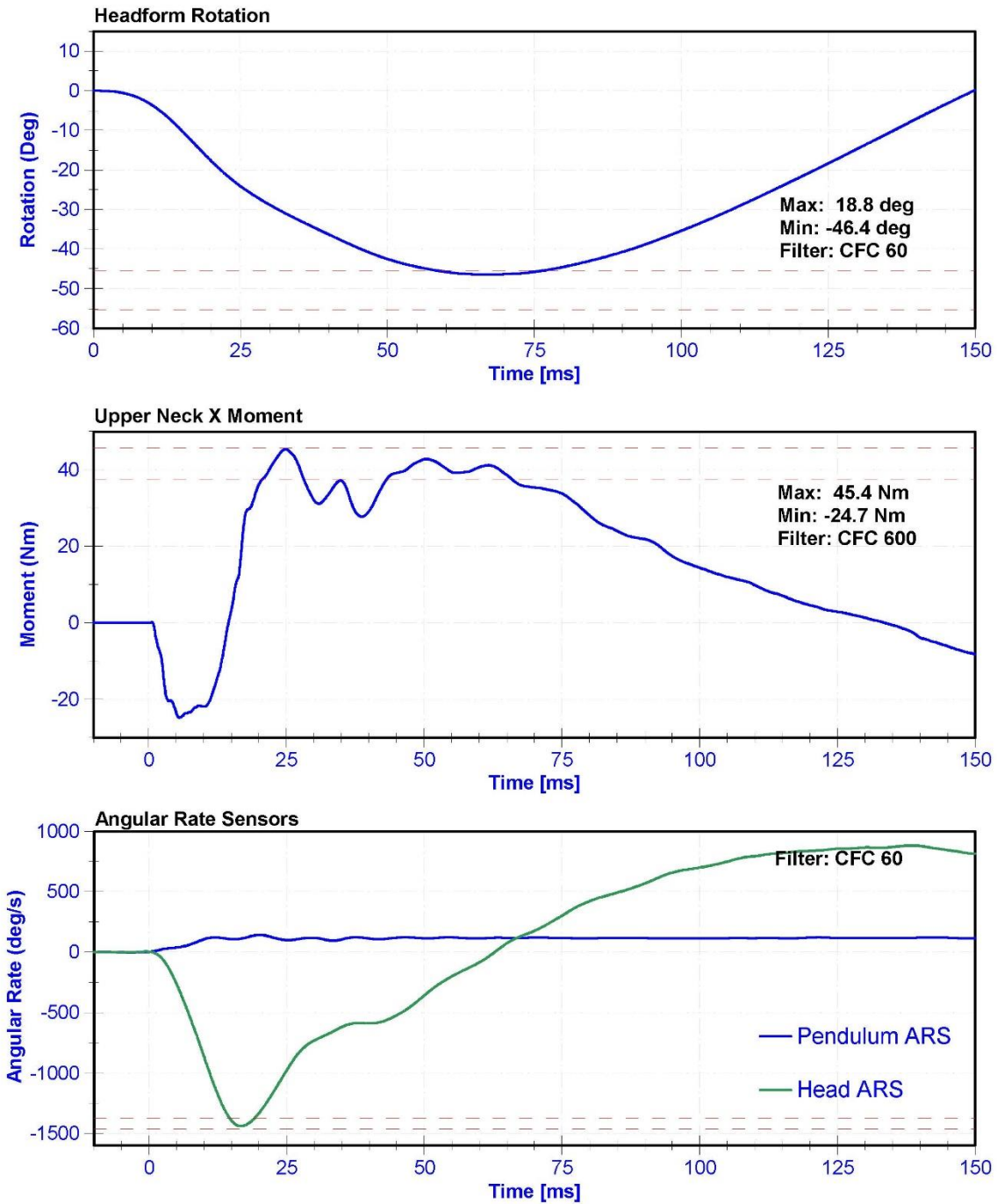
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	35.5	Pass
Velocity	3.35	3.45	m/s	3.418	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.977	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.150	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.273	Pass
Peak Upper Neck X Moment after 40ms	37.4	45.7	Nm	42.80	Pass
Peak Head X Angular Rate	-1462	-1375	deg/s	-1440.0	Pass
Peak Head X Rotation	-55.3	-45.4	deg	-46.41	Pass
Rotational Decay Time to Zero	83.7	90.9	ms	82.95	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 10380J14	LC-DP3956 Mx	3/5/2015	3/4/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head X ARS	DTS ARS-18K	ARS-4740	3/30/2015	3/29/2016





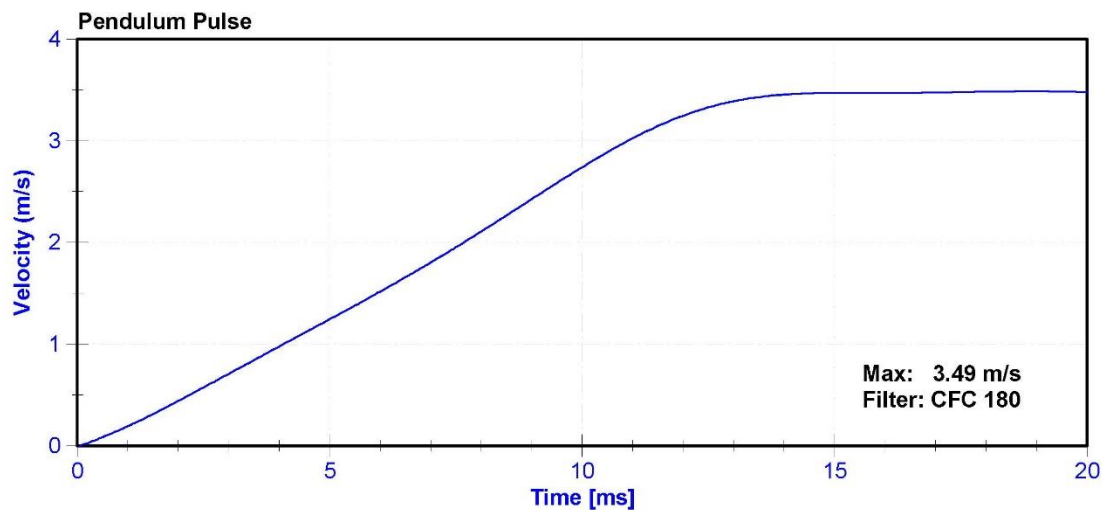
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

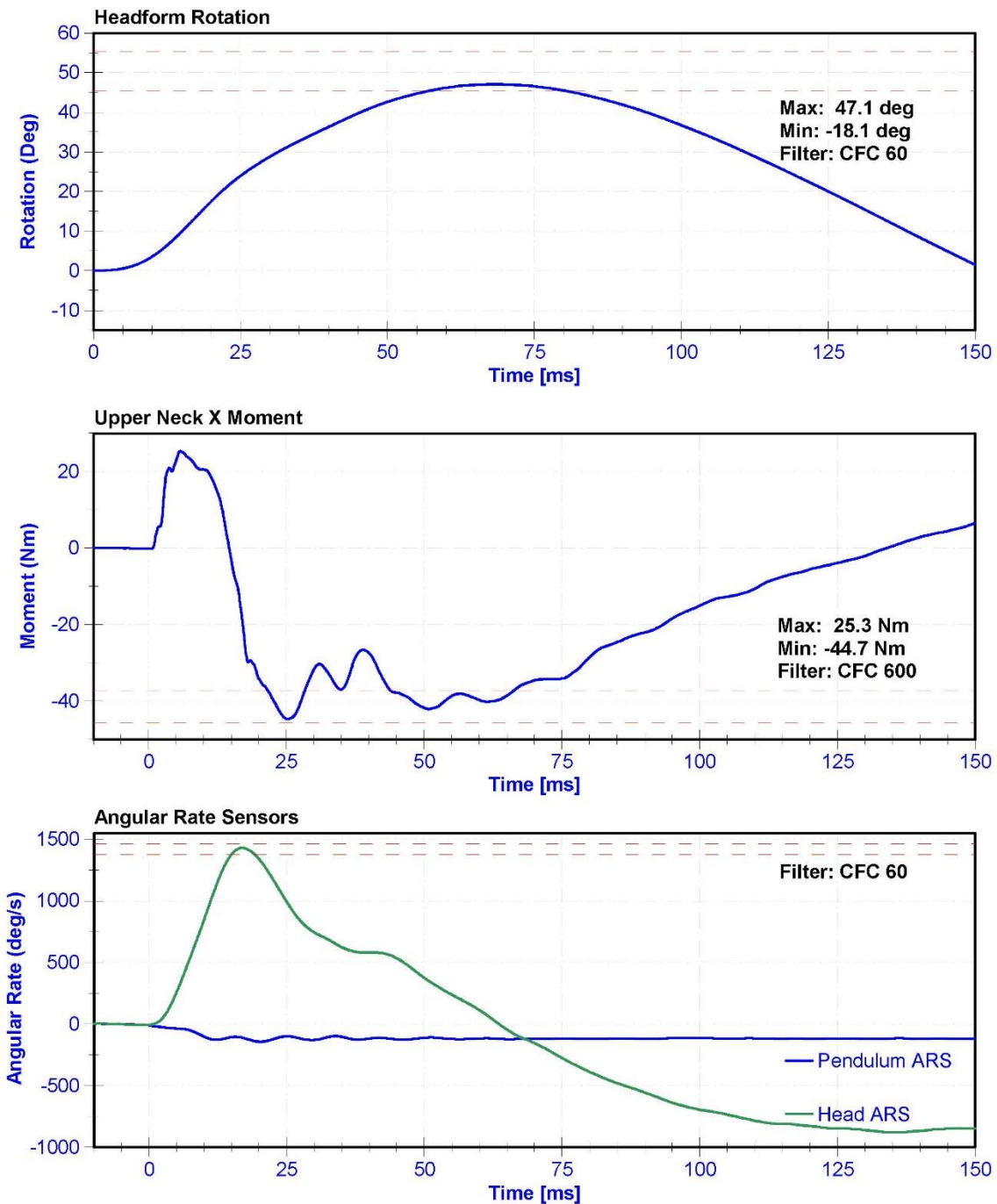
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	34.3	Pass
Velocity	3.35	3.45	m/s	3.42	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.977	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.107	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.246	Pass
Peak Upper Neck X Moment after 40ms	-45.7	-37.4	Nm	-42.03	Pass
Peak Head X Angular Rate	1375	1462	deg/s	1430.3	Pass
Peak Head X Rotation	45.4	55.3	deg	47.06	Pass
Rotation Decay Time to Zero	83.7	90.9	ms	83.85	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 10380J14	LC-DP3956 Mx	3/5/2015	3/4/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head X ARS	DTS ARS-18K	ARS-4740	3/30/2015	3/29/2016





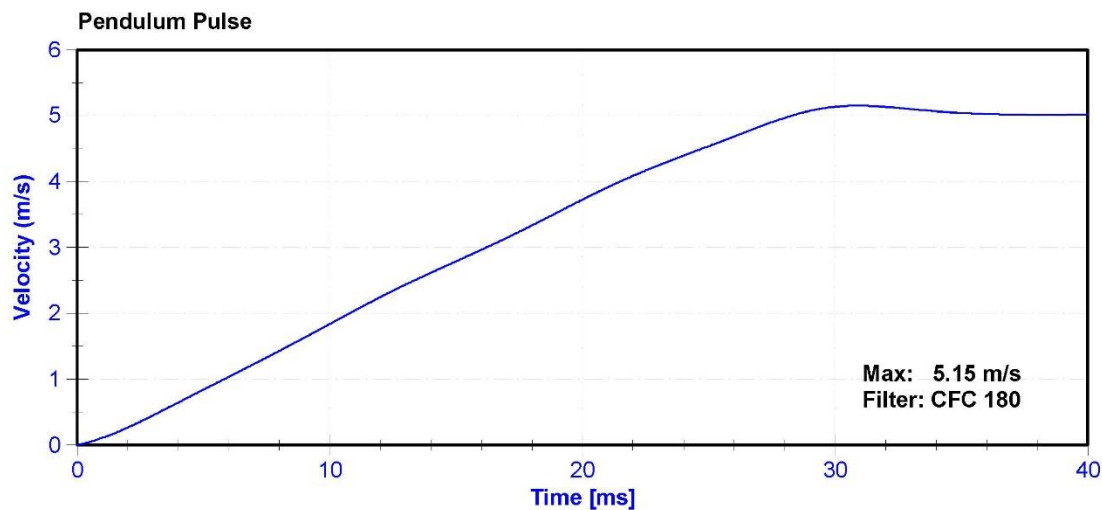
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

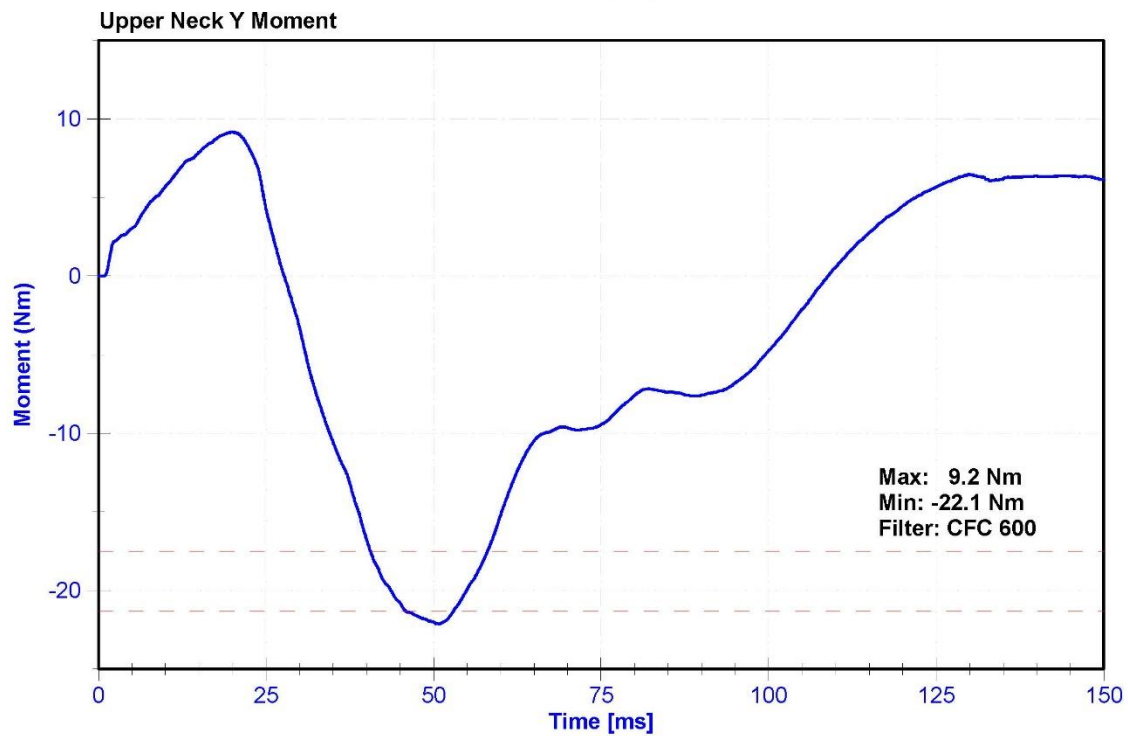
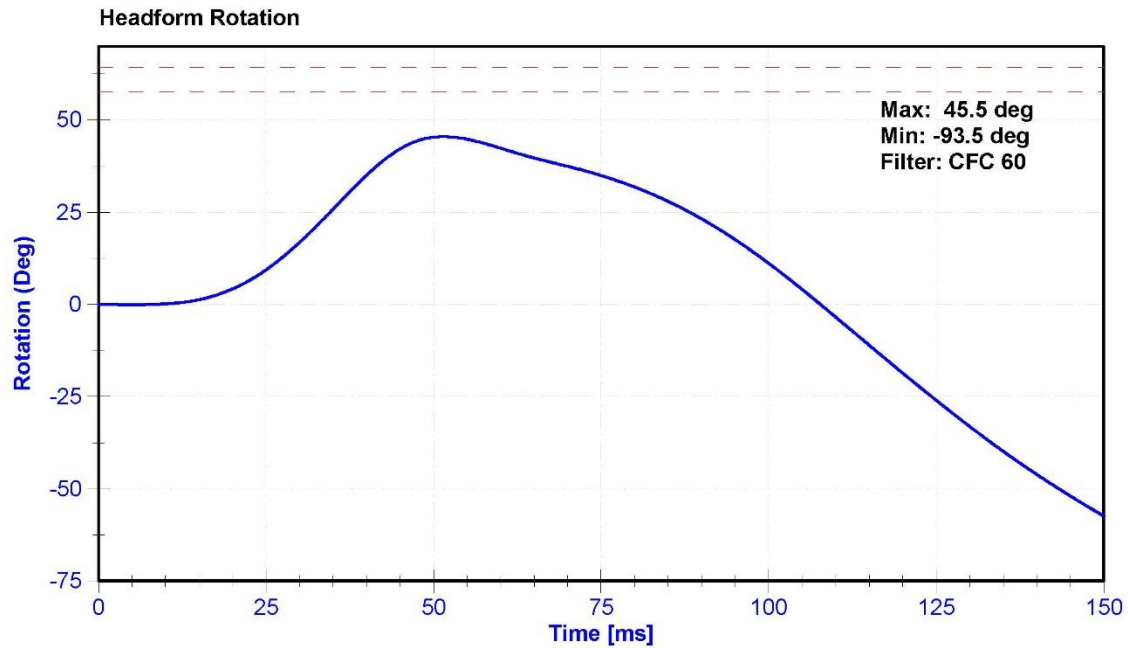
Results

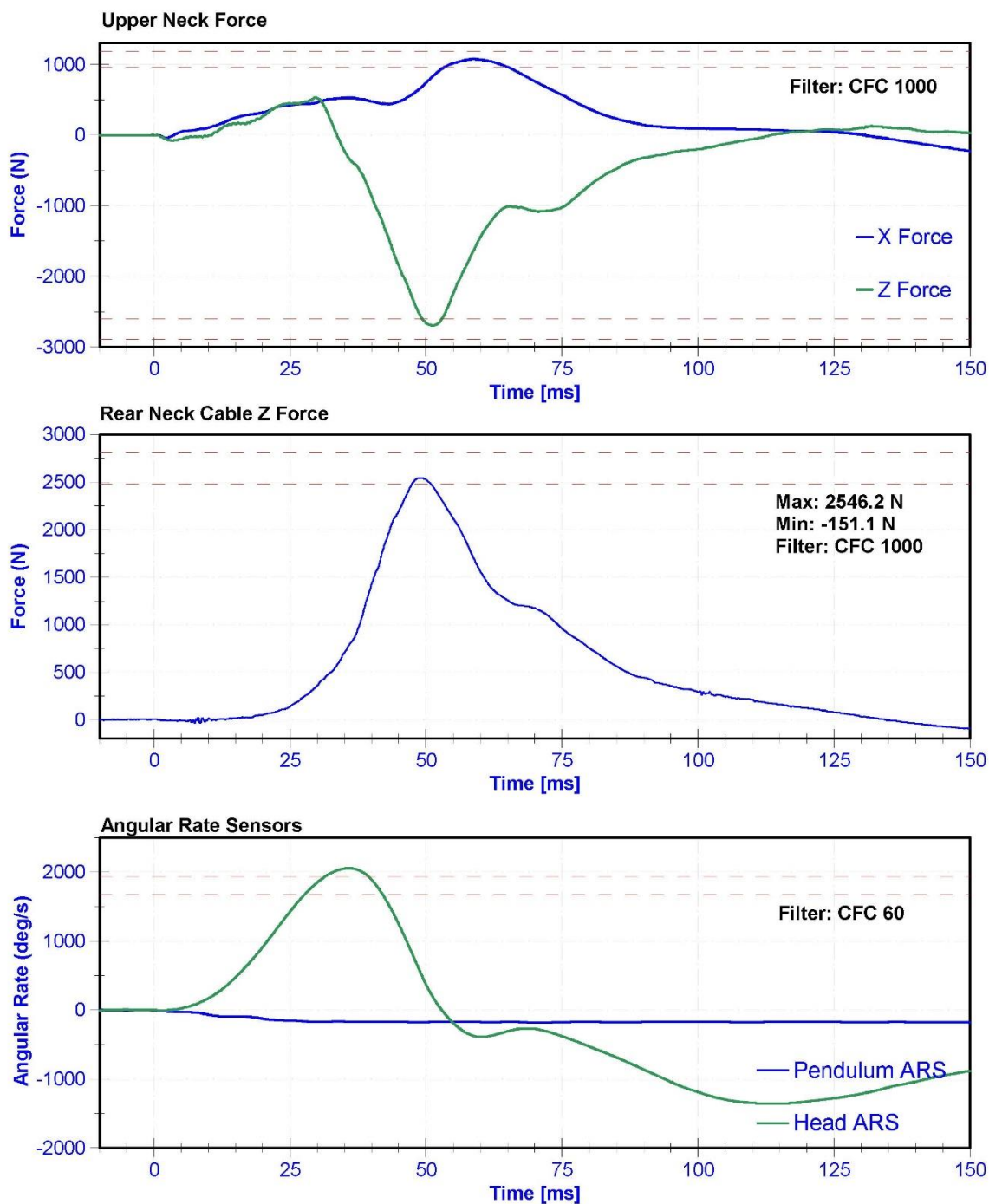
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	36.0	Pass
Velocity	4.95	5.05	m/s	4.985	Pass
Pendulum Impulse at 10ms	1.76	1.91	m/s	1.840	Pass
Pendulum Impulse at 20ms	3.50	3.75	m/s	3.727	Pass
Pendulum Impulse at 30ms	4.88	5.20	m/s	5.134	Pass
Peak Upper Neck Y Moment	-21.3	-17.5	Nm	-22.12	Fail
Peak Upper Neck X Force	967	1182	N	1078.0	Pass
Peak Upper Neck Z Force	-2893	-2603	N	-2701.5	Pass
Peak Front Neck Cable Force	2482	2809	N	2546.2	Pass
Peak Head Y Angular Rate	1907	2043	deg/s	2056.4	Fail
Peak Head Y Rotation	57.6	64.2	deg	45.50	Fail
Rotational Decay Time to Zero	79.3	82.5	ms	56.30	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 10380Jl4	LC-DP3956 Fx	3/5/2015	3/4/2016
Fr Neck Cable Load	Humanetics 10386Jl4	LC-DO9740	3/6/2015	3/5/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head ARS Y-Axis	DTS ARS-18K	ARS-4737	3/30/2015	3/29/2016







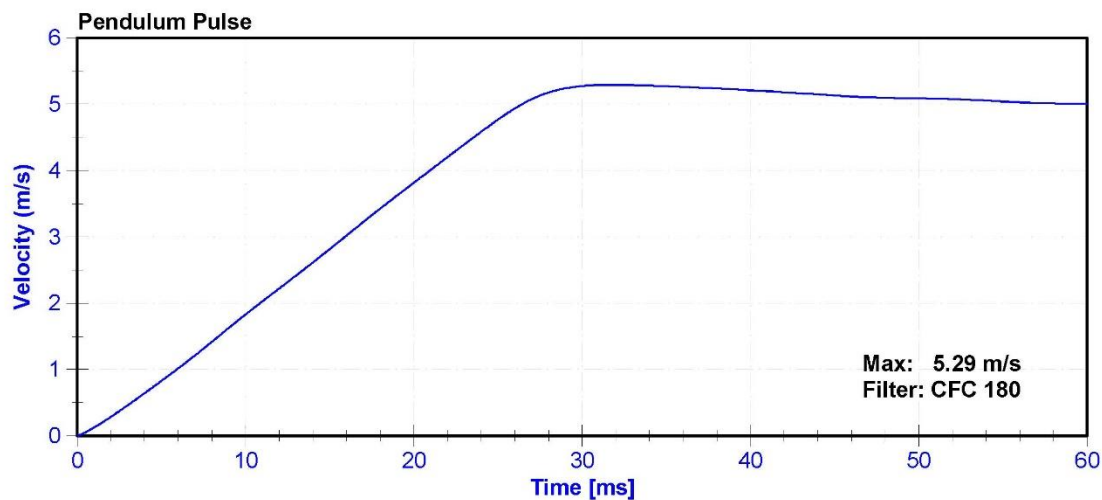
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

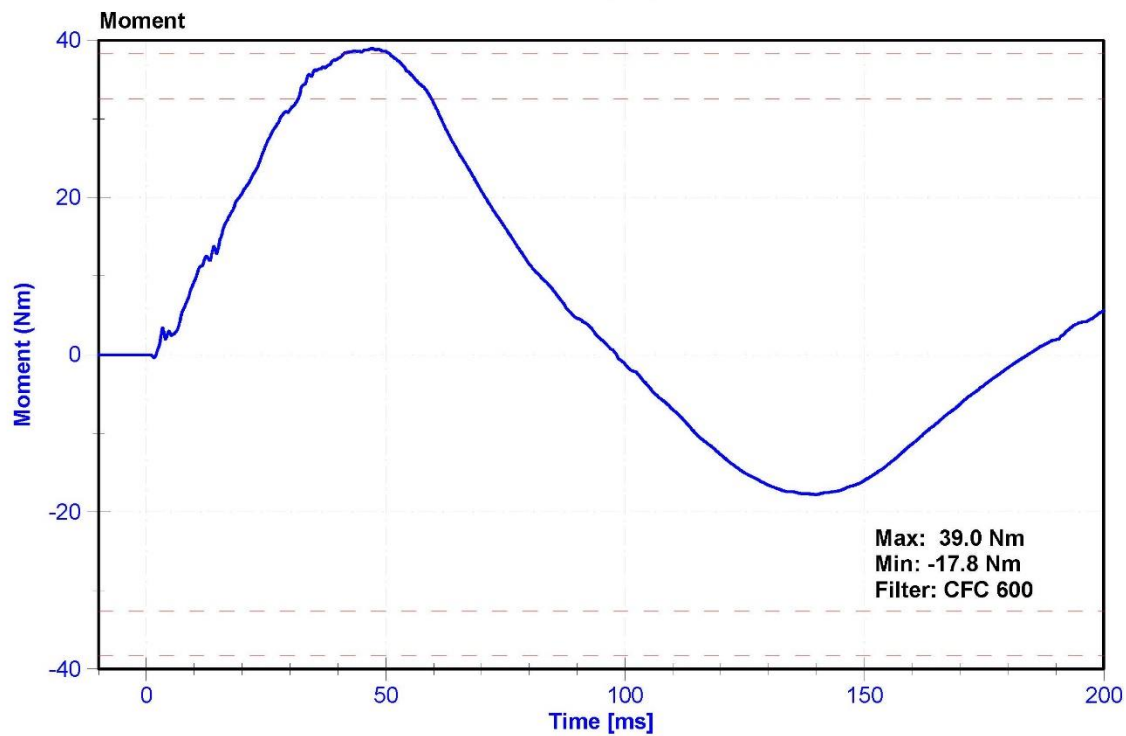
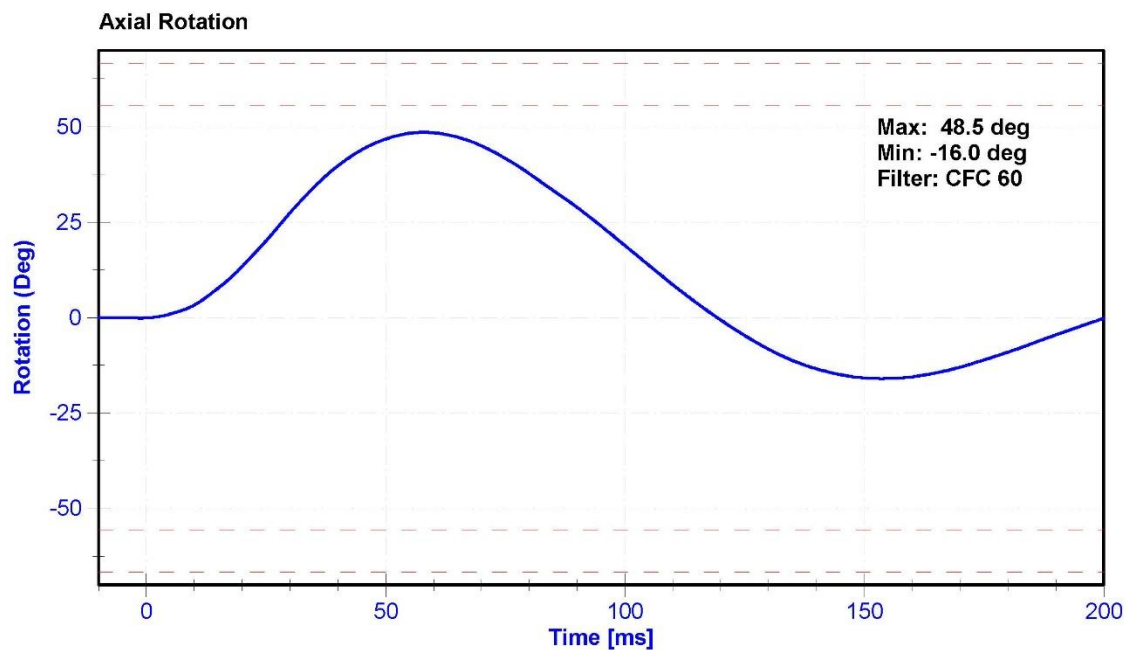
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	29.7	Pass
Velocity	4.95	5.05	m/s	5.04	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.829	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.816	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.817	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.769	Pass
Peak Upper Neck Z Moment	32.6	38.3	Nm	38.98	Fail
Peak Neck Axial Rotation	55.6	66.6	deg	48.54	Fail
Rotation Decay Time to Zero	58.0	61.6	ms	61.35	Pass
Peak Upper Neck Angular Velocity	1559	1709	deg/s	1576.78	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Neck Fixture Potentiometer	Servo 14CB1-3615	DS-0001	10/21/2015	10/20/2016
Upper Neck Load Cell	Humanetics 10380JI4	LC-DP3956 Mz	3/5/2015	3/4/2016
Upper Neck ARS	DTS ARS PRO-18K	ARS-9097	9/30/2015	9/29/2016





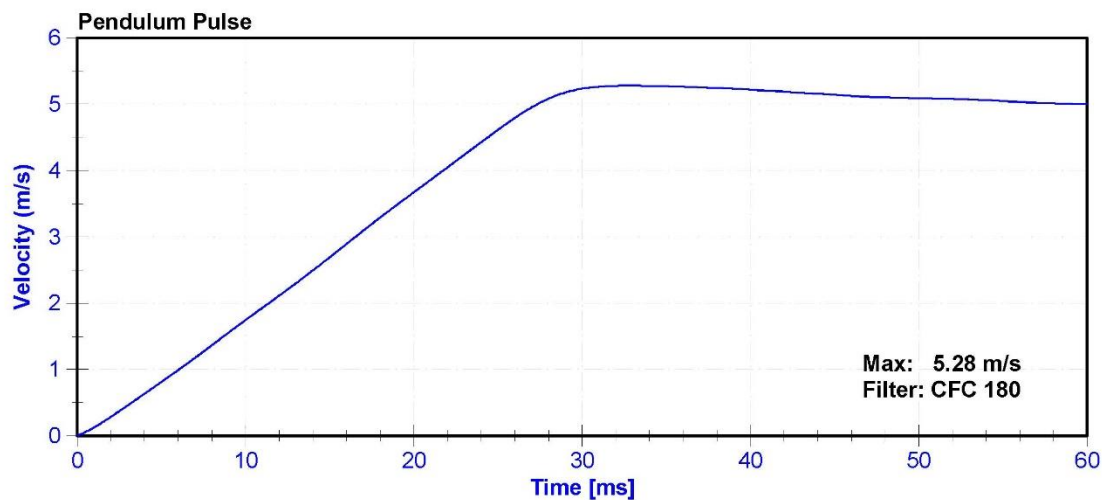
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

