

REPORT NUMBER: R&D-CAL-15-011

**MOVING BARRIER TO VEHICLE CRASH TEST IN SUPPORT OF NHTSA'S
FRONTAL OBLIQUE OFFSET PROGRAM
OBLIQUE MOVING DEFORMABLE BARRIER INTO LEFT FRONT OF A**

2016 Mazda CX-5

90.1KPH, 15 DEGREE ANGLE, 35% OVERLAP

TEST DATE: 11/13/2015

NHTSA No: R20165409

**CALSPAN CORPORATION
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FINAL REPORT SUBMITTED:

April 15, 2016

PREPARED FOR:

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

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

Date: _____

TOM, Vehicle Crash Testing
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Date: _____

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16. Abstract A test was conducted in accordance with Contract DTNH22-14-D-00359, Task Order #003. The Test consisted of an Oblique Moving Deformable Barrier (OMDB) traveling at a target speed of 90.12 kph into a stationary 2016 Mazda CX-5 SUV. The struck vehicle was positioned 15 degrees relative to the moving barrier and impacted 35% of the left side of the vehicle. 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 November 13, 2015. The OMDB impact velocity was 90.08 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 818 mm. The test vehicle's performance was as follows: <table border="1"> <thead> <tr> <th>Measurement Description</th> <th>Units</th> <th>Driver THOR</th> <th>Pass. THOR</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>231.44</td> <td>721.93</td> </tr> <tr> <td>Brain Injury Criteria (BrIC)</td> <td>N/A</td> <td>0.70</td> <td>1.03</td> </tr> <tr> <td>Peak Neck Tension</td> <td>mm</td> <td>1634.41</td> <td>2419.08</td> </tr> <tr> <td>Peak Resultant Chest Deflection</td> <td>N/A</td> <td>51.97</td> <td>33.02</td> </tr> <tr> <td>Peak Abdomen Deflection</td> <td>N</td> <td>-60.34</td> <td>-42.70</td> </tr> <tr> <td>Peak Resultant Acetabulum force</td> <td>N</td> <td>1600.15</td> <td>2861.44</td> </tr> <tr> <td>Peak Femur Force</td> <td>N</td> <td>-2778.00</td> <td>-3316.17</td> </tr> <tr> <td>Right Tibia Index</td> <td>N</td> <td>0.50</td> <td>0.44</td> </tr> </tbody> </table>					Measurement Description	Units	Driver THOR	Pass. THOR	Head Injury Criteria (HIC ₁₅)	N/A	231.44	721.93	Brain Injury Criteria (BrIC)	N/A	0.70	1.03	Peak Neck Tension	mm	1634.41	2419.08	Peak Resultant Chest Deflection	N/A	51.97	33.02	Peak Abdomen Deflection	N	-60.34	-42.70	Peak Resultant Acetabulum force	N	1600.15	2861.44	Peak Femur Force	N	-2778.00	-3316.17	Right Tibia Index	N	0.50	0.44
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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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SECTION 1
PURPOSE OF TEST

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015

This 90.12 kph (56 mph) Moving Barrier into a test vehicle is part of the Frontal Offset Test outlined in Contract No. DTNH22-14-D-00359, Task Order 0003. The purpose of this test is to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

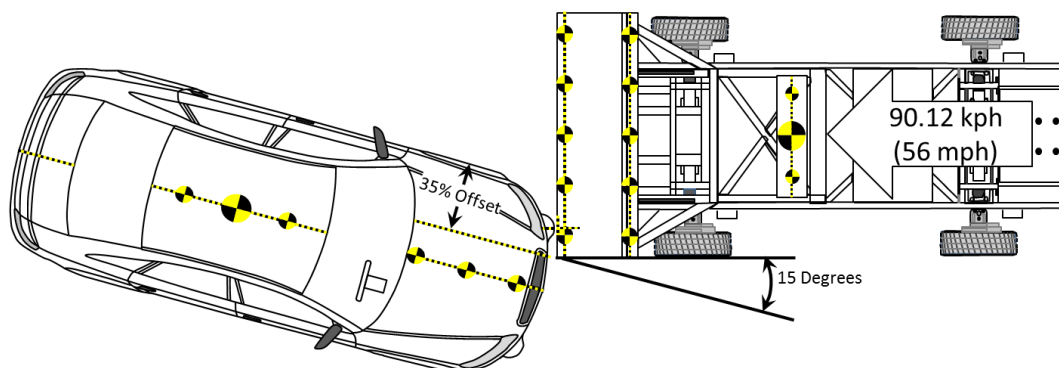
This test was conducted in accordance with the instructions set forth for a 15° angle, 35% offset moving barrier to vehicle impact, outlined in Contract No. DTNH22-14-D-00359, Task Order 0003. Data was obtained indicant of Federal Motor Vehicle Safety Standard FMVSS 208- Occupant Crash Protection, FMVSS 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 0003.

SECTION 2 SUMMARY OF TEST

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015

A 2016 Mazda CX-5 SUV was impacted on the left front corner by an Oblique Moving Deformable Barrier (OMDB). This test vehicle was stationary and positioned at a target angle of 15° and at a target offset of 35% to the forward line of motion of the OMDB. The OMDB was towed down the test track in a full forward direction, without any crabbing, and at the targeted impact velocity of 90.12 kph (56.0 mph) into the test vehicle. The test vehicle's mass was 1,775 kg (3,913.2 lbs), and the OMDB's mass was 2519 kg (5,552 lbs). The test was conducted by Calspan Corporation on November 13, 2015.



The test was documented by two (2) real time and fifteen (15) high-speed video cameras. Camera locations and other pertinent data are located in Data Sheet No. 6 of this report. Pre and post – test photographs of the test vehicle, OMDB, and test setup were taken using a digital still camera. Photographic documentation of the test is presented in Appendix A of this report.

One 50% adult male THOR-NT anthropomorphic test device (ATD) (Serial No. DO9798) was seated in the left, front (P1 -Driver's) seating position and one 50% adult male THOR-NT adult male ATD (Serial No. DL9207) was seated in the right front passenger seating position (P2). The driver and passenger were positioned according to instructions specified in the THOR seating procedures.

The driver was restrained with a 3 – point seat belt, frontal, curtain, and torso airbag. The passenger was restrained with a 3 – point seat belt, frontal, curtain and torso airbags.

SECTION 2 (CONTINUED)

SUMMARY OF TEST

Test Vehicle: 2016 Mazda CX-5 SUV
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Two hundred and fifty eight (258) channels of data from the two ATD's, test vehicle and OMDB were collected using Kayser – Threde data acquisition systems. Appendix B contains dummy data plots, as well as vehicle and OMDB response data plots.

There was 83.7% total windshield retention, with 67.4% and 100% retention on the left and right sides, respectively. 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 818 mm at C1 to the left of the vehicle's centerline. The maximum crush of the structural bumper beam was 343 mm at B1, to the left of the vehicle's centerline. Full vehicle measurements are presented in Section 3 of this report.

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 cracks throughout with minor separation along the driver side.
- The B-Pillar & C-Pillar Buckled during impact
- Hood bent inwards and exposed part of the engine compartment

The driver ATD's visible contact points were:

- Head contacted the frontal and curtain airbags and headrest
- Torso contacted the frontal and torso airbag, seatback, shoulder/arm contacted the door
- Left Knee contacted the knee bolster
- Right Knee contacted the knee bolster

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

- Head contacted the frontal airbag and center instrument panel
- Torso contacted the frontal airbag, shoulder contacted center instrument panel
- Knees contacted the glove box

SECTION 2 (CONTINUED)
CRASH VEHICLE SUMMARY

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015

Primary Impact Data

Measured Parameter	Units	Value
OMDB Velocity at Impact	kph	90.07
OMDB Test Weight	kg	2519
OMDB Maximum Static Crush	mm	413
Vehicle Test Weight	kg	1775
Actual Vehicle Angle	degrees	15
Vehicle Maximum Static Crush	mm	818
Vertical Offset from Target Point (+ down / - up)*	mm	-18
Lateral Offset from Target Point (+ left / - right)*	mm	+1
Number of Data Channels		258
Number of Real-Time Cameras		2
Number of High-Speed Cameras		15

*Offsets are in relation to the vehicle coordinate system.

Dummy Contacts

	Driver	Picture Ref.	Passenger	Picture Ref.
Dummy Type	THOR, S/N: DO9798		THOR, S/N: DL9207	
Head Contact	Front & Curtain Airbags, Headrest	A49-A51	Front Airbag, center instrument panel, & visor	A70-A72
Upper Torso Contact	Front & Torso Airbag	N/A	Front Airbag	N/A
Lower Torso Contact	None	N/A	None	N/A
Side Torso Contact	Seatback, Torso Airbag, Arm contacted door	N/A	Shoulder Contacted Center Instrument Panel	N/A
Left Knee Contact	Knee Bolster	A28	Glove Box	A52
Right Knee Contact	Knee Bolster	A28	Glove Box	A52

Data Anamolies

CHANNEL DESCRIPTION	EXPLANATION
Driver Thorax Lower Left X Displacement, Questionable spikes 16.2ms to 20.5ms and 64.6ms and 71.6ms	Could not reproduce, suspected poor internal grounding
Driver Abdomen Left X Displacement, Questionable spike at 20.2ms	Could not reproduce, suspected poor internal grounding
Front Passenger Thorax Upper Right X Displacement, Questionable spike at 126ms and 259ms	Could not reproduce, suspected poor internal grounding
Front Passenger Abdomen Right X Displacement, Questionable spike at 126ms	Could not reproduce, suspected poor internal grounding

PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: R20165409 - 2016 Mazda CX-5 NHTSA No.: R20165409
 Test Program: NHTSA R&D Left Oblique Offset 15deg/35% Test Date: 11/13/2015

Driver: THOR Serial No. D09798 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	HIC 15ms		Compute	231.44	
	Brain Injury Criteria (BrIC)		Compute	0.70	
	Head Rotational Velocity X	Deg/s	60	714.63	-893.94
	Head Rotational Velocity Y	Deg/s	60	963.26	-1421.88
	Head Rotational Velocity Z	Deg/s	60	1221.19	-522.93
Neck	Upper Neck Z-axis Force	N	1000	1634.41	-73.69
	Upper Neck Y-axis Moment	Nm	Thortest	22.92	-12.70
Chest	Upper Left Resultant Chest Deflection	mm	Thortest	21.42	
	Upper Right Resultant Chest Deflection	mm	Thortest	51.97	
	Lower Left Resultant Chest Deflection	mm	Thortest	11.72 ⁽¹⁾	
	Lower Right Resultant Chest Deflection	mm	Thortest	36.29	
Abdomen	Lower Left X-axis Deflection	mm	Thortest	0.00 ⁽²⁾	-59.02 ⁽²⁾
	Lower Right X-axis Deflection	mm	Thortest	1.07	-60.34
Acetabulum	Left Acetabulum Resultant Force	N	Compute	1480.53	0.07
	Right Acetabulum Resultant Force	N	Compute	1600.15	0.12
Femur	Left Femur Force, FZ	N	600	331.85	-2778.00
	Right Femur Force, FZ	N	600	410.30	-2223.33
Tibia	Left Upper Tibia, FZ	N	600	124.25	-1530.51
	Left Upper Tibia Index		Compute	0.55	
	Right Upper Tibia, FZ	N	600	299.63	-1568.29
	Right Upper Tibia Index		Compute	0.41	
	Left Lower Tibia, FZ	N	600	308.60	-2251.78
	Left Lower Tibia Index		Compute	0.54	
	Right Lower Tibia, FZ	N	600	223.09	-2440.86
	Right Lower Tibia Index		Compute	0.50	
Ankle	Left Ankle Rotation, RX	Deg	180	5.69	-24.60
	Left Ankle Rotation, RY	Deg	180	31.20	-25.54
	Left Ankle Dorsiflexion Moment, MY	Nm	Compute	45.50	-14.34
	Left Ankle In/Eversion Moment, MX	Nm	Compute	37.26	-110.01
	Right Ankle Rotation, RX	Deg	180	-3.62	-37.09
	Right Ankle Rotation, RY	Deg	180	11.38	-14.05
	Right Ankle Dorsiflexion Moment, MY	Nm	Compute	49.25	-59.79
	Right Ankle In/Eversion Moment, MX	Nm	Compute	39.30	-80.69

Anomalies: (1) Thorax Lower Left X Displacement, Questionable spikes 16.2ms to 20.5ms, 64.6ms and 71.6ms
 (2) Questionable spike at 20.2ms

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: R20165409 - 2016 Mazda CX-5 NHTSA No.: R20165409
 Test Program: NHTSA R&D Left Oblique Offset 15deg/35% Test Date: 11/13/2015

Right Front Passenger: THOR Serial No. DL9207 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	HIC 15ms		Compute	721.93	
	Brain Injury Criteria (BrIC)		Compute	1.03	
	Head Rotational Velocity X	Deg/s	60	827.98	-2125.41
	Head Rotational Velocity Y	Deg/s	60	608.74	-2058.86
	Head Rotational Velocity Z	Deg/s	60	1447.26	-729.93
Neck	Upper Neck Z-axis Force	N	1000	2419.08	-155.56
	Upper Neck Y-axis Moment	Nm	Thortest	10.56	-25.38
Chest	Upper Left Resultant Chest Deflection	mm	Thortest	33.02	
	Upper Right Resultant Chest Deflection	mm	Thortest	18.95 ⁽³⁾	
	Lower Left Resultant Chest Deflection	mm	Thortest	28.97	
	Lower Right Resultant Chest Deflection	mm	Thortest	13.03	
Abdomen	Lower Left X-axis Deflection	mm	Thortest	0.14	-42.70
	Lower Right X-axis Deflection	mm	Thortest	0.36 ⁽⁴⁾	-44.52 ⁽⁴⁾
Acetabulum	Left Acetabulum Resultant Force	N	Compute	2861.44	0.04
	Right Acetabulum Resultant Force	N	Compute	1670.26	0.04
Femur	Left Femur Force, FZ	N	600	302.00	-3316.17
	Right Femur Force, FZ	N	600	331.79	-1110.15
Tibia	Left Upper Tibia, FZ	N	600	157.40	-2258.74
	Left Upper Tibia Index		Compute	0.65	
	Right Upper Tibia, FZ	N	600	211.32	-2104.48
	Right Upper Tibia Index		Compute	0.44	
	Left Lower Tibia, FZ	N	600	134.86	-2962.39
	Left Lower Tibia Index		Compute	0.65	
	Right Lower Tibia, FZ	N	600	184.50	-2454.17
	Right Lower Tibia Index		Compute	0.42	
Ankle	Left Ankle Rotation, RX	Deg	180	15.39	-32.03
	Left Ankle Rotation, RY	Deg	180	4.69	-26.45
	Left Ankle Dorsiflexion Moment, MY	Nm	Compute	15.50	-44.97
	Left Ankle In/Eversion Moment, MX	Nm	Compute	41.06	-100.59
	Right Ankle Rotation, RX	Deg	180	23.60	-28.99
	Right Ankle Rotation, RY	Deg	180	-3.92	-25.66
	Right Ankle Dorsiflexion Moment, MY	Nm	Compute	10.08	-40.59
	Right Ankle In/Eversion Moment, MX	Nm	Compute	108.89	-87.42

Anomalies: (3) Thorax Upper Right X Displacement, Questionable spike at 126ms and 259ms
 (4) Questionable spike at 126ms

SECTION 3 DATA SHEETS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

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DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

VEHICLE INFORMATION

NHTSA No.	R20165409
Model Year	2016
Make	Mazda
Model	CX-5
Body Style	SUV
VIN	JM3KE4BY7G0668318
Body Color	Charcoal Gray
Odometer Reading (km/mi)	222 km / 138 mi
Engine Displacement. (L)	2.5
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	05/15

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	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 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

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TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	465	323		487	418	
Right	kg	433	331		502	368	
Ratio	%	57.9	42.1		56	44	
Totals	kg	898	654	1552	989	786	1775

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1552
Weight of 2 THOR ATDs	kg	184
Rated Cargo/Luggage Weight (RCLW)	kg	44.8
Calculated Vehicle Target Weight (TVTW)	kg	1780.8

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	876	881	897	898	1136
As Tested	mm	861	863	868	871	1194
Post Test	mm	833	876	826	956	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2696
Total Vehicle Length at Left Side	mm	4406
Total Vehicle Length at Centerline	mm	4541
Total Vehicle Length at Right Side	mm	4406
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	99
Amount of Stoddard Solvent in Fuel Tank	L	53.94

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Rear seats, door panels, bumper beam and skin, side view mirrors, muffler, trunk
Carpeting, spare tire, jack, tail light.

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

Test Vehicle: 2016 Mazda CX-5 SUV
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TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Units	Pre-Test
1	Total Length	mm	4541
2	Total Width	mm	1828
3*	Bumper Top Height	mm	631
4*	Bumper Bottom Height	mm	551
5*	Longitudinal Member Top Height	mm	647
6	Distance Between Longitudinal Members	mm	1009
7	Longitudinal Member Width	mm	63
8*	Engine Top Height	mm	931
9*	Engine Bottom Height	mm	267
10	Engine and Gearbox Width	mm	569
11	Front Bumper-Engine Distance	mm	497
12*	Front Shock Absorber Fixing Height	mm	1017
13*	Bonnet Leading Edge Height	mm	912
14	Front Shock Absorber Fixing Width	mm	1184
15	Front Bumper – Front Axle Distance	mm	933
16	Front Axle – A Pillar Distance	mm	562
17	A-Pillar – B-Pillar Distance	mm	1074
18	B-Pillar – Rear Axle Distance	mm	1060
19	B-Pillar – C-Pillar Distance	mm	921
20*	Roof Sill Bottom Height	mm	1545
21*	Roof Sill Top Height	mm	1605
22*	Floor Sill Bottom Height	mm	452
23*	Floor Sill Top Height	mm	497

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

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

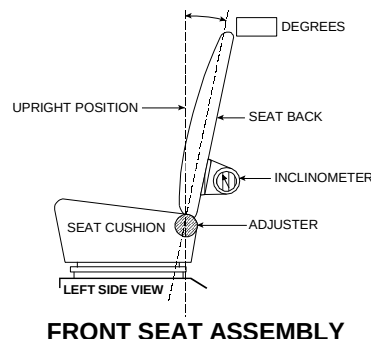
NHTSA No.: R20165409
 Test Date: 11/13/2015

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. Was adjusted rearward per the THOR seating procedure to obtain head level target.

Passenger Seat: The passenger seat back was positioned according to the Nominal Design Riding position listed in FORM 1. Was adjusted rearward per the THOR seating procedure to obtain head level target.



	UNIT	FORM 1 POSITION	AFTER ATD POSITIONING
Driver Seat Back Angle	deg	5.2	7.1
Passenger Seat Back Angle	deg	4.0	5.9

SEAT FORE/AFT POSITIONS

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

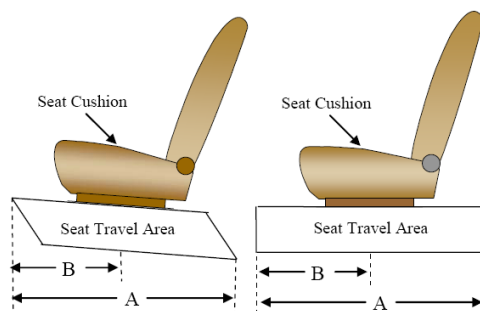
The driver's seat was positioned at its mid angle position and at the mid-point of fore/aft travel. The passenger's seat was positioned at the mid-point of fore/aft travel then moved rearward to obtain clearance per the THOR Seating procedures.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	27 (0-26)	13
Passenger Seat	27 (0-26)	15

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
Passenger Seat	4	0



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

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

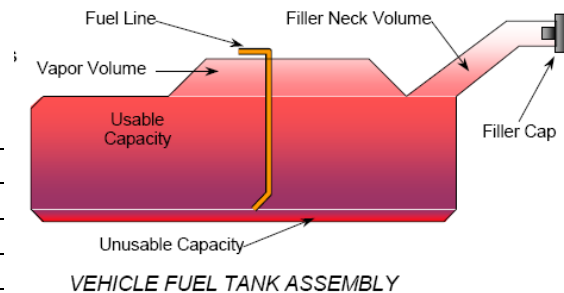
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	58
Usable Capacity of "Optional Tank"	
93% of Usable Capacity	53.94
Actual Amount of Solvent Used	53.94
1/3 of Usable Capacity	19.33

FUEL PUMP

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

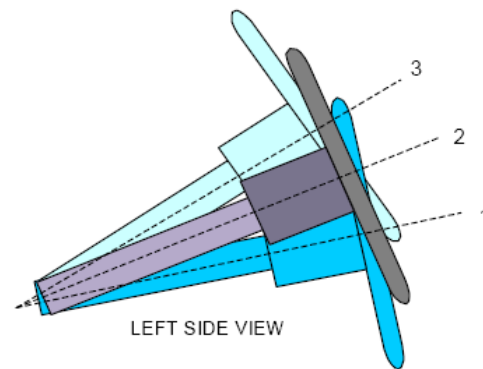
Fuel evacuated according to the specifications provided by the manufacturer in Form 1. Electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the left rear wheel.



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



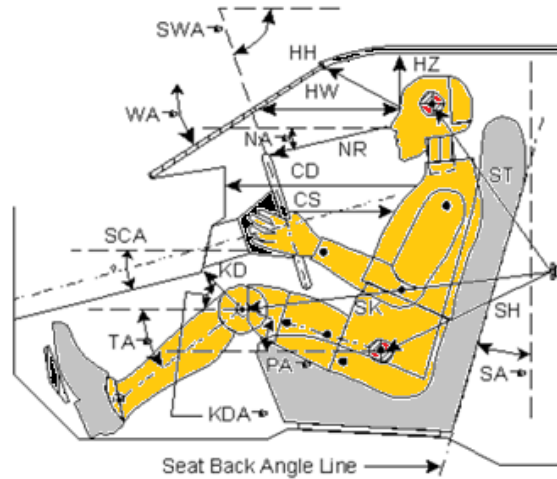
STEERING COLUMN POSITIONS

	Tilt (degrees)	Fore/Aft Position (mm)
Lowermost position No. 1	23.5	
Geometric center position No. 2	25.95	
Uppermost position No. 3	28.4	
Telescoping Steering Wheel Travel		50
Test Position	25.9	25

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

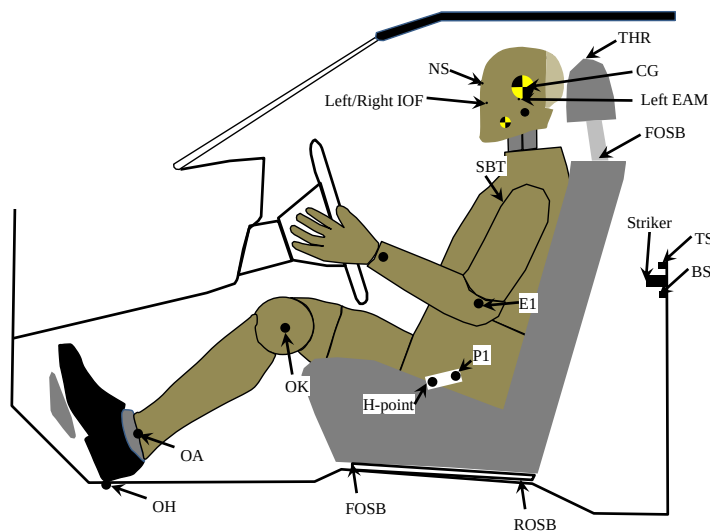


Code	Measurement Description	Driver (Serial#THOR DO9798)		Passenger (Serial#THOR DL9207)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		32		
SWA°	Steering Wheel Angle		26.2		
SCA°	Steering Column Angle		63.8		
SA°	Seat Back Angle (on headrest post)		7.1		5.9
SA°	Seat Back Angle		21.6		20.3
HZ	Head to Roof (Z)	223	90	216	90
HH	Head to Header	425	20	433	18.1
HW	Head to Windshield	718	0	743	0
NR	Nose to Rim	510	17.4	674	33.4
CD	Chest to Dash	581		545	
CS	Chest to Steering Hub	367	7.5		
RA	Rim to Abdomen	183	0		
KDL	Left Knee to Dash	106	21.7	88	30.5
KDR	Right Knee to Dash	100	15.6	115	23.9
PA°	Pelvic Angle		32.6		33.3
TA°	Tibia Angle		50.6		47.5
SK	Striker to Knee	644	2.0	655	5.7
ST	Striker to Head	523	86.5	524	87.3
SH	Striker to H-Point	278	28.8	269	28.8
HAX°	Head Angle (X)		0.1		-0.1
HAY°	Head Angle (Y)		-5.2		-6.8
TAX°	T6 Angle (X)		-0.4		-1.2
TAY°	T6 Angle (Y)		21.7		22.4
TAX°	T1 (X)		-0.3		-1.4
TAY°	T1 (Y)		1.4		1.8
TAX°	T12 (X)		-0.5		-1.2
TAY°	T12 (Y)		31.1		31.3
PAX	Pelvic (X)		-0.4		-0.4
PAY	Pelvic (Y)		32.6		33.3

DATA SHEET NO.3 (CONTINUED) DUMMY CMM MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015



Description	Units	Driver			Passenger		
		X	Y	Z	X	Y	Z
Head CG	mm	2097	-443	-757	2099	449	-765
Nasion	mm	2196	-367	-757	2193	369	-767
Tip of Nose	mm	2193	-370	-718	2190	370	-730
Tip of Chin	mm	2181	-372	-621	2177	369	-630
Left EAM	mm	2103	-440	-729	2101	294	-735
Right EAM	mm	2107	-292	-723	2104	443	-739
Left IOF	mm	2188	-401	-721	2186	337	-730
Right IOF	mm	2191	-338	-717	2187	403	-730
Outboard Elbow	mm	2338	-625	-322	2226	649	-249
H-Point	mm	2313	-612	-98	2305	623	-111
H-Point Tool	mm	2239	-610	-128	2229	620	-142
Outboard Knee Bolt	mm	2711	-575	-213	2724	537	-180
Inboard Knee Bolt	mm	2717	-273	-235	2719	308	-182
Outboard Ankle Bolt	mm	2962	-585	122	3016	508	116
Outer Heel Point	mm	2976	-562	258	2987	270	247
Inboard Heel Point	mm	2925	-213	252	3018	304	112
Striker Top Bolt	mm	2040	-799	-256	2040	798	-257
Striker Bottom Bolt	mm	2041	-801	-220	2042	801	-222
Center Tip of Striker	mm	2073	-800	-241	2070	798	-242
Front Outboard Seat Anchor Bolt	mm	2544	-609	161	2547	610	159
Rear Outboard Seat Anchor Bolt	mm	2101	-606	186	2104	610	183
Outboard Head Restraint Post	mm	1899	-448	-624	1893	455	-633
Top of Head Restraint	mm	1941	-367	-890	1938	370	-901
Center of Steering Wheel	mm	2588	-368	-446			

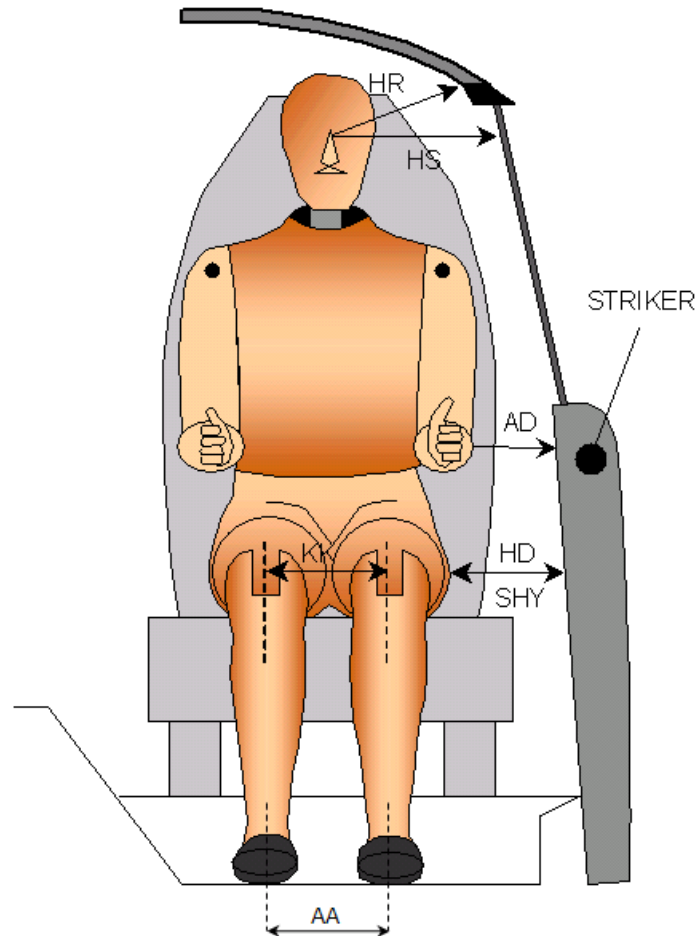
Reference point:

- +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. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

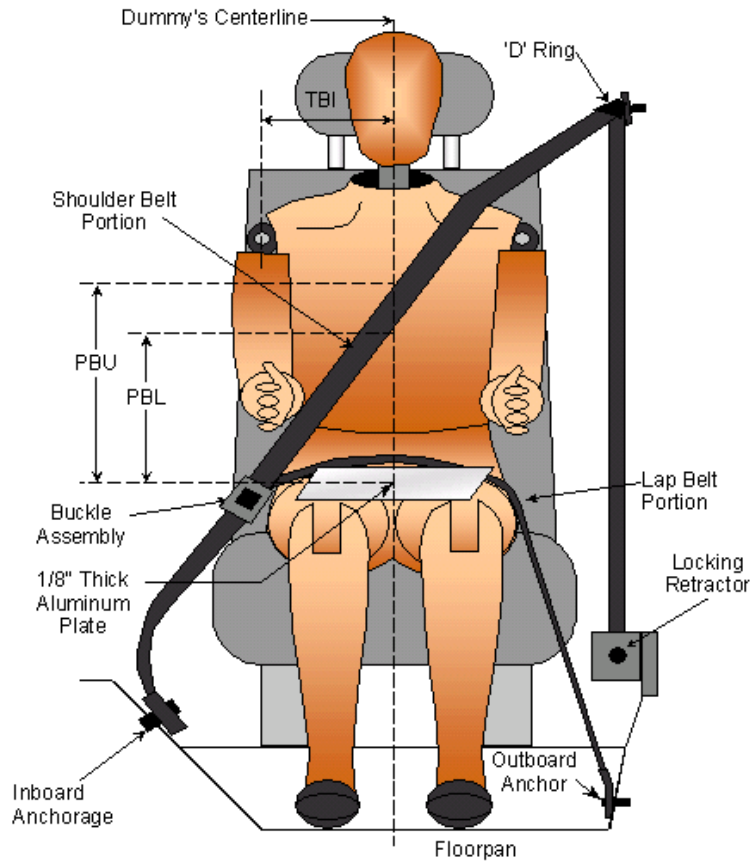


Code	Description	Units	Driver	Passenger
AD	Arm to Door	mm	140	48
HD	H-Point to Door	mm	195	189
HR	Head to Side Header	mm	238	237
HS	Head to Side Window	mm	345	344
KK	Knee to Knee	mm	347	270
SHY	Striker to H-Point (Y Direction)	mm	240	235
AA	Ankle to Ankle	mm	325	205

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	370	370
PBL — Top surface of reference to belt lower edge	mm	295	295

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	875	885
Lap Belt Length as measured on ATD	mm	845	845
Remainder of belt on reel	mm	900	890
Total belt length for continuous webbing systems	mm	2620	2620

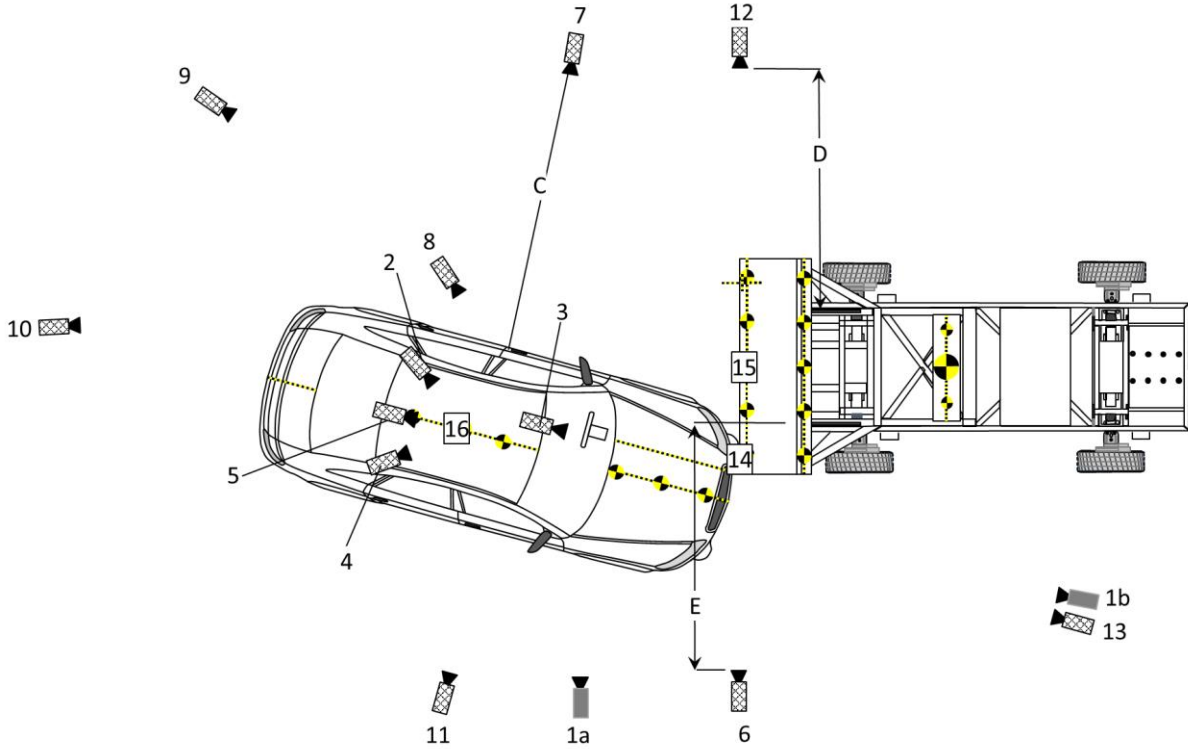
DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

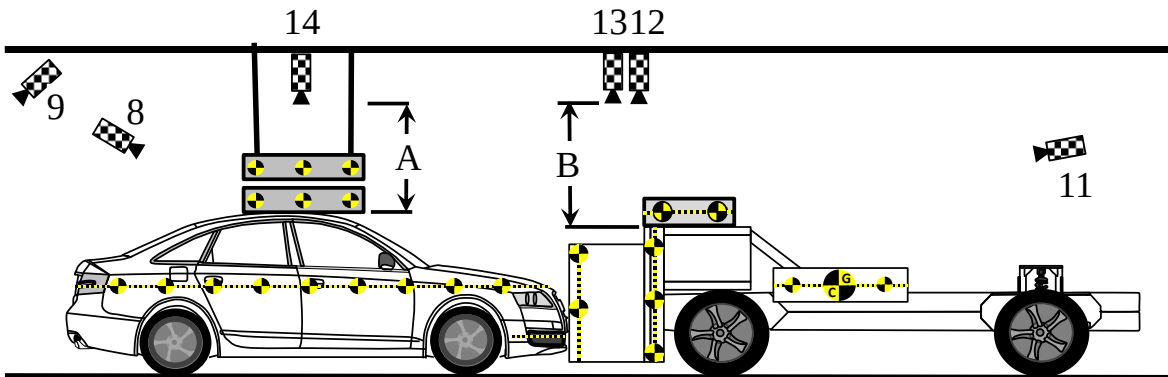
Test Vehicle:	2016 Mazda CX-5 SUV
Test Program:	R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015

HORIZONTAL LOCATION



VERTICAL LOCATION



A	mm	3705
B	mm	4136
C	mm	7822
D	mm	8690
E	mm	9237

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

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side	--	--	--	Zoom	60
2	Onboard Passenger Movement	7693	-384	1430	8	1000
3	Onboard Passenger Lower Leg	7552	-473	314	6.5	1000
4	Onboard Driver Movement	6593	-915	1452	8	1000
5	Onboard Centerline	7583	-618	1452	8	1000
6	Passenger Interaction	4972	9282	1131	24	1000
7	Driver Interaction	6987	8211	1403	24	1000
8	Target Vehicle Left Side Perpendicular (High)	8426	-2150	3725	24	1000
9	Target Vehicle Driver Motion	13579	6835	2731	24	1000
10	Rear View of Vehicle and OMDB	28750	0	3421	10	1000
11	Right Side Target Vehicle and OMDB	10873	-9721	2575	28	1000
12	Front of Vehicle and OMDB	4910	9825	1212	20	1000
13	Close-Up Impact Point	645	-3100	1308	24	1000
14	Overhead Impact Point View	4937	-1166	4563	28	1000
15	Overhead Vehicle View	7369	0	5327	15	1000
16	Overhead OMDB View	4678	0	5327	15	1000

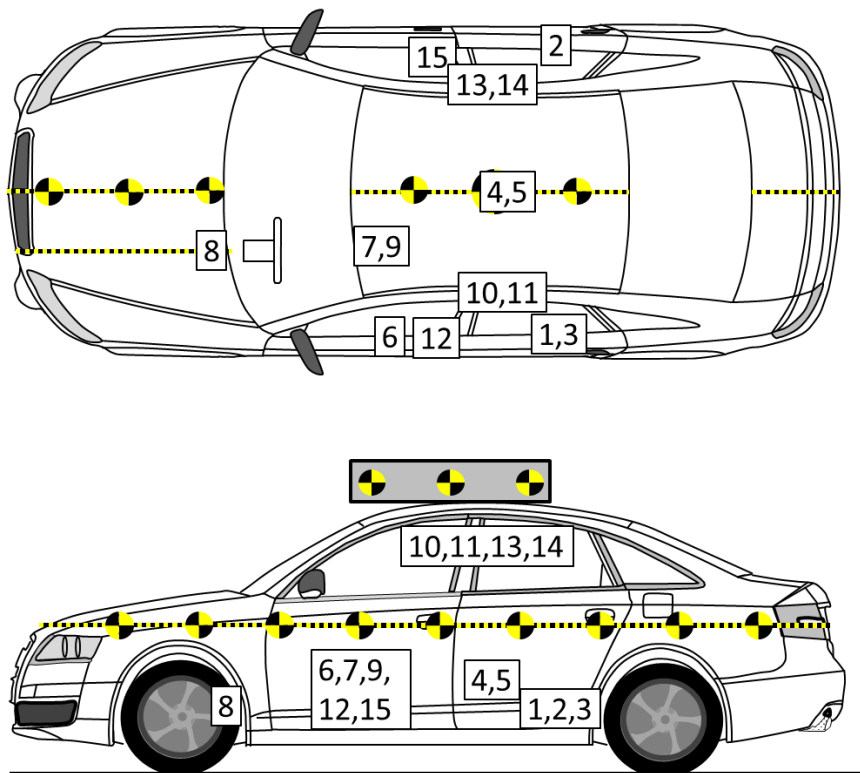
Reference Point:

- +X – From back of OMDB to front of OMDB
- +Y – Right of monorail center
- +Z – Up from ground

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

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS RELATIVE TO VCS

No.	Accelerometer Location	Axes	Units	Measurements (mm)		
				X	Y	Z
1	Left Rear Sill	X,Y	mm	1776	-692	180
2	Right Rear Sill	X,Y	mm	1775	694	177
3	Left Rear Sill Redundant	X,Y	mm	1759	-692	180
4	Vehicle CG	X,Y,Z	mm	1854	0	91
5	Vehicle CG Angular Displacement	X	mm	1865	-2	93
		Y	mm	1854	10	93
		Z	mm	1854	-1	91
6	Left Side Seat Track	X,Y,Z	mm	2297	-597	189
8	Left Side Toe Pan	X,Y,Z	mm	3371	-375	74
7	Left Side String Pot	N/A	mm	3283	-330	164

Reference point:

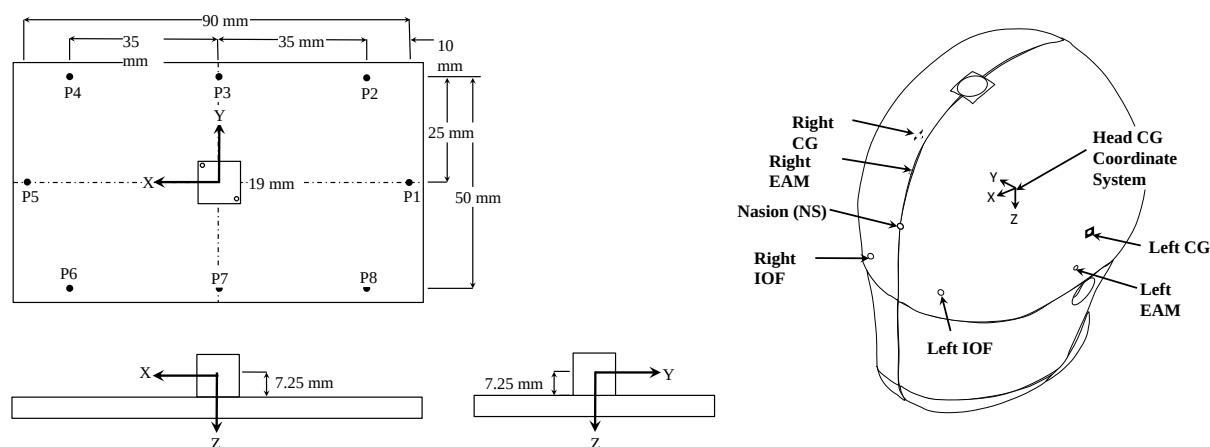
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO. 7 (Continued) **VEHICLE INSTRUMENTATION DATA**

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

ANGULAR RATE SENSOR MOUNTING PLATE & THOR HEAT POINT DEFINITIONS



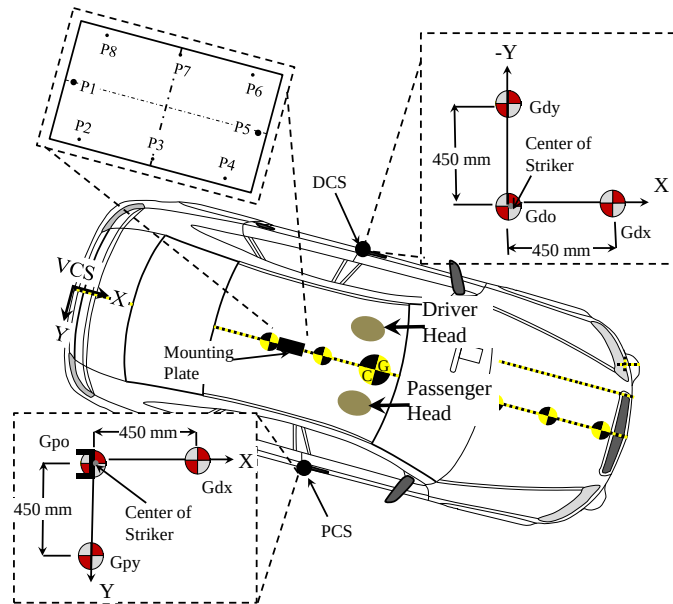
ARS MOUNTING PLATE - VEHICLE COORDINATE SYSTEM					
No.	Description	Units	Measurements (mm)		
			X	Y	Z
P1	Plate Point 1	mm	1809	0	106
P2	Plate Point 2	mm	1819	25	105
P3	Plate Point 3	mm	1854	24	105
P4	Plate Point 4	mm	1889	24	105
P5	Plate Point 5	mm	1899	-1	105
P6	Plate Point 6	mm	1889	-26	105
P7	Plate Point 7	mm	1854	-26	105
P8	Plate Point 8	mm	1819	-25	105

HEAD POINTS IN RELATION TO HEAD CG COORDINATE SYSTEM					
Description	Units	X	Y	Z	
CG	mm	0	0	0	
Left CG	mm	0	-77	0	
Right CG	mm	0	77	0	
Left EAM	mm	7	-72	27	
Right EAM	mm	7	72	27	
Left IOF	mm	89	-32	28	
Right IOF	mm	89	32	28	
Nasion	mm	92	0	-10	

DATA SHEET NO. 7 (Continued)
VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015



ARS MOUNTING PLATE & ATD'S HEAD POINTS RELATIVE TO GLOBAL COORDINATE SYSTEMS

DESCRIPTION	DRIVER DCS			PASS. PCS		
	X	Y	Z	X	Y	Z
G ₀	0	0	0	0	0	0
G _x	451	0	-3	448	0	-2
G _y	1	-452	0	0	450	-2
P1	-438	706	-498	-35	-836	-492
P2	-434	733	-498	-32	-809	-492
P3	-401	742	-498	2	-801	-493
P4	-366	751	-498	36	-792	-493
P5	-350	729	-498	52	-814	-493
P6	-354	702	-498	48	-840	-493
P7	-388	693	-498	14	-849	-493
P8	-421	684	-498	-20	-858	-492
Left CG	-44	353	-1360			
Right CG				133	-329	-1362
Left EAM	-40	358	-1332			
Right EAM				139	-333	-1337
Left IOF	32	417	-1324	245	-415	-1327
Right IOF	19	479	-1321	229	-351	-1328
Nasion	31	452	-1360	244	-382	-1365

DATA SHEET NO. 7 (CONTINUED)
VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015

No.	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Max	Time (ms)
1	Left Rear Sill	X	g	2.85	100.90	-33.13	42.20
		Y	g	19.31	49.20	-5.50	10.85
2	Right Rear Sill	X	g	4.36	105.10	-45.74	44.65
		Y	g	18.83	48.25	-4.19	10.75
3	Impact Side Rear Sill Redundant	X	g	2.46	101.10	-32.75	42.35
		Y	g	14.92	49.10	-7.82	72.55
4	Vehicle CG Acceleration	X	g	3.97	18.35	-40.45	56.30
		Y	g	25.20	41.80	-3.96	72.05
		Z	g	15.95	39.50	-18.13	18.10
5	Impact Side Seat Track	X	g	2.25	125.60	-33.17	42.50
		Y	g	29.32	48.15	-4.21	10.55
		Z	g	23.64	55.75	-23.75	71.15
6	Impact Side Seat Crossmember	X	g	5.66	146.25	-37.73	41.85
		Z	g	23.24	56.60	-20.20	69.65
7	Impact Side Toe Pan	X	g	63.81	56.30	-82.43	40.85
		Y	g	22.86	53.15	-46.37	41.80
		Z	g	9.53	35.00	-64.88	47.45
8	Angular Rate Sensors	X	Deg/s	425.72	45.65	-123.24	55.10
		Y	Deg/s	189.91	42.10	-240.96	52.60
		Z	Deg/s	126.76	59.30	-16.73	18.45
9	Driver Shoulder Displacement		mm	104.06	22.95	-43.57	86.30
10	Driver Shoulder Belt		N	4290.95	69.30	-33.55	7.95
11	Driver Lap Belt		N	3567.46	60.80	-15.63	11.75
12	Passenger Shoulder Displacement		mm	84.83	20.05	-308.41	113.90
13	Passenger Shoulder Belt		N	4087.87	46.70	-54.38	187.50
14	Passenger Lap Belt		N	7568.86	62.65	-36.73	211.50
15	Impact Side Floor String Pot		mm	9.27	96.25	-16.46	225.70

Note: See Appendix B for all vehicle data plots.

