

REPORT NUMBER: R&D-CAL-15-014

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

2016 Mazda CX-5

56.3 KPH RIGID BARRIER FRONTAL

TEST DATE: 9/23/2016

NHTSA No: M20165403

**CALSPAN CORPORATION
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FINAL REPORT SUBMITTED:

October 25, 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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STRUCTURAL AND RESTRAINTS RESEARCH DIVISION:

Date: _____

TOM, Vehicle Crash Testing
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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 Mazda CX-5 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 September 23, 2016. The vehicle's impact velocity was 56.29 KPH and the ambient temperature at the test vehicle at the time of impact was 21°C. The target vehicle post-test maximum crush was 558 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>149.08</td> <td>259.48</td> <td>570.79</td> </tr> <tr> <td>Brain Injury Criterion (BrIC)</td> <td>N/A</td> <td>0.65</td> <td>0.56</td> <td></td> </tr> <tr> <td>Abdomen Deflection</td> <td>mm</td> <td>-53.64</td> <td></td> <td></td> </tr> <tr> <td>Resultant Acetabulum Force</td> <td>N</td> <td>1687.57</td> <td></td> <td></td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>47.02</td> <td>-18.30</td> <td>-37.50</td> </tr> <tr> <td>Neck Injury Criteria (Nij)</td> <td>N/A</td> <td>0.76</td> <td>0.30</td> <td>1.13</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>1671.66</td> <td>662.52</td> <td>2930.05</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>-299.08</td> <td>-809.22</td> <td>-976.65</td> </tr> <tr> <td>Tibia Index</td> <td>N/A</td> <td>0.54</td> <td>2.18</td> <td></td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>-2897.46</td> <td>-509.43</td> <td>-138.20</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>-2526.17</td> <td>-392.82</td> <td>-405.48</td> </tr> </tbody> </table>					Measurement Description	Units	Driver	Front Passenger	Rear Passenger	Head Injury Criteria (HIC ₁₅)	N/A	149.08	259.48	570.79	Brain Injury Criterion (BrIC)	N/A	0.65	0.56		Abdomen Deflection	mm	-53.64			Resultant Acetabulum Force	N	1687.57			Maximum Chest Compression	mm	47.02	-18.30	-37.50	Neck Injury Criteria (Nij)	N/A	0.76	0.30	1.13	Neck Tension	N	1671.66	662.52	2930.05	Neck Compression	N	-299.08	-809.22	-976.65	Tibia Index	N/A	0.54	2.18		Left Femur Force	N	-2897.46	-509.43	-138.20	Right Femur Force	N	-2526.17	-392.82	-405.48
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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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Transportation Test Operations

Date: October 25, 2016

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 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

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SECTION 1
PURPOSE OF TEST

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

This 56.3 kph (35 mph) test vehicle into a rigid barrier is part of the Frontal Rigid Barrier Test 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 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

A rigid fixed barrier was impacted by a 2016 Mazda CX-5 at a velocity of 56.29 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on September 23, 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. DO9798), 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 (Serial No. 513), 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 (Serial No. 517) 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. DO9798), right-front passenger (position 2) ATD (Serial No. 513), and the rear passenger ATD (Serial No. 517) 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 twenty (220) channels of data from the ATD's and test vehicle were collected using Kayser – Threde 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 558 mm at the vehicle's centerline. Full vehicle measurements are presented in Section 3 of this report.

SECTION 2 (CONTINUED)
SUMMARY OF TEST

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

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

Structure observations include the following:

- Windshield had some minor cracks
- Hood bent inwards and engine went into firewall

The driver ATD's visible contact points were:

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

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

- Head contacted the frontal airbag and headrest
- Torso contacted the frontal airbag

The rear passenger ATD's visible contact points were:

- Head contacted her chest then the seatback

SECTION 2 (CONTINUED)
CRASH VEHICLE SUMMARY

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

Primary Impact Data

Measured Parameter	Units	Value
Test Vehicle Velocity at Impact	kph	56.29
Vehicle Test Weight	kg	1797
Vehicle Maximum Static Crush	mm	558
Number of Data Channels		220
Number of Real-Time Cameras		1
Number of High-Speed Cameras		16

GENERAL COMMENTS:

1. P1 (Driver) serial number – DO9798
2. P2 (Passenger) serial number – 513
3. P3 (Rear Passenger) serial number – 517

Data Anamolies:

- Driver Abdomen Left X Displacement, Questionable spikes throughout
- Driver Pelvis Y Acceleration, Questionable data throughout
- Driver Pelvis Z Acceleration, Questionable data throughout
- Front Passenger Left Lower Tibia X Force, Questionable data 60ms to 62ms
- Vehicle CG Z Acceleration, Questionable spikes 72ms to 146ms

PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: M20165403 - 2016 Mazda CX-5 NHTSA No.: M20165403
 Test Program: NHTSA R&D Frontal Rigid Barrier Test Date: 9/23/2016

Driver: THOR Serial No. DO9798 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	HIC 15ms		Compute	149.08	
	Brain Injury Criteria (BrIC)		Compute	0.65	
	Head Rotational Velocity X	Deg/s	60	242.73	-246.21
	Head Rotational Velocity Y	Deg/s	60	974.01	-1951.81
	Head Rotational Velocity Z	Deg/s	60	588.48	-332.73
Neck	Upper Neck Z-axis Force	N	1000	1671.66	-299.08
	Upper Neck Y-axis Moment	Nm	Thortest	28.66	-18.84
Chest	Upper Left Resultant Chest Deflection	mm	Compute	30.72	
	Upper Right Resultant Chest Deflection	mm	Compute	47.02	
	Lower Left Resultant Chest Deflection	mm	Compute	18.31	
	Lower Right Resultant Chest Deflection	mm	Compute	26.80	
Abdomen	Lower Left X-axis Deflection	mm	Compute	81.24 ⁽¹⁾	-53.64 ⁽¹⁾
	Lower Right X-axis Deflection	mm	Compute	0.84	-53.43
Acetabulum	Left Acetabulum Resultant Force	N	Compute	1687.57	0.28
	Right Acetabulum Resultant Force	N	Compute	1168.35	0.68
Femur	Left Femur Force, FZ	N	600	288.10	-2897.46
	Right Femur Force, FZ	N	600	377.69	-2526.17
Tibia	Left Upper Tibia, FZ	N	600	54.63	-1753.00
	Left Upper Tibia Index		Compute	0.43	
	Right Upper Tibia, FZ	N	600	161.78	-2089.94
	Right Upper Tibia Index		Compute	0.49	
	Left Lower Tibia, FZ	N	600	87.04	-2771.02
	Left Lower Tibia Index		Compute	0.44	
	Right Lower Tibia, FZ	N	600	63.33	-3282.92
	Right Lower Tibia Index		Compute	0.54	
Ankle	Left Ankle Rotation, RX	Deg	180	8.00	-7.08
	Left Ankle Rotation, RY	Deg	180	26.39	-2.93
	Left Ankle Dorsiflexion Moment, MY	Nm	Compute	22.91	-3.11
	Left Ankle In/Eversion Moment, MX	Nm	Compute	33.16	-13.88
	Right Ankle Rotation, RX	Deg	180	-4.56	-48.73
	Right Ankle Rotation, RY	Deg	180	18.36	-12.04
	Right Ankle Dorsiflexion Moment, MY	Nm	Compute	30.50	-20.28
	Right Ankle In/Eversion Moment, MX	Nm	Compute	38.15	-70.45

Anomalies:

(1) Questionable spikes throughout

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: M20165403 - 2016 Mazda CX-5 NHTSA No.: M20165403
 Test Program: NHTSA R&D Frontal Rigid Barrier Test Date: 9/23/2016

Right Front Passenger: HF Serial No. 513 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	15 ms HIC		Compute	259.48	
	Brain Injury Criteria (BrIC)		Compute	0.56	
Neck	Upper Neck Force Z	N	1000	662.52	-809.22
	Upper Neck Moment Y	Nm	600	34.00	-12.84
	NIJ		Compute	0.30	
Chest	Chest Potentiometer Deflection	mm	600		-18.30
	Chest Resultant Acceleration	g	Compute	60.43	
	Chest Resultant Acceleration, 3 ms clip	g	Compute	54.59	
Pelvis	Pelvis Resultant Acceleration	g	Compute	60.66	
Femur	Left Femur Force, FZ	N	600	1494.41	-509.43
	Right Femur Force, FZ	N	600	1711.77	-392.82
Tibia	Left Upper Tibia, FZ	N	600	914.88	-2129.07
	Left Upper Tibia Index		Compute	1.46	
	Right Upper Tibia, FZ	N	600	1077.29	-1825.28
	Right Upper Tibia Index		Compute	0.78	
	Left Lower Tibia, FZ	N	600	786.50	-2336.02
	Left Lower Tibia Index		Compute	2.18	
	Right Lower Tibia, FZ	N	600	818.13	-1736.43
	Right Lower Tibia Index		Compute	1.74	
Anomalies None					

PRELIMINARY INJURY SUMMARY: Right Rear Passenger

Test Vehicle: M20165403 - 2016 Mazda CX-5 NHTSA No.: M20165403
 Test Program: NHTSA R&D Frontal Rigid Barrier Test Date: 9/23/2016

Right Rear Passenger: HF Serial No. 517 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	15 ms HIC		Compute	570.79	
Neck	Upper Neck Force Z	N	1000	2930.05	-976.65
	Upper Neck Moment Y	Nm	600	37.25	-60.91
	NIJ		Compute	1.13	
Chest	Chest Potentiometer Deflection	mm	600		-37.50
	Chest Resultant Acceleration	g	Compute	56.83	
	Chest Resultant Acceleration, 3 ms clip	g	Compute	55.33	
Pelvis	Pelvis Resultant Acceleration	g	Compute	63.70	
	Left ASIS Force X	N	600	176.93	-4763.55
	Right ASIS Force X	N	600	36.53	-4800.89
Femur	Left Femur Force Z	N	600	2523.96	-138.20
	Right Femur Force Z	N	600	2254.15	-405.48
Anomalies None					

SECTION 3 DATA SHEETS

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
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DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

VEHICLE INFORMATION

NHTSA No.	M20165403
Model Year	2016
Make	Mazda
Model	CX-5
Body Style	SUV
VIN	JM3KE4BY8G0846222
Body Color	Charcoal Gray
Odometer Reading (km/mi)	22.5 km / 14 mi
Engine Displacement. (L)	2.0
Type/No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	AWD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
All-Wheel Drive (AWD)	Yes
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	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	No
Pass. Front Airbag	Yes
Pass. Curtain Airbag	Yes
Pass. Head/Torso Airbag	No
Pass. Torso Airbag	No
Pass. Torso/Pelvis Airbag	Yes
Pass. Pelvis Airbag	No
Pass. Knee Airbag	No
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?

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Mazda Motor Corporation
Date of Manufacture	07/16

GWR (kg)	2071
GAWR Front (kg)	1056
GAWR Rear (kg)	1018

VEHICLE SEATING AND WEIGHT CAPACITY

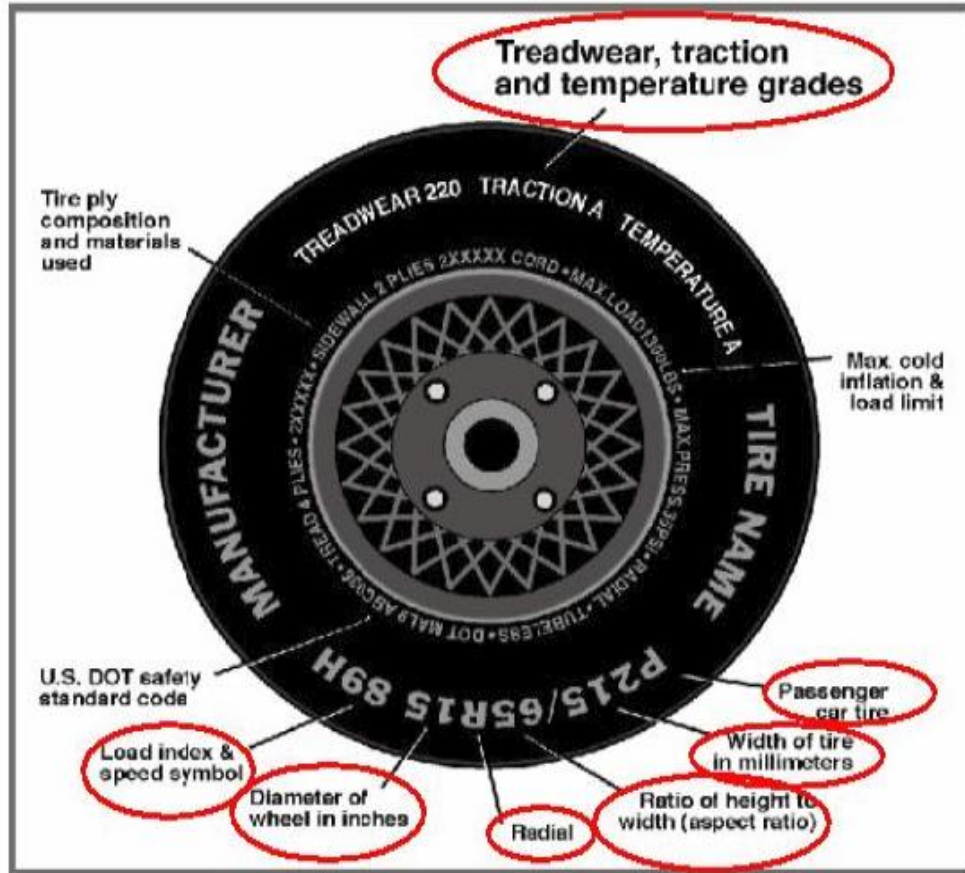
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	-	
Number of Occupants	2	3	-	5
Capacity Wt. (VCW) (kg)				385
Cargo Wt. (RCLW) (kg)				44.8

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

Test Vehicle: 2016 Mazda CX-5
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Collect items circled in red, tire manufacturer, and tire name.



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	230	230
Recommended Tire Size	P225/65R17	P225/65R17
Tire Size on Vehicle	P225/65R17	P225/65R17
Tire Manufacturer	Yokohama	Yokohama
Tire Model	Geolandar	Geolandar
Treadwear	280	280
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	100H	100H
Tire Material	Rubber	Rubber
DOT Safety Code Right	FDF5PC52816	FDF5PC52816
DOT Safety Code Left	FDF5PC52816	FDF5PC52816

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

Test Vehicle: 2016 Mazda CX-5
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TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	467	321		509	400	
Right	kg	427	334		479	409	
Ratio	%	58	42		55	45	
Totals	kg	894	655	1549	988	809	1797

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1549
Weight of 1 THOR & 2 HIII 5 th Females	kg	211
Rated Cargo/Luggage Weight (RCLW)	kg	44.8
Calculated Vehicle Target Weight (TVTW)	kg	1804.8

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	830	841	866	870	1140
As Tested	mm	809	814	805	809	1213
Post Test	mm	818	844	817	802	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2696
Total Vehicle Length at Left Side	mm	4408
Total Vehicle Length at Centerline	mm	4546
Total Vehicle Length at Right Side	mm	4408
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	86
Amount of Stoddard Solvent in Fuel Tank	L	19.3

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Rear hatch, bumper fascia, bumper beam, trunk carpeting, spare tire, jack, tail light,
Under panels, door internals.

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

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Units	Pre-Test
1	Total Length	mm	4546
2	Total Width	mm	1830
3*	Bumper Top Height	mm	69
4*	Bumper Bottom Height	mm	149
5*	Longitudinal Member Top Height	mm	45
6	Distance Between Longitudinal Members	mm	1002
7	Longitudinal Member Width	mm	42
8*	Engine Top Height	mm	-221
9*	Engine Bottom Height	mm	401
10	Engine and Gearbox Width	mm	567
11	Front Bumper-Engine Distance	mm	597
12*	Front Shock Absorber Fixing Height	mm	-341
13*	Bonnet Leading Edge Height	mm	-221
14	Front Shock Absorber Fixing Width	mm	1181
15	Front Bumper – Front Axle Distance	mm	938
16	Front Axle – A Pillar Distance	mm	549
17	A-Pillar – B-Pillar Distance	mm	1089
18	B-Pillar – Rear Axle Distance	mm	1056
19	B-Pillar – C-Pillar Distance	mm	915
20*	Roof Sill Bottom Height	mm	1549
21*	Roof Sill Top Height	mm	1605
22*	Floor Sill Bottom Height	mm	376
23*	Floor Sill Top Height	mm	497

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

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. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

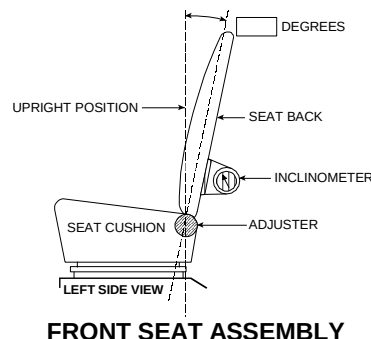
NHTSA No.: M20165403
 Test Date: 9/23/2016

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 Procedures.

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



	Deg.
Driver Seat Back Angle	7.2*
Passenger Seat Back Angle	3.5
Rear Passenger Seat Back Angle	FIXED

*Seat back was reclined for THOR positioning.

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.

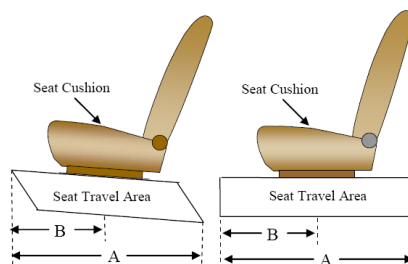
	Total Fore/Aft Travel	Placed in Position #
Driver Seat	27	13
Passenger Seat	27	13
Rear Passenger Seat	FIXED	FIXED

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	4	0 – Uppermost
Passenger Seat	4	0 – Uppermost
Rear Passenger Seat	FIXED	FIXED



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

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

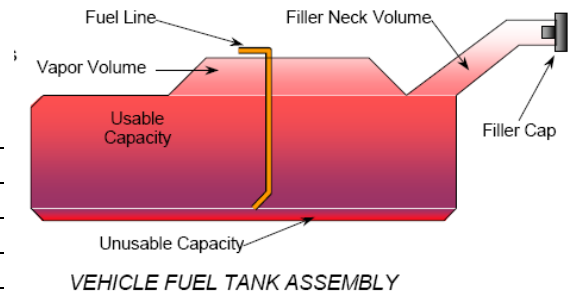
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	58
Usable Capacity of "Optional Tank"	
93% of Usable Capacity	53.9
Actual Amount of Solvent Used	19.3
1/3 of Usable Capacity	19.3

FUEL PUMP

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

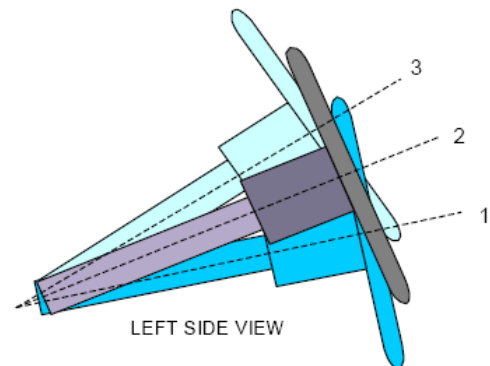
Fuel evacuated according to the specifications provided by the manufacturer in Form 1. Electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the left rear wheel.



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 ASSEMBLY

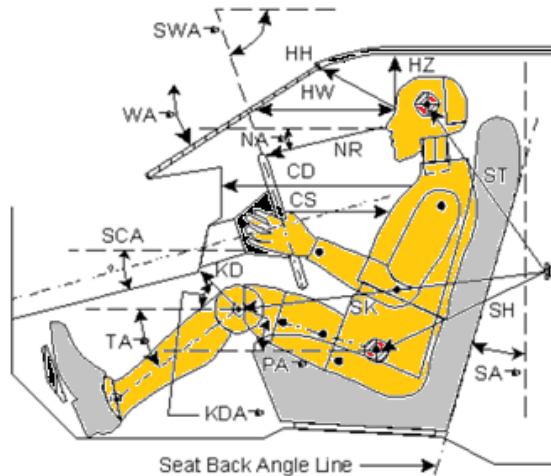
STEERING COLUMN POSITIONS

	Tilt (degrees)	Fore/Aft Position (mm)
Lowermost position No. 1	22.8	
Geometric center position No. 2	25.15	
Uppermost position No. 3	27.5	
Telescoping Steering Wheel Travel		50
Test Position	25.2	25

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

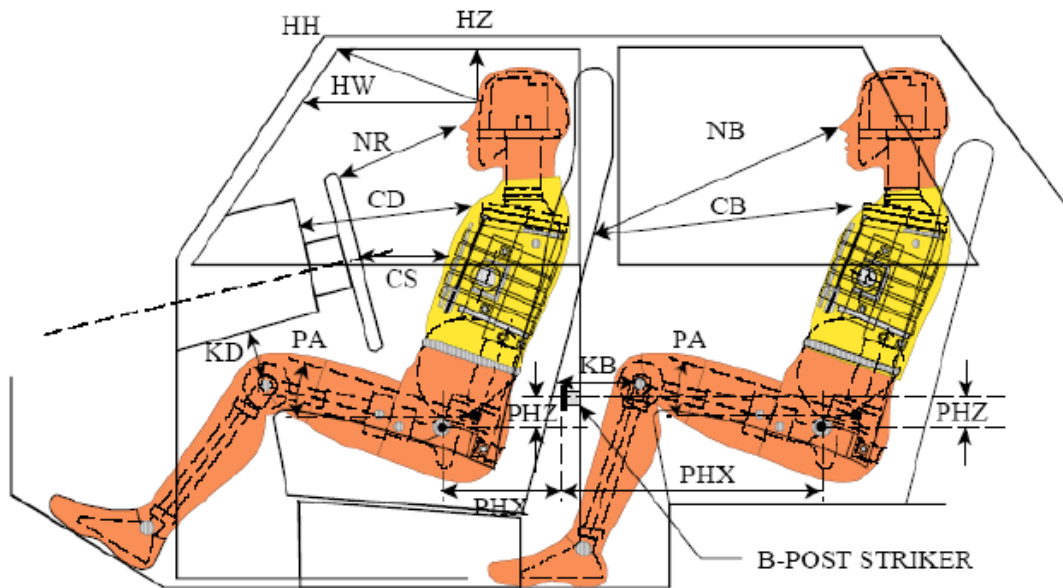


Code	Measurement Description	Driver (Serial# THOR DO9798)		Front Passenger (Serial # 513)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		32.4		
SWA°	Steering Wheel Angle		25.2		
SCA°	Steering Column Angle		64.8		
SA°	Seat Back Angle (on headrest post)		7.2		3.5
HZ	Head to Roof (Z)	228	90	269	90
HH	Head to Header	432	21	400	35.5
HW	Head to Windshield	713	0	767	0
NR	Nose to Rim	513	18	523	30.8
CD	Chest to Dash	584		470	
CS	Chest to Steering Hub	365	9.7		
RA	Rim to Abdomen	182	0		
KDL	Left Knee to Dash	116	6.9	166	43.7
KDR	Right Knee to Dash	85	23.6	180	27.2
PA°	Pelvic Angle		34.6		19.3
TA°	Tibia Angle		55		47.8
SK	Striker to Knee	650	2.3	602	10.5
ST	Striker to Head	512	87.4	444	73.8
SH	Striker to H-Point	280	29.3	297	30.1
HAX°	Head Angle (X)		0.3		
HAY°	Head Angle (Y)		-3.2		
TAX°	T6 Angle (X)		0.4		
TAY°	T6 Angle (Y)		22.9		
TAX°	T1 (X)		0.3		
TAY°	T1 (Y)		1.7		
TAX°	T12 (X)		0.2		
TAY°	T12 (Y)		32.6		
PAX°	Pelvis (X)		0.1		
PAY°	Pelvis (Y)		34.6		

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

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016



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 # 517)	
		Length (mm)	Angle (°)
SA°	Seat Back Angle (on headrest post)		13.7
HZ	Head to Roof (Z)	317	
NB	Nose to Seatback	543	
CB	Chest to Seatback	560	
KDL	Left Knee to Seatback	302	22.5
KDR	Right Knee to Seatback	299	22.7
PAX°	Pelvic Tilt Angle (X-axis)		19.5
PAY°	Pelvic Tilt Angle (Y-axis)		0.3
PHX	Hip Point to Striker (X-Axis)	281	
PHZ	Hip Point to Striker (Z-Axis)	265	
HB	Head to Seatback	582	0

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

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

MEASUREMENT LOCATIONS

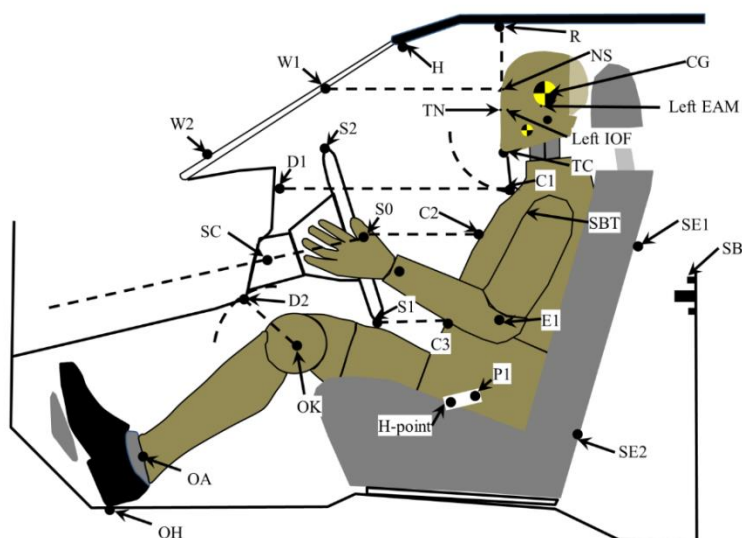


DIAGRAM #1

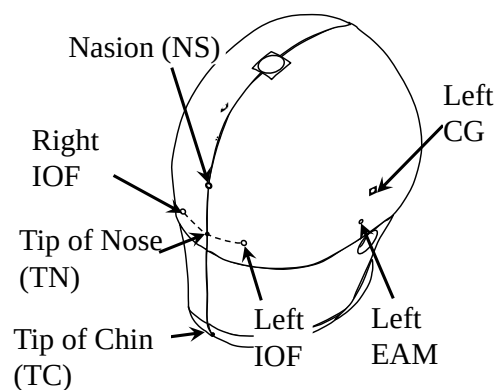


DIAGRAM #2

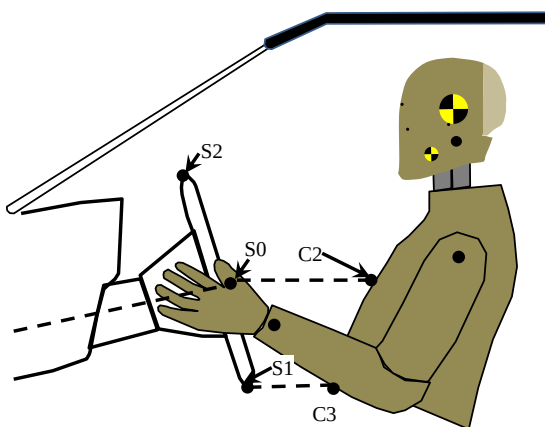


DIAGRAM #3

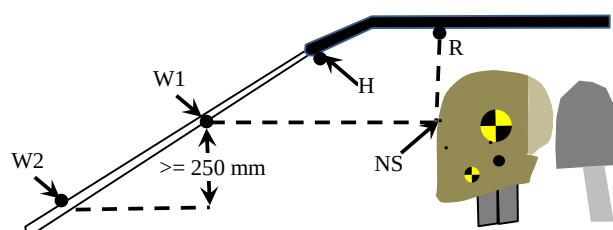


DIAGRAM #4

DATA SHEET NO.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

DRIVER MEASUREMENT PONITS

Description	Units	Driver		
		X	Y	Z
Tip of Striker	mm	2075	-801	-195
Top of Head Restraint	mm	1943	-370	-844
Outboard Head Restraint Post	mm	1901	-451	-578
Head CG	mm	2098	-451	-706
Nasion	mm	2191	-371	-711
Tip of Nose	mm	2190	-371	-674
Tip of Chin	mm	2184	-372	-577
LEAM	mm	2104	-445	-678
LIOF	mm	2187	-404	-674
RIOF	mm	2187	-341	-674
Outboard Elbow	mm	2318	-615	-244
H-Point	mm	2319	-700	-58
Center of H-Point Tool	mm	2244	-626	-85
Left Knee	mm	2708	-596	-174
Right Knee	mm	2724	-291	-169
Left Ankle	mm	2961	-600	165
Right Heel	mm	2984	-569	305
Left Heel	mm	2930	-200	310
W1 – Upper Windshield	mm	2902	-372	-711
W2 – Lower Windshield	mm	3066	-371	-611
Header	mm	2592	-370	-867
Head to Roof	mm	2193	-371	-942
C1- Upper Chest	mm	2233	-371	-445
C2 – Mid Chest	mm	2249	-372	-403
C3 – Lower Chest	mm	2348	-371	-243
S2 – Top Steering Wheel Rim	mm	2678	-370	-558
S1 – Lower Steering Wheel Rim	mm	2529	-371	-247
SC – Steering Column	mm	2794	-489	-308
D1 – Dash Point	mm	2618	-370	-445
D2 – Knee Bolster	mm	2826	-596	-178
SE1 – Seatback Point	mm	1858	-370	-560
SE2 – Seatback Point	mm	2027	-372	-6
Left Front Outboard Seat Anchor Bolt	mm	2548	-610	205
Left Rear Outboard Seat Anchor Bolt	mm	2106	-611	229

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.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

FRONT PASSENGER MEASUREMENT POINTS

Description	Units	Front Passenger		
		X	Y	Z
Tip of Striker	mm	2073	798	-194
Top of Head Restraint	mm	1997	370	-803
Outboard Head Restraint Post	mm	1937	452	-597
Head CG	mm	2197	445	-620
Bridge of Nose	mm	2279	370	-630
Tip of Nose	mm	2299	370	-601
Tip of Chin	mm	2280	371	-521
Outboard Shoulder Bolt	mm	2178	530	-391
Outboard Elbow	mm	2243	598	-186
H-Point	mm	2330	625	-45
Center of H-Point Tool	mm	2245	622	-82
Left Knee	mm	2663	313	-83
Right Knee	mm	2665	473	-84
Left Ankle	mm	2834	302	184
Right Ankle	mm	2846	465	186
Left Heel	mm	2793	272	288
Right Heel	mm	2791	453	285
W1 – Upper Windshield	mm	3043	371	-628
W2 – Lower Windshield	mm	3199	369	-527
Header	mm	2592	370	-869
Head up to Roof	mm	2280	370	-912
C1 - Upper Chest	mm	2289	371	-390
D1 - Dash Point	mm	2788	372	-391
D2 - Dash Bolster	mm	2824	486	-174
SE1 - Seat Back Point	mm	1894	371	-590
SE2 - Seat Back Point	mm	2042	370	-39
Right Front Outboard Seat Anchor Bolt	mm	2548	608	206
Right Rear Outboard Seat Anchor Bolt	mm	2105	608	229

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.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

Description	Units	Rear Passenger		
		X	Y	Z
Tip of Striker	mm	1117	796	-331
Top of Head Restraint	mm	1019	350	-761
Outboard Head Restraint Post	mm	990	419	-607
Head CG	mm	1249	430	-629
Bridge of Nose	mm	1328	350	-639
Tip of Nose	mm	1348	350	-611
Tip of Chin	mm	1331	351	-536
Outboard Shoulder Bolt	mm	1236	513	-392
Outboard Elbow	mm	1257	581	-175
H-Point	mm	1398	567	-66
Center of H-Point Tool	mm	1312	580	-98
Left Knee	mm	1729	295	-92
Right Knee	mm	1731	463	-97
Left Ankle	mm	1865	284	198
Right Ankle	mm	1865	467	201
Left Heel	mm	1800	252	297
Right Heel	mm	1797	433	300
Head up to Roof	mm	1329	350	-956
C1 - Upper Chest	mm	1342	350	-406
D1 - Dash Point	mm	1941	351	-406
D2 - Dash Bolster	mm	1999	466	-214
SE1 - Seat Back Point	mm	952	351	-583
SE2 - Seat Back Point	mm	1125	350	-152
Head to Seatback Point	mm	1905	351	-638

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.

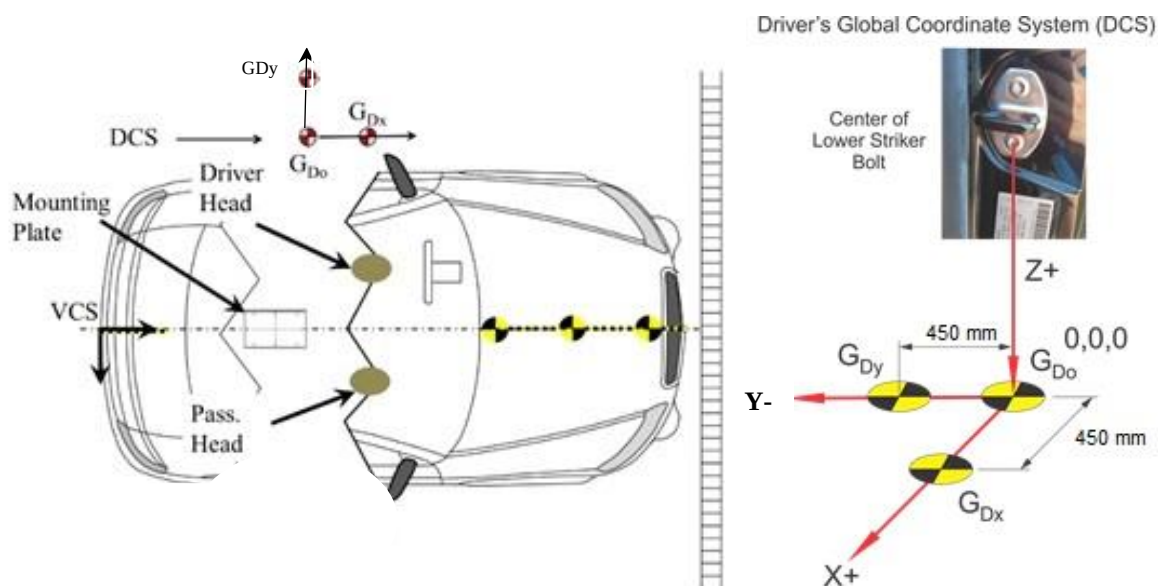
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO.3 (CONTINUED) DUMMY CMM MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

DRIVER GLOBAL COORDINATE SYSTEM



Driver ATD Measurement Points

Measurement Points	Units	Measurements (mm)		
		X	Y	Z
Head CG	mm	23	351	-1372
Nasion	mm	116	430	-1377
Tip of Nose	mm	115	430	-1340
Tip of Chin	mm	109	430	-1243
LEAM	mm	29	357	-1344
LIOF	mm	112	398	-1340
RIOF	mm	112	461	-1339

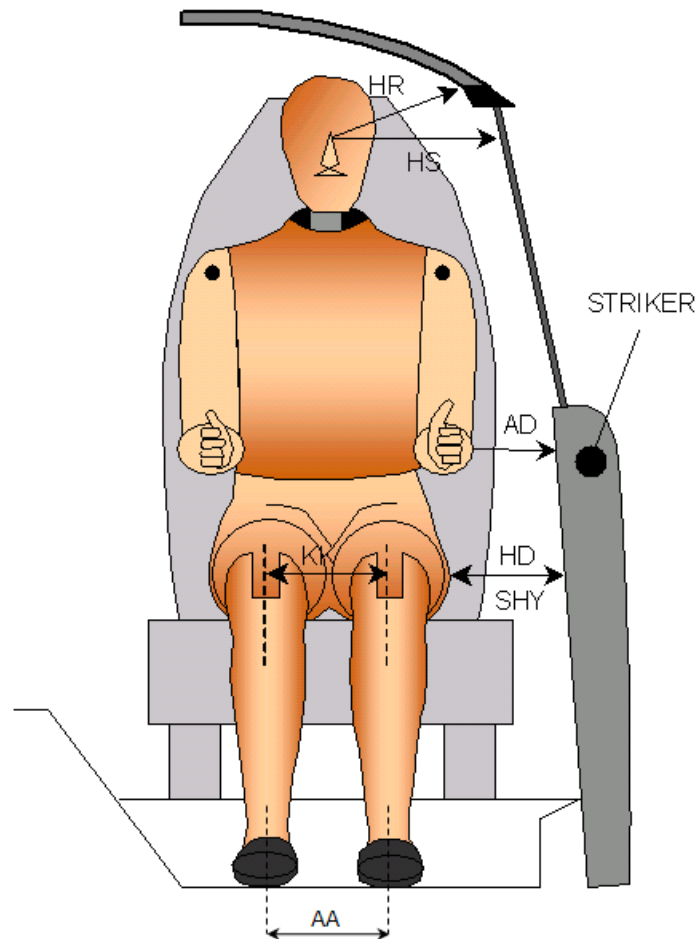
Reference point:

- +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 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

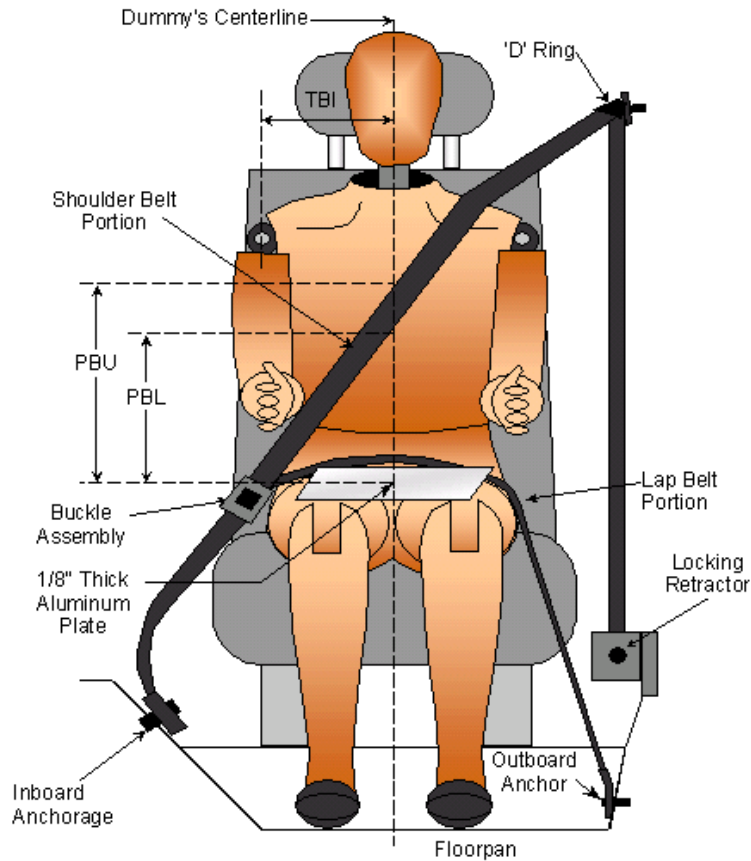


Code	Description	Units	Driver	Front Passenger	Rear Passenger
AD	Arm to Door	mm	143	94	122
HD	H-Point to Door	mm	190	241	204
HR	Head to Side Header	mm	235	288	283
HS	Head to Side Window	mm	345	378	370
KK	Knee to Knee	mm	340	168	165
SHY	Striker to H-Point (Y Direction)	mm	240	280	290
AA	Ankle to Ankle	mm	342	169	165

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger	Rear Pass.
PBU — Top surface of reference to belt upper edge	mm	380	310	325
PBL — Top surface of reference to belt lower edge	mm	305	235	250

BELT LENGTH DATA

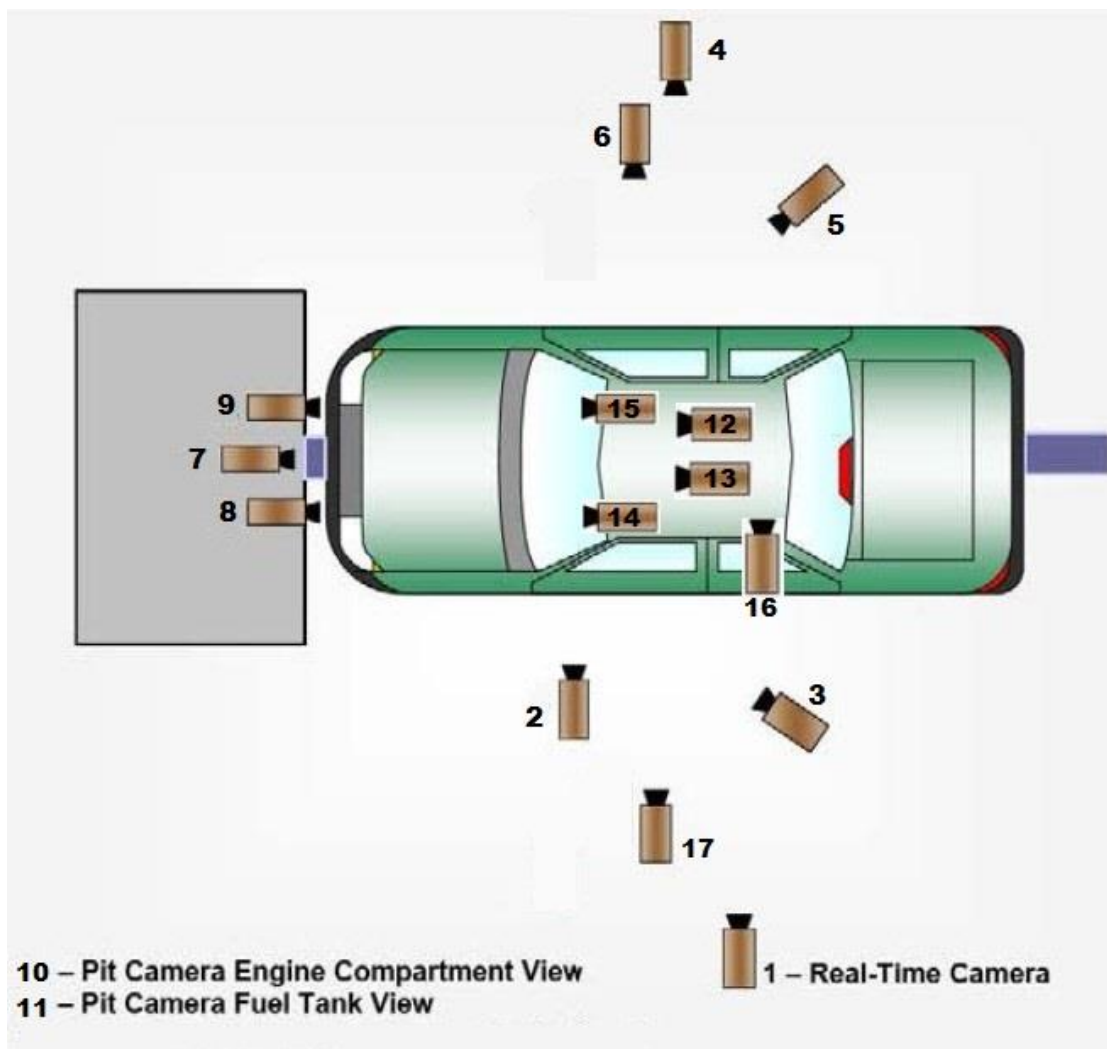
Measurement Description	Units	Driver	Passenger	Rear Pass.
Shoulder belt length as measured on ATD	mm	875	915	1000
Lap Belt Length as measured on ATD	mm	815	760	660
Remainder of belt on reel	mm	910	925	1040
Total belt length for continuous webbing systems	mm	2600	2600	2700

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

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

HORIZONTAL LOCATION



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

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

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	-1052	-6475	-1269	28	1000
3	Left Angle	-2565	-3041	-2283	24	1000
4	Right Overall	-2495	9906	-1272	24	1000
5	Right Angle	-2584	2744	-2193	24	1000
6	Right Front Half	-1158	6421	-1233	24	1000
7	Windshield	173	0	-3561	20	1000
8	Driver Windshield	-395	-624	-2023	12.5	1000
9	Passenger Windshield	-344	662	-2031	12.5	1000
10	Pit Front	-617	0	1898	13	1000
11	Pit Rear	-3104	0	1898	13	1000
12	Onboard Driver Airbag	-2883	275	-1456	8	1000
13	Onboard Passenger Airbag	-2764	-315	-1500	8	1000
14	Onboard Driver Toepan	-1861	-434	-433	6.5	1000
15	Onboard Front Passenger Toepan	-1954	367	-438	6.5	1000
16	Onboard Rear Passenger Side View	-3031	-579	-1100	8	1000
17	Left Overall	-2471	-8085	-1467	24	1000

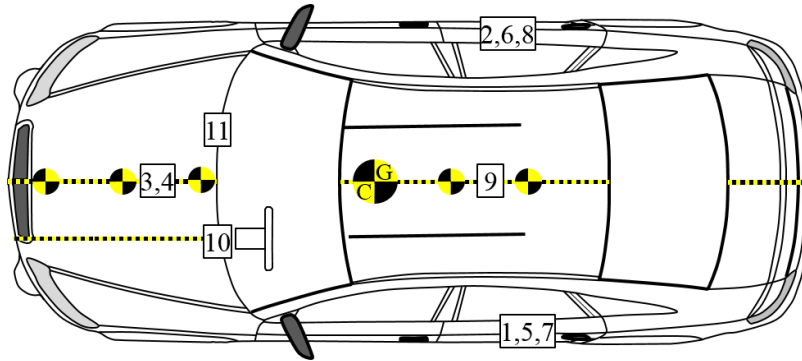
Reference Point:

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

DATA SHEET NO. 7
VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016



VEHICLE INSTRUMENTATION PRE-TEST LOCATIONS

No.	Instrumentation Location	Axes	Units	Measurements (mm)		
				X	Y	Z
1	Left Rear Seat Cross Member	X,Z	mm	1724	-417	278
2	Right Rear Seat Cross Member	X,Z	mm	1724	412	281
3	Top of Engine	X	mm	3666	134	-232
4	Bottom of Engine	X	mm	4097	104	400
5	Left Sill	X,Y	mm	1772	-686	233
6	Right Sill	X,Y	mm	1764	679	240
7	Left Rear Seat Cross Member Redundant	X,Z	mm	1724	-434	278
8	Right Rear Seat Cross Member Redundant	X,Z	mm	1724	436	272
9	Linear Acceleration & Angular Rate Sensor	X	mm	1850	-1	151
		Y	mm	1835	11	148
		Z	mm	1836	-1	143
10	Driver Toe Pan	X,Y,Z	mm	3359	-384	136
11	Front Passenger Toe Pan	X,Y,Z	mm	3337	310	48

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.

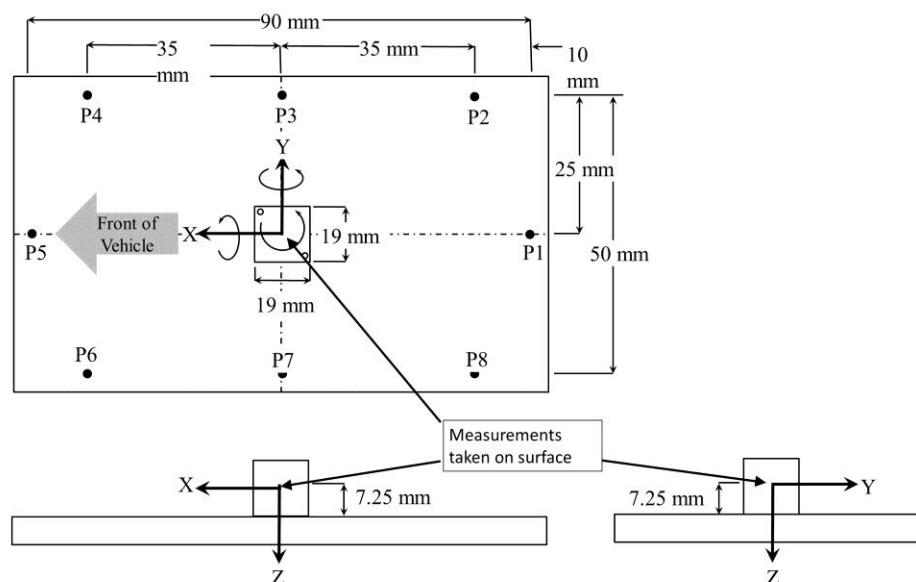
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO. 7 (CONTINUED) VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

ANGULAR RATE SENSOR



VEHICLE COORDINATE SYSTEM					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	1850	-1	151
ACC-2	Accelerometer CG – Y Direction	mm	1835	11	148
ACC-3	Accelerometer CG – Z Direction	mm	1836	-1	143
M1	Mounting Bolt 1	mm	1832	-9	146
M2	Mounting Bolt 2	mm	1843	1	146
P1	Plate Point 1	mm	1790	-1	161
P2	Plate Point 2	mm	1799	24	160
P3	Plate Point 3	mm	1834	24	160
P4	Plate Point 4	mm	1869	25	160
P5	Plate Point 5	mm	1880	0	159
P6	Plate Point 6	mm	1870	-25	160
P7	Plate Point 7		1835	-26	160
P8	Plate Point 8		1800	-26	160

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

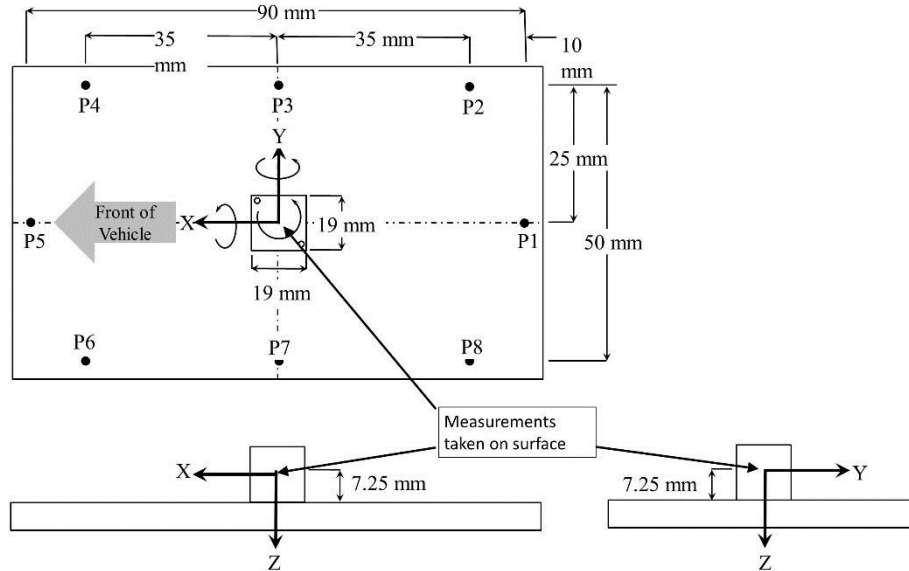
DATA SHEET NO. 7 (CONTINUED)

VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

ANGULAR RATE SENSOR



DRIVER GLOBAL COORDINATE SYSTEM					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	-225	800	-515
ACC-2	Accelerometer CG – Y Direction	mm	-239	813	-518
ACC-3	Accelerometer CG – Z Direction	mm	-239	800	-523
M1	Mounting Bolt 1	mm	-242	792	-520
M2	Mounting Bolt 2	mm	-232	803	-520
P1	Plate Point 1	mm	-285	801	-505
P2	Plate Point 2	mm	-275	826	-505
P3	Plate Point 3	mm	-240	826	-506
P4	Plate Point 4	mm	-205	826	-506
P5	Plate Point 5	mm	-195	801	-506
P6	Plate Point 6	mm	-205	776	-506
P7	Plate Point 7	mm	-240	776	-506
P8	Plate Point 8	mm	-275	776	-505

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

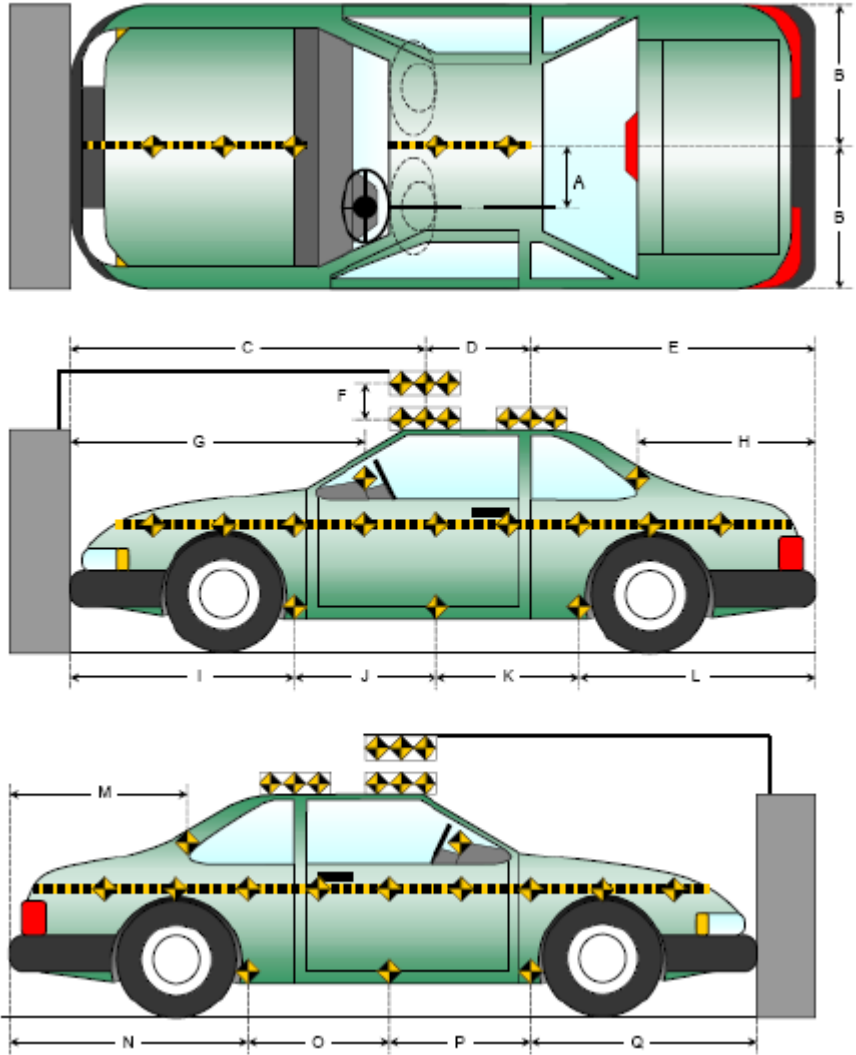
DATA SHEET NO. 8 **PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

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	375
B	915
C	2697
D	611
E	1227
F	201
G	1801
H	1048
I	1425
J	861
K	863
L	1386
M	1042
N	1383
O	864
P	859
Q	1429

All units in millimeters



DATA SHEET NO. 9
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2016 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	108
Passenger Dummy Accelerometers	36
Rear Passenger Dummy Accelerometers	36
Vehicle Structure Accelerometers	40
Total	220

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 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Right Front Passenger	Rear Passenger
Dummy Type/Serial No.	DO9798	513	517
Lower Leg Type	LX		
Lower Leg Serial No.	LX655/LX654		
Head Contact	Front Airbag & Headrest	Front Airbag & Headrest	Chest & Seatback
Upper Torso Contact	Front Airbag	Front Airbag	None
Lower Torso Contact	None	None	None
Left Knee Contact	Knee Bolster	None	None
Right Knee Contact	Knee Bolster	None	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	None	None	None
Glazing Damage	None	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Remained in good condition
Windshield Damage	Minor Cracks
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	635
Center	mm	685
Right Side	mm	642
Average	mm	654

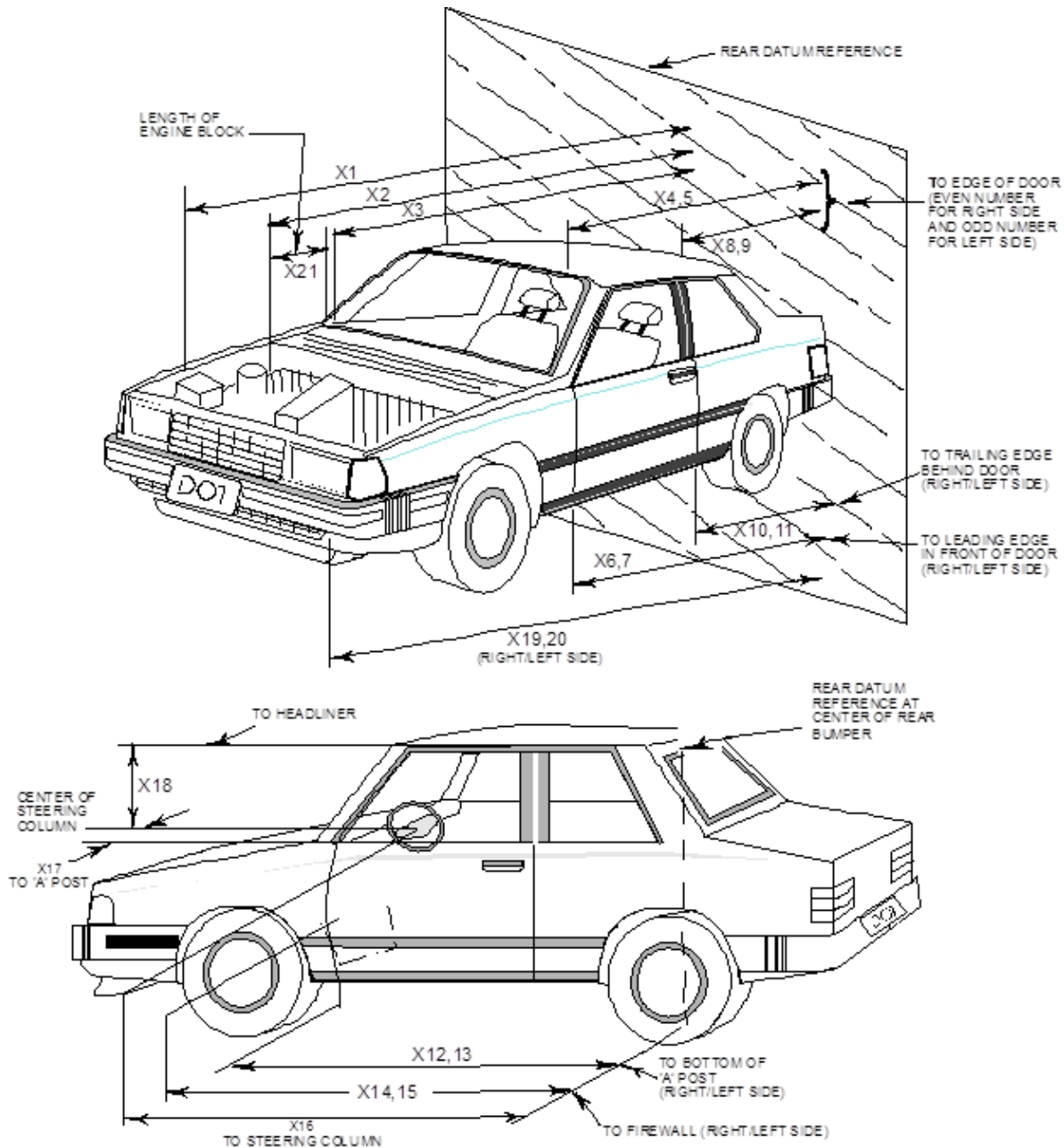
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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	No	Yes	No	Yes	No
Torso Airbag	Yes	No	Yes	No	No	N/A
Knee Airbag	No	N/A	No	N/A	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 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016



DATA SHEET NO. 11 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4546	3988	-558
2	Rear Surface of Vehicle (RSOV) to Front of Engine	mm	3949	3659	-290
3	RSOV to Firewall	mm	3567	3526	-41
4	RSOV to Upper Leading Edge of Right Door	mm	3056	3054	-1
5	RSOV to Upper Leading Edge of Left Door	mm	3058	3057	0
6	RSOV to Lower Leading Edge of Right Door	mm	3081	3077	-4
7	RSOV to Lower Leading Edge of Left Door	mm	3082	3080	-2
8	RSOV to Upper Trailing Edge of Right Door	mm	1975	1975	-1
9	RSOV to Upper Trailing Edge of Left Door	mm	1975	1975	-1
10	RSOV to Lower Trailing Edge of Right Door	mm	2030	2026	-4
11	RSOV to Lower Trailing Edge of Left Door	mm	2031	2029	-1
12	RSOV to Bottom of "A" Post of Right Side	mm	3097	3093	-4
13	RSOV to Bottom of "A" Post of Left Side	mm	3099	3098	-1
14	RSOV to Firewall, Right Side	mm	3562	3524	-38
15	RSOV to Firewall, Left Side	mm	3564	3558	-6
16	RSOV to Steering Column	mm	2600	2661	61
17	Center of Steering Column to "A" Post	mm	302	303	1
18	Center of Steering Column to Headliner	mm	448	510	62
19	RSOV to Right Side of Front Bumper	mm	4477	4089	-388
20	RSOV to Left Side of Front Bumper	mm	4479	4018	-461
21	Length of Engine Block	mm	308	308	0
RD	RSOV to Right Side of Dash Panel	mm	2822	2819	-3
CD	RSOV to Center of Dash Panel	mm	2735	2740	5
LD	RSOV to Left Side of Dash Panel	mm	2822	2824	3

UR* = Unrecoverable Data Point

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. 12
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

VEHICLE INFORMATION

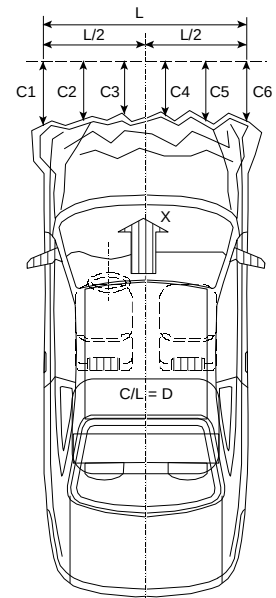
VIN: JM3KE4BY8G0846222 Wheelbase (mm): 2696
 Vehicle Size Category: Passenger Test Weight (kg): 1797

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): 56.29
 Velocity Change (kph): 56.29

CRUSH PROFILE

Collision Deformation Classification: 12FDEW03
 Midpoint of Damage: C3
 Damage Region Length (mm): 1359
 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	4312	3982	330
C2	Crush zone 2 at left side	mm	4460	3943	517
C3	Crush zone 3 at left side	mm	4520	3970	550
C4	Crush zone 4 at right side	mm	4519	3994	525
C5	Crush zone 5 at right side	mm	4459	3979	480
C6	Crush zone 6 at right side	mm	4305	4036	269
L	C1 to C6	mm	1359	1402	-43
	Logitudinal horizontal distance from the tip of the front bumper to the base of the windshield	mm	1,126	579	546

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. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

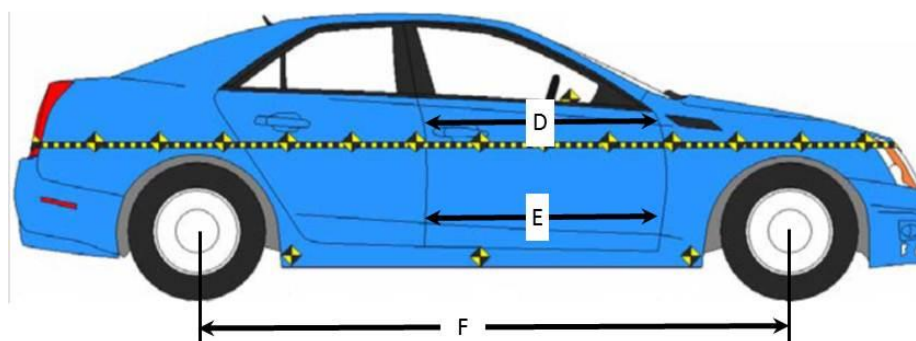
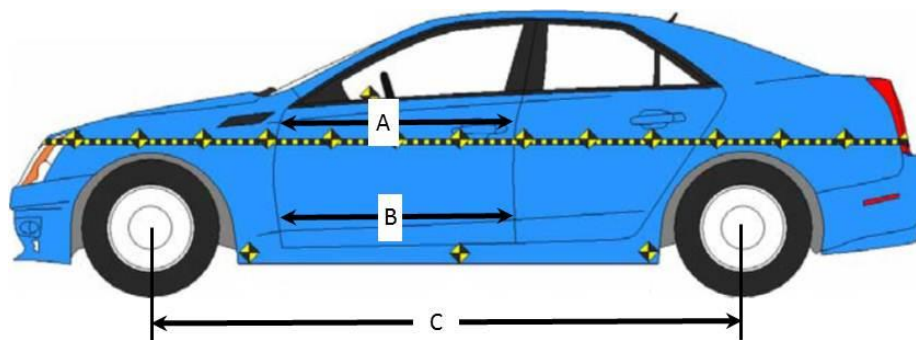
NHTSA No.: M20165403
 Test Date: 9/23/2016

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	985	984	-1
B	Left Side Lower	mm	833	833	0
D	Right Side Upper	mm	985	983	-2
E	Right Side Lower	mm	835	834	-1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2696	2611	-85
F	Right Side Wheelbase	mm	2696	2671	-26



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

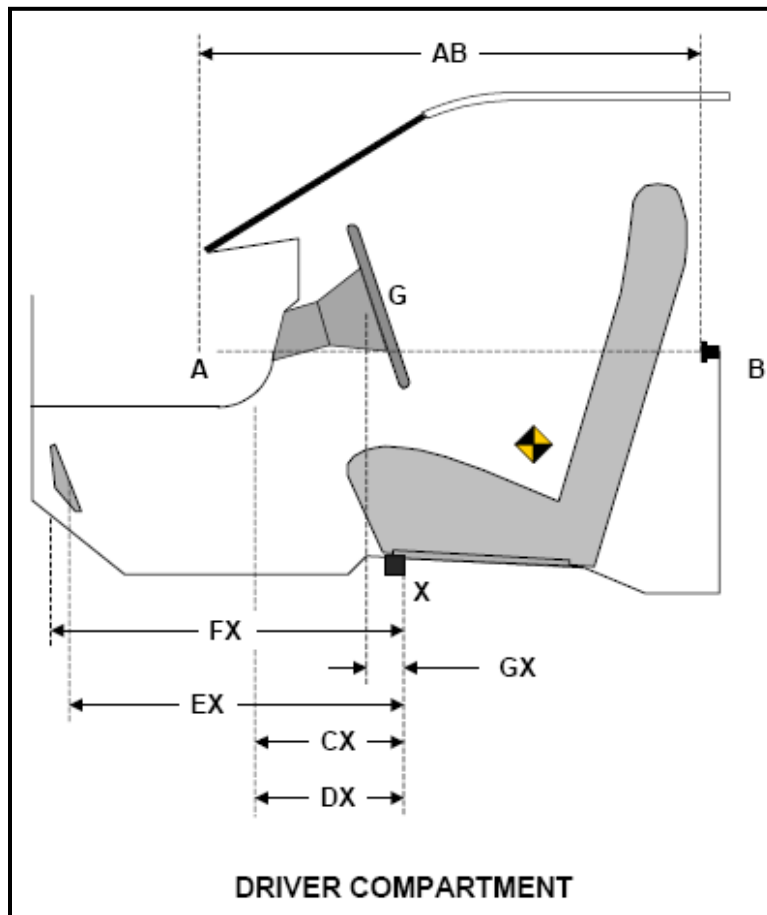
Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	808	807	-1
CX	Left Knee Bolster to X	mm	287	299	12
DX	Right Knee Bolster to X	mm	285	304	19
EX	Brake Pedal to X	mm	526	577	51
FX	Foot Rest to X	mm	578	565	-13
GX	Center of Steering Column Wheel Hub to X	mm	41	104	63

X = Front of Seat Track (Stationary)



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

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016

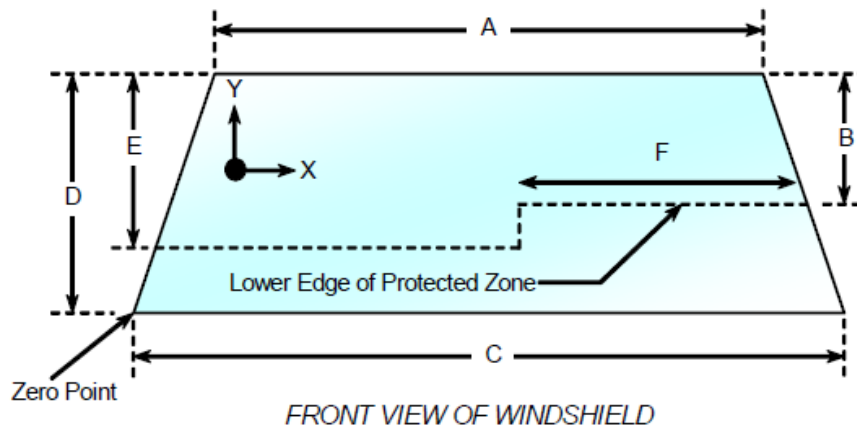
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2241	2241	100
Right Side	2241	2241	100
Total	4482	4482	100



Item	Units	Value
A	mm	1246
B	mm	546
C	mm	1512
D	mm	862
E	mm	520
F	mm	500

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 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

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

Test Time: 11:41 AM

Stoddard Solvent Spillage Measurements

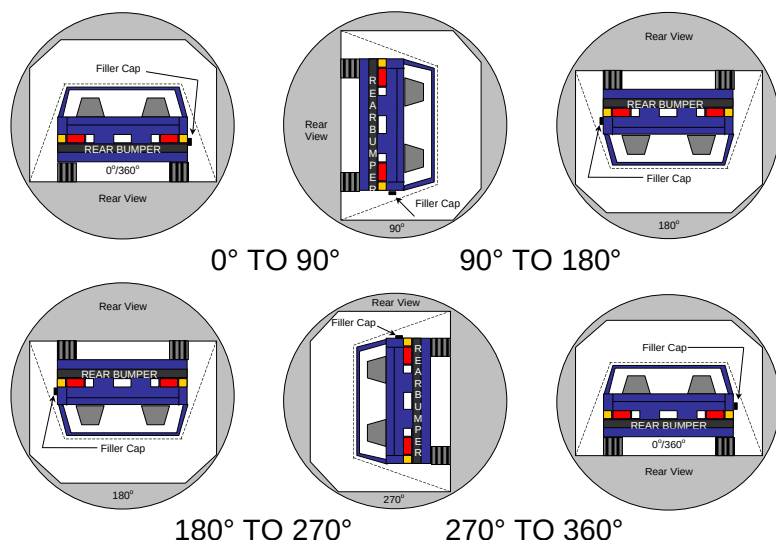
A.	From impact until vehicle motion ceases: (Maximum allowable = 1 oz.)	<u>0</u>	oz
B.	For the 5-minute period after motion ceases: (Maximum allowable = 5 oz.	<u>0</u>	oz
C.	For the following 25 minutes: (Maximum allowable = 1 oz./minute	<u>0</u>	oz
D.	Spillage	<u>0</u>	oz

DATA SHEET NO. 15

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2016 Mazda CX-5
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
 Test Date: 9/23/2016



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°	70	300	370
90° to 180°	61	300	361
180° to 270°	62	300	362
270° to 360°	72	300	372

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	

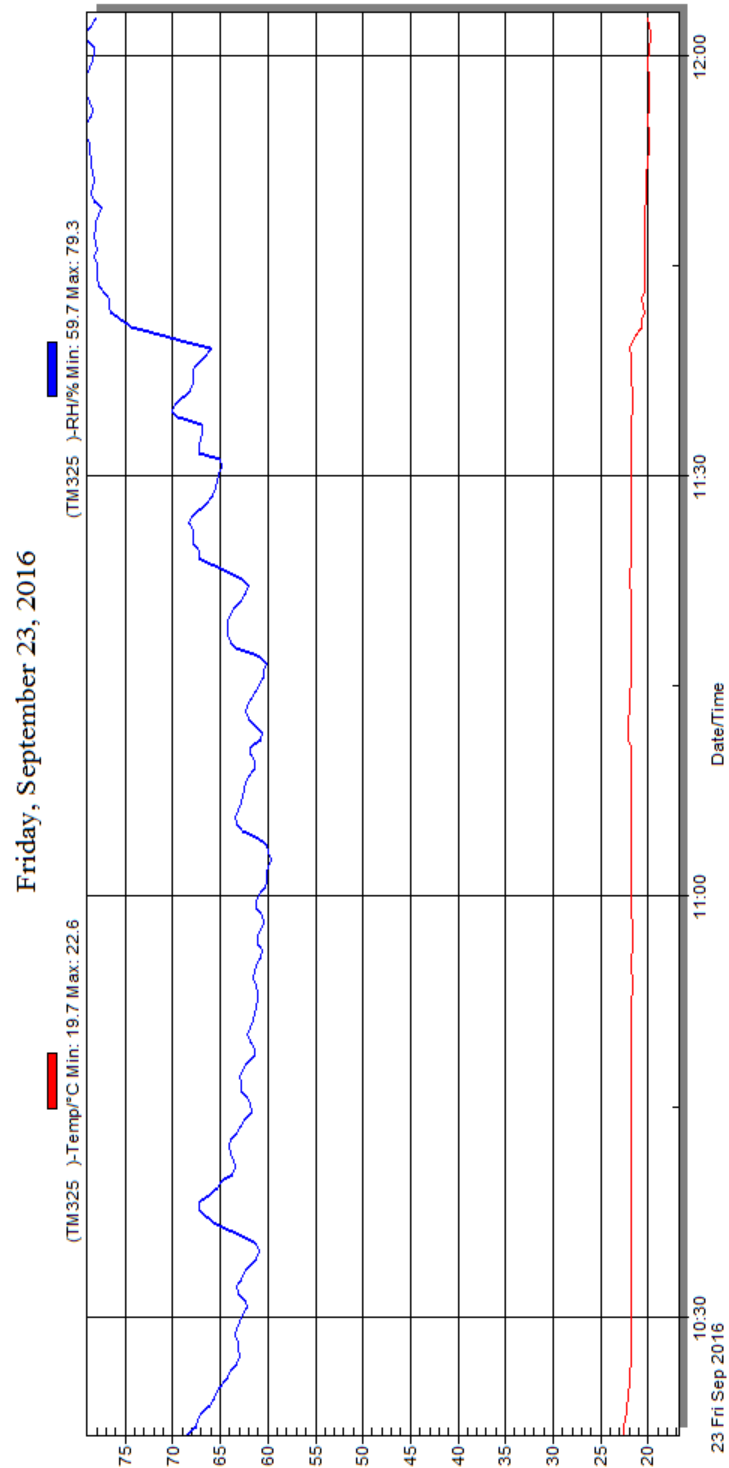
SOLVENT SPILLAGE LOCATION TABLE

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 Mazda CX-5
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: M20165403
Test Date: 9/23/2016



Temperature Stabilization Chart/Data

APPENDIX A
PHOTOGRAPHS

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Fig.	Description	Page
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44	Post-Test Driver's Side Floorpan	A-26
45	Post-Test Driver Dummy Face	A-27
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Fig.	Description	Page
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Photo Not Applicable

Figure A-1: Load Cell Location

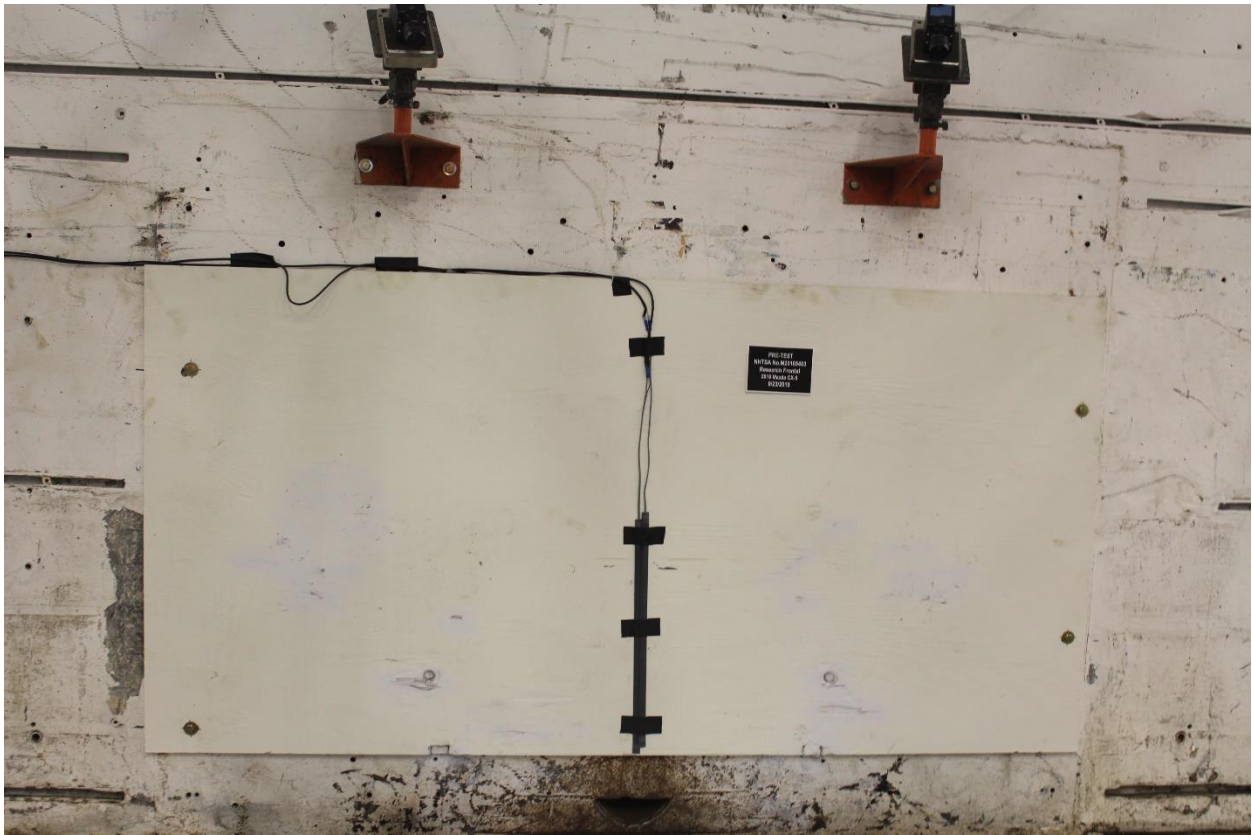


Figure A-2: Rigid Barrier Frontal Wall

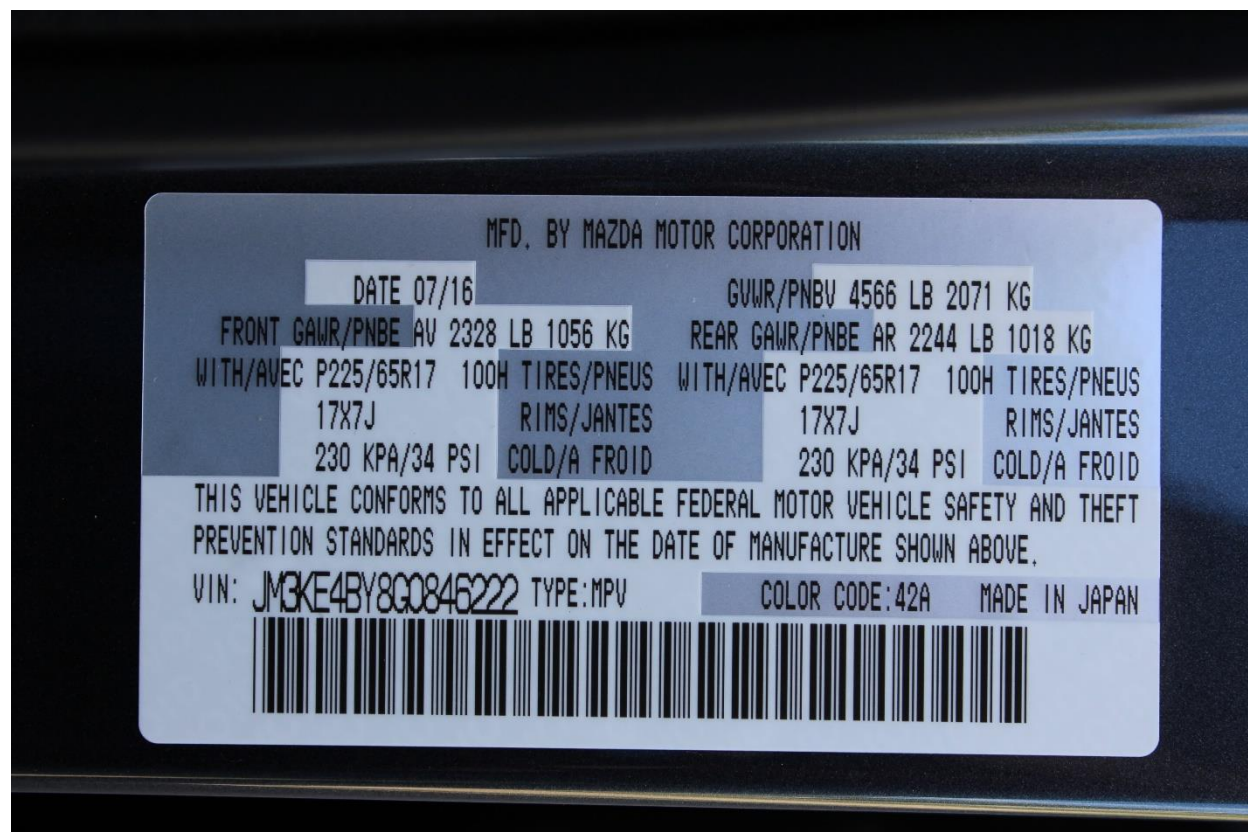


Figure A-3: Manufacturer's Label

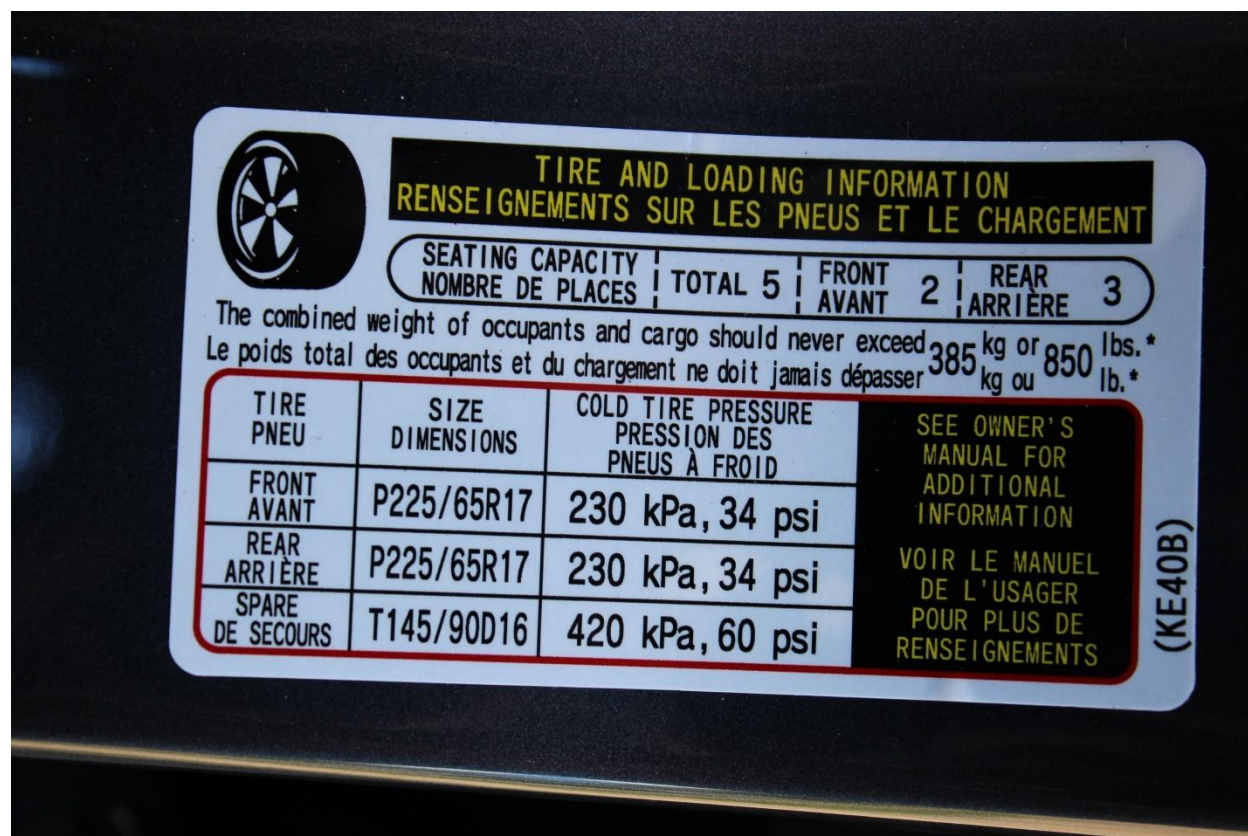


Figure A-4: Tire Placard



Figure A-5: 2016 Mazda CX-5 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

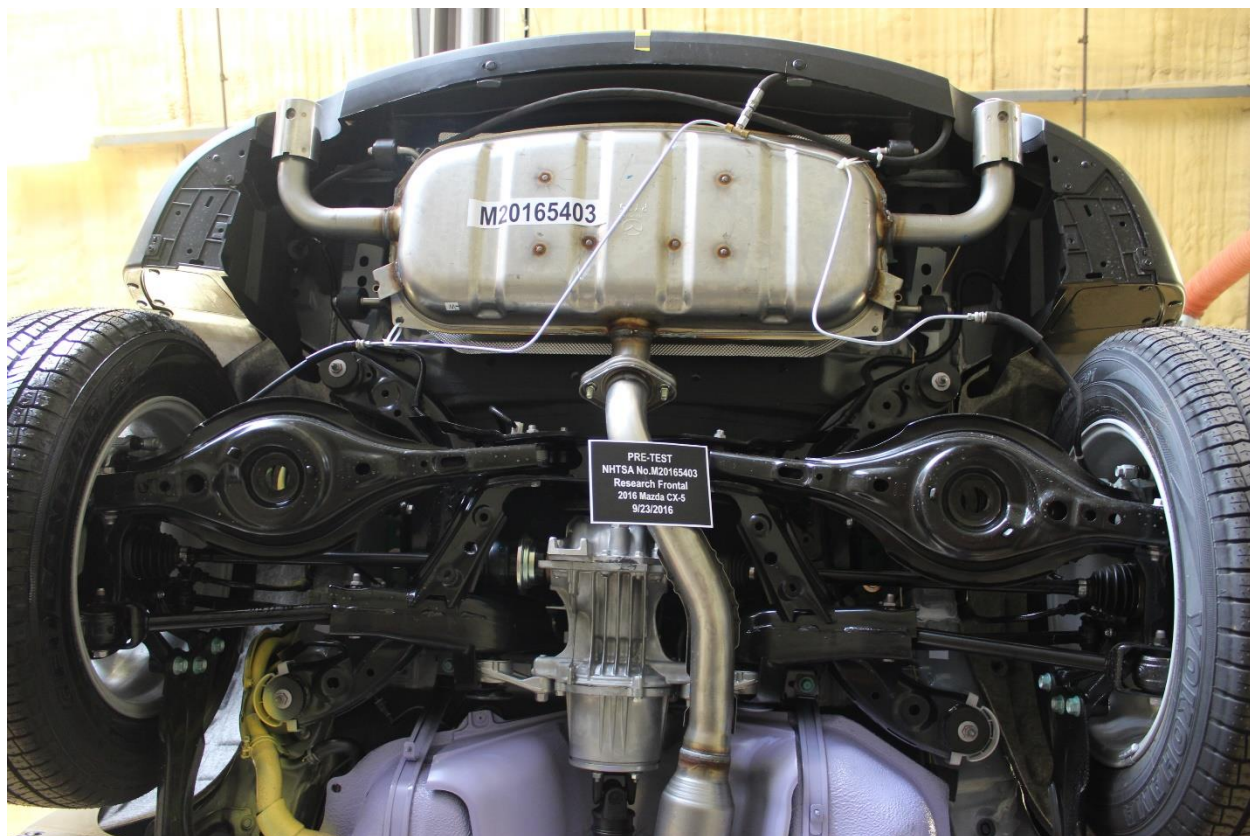


Figure A-25: Pre-Test Rear Underbody View

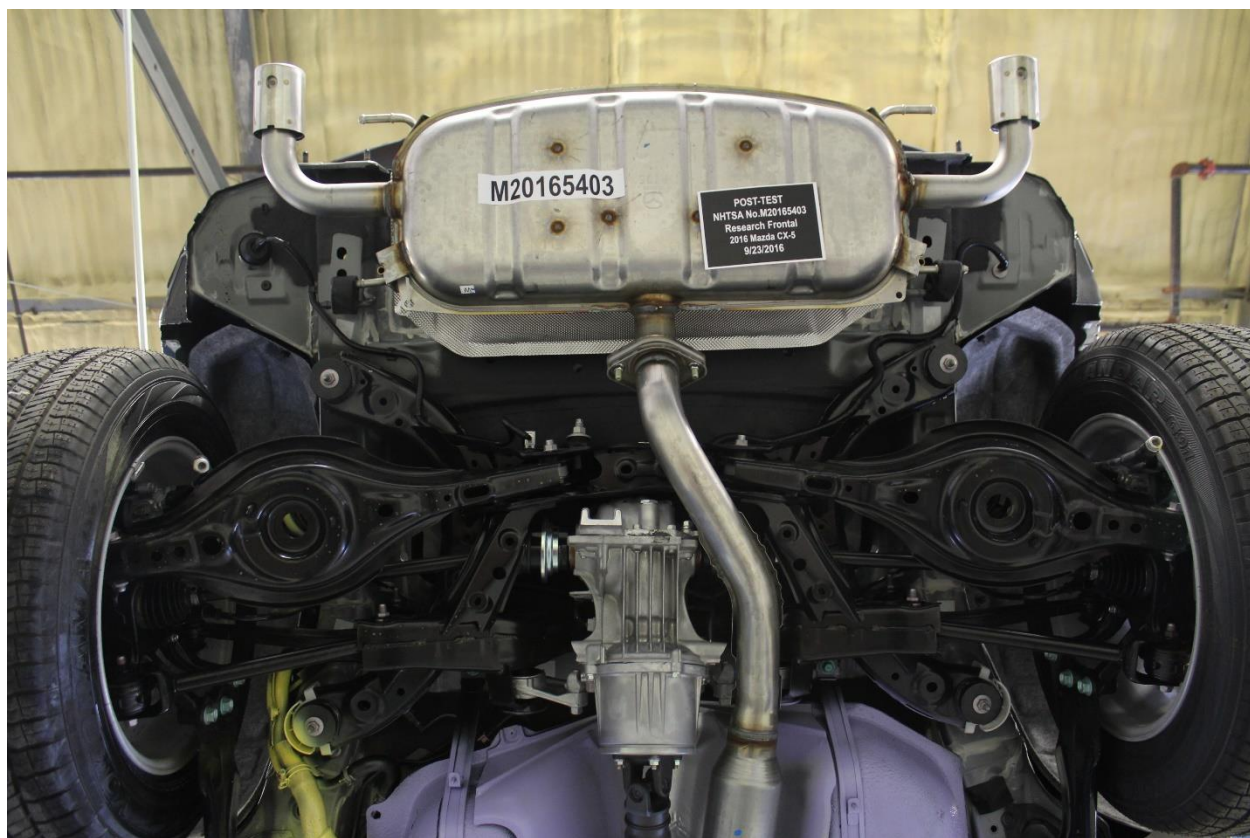


Figure A-26: Post-Test Rear Underbody View



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

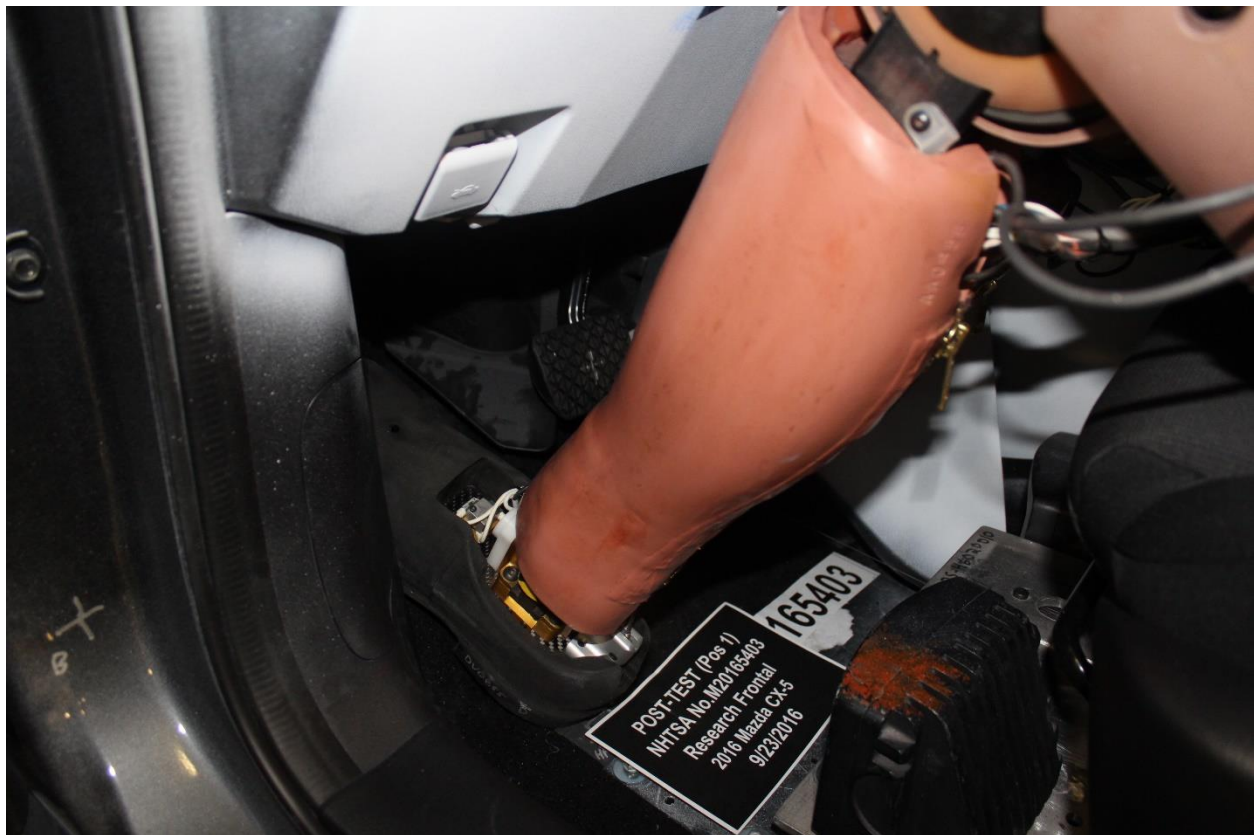


Figure A-40: Post-Test Driver Dummy Feet



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

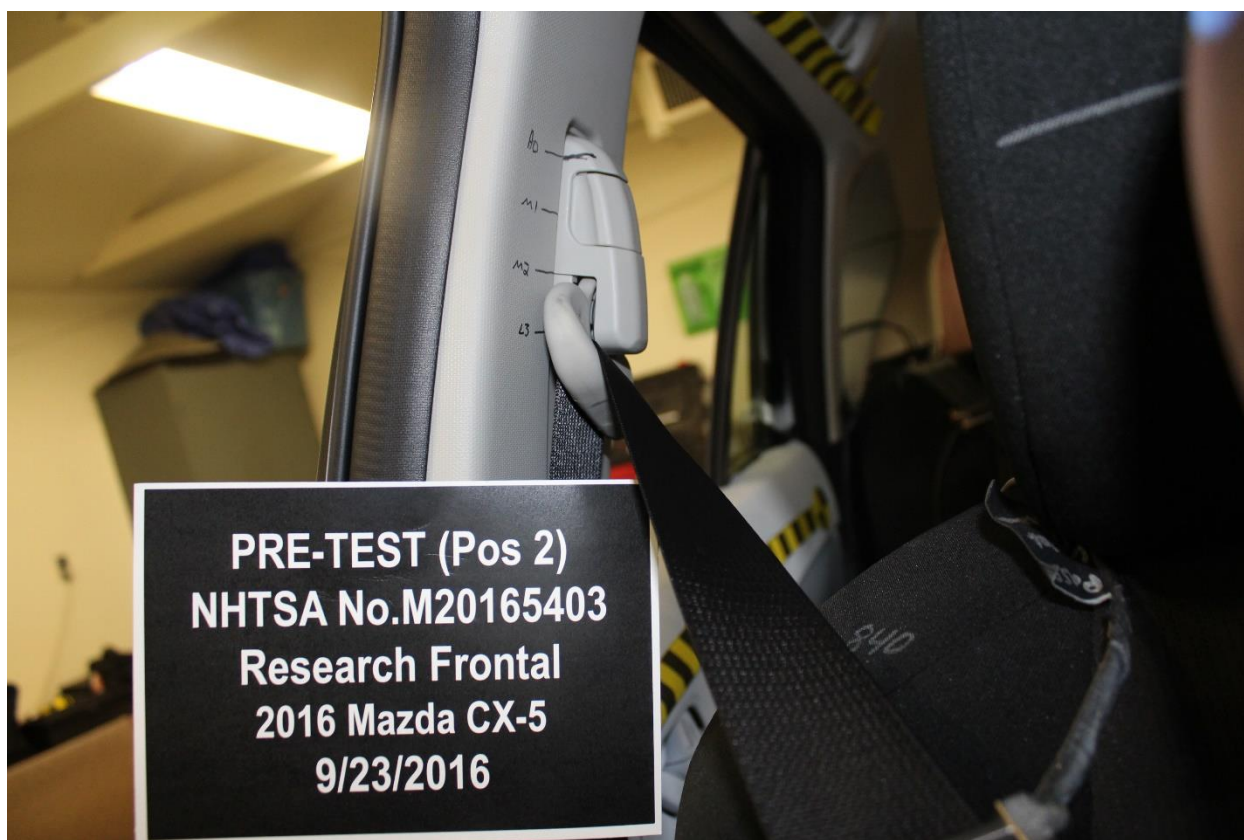


Figure A-58: Pre-Test View of Belt Anchorage for Passenger Dummy



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

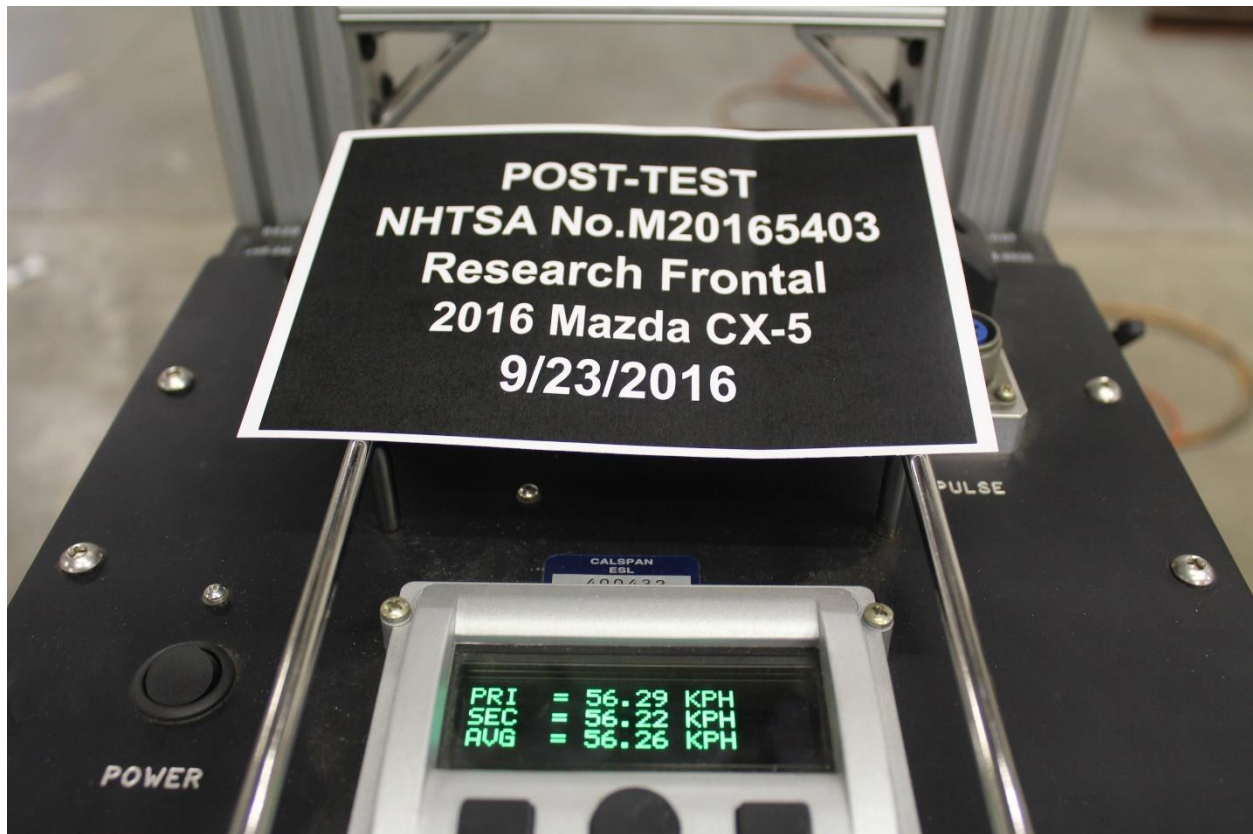


Figure A-71: Post-Test Speed Trap Read-Out



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: 2016 Mazda CX-5 Frontal Impact Event

Photo Not Applicable

Figure A-78: Monroney Label Photograph



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

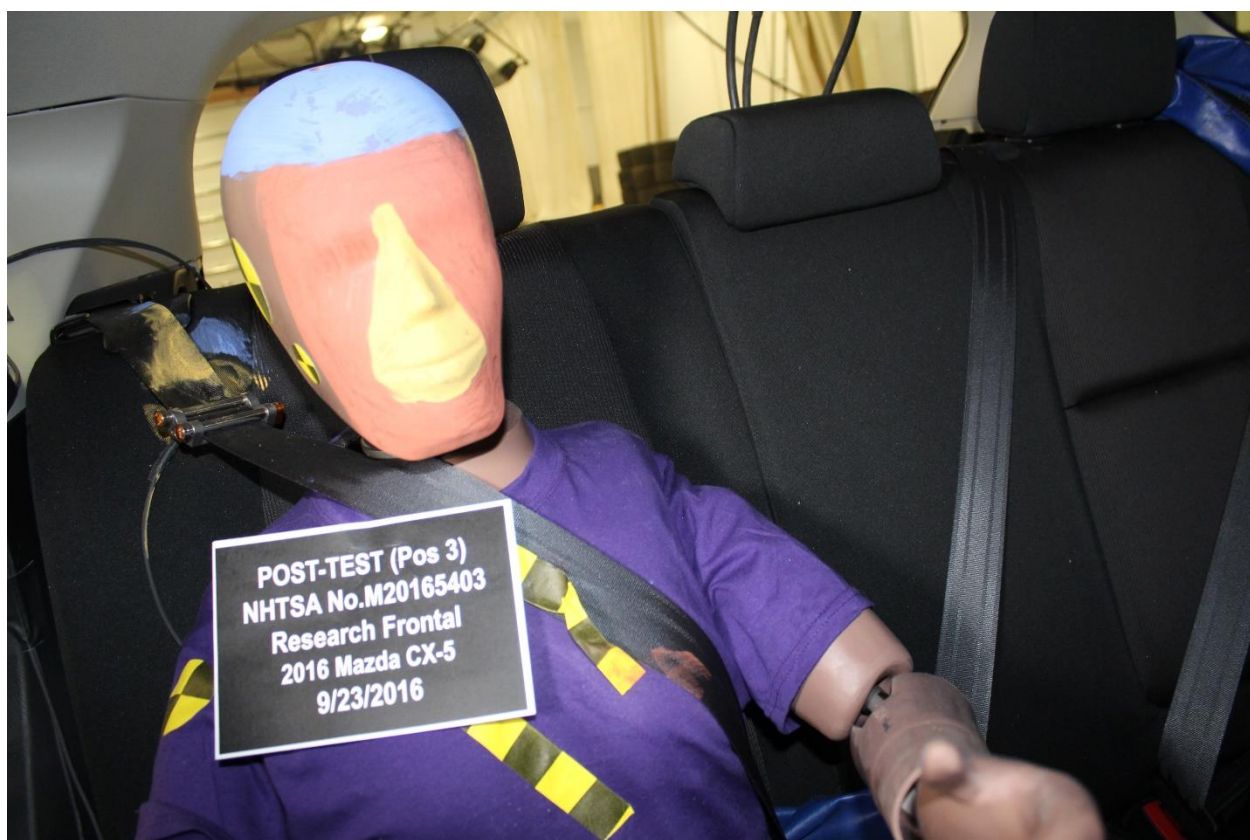


Figure A-80: Post-Test Rear Passenger Dummy Front view



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



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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



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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