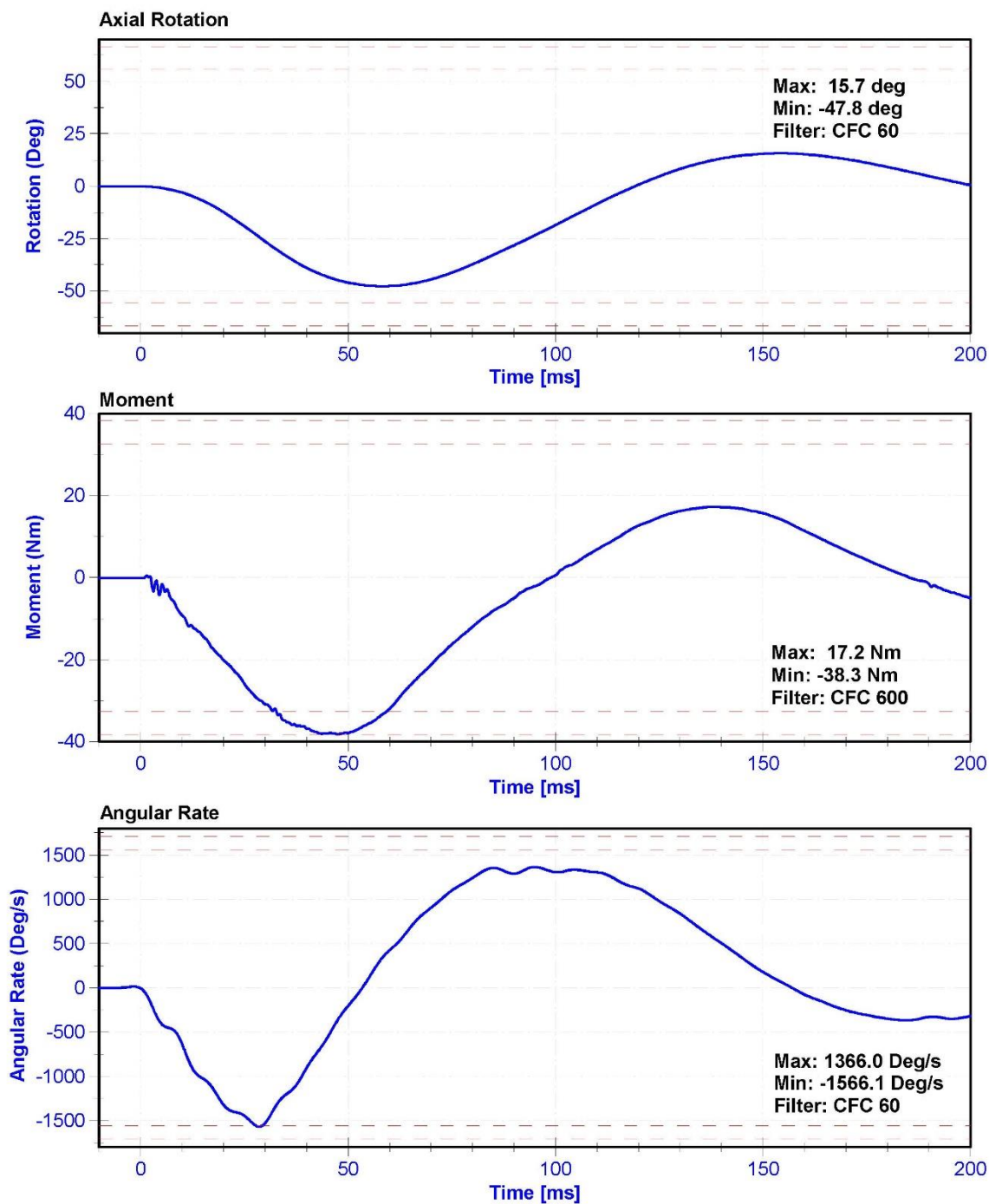
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	31.8	Pass
Velocity	4.95	5.05	m/s	5.045	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.746	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.693	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.674	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.615	Pass
Peak Upper Neck Z Moment	32.6	38.3	Nm	38.26	Pass
Peak Neck Axial Rotation	55.6	66.6	deg	47.76	Fail
Rotation Decay Time to Zero	58.0	61.6	ms	47.00	Fail
Peak Upper Neck Angular Velocity	1559	1709	deg/s	1566.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Neck Fixture Potentiometer	Servo 14CB1-3615	DS-0001	10/21/2015	10/20/2016
Upper Neck Load Cell	Humanetics 10380JI4	LC-DP3956 Mz	3/5/2015	3/4/2016
Upper Neck ARS	DTS ARS PRO-18K	ARS-9097	9/30/2015	9/29/2016





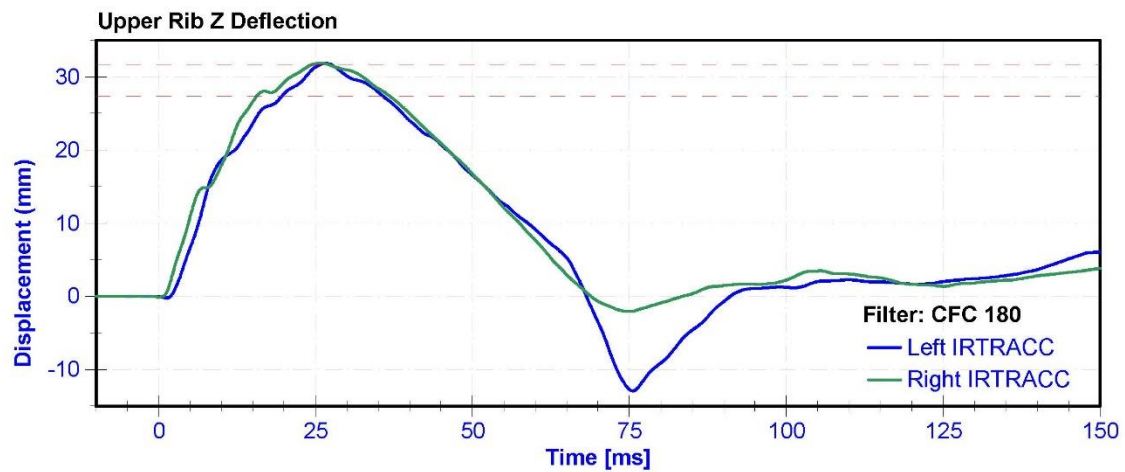
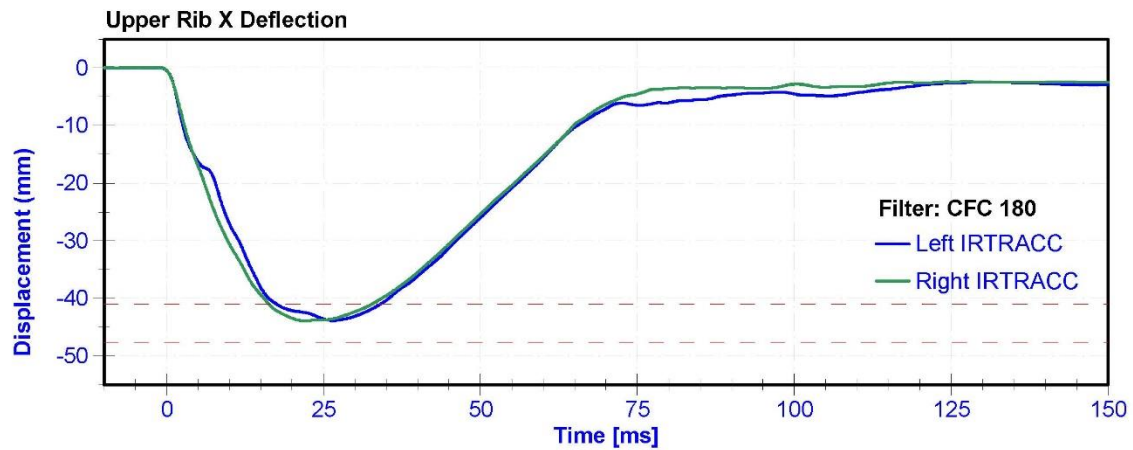
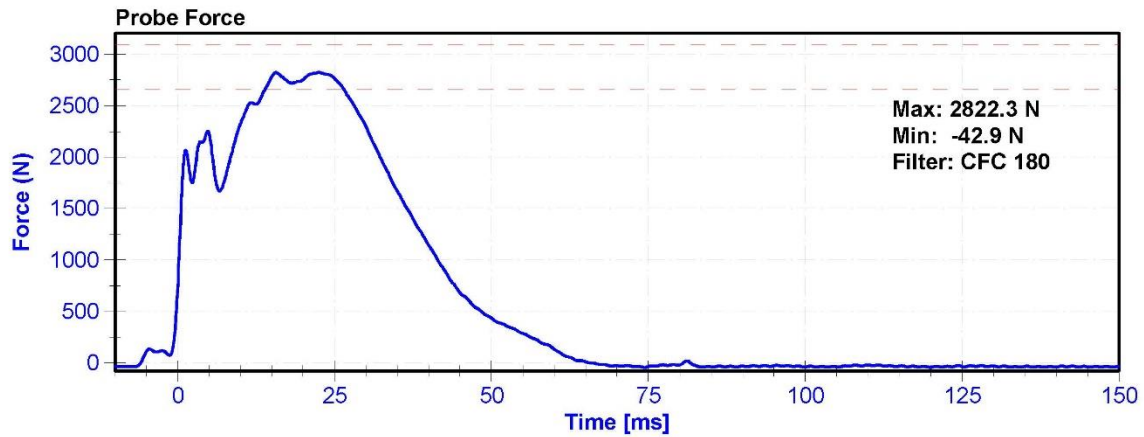
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

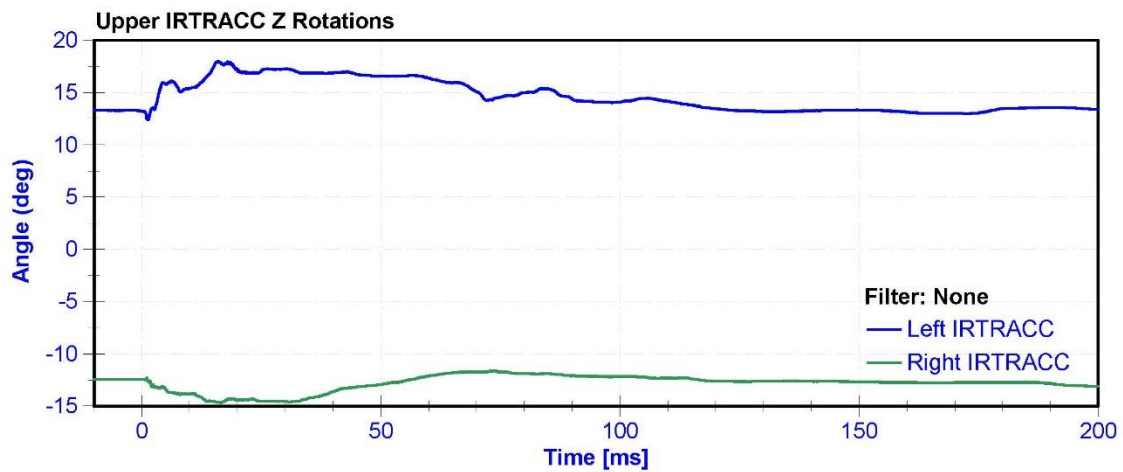
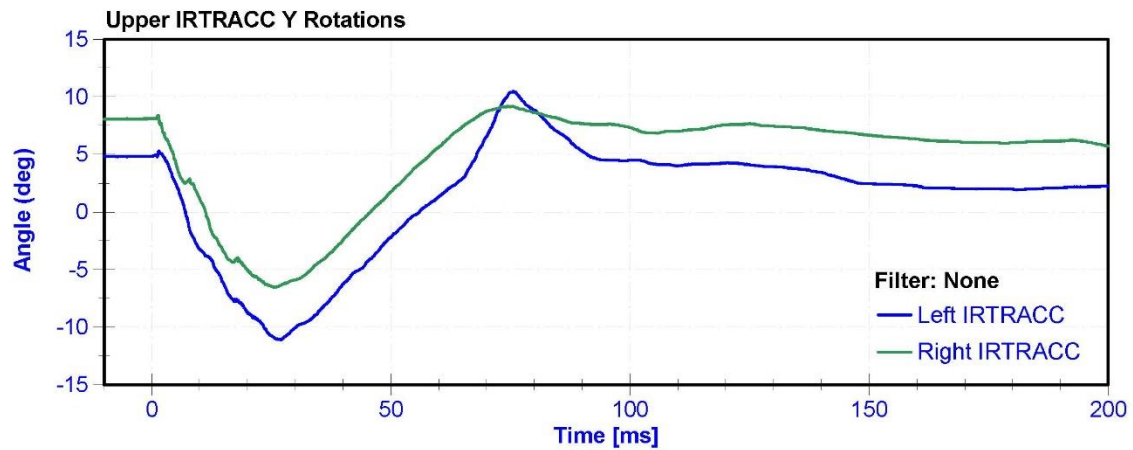
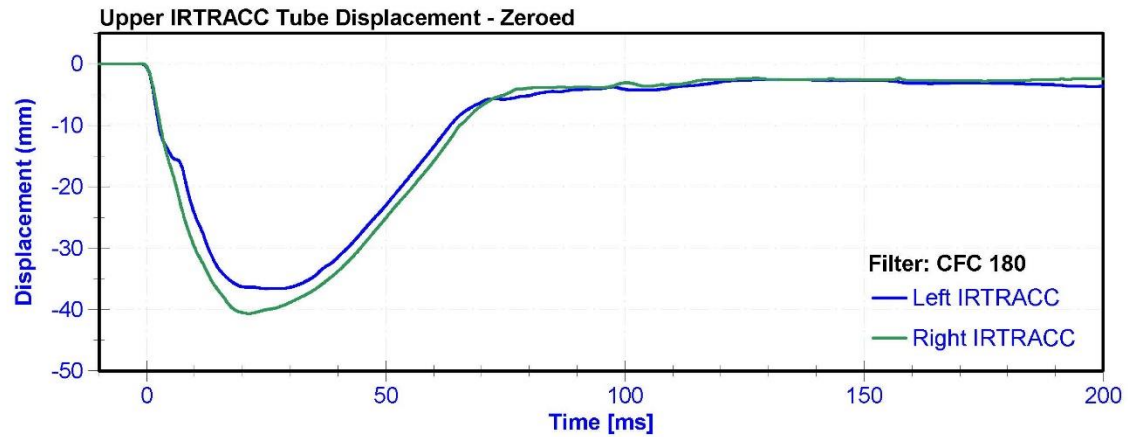
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.8	Pass
Humidity	10	70	%	30.8	Pass
Impact Velocity	4.25	4.35	m/s	4.323	Pass
Probe Force	2474	2850	N	2822.3	Pass
Upper Left X Rib Deflection	-47.6	-41.0	mm	-43.87	Pass
Upper Right X Rib Deflection	-47.6	-41.0	mm	-43.90	Pass
Left/Right X Rib Deviation	-7.00	7.00	mm	0.033	Pass
Upper Left Z Rib Deflection	27.3	31.7	mm	31.86	Fail
Upper Right Z Rib Deflection	27.3	31.7	mm	31.90	Fail
Left/Right Z Rib Deviation	-7.00	7.00	mm	-0.031	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Upper Left IRTRACC	Humanetics IF-364-C-R3	DS-DS6355	11/10/2015	11/9/2016
Upper Left Y Potentiometer	Humanetics 9945	DS-DI2382	4/8/2015	4/7/2016
Upper Left Z Potentiometer	Humanetics 9945	DS-DI2383	4/8/2015	4/7/2016
Upper Right IRTRACC	Humanetics IF-364-C-R3	DS-DJ2613	4/8/2015	4/7/2016
Upper Right Y Potentiometer	Humanetics 9945	DS-DI7753	4/9/2015	4/8/2016
Upper Right Z Potentiometer	Humanetics 9945	DS-DI7752	4/9/2015	4/8/2016





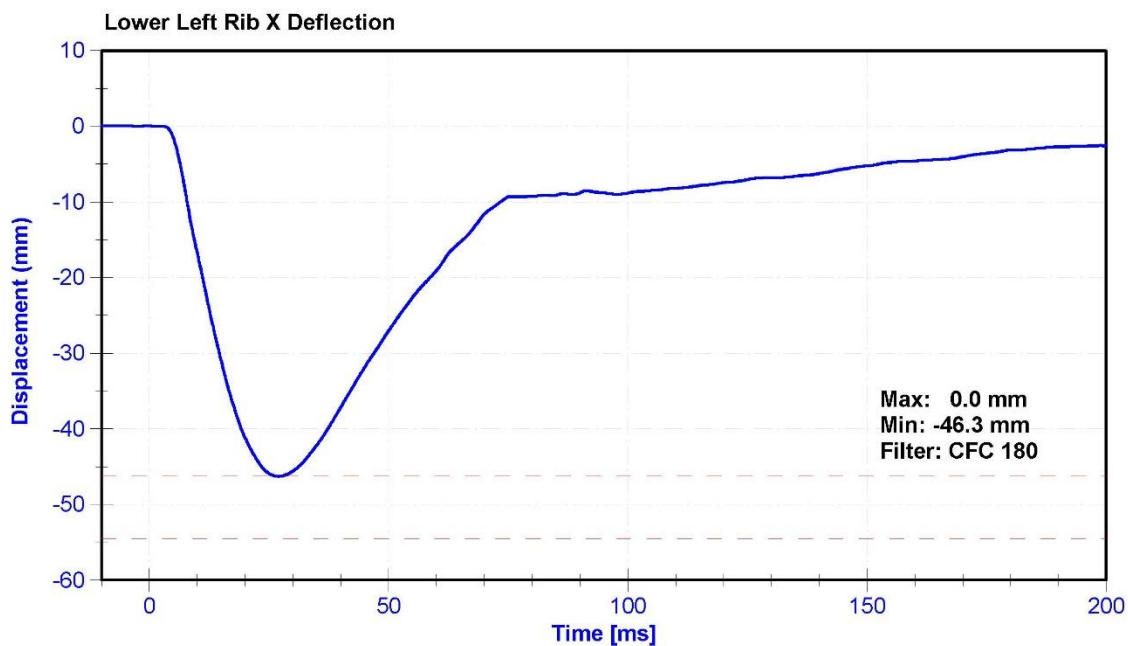
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

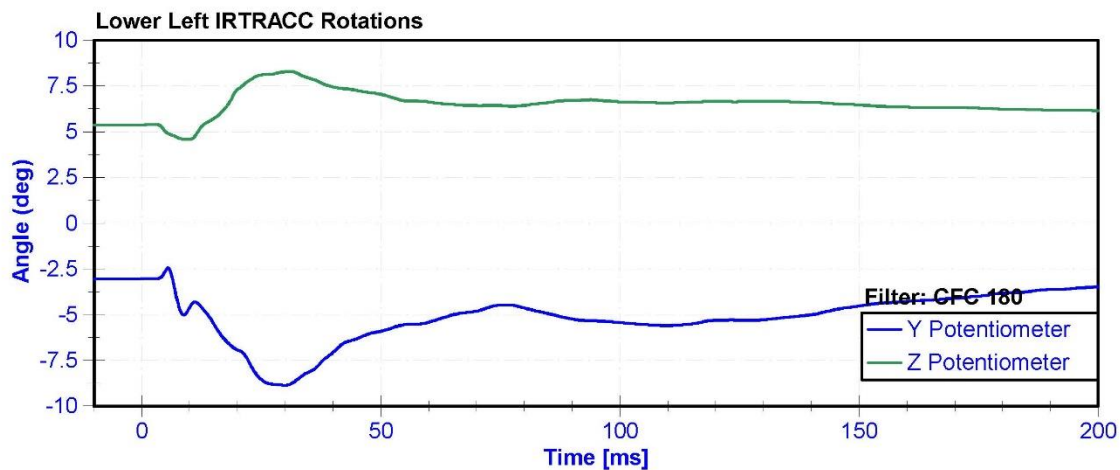
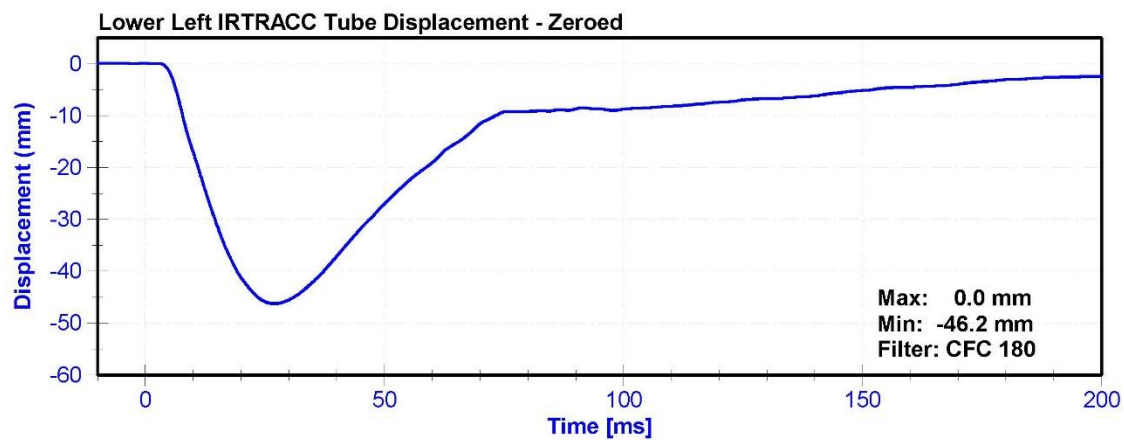
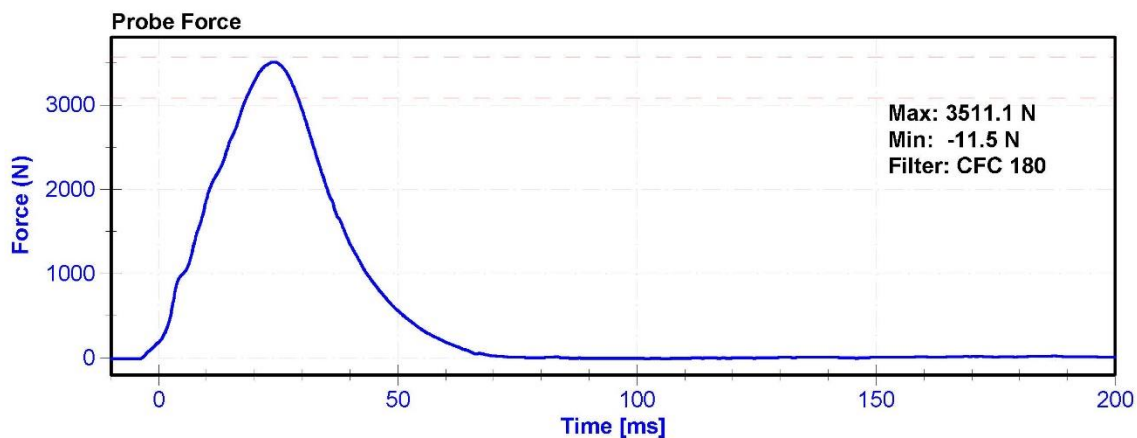
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	17.4	Pass
Impact Velocity	4.25	4.35	m/s	4.311	Pass
Peak Left X Rib Deflection	-54.5	-46.2	mm	-46.28	Pass
Probe Force during Peak Deflection	3083	3571	N	3511.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Lower Left IRTRACC	Humanetics IF-364-C-R3	DS-DS6353	11/10/2015	11/9/2016
Lower Left Y Potentiometer	Humanetics 9945	DS-DM4781	4/7/2015	4/6/2016
Lower Left Z Potentiometer	Humanetics 9945	DS-DS4092	4/7/2015	4/6/2016





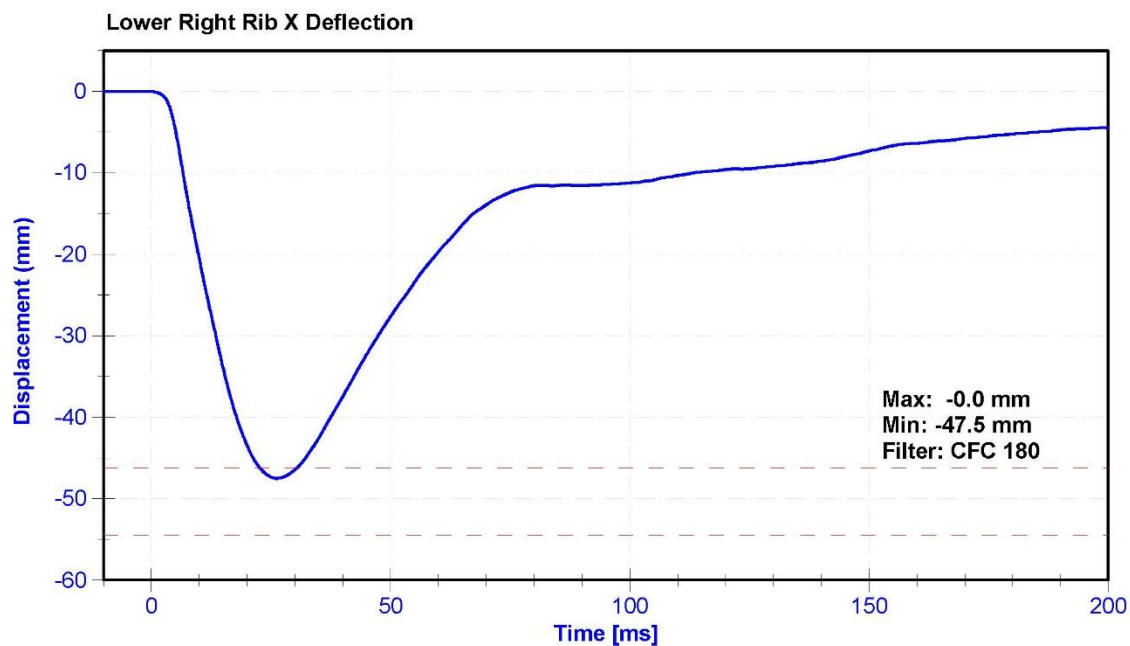
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

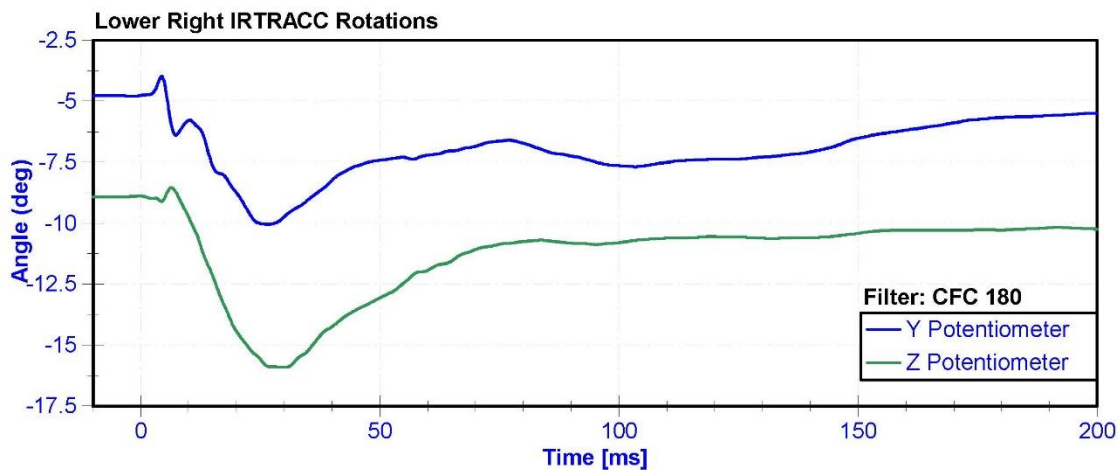
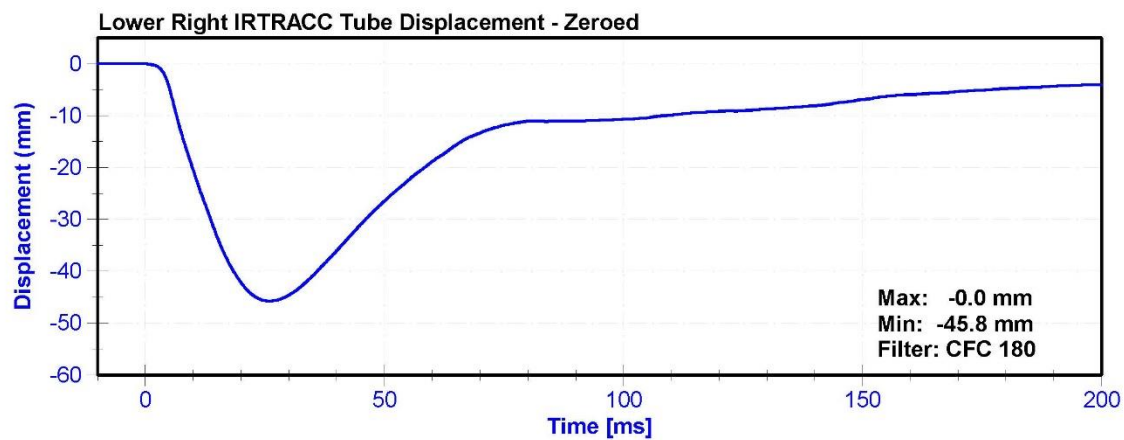
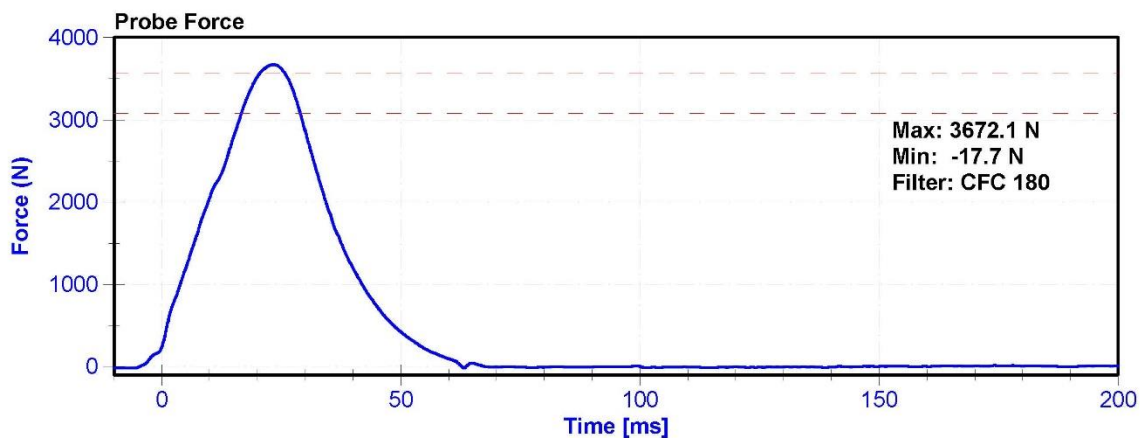
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	17.3	Pass
Impact Velocity	4.25	4.35	m/s	4.314	Pass
Peak Right X Rib Deflection	-54.5	-46.2	mm	-47.51	Pass
Probe Force during Peak Deflection	3083	3571	N	3672.1	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Lower Right IRTRACC	Humanetics IF-364-C-R3	DS-DS6354	11/10/2015	11/9/2016
Lower Right Y Potentiometer	Humanetics 9945	DS-DM4776	4/7/2015	4/6/2016
Lower Right Z Potentiometer	Humanetics 9945	DS-DM4777	4/7/2015	4/6/2016







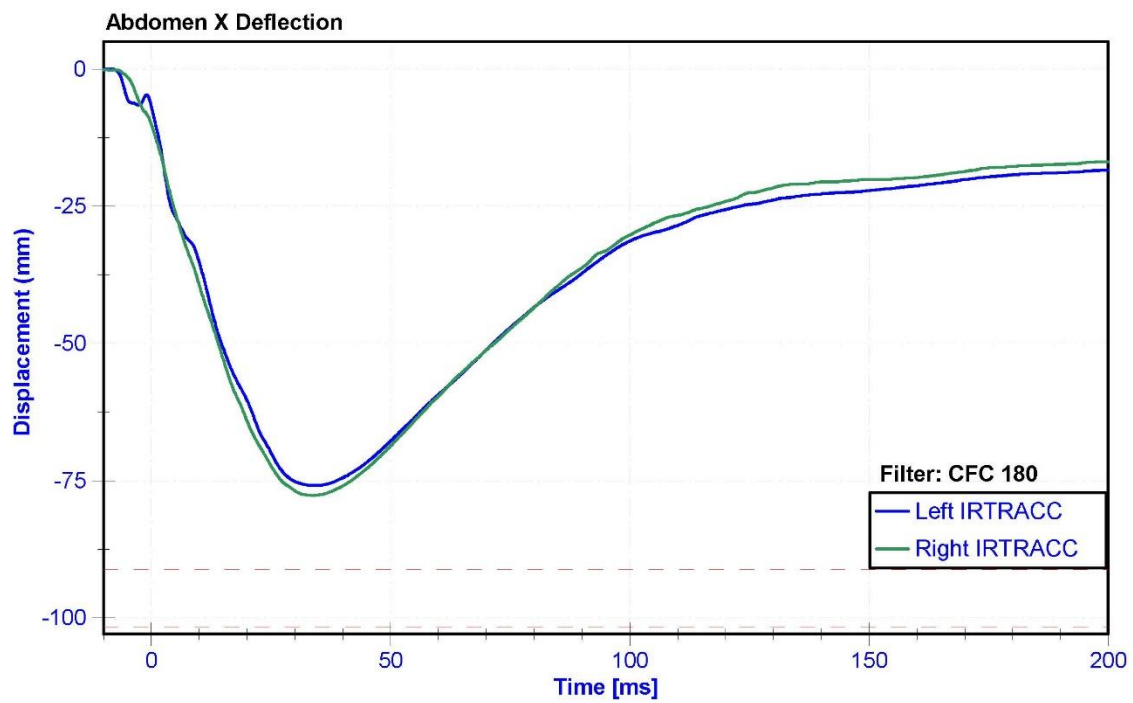
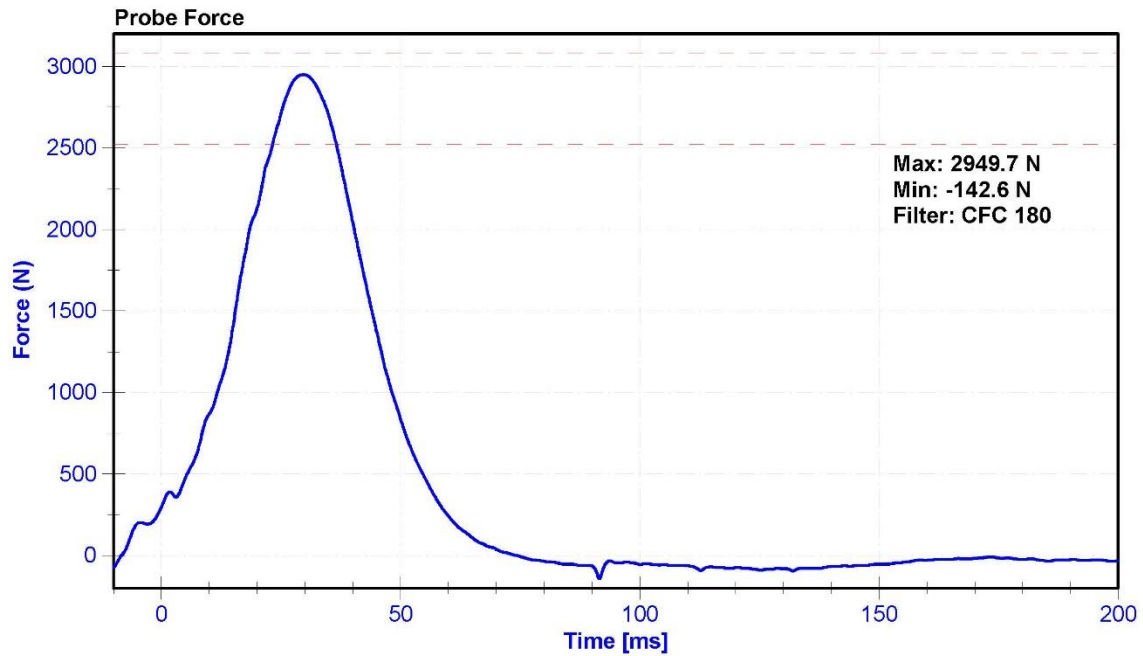
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