TIME TO FIRE RESTRAINT TIMING

No.	Description	Axes	Units	Time to Fire (ms)
1	Driver Air Bag Squib 1	*	A	8.50
2	Driver Air Bag Squib 2	*	A	13.50
3	Driver Curtain Airbag	*	A	41.00
4	Driver Torso Airbag	*	A	41.00
5	Driver Knee Airbag	*	A	N/A
6	Driver Pretensioner	*	A	8.50
7	Passenger Air Bag Squib 1	*	A	8.50
8	Passenger Air Bag Squib 2	*	A	13.50
9	Passenger Curtain Airbag	*	A	Did not fire
10	Passenger Torso Airbag	*	A	Did not fire
11	Passenger Knee Airbag	*	A	N/A
12	Passenger Pretensioner	*	A	8.50

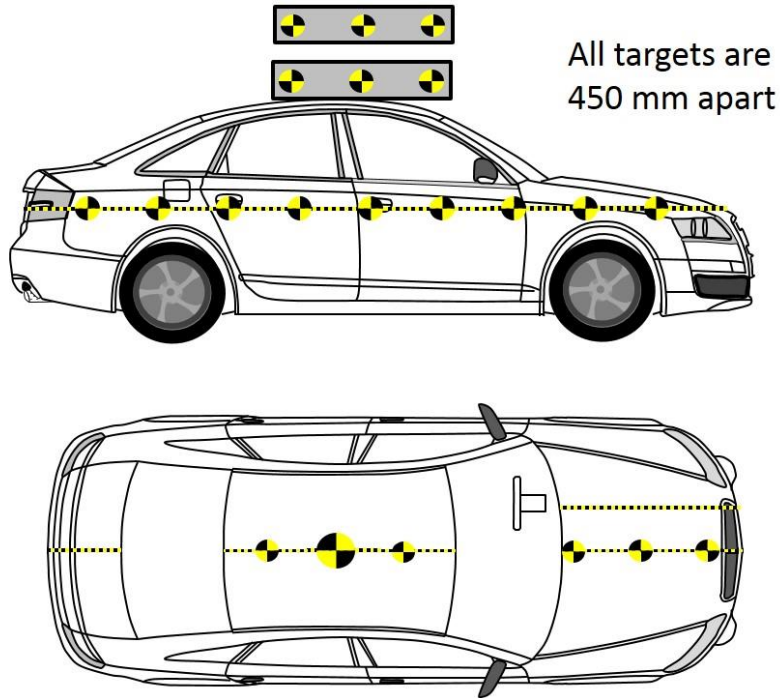
* The measurement indicates the time the voltage changed

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

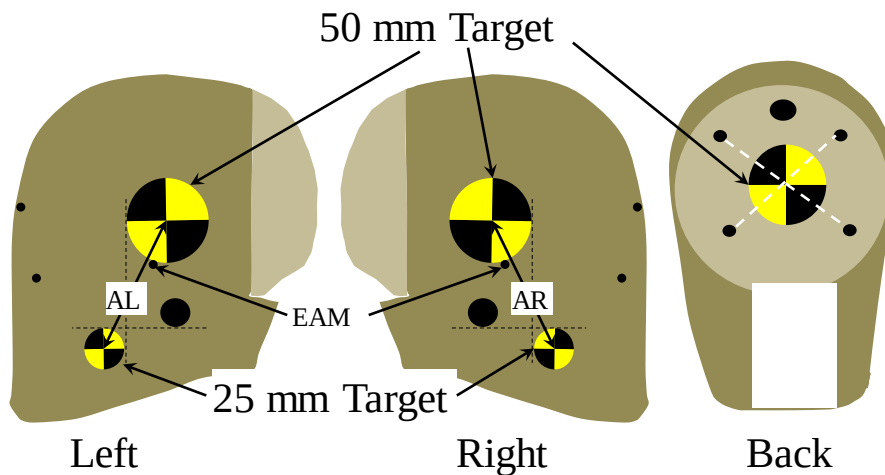
Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

VEHICLE TARGETS



ATD HEAD TARGETS



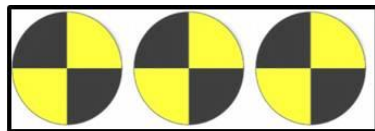
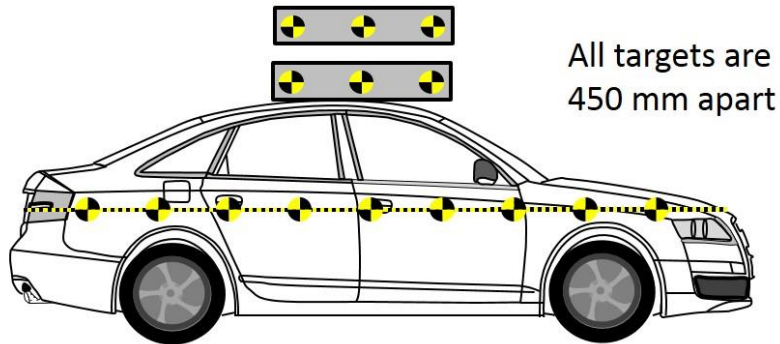
Target	Measurement
AL	91 mm
AR	91 mm

DATA SHEET NO. 8 (CONTINUED)
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

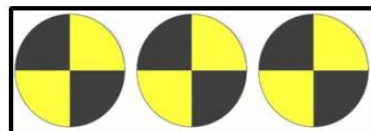
NHTSA No.: R20165409
 Test Date: 11/13/2015

OVERHEAD TARGET BARS



1 2 3

Vertical Target
Plane 1
(Driver's Side)



4 5 6

Vertical Target
Plane 2
(Passenger Side)

Target	Units	X	Y	Z
1	mm	2482	-375	-1380
2	mm	2030	-378	-1374
3	mm	1575	-386	-1372
4	mm	2490	413	-1388
5	mm	2040	404	-1388
6	mm	1583	397	-1382

Reference point:

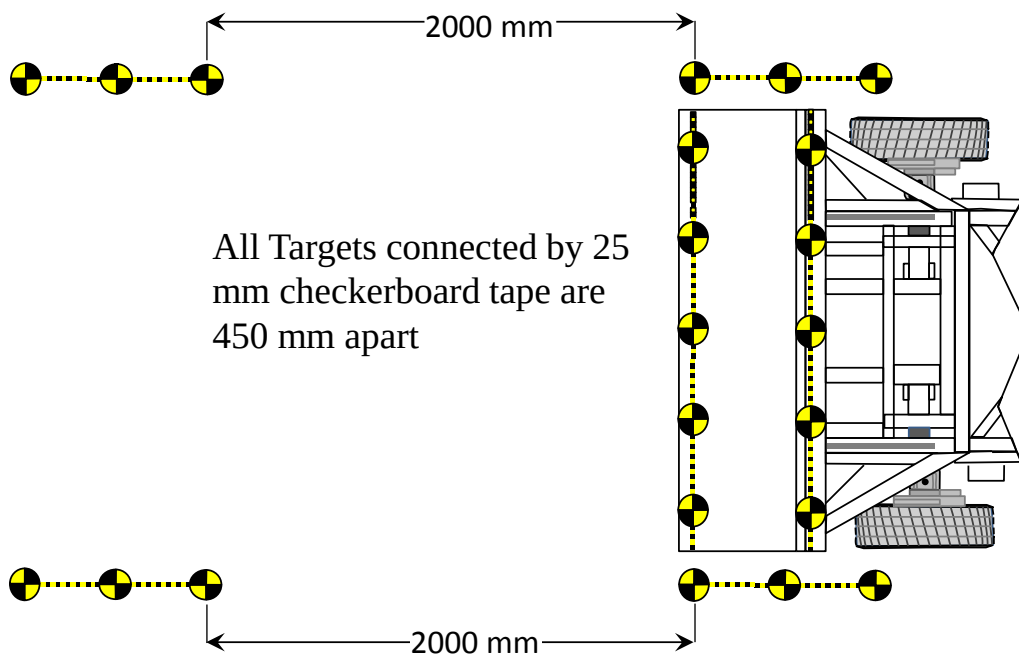
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO. 8 (CONTINUED)
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015

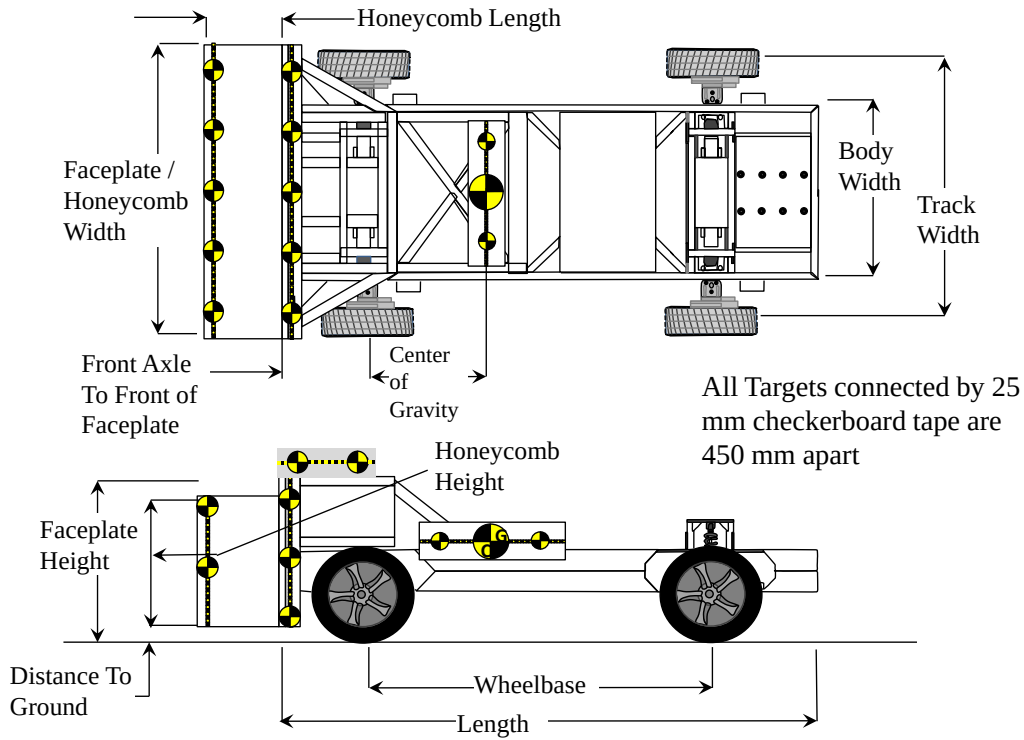
GROUND TARGETS LOCATED IN REFERENCE TO OMDB



DATA SHEET NO. 8 (CONTINUED)
OMDB PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015



Item	Units	Value	Item	Units	Value
Honeycomb Width	mm	2205	Faceplate Height	mm	1183
Honeycomb Length	mm	605	Faceplate to Ground	mm	83
Honeycomb Height	mm	947	Wheelbase	mm	2589
Left Front Axle to Front Faceplate	mm	600	Cart Length	mm	3993
Right Front Axle to Front Faceplate	mm	601	Body Width	mm	1301
Front Axle to CG	mm	926	Track Width	mm	1884

	Units	Front Axle	Rear Axle	Total
Left	kg	826	434	1260
Right	kg	792	467	1259
Ratio	%	64%	36%	
Total	kg	1618	901	2519
CG Aft of Front Axle	mm			926

Note: All targets on the OMDB honeycomb are 450mm apart

DATA SHEET NO. 9
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	105
Passenger Dummy Accelerometers	105
Vehicle Structure Accelerometers	27
SRS Inductive Pickups	12
OMDB Cart Accelerometers	9
Total	258

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	4
High-Speed Off-board	11
Real-Time Panning	2
Total	17

DATA SHEET NO. 10
POST TEST OBSERVATIONS

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Right Front Passenger
Dummy Type/Serial No.	THOR DO9798	THOR DL9207
Lower Leg Type	LX	LX
Lower Leg Serial No.	LX655/LX654	LX0045/ LX0046
Head Contact	Front & Curtain Airbag & Headrest	Front Airbag, center instrument panel, visor
Upper Torso Contact	Front & Torso Airbag, seatback, Arm contacted door	Front Airbag, Shoulder contacted center instrument panel
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster	Glove Box

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions	Photo Taken (Y/N)
Pillar Performance	B-Pillar & C-Pillar Buckled	Y
Windshield Damage	Cracks throughout with minor separation	Y
Window Damage	None	Y
Other Notable Effects	None	--

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 11 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4541	4286	255
2	Rear Surface of Vehicle (RSOV) to Front of Engine	mm	4044	3906	138
3	RSOV to Firewall	mm	3564	3457	106
4	RSOV to Upper Leading Edge of Right Door	mm	3051	3049	2
5	RSOV to Upper Leading Edge of Left Door	mm	3053	3068	-15
6	RSOV to Lower Leading Edge of Right Door	mm	3078	3073	4
7	RSOV to Lower Leading Edge of Left Door	mm	3079	3078	1
8	RSOV to Upper Trailing Edge of Right Door	mm	1971	1971	0
9	RSOV to Upper Trailing Edge of Left Door	mm	1972	1969	4
10	RSOV to Lower Trailing Edge of Right Door	mm	2026	2025	1
11	RSOV to Lower Trailing Edge of Left Door	mm	2028	2028	0
12	RSOV to Bottom of "A" Post of Right Side	mm	3095	3093	3
13	RSOV to Bottom of "A" Post of Left Side	mm	3097	3092	5
14	RSOV to Firewall, Right Side	mm	3560	3587	-27
15	RSOV to Firewall, Left Side	mm	3561	3357	203
16	RSOV to Steering Column	mm	2598	2621	-23
17	Center of Steering Column to "A" Post	mm	305	272	33
18	Center of Steering Column to Headliner	mm	452	398	53
19	RSOV to Right Side of Front Bumper	mm	4474	4415	59
20	RSOV to Left Side of Front Bumper	mm	4475	4147	328
21	Length of Engine Block	mm	437	412	25
RD	RSOV to Right Side of Dash Panel	mm	2822	2828	-6
CD	RSOV to Center of Dash Panel	mm	2717	2696	22
LD	RSOV to Left Side of Dash Panel	mm	2820	2807	12

UR* = Unrecoverable Data Point

DATA SHEET NO. 12
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

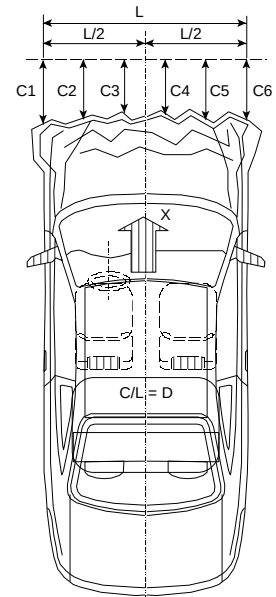
NHTSA No.: R20165409
Test Date: 11/13/2015

VEHICLE INFORMATION

VIN: JM3KE4BY7G0668318 Wheelbase (mm): 2696
Vehicle Size Category: Passenger Test Weight (kg): 1775

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): 90.08
Velocity Change (kph): 90.08



CRUSH PROFILE

Collision Deformation Classification: 12FLEE5
Midpoint of Damage: C2
Damage Region Length (mm): 1358
Impact Mode: Frontal 15° Angle, 35% Left Offset

Crush Measurements: Bumper Cover

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4290	3472	818
C2	Crush zone 2 at left side	mm	4454	3916	538
C3	Crush zone 3 at left side	mm	4513	4148	365
C4	Crush zone 4 at right side	mm	4514	4303	211
C5	Crush zone 5 at right side	mm	4456	4361	95
C6	Crush zone 6 at right side	mm	4291	4374	-83
L	C1 to C6	mm	1358	1192	166

Crush Measurements: Bumper Cover Removed

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
B1	Bumper Beam 1 at left side	mm	4344	4001	-343
B2	Bumper Beam 2 at left side	mm	4372	4062	-310
B3	Bumper Beam 3 at left side	mm	4401	4122	-279
B4	Bumper Beam 4 at left side	mm	4412	4188	-224
B5	Bumper Beam 5 at right side	mm	4417	4241	-176
B6	Bumper Beam 6 at right side	mm	4413	4285	-128
B7	Bumper Beam 7 at right side	mm	4400	4321	-79
B8	Bumper Beam 8 at right side	mm	4373	4344	-29
B9	Bumper Beam 9 at right side	mm	4345	4362	17
L	B1 to B9	mm	1009	933	76

DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

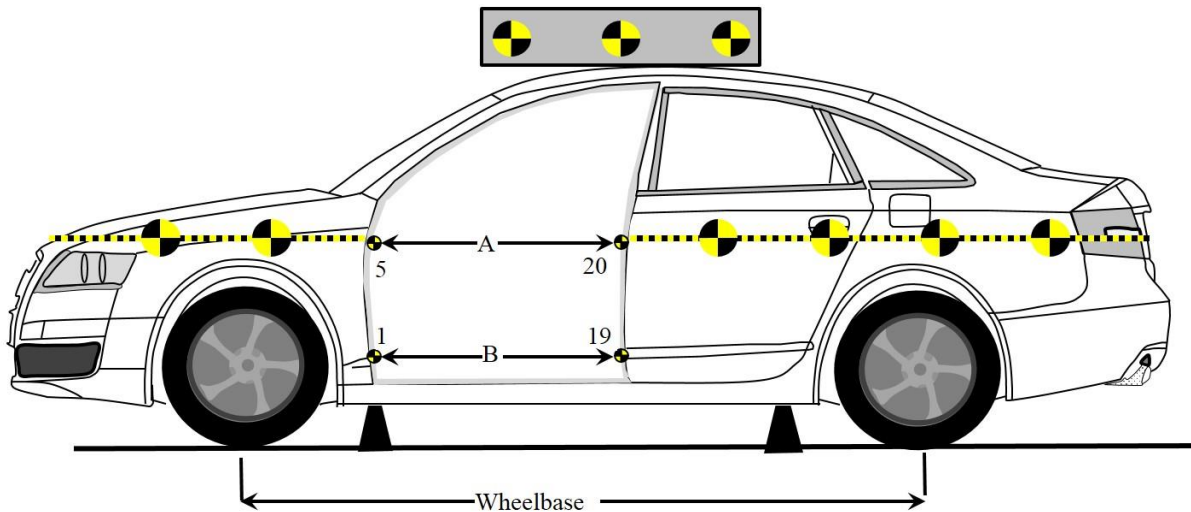
NHTSA No.: R20165409
 Test Date: 11/13/2015

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	854	847	-7
B	Left Side Lower	mm	704	701	-3
D	Right Side Upper	mm	856	851	-5
E	Right Side Lower	mm	703	700	-3

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2696	2524	-172
F	Right Side Wheelbase	mm	2696	2712	16



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

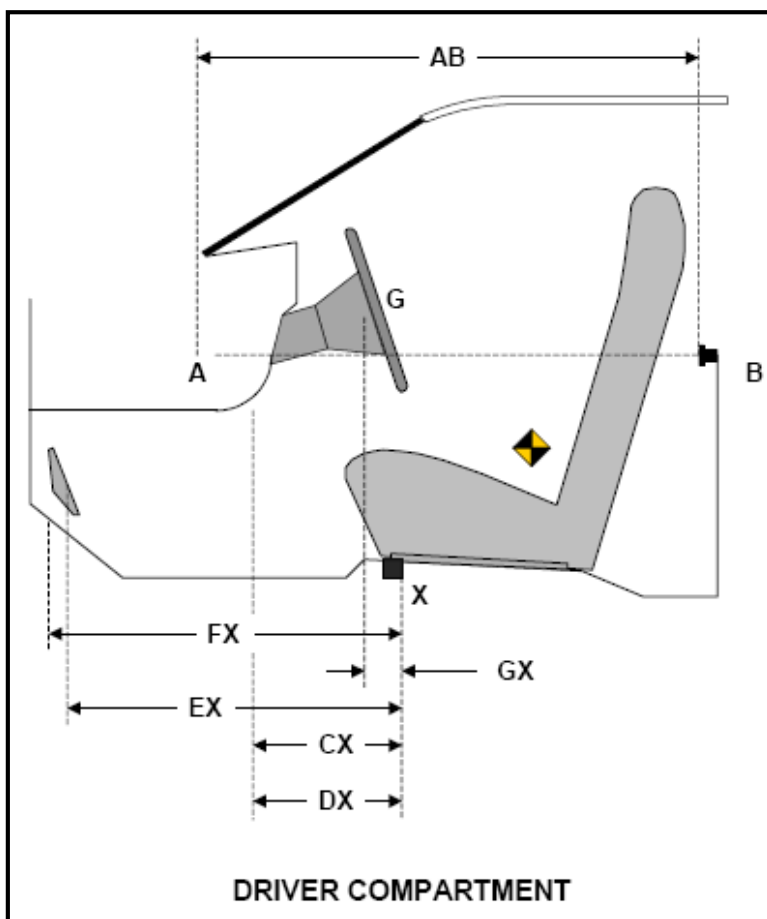
Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	786	787	1
CX	Left Knee Bolster to X	mm	287	278	-9
DX	Right Knee Bolster to X	mm	285	257	-28
EX	Brake Pedal to X	mm	528	532	4
FX	Foot Rest to X	mm	671	637	-34
GX	Center of Steering Column Wheel Hub to X	mm	43	66	23

X = Front of Seat Track (Stationary)

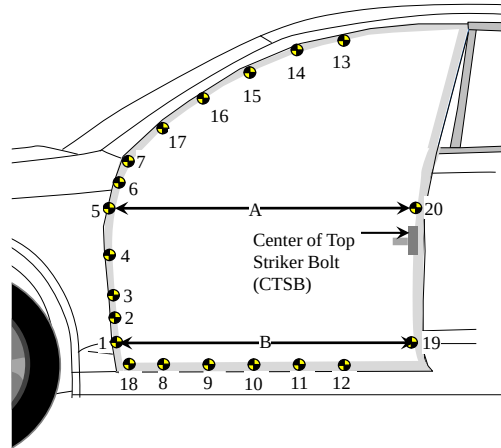


DATA SHEET NO.13 (CONTINUED) **VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

DRIVER SIDE DOOR SILL INTRUSIONS



- +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

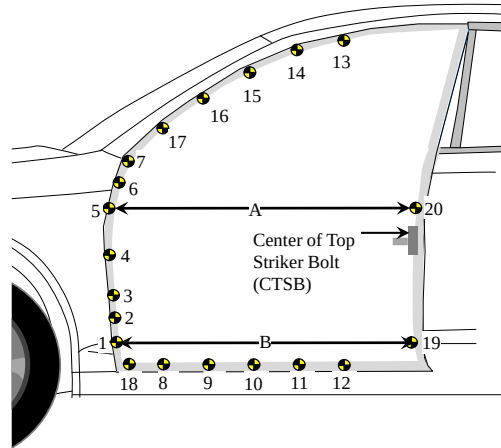
Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2947	-756	92	2944	-750	85	-3	6	-7
2	2957	-750	16	2954	-747	10	-3	3	-6
3	2953	-748	-58	2946	-755	-64	-7	-7	-6
4	2941	-743	-209	2934	-755	-215	-7	-12	-6
5	2931	-746	-359	2923	-763	-367	-8	-17	-8
6	2925	-749	-433	2918	-768	-442	-7	-19	-9
7	2916	-751	-509	2909	-771	-518	-7	-20	-9
17	2838	-731	-607	2835	-751	-614	-3	-20	-7
16	2722	-706	-687	2720	-723	-694	-2	-17	-7
15	2604	-678	-759	2602	-695	-767	-2	-17	-8
14	2477	-651	-820	2477	-665	-828	0	-14	-8
13	2346	-629	-865	2345	-642	-873	-1	-13	-8
20	2076	-745	-359	2076	-748	-362	0	-3	-3
19	2245	-757	91	2243	-755	87	-2	2	-4
12	2196	-757	34	2198	-752	32	2	5	-2
11	2346	-759	149	2347	-756	143	1	3	-6
10	2496	-759	159	2497	-756	153	1	3	-6
9	2646	-758	159	2647	-754	152	1	4	-7
8	2797	-758	159	2797	-753	151	0	5	-8
18	2871	-759	154	2869	-753	147	-2	6	-7

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

PASSENGER SIDE DOOR SILL INTRUSIONS



- +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

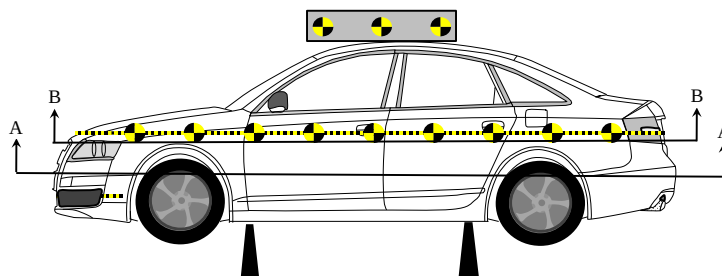
Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2946	757	92	2946	783	84	0	26	-8
2	2959	752	16	2957	778	8	-2	26	-8
3	2953	748	-59	2952	774	-68	-1	26	-9
4	2941	744	-209	2939	770	-216	-2	26	-7
5	2931	748	-358	2927	772	-365	-4	24	-7
6	2925	750	-434	2921	773	-441	-4	23	-7
7	2916	751	-509	2912	773	-515	-4	22	-6
17	2837	731	-608	2833	750	-613	-4	19	-5
16	2722	705	-688	2719	719	-692	-3	14	-4
15	2602	677	-760	2600	687	-763	-2	10	-3
14	2479	650	-820	2476	655	-820	-3	5	0
13	2346	628	-865	2345	630	-866	-1	2	-1
20	2076	743	-359	2077	749	-363	1	6	-4
19	2244	759	93	2247	774	87	3	15	-6
12	2196	756	34	2200	770	30	4	14	-4
11	2346	760	147	2348	776	140	2	16	-7
10	2496	760	158	2498	778	150	2	18	-8
9	2646	760	158	2648	780	150	2	20	-8
8	2796	759	157	2797	783	149	1	24	-8
18	2871	758	152	2873	782	144	2	24	-8

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A



Reference point:

- +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

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
1	2017	-912	52	1	2013	-906	52
2	2214	-912	52	2	2152	-908	52
3	2409	-910	52	3	2303	-908	52
4	2581	-908	52	4	2397	-908	52
5	2789	-906	53	5	2590	-909	53
6	2993	-904	52	6	2795	-910	53
7	3123	-909	53	7	3006	-912	52
8	3192	-915	53	8	3075	-917	52
9	4003	-906	52	9	3133	-978	53
10	4074	-891	53	10	3187	-1029	52
11	4184	-852	52	11	3242	-1012	52
12	4316	-645	52	12	3268	-940	95
13	4413	-560	52	13	3313	-909	52
14	4460	-430	53	14	3518	-785	52
15	4491	-304	53	15	3657	-732	52
16	4516	-157	53	16	3677	-726	53
17	4530	-2	53	17	3654	-638	52
18	4526	83	52	18	3625	-557	52
19	4501	247	52	19	3649	-425	53
20	4463	413	52	20	3703	-430	52
21	4385	598	52	21	3815	-496	52
22	4318	646	53	22	3880	-484	52
23	4205	845	53	23	3868	-392	52
24	4002	910	52	24	3830	-317	52
25	3195	913	52	25	3918	-317	52

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A (Continued)

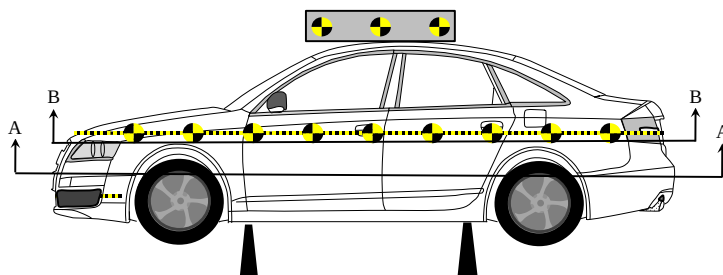
Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	3036	906	53	26	3947	-284	52
27	2662	908	52	27	4010	-148	52
28	2299	912	53	28	4157	-81	52
29	2015	912	52	29	4250	112	52
				30	4314	298	52
				31	4353	464	53
				32	4372	604	52
				33	4135	610	52
				34	4109	809	53
				35	3990	827	53
				36	4032	919	52
				37	3866	942	53
				38	3756	946	52
				39	3463	900	53
				40	3183	916	52
				41	3070	917	52
				42	2891	898	52
				43	2540	904	52
				44	2247	907	53
				45	2015	907	53

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B



Reference point:

- +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

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
1	2004	-907	-253	1	2003	-914	-243
2	2214	-908	-253	2	2152	-917	-242
3	2435	-907	-253	3	2306	-919	-243
4	2636	-906	-253	4	2421	-921	-242
5	2910	-905	-252	5	2624	-923	-243
6	3087	-906	-252	6	2867	-926	-242
7	3355	-915	-252	7	3082	-931	-243
8	3649	-909	-252	8	3152	-877	-242
9	3757	-909	-252	9	3158	-945	-242
10	3933	-888	-253	10	3158	-1005	-242
11	4052	-863	-253	11	3172	-895	-242
12	4267	-698	-252	12	3306	-796	-243
13	4355	-517	-253	13	3390	-727	-242
14	4436	-394	-253	14	3423	-648	-243
15	4489	-183	-252	15	3477	-533	-242
16	4499	8	-253	16	3565	-411	-242
17	4497	59	-243	17	3605	-324	-242
18	4475	269	-242	18	3661	-232	-243
19	4422	432	-242	19	3801	-184	-242
20	4332	587	-243	20	3912	-87	-242
21	4235	753	-243	21	4066	-237	-242
22	4020	871	-243	22	4216	-130	-243
23	3757	910	-242	23	4385	9	-243
24	3619	921	-241	24	4454	73	-242
25	3344	916	-243	25	4505	239	-243

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B (Continued)

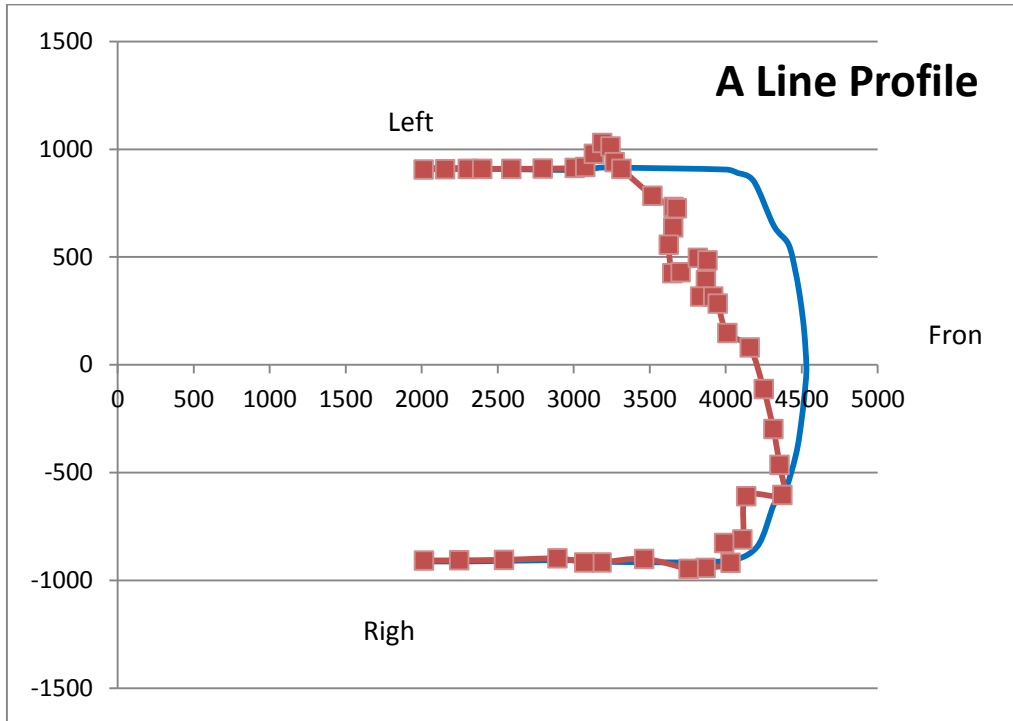
Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	3128	909	-242	26	4387	563	-243
27	2695	908	-242	27	4319	664	-242
28	2322	909	-243	28	4191	753	-242
29	2007	909	-242	29	4043	785	-243
				30	3863	907	-242
				31	3668	927	-242
				32	3482	930	-243
				33	3245	924	-242
				34	3091	918	-243
				35	3079	918	-242
				36	2878	915	-242
				37	2586	913	-242
				38	2280	910	-243
				39	2003	907	-242

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

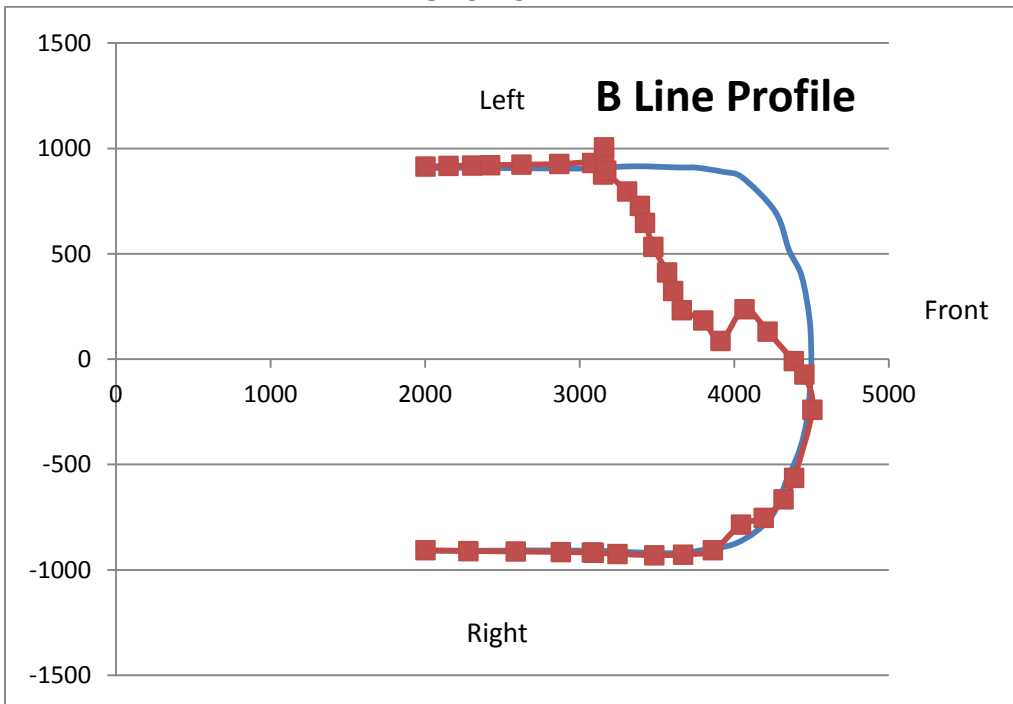
Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A



SECTION B-B



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

STRUCTURAL BUMPER BEAM POINTS

	Point	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
		X	Y	Z	X	Y	Z	X	Y	Z
Structural Bumper Beam	B1	4344	-504	53	4001	-372	-77	-343	132	-130
	B2	4372	-377	53	4062	-260	-56	-310	117	-109
	B3	4401	-252	52	4122	-151	-35	-279	101	-87
	B4	4412	-123	52	4188	-43	-16	-224	80	-68
	B5	4417	8	52	4241	78	4	-176	70	-48
	B6	4413	134	53	4285	193	20	-128	59	-33
	B7	4400	261	52	4321	315	37	-79	54	-15
	B8	4373	386	53	4344	440	51	-29	54	-2
	B9	4345	505	53	4362	561	63	17	56	10

Reference point:

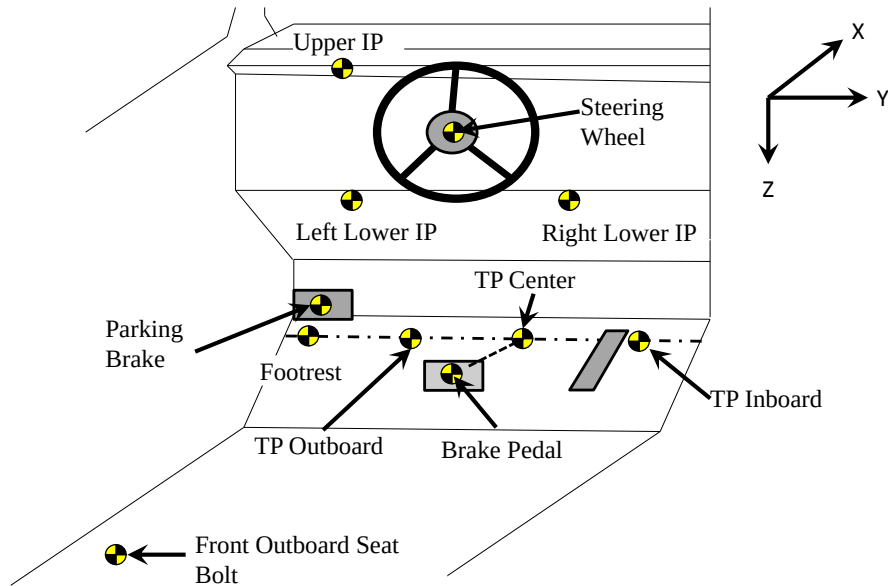
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO.13 (CONTINUED) **VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

DRIVER FLOOR PAN MEASUREMENTS



Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
TP Inboard	3355	-177	91	3326	-171	67	-29	6	-24
TP Center	3358	-328	93	3293	-317	59	-65	11	-34
TP Outboard	3308	-478	93	3248	-444	68	-60	34	-25
TP Footrest	3215	-578	92	3181	-557	79	-34	21	-13
Brake Pedal	3073	-328	92	3077	-343	137	4	-15	45
Left Lower IP	2831	-518	-199	2822	-532	-217	-9	-14	-18
Right Lower IP	2829	-217	-199	2801	-232	-198	-28	-15	1
Upper IP	2793	-618	-343	2780	-634	-355	-13	-16	-12
Steering Column	2588	-368	-446	2611	-419	-498	23	-51	-52
Front Outboard Bolt	2544	-609	161	2545	-606	158	1	3	-3
Emergency Brake									

Reference point:

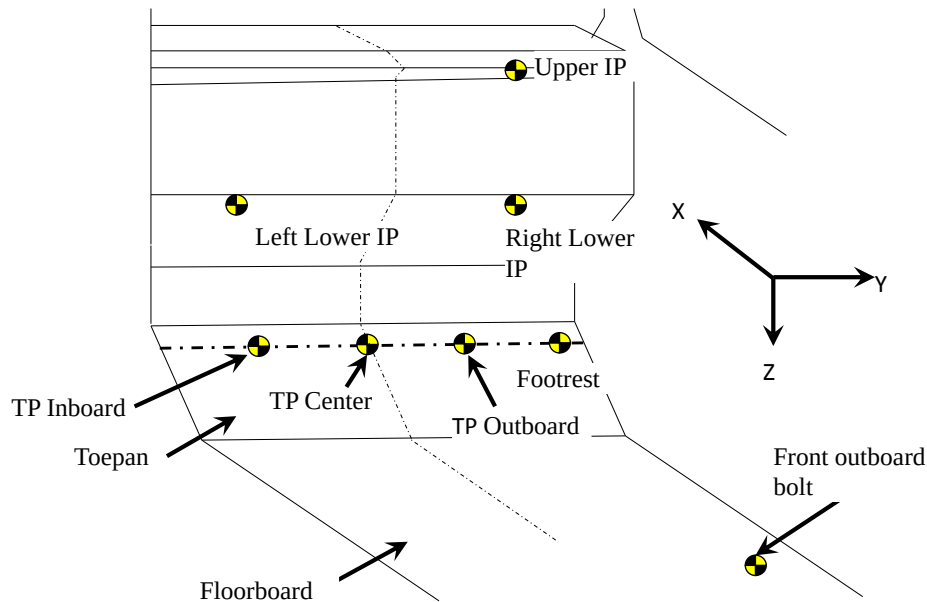
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO.13 (CONTINUED) **VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