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

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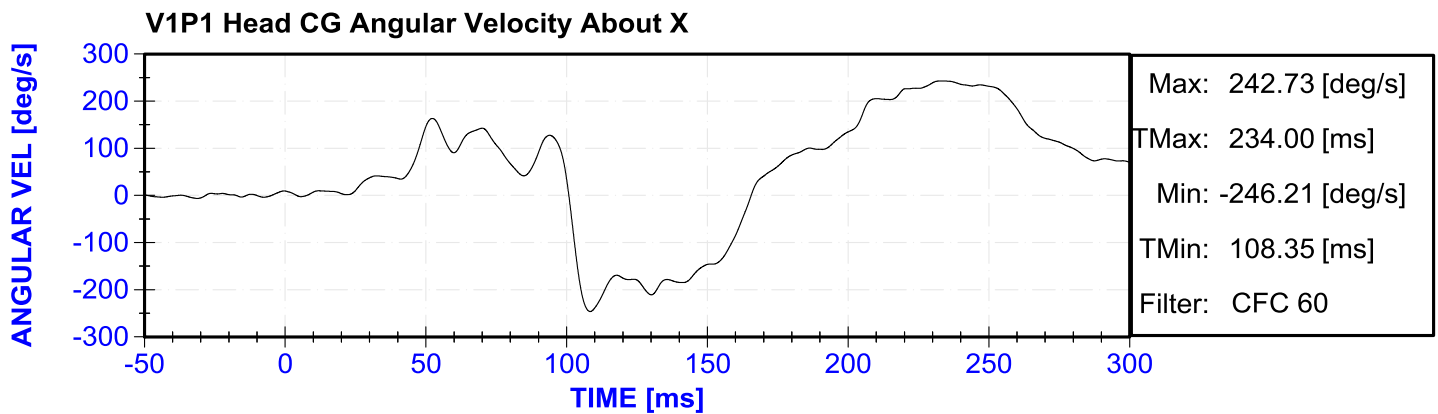
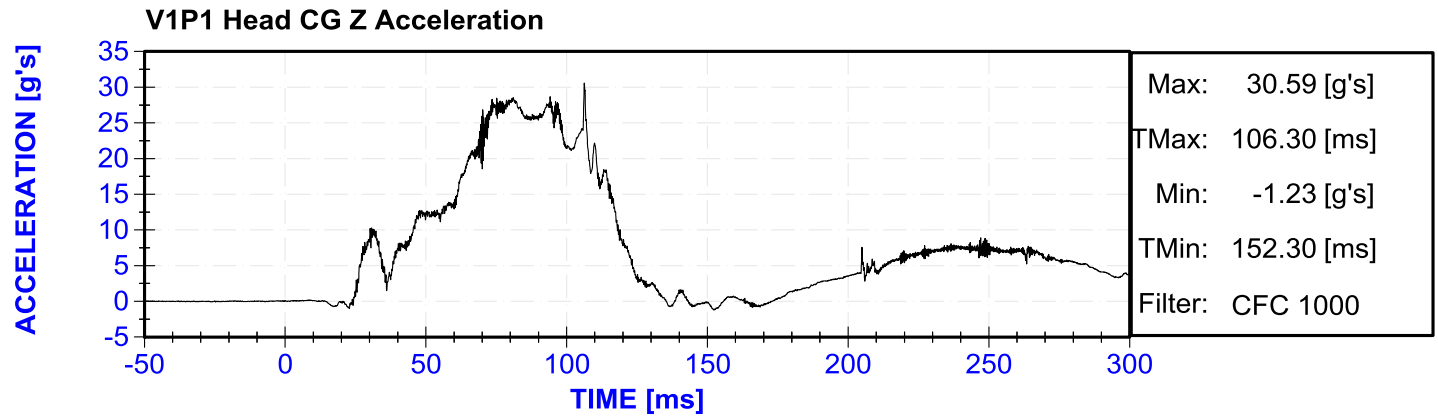
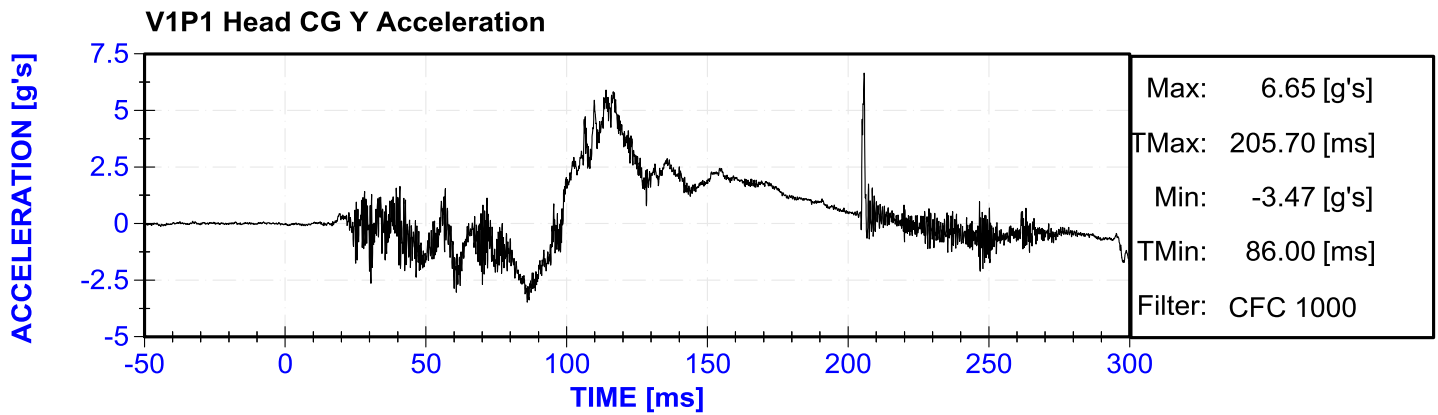
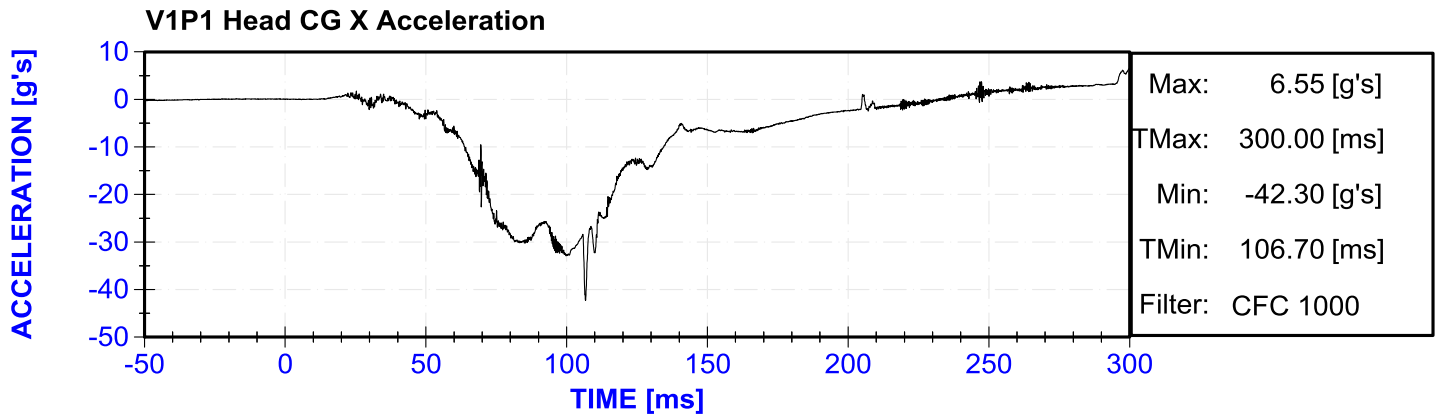
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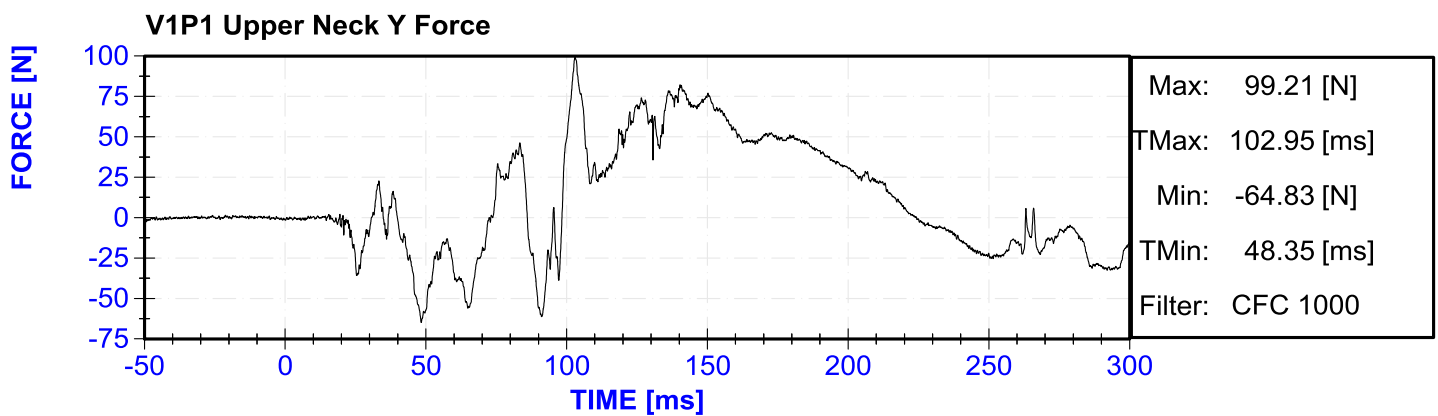
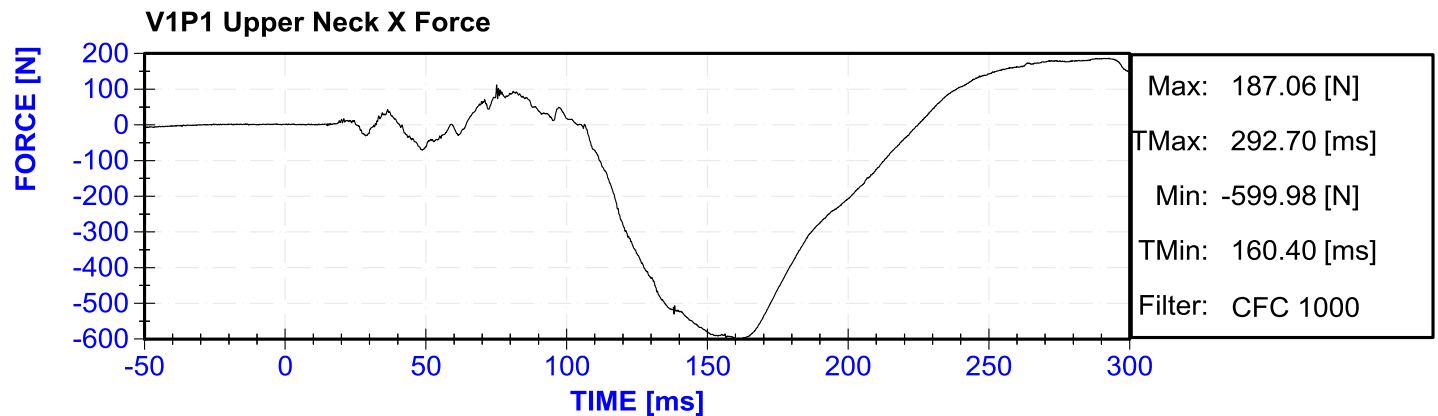
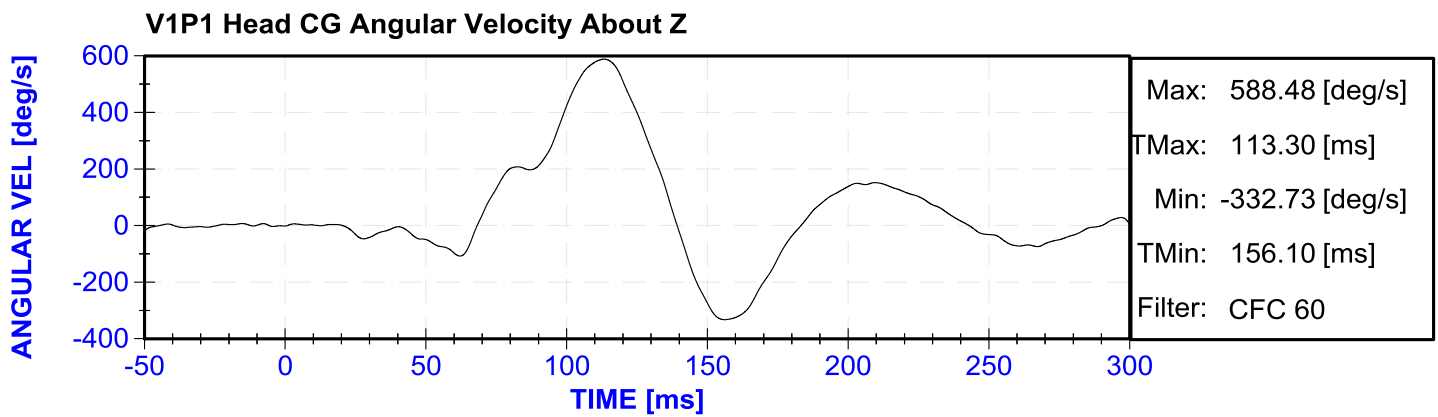
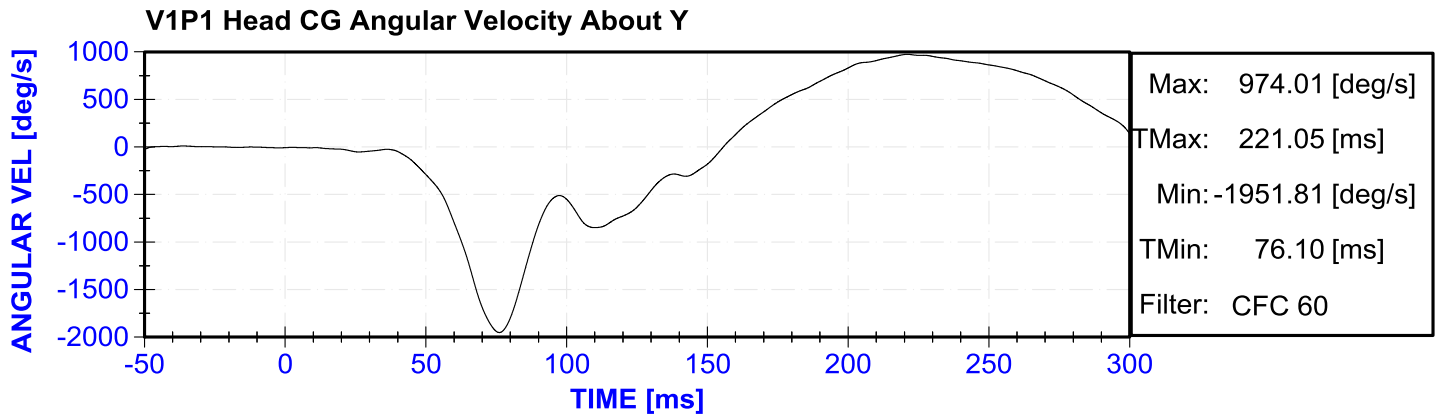
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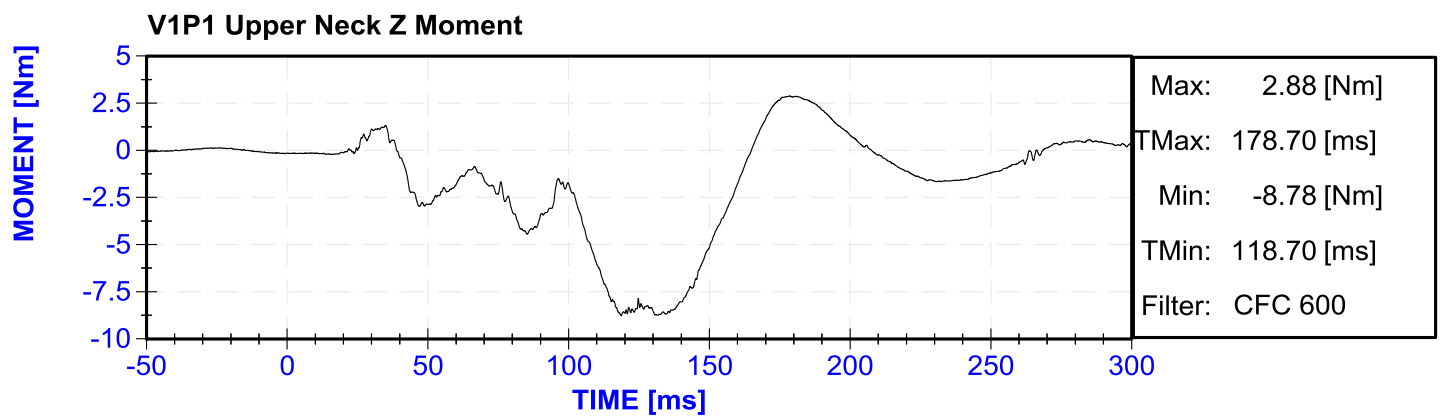
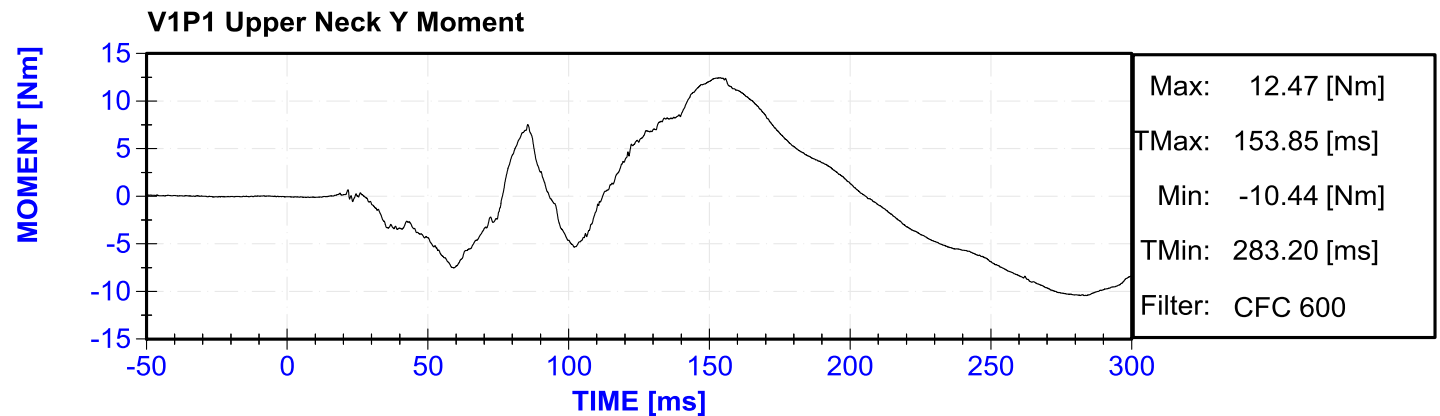
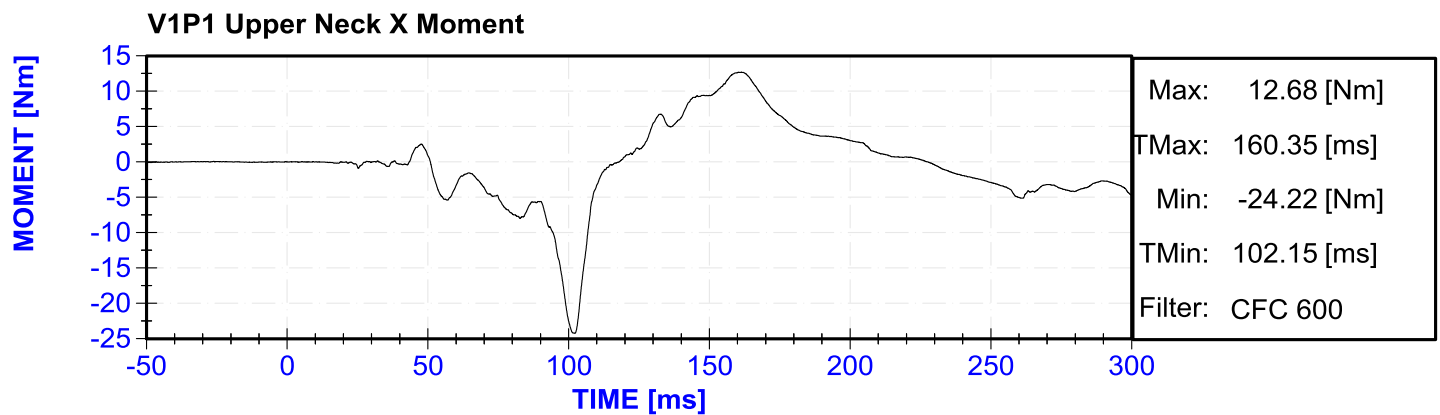
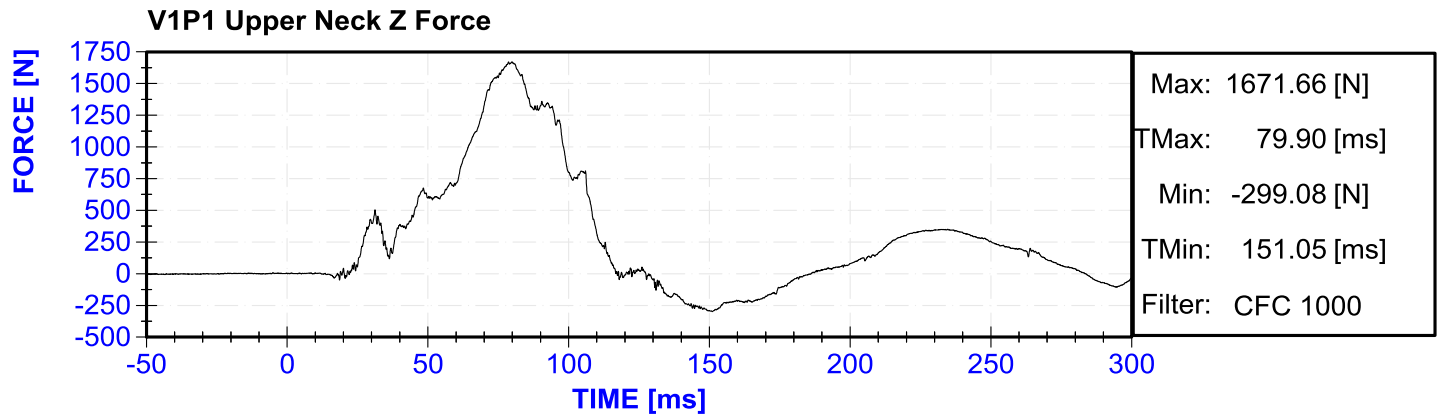
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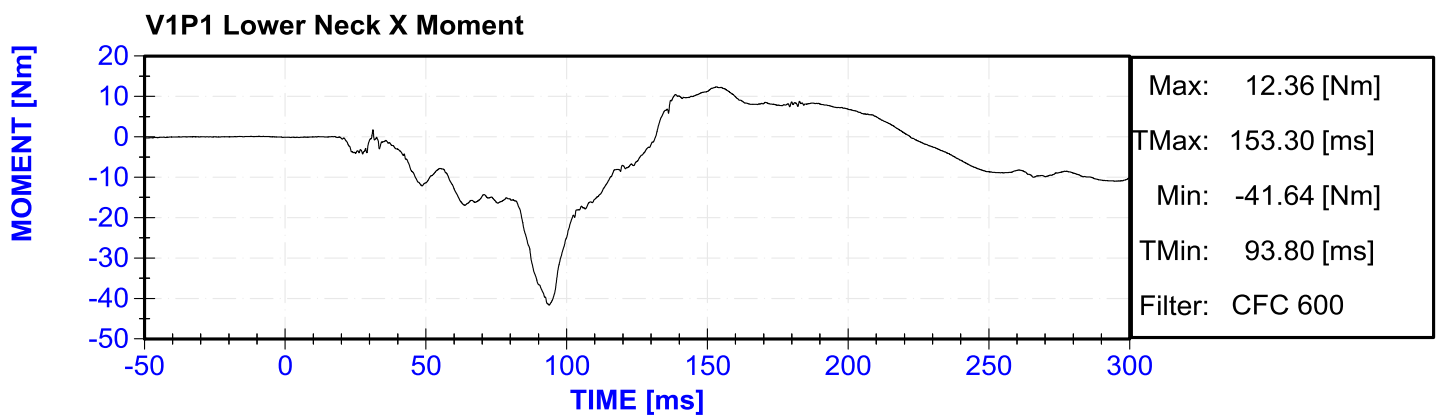
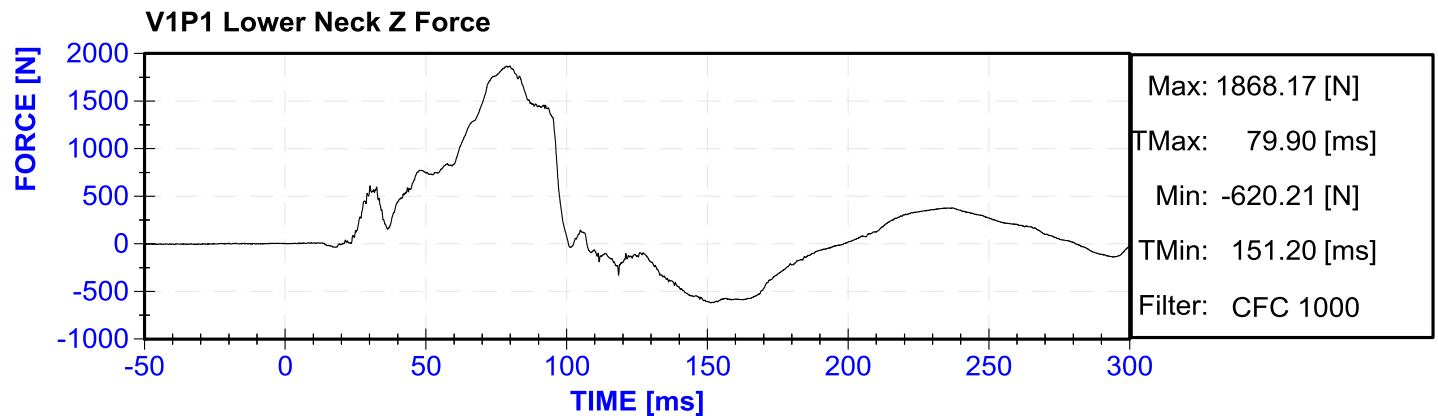
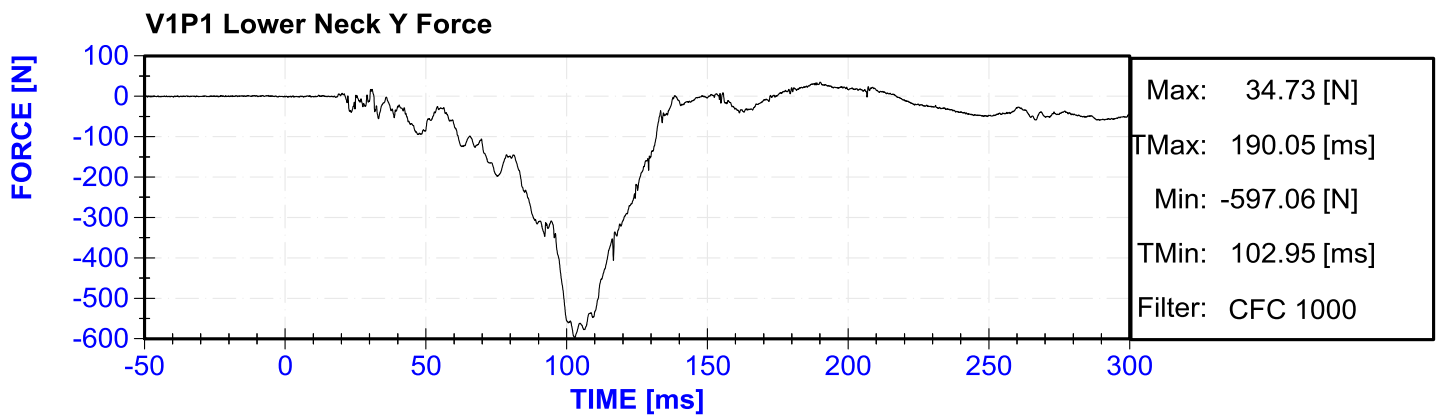
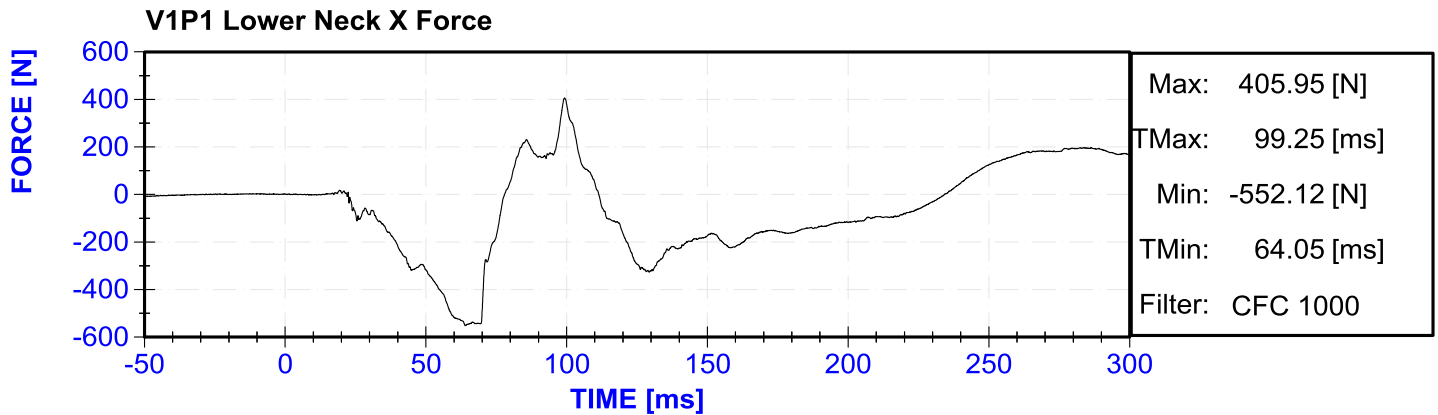
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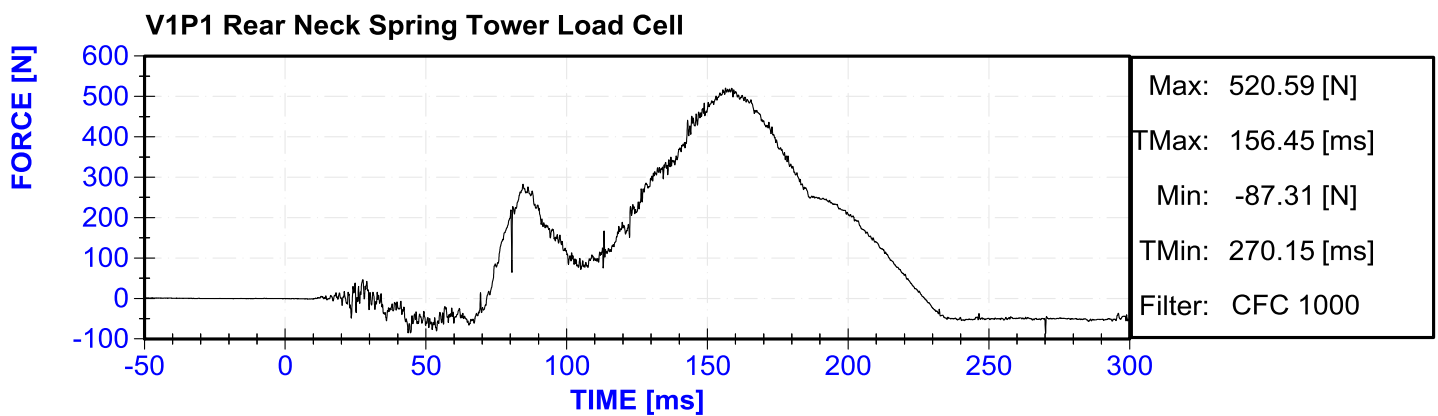
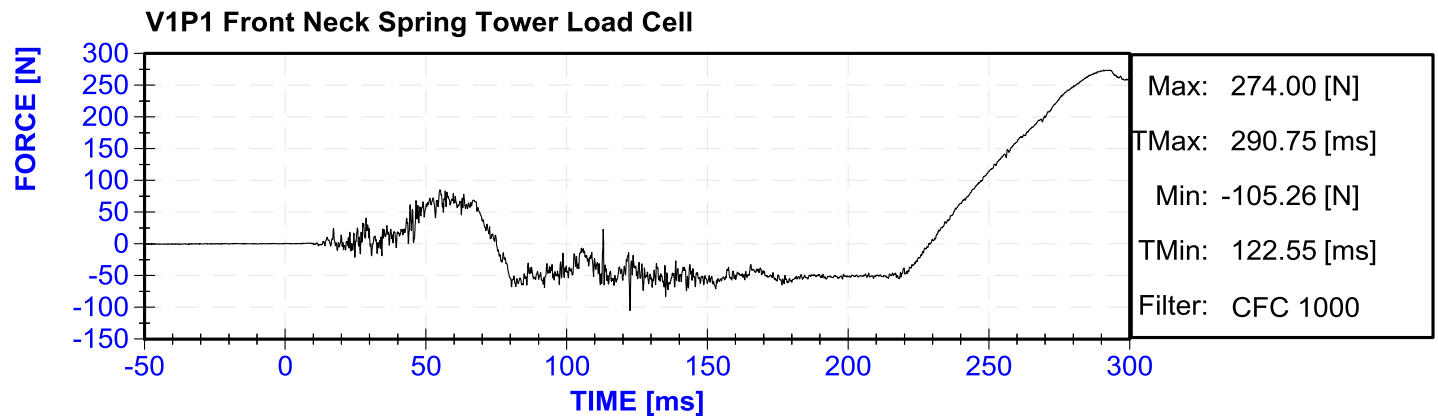
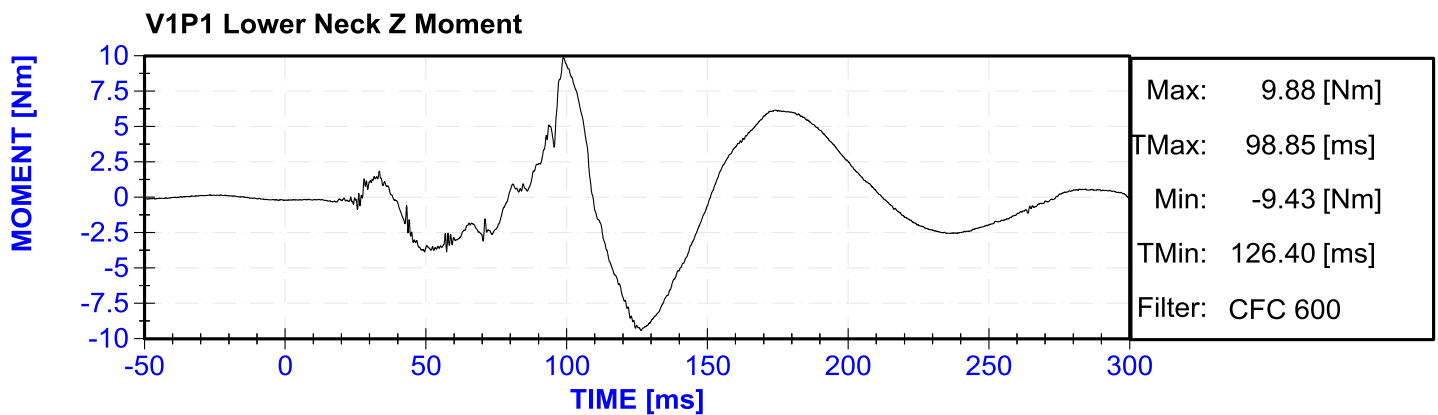
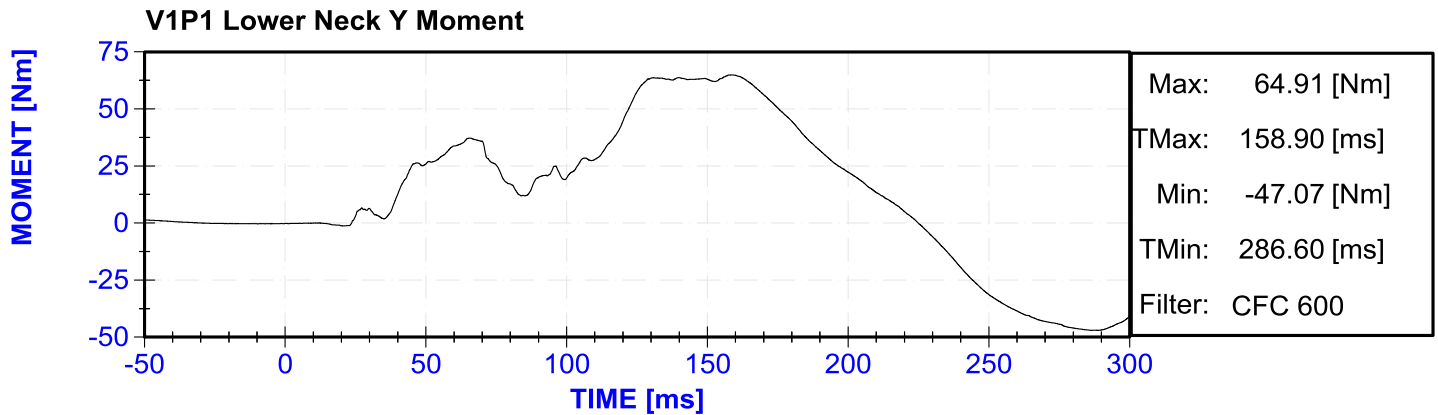
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Plot 247	V1P1 Abdomen Right Lower Dx	B-68
Plot 248	V1P1 Abdomen Right Lower Dy	B-68
Plot 249	V1P1 Abdomen Right Lower Dz	B-69
Plot 250	V1P1 Abdomen Right Lower D	B-69



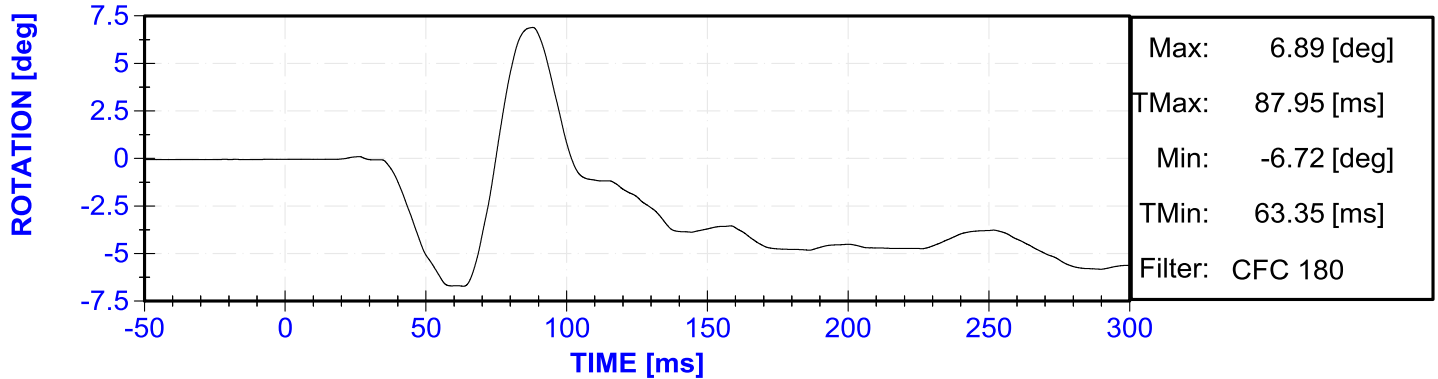




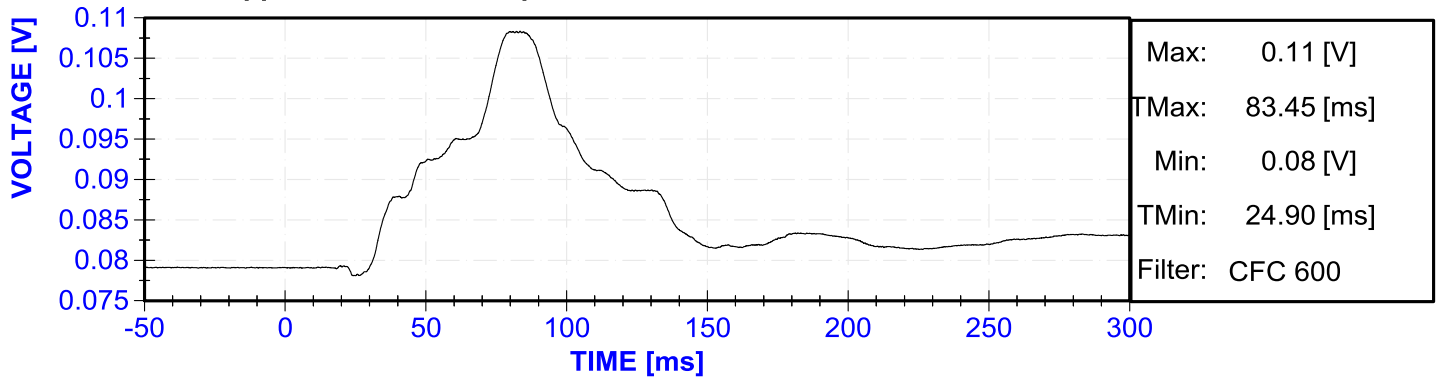




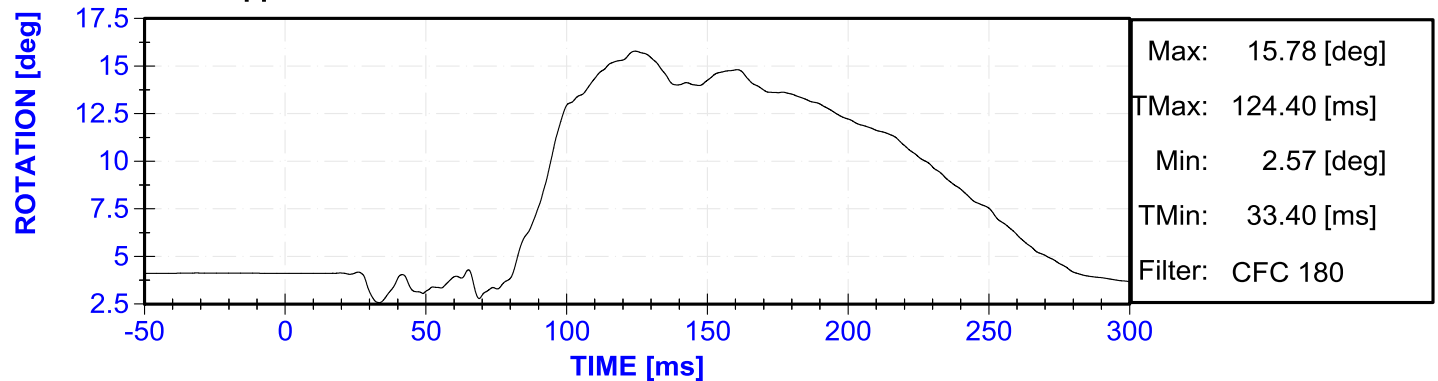
V1P1 Occipital Condyle Rotation Potentiometer



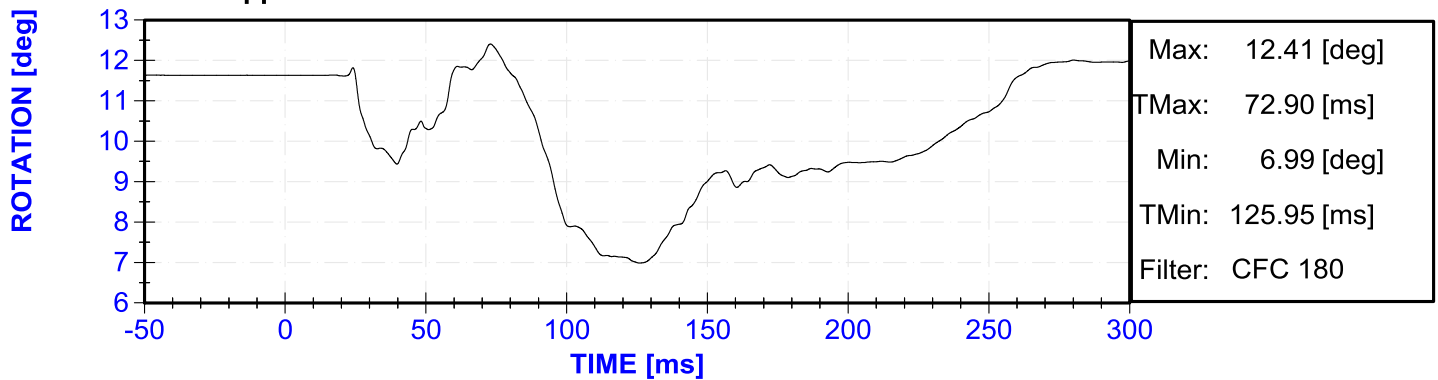
V1P1 Upper Left DGIR X Displacement

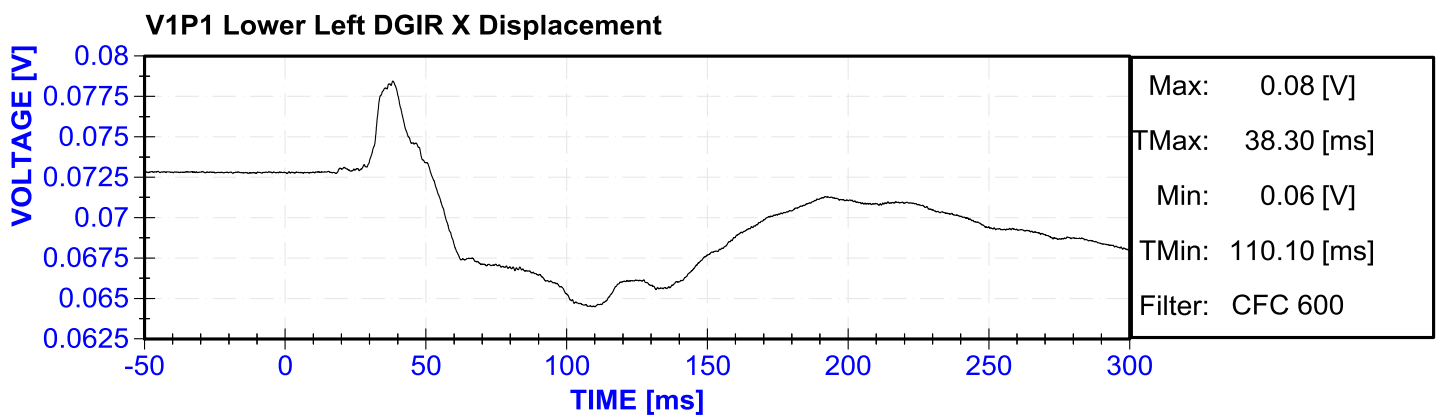
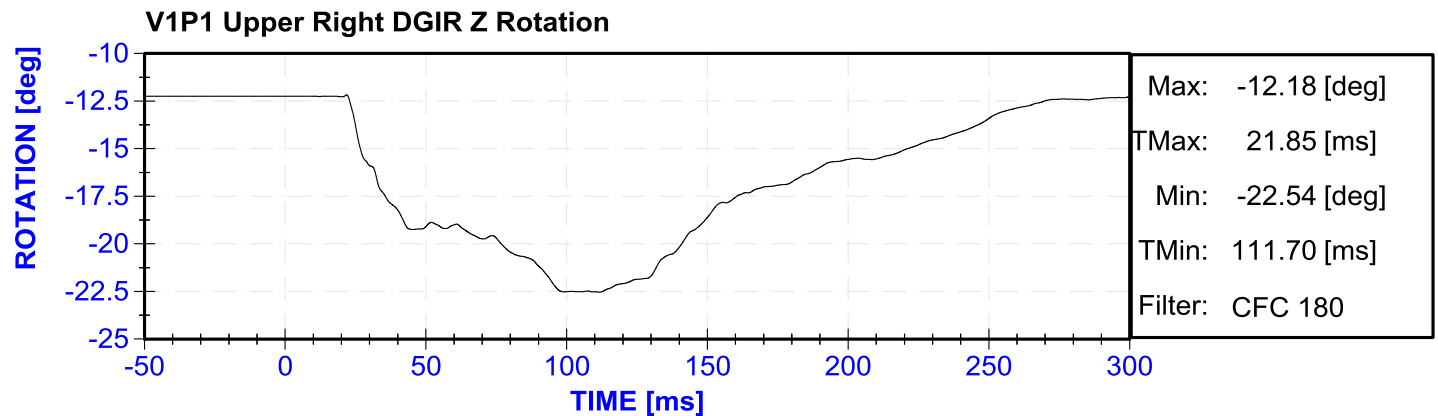
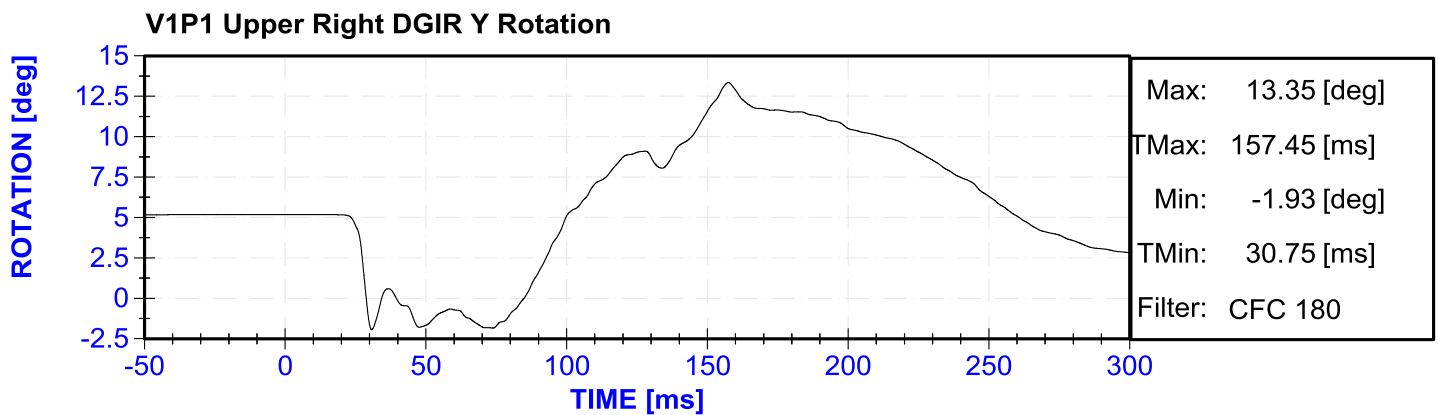
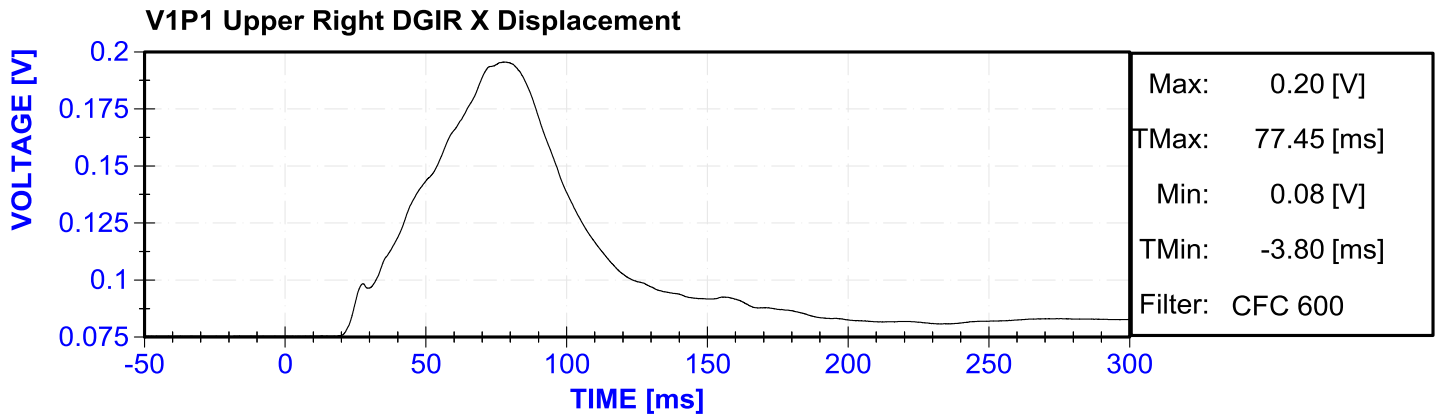


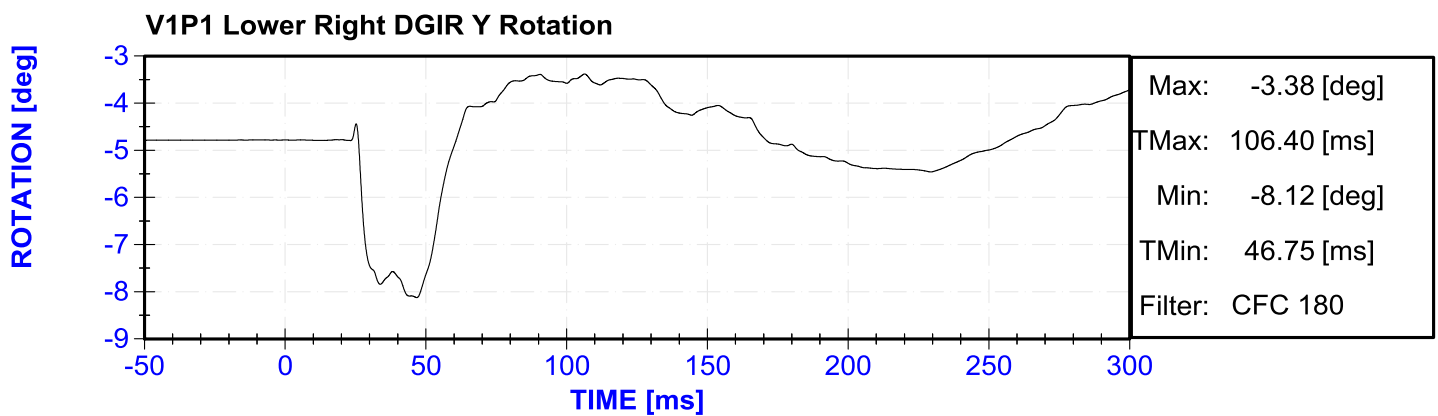
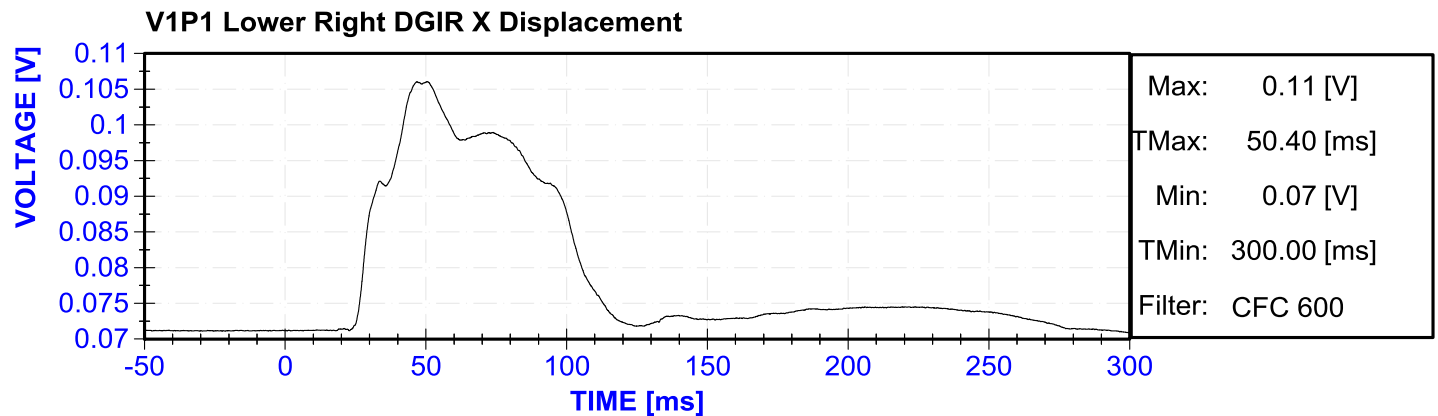
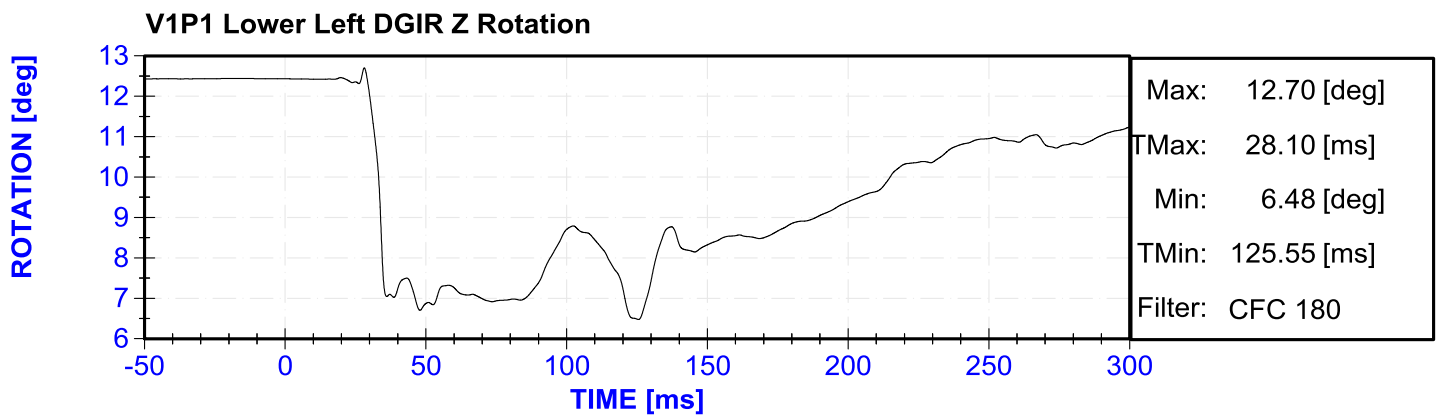
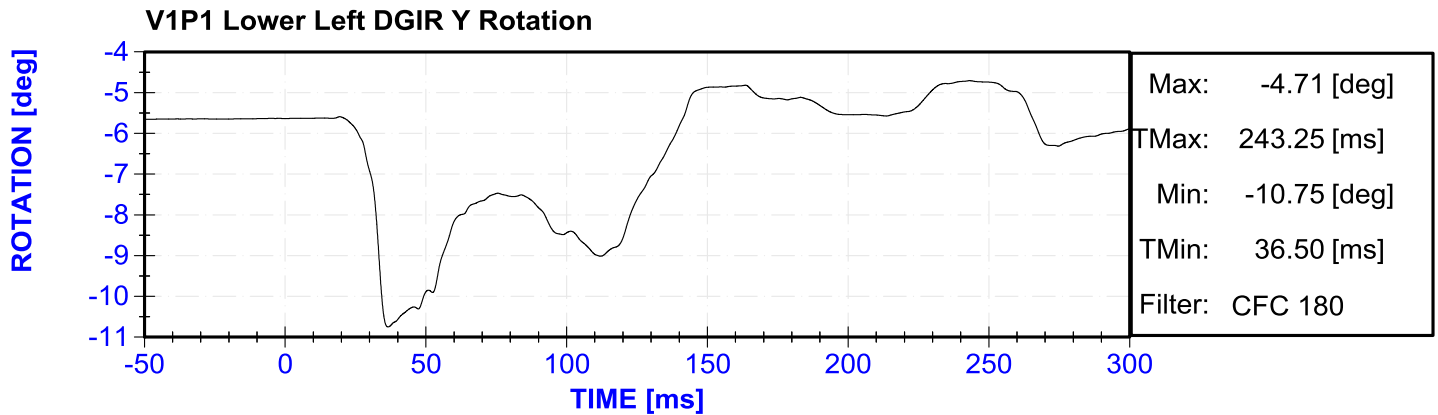
V1P1 Upper Left DGIR Y Rotation

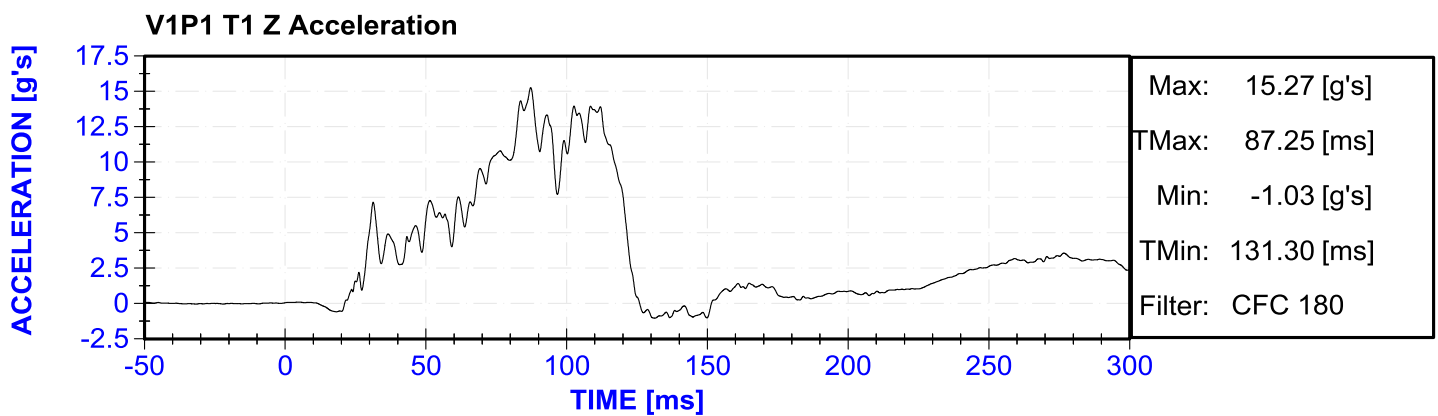
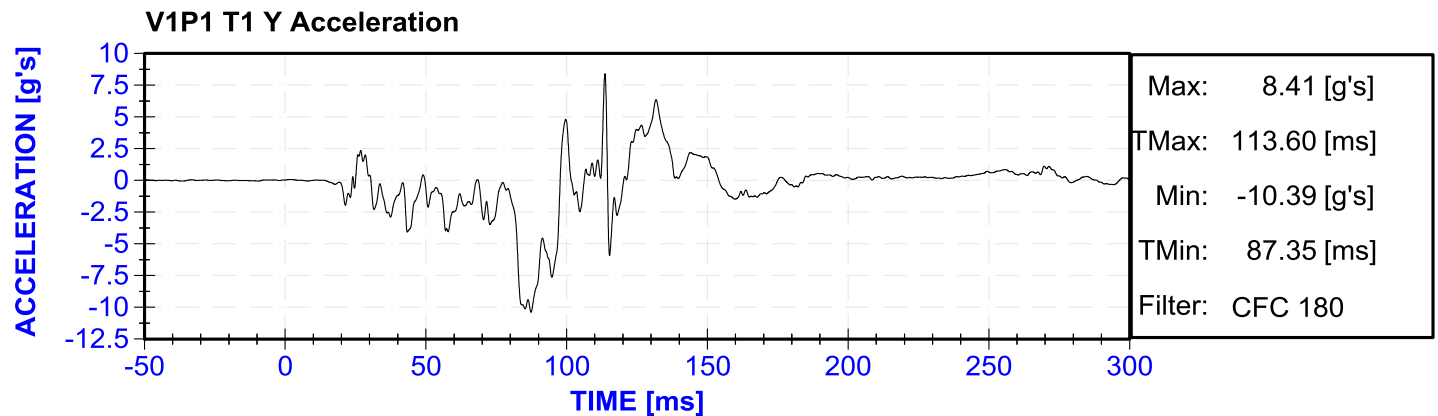
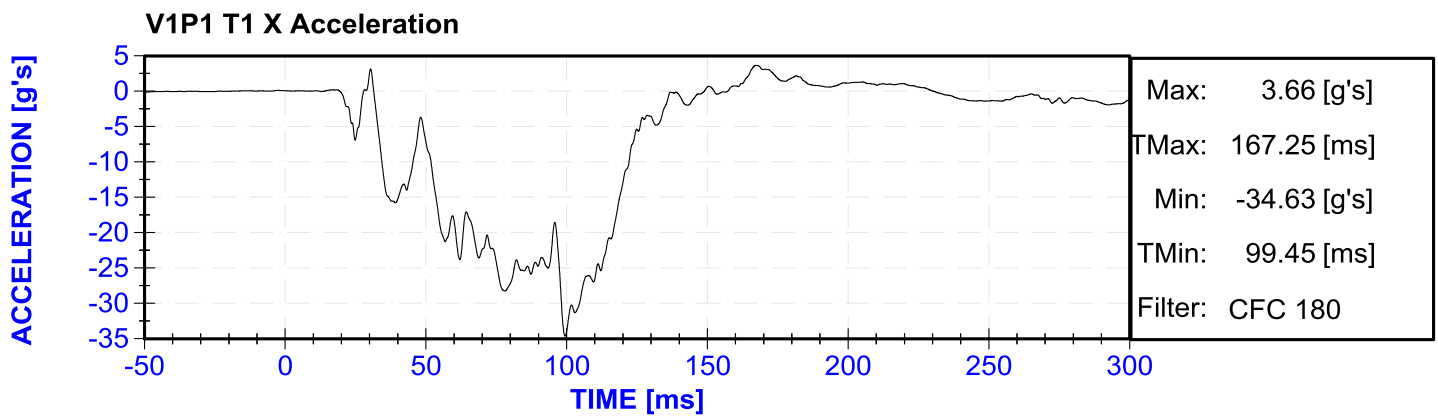
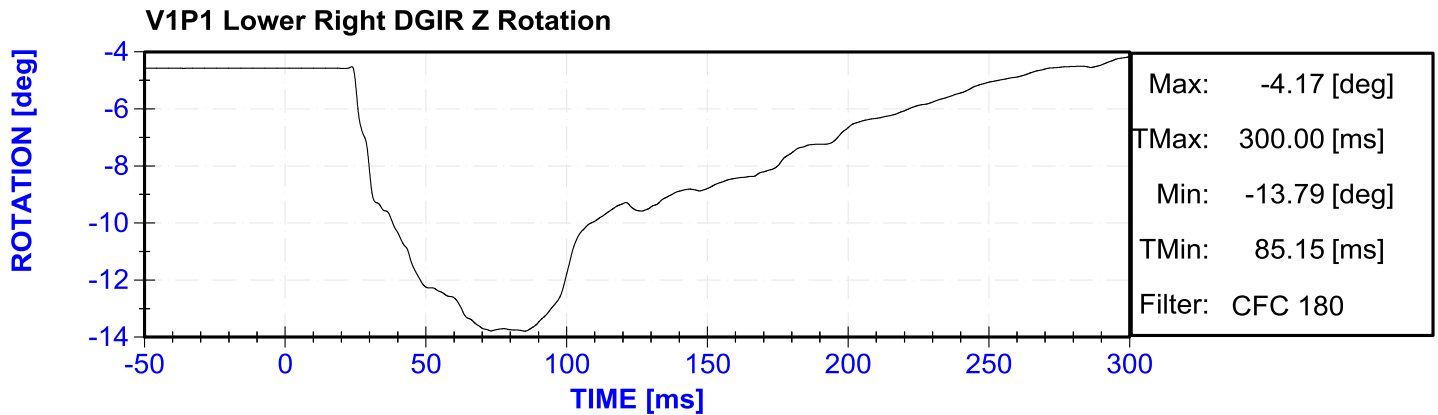


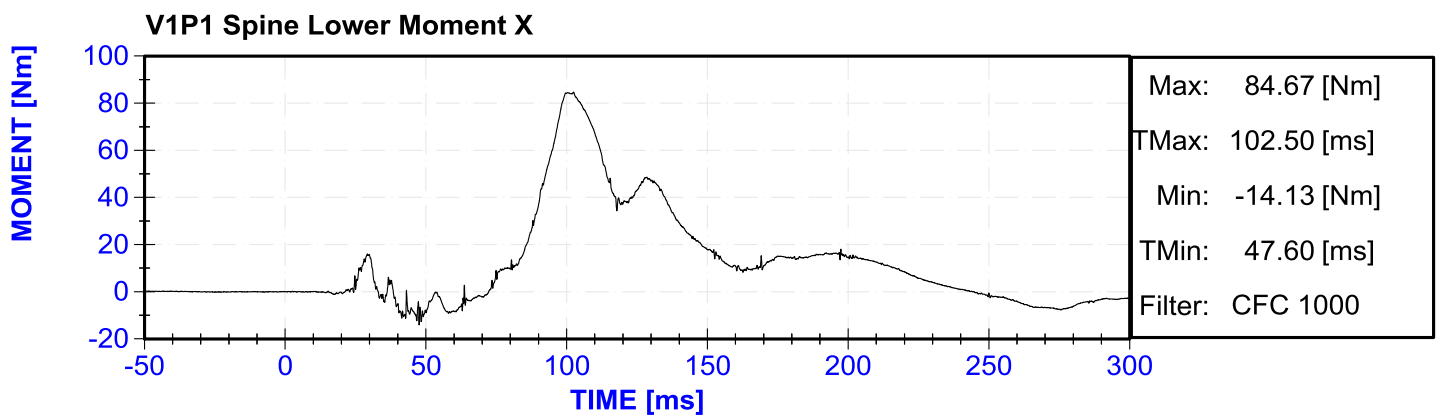
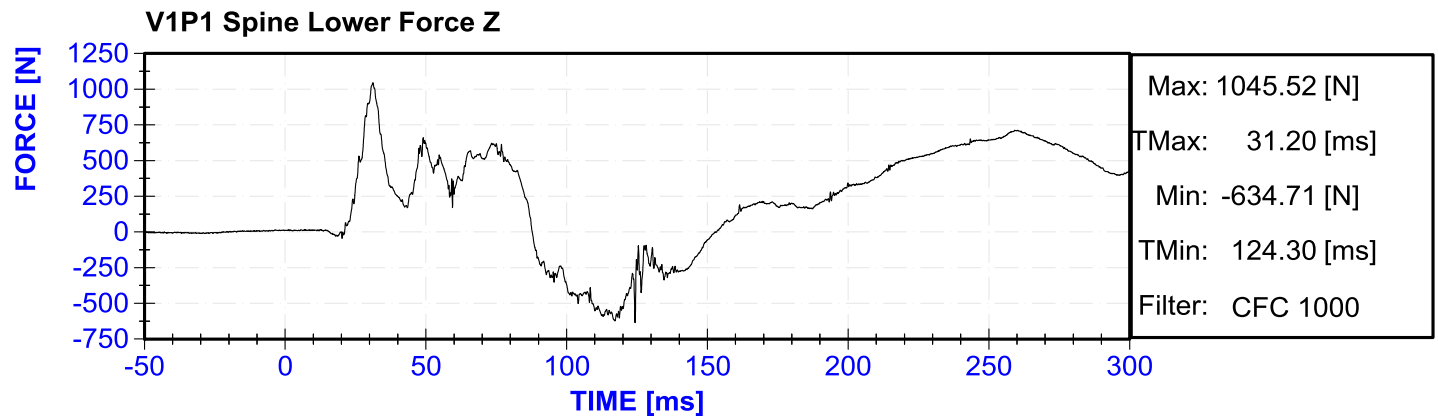
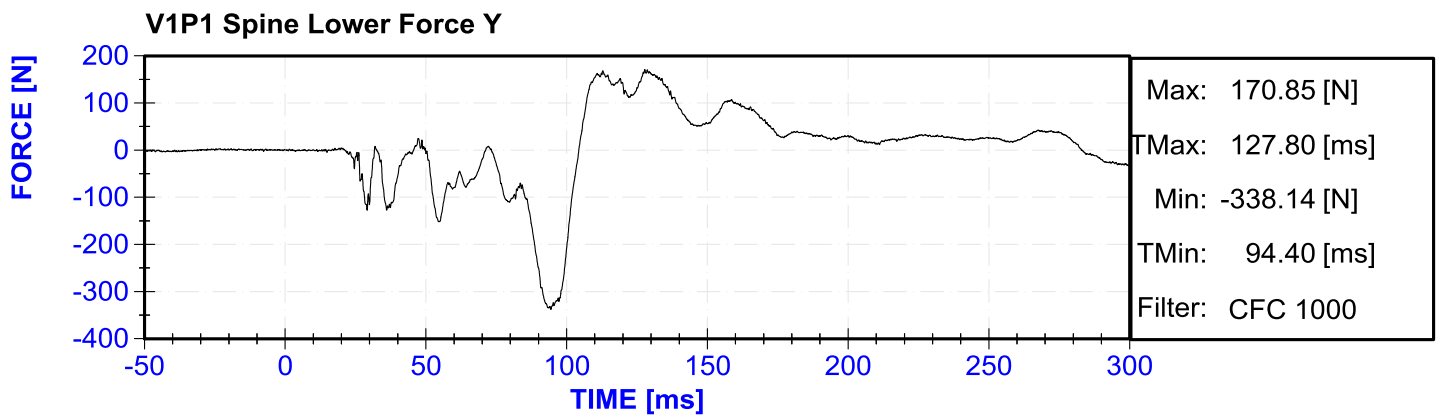
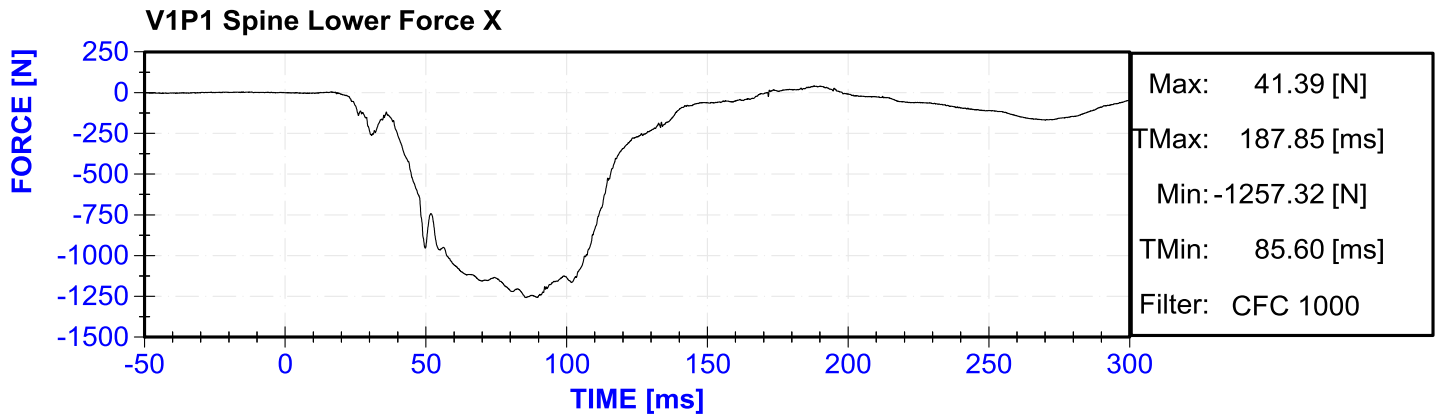
V1P1 Upper Left DGIR Z Rotation

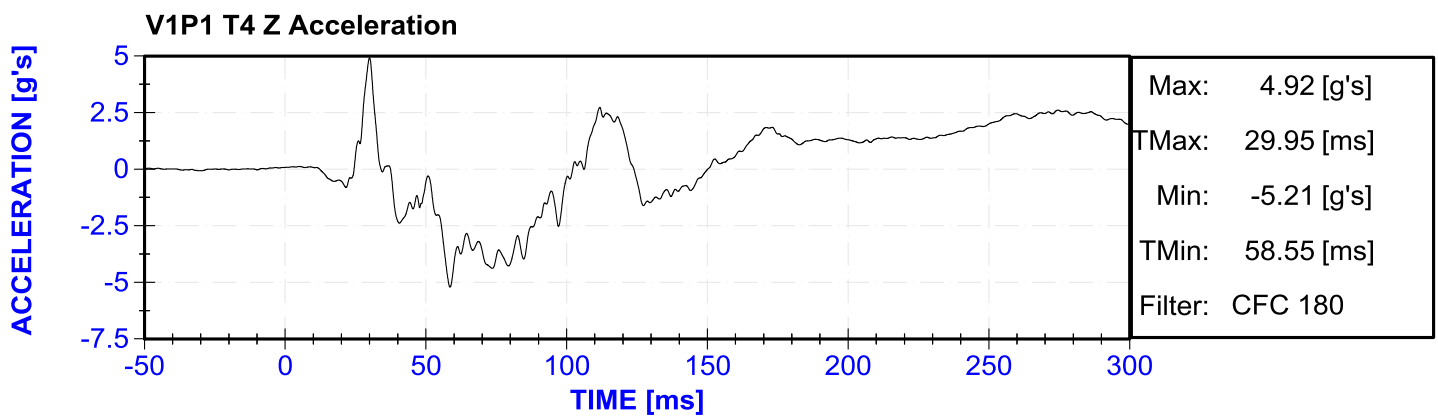
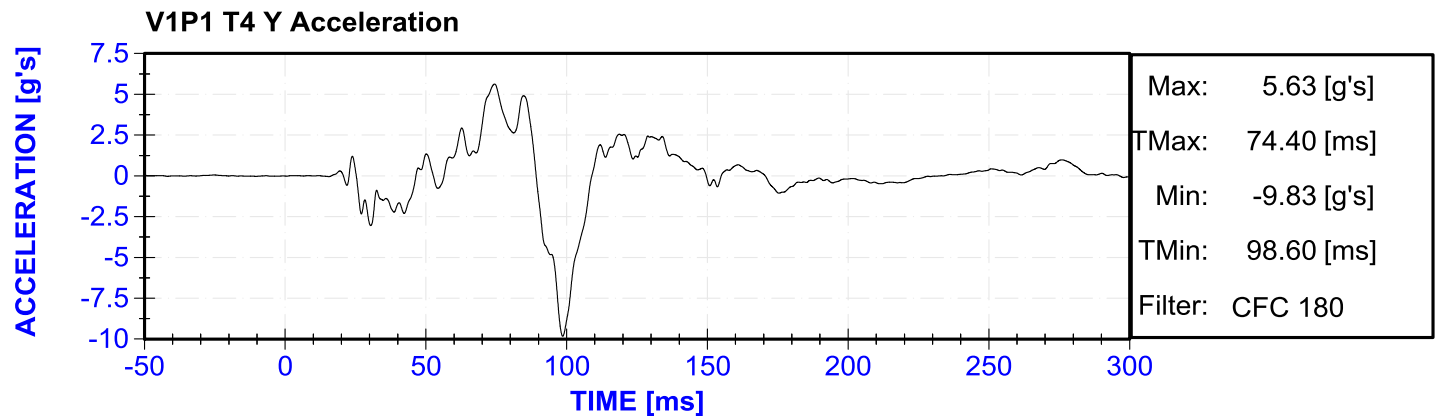
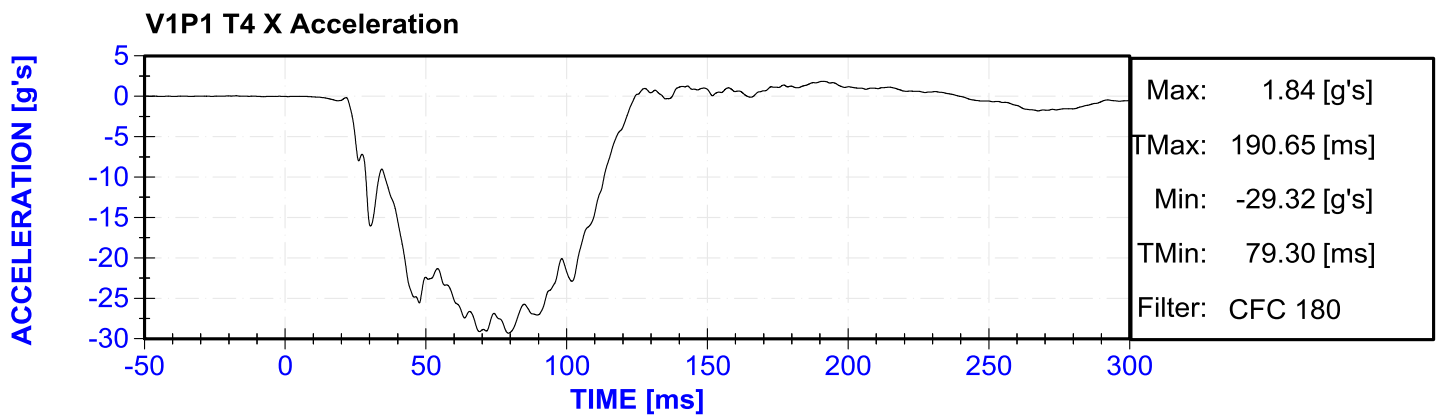
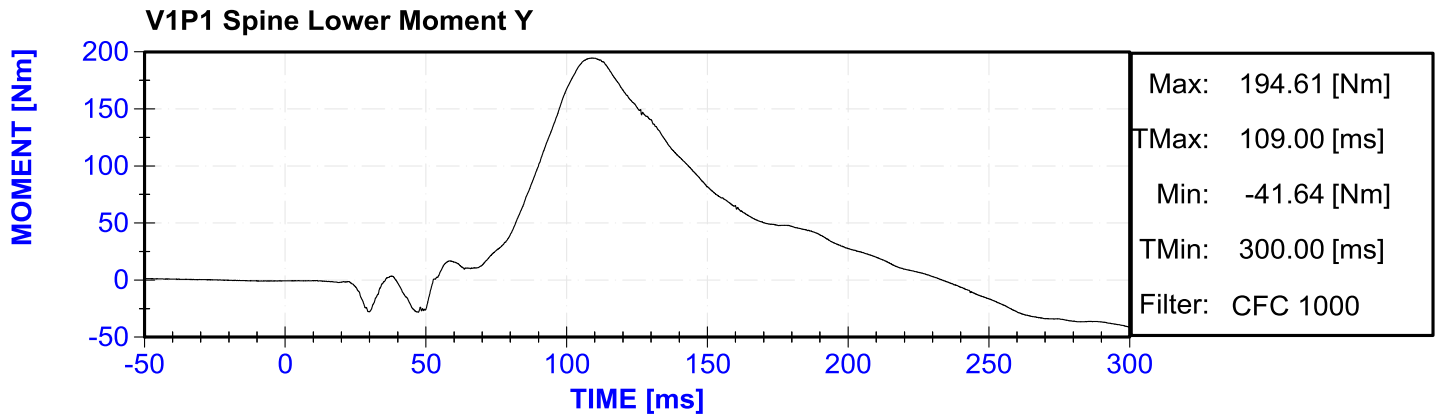


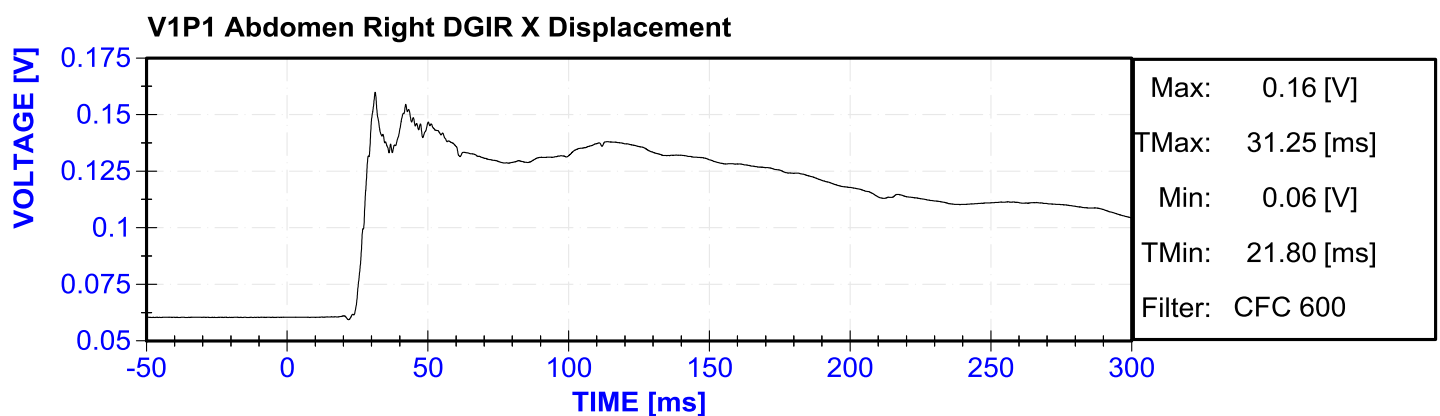
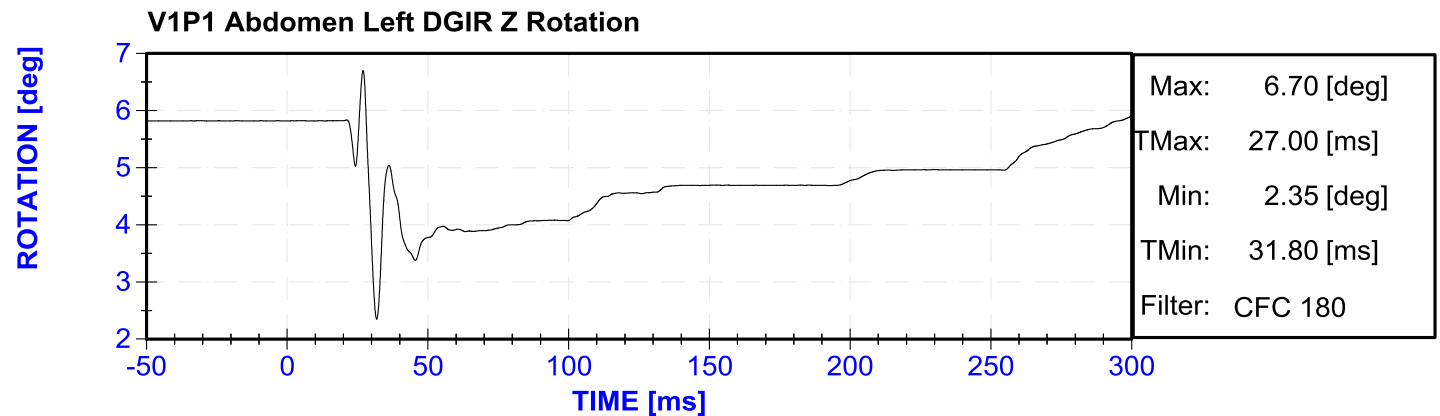
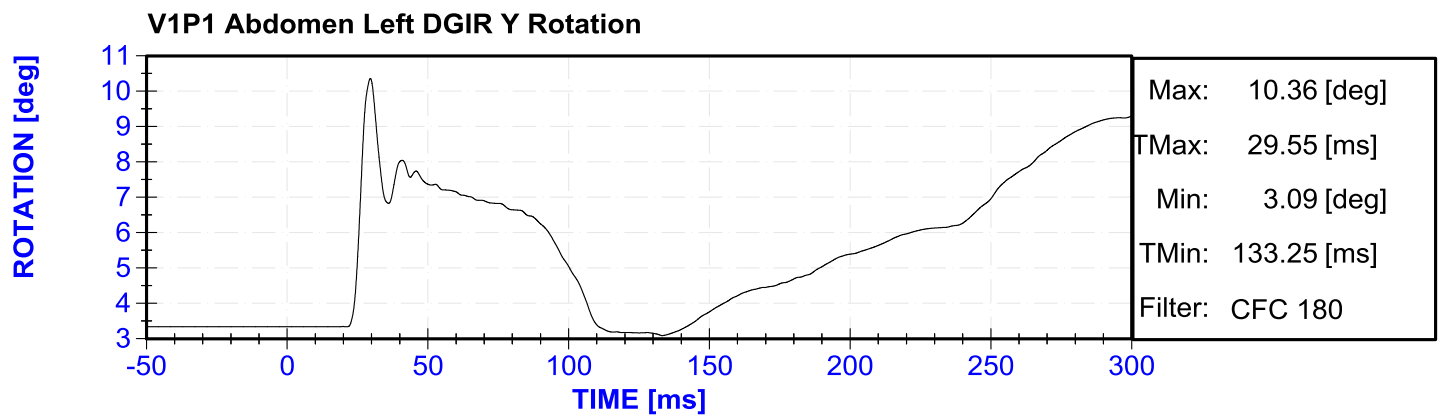
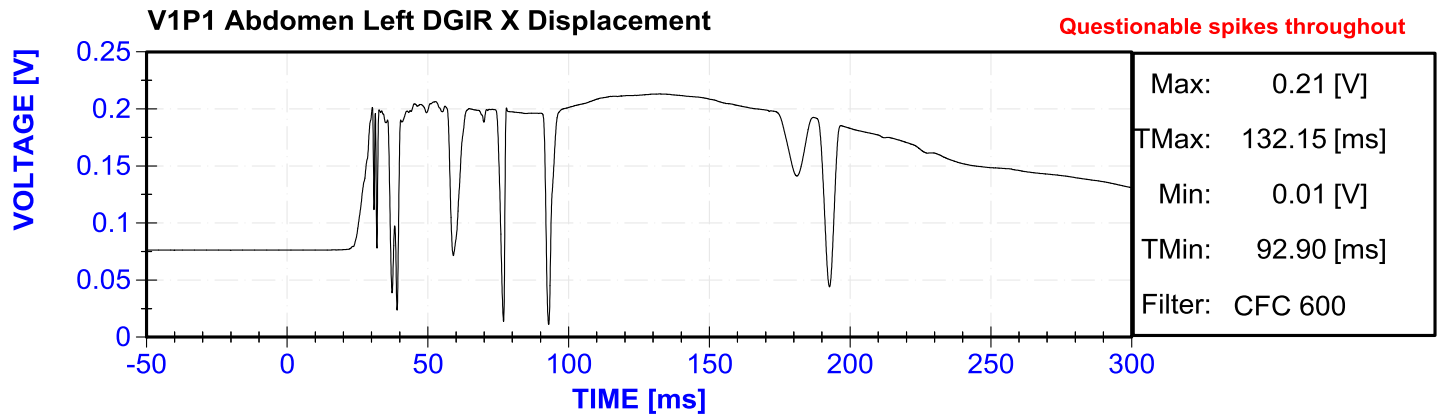


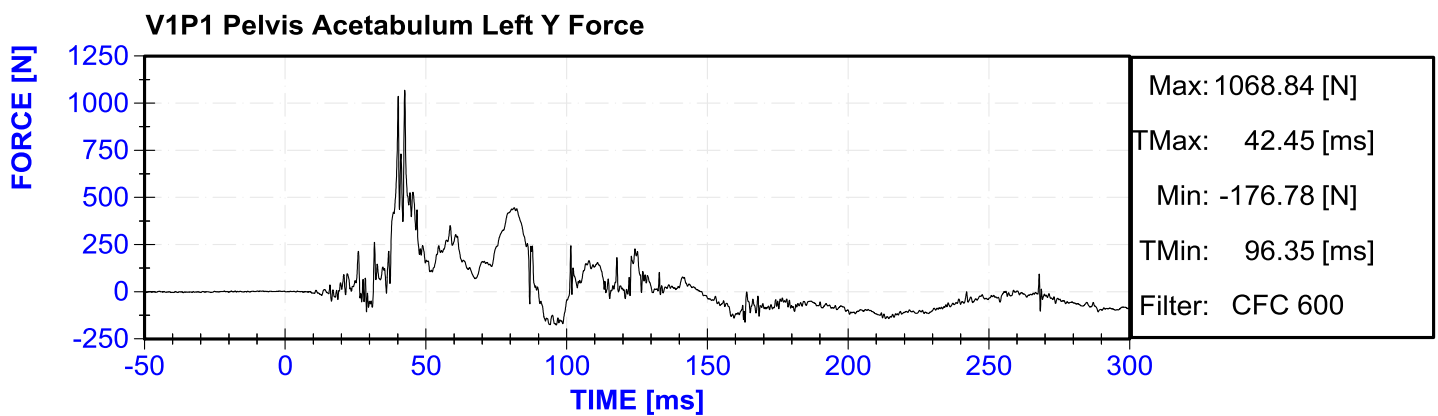
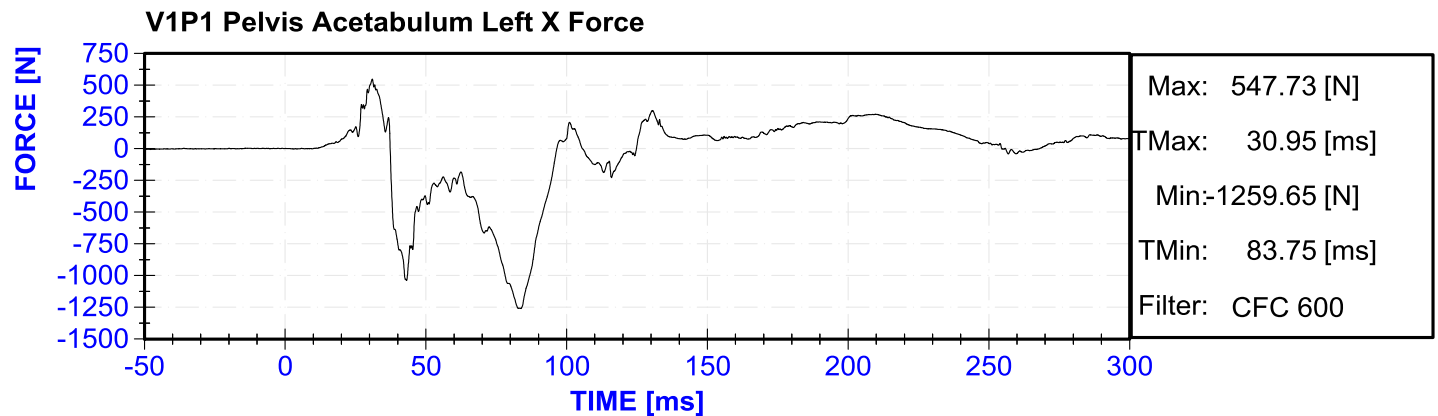
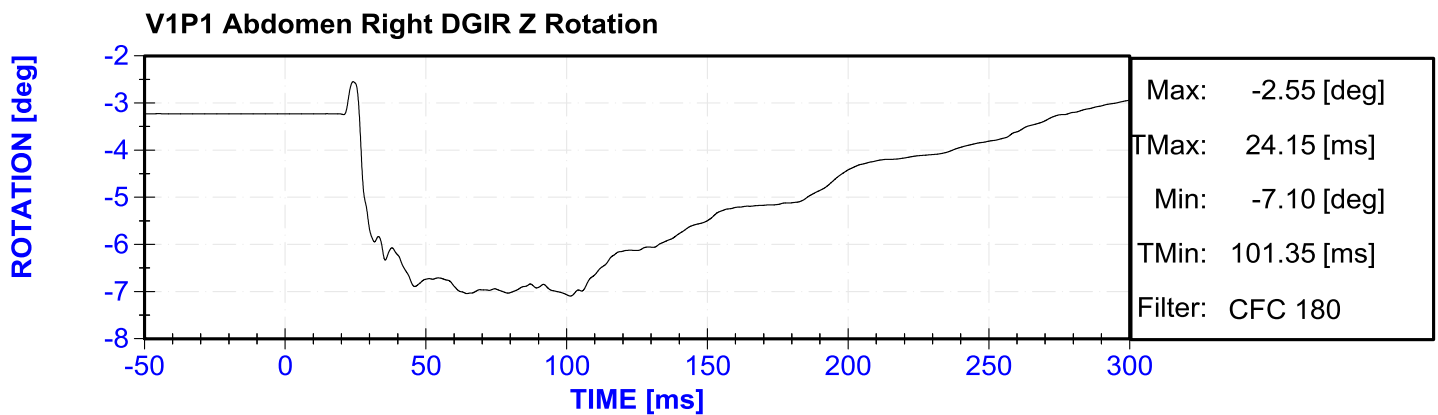
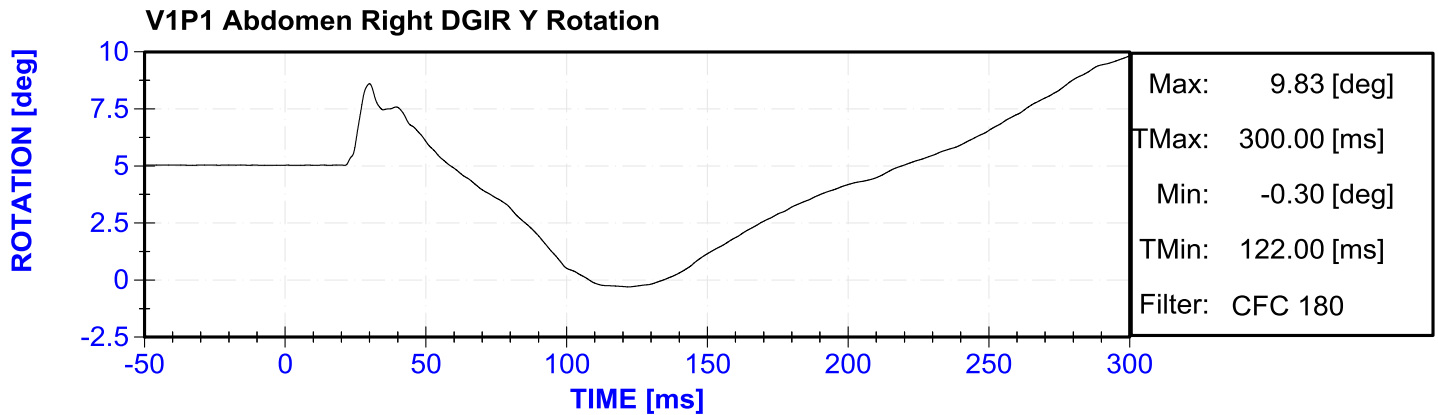


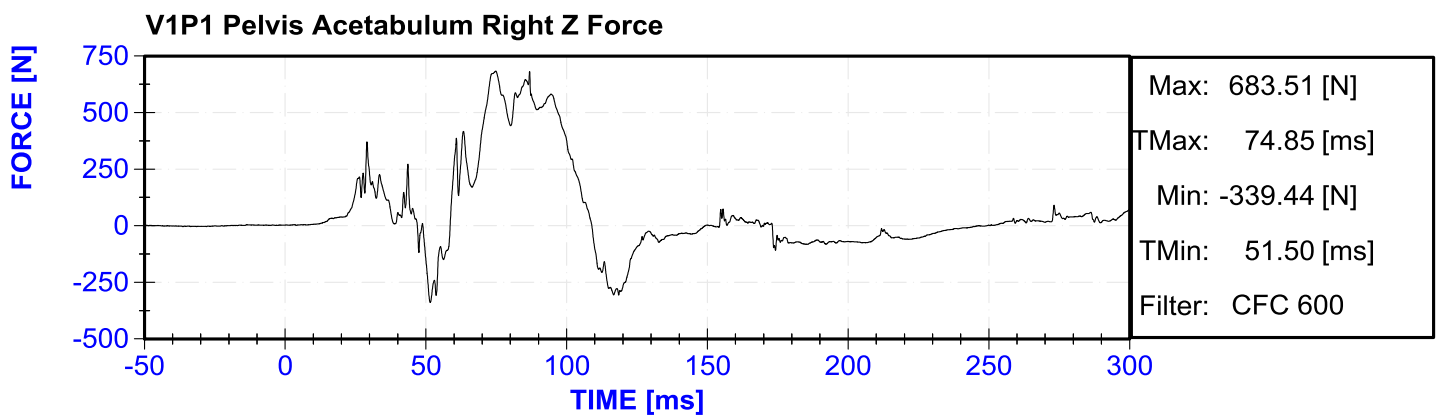
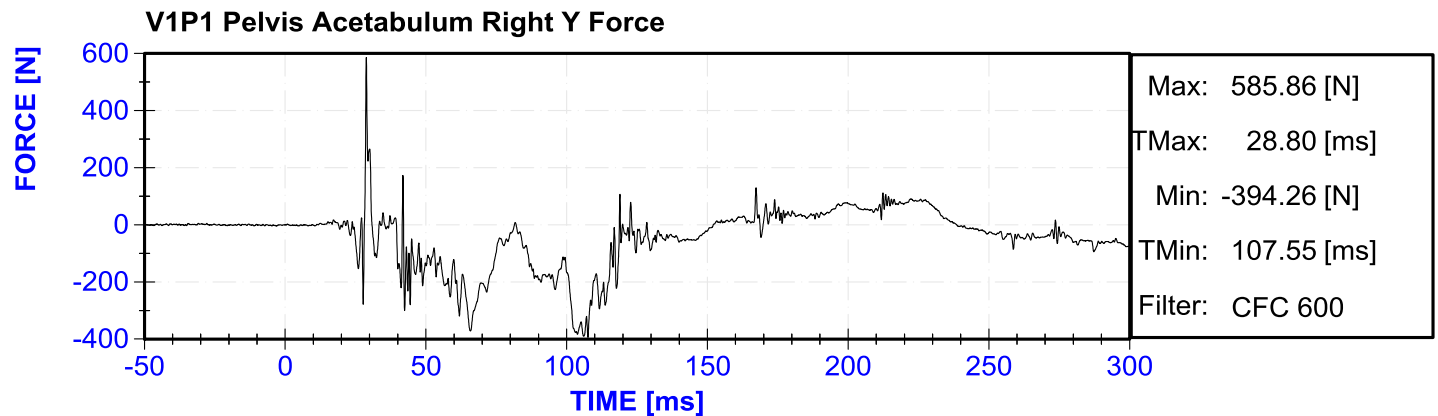
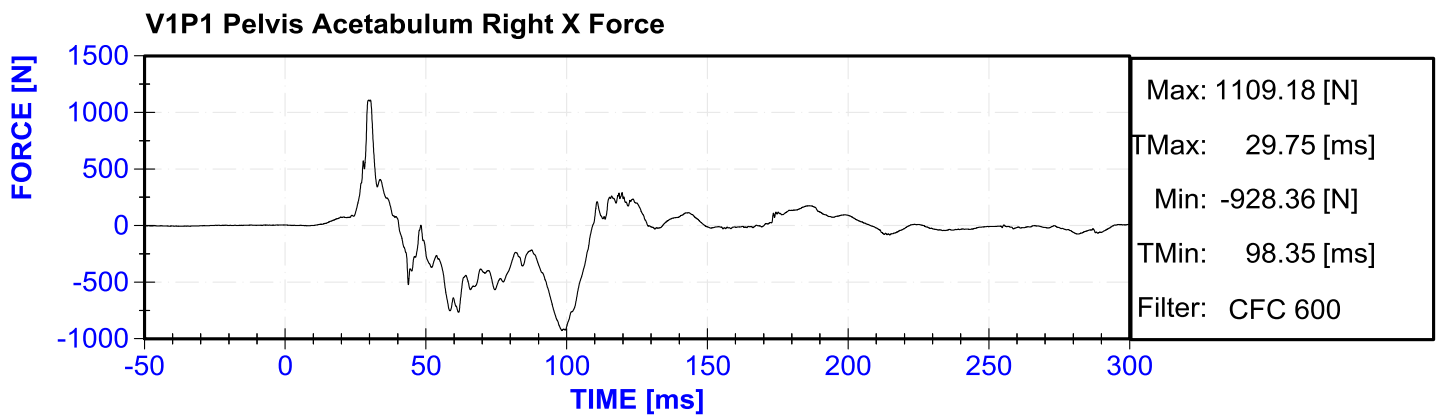
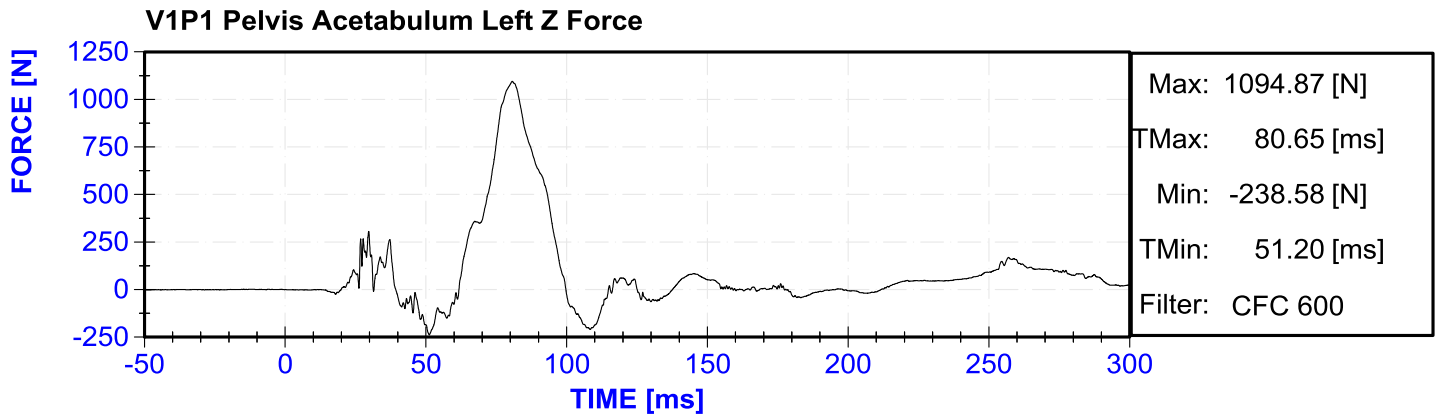


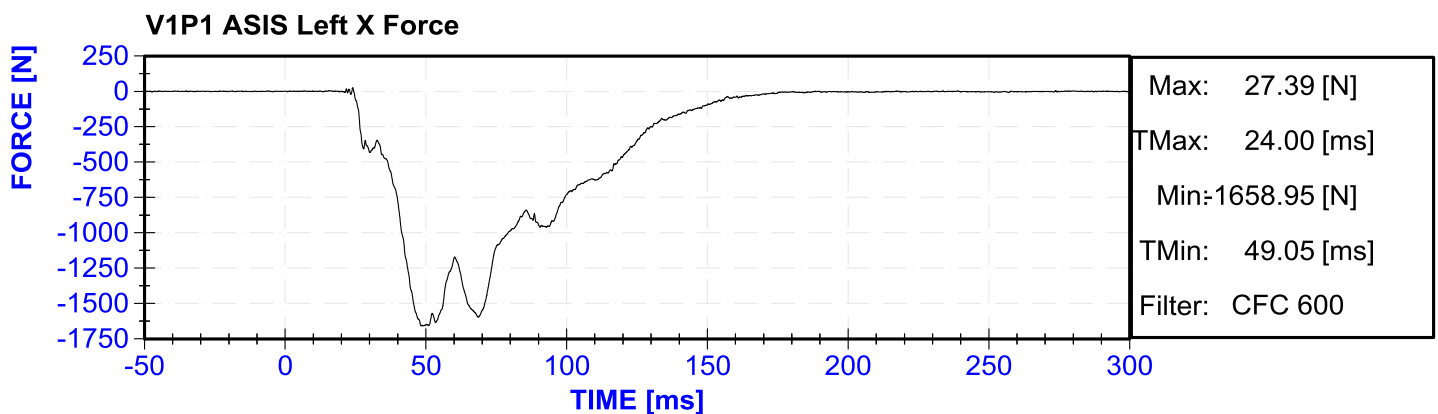
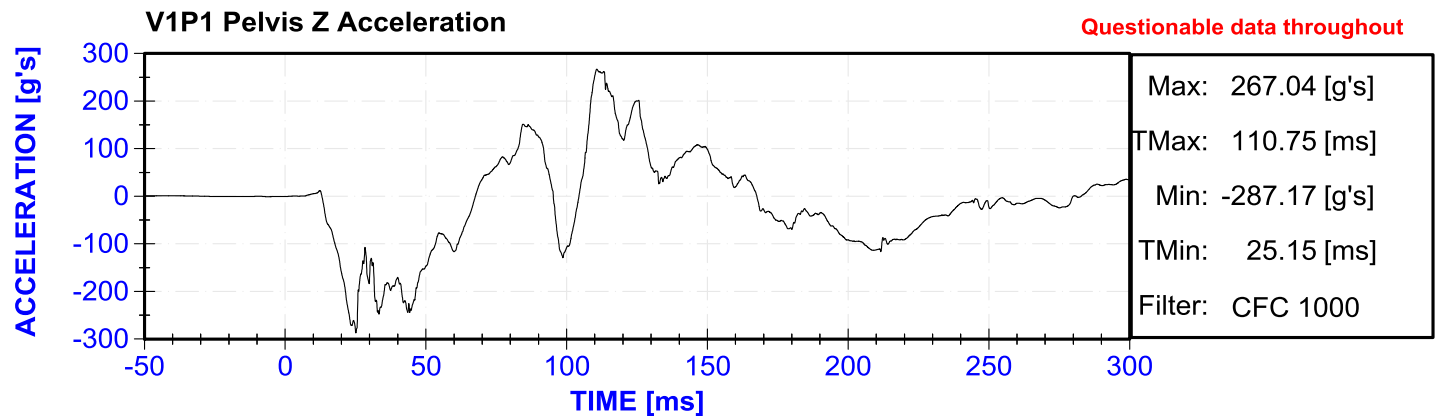
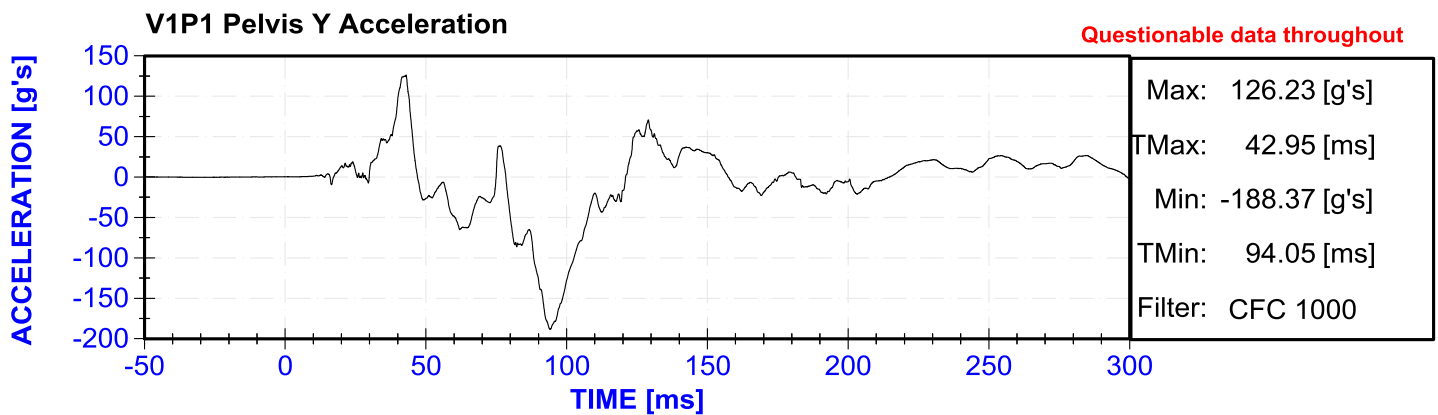
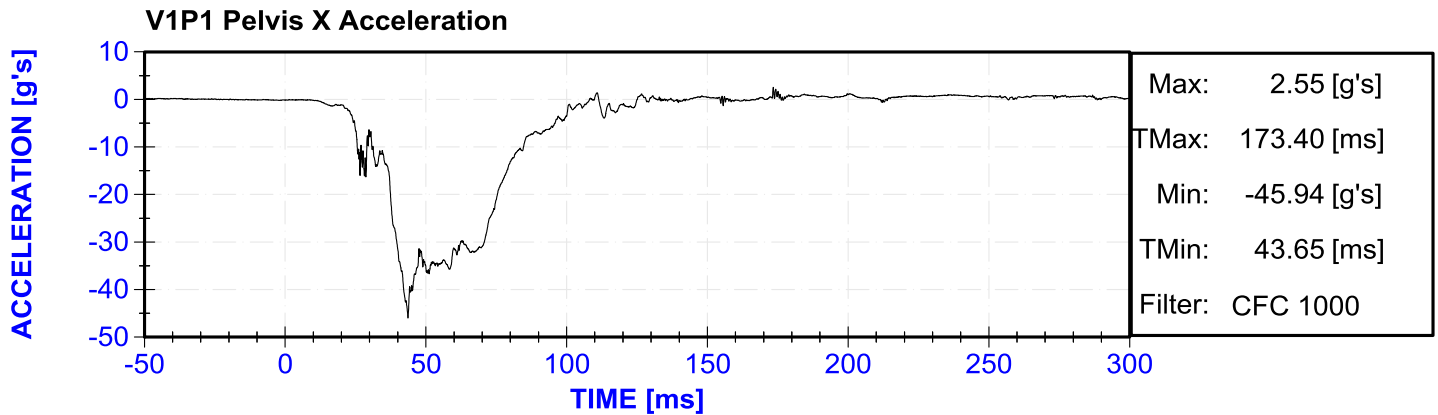


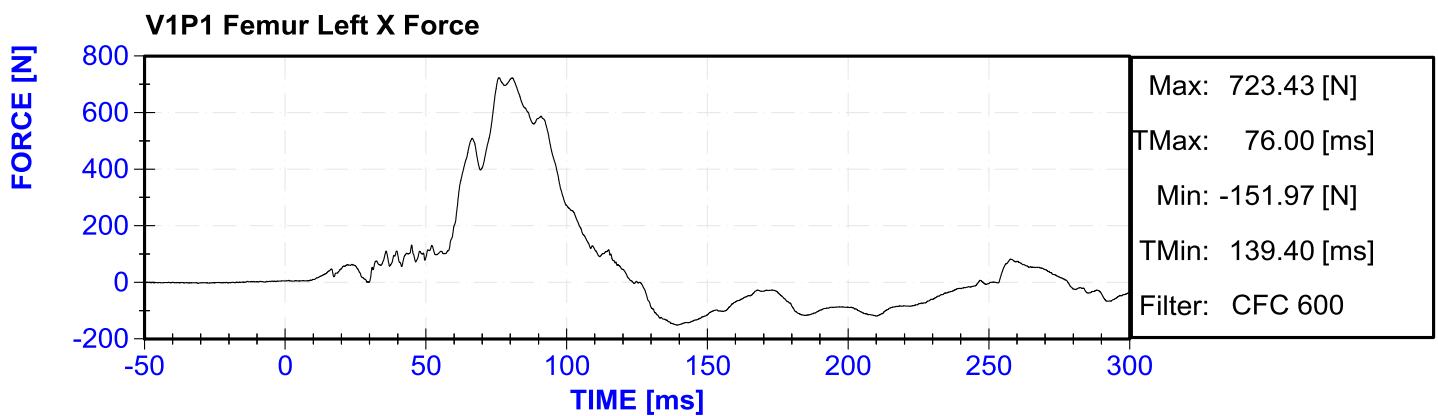
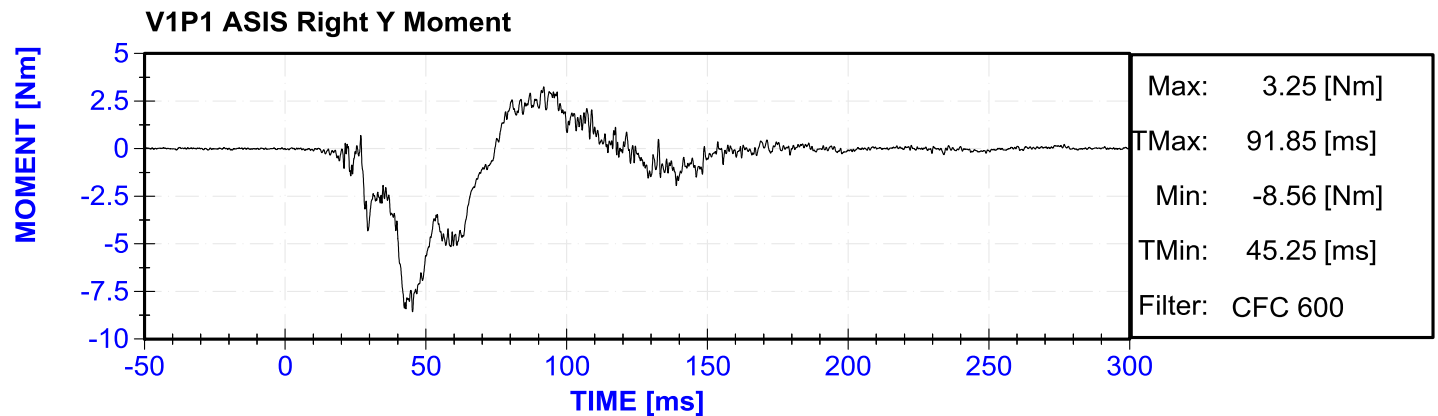
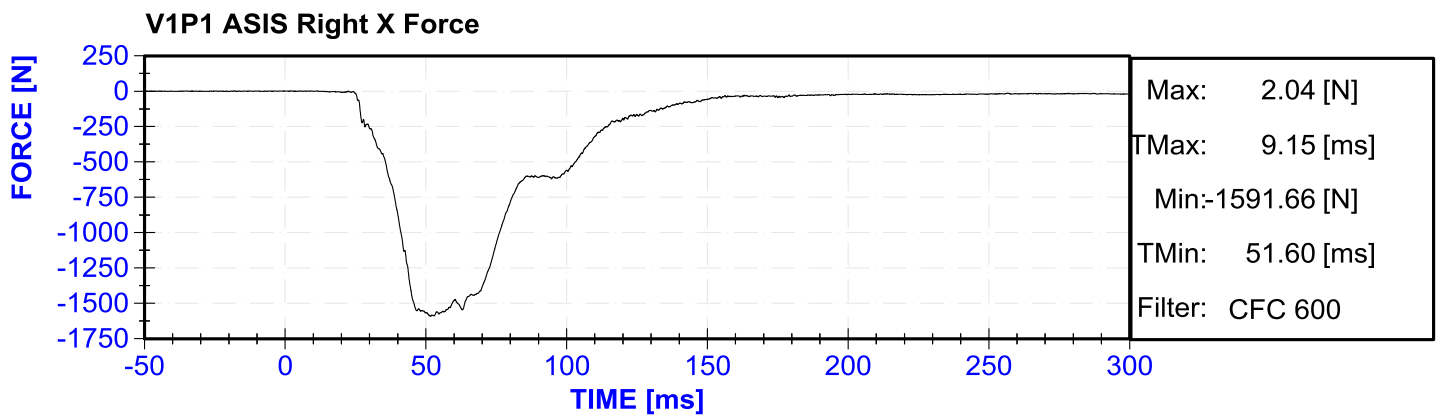
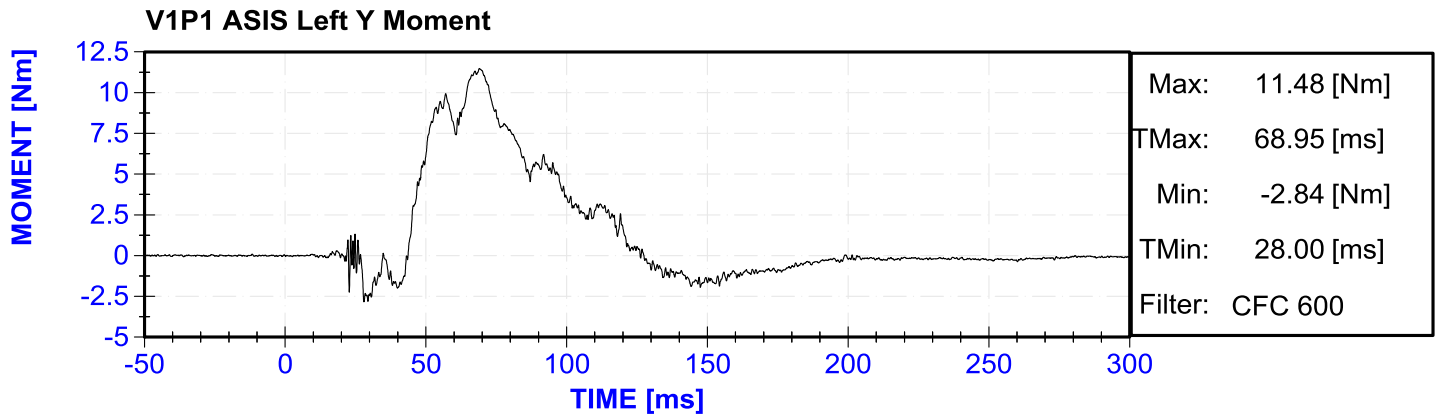


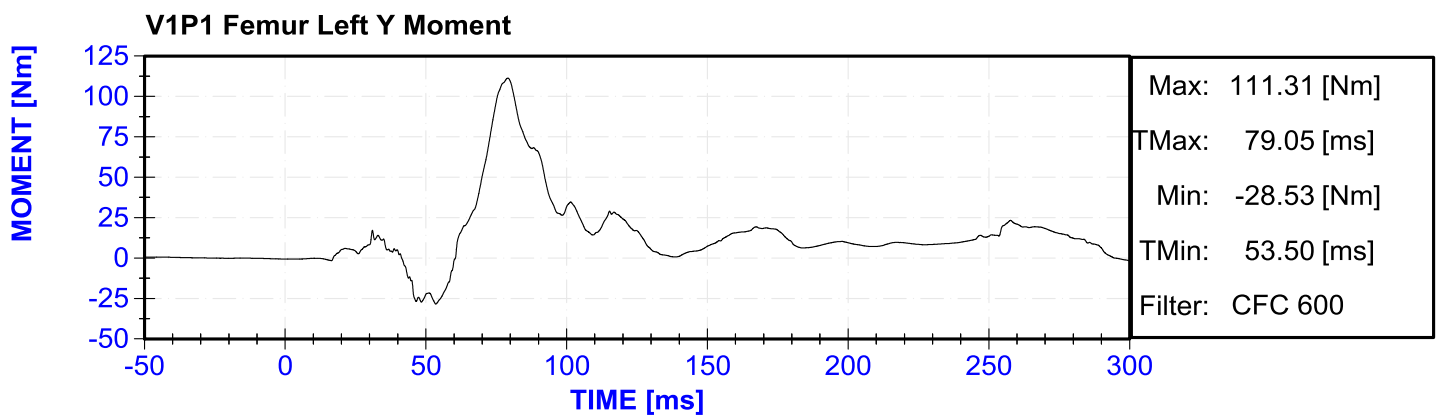
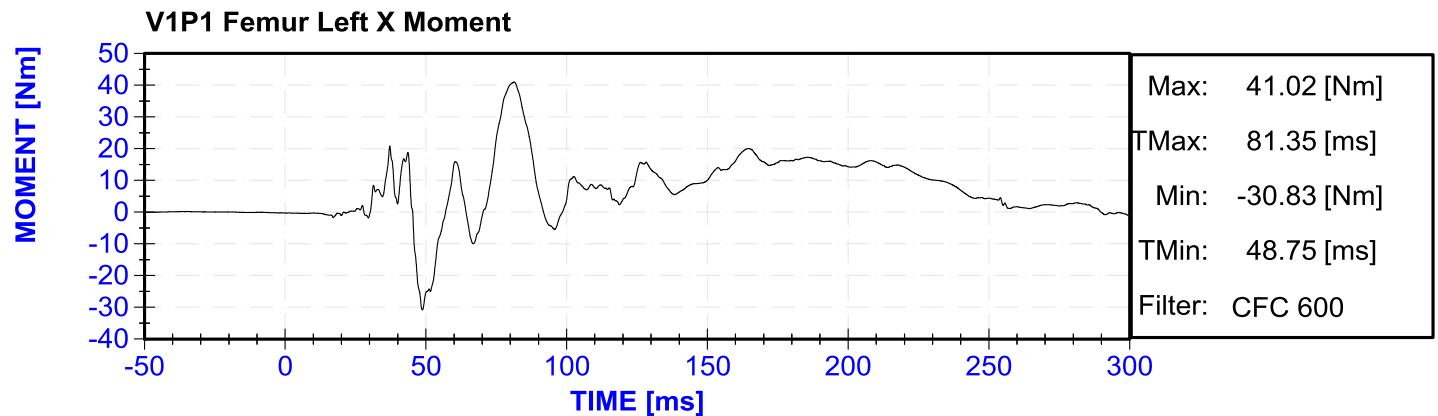
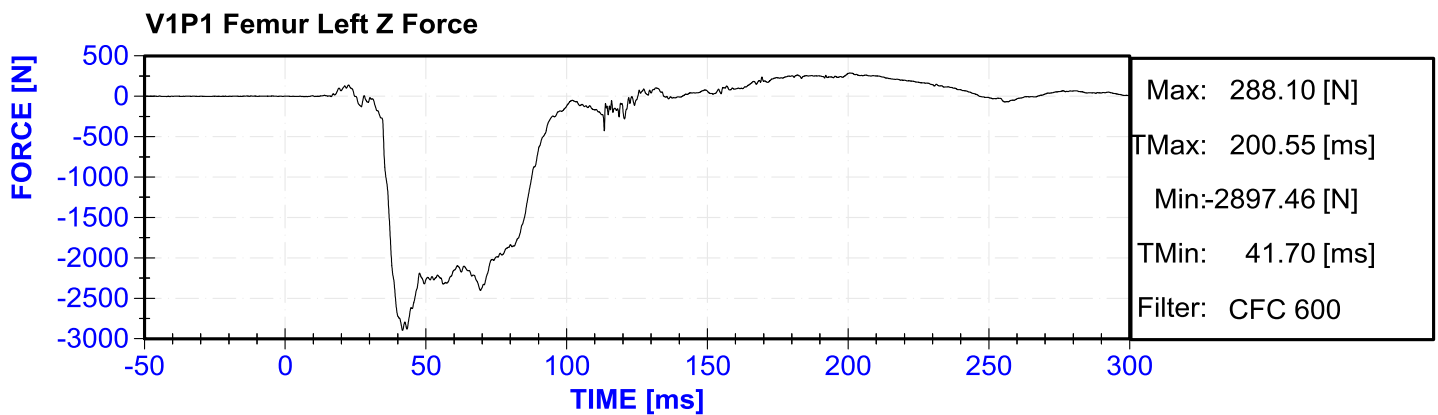
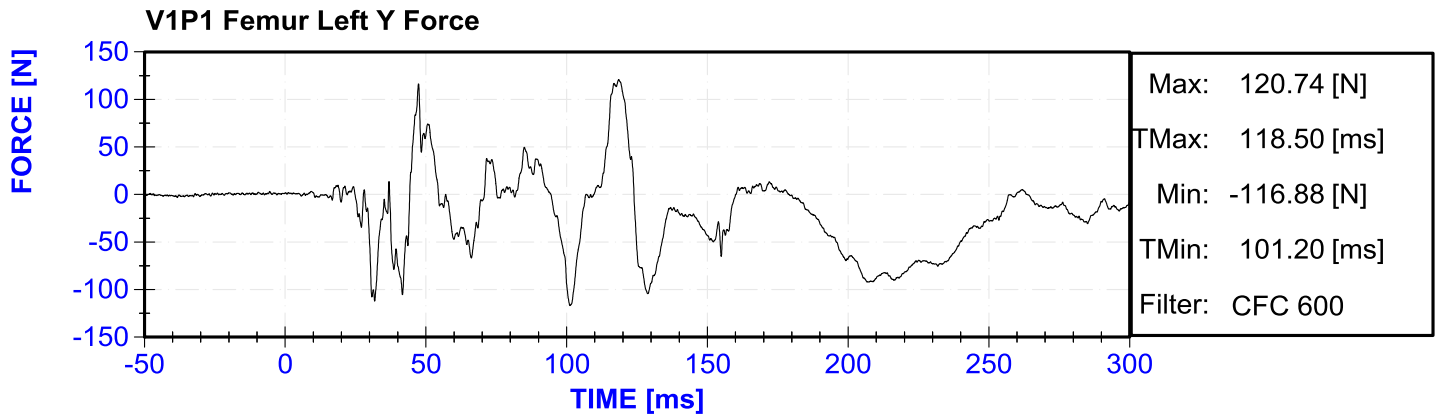