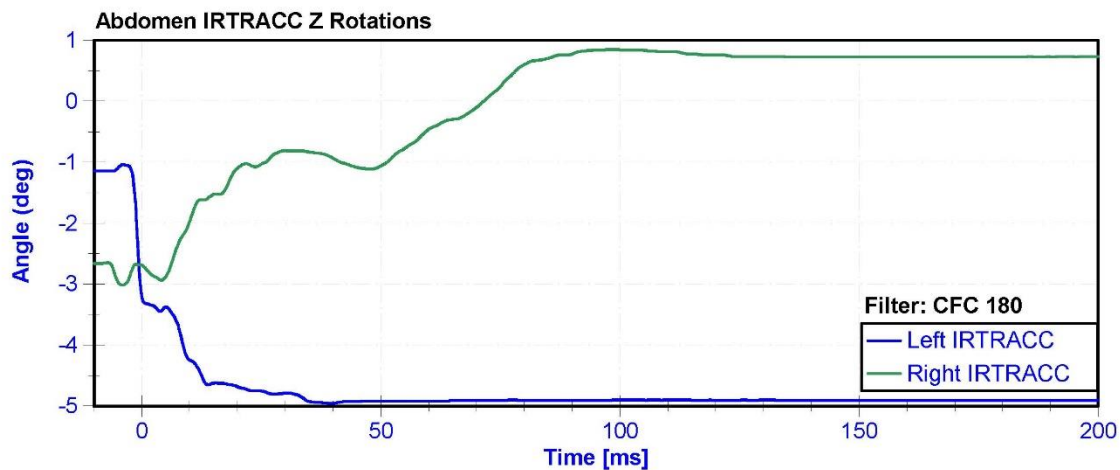
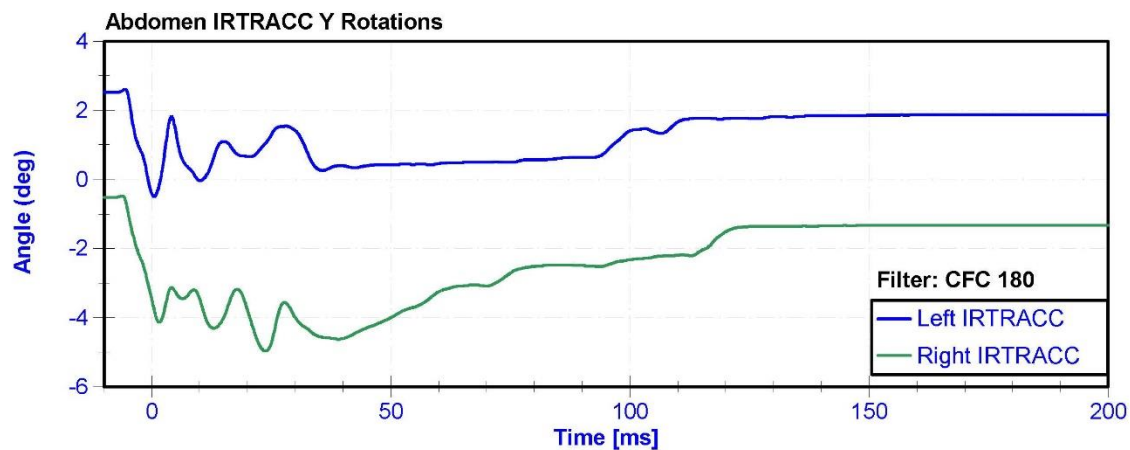
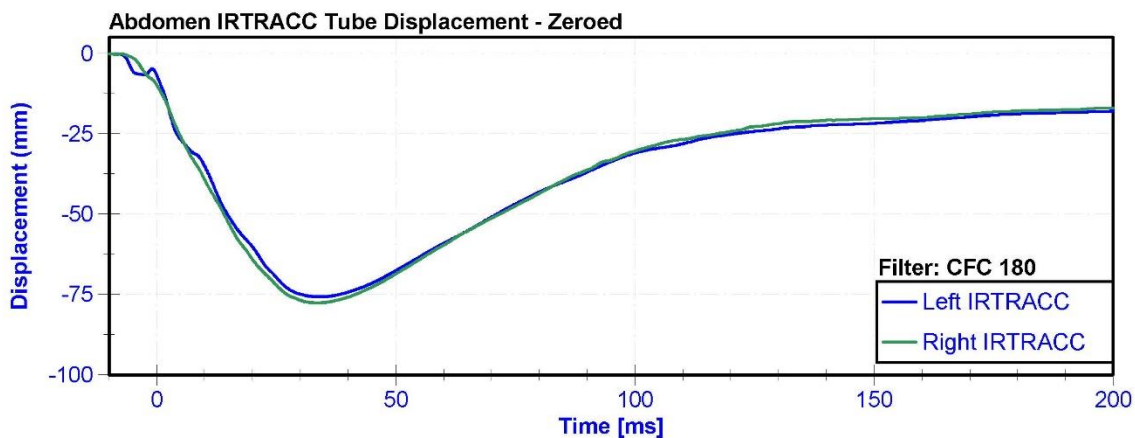
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	17.9	Pass
Impact Velocity	3.25	3.35	m/s	3.315	Pass
Probe Force	2523	3083	N	2949.7	Pass
Left Abdomen X Deflection	-101.6	-91.2	mm	-75.86	Fail
Right Abdomen X Deflection	-101.6	-91.2	mm	-77.68	Fail
Left/Right X Deviation	-7.00	7.00	mm	1.824	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Abdomen Left IRTRACC	Humanetics 9910	DS-DQ2303	4/13/2015	4/12/2016
Abdomen Left Y Potentiometer	Humanetics 9945	DS-DS8363	12/16/2015	12/15/2016
Abdomen Left Z Potentiometer	Humanetics 9945	DS-DS8361	12/16/2015	12/15/2016





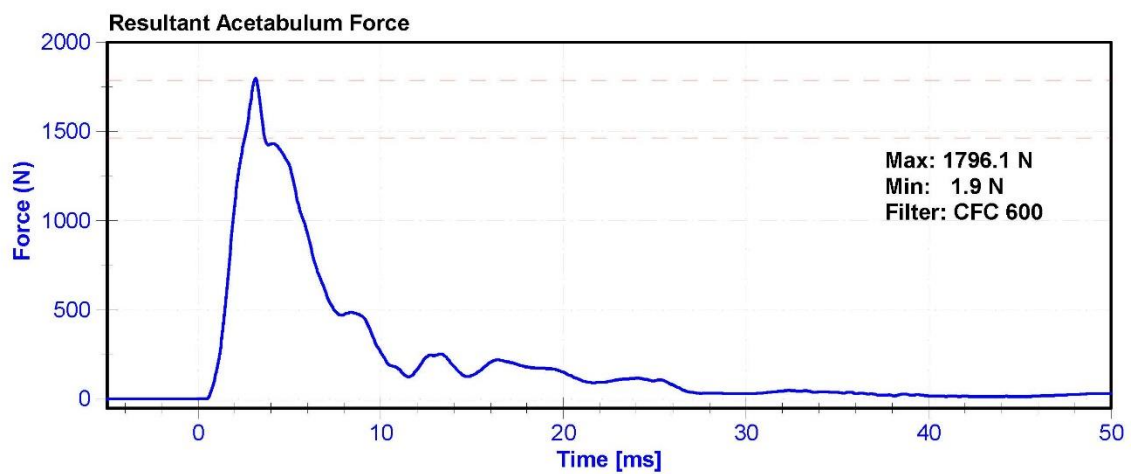
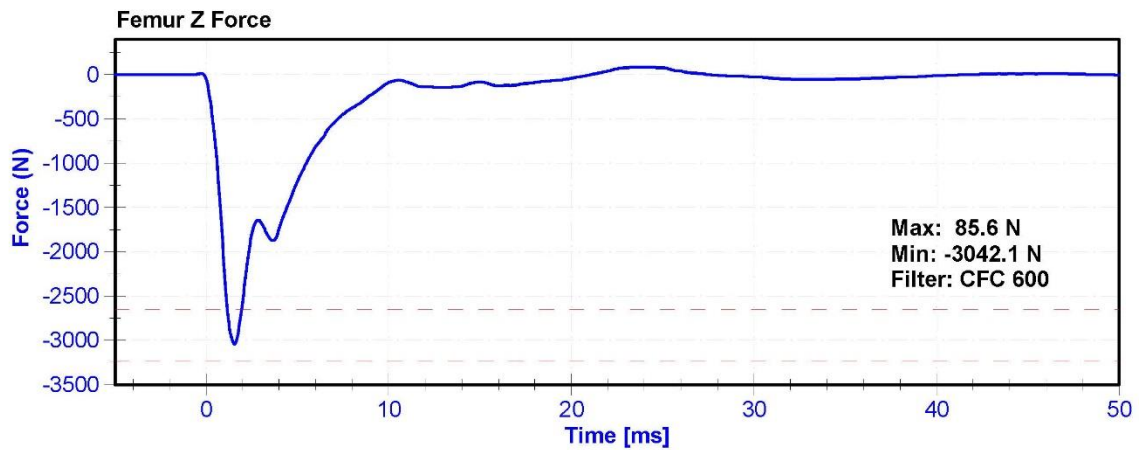
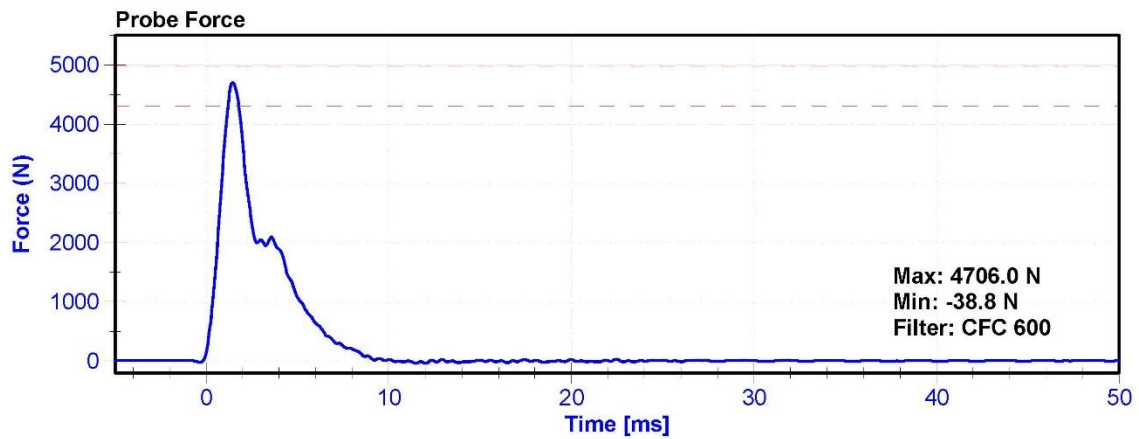
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

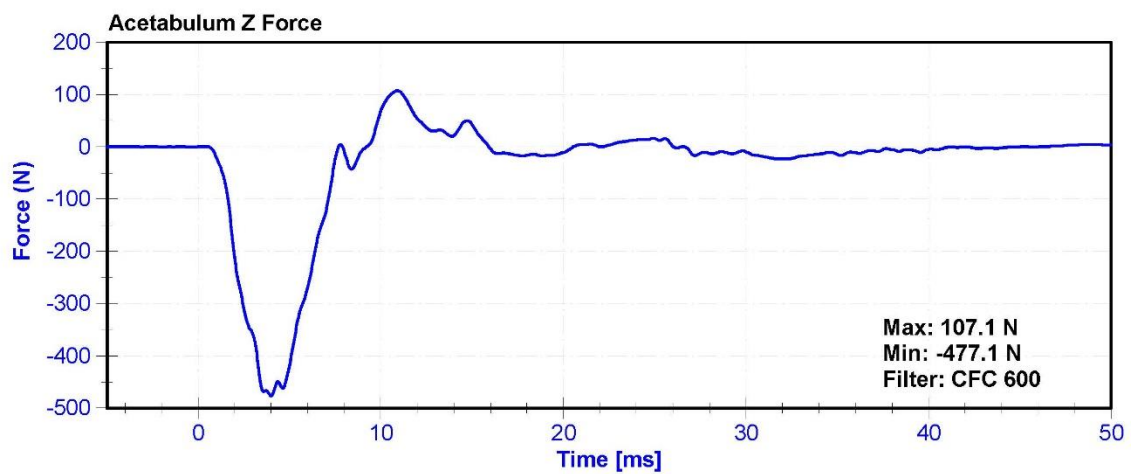
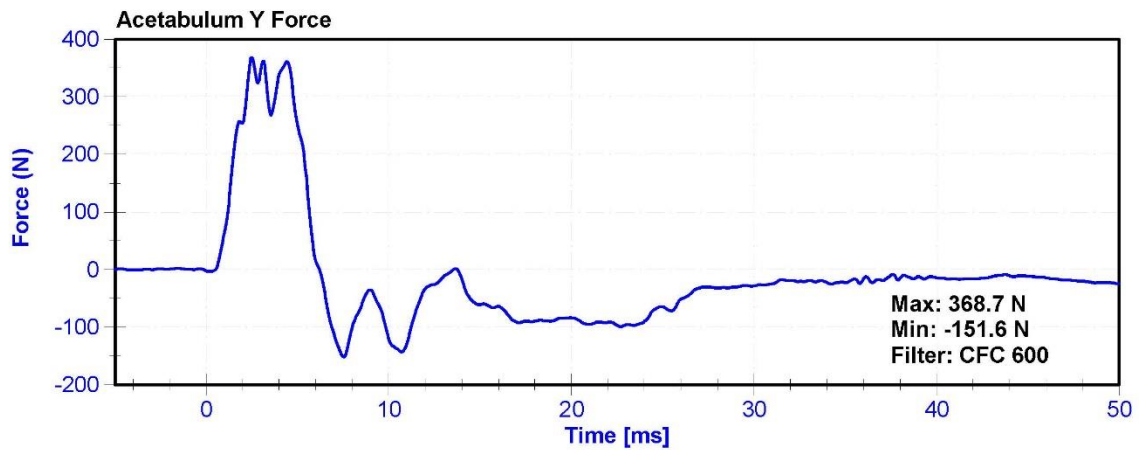
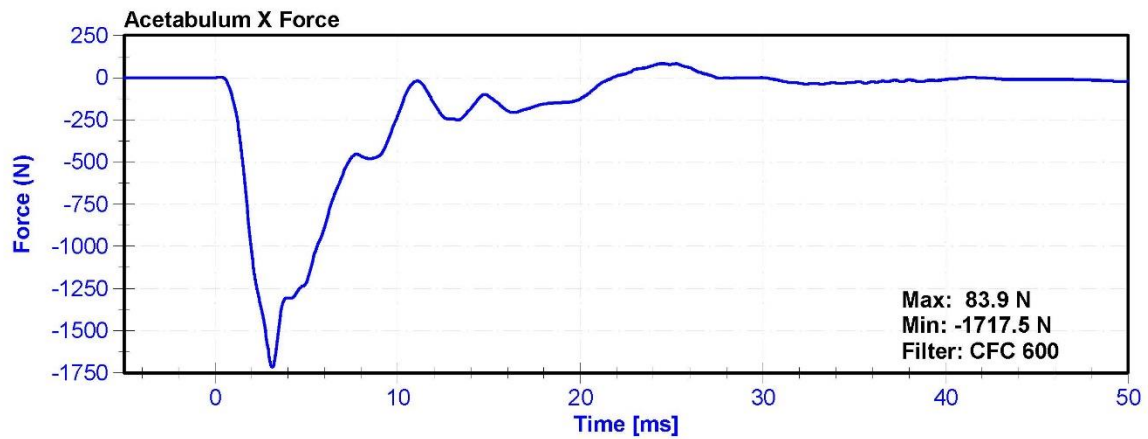
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	15.3	Pass
Impact Velocity	2.55	2.65	m/s	2.592	Pass
Probe Force	4318	4989	N	4706.0	Pass
Peak Femur Z Force	-3241	-2652	N	-3042.13	Pass
Peak Resultant Acetabulum Force	1462	1787	N	1796.09	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Left Femur Load Cell	Denton W50-7101051	LC-DM4975 Fz	2/20/2015	2/20/2016
Left Acetabulum Load Cell	Humanetics 10530JI4	LC-DP4639 Fx	3/6/2015	3/5/2016





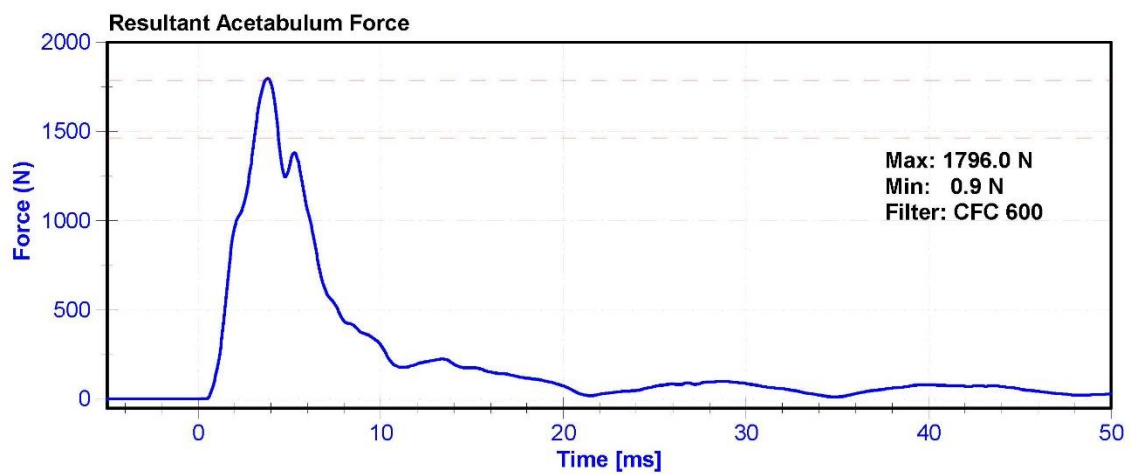
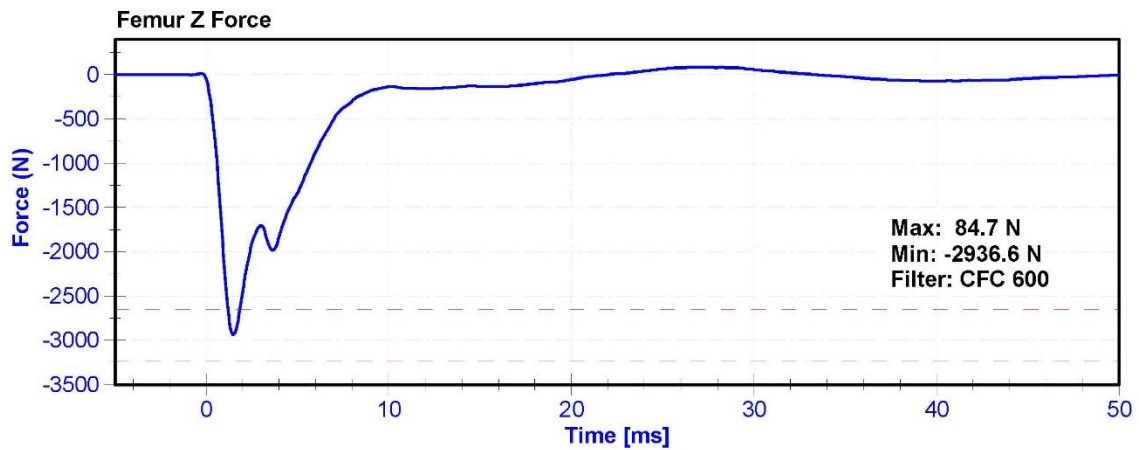
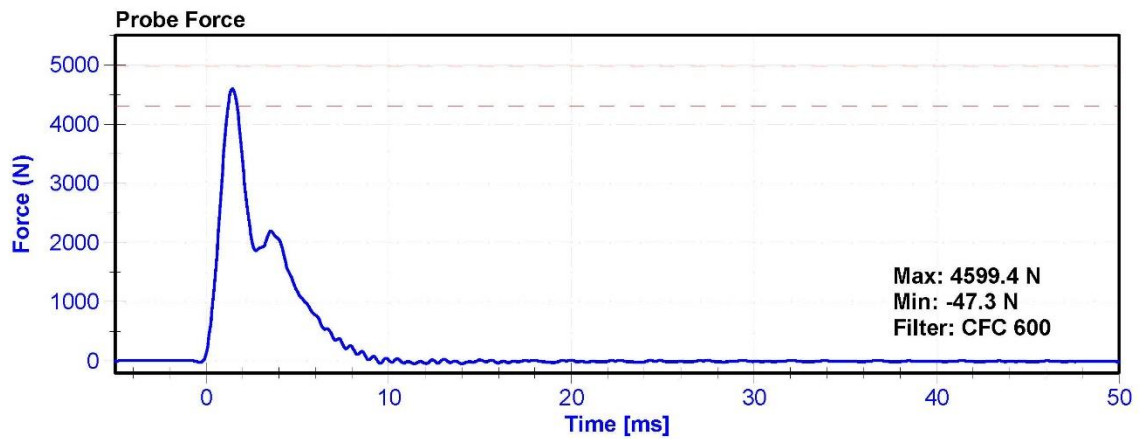
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

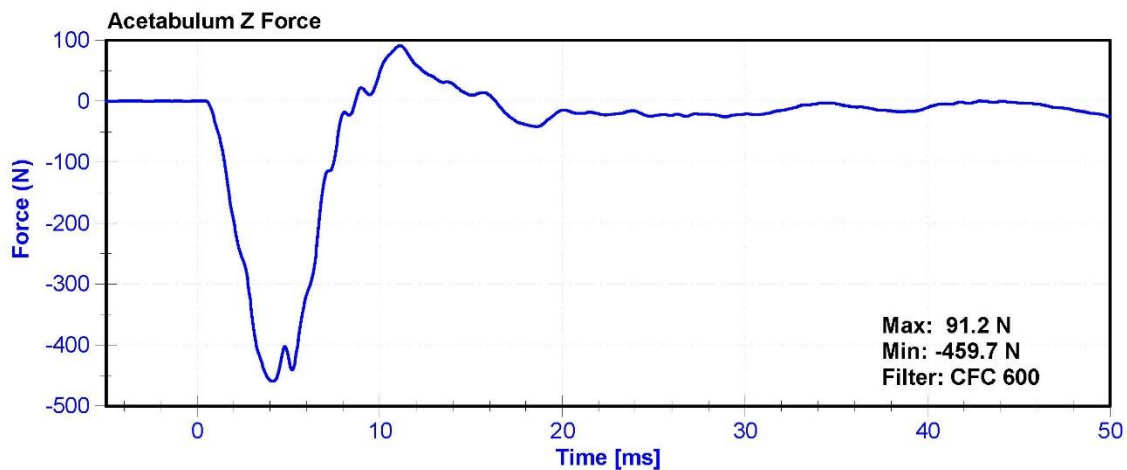
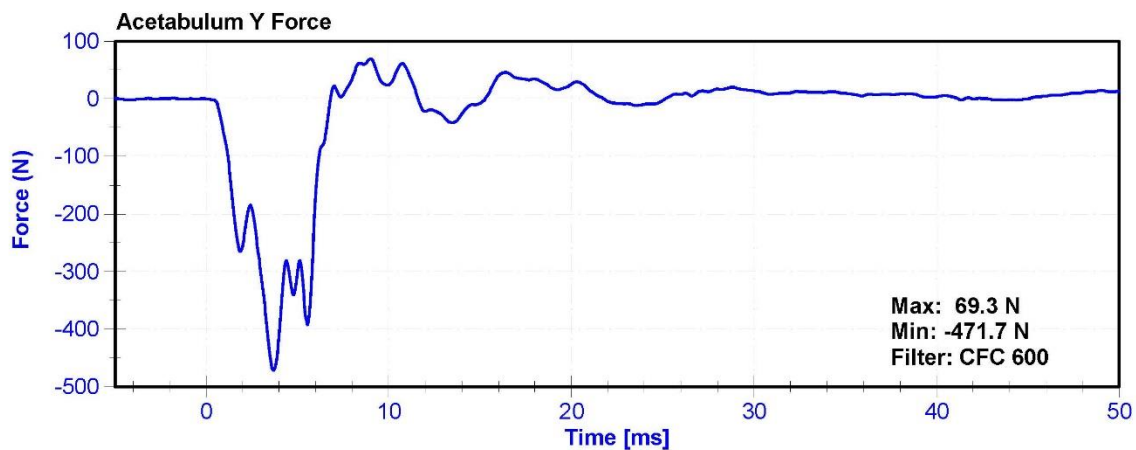
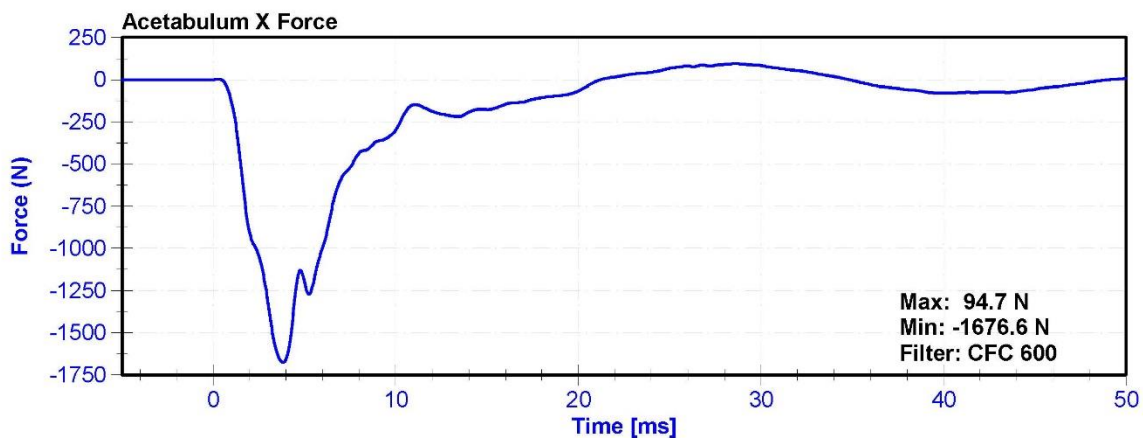
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
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Humidity	10	70	%	15.6	Pass
Impact Velocity	2.55	2.65	m/s	2.579	Pass
Probe Force	4318	4989	N	4599.4	Pass
Peak Femur Z Force	-3241	-2652	N	-2936.62	Pass
Peak Resultant Acetabulum Force	1462	1787	N	1795.97	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Right Femur Load Cell	Denton W50-7101051	LC-DM4976 Fz	2/23/2015	2/23/2016
Right Acetabulum Load Cell	Humanetics 10670JI4	LC-DP3835 Fx	3/7/2015	3/6/2016







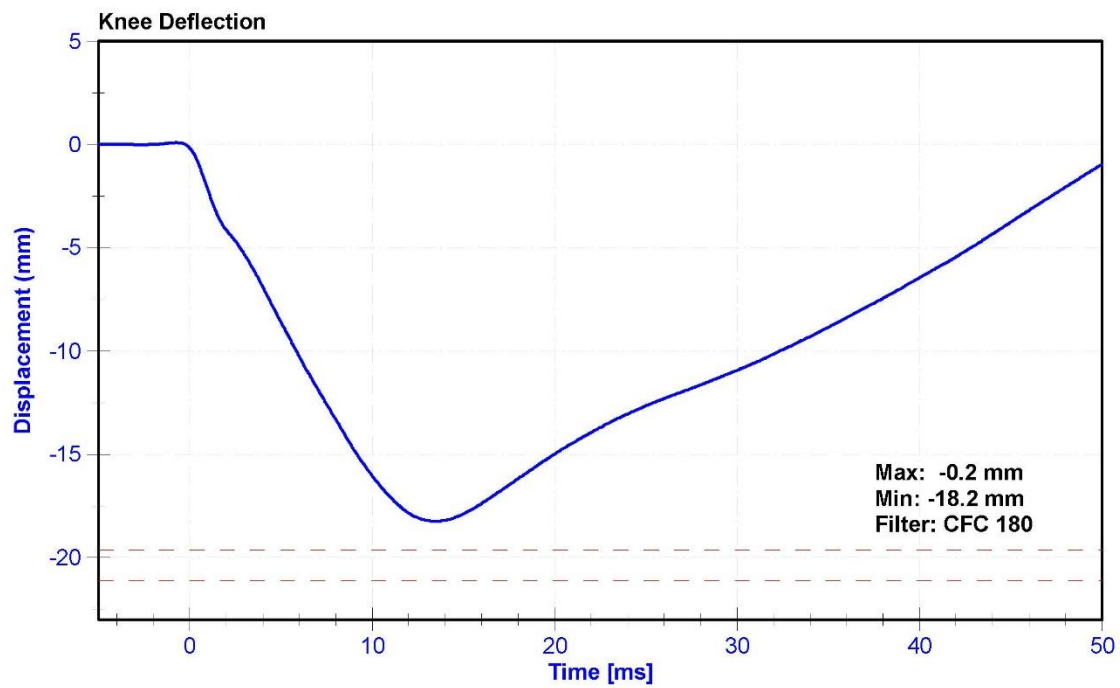
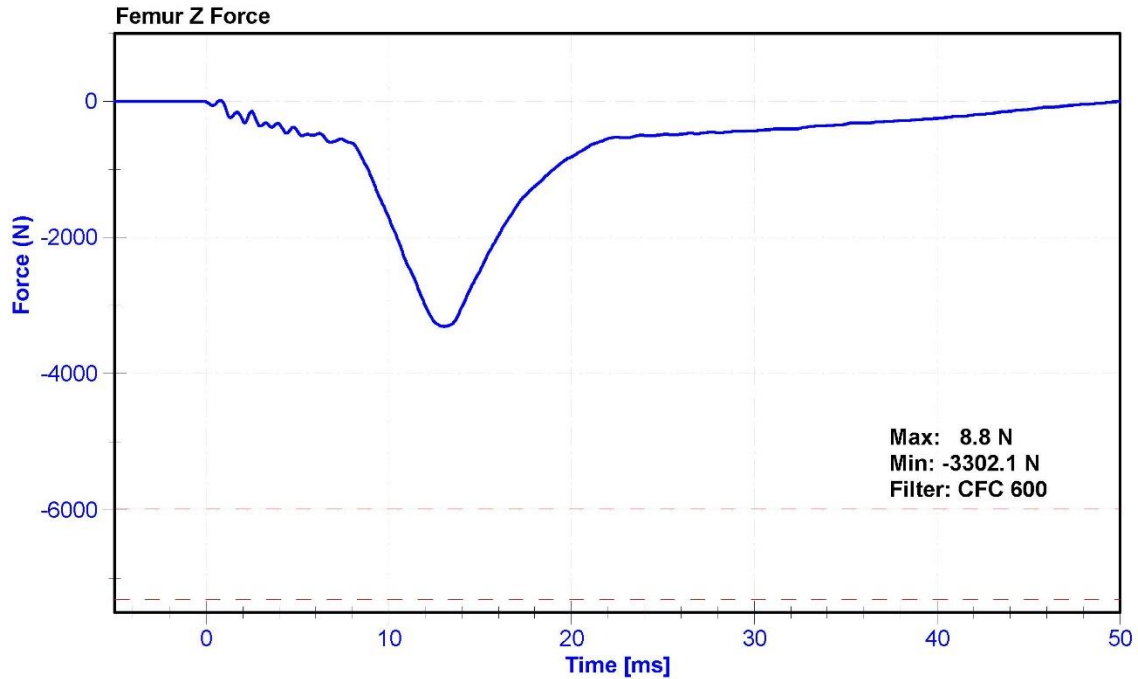
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	16.4	Pass
Impact Velocity	2.15	2.25	m/s	2.223	Pass
Peak Femur Z Force	-7317	-5987	N	-3302.1	Fail
Knee Deflection at Peak Force	-21.12	-19.62	mm	-18.24	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Femur Load Cell	Denton W50-7101051	LC-DM4975 Fz	2/20/2015	2/20/2016
Knee Potentiometer	Space Age 150-0121V	DS-C2102639B	2/17/2015	2/17/2016