PASSENGER FLOOR PAN MEASUREMENTS



Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
TP Inboard	3332	216	91	3269	293	40	-63	77	-51
TP Center	3360	367	92	3359	397	76	-1	30	-16
TP Outboard	3256	517	92	3260	548	82	4	31	-10
TP Footrest	3200	617	91	3204	648	82	4	31	-9
Left Lower IP	2799	216	-202	2839	207	-217	40	-9	-15
Right Lower IP	2839	516	-202	2860	509	-208	21	-7	-6
Upper IP	2793	617	-384	2798	618	-392	5	1	-8
Front Outboard Bolt	2547	610	159	2551	630	153	4	20	-6

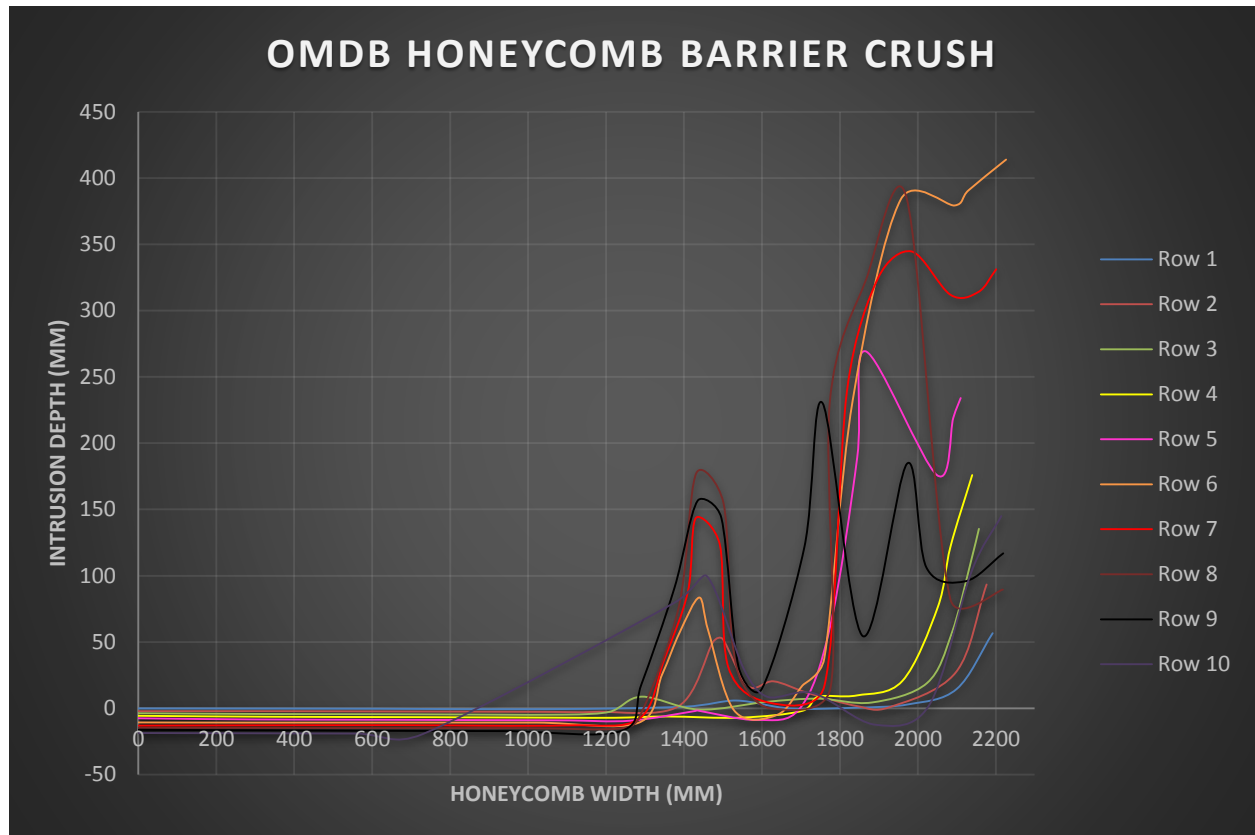
Reference point:

- +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.14
OMDB CRUSH MEASUREMENTS

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015



DATA SHEET NO. 15
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015

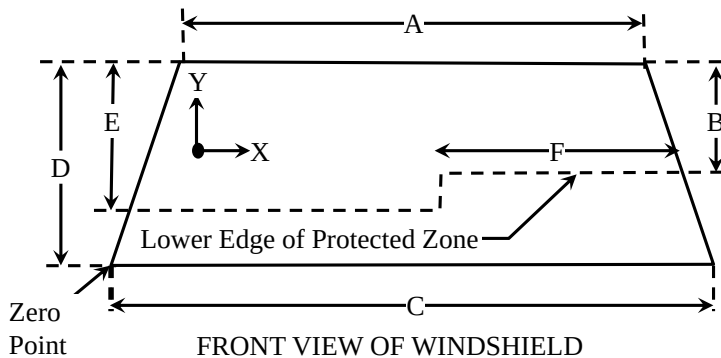
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2237	1507	67.4
Right Side	2237	2237	100
Total	4474	3744	83.7



Item	Units	Value
A	mm	1244
B	mm	518
C	mm	1502
D	mm	864
E	mm	524
F	mm	495

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. 15 (CONTINUED)
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
Test Date: 11/13/2015

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Ambient Temperature at Test Vehicle Time of Impact: 21.1° C

Test Time: 12:10 PM

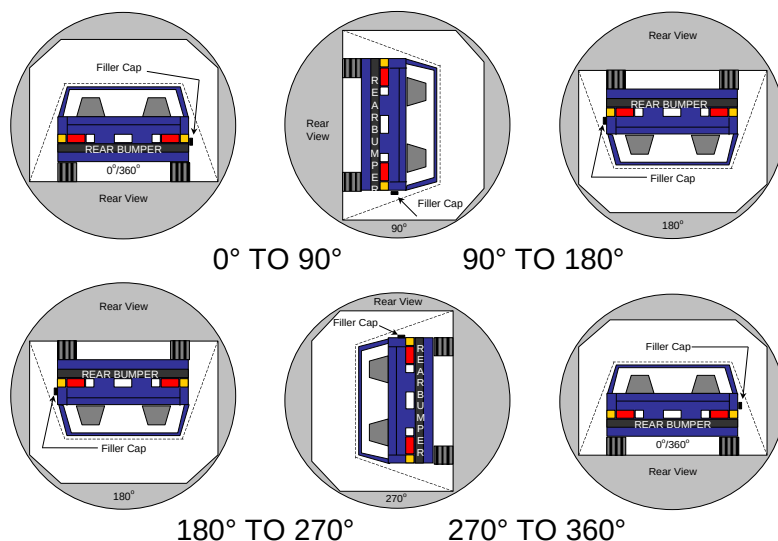
Stoddard Solvent Spillage Measurements

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

DATA SHEET NO. 16 **FMVSS 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015



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°	69	300	369
90° to 180°	64	300	364
180° to 270°	61	300	361
270° to 360°	70	300	370

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	

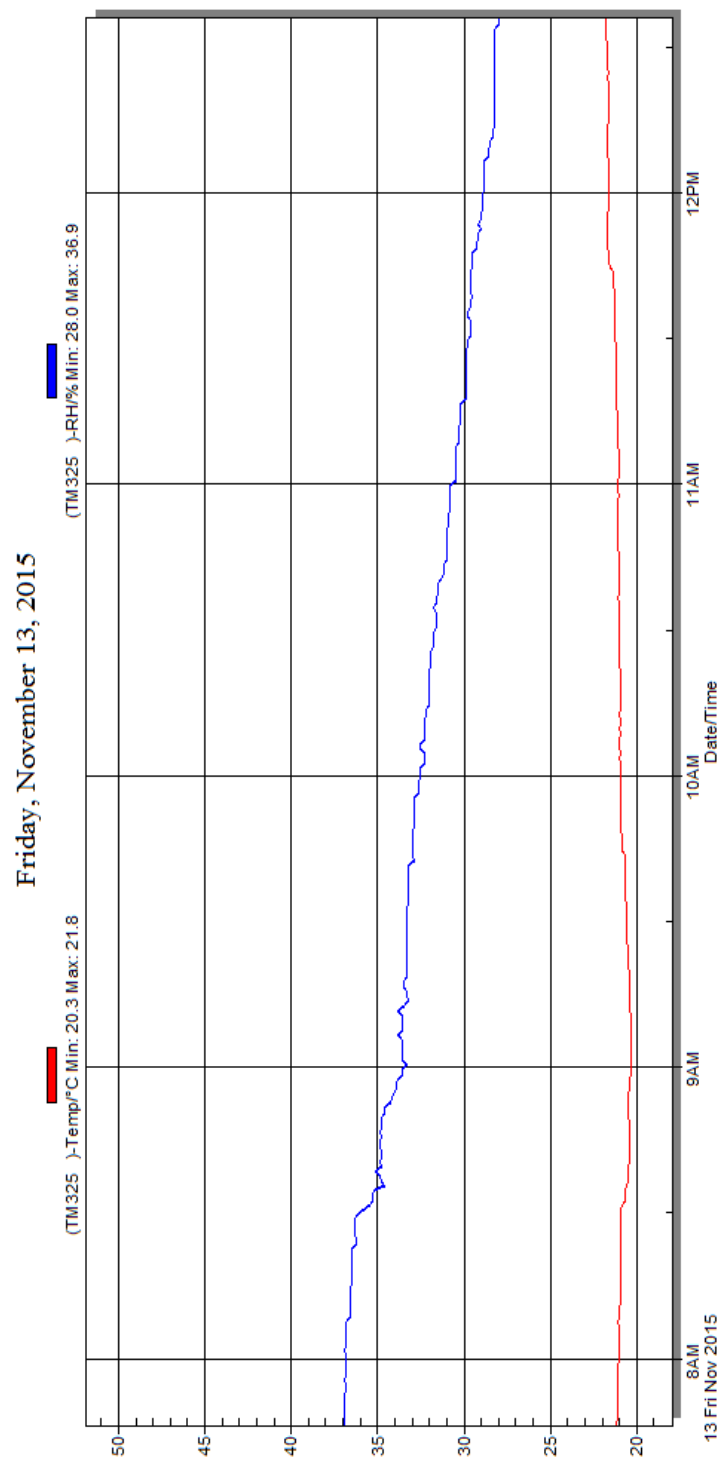
SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17 **DUMMY/VEHICLE TEMPERATURE STABILIZATION**

Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165409
 Test Date: 11/13/2015



Temperature Stabilization Chart/Data

APPENDIX A
PHOTOGRAPHS

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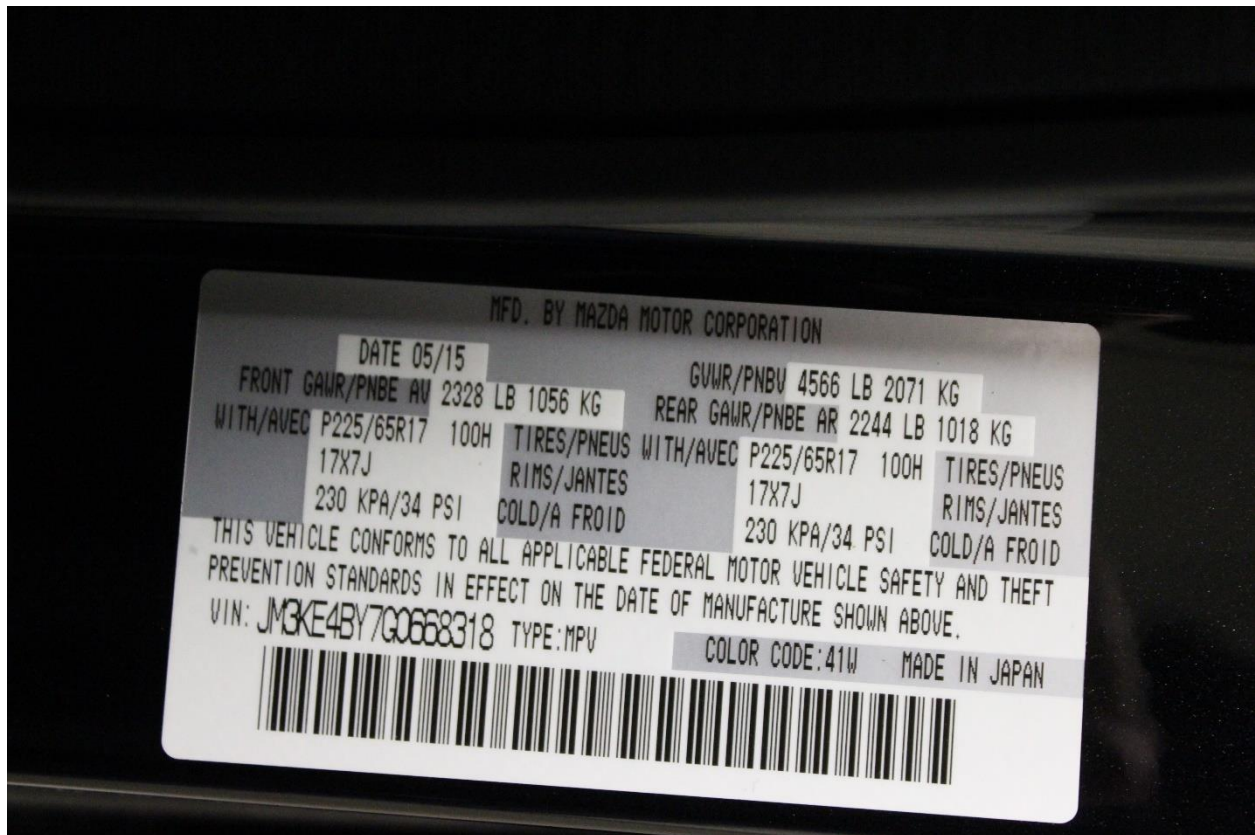
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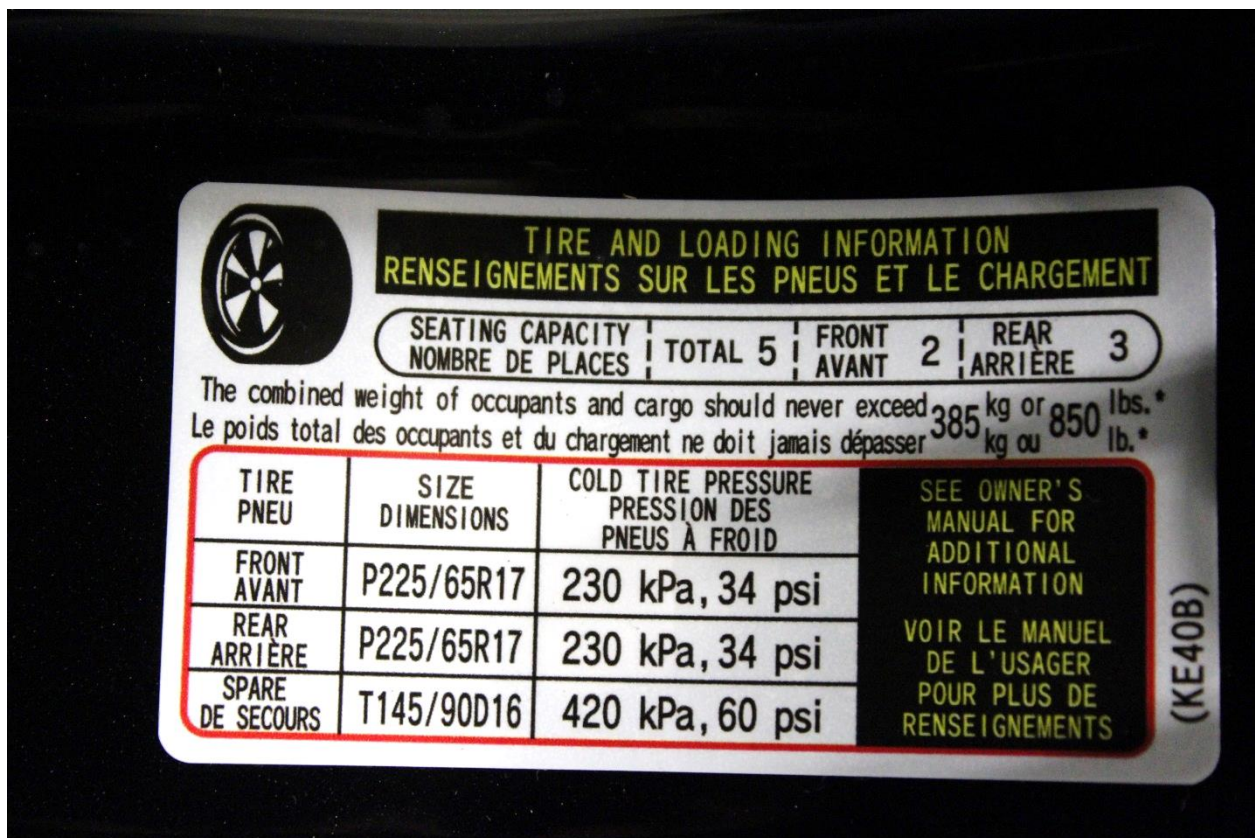
No. 001 As Delivered Right Front 3-4 View of Test Vehicle



No. 002 As Delivered Left Rear 3-4 View of Test Vehicle



No. 003 Test Vehicle Certification Label



No. 004 Test Vehicle Tire Placard



No. 005 Pre-Test Front View of Test Vehicle



No. 006 Post-Test Front View of Test Vehicle



No. 007 Pre-Test Left Front 3-4 View of Test Vehicle



No. 008 Post-Test Left Front 3-4 View of Test Vehicle



No. 009 Pre-Test Left Side View of Test Vehicle



No. 010 Post-Test Left Side View of Test Vehicle



No. 011 Pre-Test Left Rear 3-4 View of Test Vehicle



No. 012 Post-Test Left Rear 3-4 View of Test Vehicle



No. 013 Pre-Test Rear View of Test Vehicle



No. 014 Post-Test Rear View of Test Vehicle



No. 015 Pre-Test Right Rear 3-4 View of Test Vehicle



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No. 017 Pre-Test Right Side View of Test Vehicle



No. 018 Post-Test Right Side View of Test Vehicle



No. 019 Pre-Test Right Front 3-4 View of Test Vehicle



No. 020 Post-Test Right Front 3-4 View of Test Vehicle


mazda

SKYACTIV
TECHNOLOGY

Scan for Vehicle Info and offers



2016 CX-5
 Model: 2016 CX-5 SPORT ALL WHEEL DRIVE
 Exterior Color: JET BLACK MICA
 Interior Color: BLACK

Fuel Economy and Environment
 EPA DOT

Fuel Economy
26 MPG
combined city/hwy
 24 city
 30 highway
 3.8 gallons per 100 miles

Small SUVs range from 17 to 32 MPG. The best vehicle rates 119 MPG.

You Save \$250
 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,750

Fuel Economy & Greenhouse Gas Rating (mpg only)

1 2 3 4 5 6 7 8 9 10 Best

Smog Rating (smog only)

1 2 3 4 5 6 Best

This vehicle emits 337 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). (Emissions are calculated by EPA laboratory emissions tests.)

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated
 Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash	Driver Passenger	Not Rated
Side Crash	Front seat	★★★★★
	Rear seat	★★★★★
Rollover		★★★★★

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

STANDARD EQUIPMENT

ENGINE/MECHANICAL FEATURES

- SKYACTIV 2.5L ENGINE
- SKYACTIV DRIVE 6SPD SPORT MODE AT
- 104 HORSEPOWER, 185 LB-FT TORQUE
- ALL-WHEEL DRIVE

EXTERIOR FEATURES

- 17" ALLOY WHEELS
- P225/65 R17 ALL-SEASON TIRES
- VARIABLE INTERMITTENT WIPERS
- FIXED INTERMITTENT REAR WIPER
- POWER MIRRORS WITH TURN LAMPS

INTERIOR FEATURES

- 5-PASSENGER SEATING
- TIPT & TELESCOPIC STEERING COLUMN
- STEERING WHEEL W/ AUDIO/CRUISE CONTROLS
- POWER AUTOMATIC DOOR LOCKS
- POWER WINDOWS W/ DRIVER ONE-TOUCH
- CLOTH TRIMMED SPORT SEATS
- 6-WAY MANUAL DRIVER'S SEAT
- MID W/ TRIP COMPUTER
- ELECTRONIC PARKING BRAKE

SAFETY AND SECURITY FEATURES

- 60/60/60 MI POWERTRAIN & 50/50/50 MI BUMPER-TO-BUMPER WARRANTY
- 24-HOUR ROADSIDE ASSISTANCE
- 5-PASSENGER 3-POINT SAFETY BELTS
- LATCH CHILD SAFETY SEAT ANCHORS
- ANTI-THEFT ENGINE IMMOBILIZER
- TIRE PRESSURE MONITORING SYSTEM
- SKYACTIV BODY - RING STRUCTURE

OPTIONAL EQUIPMENT

17" REAR CAMERA PACKAGE	\$400
REARVIEW CAMERA	
7" COLOR TOUCH-SCREEN DISPLAY	
MULTI-FUNCTION COMMANDER CONTROL	
HD RADIO	
Total Vehicle and Options Delivery, Processing and Handling Fee	\$24,880 \$980
Total MSRP	\$25,725

MSRP \$24,445

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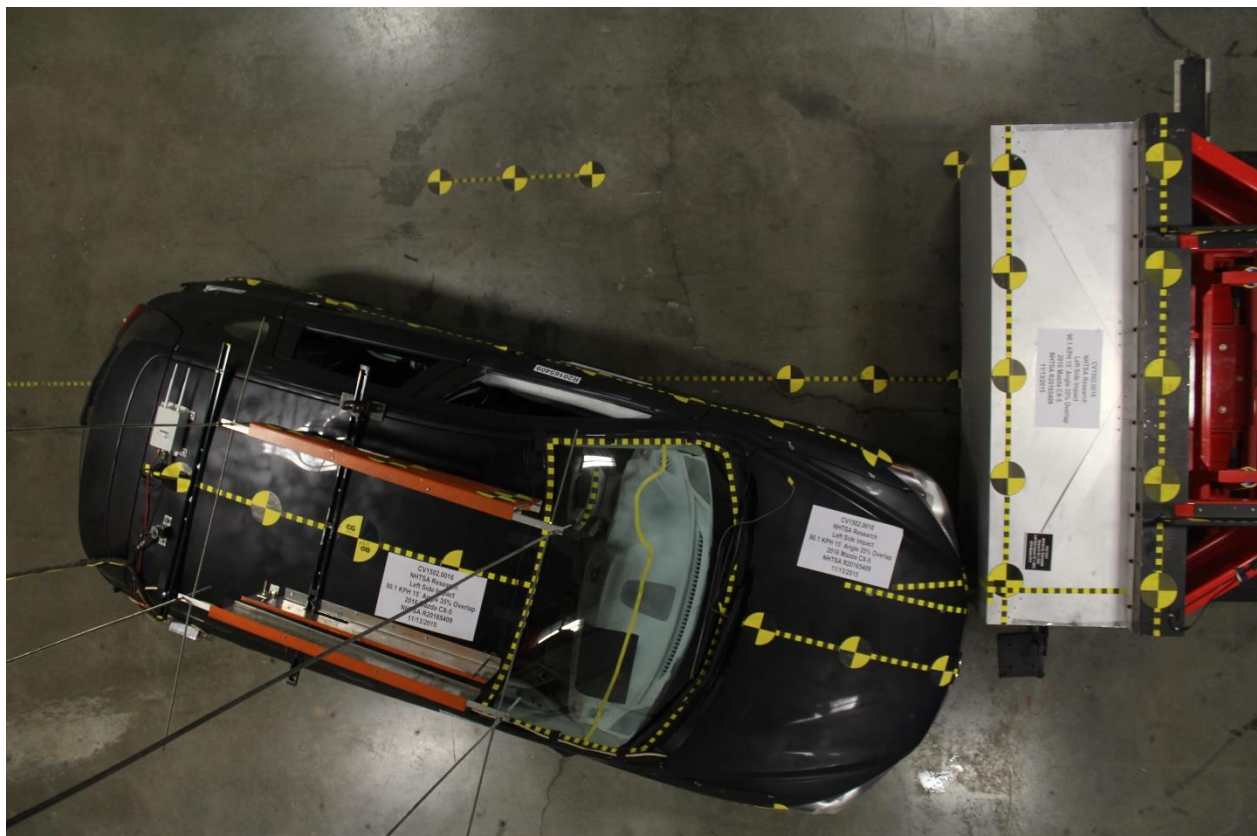
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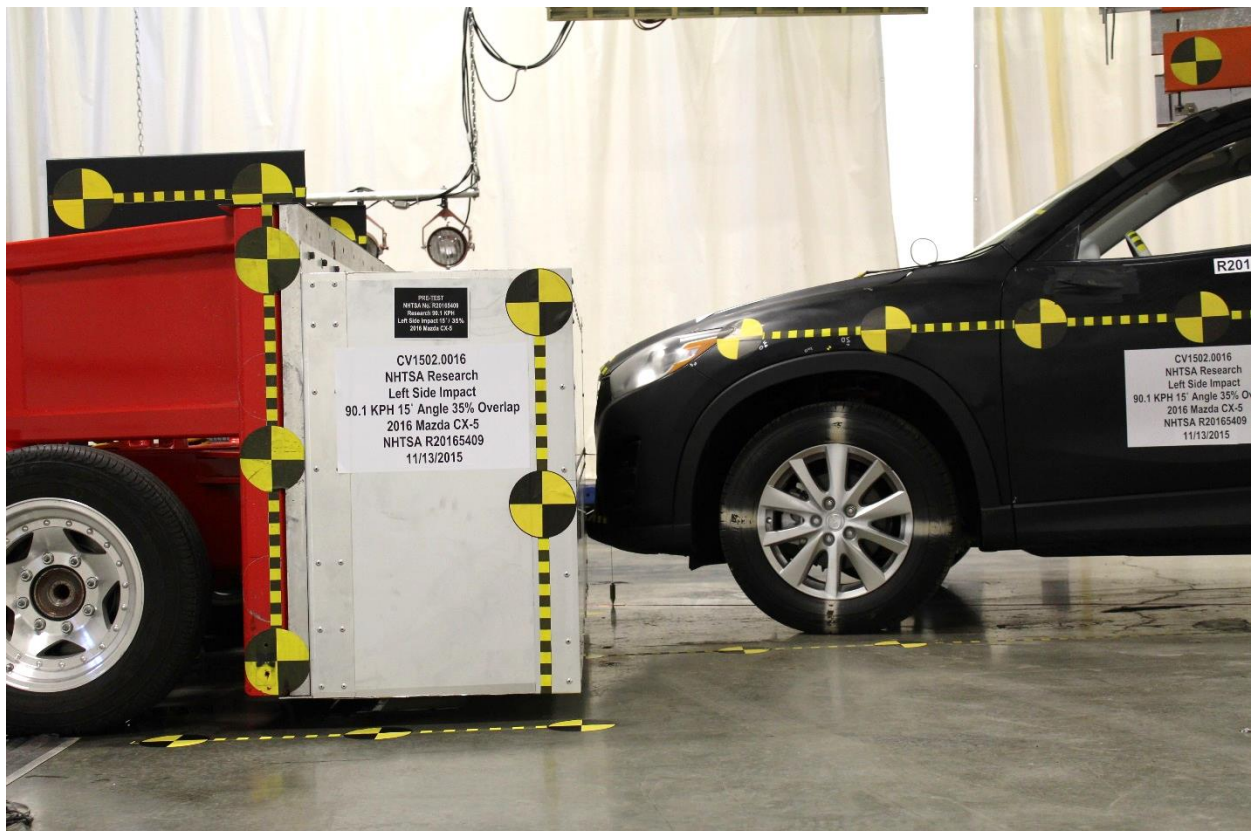
No. 021 Monroney Label Photograph



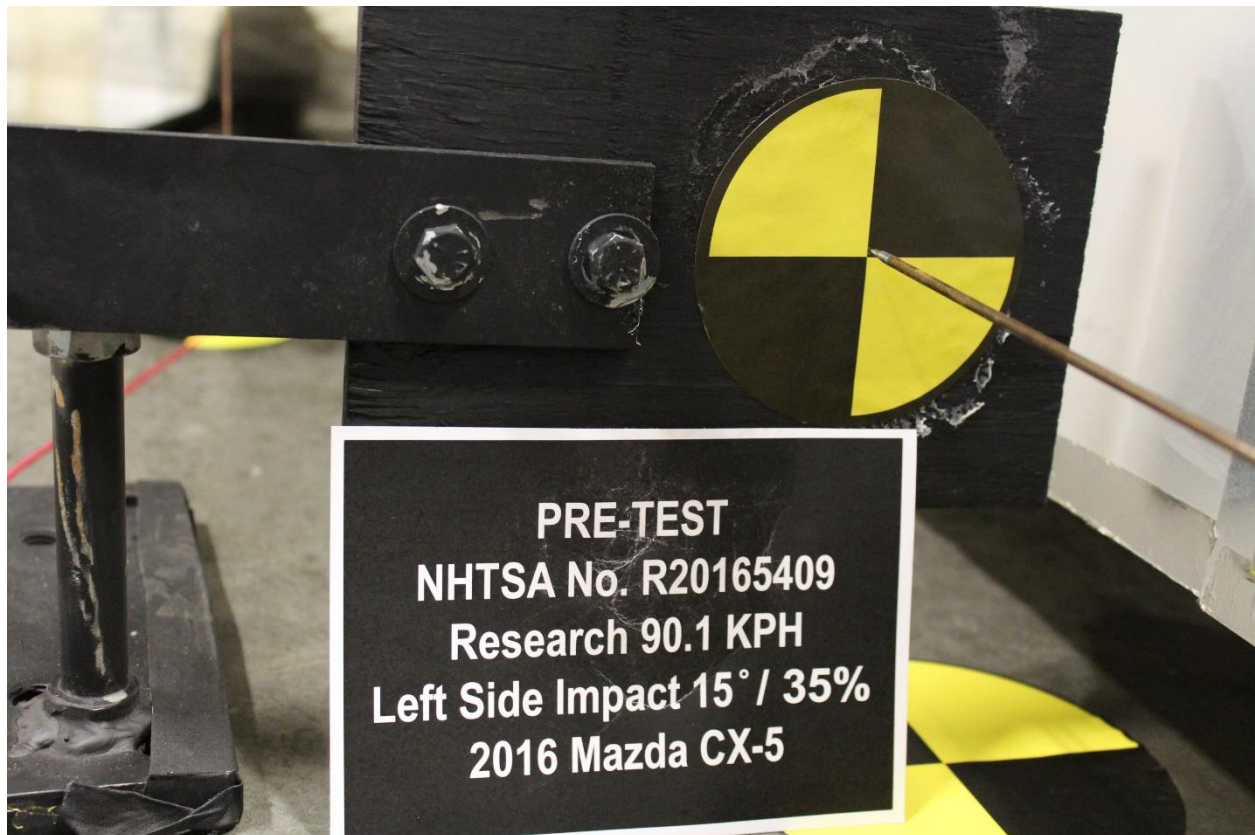
No. 022 Pre-Test Overhead View of OMDB against target vehicle at ideal Impact Point



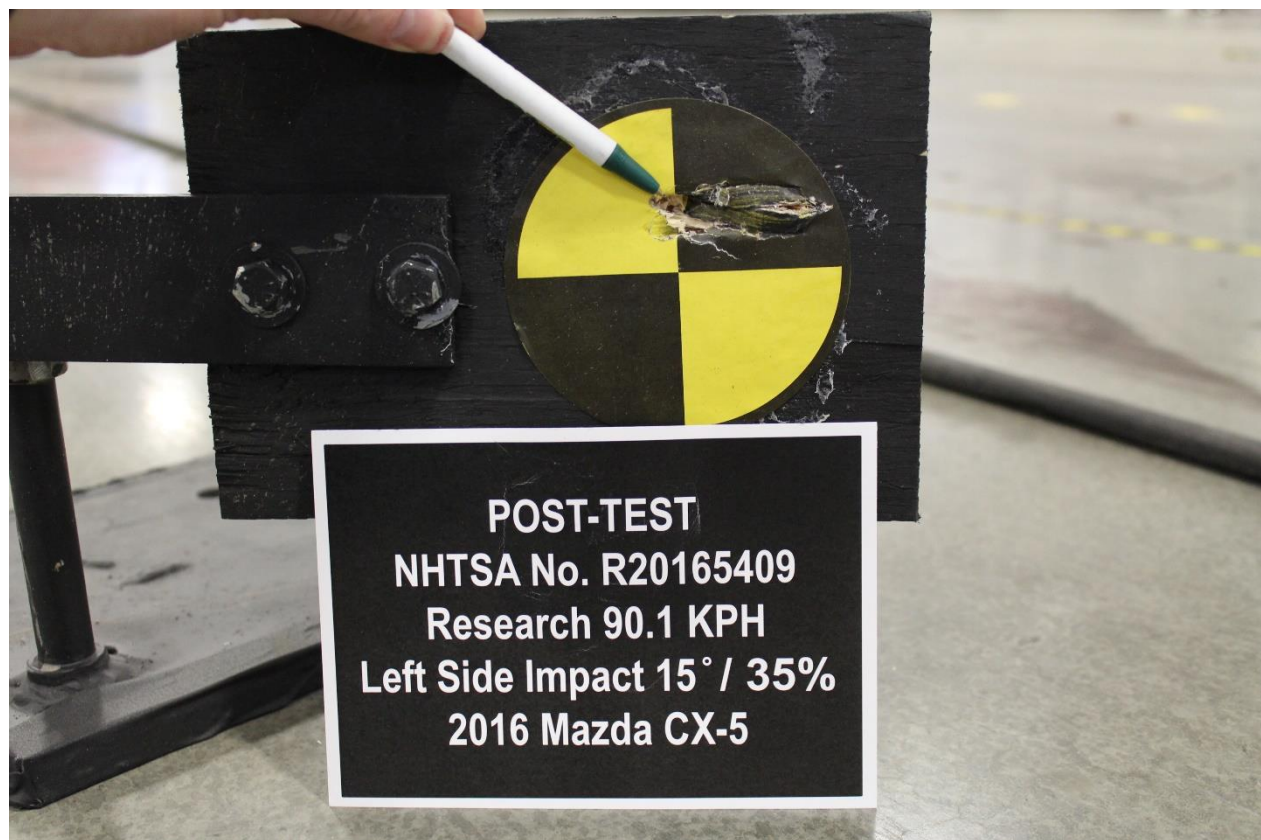
No. 023 Pre-Test Left Side View of OMDB against target vehicle at ideal Impact Point



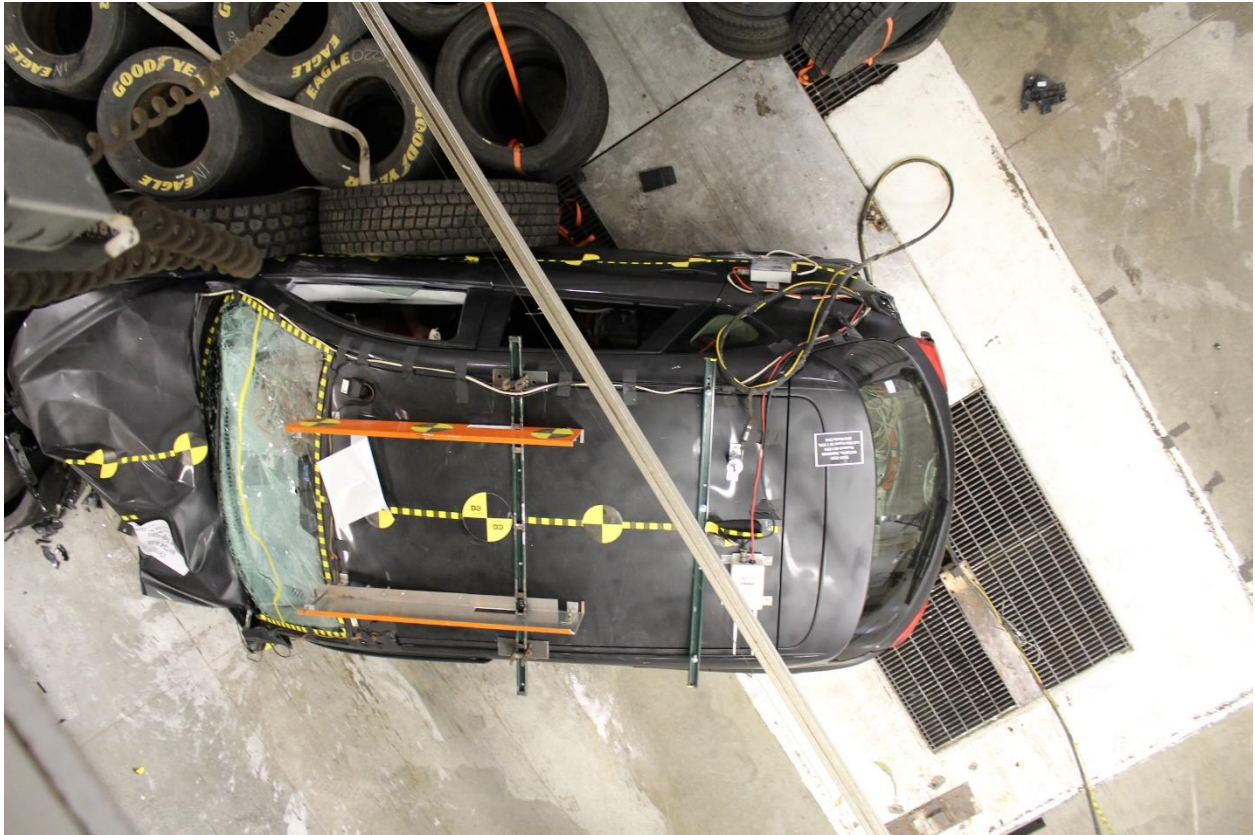
No. 024 Pre-Test Right Side View of OMDB against target vehicle at ideal Impact Point



No. 025 Pre-Test Close-up View of Impact Point



No. 026 Post-Test Close-up View of Impact Point



No. 027 Post-Test Vehicle Overhead View



No. 028 Pre-Test Close-up View of Driver Door Latch



No. 029 Post-Test Close-up View of Driver Door Latch



No. 030 Pre-Test Close-up View of Passenger Door Latch



No. 031 Post-Test Close-up View of Passenger Door Latch



No. 032 Pre-Test Windshield View



No. 033 Post-Test Windshield View



No. 034 Pre-Test View of Driver Inner Door Panel



No. 035 Post-Test View of Driver Inner Door Panel



No. 036 Pre-Test View of Passenger Inner Door Panel



No. 037 Post-Test View of Passenger Inner Door Panel



No. 038 Pre-Test Overall View of Driver Knee Bolsters



No. 039 Post-Test Overall View of Driver Knee Bolsters



No. 040 Pre-Test Left Side View of Driver Knee Bolsters



No. 041 Post-Test Left Side View of Driver Knee Bolsters



No. 042 Pre-Test Right Side View of Driver Knee Bolsters



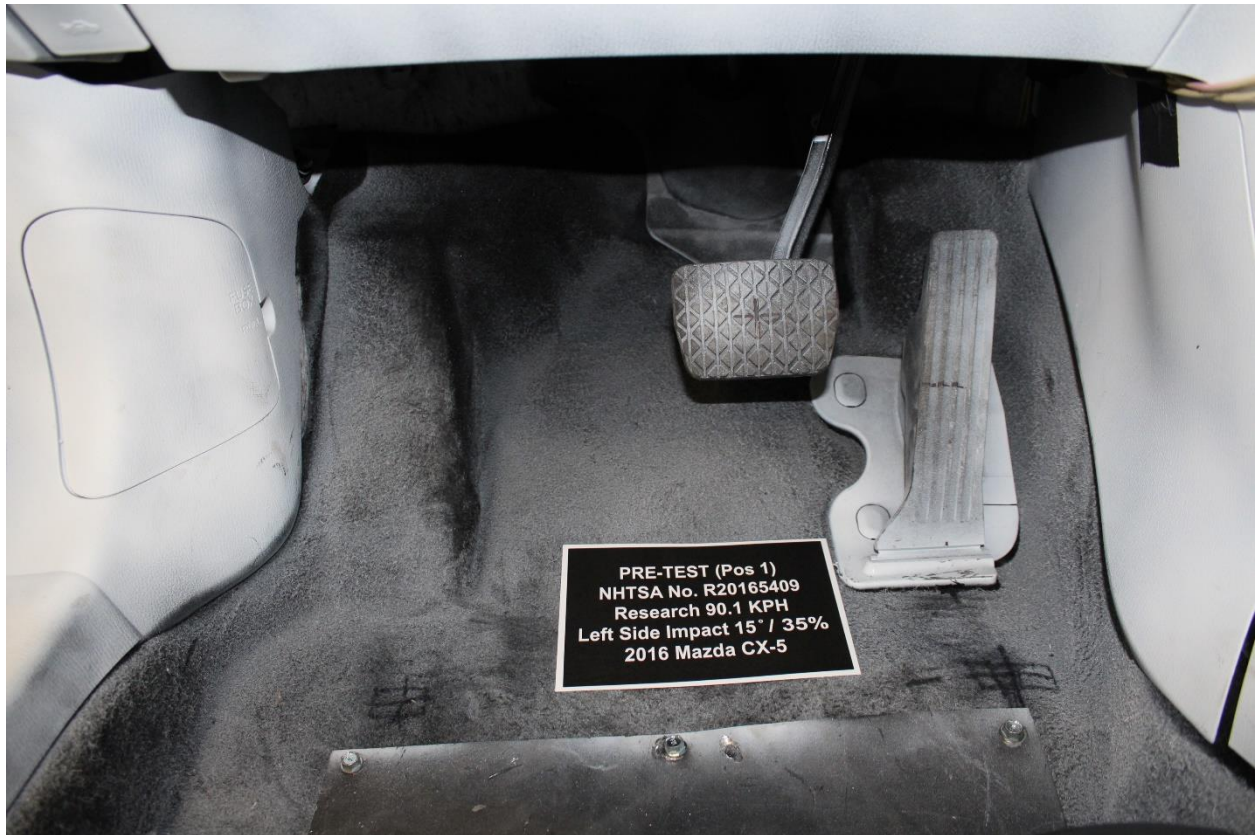
No. 043 Post-Test Right Side View of Driver Knee Bolsters