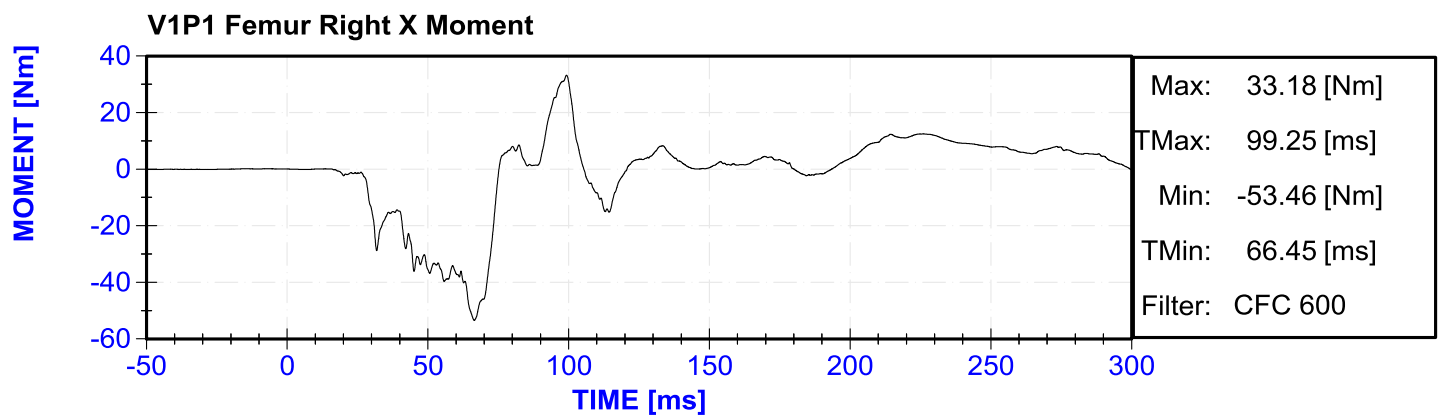
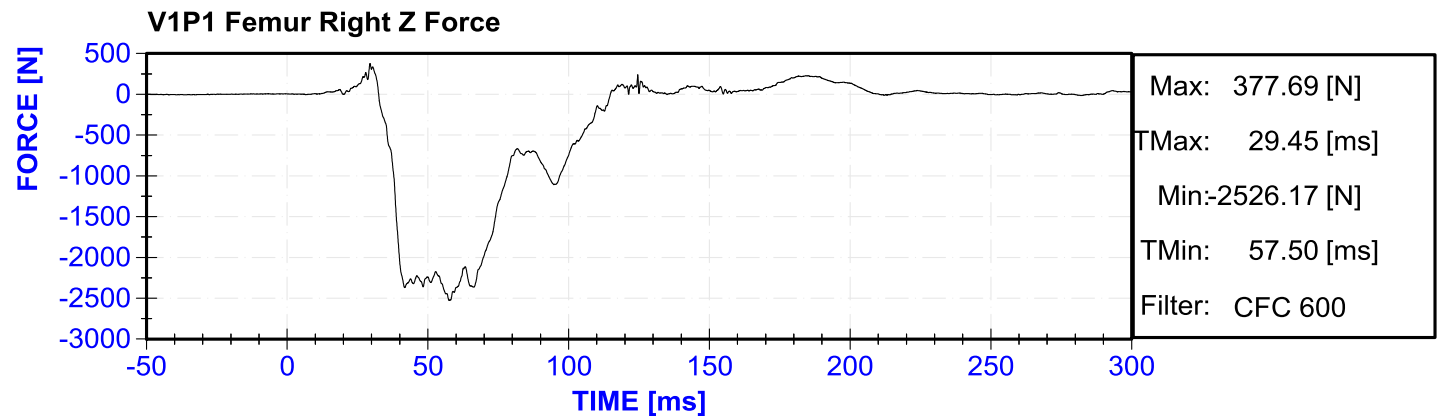
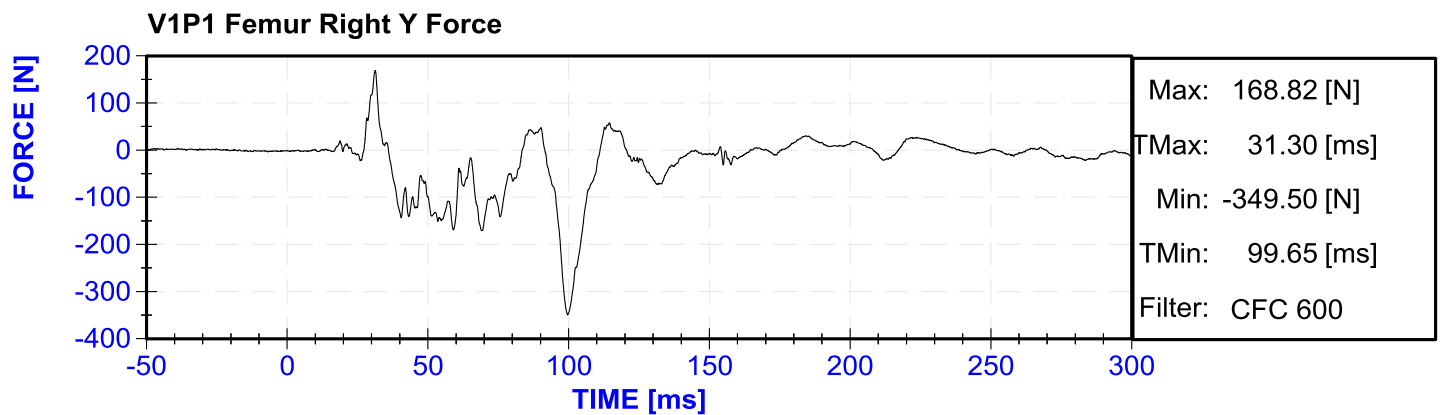
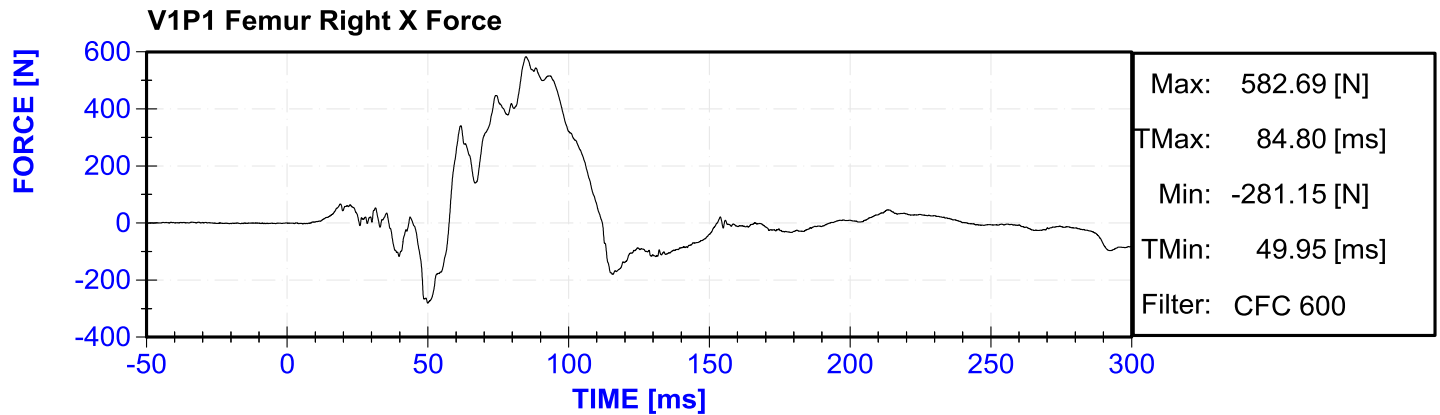


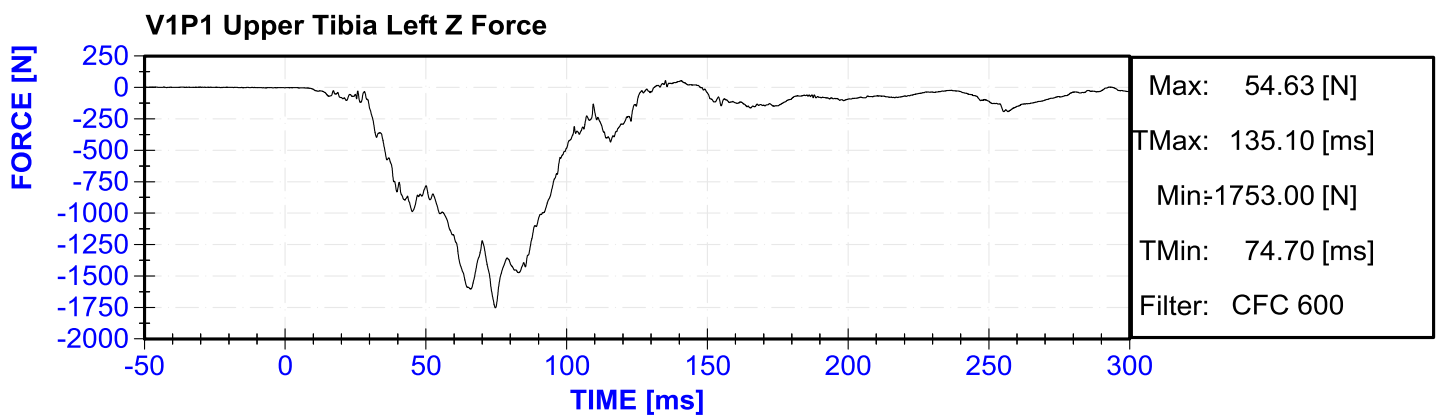
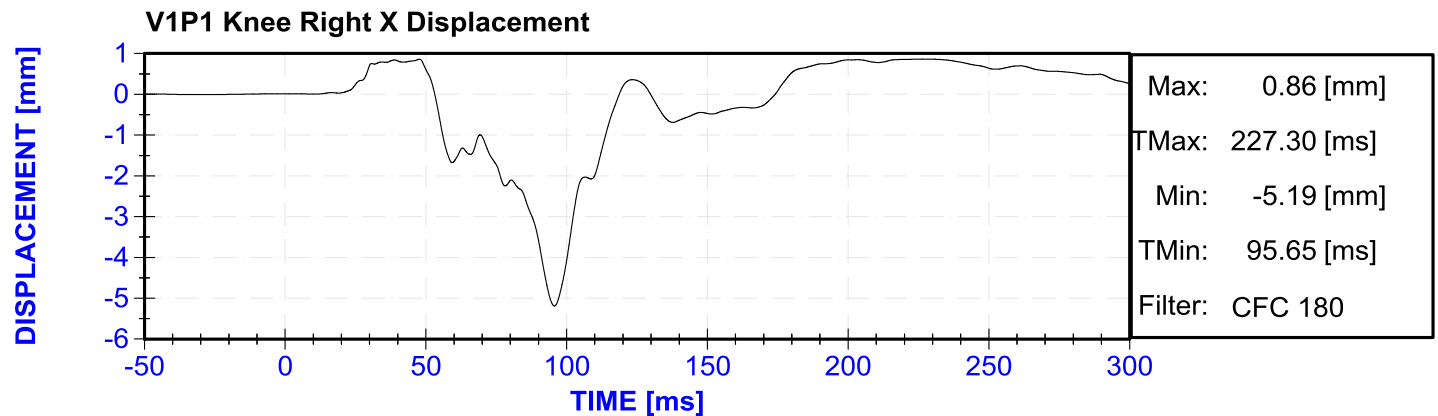
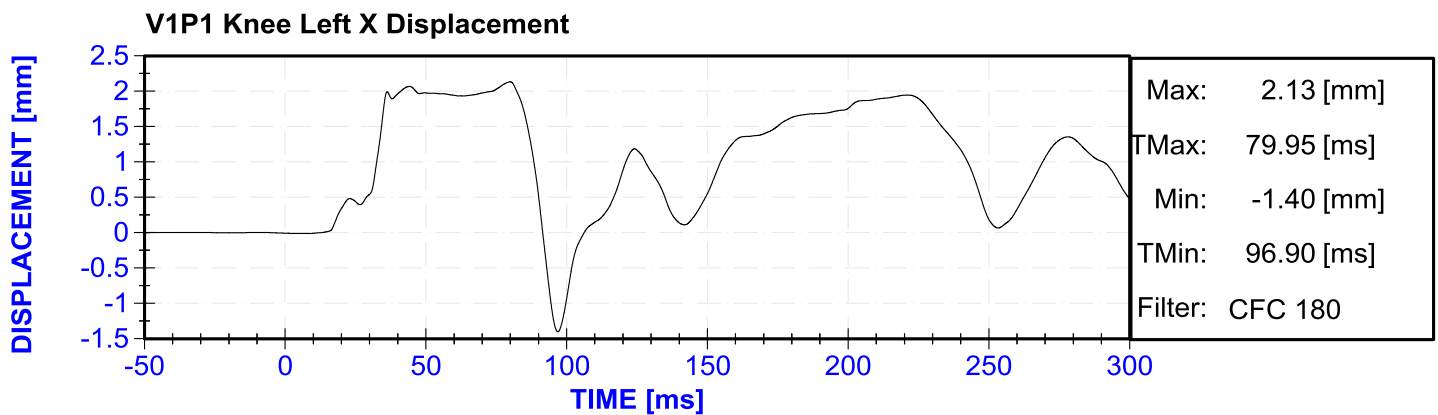
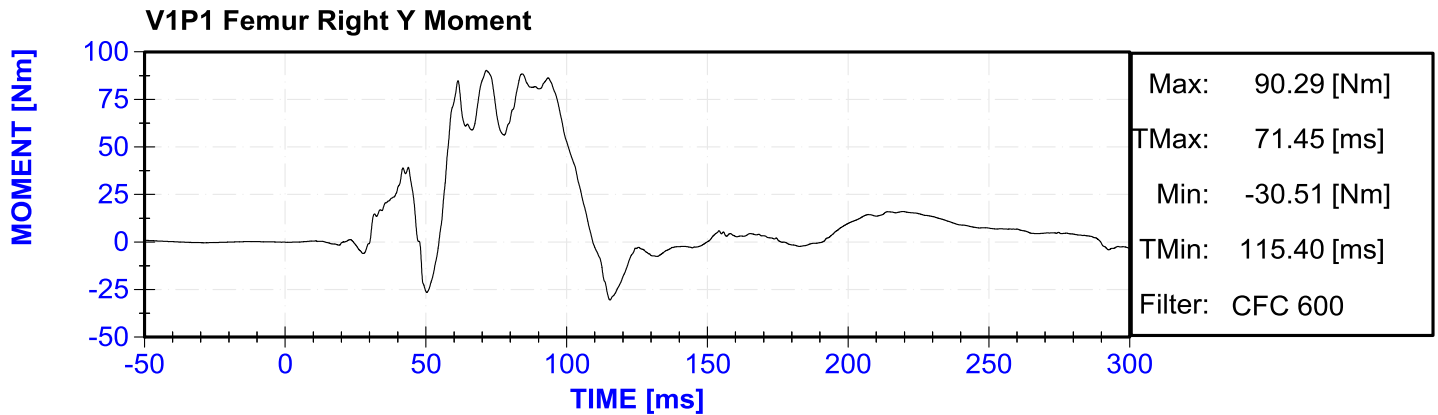


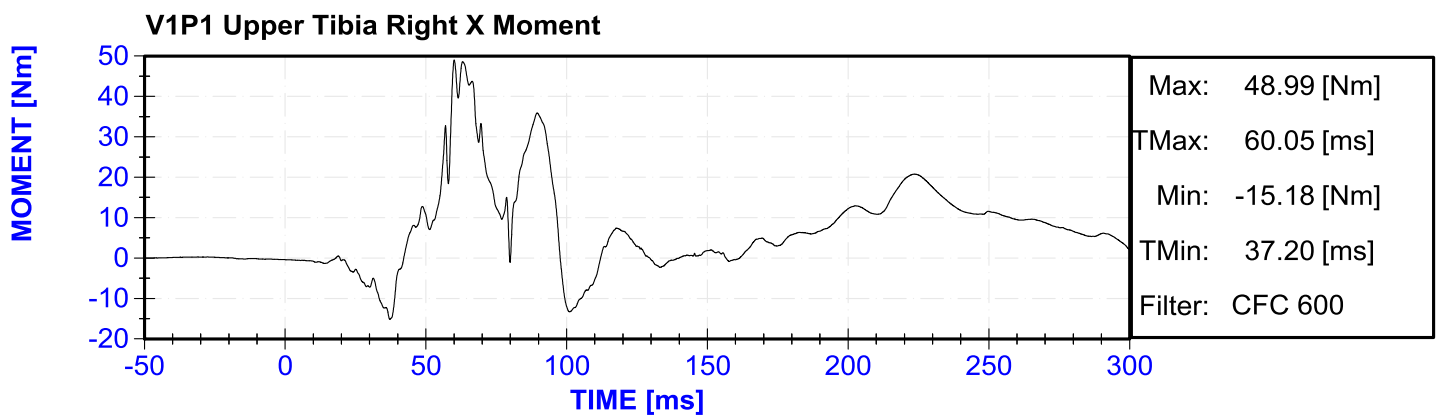
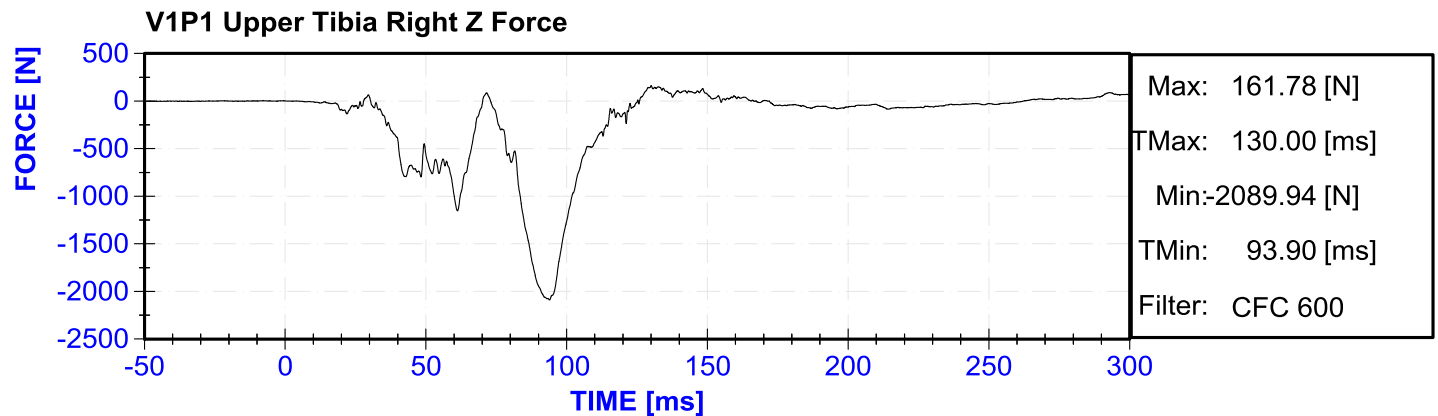
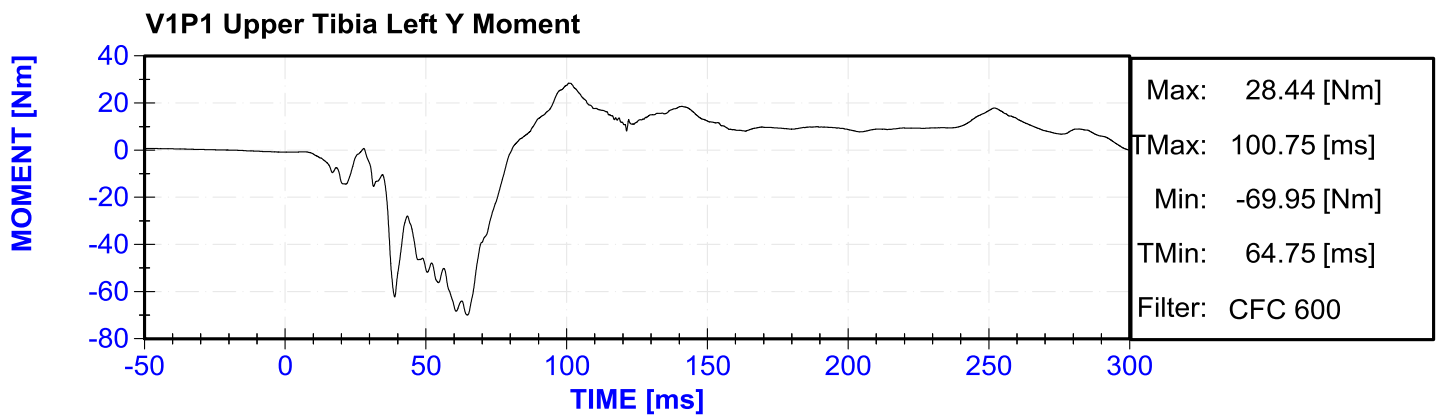
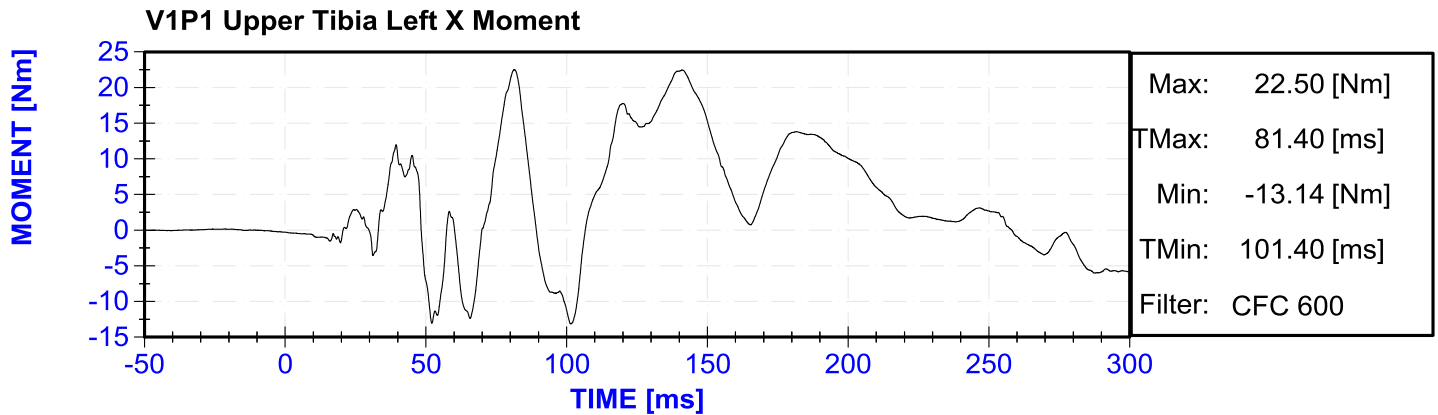


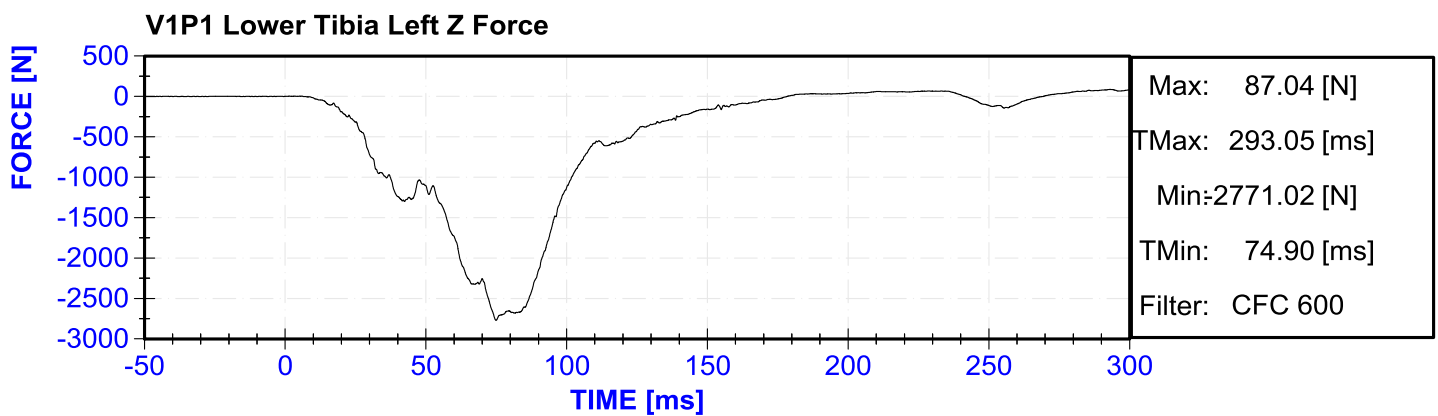
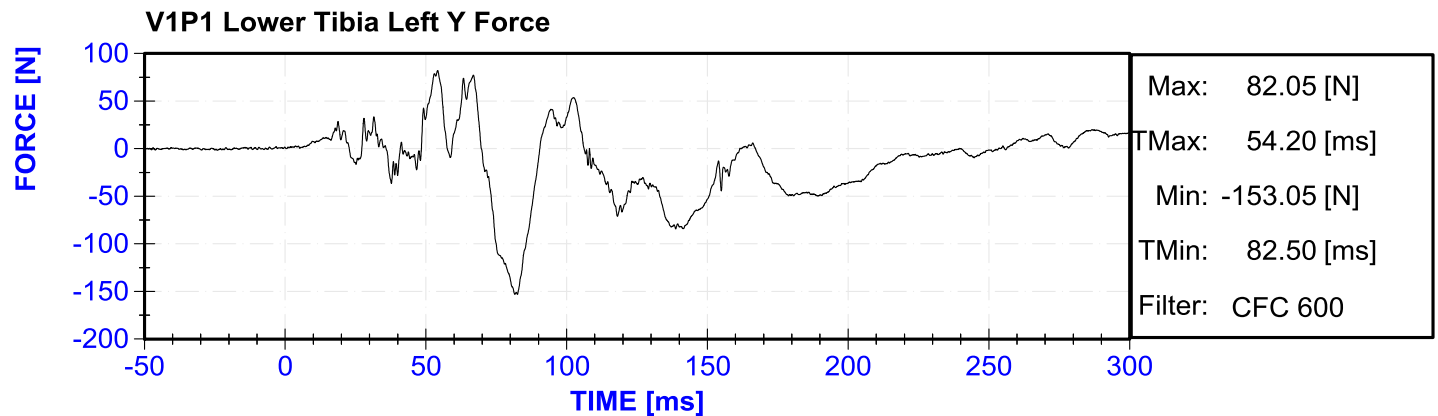
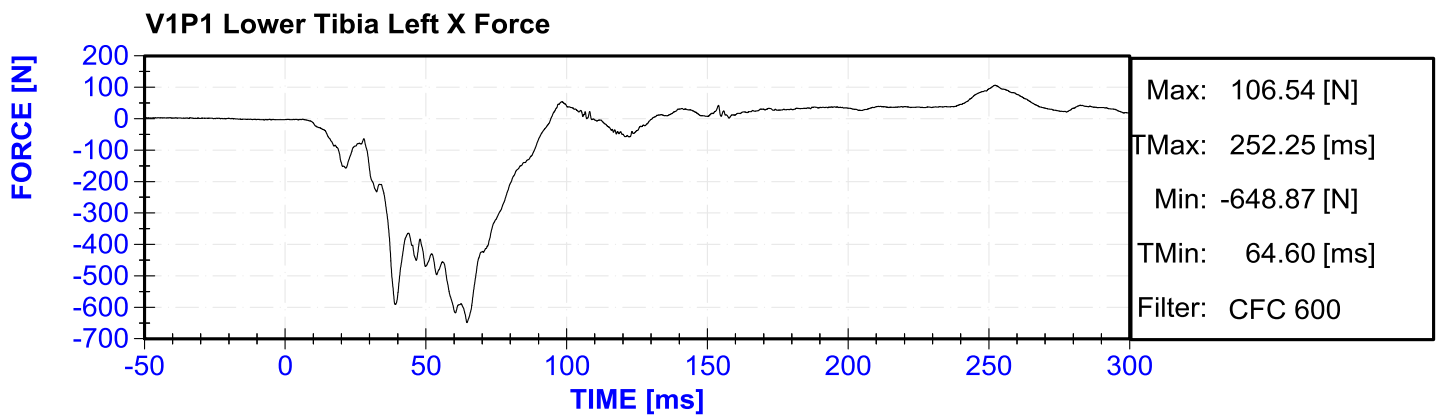
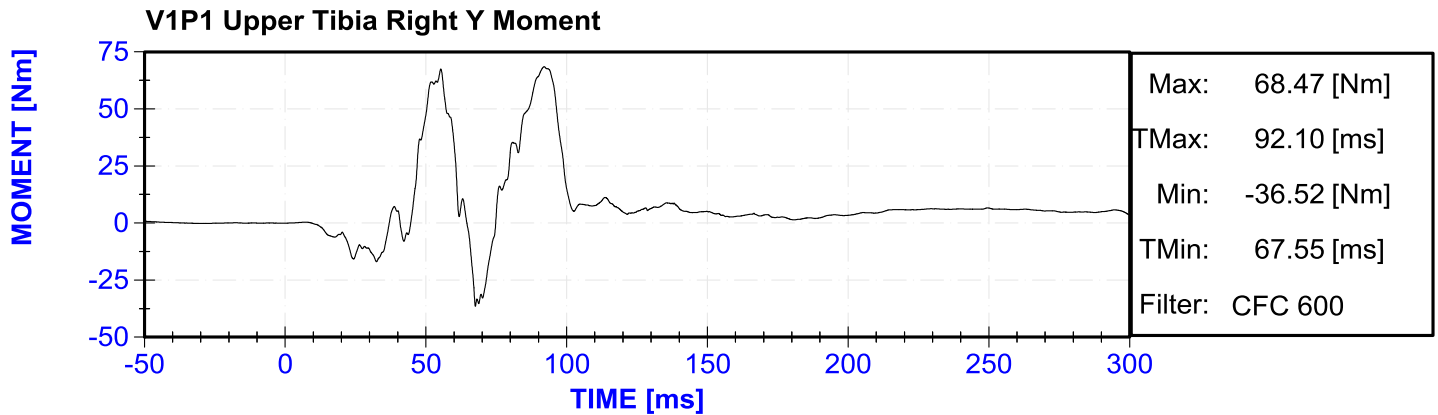


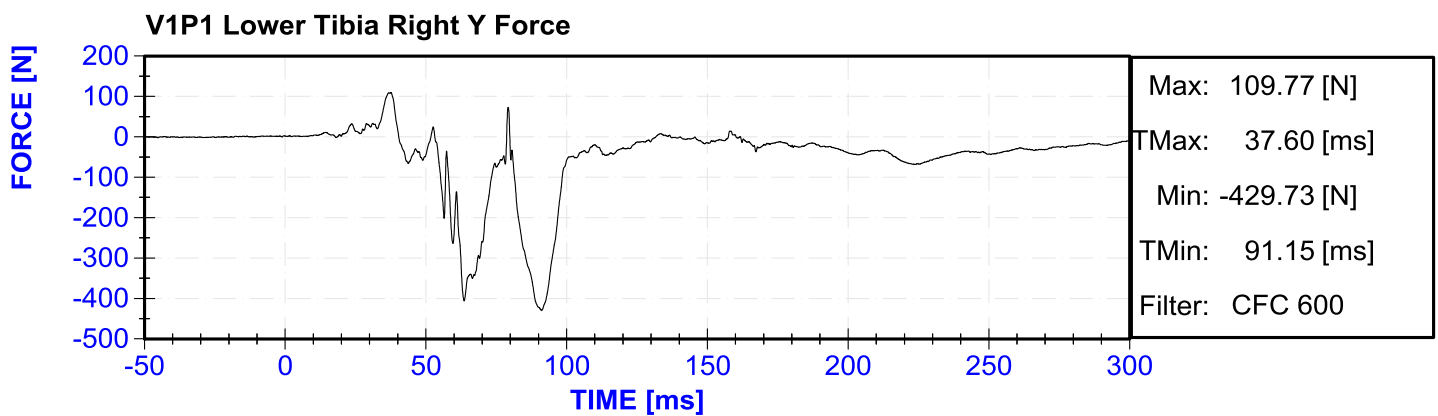
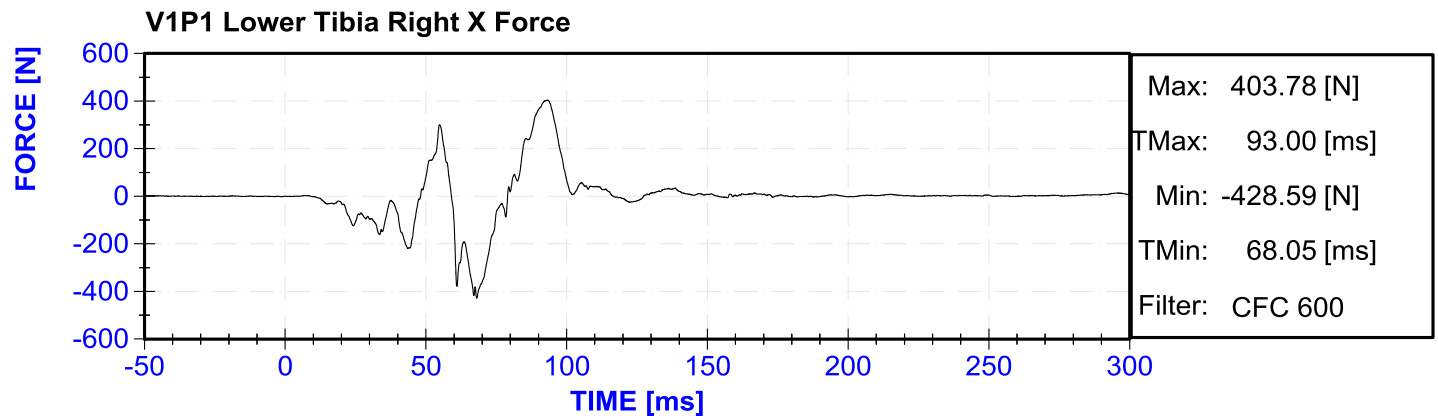
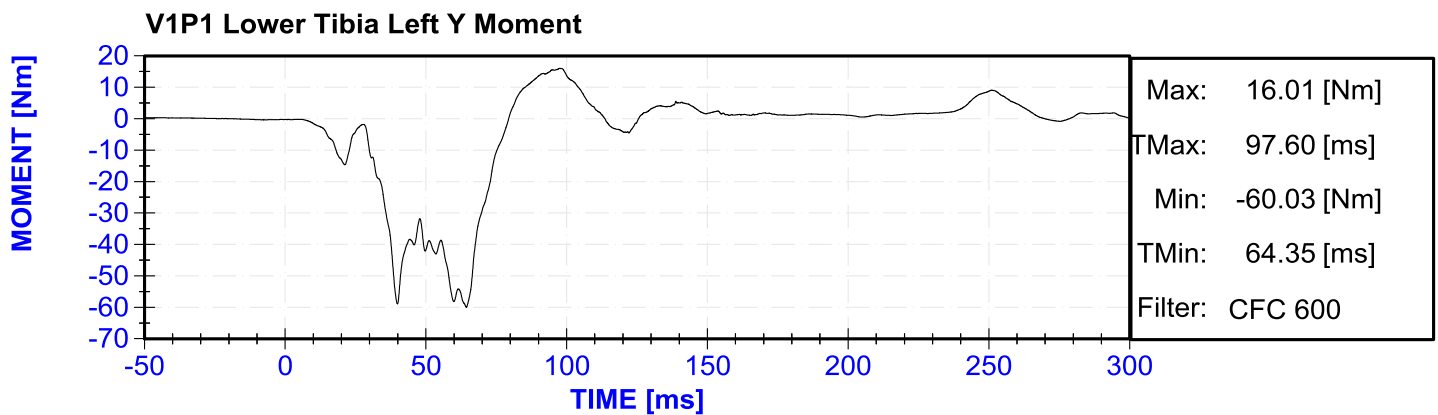
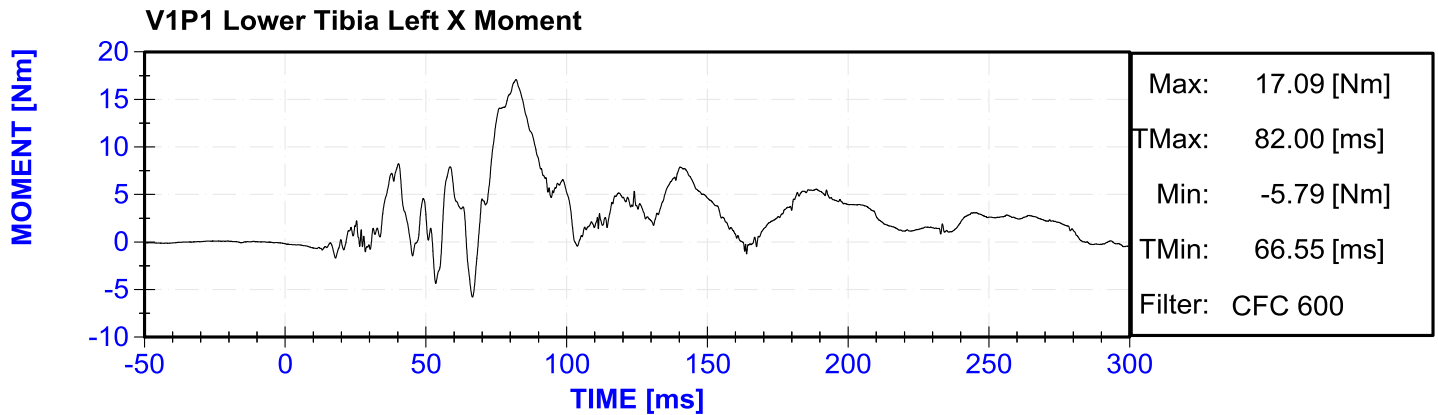


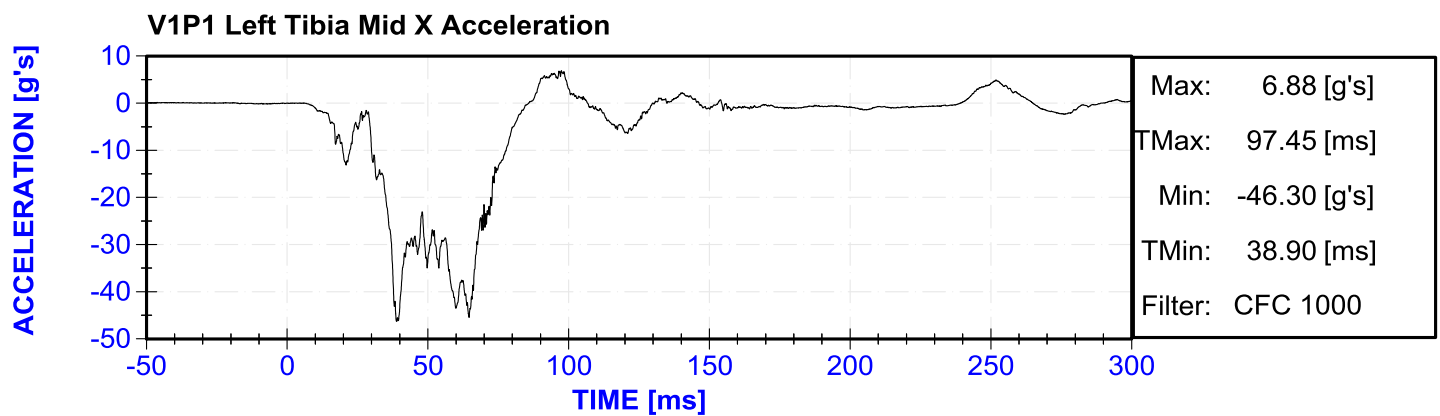
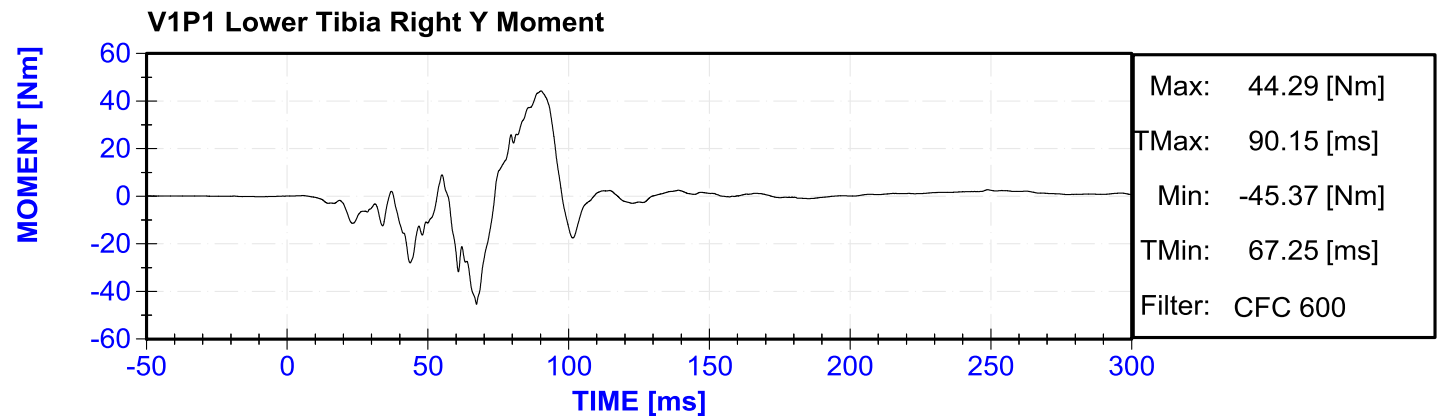
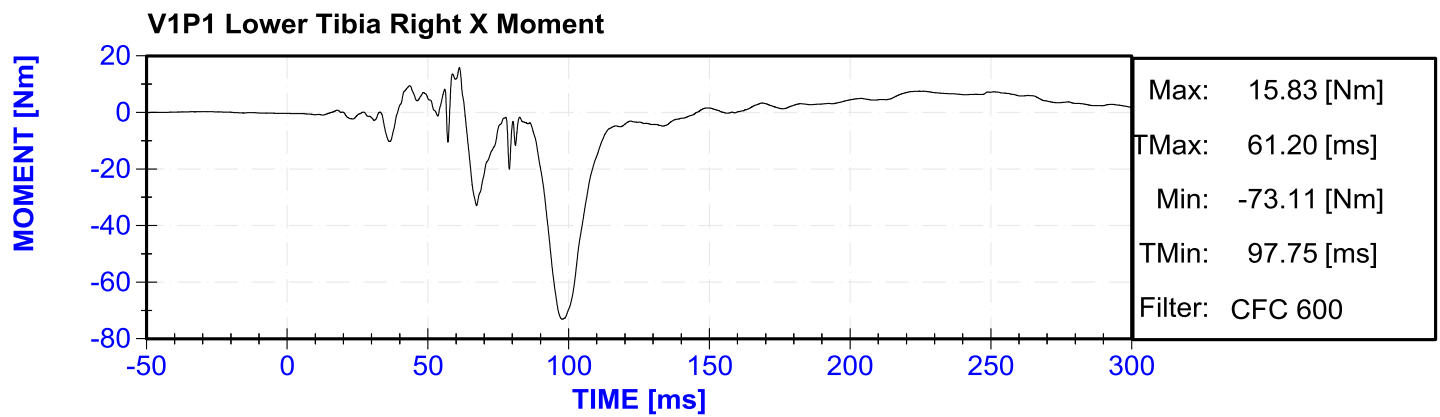
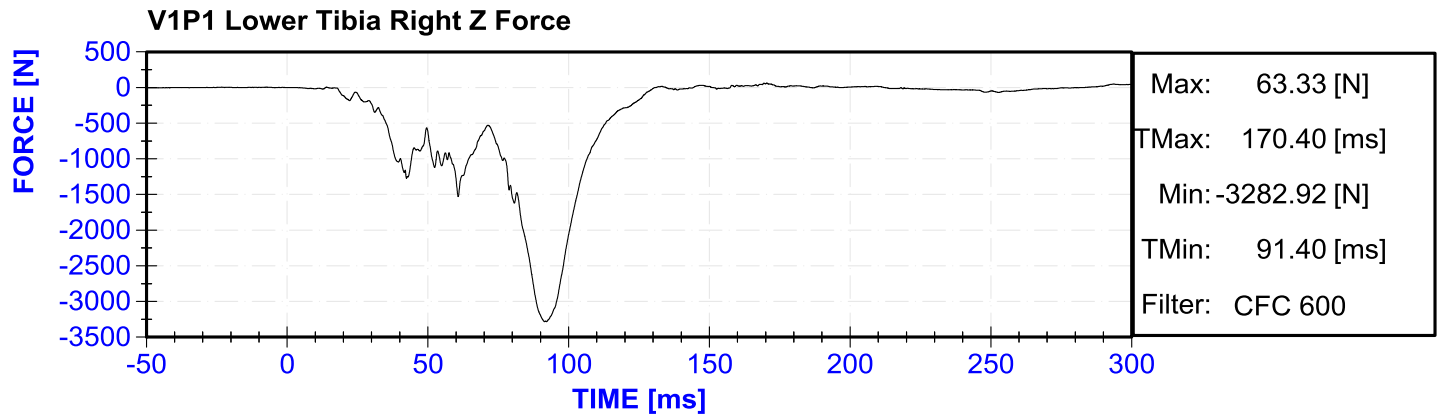


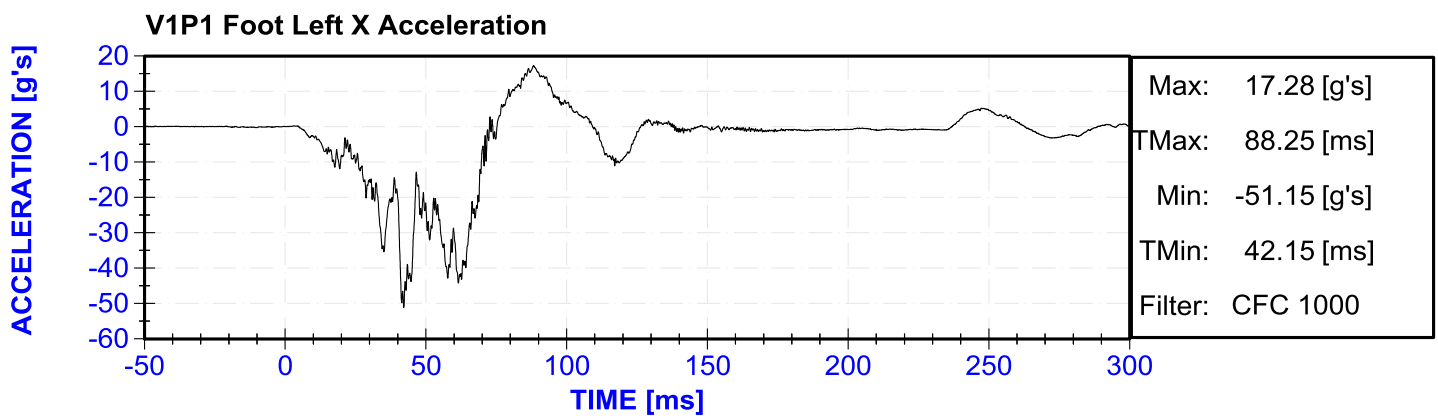
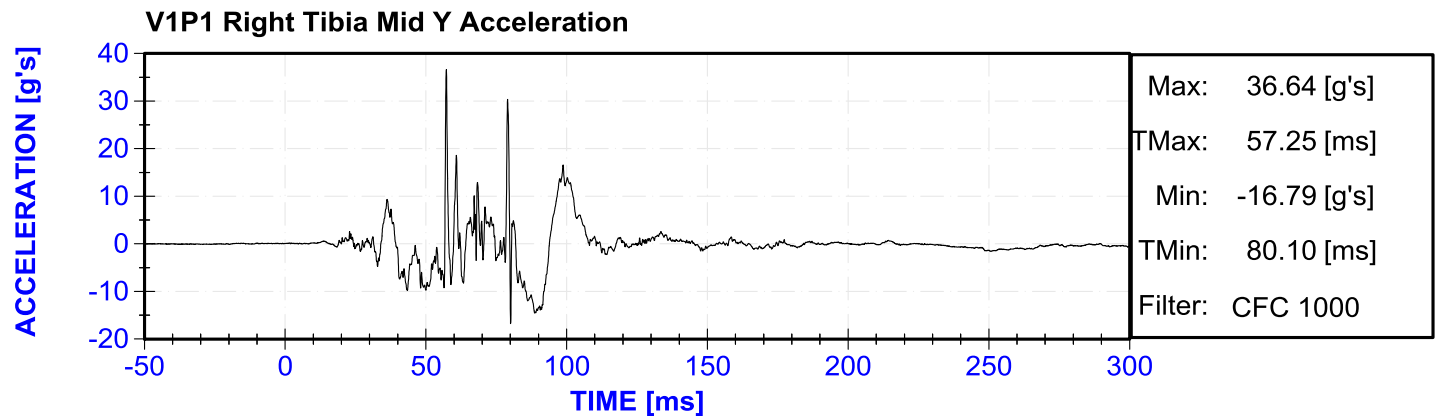
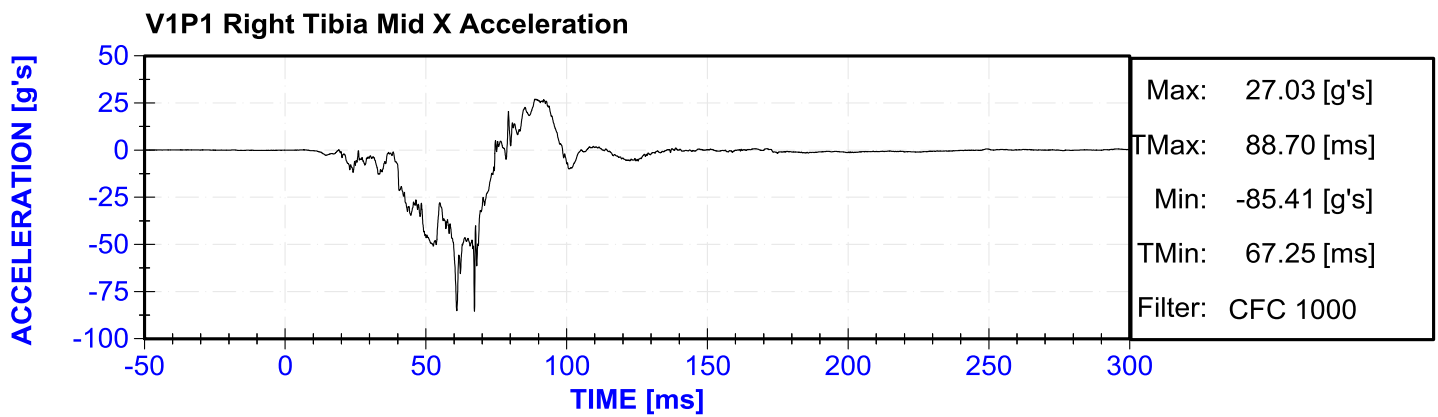
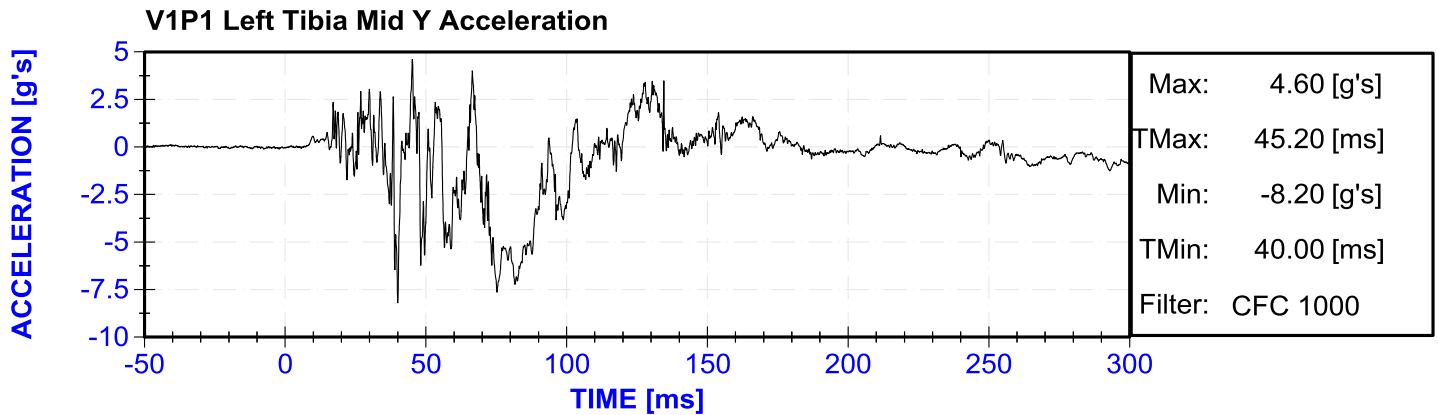


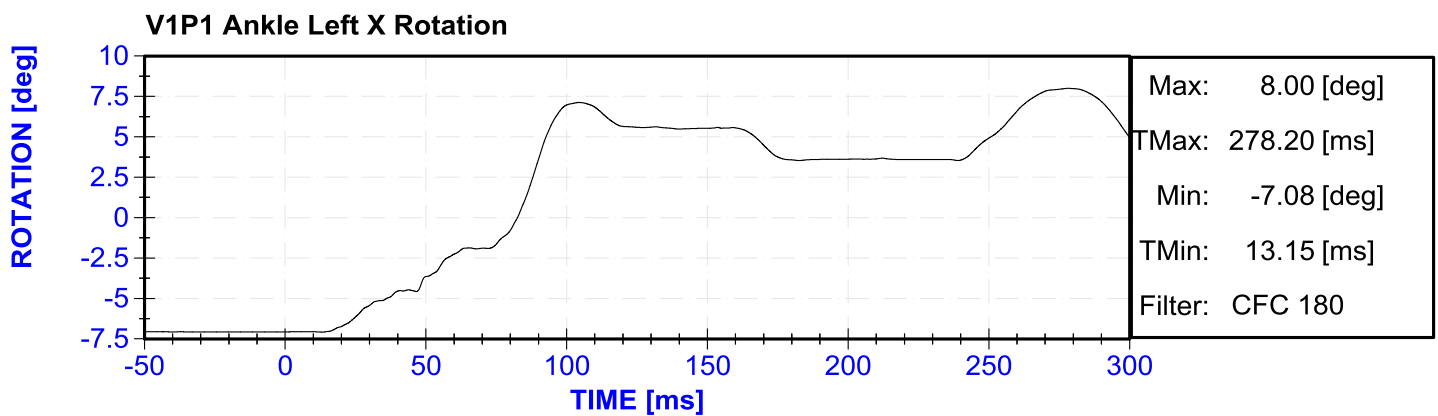
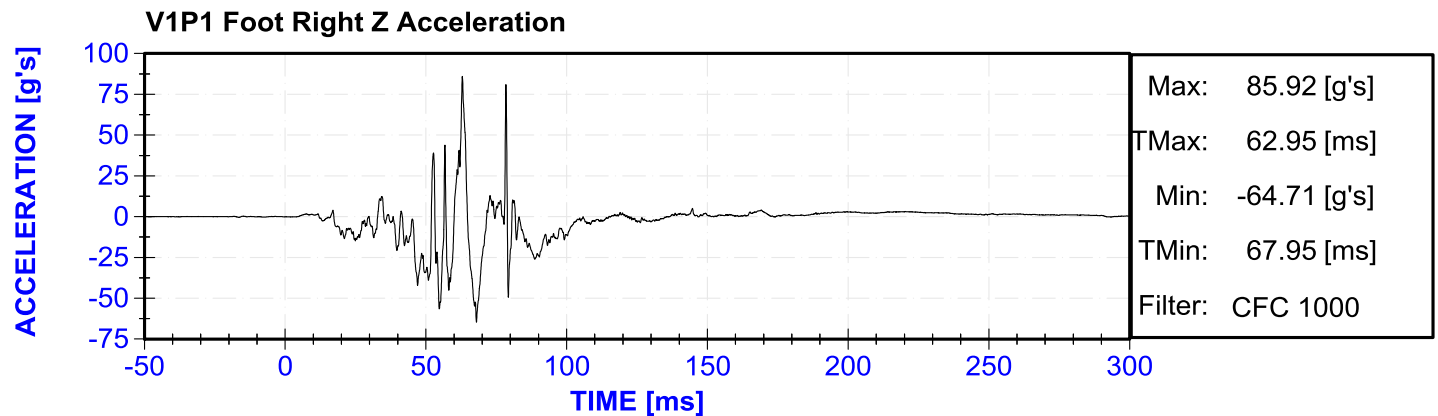
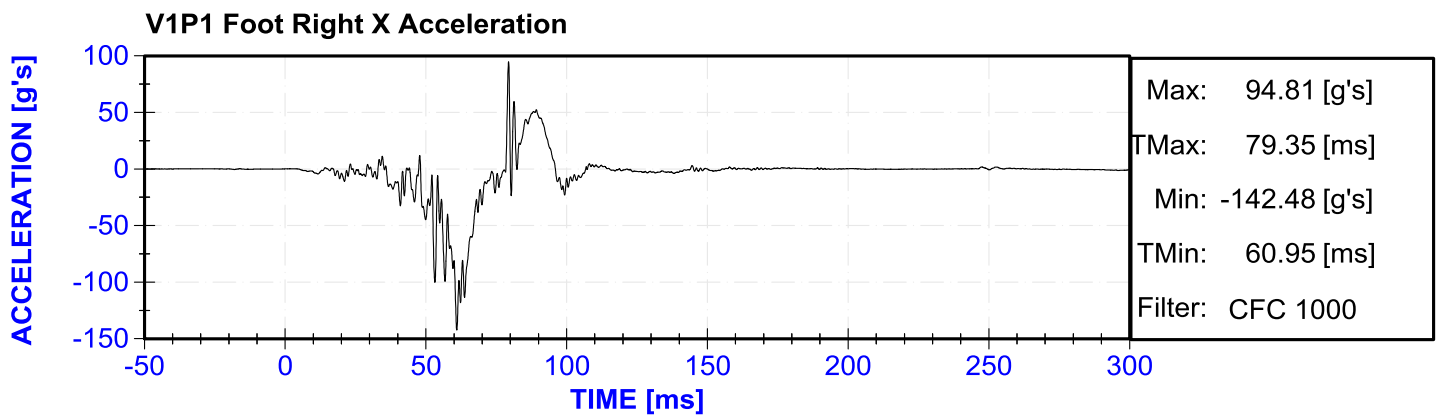
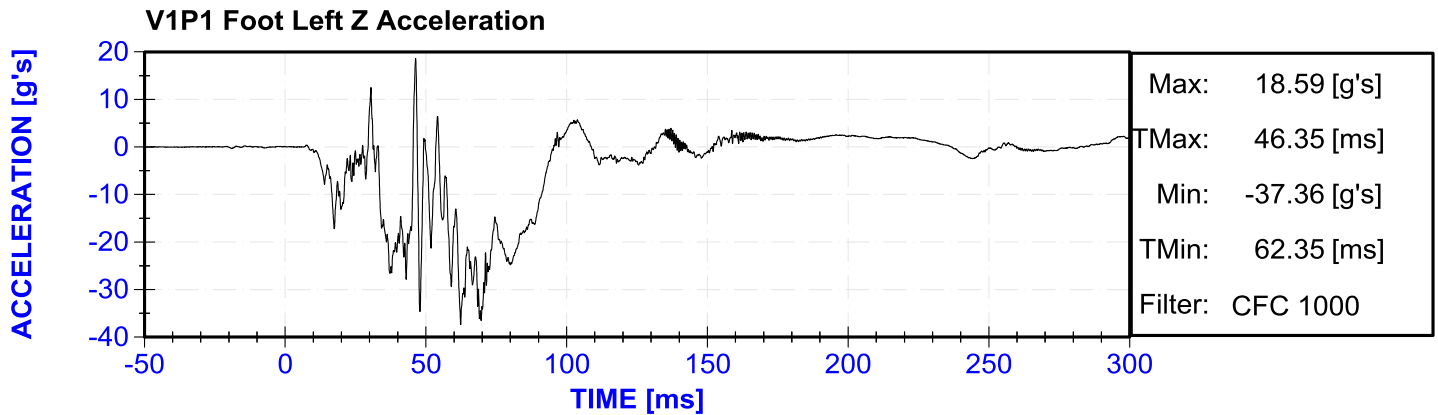


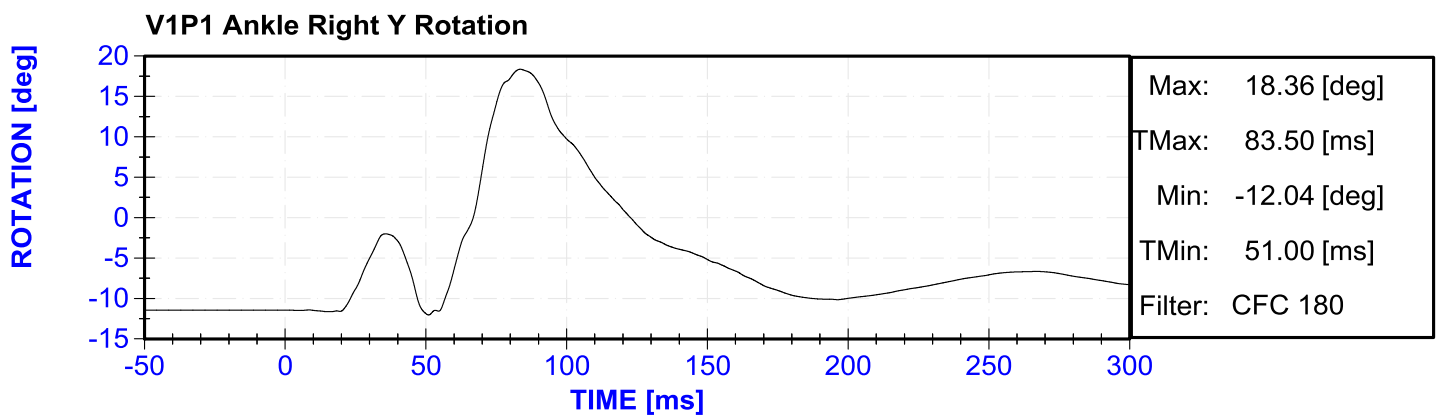
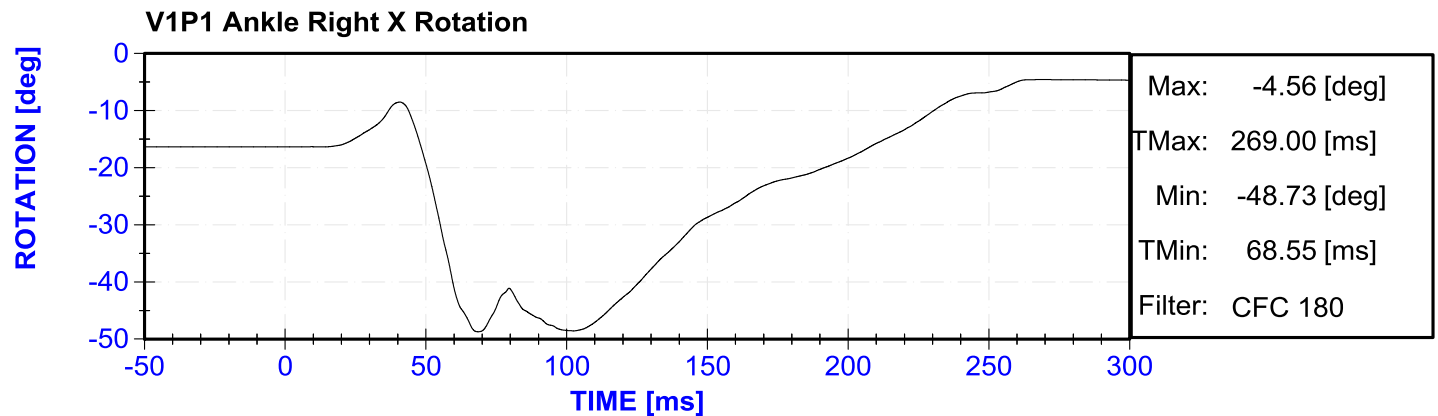
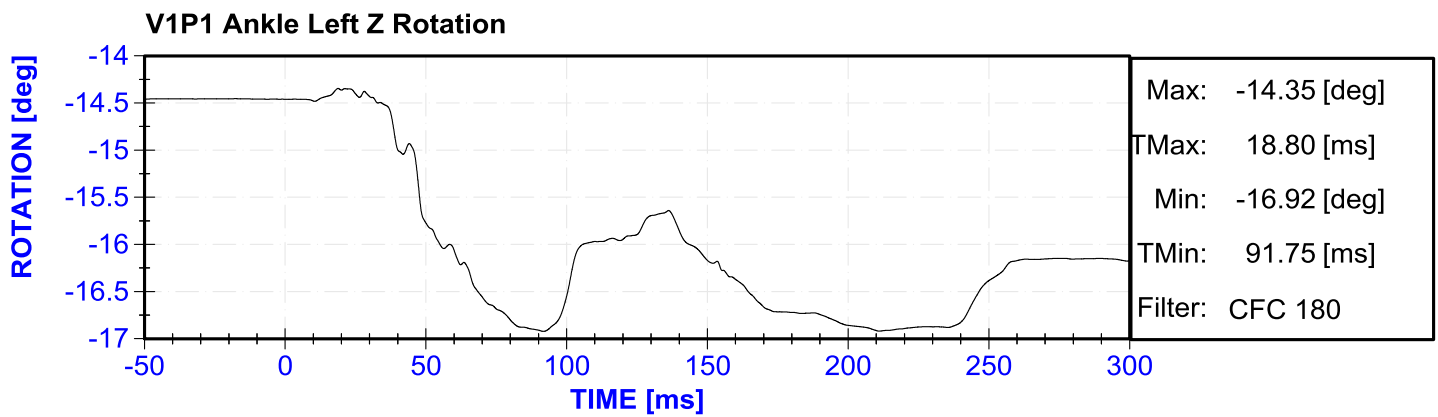
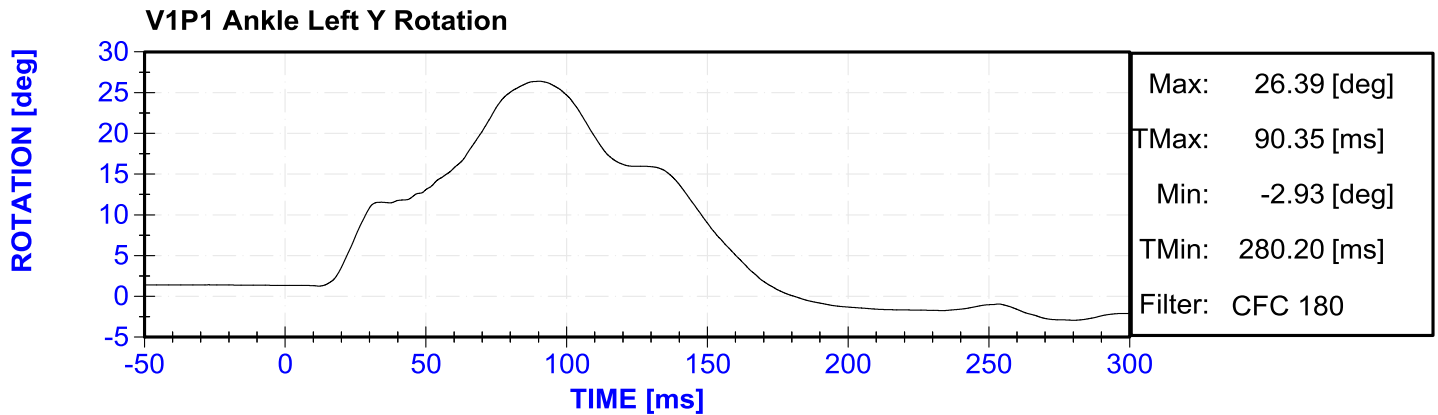


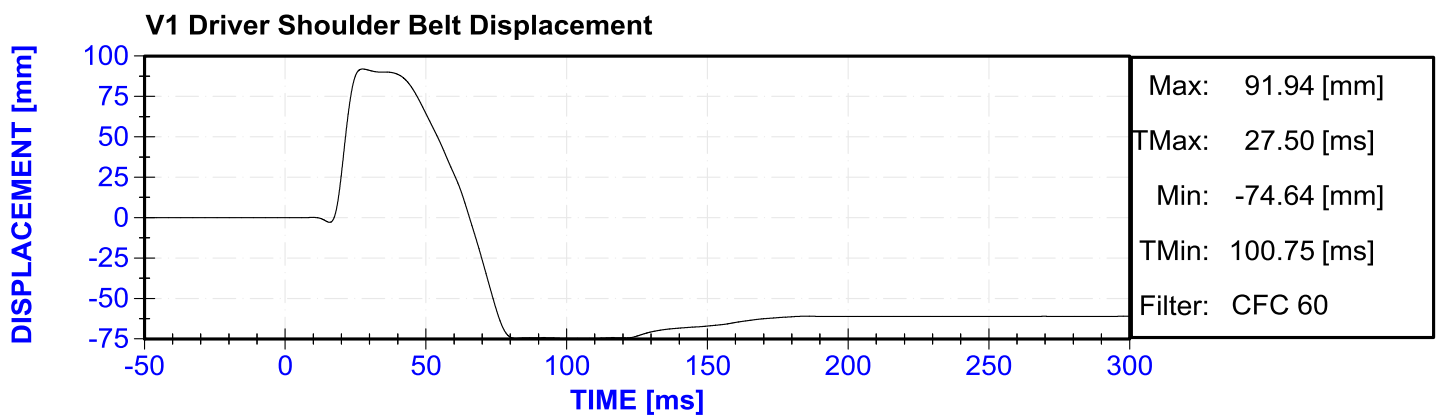
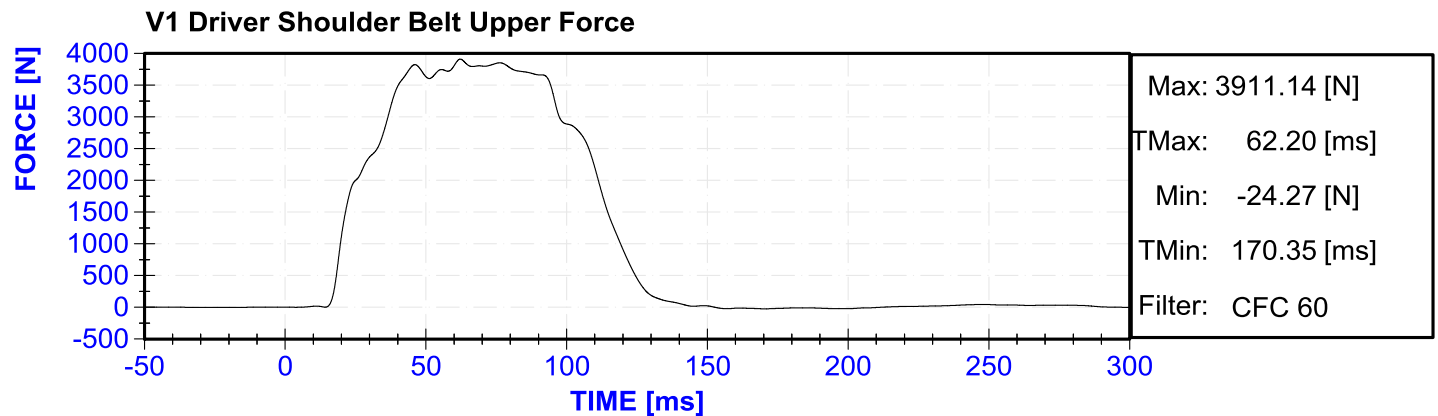
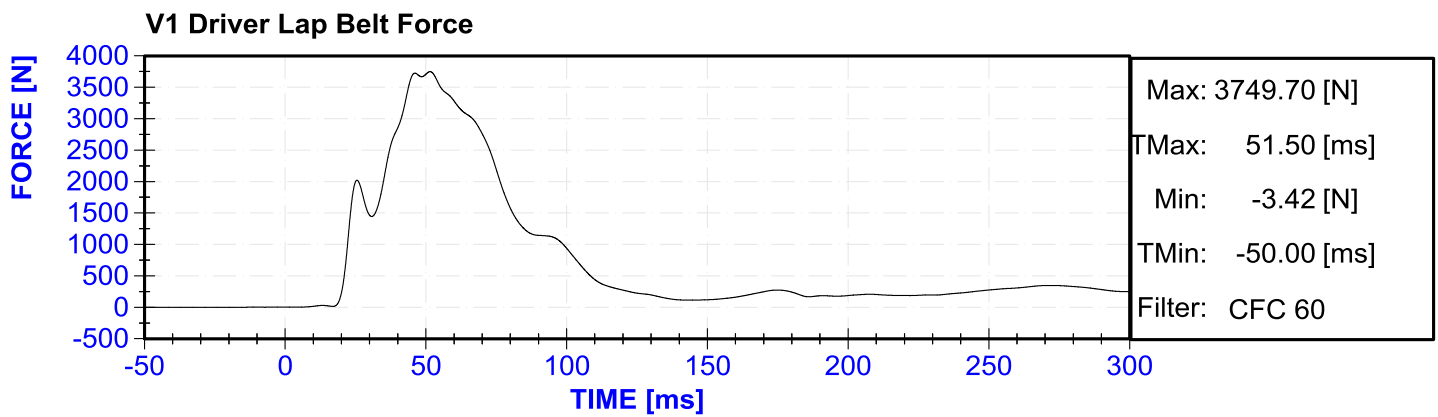
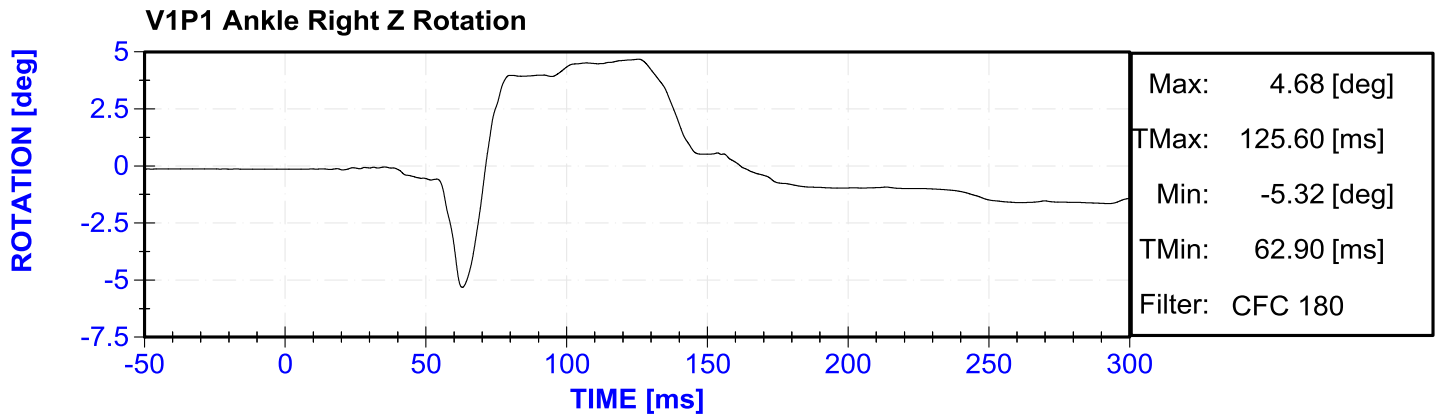


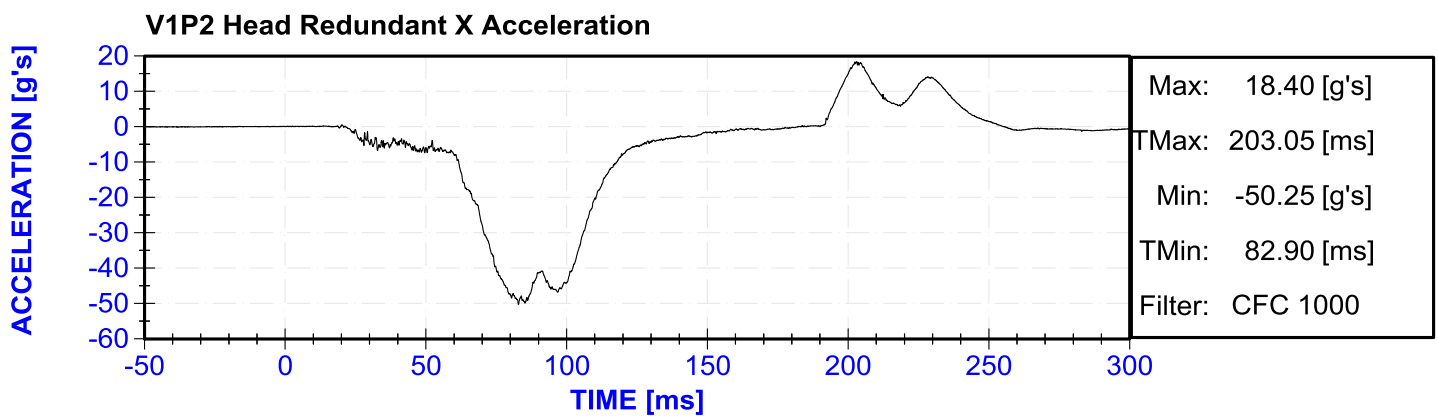
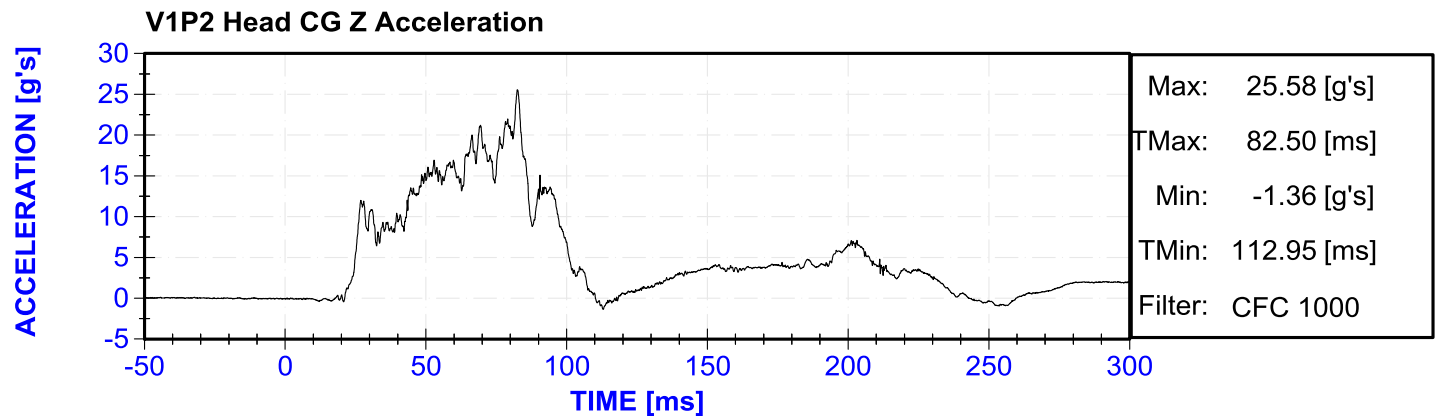
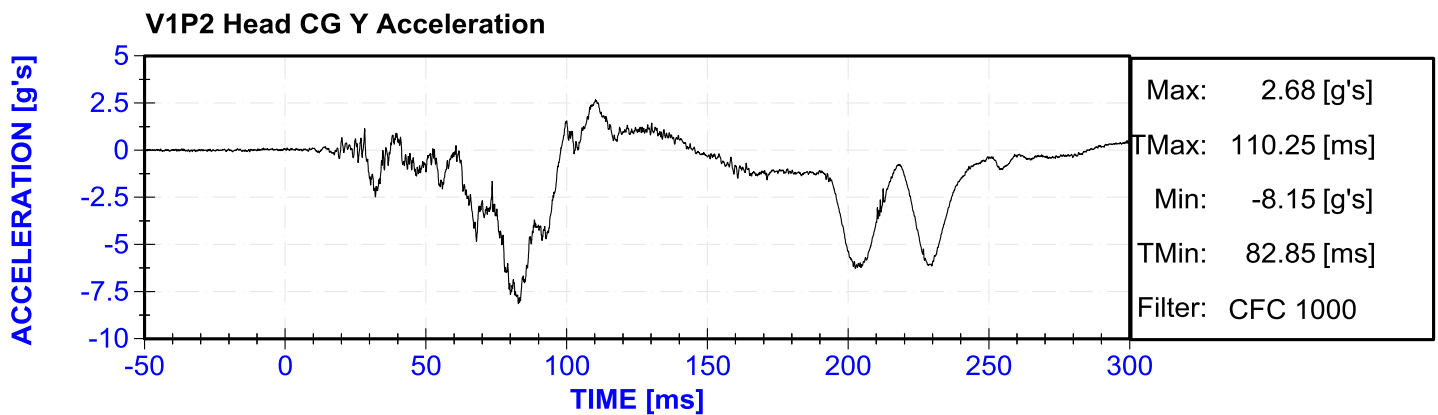
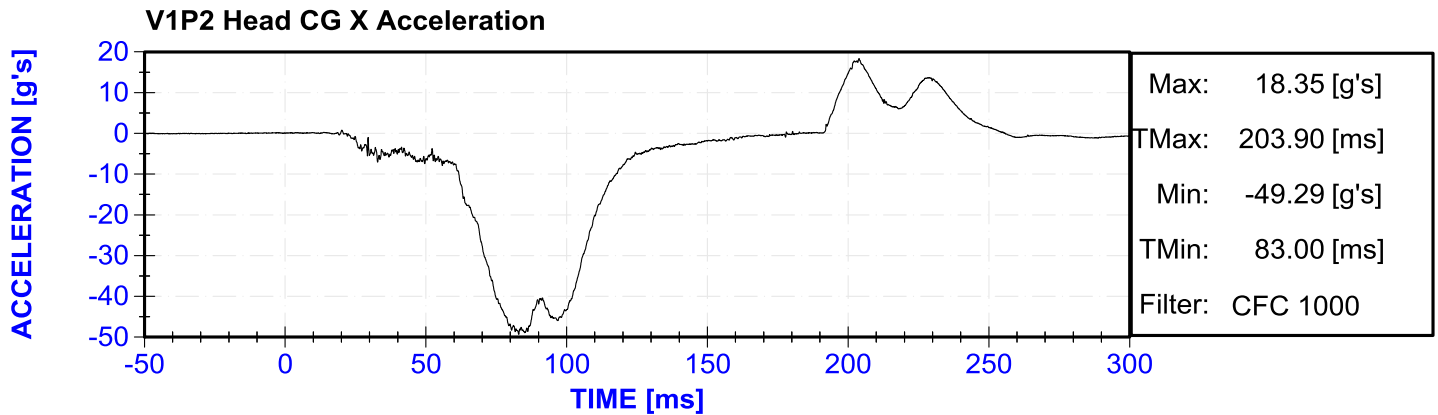


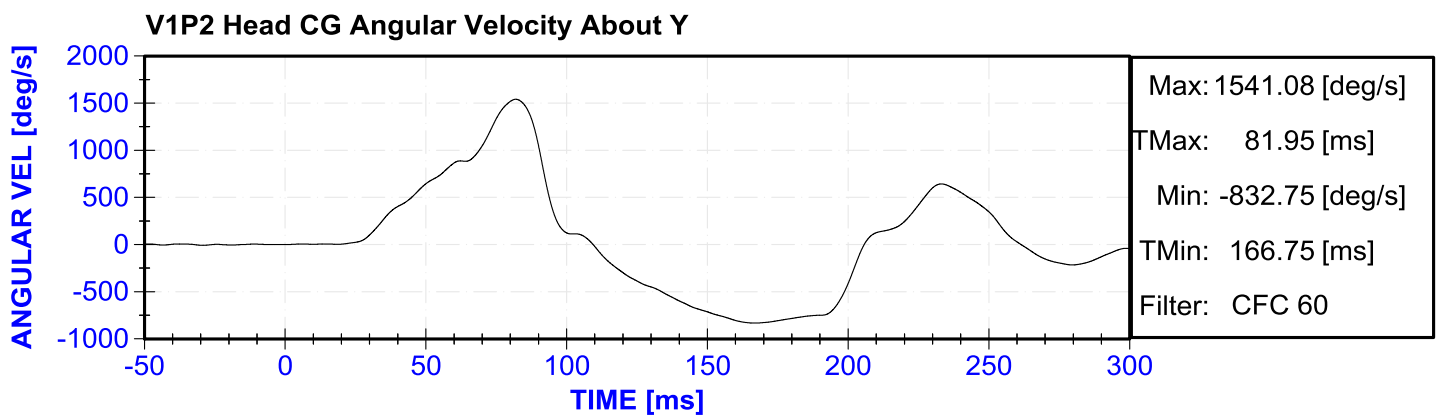
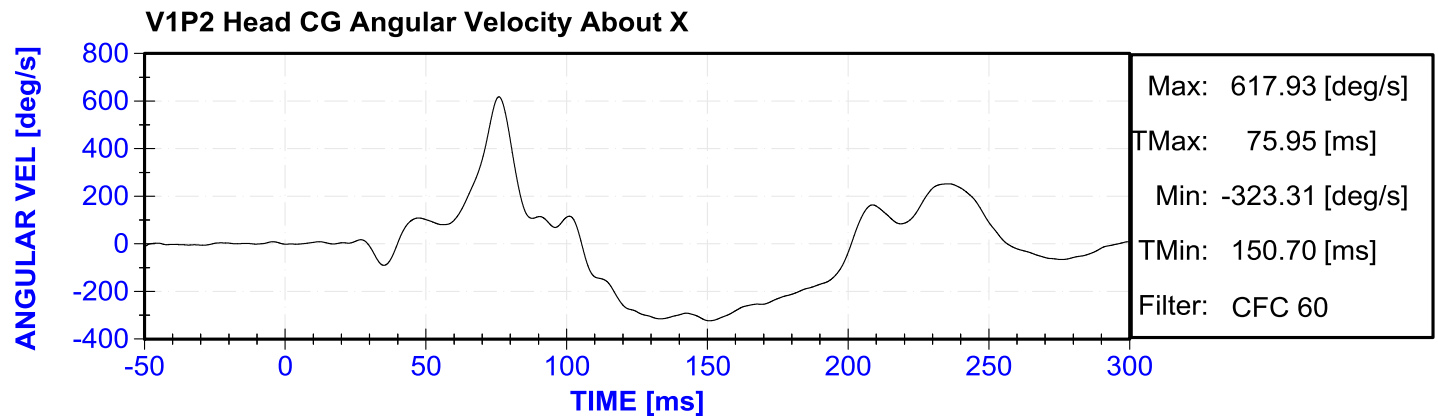
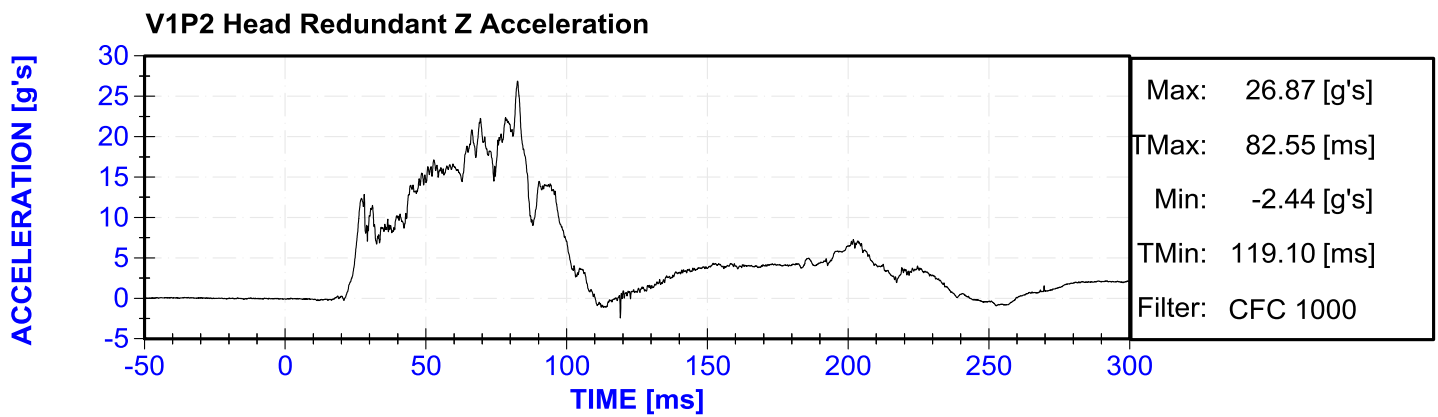
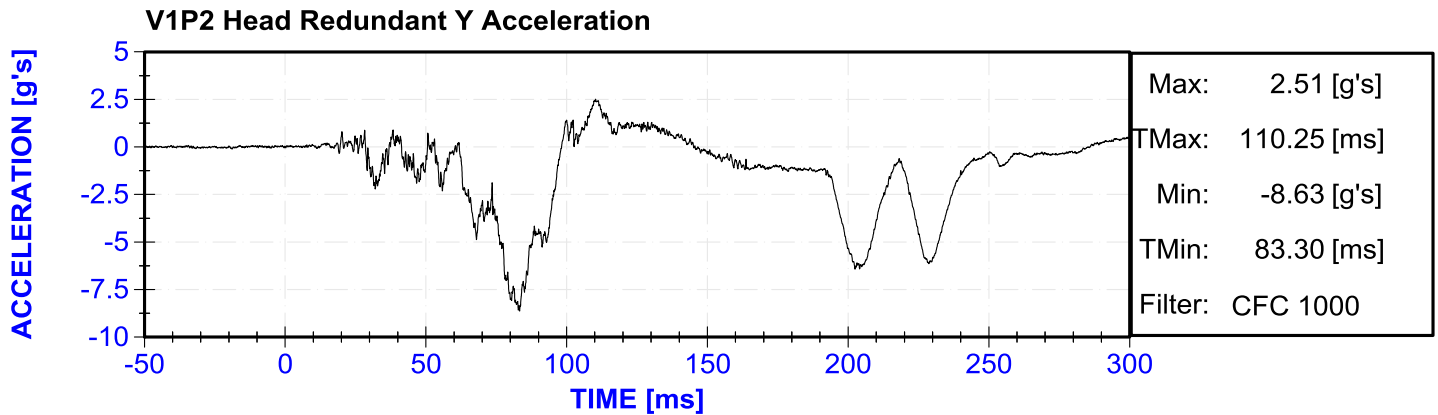


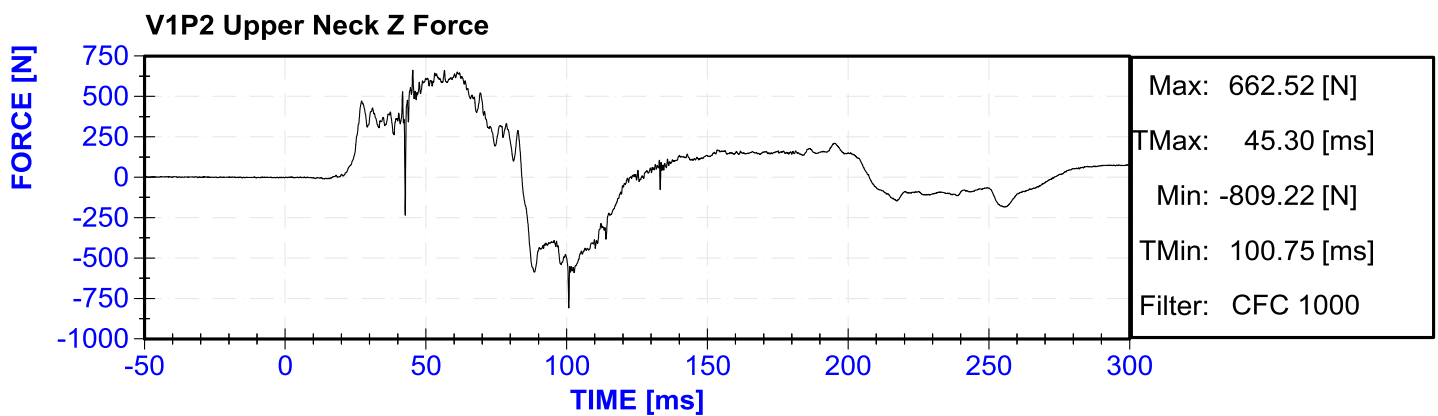
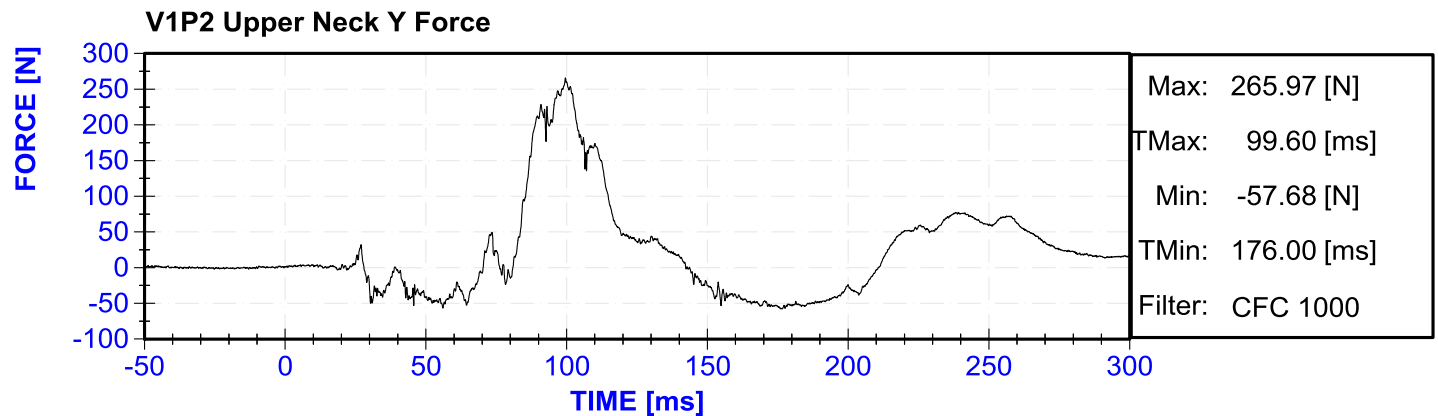
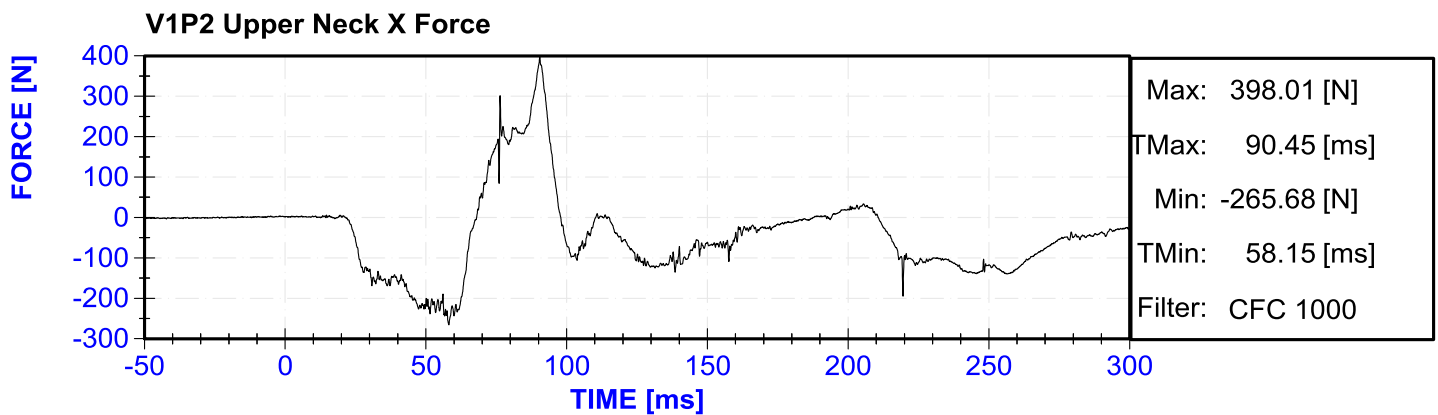
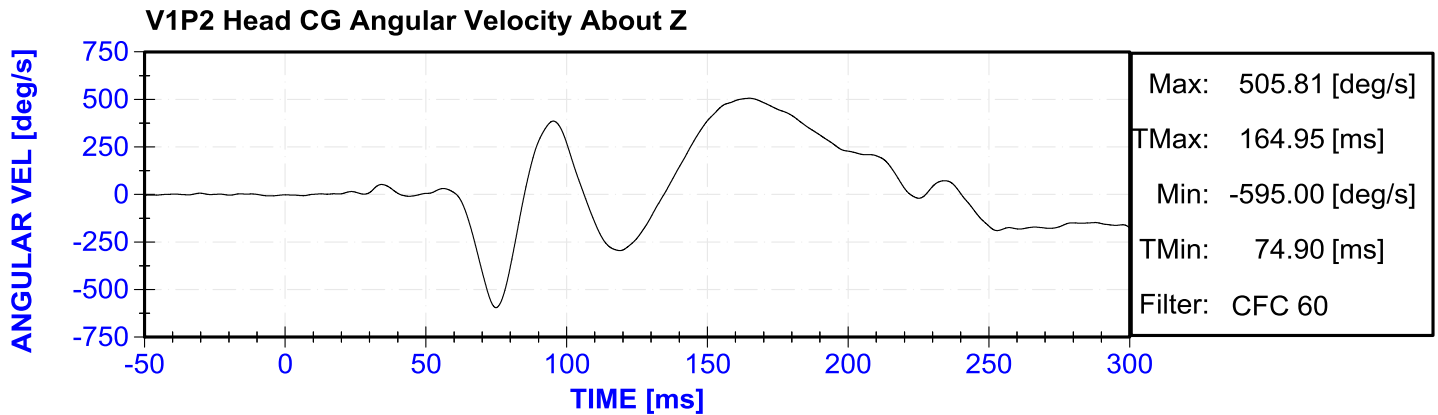


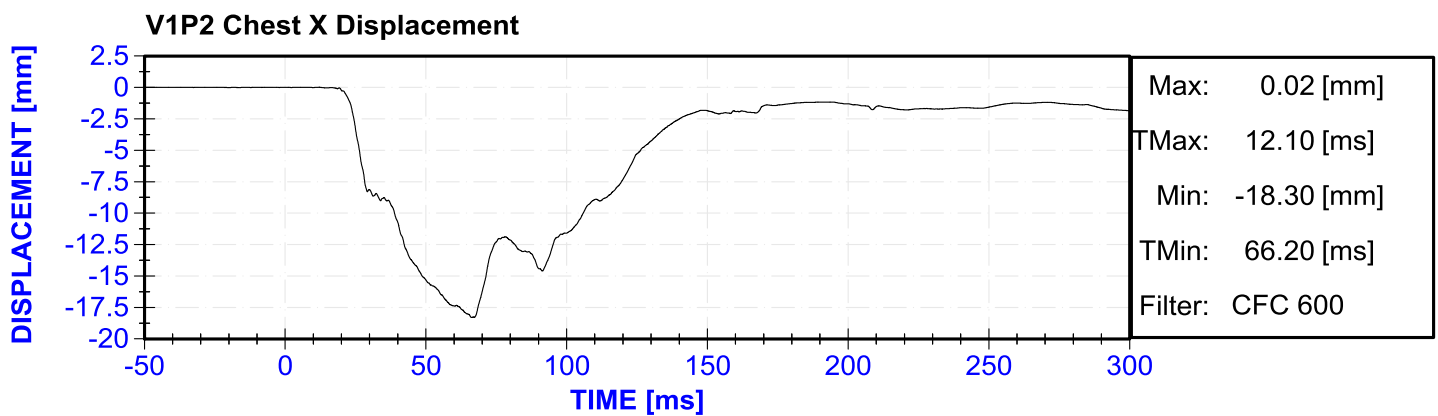
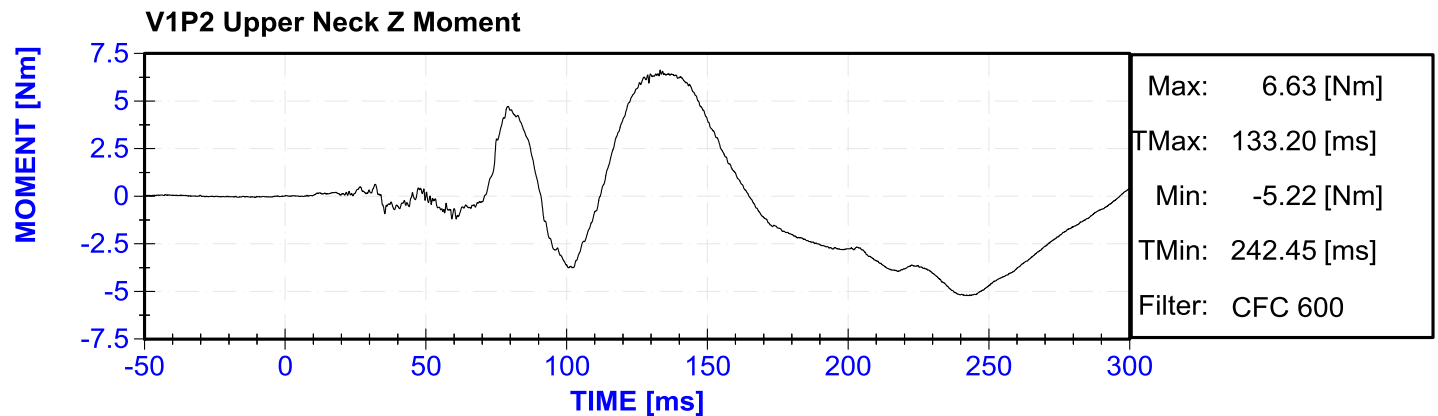
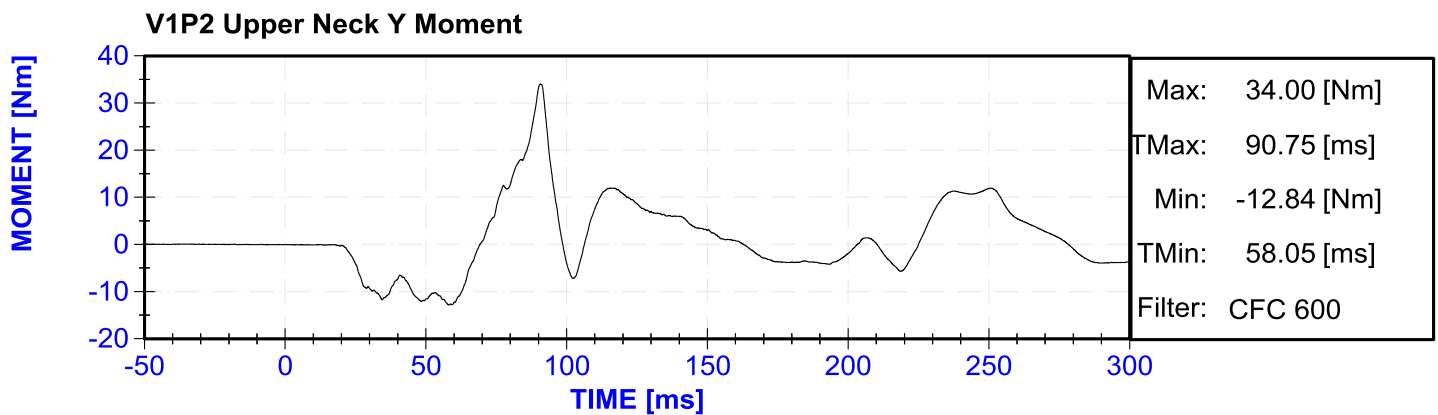
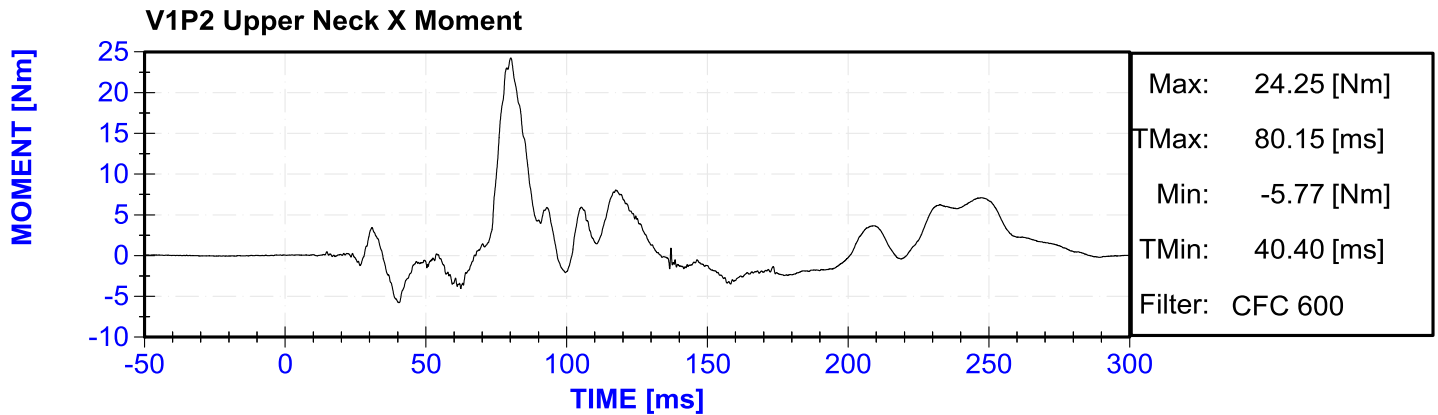


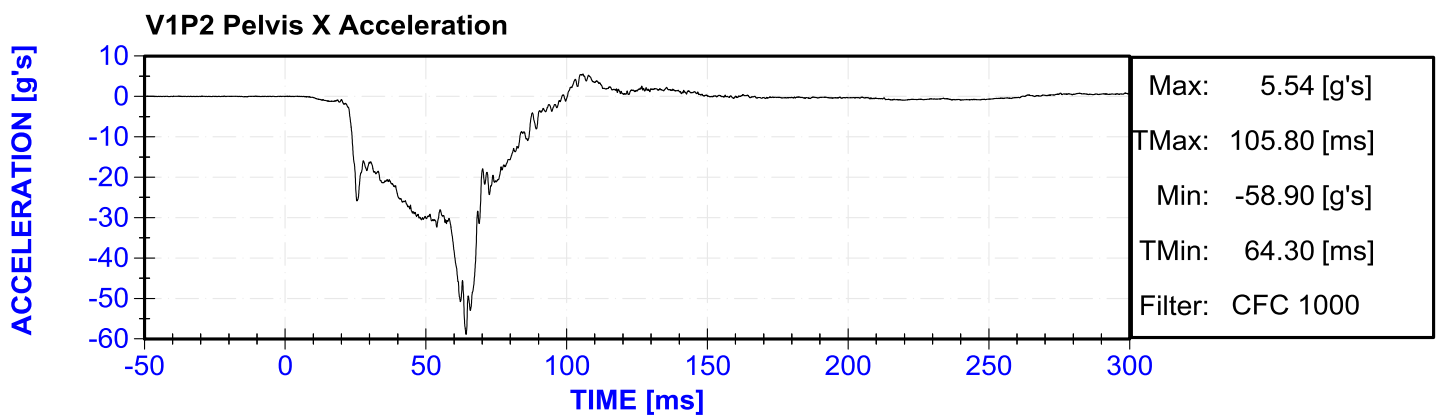
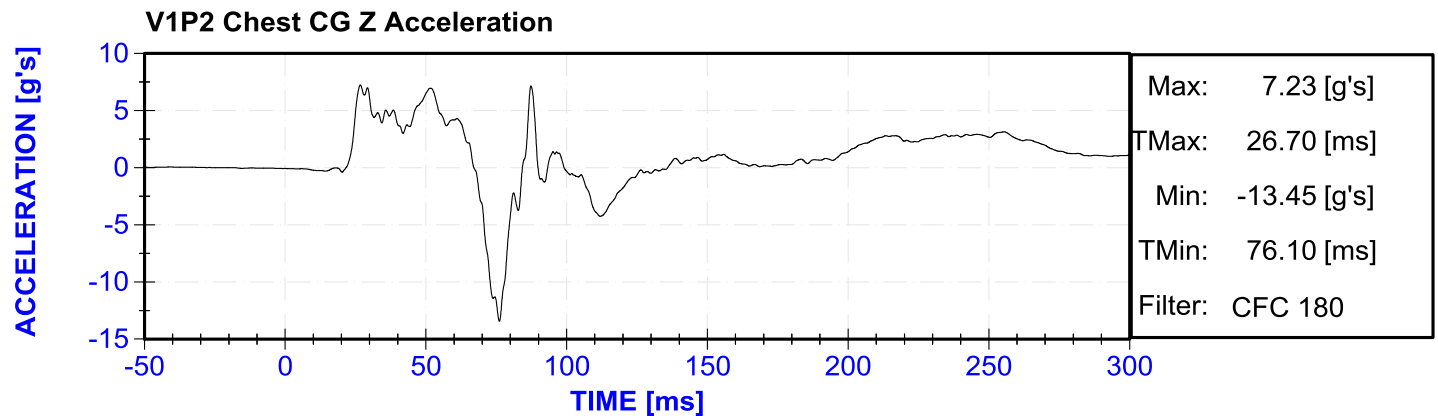
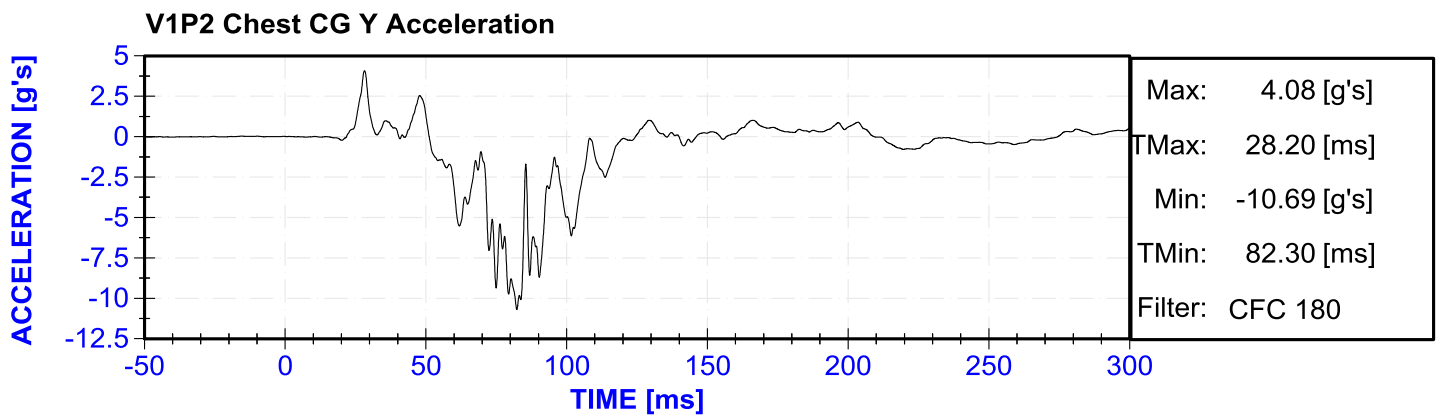
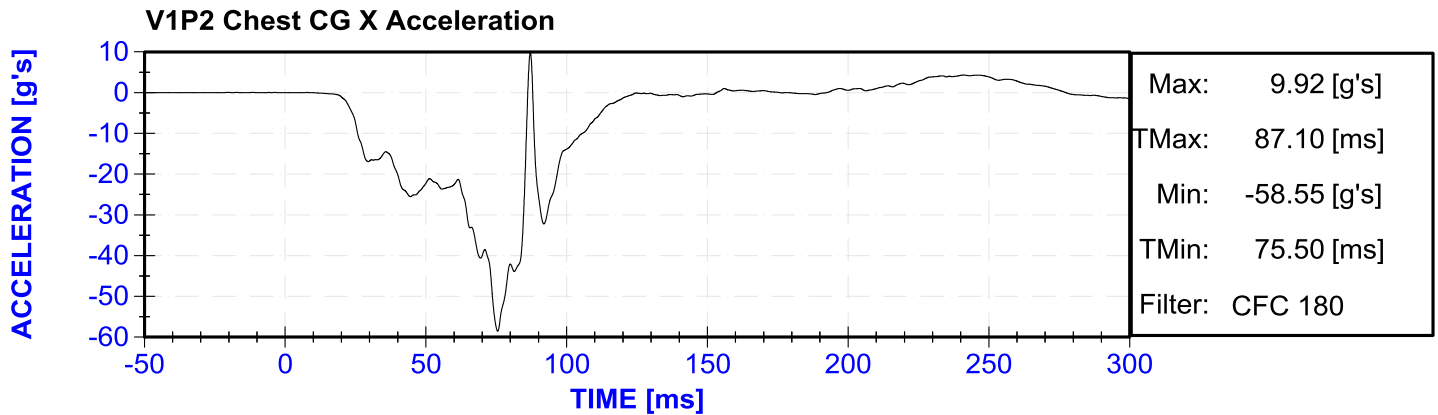