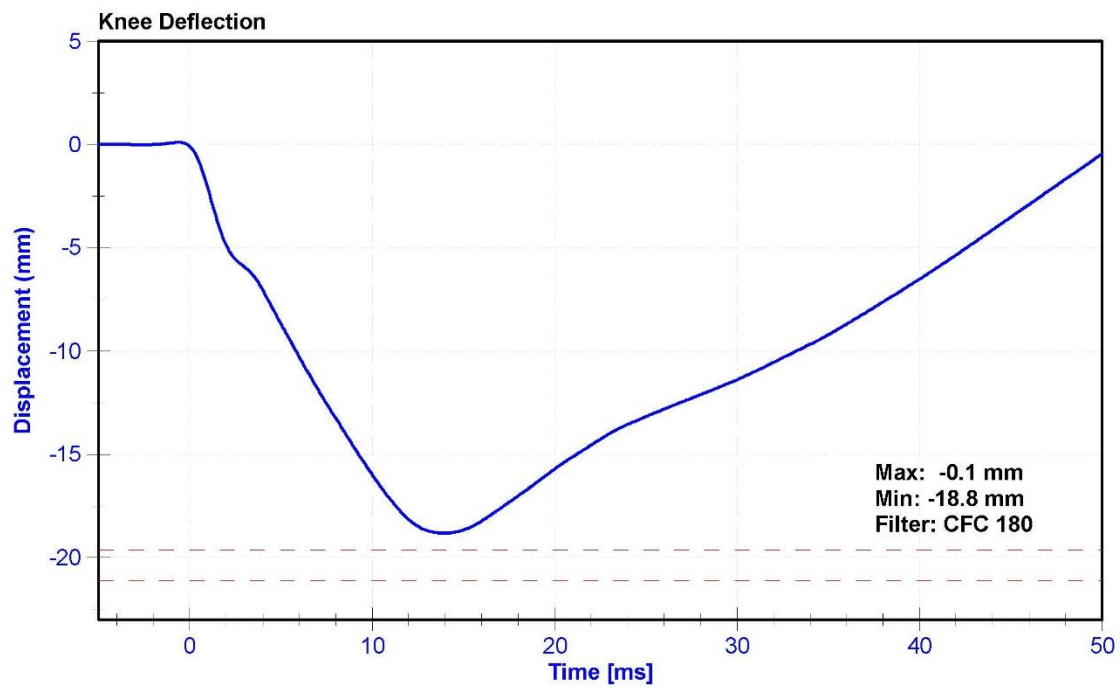
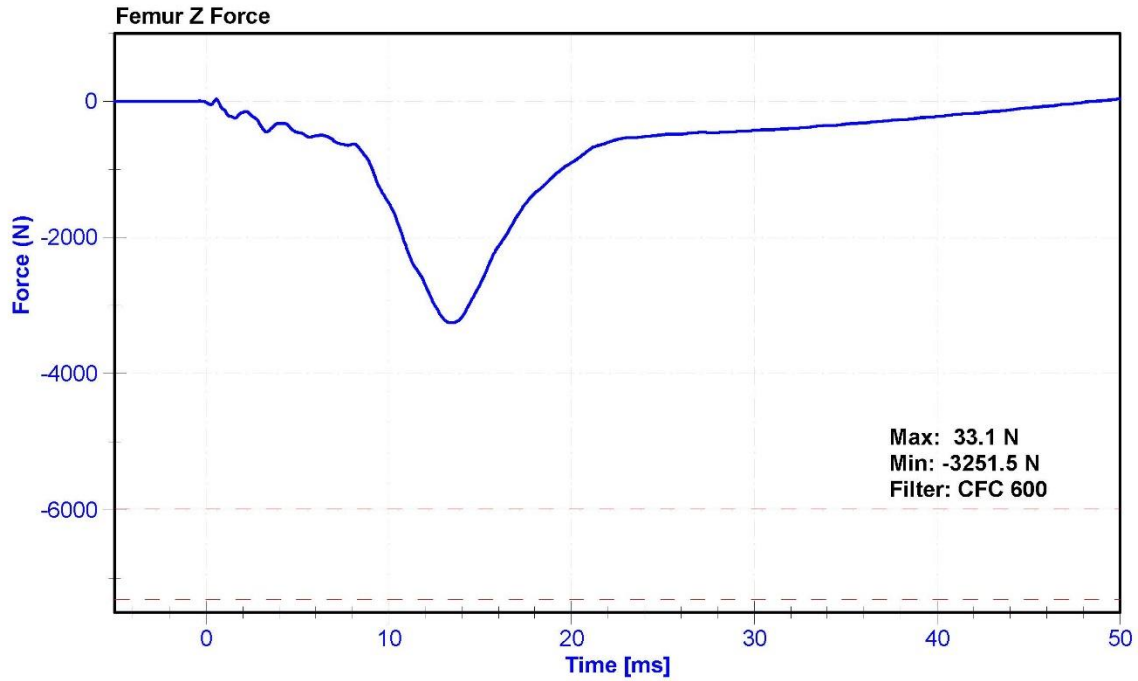
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	16.4	Pass
Impact Velocity	2.15	2.25	m/s	2.190	Pass
Peak Femur Z Force	-7317	-5987	N	-3251.5	Fail
Knee Deflection at Peak Force	-21.12	-19.62	mm	-18.82	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Femur Load Cell	Denton W50-7101051	LC-DM4976 Fz	2/23/2015	2/23/2016
Knee Potentiometer	Space Age 150-0121VL	DS-021033	3/18/2015	3/17/2016





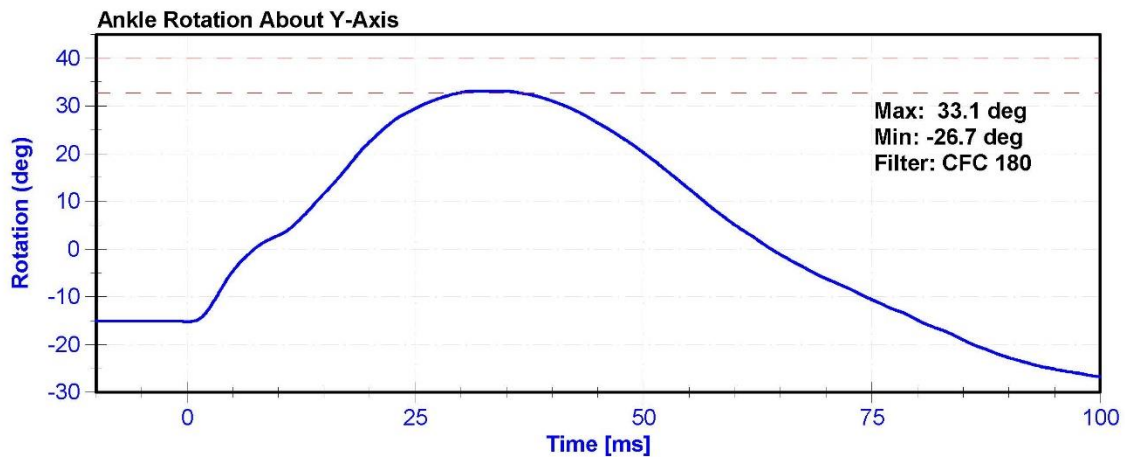
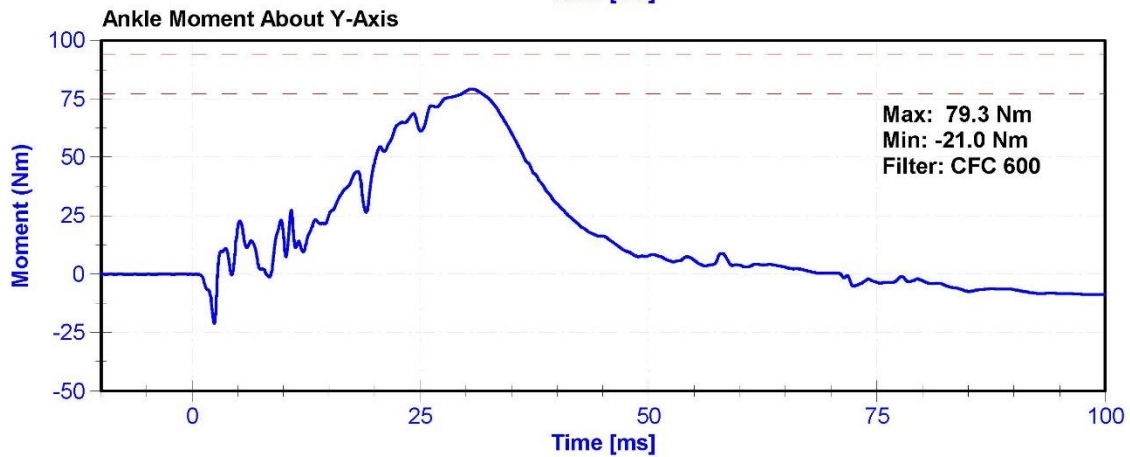
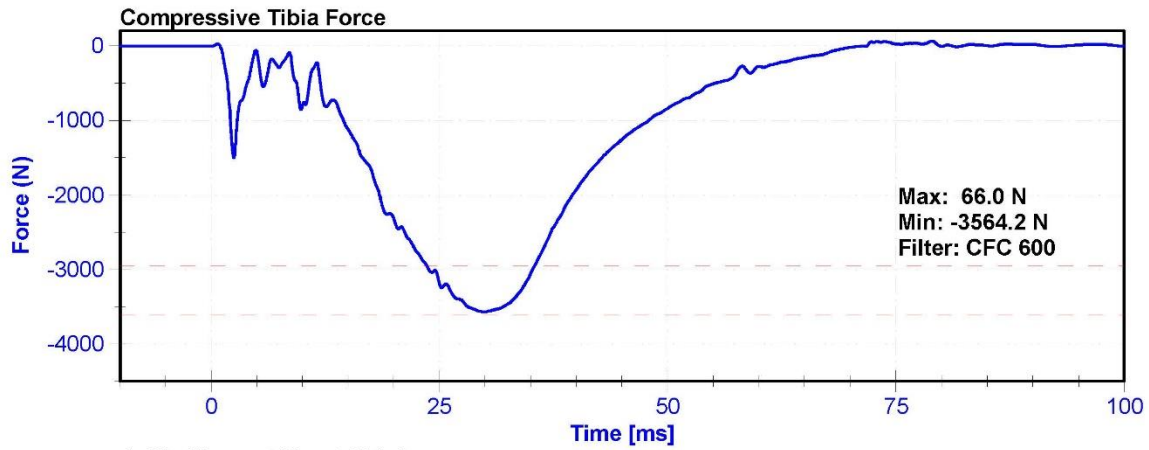
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	44.9	Pass
Velocity	4.9	5.1	m/s	4.948	Pass
Lower Tibia Compressive Force	-3613	-2956	N	-3564.2	Pass
Peak Moment about Y-Axis	77.1	94.2	Nm	79.35	Pass
Peak Rotation about Y-Axis	32.7	39.9	deg	33.08	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-121 Fz	2/10/2015	2/10/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0524	2/18/2015	2/18/2016



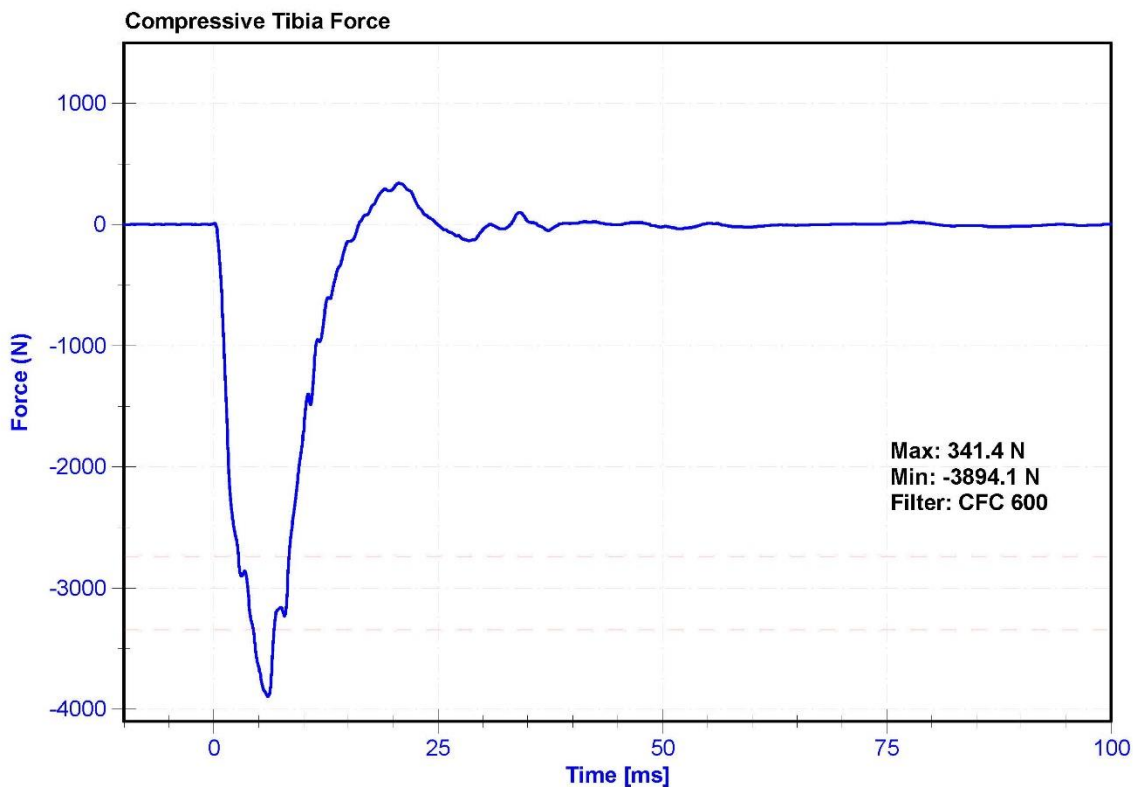
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21	Pass
Humidity	10	70	%	43.2	Pass
Velocity	3.9	4.1	m/s	4.053	Pass
Lower Tibia Compressive Force	-3346	-2738	N	-3894.1	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-121 Fz	2/10/2015	2/10/2016





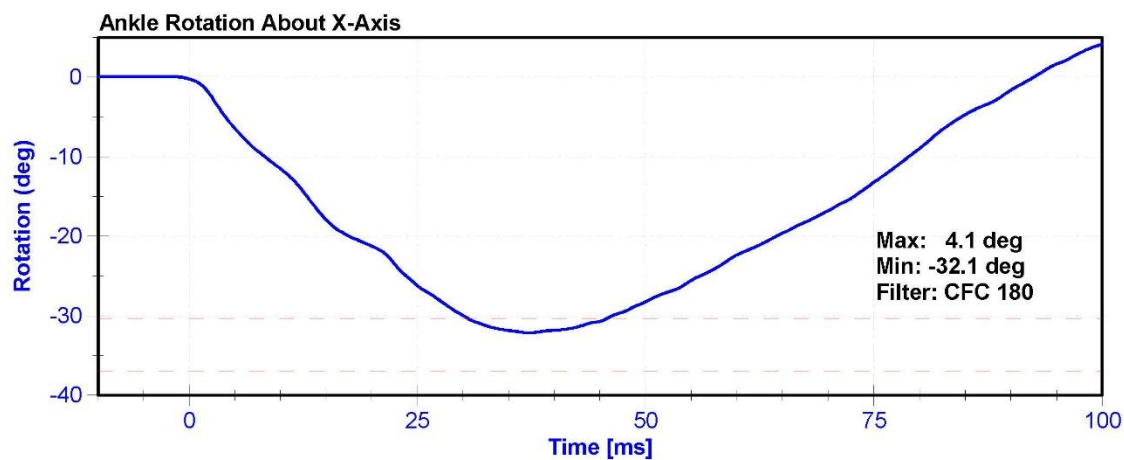
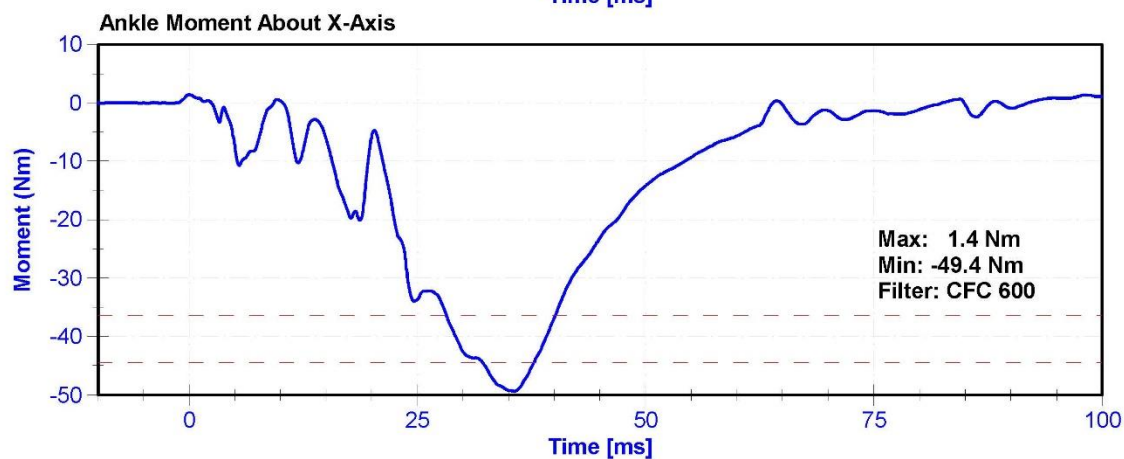
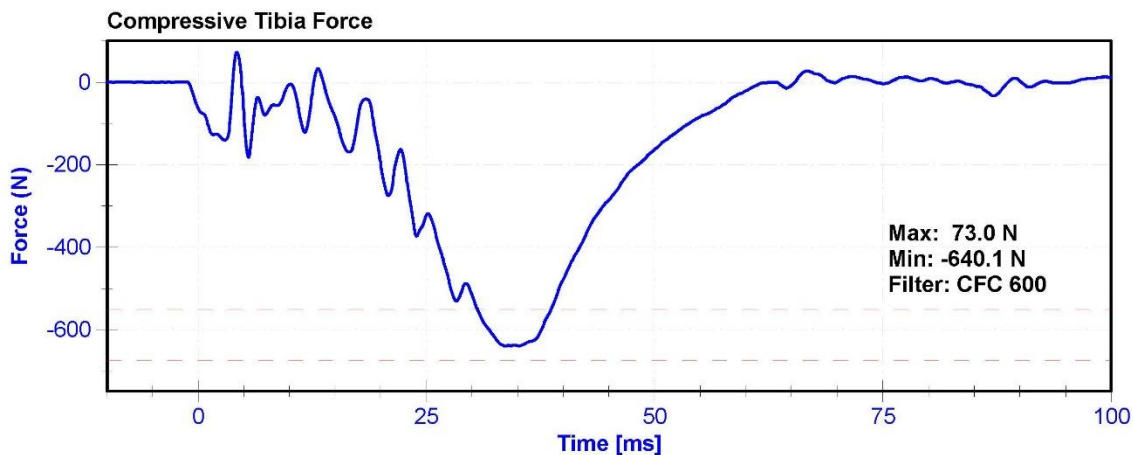
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	45.5	Pass
Velocity	1.9	2.1	m/s	2.016	Pass
Lower Tibia Compressive Force	-675	-552	N	-640.1	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-49.36	Fail
Peak Rotation about X-Axis	-37.0	-30.3	deg	-32.11	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-121 Fz	2/10/2015	2/10/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0525	2/18/2015	2/18/2016



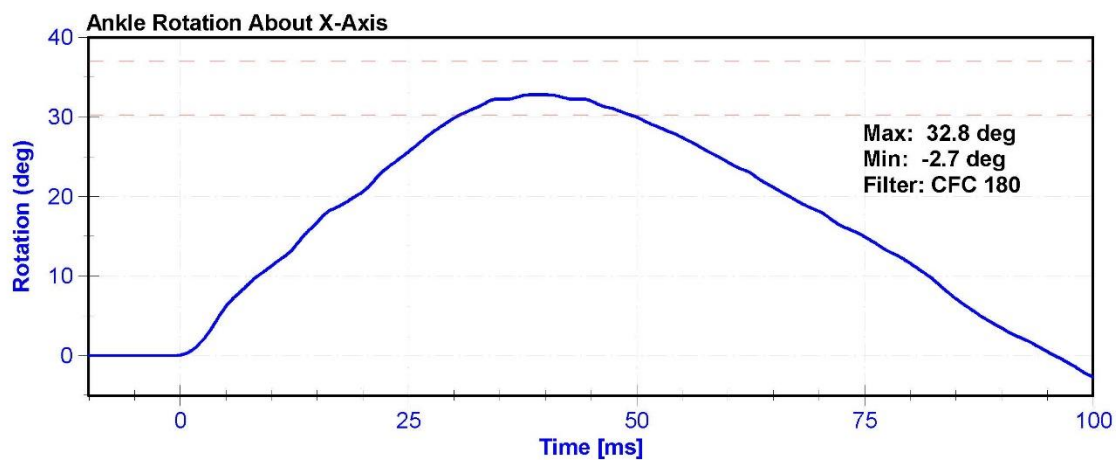
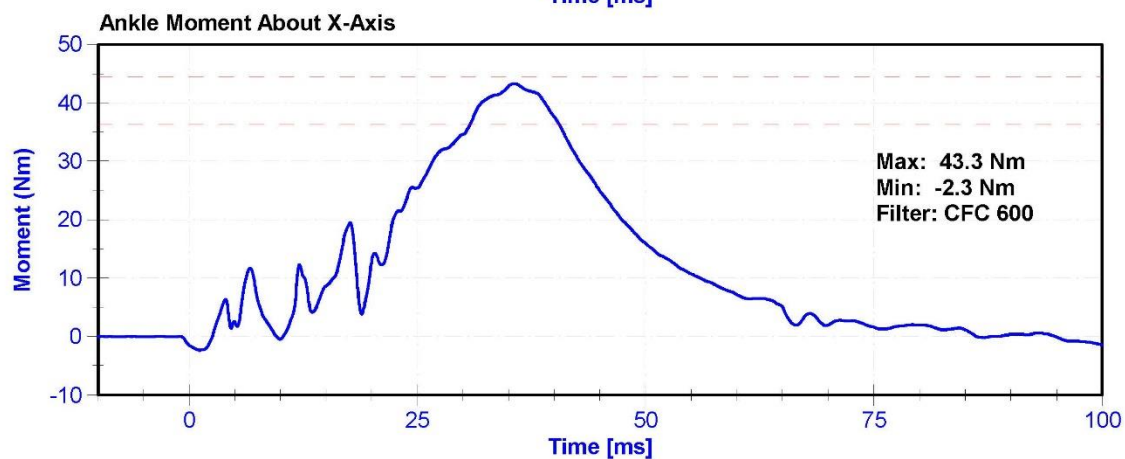
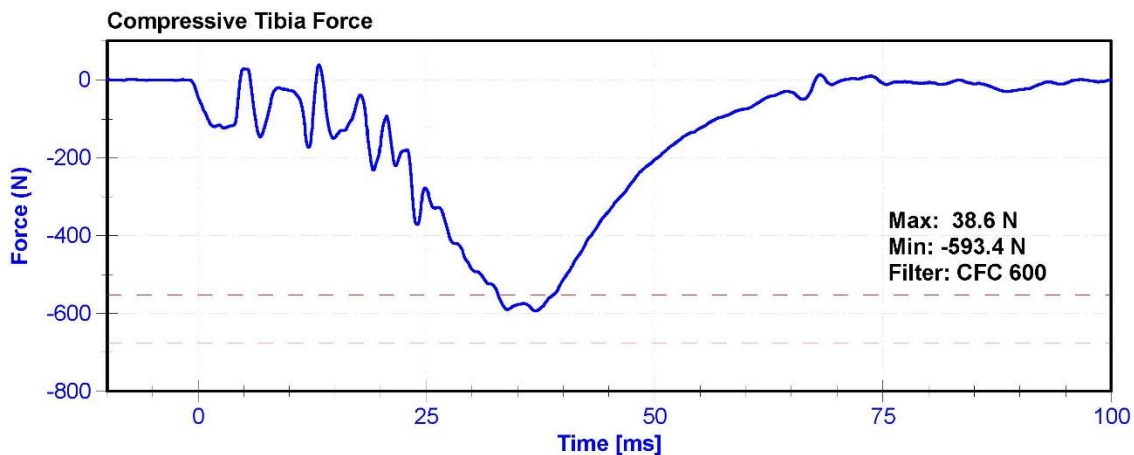
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	45.7	Pass
Velocity	1.9	2.1	m/s	2.016	Pass
Lower Tibia Compressive Force	-675	-552	N	-593.4	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	43.27	Pass
Peak Rotation about X-Axis	30.3	37.0	deg	32.78	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-121 Fz	2/10/2015	2/10/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0525	2/18/2015	2/18/2016





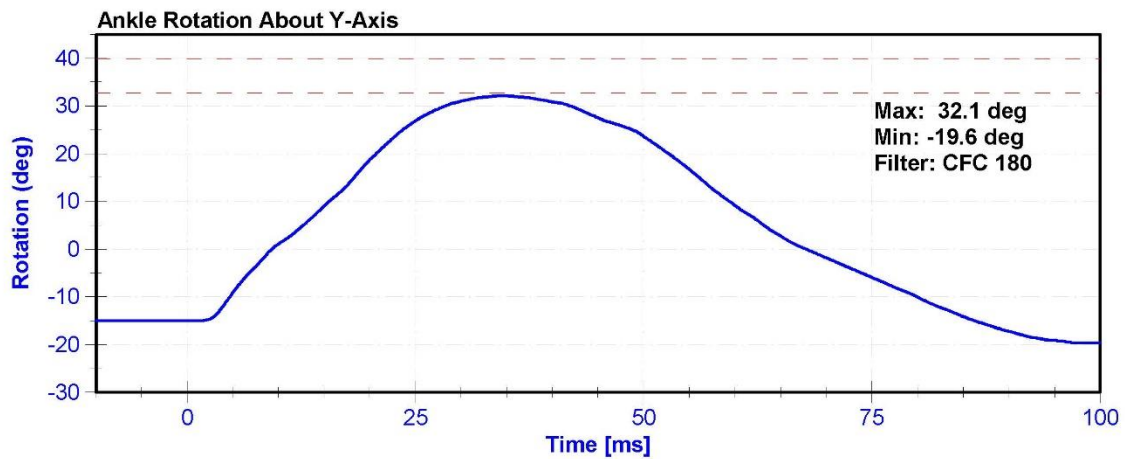
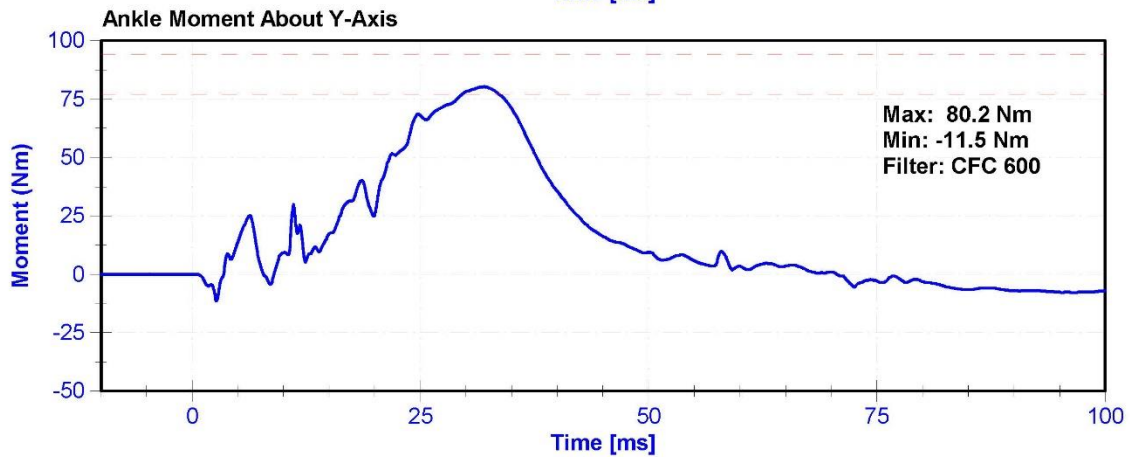
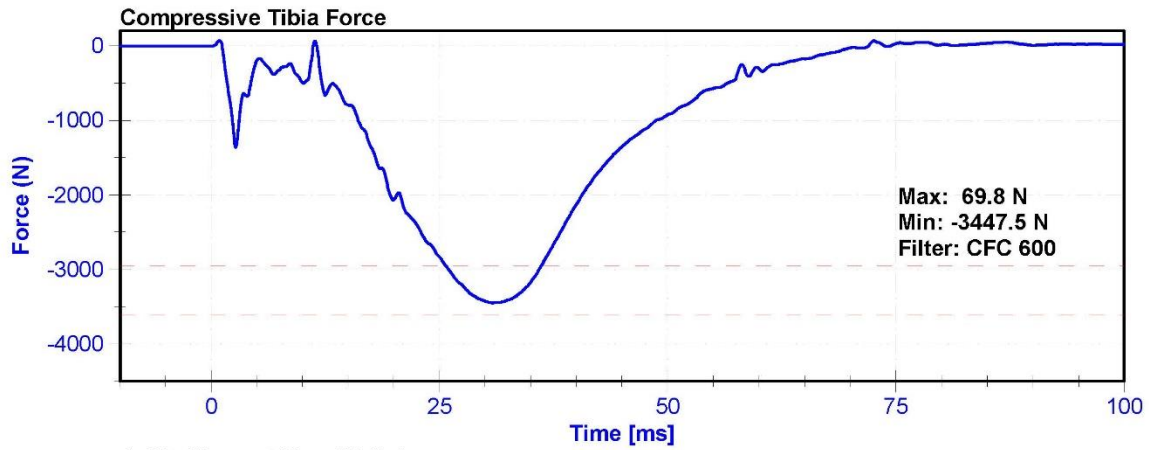
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	48.7	Pass
Velocity	4.9	5.1	m/s	4.916	Pass
Lower Tibia Compressive Force	-3613	-2956	N	-3447.5	Pass
Peak Moment about Y-Axis	77.1	94.2	Nm	80.21	Pass
Peak Rotation about Y-Axis	32.7	39.9	deg	32.14	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-166 Fz	2/9/2015	2/9/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0526	2/19/2015	2/19/2016



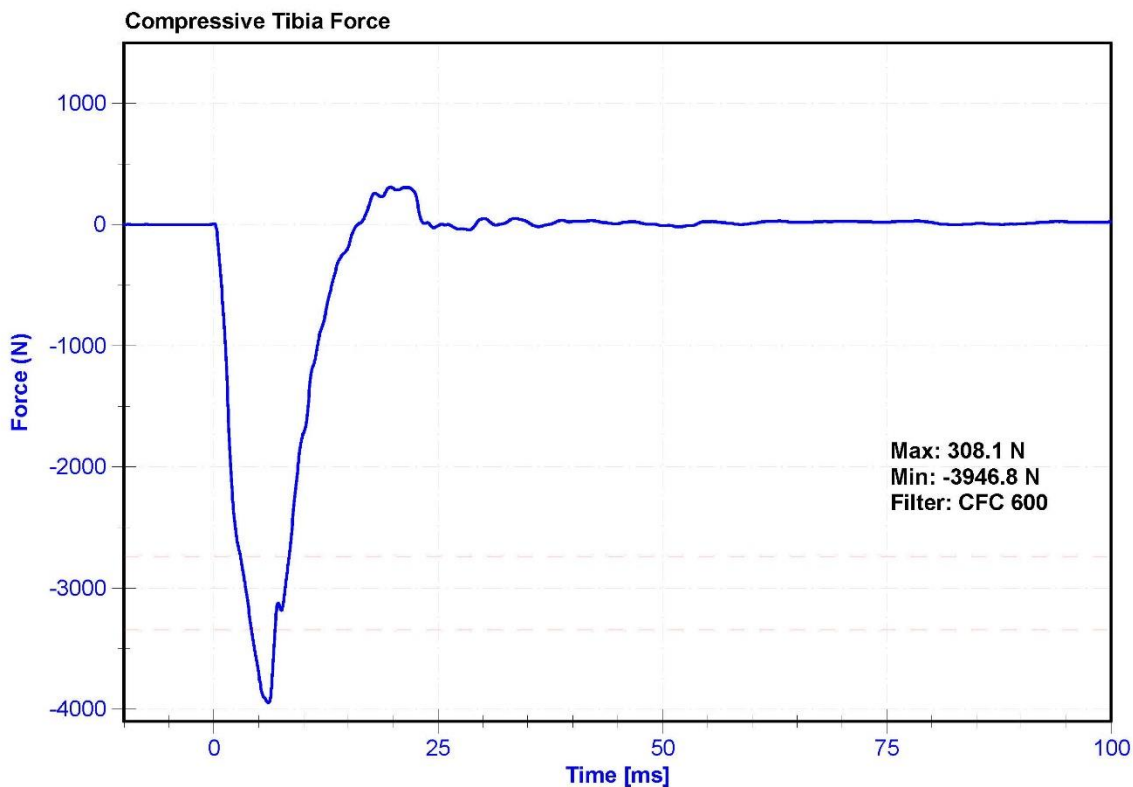
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	48.3	Pass
Velocity	3.9	4.1	m/s	4.032	Pass
Lower Tibia Compressive Force	-3346	-2738	N	-3946.8	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-166 Fz	2/9/2015	2/9/2016