No. 044 Pre-Test View of Driver Floor pan at Left sill level, w/carpet



No. 045 Post-Test View of Driver Floor pan at Left sill level, w/carpet



No. 046 Pre-Test View of Driver Floor pan at Mid seat level, w/carpet



No. 047 Post-Test view of Driver Floor pan at Mid seat level, w/carpet



No. 048 Pre-Test View of Driver Floor pan at Right Side



No. 049 Post-Test View of Driver Floor pan at Right Side



No. 050 Pre-Test Driver Front Windshield View



No. 051 Post-Test Driver Front Windshield View



No. 052 Pre-Test Left Side View of Driver and Interior



No. 053 Post-Test Left Side View of Driver and Interior



No. 054 Pre-Test Left Side Driver Window View



No. 055 Post-Test Left Side Driver Window View



No. 056 Pre-Test Right Side View of Driver and Interior



No. 057 Post-Test Right Side View of Driver and Interior



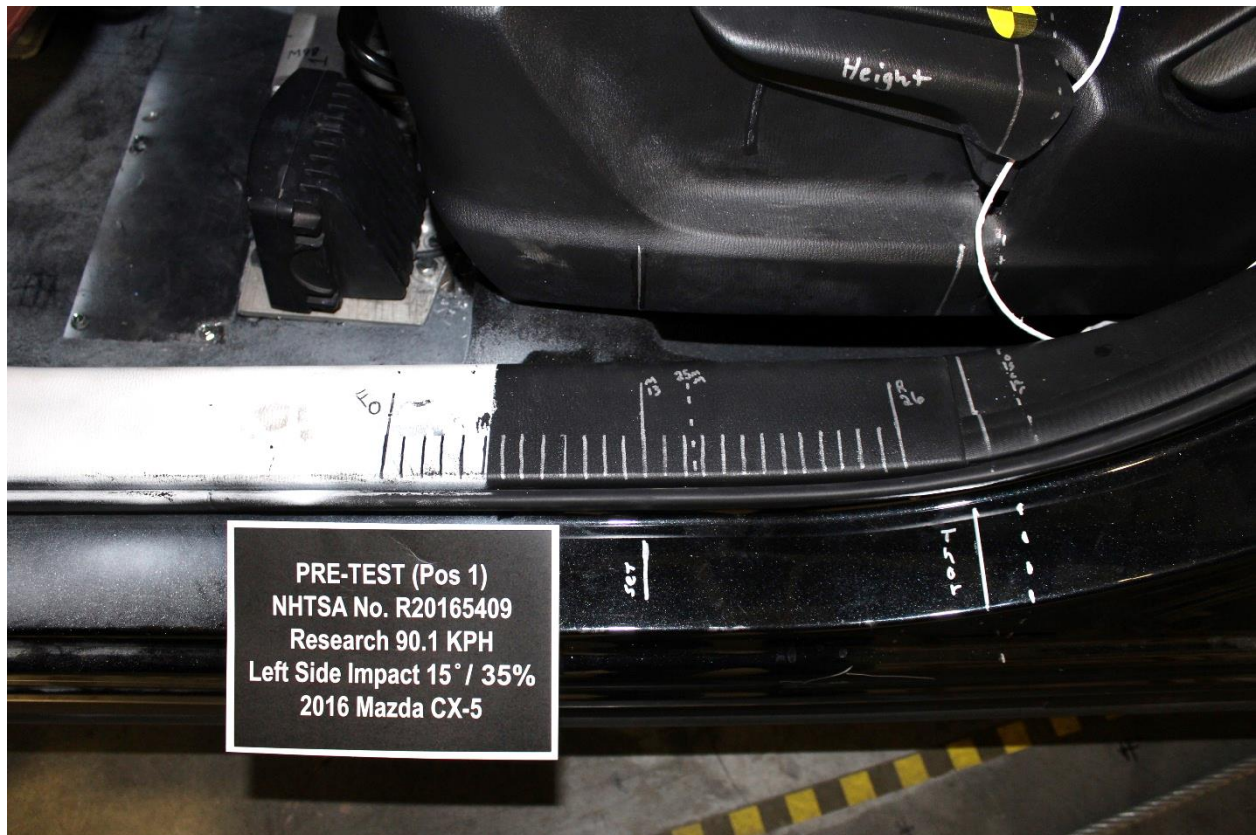
No. 058 Pre-Test View of Driver Door Clearance



No. 059 Post-Test View of Driver Door Clearance



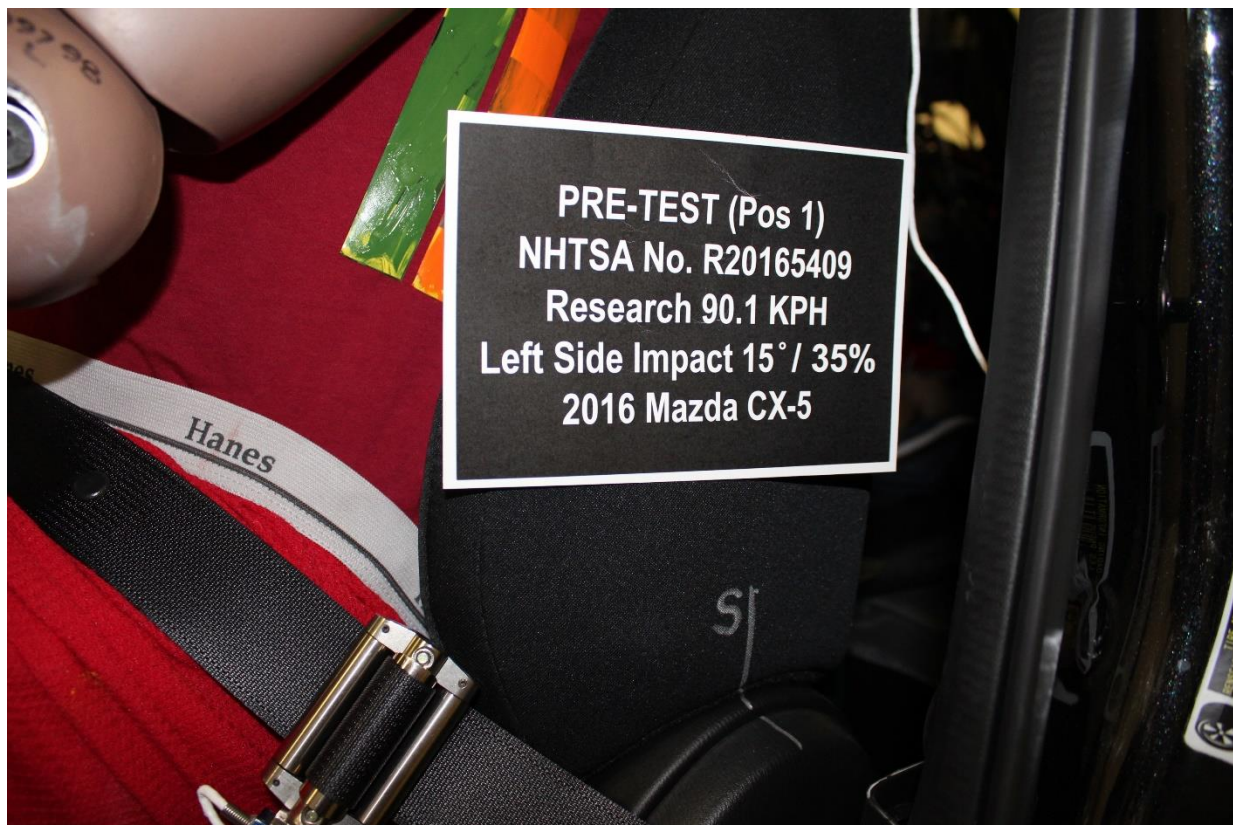
No. 060 Pre-Test View of Parking Brake



No. 061 Pre-Test Driver Seat Fore Aft Markings



No. 062 Post-Test Driver Seat Fore Aft Markings



No. 063 Pre-Test Driver Seat Back Markings



No. 064 Pre-Test Overhead View of Driver Thighs on Seat



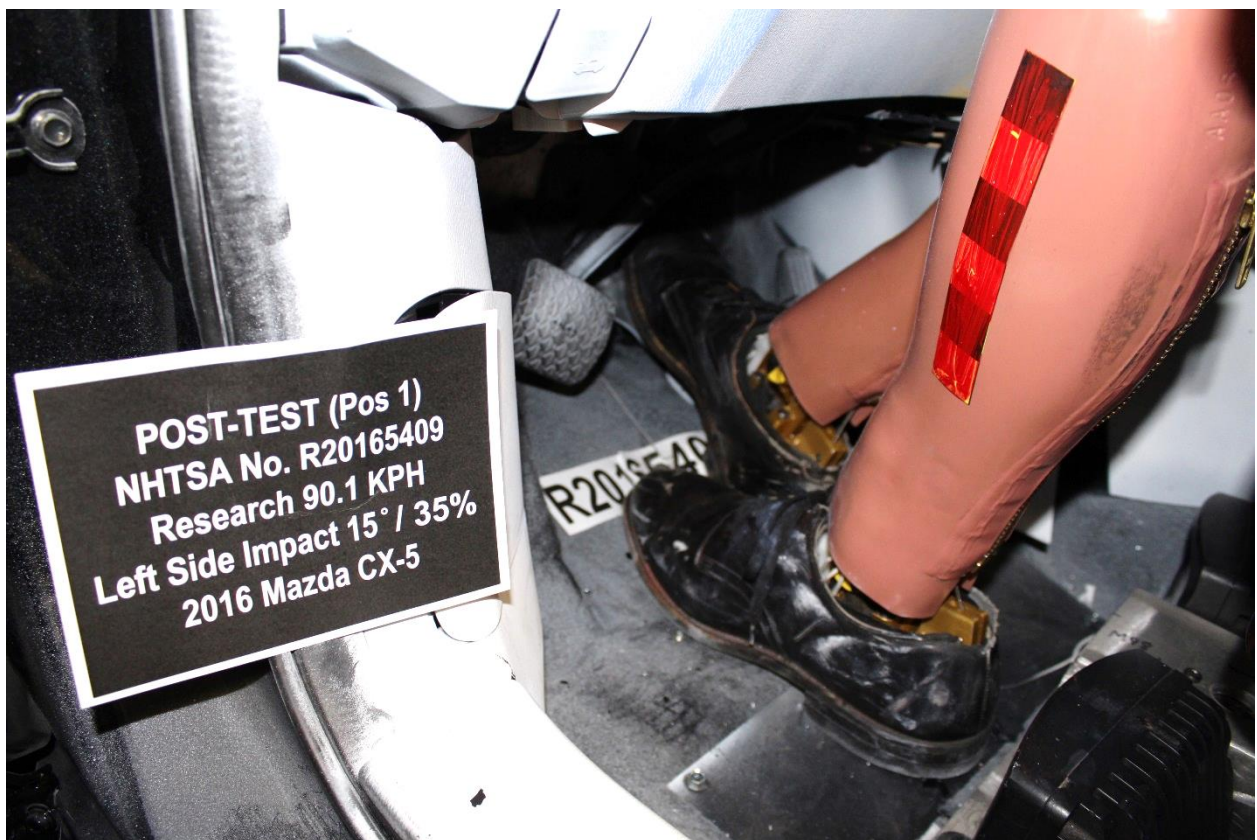
No. 065 Pre-Test Driver Adjustable D-Ring



No. 066 Post-Test Driver Adjustable D-Ring



No. 067 Pre-Test Driver Feet



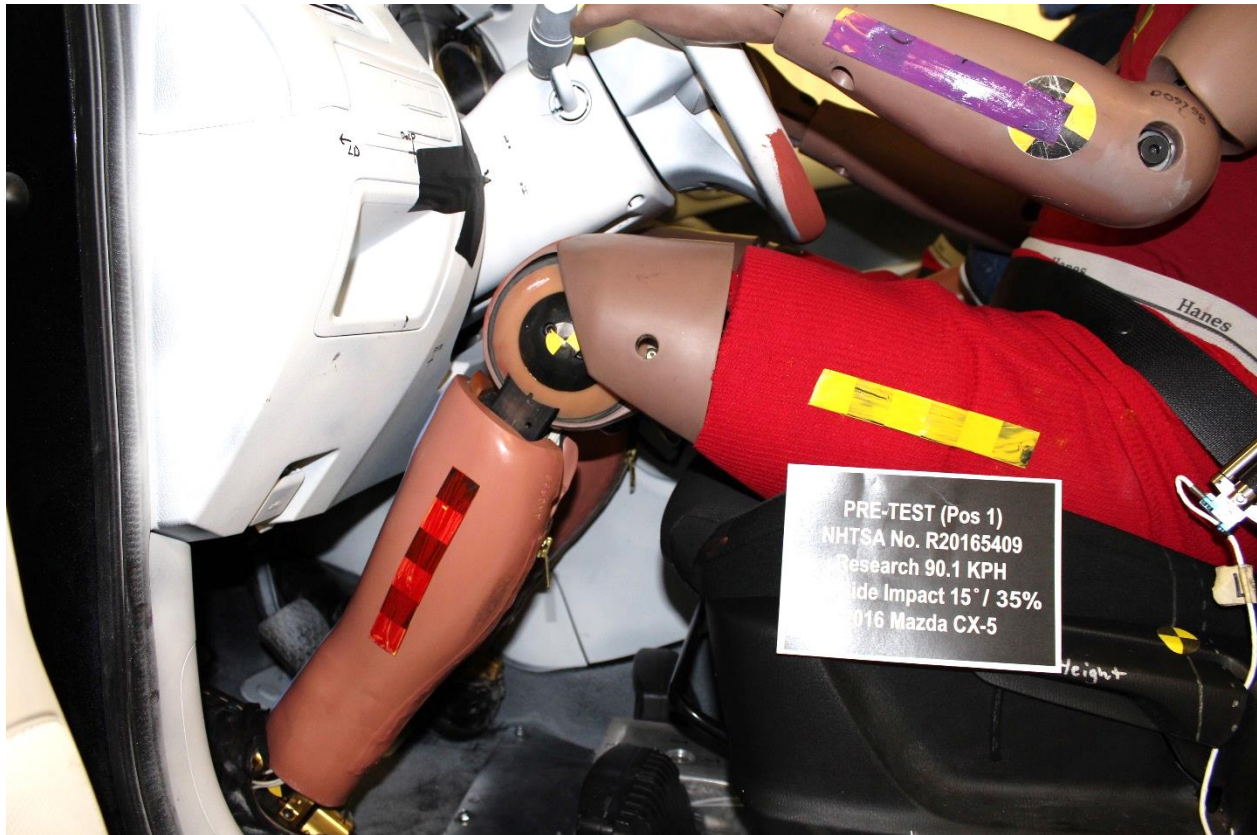
No. 068 Post-Test Driver Feet



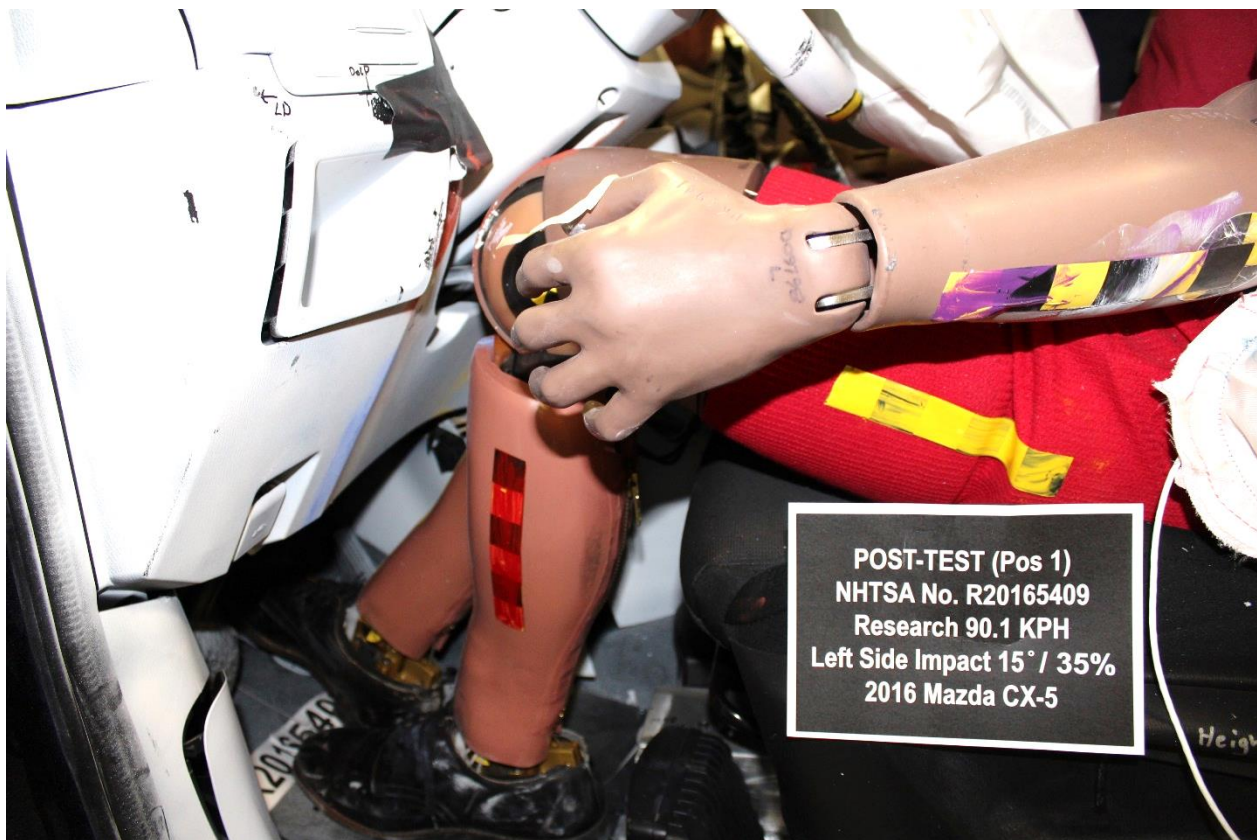
No. 069 Pre-Test View of Driver Right Knee and Bolster



No. 070 Post-Test View of Driver Right Knee and Bolster



No. 071 Pre-Test View of Driver Left Knee and Bolster



No. 072 Post-Test View of Driver Left Knee and Bolster



No. 073 Pre-Test View of Driver Abdomen



No. 074 Post-Test View of Driver Abdomen



No. 075 Pre-Test Left Side View of Steering Wheel set position



No. 076 Post-Test Left Side View of Steering Wheel set position



No. 077 Post-Test View of Driver Head Contact with Front Airbag



No. 078 Post-Test View of Driver Head Contact with Curtain Airbag



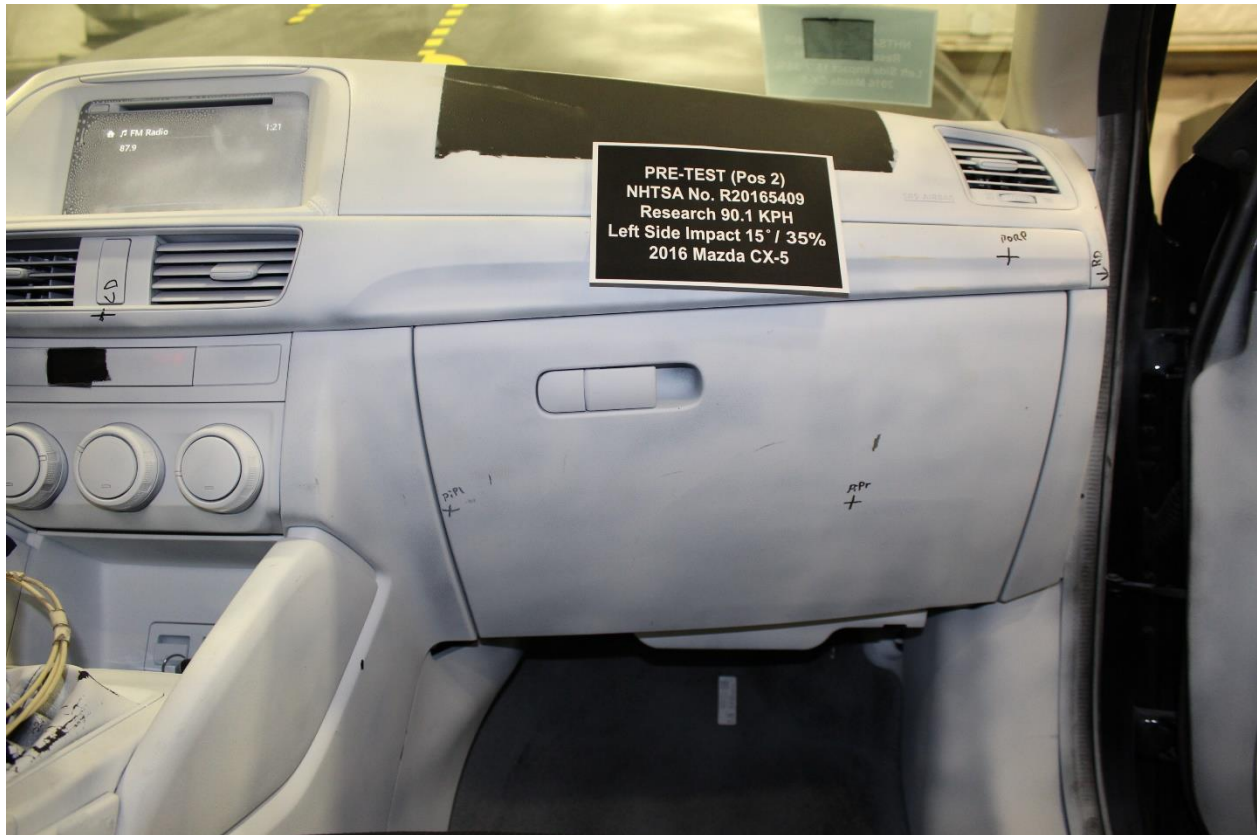
No. 079 Post-Test View of Driver Head Contact with Vehicle Interior – A



No. 080: Post-Test View of Driver Body Contact with Vehicle Interior - B



No. 081: Post-Test View of Driver Body Contact with Vehicle Interior - C



No. 082: Pre-Test Overall View of Passenger Knee Bolsters



No. 083: Post-Test Overall View of Passenger Knee Bolsters



No. 084: Pre-Test Left Side View of Passenger Knee Bolsters



No. 085: Post-Test Left Side View of Passenger Knee Bolsters



No. 086: Pre-Test Right Side View of Passenger Knee Bolsters



No. 087: Post-Test Right Side View of Passenger Knee Bolsters



No. 088: Pre-Test View of Passenger Floor pan at Right sill level, w/carpet



No. 089: Post-Test View of Passenger Floor pan at Right sill level, w/carpet



No. 090: Pre-Test View of Passenger Floor pan at Mid seat level, w/carpet



No. 091: Post-Test view of Passenger Floor pan at Mid seat level, w/carpet



No. 092: Pre-Test View of Passenger Floor pan at Left view



No. 093: Post-Test View of Passenger Floor pan at Left View



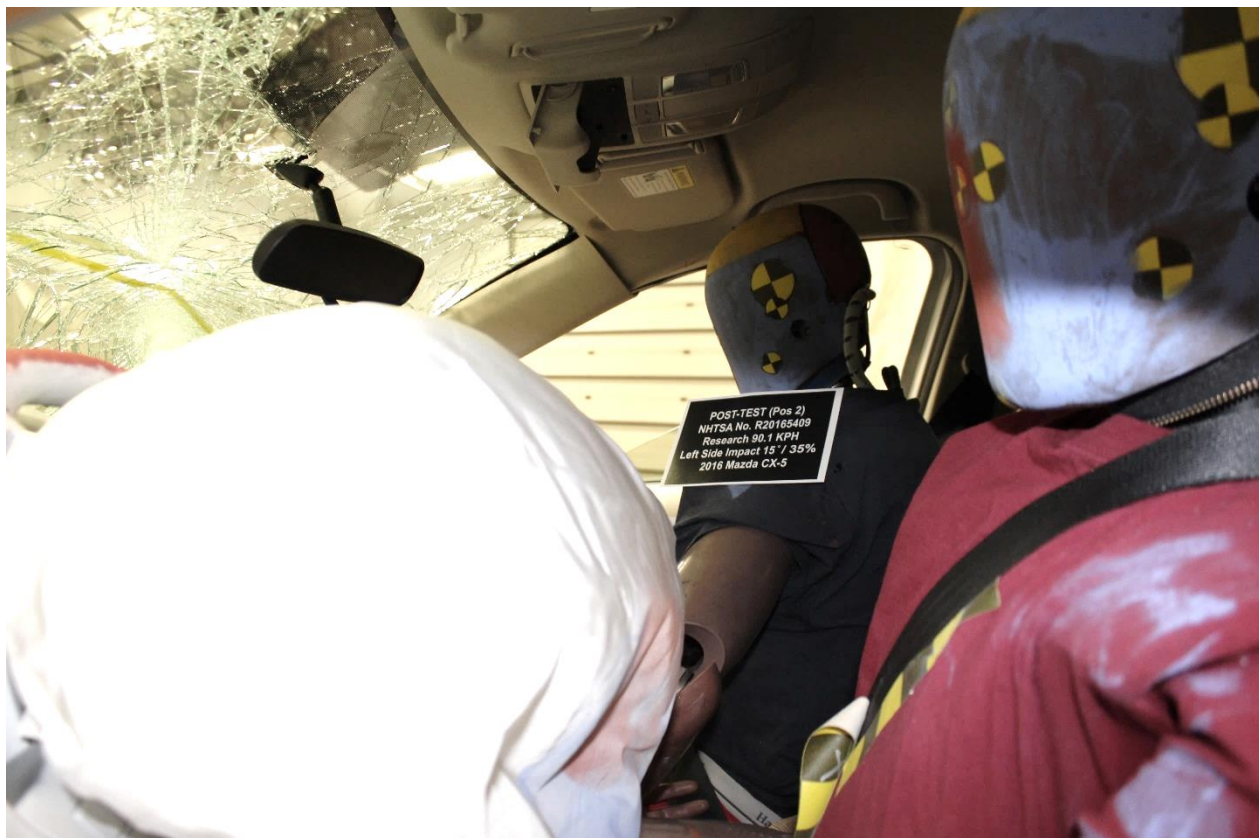
No. 094: Pre-Test Passenger Front Close-up View, Windshield



No. 095: Post-Test Passenger Front Close-up View, Windshield



No. 096: Pre-Test Left Side Passenger and Interior View



No. 097: Post-Test Left Side Passenger and Interior View



No. 98: Pre-Test Right Side Passenger Window View



No. 99: Post-Test Right Side Passenger Window View



No. 100: Pre-Test Right Side Passenger and Interior View

Photo Not Available

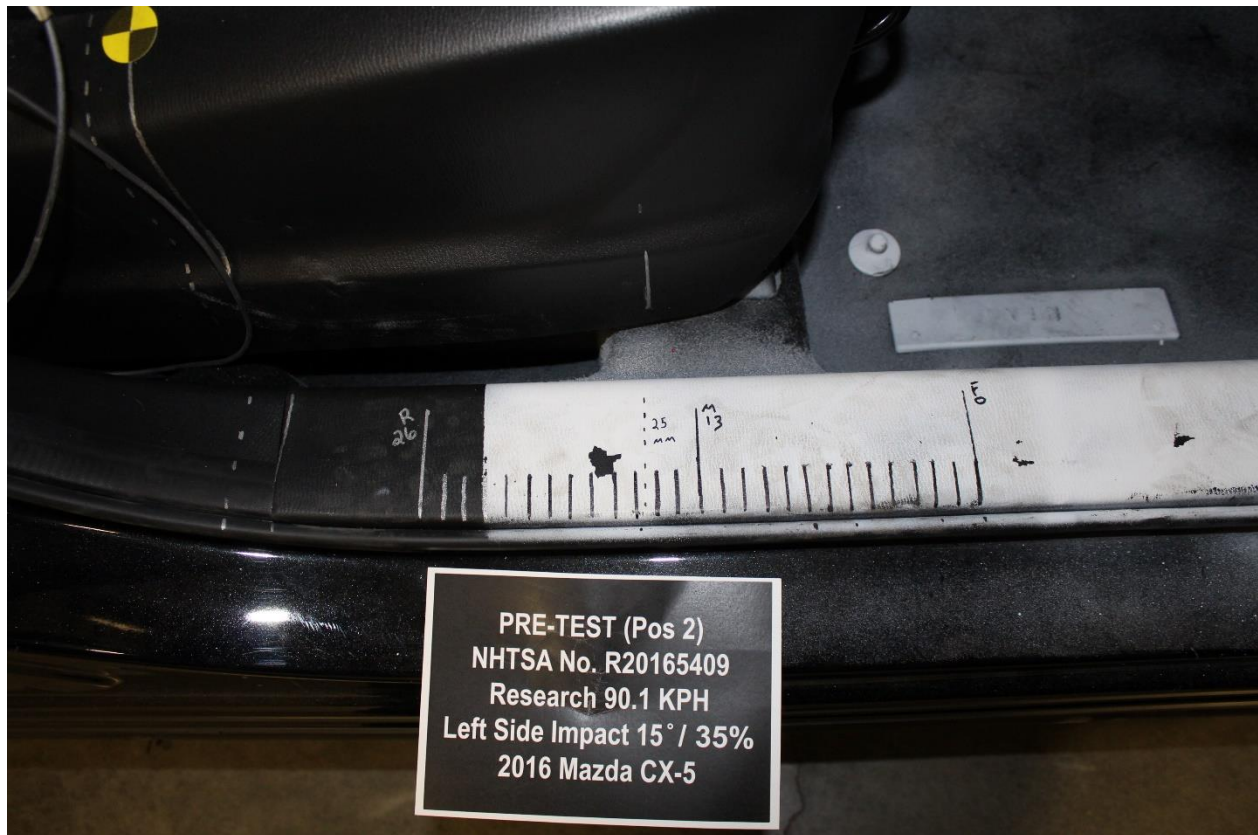
No. 101: Post-Test Right Side Passenger and Interior View



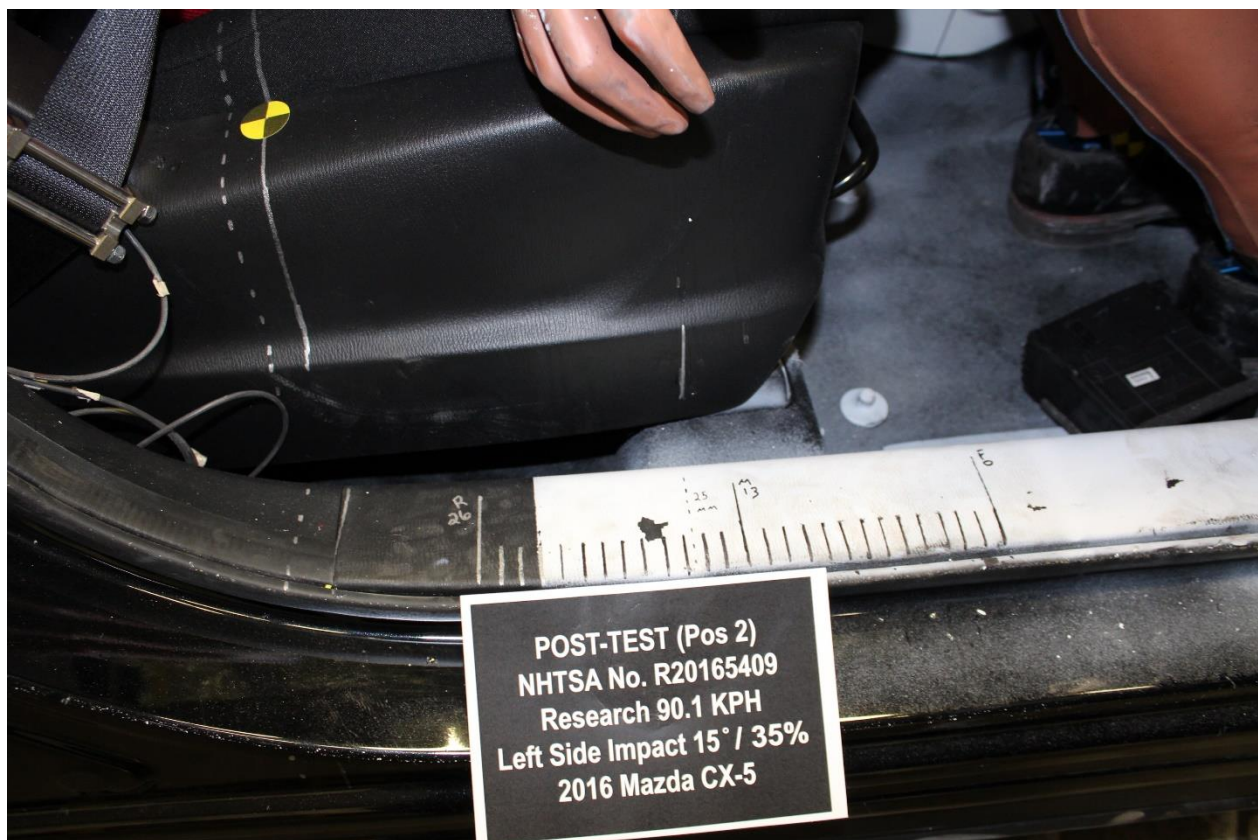
No. 102: Pre-Test View of Passenger Door Clearance



No. 103: Post-Test View of Passenger Door Clearance



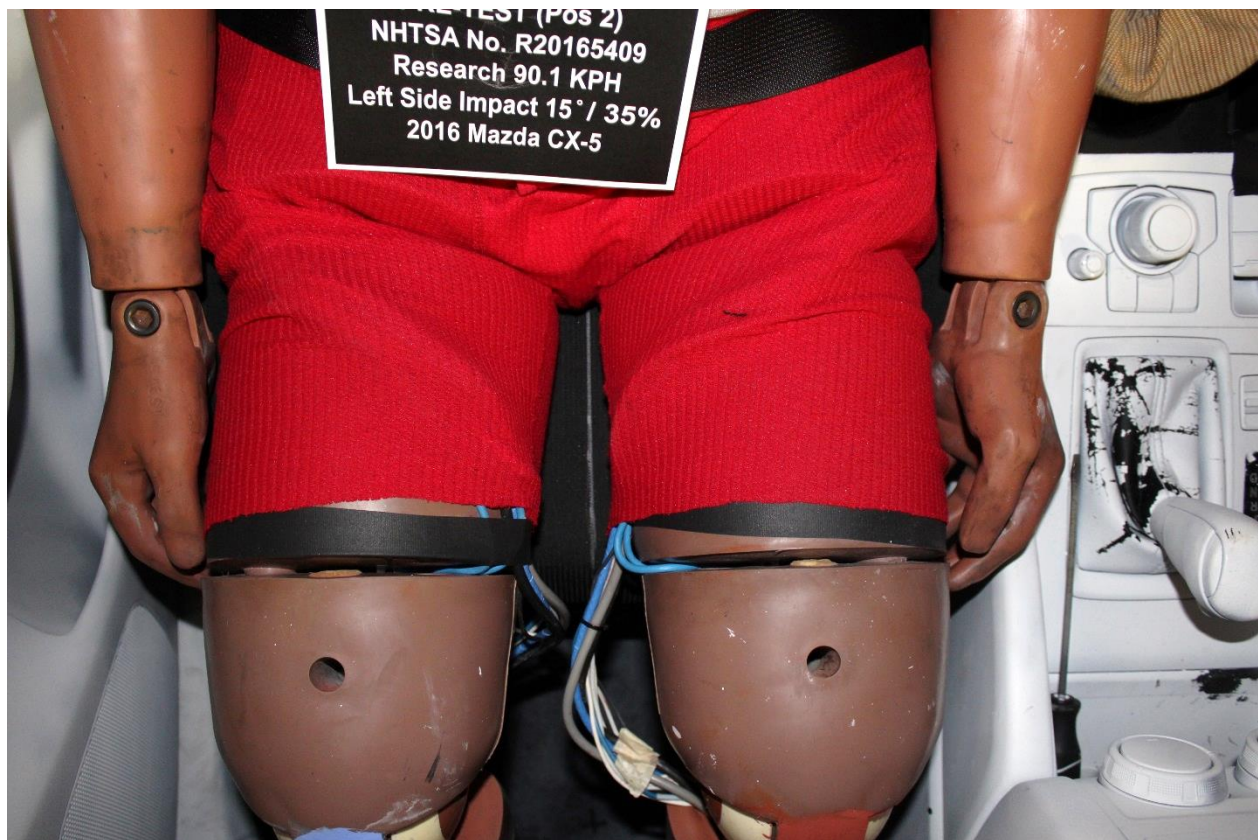
No. 104: Pre-Test Passenger Seat Fore-Aft Markings



No. 105: Post-Test Passenger Seat Fore-Aft Markings (plastic moved not seat)



No. 106: Pre-Test Passenger Seat Back Markings



No. 107: Pre-Test Overhead View of Passenger Thighs on seat



No. 108: Pre-Test Passenger Adjustable D-ring



No. 109: Post-Test Passenger Adjustable D-ring



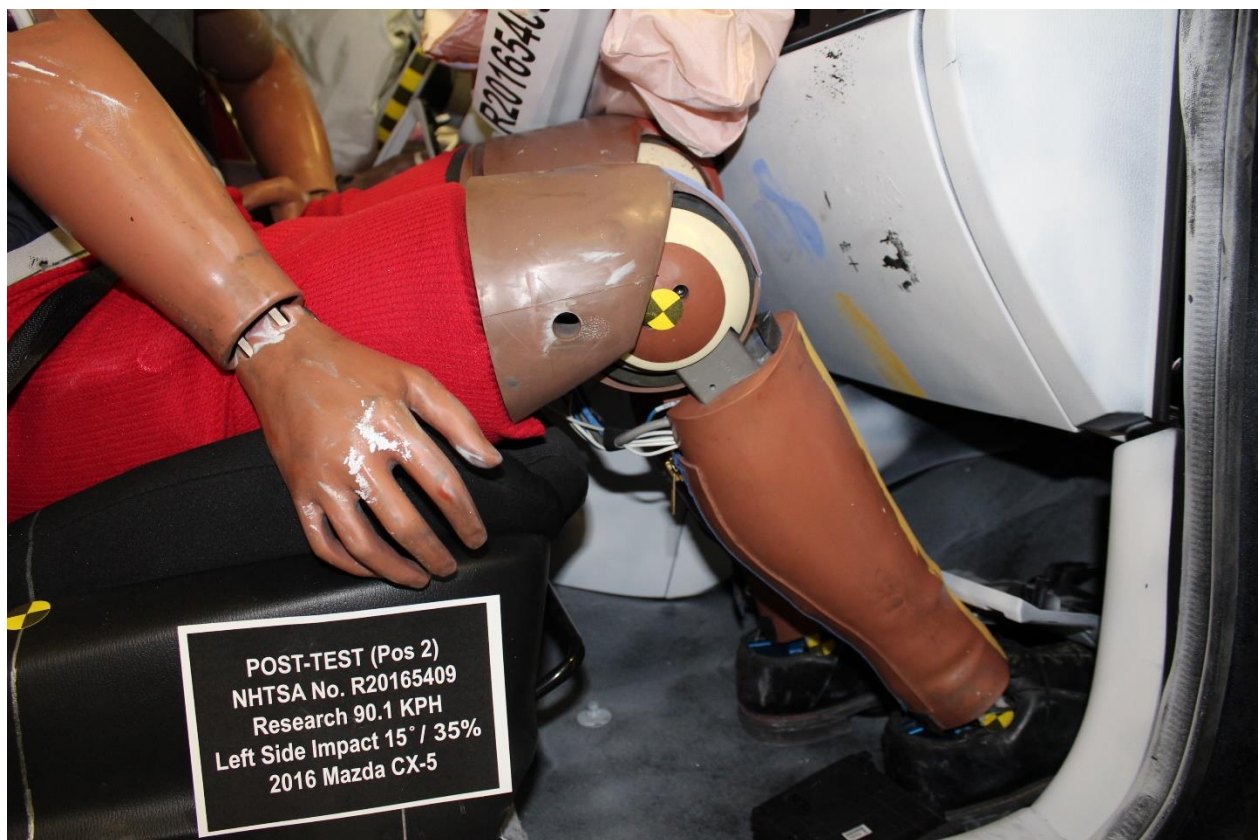
No. 110: Pre-Test View of Passenger Feet



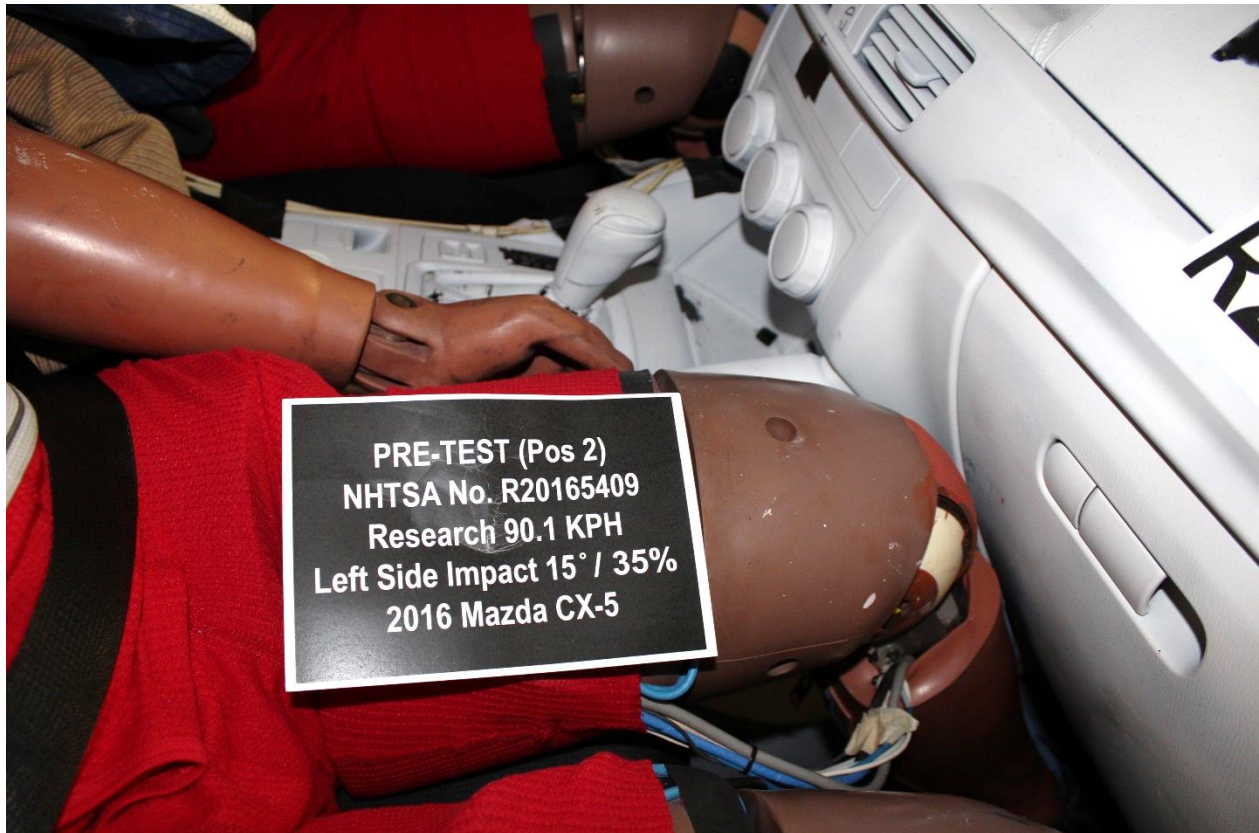
No. 111: Post-Test View of Passenger Feet