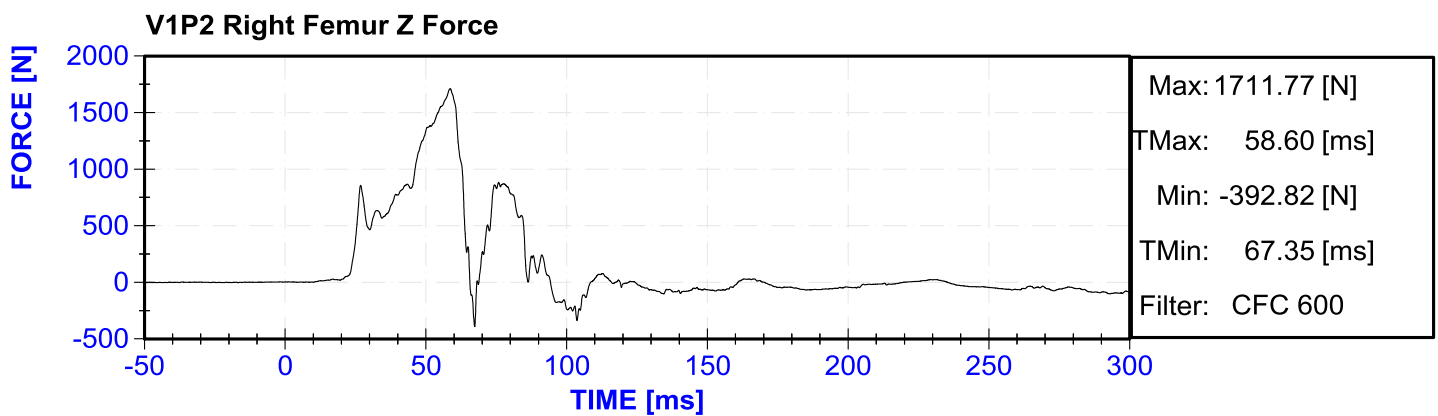
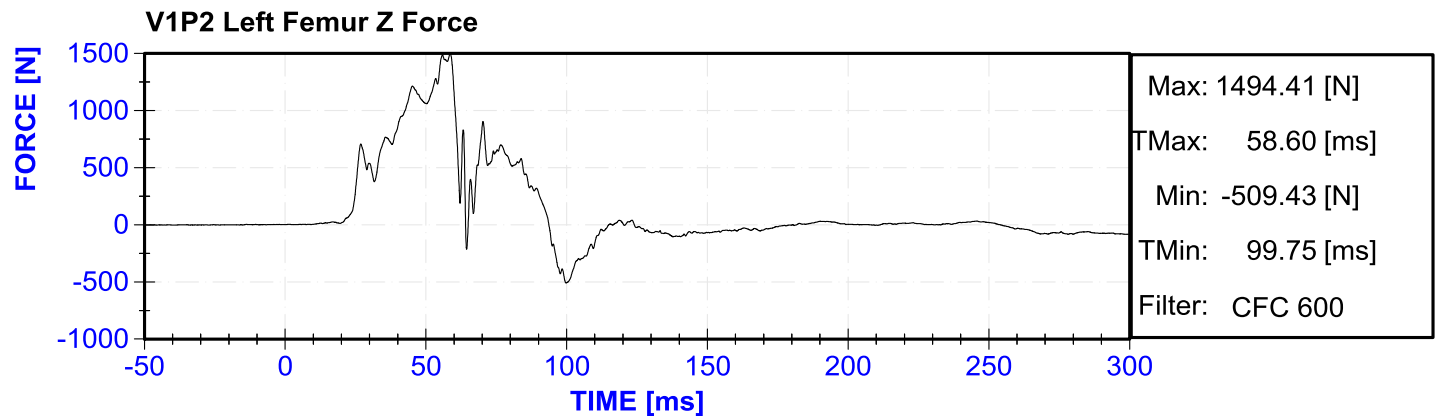
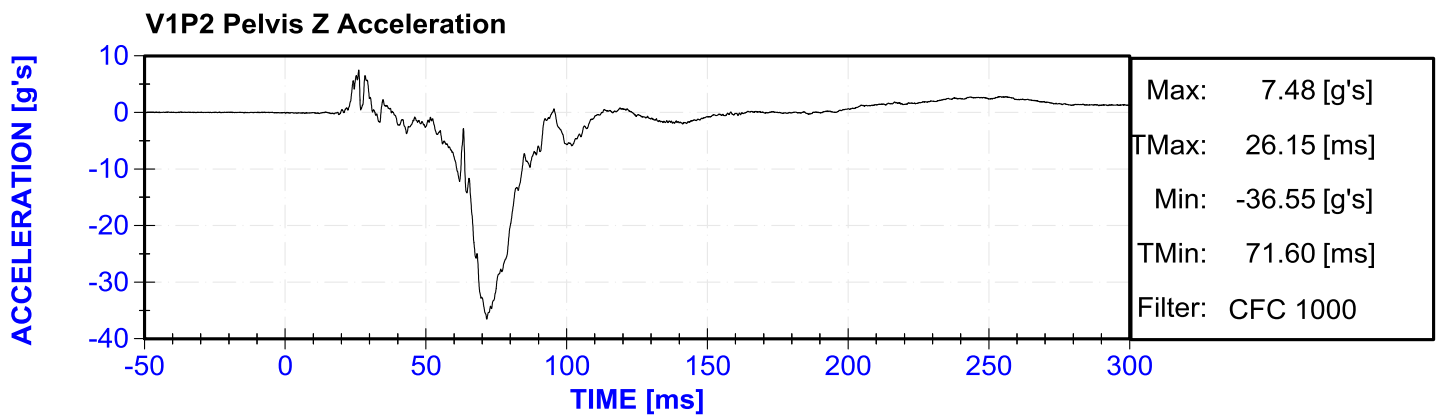
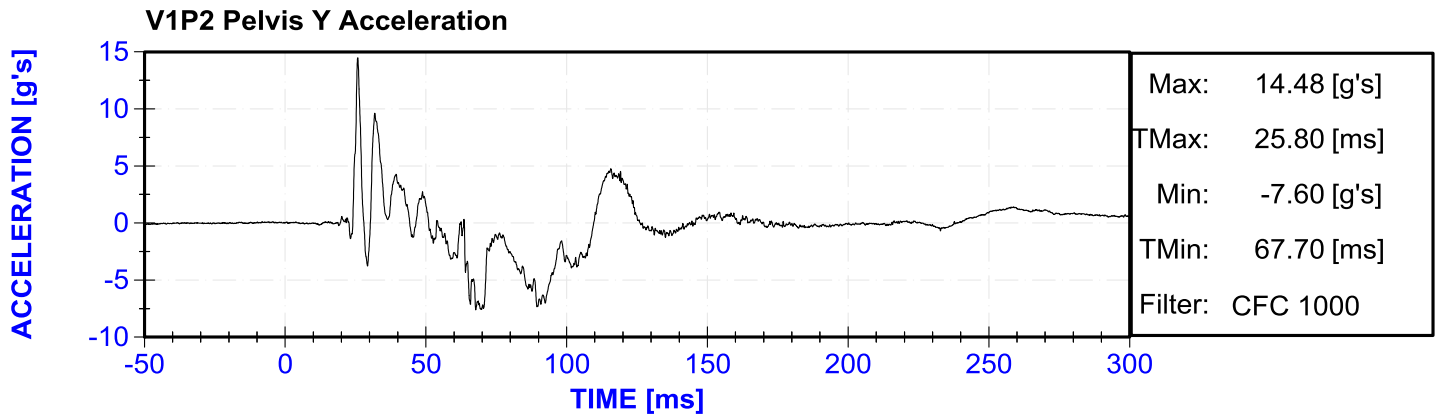


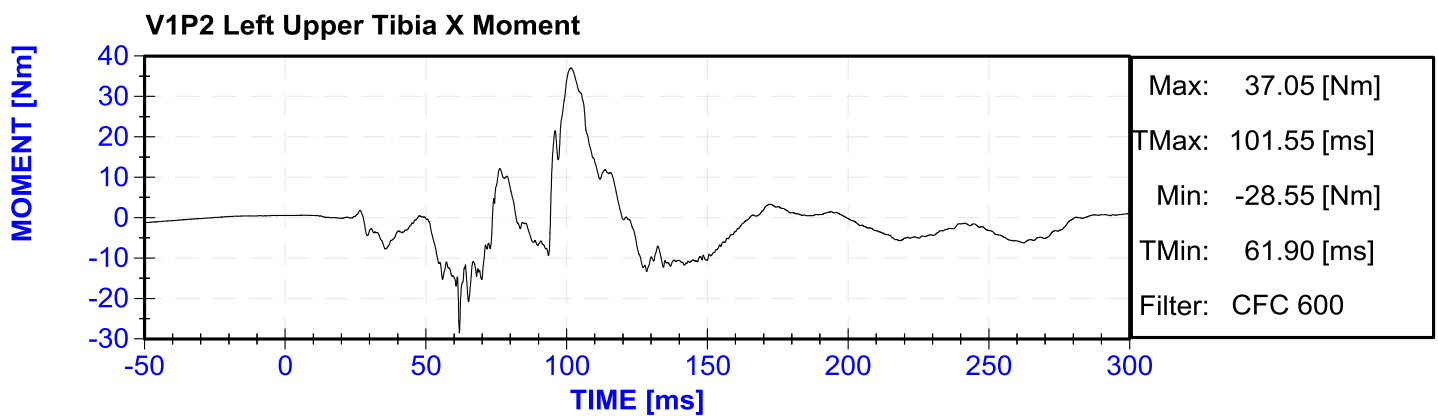
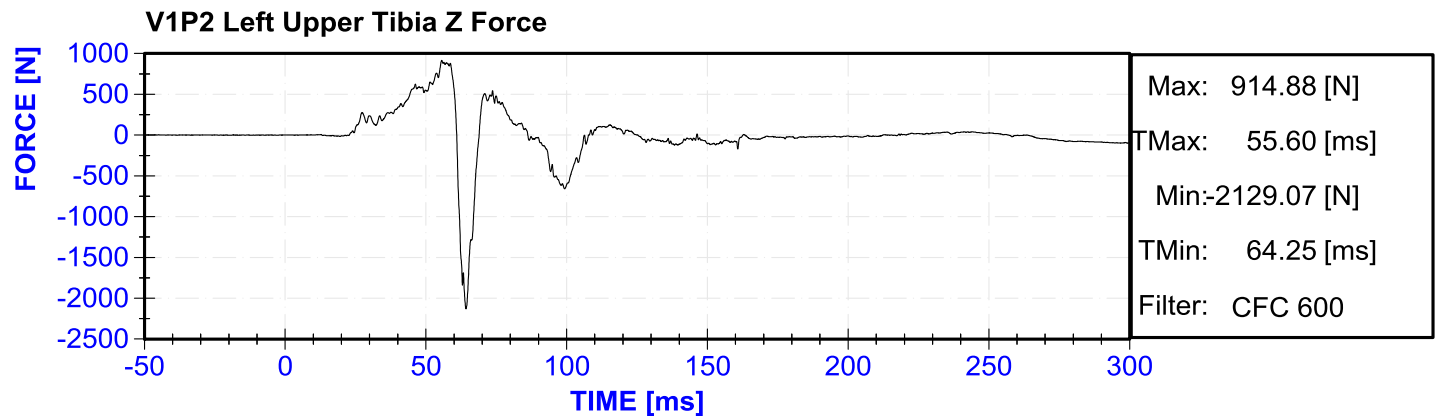
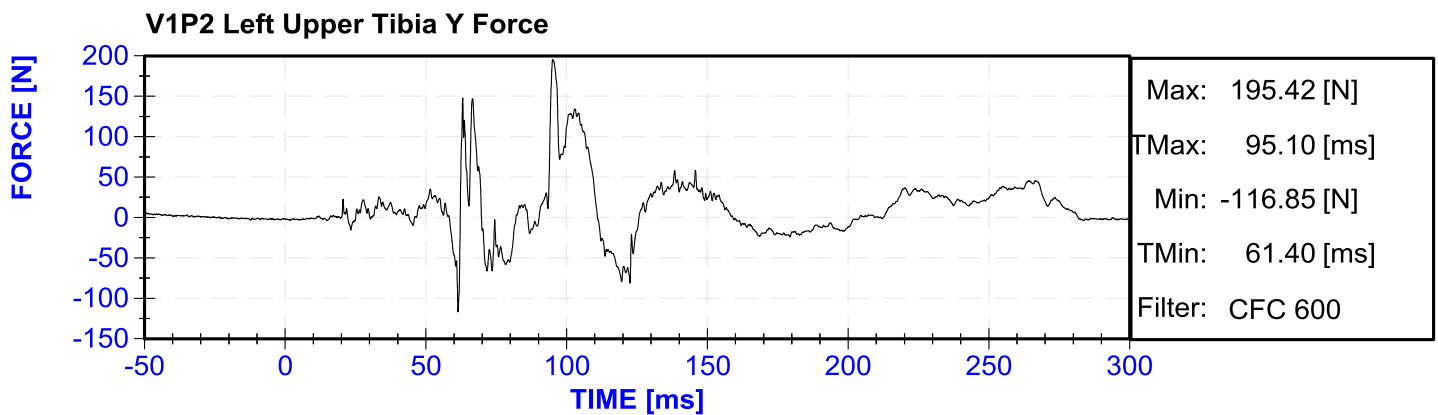
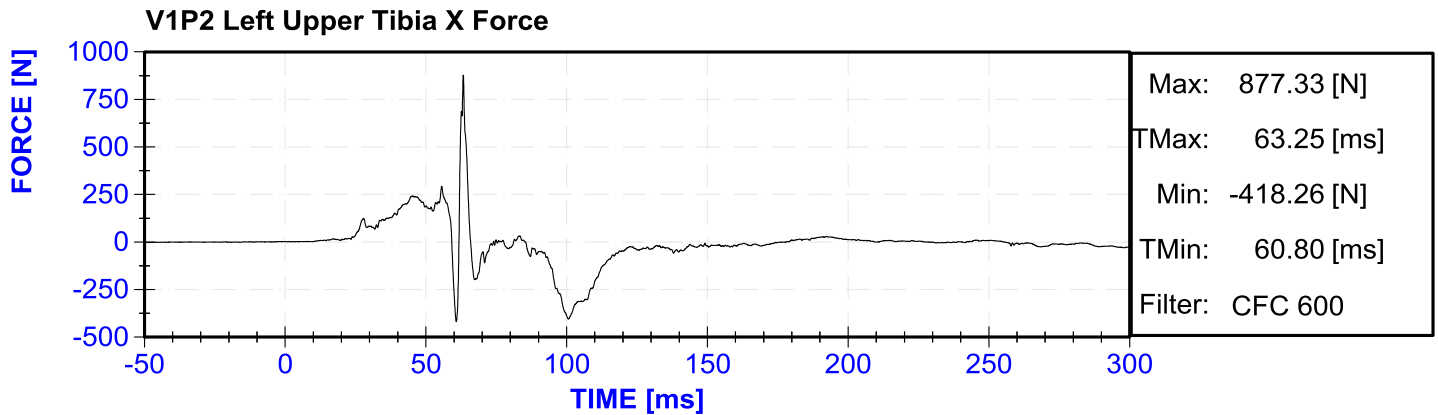


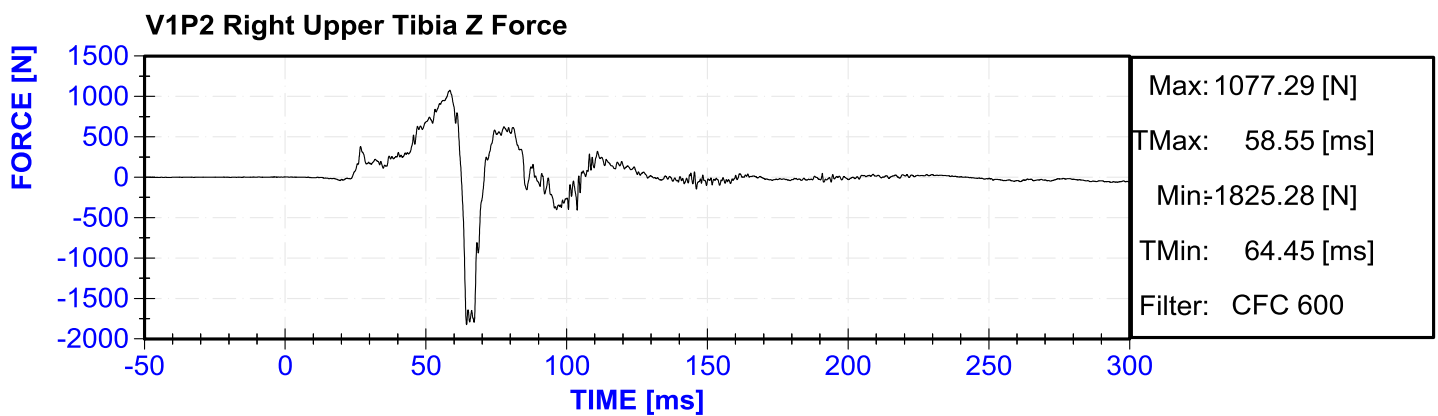
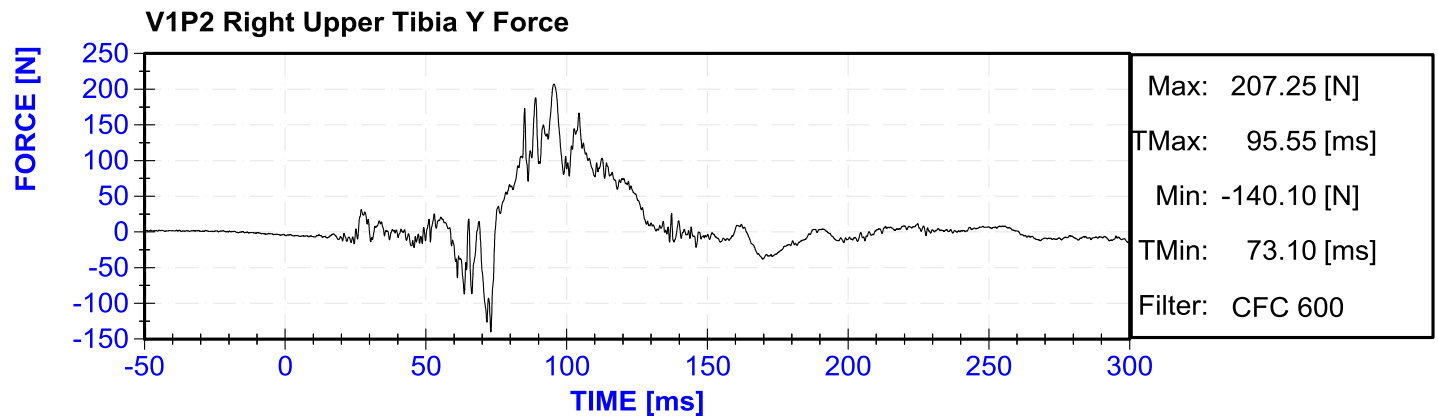
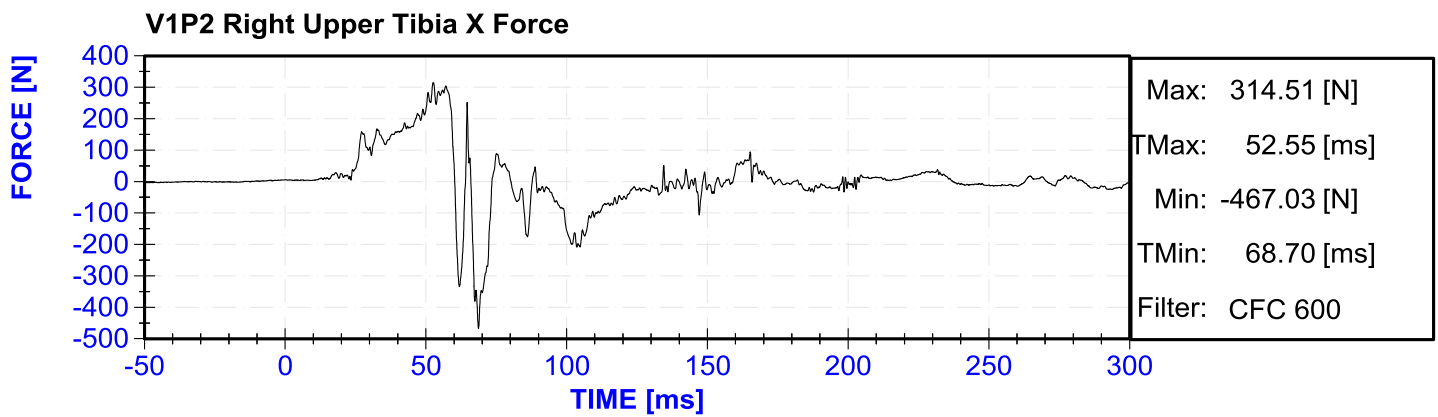
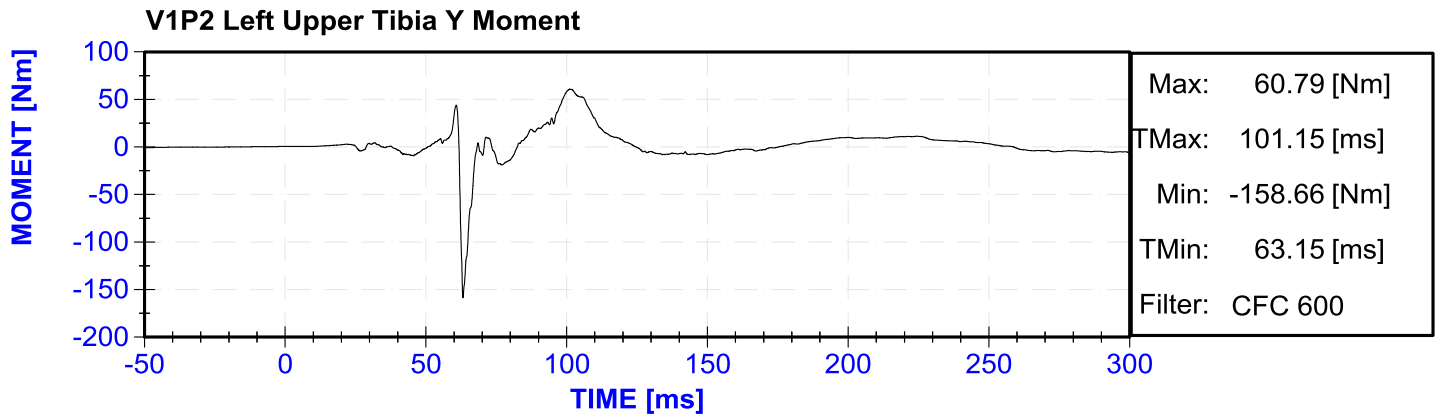


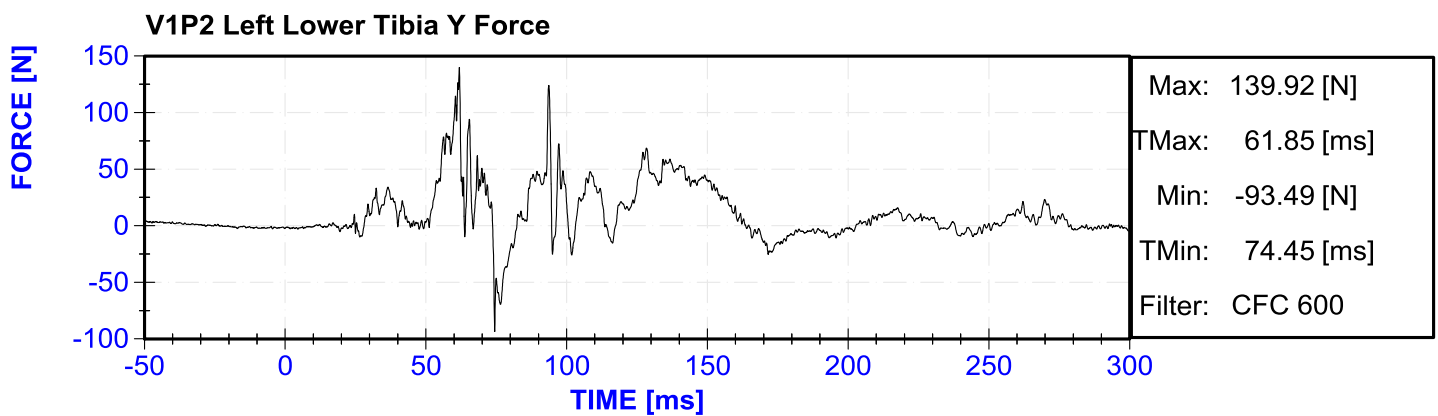
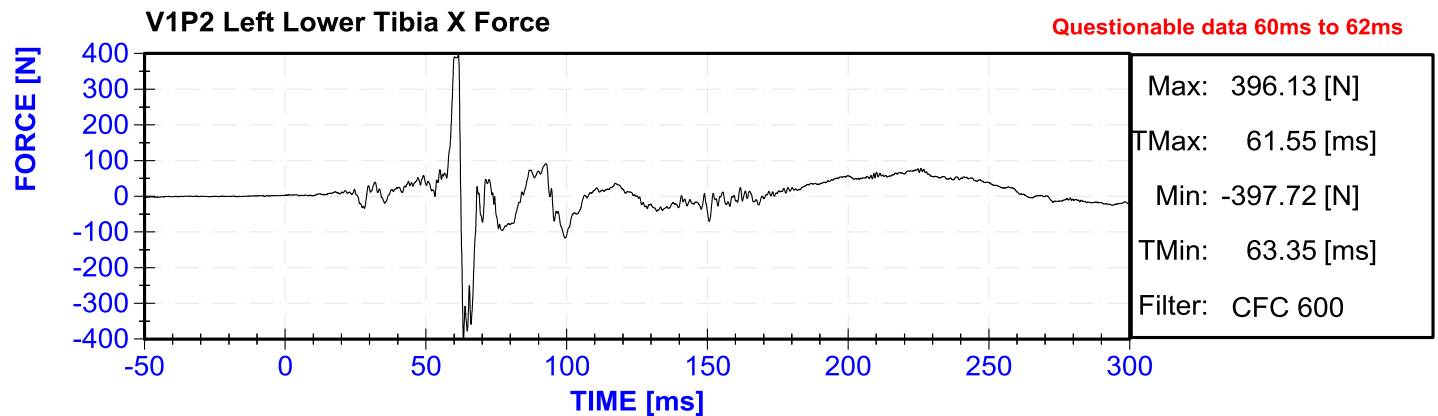
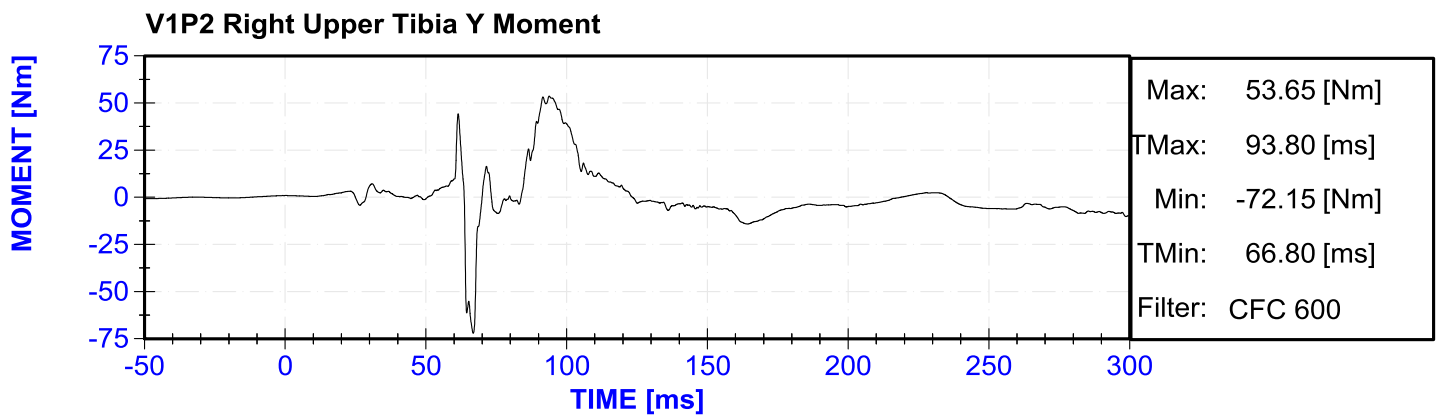
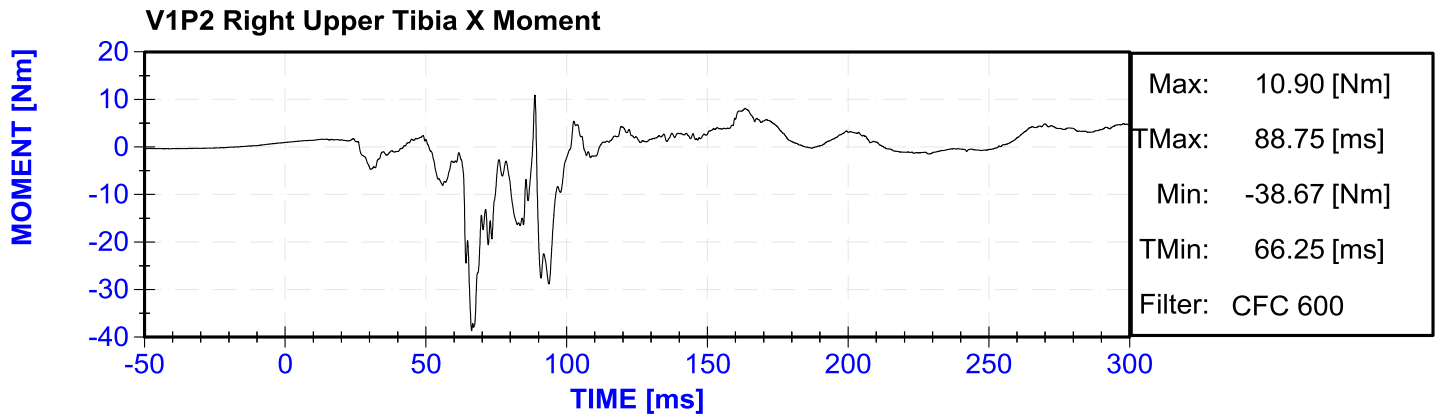


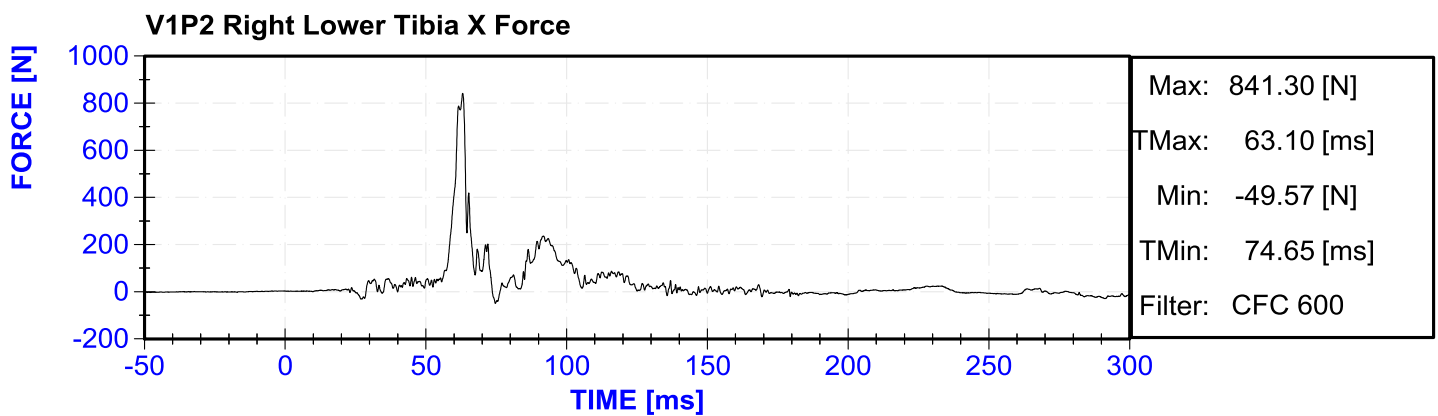
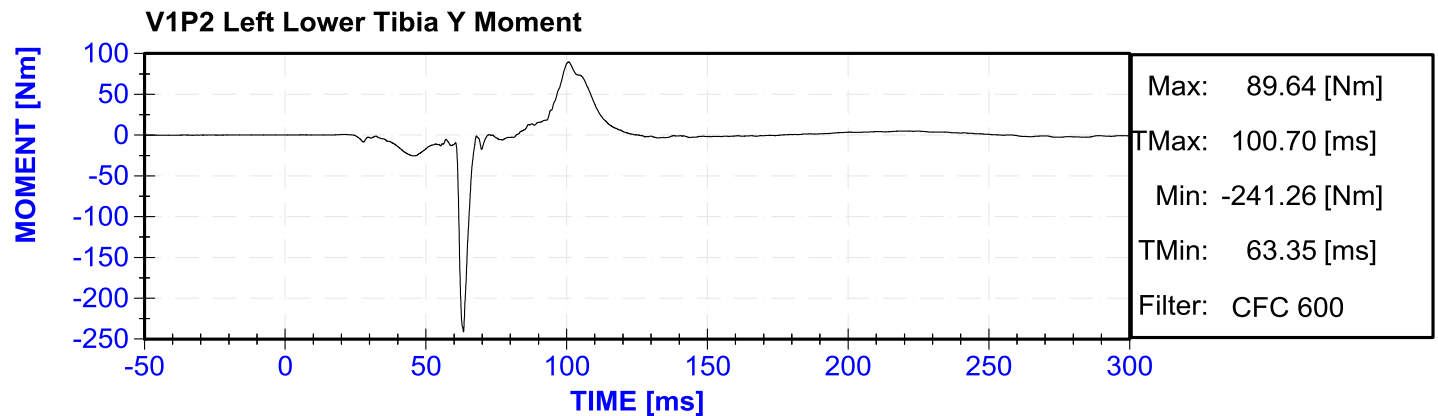
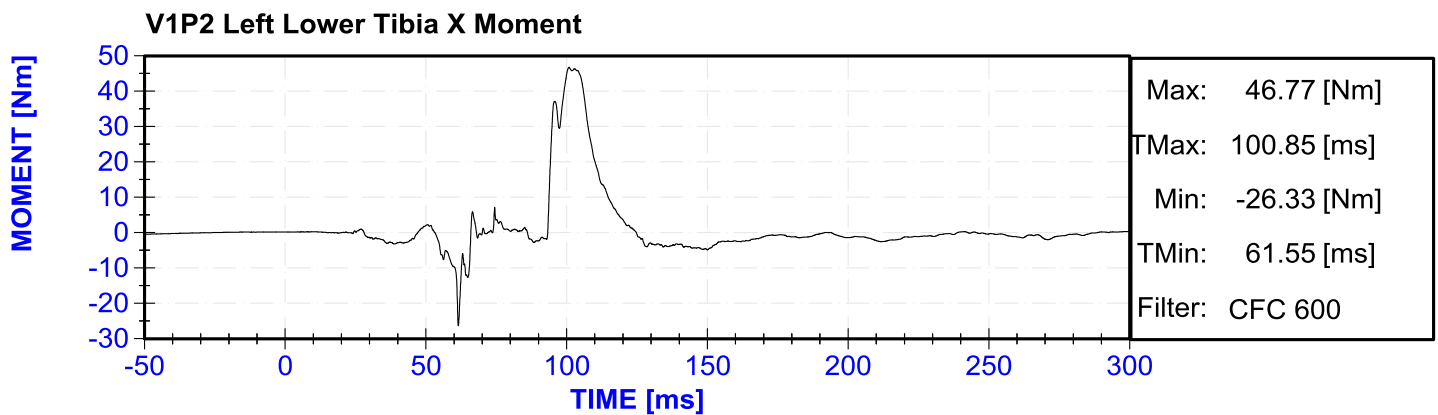
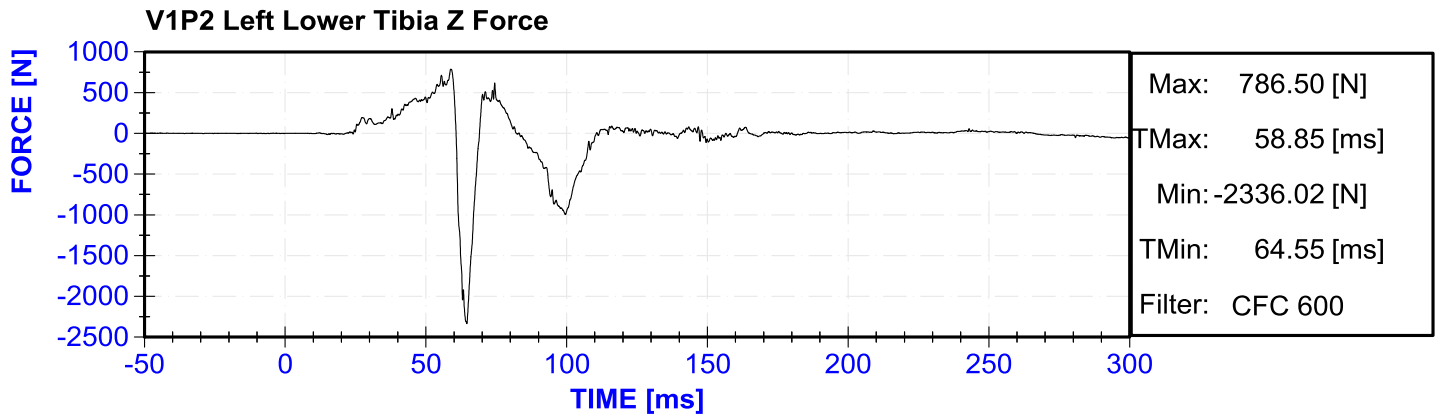


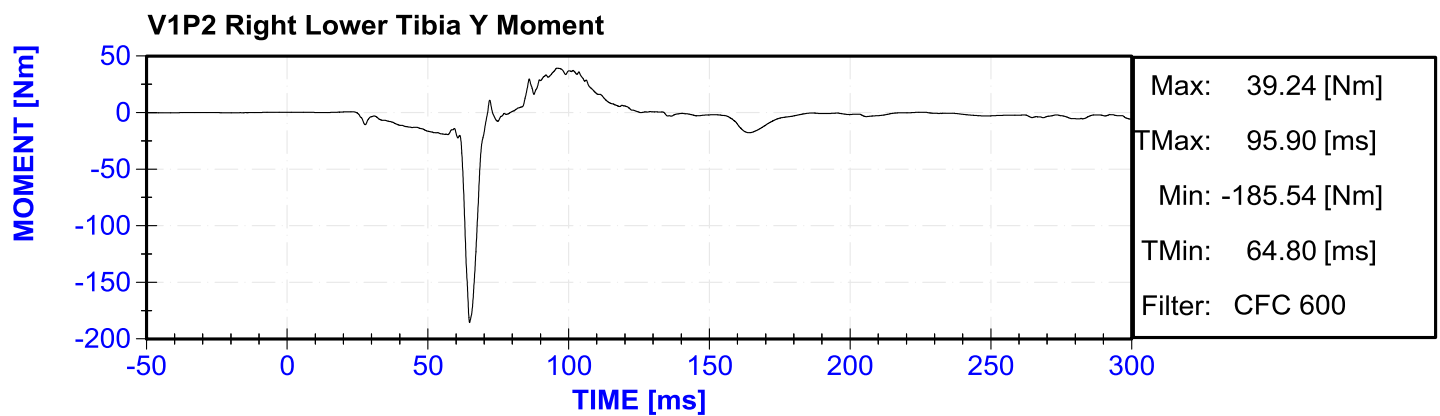
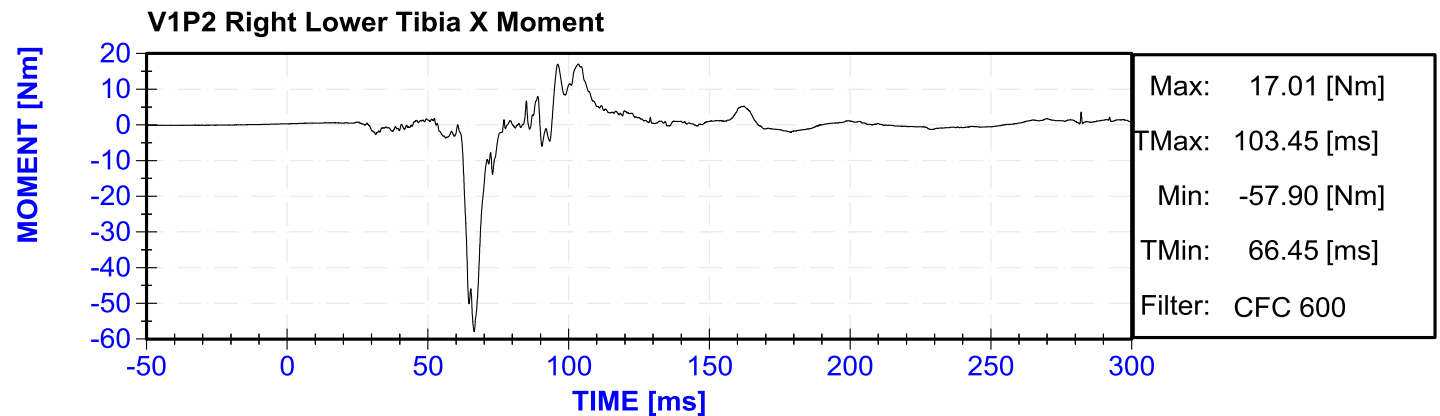
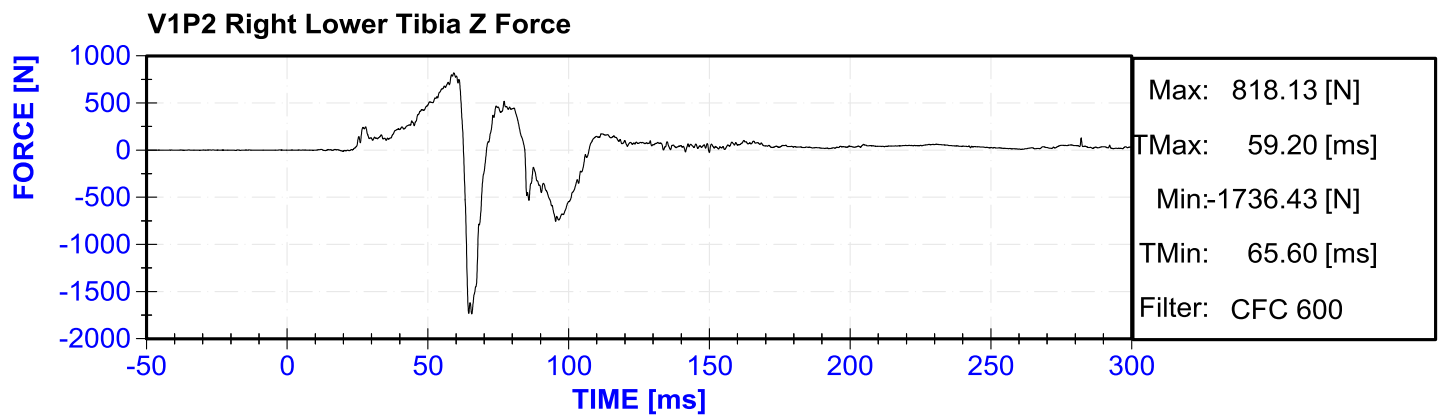
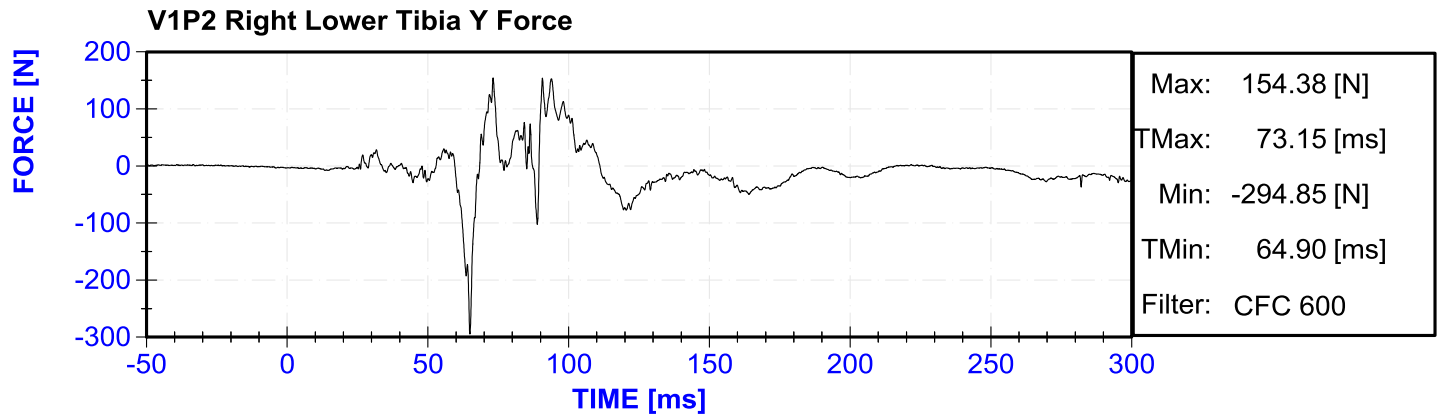


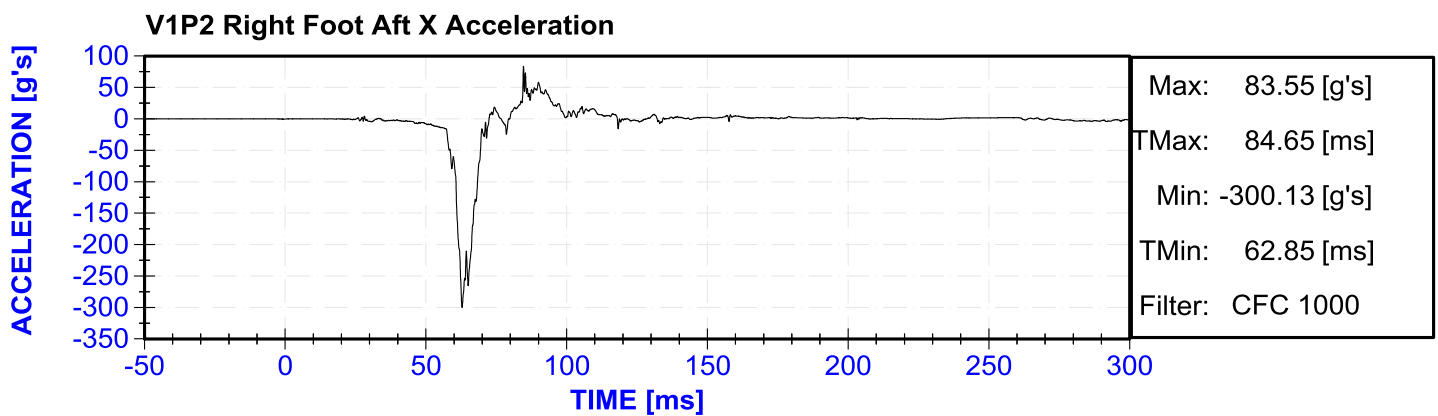
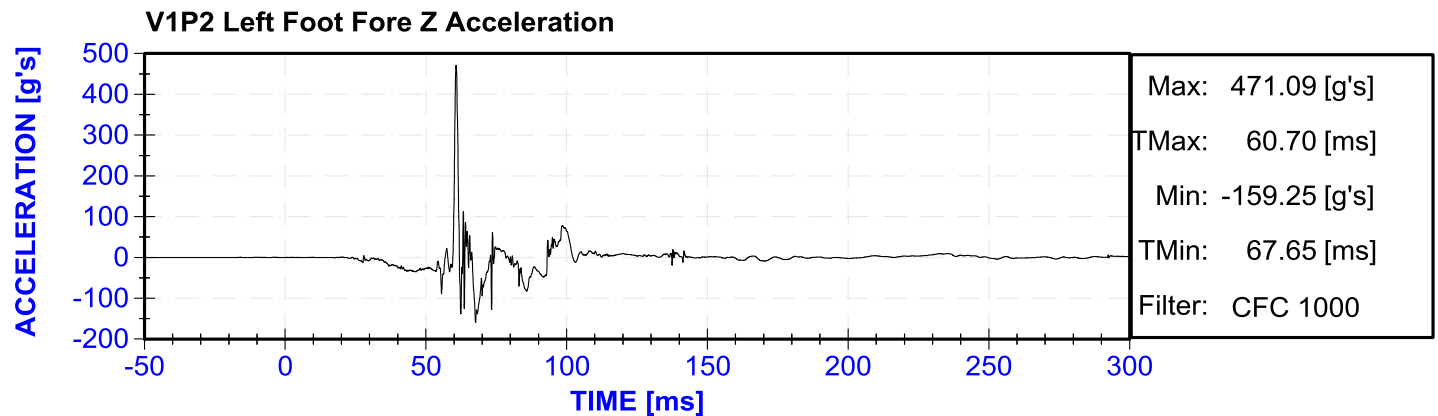
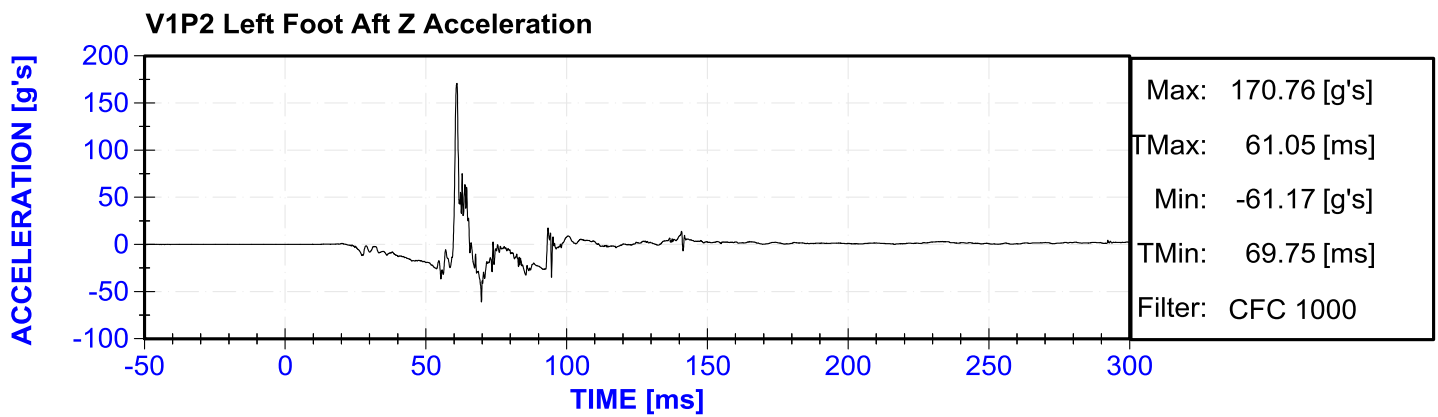
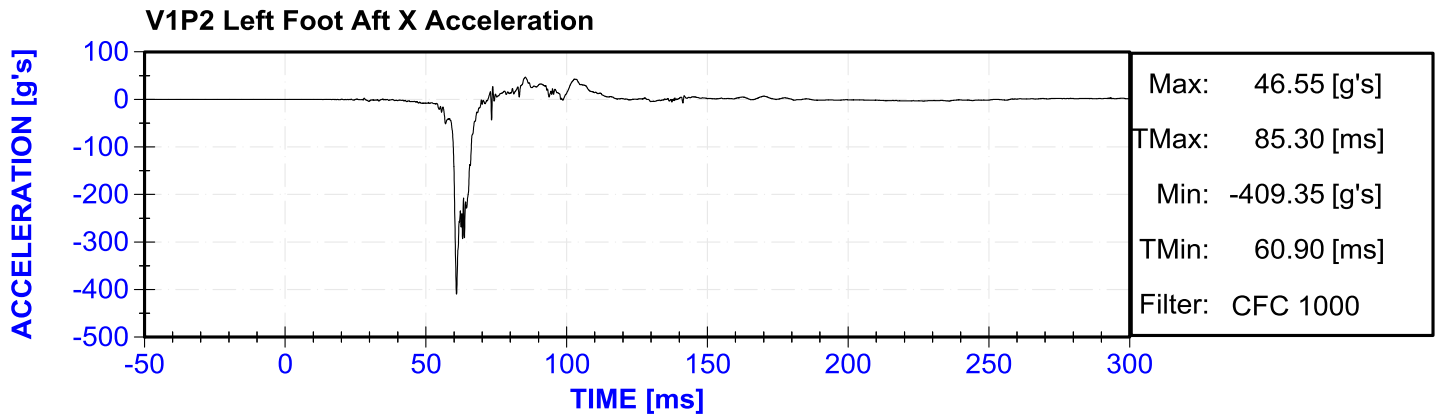


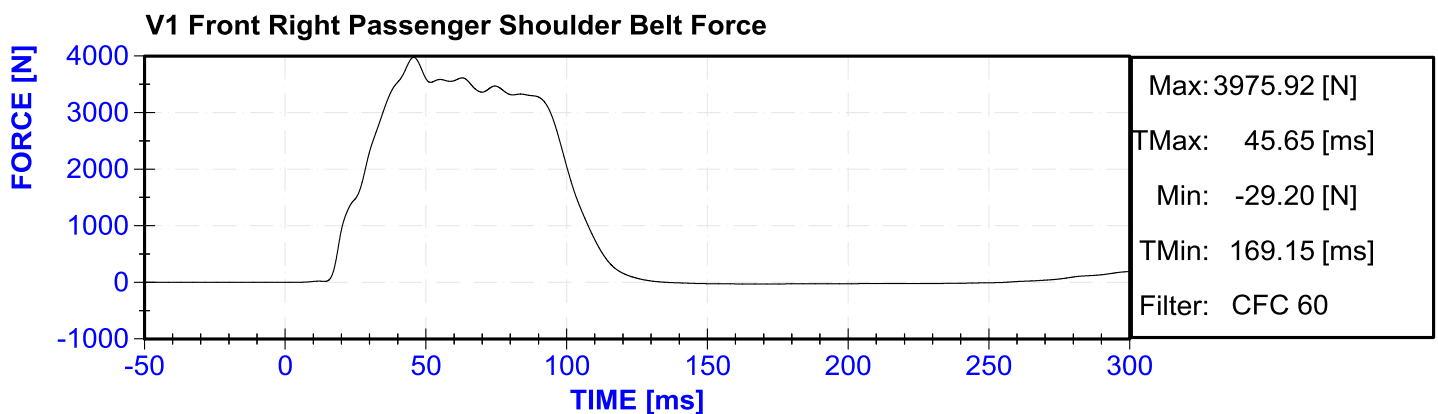
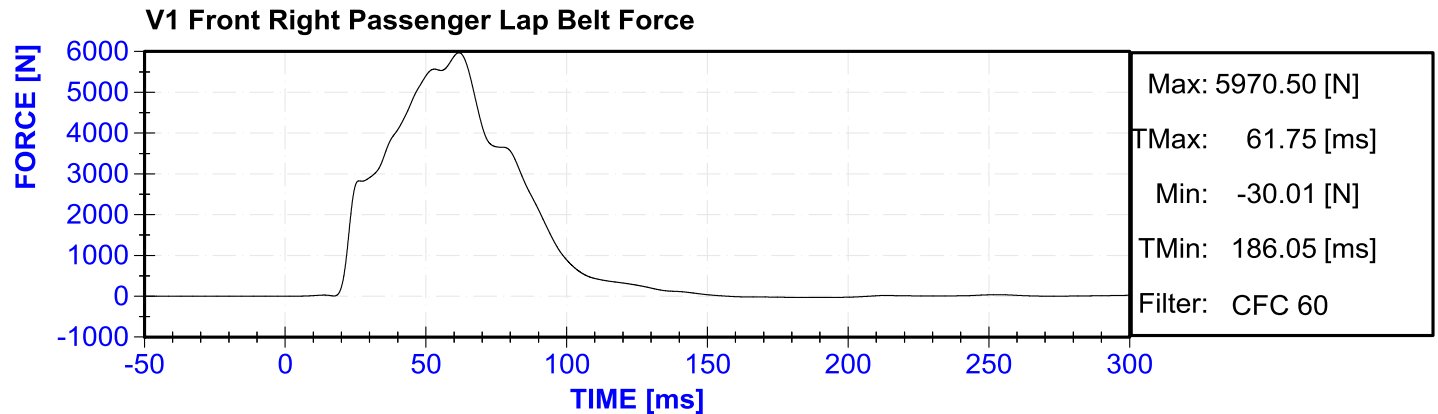
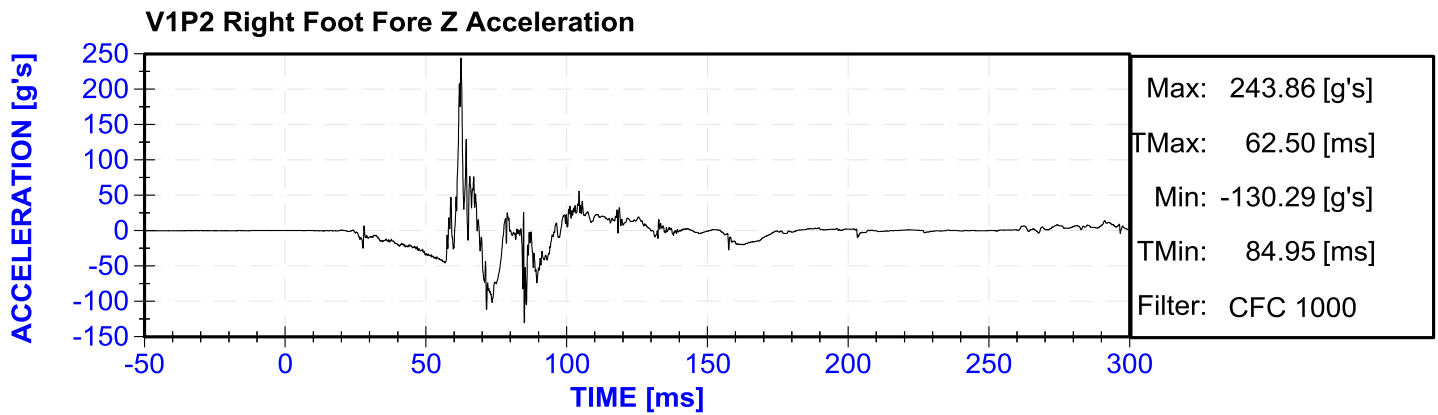
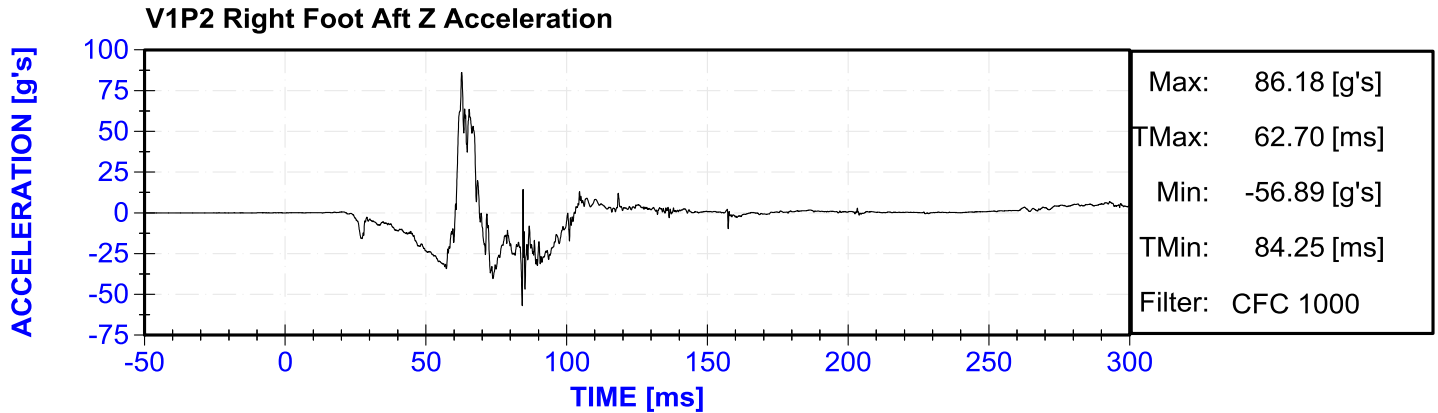




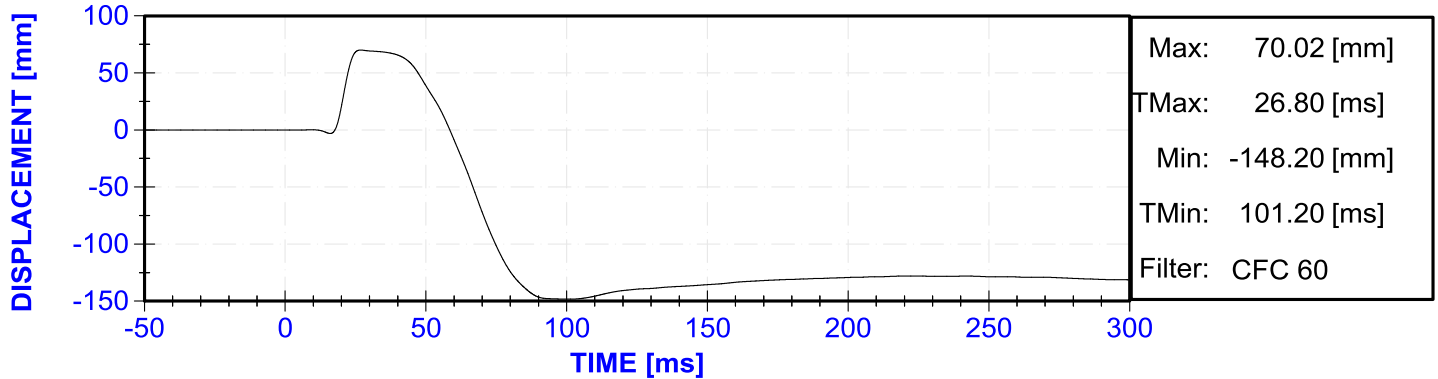




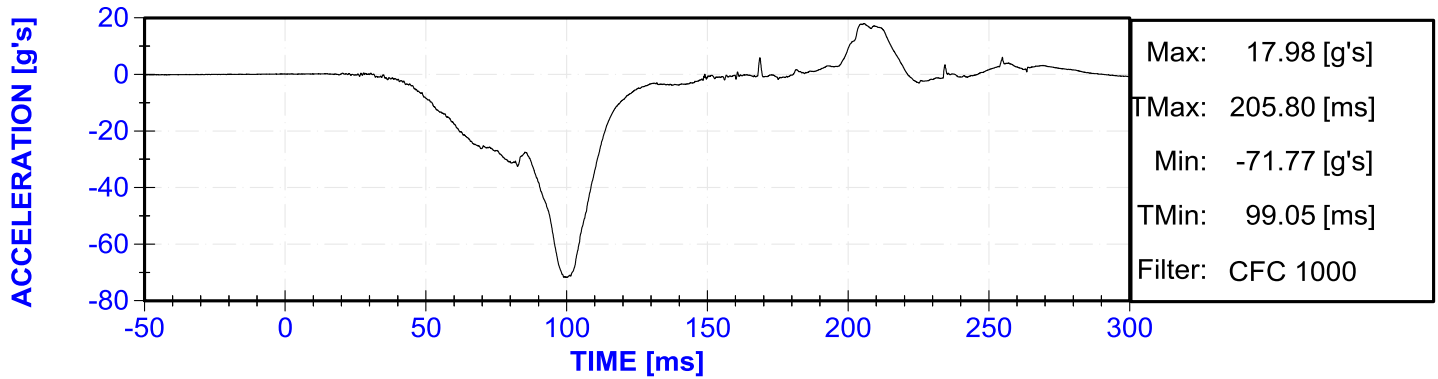




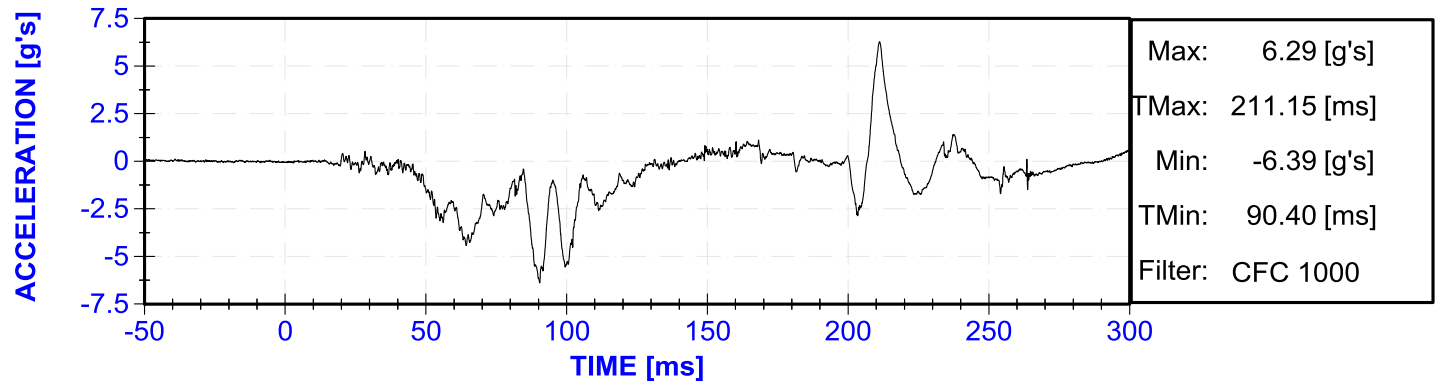
V1 Front Right Passenger Shoulder Belt Displacement



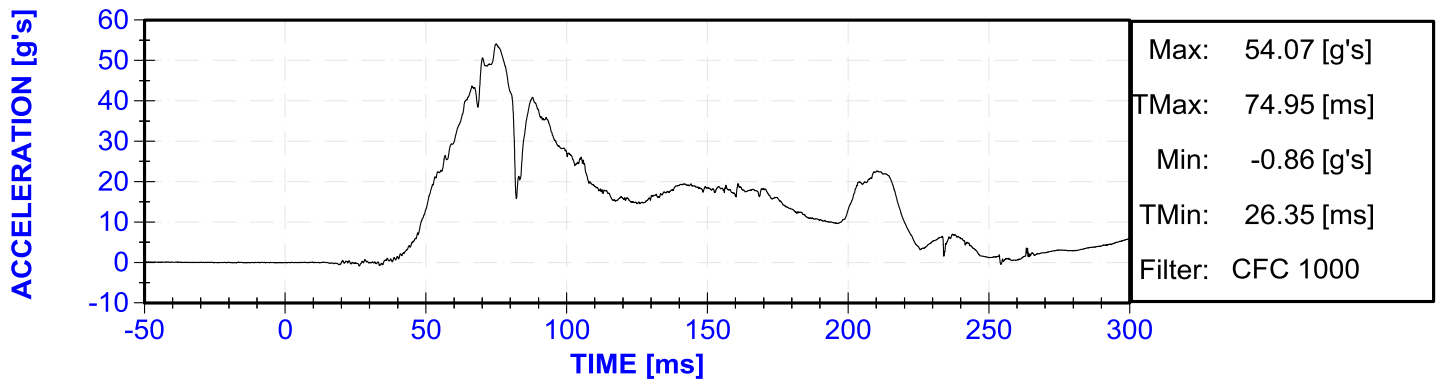
V1P3 Head CG X Acceleration

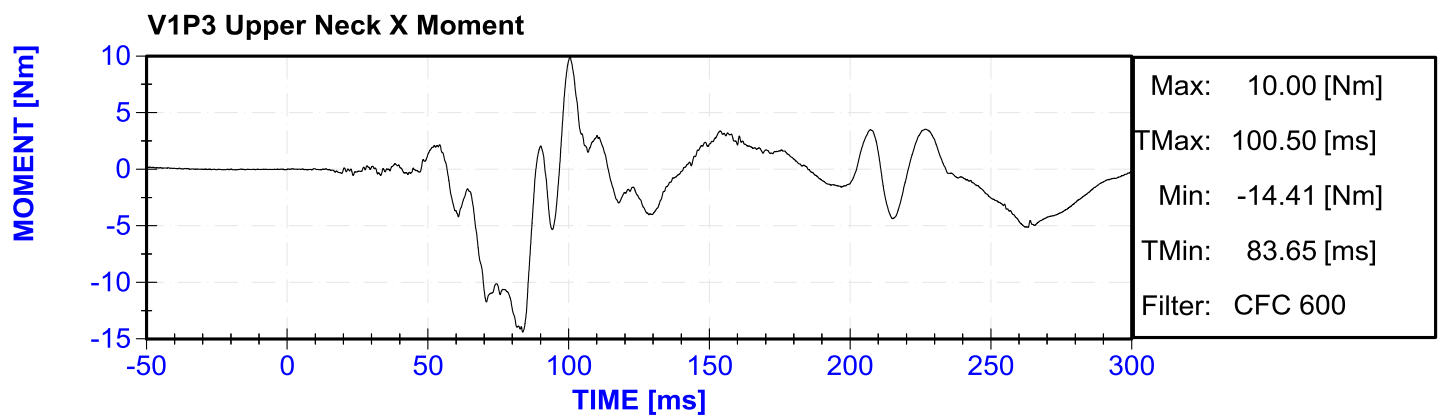
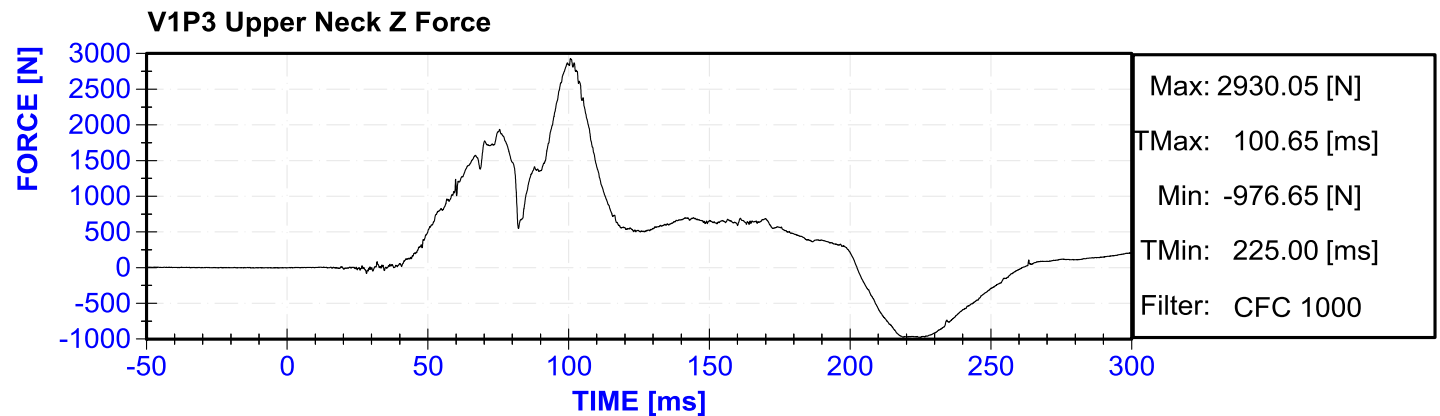
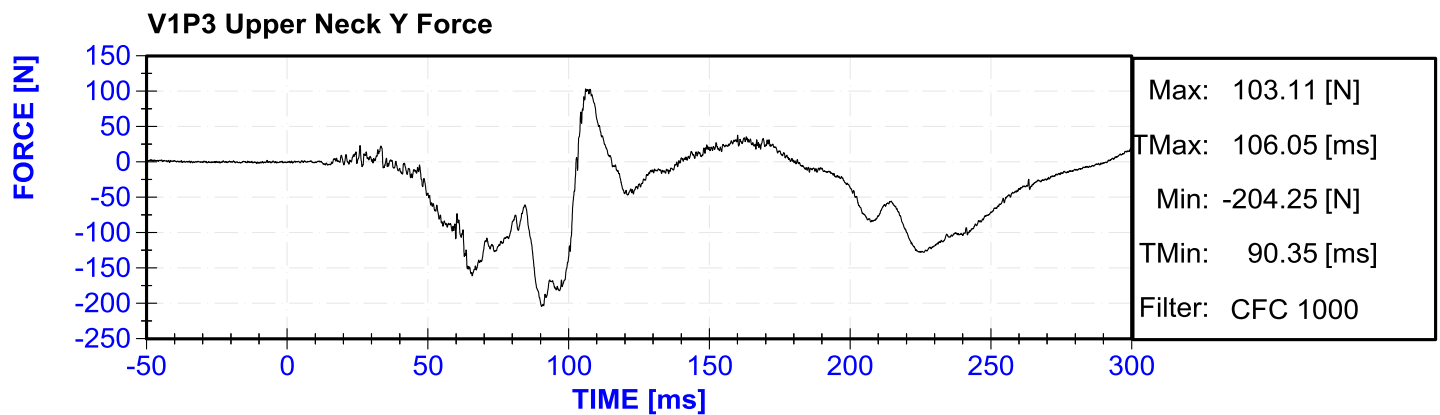
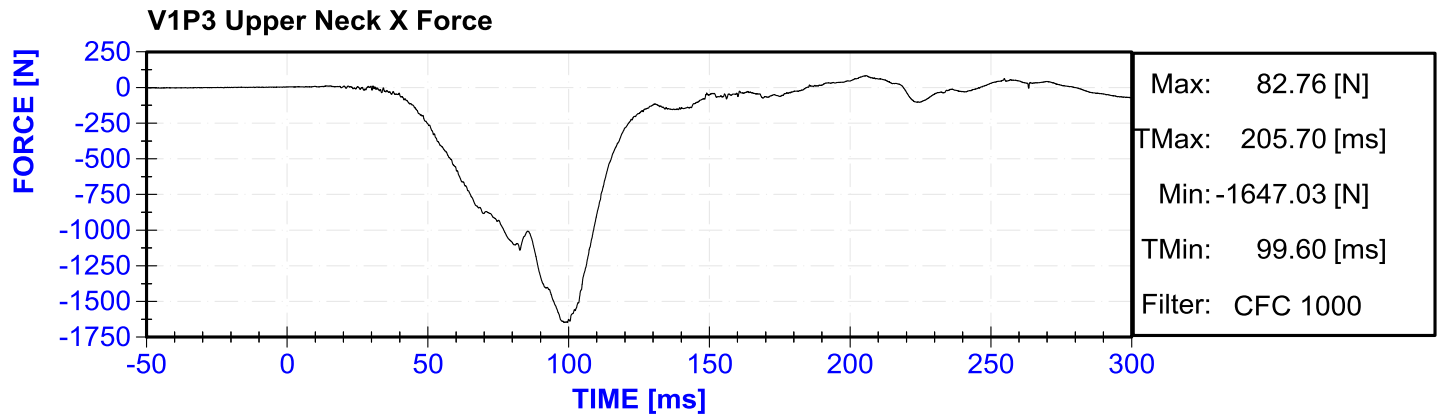


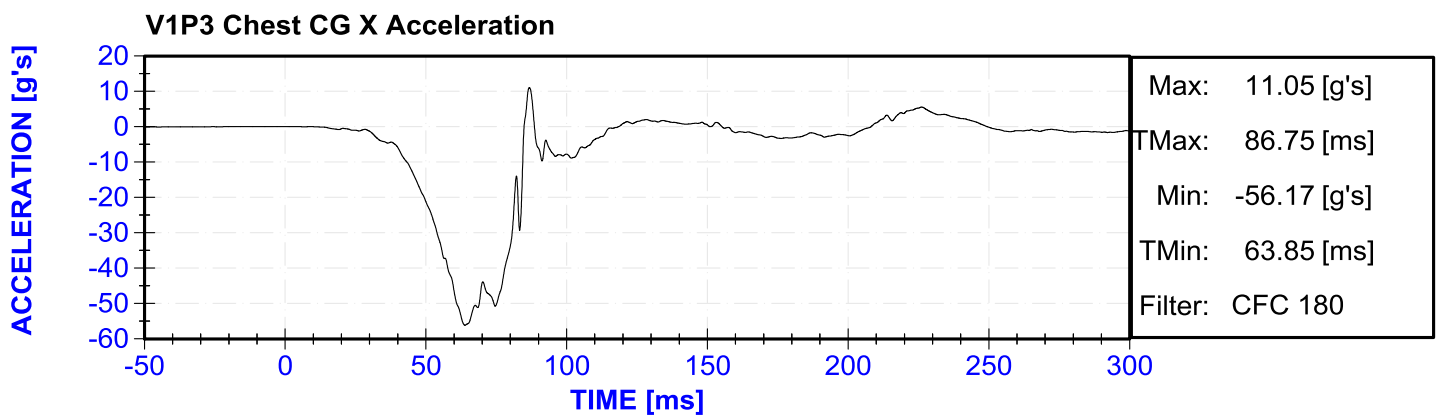
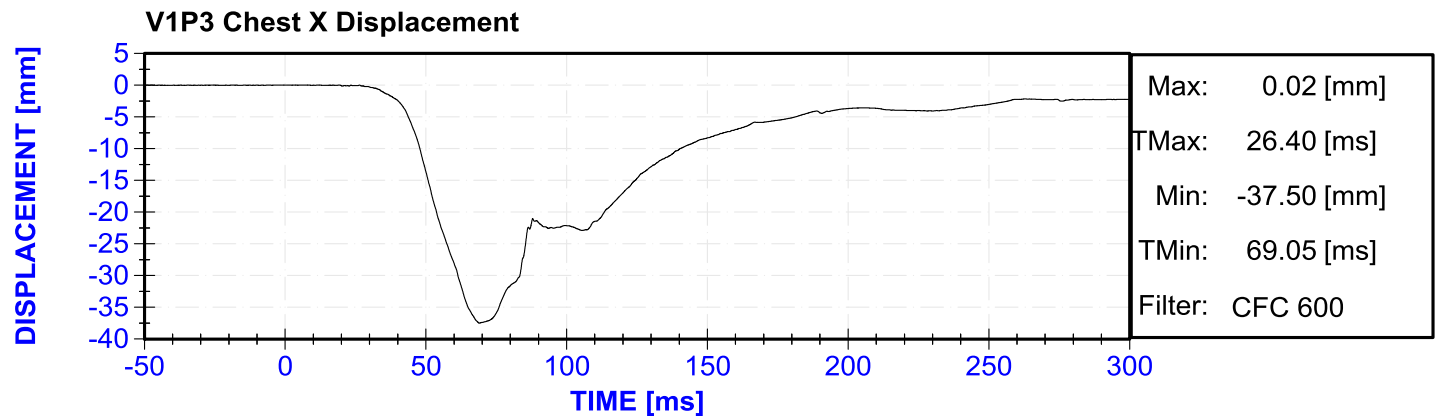
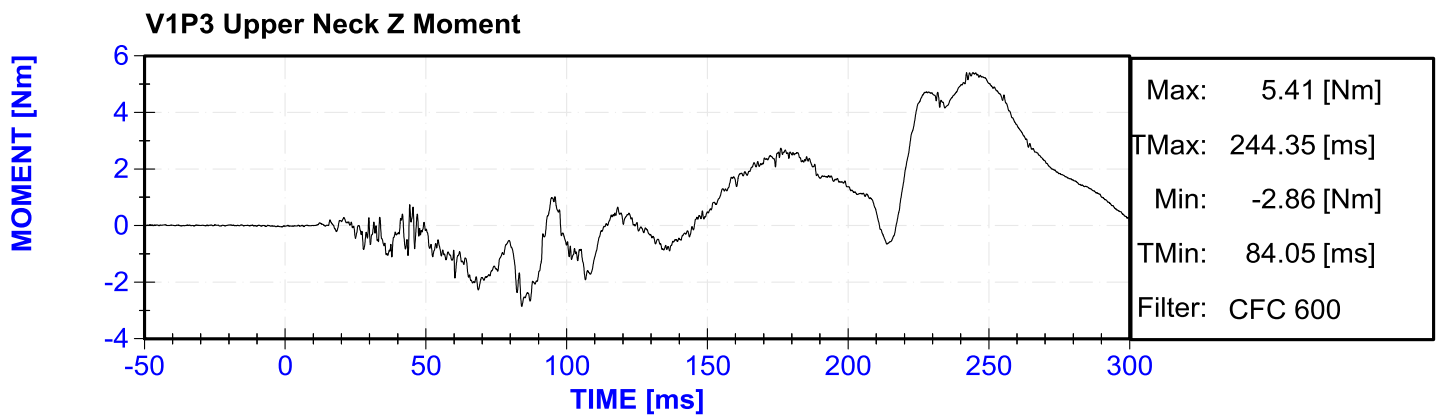
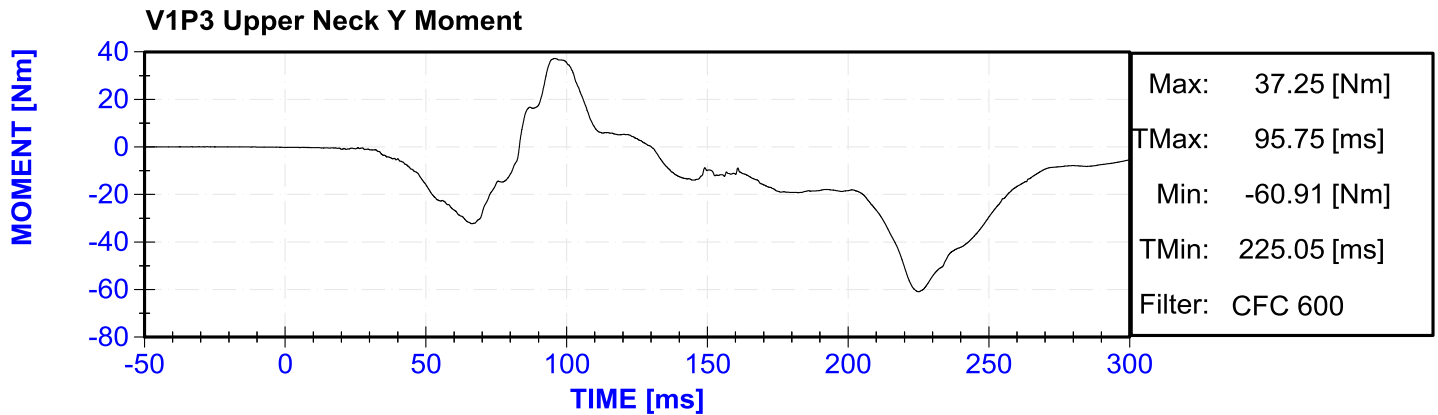
V1P3 Head CG Y Acceleration

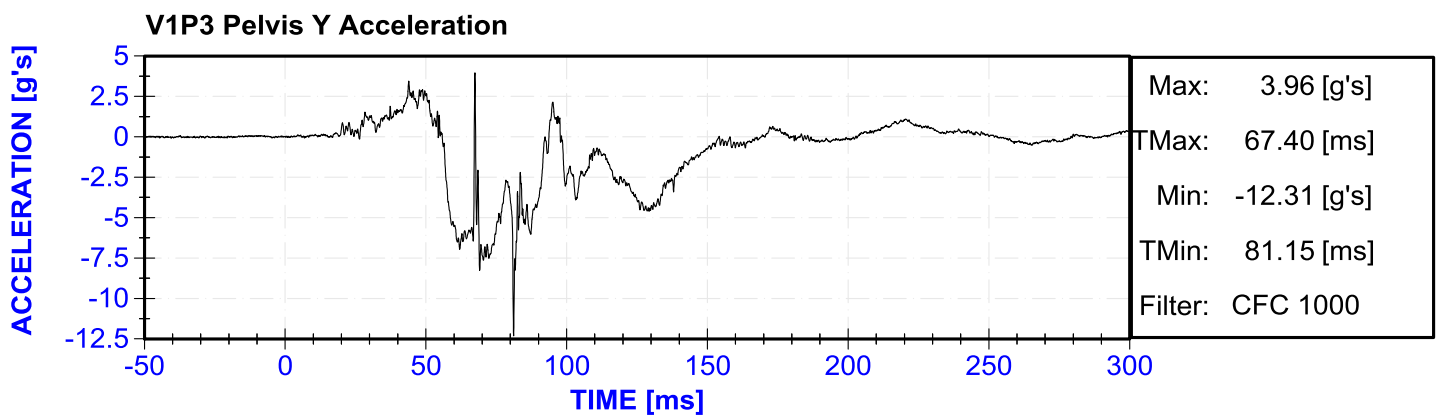
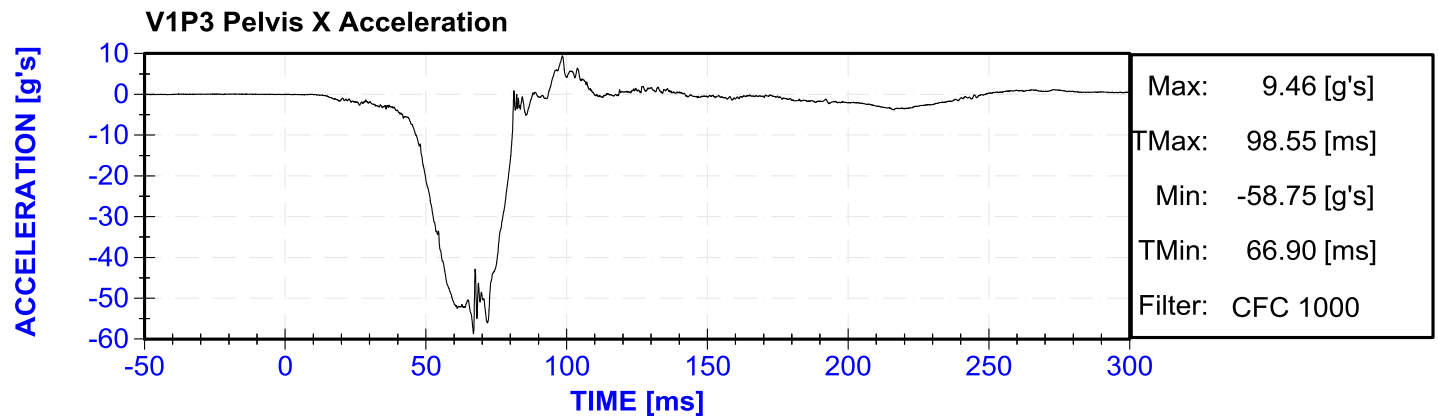
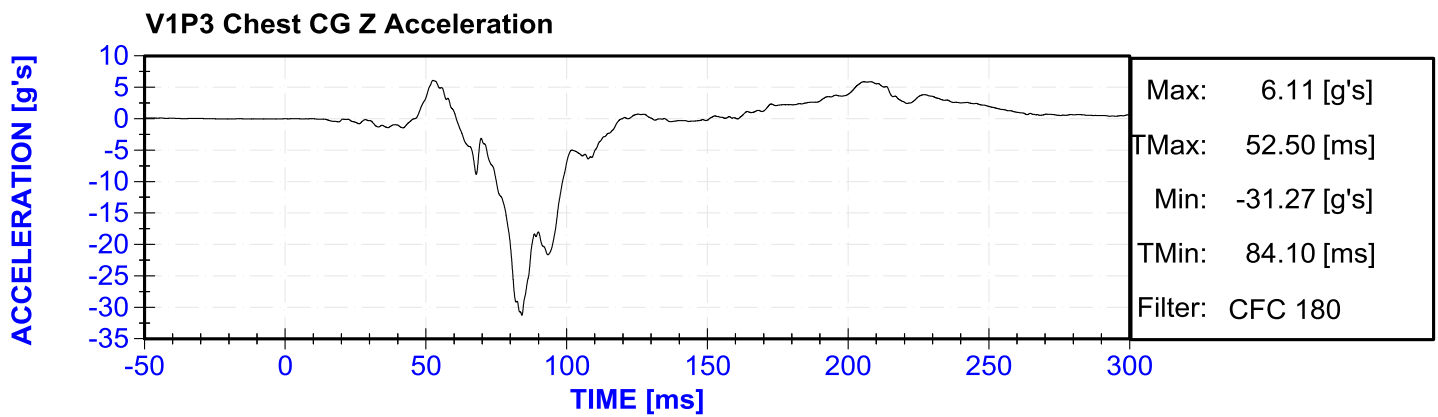
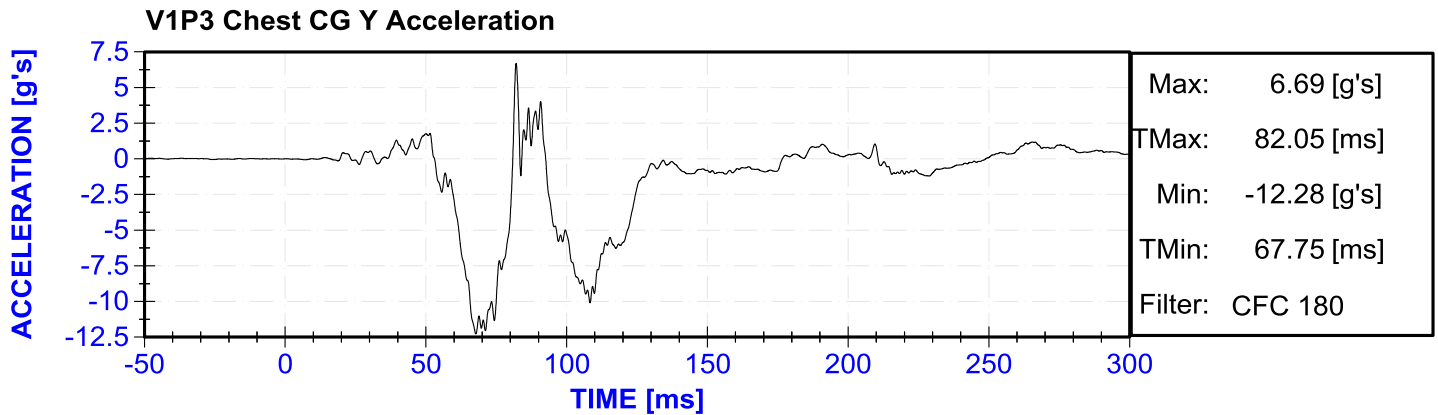


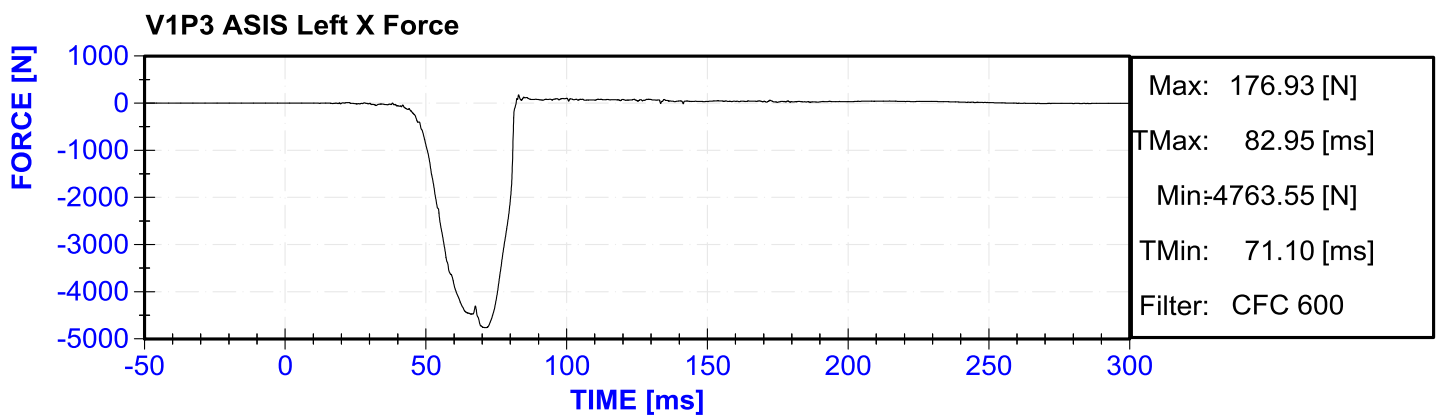
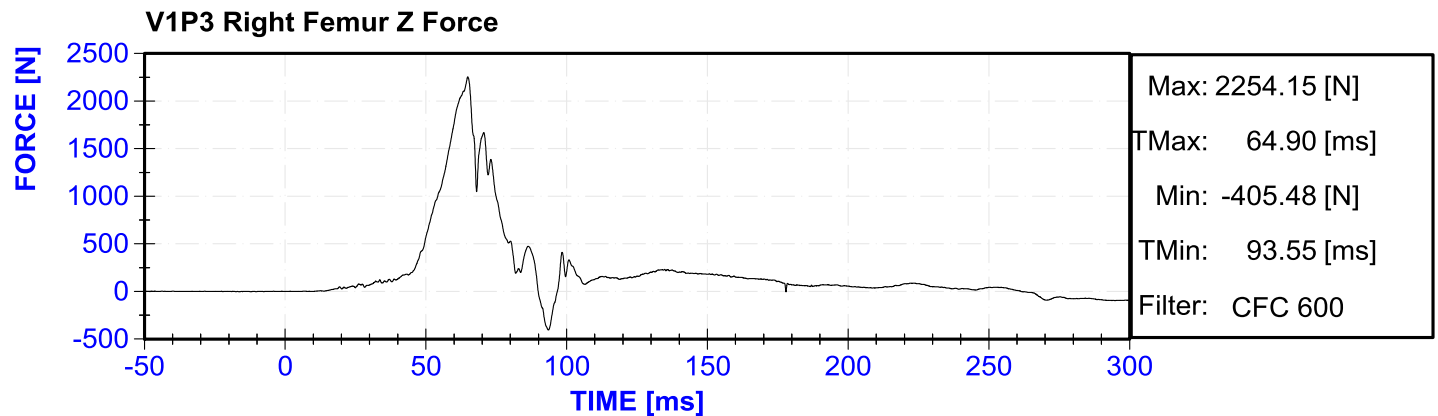
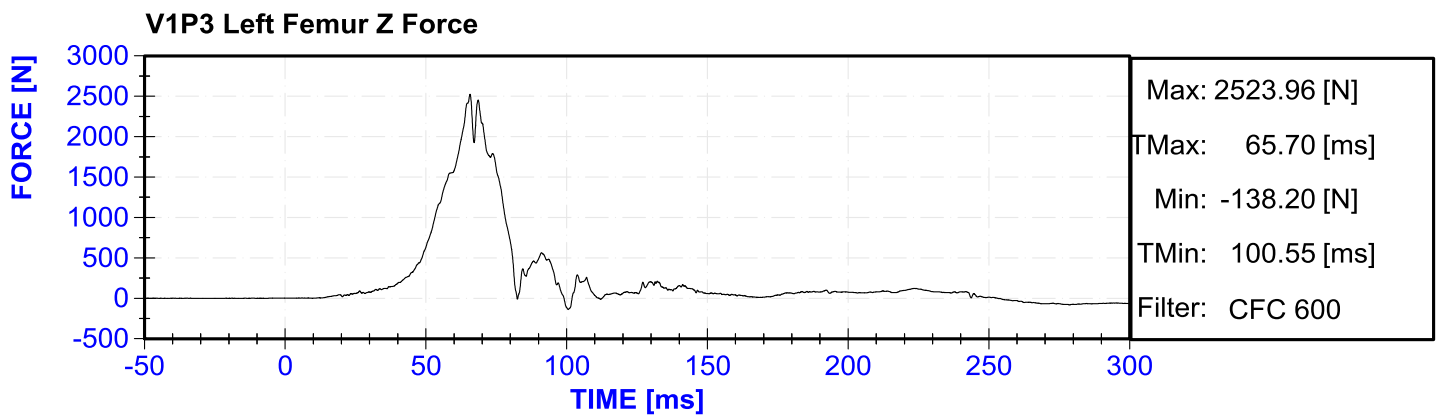
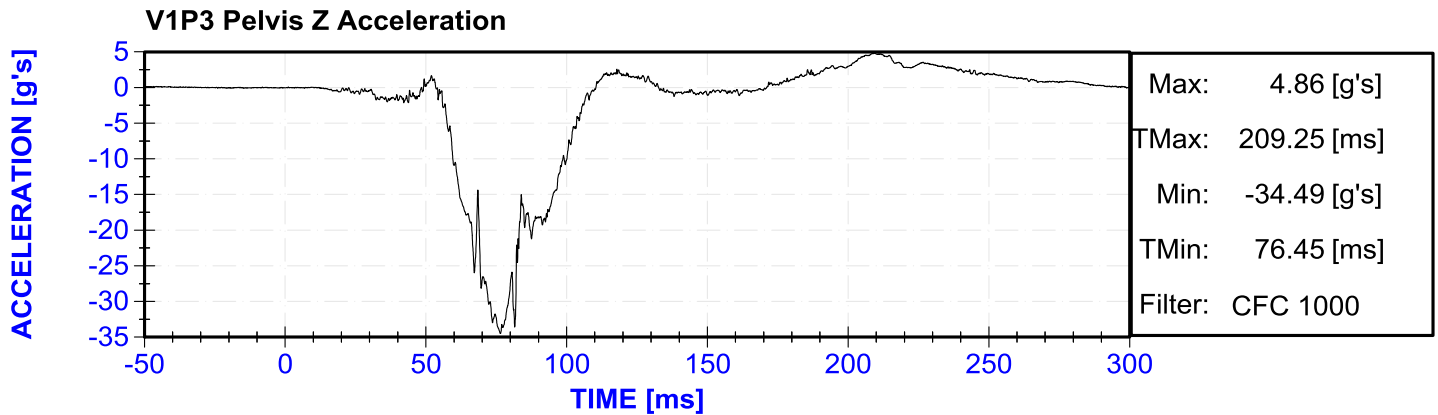
V1P3 Head CG Z Acceleration

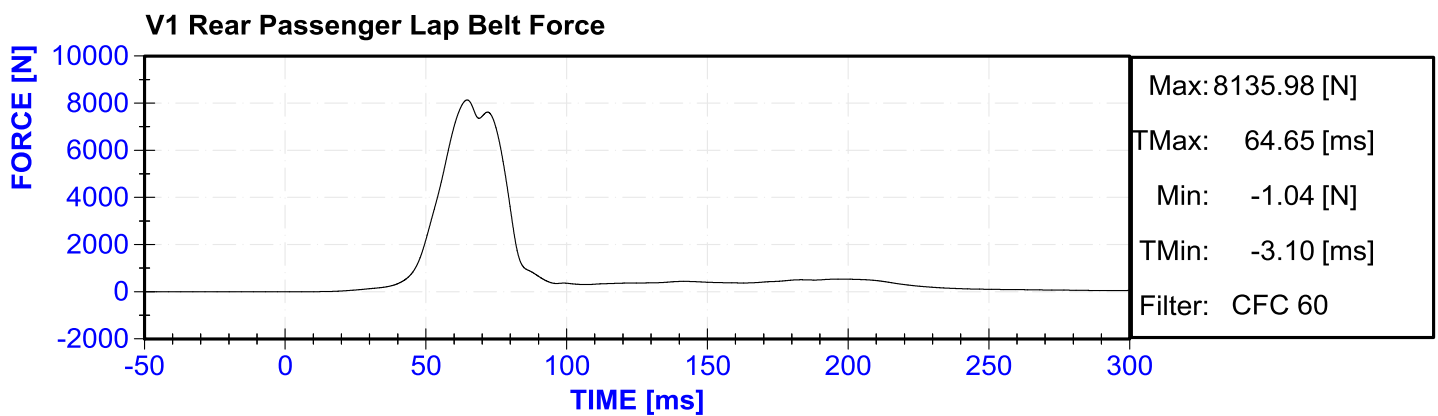
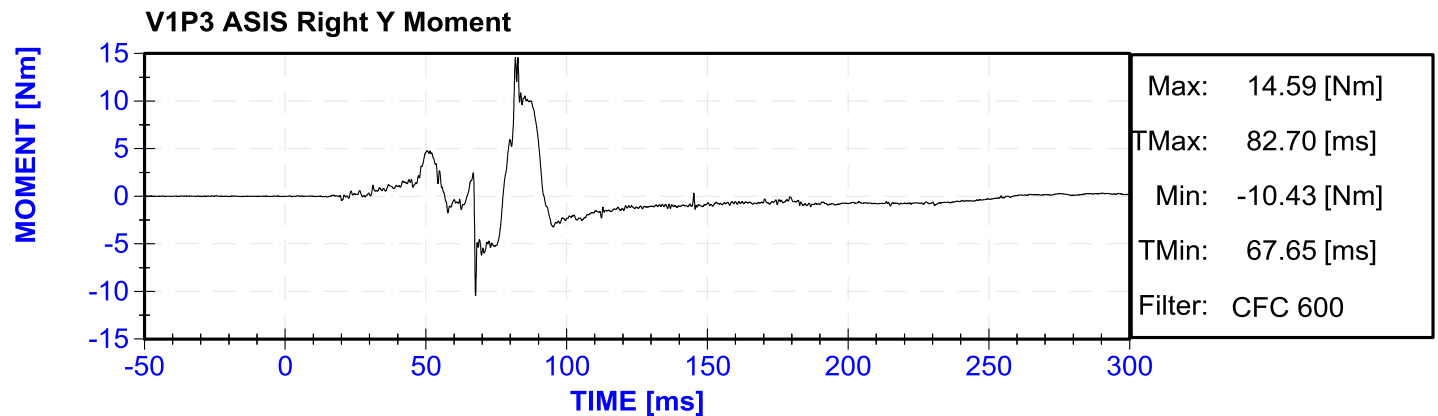
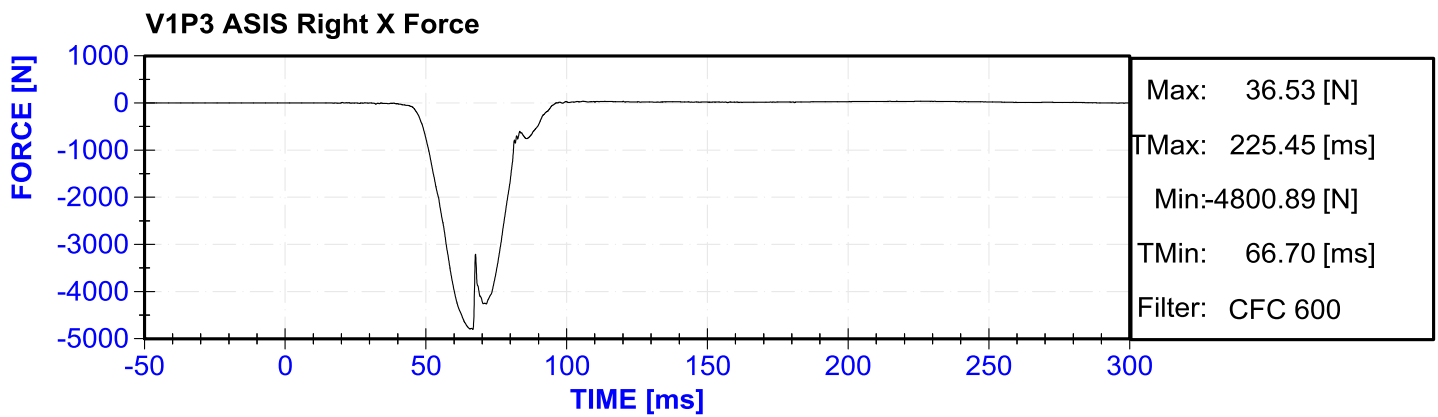
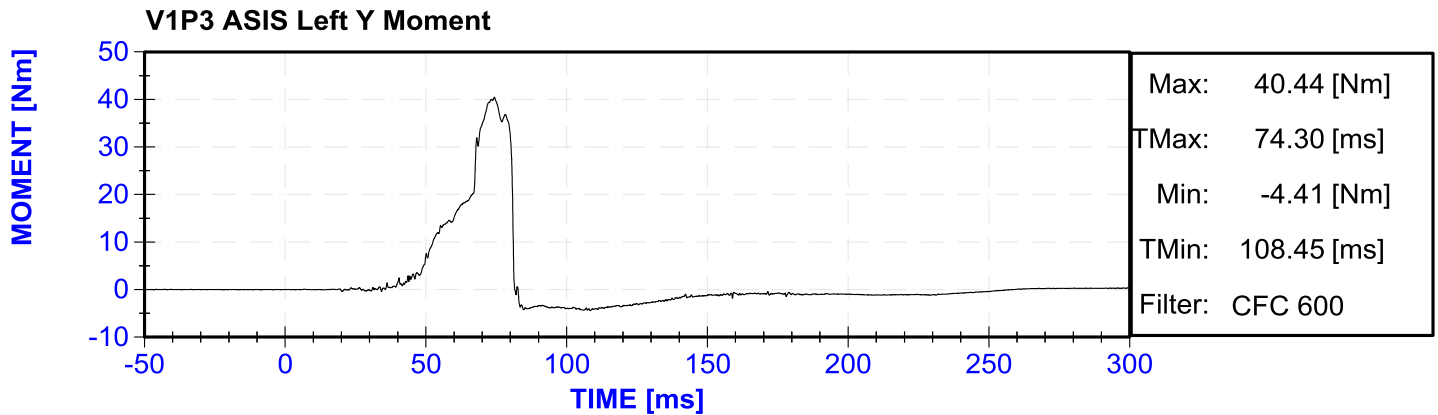




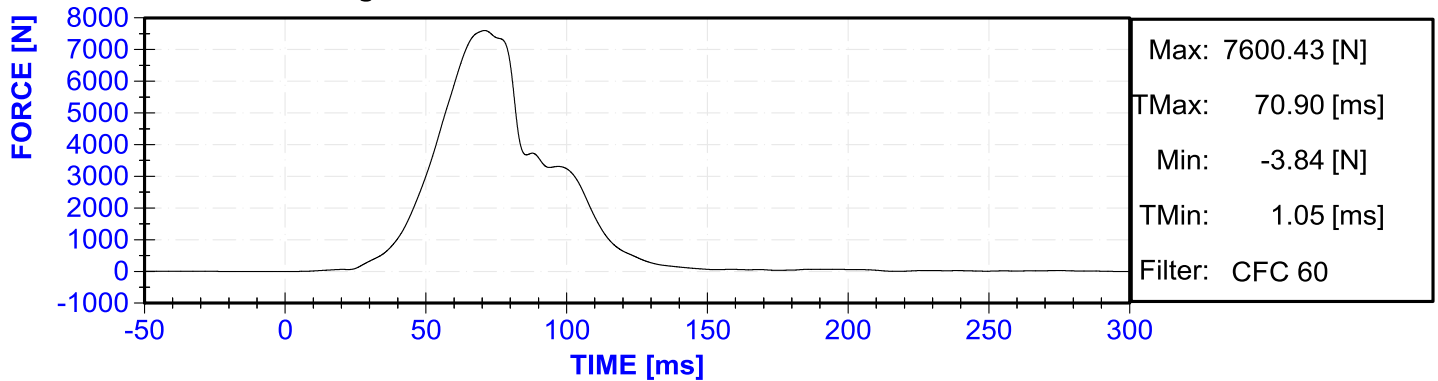




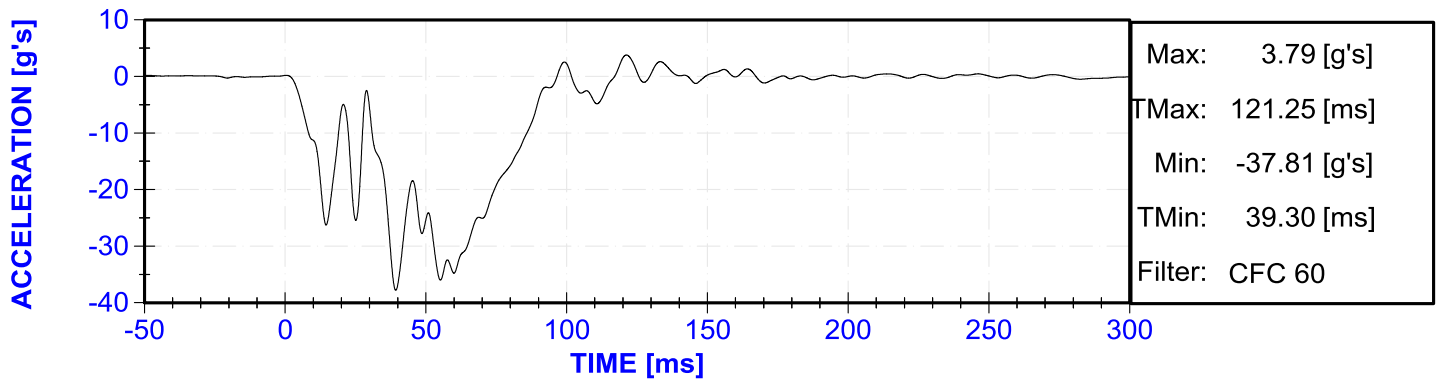




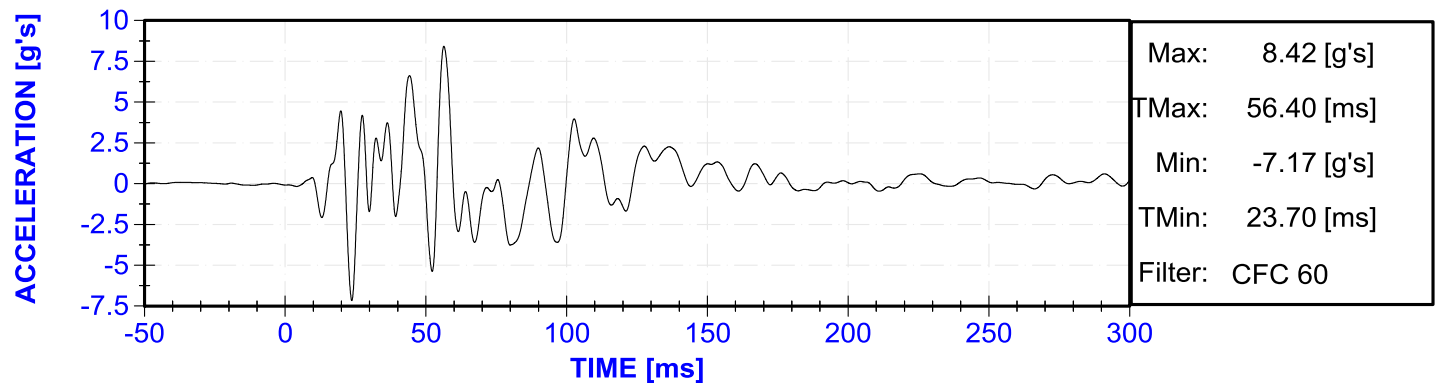
V1 Rear Passenger Shoulder Belt Force



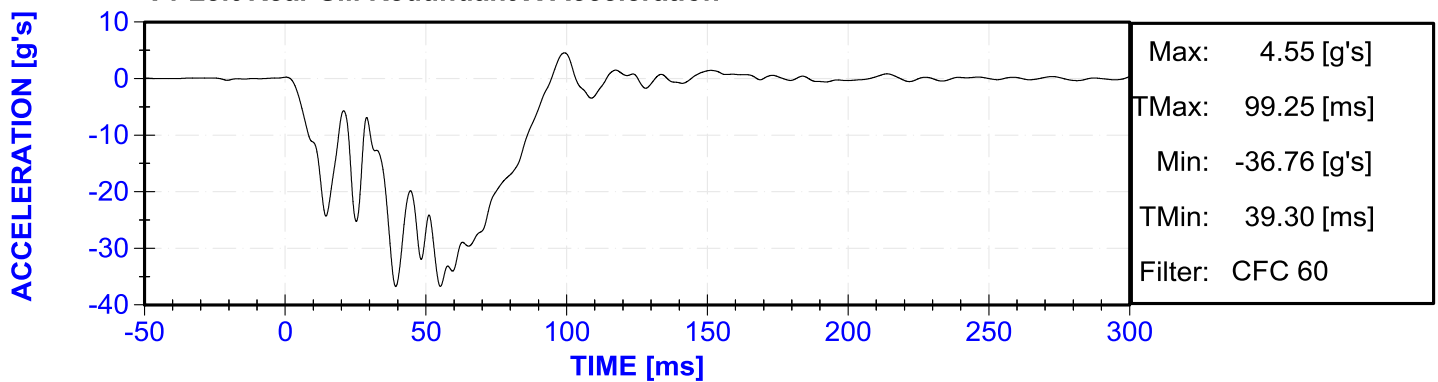
V1 Left Rear Sill X Acceleration

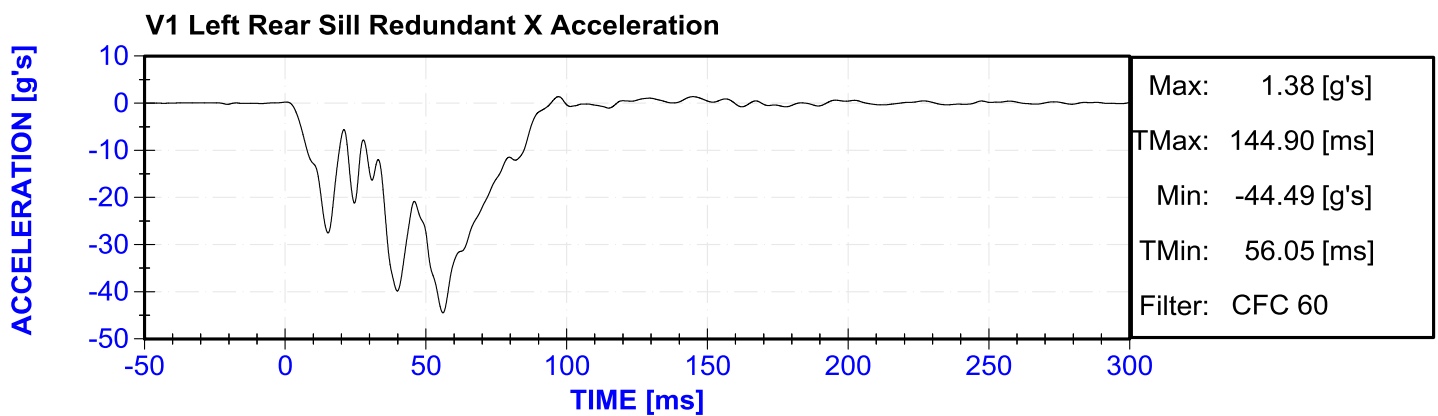
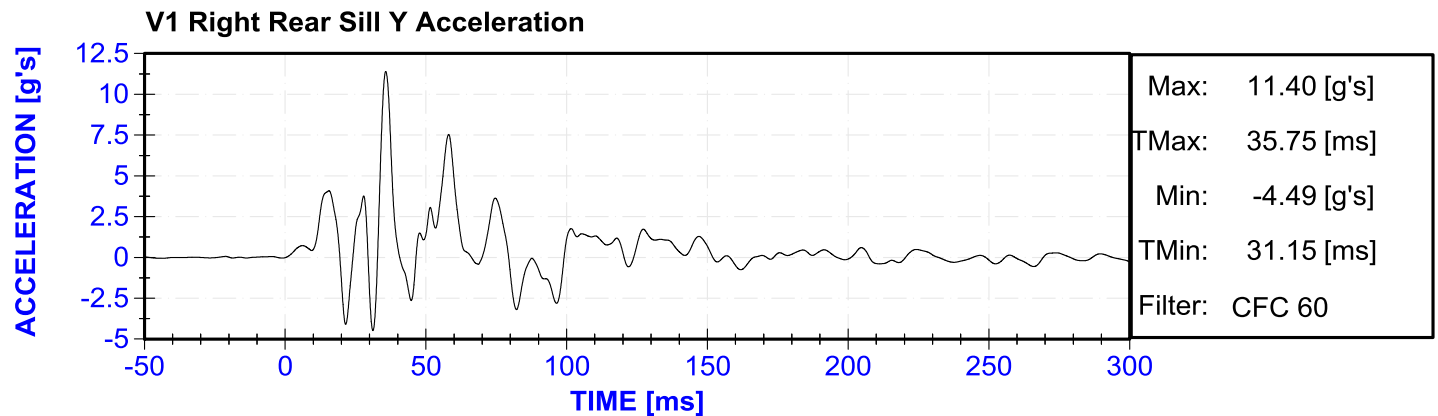
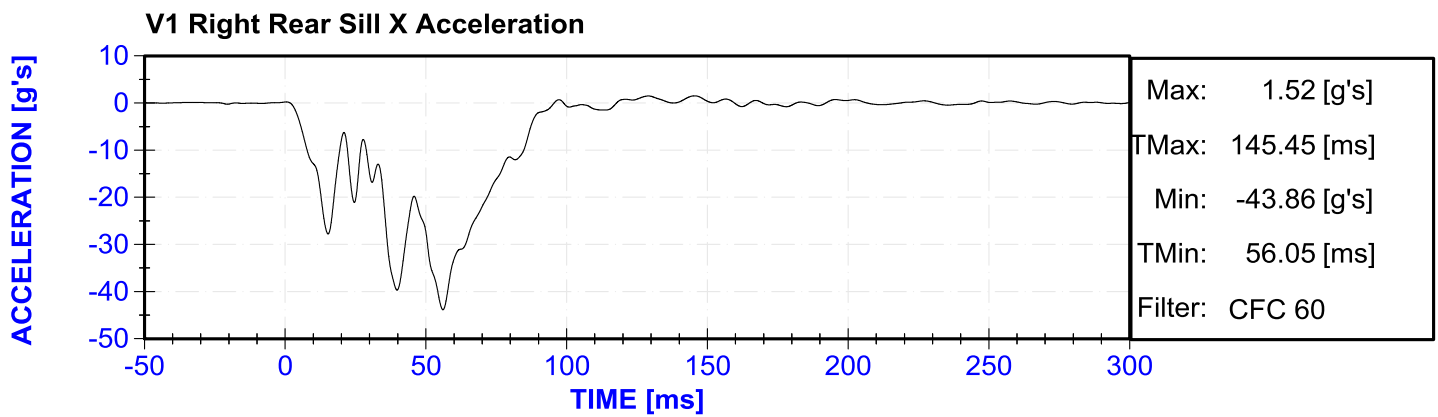
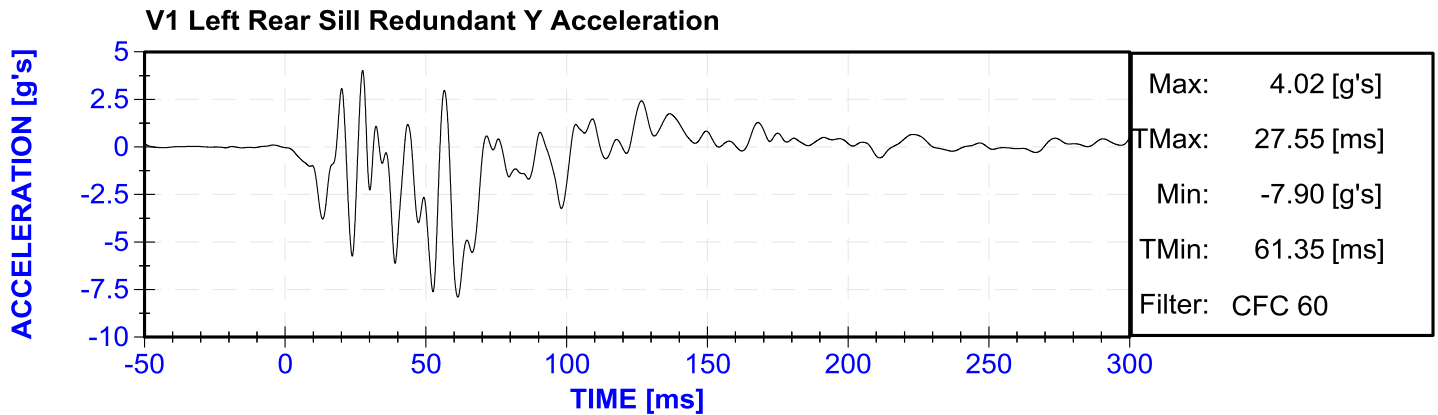