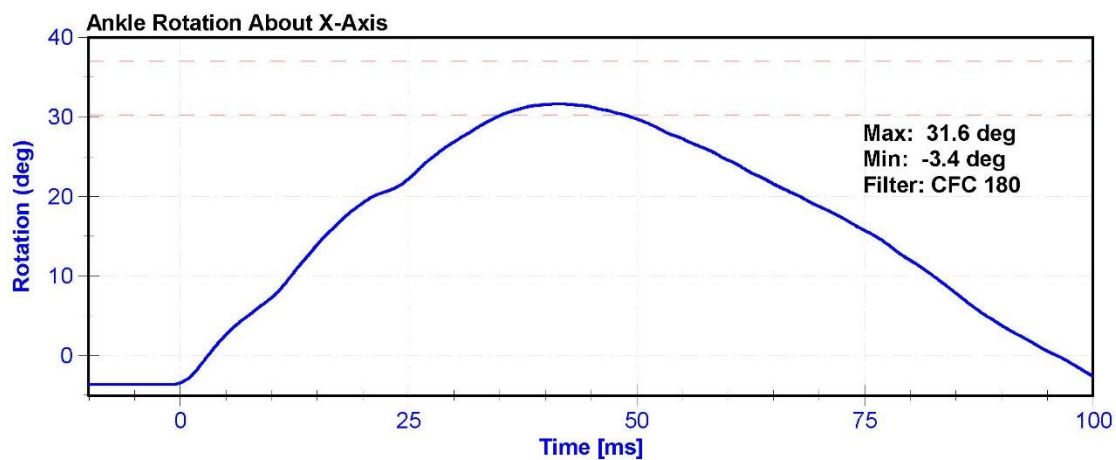
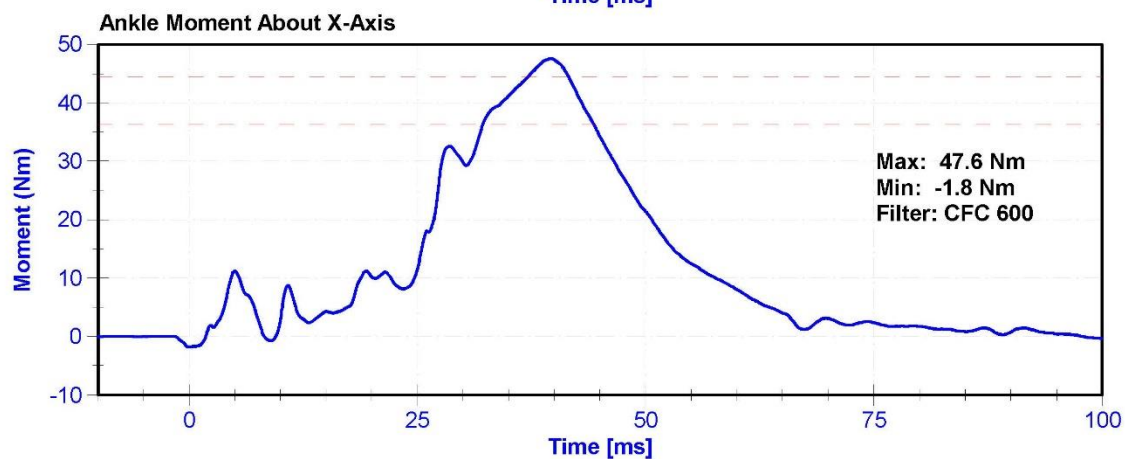
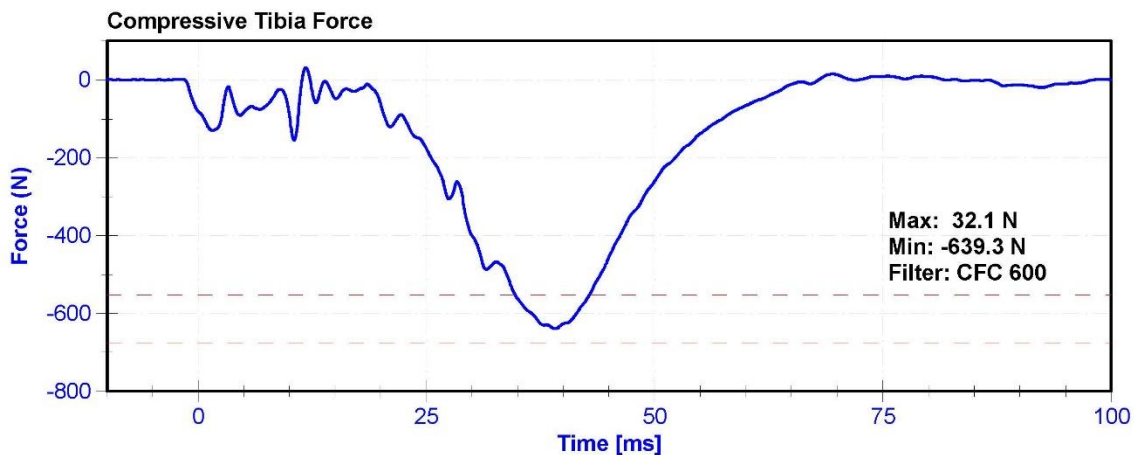
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	51.0	Pass
Velocity	1.9	2.1	m/s	1.949	Pass
Lower Tibia Compressive Force	-675	-552	N	-639.3	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	47.58	Fail
Peak Rotation about X-Axis	30.3	37.0	deg	31.61	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-166 Fz	2/9/2015	2/9/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0528	2/19/2015	2/19/2016





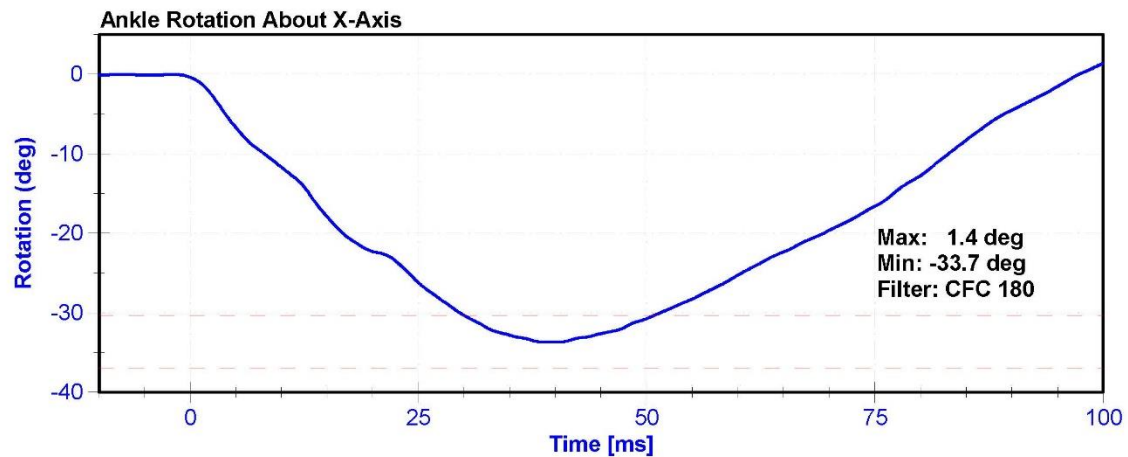
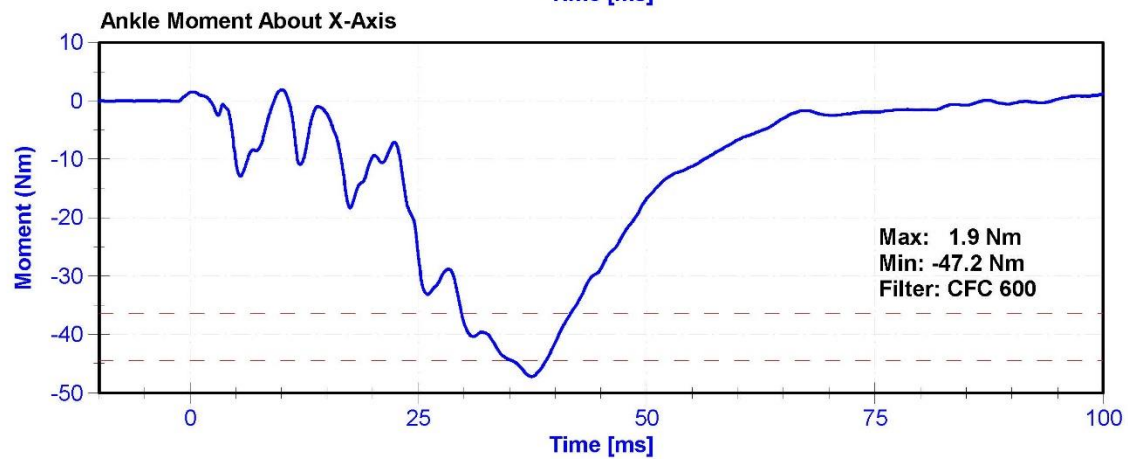
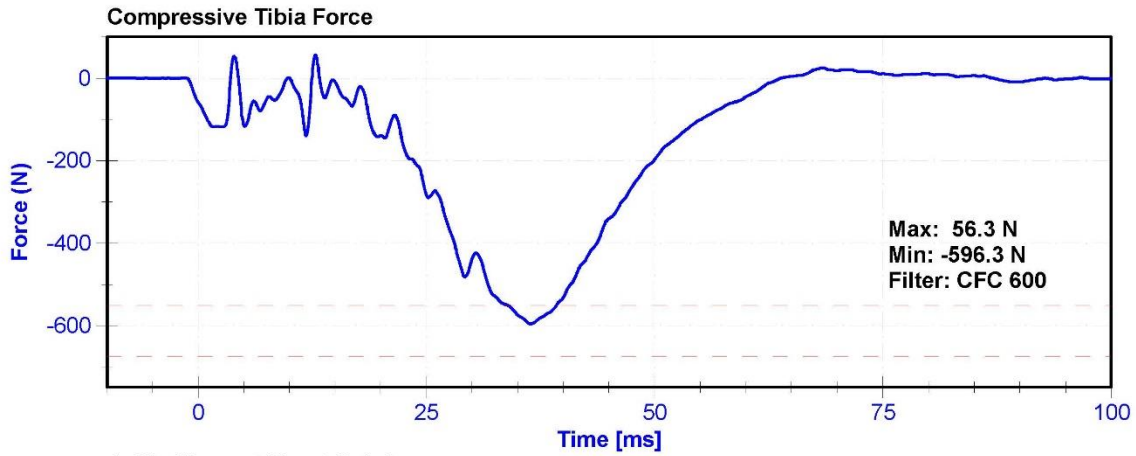
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	51.6	Pass
Velocity	1.9	2.1	m/s	1.944	Pass
Lower Tibia Compressive Force	-675	-552	N	-596.3	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-47.18	Fail
Peak Rotation about X-Axis	-37.0	-30.3	deg	-33.66	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-166 Fz	2/9/2015	2/9/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0528	2/19/2015	2/19/2016



Hybrid III 5th Female 019 DUMMY CALIBRATIONS

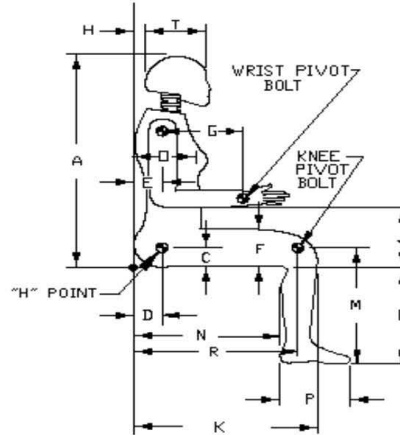
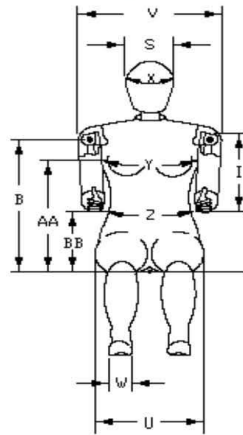


External Measurements - Hybrid 3 - 5th Female

Technician: M.Hartung

Date: 1/6/2016

Dummy Serial Number: 19



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	778	Pass
B	Shoulder Pivot Height	432	457	446	Pass
C	H-Point Height	81	86	85	Pass
D	H-Point from Backline	145	150	147	Pass
E	Shoulder Pivot from Backline	69	84	74	Pass
F	Thigh Clearance	119	135	133	Pass
G	Back of Elbow to Wrist Pivot	244	259	250	Pass
H	Head Back to Backline	43	48	45	Pass
I	Shoulder to Elbow Length	277	297	282	Pass
J	Elbow Rest Height	183	203	190	Pass
K	Buttock to Knee Length	521	546	539	Pass
L	Popliteal Height	356	376	361	Pass
M	Knee Pivot Height	394	419	400	Pass
N	Buttock Popliteal Length	414	439	427	Pass
O	Chest Depth without Jacket	175	191	182	Pass
P	Foot Length (right)	219	234	227	Pass
R	Buttock To Knee Pivot Length	457	483	473	Pass
S	Head Breadth	137	147	145	Pass
T	Head Depth	178	188	180	Pass
U	Hip Breadth	300	315	311	Pass
V	Shoulder Breadth	351	366	360	Pass
W	Foot Breadth	79	94	82	Pass
X	Head Circumference	528	549	530	Pass
Y	Chest Circumference with Jacket	851	881	872	Pass
Z	Waist Circumference	460	790	768	Pass
AA	Reference Location (Chest Circumference)	333	358	338	Pass
BB	Reference Location (Waist Circumference)	160	170	166	Pass

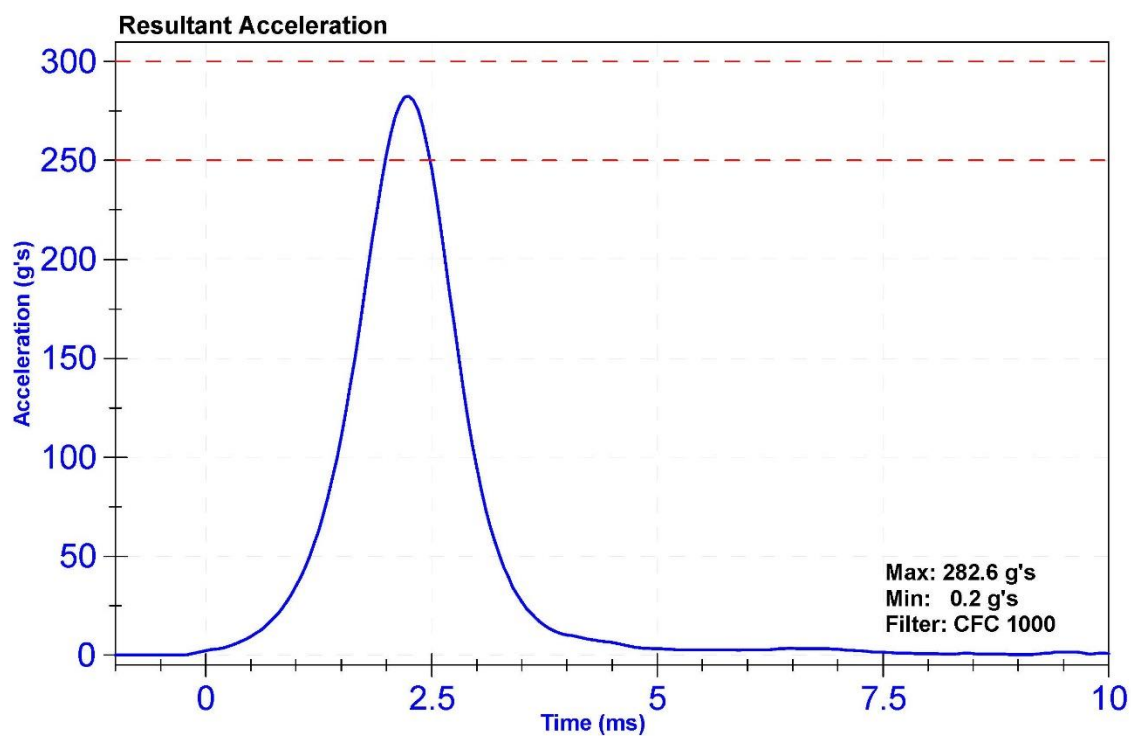
ATD Manufacturer	ATSC	Test Technician	M.Hartung
ATD Serial Number	019	Laboratory Supervisor	M.Goehle

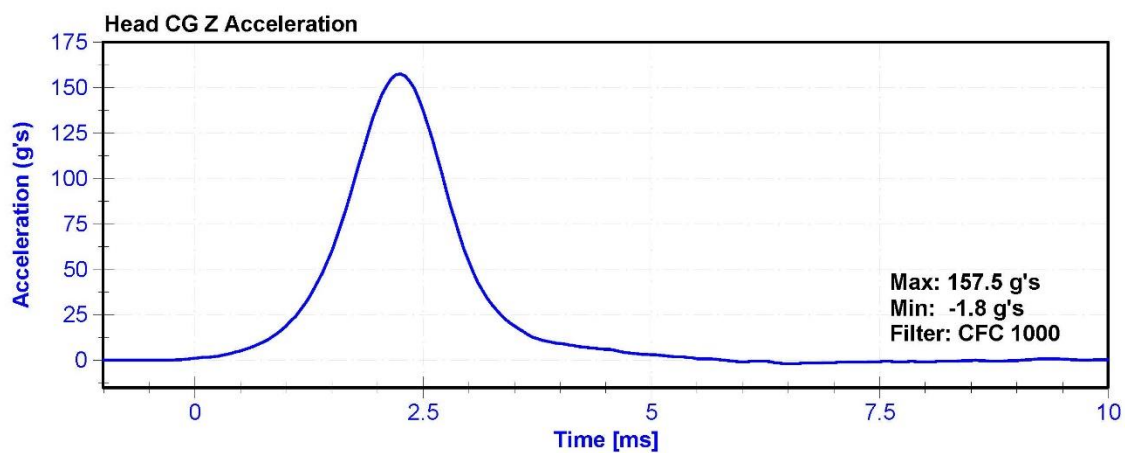
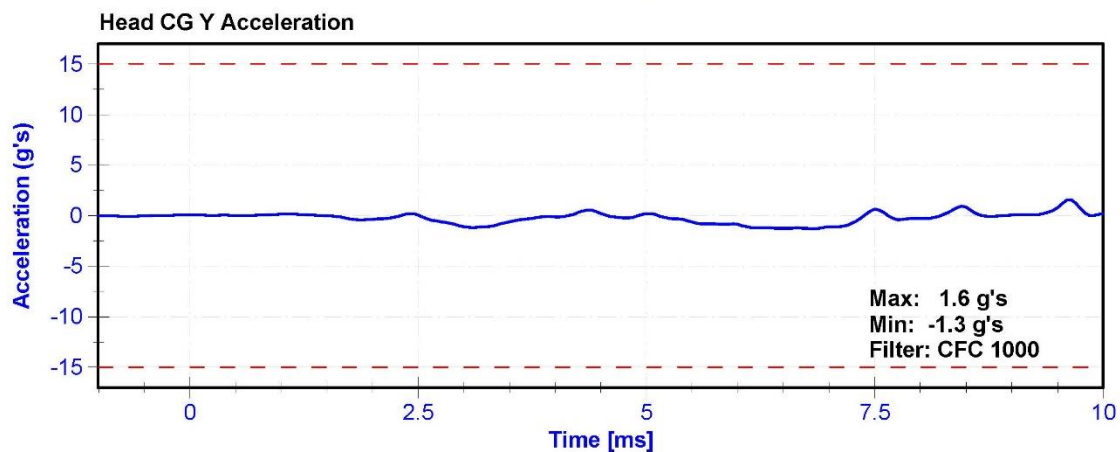
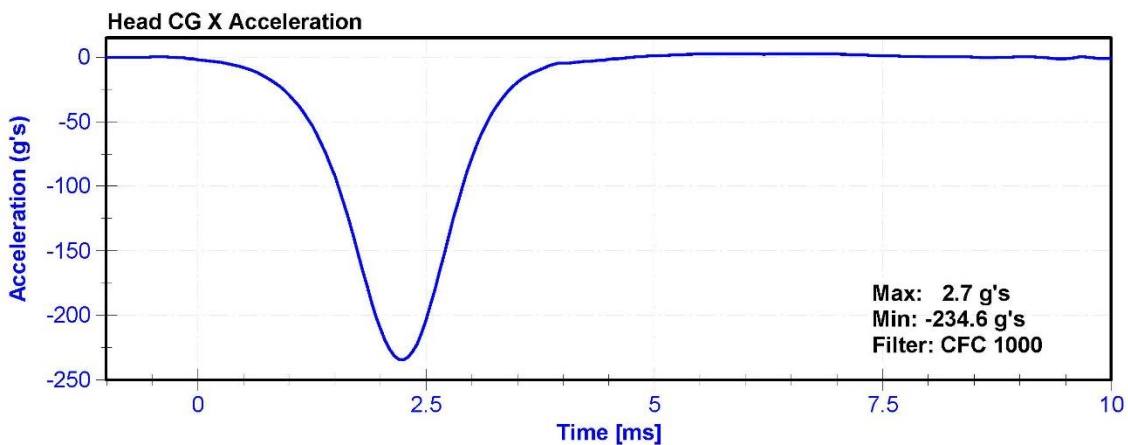
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.9	Pass
Humidity	10	70	%	19.7	Pass
Resultant Acceleration	250	300	g's	282.6	Pass
Oscillation	0	10	%	1.2	Pass
Lateral Acceleration	-15	15	g's	1.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco 7264C	AC-P79591	10/30/2015	4/29/2016
Y Accelerometer	Endevco 7264C	AC-P49181	10/30/2015	4/29/2016
Z Accelerometer	Endevco 7264C	AC-P49214	10/30/2015	4/29/2016





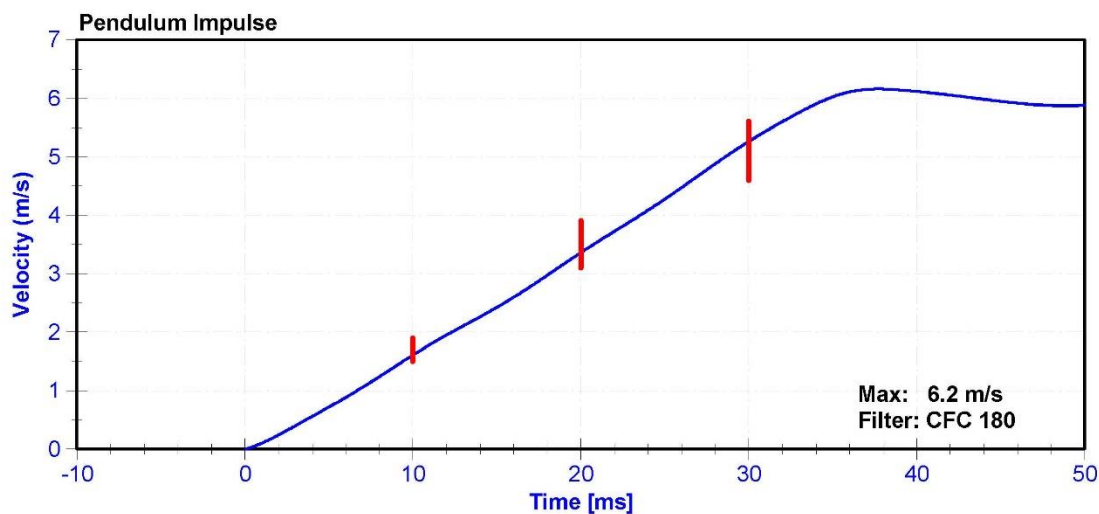
ATD Manufacturer	ATSC	Test Technician	M. Goehle
ATD Serial Number	019	Laboratory Supervisor	M. Goehle

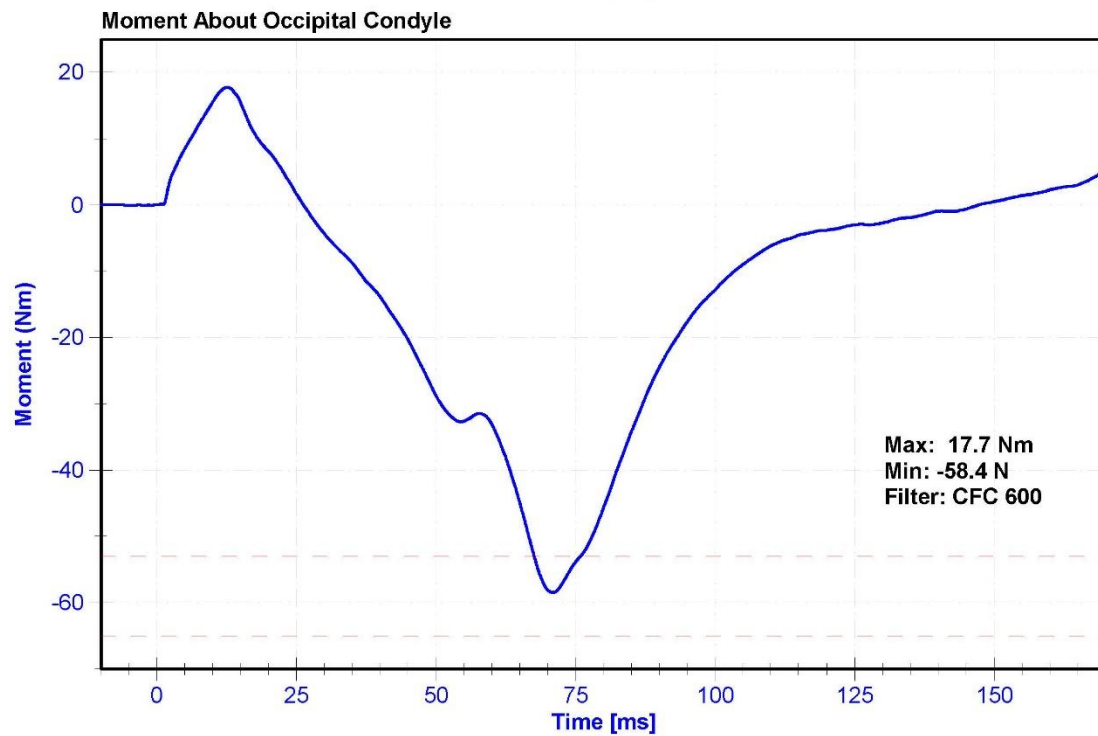
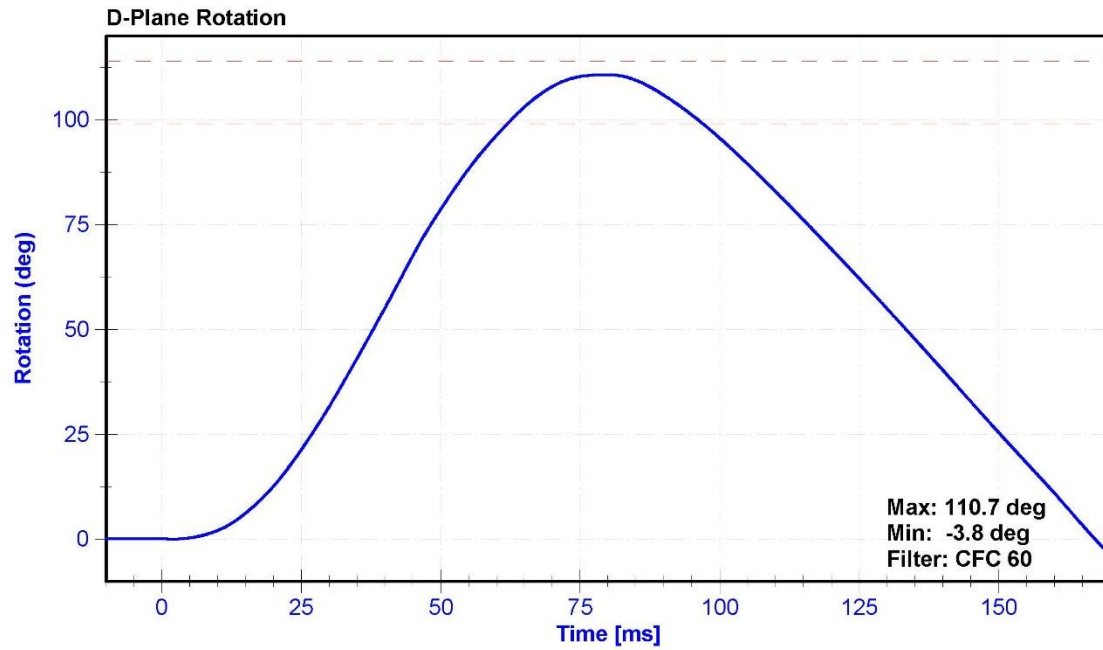
Results

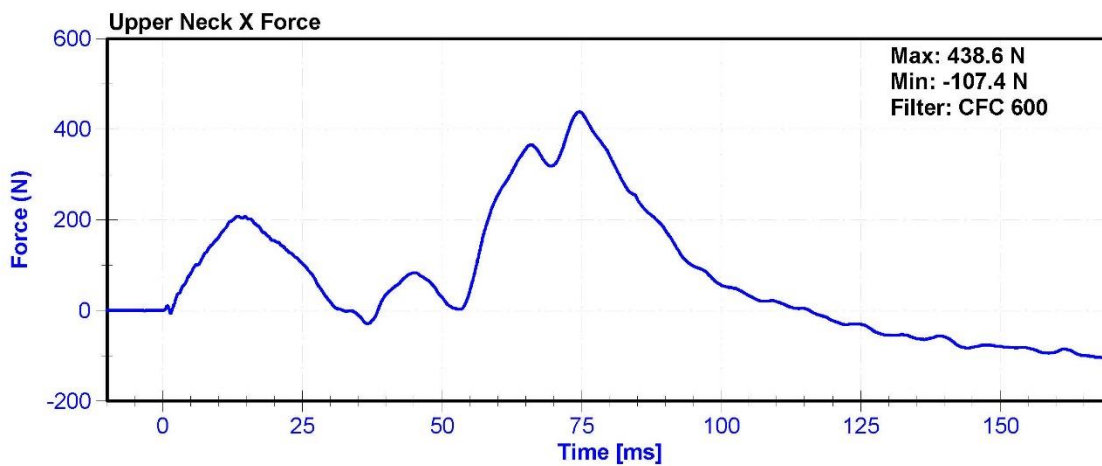
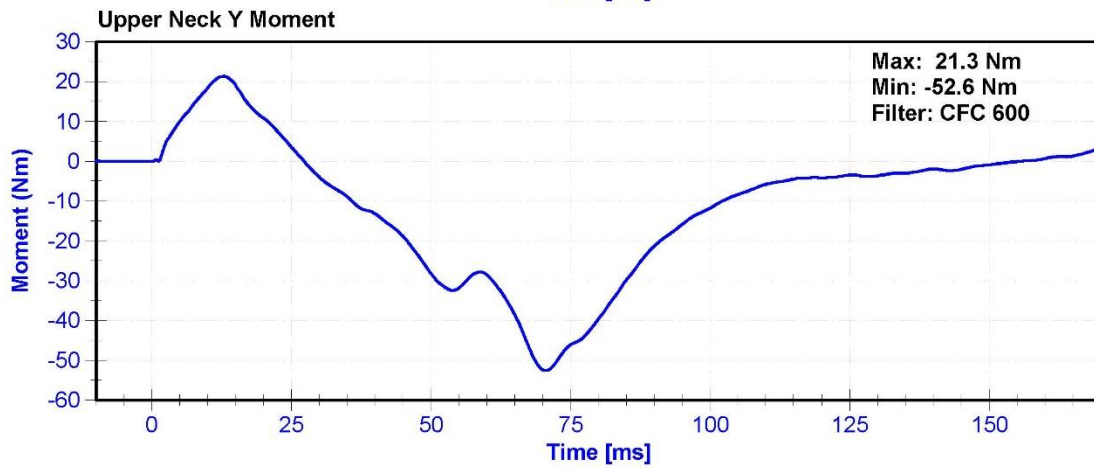
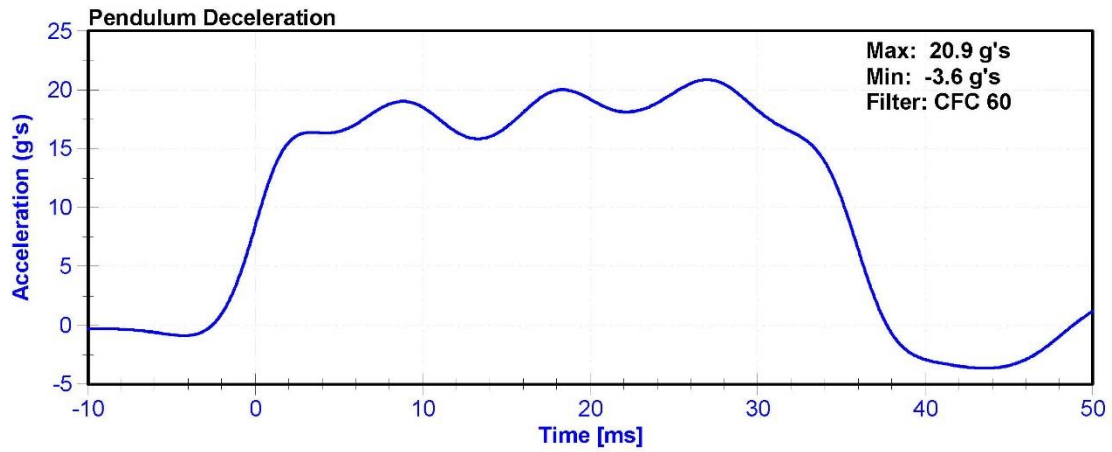
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	17.0	Pass
Velocity	5.95	6.19	m/s	6.068	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.61	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.36	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.26	Pass
D Plane Rotation	99	114	deg	110.7	Pass
Moment During Rotation Interval	-65	-53	Nm	-58.4	Pass
Moment Decay to -10Nm	94	114	ms	103.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Pendulum Potentiometer	ETI SP22G	DS-PendPot	9/28/2015	9/27/2016
Condyle Potentiometer	ETI SP22G	DS-CondPot	9/28/2015	9/27/2016
Upper Neck Load Cell	Denton 1716ATF	LC-2184 Fx	6/29/2015	6/28/2016