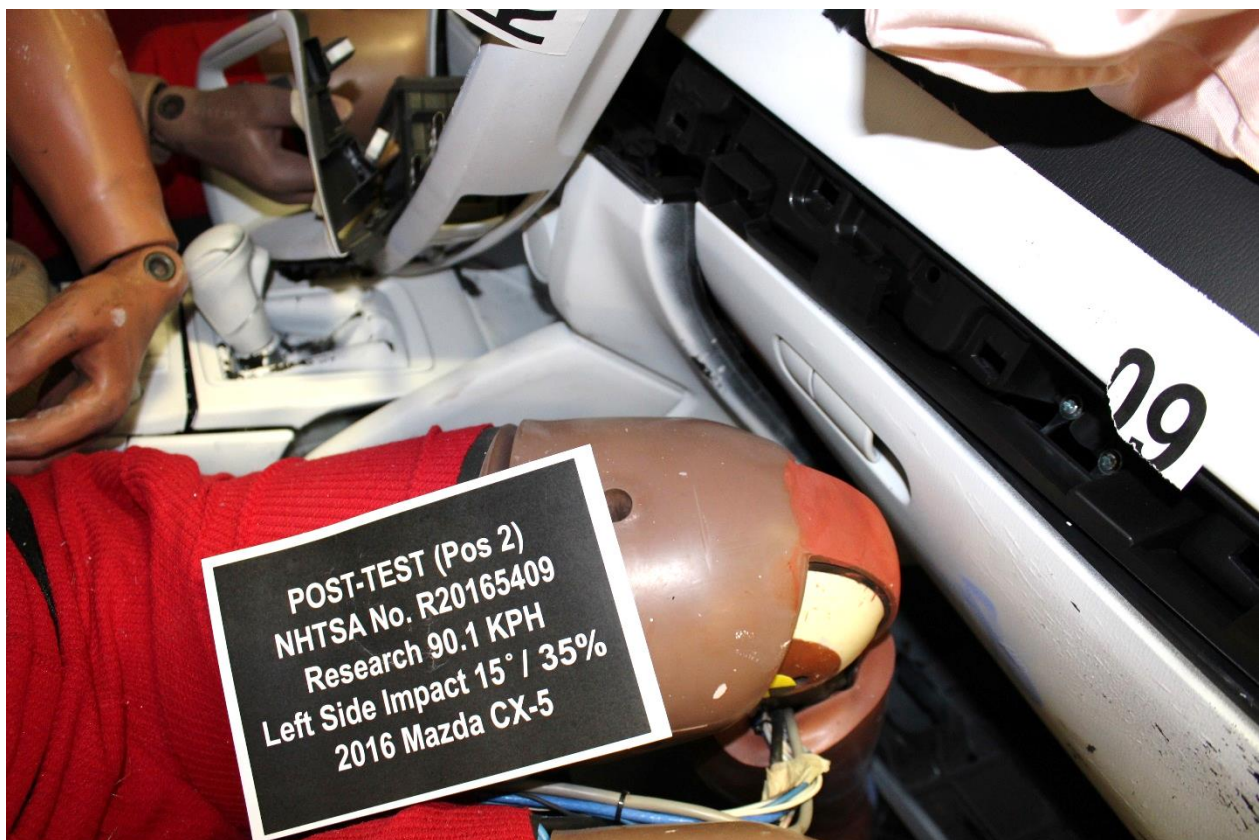
No. 112: Pre-Test View of Passenger Right Knee and Bolster



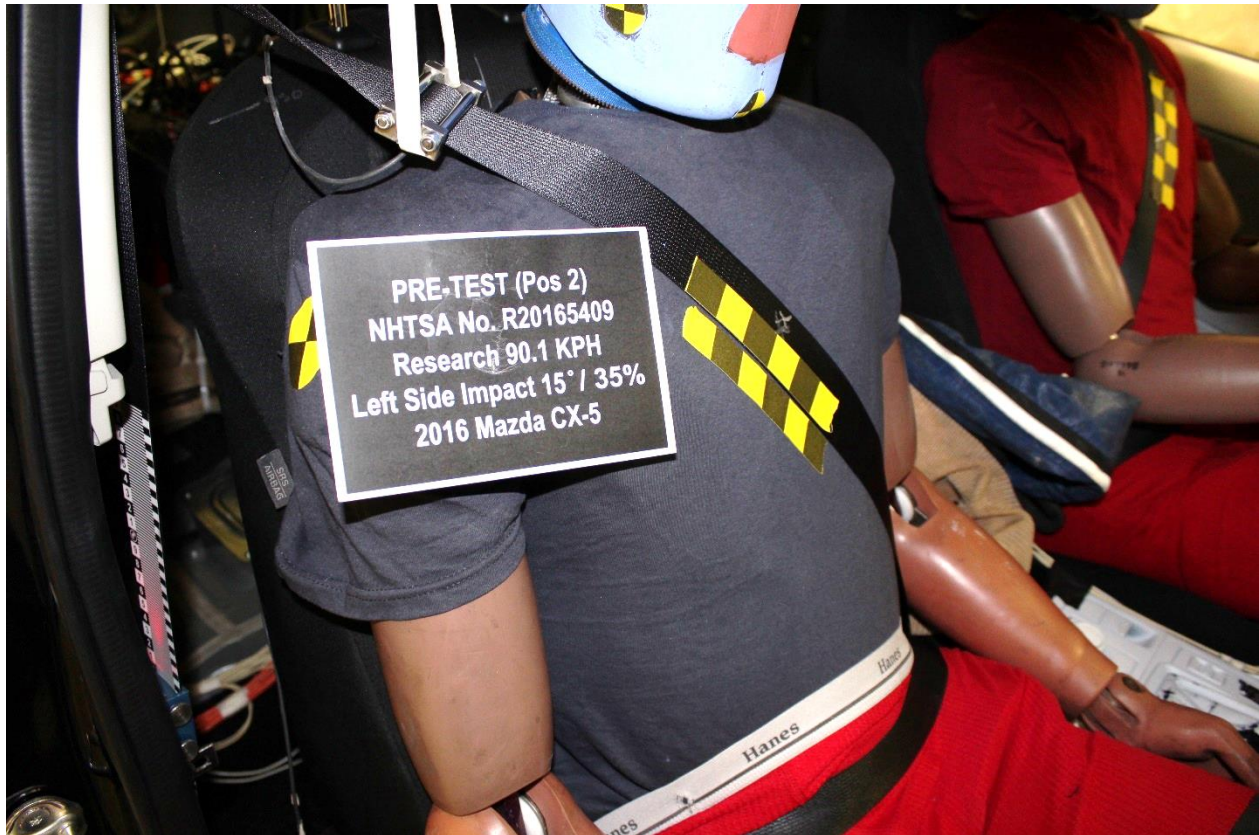
No. 113: Post-Test View of Passenger Right Knee and Bolster



No. 114: Pre-Test View of Passenger Left Knee and Bolster



No. 115: Post-Test View of Passenger Left Knee and Bolster



No. 116: Pre-Test View of Passenger Abdomen



No. 117: Post-Test View of Passenger Abdomen



No. 118: Post-Test View of Passenger Head contact with Airbag – Front

Photo Not Applicable

No. 119: Post-Test View of Passenger Head contact with Airbag - Curtain



No. 120: Post-Test View of Passenger Head contact with Interior

Photo Not Applicable

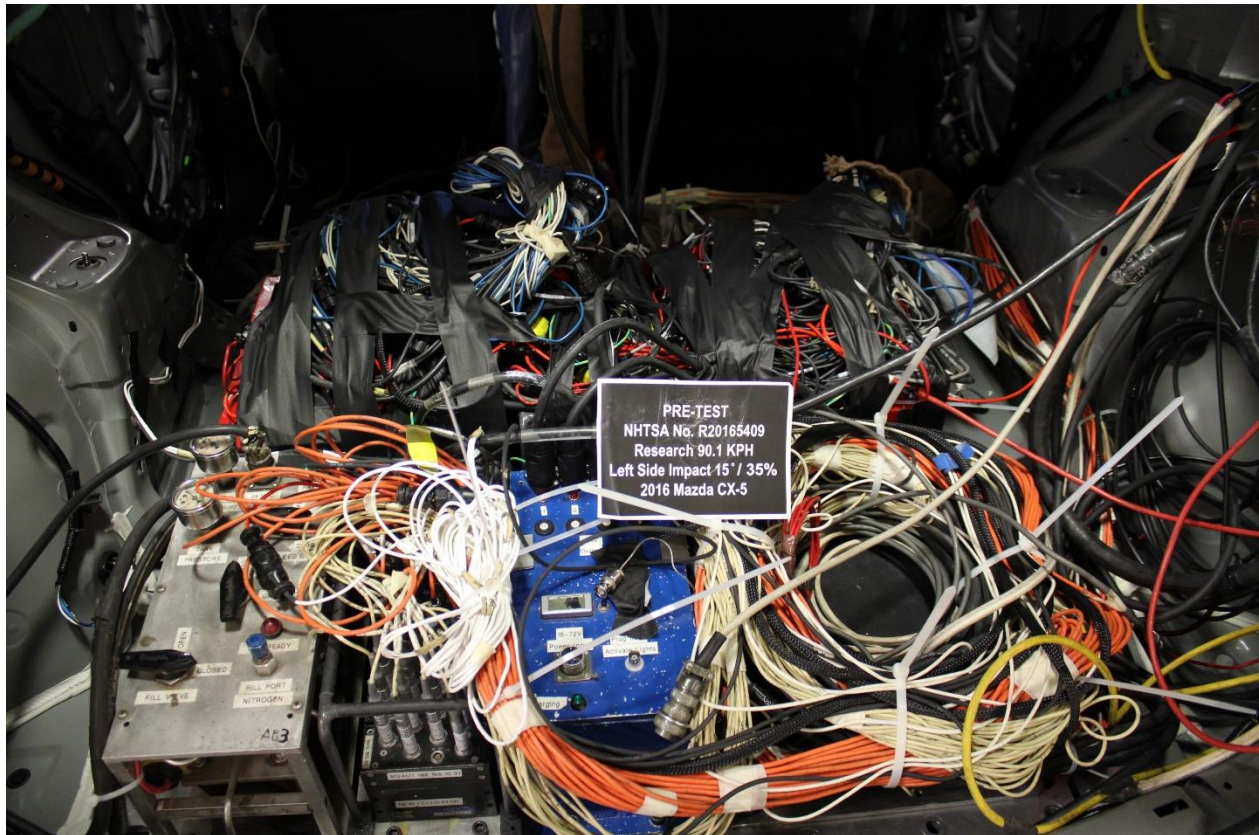
No. 121: Post-Test View of Passenger Body contact with Interior

Photo Not Applicable

No. 122: Post-Test View of Passenger Head contact with Interior



No. 123: Post-Test Passenger Contact With Glovebox



No. 124: Pre-Test Ballast Locations



No. 125: Post-Test Speed Trap Readout



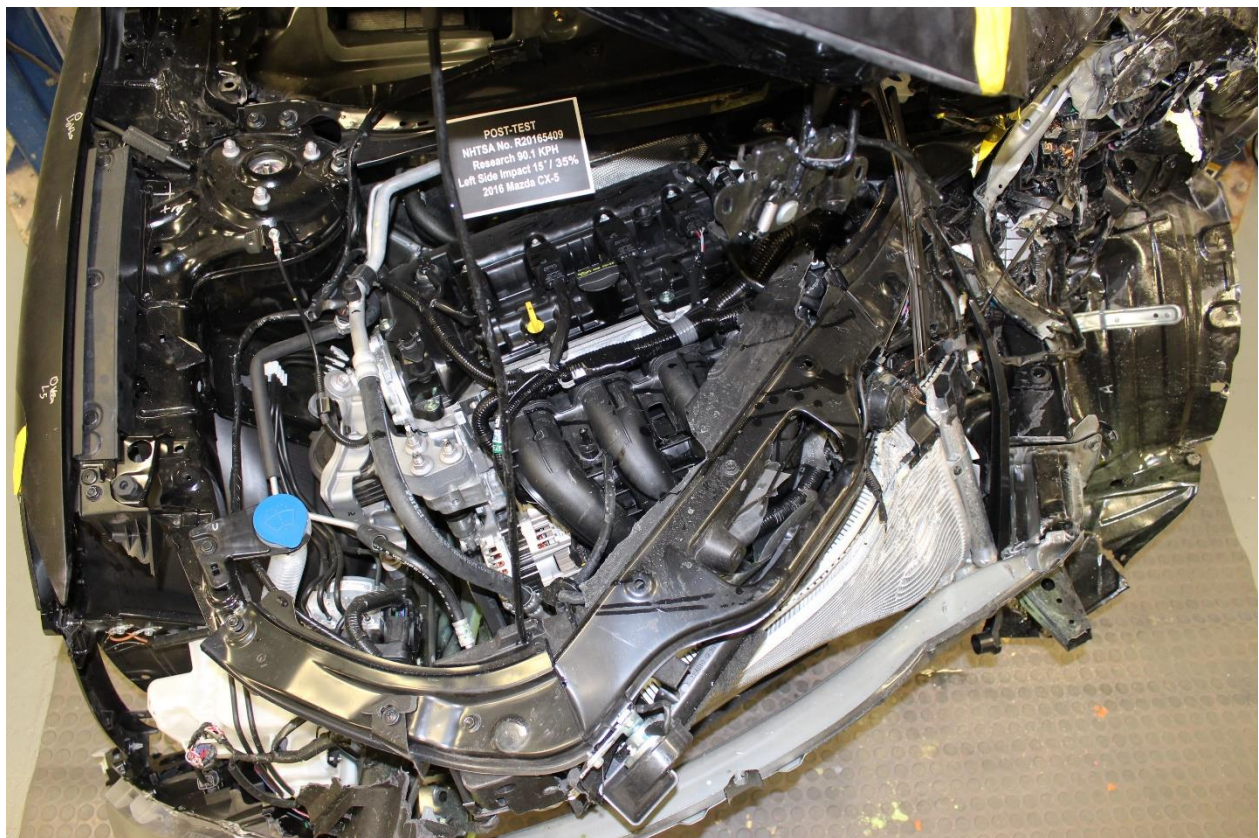
No. 126: Pre-Test View of Fuel Filler Cap



No. 127: Post-Test View of Fuel Filler Cap



No. 128: Pre-Test Engine Compartment View



No. 129: Post-Test Engine Compartment View



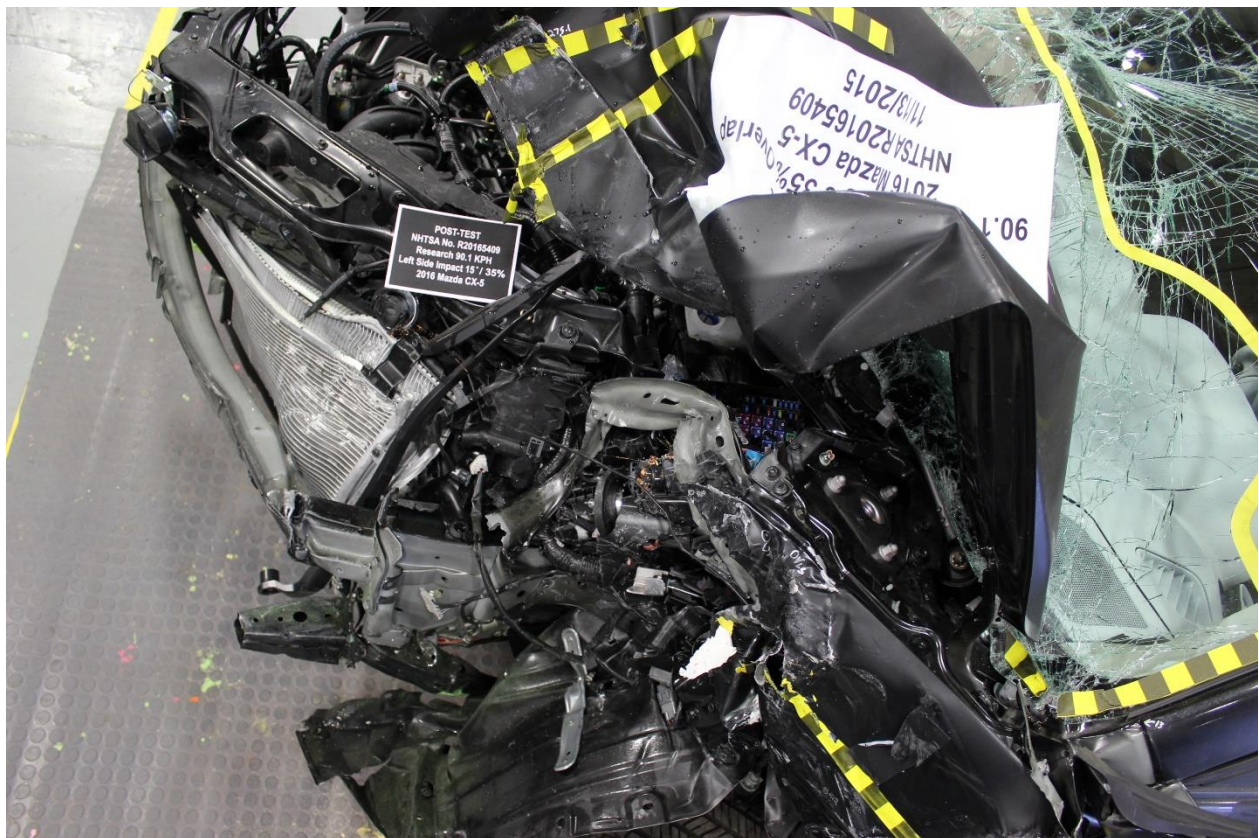
No. 130: Pre-Test Right Side Engine Compartment View



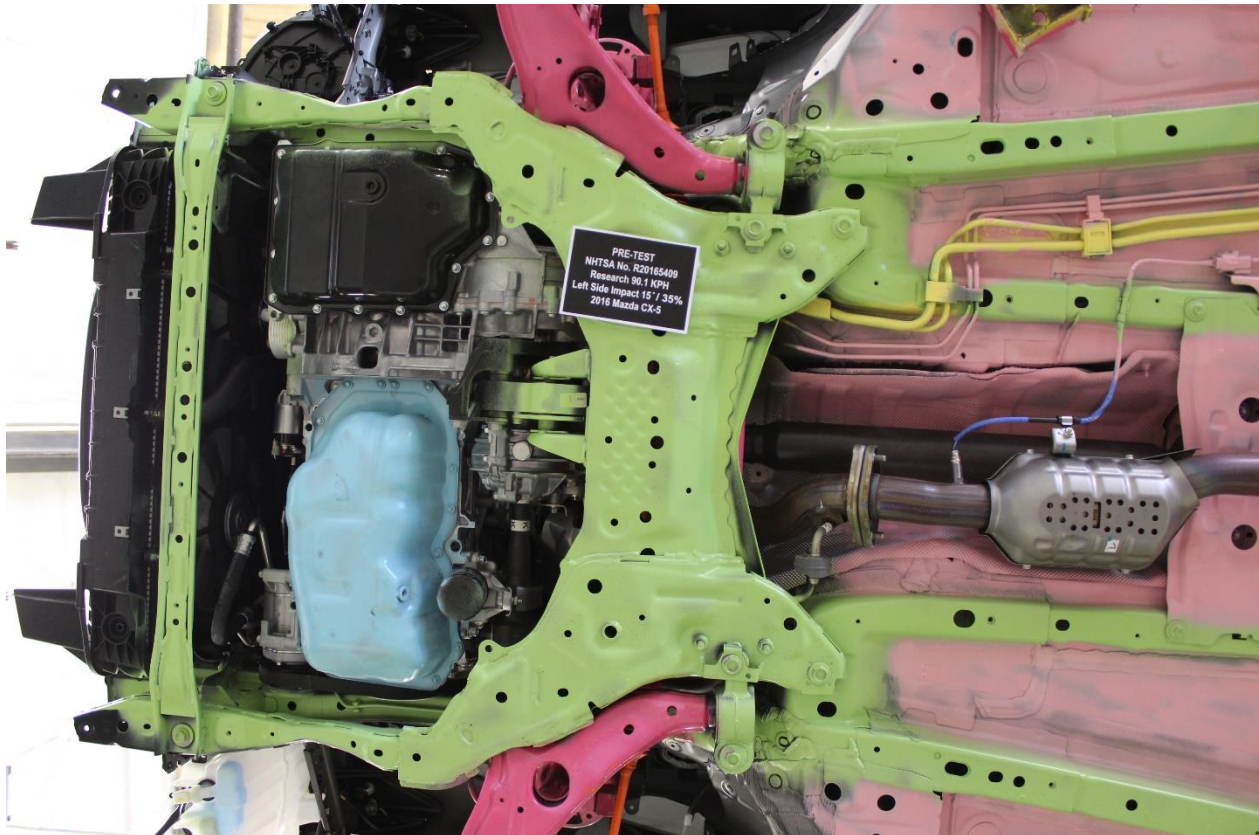
No. 131: Post-Test Right Side Engine Compartment View



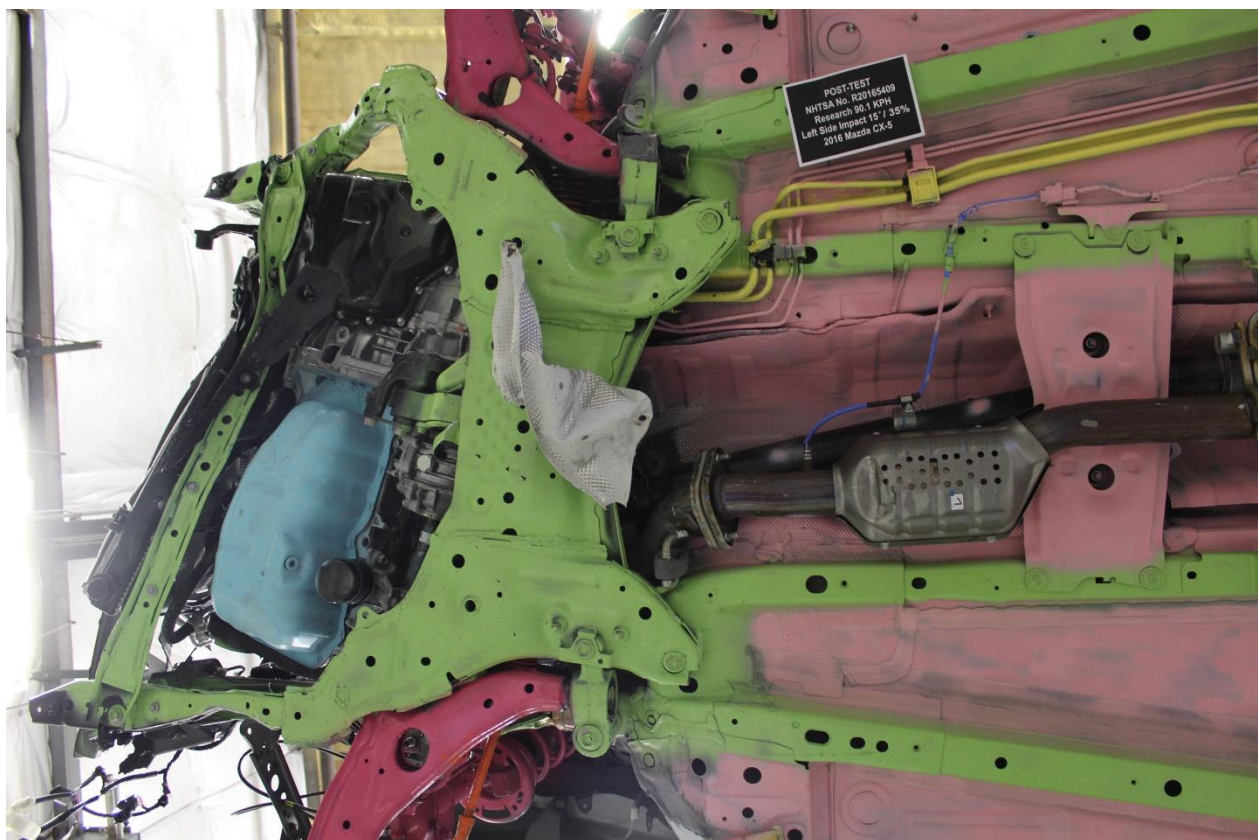
No. 132: Pre-Test Left Side Engine Compartment View



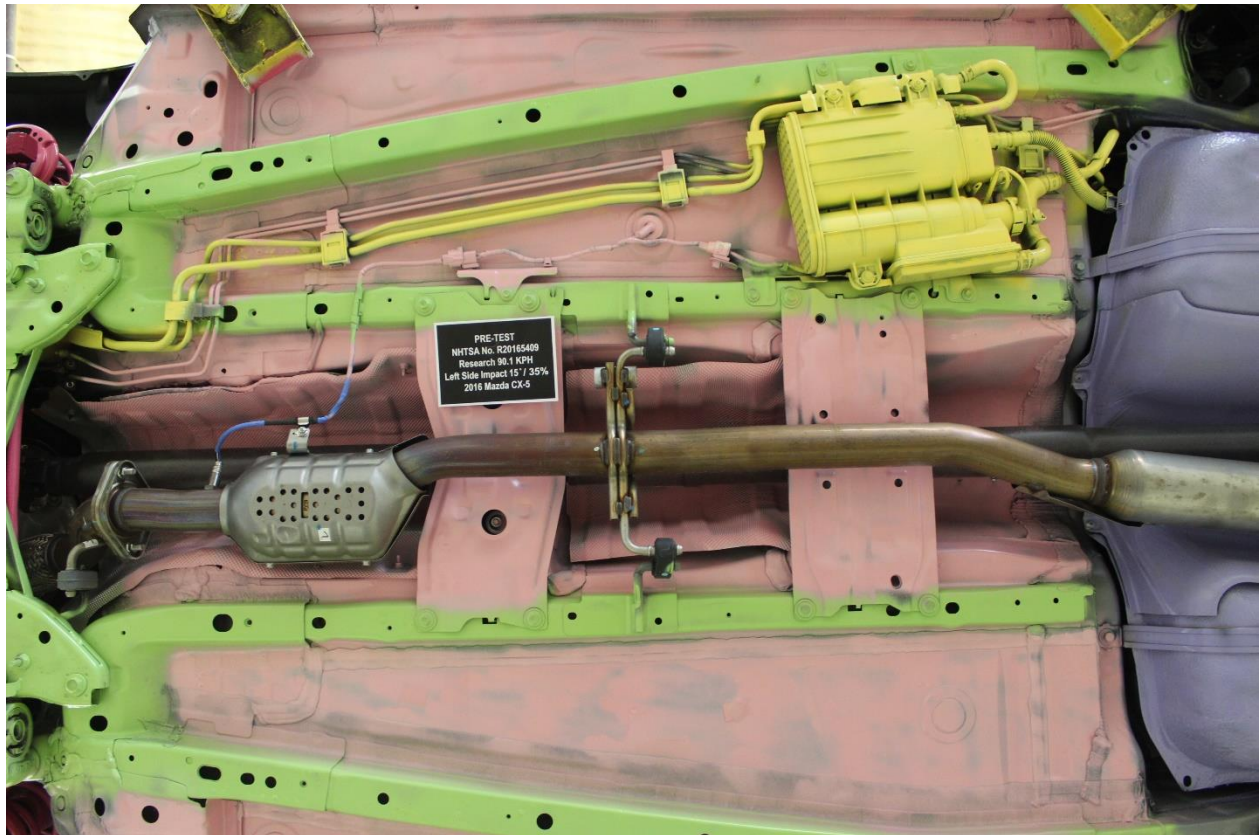
No. 133: Post-Test Left Side Engine Compartment View



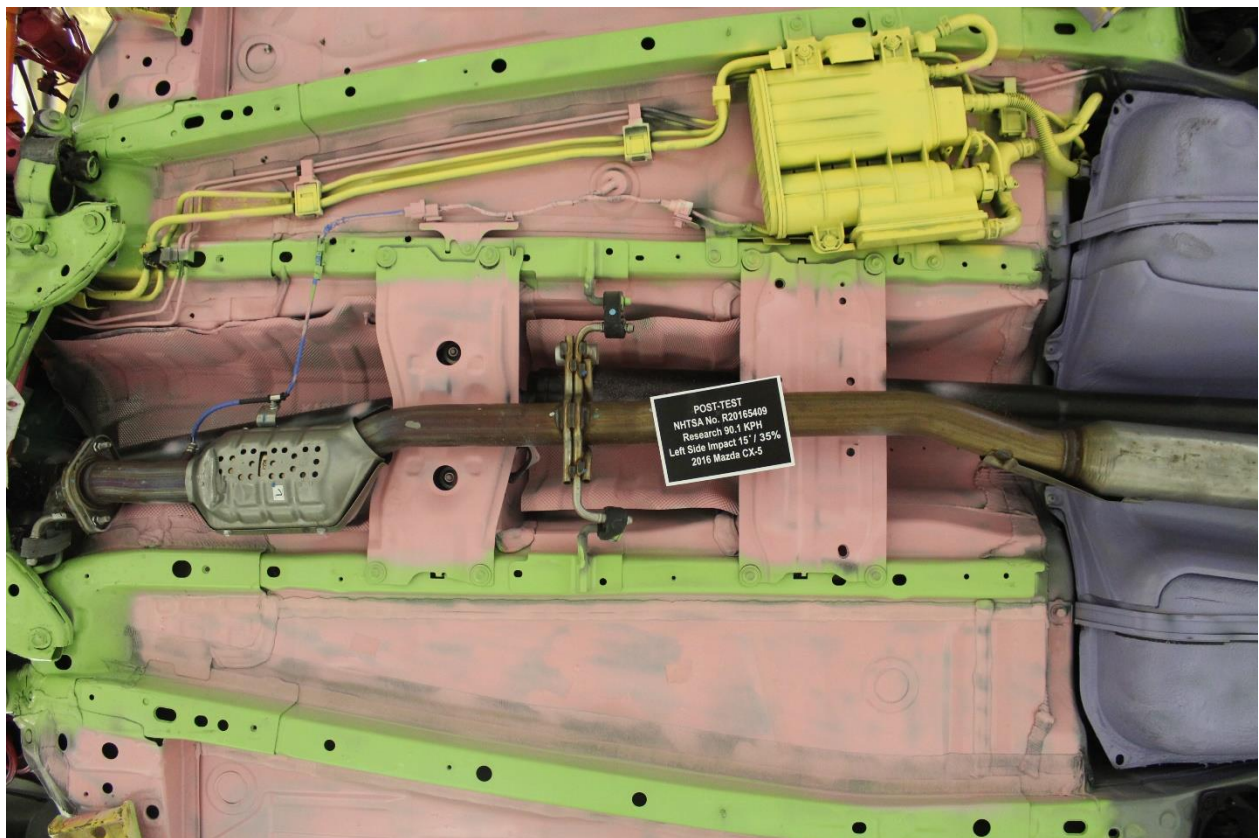
No. 134: Pre-Test View of Front Underbody (perpendicular to vehicle)



No. 135: Post-Test View of Front Underbody (perpendicular to vehicle)



No. 136: Pre-Test View of Mid Underbody (perpendicular to vehicle)



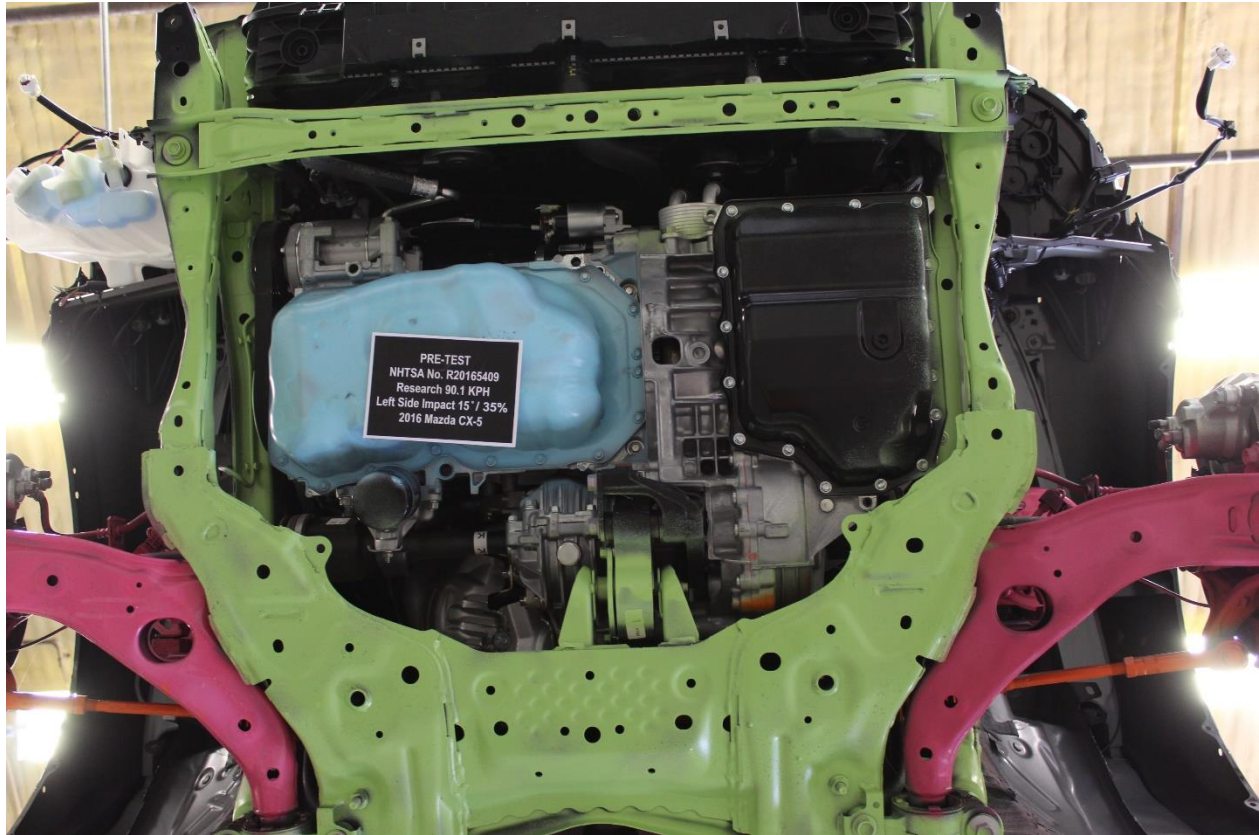
No. 137: Post-Test View of Mid Underbody (perpendicular to vehicle)



No. 138: Pre-Test View of Rear Underbody (perpendicular to vehicle)



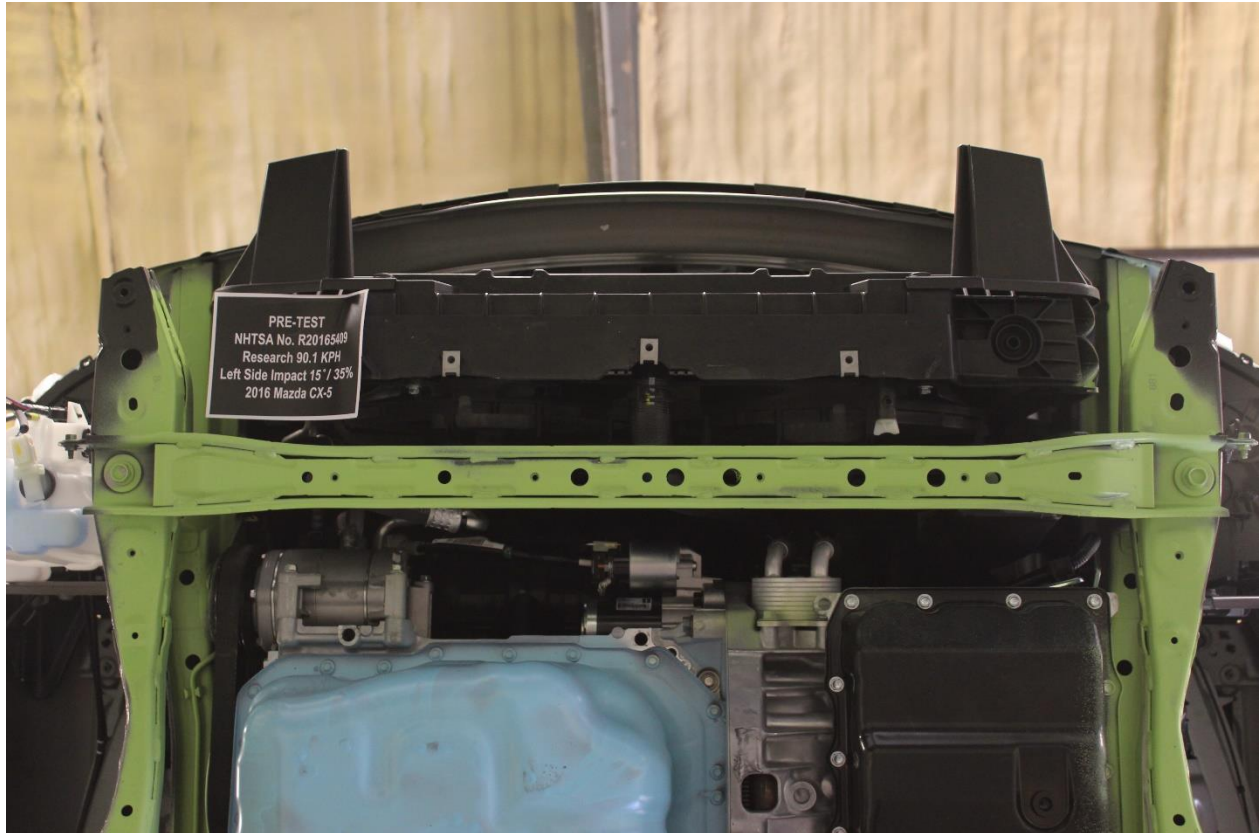
No. 139: Post-Test View of Rear Underbody (perpendicular to vehicle)



No. 140: Pre-Test View of Steering rack and or sway bar



No. 141: Post-Test View of Steering rack and or sway bar



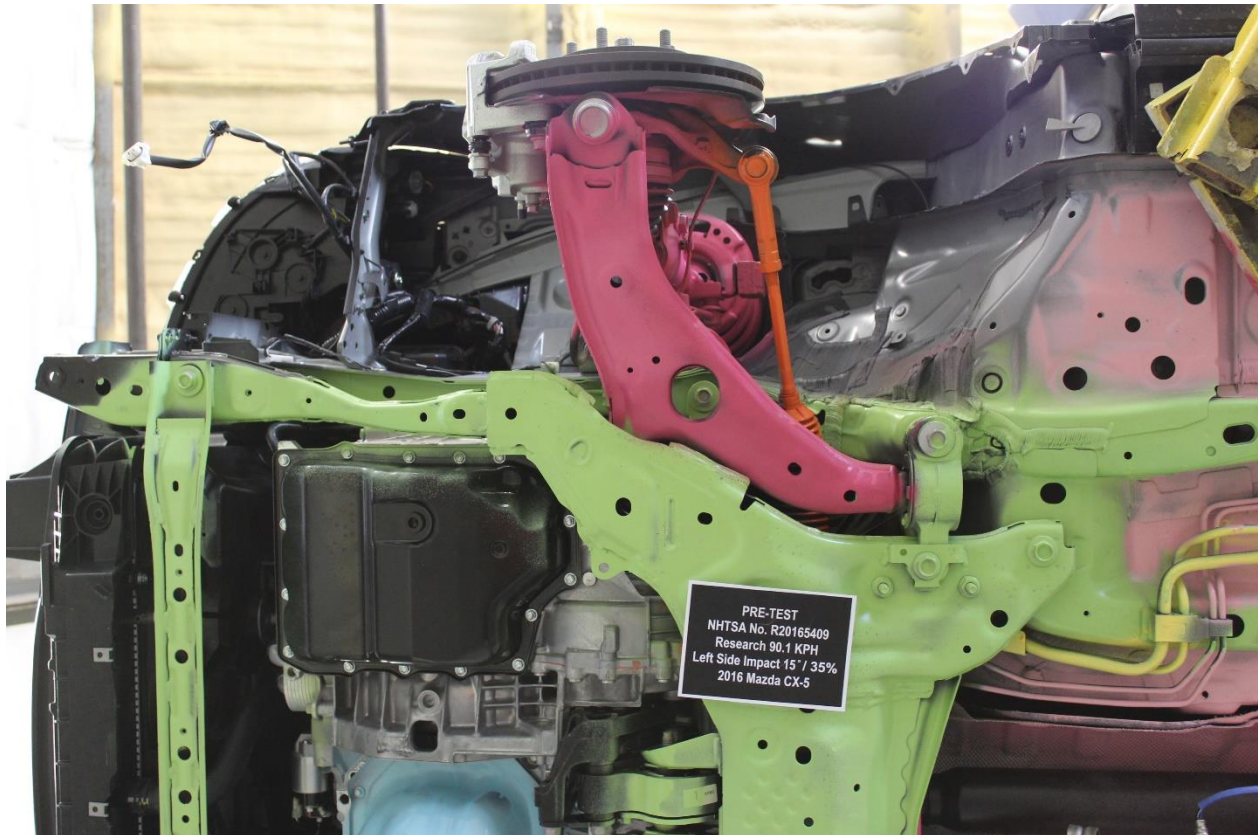
No. 142: Pre-Test Bumper to Rail Attachments and Crush Initiators



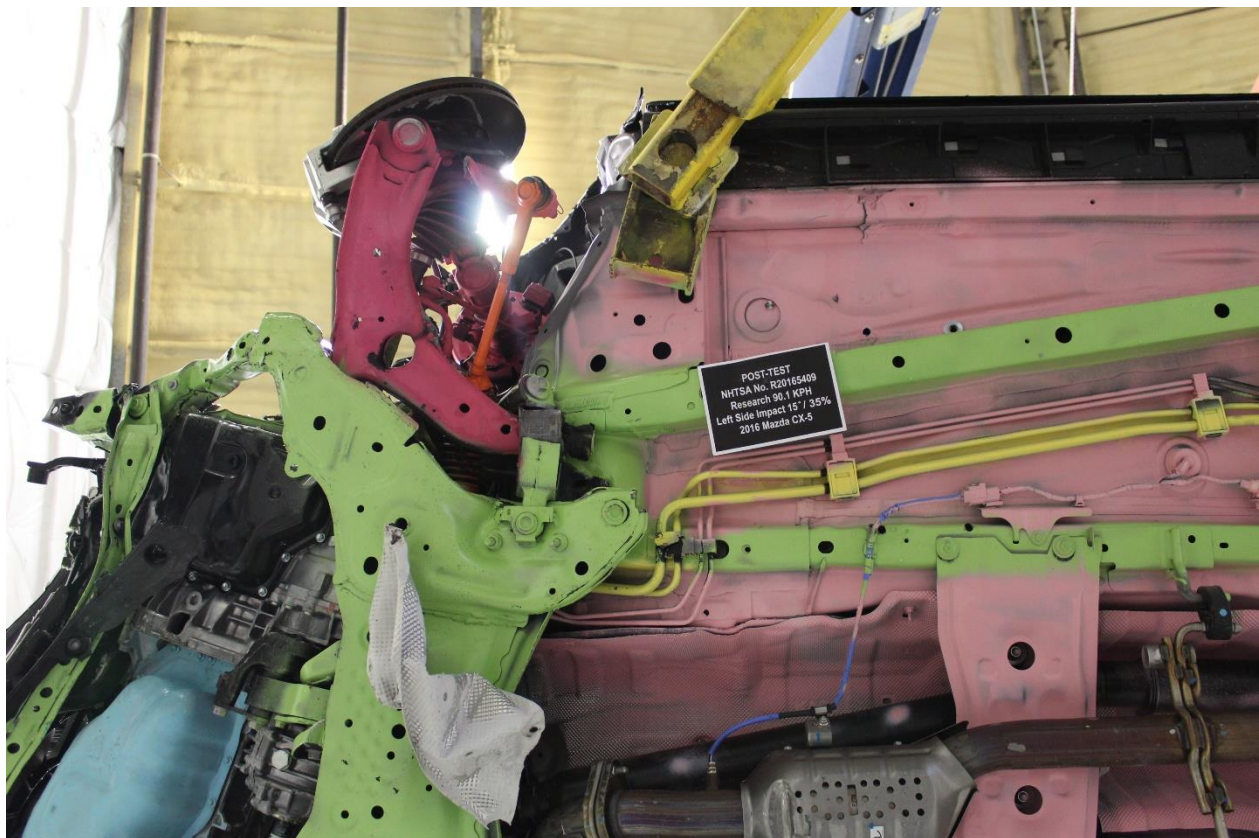
No. 143: Post-Test Bumper to Rail Attachments and Crush Initiators