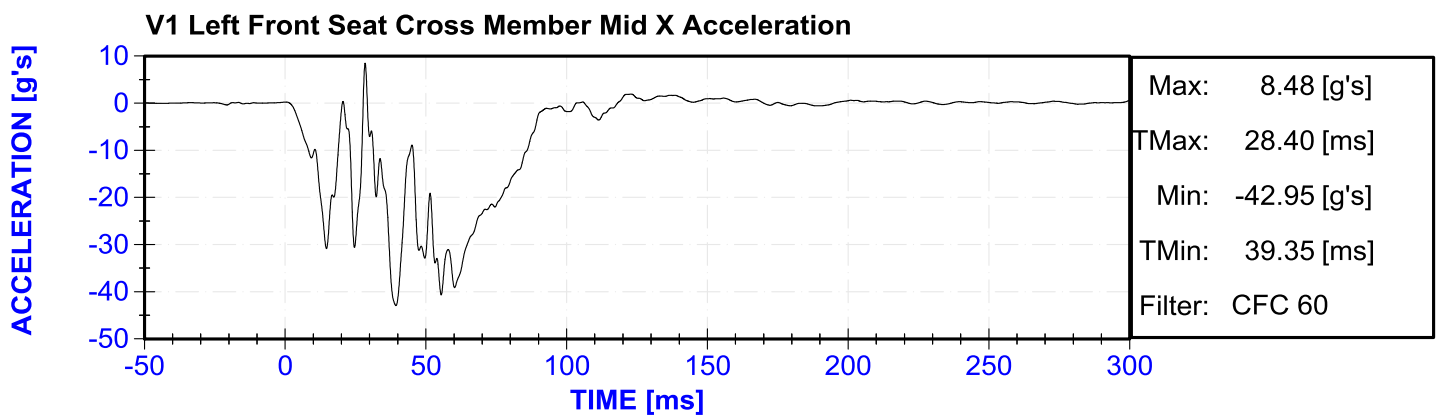
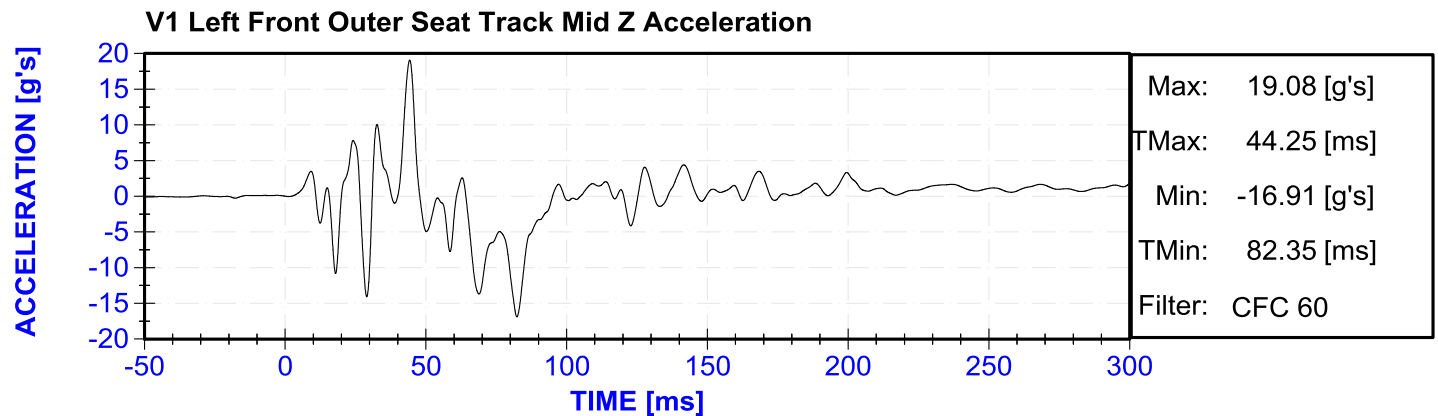
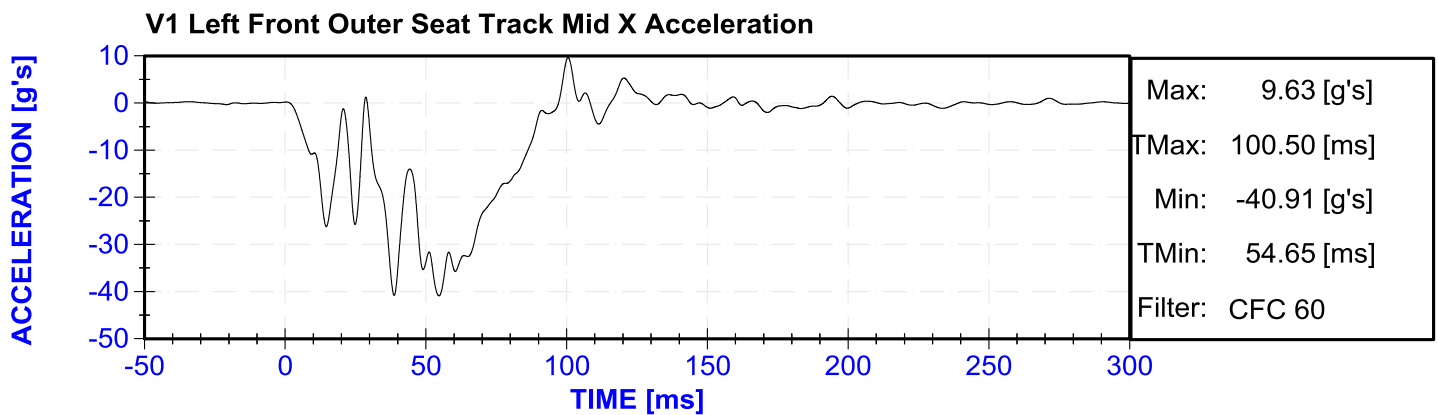
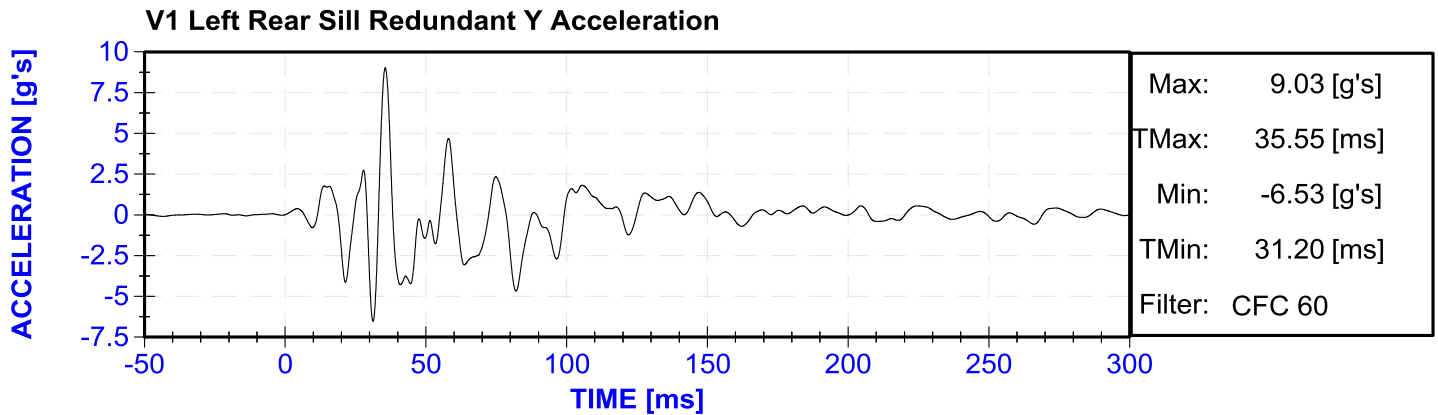
V1 Left Rear Sill Y Acceleration

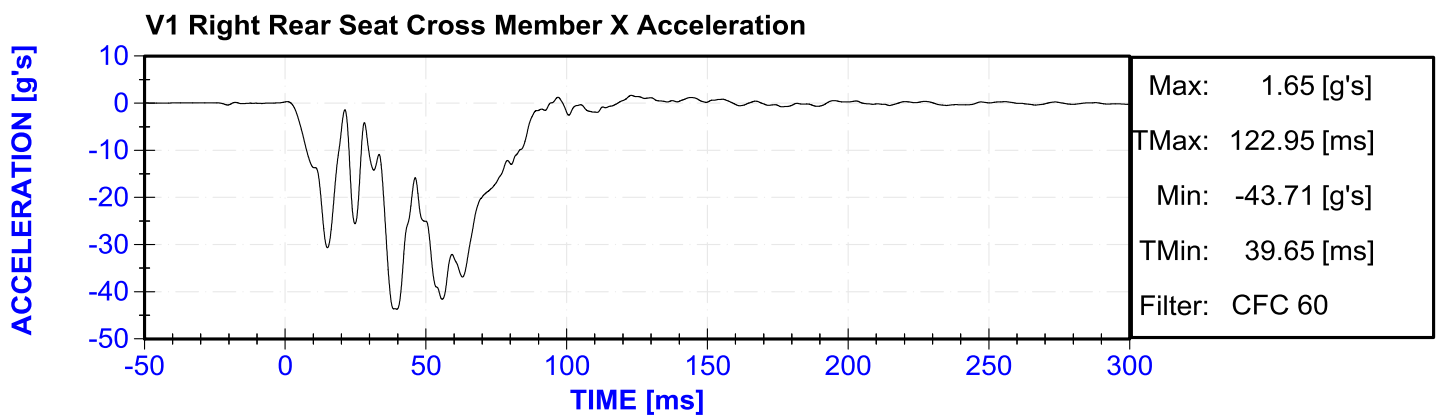
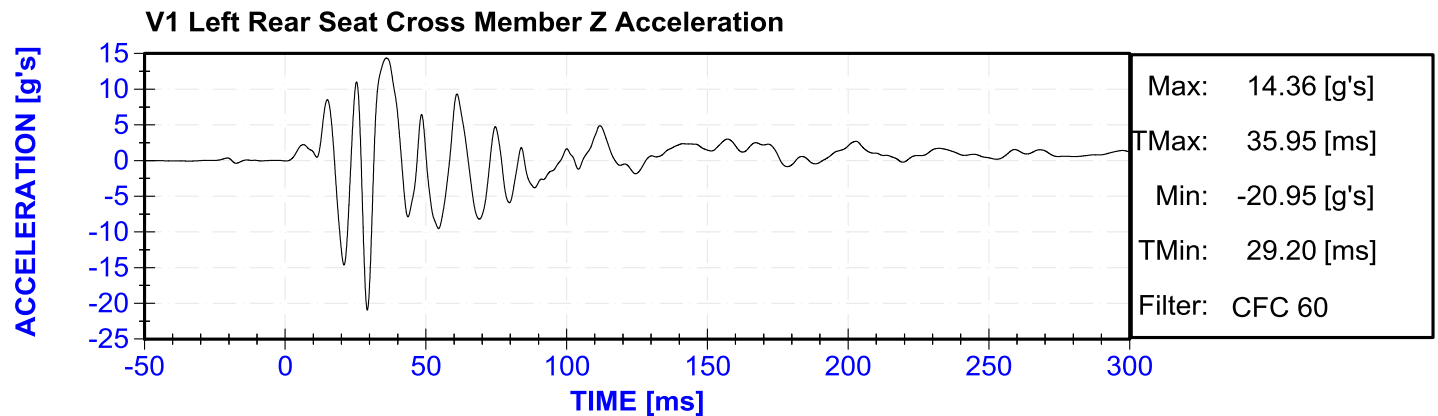
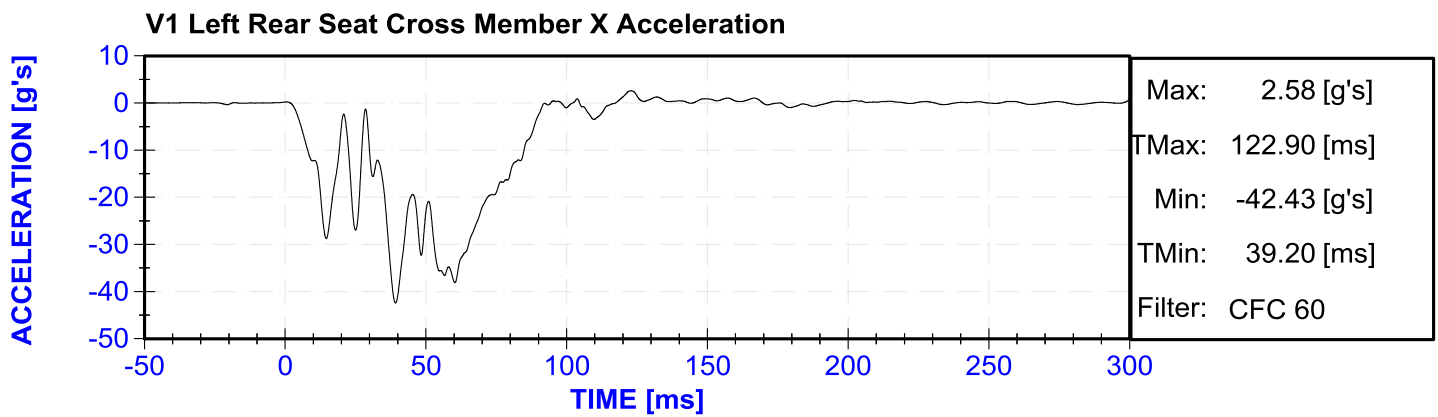
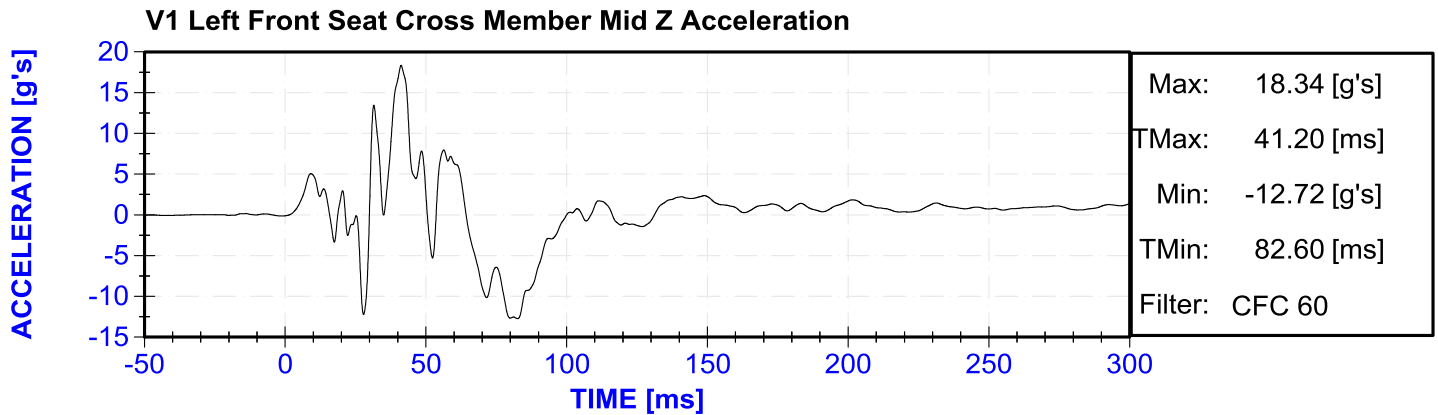


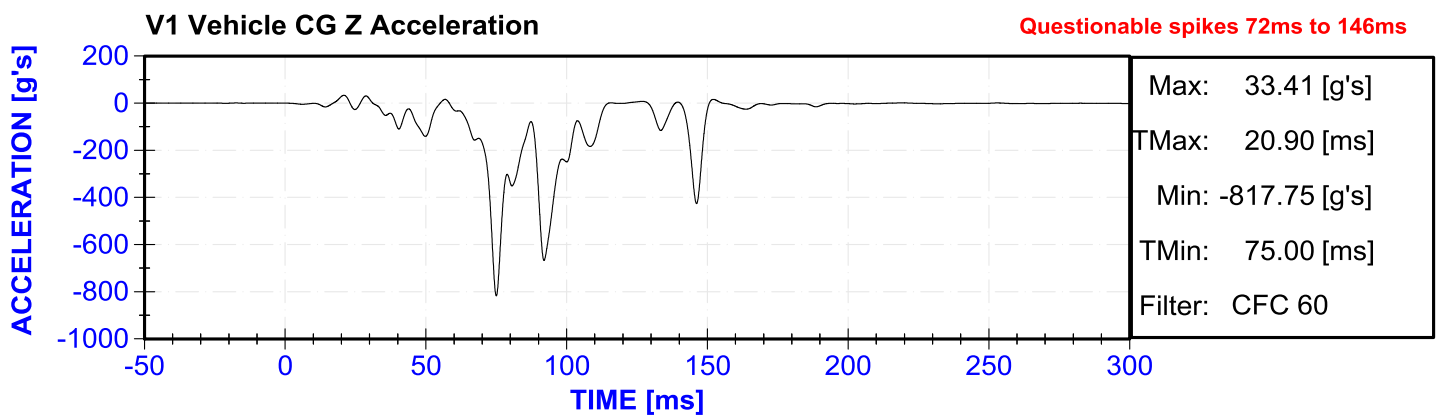
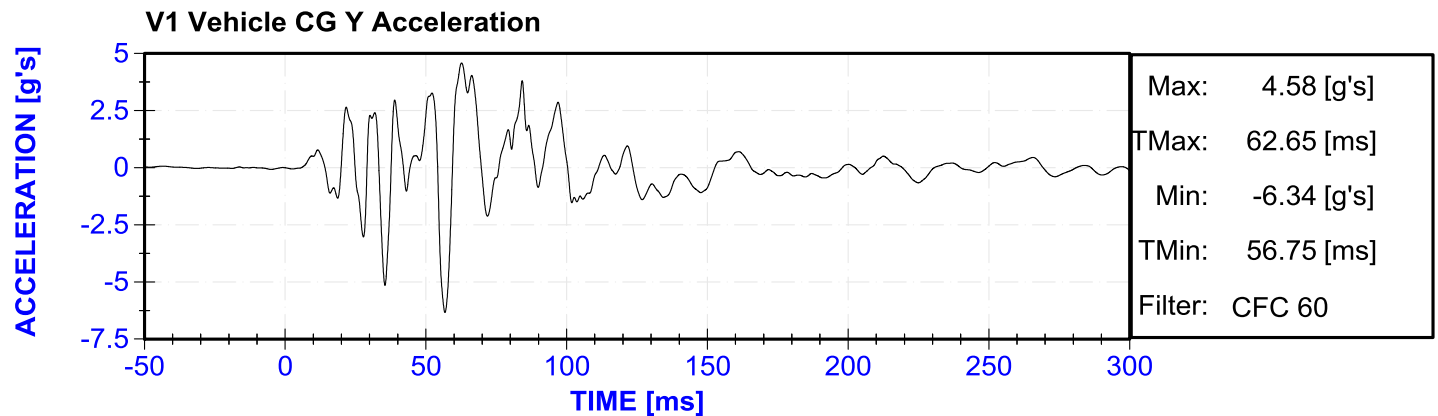
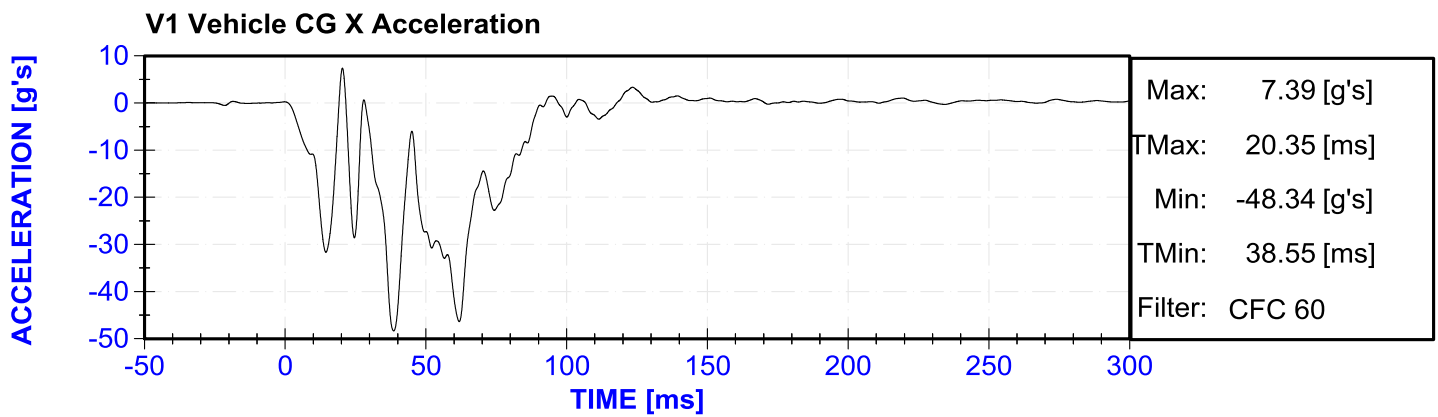
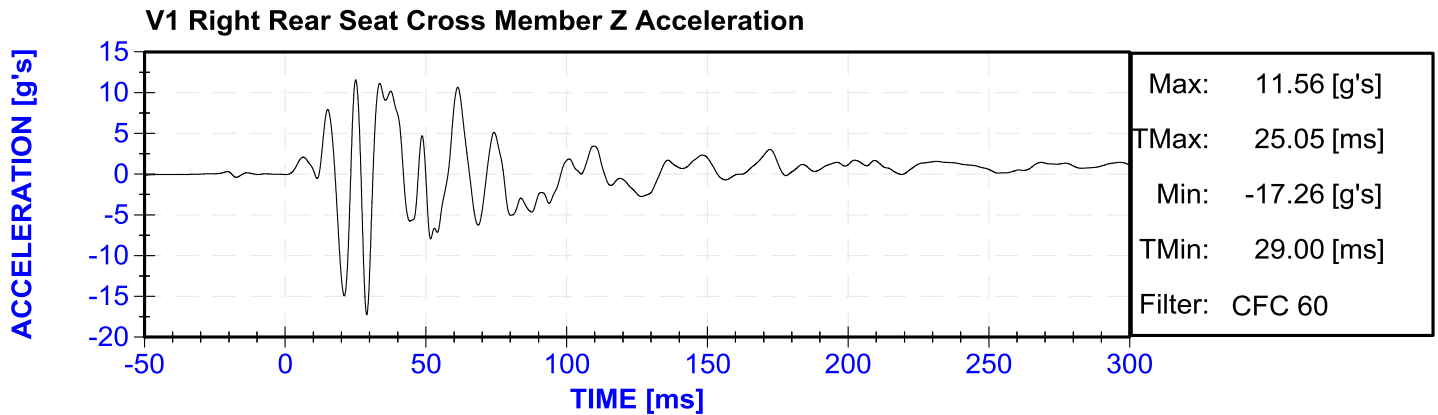
V1 Left Rear Sill Redundant X Acceleration

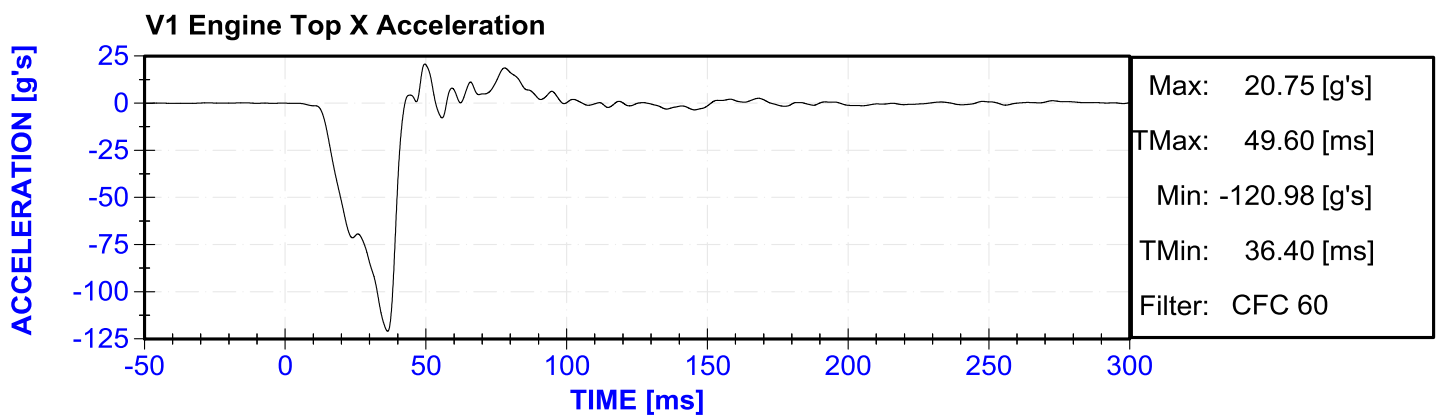
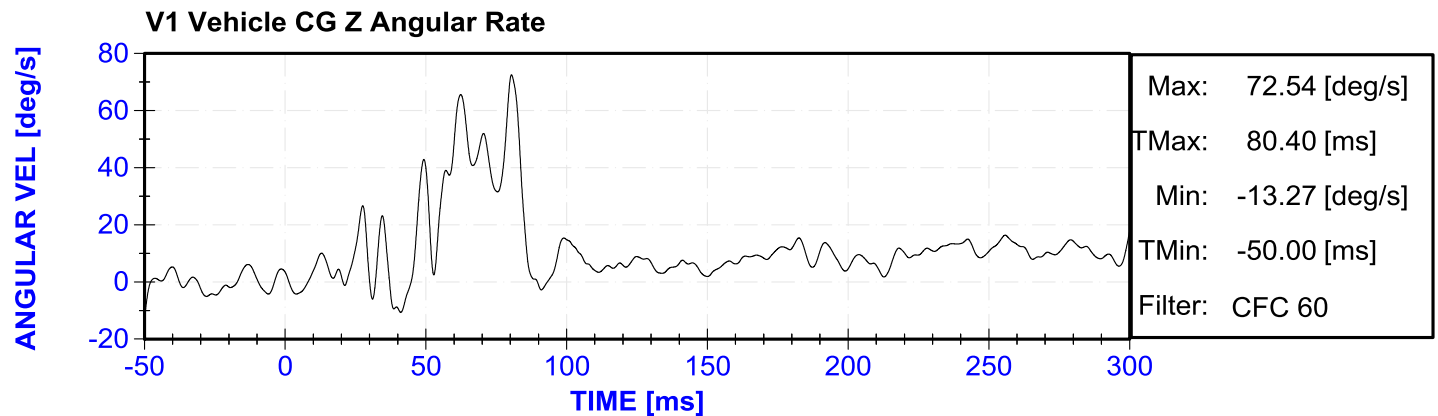
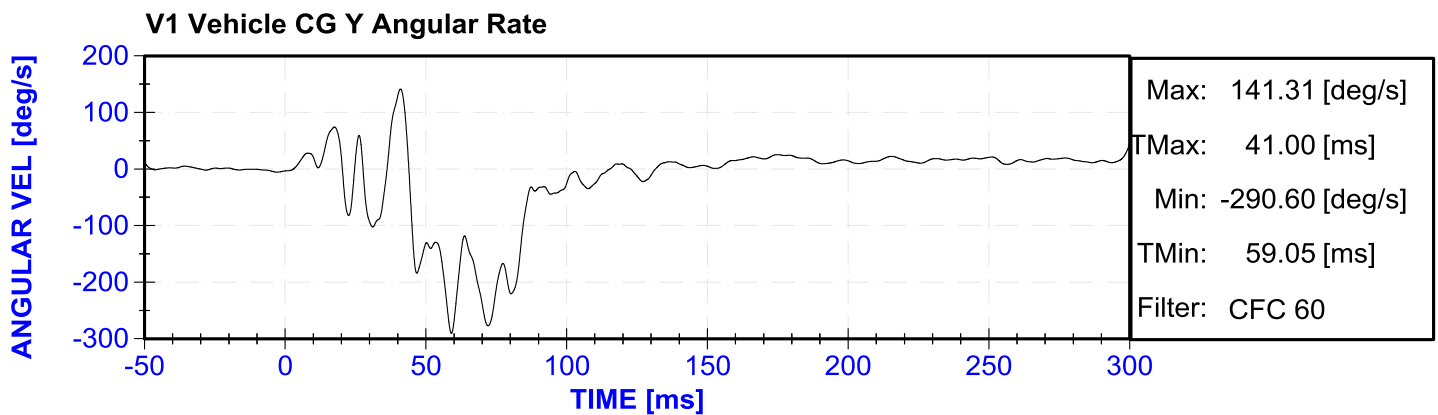
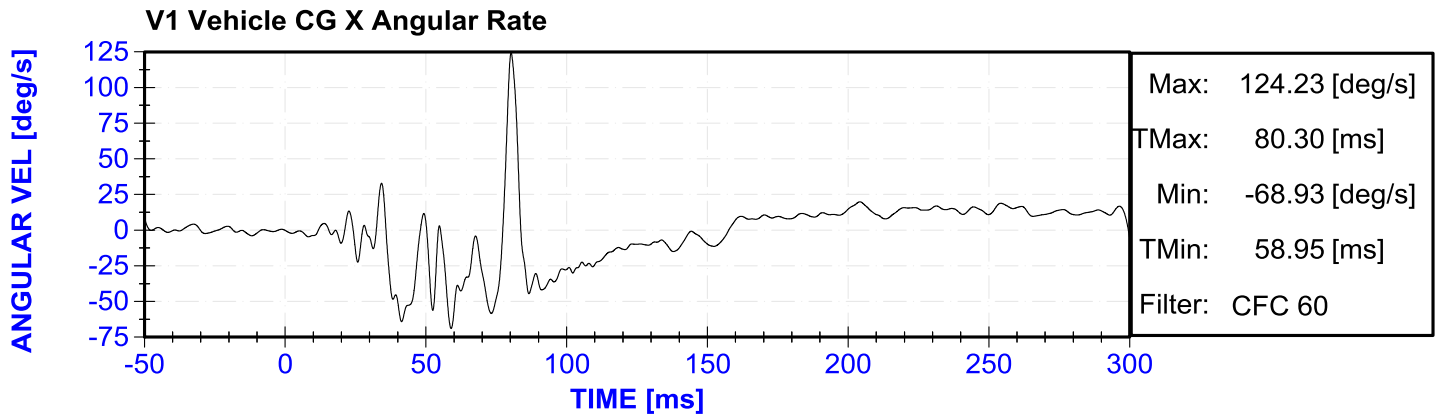


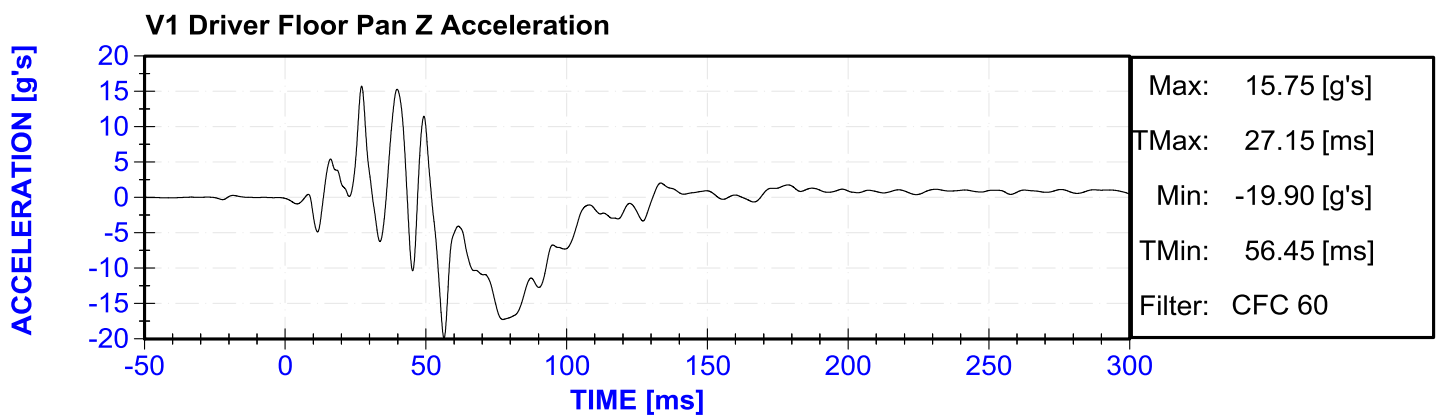
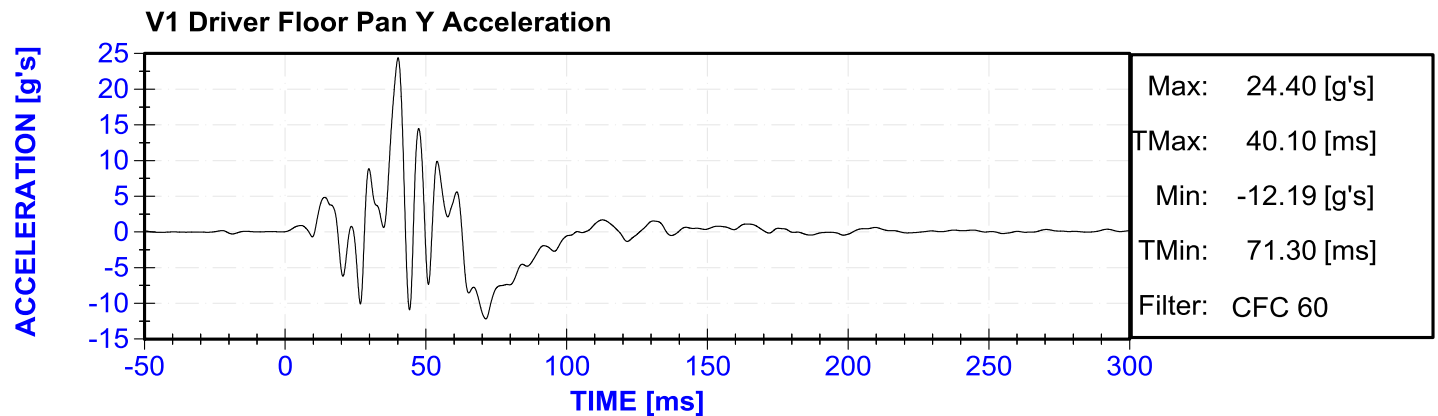
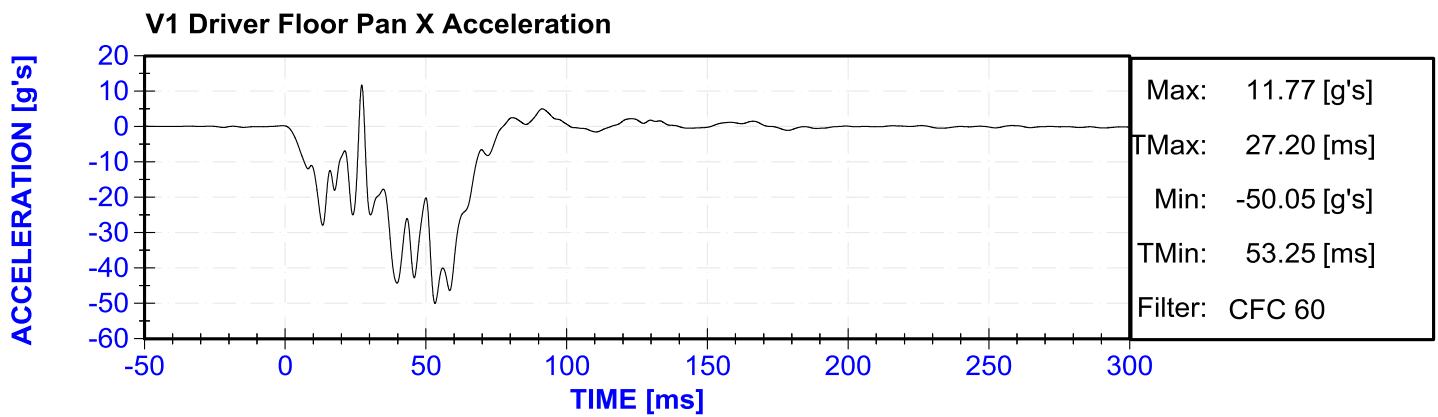
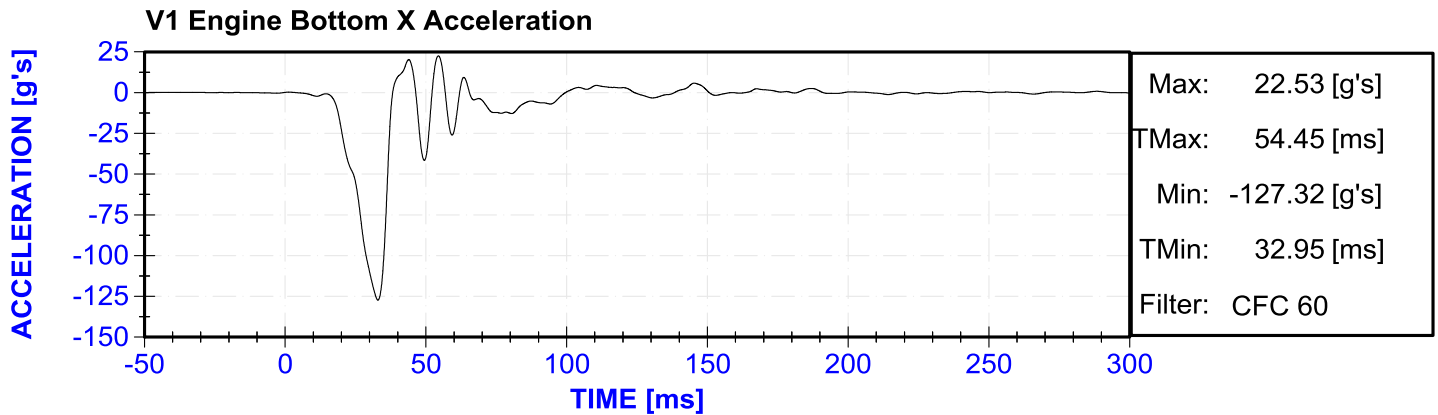


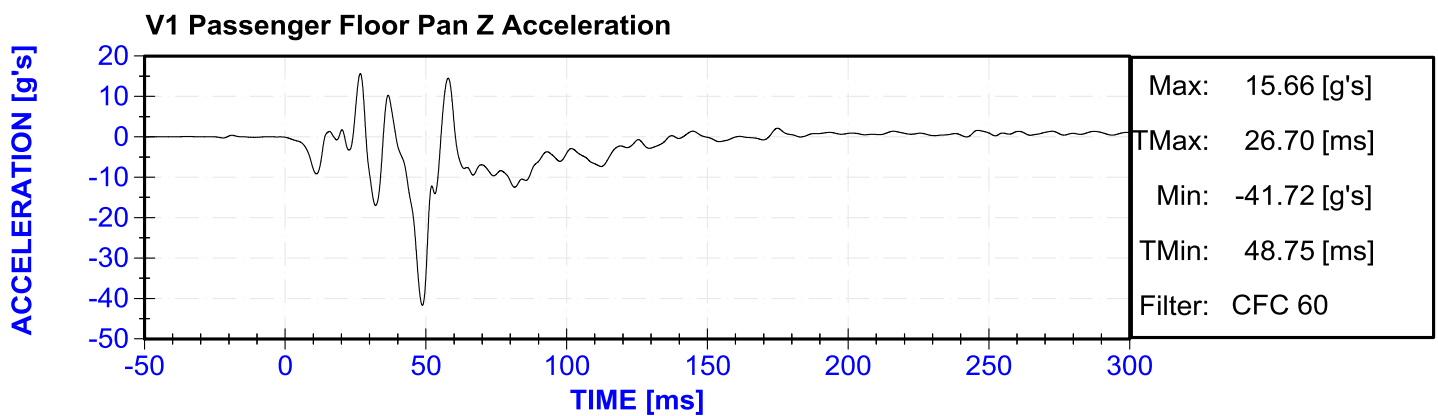
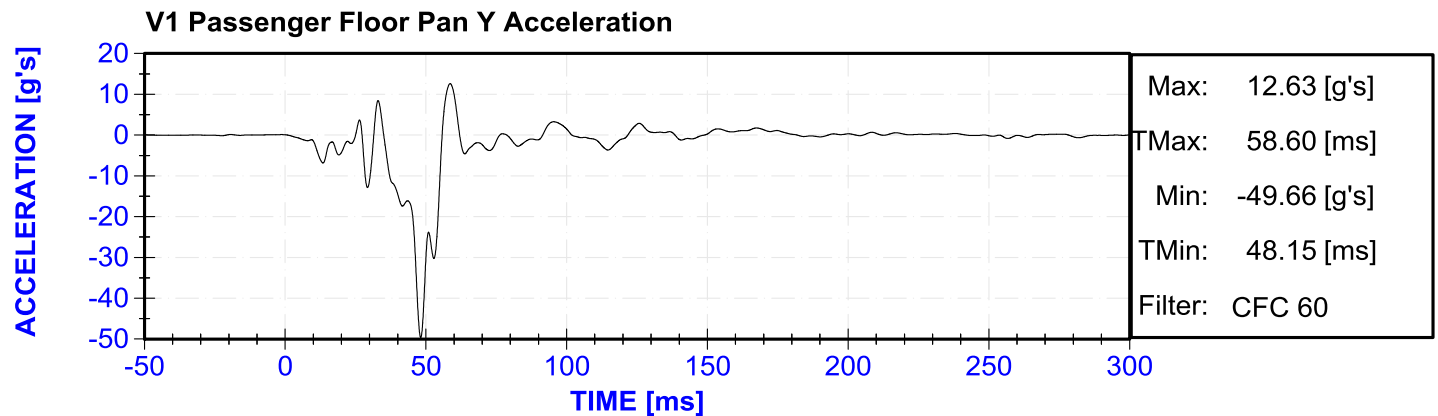
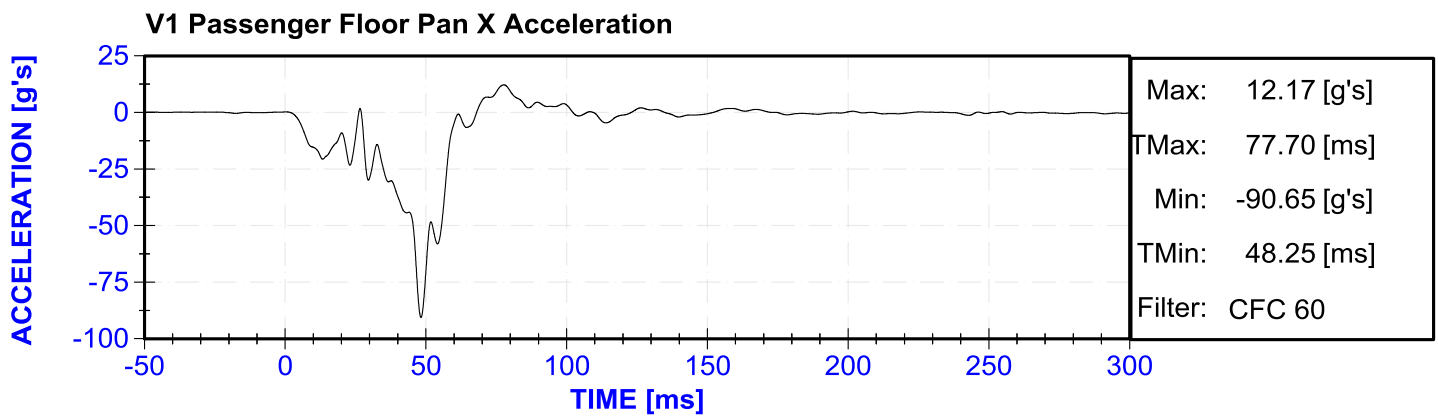
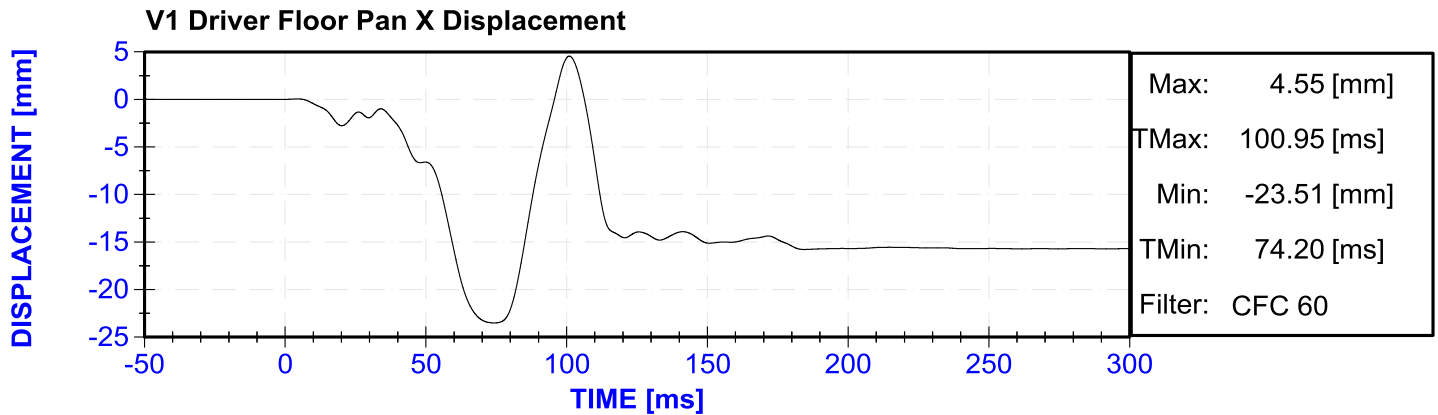


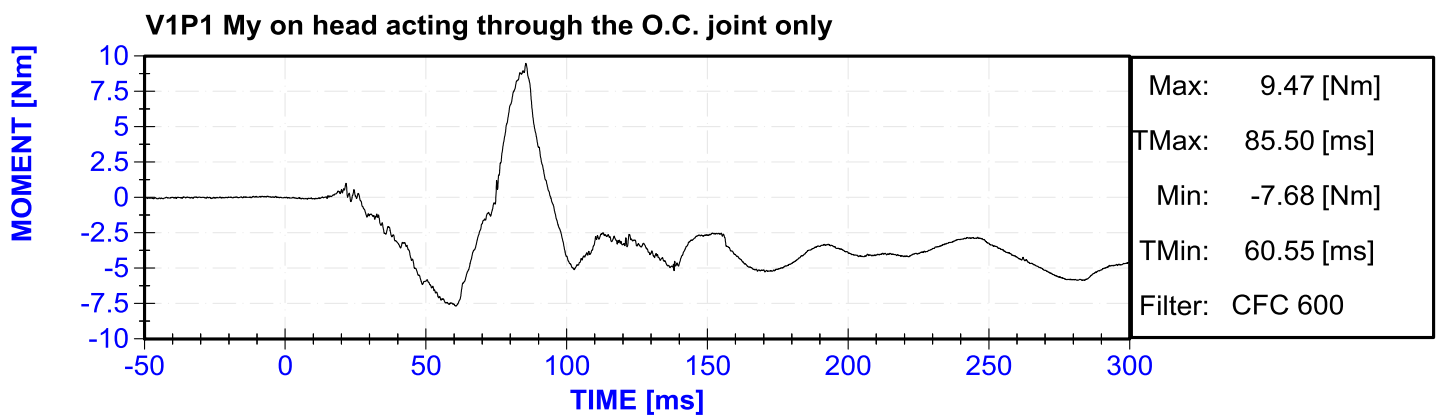
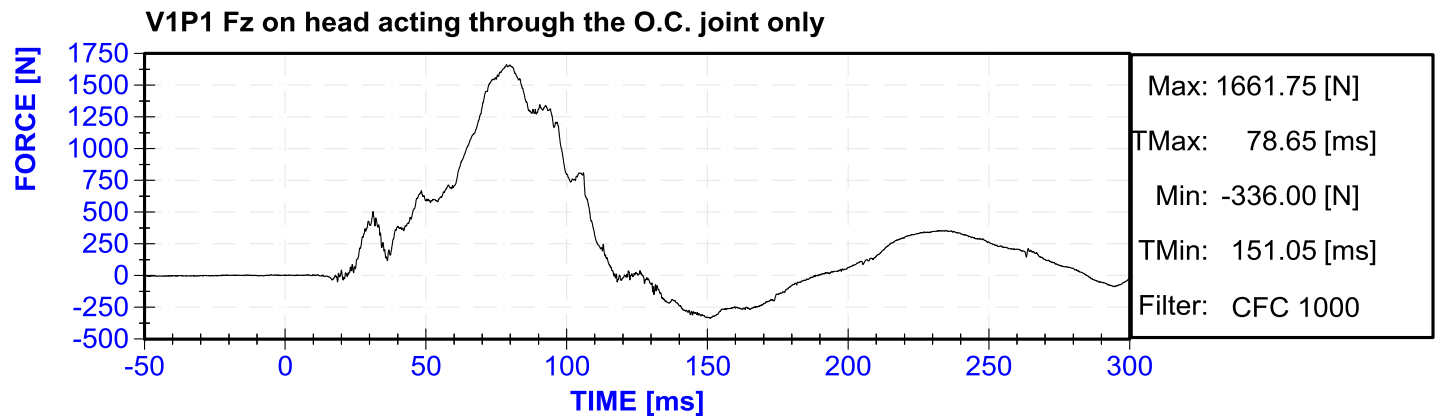
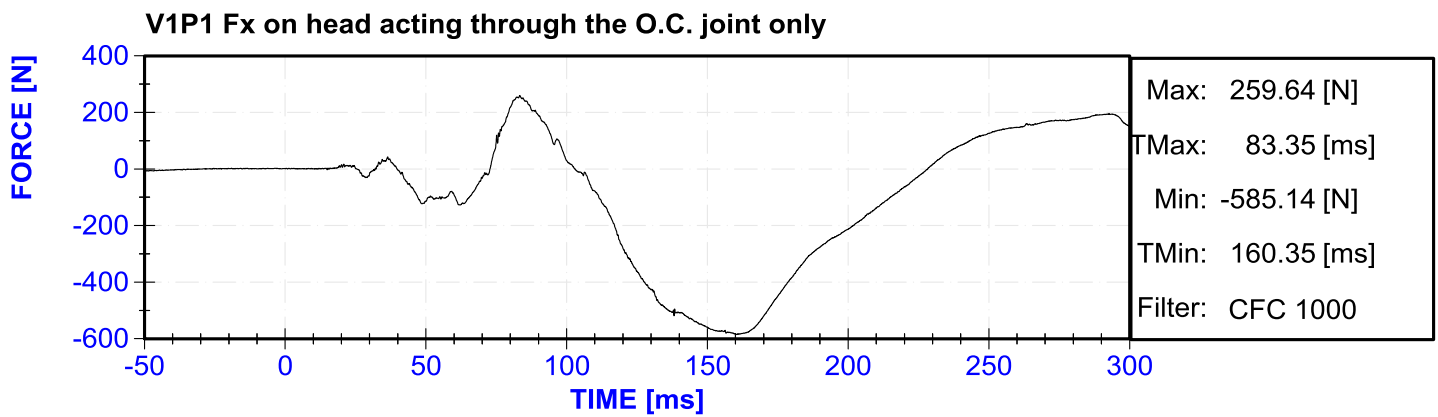
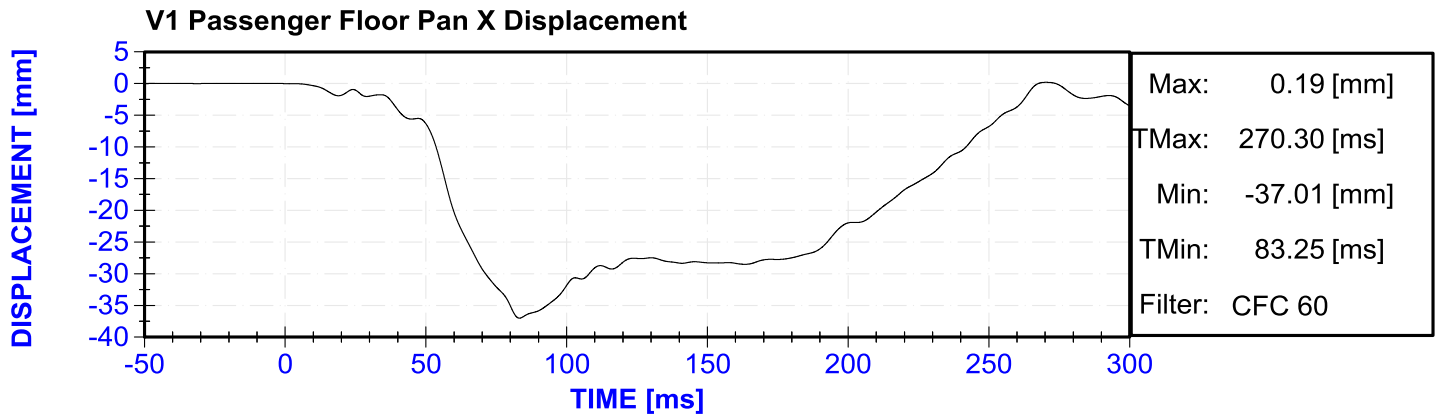


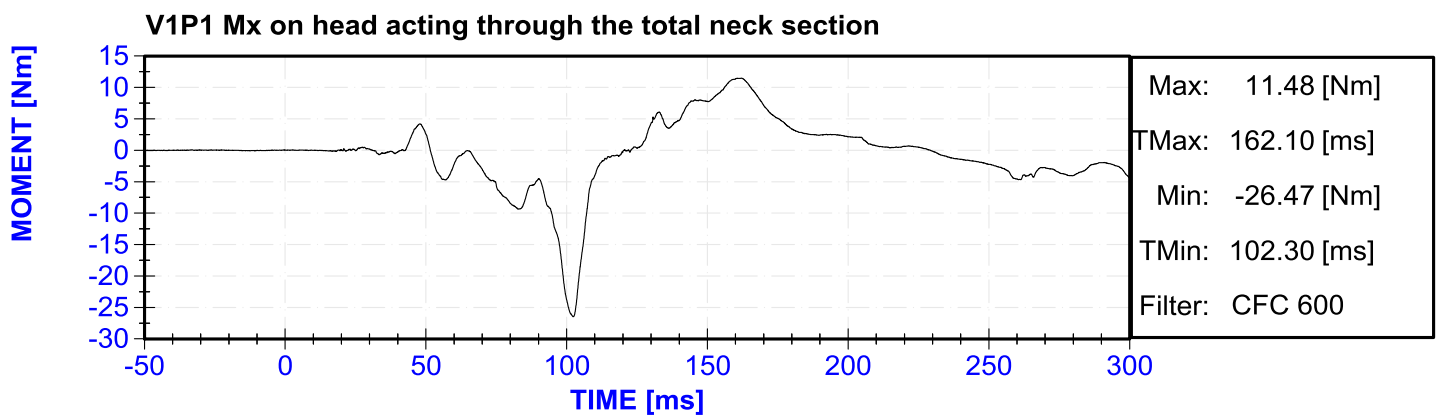
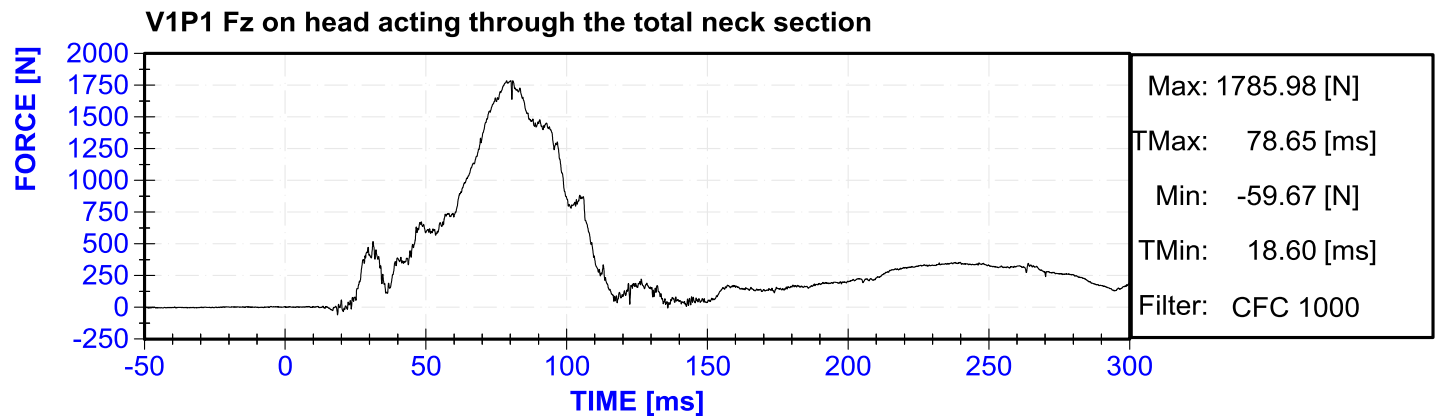
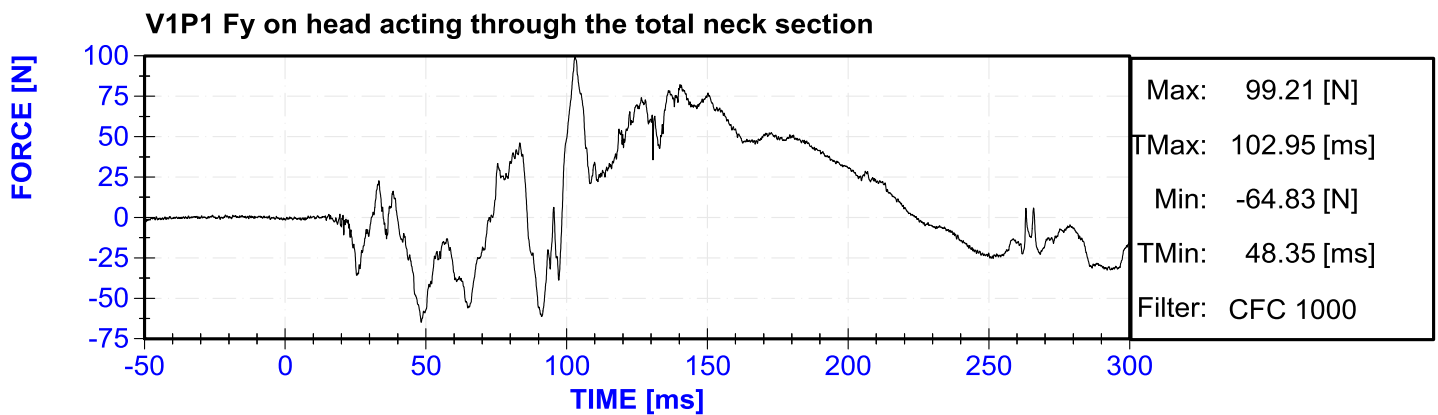
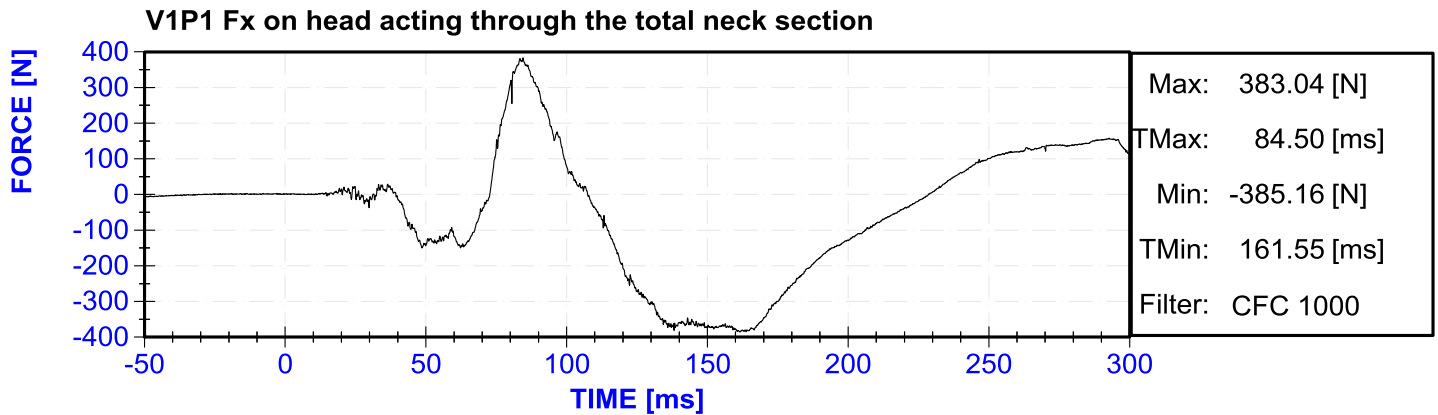


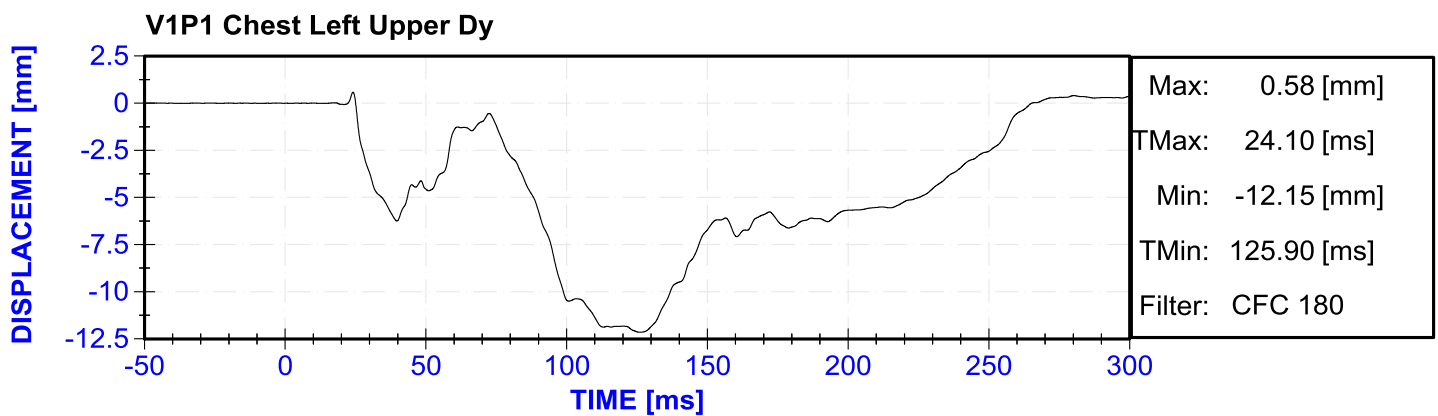
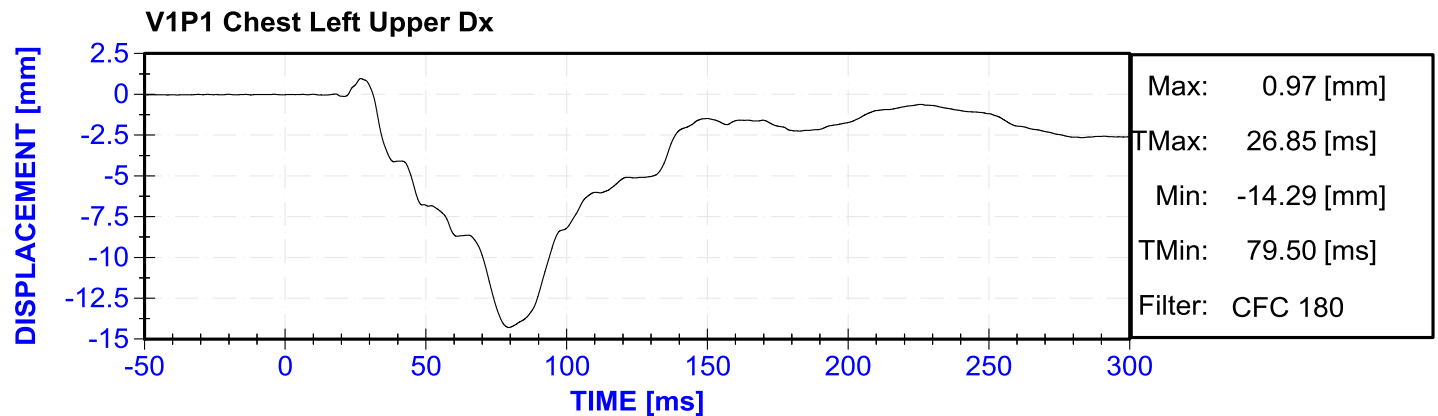
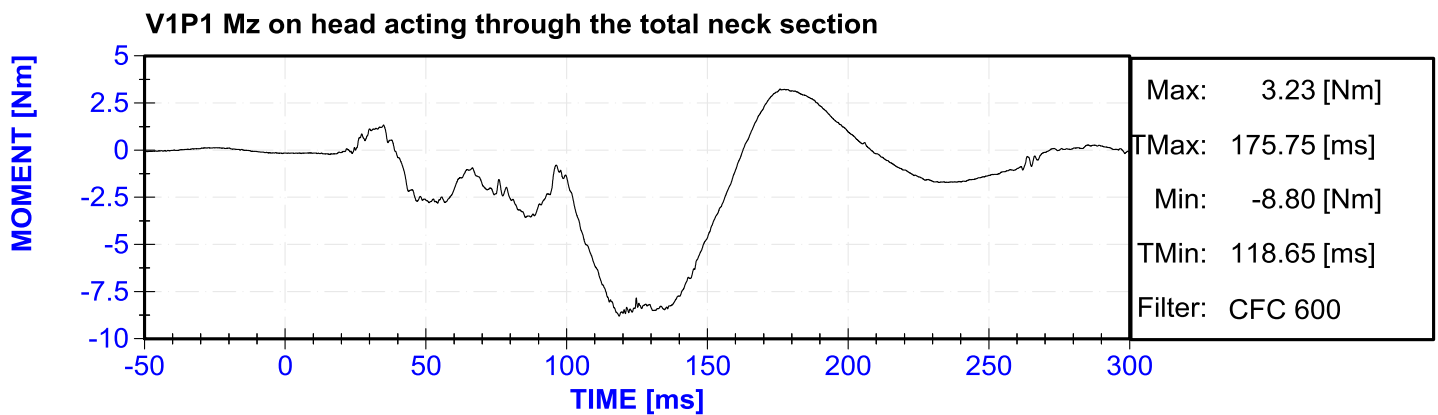
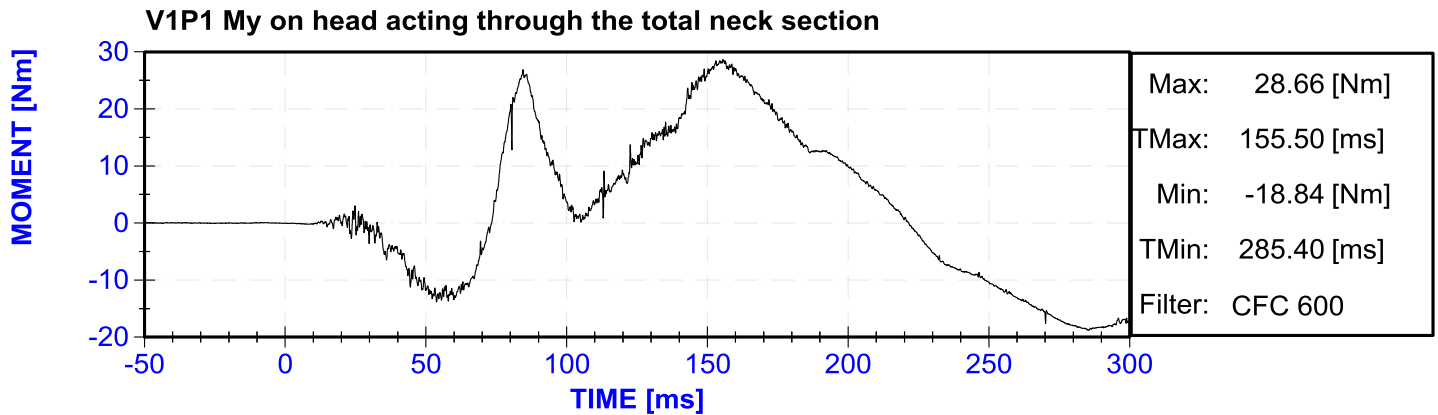


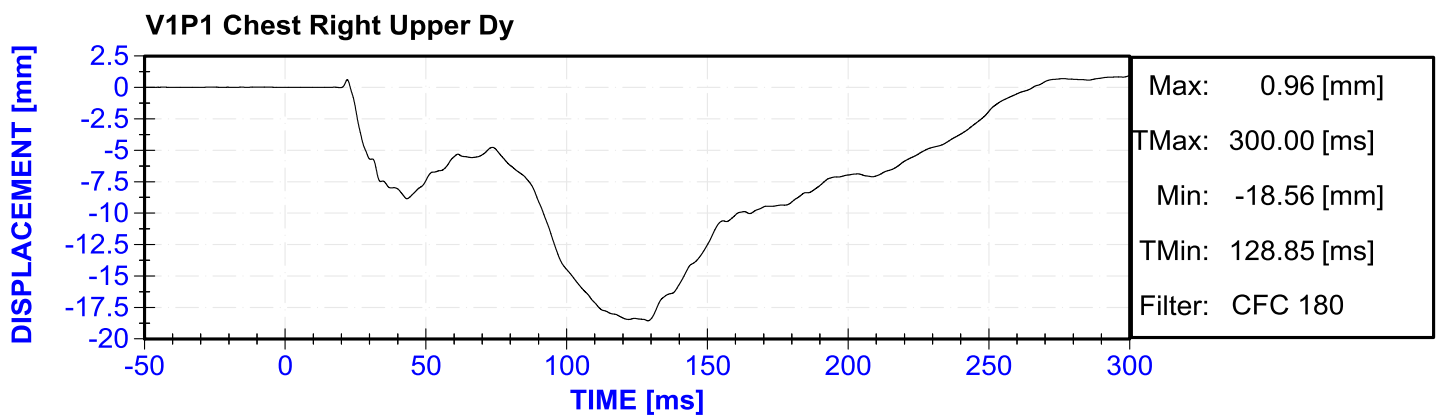
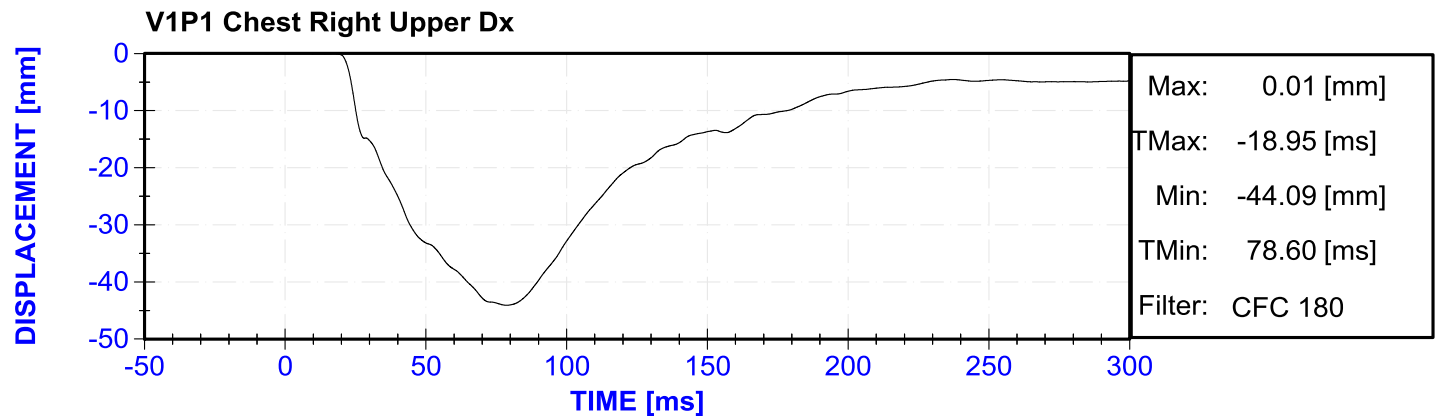
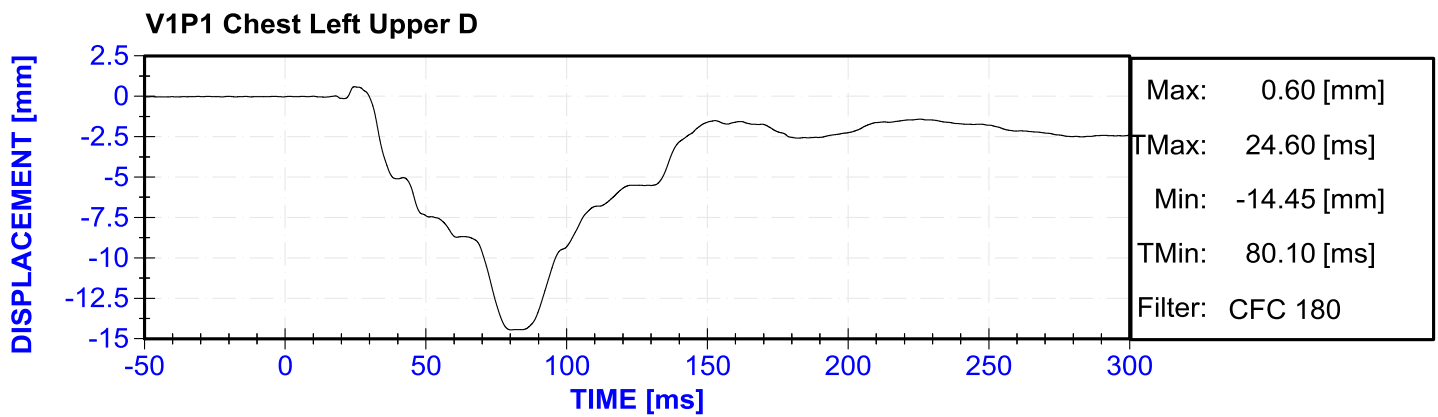
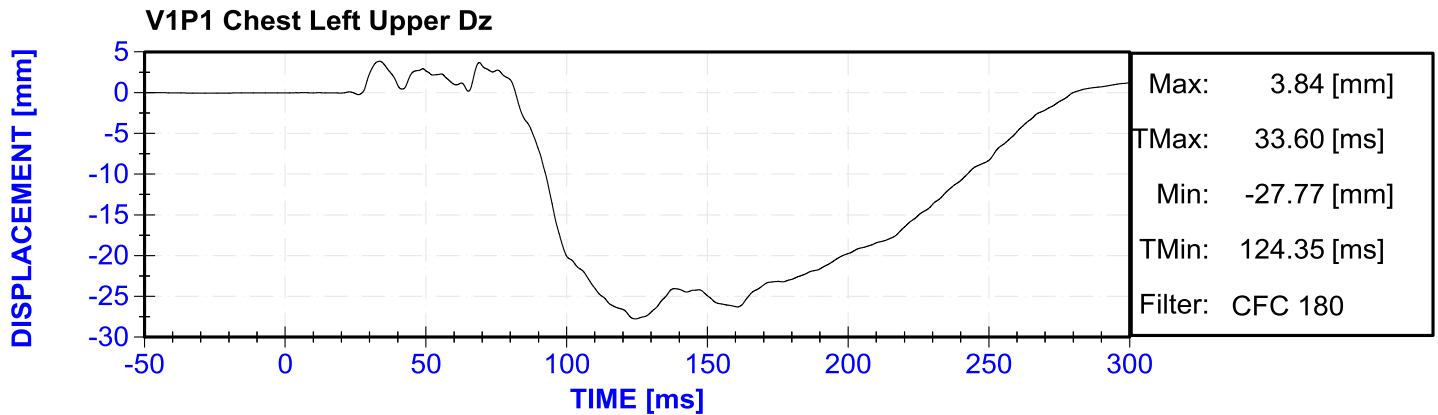


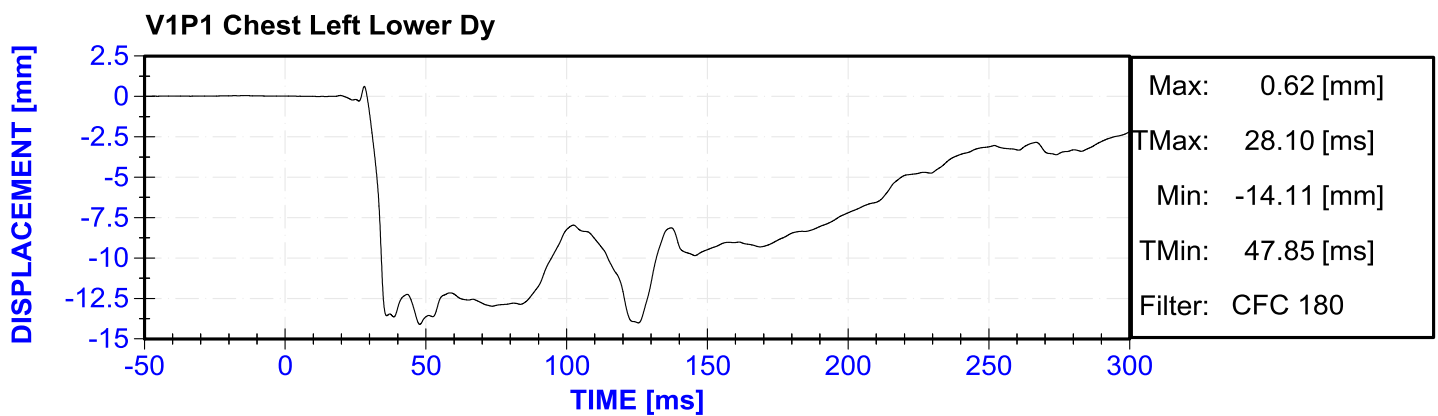
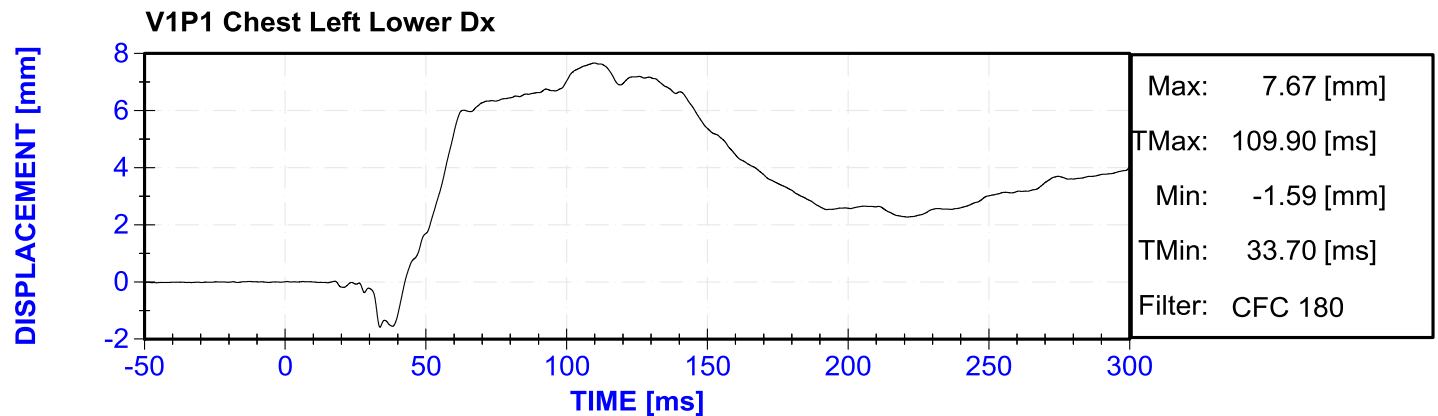
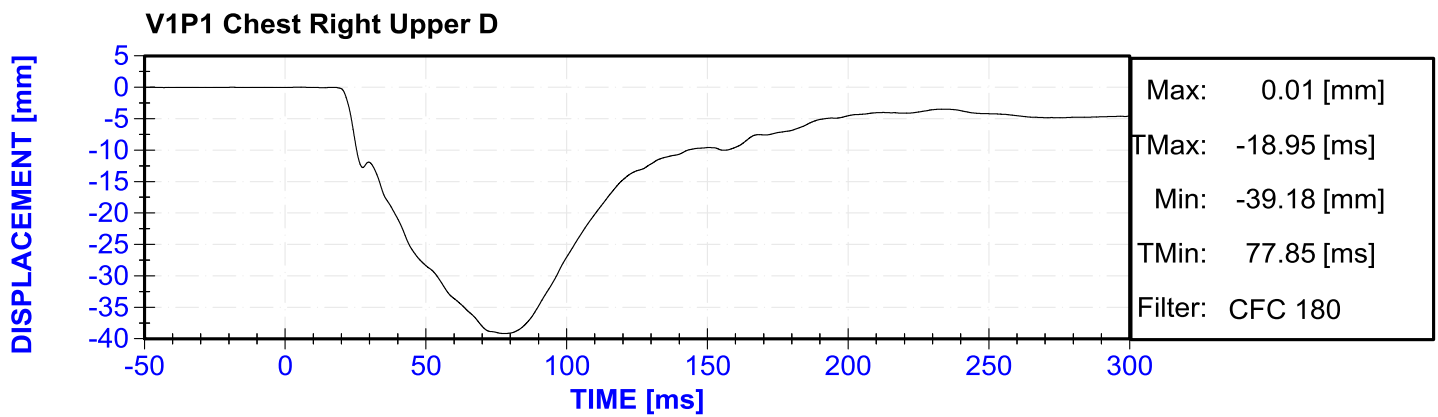
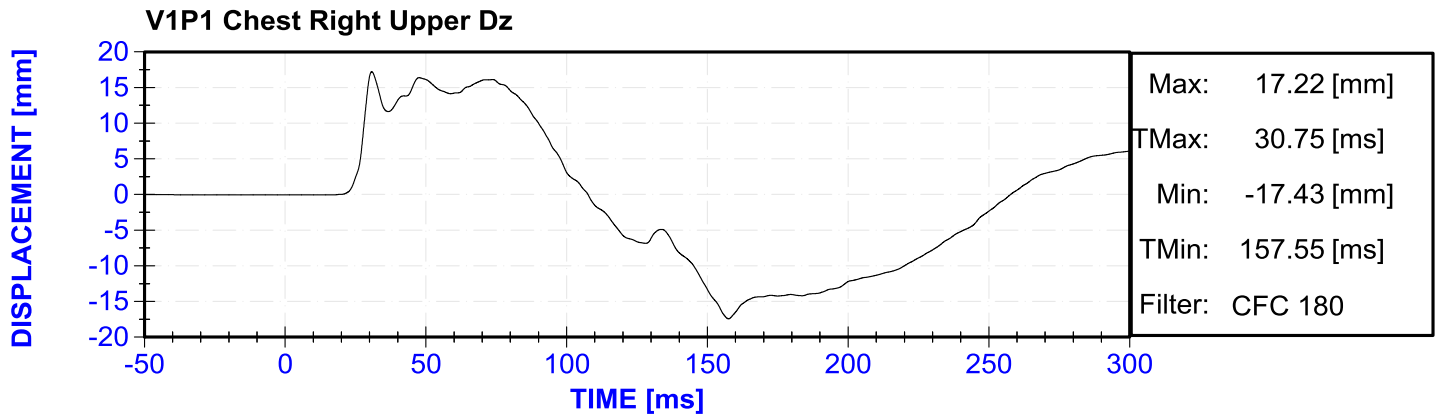


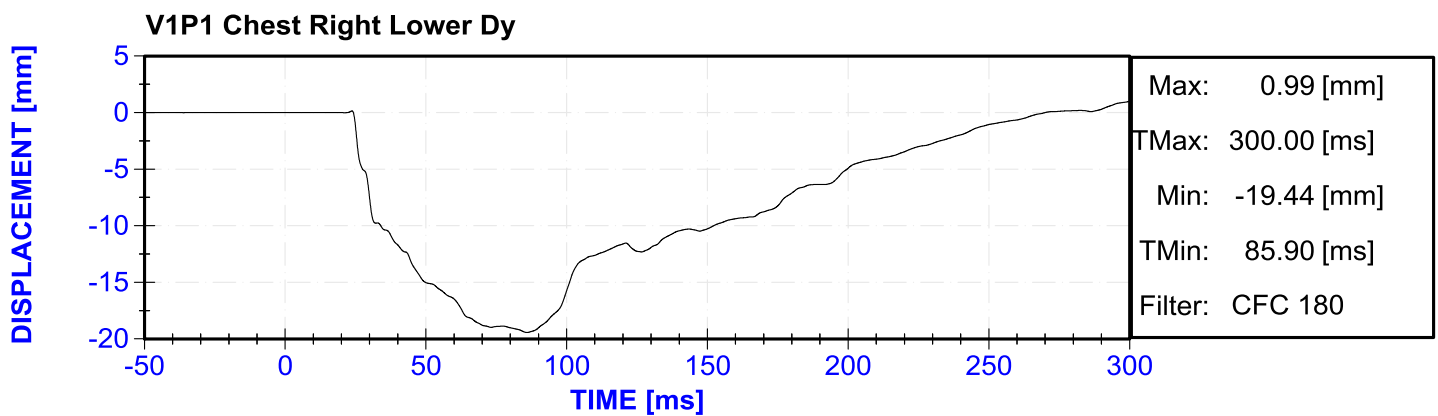
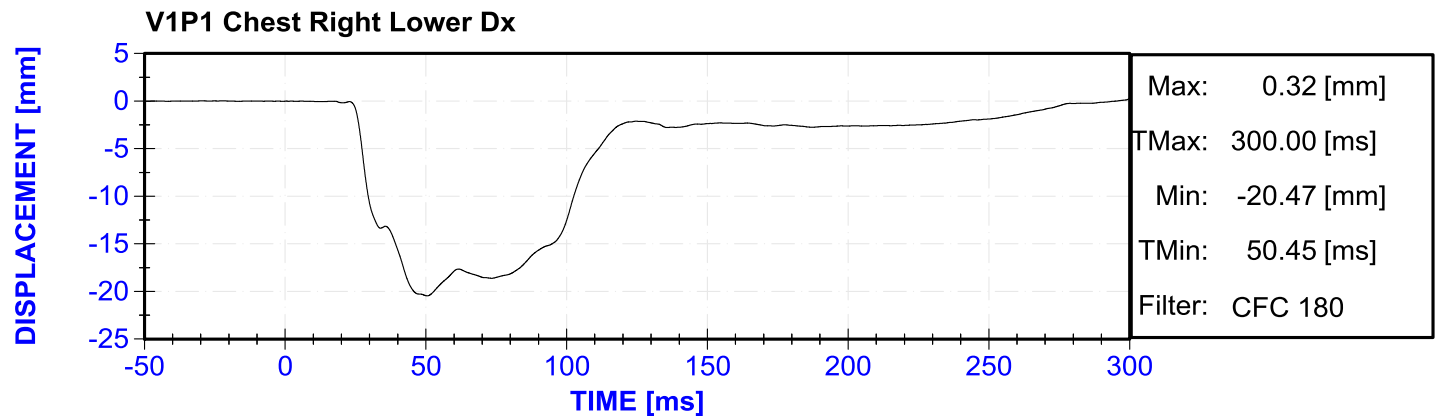
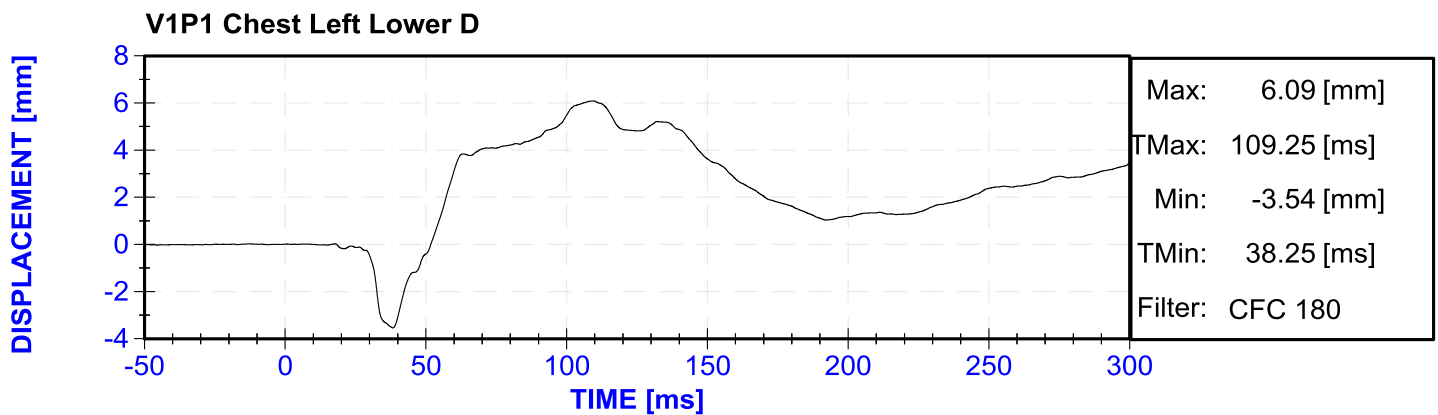
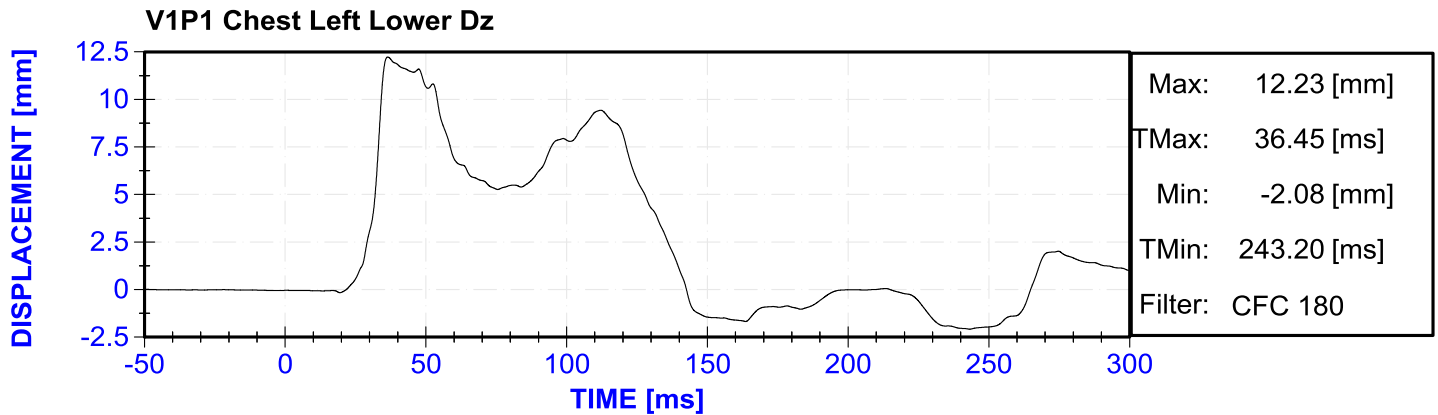


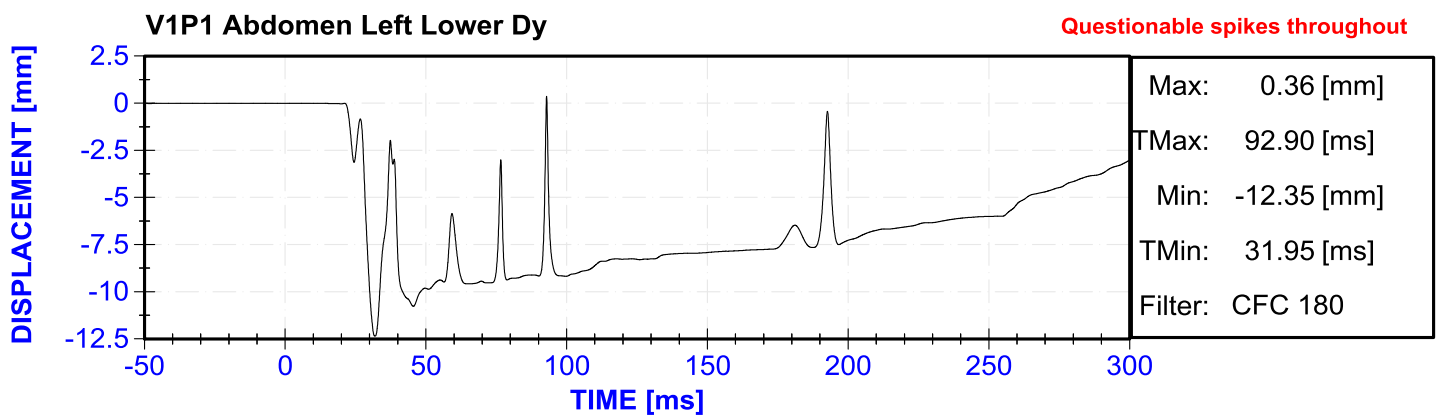
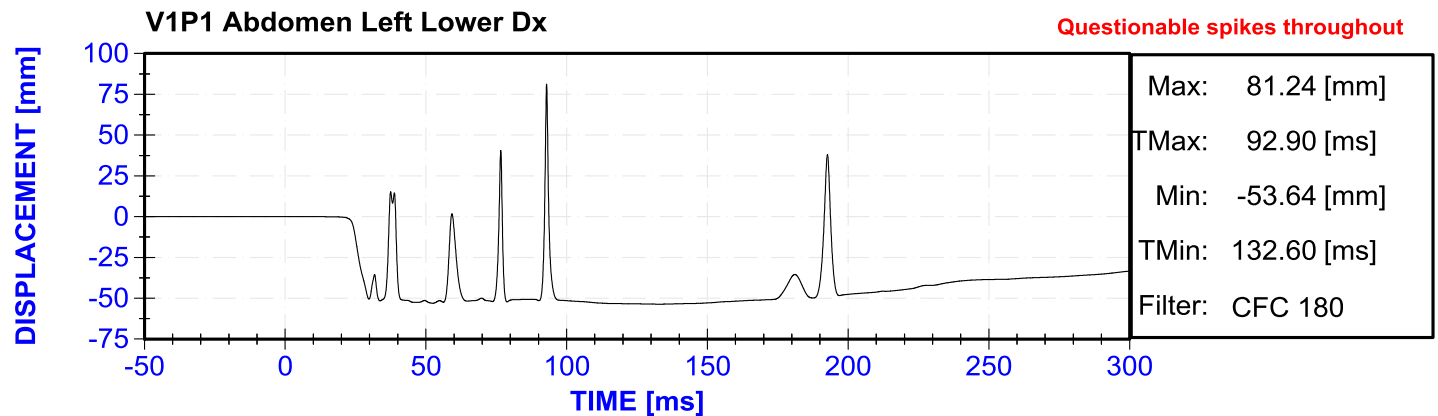
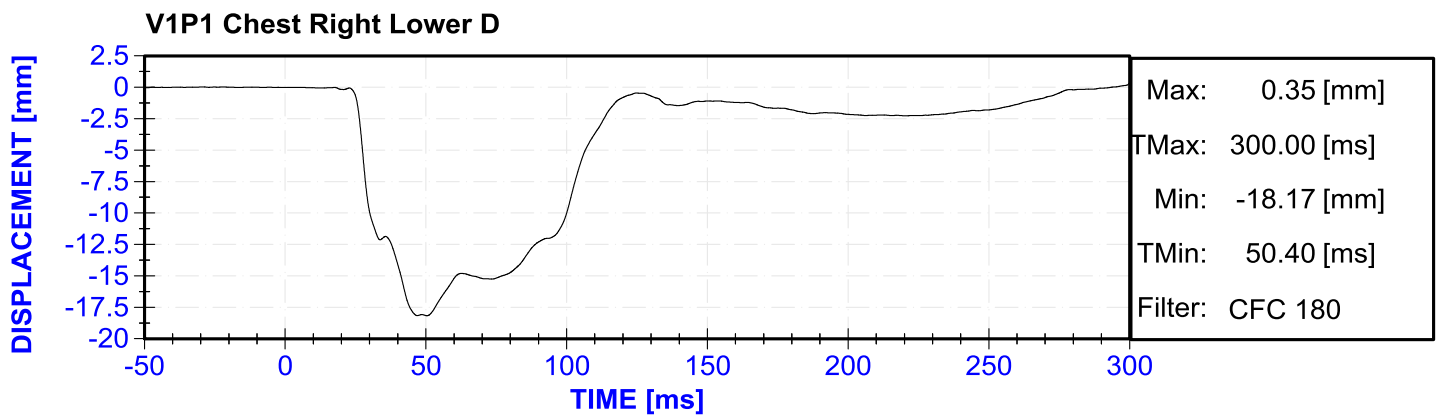
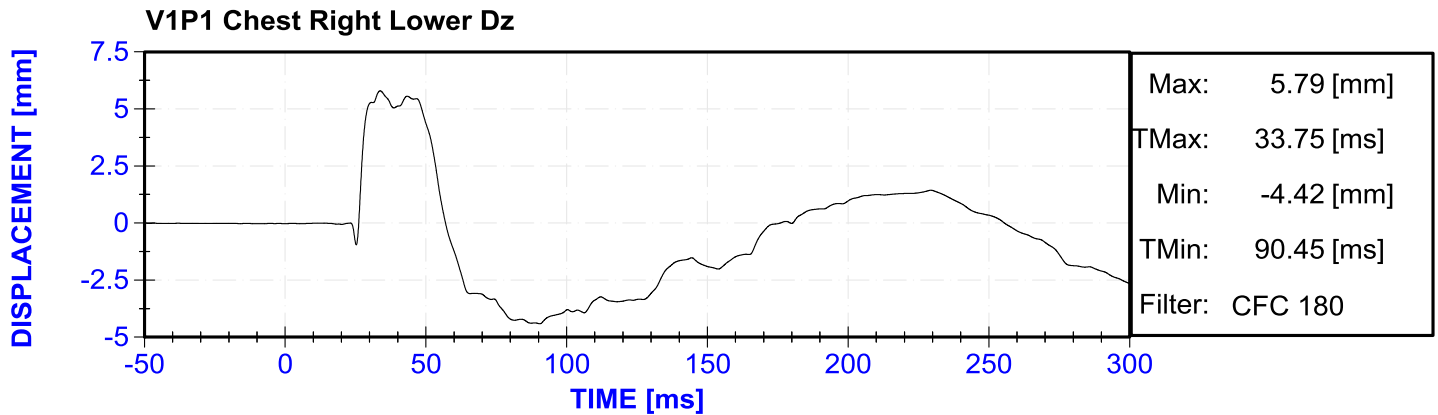


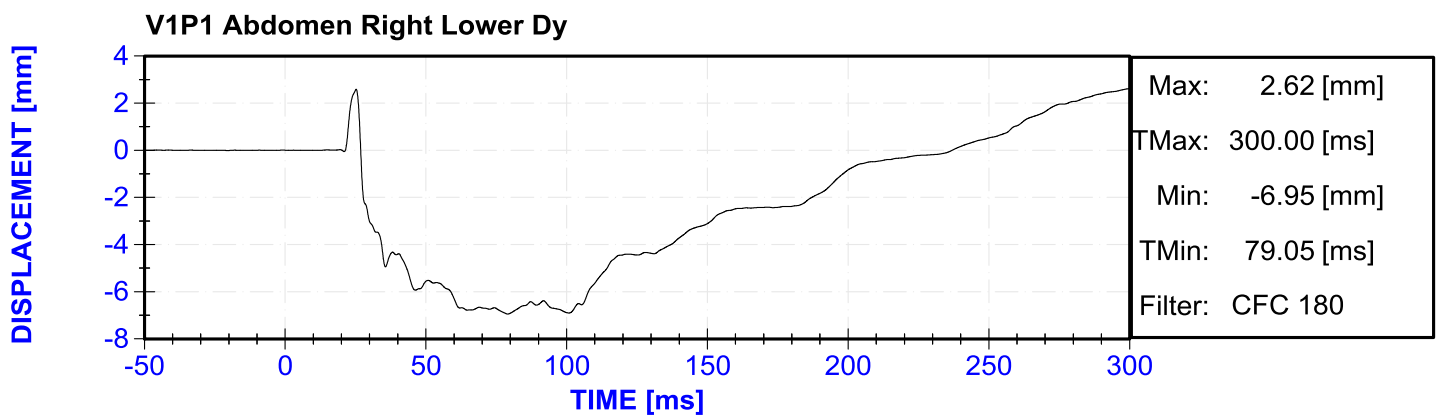
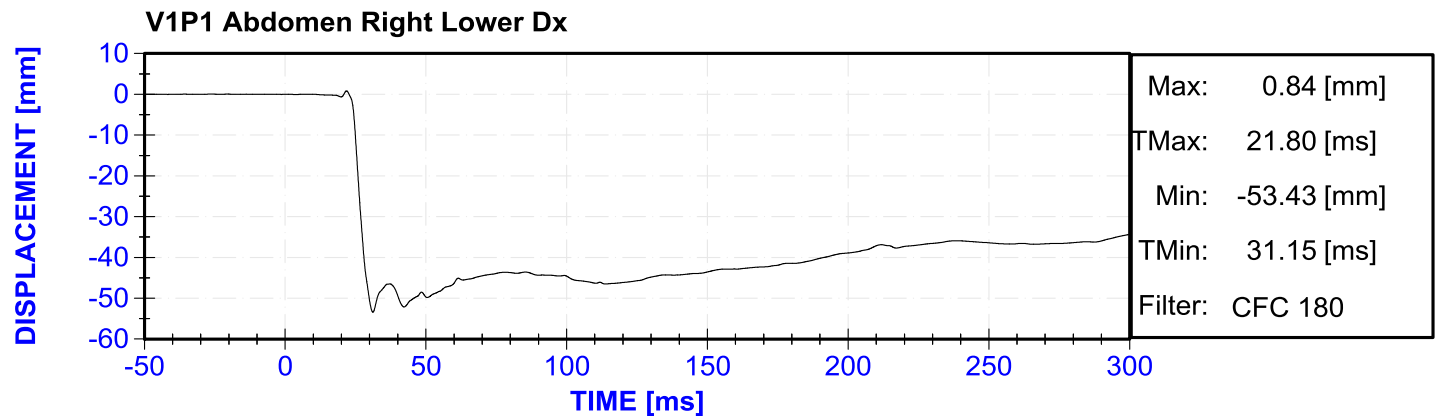
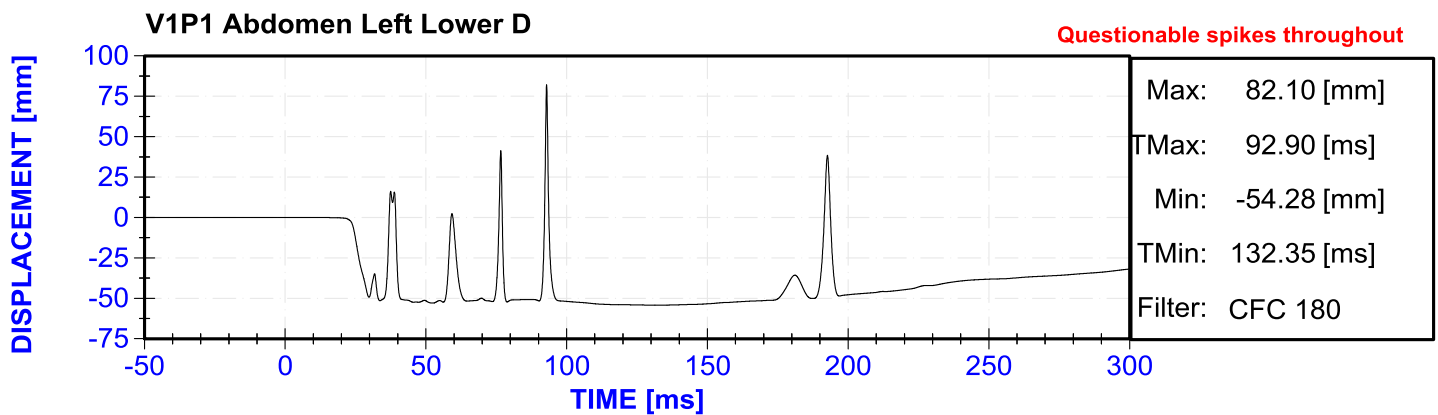
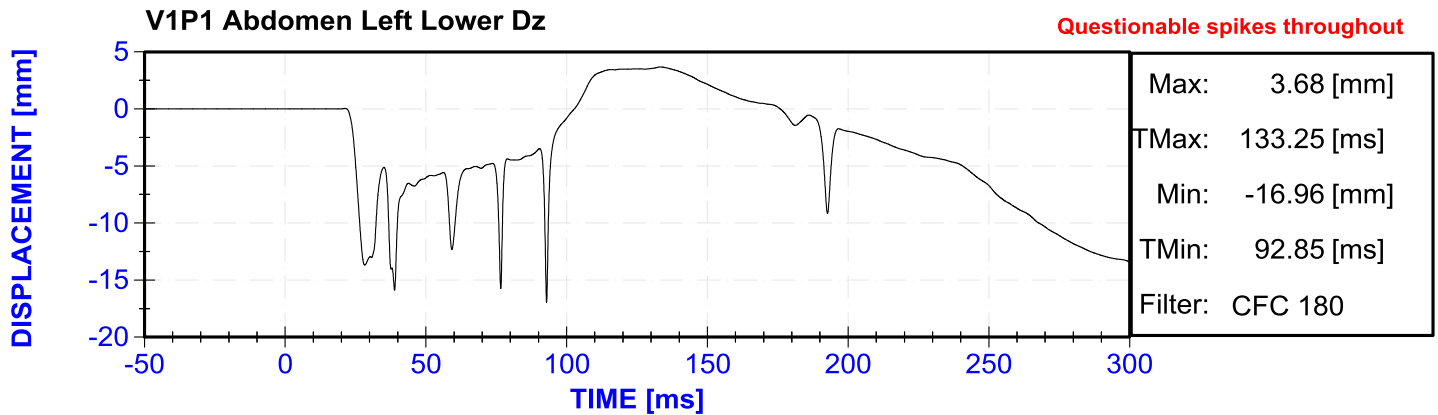


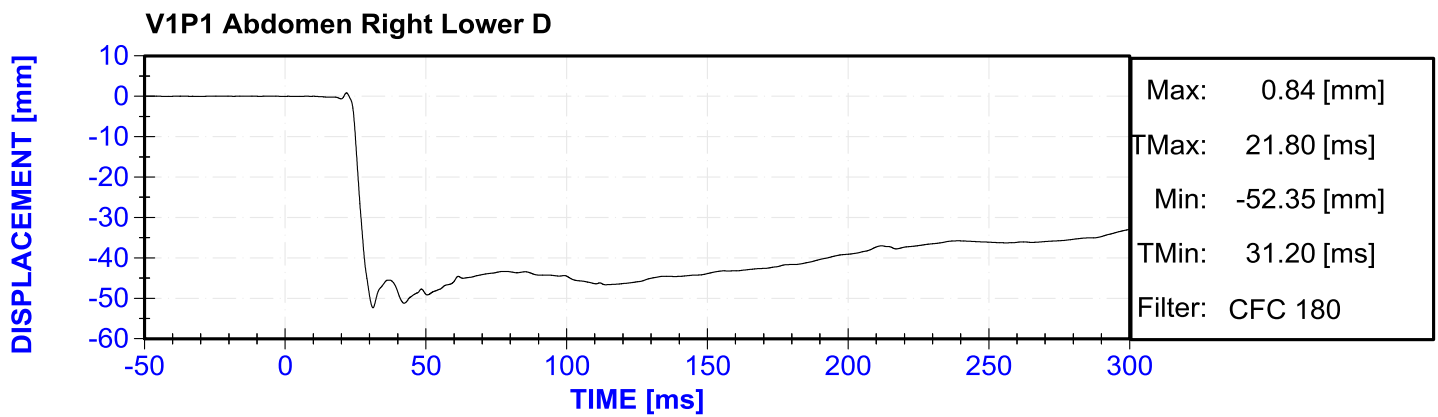
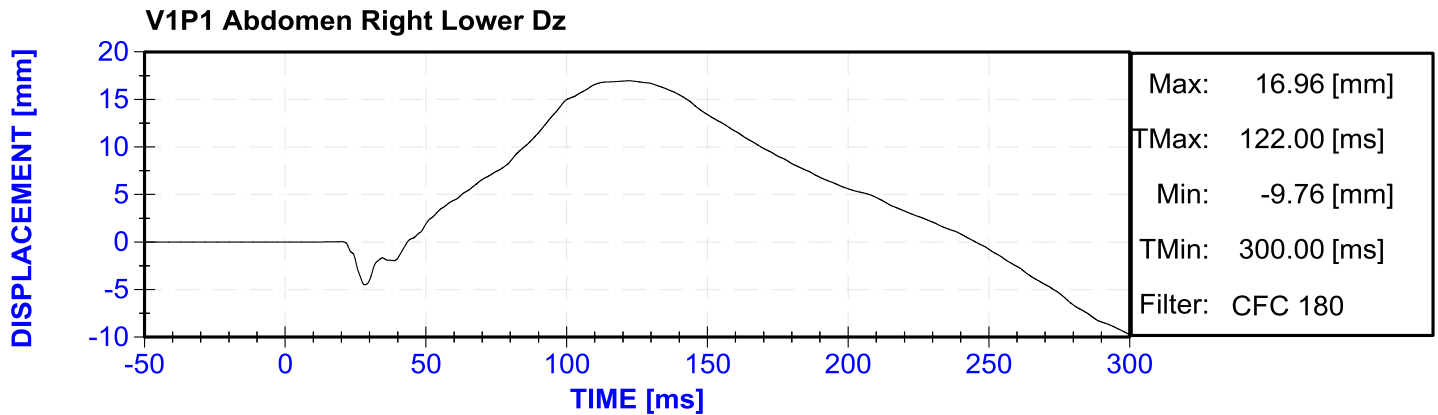