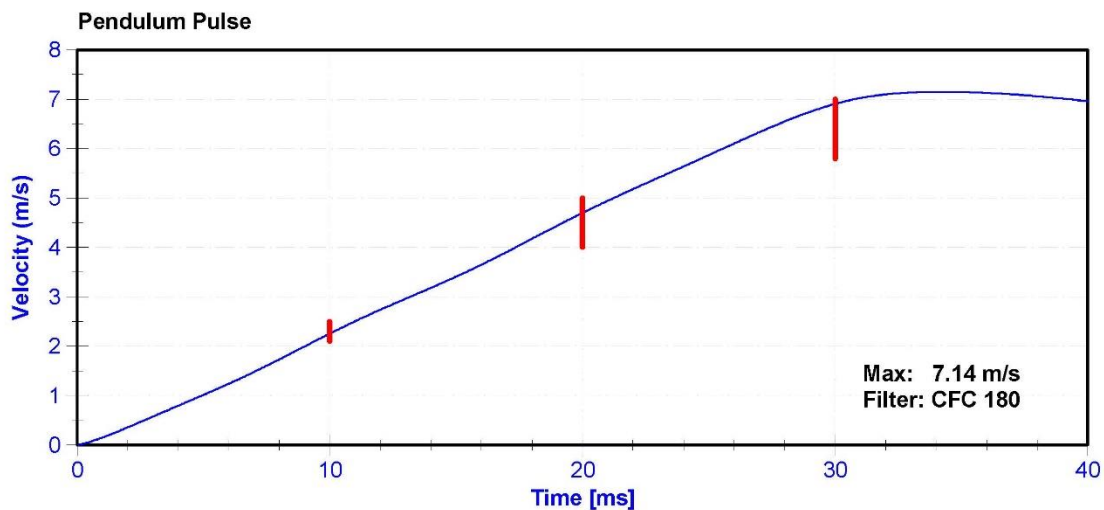
ATD Manufacturer	ATSC	Test Technician	M. Goehle
ATD Serial Number	019	Laboratory Supervisor	M. Goehle

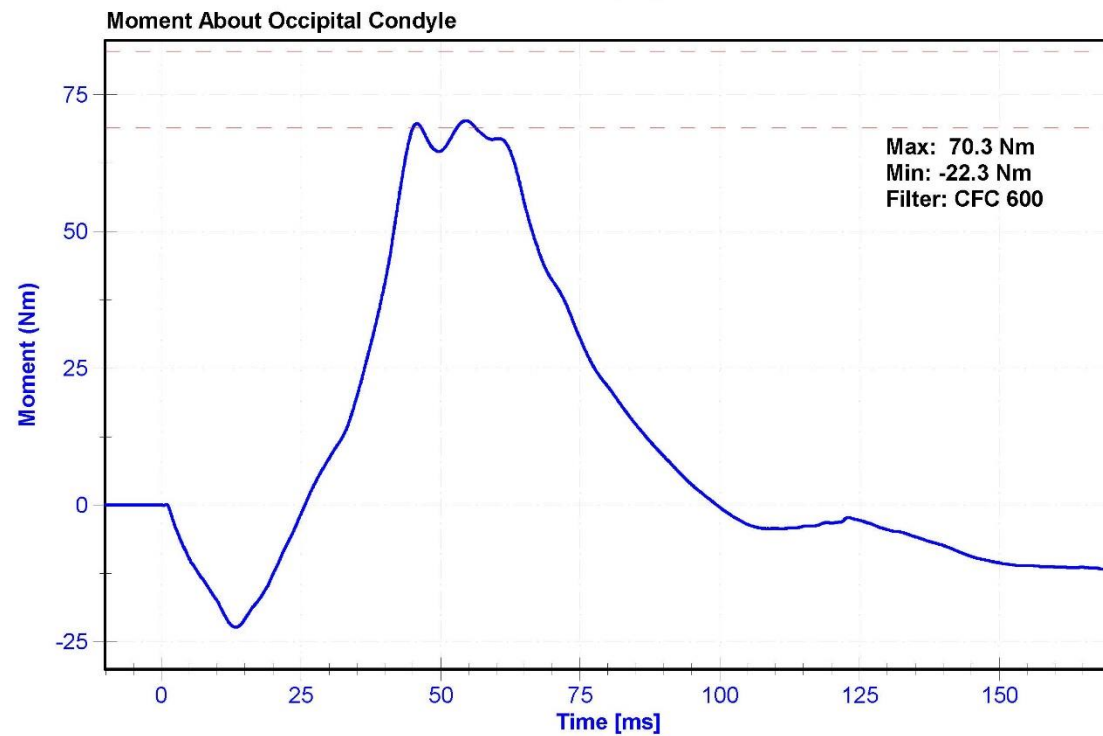
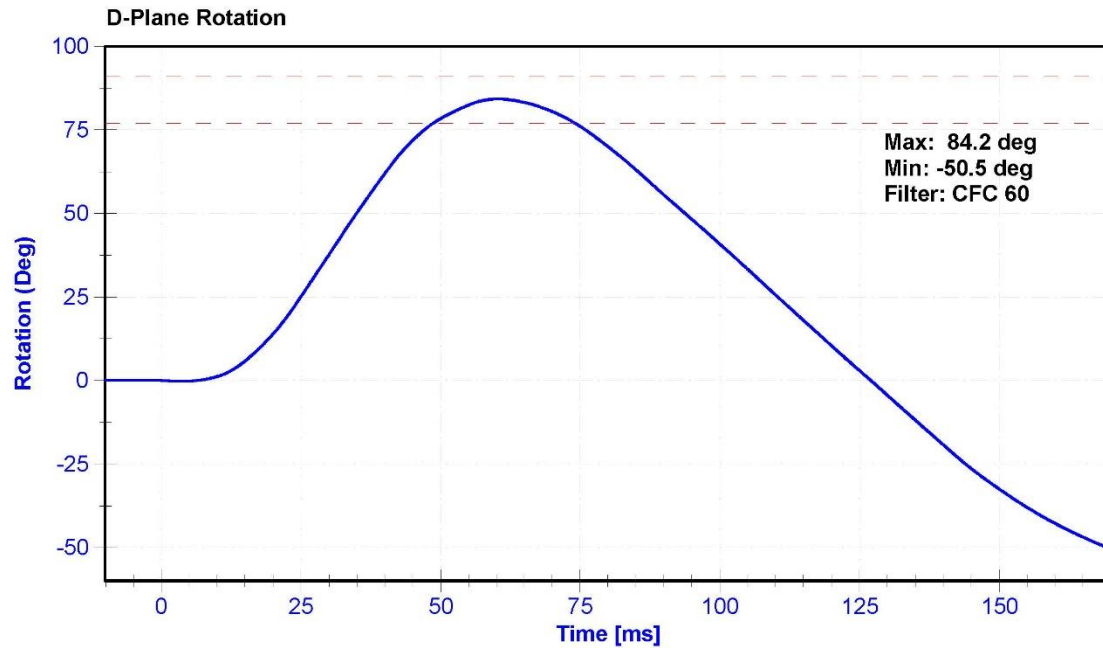
Results

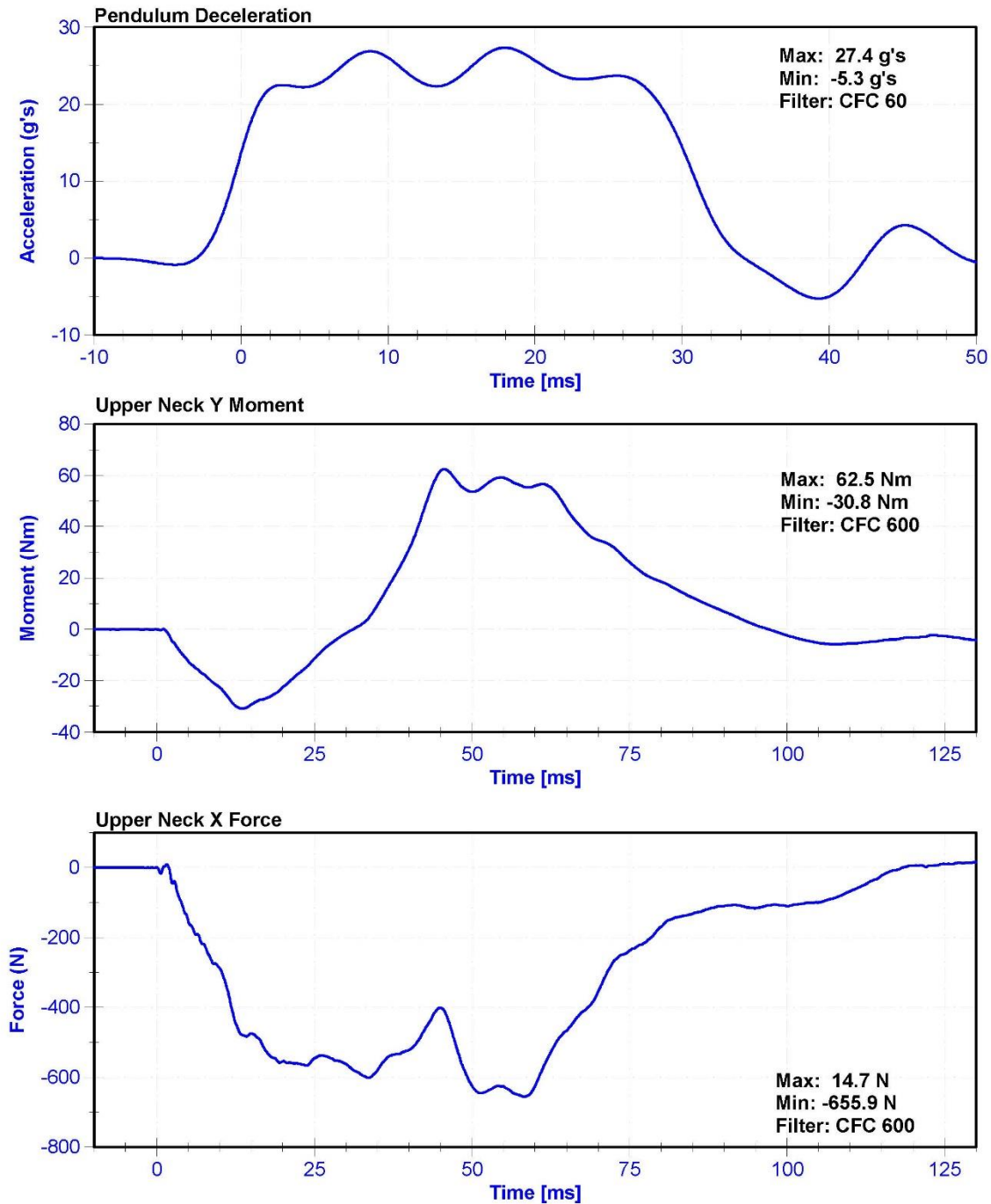
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	17.0	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.26	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.70	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.90	Pass
Max D Plane Rotation	77	91	deg	84.2	Pass
Max Moment During Rotation Interval	69	83	Nm	70.3	Pass
Moment Decay to 10.0 Nm	80	100	ms	89.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Pendulum Potentiometer	ETI SP22G	DS-PendPot	9/28/2015	9/27/2016
Condyle Potentiometer	ETI SP22G	DS-CondPot	9/28/2015	9/27/2016
Upper Neck Load Cell	Denton 1716ATF	LC-2184 Fx	6/29/2015	6/28/2016







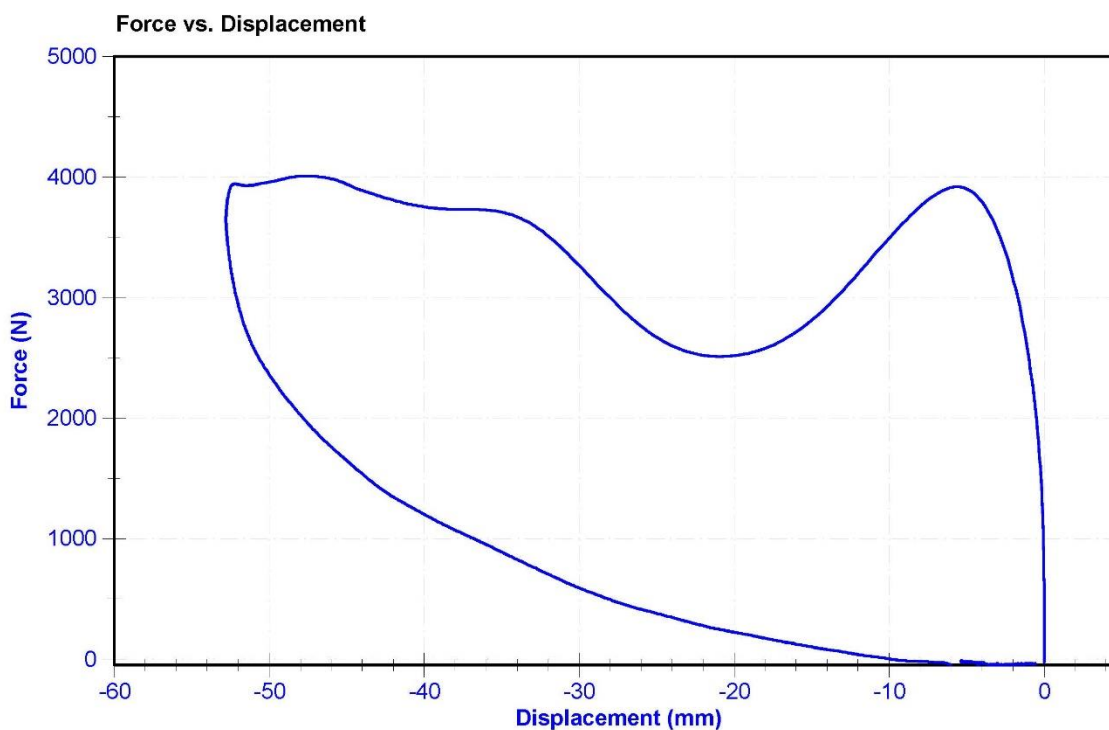
ATD Manufacturer	ASTC	Test Technician	M. Geesey
ATD Serial Number	019	Laboratory Supervisor	M. Goehle

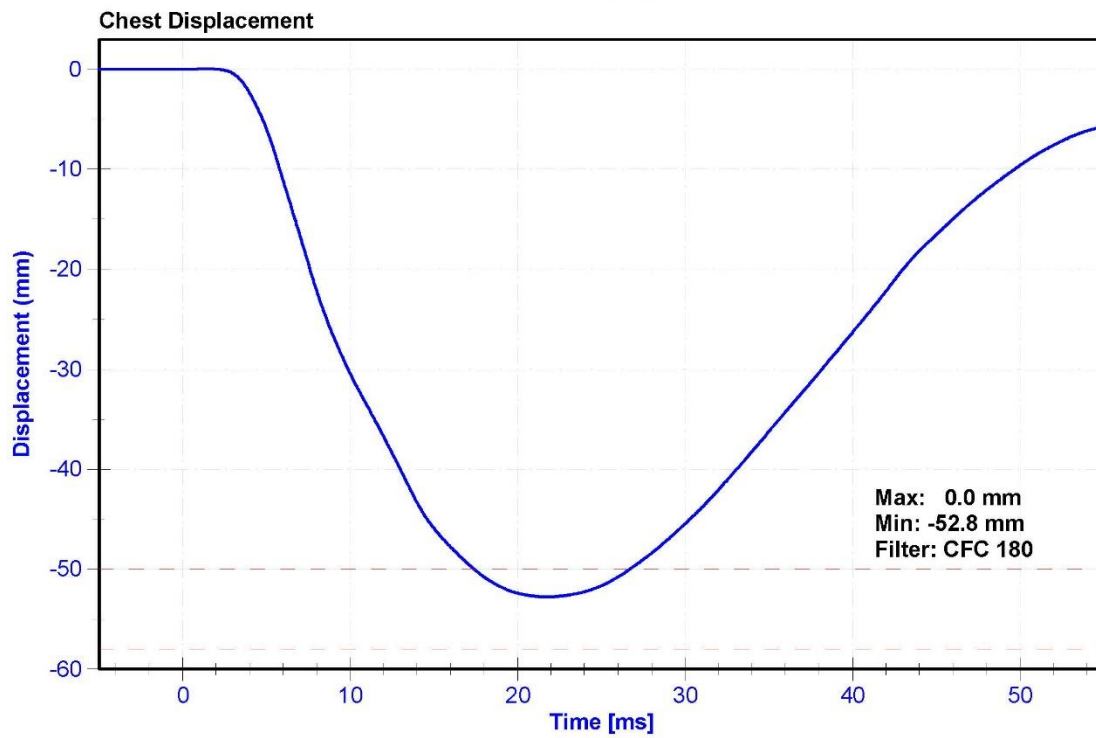
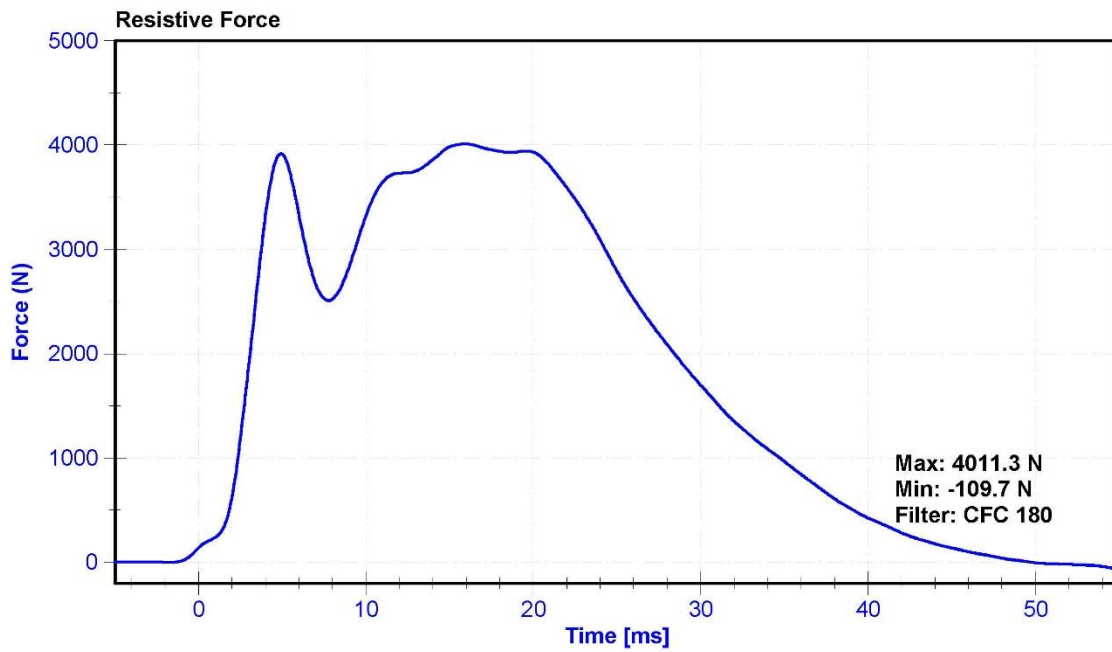
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	16.3	Pass
Velocity	6.59	6.83	m/s	6.773	Pass
Chest Deflection	-58	-50	mm	-52.8	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	3959.5	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4011.3	Pass
Hysteresis	69	85	%	78.3	Pass

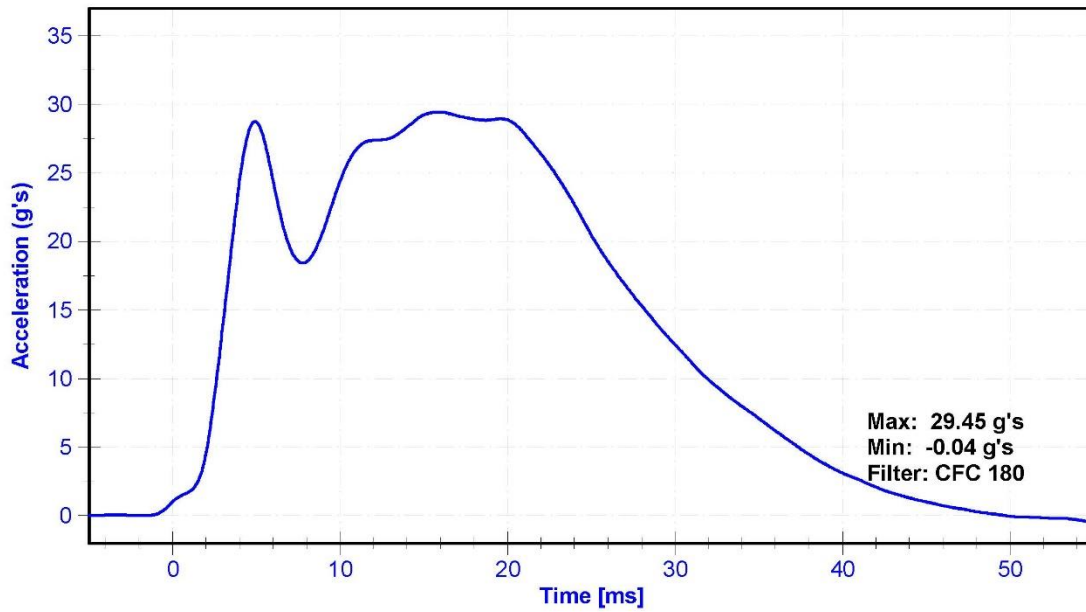
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Chest Potentiometer	Servo 14CB1	DS-FEM019	7/1/2015	6/30/2016

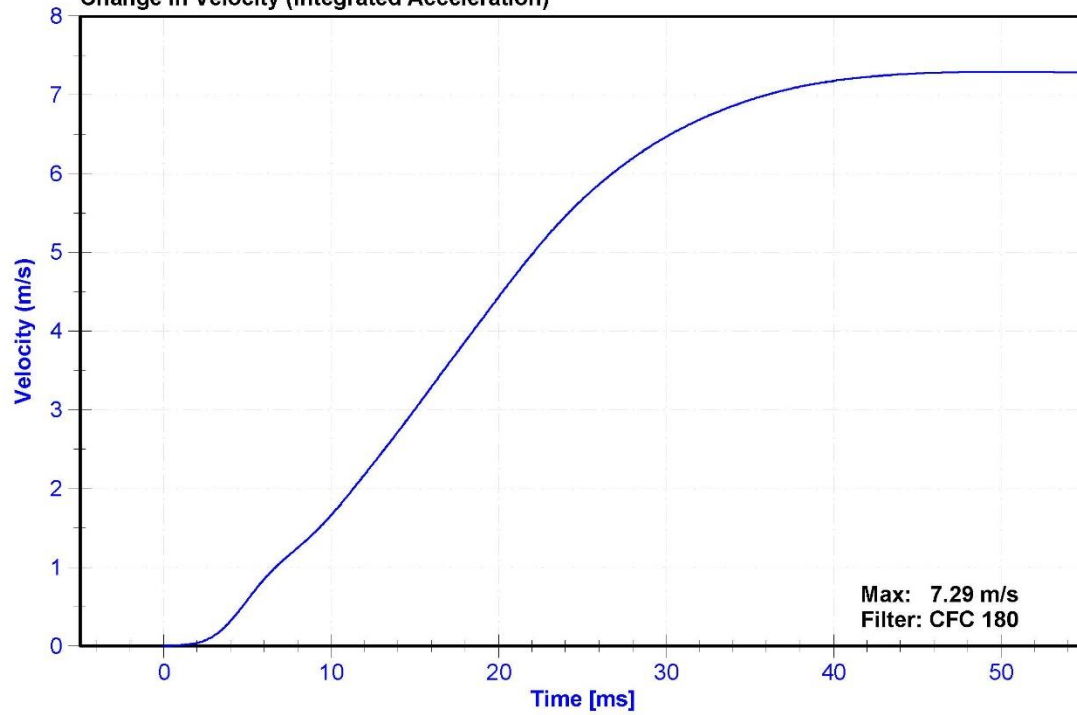




Probe Acceleration



Change in Velocity (Integrated Acceleration)



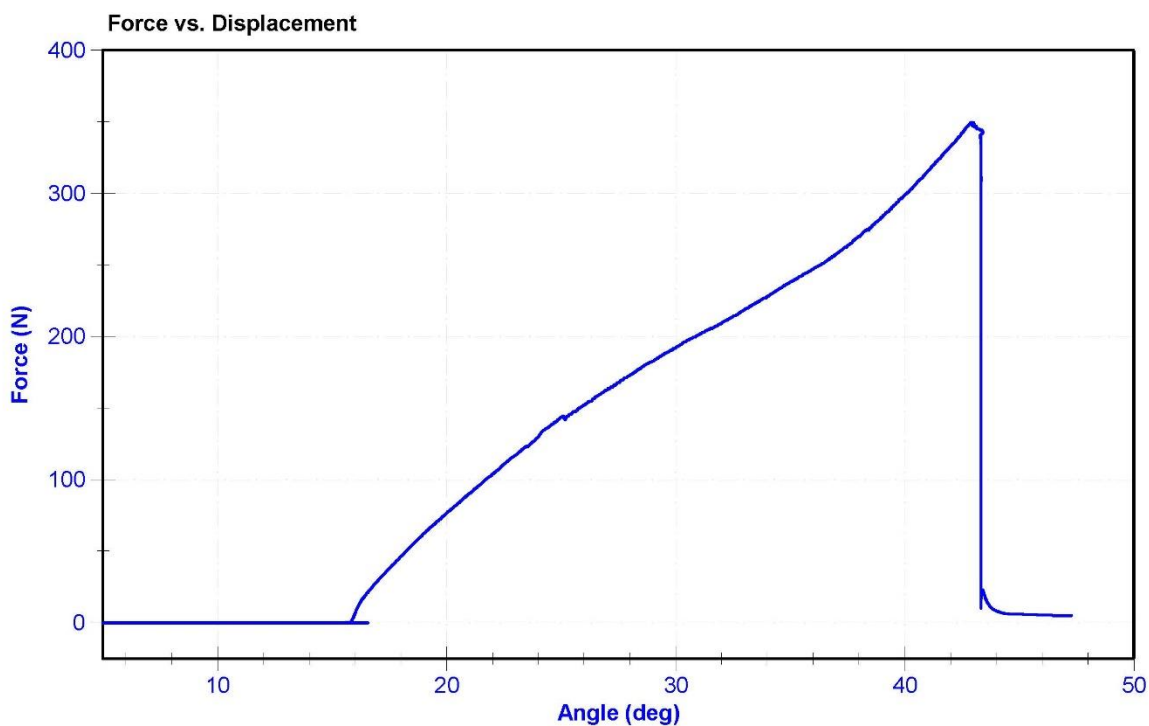
ATD Manufacturer	ATSC	Test Technician	M.Hartung
ATD Serial Number	019	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	21.5	Pass
Humidity	10	70	%	17.7	Pass
Initial Angle	0	20	deg	15.4	Pass
Force at 45 Degrees	320	390	N	349.6	Pass
Return Angle Relative to Initial	0	8	deg	5.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	8/14/2015	8/13/2016
Load Cell	Interface SML-200	LC-493319	8/13/2015	8/12/2016



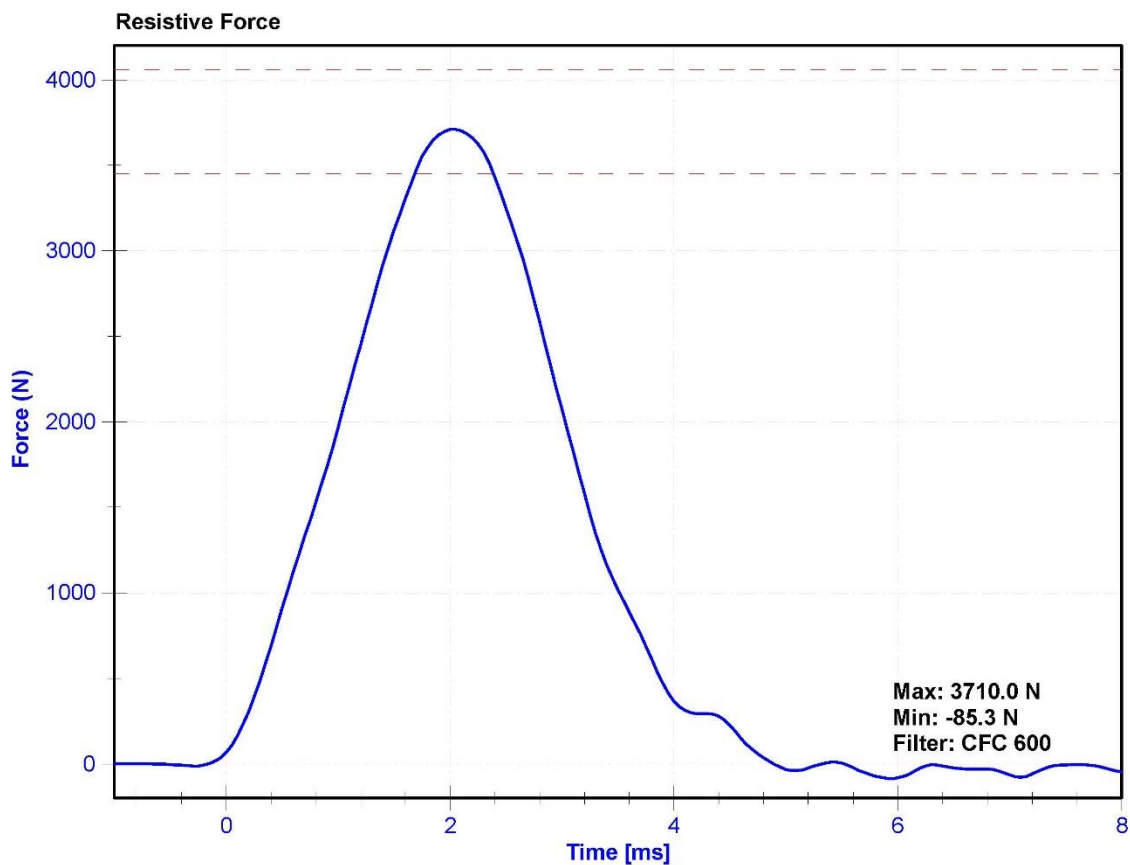
ATD Manufacturer	ASTC	Test Technician	M. Geesey
ATD Serial Number	019	Laboratory Supervisor	M. Goehle

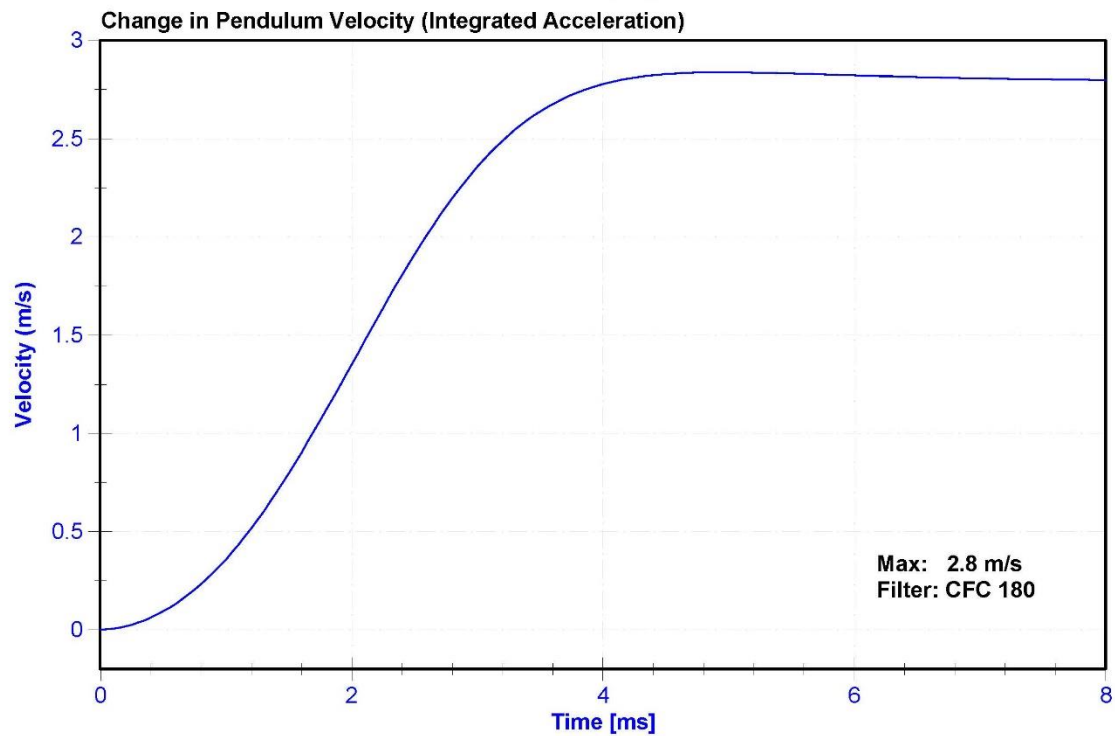
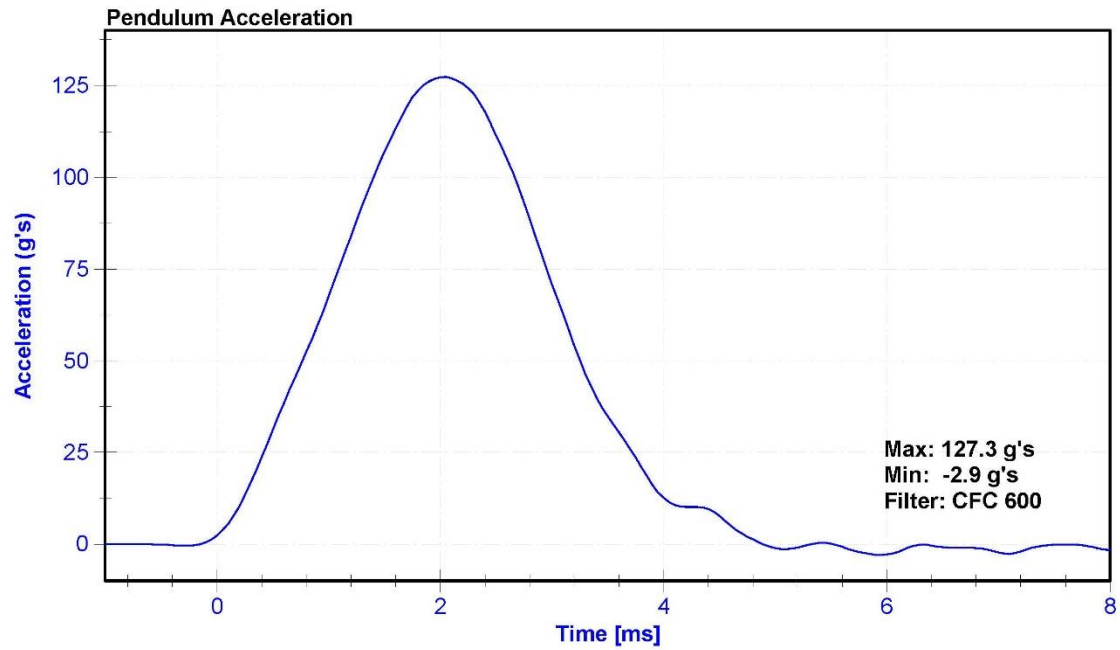
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	15.1	Pass
Velocity	2.07	2.13	m/s	2.088	Pass
Resistive Force	3450	4060	N	3710.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016