No. 144: Post-Test View of Front Sub-Frame Deformation



No. 145: Pre-Test Frame Rail with tire removed



No. 146: Post-Test Frame Rail with tire removed



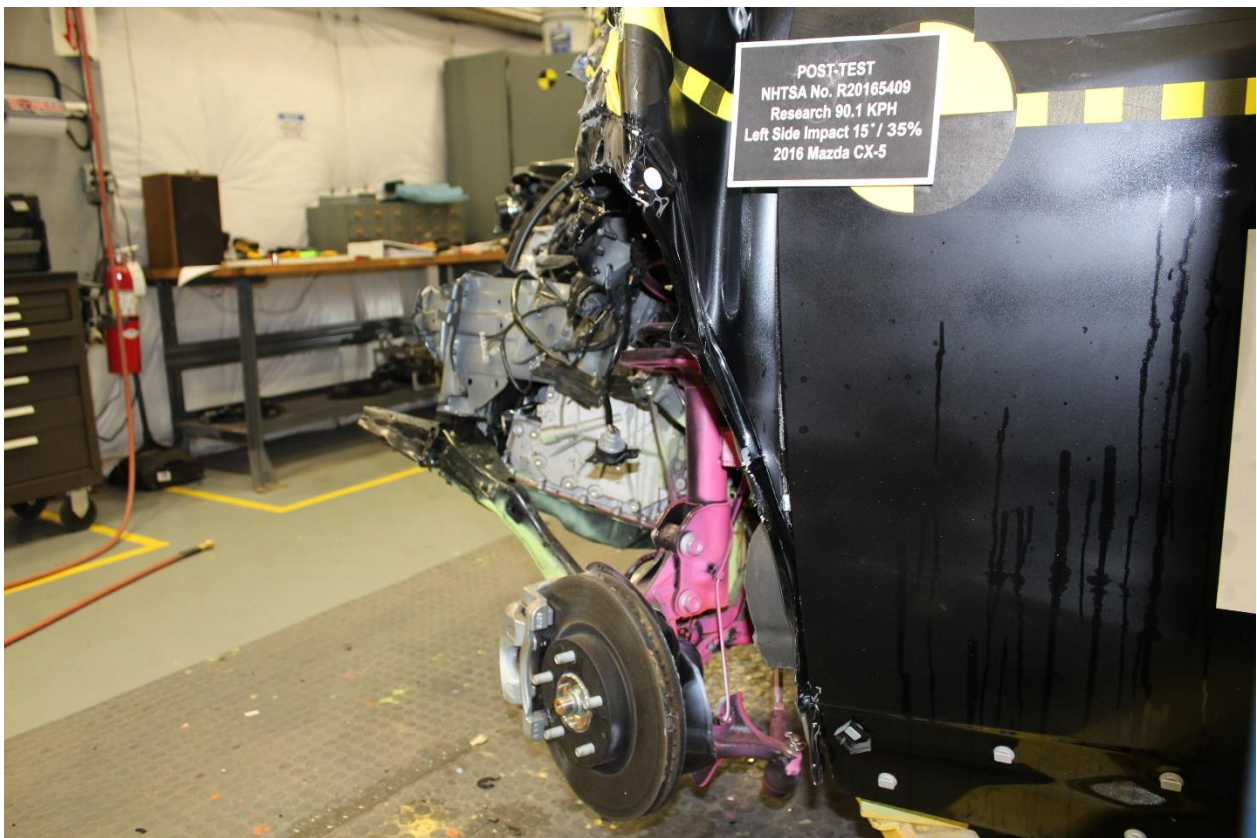
No. 147: Pre-Test View of Front Driver Wheel Well w/ Tire Removed



No. 148: Post-Test ¾ View of Front Driver Wheel Well w/ Tire Removed



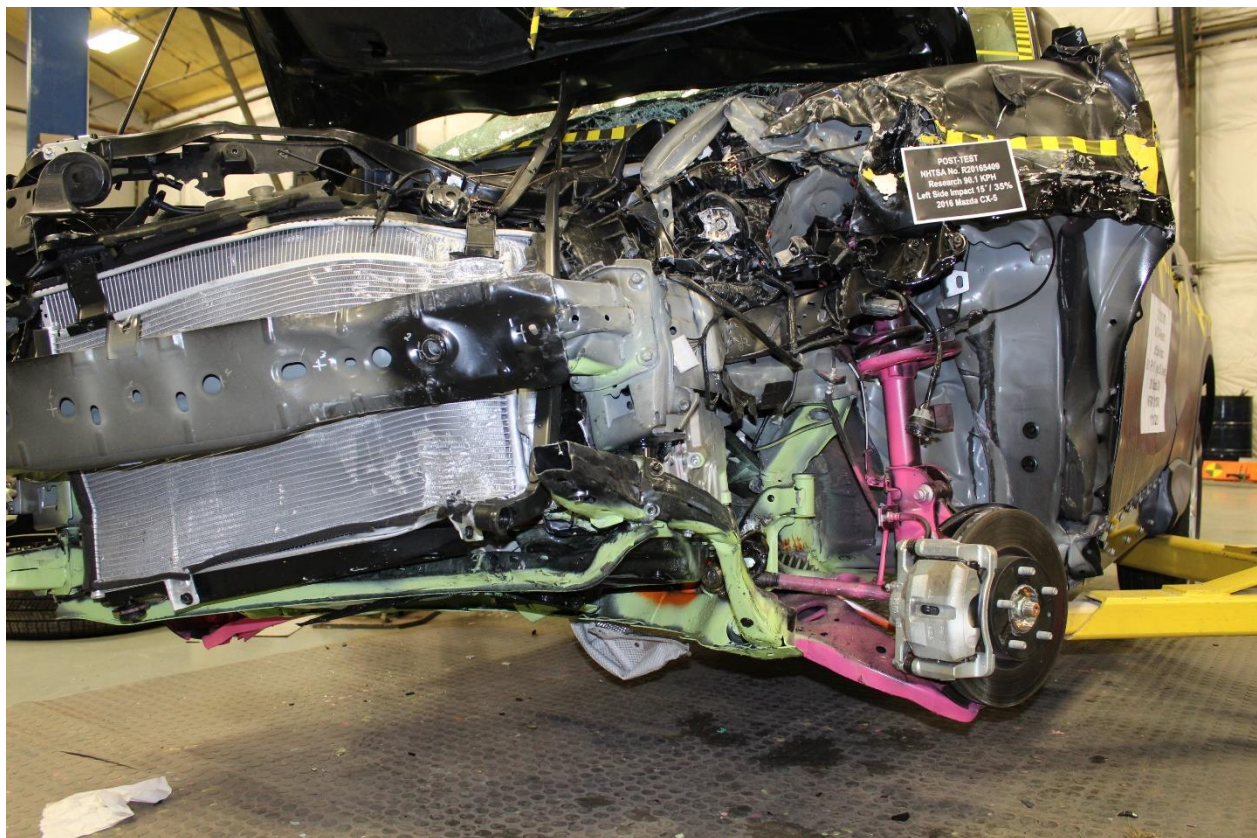
No. 149: Post-Test Side View of Front Driver Wheel Well w/ Tire Removed



No. 150: Post-Test Right Side 3/4 Rear View of the Front Driver Wheel Well w/ Tire Removed



No. 151: Post-Test Looking Down at the Front Driver Shotgun



No. 152: Post-Test Right Side $\frac{3}{4}$ View of Front Driver Shotgun



No. 153: Post-Test Front Driver Close up View of Suspension w/ Tire Removed



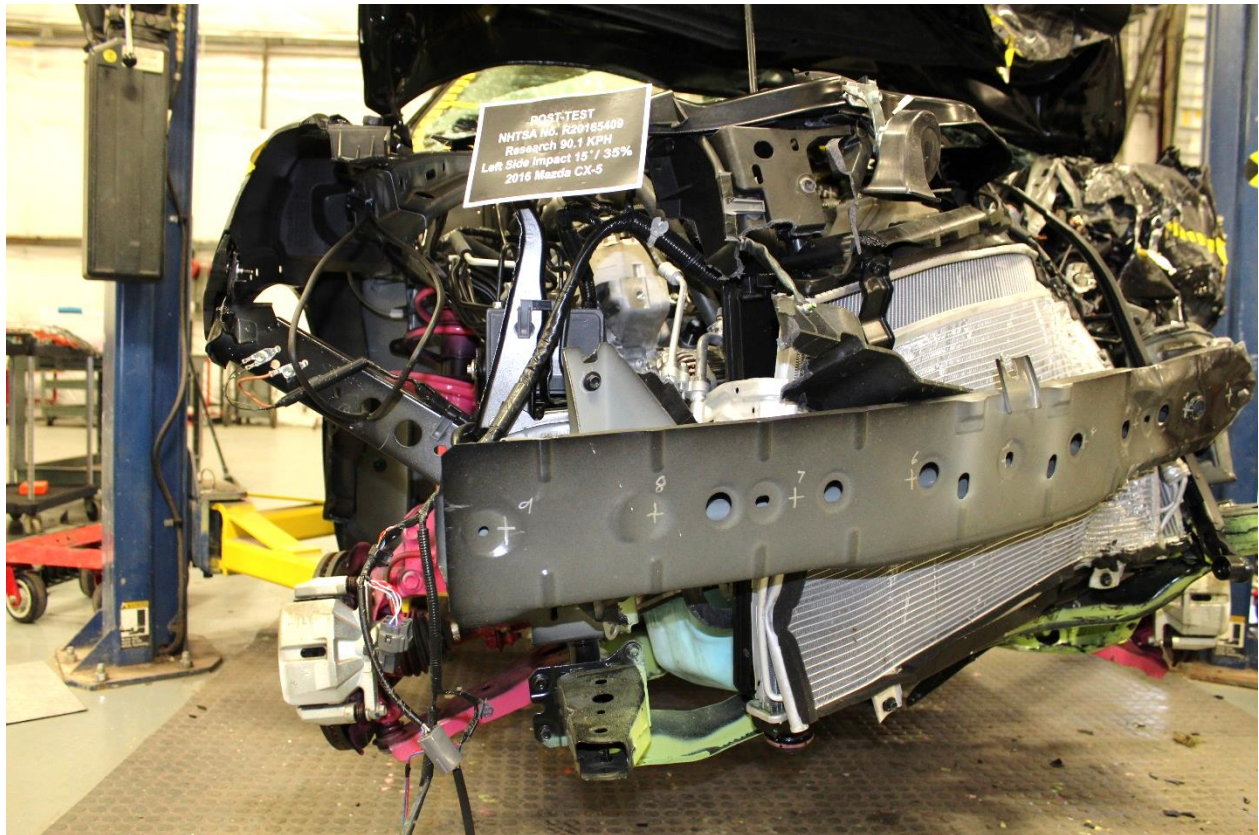
No. 154: Post-Test ¾ View of Front Passenger Wheel Well w/ Tire Removed



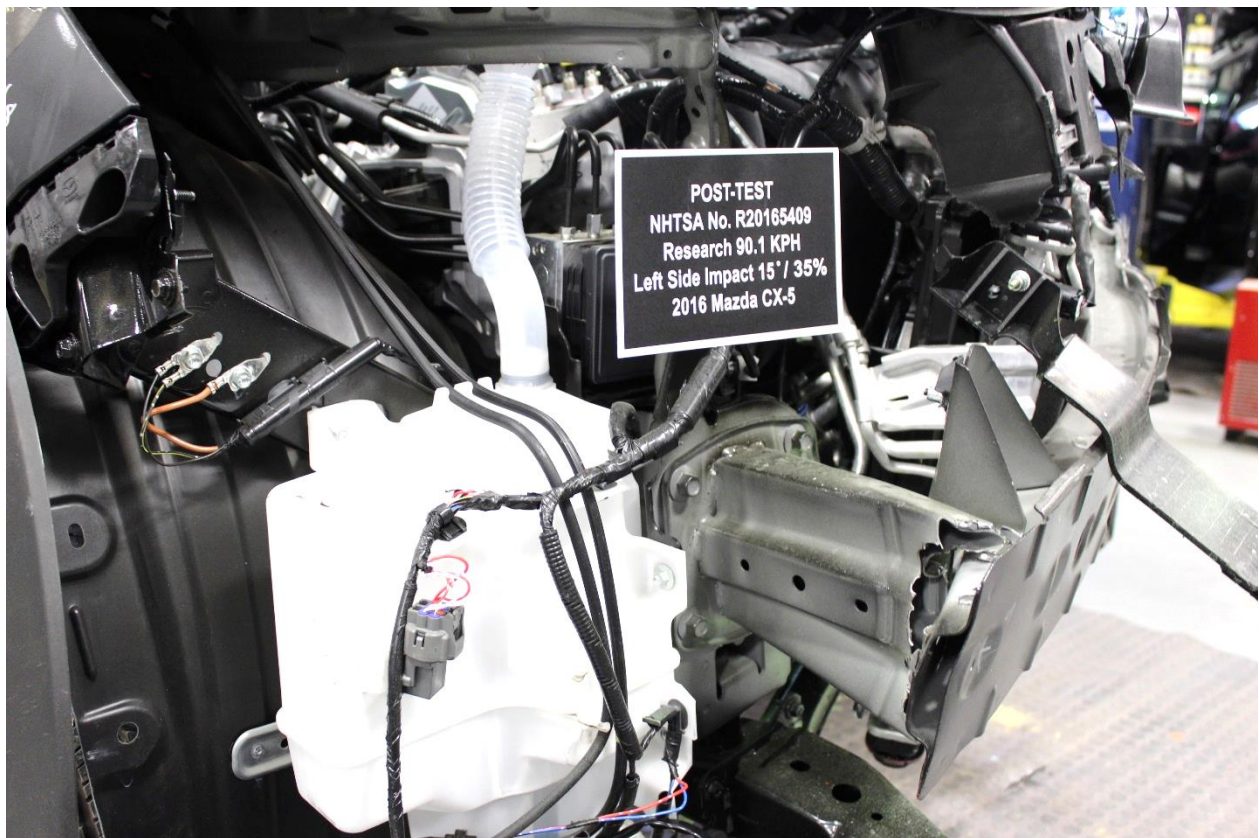
No. 155: Post-Test Side View of Front Passenger Wheel Well w/ Tire Removed



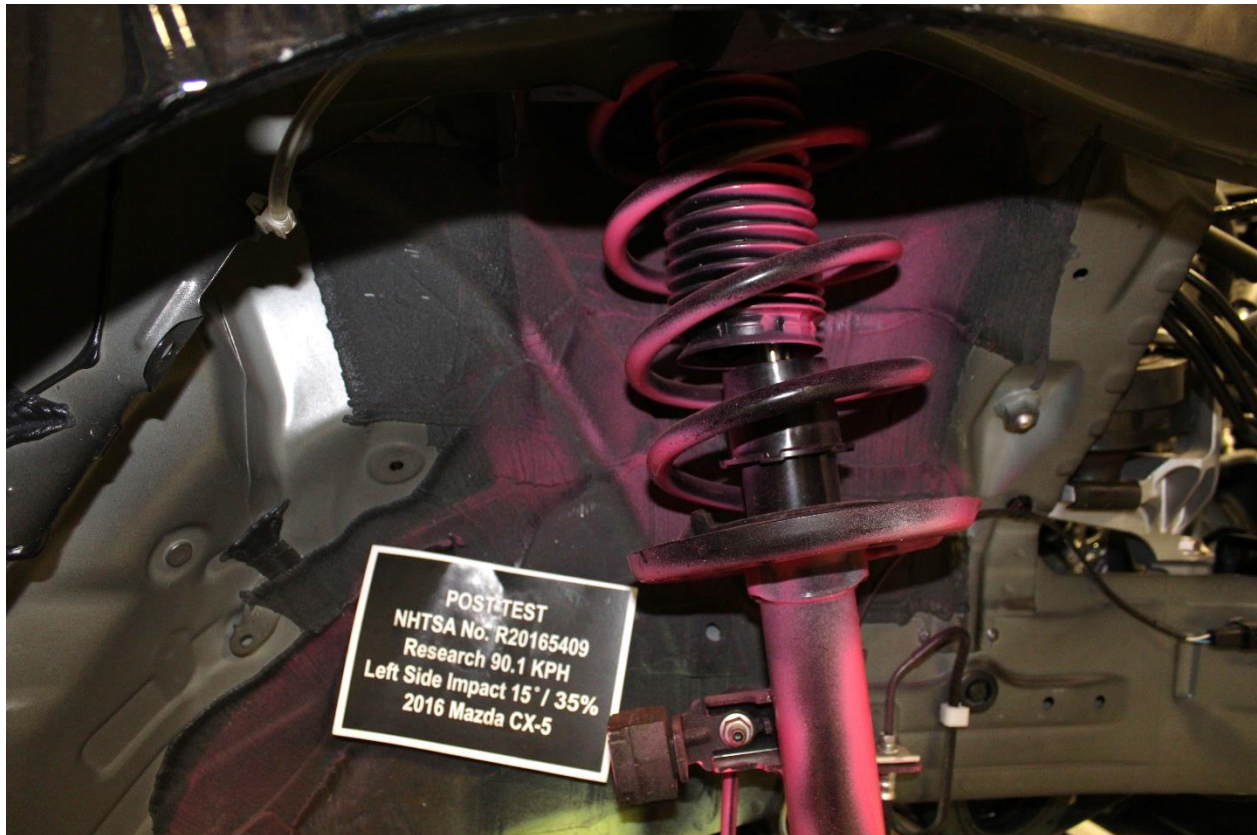
No. 156: Post-Test Right Side 3/4 Rear View of the Front Passenger Wheel Well w/ Tire Removed



No. 157: Post-Test Looking Down at the Front Passenger Shotgun



No. 158: Post-Test Right Side $\frac{3}{4}$ View of Front Passenger Shotgun



No. 159: Post-Test Front Passenger Close up View of Suspension w/ Tire Removed



No. 160: Post-Test View of Door Sill with Door Open- Struck Side



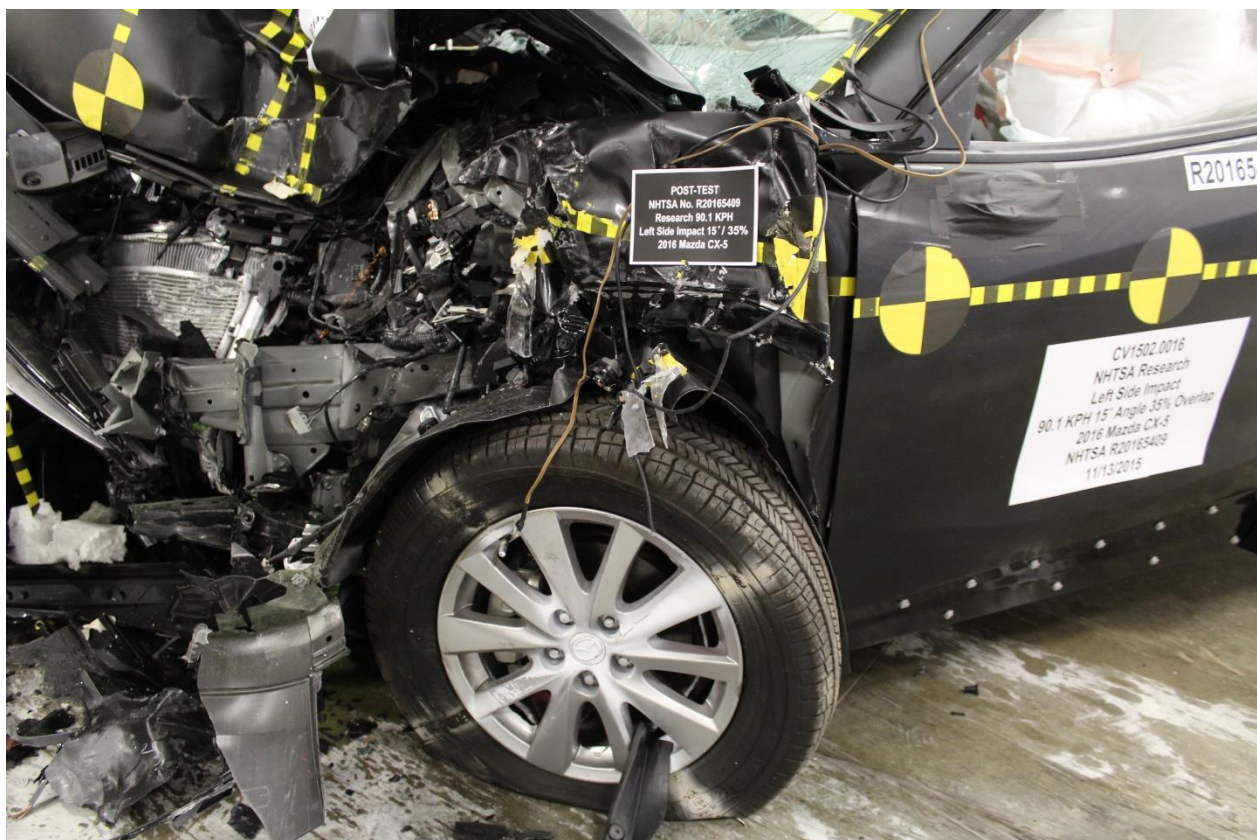
No. 161: Post-Test View of Deformation of A pillar-Struck Side



No. 162: Post-Test View of Deformation of B pillar-Struck Side



No. 163: Post-Test View of Deformation of C pillar-Struck Side



No. 164: Post-Test View of Wheel and/or Tire Deformation-Struck Side



No. 165: Post-Test View of Deformation of Rocker or Post-Struck Side



No. 166: Post-Test View of Windshield Separation



No. 167: Pre-Test Left Side View of OMDB



No. 168: Post-Test Left Side View of OMDB



No. 169: Pre-Test Right Side View of OMDB



No. 170: Post-Test Right Side View of OMDB



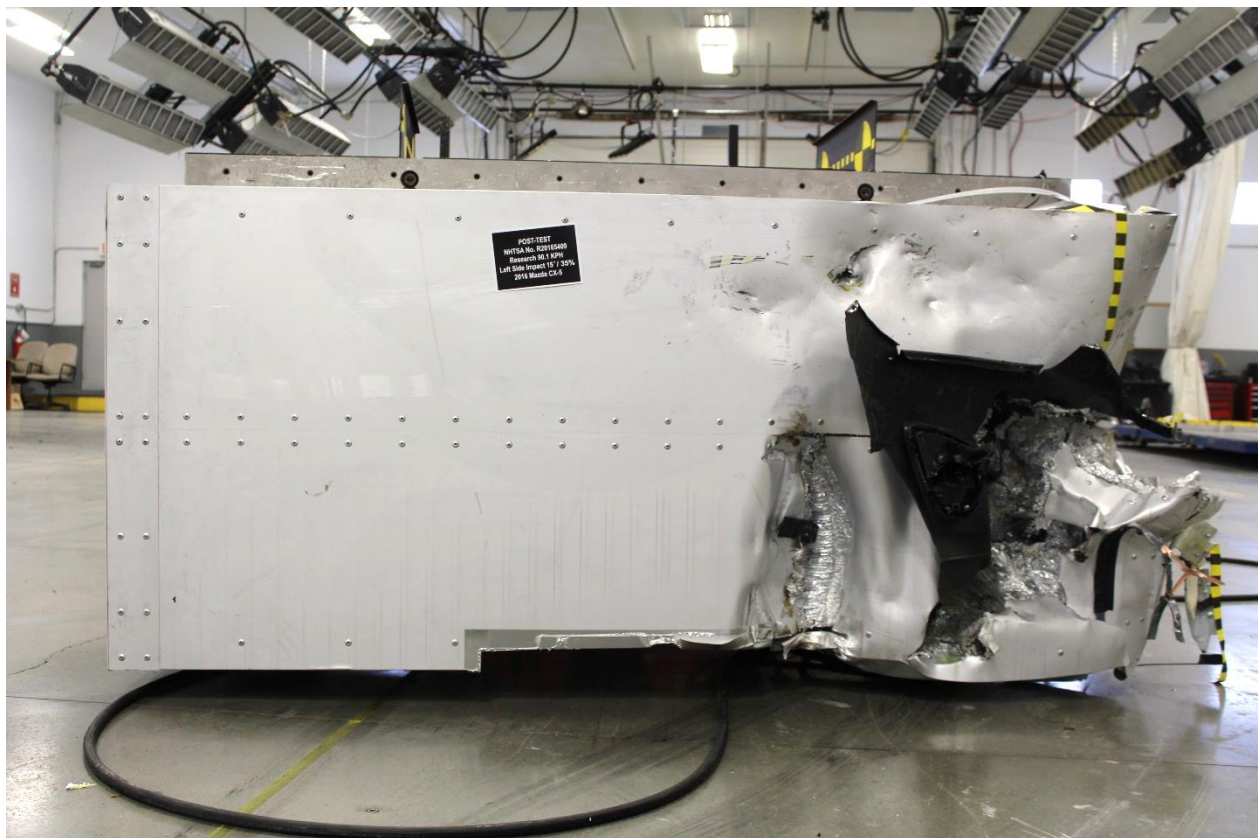
No. 171: Pre-Test Top View of OMDB



No. 172: Post-Test Top View of OMDB



No. 173: Pre-Test Front View of OMDB



No. 174: Post-Test Front View of OMDB



No. 175: Pre-Test Left Front $\frac{3}{4}$ View of OMDB



No. 176: Post-Test Left Front $\frac{3}{4}$ View of OMDB



No. 177: Pre-Test Right Front $\frac{3}{4}$ View of OMDB



No. 178: Post-Test Right Front $\frac{3}{4}$ View of OMDB



No. 179: Pre-Test Right Side View of OMDB



No. 180: Post-Test Right Side View of OMDB



No. 181: Pre-Test Left Side View of OMDB



No. 182: Post-Test Left Side View of OMDB



No. 183: Pre-Test OMDB & Vehicle, Right Side



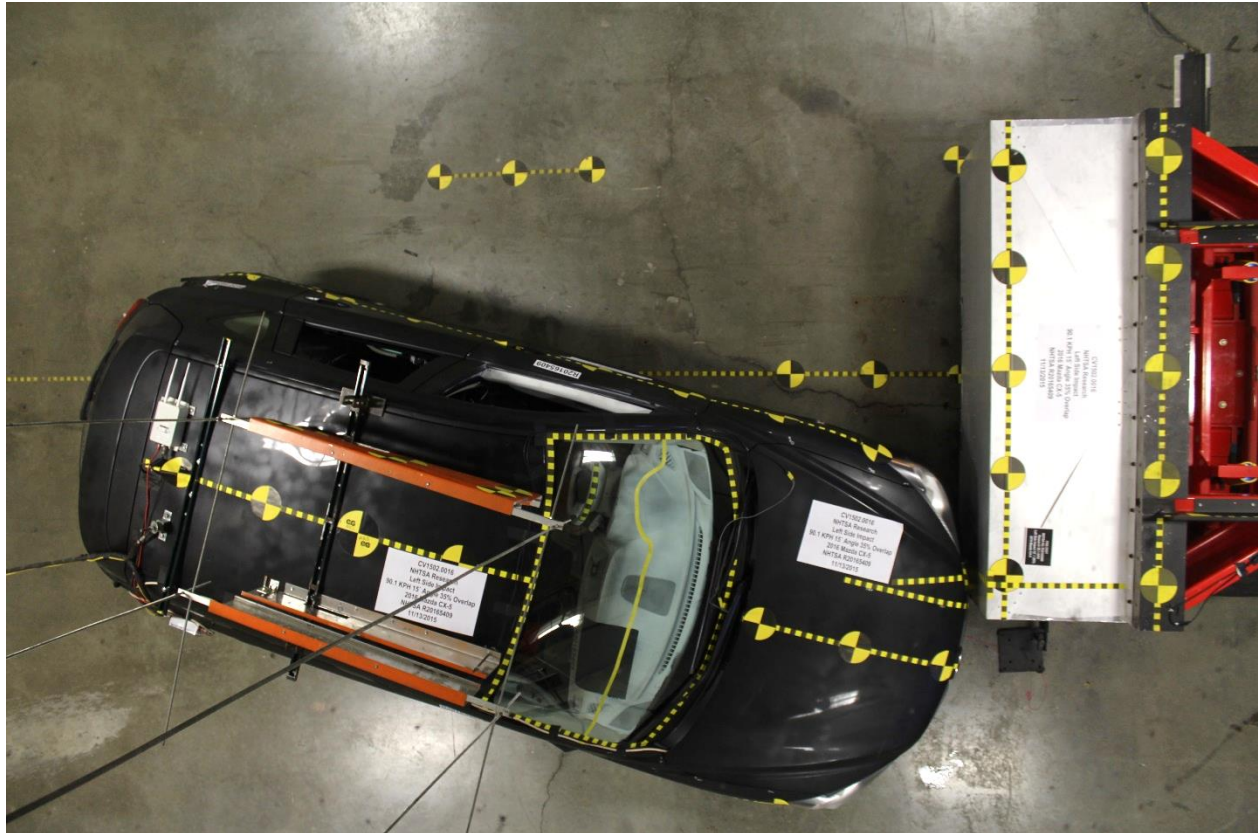
No. 184: Post-Test OMDB & Vehicle, Right Side



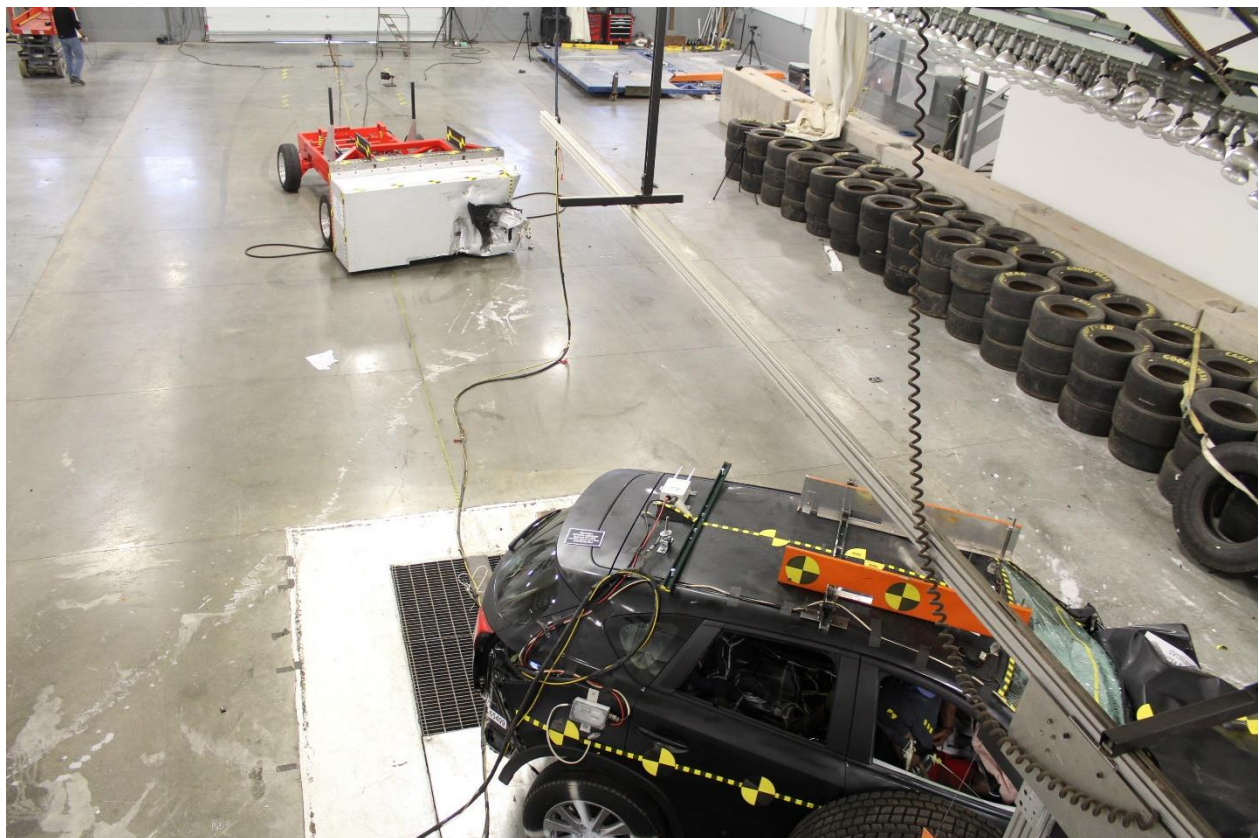
No. 185: Pre-Test OMDB & Vehicle, Left Side



No. 186: Post-Test OMDB & Vehicle, Left Side



No. 187: Pre-Test OMDB & Vehicle, Top View



No. 188: Post-Test OMDB & Vehicle, Top View



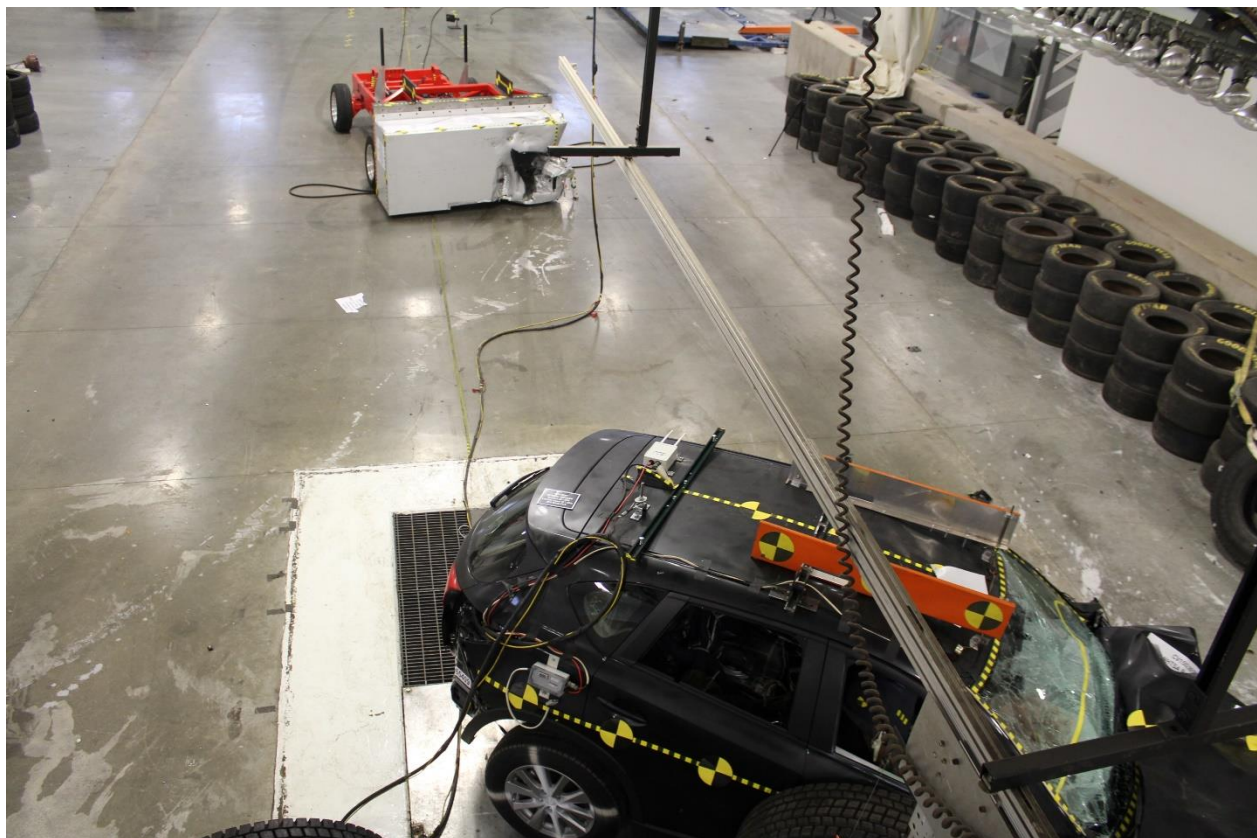
No. 189: Pre-Test OMDB & Vehicle, Rear View



No. 190: Post-Test OMDB & Vehicle, Rear View



No. 191: Pre-Test OMDB & Vehicle, Front View



No. 192: Post-Test OMDB & Vehicle, Front View



No. 193: Pre-Test OMDB & Vehicle Alignment



No. 194: Vehicle at 0 Degrees on Static Rollover Device



No. 195: Vehicle at 90 Degrees on Static Rollover Device



No. 196: Vehicle at 180 Degrees on Static Rollover Device



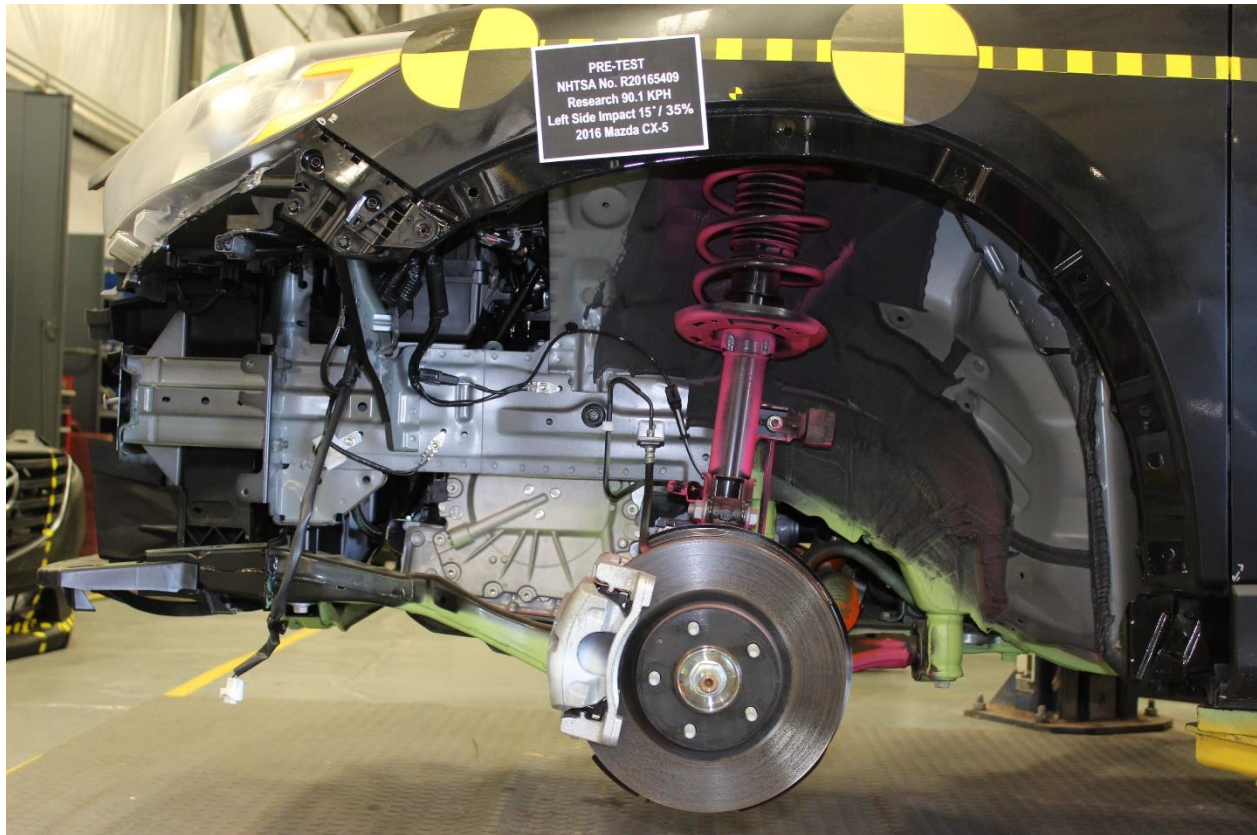
No. 197: Vehicle at 270 Degrees on Static Rollover Device



No. 198: Vehicle at 360 Degrees on Static Rollover Device



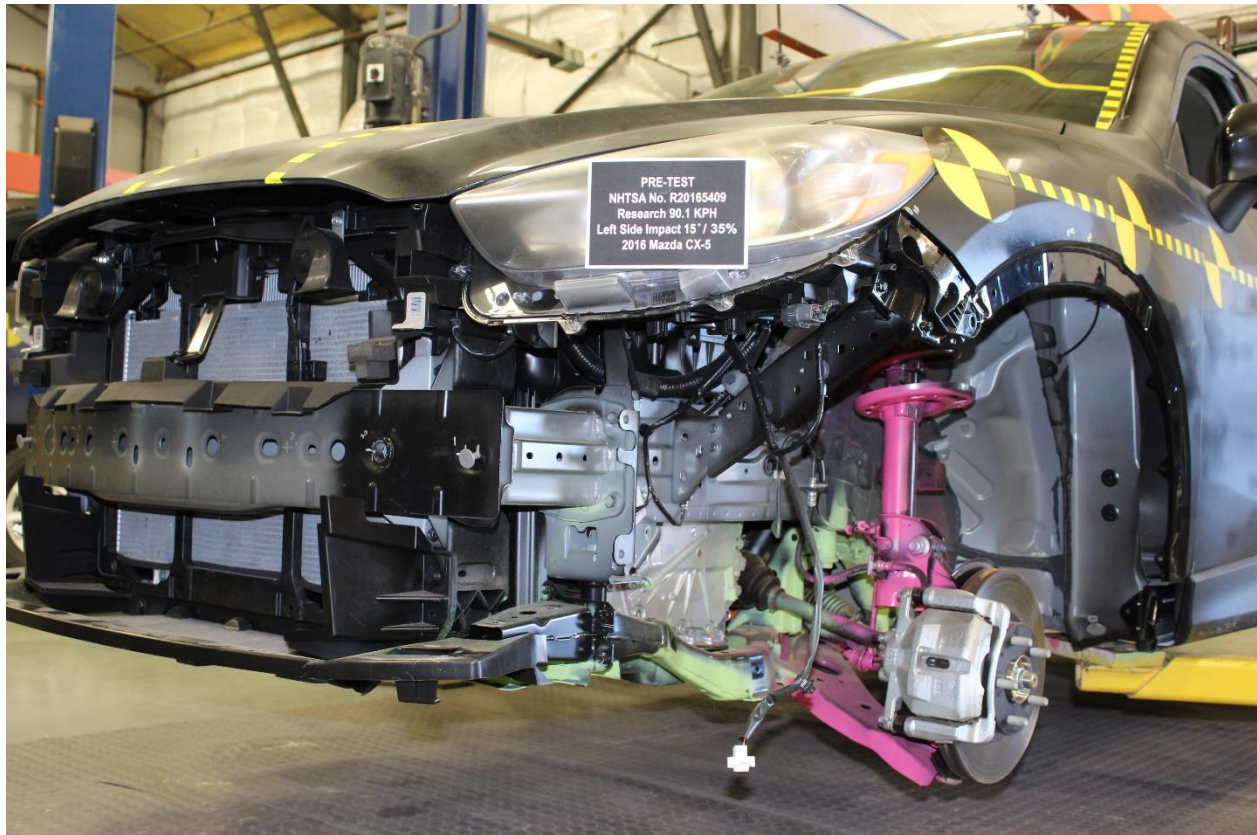
No. 199: Impact Photo



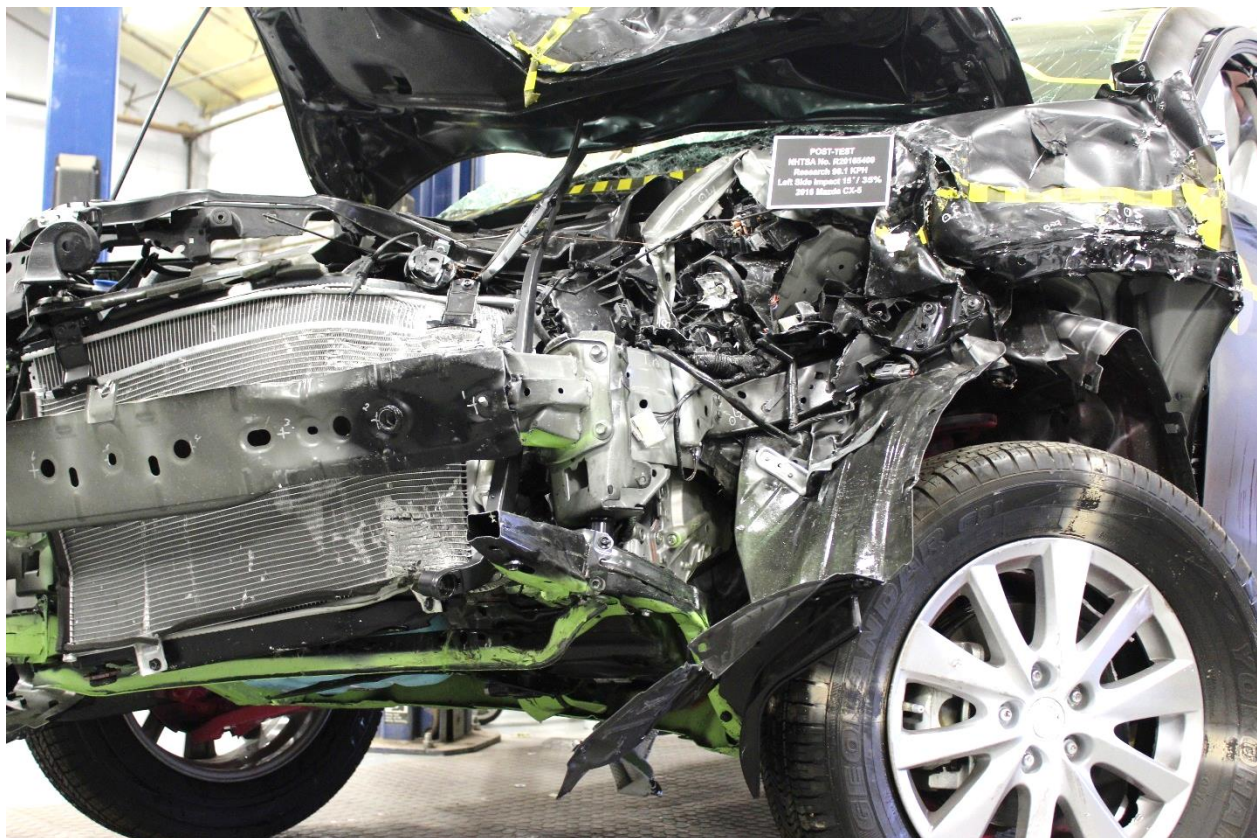
No. 200: Pre-Test Vehicle Bumper Left Side View