APPENDIX C

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

Table C-1: Dummy Information

TYPE	SERIAL NUMBER
THOR-M 50 TH Male	DO9798
5 th Female	513
5 th Female	517

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

THOR – M S/N: DO9798		
IR-TRACC Location	IR-TRACC Exponent	IR-TRACC Slope
Upper Left Thorax Dx	-0.46744159	-32.5093629
Upper Right Thorax Dx	-0.48506218	-30.4904461
Lower Left Thorax Dx	-0.46799780	-30.8741325
Lower Right Thorax Dx	-0.48997700	-28.2690009
Left Abdomen Dx	-0.47981270	-40.5878908
Right Abdomen Dx	-0.48895948	-35.5683710

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

THOR – M S/N: DO9798					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	AC-P58889	2019.5	0.023047699869494	mV/V/g
Head CG Ay	Endevco	AC-B02A25-N04	2041.9	0.0208956007554661	mV/V/g
Head CG Az	Endevco	AC-02I02I05-F22	2004.3	0.0212877002923051	mV/V/g
Head Wx	DTS	ARS4650	19113.3	0.0956700023380108	mV/deg/sec
Head Wy	DTS	ARS5949	18950.9	0.0964900027611293	mV/deg/sec
Head Wz	DTS	ARS6010	18288.3	0.0933199989958666	mV/deg/sec
Skull Spring Front Fz	Humanetics	LC-77	4473.6	0.000854099994285207	mV/V/N
Skull Spring Rear Fz	Humanetics	LC-76	4469.3	0.000909200025489554	mV/V/N
Condyle Pot Ry	Humanetics	DS-DK5913	120	3.04670003242791	mV/V/deg
Upper Neck Fx	Humanetics	LC-76 FX	8919.4	0.00023239999791258	mV/V/N
Upper Neck Fy	Humanetics	LC-76 FY	8904.1	0.000234699996326526	mV/V/N
Upper Neck Fz	Humanetics	LC-76 FZ	13361.7	8.86999984572867E-5	mV/V/N
Upper Neck Mx	Humanetics	LC-76 MX	283	0.00591229991186992	mV/V/Nm
Upper Neck My	Humanetics	LC-76 MY	283.1	0.00592939977650531	mV/V/Nm
Upper Neck Mz	Humanetics	LC-76 MZ	282.9	0.010283099982189	mV/V/Nm
Lower Neck Fx	Humanetics	LC-DP4780 FX	13405.4	0.000174400000219066	mV/V/N
Lower Neck Fy	Humanetics	LC-DP4780 FY	13367.1	0.000174899994931366	mV/V/N
Lower Neck Fz	Humanetics	LC-DP4780 FZ	13348.3	7.09000005372218E-5	mV/V/N
Lower Neck Mx	Humanetics	LC-DP4780 MX	453	0.00412459985454916	mV/V/Nm
Lower Neck My	Humanetics	LC-DP4780 MY	453.3	0.00413689986089594	mV/V/Nm
Lower Neck Mz	Humanetics	LC-DP4780 MZ	226	0.00686500015945057	mV/V/Nm
T1 Ax	Endevco	AC-06A04-R06	2039.1	0.0228261997108348	mV/V/g
T1 Ay	Endevco	AC-00L13-F22	2039.8	0.0179287999344524	mV/V/g

T1 Az	Endevco	AC-P83346	2022.5	0.0194737003766932	mV/V/g
Upper Left Thorax Dx	Humanetics	DS-DQ2255	2.3	1000	
Upper Left Thorax Ry	Humanetics	DS-DM4779	93.8	3.03280004300177	mV/V/deg
Upper Left Thorax Rz	Humanetics	DS-DM4778	93.6	3.03740007802844	mV/V/deg
Upper Right Thorax Dx	Humanetics	DS-DQ2254	2.3	1000	
Upper Right Thorax Ry	Humanetics	DS-DM4774	93.8	3.03160003386438	mV/V/deg
Upper Right Thorax Rz	Humanetics	DS-DM4775	93.2	3.05190007202327	mV/V/deg
Lower Left Thorax Dx	Humanetics	DS-DK3866	2.3	1000	
Lower Left Thorax Ry	Humanetics	DS-DJ5455	93.2	3.0515999533236	mV/V/deg
Lower Left Thorax Rz	Humanetics	DS-DJ5454	93.5	3.04299988783896	mV/V/deg
Lower Right Thorax Dx	Humanetics	DS-DK3865	2.3	1000	
Lower Right Thorax Ry	Humanetics	DS-DJ5453	93.3	3.04910005070269	mV/V/deg
Lower Right Thorax Rz	Humanetics	DS-DJ5452	92.3	3.08030005544424	mV/V/deg
T4 Ax	Endevco	AC-P51697	2005.2	0.0222033995669335	mV/V/g
T4 Ay	Endevco	AC-P75155	2026.8	0.0180437000381062	mV/V/g
T4 Az	Endevco	AC-P52001	2069.8	0.0197898007172626	mV/V/g
Thoracic Spine Fx	Humanetics	LC-DS9962 FX	13347.5	0.000145300006693105	mV/V/N
Thoracic Spine Fy	Humanetics	LC-DS9962 FY	13352.3	0.000145800001405405	mV/V/N
Thoracic Spine Fz	Humanetics	LC-DS9962 FZ	17810.2	6.11000032790798E-5	mV/V/N
Thoracic Spine Mx	Humanetics	LC-DS9962 MX	678	0.00214519991459383	mV/V/Nm
Thoracic Spine My	Humanetics	LC-DS9962 MY	905	0.00190490004570165	mV/V/Nm
Abdomen Left Dx	Humanetics	DS-DP1395	2.2	1000	
Abdomen Left Ry	Humanetics	DS-DJ5443	91	3.04060010239482	mV/V/deg
Abdomen Left Rz	Humanetics	DS-DJ5444	90.8	3.04650003090501	mV/V/deg
Abdomen Right Dx	Humanetics	DS-DP1396	2.2	1000	
Abdomen Right Ry	Humanetics	DS-DJ5445	91	3.04040010087192	mV/V/deg
Abdomen Right Rz	Humanetics	DS-DJ5446	90.9	3.04450001567602	mV/V/deg
Acetabulum Right Fx	Humanetics	LC-DL9552 FX	22251.8	0.000118300000906402	mV/V/N
Acetabulum Right Fy	Humanetics	LC-DL9552 FY	13345.2	5.99000031797914E-5	mV/V/N
Acetabulum Right Fz	Humanetics	LC-DL9552 FZ	13365.1	0.000161299993806097	mV/V/N
Acetabulum Left Fx	Humanetics	LC-DM1945 FX	22257.2	0.00011950000100569	mV/V/N
Acetabulum Left Fy	Humanetics	LC-DM1945 FY	13349.3	6.03999978920911E-5	mV/V/N
Acetabulum Left Fz	Humanetics	LC-DM1945 FZ	13354	0.000164200002927828	mV/V/N
Pelvis Ax	Endevco	AC-P81384	2001.6	0.0176409994310234	mV/V/g
Pelvis Ay	Endevco	AC-J28989	2028.2	0.0280491003650241	mV/V/g
Pelvis Az	Endevco	AC-J27496	2004.6	0.0283795998257119	mV/V/g
ASIS Right Fx	Humanetics	LC-76ASIS FX	13006.8	0.000129699998296928	mV/V/N
ASIS Right My	Humanetics	LC-76ASIS MY	325.1	0.00367930010725104	mV/V/Nm
ASIS Left Fx	Humanetics	LC-DJ5525 FX	13004	7.66000027851987E-5	mV/V/N
ASIS Left My	Humanetics	LC-DJ5525 MY	325	0.00371080000149959	mV/V/Nm
Femur Left Fx	Denton	LC-DK3608 FX	15023.6	0.00014409999948839	mV/V/N
Femur Left Fy	Denton	LC-DK3608 FY	15002.3	0.000143999997703759	mV/V/N
Femur Left Fz	Denton	LC-DK3608 FZ	15027.7	7.27999989180717E-5	mV/V/N
Femur Left Mx	Denton	LC-DK3608 MX	351.3	0.0065346998781024	mV/V/Nm
Femur Left My	Denton	LC-DK3608 MY	350.7	0.00645930003884132	mV/V/Nm
Femur Right Fx	Denton	LC-DK0842 FX	15033.7	0.000143700006560721	mV/V/N
Femur Right Fy	Denton	LC-DK0842 FY	15044.1	0.00014360000477609	mV/V/N
Femur Right Fz	Denton	LC-DK0842 FZ	15025.7	7.25000006696064E-5	mV/V/N
Femur Right Mx	Denton	LC-DK0842 MX	351.5	0.0065326998992532	mV/V/Nm
Femur Right My	Denton	LC-DK0842 MY	350.6	0.0065782001001935	mV/V/Nm
Upper Tibia Fz	Denton	LC-DS8145 FZ	11111.5	9.53999972352904E-5	mv/v/N
Upper Tibia Mx	Denton	LC-DS8145 MX	395.5	0.00739830011298181	mv/v/Nm

Upper Tibia My	Denton	LC-DS8145 MY	395.6	0.00743859982321737	mv/v/Nm
Lower Tibia Left Fx	Denton	LC-DQ9685 FX	11154.1	0.000175200000285258	mv/v/N
Lower Tibia Left Fy	Denton	LC-DQ9685 FY	11156.8	0.000170600003457366	mv/v/N
Lower Tibia Left Fz	Denton	LC-DQ9685 FZ	11134.9	9.65999973345788E-5	mv/v/N
Lower Tibia Left Mx	Denton	LC-DQ9685 MX	396.3	0.00759900012781145	mv/v/Nm
Lower Tibia Left My	Denton	LC-DQ9685 MY	395.7	0.00756589997763513	mv/v/Nm
Ankle Rx	Contelec	DS-004	129.1	3.04390001110733	mv/v/deg
Ankle Ry	Contelec	DS-005	128.6	3.05770011618733	mv/v/deg
Ankle Rz	Contelec	DS-006	127.3	3.03400005213916	mv/v/deg
Knee Dx	Space Age	DS-13073814	20.4	22.8479001671076	mv/v/mm
Leg Ax	Endevco	AC-P83316	2017.7	0.0195198008441366	mv/v/g
Leg Ay	Endevco	AC-P51641	2034.7	0.0193561991181923	mv/v/g
Foot Ax	Endevco	AC-P52004	2027.7	0.0210424004762899	mv/v/g
Foot Az	Endevco	AC-P58747	2120	0.0185775006684707	mv/v/g
Upper Tibia Fz	Denton	LC-DS8144 FZ	11111.2	9.61999973014827E-5	mv/v/N
Upper Tibia Mx	Denton	LC-DS8144 MX	397.6	0.00748640013625845	mv/v/Nm
Upper Tibia My	Denton	LC-DS8144 MY	397.3	0.00744970020605251	mv/v/Nm
Lower Tibia Fx	Denton	LC-DQ9684 FX	11155.9	0.000177199993345312	mv/v/N
Lower Tibia Fy	Denton	LC-DQ9684 FY	11161.6	0.000173100005440574	mv/v/N
Lower Tibia Fz	Denton	LC-DQ9684 FZ	11125.6	9.7499999185402E-5	mv/v/N
Lower Tibia Mx	Denton	LC-DQ9684 MX	395.4	0.00766179982747417	mv/v/Nm
Lower Tibia My	Denton	LC-DQ9684 MY	397.5	0.00762099989515264	mv/v/Nm
Ankle Rx	Contelec	DS-001	129	3.04959993809462	mv/v/deg
Ankle Ry	Contelec	DS-002	129.2	3.03740007802844	mv/v/deg
Ankle Rz	Contelec	DS-003	121.9	3.05430009029806	mv/v/deg
Knee Dx	Space Age	DS-13073811	20.2	23.0272002518177	mv/v/mm
Foot Ax	Endevco	AC-P82401	2083.7	0.0175512996065663	mv/v/g
Foot Az	Endevco	AC-P51715	2030	0.0180151000677142	mv/v/g

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

5 th Female S/N: 513					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	AC-P79408	2132.8	0.0171468000189634	mV/V/g
Head CG Ax	Endevco	AC-P80338	2046.7	0.0166771005751798	mV/V/g
Head CG Ax	Endevco	AC-P81386	2061.7	0.0177388992597116	mV/V/g
Head CG RAx	Endevco	AC-P63969	2089.8	0.0204164007300278	mV/V/g
Head CG RAY	Endevco	AC-P77732	2122.1	0.0185593999049161	mV/V/g
Head CG RAZ	Endevco	AC-P64099	2097.7	0.0221885002247291	mV/V/g
Head Wx	DTS	ARS6733	18042.8	0.0945900028455071	mV/V/sec
Head Wy	DTS	ARS4719	18323.7	0.0931399990804493	mV/V/sec
Head Wz	DTS	ARS4071	18306	0.0932300026761368	mV/V/sec
Upper Neck Fx	Denton	LC-1873 FX	8918	0.00018580000471502	mV/V/N

Upper Neck Fy	Denton	LC-1873 FY	8913.6	0.000181199993676273	mV/V/N
Upper Neck Fz	Denton	LC-1873 FZ	-13348.9	-9.219999969705212E-5	mV/V/N
Upper Neck Mx	Denton	LC-1873 MX	282.7	0.00576879983782419	mV/V/Nm
Upper Neck My	Denton	LC-1873 MY	283.3	0.00573809984416584	mV/V/Nm
Upper Neck Mz	Denton	LC-1873 MZ	282.8	0.00811750032880809	mV/V/Nm
Chest Ax	Endevco	AC-P64131-513	2020.5	0.0191968010767596	mV/V/g
Chest Ay	Endevco	AC-P51978-513	2003.9	0.0179932012542849	mV/V/g
Chest Az	Endevco	AC-P51725-513	2030.4	0.0213705006899545	mV/V/g
Chest Dx	Servo	DS-CST513	71.1	1.75649998709559	mV/V/deg
Pelvis Ax	Endevco	AC-P79626	2025.2	0.0210681992030004	mV/V/g
Pelvis Ay	Endevco	AC-P63845	2005.4	0.0236402993323281	mV/V/g
Pelvis Az	Endevco	AC-P83310	2017.8	0.0195184002222959	mV/V/g
Femur Right Fz	Denton	LC-109 FZ	13375.1	0.000110000001996013	mV/V/N
Femur Left Fz	Denton	LC-112 FZ	13342.5	0.000108400001863629	mV/V/N
Upper Tibia Right Fx	Denton	LC-DH3308 FX	11145.9	0.000191400005178366	mV/V/N
Upper Tibia Right Fy	Denton	LC-DH3308 FY	11157.6	0.000192000001675297	mV/V/N
Upper Tibia Right Fz	Denton	LC-DH3308 FZ	11136.3	9.93000028870483E-5	mV/V/N
Upper Tibia Right Mx	Denton	LC-DH3308 MX	391.3	0.00788160014053574	mV/V/Nm
Upper Tibia Right My	Denton	LC-DH3308 MY	391.7	0.0080185000115307	mV/V/Nm
Lower Tibia Right Fx	Denton	LC-DI4273 FX	11157.6	0.000192000001675297	mV/V/N
Lower Tibia Right Fy	Denton	LC-DI4273 FY	11134.9	0.000193199994669158	mV/V/N
Lower Tibia Right Fz	Denton	LC-DI4273 FZ	11134.5	0.000100400001201706	mV/V/N
Lower Tibia Right Mx	Denton	LC-DI4273 MX	390.6	0.00785009979153983	mV/V/Nm
Lower Tibia Right My	Denton	LC-DI4273 MY	391	0.00770239967096131	mV/V/Nm
Upper Tibia Left Fx	Denton	LC-DH3054 FX	11141.1	0.000189900006830612	mV/V/N
Upper Tibia Left Fy	Denton	LC-DH3054 FY	11128.8	0.000190899996255212	mV/V/N
Upper Tibia Left Fz	Denton	LC-DH3054 FZ	11128.5	9.9799997599348E-5	mV/V/N
Upper Tibia Left Mx	Denton	LC-DH3054 MX	391.4	0.00783319956099149	mV/V/Nm
Upper Tibia Left My	Denton	LC-DH3054 MY	390.9	0.00793779963714769	mV/V/Nm
Lower Tibia Left Fx	Denton	LC-DI4209 FX	390	0.00019399999473535	mV/V/N
Lower Tibia Left Fy	Denton	LC-DI4209 FY	11129.4	0.000196599998503189	mV/V/N
Lower Tibia Left Fz	Denton	LC-DI4209 FZ	11121.8	0.000101399997731733	mV/V/N
Lower Tibia Left Mx	Denton	LC-DI4209 MX	390.2	0.00790430021879729	mV/V/Nm
Lower Tibia Left My	Denton	LC-DI4209 MY	392	0.00791509955888614	mV/V/Nm
Right Toe Az	Endevco	AC-P83421-513	2022	0.0178324007720221	mV/V/g
Right Foot Ax	Endevco	AC-P52130-513	2024.6	0.0170873991010012	mV/V/g
Right Foot Az	Endevco	AC-P51678-513	2009.5	0.0208839992410503	mV/V/g
Left Toe Az	Endevco	AC-P80272	2015.2	0.0195442007679958	mV/V/g
Left Foot Ax	Endevco	AC-P51297	2068.2	0.0190431001101388	mV/V/g
Left Foot Az	Endevco	AC-P79622	2006.6	0.0212629001907771	mV/V/g

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

5 th Female S/N: 517					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	AC-P51282	2146.5	0.0216841999645112	mV/V/g
Head CG Ay	Endevco	AC-05G14-X33	2010.8	0.0212187005672604	mV/V/g

Head CG Az	Endevco	AC-00L20-A22	2071.5	0.0190125992958201	mV/V/g
Upper Neck Fx	Denton	LC-1875 FX	8925.3	0.000192499996387596	mV/V/N
Upper Neck Fy	Denton	LC-1875 FY	8899	0.000186799994139619	mV/V/N
Upper Neck Fz	Denton	LC-1875 FZ	13345.8	9.37999971029058E-5	mV/V/N
Upper Neck Mx	Denton	LC-1875 MX	282.5	0.00577109994992497	mV/V/Nm
Upper Neck My	Denton	LC-1875 MY	283.1	0.005852500180481	mV/V/Nm
Upper Neck Mz	Denton	LC-1875 MZ	283.6	0.00831859961181181	mV/V/Nm
Chest Ax	Endevco	AC-P83336	2112.5	0.0201975999516435	mV/V/g
Chest Ay	Endevco	AC-P74940	2049.4	0.0166548998095095	mV/V/g
Chest Az	Endevco	AC-P83426	2078	0.0175990007846849	mV/V/g
Chest Ds	Servo	DS-517	71	1.75890000537038	mV/V/deg
Pelvis Ax	Endevco	AC-P52008	2076.6	0.0189659003808629	mV/V/g
Pelvis Ay	Endevco	AC-P52069	2066.1	0.0190623995877104	mV/V/g
Pelvis Az	Endevco	AC-P63840	2100.4	0.0221606005652575	mV/V/g
ASIS Left Fx	Denton	LC-80 FX	8908.9	0.000187200001278143	mV/V/N
ASIS Left My	Denton	LC-80 MY	226.4	0.00528430018675863	mV/V/Nm
ASIS Right Fx	Denton	LC-78 FX	8899.4	0.000187400004847404	mV/V/N
ASIS Right My	Denton	LC-78 MY	226.2	0.00516740010425565	mV/V/Nm
Left Femur Fz	Denton	LC-103 FZ	13361.1	0.000109799998426752	mV/V/N
Right Femur Fz	Denton	LC-128 FZ	13366.7	0.000106400001698148	mV/V/N

THOR DO9798 IRTACC Summary Sheets

THOR 3D IR-TRACC Calibration Summary

Date	8/23/2016
Technician	Rick Waldeck

3D IR-TRACC Location in THOR	
Left or Right Side	Left
Upper or Lower (n/a for Abdomen)	Upper
Thorax or Abdomen	Thorax

Calibration Factors					
IR-TRACC Model Number	IF-364-C	Y Pot Model Number	9945	Z Pot Model Number	9945
IR-TRACC Serial Number	DQ2255	Y Pot Serial Number	DM4779	Z Pot Serial Number	DM4778
IR-TRACC Excitation	5	Y Pot Excitation (V)	5	Z Pot Excitation (V)	5
IR-TRACC Sensitivity (mm/V)	33.7101	Y Pot Sensitivity (mV/V/°)	3.0328	Z Pot Sensitivity (mV/V/°)	3.0374
IR-TRACC Exponent	-0.4581				

THOR 3D IR-TRACC Setup Fixture Calibration												
Fixture Position	IR-TRACC				Y-Axis Potentiometer				Z-Axis Potentiometer			
	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail
1	0.0915		0		-0.0387		0		0.0305		0	
2	0.1480	-19.93	-20	Pass	-0.1132	-4.91	-5	Pass	-0.0471	-5.11	-5	Pass
3	0.0622	19.50	20	Pass	0.0423	5.34	5	Pass	0.1111	5.31	5	Pass

Processing Software Setup Values				
Transducer	Exponent	Sensitivity (mm/V)	Intercept	
IR-TRACC	-0.4581	33.7101	41.08	
Y-Axis Potentiometer			2.55	
Z-Axis Potentiometer			-2.01	

IR-TRACC Processing

$$\text{IR-TRACC Length (pivot-to-pivot)} = ((V_{\text{IR-TRACC}})^{\text{Exponent}} * \text{Sensitivity}) + \text{Intercept}$$

Potentiometer Processing

$$Y \text{ Angle}_{(\text{THOR})} = Y \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

$$Z \text{ Angle}_{(\text{THOR})} = Z \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

Data Acquisition System Setup

IR-TRACC and potentiometer channels used in the THOR 3D IR-TRACC assembly should be setup in the DAS so that the transducer bias is not removed prior to testing since initial positions of these transducers are required to calculate X, Y and Z-axis displacements in post-test processing software

THOR 3D IR-TRACC Calibration Summary

Date	8/23/2016
Technician	Rick Waldeck

3D IR-TRACC Location in THOR	
Left or Right Side	Right
Upper or Lower (n/a for Abdomen)	Upper
Thorax or Abdomen	Thorax

Calibration Factors					
IR-TRACC Model Number	IF-364-C	Y Pot Model Number	9945	Z Pot Model Number	9945
IR-TRACC Serial Number	DQ2254	Y Pot Serial Number	DM4774	Z Pot Serial Number	DM4775
IR-TRACC Excitation	5	Y Pot Excitation (V)	5	Z Pot Excitation (V)	5
IR-TRACC Sensitivity (mm/V)	30.4515	Y Pot Sensitivity (mV/V/°)	3.0316	Z Pot Sensitivity (mV/V/°)	3.0519
IR-TRACC Exponent	-0.4854				

THOR 3D IR-TRACC Setup Fixture Calibration												
Fixture Position	IR-TRACC				Y-Axis Potentiometer				Z-Axis Potentiometer			
	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail
1	0.0920		0		0.0246		0		-0.0017		0	
2	0.1491	-20.26	-20	Pass	0.1033	5.19	5	Pass	0.0699	4.69	5	Pass
3	0.0629	19.65	20	Pass	-0.0513	-5.01	-5	Pass	-0.0792	-5.08	-5	Pass

Processing Software Setup Values			
Transducer	Exponent	Sensitivity (mm/V)	Intercept
IR-TRACC	-0.4854	30.4515	44.94
Y-Axis Potentiometer			-1.62
Z-Axis Potentiometer			0.11

IR-TRACC Processing

$$\text{IR-TRACC Length (pivot-to-pivot)} = ((V_{\text{IR-TRACC}})^{\text{Exponent}} * \text{Sensitivity}) + \text{Intercept}$$

Potentiometer Processing

$$Y \text{ Angle}_{(\text{THOR})} = Y \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

$$Z \text{ Angle}_{(\text{THOR})} = Z \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

Data Acquisition System Setup

IR-TRACC and potentiometer channels used in the THOR 3D IR-TRACC assembly should be setup in the DAS so that the transducer bias is not removed prior to testing since initial positions of these transducers are required to calculate X, Y and Z-axis displacements in post-test processing software

THOR 3D IR-TRACC Calibration Summary

Date	8/23/2016
Technician	Rick Waldeck

3D IR-TRACC Location in THOR	
Left or Right Side	Left
Upper or Lower (n/a for Abdomen)	Lower
Thorax or Abdomen	Thorax

Calibration Factors					
IR-TRACC Model Number	IF-364-C	Y Pot Model Number	9945	Z Pot Model Number	9945
IR-TRACC Serial Number	DK3866	Y Pot Serial Number	DJ5455	Z Pot Serial Number	DJ5454
IR-TRACC Excitation	5	Y Pot Excitation (V)	5	Z Pot Excitation (V)	5
IR-TRACC Sensitivity (mm/V)	30.874	Y Pot Sensitivity (mV/V/°)	3.0516	Z Pot Sensitivity (mV/V/°)	3.043
IR-TRACC Exponent	-0.468				

THOR 3D IR-TRACC Setup Fixture Calibration												
Fixture Position	IR-TRACC				Y-Axis Potentiometer				Z-Axis Potentiometer			
	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail
1	0.0844		0		-0.0415		0		0.0911		0	
2	0.1377	-20.10	-20	Pass	0.0339	4.94	5	Pass	0.1708	5.24	5	Pass
3	0.0582	18.66	20	Pass	-0.1157	-4.86	-5	Pass	0.0144	-5.04	-5	Pass

Processing Software Setup Values				
Transducer	Exponent	Sensitivity (mm/V)	Intercept	
IR-TRACC	-0.468	30.874	43.71	
Y-Axis Potentiometer			2.72	
Z-Axis Potentiometer			-5.99	

IR-TRACC Processing

$$\text{IR-TRACC Length (pivot-to-pivot)} = ((V_{\text{IR-TRACC}})^{\text{Exponent}} * \text{Sensitivity}) + \text{Intercept}$$

Potentiometer Processing

$$Y \text{ Angle}_{(\text{THOR})} = Y \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

$$Z \text{ Angle}_{(\text{THOR})} = Z \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

Data Acquisition System Setup

IR-TRACC and potentiometer channels used in the THOR 3D IR-TRACC assembly should be setup in the DAS so that the transducer bias is not removed prior to testing since initial positions of these transducers are required to calculate X, Y and Z-axis displacements in post-test processing software

THOR 3D IR-TRACC Calibration Summary

Date	8/23/2016
Technician	Rick Waldeck

3D IR-TRACC Location in THOR	
Left or Right Side	Right
Upper or Lower (n/a for Abdomen)	Lower
Thorax or Abdomen	Thorax

Calibration Factors					
IR-TRACC Model Number	IF-364-C	Y Pot Model Number	9945	Z Pot Model Number	9945
IR-TRACC Serial Number	DK3865	Y Pot Serial Number	DJ5453	Z Pot Serial Number	DJ5452
IR-TRACC Excitation	5	Y Pot Excitation (V)	5	Z Pot Excitation (V)	5
IR-TRACC Sensitivity (mm/V)	27.1972	Y Pot Sensitivity (mV/V/°)	3.0491	Z Pot Sensitivity (mV/V/°)	3.0803
IR-TRACC Exponent	-0.5				

THOR 3D IR-TRACC Setup Fixture Calibration												
Fixture Position	IR-TRACC				Y-Axis Potentiometer				Z-Axis Potentiometer			
	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail
1	0.0823		0		-0.0060		0		0.0457		0	
2	0.1341	-20.53	-20	Pass	-0.0824	-5.01	-5	Pass	-0.0307	-4.96	-5	Pass
3	0.0575	18.62	20	Pass	0.0721	5.12	5	Pass	0.1230	5.02	5	Pass

Processing Software Setup Values			
Transducer	Exponent	Sensitivity (mm/V)	Intercept
IR-TRACC	-0.5	27.1972	47.10
Y-Axis Potentiometer			0.39
Z-Axis Potentiometer			-2.97

IR-TRACC Processing

$$\text{IR-TRACC Length (pivot-to-pivot)} = ((V_{\text{IR-TRACC}})^{\text{Exponent}} * \text{Sensitivity}) + \text{Intercept}$$

Potentiometer Processing

$$Y \text{ Angle}_{(\text{THOR})} = Y \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

$$Z \text{ Angle}_{(\text{THOR})} = Z \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

Data Acquisition System Setup

IR-TRACC and potentiometer channels used in the THOR 3D IR-TRACC assembly should be setup in the DAS so that the transducer bias is not removed prior to testing since initial positions of these transducers are required to calculate X, Y and Z-axis displacements in post-test processing software

THOR 3D IR-TRACC Calibration Summary

Date	8/23/2016
Technician	Rick Waldeck

3D IR-TRACC Location in THOR	
Left or Right Side	Left
Upper or Lower (n/a for Abdomen)	n/a
Thorax or Abdomen	Abdomen

Calibration Factors					
IR-TRACC Model Number	472-4750	Y Pot Model Number	9945	Z Pot Model Number	9945
IR-TRACC Serial Number	DP1395	Y Pot Serial Number	DJ5443	Z Pot Serial Number	DJ5444
IR-TRACC Excitation	5	Y Pot Excitation (V)	5	Z Pot Excitation (V)	5
IR-TRACC Sensitivity (mm/V)	40.0978	Y Pot Sensitivity (mV/V/°)	3.0406	Z Pot Sensitivity (mV/V/°)	3.0465
IR-TRACC Exponent	-0.4832				

THOR 3D IR-TRACC Setup Fixture Calibration												
Fixture Position	IR-TRACC				Y-Axis Potentiometer				Z-Axis Potentiometer			
	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail
1	0.1267		0		-0.0070		0		0.0563		0	
2	0.1957	-20.62	-21.6	Pass	0.0561	4.15	4.3	Pass	-0.0255	-5.37	-4.3	Pass
3	0.0873	21.46	21.6	Pass	-0.0726	-4.31	-4.3	Pass	0.1070	3.33	4.3	Pass

Processing Software Setup Values				
Transducer	Exponent	Sensitivity (mm/V)	Intercept	
IR-TRACC	-0.4832	40.0978	45.39	
Y-Axis Potentiometer			0.46	
Z-Axis Potentiometer			-3.70	

IR-TRACC Processing

$$\text{IR-TRACC Length (pivot-to-pivot)} = ((V_{\text{IR-TRACC}})^{\text{Exponent}} * \text{Sensitivity}) + \text{Intercept}$$

Potentiometer Processing

$$Y \text{ Angle}_{(\text{THOR})} = Y \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

$$Z \text{ Angle}_{(\text{THOR})} = Z \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

Data Acquisition System Setup

IR-TRACC and potentiometer channels used in the THOR 3D IR-TRACC assembly should be setup in the DAS so that the transducer bias is not removed prior to testing since initial positions of these transducers are required to calculate X, Y and Z-axis displacements in post-test processing software

THOR 3D IR-TRACC Calibration Summary

Date	8/23/2016
Technician	Rick Waldeck

3D IR-TRACC Location in THOR	
Left or Right Side	Right
Upper or Lower (n/a for Abdomen)	n/a
Thorax or Abdomen	Abdomen

Calibration Factors					
IR-TRACC Model Number	472-4750	Y Pot Model Number	9945	Z Pot Model Number	9945
IR-TRACC Serial Number	DP1396	Y Pot Serial Number	DJ5445	Z Pot Serial Number	DJ5446
IR-TRACC Excitation	5	Y Pot Excitation (V)	5	Z Pot Excitation (V)	5
IR-TRACC Sensitivity (mm/V)	36.27	Y Pot Sensitivity (mV/V/°)	3.0404	Z Pot Sensitivity (mV/V/°)	3.0445
IR-TRACC Exponent	-0.4837				

THOR 3D IR-TRACC Setup Fixture Calibration												
Fixture Position	IR-TRACC				Y-Axis Potentiometer				Z-Axis Potentiometer			
	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail	Out (V)	Actual	Expected	Pass/Fail
1	0.1033		0		0.0166		0		-0.0236		0	
2	0.1679	-22.77	-21.6	Pass	-0.0446	-4.03	-4.3	Pass	0.0450	4.51	4.3	Pass
3	0.0708	21.80	21.6	Pass	0.0858	4.55	4.3	Pass	-0.0768	-3.49	-4.3	Pass

Processing Software Setup Values			
Transducer	Exponent	Sensitivity (mm/V)	Intercept
IR-TRACC	-0.4837	36.27	45.45
Y-Axis Potentiometer			-1.09
Z-Axis Potentiometer			1.55

IR-TRACC Processing

$$\text{IR-TRACC Length (pivot-to-pivot)} = ((V_{\text{IR-TRACC}})^{\text{Exponent}} * \text{Sensitivity}) + \text{Intercept}$$

Potentiometer Processing

$$Y \text{ Angle}_{(\text{THOR})} = Y \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

$$Z \text{ Angle}_{(\text{THOR})} = Z \text{ Angle}_{(\text{recorded by DAS})} + \text{Intercept}$$

Data Acquisition System Setup

IR-TRACC and potentiometer channels used in the THOR 3D IR-TRACC assembly should be setup in the DAS so that the transducer bias is not removed prior to testing since initial positions of these transducers are required to calculate X, Y and Z-axis displacements in post-test processing software

THOR Inspection Checklist

Date: 9/22/2016	
NHTSA Representative: James Saunders	
Inspection Reporter: Steve Keller	
Inspection type (check one): ☒ Pre-Test ☒ Post-Test	
Dummy S/N: DO9798	
Dummy Description: THOR-M 50th Male	
Date of last Certification: 9/6/2016	
Tests conducted since last inspection: 2M20165115 – 2016 Toyota Prius	Since last certification: M20165120 – 2016 Scion iA 2M20165115 – 2016 Toyota Prius
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> 11PELV0000THACYP, Pelvis Y Acceleration, Questionable data throughout, SN:AC-J28989 11PELV0000THACZP, Pelvis Z Acceleration, Questionable data throughout, SN:AC-J27496 11TIBIRILOTHMOXP, Tibia Lower Right X Moment, Questionable spikes 28ms to 159ms, SN:LC-DQ9684 MX 11ANKLRI00THANZP, Ankle Right Z Rotation, Questionable data throughout, SN:DS-003	
<u>Physical evidence of damage:</u> None New	
<u>Anecdotal evidence of damage:</u> None	
<u>Equipment delivered to Borrower:</u> THOR DO9798 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 with 3 channel hub 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 Small cut in center of face above Nasion
	
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
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
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
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 Minor scratches and scuffs
OTHER	
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
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
OTHER	

THOR Inspection Checklist

Date: 9/27/2016	
NHTSA Representative: James Saunders	
Inspection Reporter: Steve Keller	
Inspection type (check one): ☒ Pre-Test ☒ Post-Test	
Dummy S/N: DO9798	
Dummy Description: THOR-M 50th Male	
Date of last Certification: 9/6/2016	
Tests conducted since last inspection: M20165403 - 2016 Mazda CX-5	Since last certification: M20165120 – 2016 Scion iA M20165115 – 2016 Toyota Prius M20165403 - 2016 Mazda CX-5
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> 11ABDOLE00THVO0P, Abdomen Left X Displacement, Questionable spikes throughout 11PELV0000THACYP, Pelvis Y Acceleration, Questionable data throughout 11PELV0000THACZP, Pelvis Z Acceleration, Questionable data throughout	
<u>Physical evidence of damage:</u> None New	
<u>Anecdotal evidence of damage:</u> None	
<u>Equipment delivered to Borrower:</u> THOR DO9798 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 with 3 channel hub 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 Small cut in center of face above Nasion
	
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
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
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
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 Minor scratches and scuffs
OTHER	
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
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
OTHER	

ATD 517: PRE-TEST INSPECTION

5th Female Inspection Checklist

Date: 9/22/2016	
NHTSA Representative: Tim Keon	
Inspection Reporter: Matt Goehle	
Inspection type (check one): ☒ Pre-Test ☒ Post-Test	
Dummy S/N: 517	
Dummy Description: Hybrid 3 – 5th Female	
Date of last Certification: 9/7/2016	
Tests conducted since last inspection: M20165115 - 2016 Toyota Prius	Since last certification: M20165120 - 2016 Toyota Scion iA M20165115 - 2016 Toyota Prius
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> None	
<u>Physical evidence of damage:</u> Minor Head Scuffs	
<u>Anecdotal evidence of damage:</u> None	
<u>Equipment delivered to Borrower:</u> Hybrid 3 5th Female 15 Accelerometers 1 Upper neck load cell 2 Femur load cells 2 ASIS load cells 1 Chest potentiometer	

Note: New Damage is Noted in Red

HEAD	
Y / N	Ballast secure
Y / N	General appearance Top of head skin scuffed where impacted top window surround.
	
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
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 517: POST-TEST INSPECTION

5th Female Inspection Checklist

Date: 9/26/2016	
NHTSA Representative: Tim Keon	
Inspection Reporter: Matt Goehle	
Inspection type (check one): ☐ Pre-Test ☒ Post-Test	
Dummy S/N: 517	
Dummy Description: Hybrid 3 – 5th Female	
Date of last Certification: 9/7/2016	
Tests conducted since last inspection: M20165403 - 2016 Mazda CX-5	Since last certification: M20165120 - 2016 Toyota Scion iA M20165115 - 2016 Toyota Prius M20165403 - 2016 Mazda CX-5
<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 15 Accelerometers 1 Upper neck load cell 2 Femur load cells 2 ASIS load cells 1 Chest potentiometer	

Note: New Damage is Noted in Red

HEAD	
Y / N	Ballast secure
Y / N	General appearance Top of head skin scuffed where impacted top window surround.
	
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
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 513: PRE-TEST INSPECTION

5th Female Inspection Checklist

Date: 9/22/2016	
NHTSA Representative: Tim Keon	
Inspection Reporter: Matt Goehle	
Inspection type (check one): ☒ Pre-Test ☒ Post-Test	
Dummy S/N: 513	
Dummy Description: Hybrid 3 – 5th Female	
Date of last Certification: 9/7/2016	
Tests conducted since last inspection: M20165115-2016 Toyota Prius	Since last certification: M20165120 - 2016 Toyota Scion iA M20165115 - 2016 Toyota Prius
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> 13HEADCG00HFAVXP, Head CG Angular Velocity About X, Questionable data throughout 13TIBILEUPHFFOZP, Left Upper Tibia Z Force, Questionable data after 101ms 13TIBILELOHFFOXP, Left Lower Tibia X Force, Questionable data 58.3ms to 72.3ms 13TIBILELOHFMOXP, Left Lower Tibia X Moment, Questionable data throughout 13TIBIRILOHFFOZP, Right Lower Tibia Z Force, Questionable spike 118ms	
<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 21 Accelerometers 3 Angular Rate Sensors 1 Upper neck load cell 2 Femur load cells 2 Upper tibia load cells 2 Lower tibia load cells 1 Chest potentiometer	

Note: New Damage is Noted in Red

HEAD	
Y / N	Ballast secure
Y / N	General appearance
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
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

ATD 513: POST-TEST INSPECTION

5th Female Inspection Checklist

Date: 9/26/2016	
NHTSA Representative: Tim Keon	
Inspection Reporter: Matt Goehle	
Inspection type (check one): ☐ Pre-Test ☒ Post-Test	
Dummy S/N: 513	
Dummy Description: Hybrid 3 – 5th Female	
Date of last Certification: 9/7/2016	
Tests conducted since last inspection: M20165403 - 2016 Mazda CX-5	Since last certification: M20165120 - 2016 Toyota Scion iA M20165115 - 2016 Toyota Prius M20165403 - 2016 Mazda CX-5
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> 13TIBILELOHFFOXP, Left Lower Tibia X Force, Questionable data 60ms to 62ms	
<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 21 Accelerometers 3 Angular Rate Sensors 1 Upper neck load cell 2 Femur load cells 2 Upper tibia load cells 2 Lower tibia load cells 1 Chest potentiometer	

Note: New Damage is Noted in Red

HEAD	
Y / N	Ballast secure
Y / N	General appearance
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
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

Test Data/Sensor Repair Notes

DUMMY CALIBRATIONS

50% ADULT MALE THOR DO9798 DUMMY CALIBRATIONS



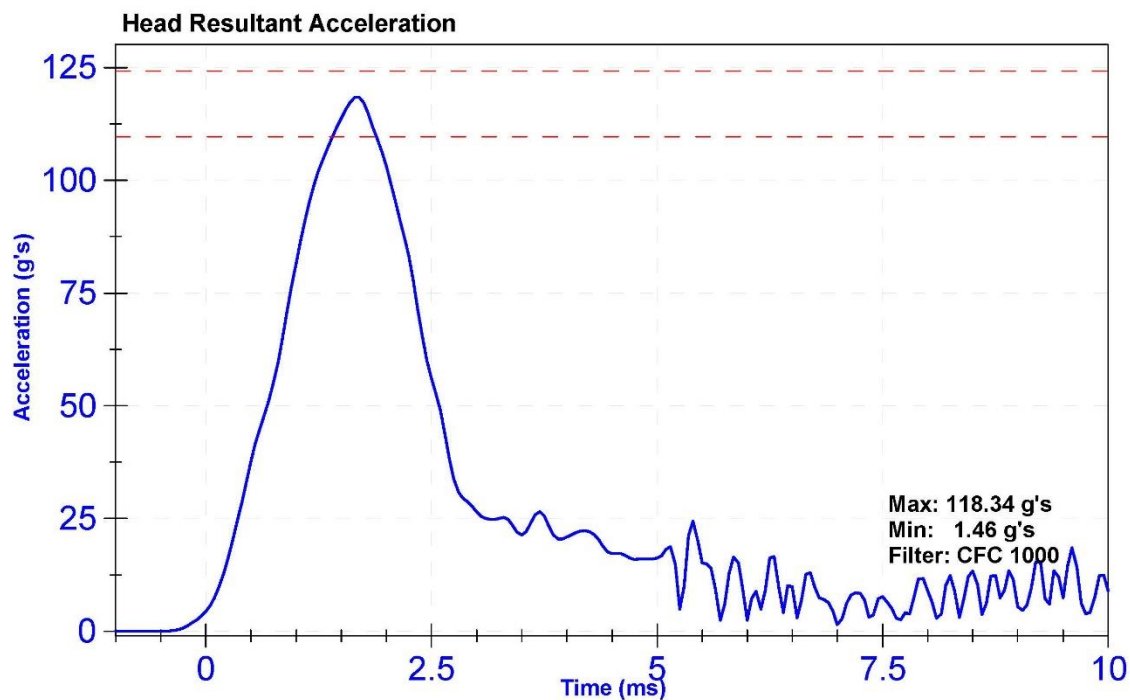
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

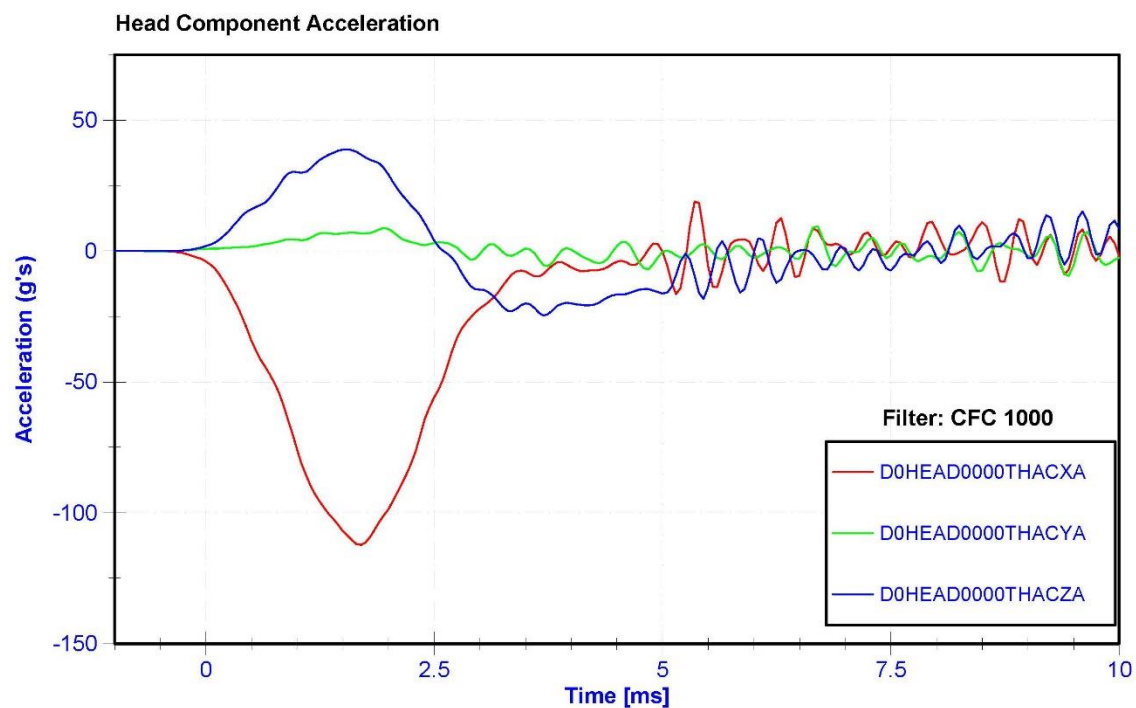
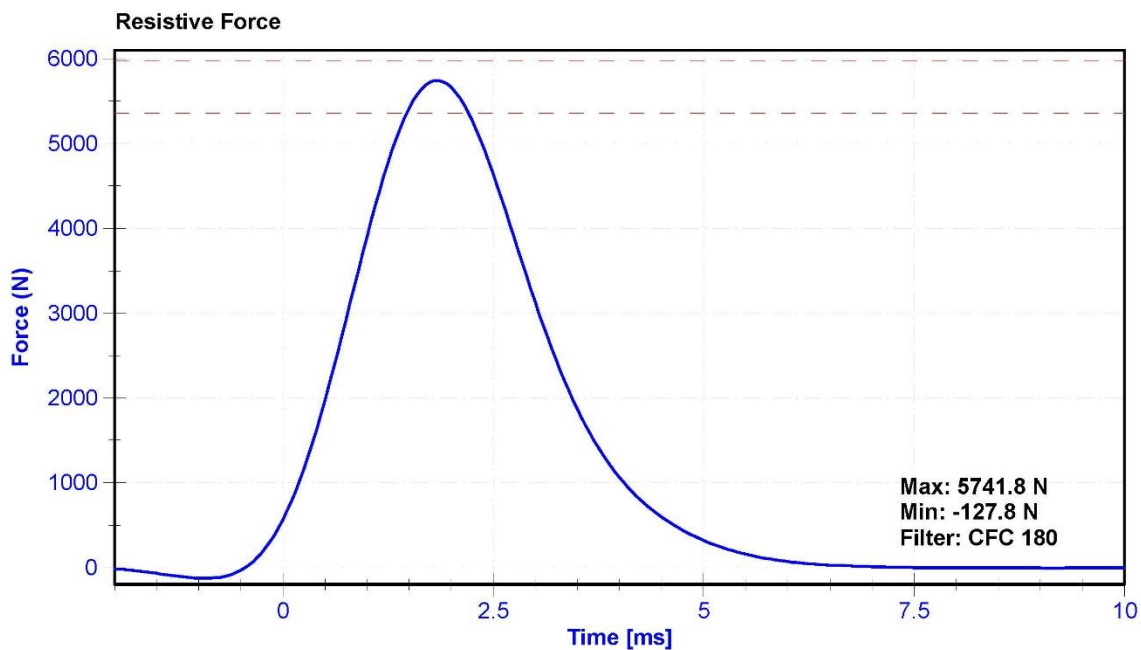
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	42.0	Pass
Impact Velocity	1.95	2.05	m/s	1.981	Pass
Probe Force	5362	5972	N	5741.8	Pass
Resultant Acceleration	109.6	124.2	g's	118.34	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Head X Accel	Endevco 7264	AC-P58889	6/21/2016	12/20/2016
Head Y Accel	Endevco 7264	AC-B02A25-N04	6/21/2016	12/20/2016
Head Z Accel	Endevco 7264	AC-02102105-F22	6/21/2016	12/20/2016
Probe Accel	ENDEVCO 7264CT	AC-P16593	9/8/2015	9/7/2016





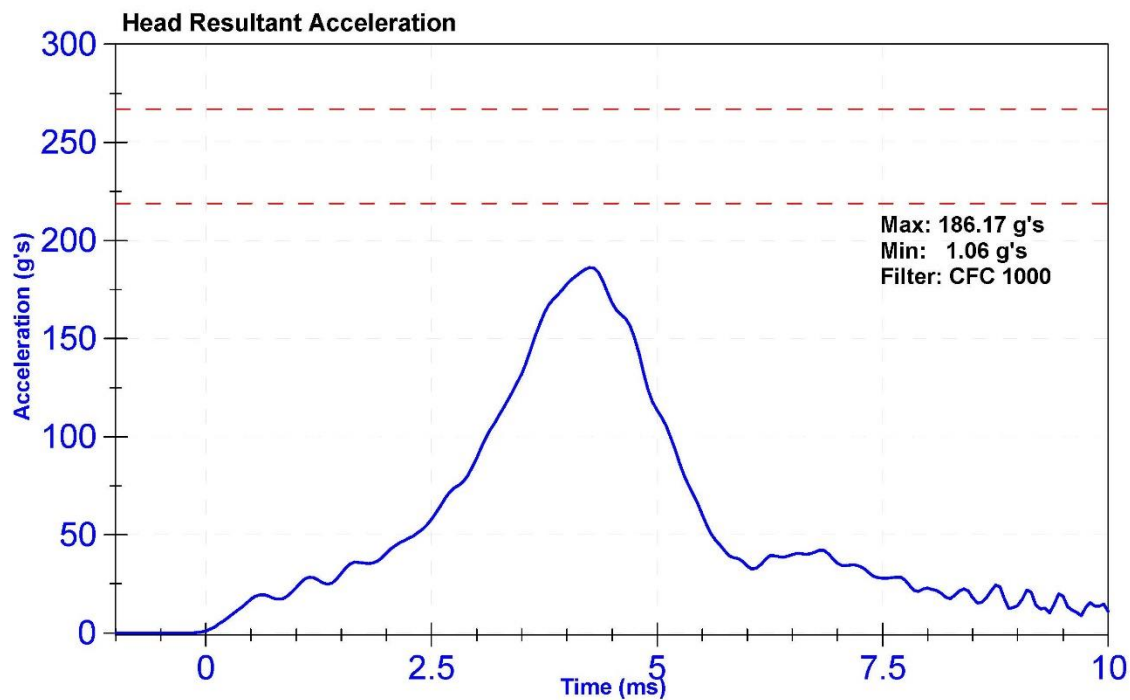
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

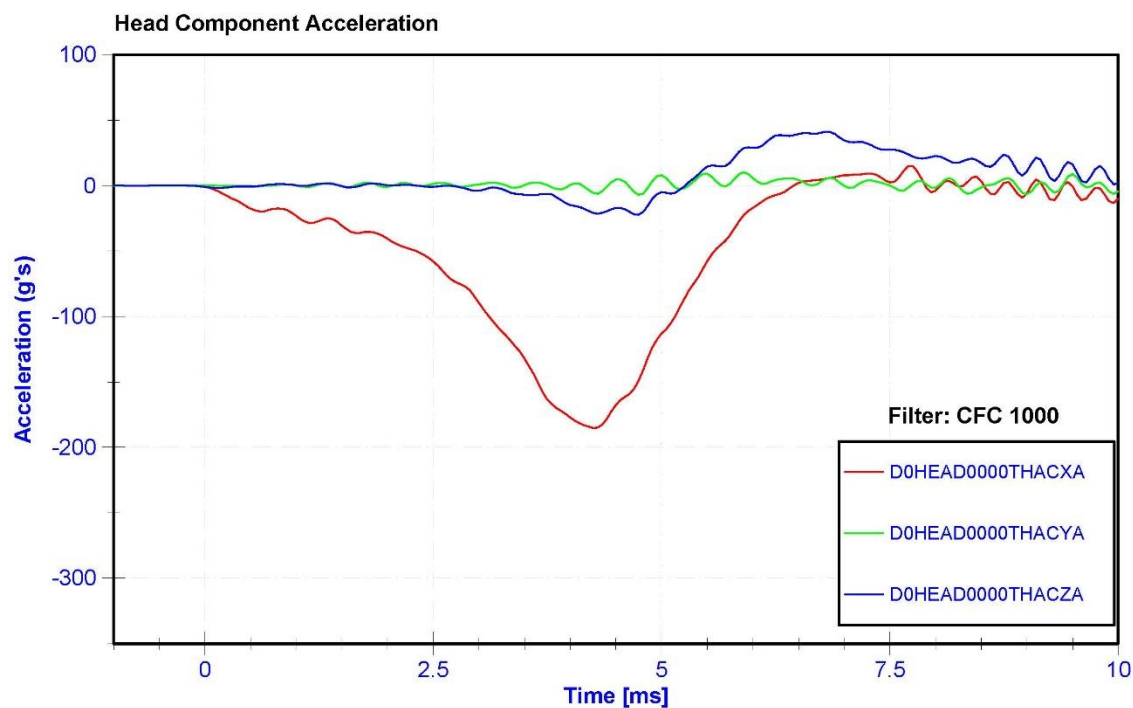
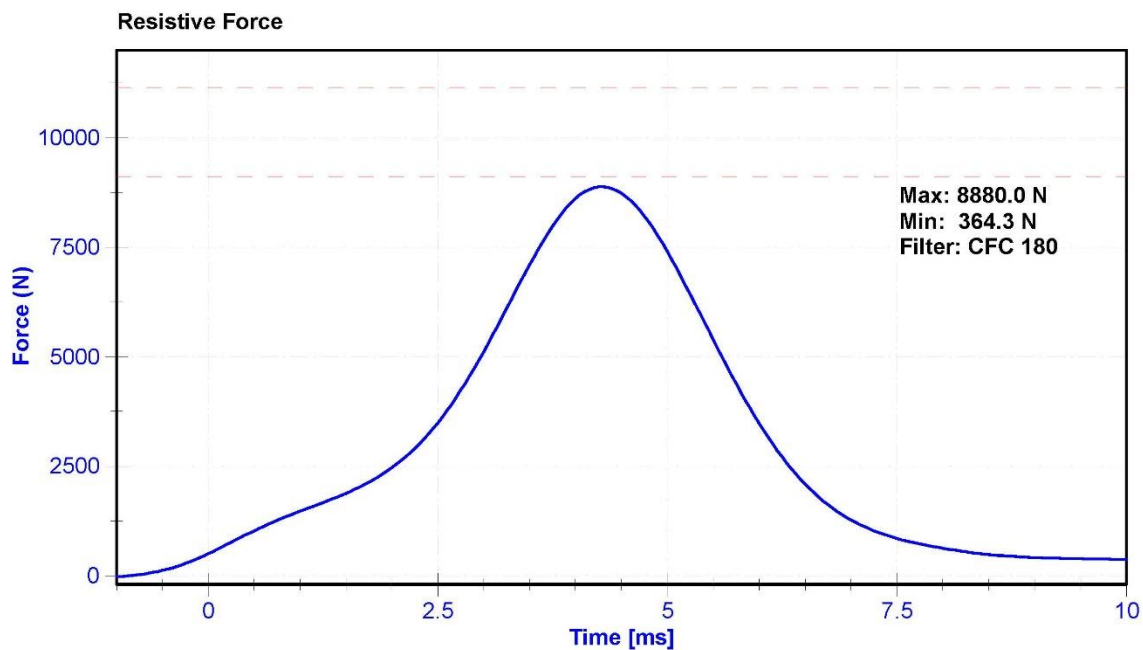
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	43.9	Pass
Impact Velocity	6.68	6.78	m/s	6.728	Pass
Probe Force	9117	11143	N	8880.0	Fail
Resultant Acceleration	219	267	g's	186.2	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Head X Accel	Endevco 7264	AC-P58889	6/21/2016	12/20/2016
Head Y Accel	Endevco 7264	AC-B02A25-N04	6/21/2016	12/20/2016
Head Z Accel	Endevco 7264	AC-02102105-F22	6/21/2016	12/20/2016
Probe Accel	ENDEVCO 7264CT	AC-P16593	9/8/2015	9/7/2016





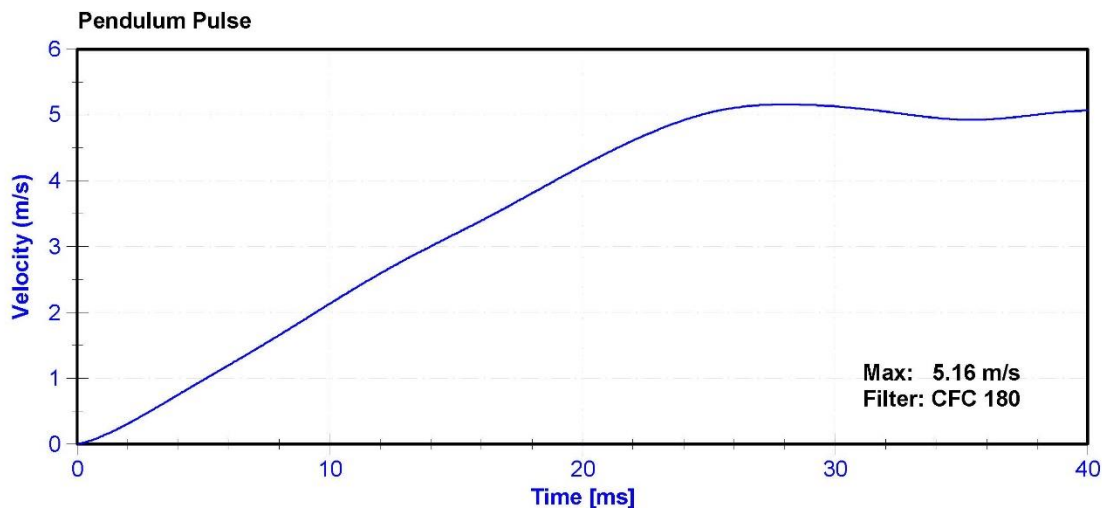
ATD Manufacturer	Humanetics	Test Technician	S. Keller
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

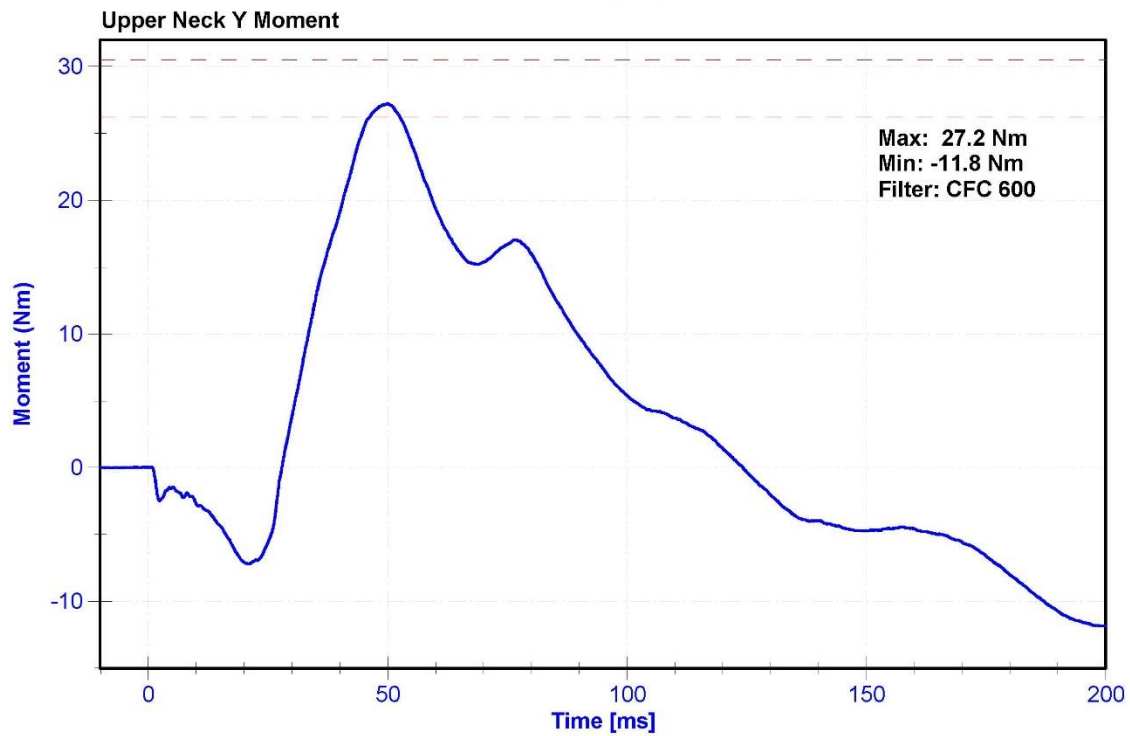
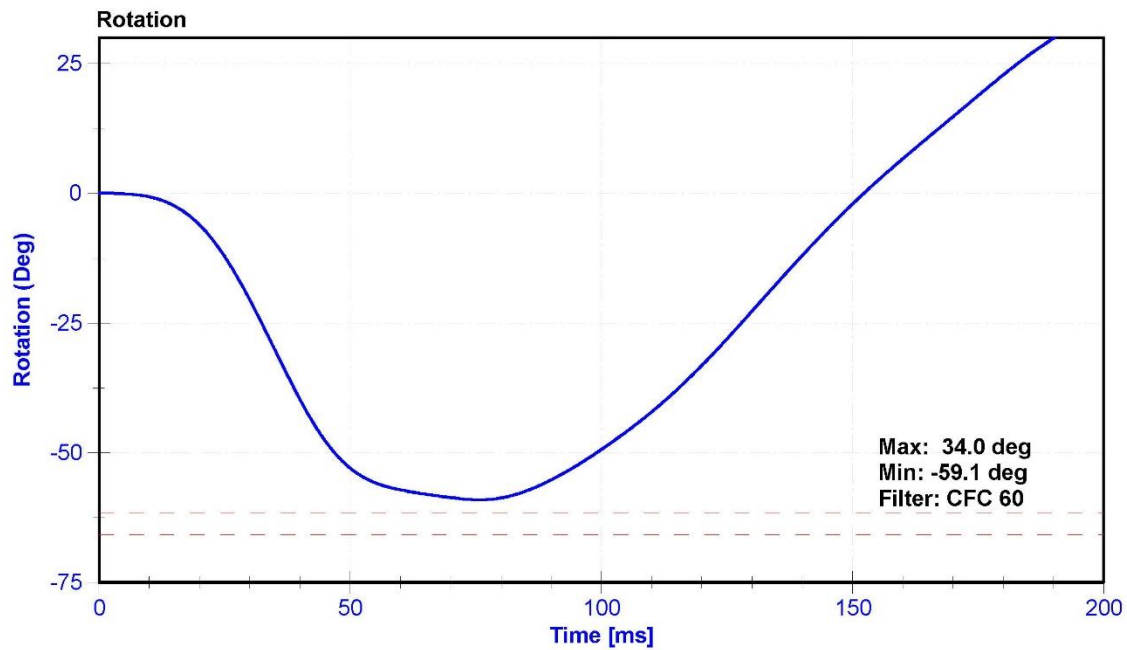
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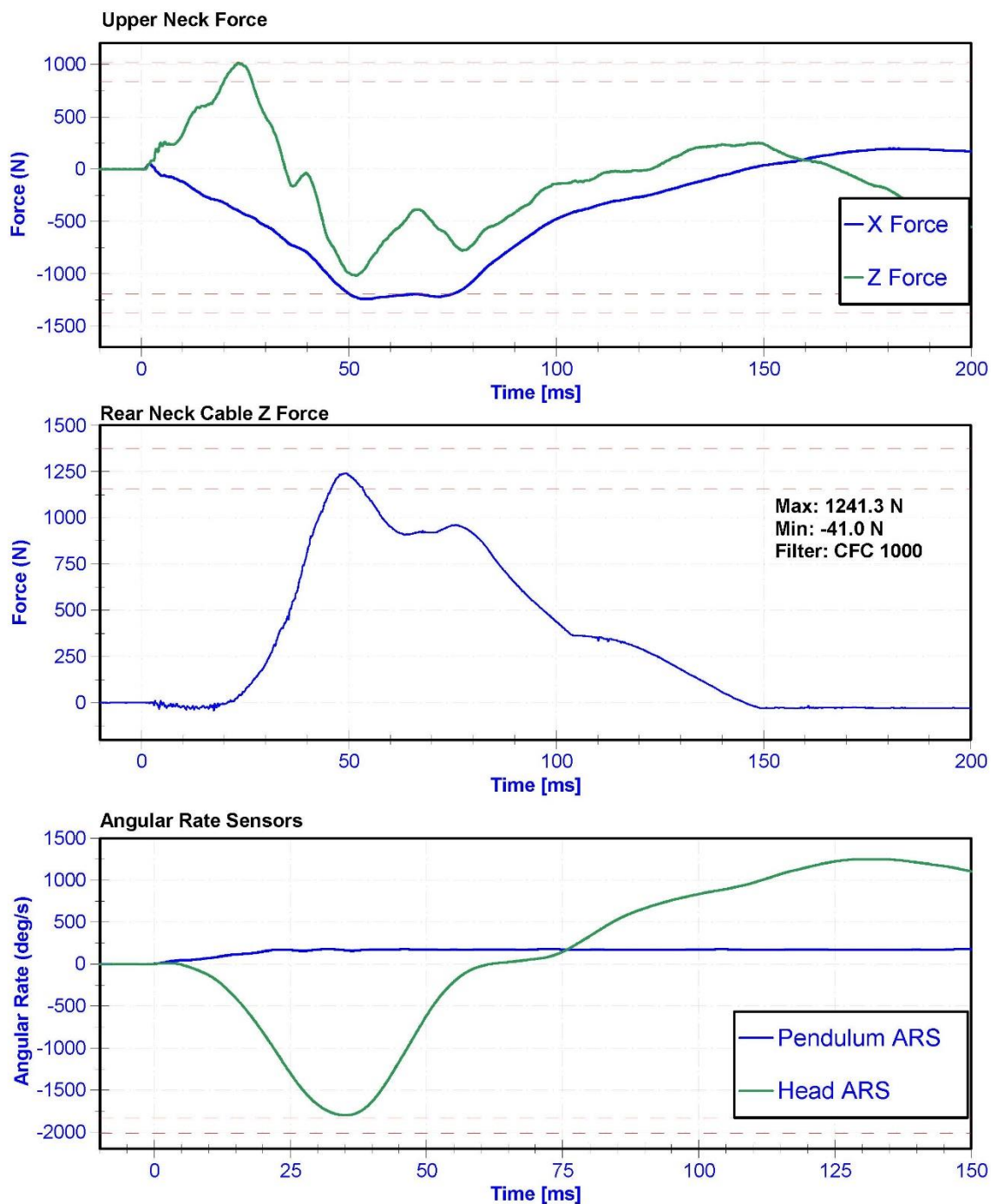
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	44.5	Pass
Velocity	4.95	5.05	m/s	4.985	Pass
Pendulum Impulse at 8ms	1.49	1.85	m/s	1.658	Pass
Pendulum Impulse at 16ms	3.08	3.86	m/s	3.395	Pass
Pendulum Impulse at 24ms	4.48	5.26	m/s	4.919	Pass
Peak Upper Neck Y Moment	26.2	30.5	Nm	27.24	Pass
Peak Upper Neck X Force	-1375	-1195	N	-1239.7	Pass
Maximum Upper Neck Z Force	835	1020	N	1013.2	Pass
First Peak Rear Neck Cable Force	1157	1375	N	1241.3	Pass
Peak Head Y Angular Rate	-2017	-1828	deg/s	-1798.7	Fail
Peak Head Y Rotation	-65.8	-61.5	deg	-59.07	Fail
Rotation Decay Time to Zero	77.6	87.2	ms	76.55	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Upper Neck Load Cell	Humanetics 10380J14	LC-76 FX	8/10/2016	8/10/2017
Rear Neck Cable Load Cell	Humanetics 6005JFL	LC-76	8/23/2016	8/23/2017
Pendulum ARS	DTS ARS-PRO-8K	ARS-6419	1/19/2016	1/18/2017
Head Y ARS	DTS ARS 18k	ARS5949	1/27/2016	1/26/2017







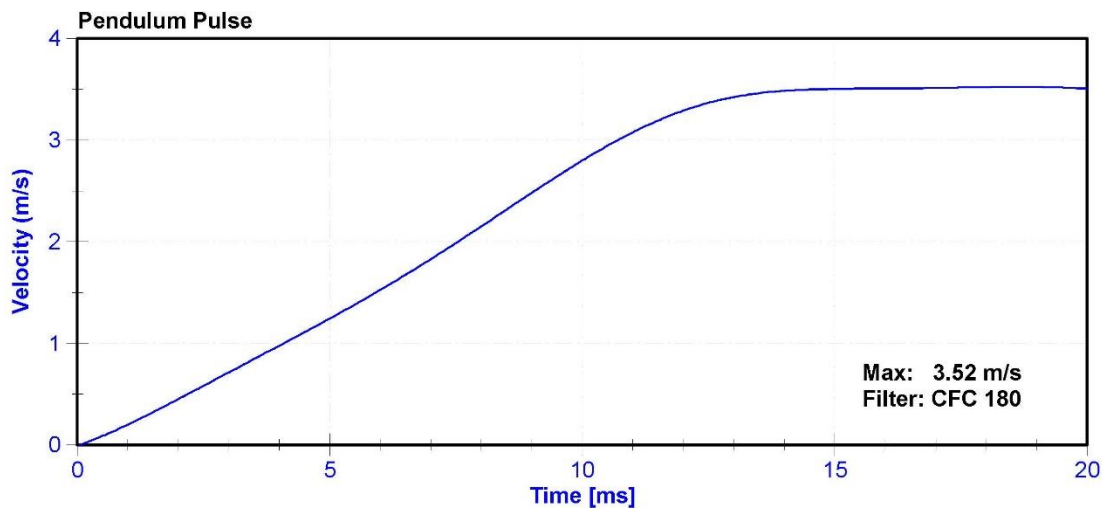
ATD Manufacturer	Humanetics	Test Technician	S. Keller
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

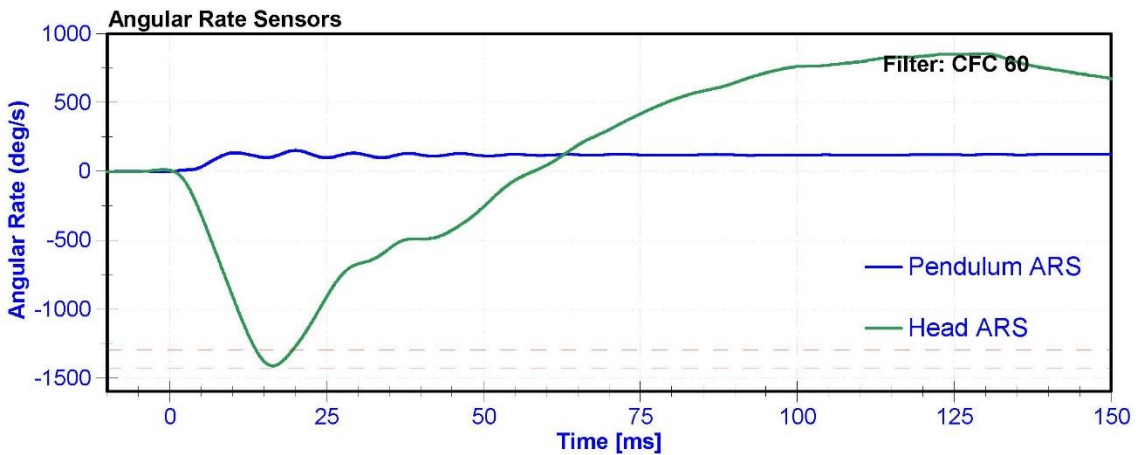
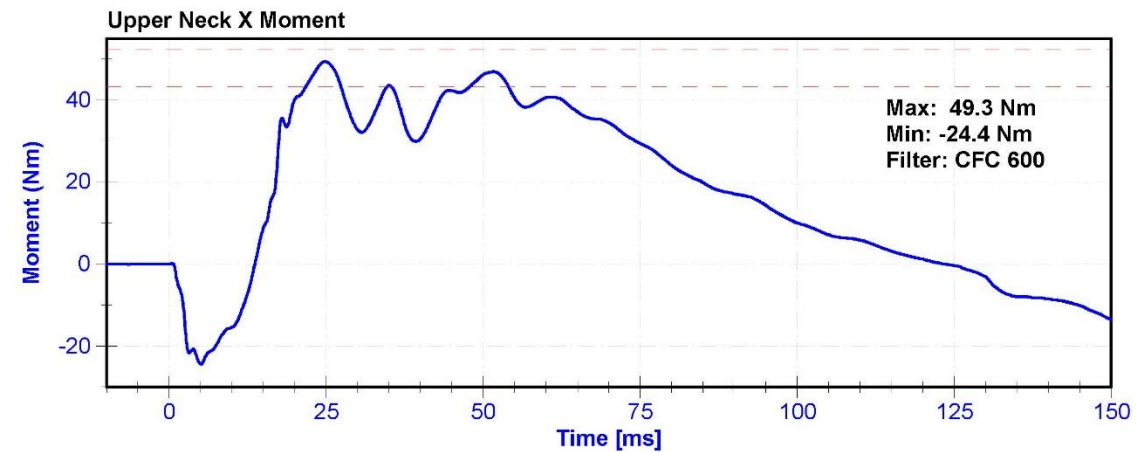
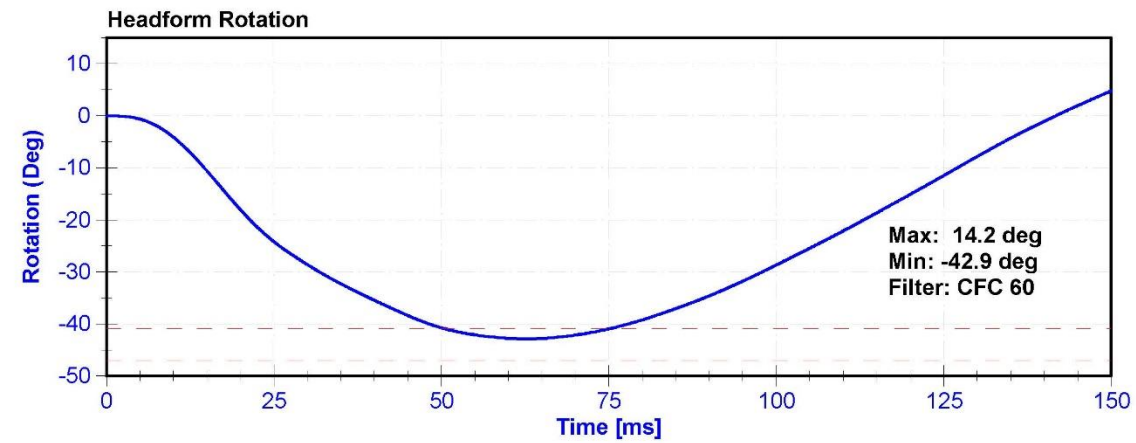
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	44.3	Pass
Velocity	3.35	3.45	m/s	3.432	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.977	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.151	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.290	Pass
Peak Upper Neck X Moment after 40ms	43.2	52.2	Nm	46.87	Pass
Peak Head X Angular Rate	-1434	-1300	deg/s	-1413.0	Pass
Peak Head X Rotation	-47.0	-40.9	deg	-42.86	Pass
Rotational Decay Time to Zero	78.0	83.4	ms	79.00	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Upper Neck Load Cell	Humanetics 10380J14	LC-76 MX	8/10/2016	8/10/2017
Pendulum ARS	DTS ARS-PRO-8K	ARS-6419	1/19/2016	1/18/2017
Head X ARS	DTS ARS 18k	ARS4650	1/27/2016	1/26/2017





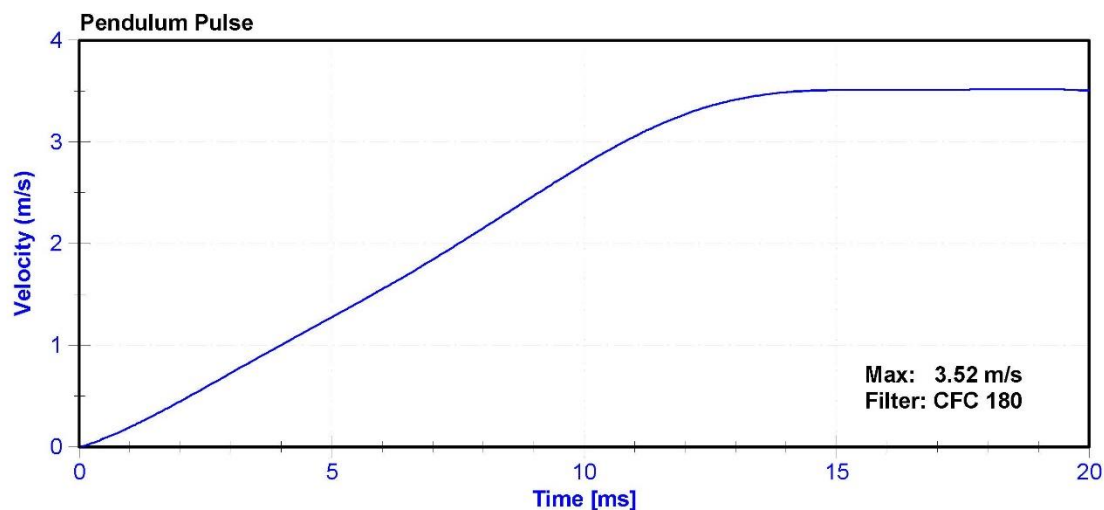
ATD Manufacturer	Humanetics	Test Technician	S. Keller
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

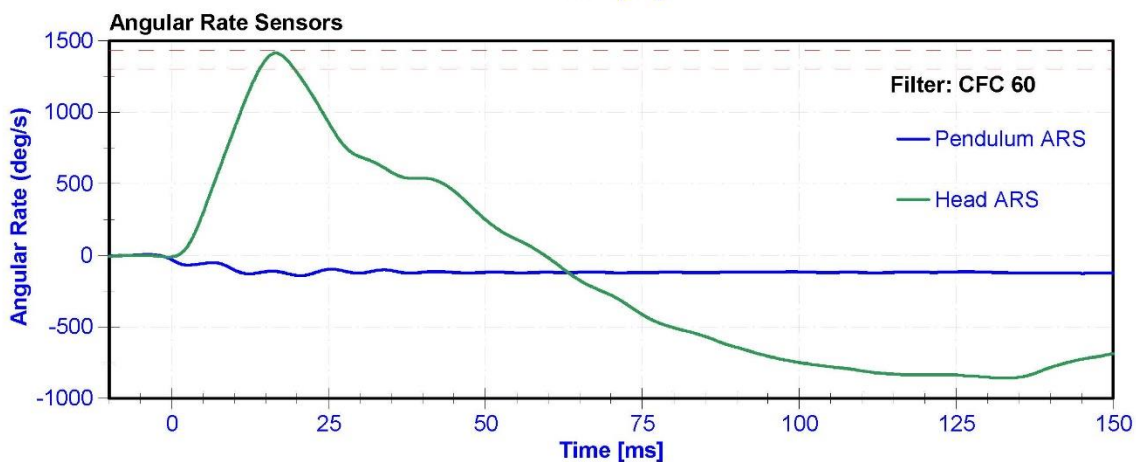
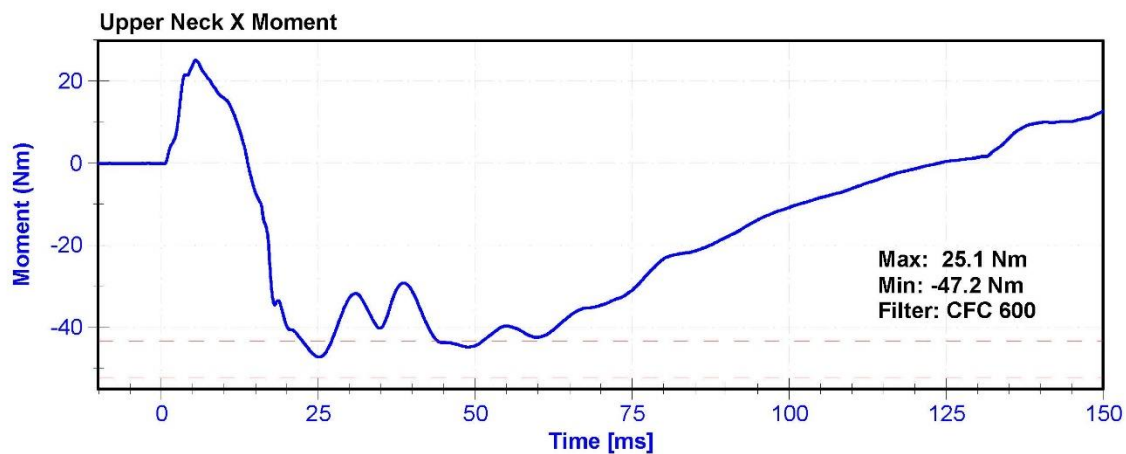
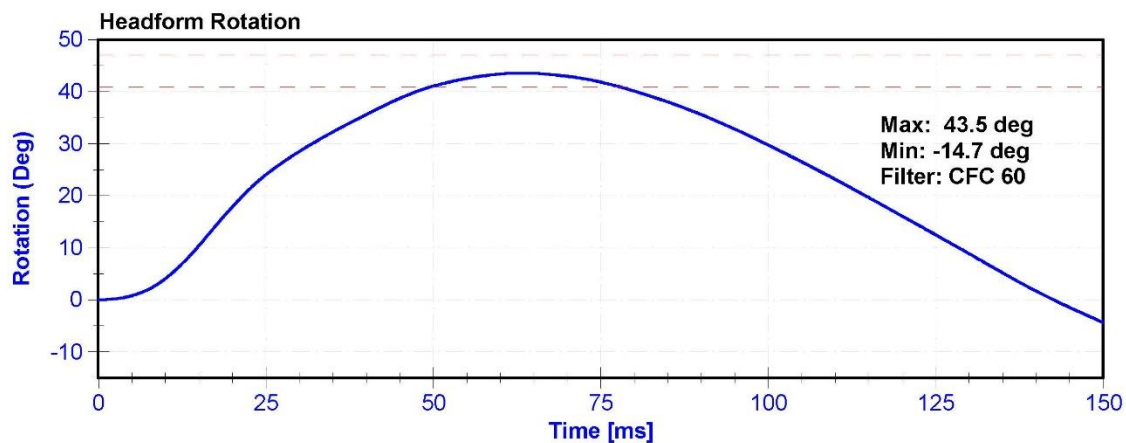
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	41.3	Pass
Velocity	3.35	3.45	m/s	3.42	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	1.002	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.151	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.272	Pass
Peak Upper Neck X Moment after 40ms	-52.2	-43.2	Nm	-44.81	Pass
Peak Head X Angular Rate	1300	1434	deg/s	1412.8	Pass
Peak Head X Rotation	40.9	47.0	deg	43.55	Pass
Rotation Decay Time to Zero	78.0	83.4	ms	79.40	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Upper Neck Load Cell	Humanetics 10380J14	LC-76 MX	8/10/2016	8/10/2017
Pendulum ARS	DTS ARS-PRO-8K	ARS-6419	1/19/2016	1/18/2017
Head X ARS	DTS ARS 18k	ARS4650	1/27/2016	1/26/2017





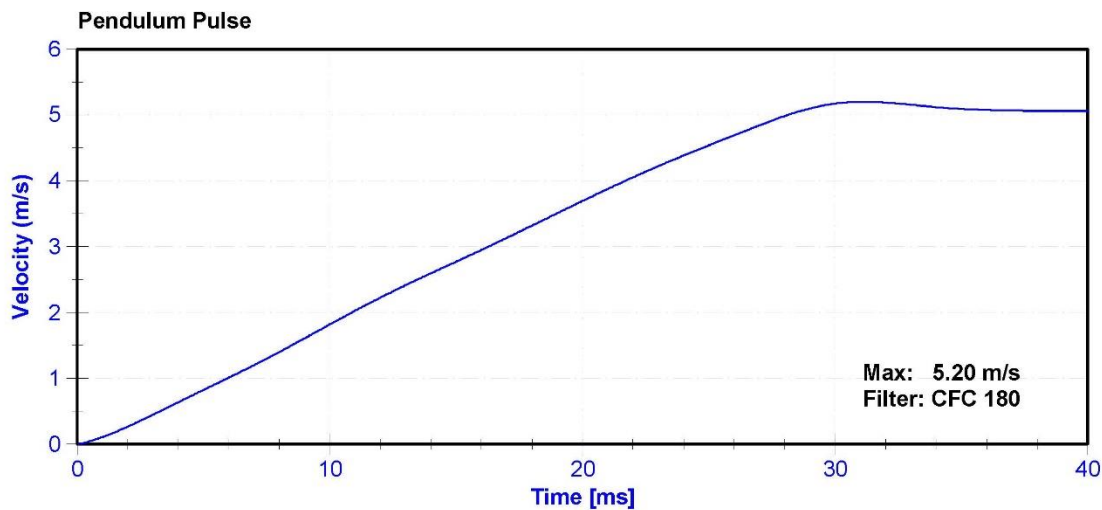
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ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

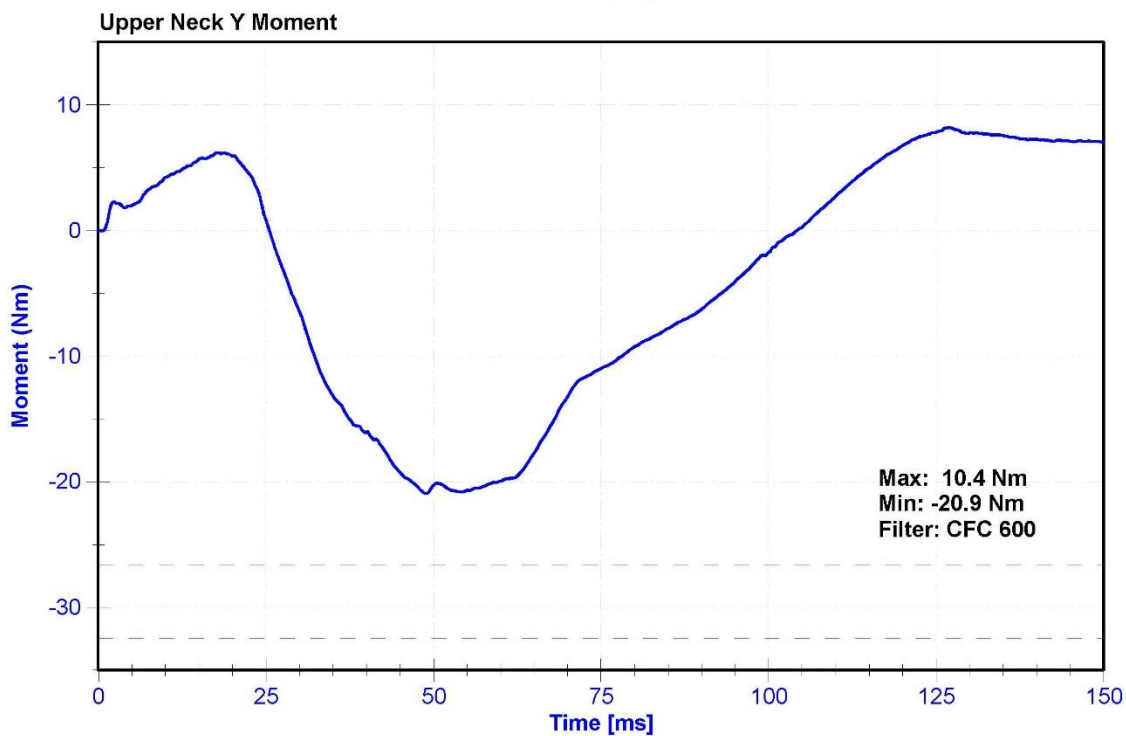
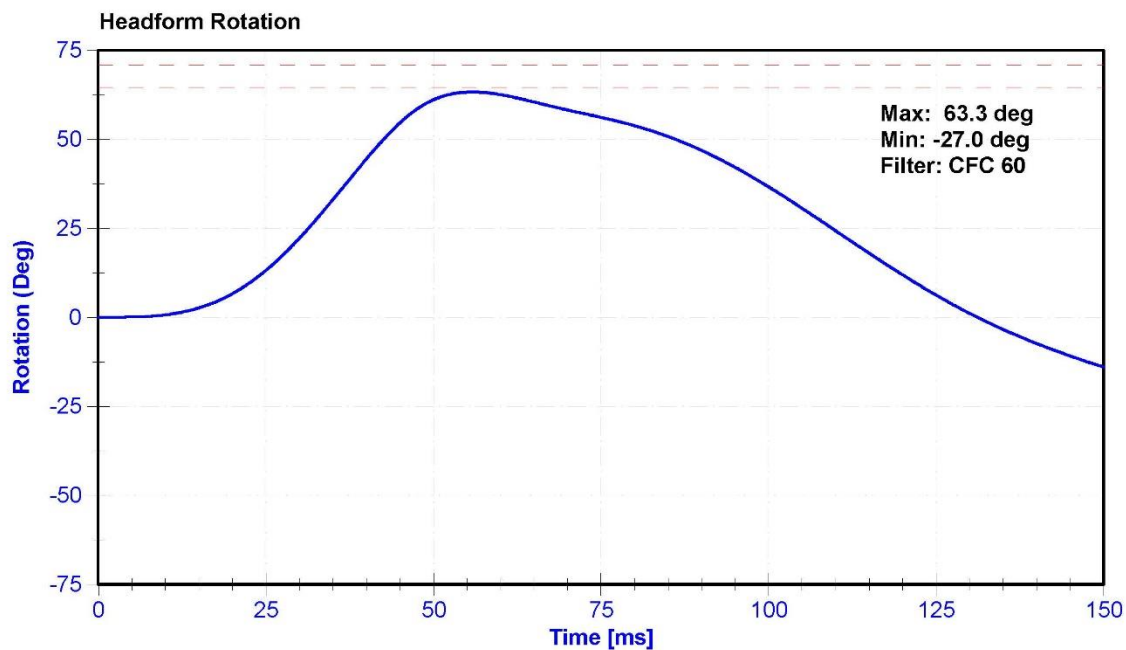
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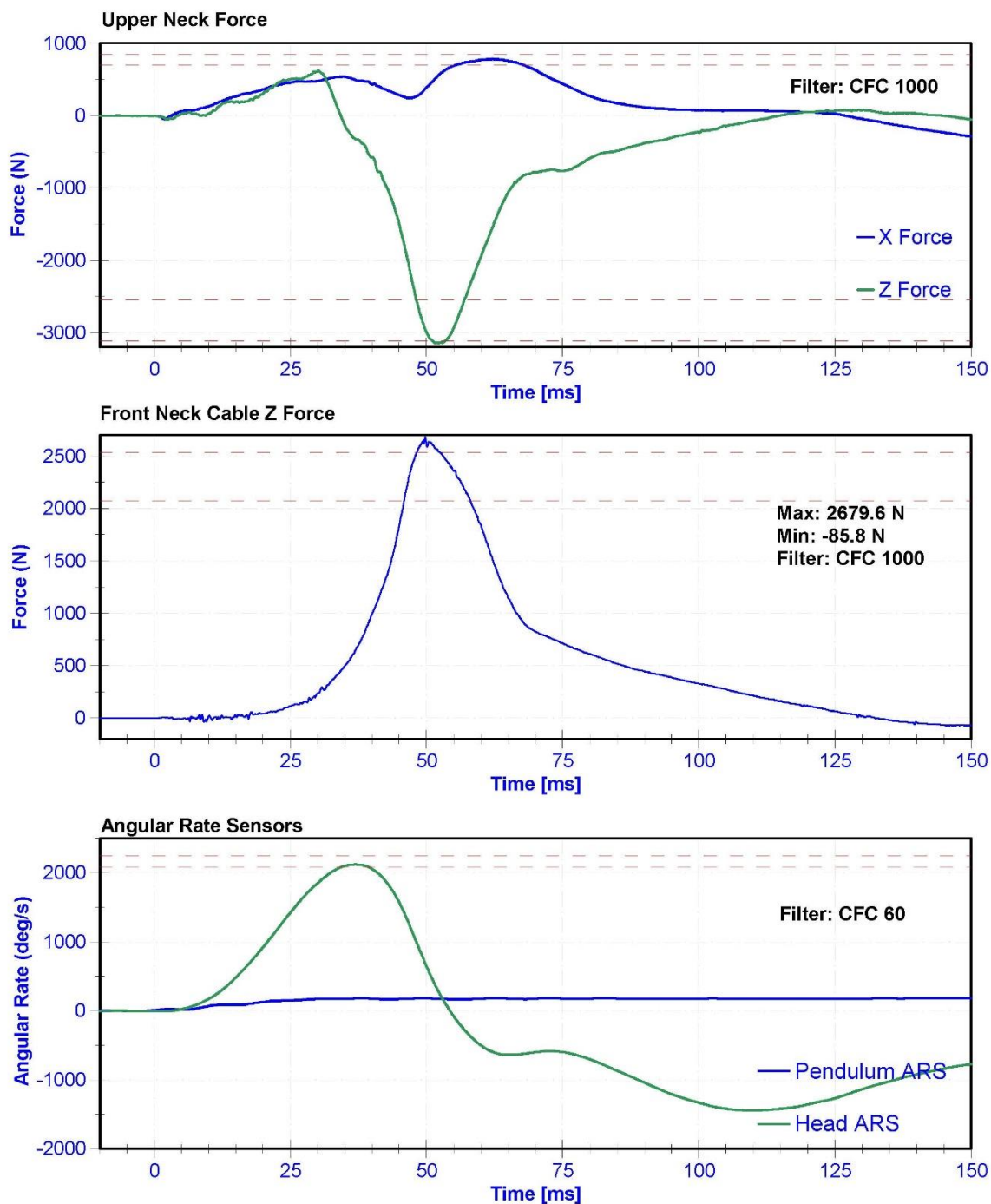
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	46.2	Pass
Velocity	4.95	5.05	m/s	5.045	Pass
Pendulum Impulse at 10ms	1.76	1.91	m/s	1.819	Pass
Pendulum Impulse at 20ms	3.50	3.75	m/s	3.692	Pass
Pendulum Impulse at 30ms	4.88	5.20	m/s	5.171	Pass
Peak Upper Neck Y Moment	-32.5	-26.6	Nm	-20.94	Fail
Peak Upper Neck X Force	699	854	N	783.8	Pass
Peak Upper Neck Z Force	-3115	-2549	N	-3146.6	Fail
Peak Front Neck Cable Force	2074	2535	N	2679.6	Fail
Peak Head Y Angular Rate	2084	2247	deg/s	2121.3	Pass
Peak Head Y Rotation	64.5	70.9	deg	63.30	Fail
Rotational Decay Time to Zero	74.2	78.7	ms	75.35	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Upper Neck Load Cell	Humanetics 10380J14	LC-76 FX	8/10/2016	8/10/2017
Fr Neck Cable Load	Humanetics 6005JFL	LC-77	5/17/2016	5/17/2017
Pendulum ARS	DTS ARS-PRO-8K	ARS-6419	1/19/2016	1/18/2017
Head ARS Y-Axis	DTS ARS 18k	ARS5949	1/27/2016	1/26/2017







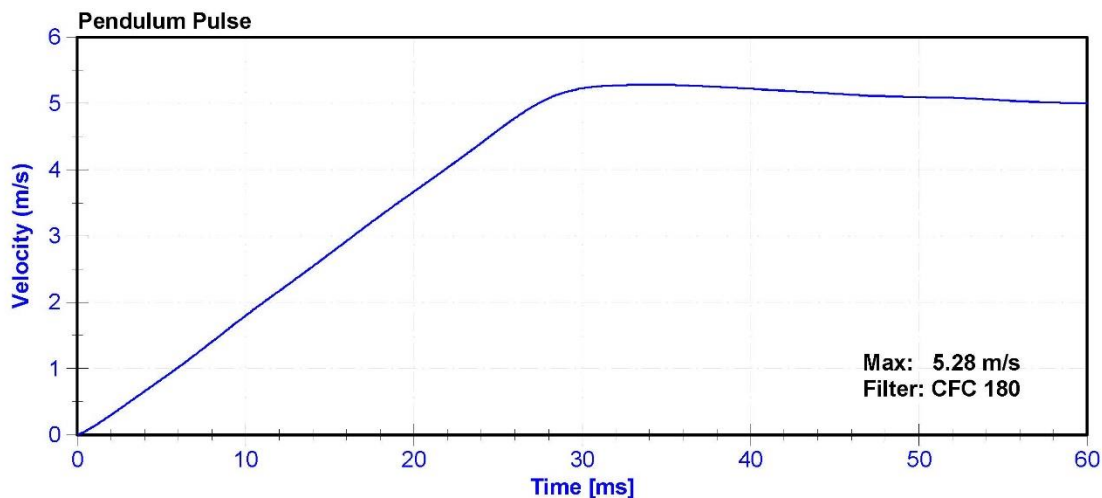
ATD Manufacturer	Humanetics	Test Technician	S. Keller
ATD Serial Number	9798	Laboratory Supervisor	M. Goehle

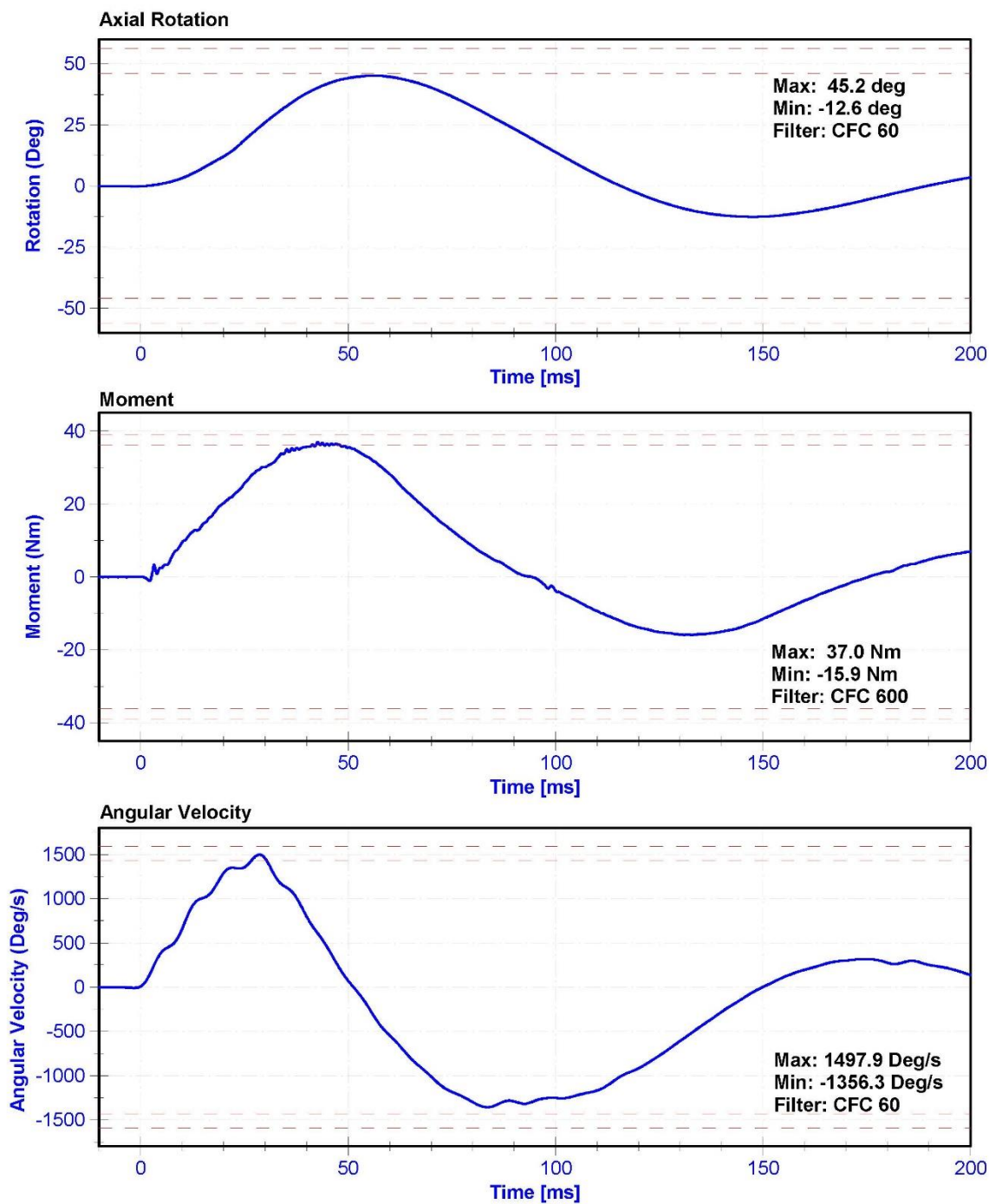
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	45.2	Pass
Velocity	4.95	5.05	m/s	5.045	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.798	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.733	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.670	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.596	Pass
Peak Upper Neck Z Moment	36.1	39.0	Nm	37.02	Pass
Peak Neck Axial Rotation	46.0	56.3	deg	45.16	Fail
Rotation Decay Time to Zero	50.9	62.2	ms	59.45	Pass
Peak Upper Neck Angular Velocity	1431	1591	deg/s	1497.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Neck Fixture Potentiometer	Servo 14CB1-3615	DS-0001	10/21/2015	10/20/2016
Upper Neck Load Cell	Humanetics 10380J14	LC-76 MZ	8/10/2016	8/10/2017
Upper Neck ARS	DTS ARS-PRO-8K	ARS-6424	1/19/2016	1/18/2017





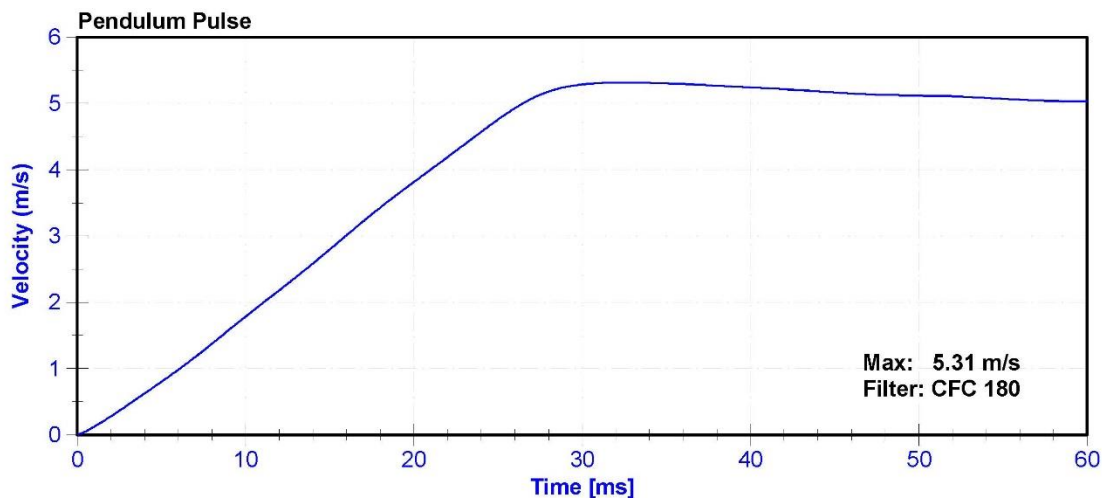
ATD Manufacturer	Humanetics	Test Technician	S. Keller
ATD Serial Number	9798	Laboratory Supervisor	M. Goehle

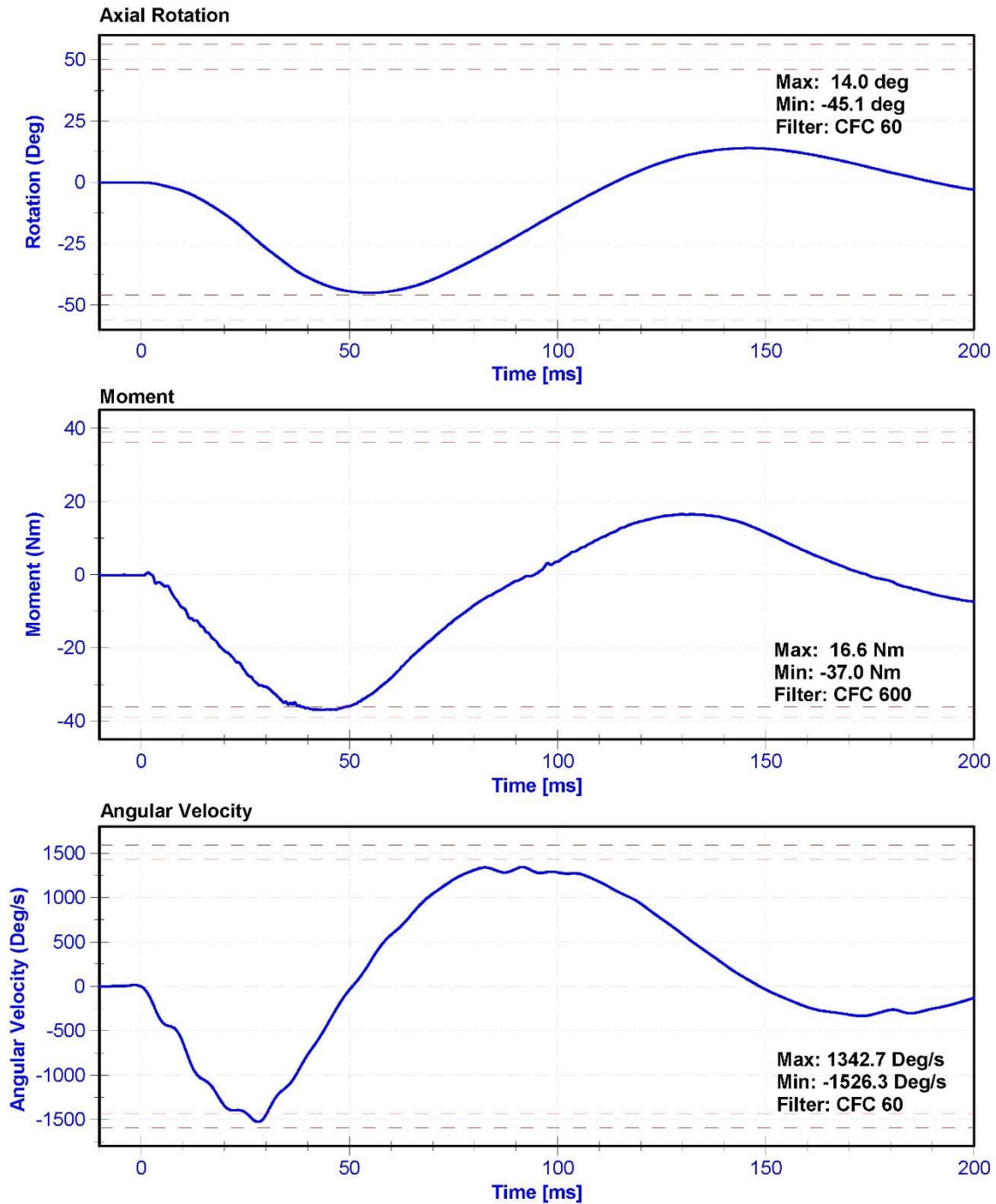
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	48.6	Pass
Velocity	4.95	5.05	m/s	5.045	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.785	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.797	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.816	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.758	Pass
Peak Upper Neck Z Moment	36.1	39.0	Nm	37.00	Pass
Peak Neck Axial Rotation	46.0	56.3	deg	45.11	Fail
Rotation Decay Time to Zero	50.9	62.2	ms	44.55	Fail
Peak Upper Neck Angular Velocity	1431	1591	deg/s	1526.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Neck Fixture Potentiometer	Servo 14CB1-3615	DS-0001	10/21/2015	10/20/2016
Upper Neck Load Cell	Humanetics 10380JI4	LC-76 MZ	8/10/2016	8/10/2017
Upper Neck ARS	DTS ARS-PRO-8K	ARS-6424	1/19/2016	1/18/2017





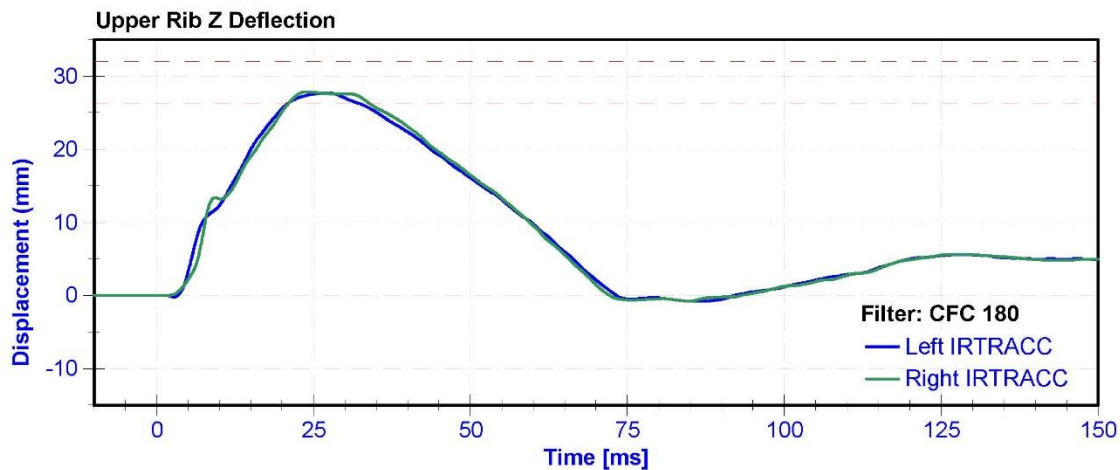
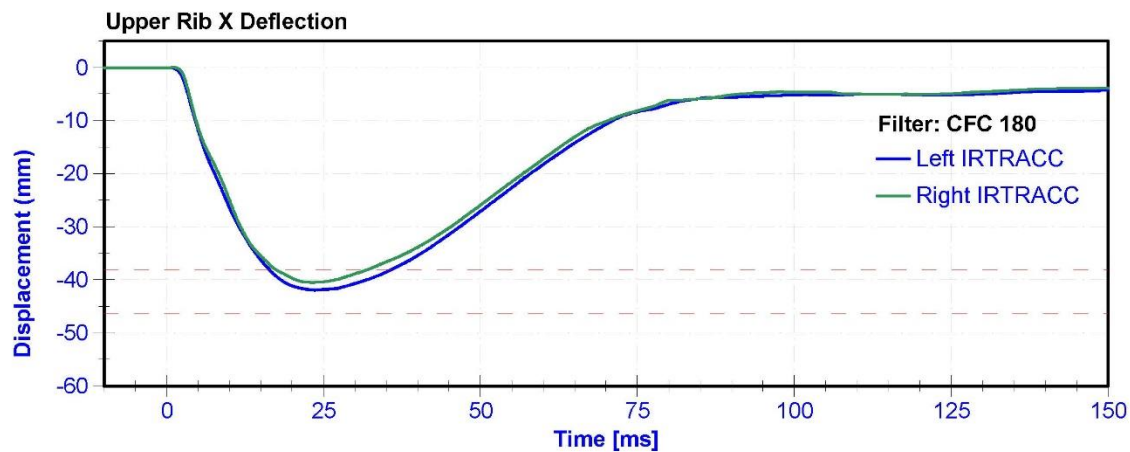
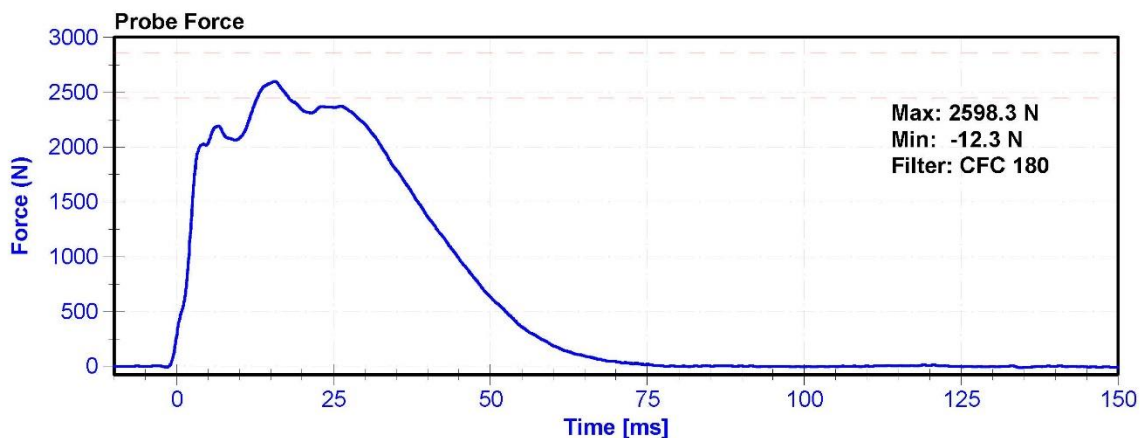
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