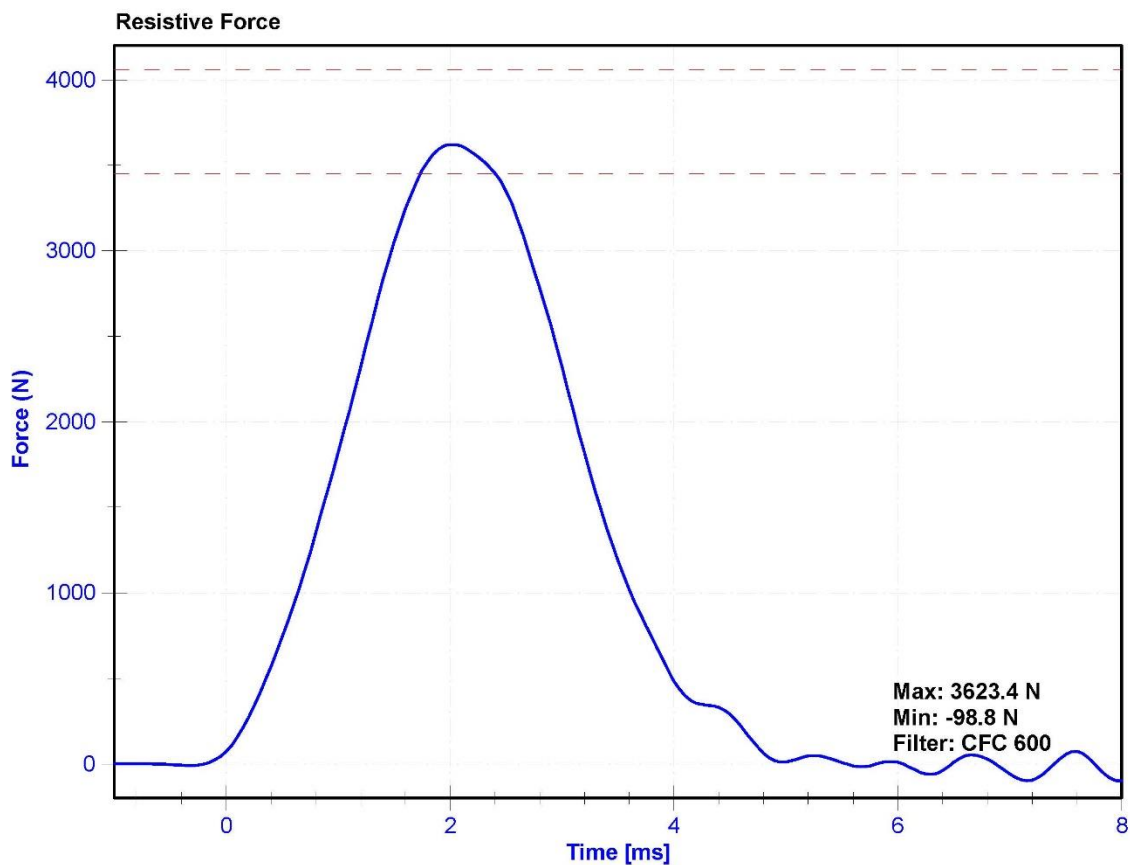
ATD Manufacturer	ASTC	Test Technician	M. Geesey
ATD Serial Number	019	Laboratory Supervisor	M. Goehle

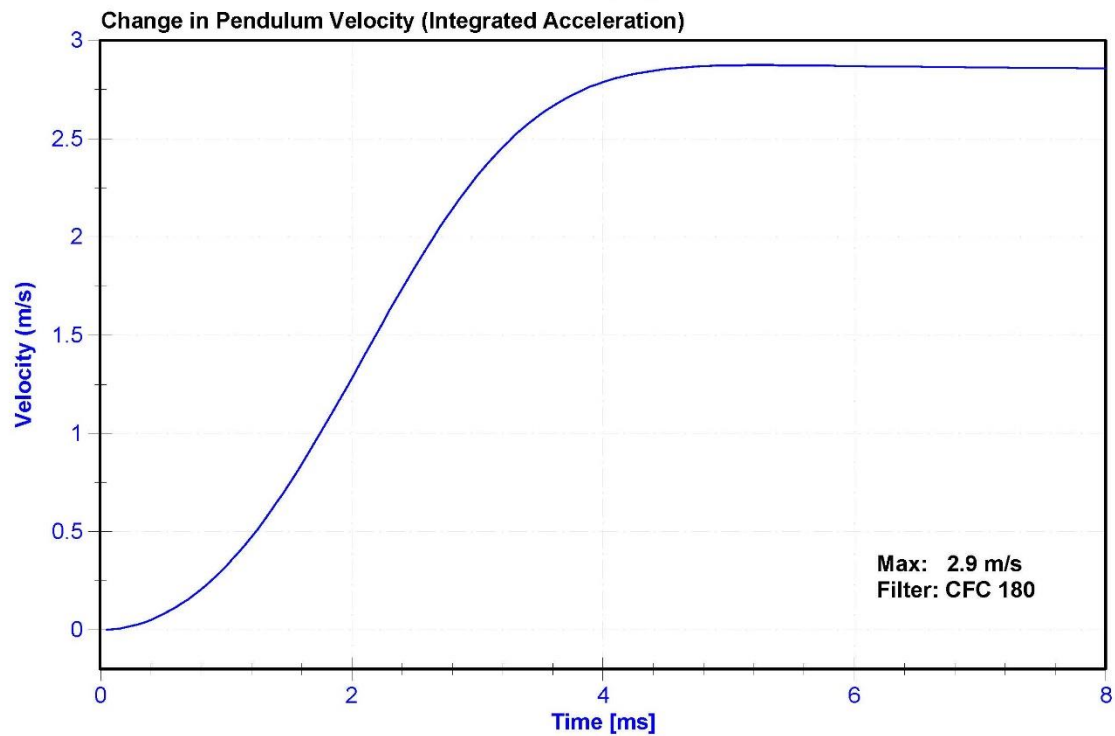
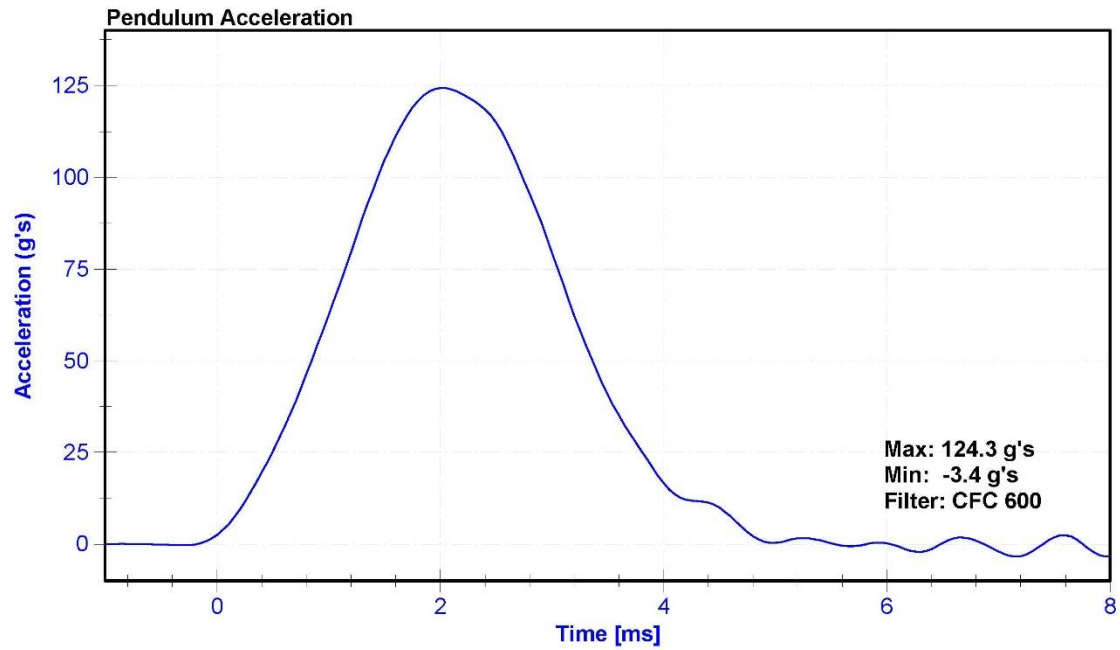
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	15.1	Pass
Velocity	2.07	2.13	m/s	2.086	Pass
Resistive Force	3450	4060	N	3623.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016





Hybrid III 5th Female 324 DUMMY CALIBRATIONS

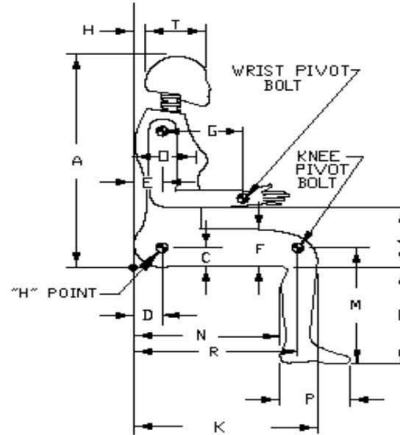
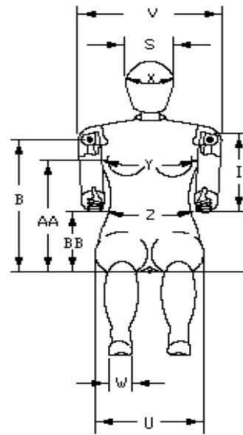


External Measurements - Hybrid 3 - 5th Female

Technician: M.Hartung

Date: 1/6/2016

Dummy Serial Number: 324



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	782	Pass
B	Shoulder Pivot Height	432	457	445	Pass
C	H-Point Height	81	86	86	Pass
D	H-Point from Backline	145	150	147	Pass
E	Shoulder Pivot from Backline	69	84	81	Pass
F	Thigh Clearance	119	135	130	Pass
G	Back of Elbow to Wrist Pivot	244	259	247	Pass
H	Head Back to Backline	43	48	45	Pass
I	Shoulder to Elbow Length	277	297	285	Pass
J	Elbow Rest Height	183	203	192	Pass
K	Buttock to Knee Length	521	546	530	Pass
L	Popliteal Height	356	376	366	Pass
M	Knee Pivot Height	394	419	411	Pass
N	Buttock Popliteal Length	414	439	430	Pass
O	Chest Depth without Jacket	175	191	182	Pass
P	Foot Length (right)	219	234	224	Pass
R	Buttock To Knee Pivot Length	457	483	473	Pass
S	Head Breadth	137	147	142	Pass
T	Head Depth	178	188	181	Pass
U	Hip Breadth	300	315	307	Pass
V	Shoulder Breadth	351	366	355	Pass
W	Foot Breadth	79	94	84	Pass
X	Head Circumference	528	549	536	Pass
Y	Chest Circumference with Jacket	851	881	867	Pass
Z	Waist Circumference	460	790	775	Pass
AA	Reference Location (Chest Circumference)	333	358	346	Pass
BB	Reference Location (Waist Circumference)	160	170	166	Pass

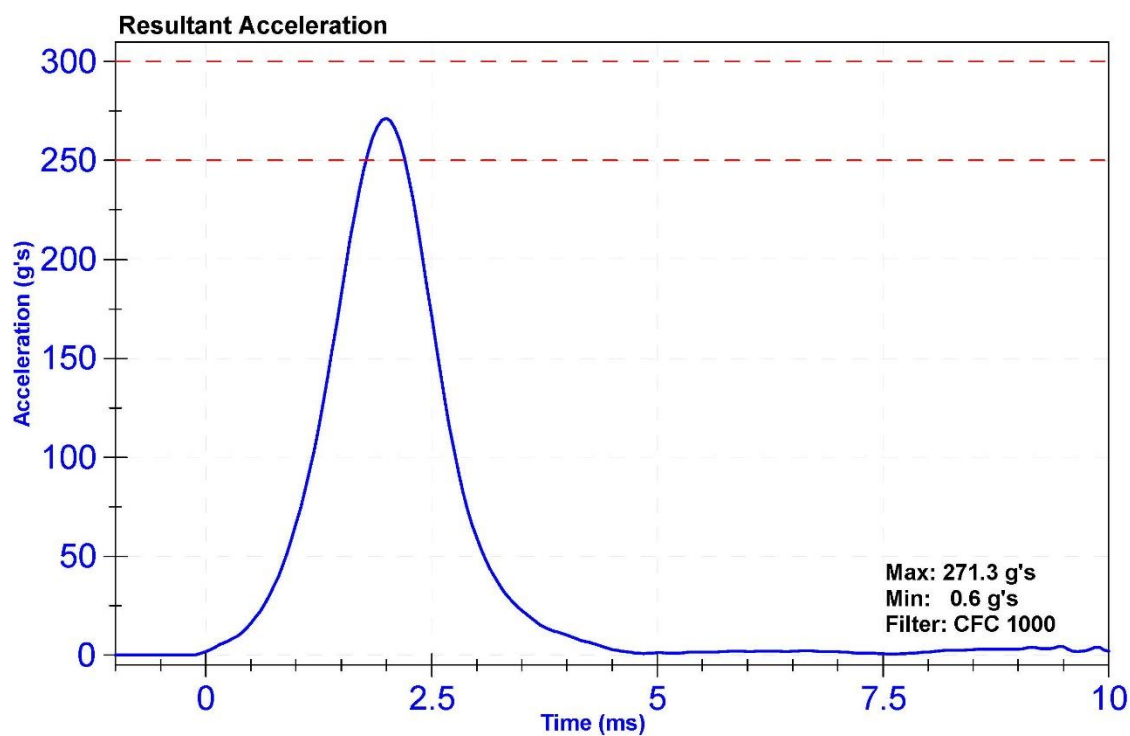
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	324	Laboratory Supervisor	M.Goehle

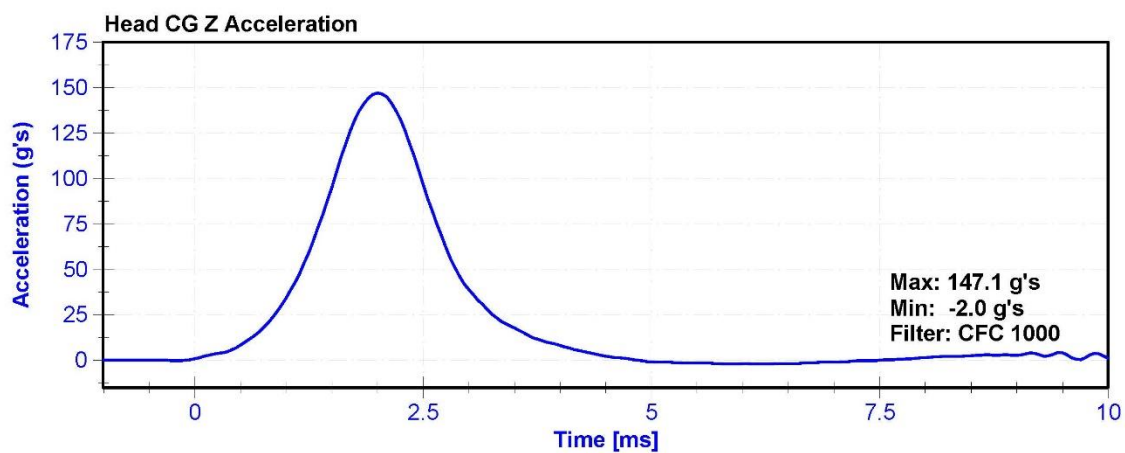
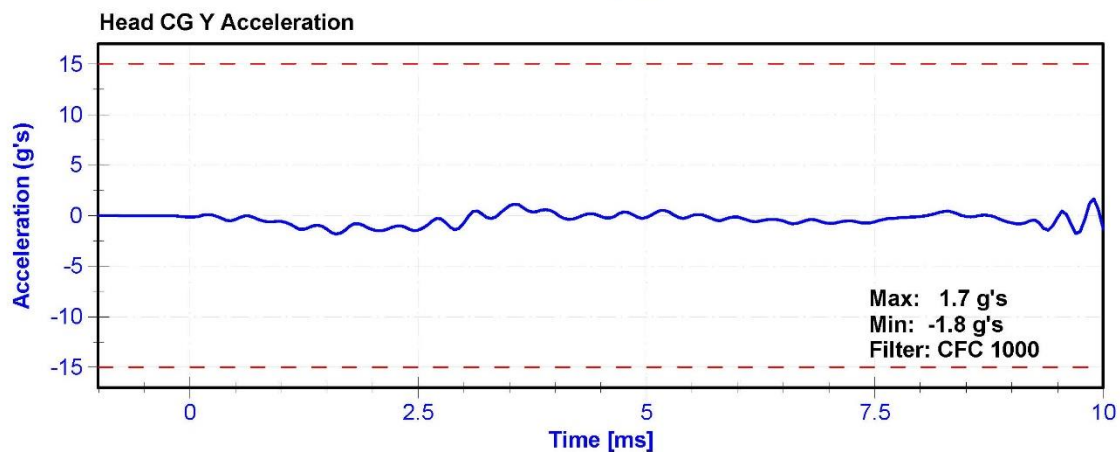
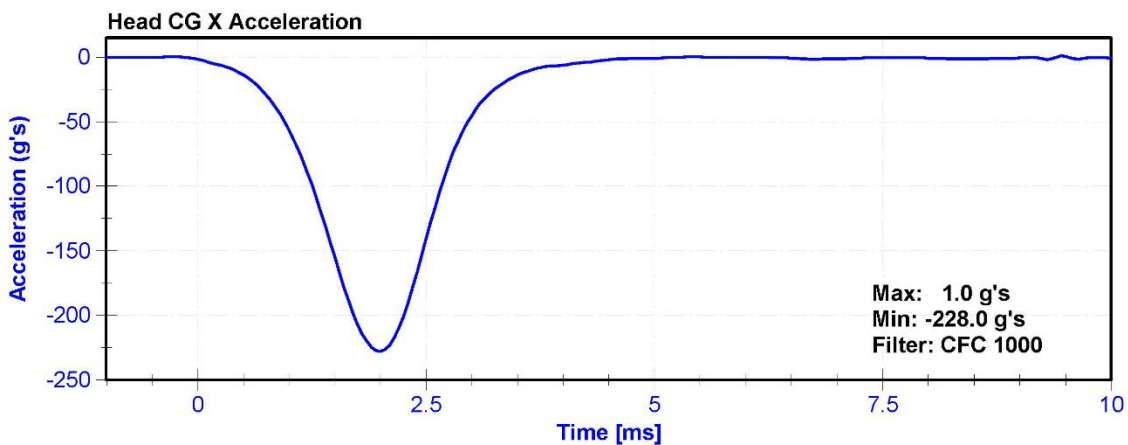
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.9	Pass
Humidity	10	70	%	16.9	Pass
Resultant Acceleration	250	300	g's	271.3	Pass
Oscillation	0	10	%	1.7	Pass
Lateral Acceleration	-15	15	g's	-2.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco 7264C	AC-P72219	12/8/2015	6/7/2016
Y Accelerometer	Endevco 7264C	AC-P49160	12/8/2015	6/7/2016
Z Accelerometer	Endevco 7264	AC-P78168	12/8/2015	6/7/2016





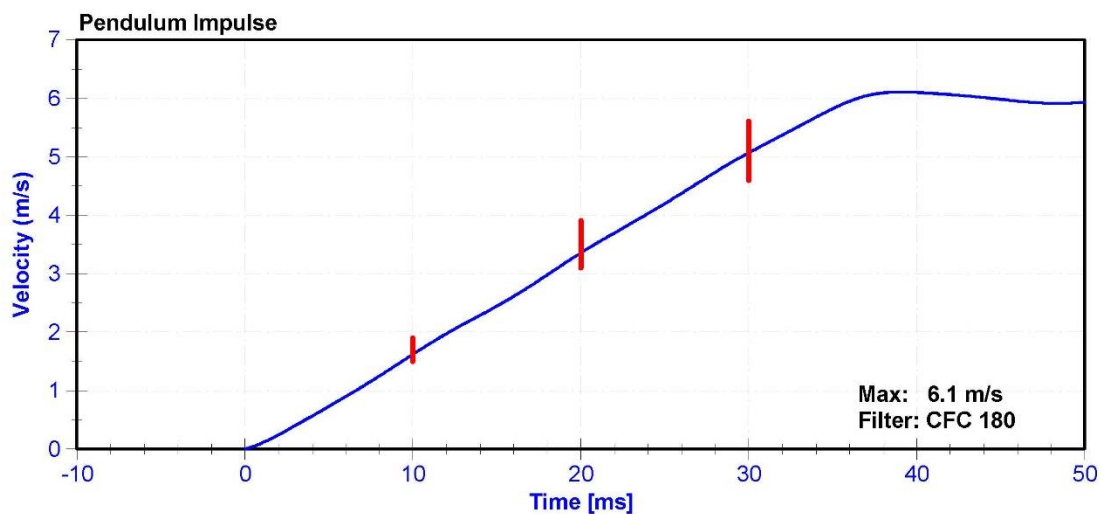
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	324	Laboratory Supervisor	M. Goehle

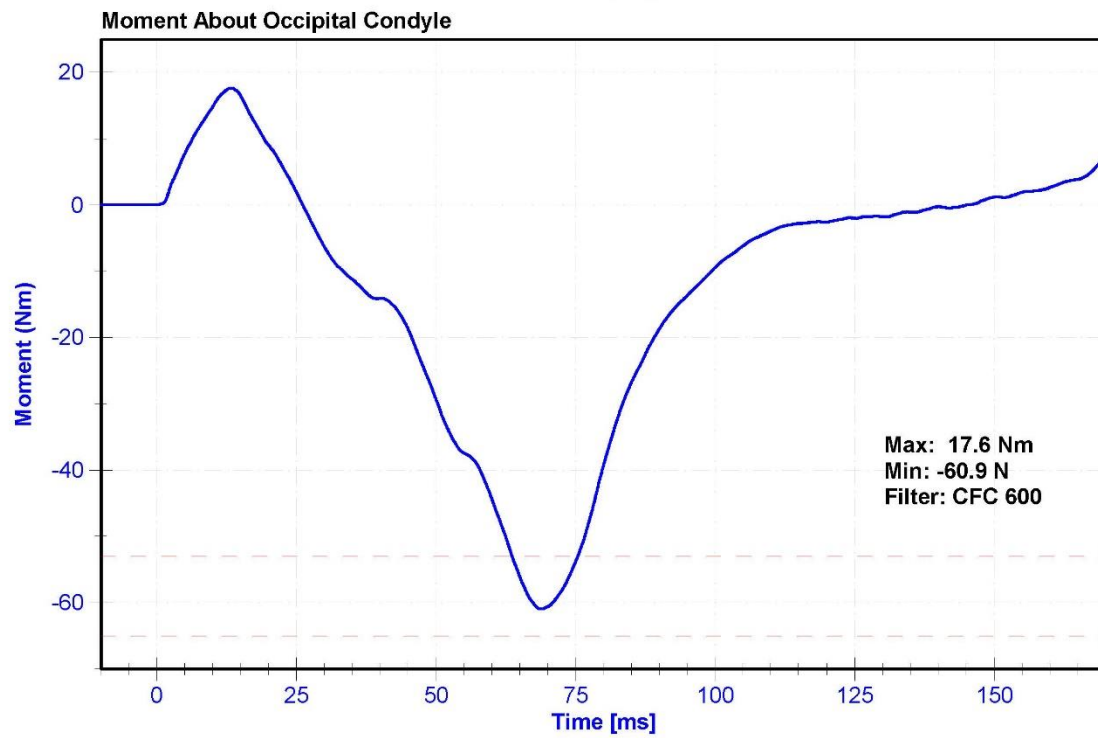
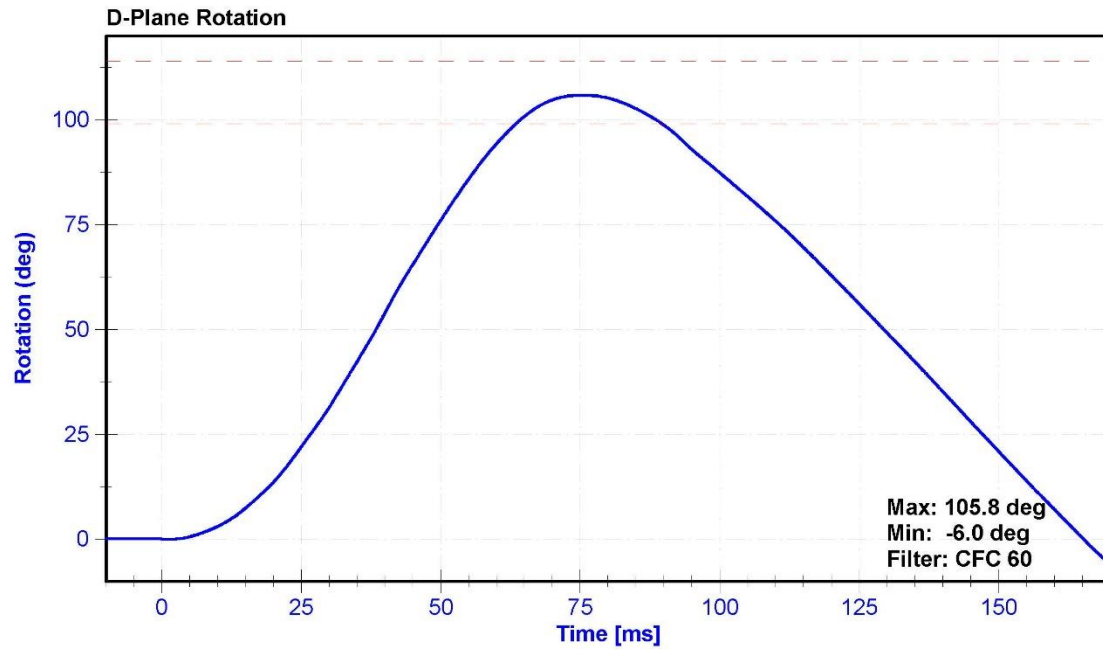
Results

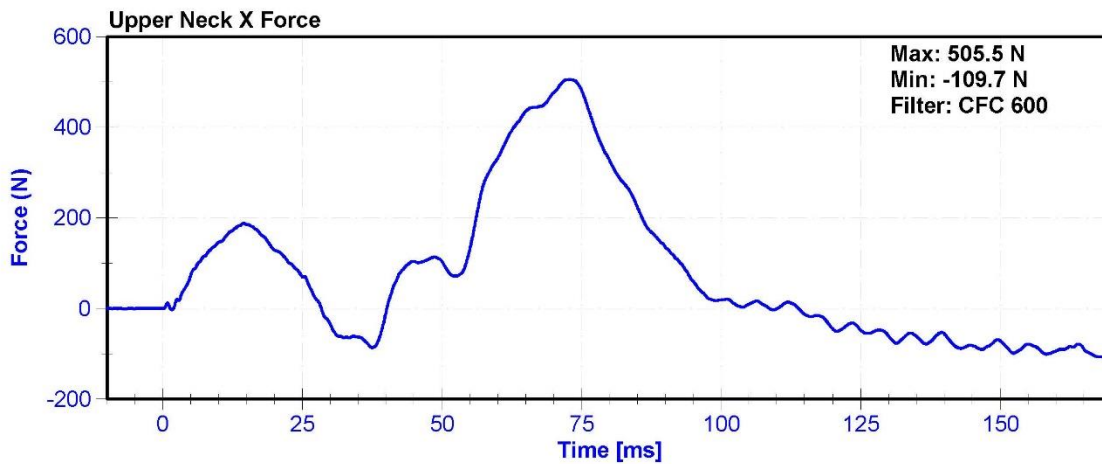
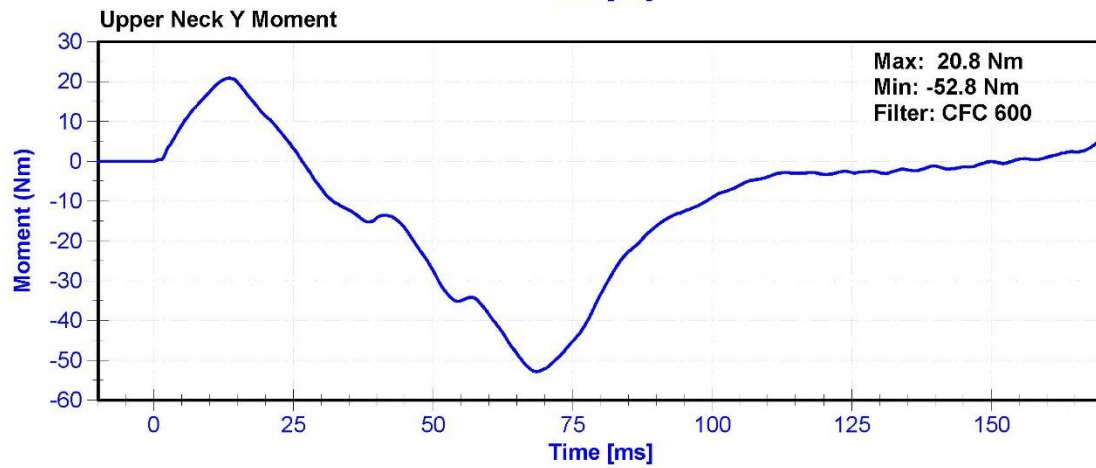
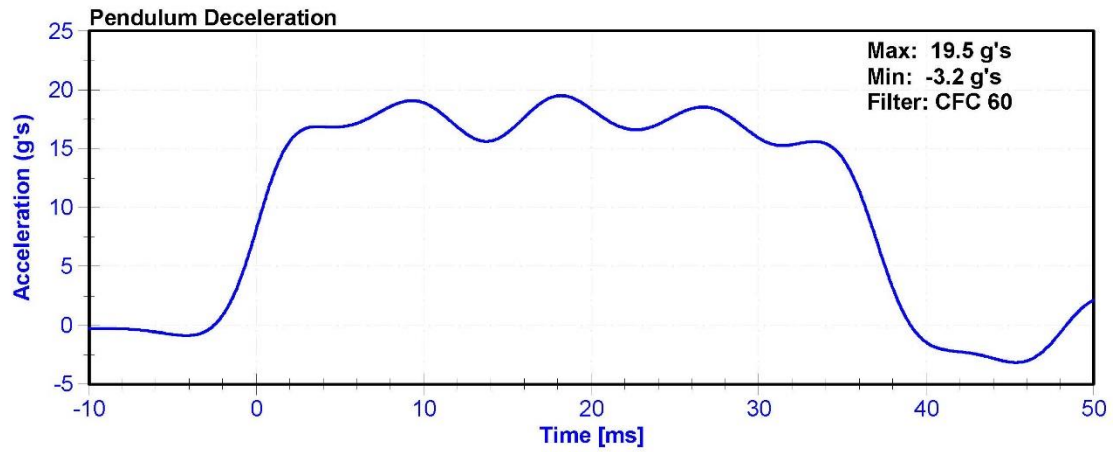
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	17.0	Pass
Velocity	5.95	6.19	m/s	6.068	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.62	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.36	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.07	Pass
D Plane Rotation	99	114	deg	105.8	Pass
Moment During Rotation Interval	-65	-53	Nm	-60.9	Pass
Moment Decay to -10Nm	94	114	ms	99.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Pendulum Potentiometer	ETI SP22G	DS-PendPot	9/28/2015	9/27/2016
Condyle Potentiometer	ETI SP22G	DS-CondPot	9/28/2015	9/27/2016
Upper Neck Load Cell	DENTON 1716	LC-2254 Fx	12/17/2015	12/16/2016







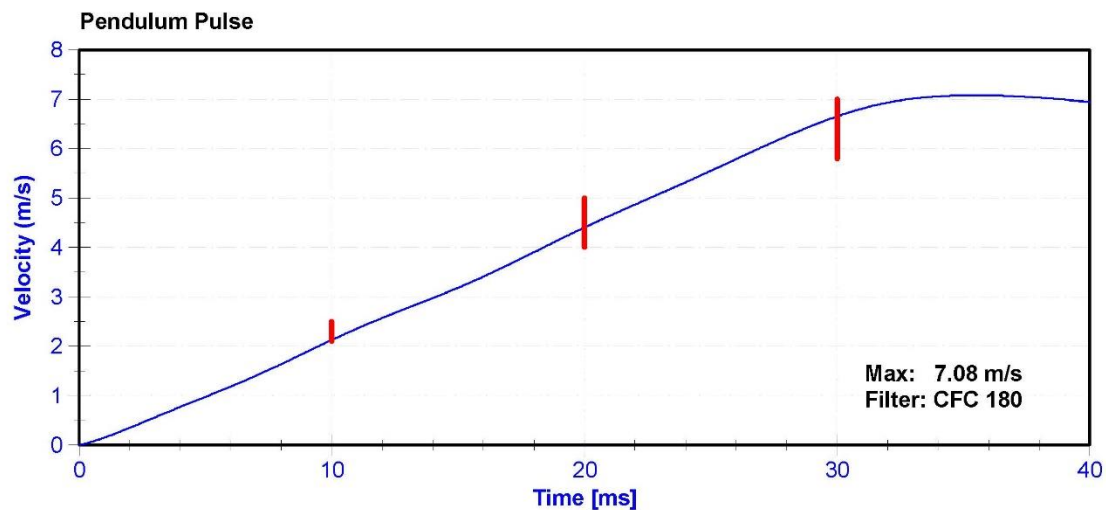
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	324	Laboratory Supervisor	M. Goehle