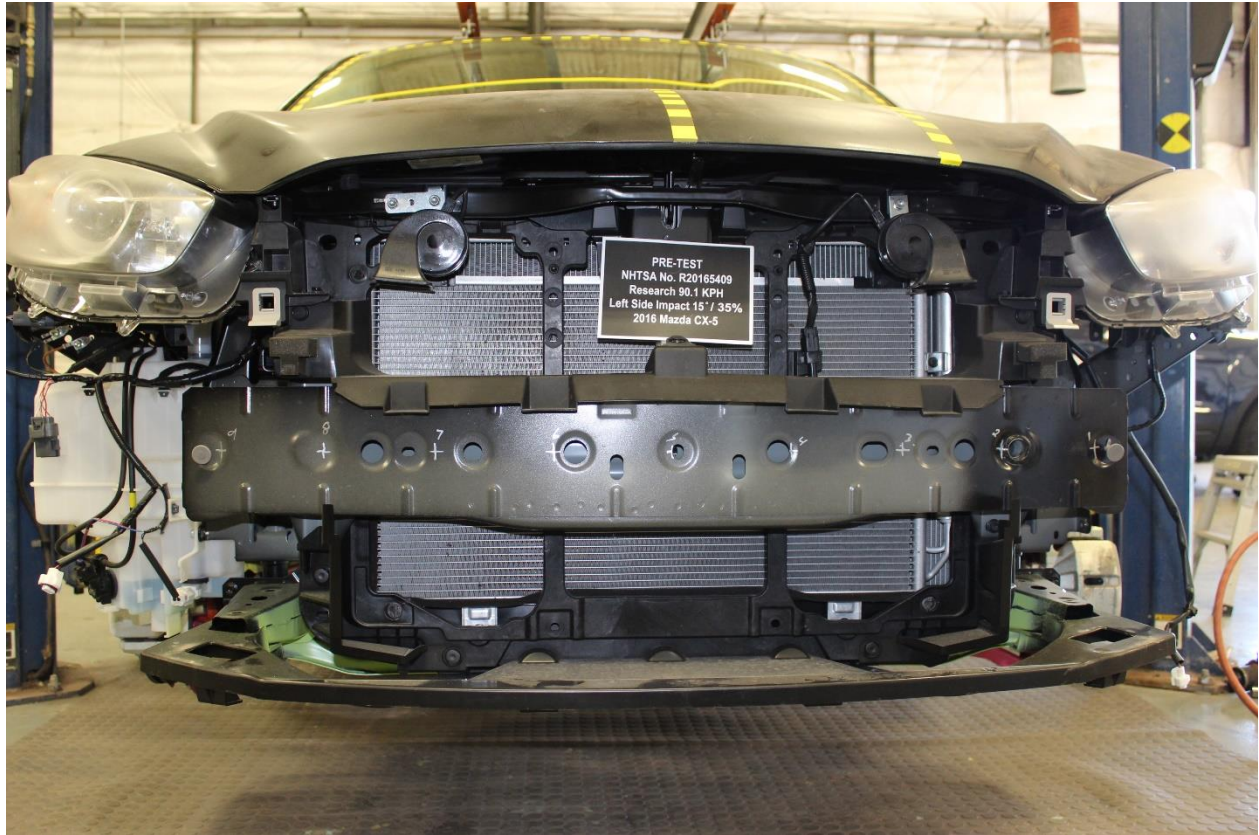
No. 201 Post-Test Vehicle Bumper Left View



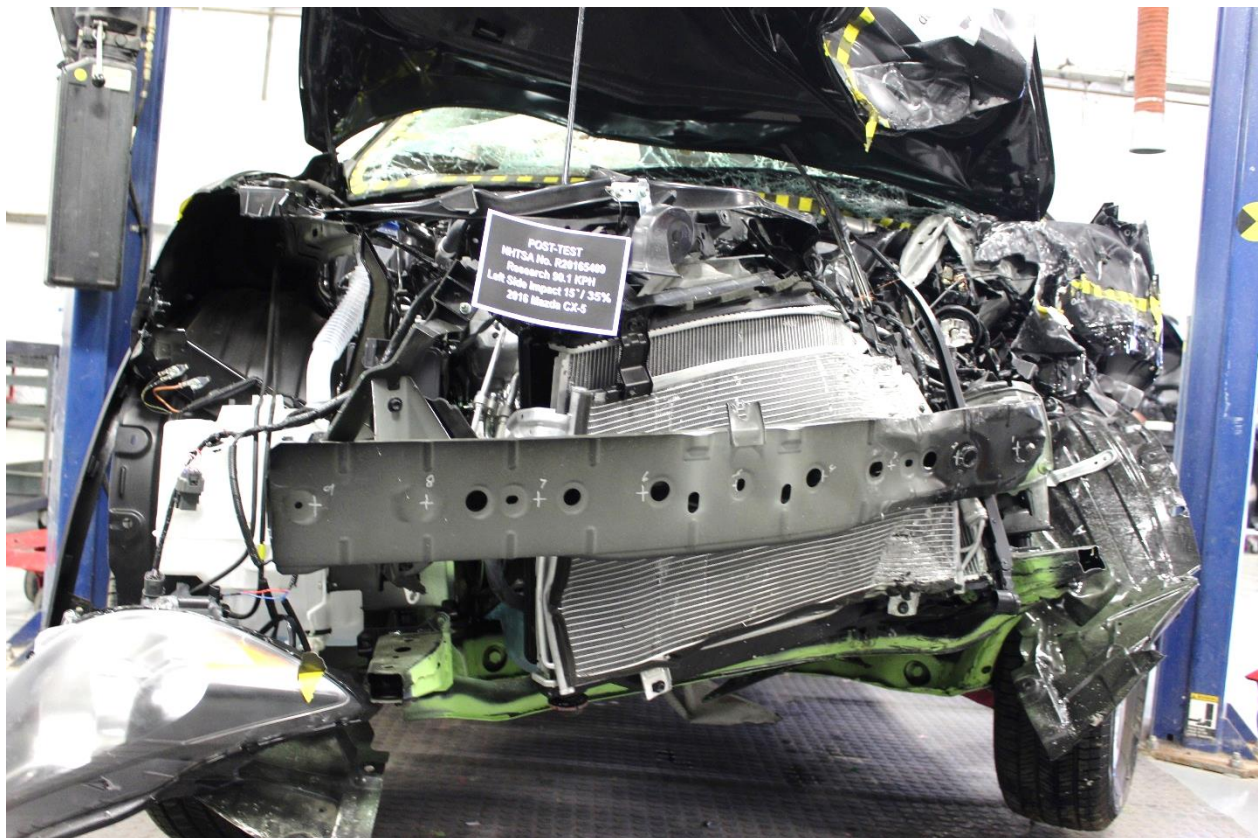
No. 202 Pre-Test Vehicle Bumper Left Front View



No. 203 Post-Test Vehicle Bumper Left Front View



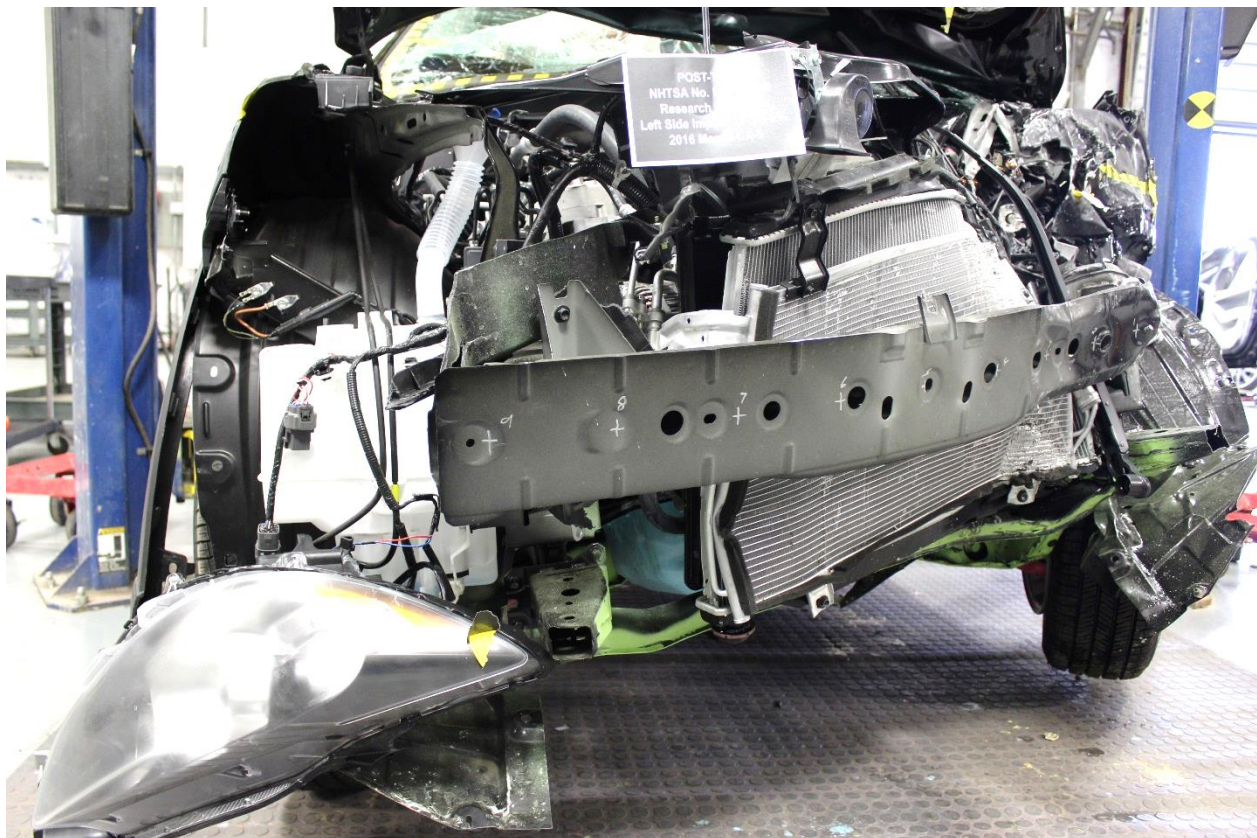
No. 204 Pre-Test Vehicle Bumper Front View



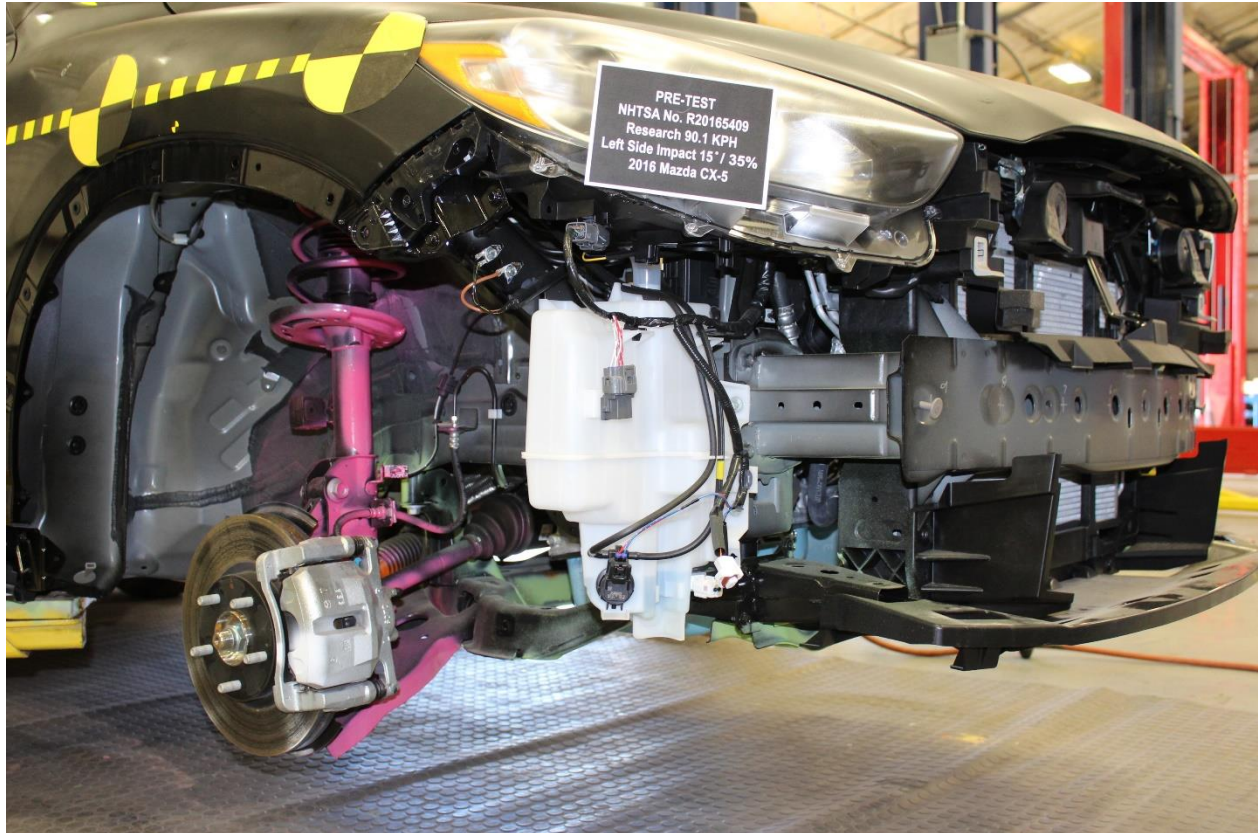
No. 205 Post-Test Vehicle Bumper Front View



No. 206 Pre-Test Vehicle Bumper Right Side View



No. 207 Post-Test Vehicle Bumper Right View



No. 208 Pre-Test Vehicle Bumper Right Front View



No. 209 Post-Test Vehicle Bumper Right Front View

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

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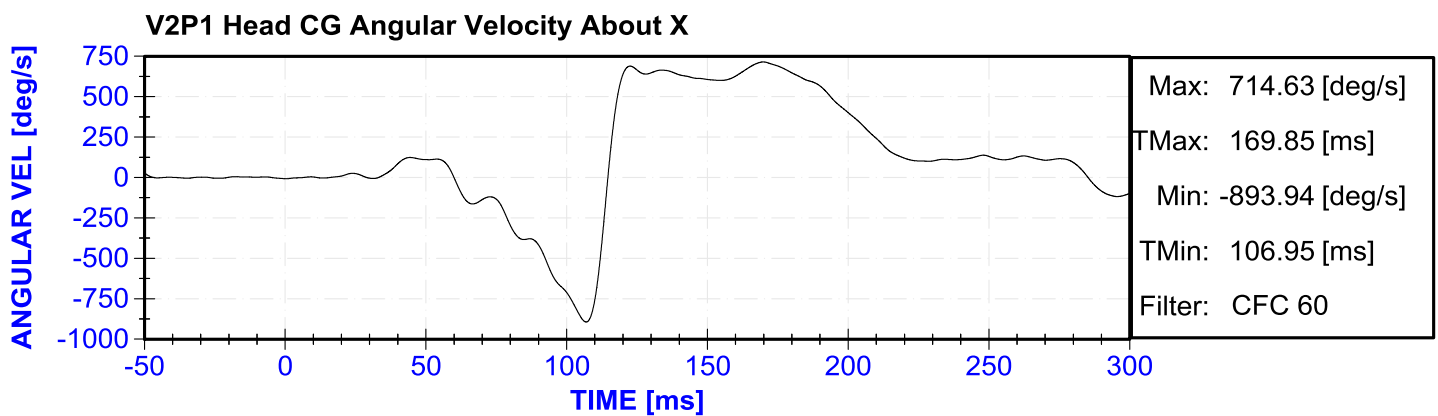
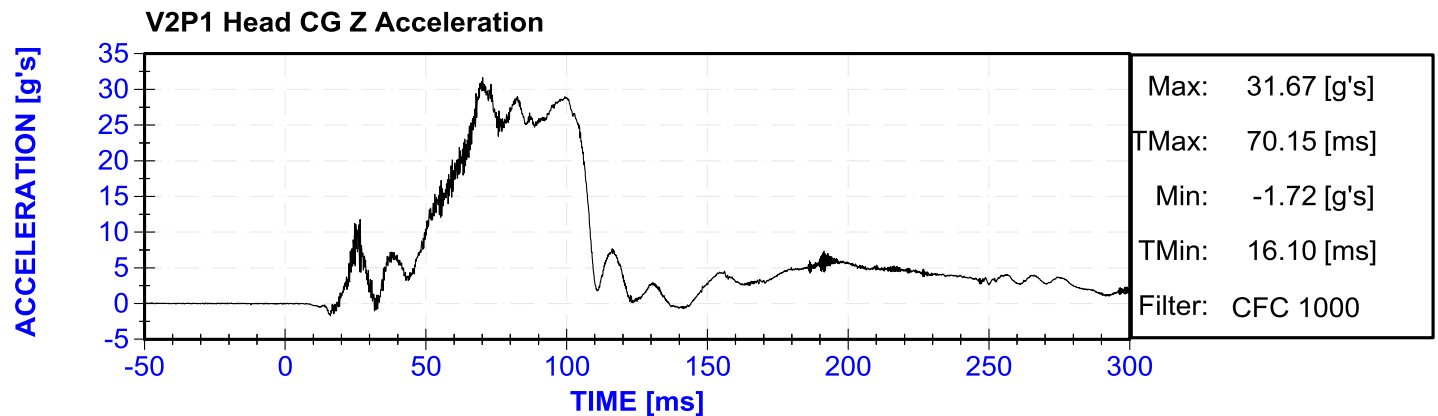
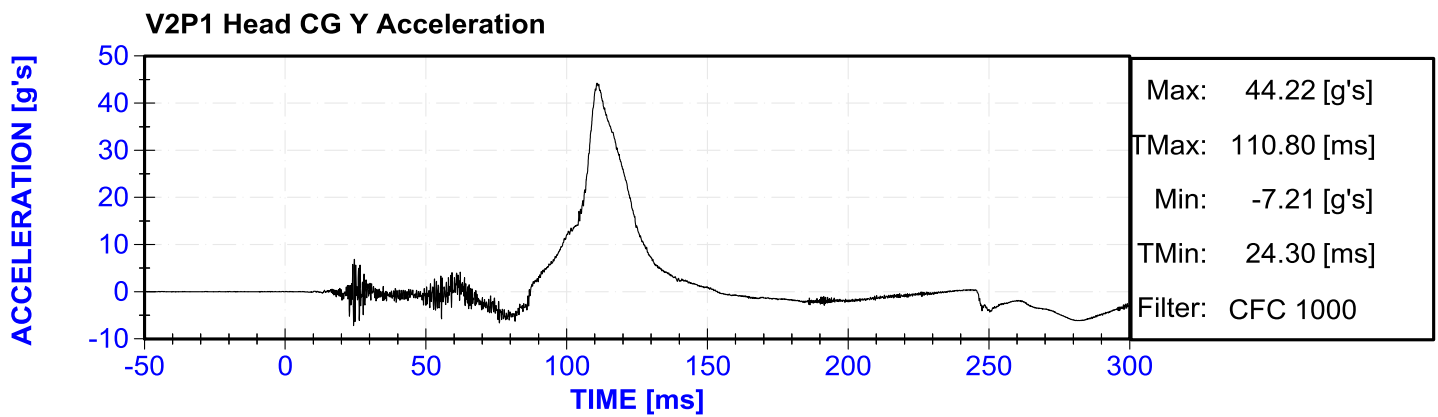
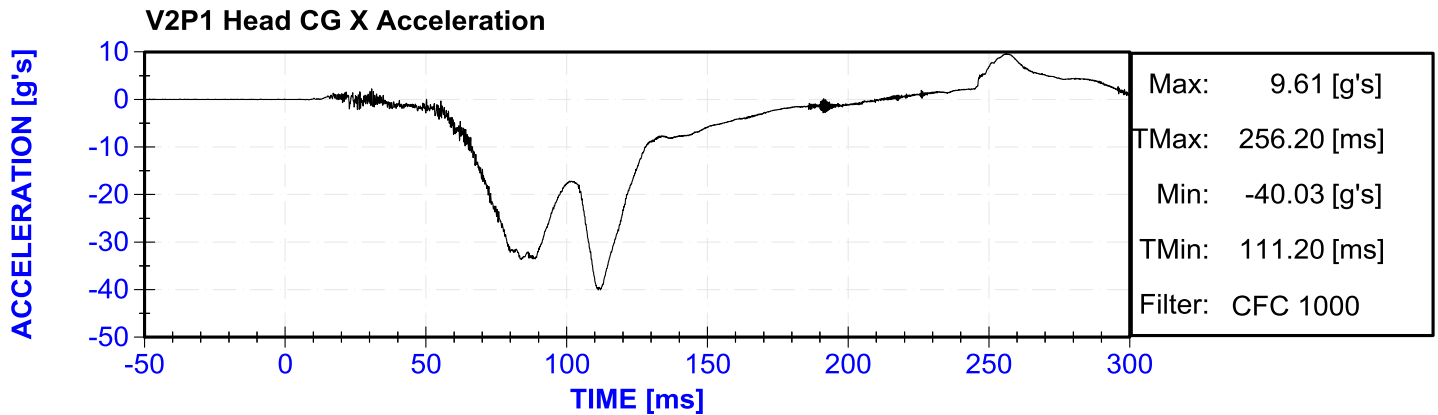
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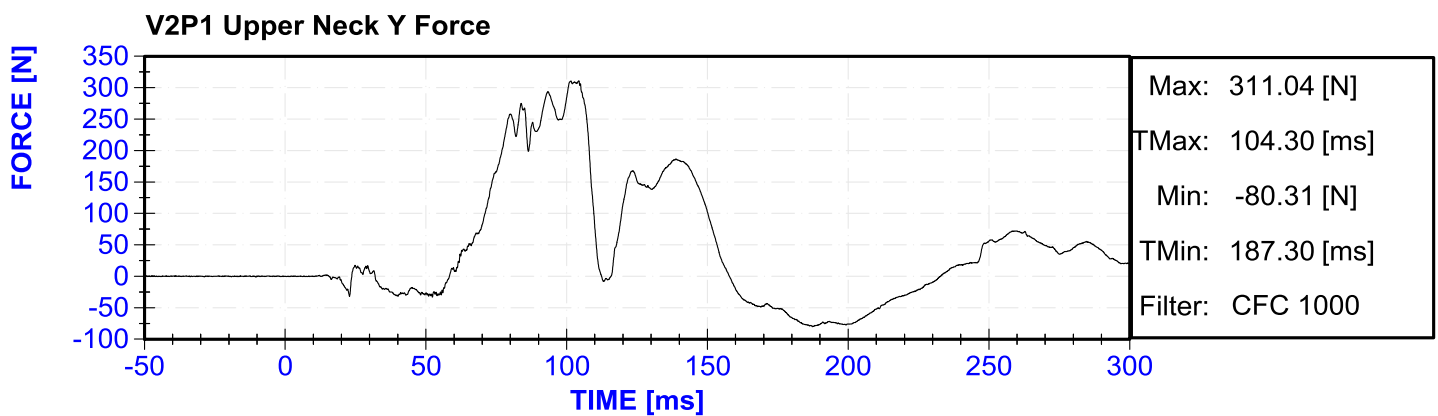
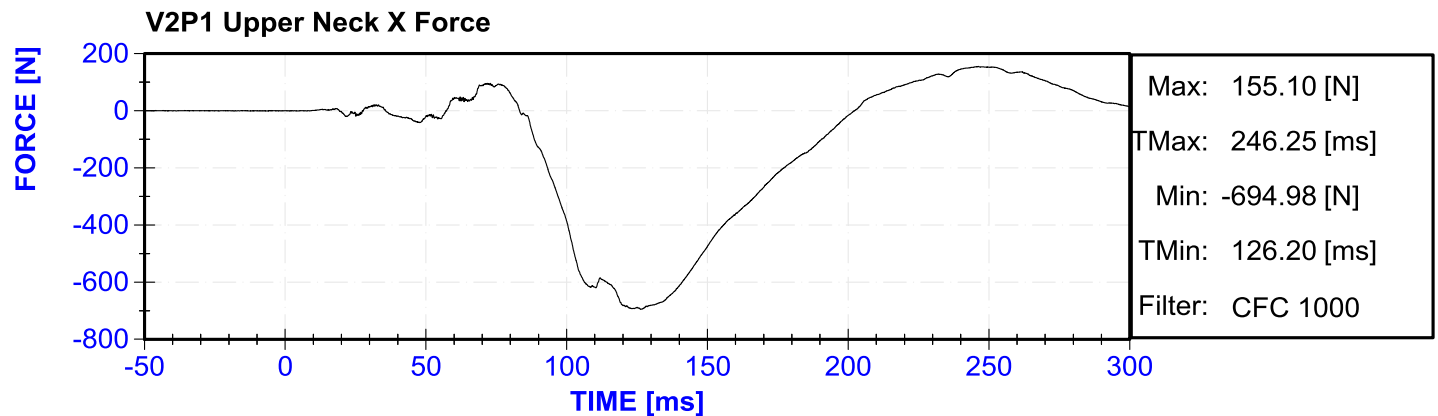
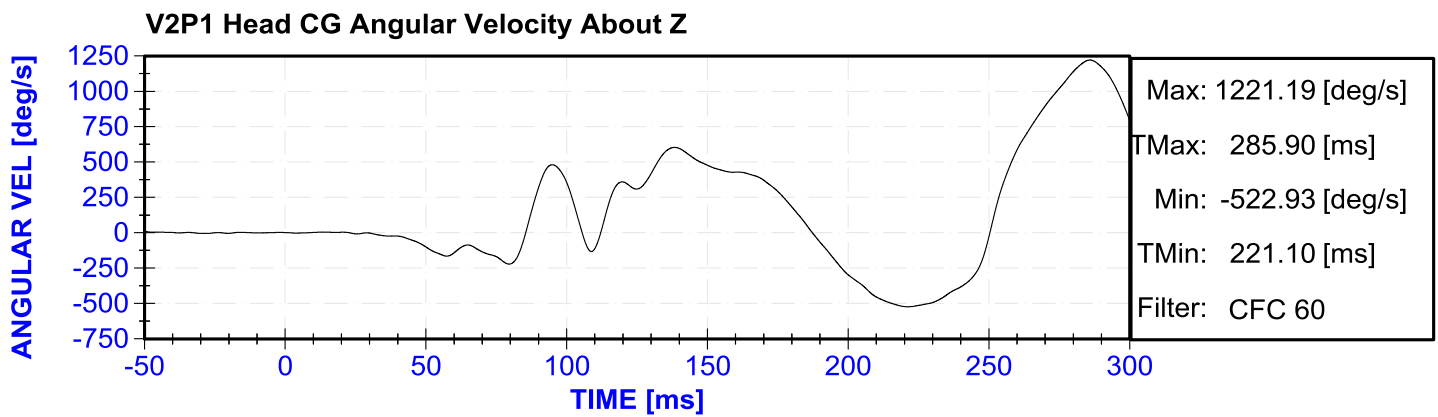
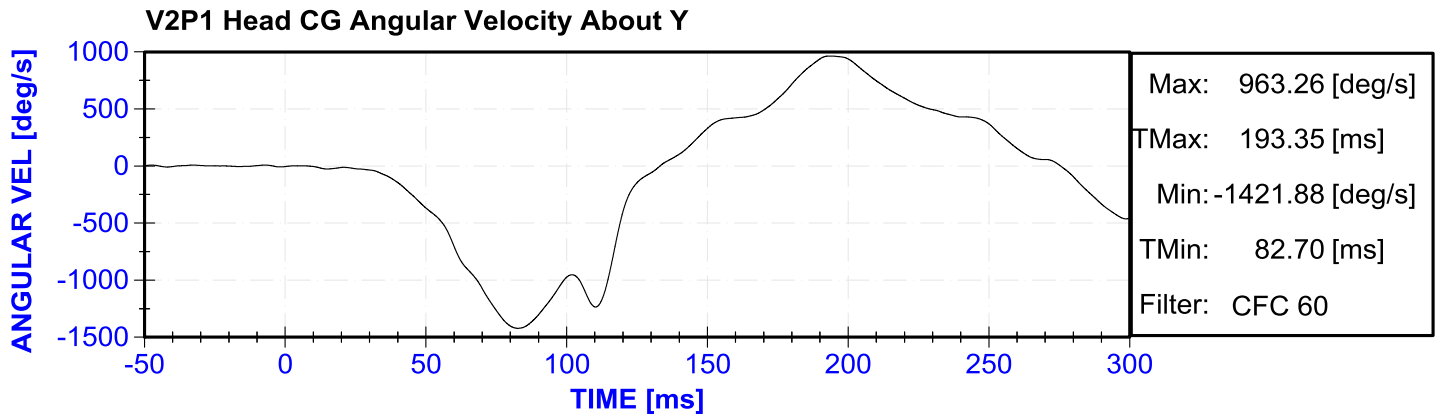
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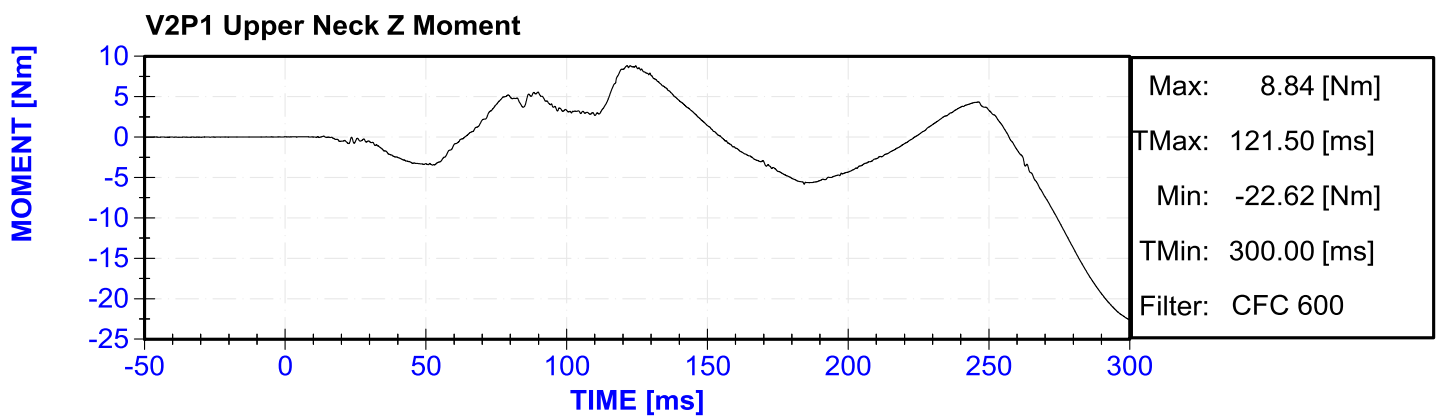
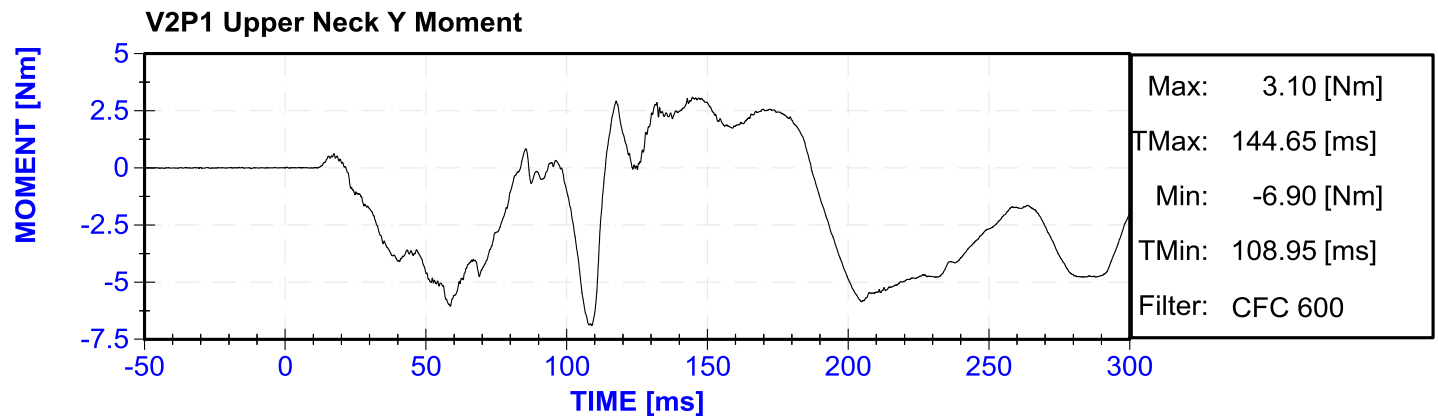
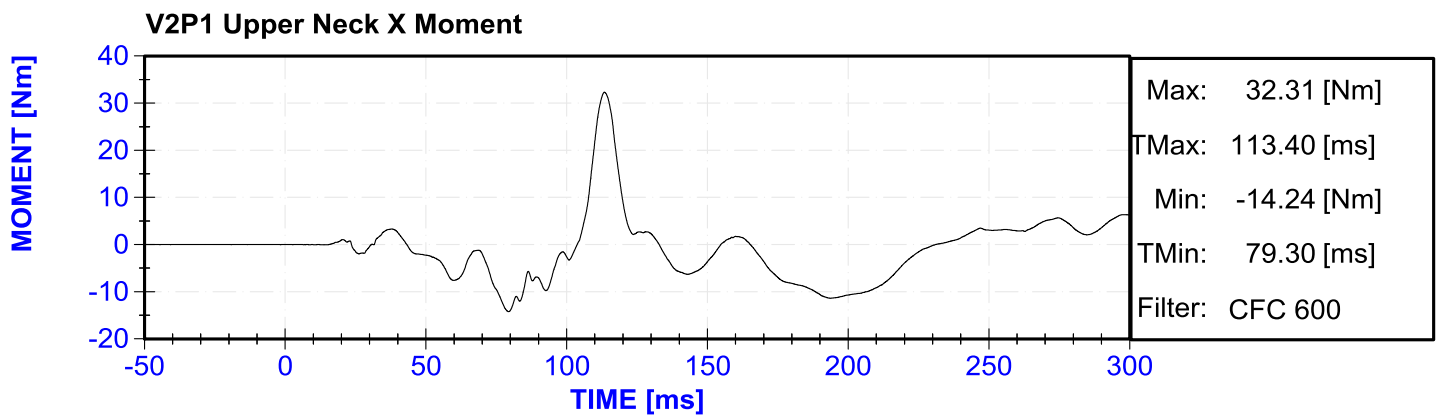
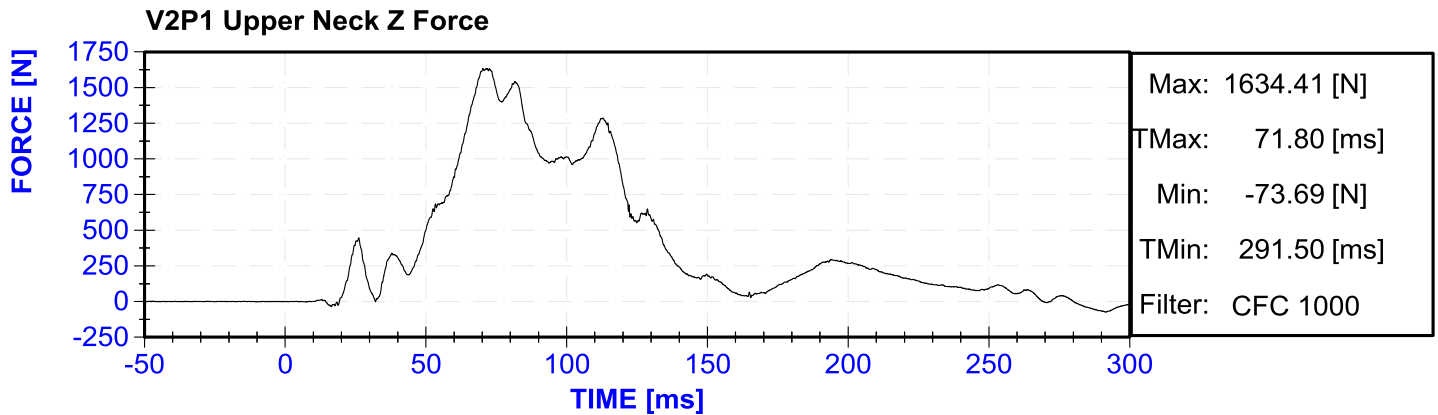
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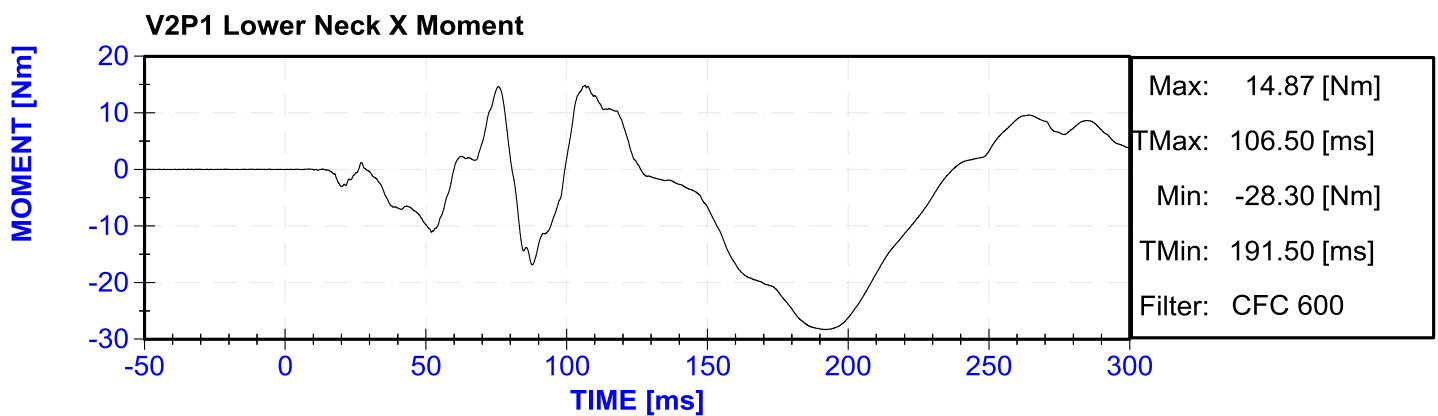
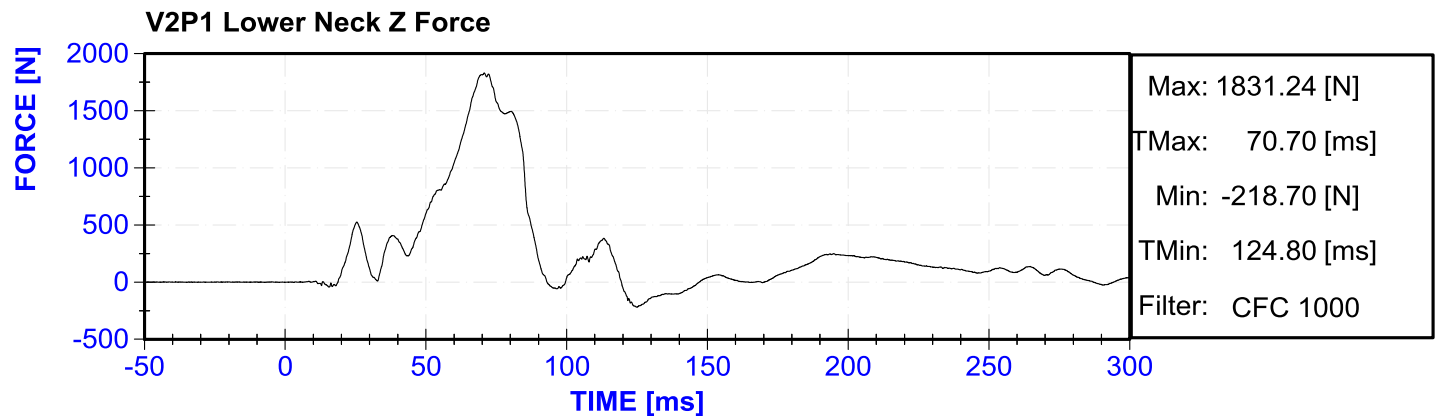
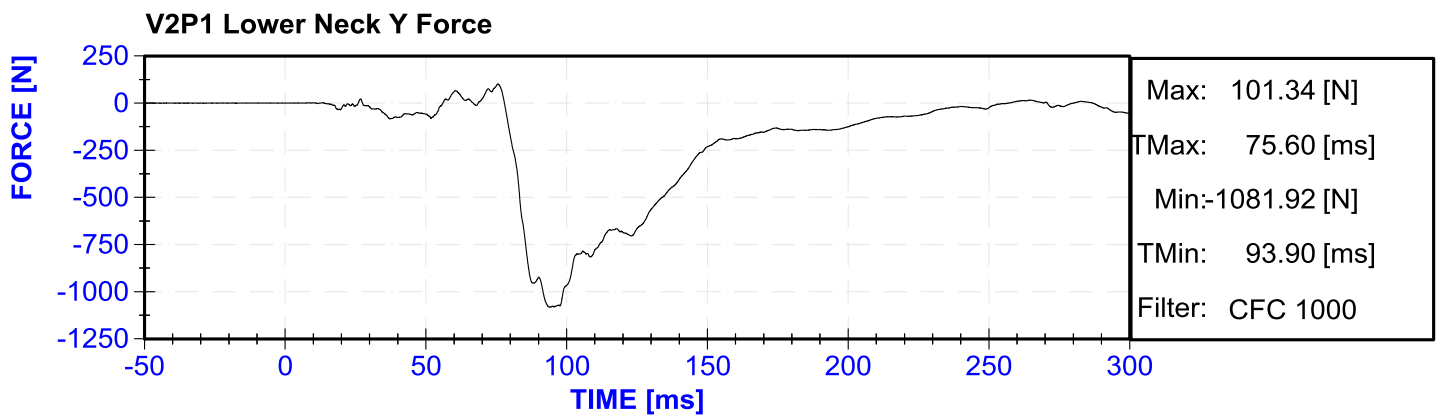
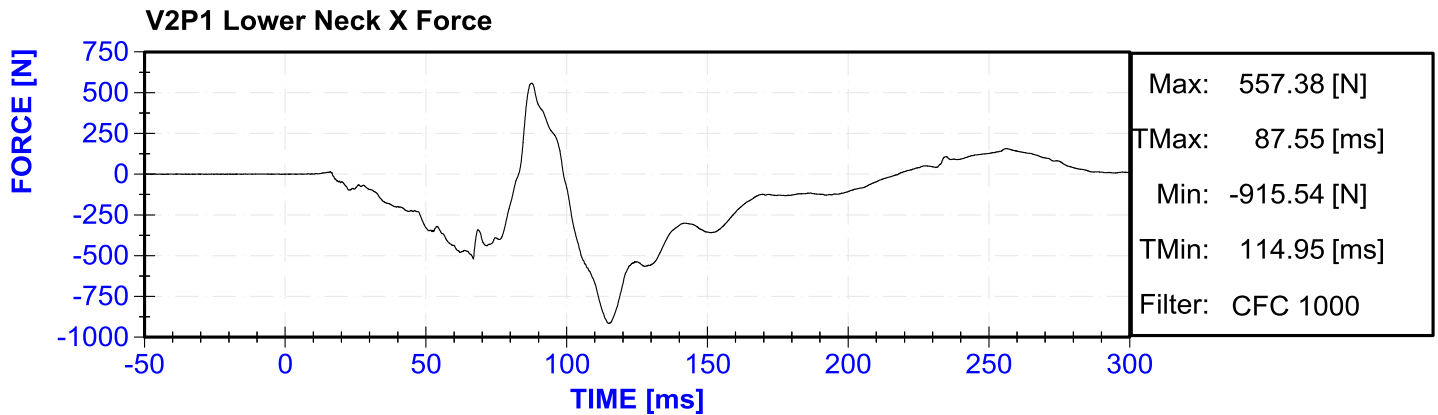
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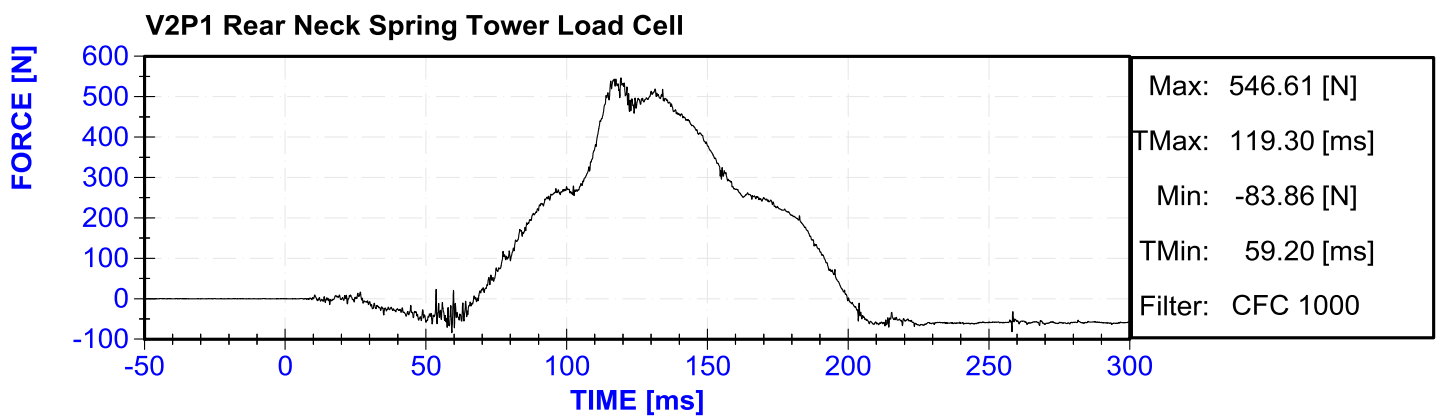
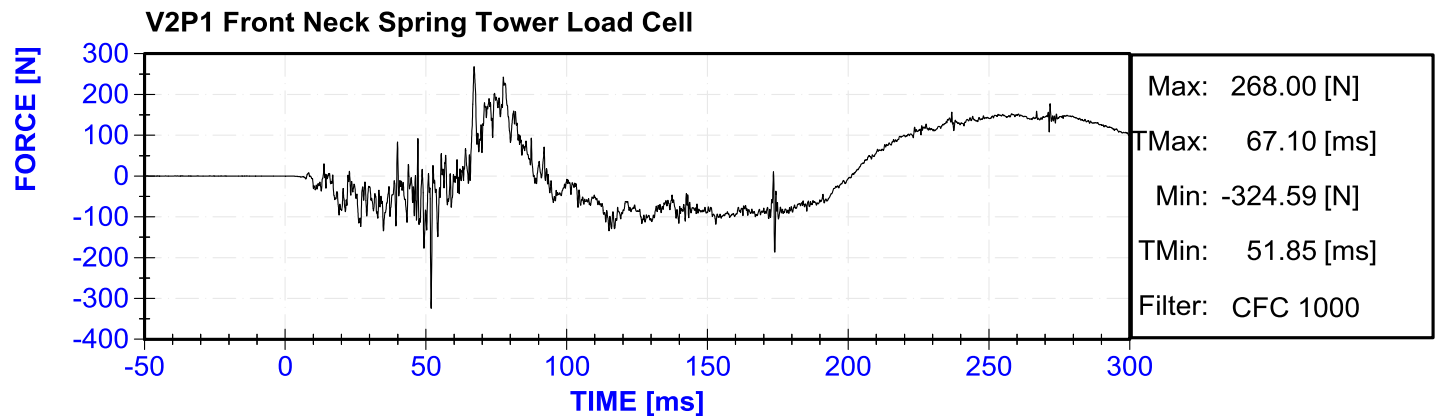
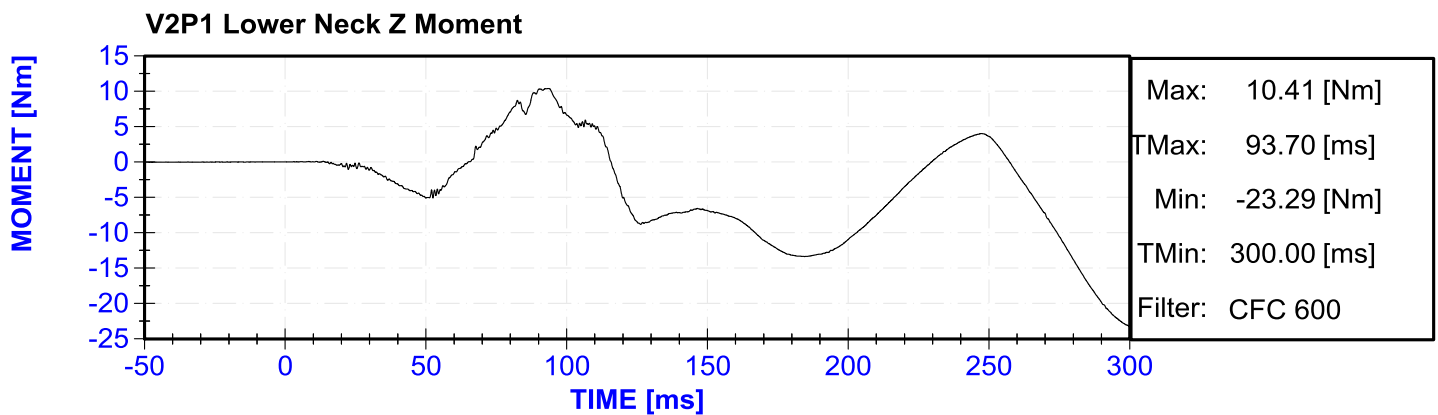
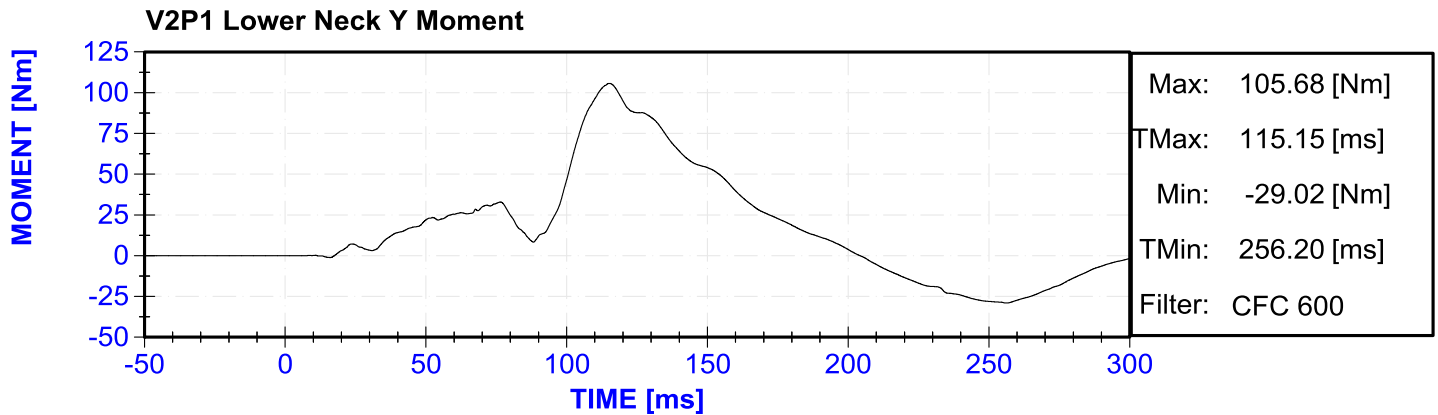
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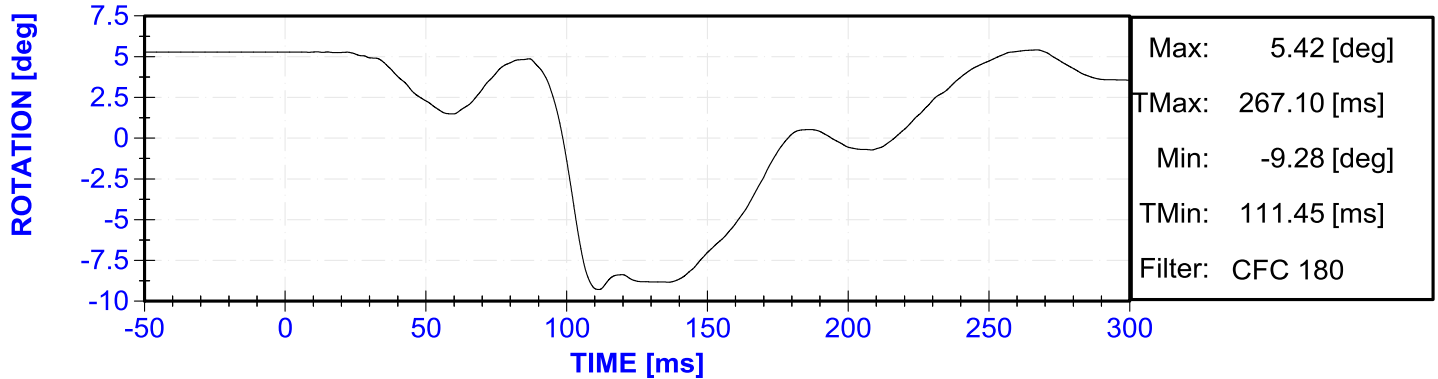