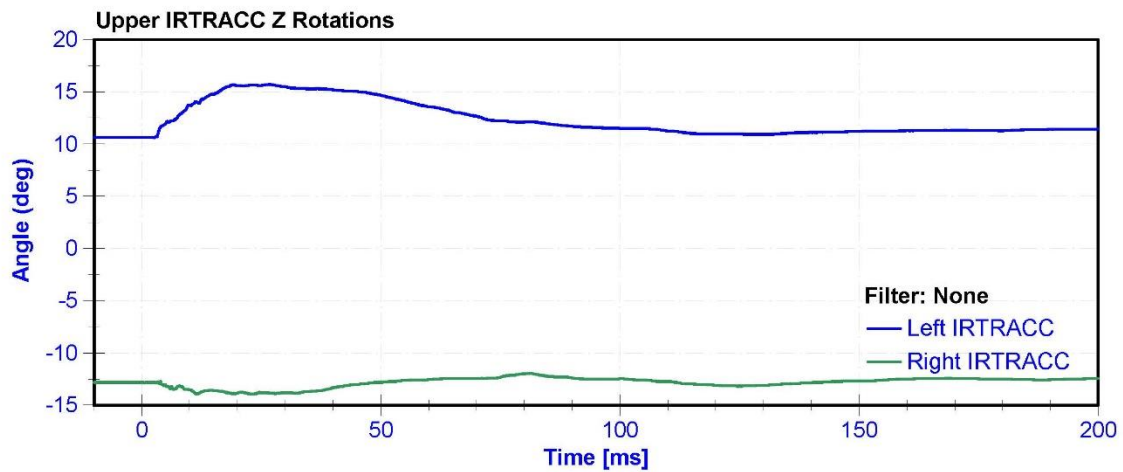
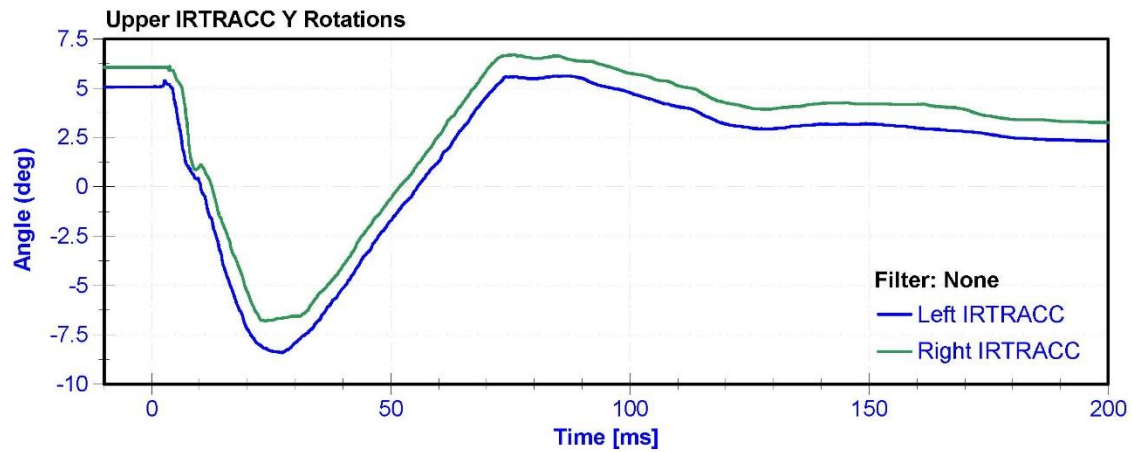
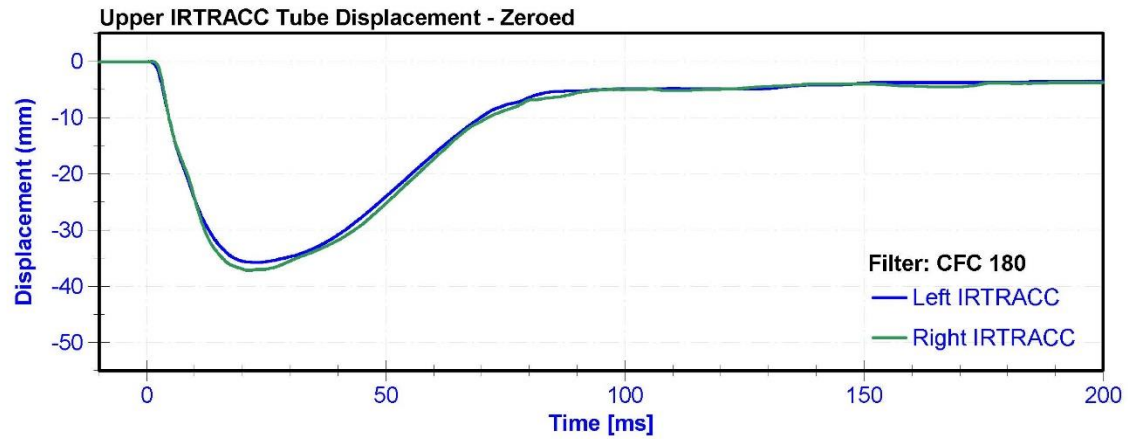
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22.2	Pass
Humidity	10	70	%	47.6	Pass
Impact Velocity	4.25	4.35	m/s	4.293	Pass
Probe Force	2449	2855	N	2598.3	Pass
Upper Left X Rib Deflection	-46.4	-38.0	mm	-41.95	Pass
Upper Right X Rib Deflection	-46.4	-38.0	mm	-40.50	Pass
Left/Right X Rib Deviation	-7.00	7.00	mm	-1.443	Pass
Upper Left Z Rib Deflection	26.2	32.0	mm	27.74	Pass
Upper Right Z Rib Deflection	26.2	32.0	mm	27.84	Pass
Left/Right Z Rib Deviation	-7	7.00	mm	-0.097	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P16593	9/8/2015	9/7/2016
Upper Left IRTRACC	Humanetics IF-364-C-R3	DS-DQ2255	8/22/2016	8/22/2017
Upper Left Y Potentiometer	Sfernice 9945	DS-DM4779	8/22/2016	8/22/2017
Upper Left Z Potentiometer	Sfernice 9945	DS-DM4778	8/22/2016	8/22/2017
Upper Right IRTRACC	Humanetics IF-364-C-R3	DS-DQ2254	8/23/2016	8/23/2017
Upper Right Y Potentiometer	Sfernice 9945	DS-DM4774	8/23/2016	8/23/2017
Upper Right Z Potentiometer	Sfernice 9945	DS-DM4775	8/23/2016	8/23/2017





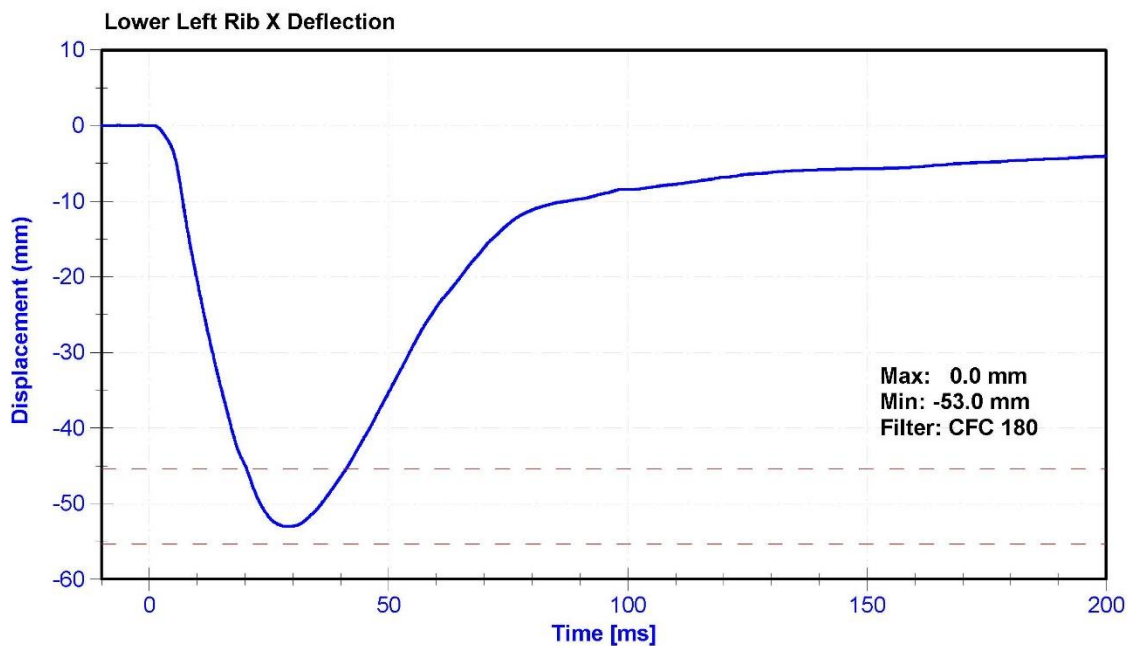
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

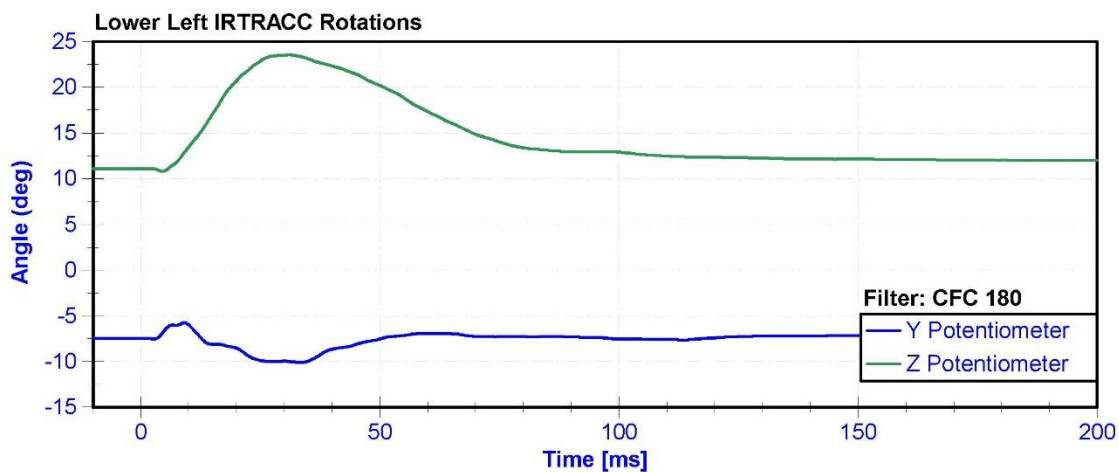
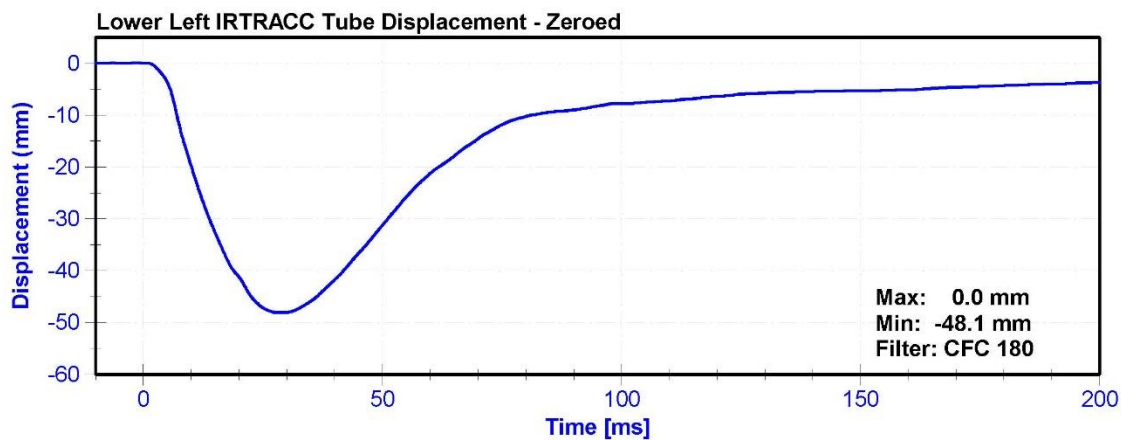
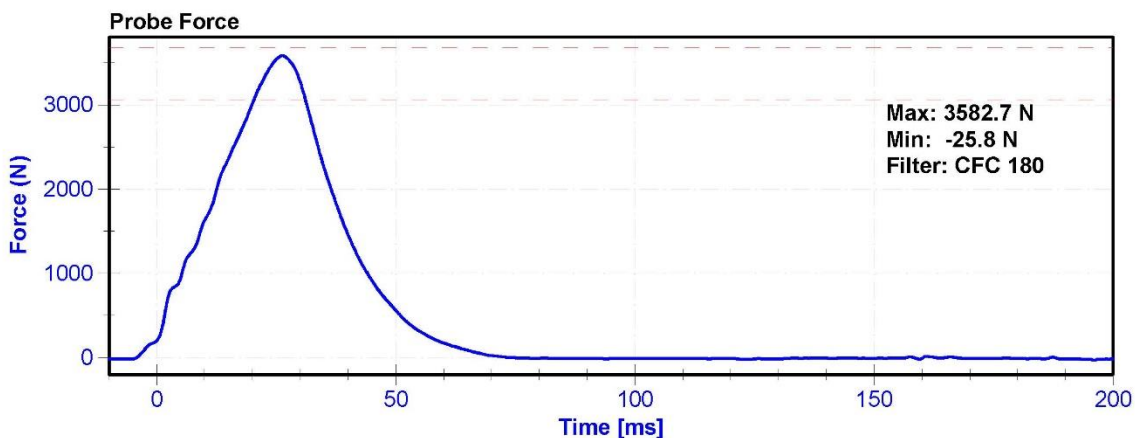
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	44.3	Pass
Impact Velocity	4.25	4.35	m/s	4.287	Pass
Peak Left X Rib Deflection	-55.3	-45.4	mm	-52.99	Pass
Probe Force during Peak Deflection	3058	3680	N	3582.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7264CT	AC-P16593	9/8/2015	9/7/2016
Lower Left IRTACC	Humanetics IF-364-C-R3	DS-DK3866	8/17/2016	8/17/2017
Lower Left Y Potentiometer	Sfernice 9945	DS-DJ5455	8/17/2016	8/17/2017
Lower Left Z Potentiometer	Sfernice 9945	DS-DJ5454	8/17/2016	8/17/2017





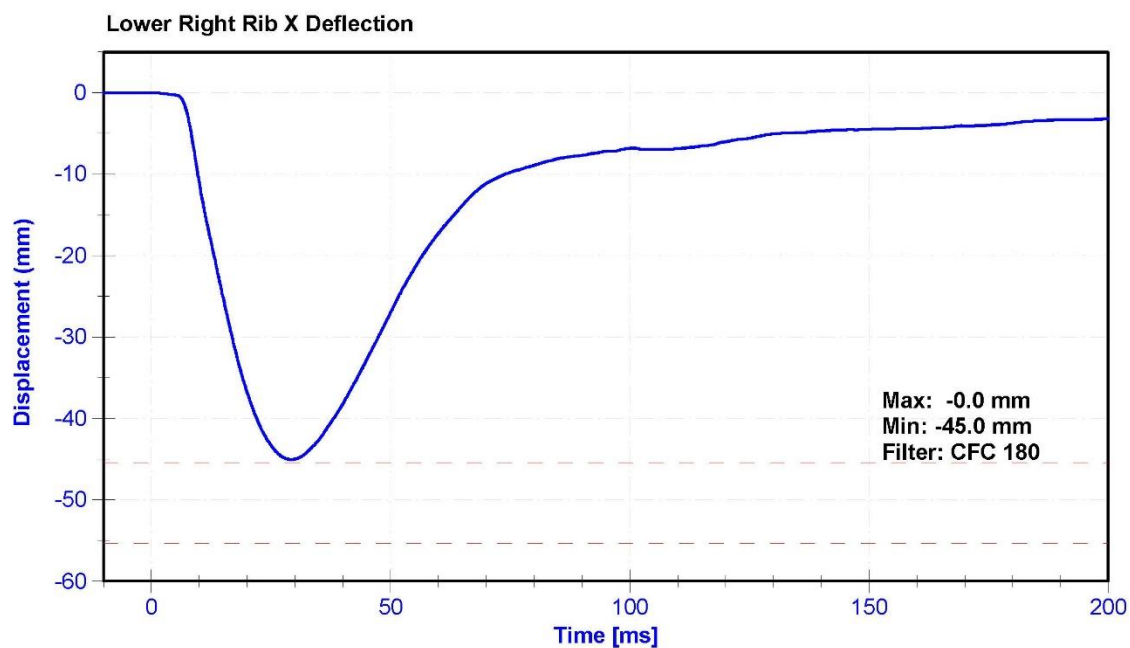
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

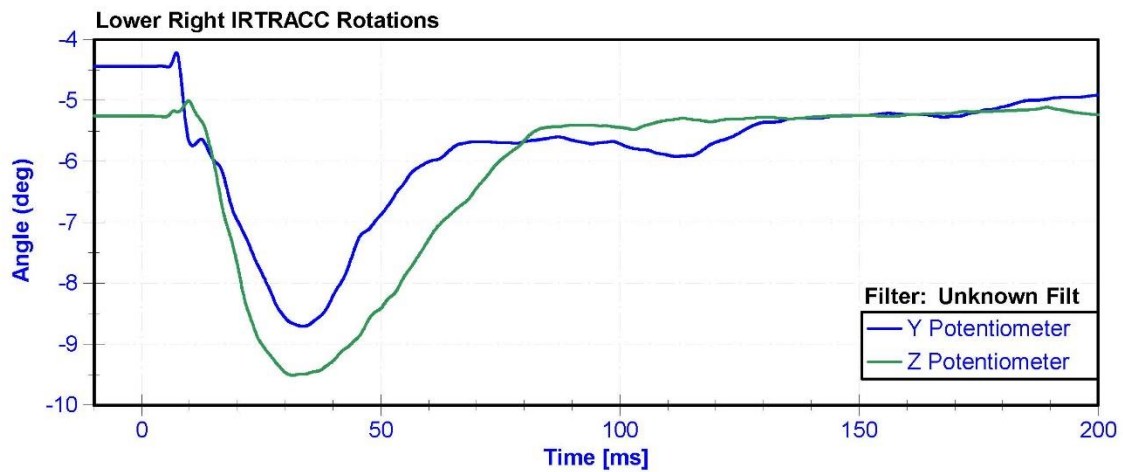
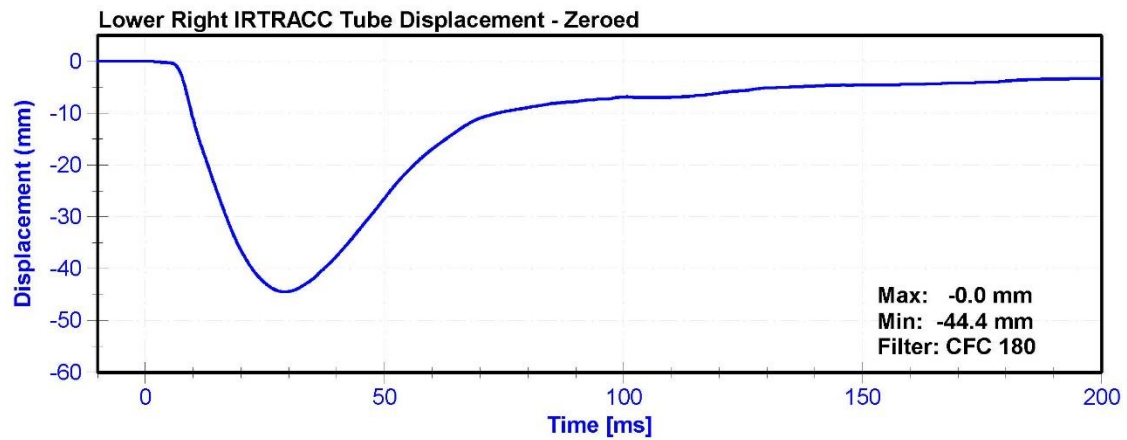
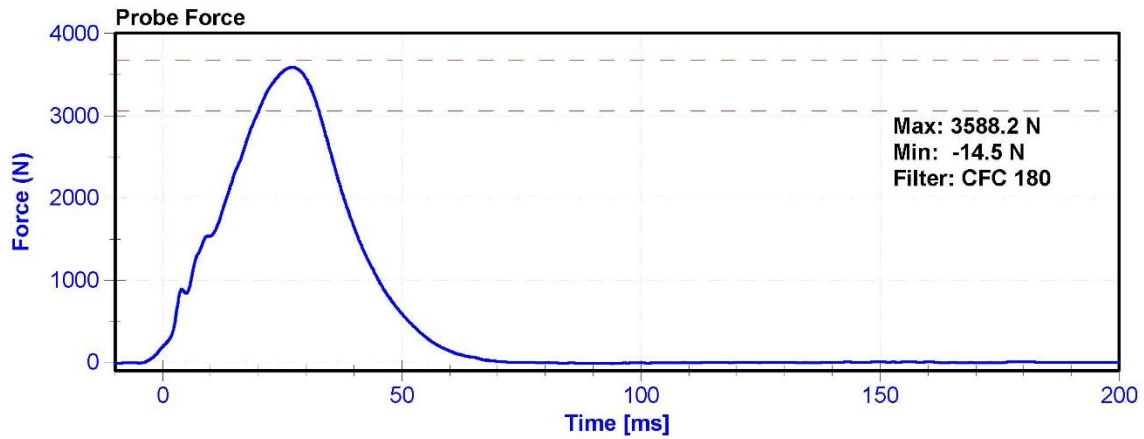
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	42.8	Pass
Impact Velocity	4.25	4.35	m/s	4.293	Pass
Peak Right X Rib Deflection	-55.3	-45.4	mm	-45.04	Fail
Probe Force during Peak Deflection	3058	3680	N	3588.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7264CT	AC-P16593	9/8/2015	9/7/2016
Lower Right IRTACC	Humanetics IF-364-C-R3	DS-DK3865	8/22/2016	8/22/2017
Lower Right Y Potentiometer	Sfernice 9945	DS-DJ5453	8/22/2016	8/22/2017
Lower Right Z Potentiometer	Sfernice 9945	DS-DJ5452	8/22/2016	8/22/2017







Certification Report
THOR 50th Abdomen Impact - NHTSA Aug 2016

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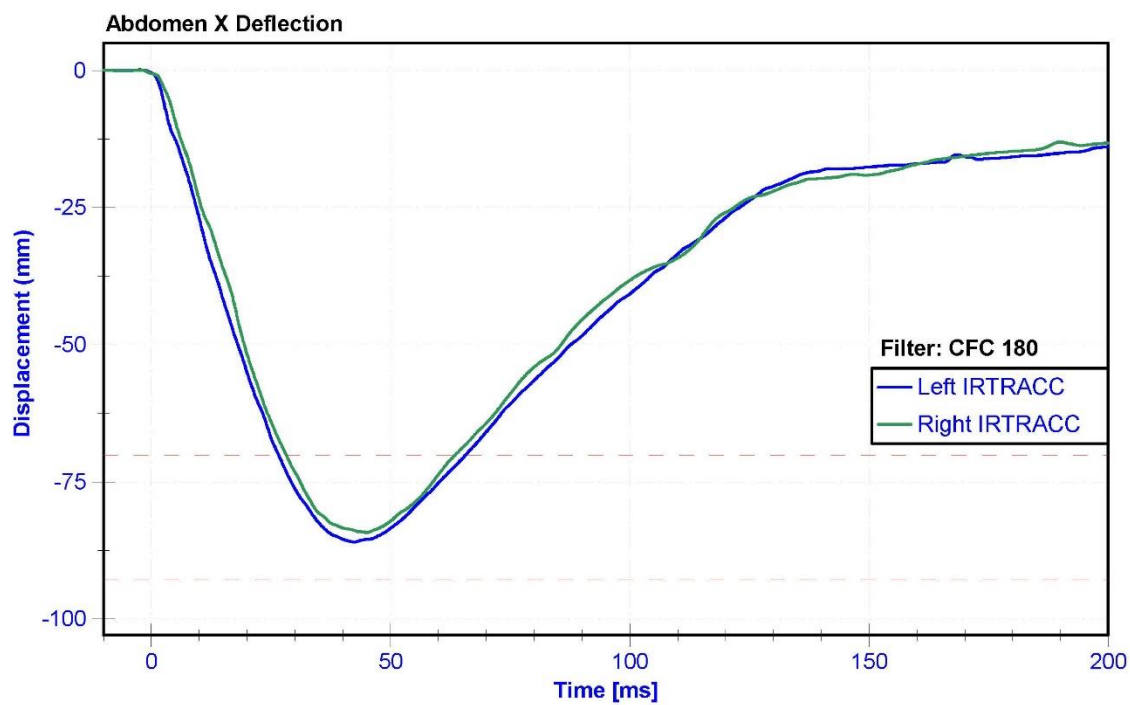
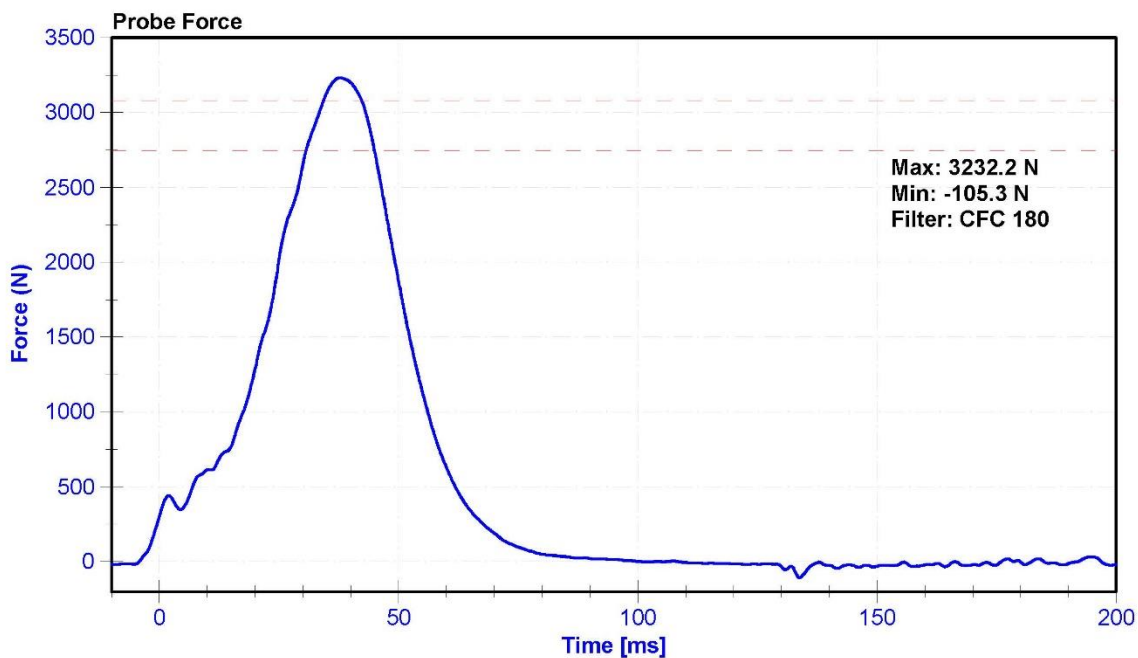
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

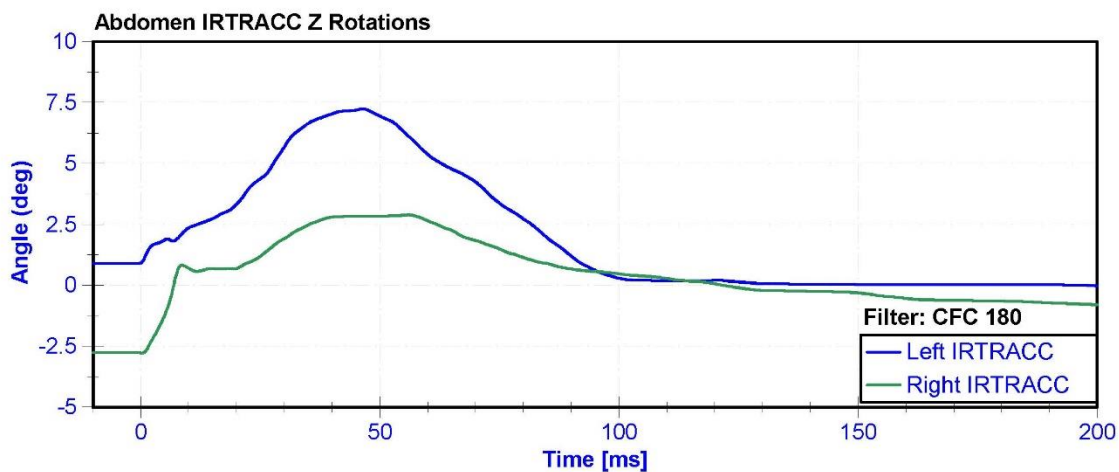
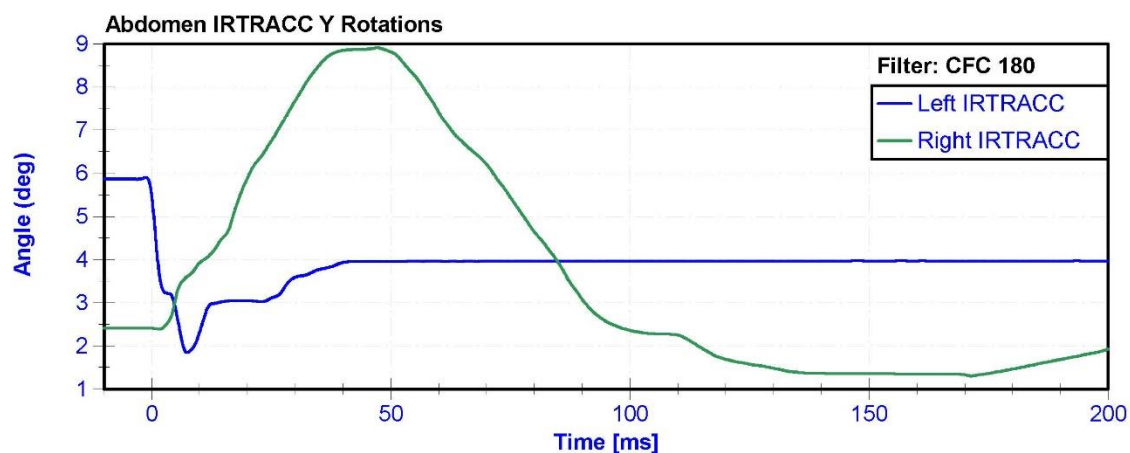
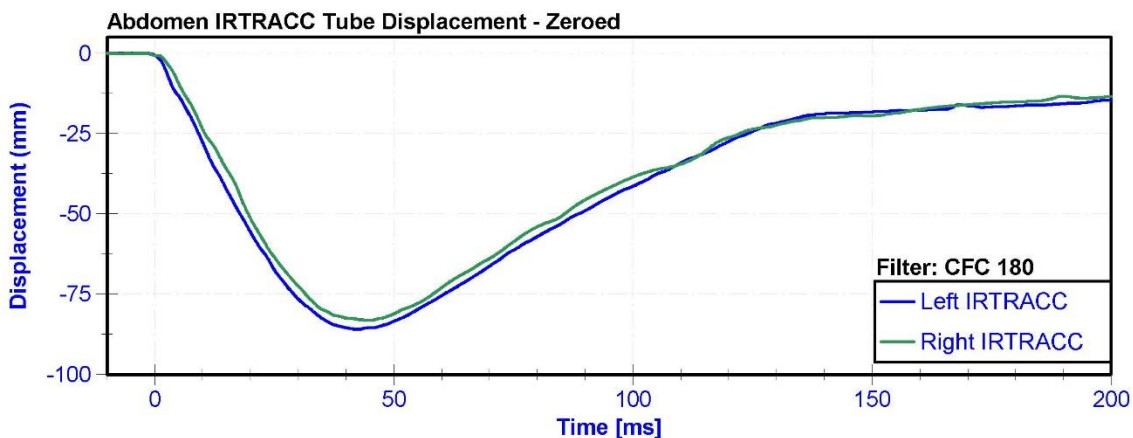
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	51.9	Pass
Impact Velocity	3.25	3.35	m/s	3.288	Pass
Probe Force	2746	3078	N	3232.2	Fail
Left Abdomen X Deflection	-92.9	-70.1	mm	-85.95	Pass
Right Abdomen X Deflection	-92.9	-70.1	mm	-84.20	Pass
Left/Right X Deviation	-12.00	12.00	mm	-1.753	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7264CT	AC-P16593	9/8/2015	9/7/2016
Abdomen Left IRTRACC	Humanetics 472-4750	DS-DP1395	8/17/2016	8/17/2017
Abdomen Left Y Potentiometer	Sfernice 9945	DS-DJ5443	8/17/2016	8/17/2017
Abdomen Left Z Potentiometer	Sfernice 9945	DS-DJ5444	8/17/2016	8/17/2017







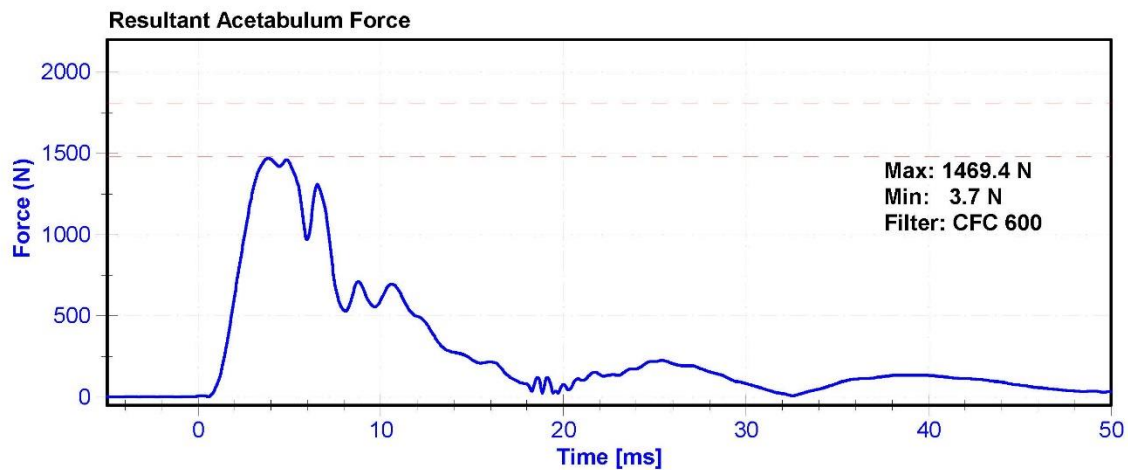
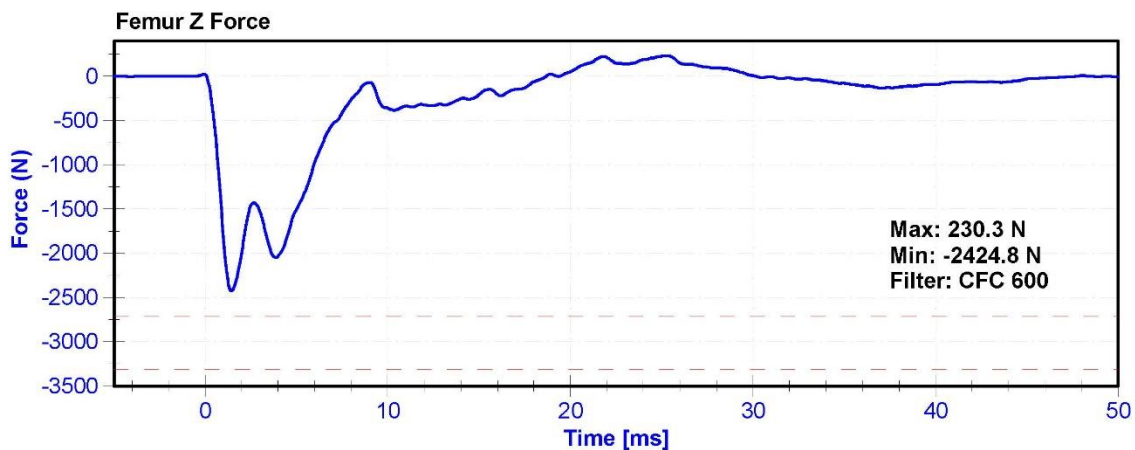
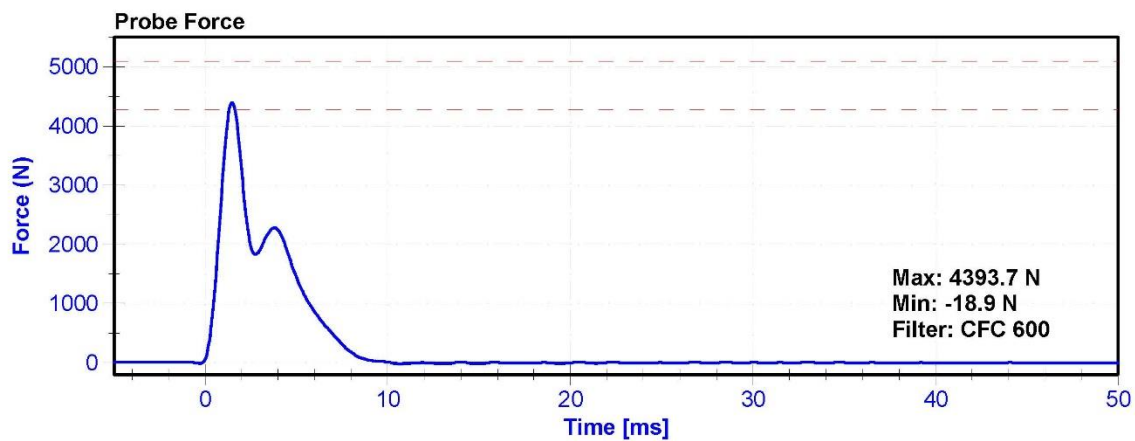
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	59.9	Pass
Impact Velocity	2.55	2.65	m/s	2.636	Pass
Probe Force	4278	5093	N	4393.7	Pass
Peak Femur Z Force	-3314	-2712	N	-2424.77	Fail
Peak Resultant Acetabulum Force	1478	1806	N	1469.36	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7264CT	AC-P16593	9/8/2015	9/7/2016
Left Femur Load Cell	Humanetics W50-71010	LC-DK3608 FZ	8/23/2016	8/23/2017
Left Acetabulum Load Cell	Humanetics 10670JI4	LC-DM1945 FX	8/23/2016	8/23/2017



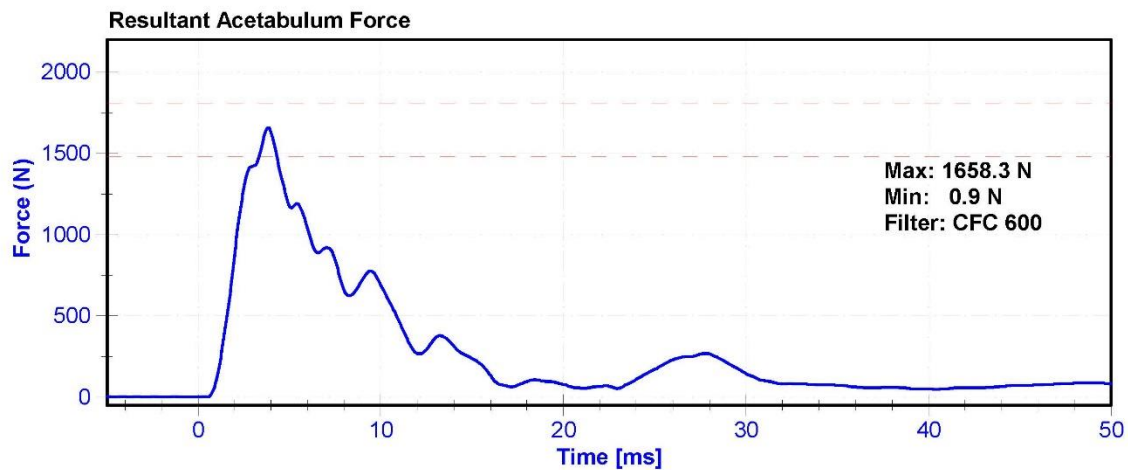
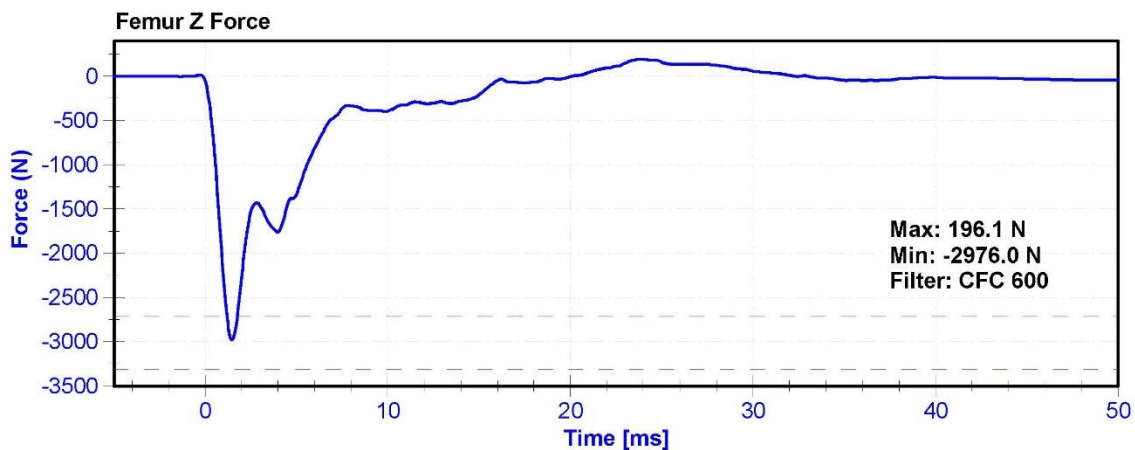
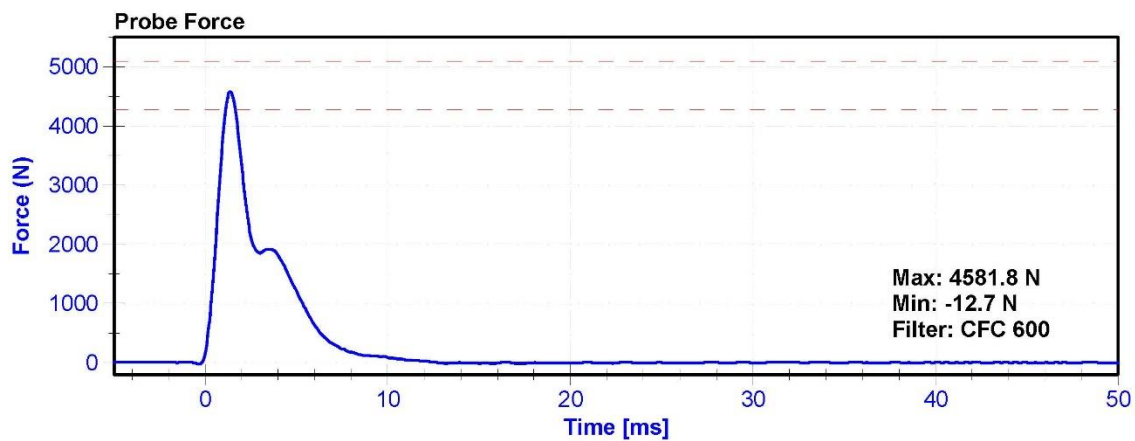
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	59.9	Pass
Impact Velocity	2.55	2.65	m/s	2.636	Pass
Probe Force	4278	5093	N	4581.8	Pass
Peak Femur Z Force	-3314	-2712	N	-2975.98	Pass
Peak Resultant Acetabulum Force	1478	1806	N	1658.25	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7264CT	AC-P16593	9/8/2015	9/7/2016
Left Femur Load Cell	Humanetics W50-71010	LC-DK0842 FZ	8/23/2016	8/23/2017
Left Acetabulum Load Cell	Humanetics 10530JI4	LC-DL9552 FX	8/23/2016	8/23/2017





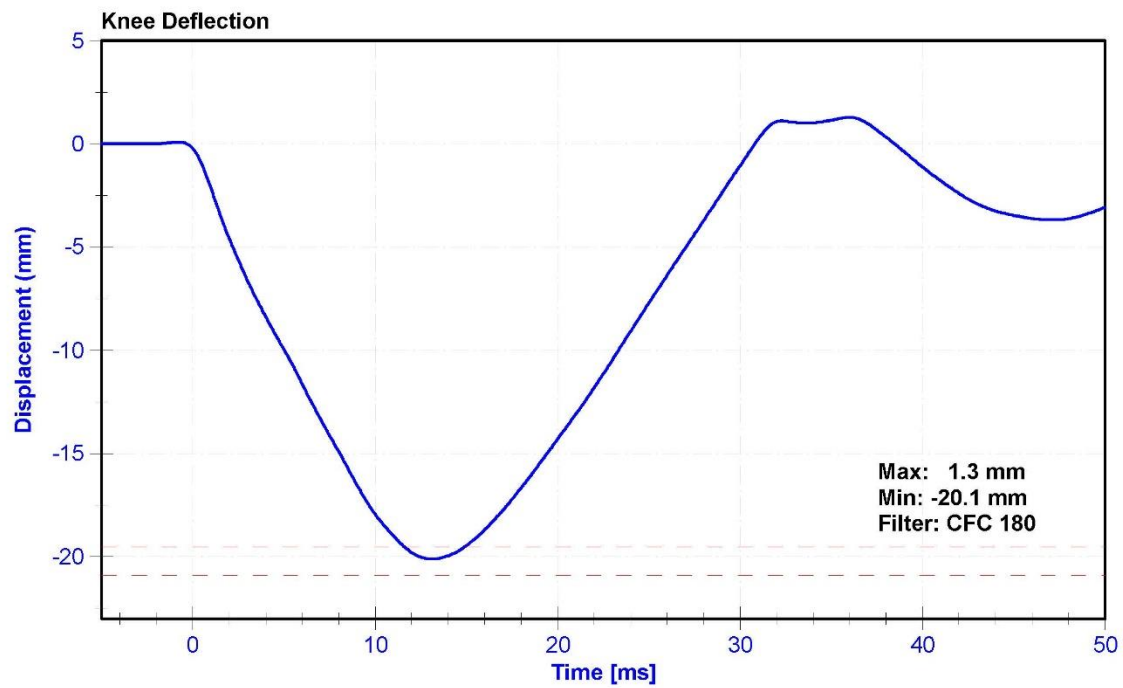
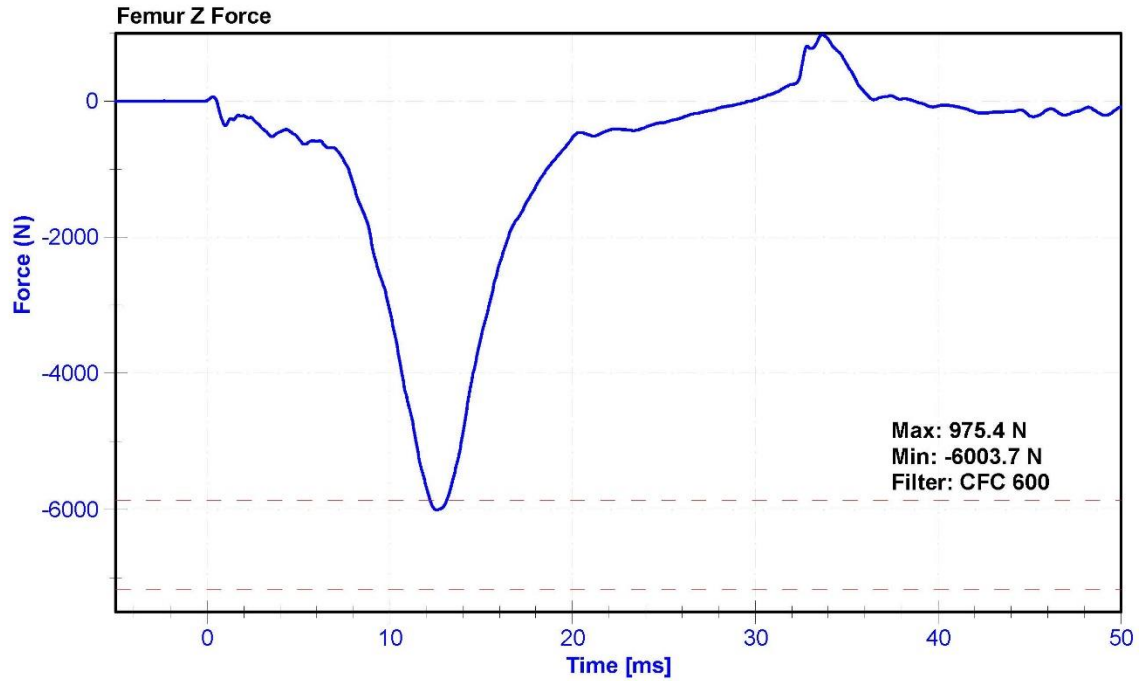
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	53.6	Pass
Impact Velocity	2.15	2.25	m/s	2.238	Pass
Peak Femur Z Force	-7170	-5866	N	-6003.7	Pass
Knee Deflection at Peak Force	-20.9	-19.5	mm	-20.11	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7264CT	AC-P16593	9/8/2015	9/7/2016
Femur Load Cell	Humanetics W50-71010	LC-DK3608 FZ	8/23/2016	8/23/2017
Knee Potentiometer	Space Age 150-0121V	DS-13073811	8/23/2016	8/23/2017



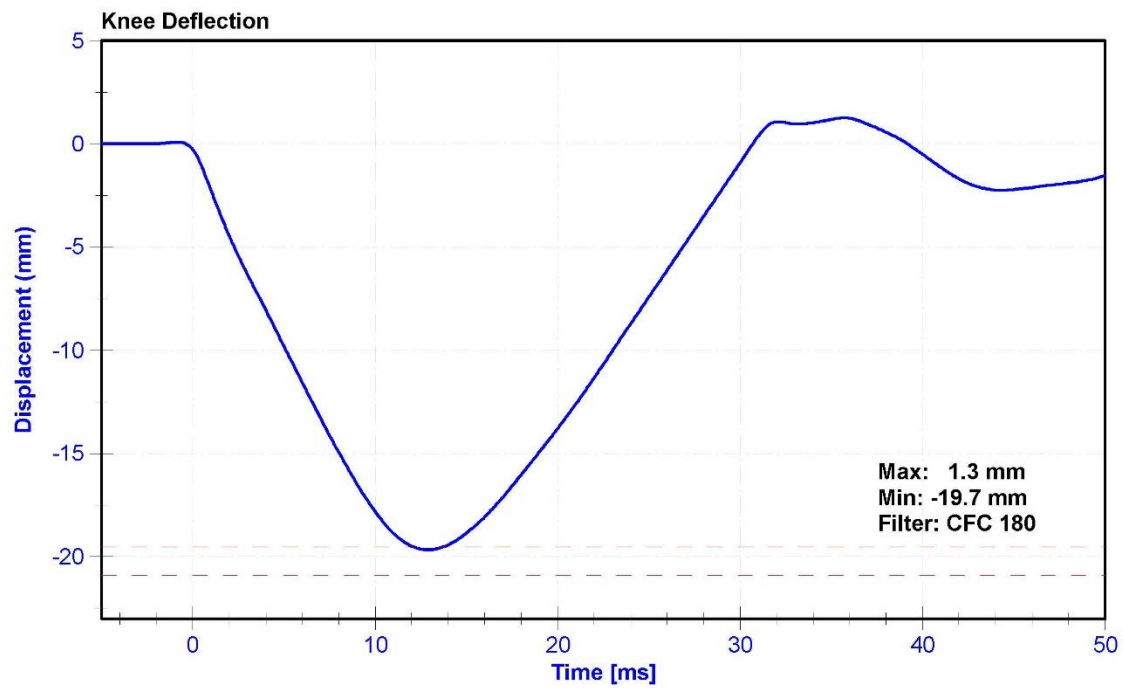
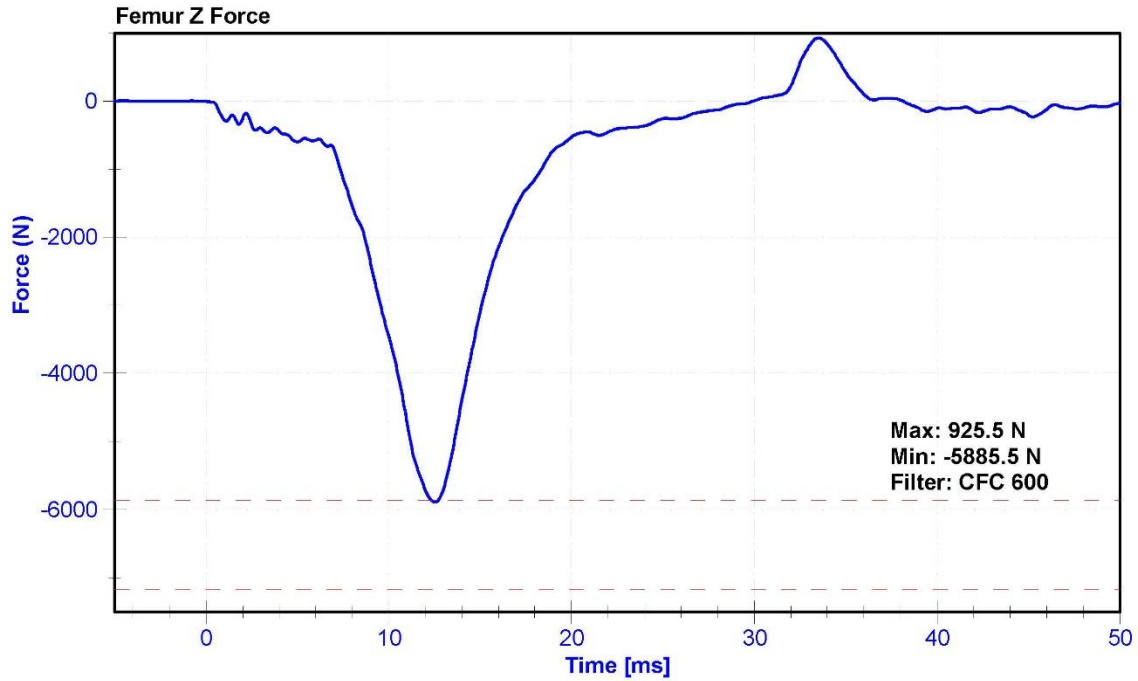
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	50.9	Pass
Impact Velocity	2.15	2.25	m/s	2.214	Pass
Peak Femur Z Force	-7170	-5866	N	-5885.5	Pass
Knee Deflection at Peak Force	-20.9	-19.5	mm	-19.66	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7264CT	AC-P16593	9/8/2015	9/7/2016
Femur Load Cell	Humanetics W50-71010	LC-DK0842 FZ	8/23/2016	8/23/2017
Knee Potentiometer	Space Age 150-0121V	DS-13073814	8/23/2016	8/23/2017





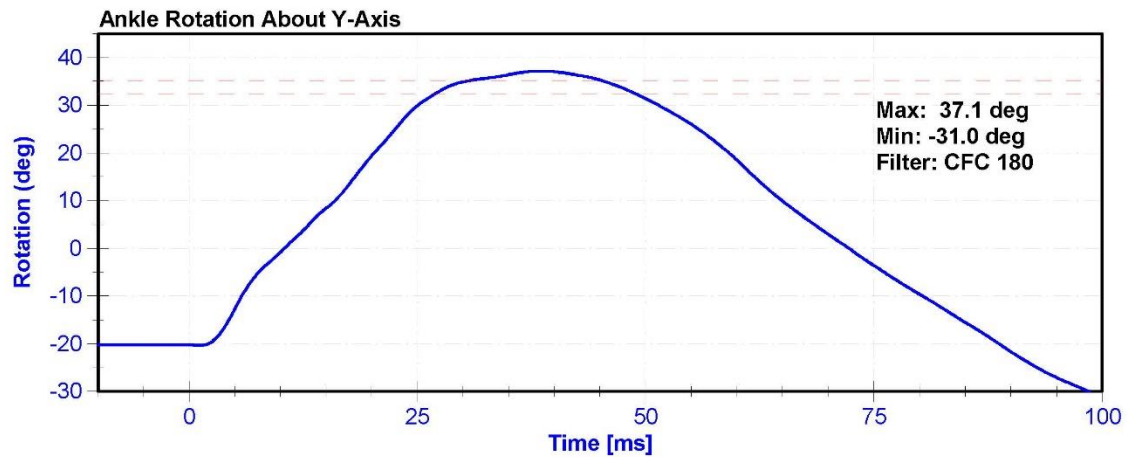
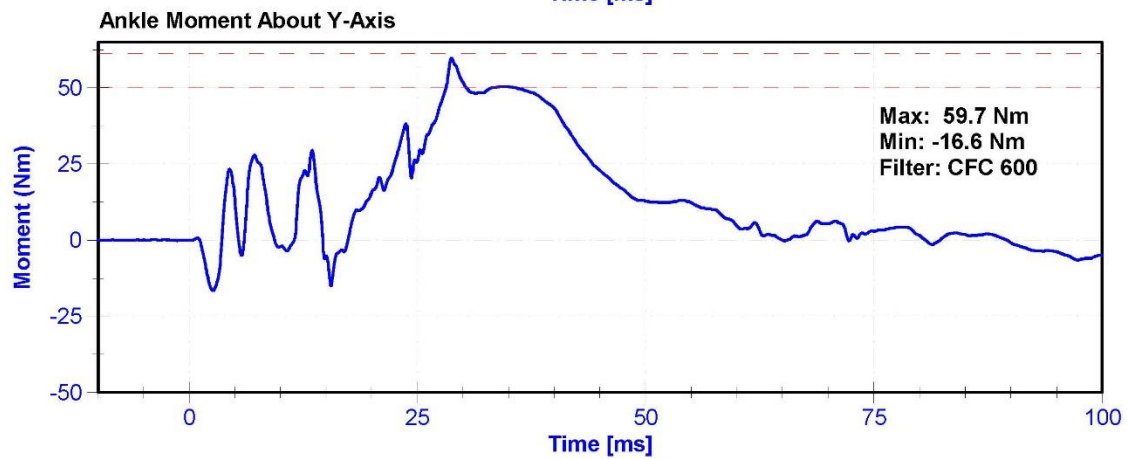
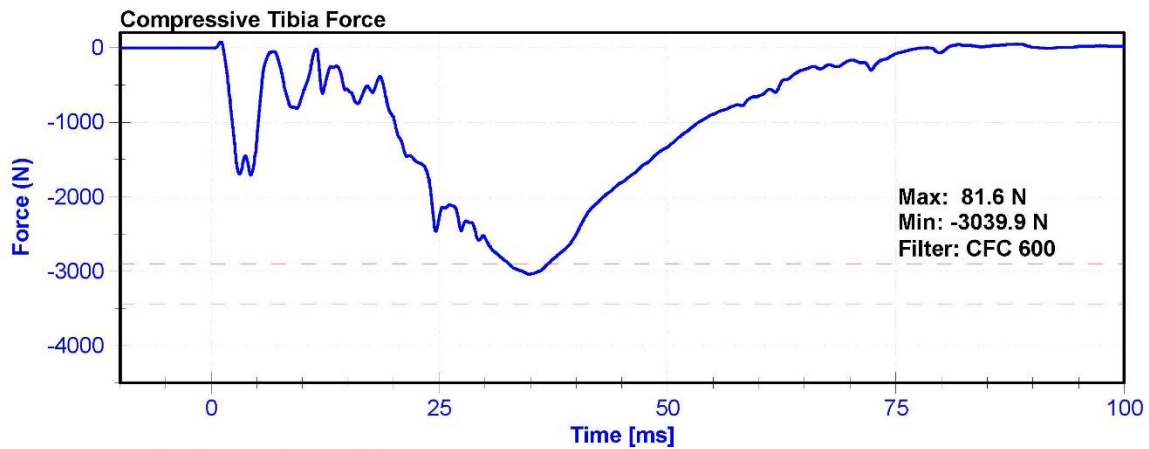
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	55.0	Pass
Velocity	4.9	5.1	m/s	4.961	Pass
Lower Tibia Compressive Force	-3437	-2897	N	-3039.9	Pass
Peak Moment about Y-Axis	50.2	61.3	Nm	59.69	Pass
Peak Rotation about Y-Axis	32.5	35.1	deg	37.13	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	9/13/2016	9/13/2017
Lower Tibia Load Cell	Denton 9329J	LC-DQ9685 FZ	8/23/2016	8/23/2017
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-005	8/18/2016	8/18/2017





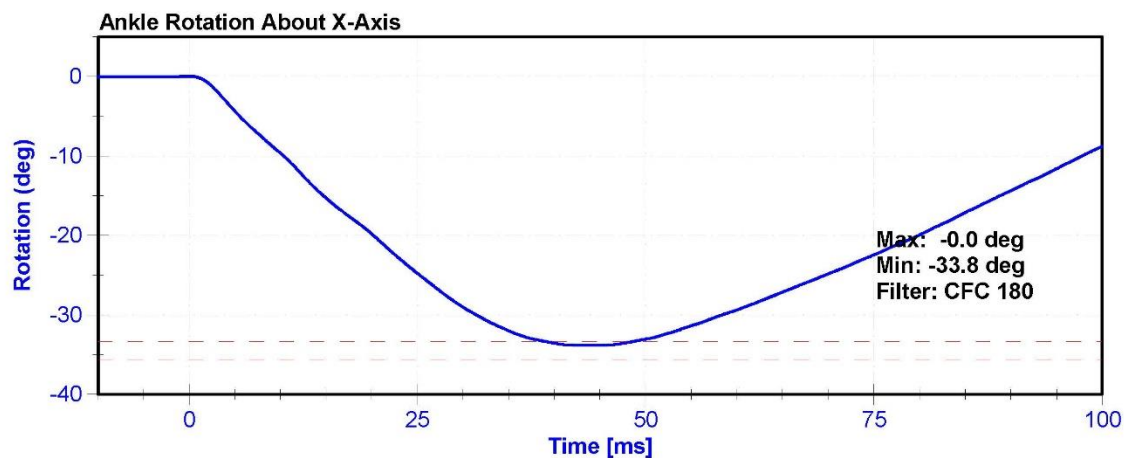
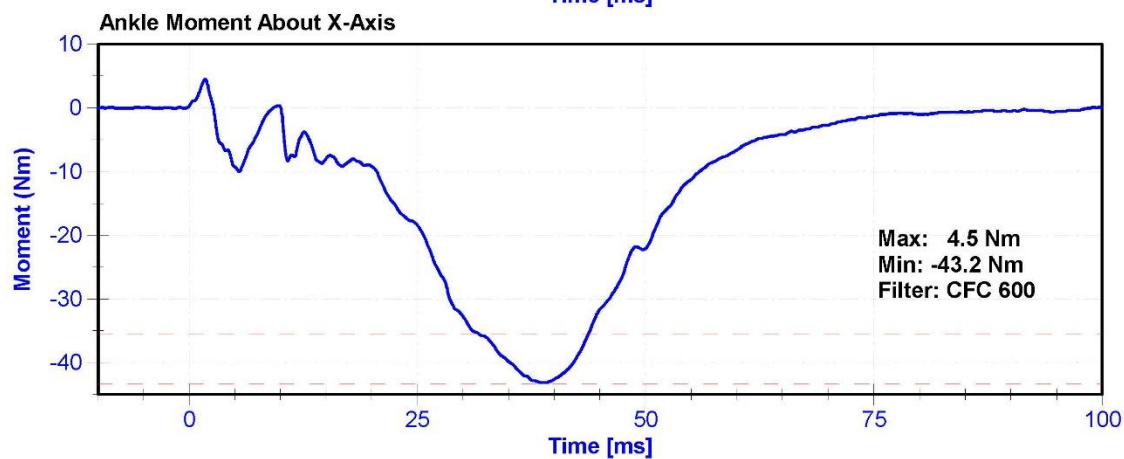
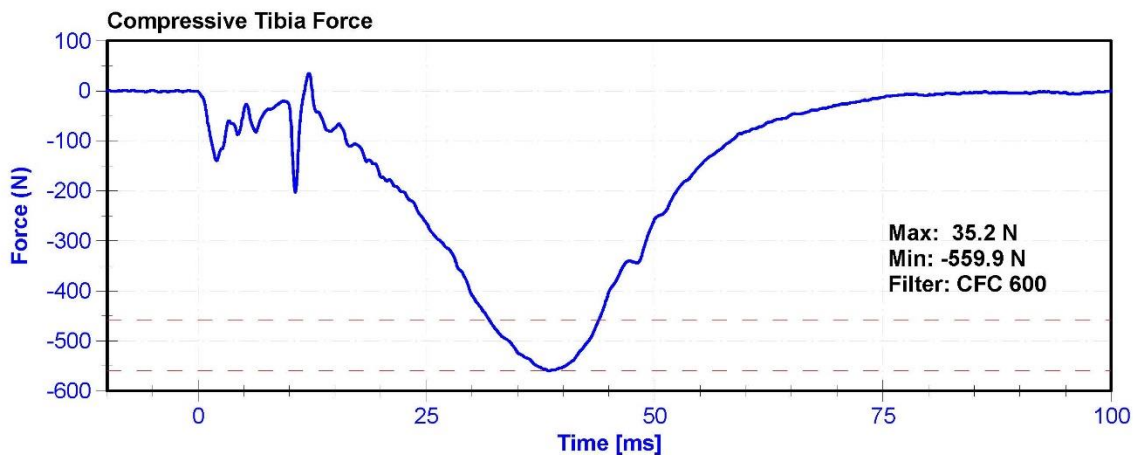
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	54.7	Pass
Velocity	1.9	2.1	m/s	1.997	Pass
Lower Tibia Compressive Force	-560	-458	N	-559.9	Pass
Peak Moment about X-Axis	-43.4	-35.5	Nm	-43.16	Pass
Peak Rotation about X-Axis	-35.6	-33.3	deg	-33.84	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	9/13/2016	9/13/2017
Lower Tibia Load Cell	Denton 9329J	LC-DQ9685 FZ	8/23/2016	8/23/2017
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-004	8/18/2016	8/18/2017



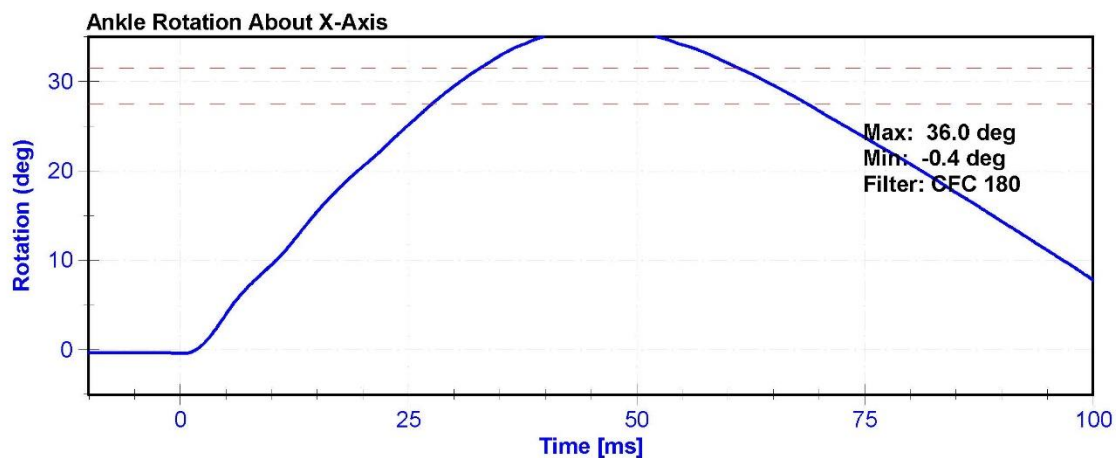
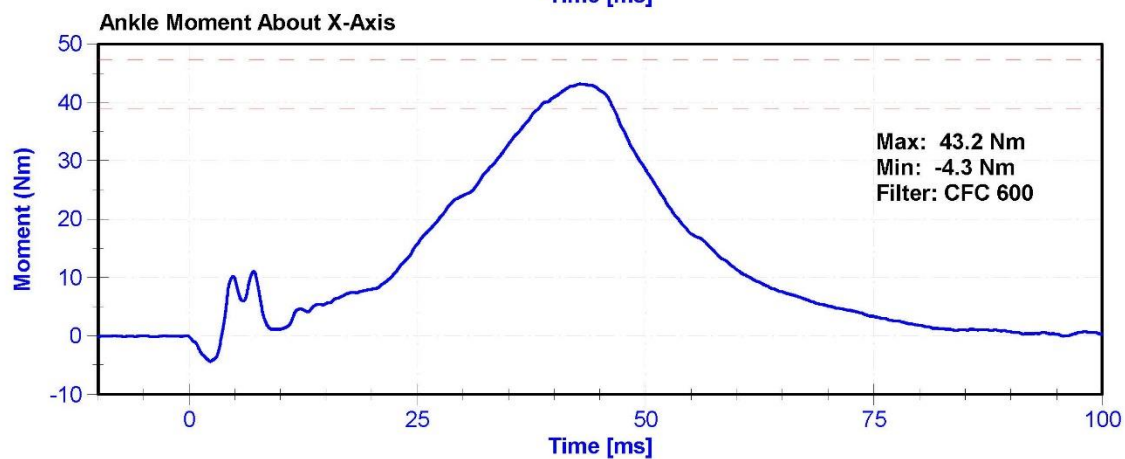
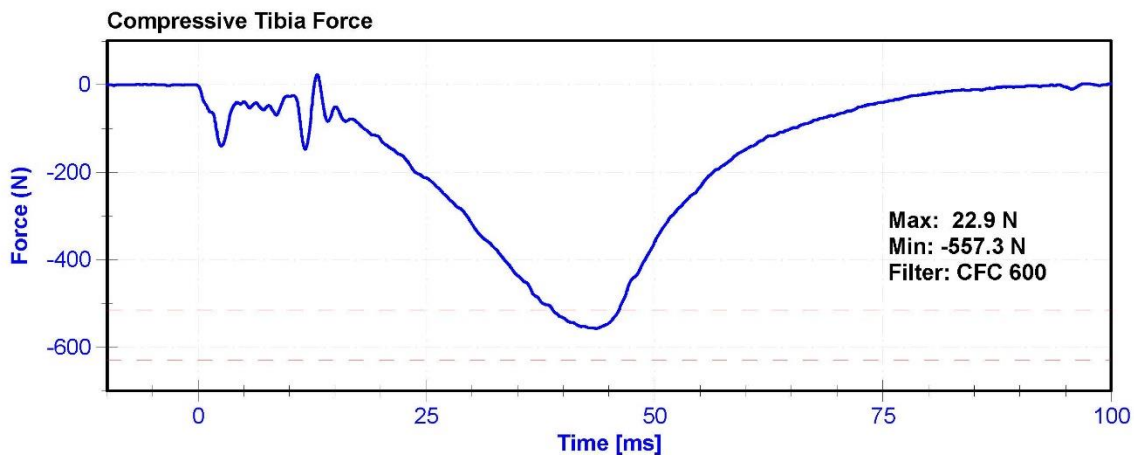
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	49.9	Pass
Velocity	1.9	2.1	m/s	1.972	Pass
Lower Tibia Compressive Force	-629	-515	N	-557.3	Pass
Peak Moment about X-Axis	38.8	47.3	Nm	43.18	Pass
Peak Rotation about X-Axis	27.5	31.5	deg	35.95	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	9/13/2016	9/13/2017
Lower Tibia Load Cell	Denton 9329J	LC-DQ9685 FZ	8/23/2016	8/23/2017
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-004	8/18/2016	8/18/2017



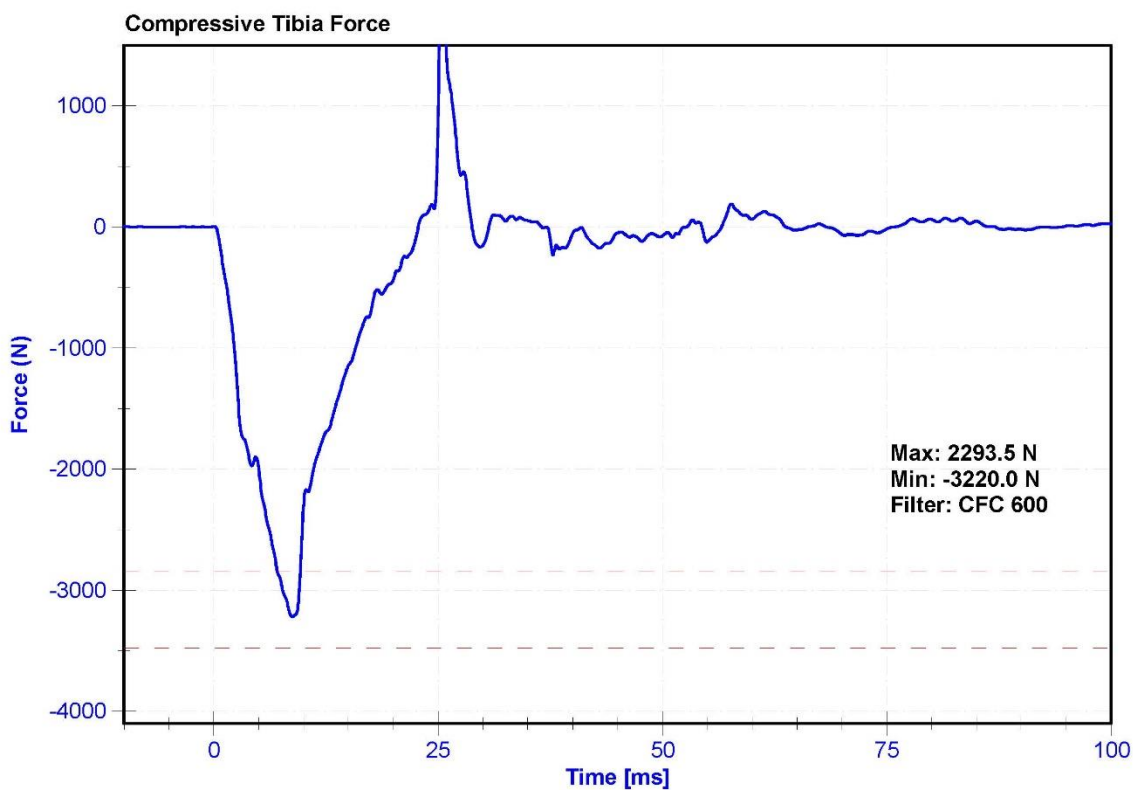
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	47.5	Pass
Velocity	3.9	4.1	m/s	4.071	Pass
Lower Tibia Compressive Force	-3477	-2845	N	-3220.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	9/13/2016	9/13/2017
Lower Tibia Load Cell	Denton 9329J	LC-DQ9685 FZ	8/23/2016	8/23/2017



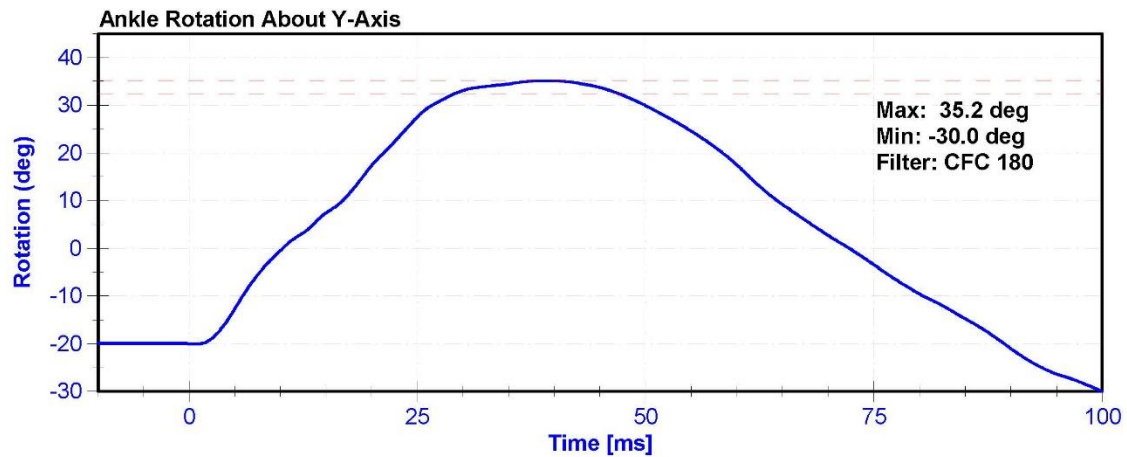
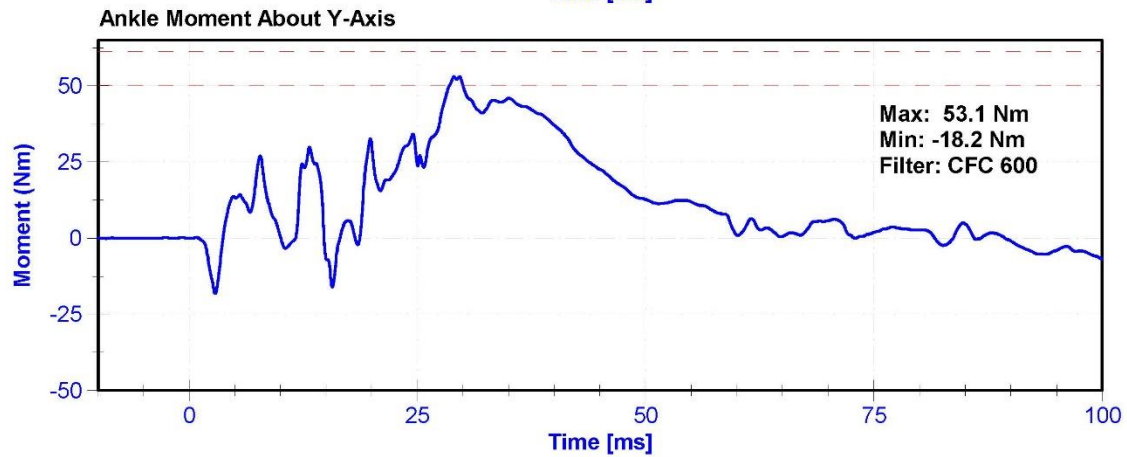
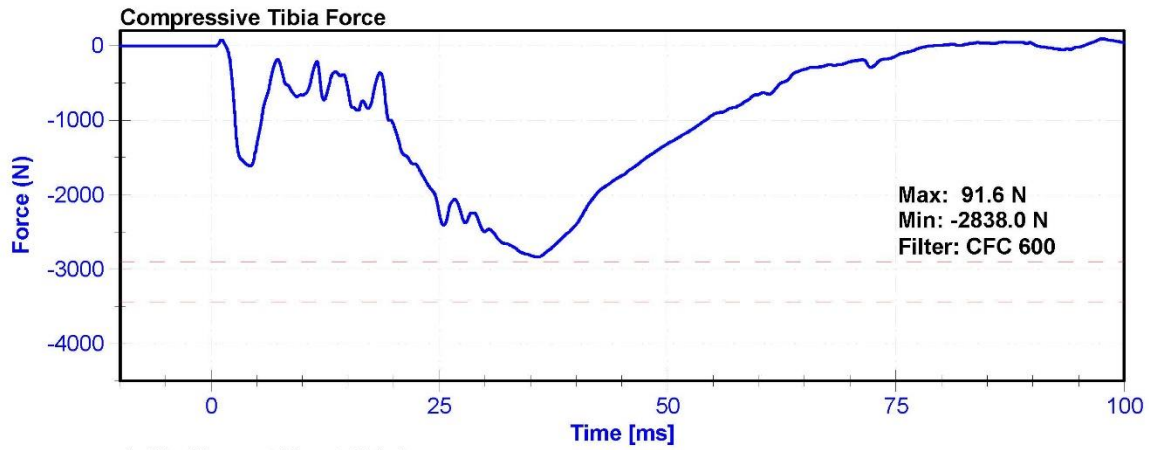
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	52.6	Pass
Velocity	4.9	5.1	m/s	5.000	Pass
Lower Tibia Compressive Force	-3437	-2897	N	-2838.0	Fail
Peak Moment about Y-Axis	50.2	61.3	Nm	53.11	Pass
Peak Rotation about Y-Axis	32.5	35.1	deg	35.16	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	9/13/2016	9/13/2017
Lower Tibia Load Cell	Denton 9329J	LC-DQ9684 FZ	8/23/2016	8/23/2017
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-002	8/18/2016	8/18/2017



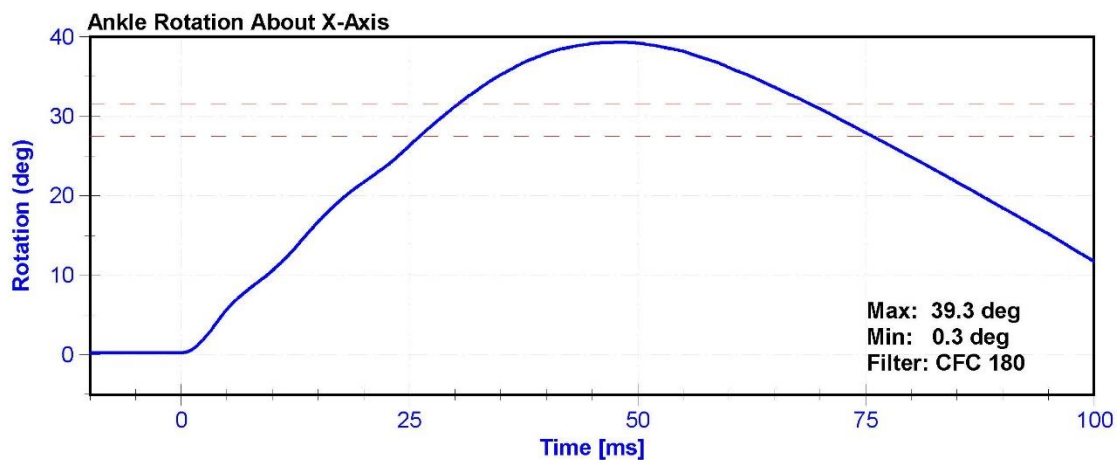
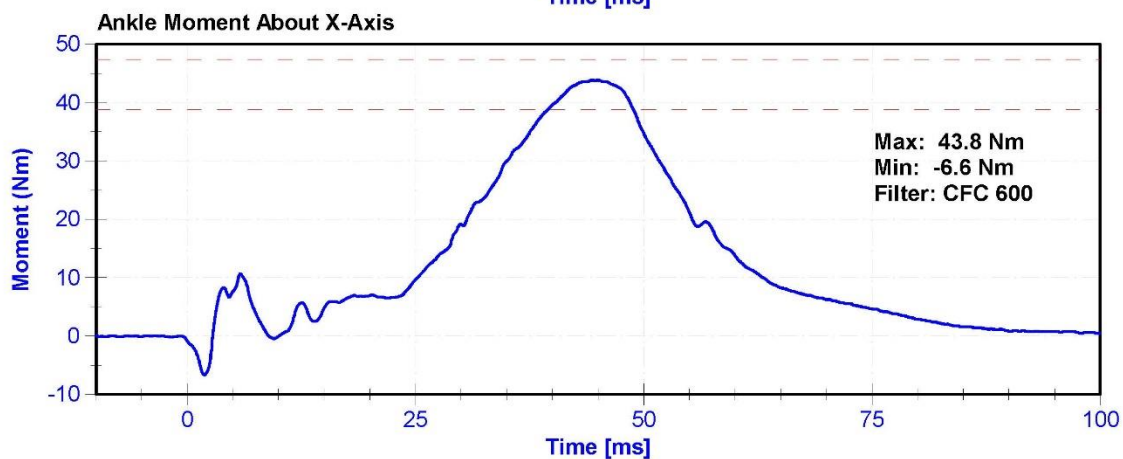
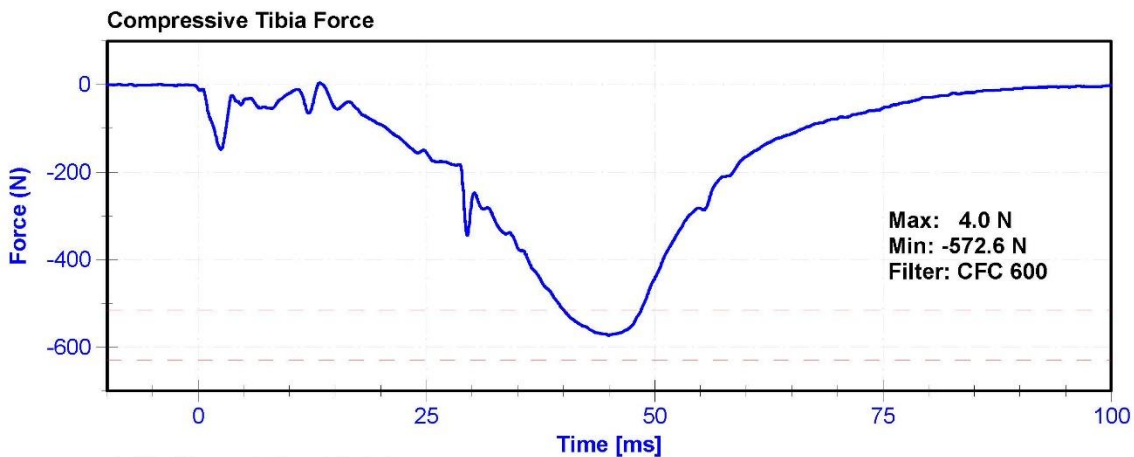
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	49.5	Pass
Velocity	1.9	2.1	m/s	1.972	Pass
Lower Tibia Compressive Force	-629	-515	N	-572.6	Pass
Peak Moment about X-Axis	38.8	47.3	Nm	43.82	Pass
Peak Rotation about X-Axis	27.5	31.5	deg	39.31	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	9/13/2016	9/13/2017
Lower Tibia Load Cell	Denton 9329J	LC-DQ9684 FZ	8/23/2016	8/23/2017
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-001	8/18/2016	8/18/2017



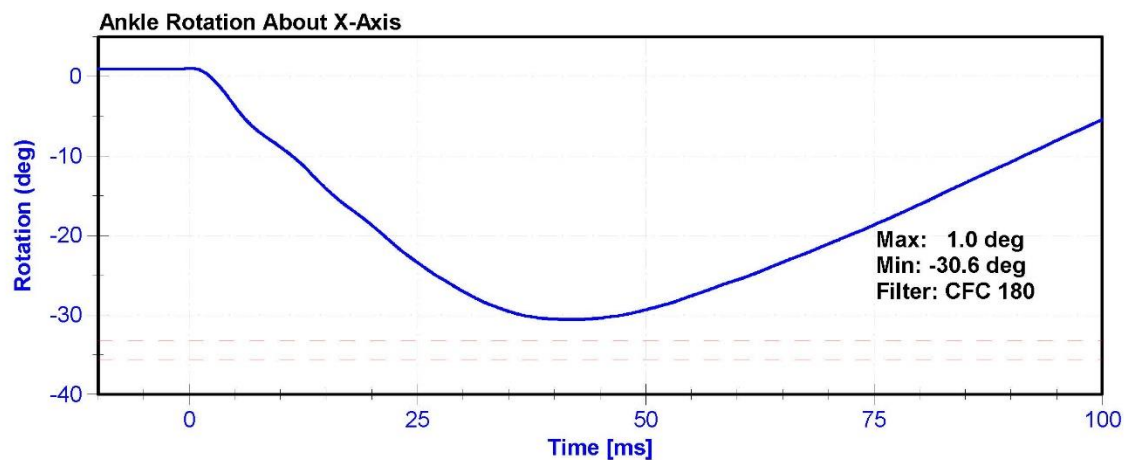
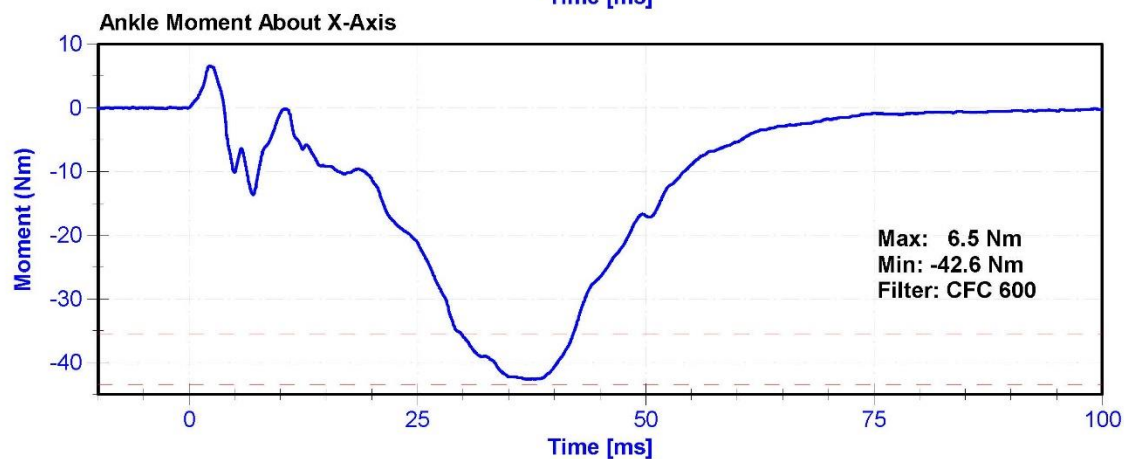
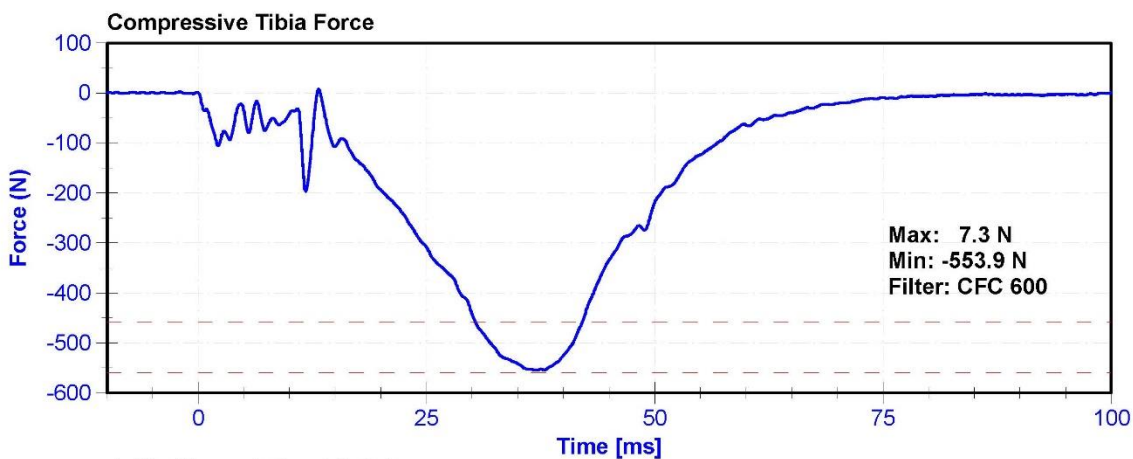
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	D09798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	49.6	Pass
Velocity	1.9	2.1	m/s	1.972	Pass
Lower Tibia Compressive Force	-560	-458	N	-553.9	Pass
Peak Moment about X-Axis	-43.4	-35.5	Nm	-42.59	Pass
Peak Rotation about X-Axis	-35.6	-33.3	deg	-30.57	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	9/13/2016	9/13/2017
Lower Tibia Load Cell	Denton 9329J	LC-DQ9684 FZ	8/23/2016	8/23/2017
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-001	8/18/2016	8/18/2017



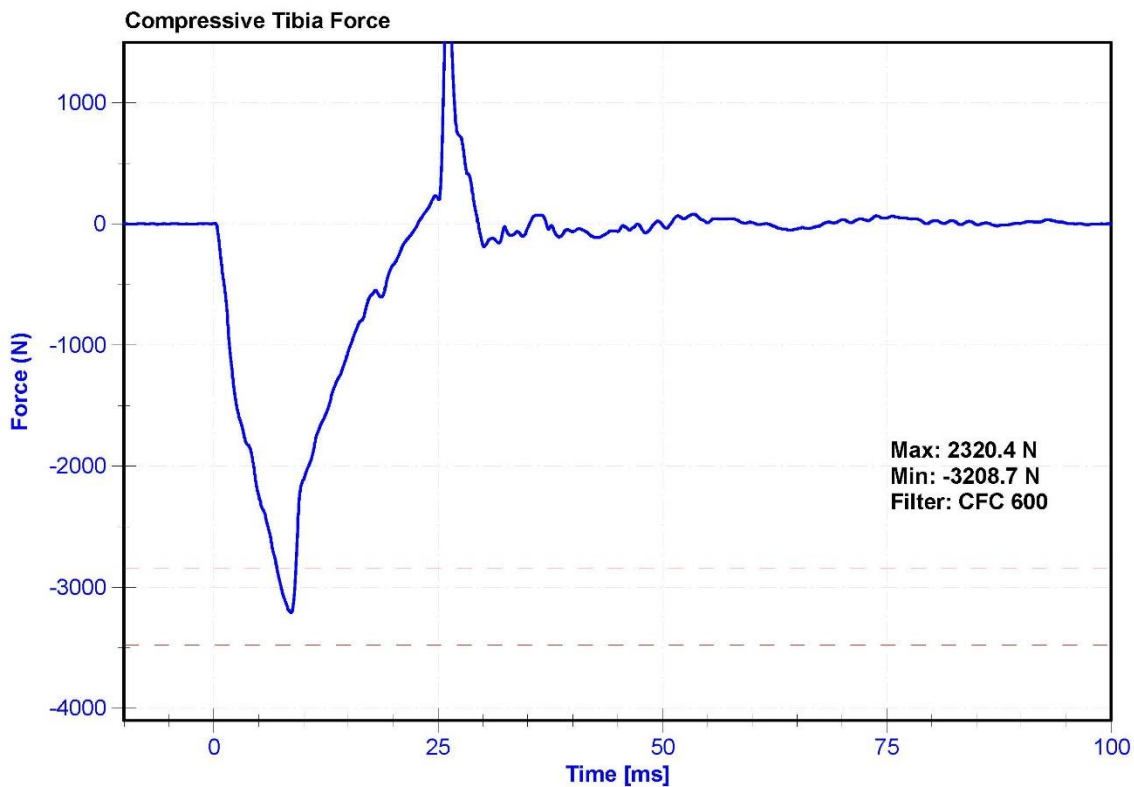
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21	Pass
Humidity	10	70	%	52.6	Pass
Velocity	3.9	4.1	m/s	4.045	Pass
Lower Tibia Compressive Force	-3477	-2845	N	-3208.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	9/13/2016	9/13/2017
Lower Tibia Load Cell	Denton 9329J	LC-DQ9684 FZ	8/23/2016	8/23/2017



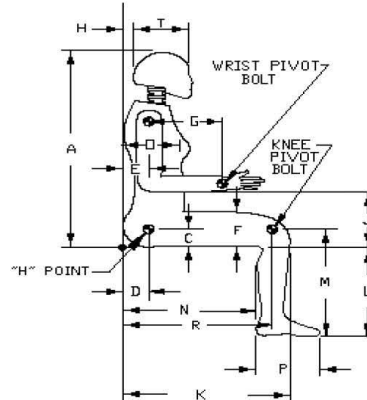
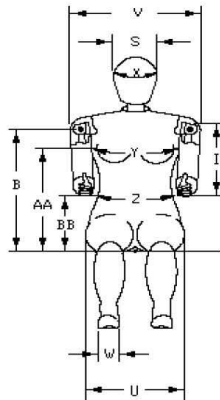


External Measurements - Hybrid 3 - 5th Female

Technician: M. Geesey

Date: 9/14/2016

Dummy Serial Number: 517



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	783	Pass
B	Shoulder Pivot Height	432	457	446	Pass
C	H-Point Height	81	86	83	Pass
D	H-Point from Backline	145	150	148	Pass
E	Shoulder Pivot from Backline	69	84	79	Pass
F	Thigh Clearance	119	135	126	Pass
G	Back of Elbow to Wrist Pivot	244	259	250	Pass
H	Head Back to Backline	43	48	46	Pass
I	Shoulder to Elbow Length	277	297	286	Pass
J	Elbow Rest Height	183	203	188	Pass
K	Buttock to Knee Length	521	546	535	Pass
L	Popliteal Height	356	376	363	Pass
M	Knee Pivot Height	394	419	405	Pass
N	Buttock Popliteal Length	414	439	425	Pass
O	Chest Depth without Jacket	175	191	185	Pass
P	Foot Length (right)	219	234	220	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	306	Pass
V	Shoulder Breadth	351	366	360	Pass
W	Foot Breadth	79	94	84	Pass
X	Head Circumference	528	549	536	Pass
Y	Chest Circumference with Jacket	851	881	860	Pass
Z	Waist Circumference	460	790	773	Pass
AA	Reference Location (Chest Circumference)	333	358	345	Pass
BB	Reference Location (Waist Circumference)	160	170	165	Pass

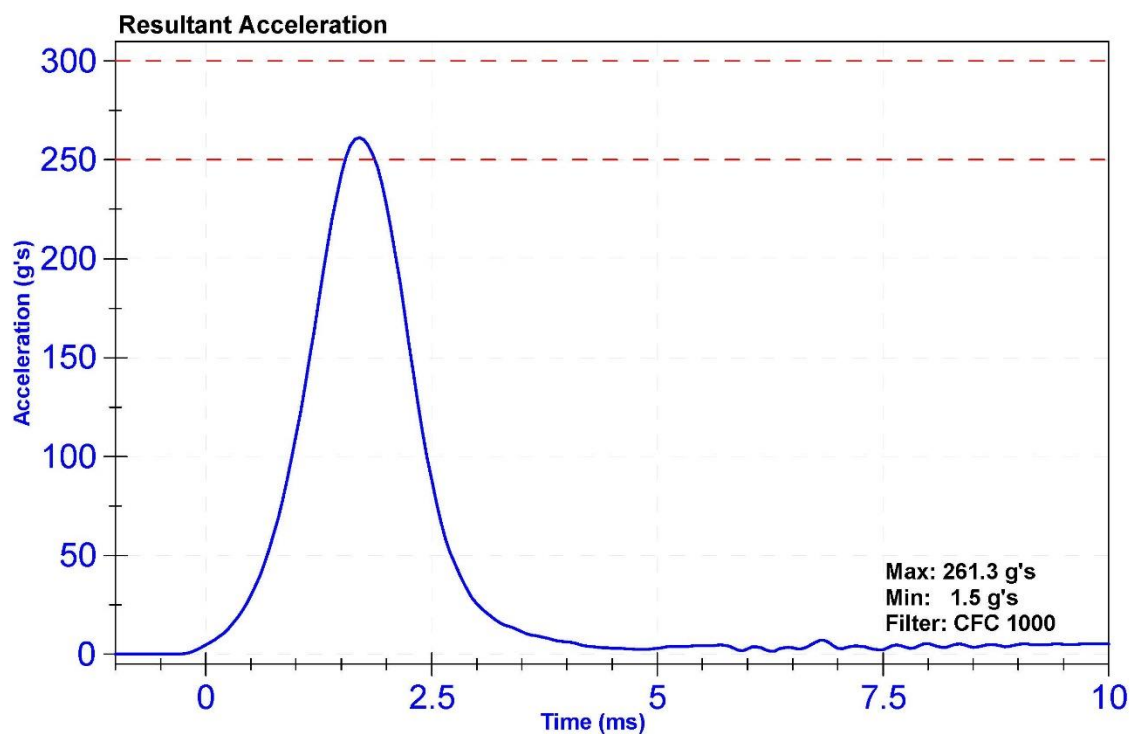
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	517	Laboratory Supervisor	M. Goehle

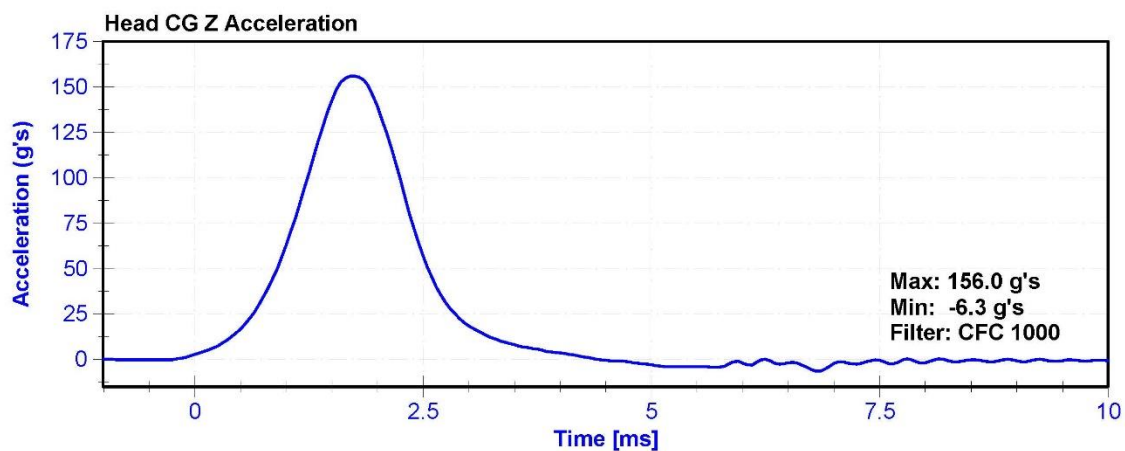
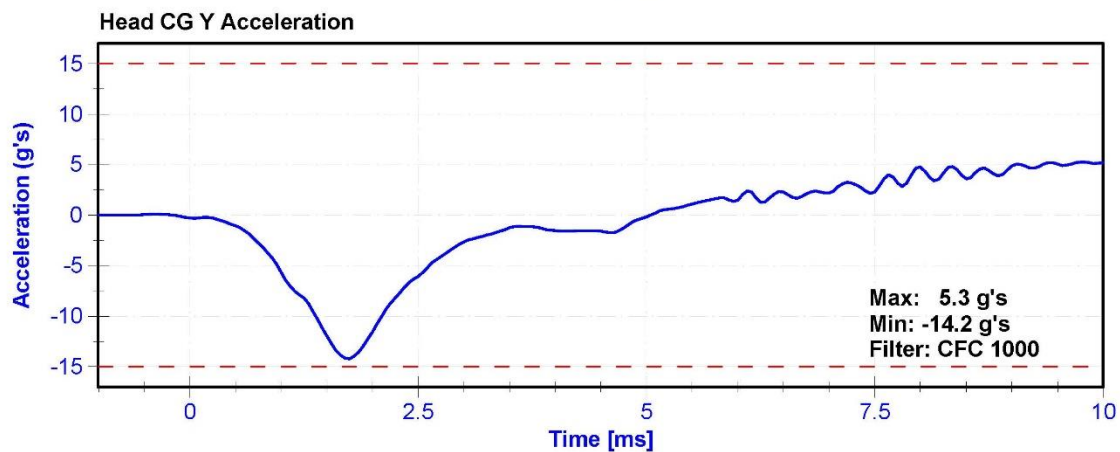
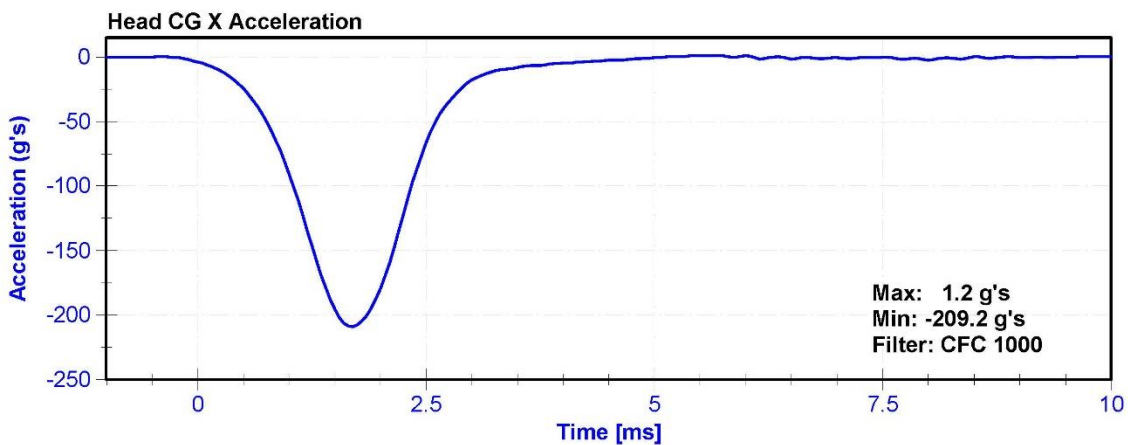
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21	Pass
Humidity	10	70	%	57.6	Pass
Resultant Acceleration	250	300	g's	261.3	Pass
Oscillation	0	10	%	2.6	Pass
Lateral Acceleration	-15	15	g's	-14.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco 7264	AC-P51282	8/24/2016	2/22/2017
Y Accelerometer	Endevco 7264	AC-05G14-X33	8/24/2016	2/22/2017
Z Accelerometer	Endevco 7264	AC-00L20-A22	8/24/2016	2/22/2017





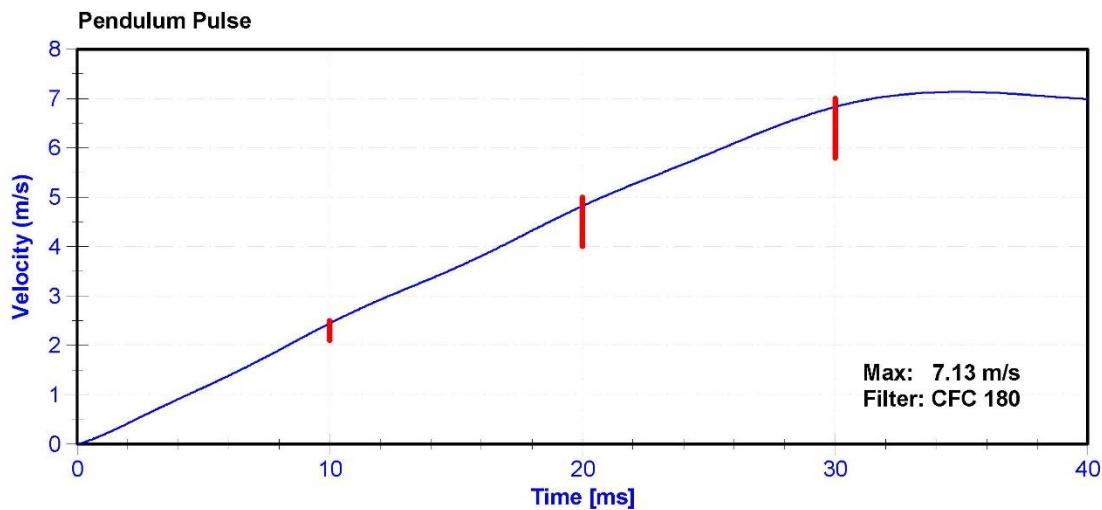
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	517	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	51.8	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.45	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.82	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.83	Pass
Max D Plane Rotation	77	91	deg	77.8	Pass
Max Moment During Rotation Interval	69	83	Nm	78.3	Pass
Moment Decay to 10.0 Nm	80	100	ms	82.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
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-1875 FX	8/24/2016	8/24/2017



Hybrid III 5th Female 517 DUMMY CALIBRATIONS

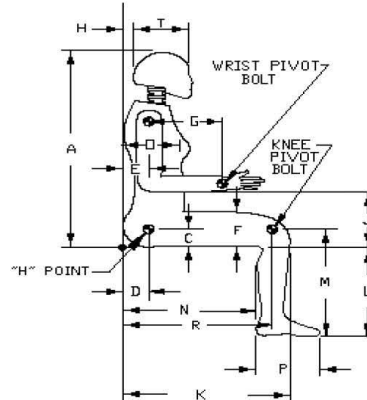
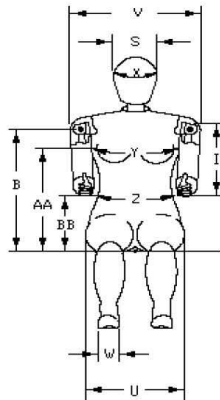


External Measurements - Hybrid 3 - 5th Female

Technician: M. Geesey

Date: 9/14/2016

Dummy Serial Number: 517



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	783	Pass
B	Shoulder Pivot Height	432	457	446	Pass
C	H-Point Height	81	86	83	Pass
D	H-Point from Backline	145	150	148	Pass
E	Shoulder Pivot from Backline	69	84	79	Pass
F	Thigh Clearance	119	135	126	Pass
G	Back of Elbow to Wrist Pivot	244	259	250	Pass
H	Head Back to Backline	43	48	46	Pass
I	Shoulder to Elbow Length	277	297	286	Pass
J	Elbow Rest Height	183	203	188	Pass
K	Buttock to Knee Length	521	546	535	Pass
L	Popliteal Height	356	376	363	Pass
M	Knee Pivot Height	394	419	405	Pass
N	Buttock Popliteal Length	414	439	425	Pass
O	Chest Depth without Jacket	175	191	185	Pass
P	Foot Length (right)	219	234	220	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	306	Pass
V	Shoulder Breadth	351	366	360	Pass
W	Foot Breadth	79	94	84	Pass
X	Head Circumference	528	549	536	Pass
Y	Chest Circumference with Jacket	851	881	860	Pass
Z	Waist Circumference	460	790	773	Pass
AA	Reference Location (Chest Circumference)	333	358	345	Pass
BB	Reference Location (Waist Circumference)	160	170	165	Pass

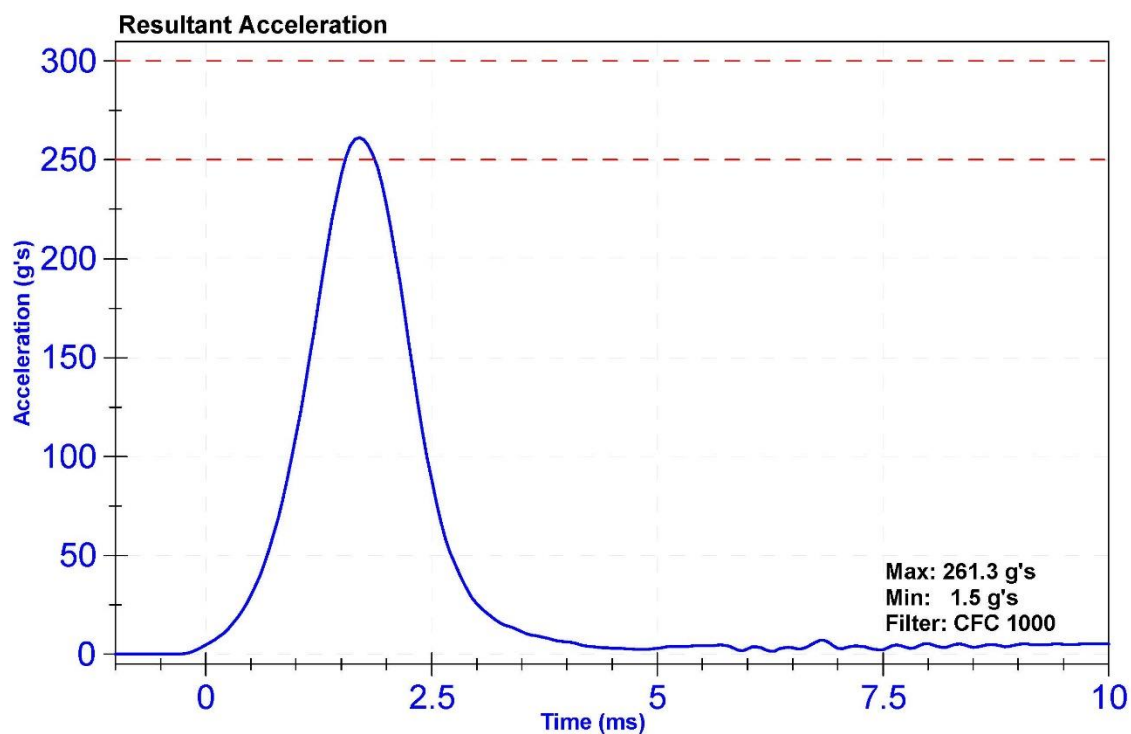
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	517	Laboratory Supervisor	M. Goehle

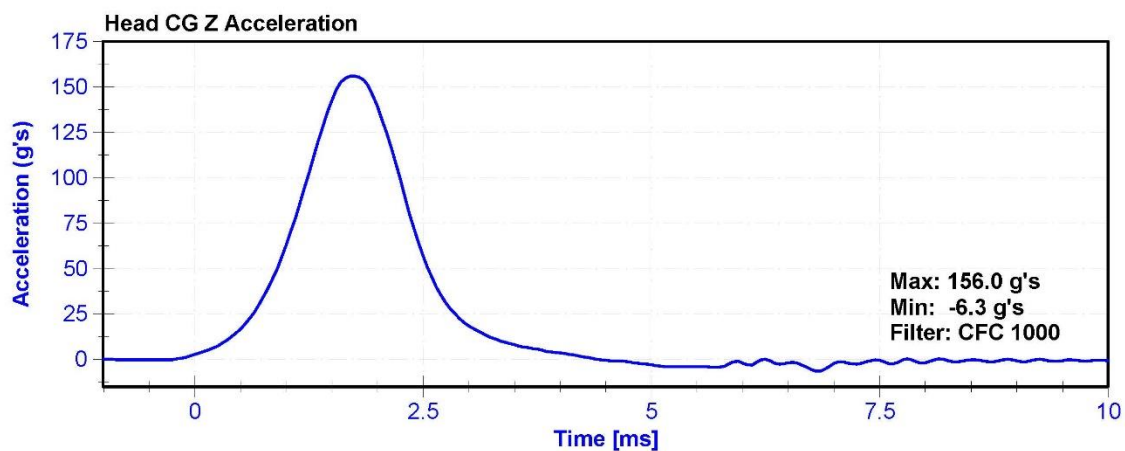
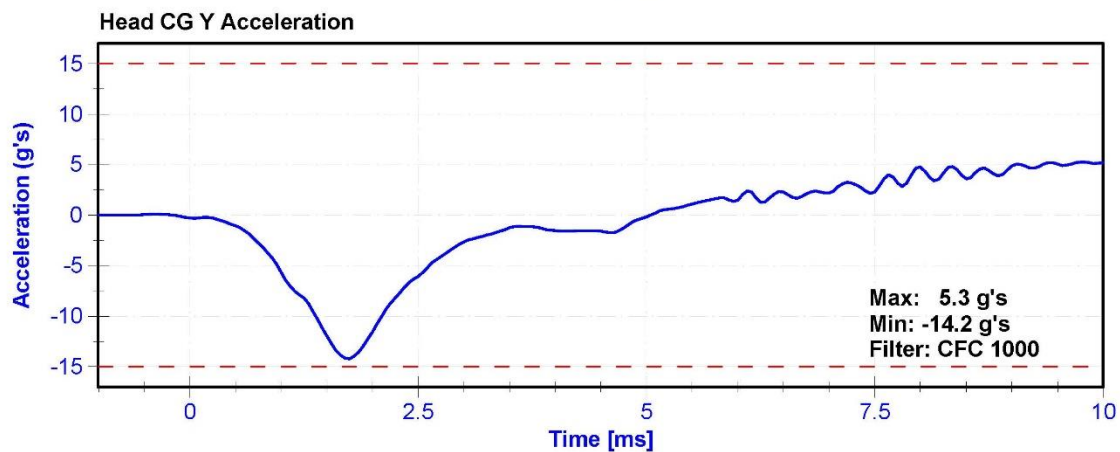
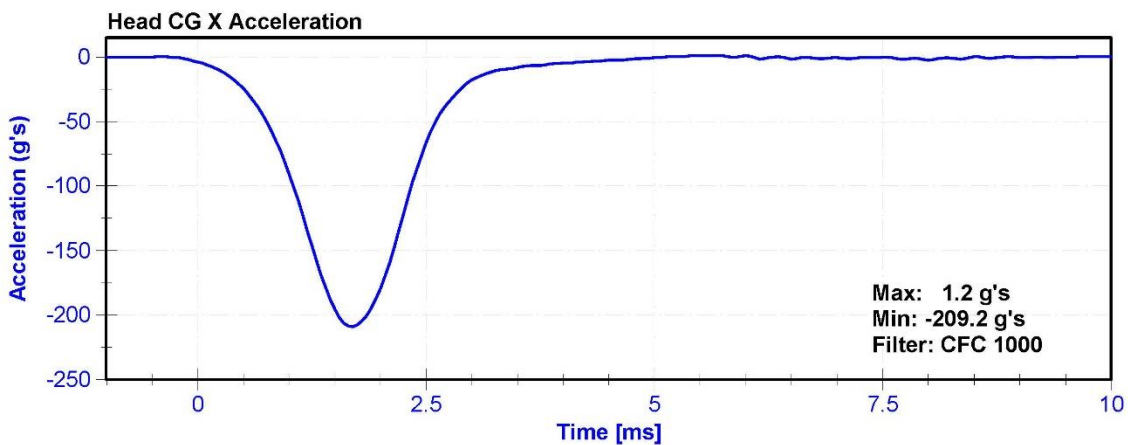
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21	Pass
Humidity	10	70	%	57.6	Pass
Resultant Acceleration	250	300	g's	261.3	Pass
Oscillation	0	10	%	2.6	Pass
Lateral Acceleration	-15	15	g's	-14.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco 7264	AC-P51282	8/24/2016	2/22/2017
Y Accelerometer	Endevco 7264	AC-05G14-X33	8/24/2016	2/22/2017
Z Accelerometer	Endevco 7264	AC-00L20-A22	8/24/2016	2/22/2017