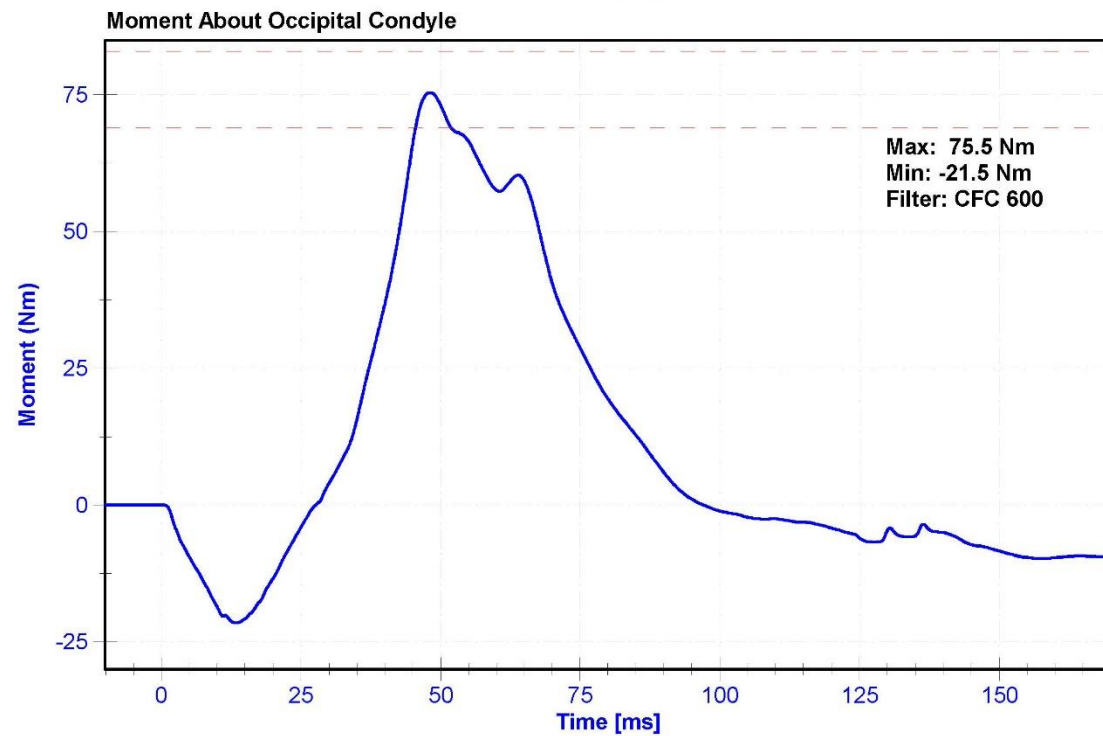
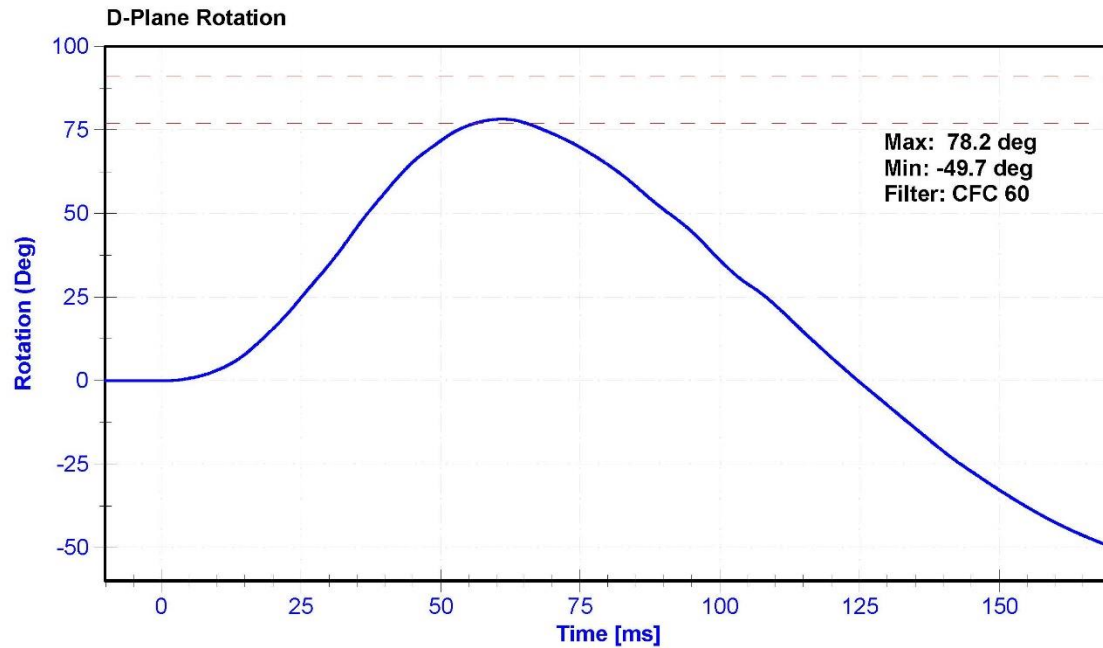
Results

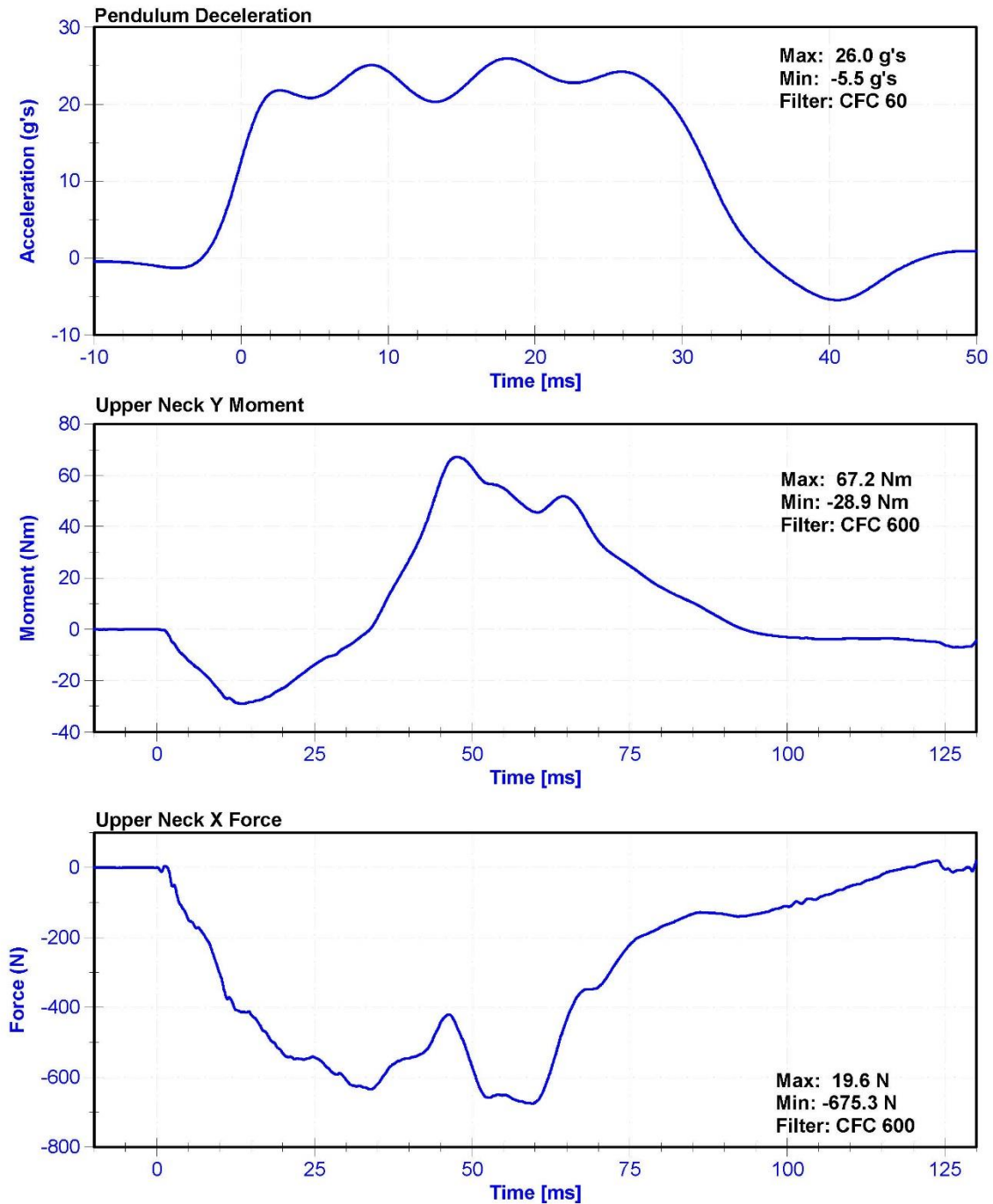
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	16.9	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.13	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.40	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.65	Pass
Max D Plane Rotation	77	91	deg	78.2	Pass
Max Moment During Rotation Interval	69	83	Nm	75.5	Pass
Moment Decay to 10.0 Nm	80	100	ms	87.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Pendulum Potentiometer	ETI SP22G	DS-PendPot	9/28/2015	9/27/2016
Condyle Potentiometer	ETI SP22G	DS-CondPot	9/28/2015	9/27/2016
Upper Neck Load Cell	DENTON 1716	LC-2254 Fx	12/17/2015	12/16/2016







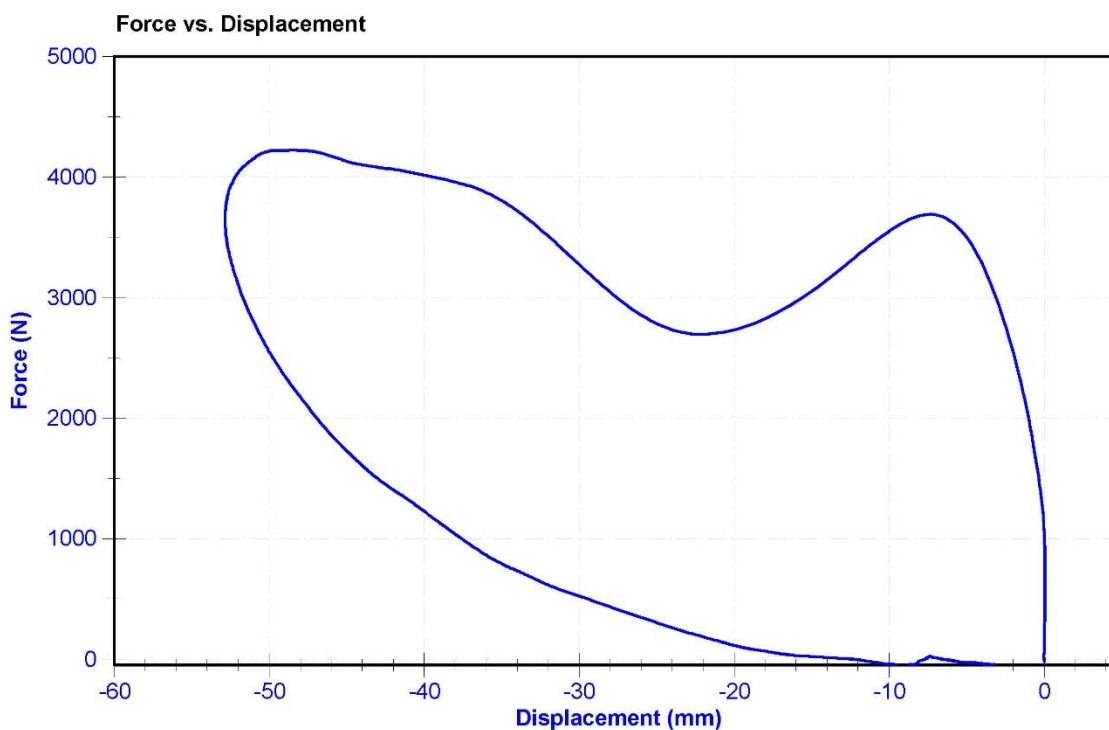
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	324	Laboratory Supervisor	M. Goehle

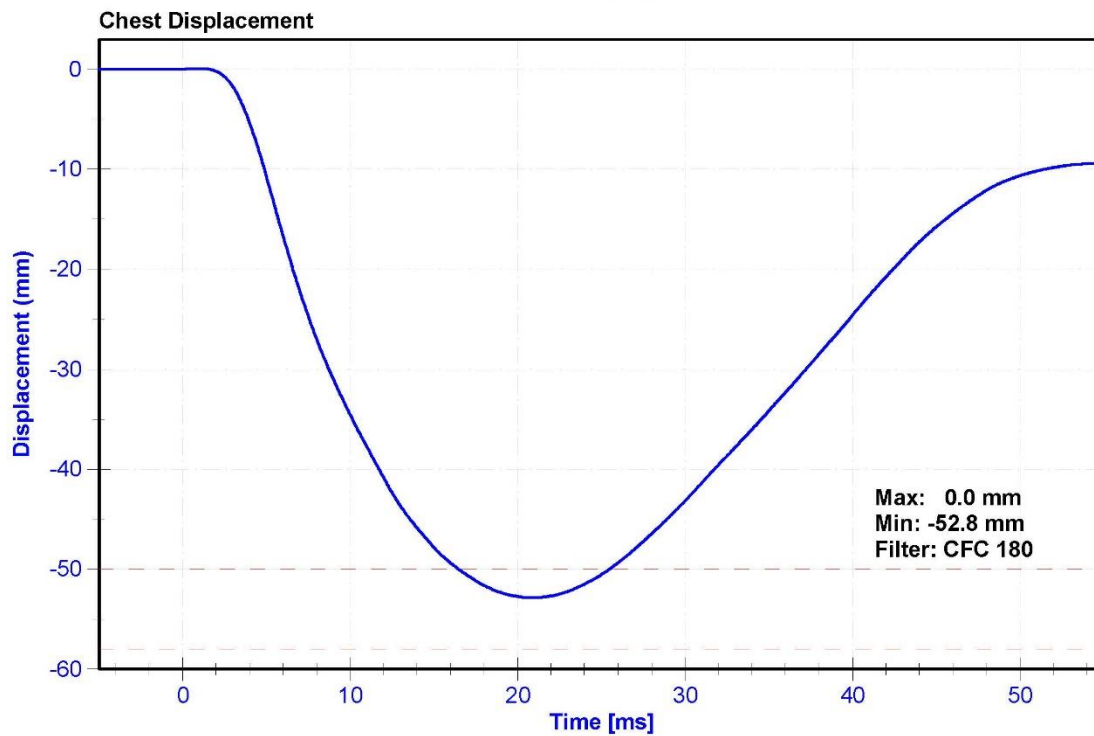
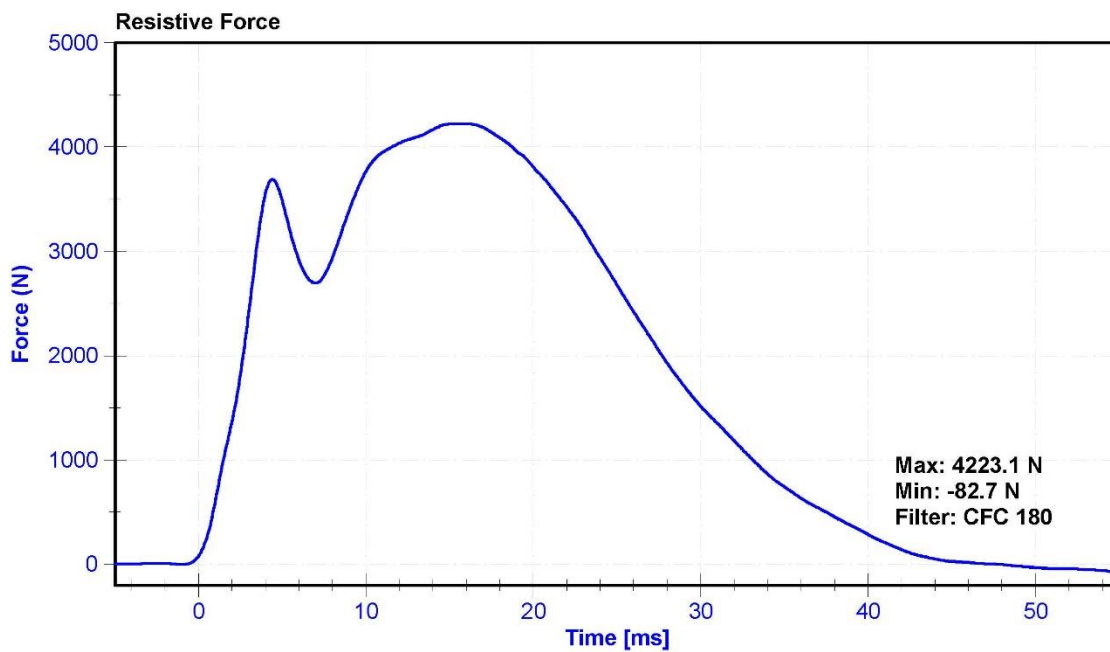
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	16.7	Pass
Velocity	6.59	6.83	m/s	6.699	Pass
Chest Deflection	-58	-50	mm	-52.8	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4216.6	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4223.1	Pass
Hysteresis	69	85	%	79.1	Pass

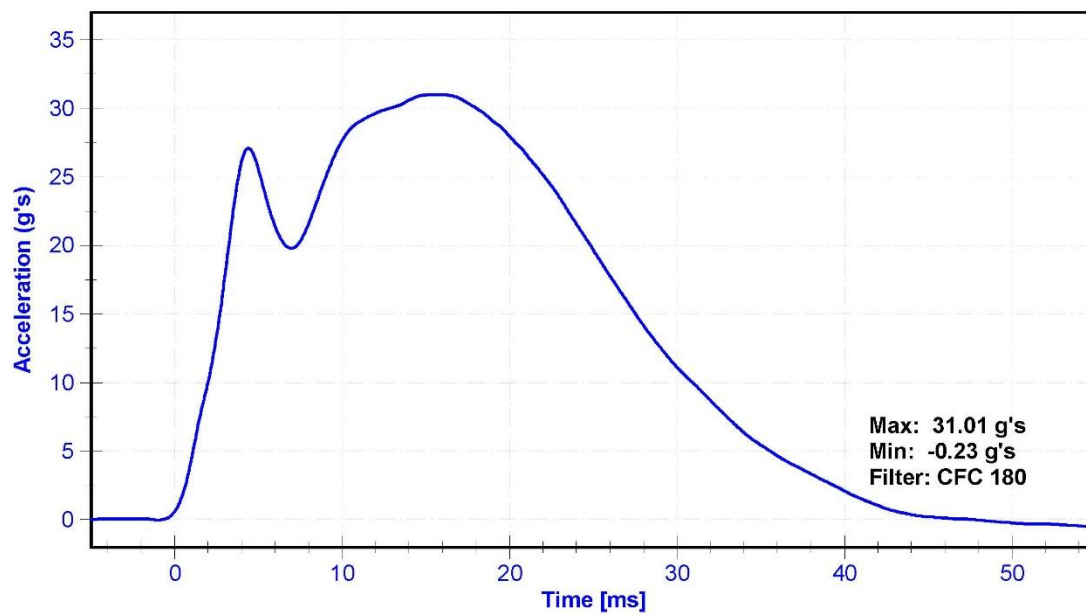
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Chest Potentiometer	Servo 14CB1	DS-CST324	6/30/2015	6/29/2016

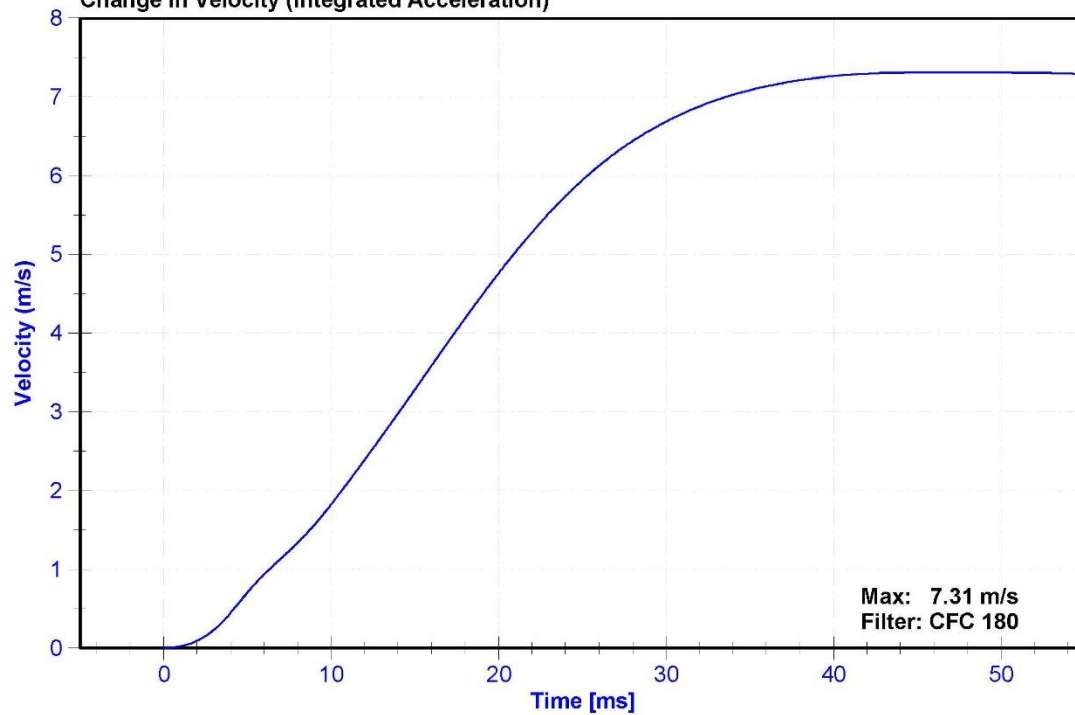




Probe Acceleration



Change in Velocity (Integrated Acceleration)



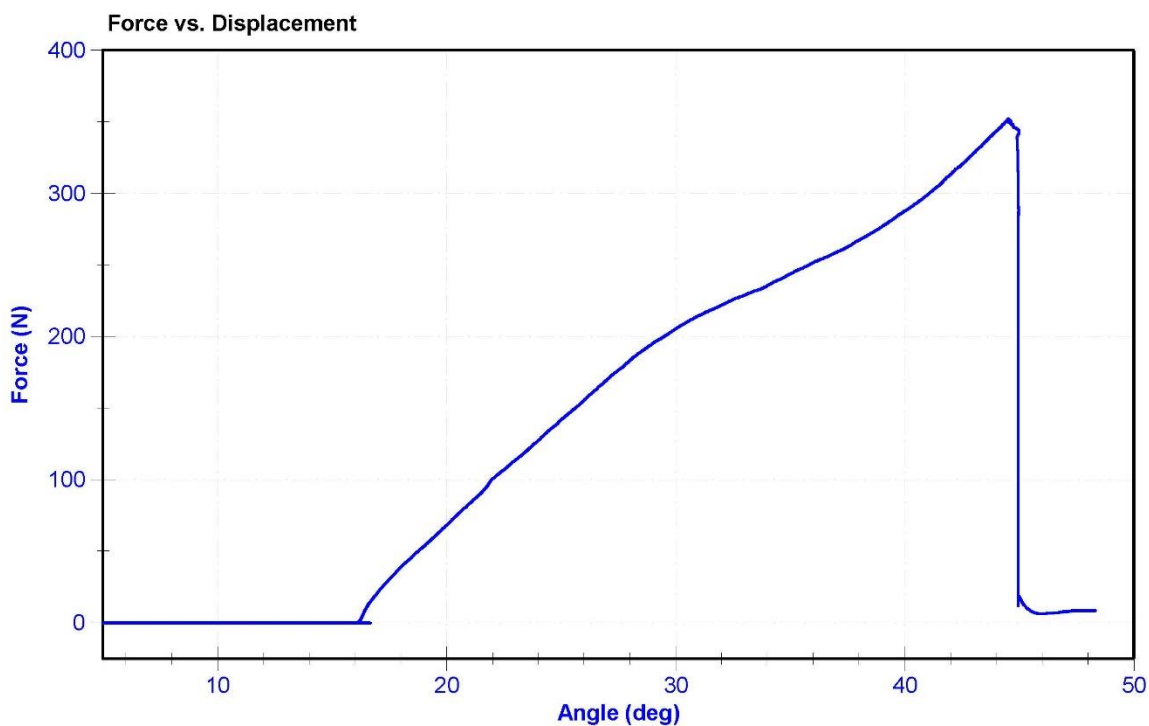
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	324	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	22.2	Pass
Humidity	10	70	%	17.2	Pass
Initial Angle	0	20	deg	15.6	Pass
Force at 45 Degrees	320	390	N	351.9	Pass
Return Angle Relative to Initial	0	8	deg	7.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	8/14/2015	8/13/2016
Load Cell	Interface SML-200	LC-493319	8/13/2015	8/12/2016



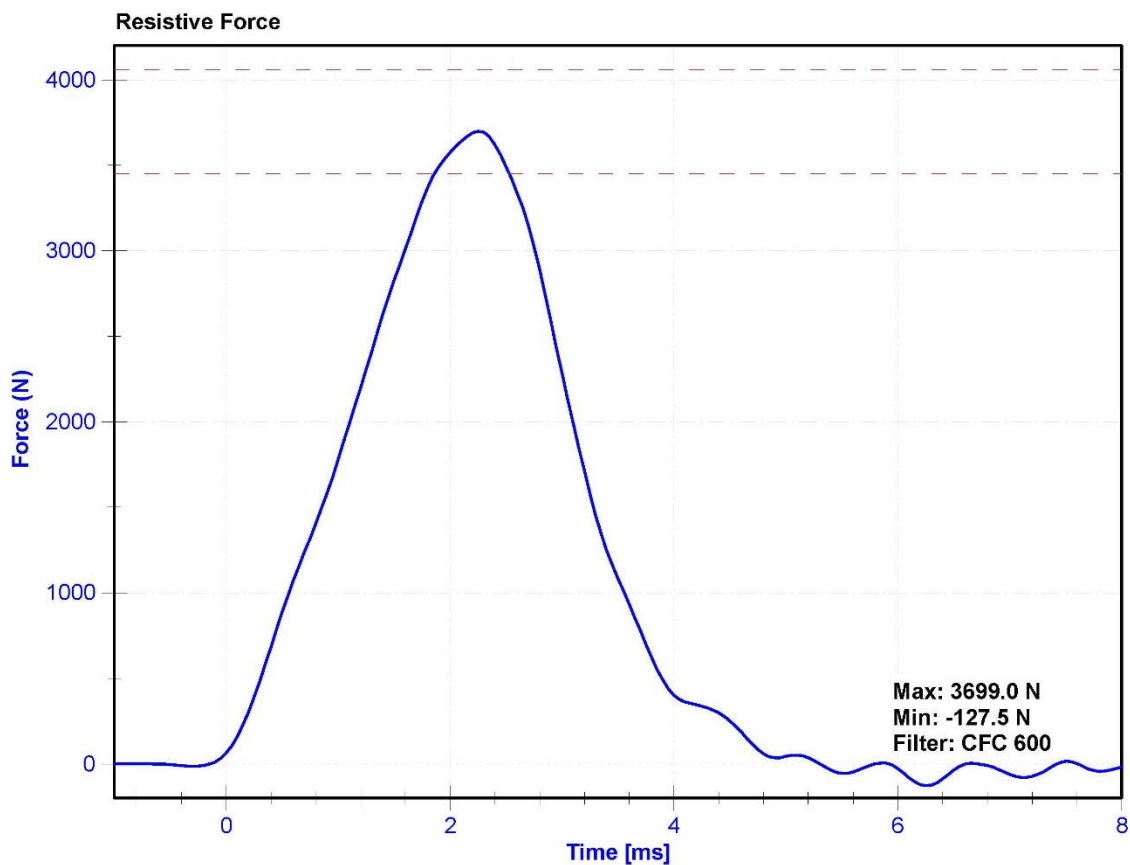
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	324	Laboratory Supervisor	M. Goehle

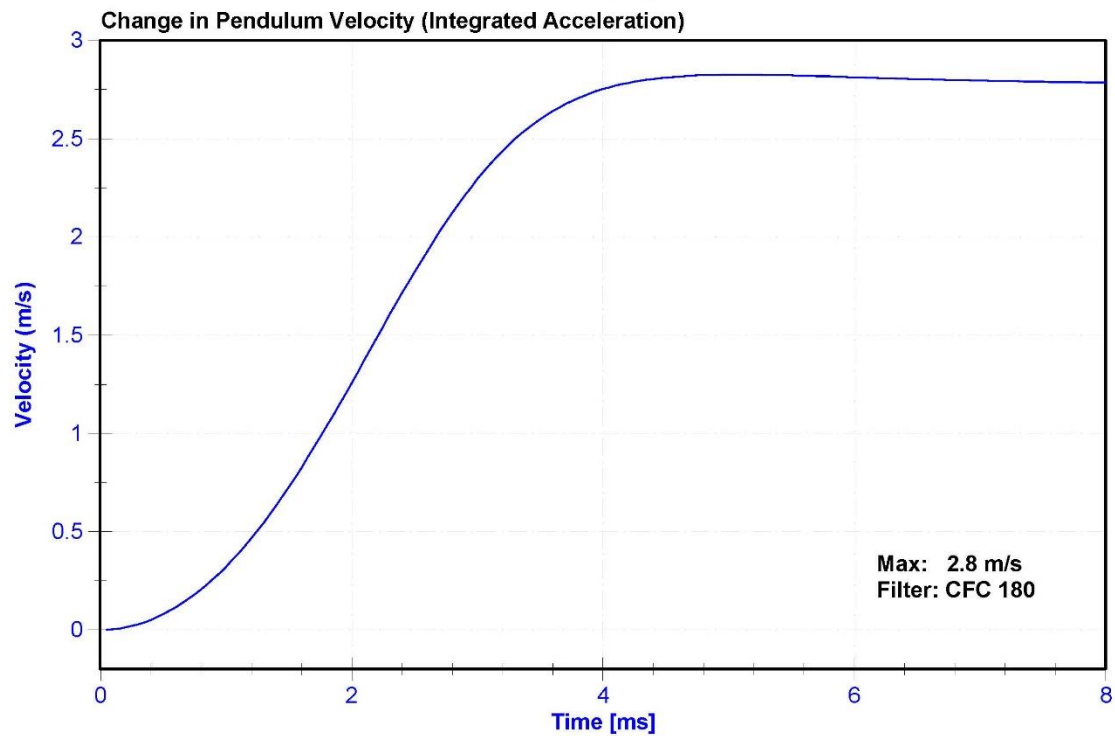
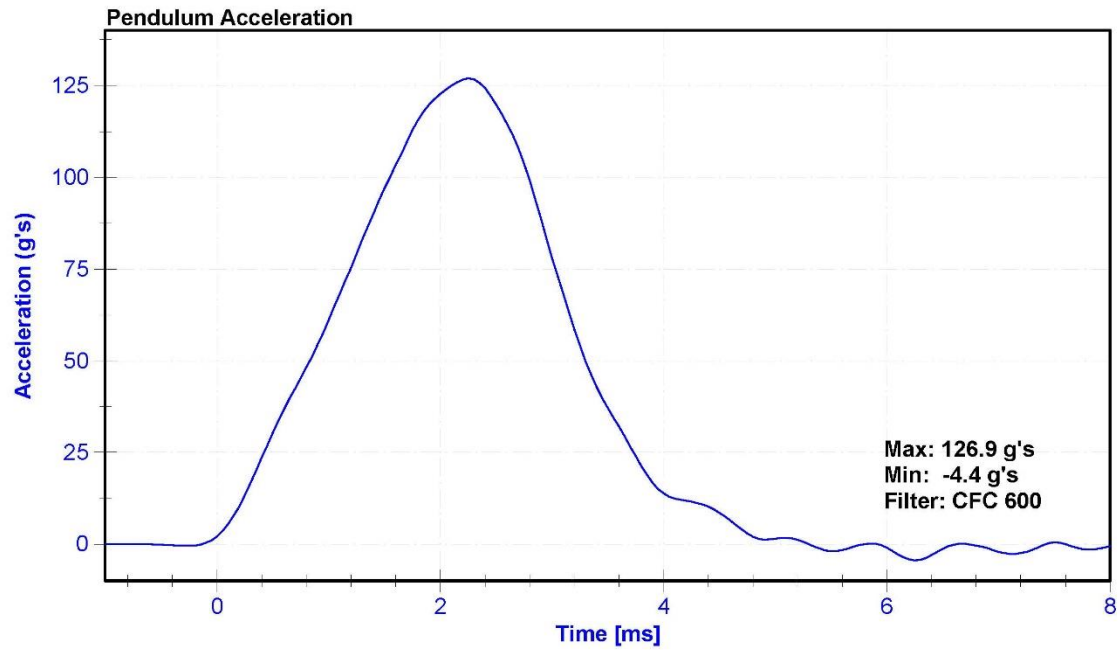
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	14.9	Pass
Velocity	2.07	2.13	m/s	2.088	Pass
Resistive Force	3450	4060	N	3699.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016





ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	324	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.3	Pass
Humidity	10	70	%	15.1	Pass
Velocity	2.07	2.13	m/s	2.088	Pass
Resistive Force	3450	4060	N	3657.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016