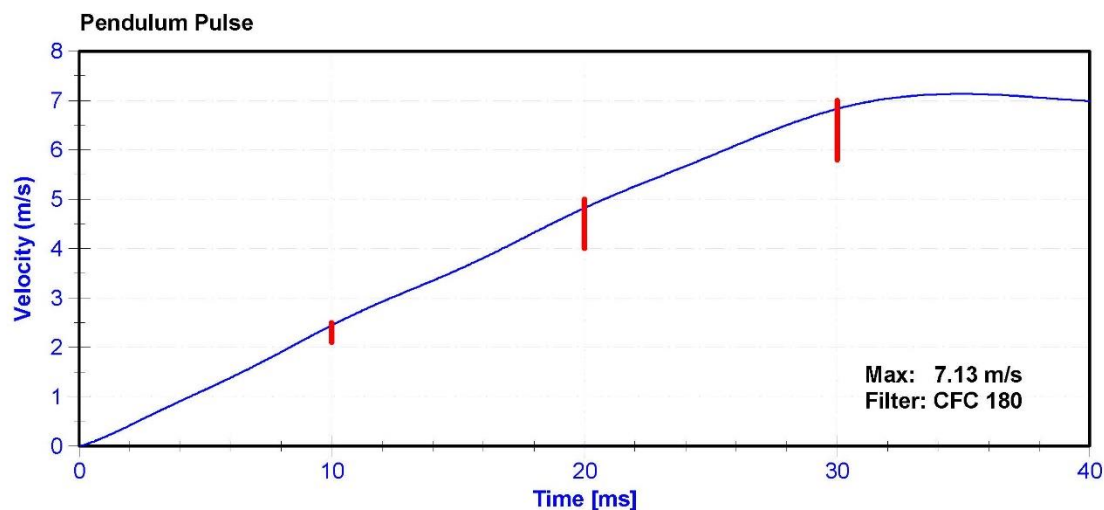
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	517	Laboratory Supervisor	M. Goehle

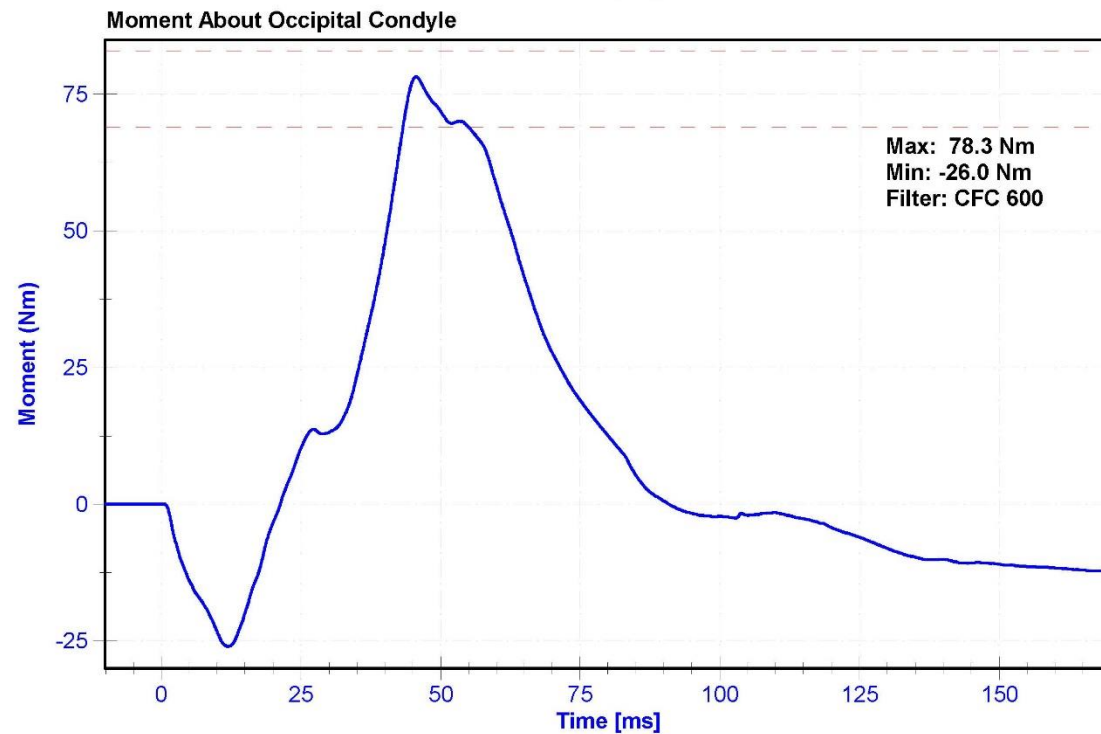
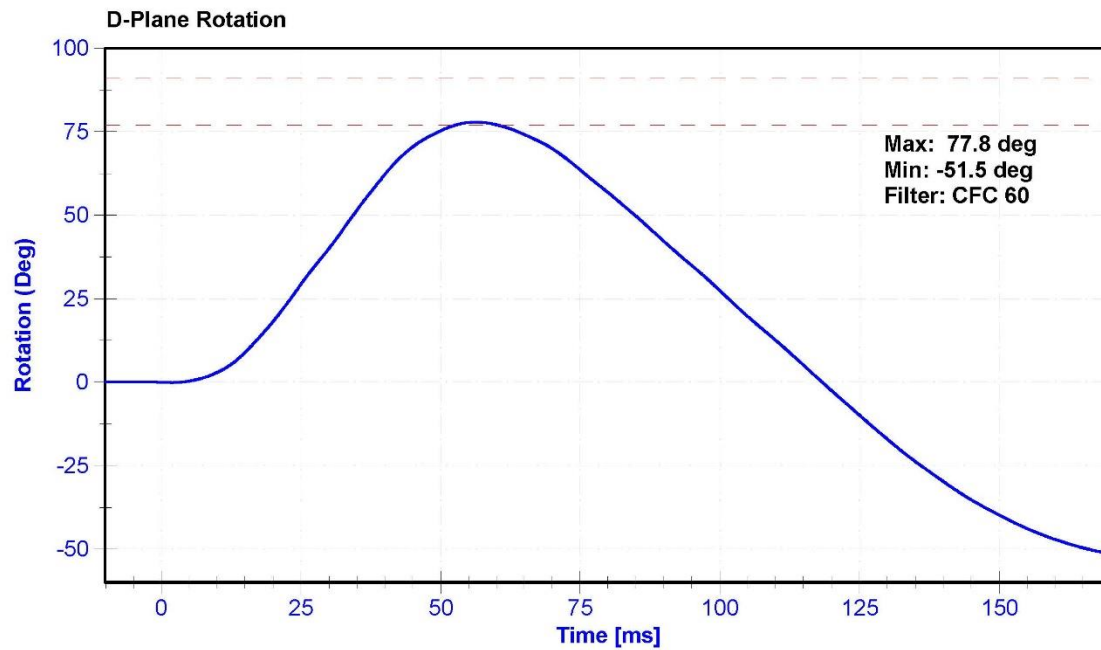
Results

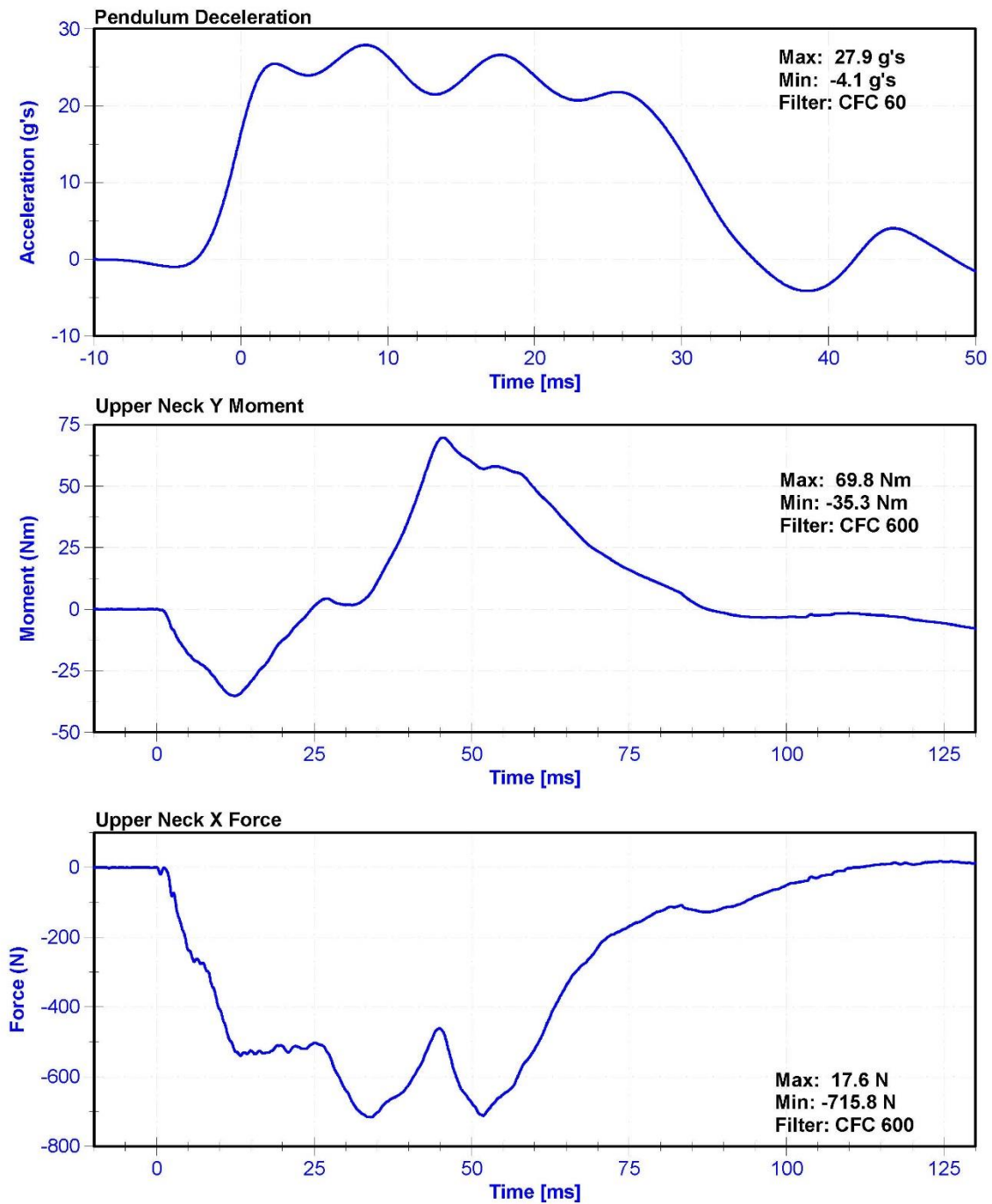
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	51.8	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.45	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.82	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.83	Pass
Max D Plane Rotation	77	91	deg	77.8	Pass
Max Moment During Rotation Interval	69	83	Nm	78.3	Pass
Moment Decay to 10.0 Nm	80	100	ms	82.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
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-1875 FX	8/24/2016	8/24/2017







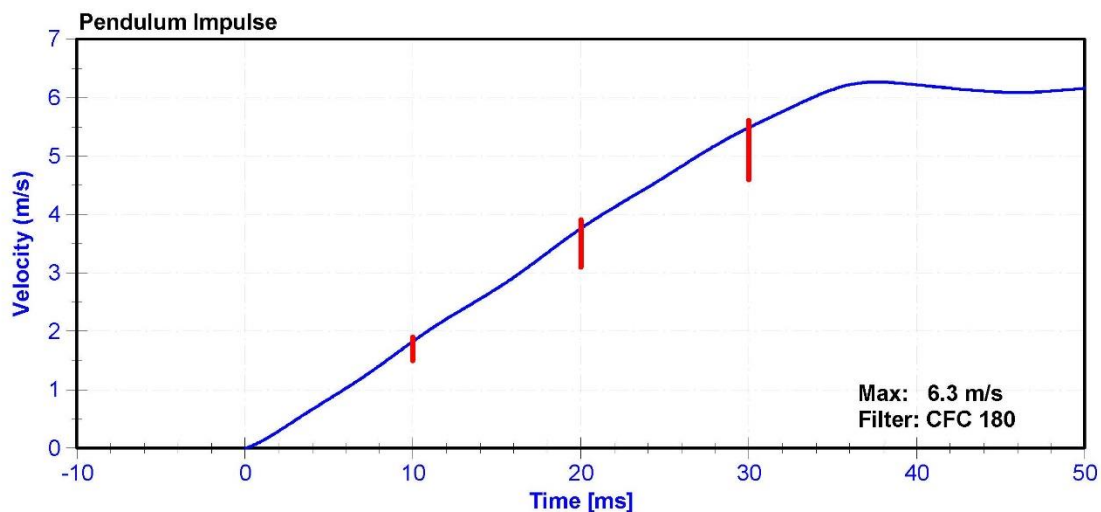
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	517	Laboratory Supervisor	M. Goehle

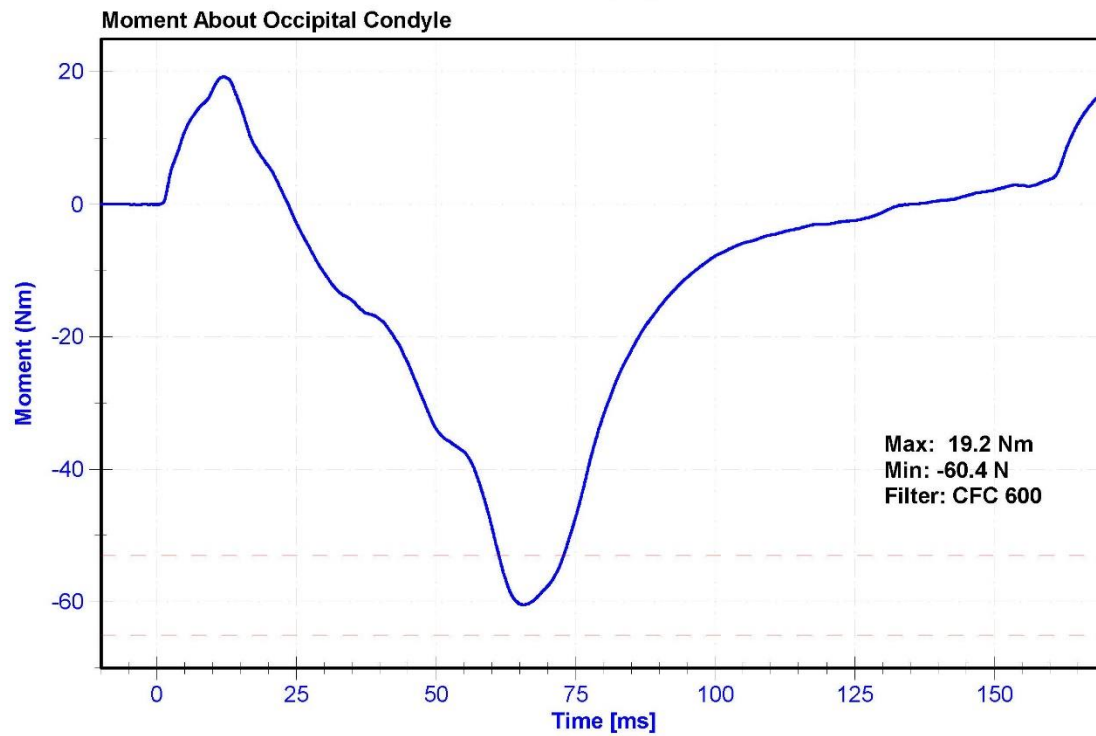
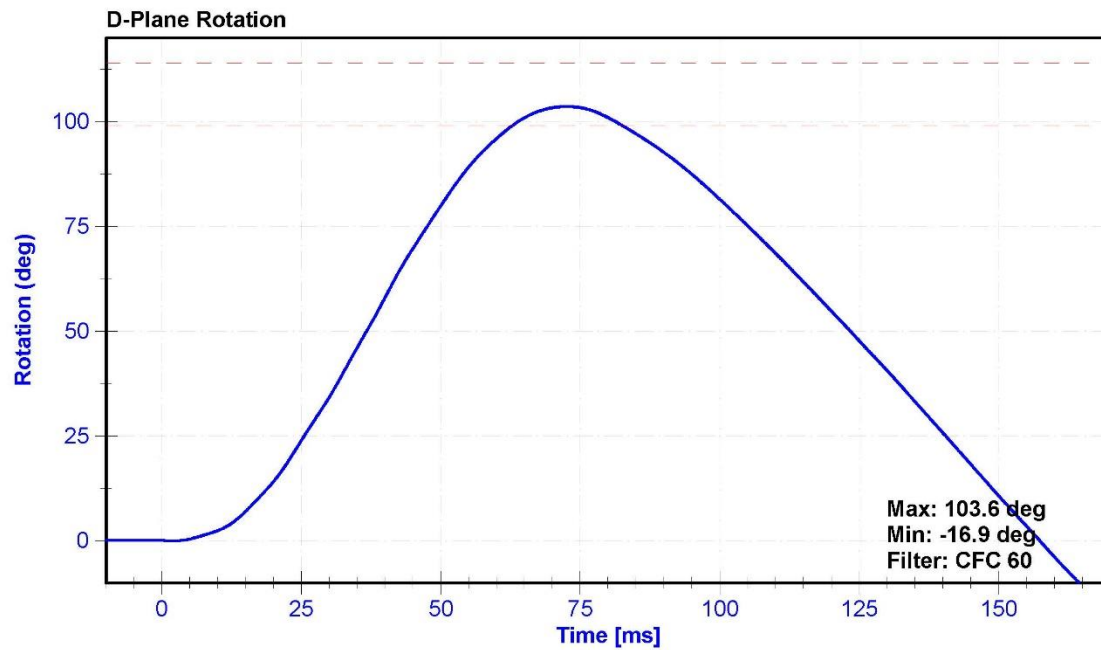
Results

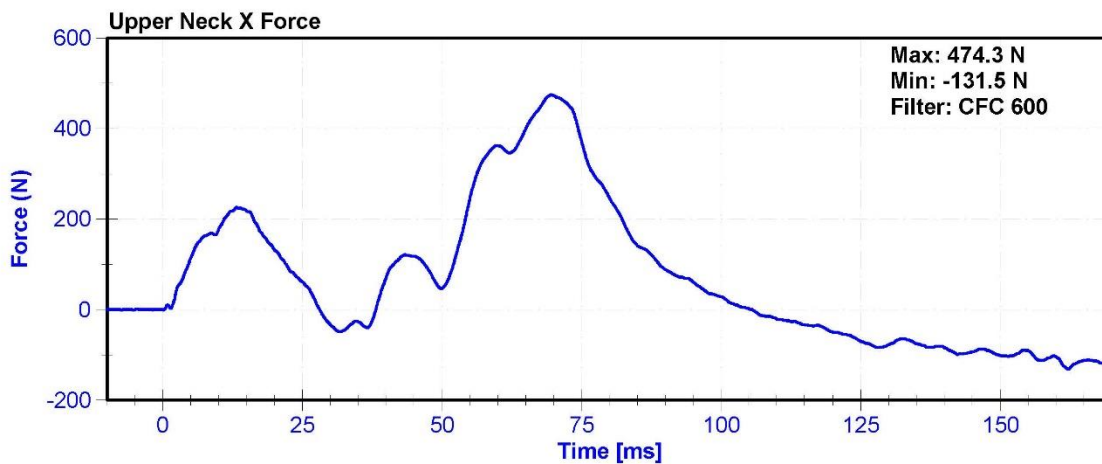
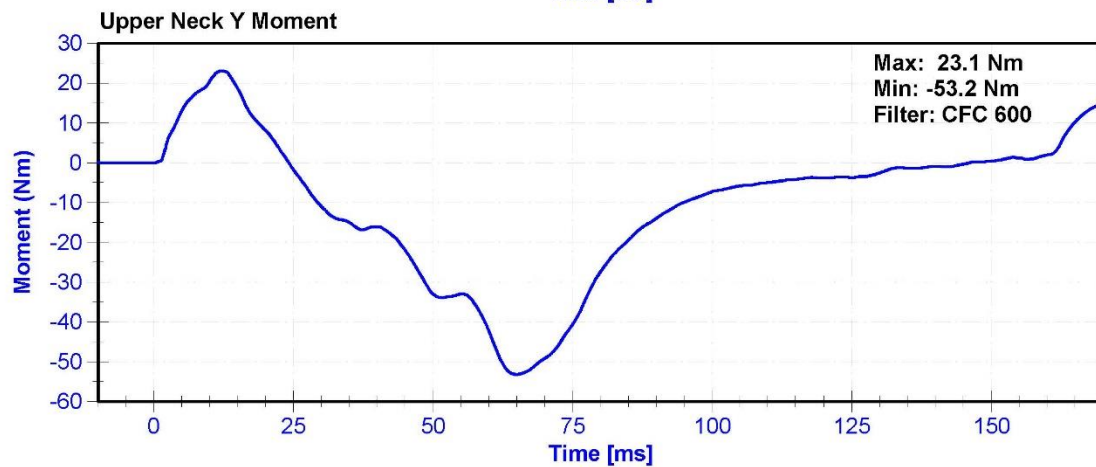
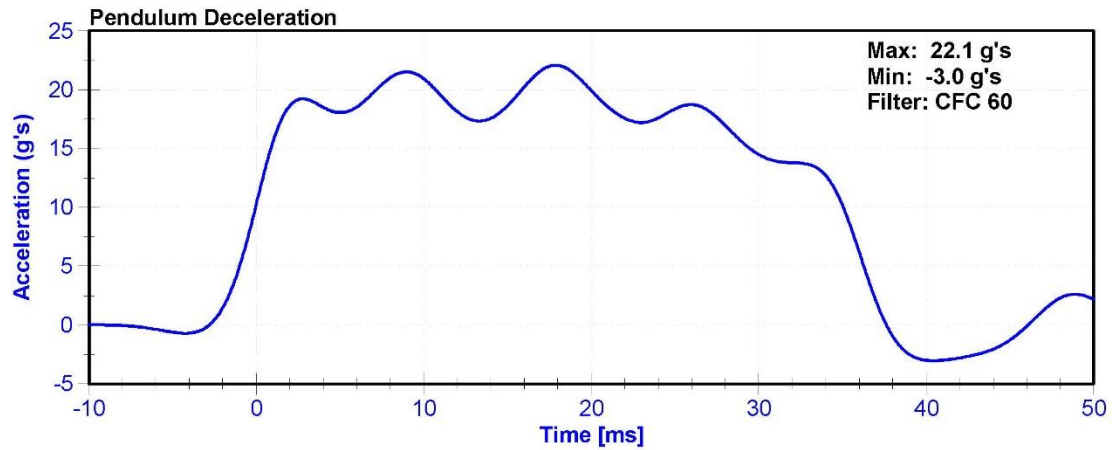
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	49.9	Pass
Velocity	5.95	6.19	m/s	6.113	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.83	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.76	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.49	Pass
D Plane Rotation	99	114	deg	103.6	Pass
Moment During Rotation Interval	-65	-53	Nm	-60.4	Pass
Moment Decay to -10Nm	94	114	ms	96.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
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-1875 FX	8/24/2016	8/24/2017







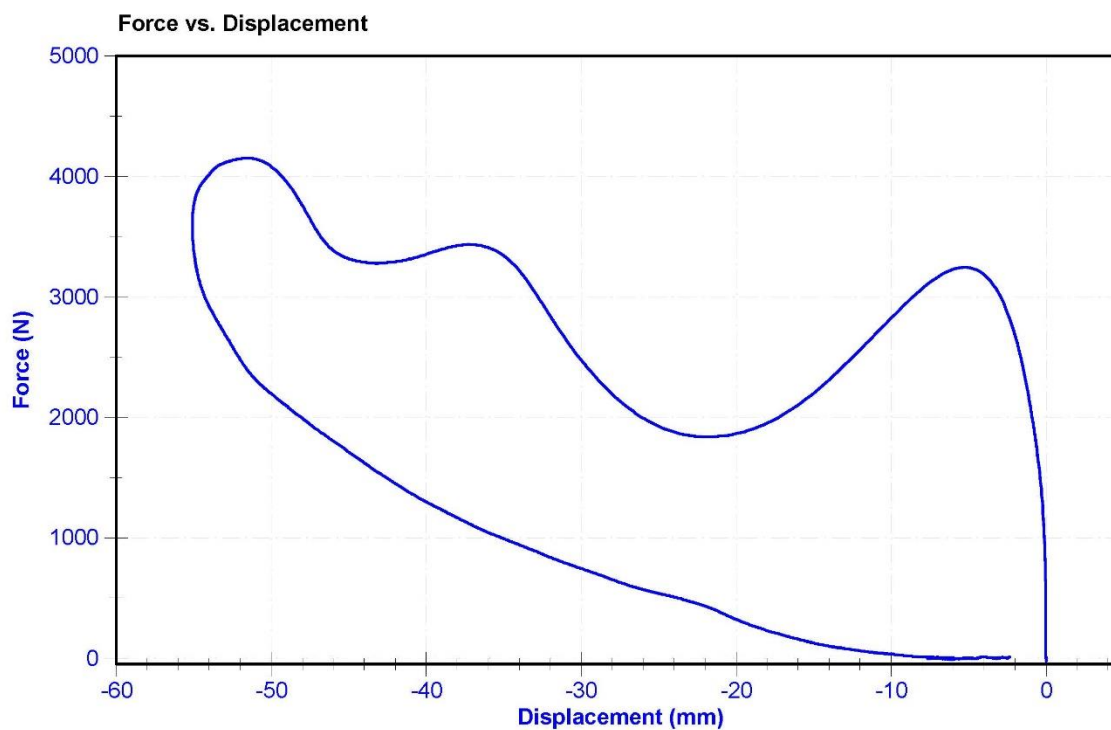
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	517	Laboratory Supervisor	M. Goehle

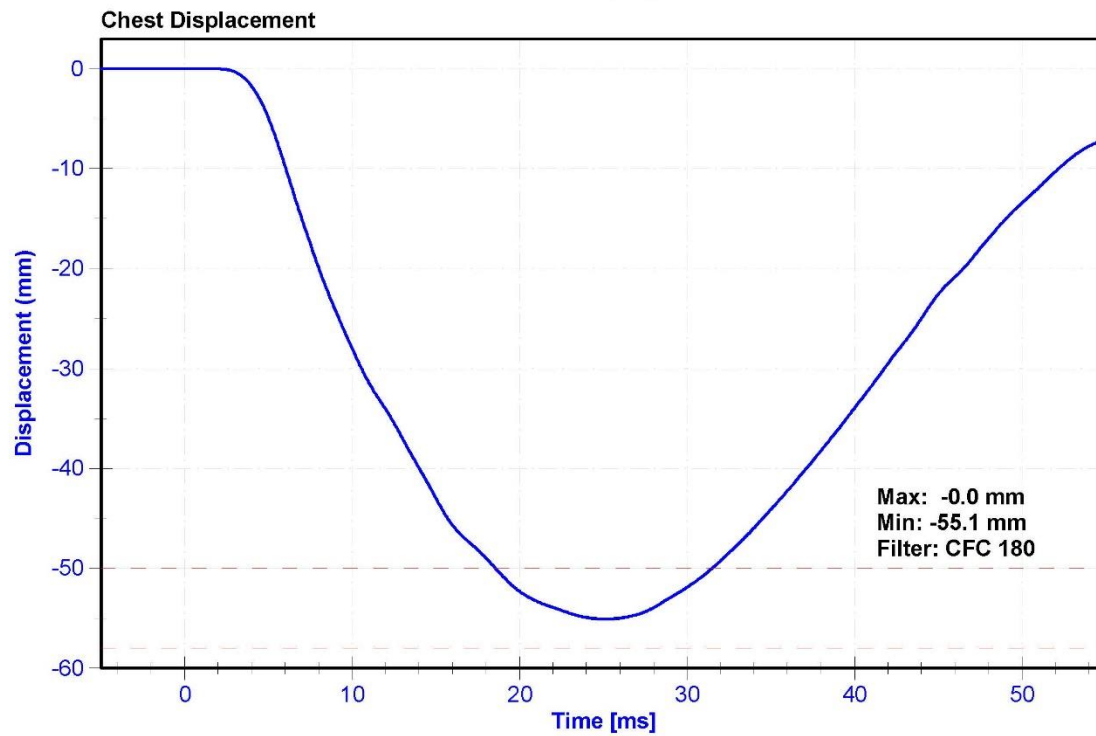
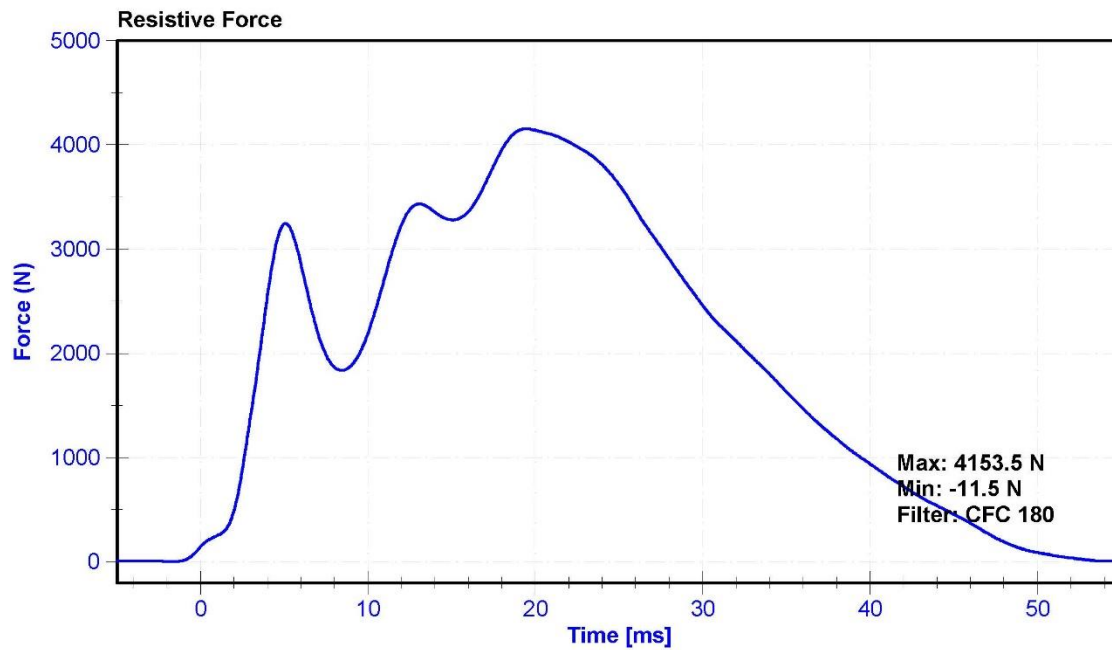
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	52.6	Pass
Velocity	6.59	6.83	m/s	6.699	Pass
Chest Deflection	-58	-50	mm	-55.1	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4153.5	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4081.1	Pass
Hysteresis	69	85	%	70.0	Pass

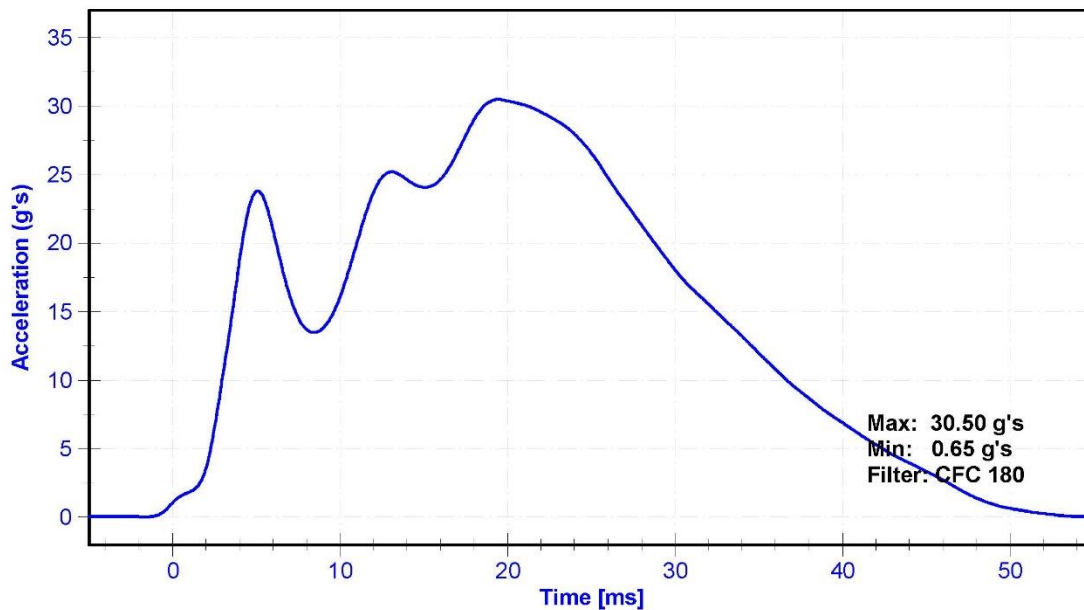
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P16593	4/1/2016	4/1/2017
Chest Potentiometer	Servo 14CB1	DS-517	8/23/2016	8/23/2017

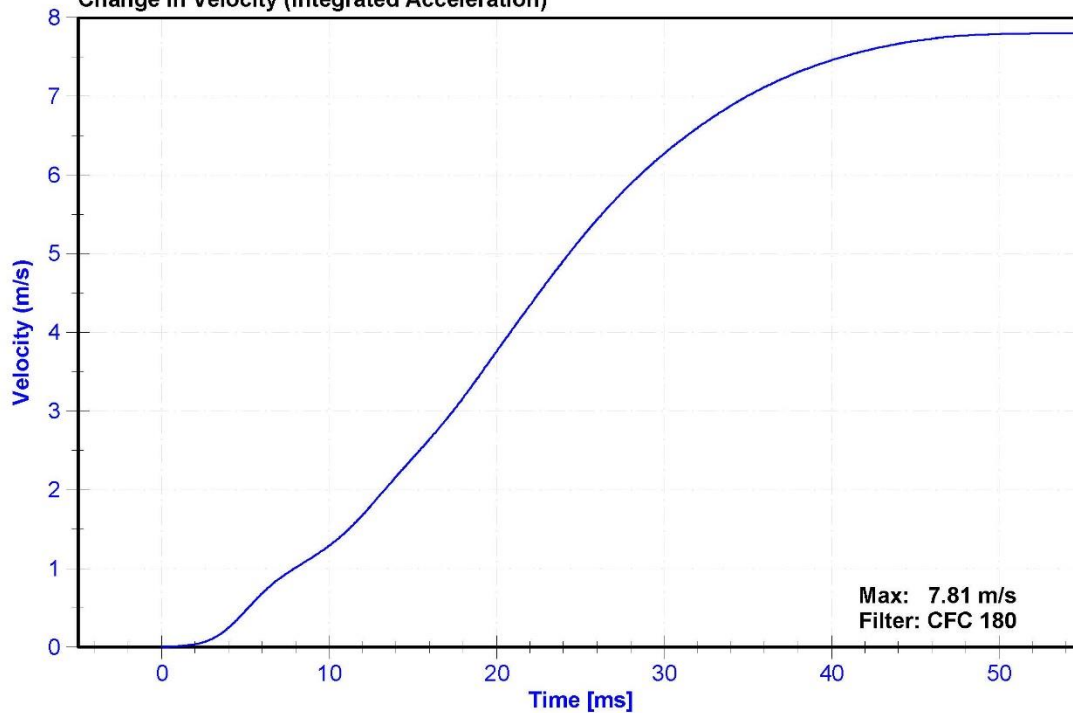




Probe Acceleration



Change in Velocity (Integrated Acceleration)



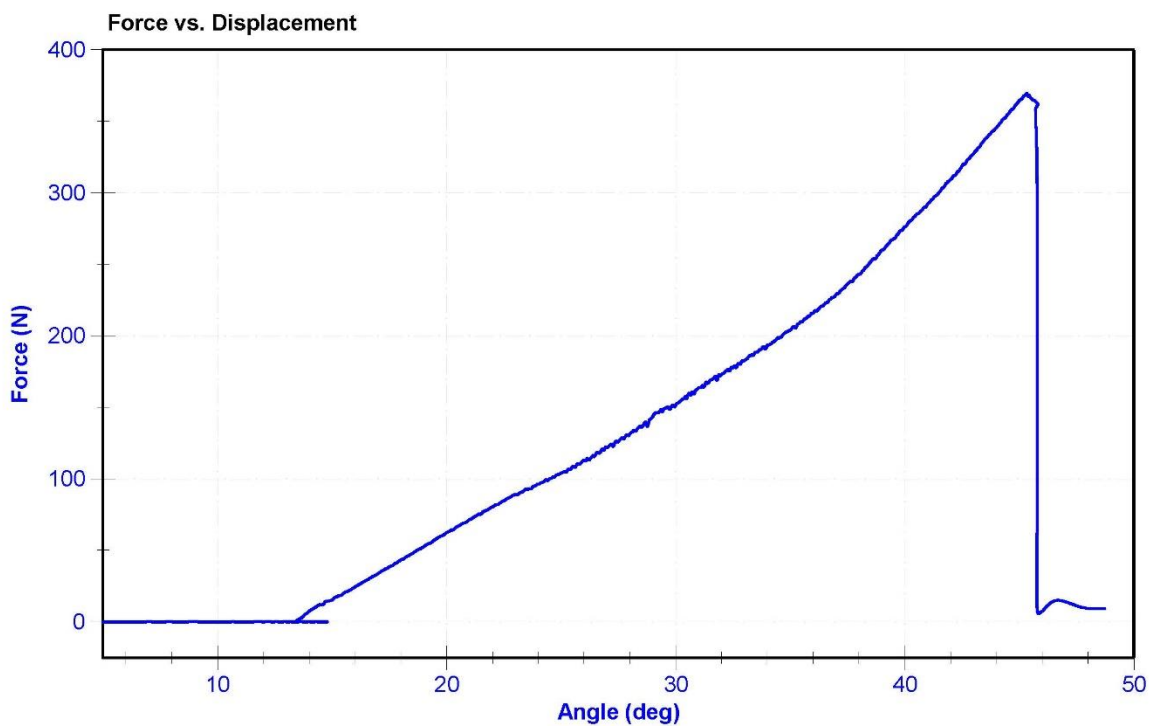
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	517	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	20.7	Pass
Humidity	10	70	%	49.8	Pass
Initial Angle	0	20	deg	13.4	Pass
Force at 45 Degrees	320	390	N	369.6	Pass
Return Angle Relative to Initial	0	8	deg	7.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	9/7/2016	9/7/2017
Load Cell	Interface SML-200	LC-493319	9/7/2016	9/7/2017



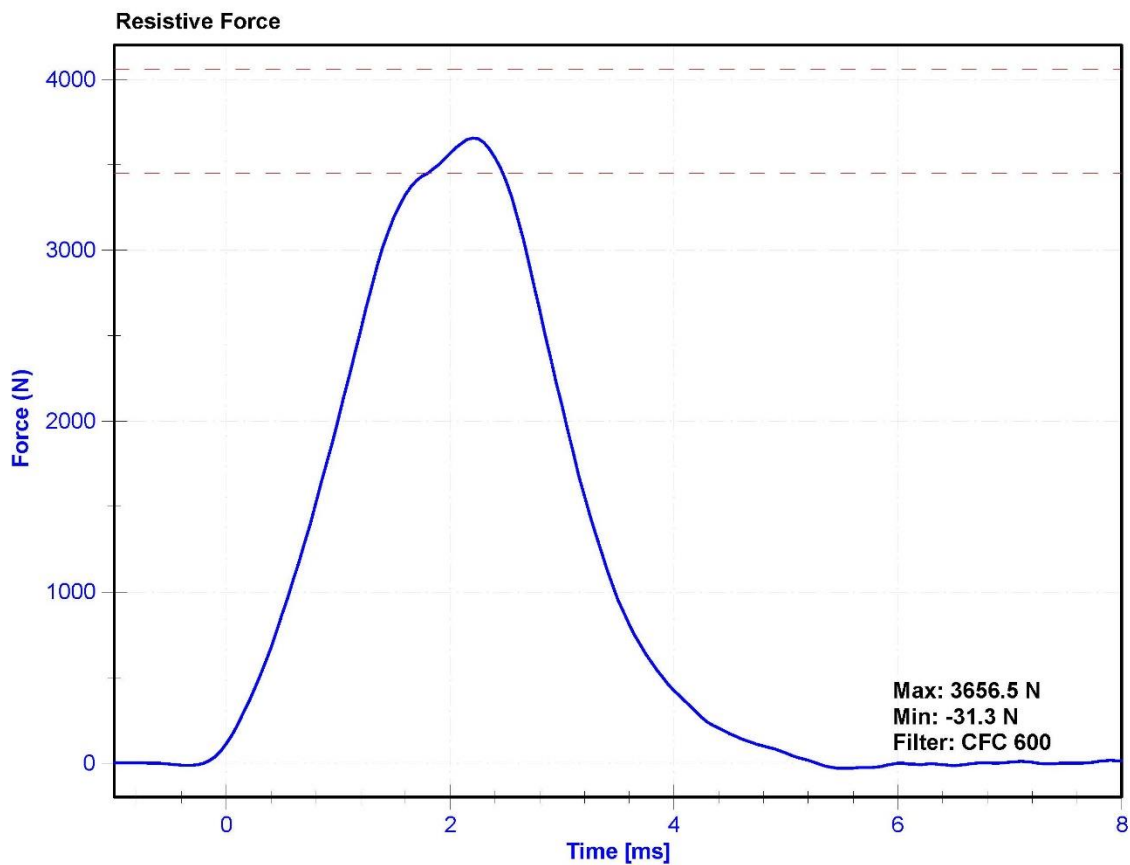
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	517	Laboratory Supervisor	M. Goehle

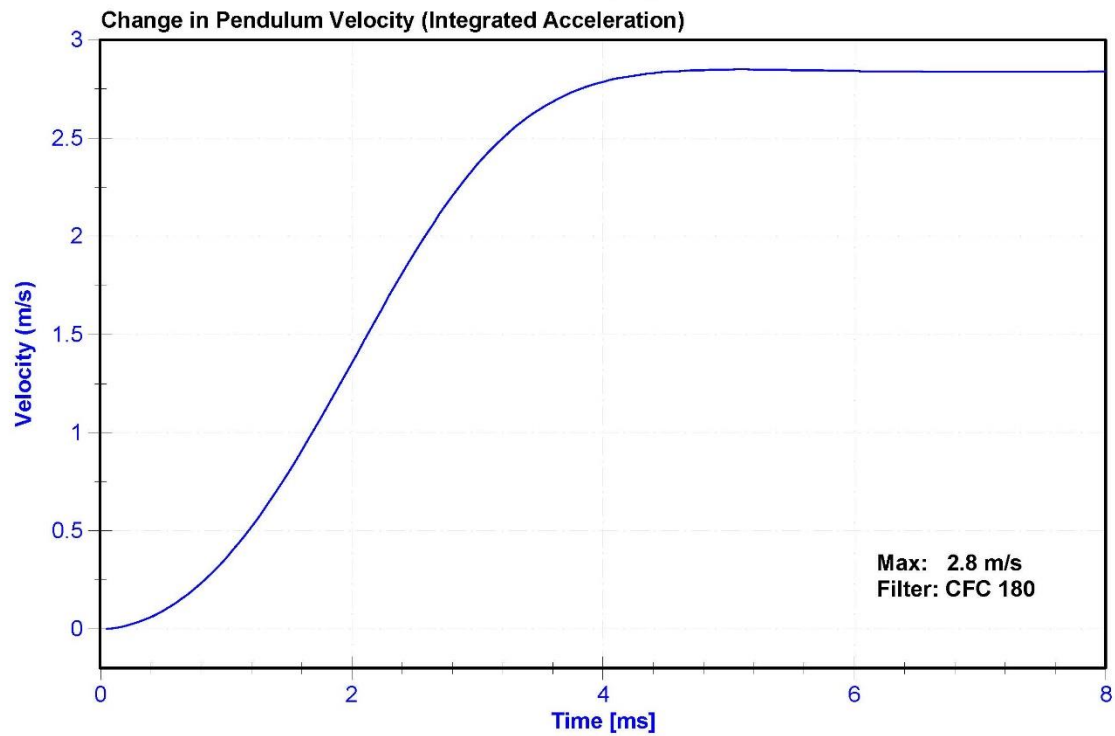
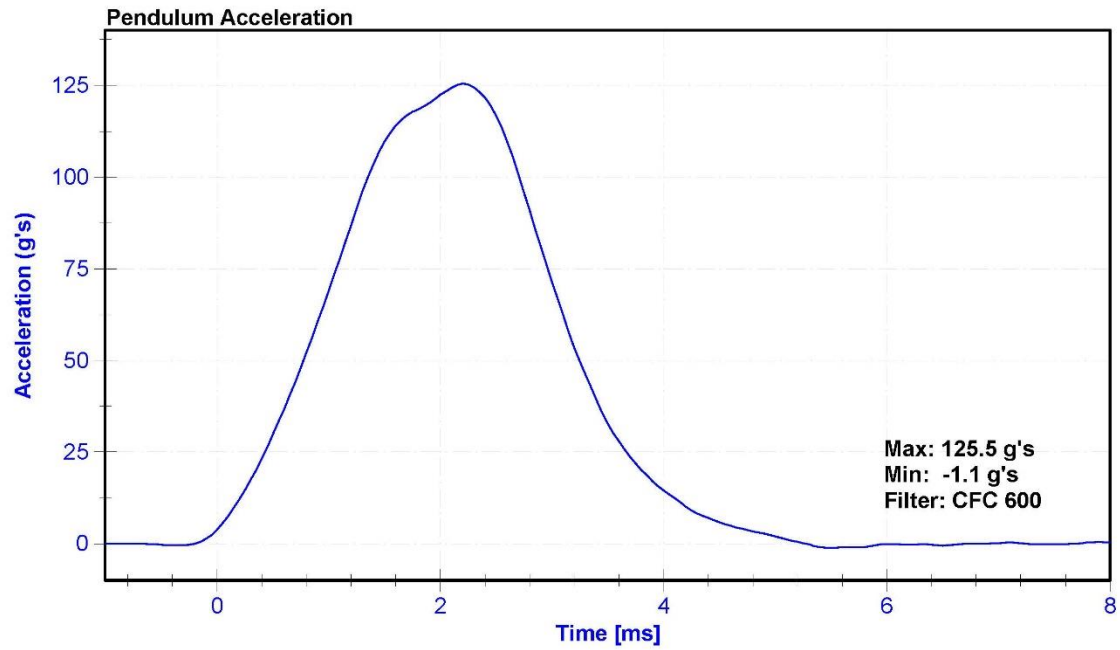
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.6	Pass
Humidity	10	70	%	45.0	Pass
Velocity	2.07	2.13	m/s	2.082	Pass
Resistive Force	3450	4060	N	3656.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P16593	4/1/2016	4/1/2017





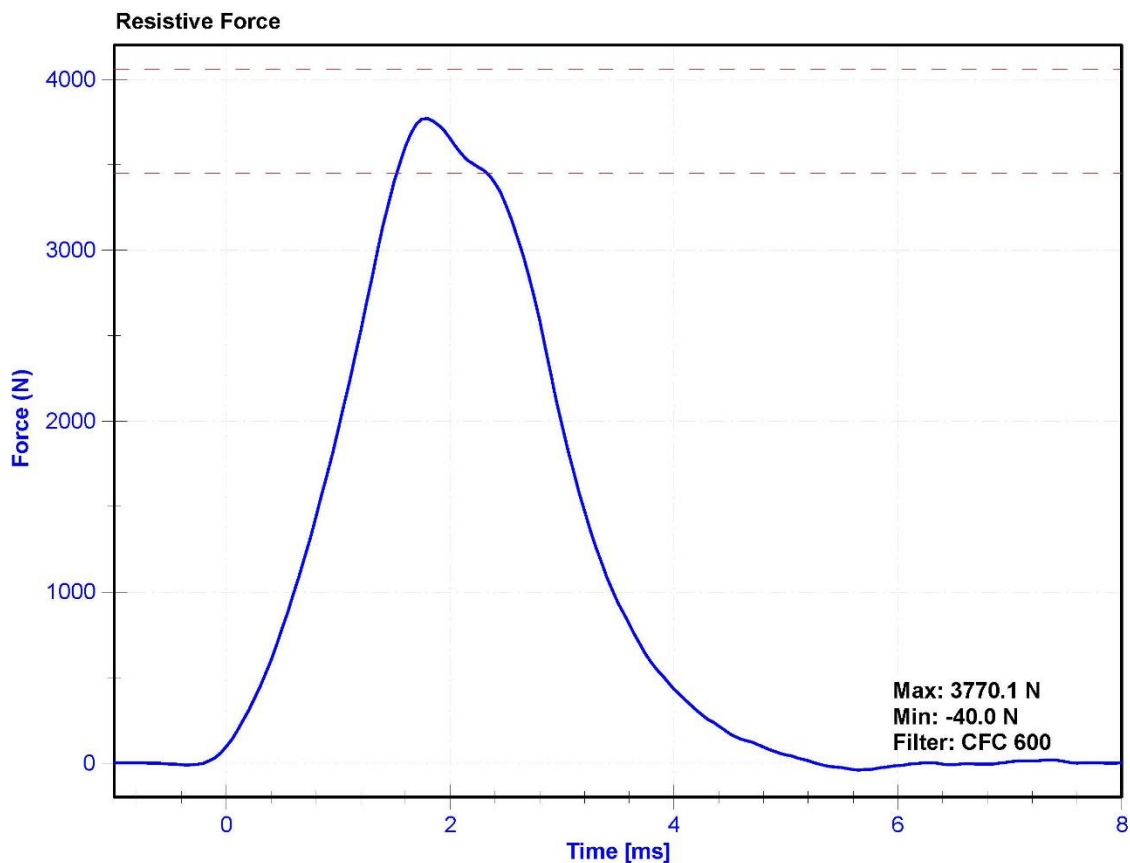
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	517	Laboratory Supervisor	M. Goehle

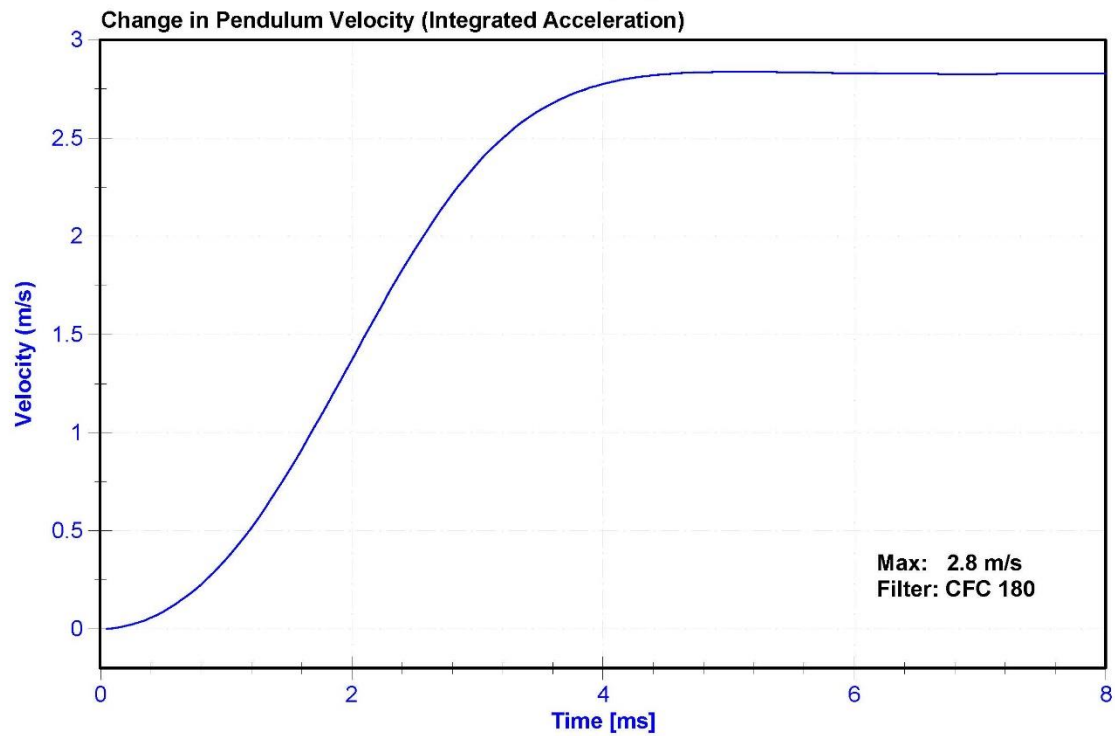
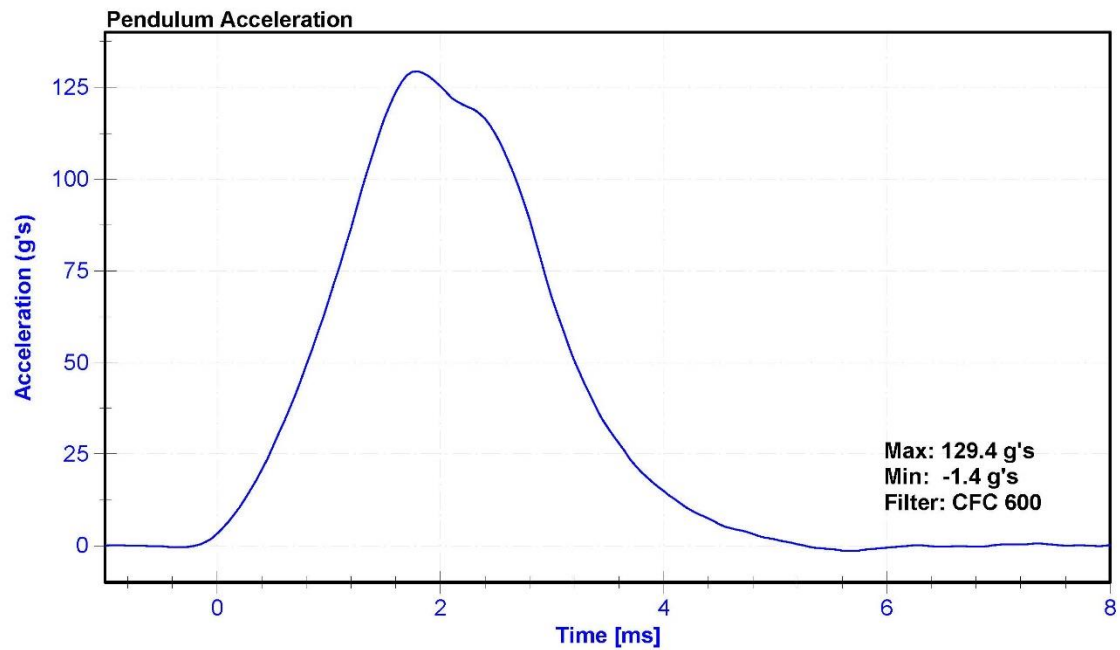
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.6	Pass
Humidity	10	70	%	45.0	Pass
Velocity	2.07	2.13	m/s	2.082	Pass
Resistive Force	3450	4060	N	3770.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P16593	4/1/2016	4/1/2017





Hybrid III 5th Female 513 DUMMY CALIBRATIONS

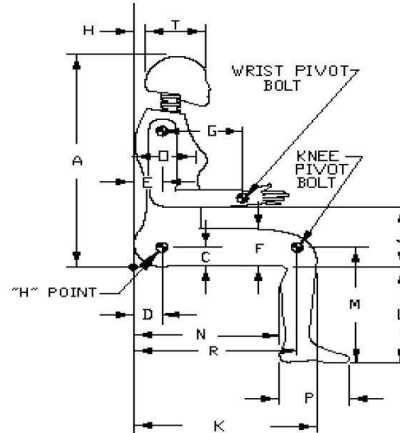
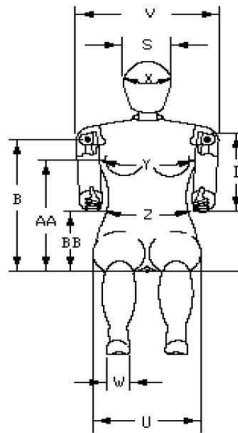


External Measurements - Hybrid 3 - 5th Female

Technician: M. Geesey

Date: 9/12/2016

Dummy Serial Number: 513



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	782	Pass
B	Shoulder Pivot Height	432	457	440	Pass
C	H-Point Height	81	86	83	Pass
D	H-Point from Backline	145	150	147	Pass
E	Shoulder Pivot from Backline	69	84	76	Pass
F	Thigh Clearance	119	135	125	Pass
G	Back of Elbow to Wrist Pivot	244	259	248	Pass
H	Head Back to Backline	43	48	46	Pass
I	Shoulder to Elbow Length	277	297	289	Pass
J	Elbow Rest Height	183	203	188	Pass
K	Buttock to Knee Length	521	546	542	Pass
L	Popliteal Height	356	376	363	Pass
M	Knee Pivot Height	394	419	400	Pass
N	Buttock Popliteal Length	414	439	429	Pass
O	Chest Depth without Jacket	175	191	182	Pass
P	Foot Length (right)	219	234	220	Pass
R	Buttock To Knee Pivot Length	457	483	470	Pass
S	Head Breadth	137	147	142	Pass
T	Head Depth	178	188	181	Pass
U	Hip Breadth	300	315	304	Pass
V	Shoulder Breadth	351	366	362	Pass
W	Foot Breadth	79	94	84	Pass
X	Head Circumference	528	549	540	Pass
Y	Chest Circumference with Jacket	851	881	854	Pass
Z	Waist Circumference	460	790	780	Pass
AA	Reference Location (Chest Circumference)	333	358	345	Pass
BB	Reference Location (Waist Circumference)	160	170	165	Pass

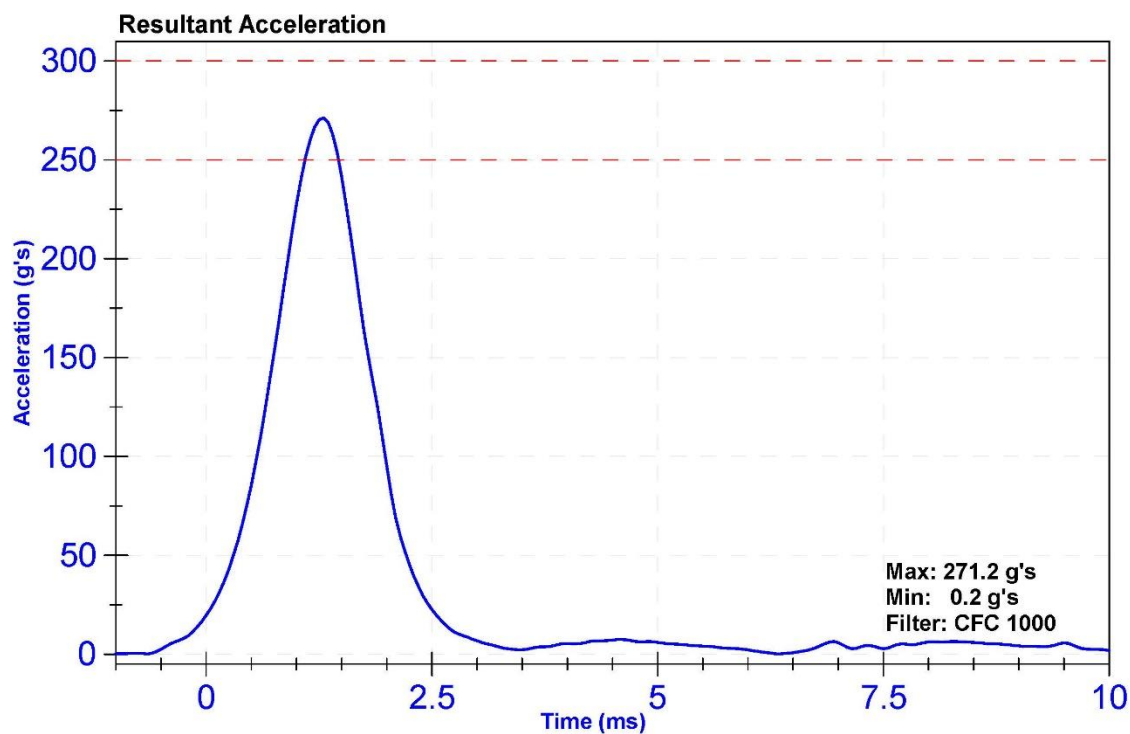
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	513	Laboratory Supervisor	M. Goehle

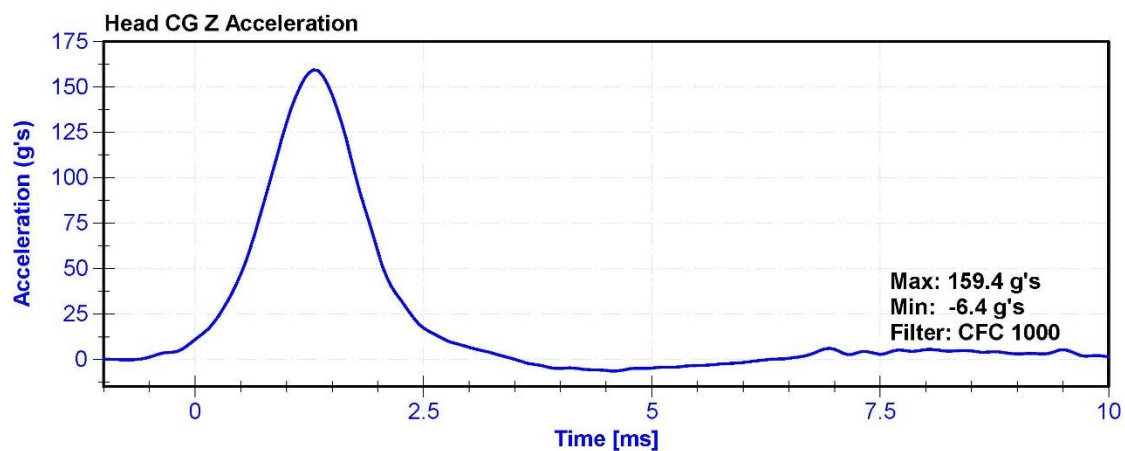
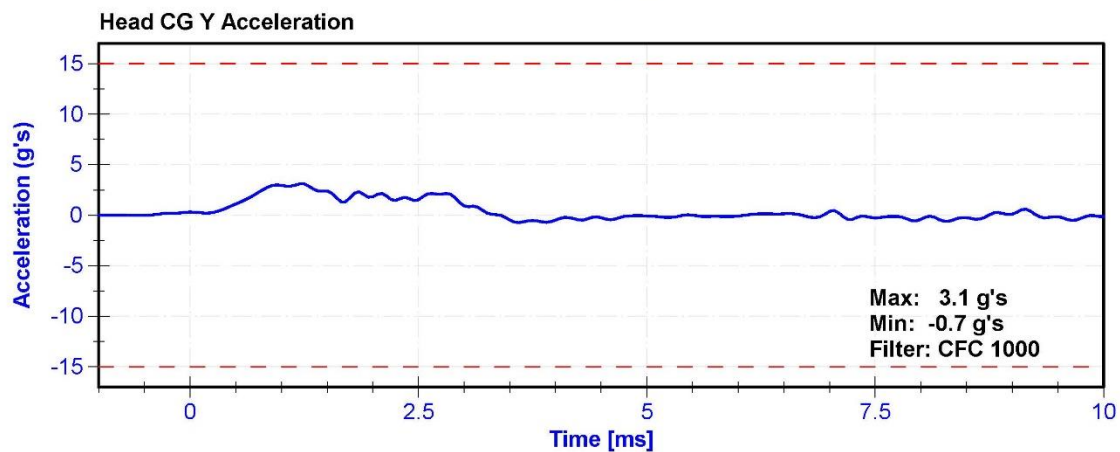
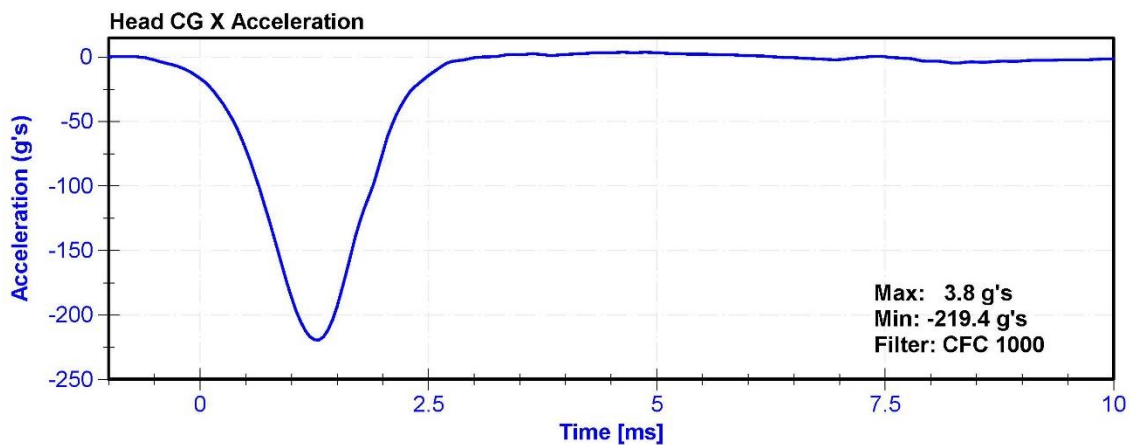
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21	Pass
Humidity	10	70	%	48.3	Pass
Resultant Acceleration	250	300	g's	271.2	Pass
Oscillation	0	10	%	2.7	Pass
Lateral Acceleration	-15	15	g's	3.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco 7264	AC-P79408	8/16/2016	2/14/2017
Y Accelerometer	Endevco 7264	AC-P80338	8/17/2016	2/15/2017
Z Accelerometer	Endevco 7264	AC-P81386	8/17/2016	2/15/2017





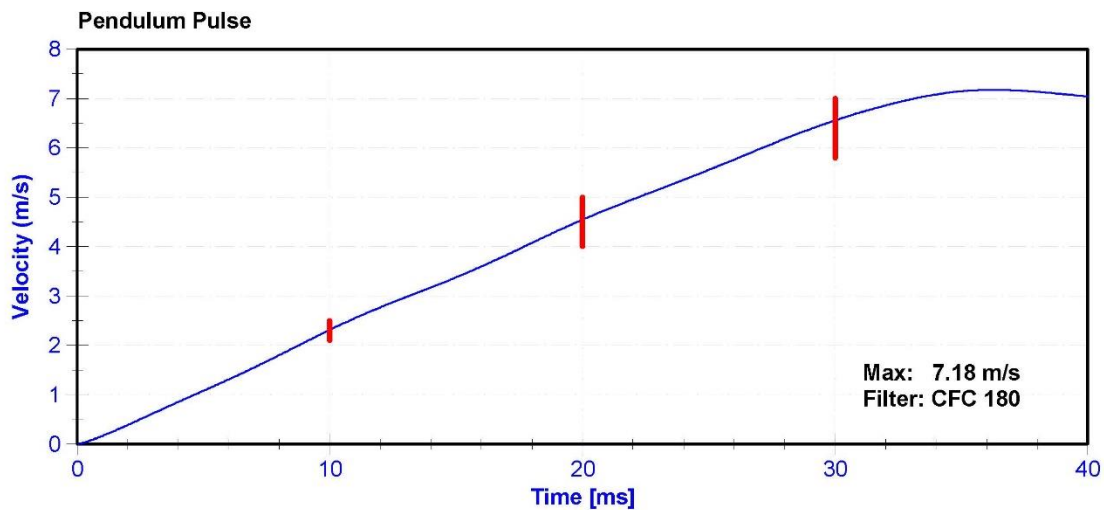
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	513	Laboratory Supervisor	M. Goehle

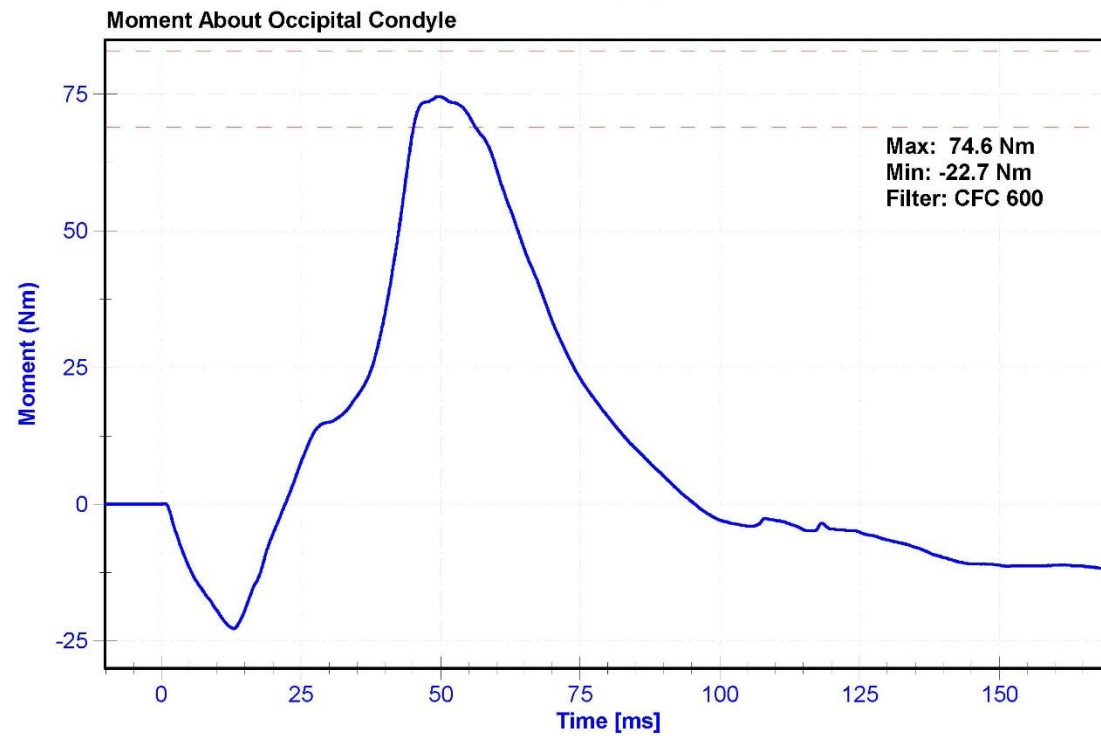
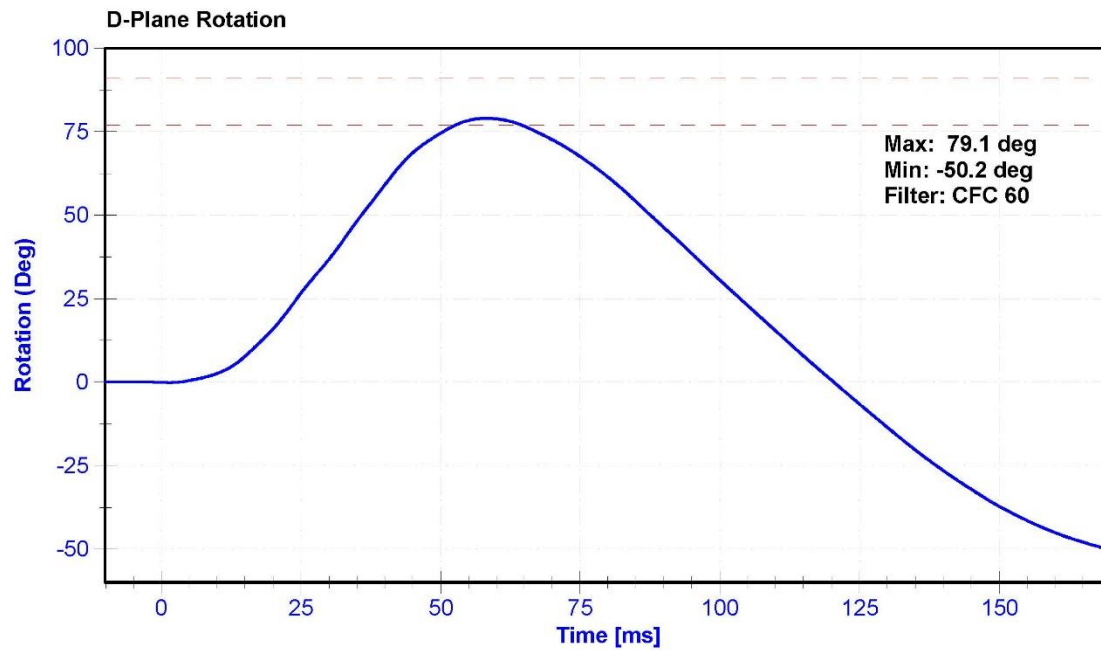
Results

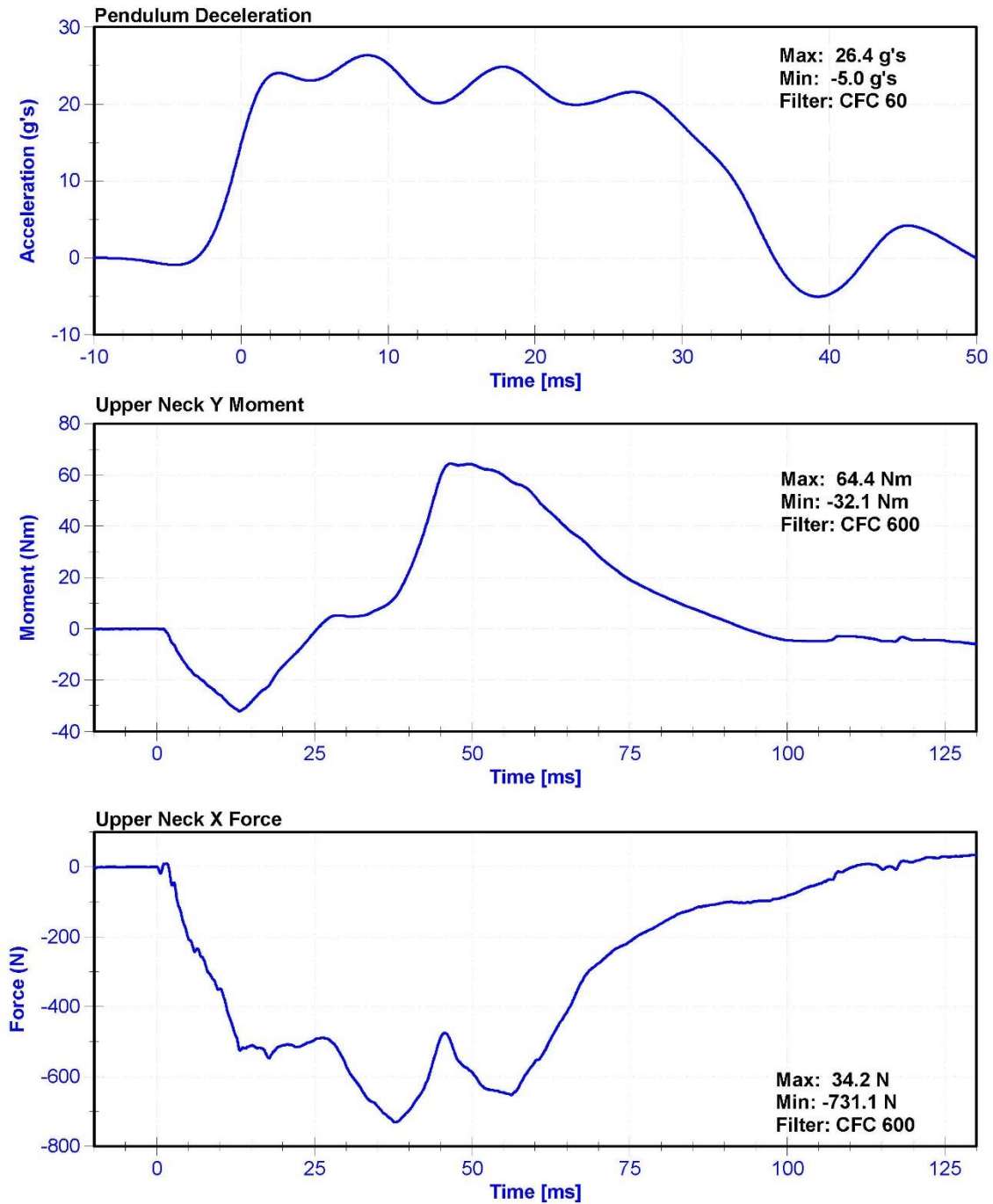
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	51.8	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.32	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.54	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.56	Pass
Max D Plane Rotation	77	91	deg	79.1	Pass
Max Moment During Rotation Interval	69	83	Nm	74.6	Pass
Moment Decay to 10.0 Nm	80	100	ms	85.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
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-1873 FX	7/19/2016	7/19/2017







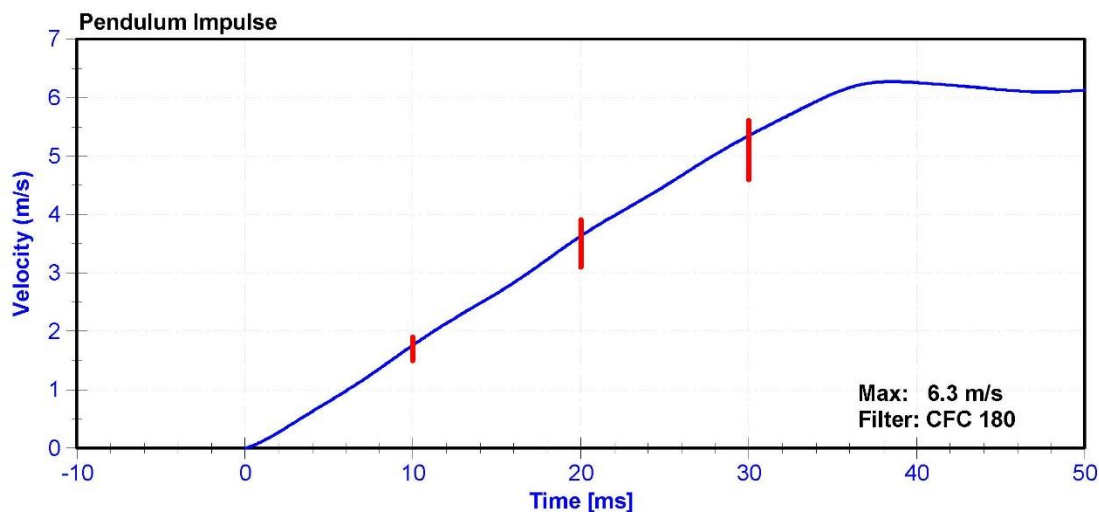
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	513	Laboratory Supervisor	M. Goehle

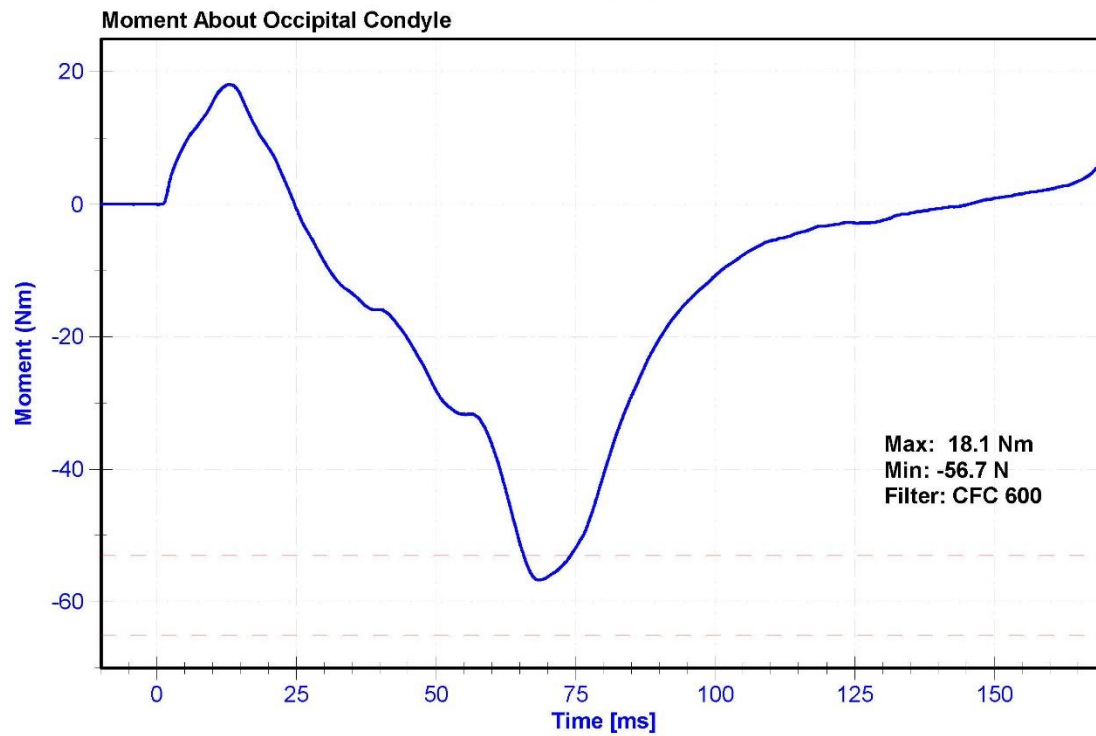
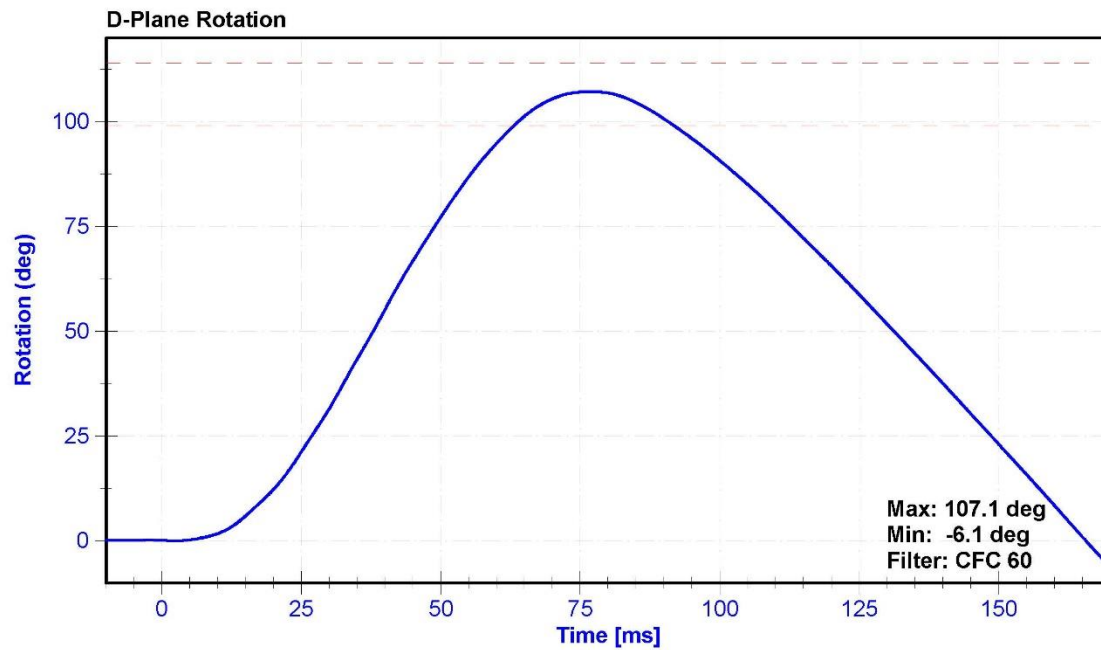
Results

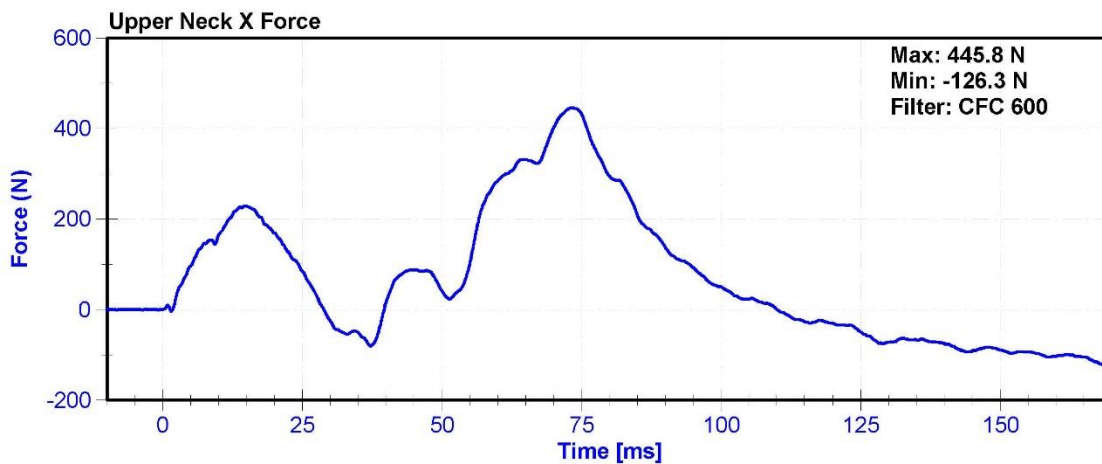
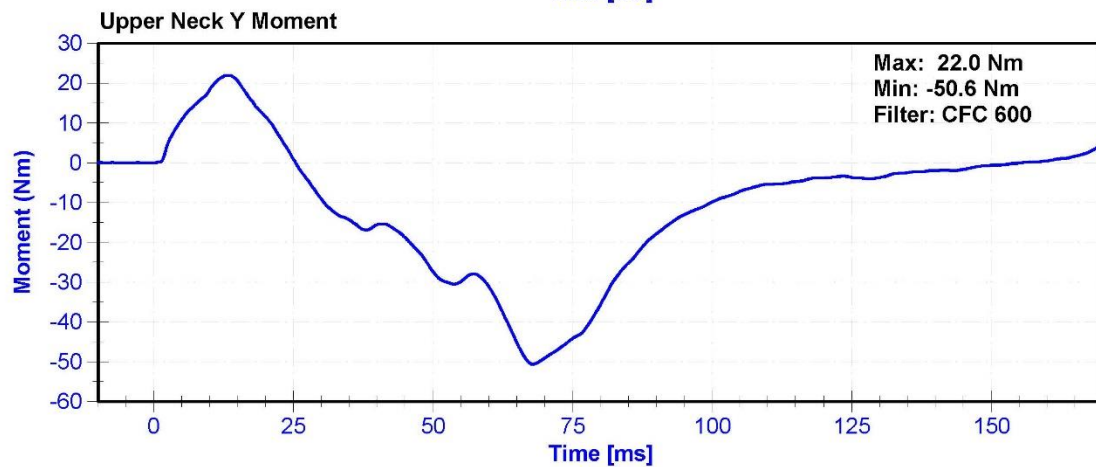
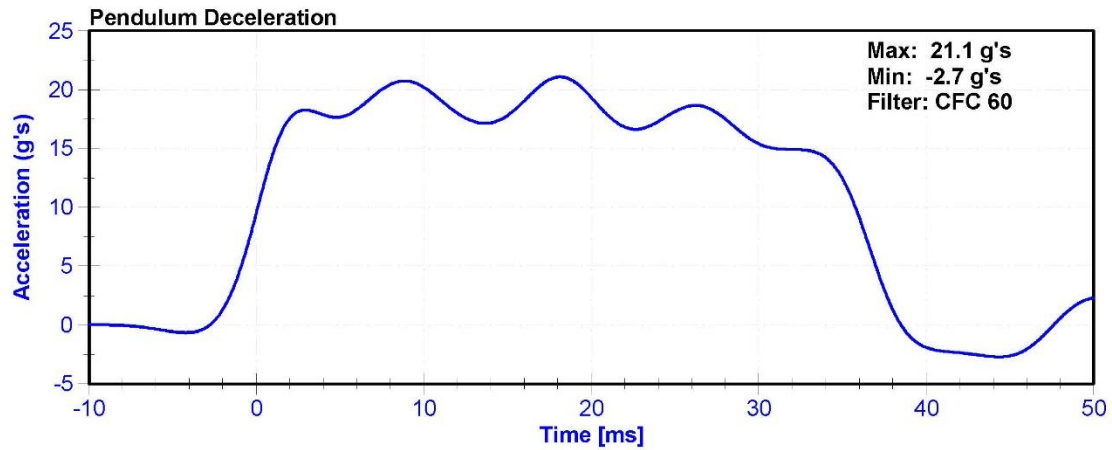
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	54.4	Pass
Velocity	5.95	6.19	m/s	6.068	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.76	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.63	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.35	Pass
D Plane Rotation	99	114	deg	107.1	Pass
Moment During Rotation Interval	-65	-53	Nm	-56.7	Pass
Moment Decay to -10Nm	94	114	ms	101.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
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-1873 FX	7/19/2016	7/19/2017







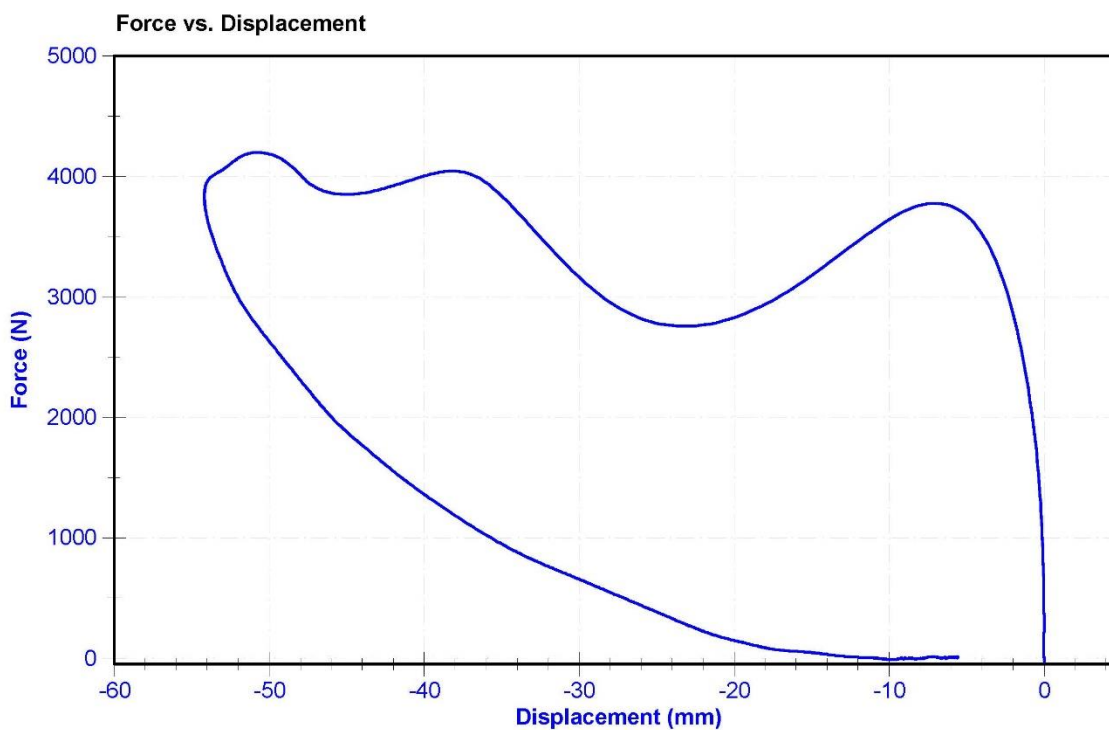
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	513	Laboratory Supervisor	M. Goehle

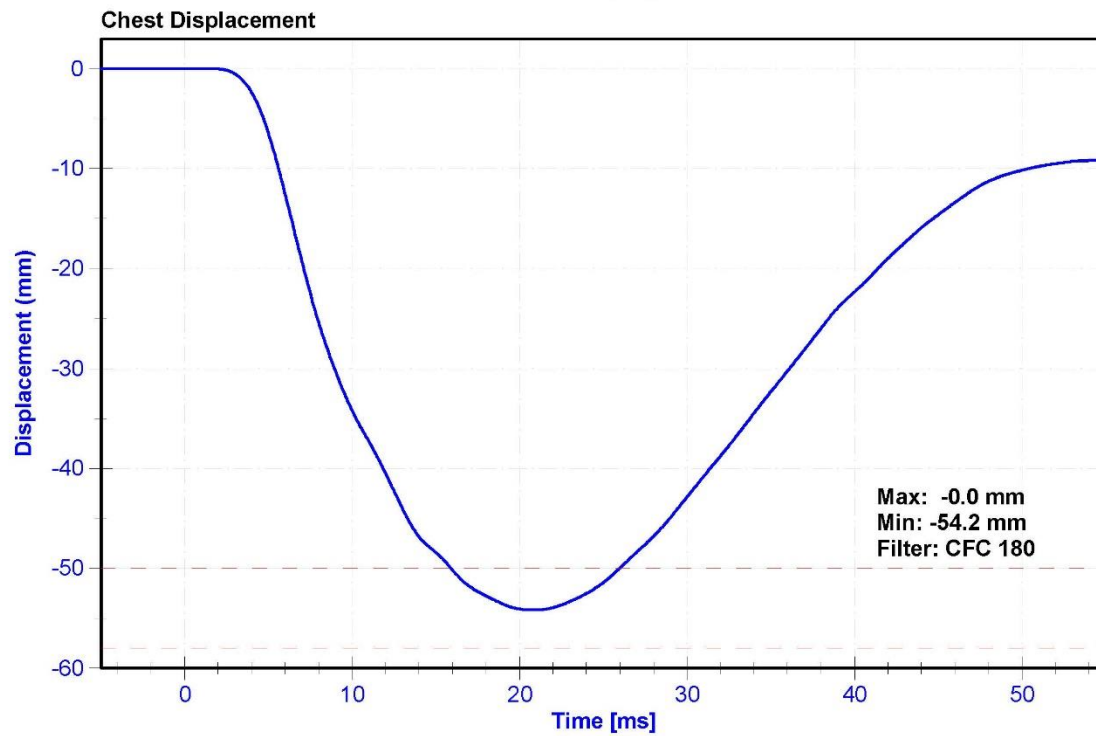
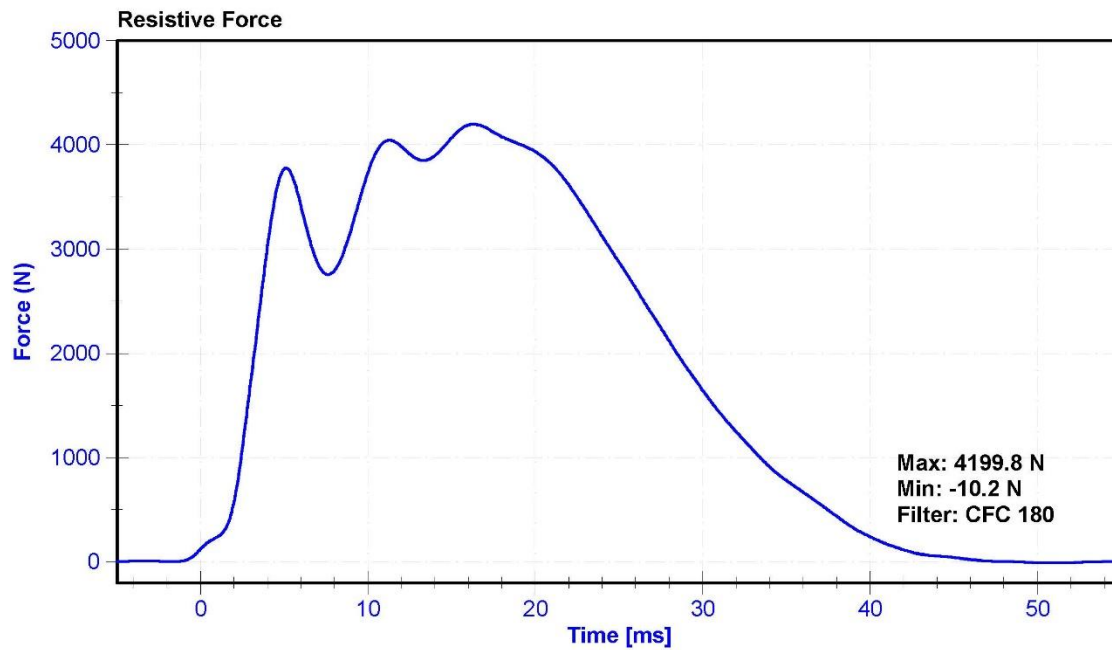
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	56.6	Pass
Velocity	6.59	6.83	m/s	6.699	Pass
Chest Deflection	-58	-50	mm	-54.2	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4199.8	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4186.1	Pass
Hysteresis	69	85	%	75.4	Pass

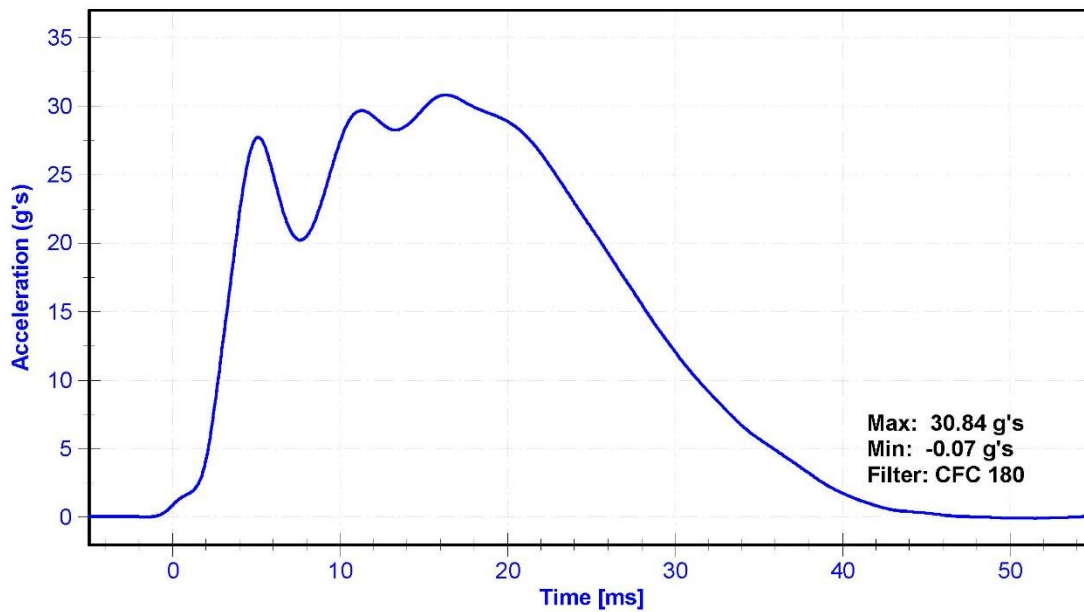
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P16593	4/1/2016	4/1/2017
Chest Potentiometer	Servo 14CB1-2897	DS-CST513	8/23/2016	8/23/2017

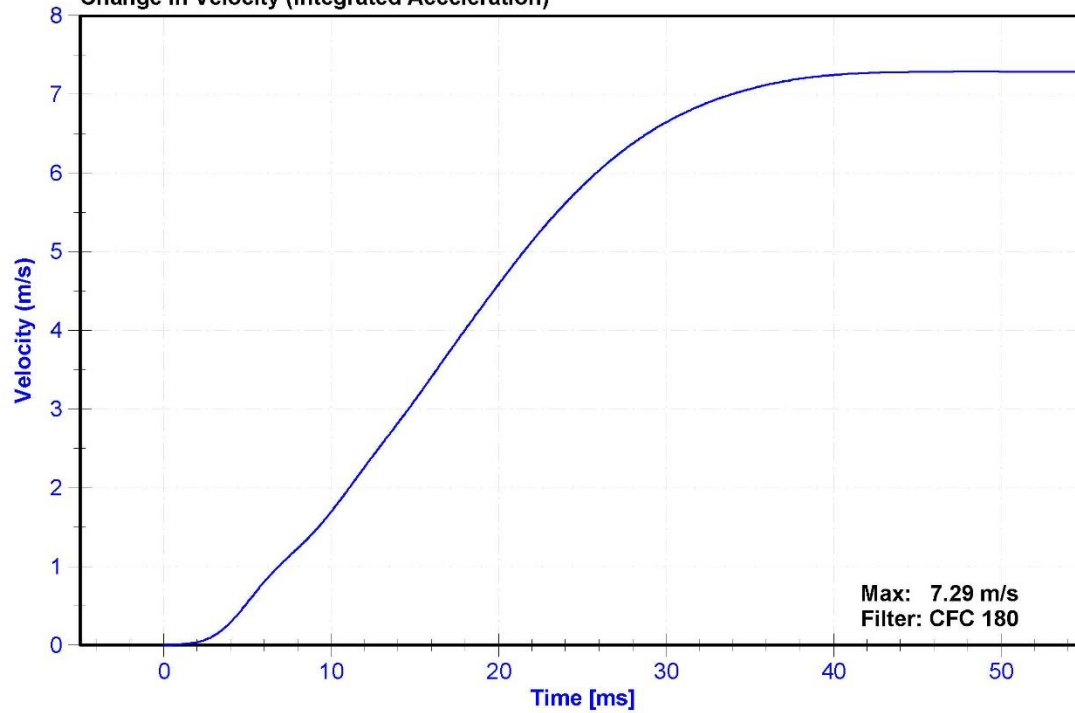




Probe Acceleration



Change in Velocity (Integrated Acceleration)



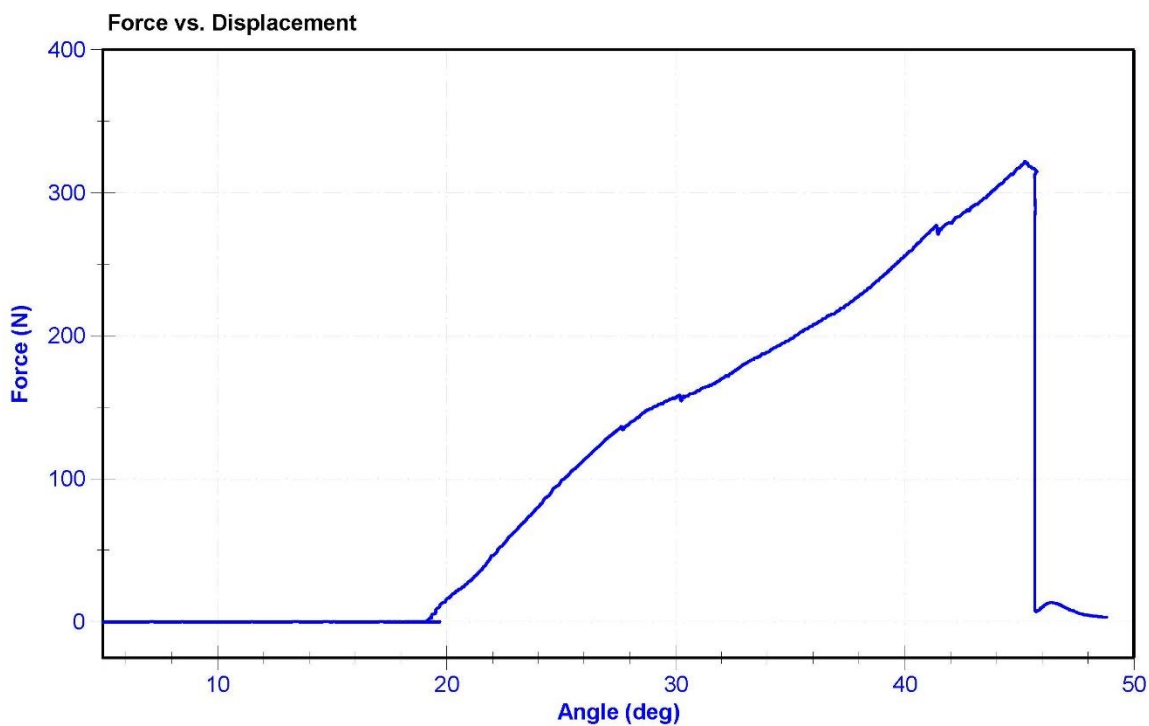
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	513	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	20.9	Pass
Humidity	10	70	%	55.7	Pass
Initial Angle	0	20	deg	18.3	Pass
Force at 45 Degrees	320	390	N	321.9	Pass
Return Angle Relative to Initial	0	8	deg	6.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	9/7/2016	9/7/2017
Load Cell	Interface SML-200	LC-493319	9/7/2016	9/7/2017



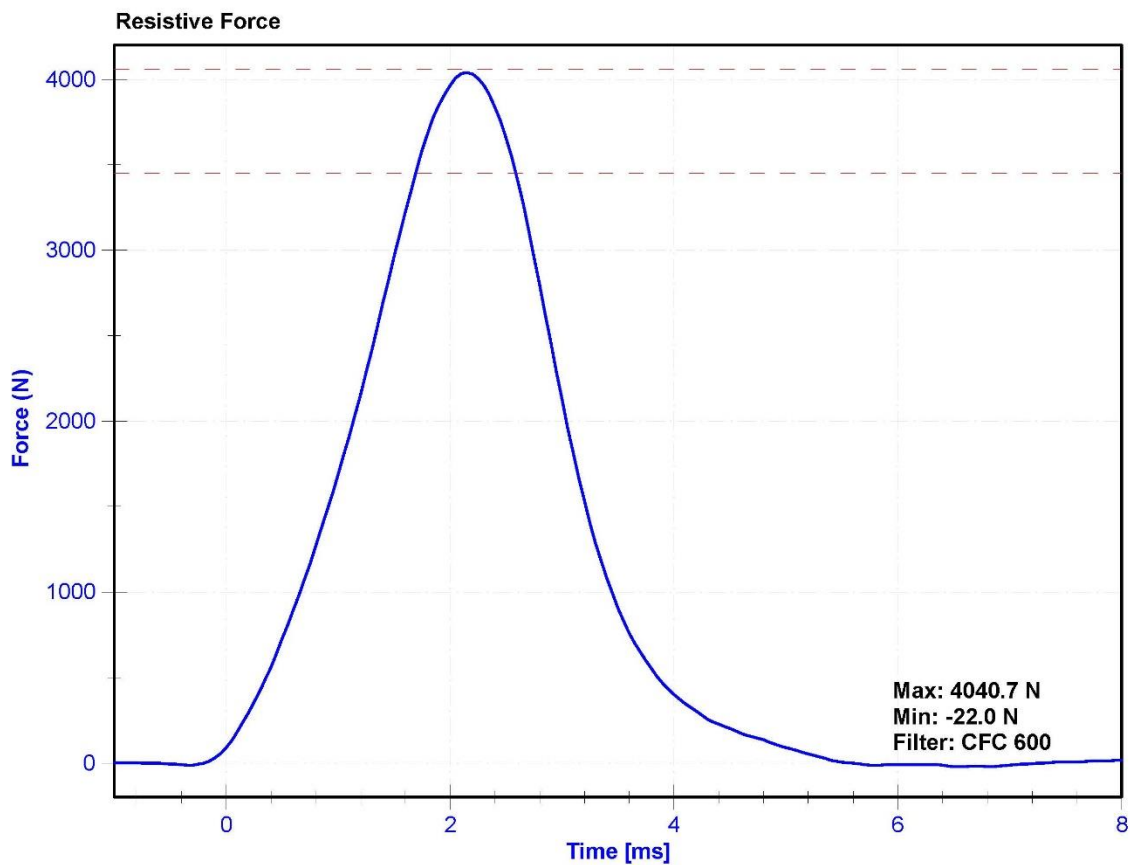
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	513	Laboratory Supervisor	M. Goehle

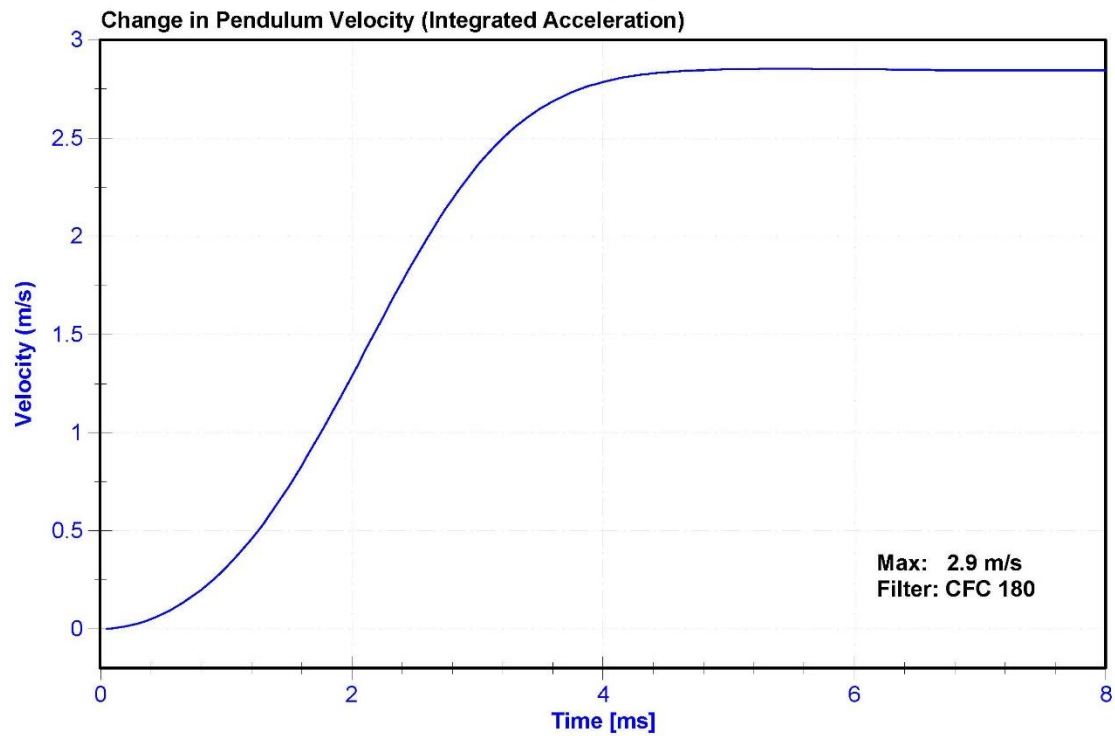
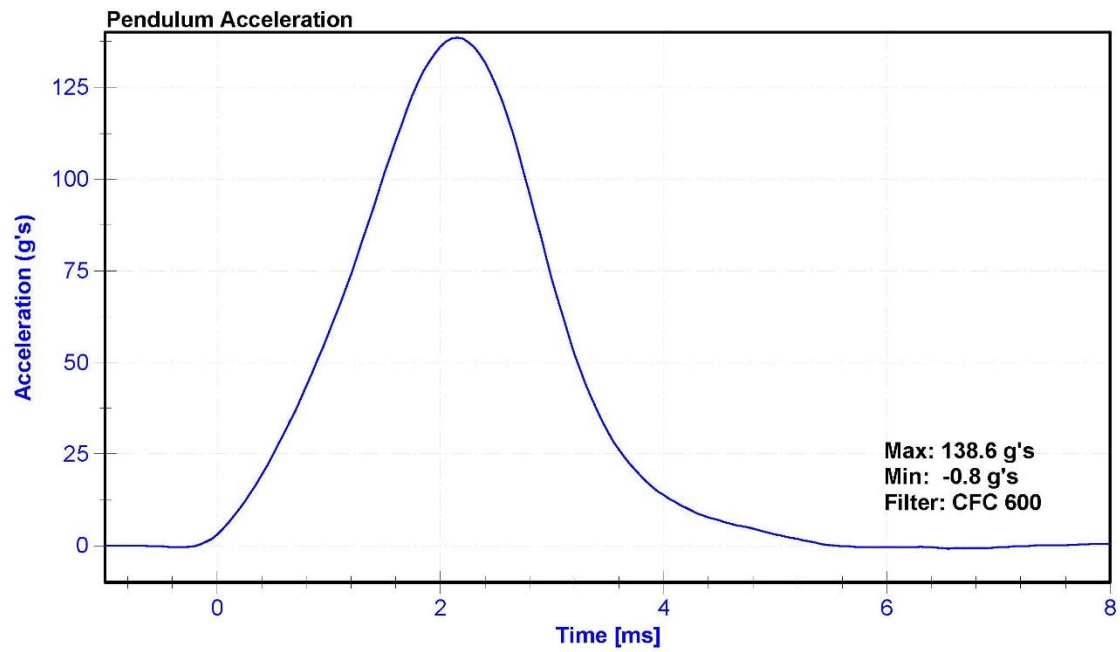
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.7	Pass
Humidity	10	70	%	50.3	Pass
Velocity	2.07	2.13	m/s	2.082	Pass
Resistive Force	3450	4060	N	4040.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P16593	4/1/2016	4/1/2017





ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	513	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.8	Pass
Humidity	10	70	%	45.8	Pass
Velocity	2.07	2.13	m/s	2.106	Pass
Resistive Force	3450	4060	N	3967.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P16593	4/1/2016	4/1/2017