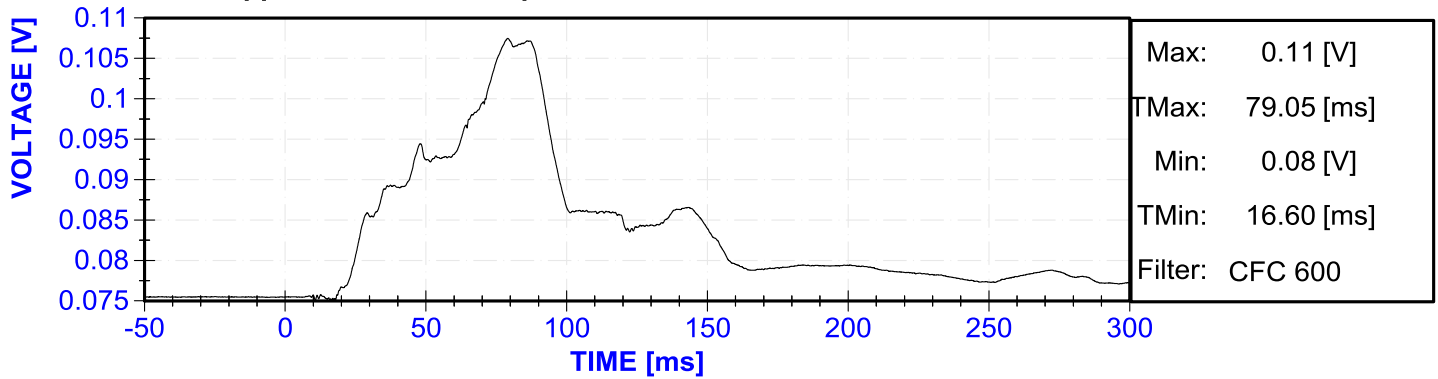




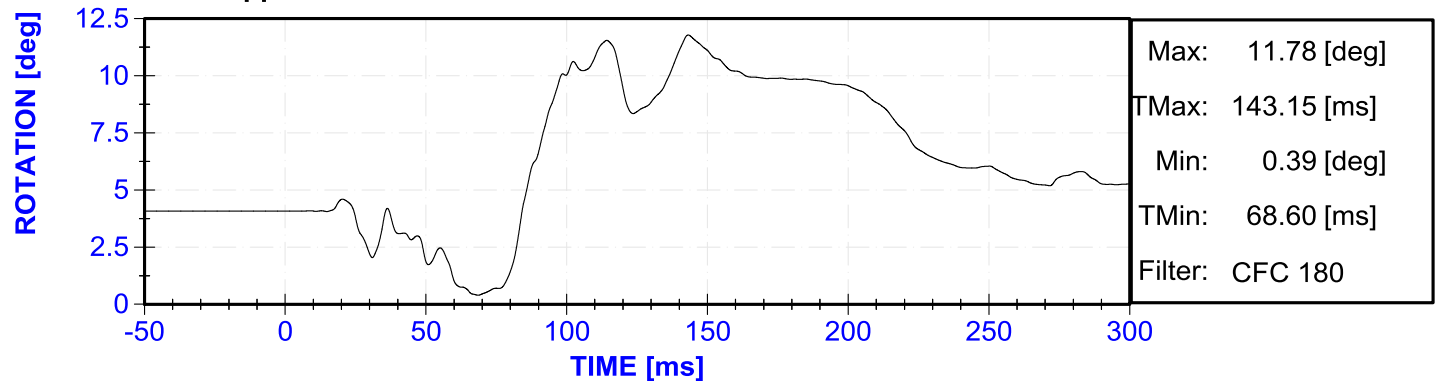
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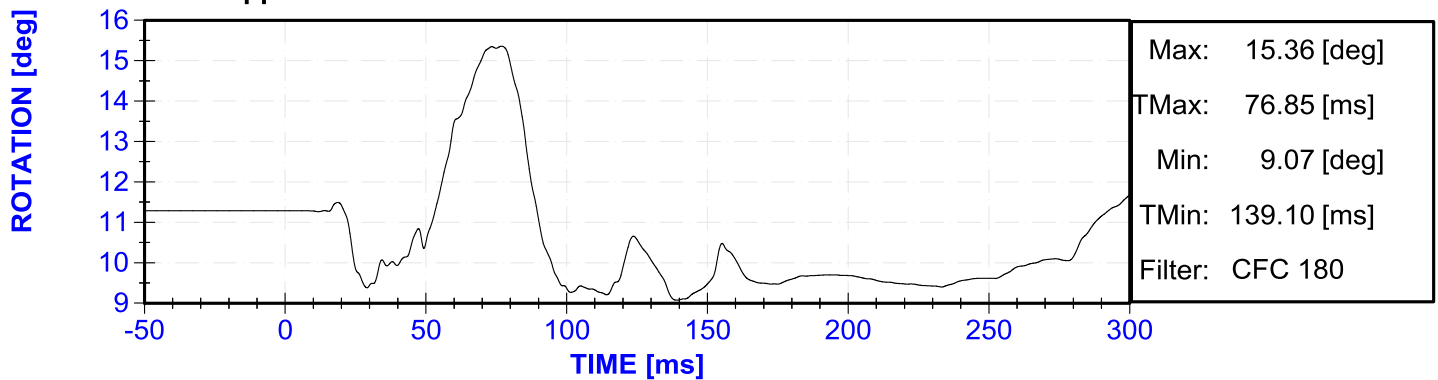
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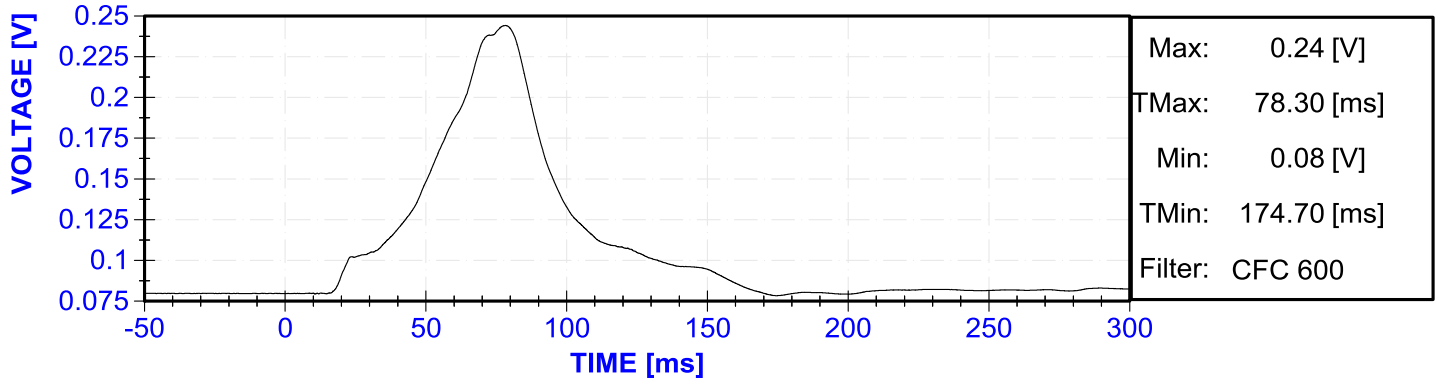
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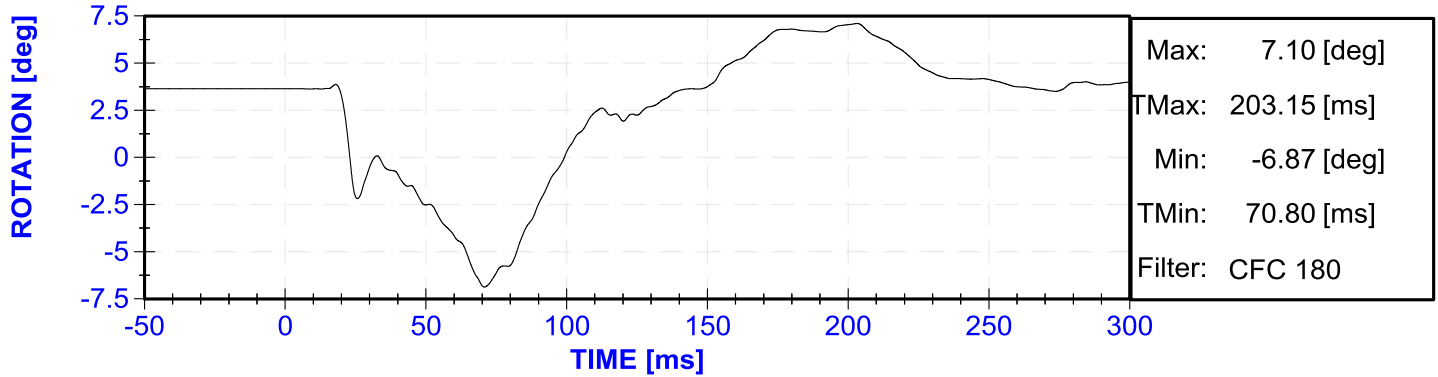
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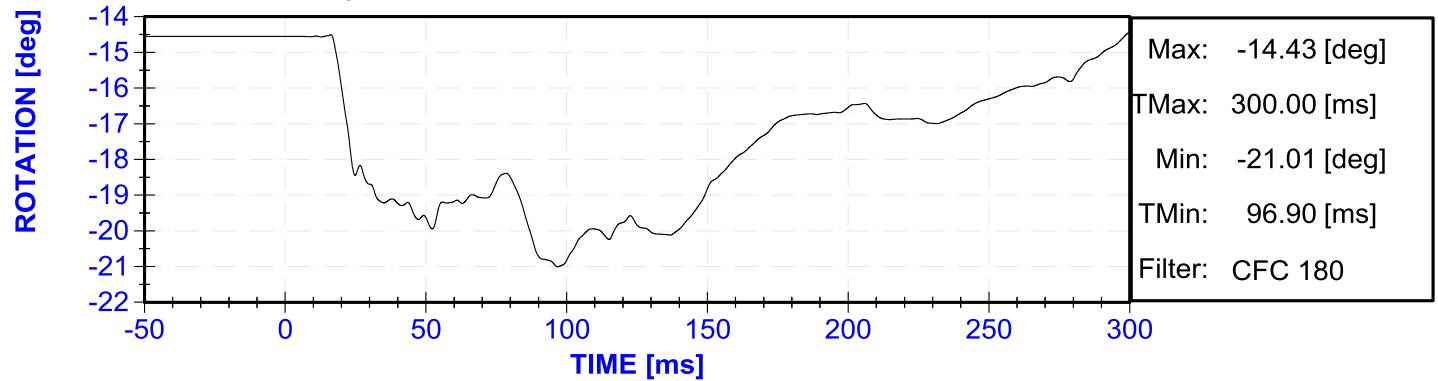
V2P1 Upper Right DGIR X Displacement



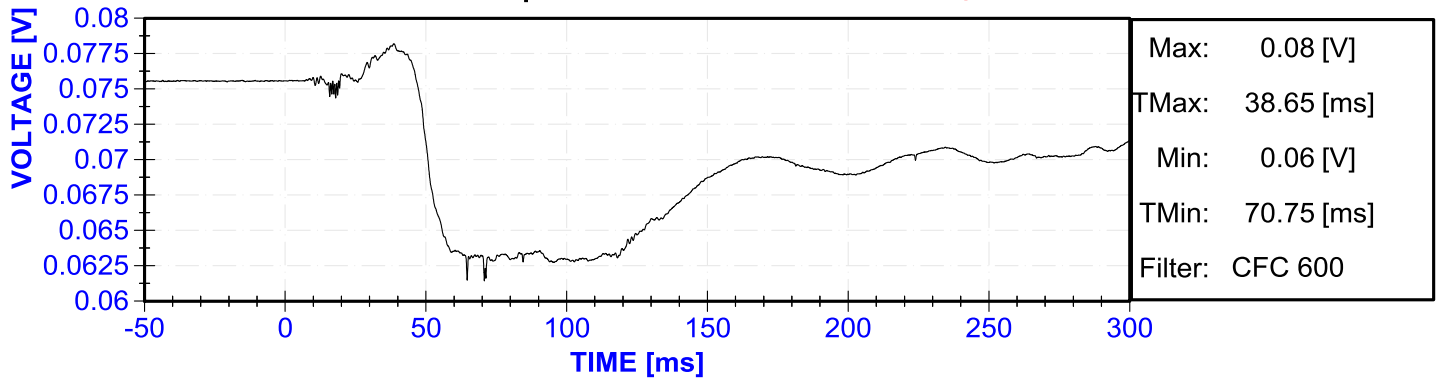
V2P1 Upper Right DGIR Y Rotation

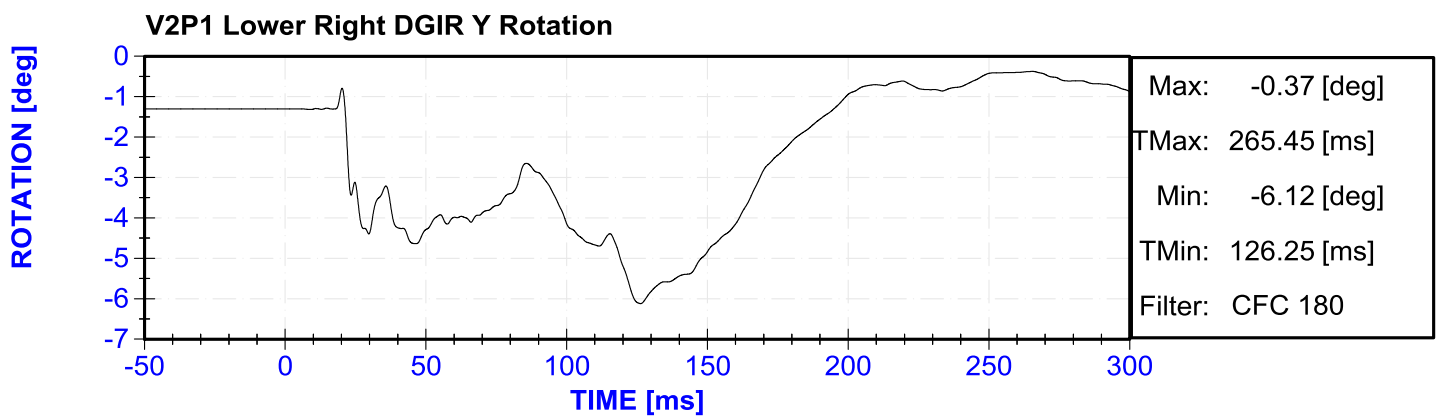
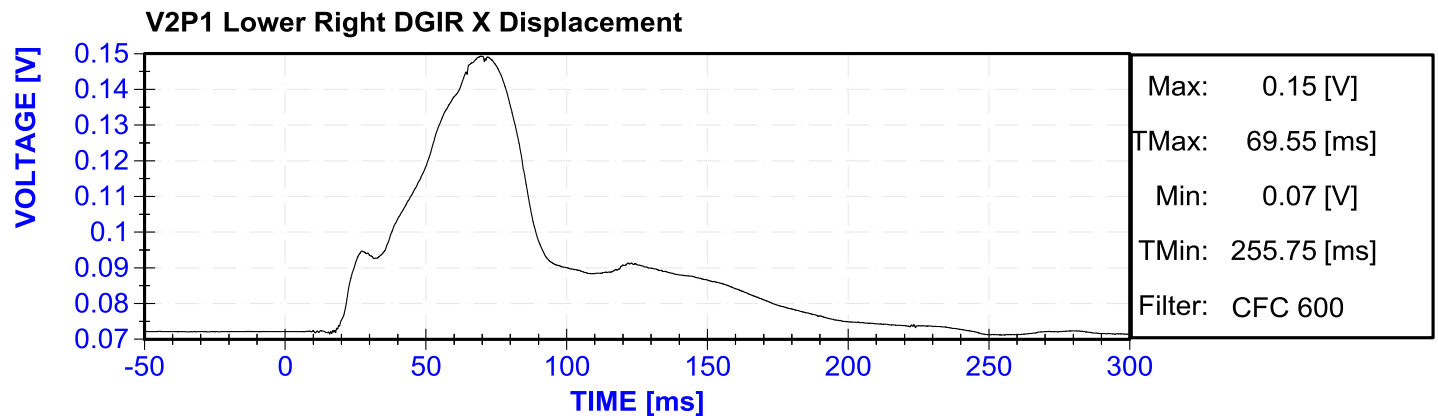
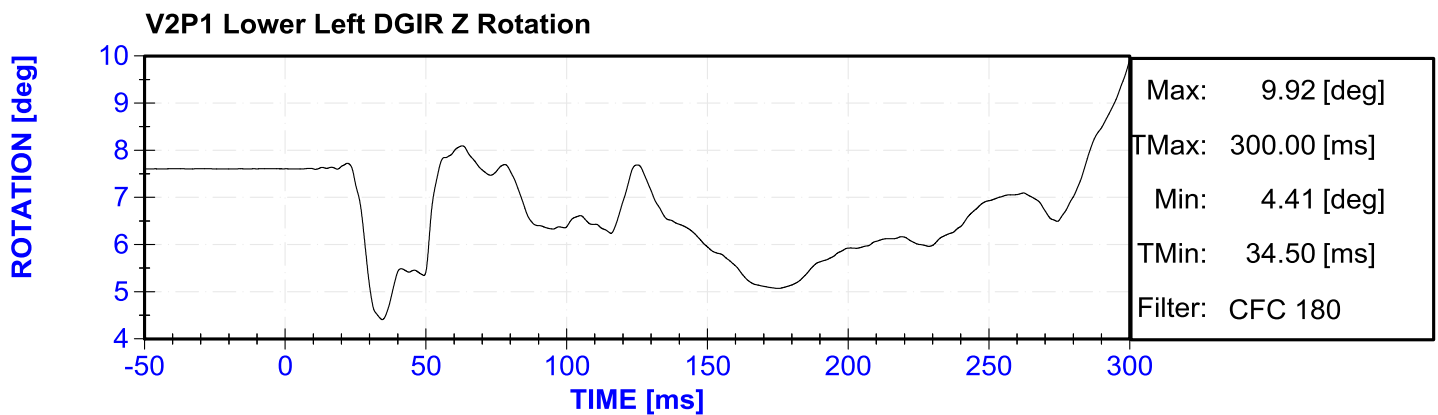
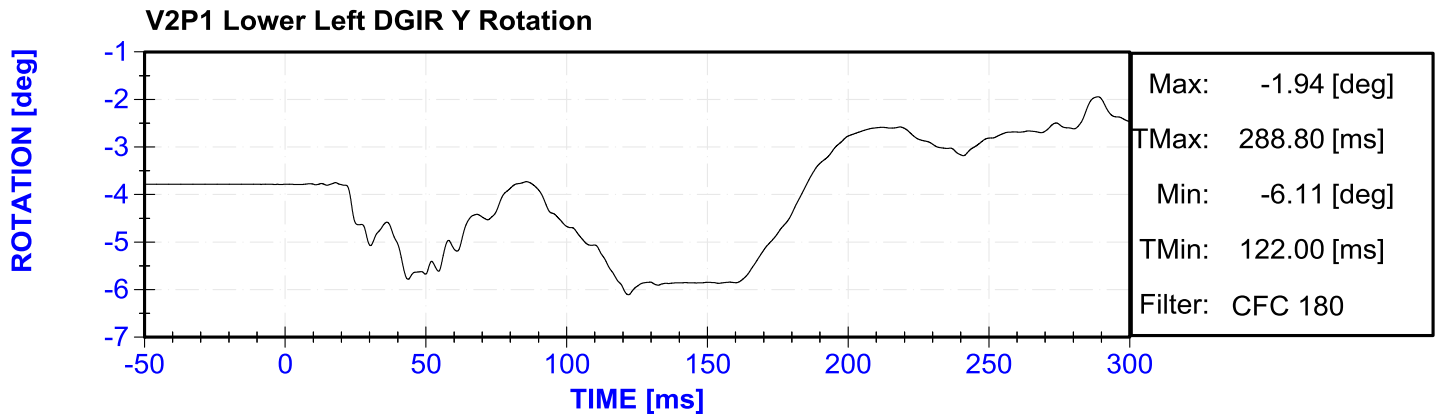


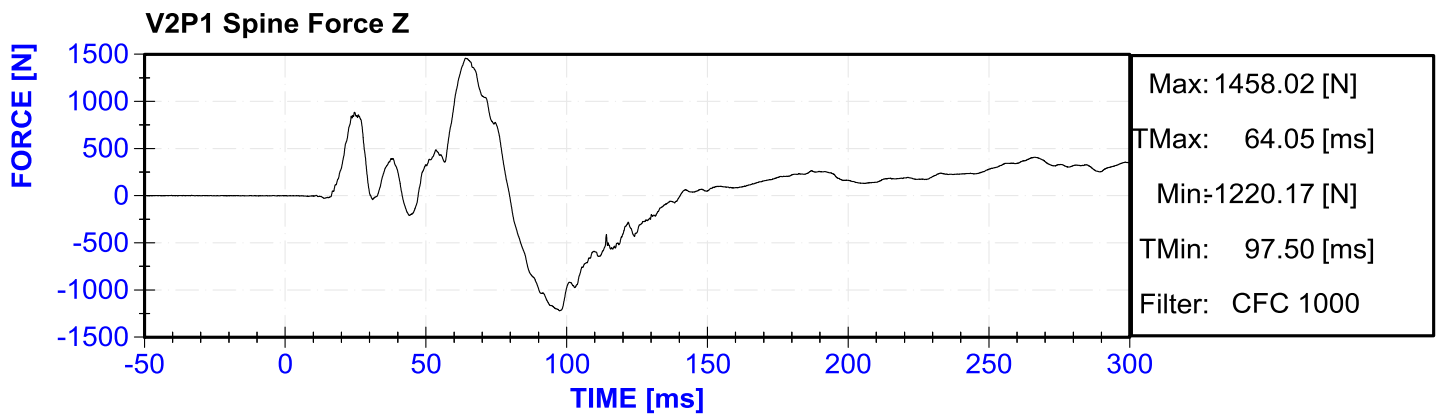
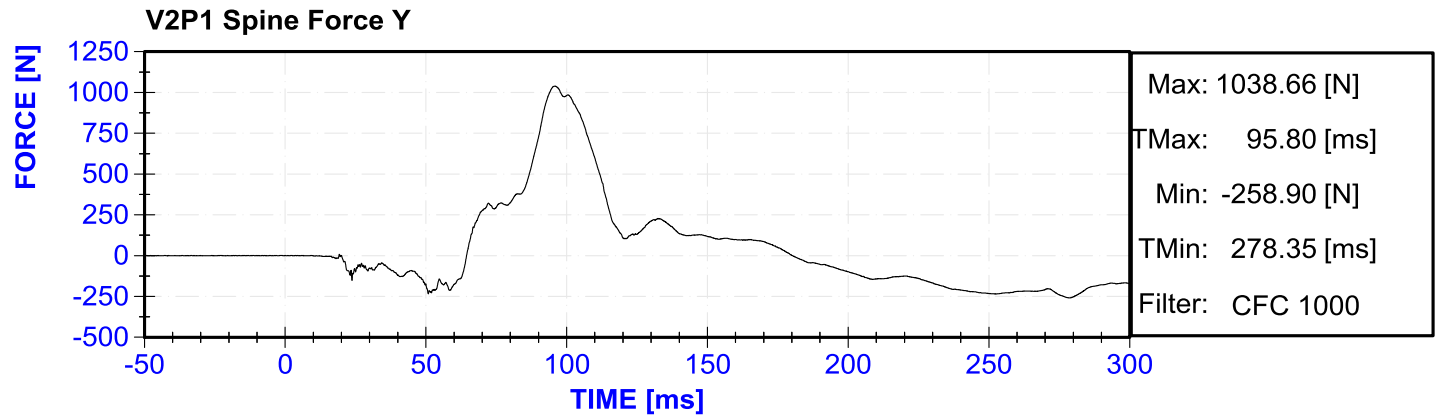
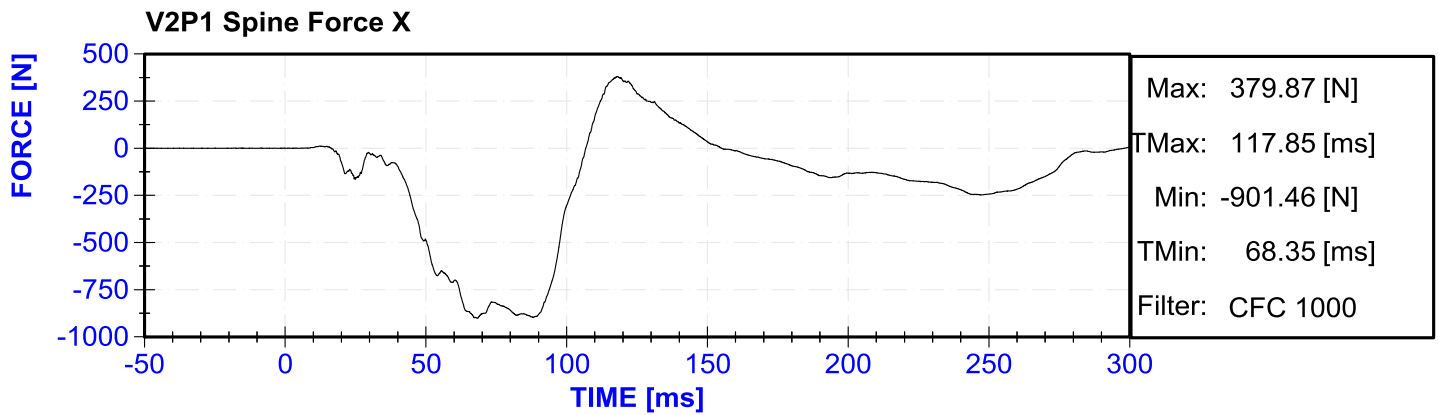
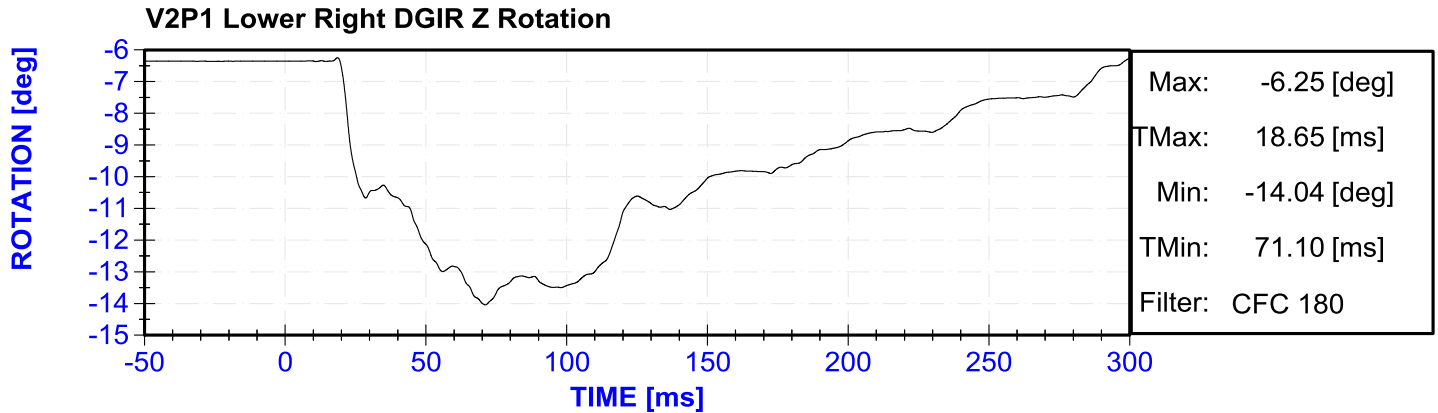
V2P1 Upper Right DGIR Z Rotation

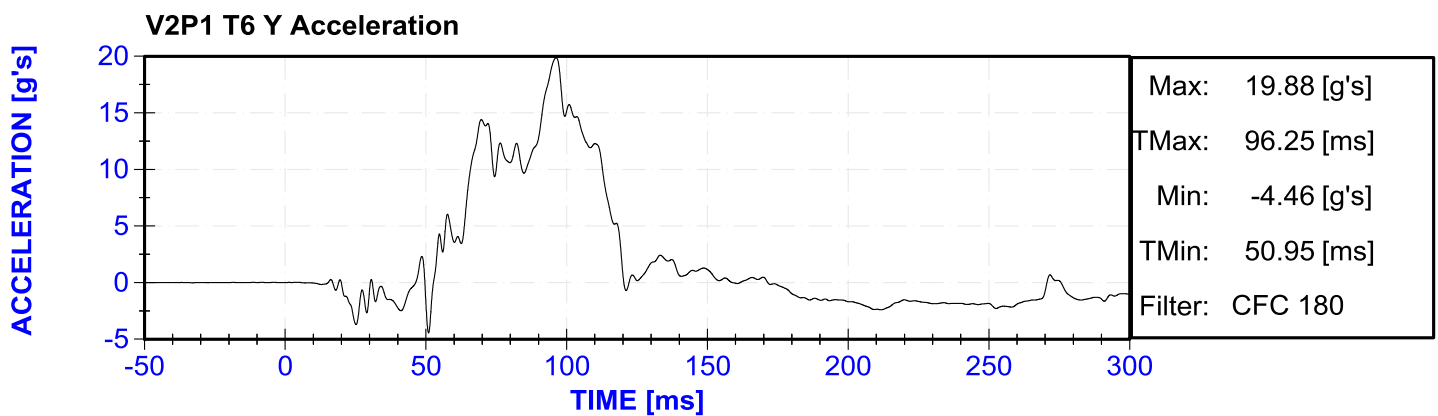
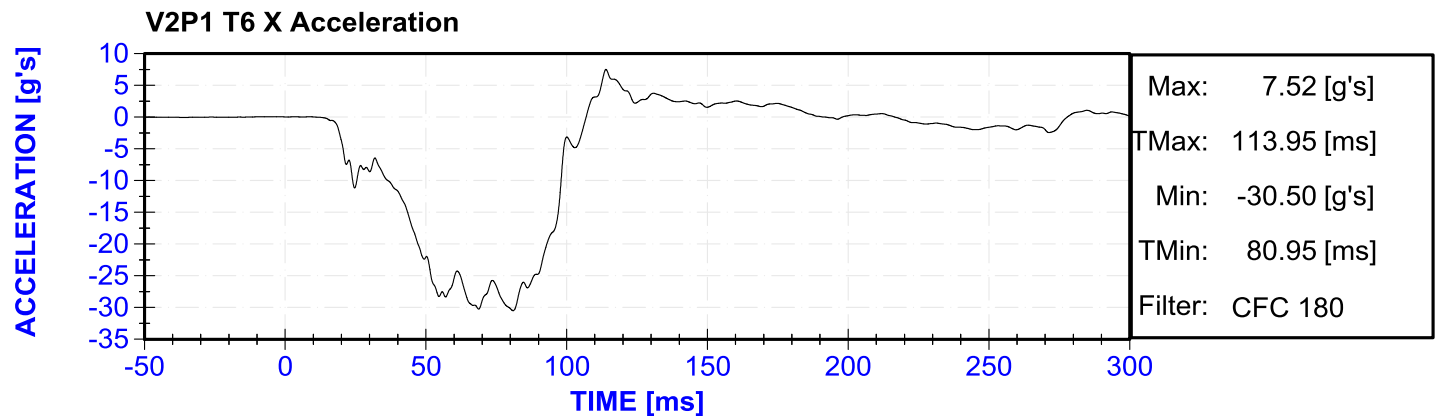
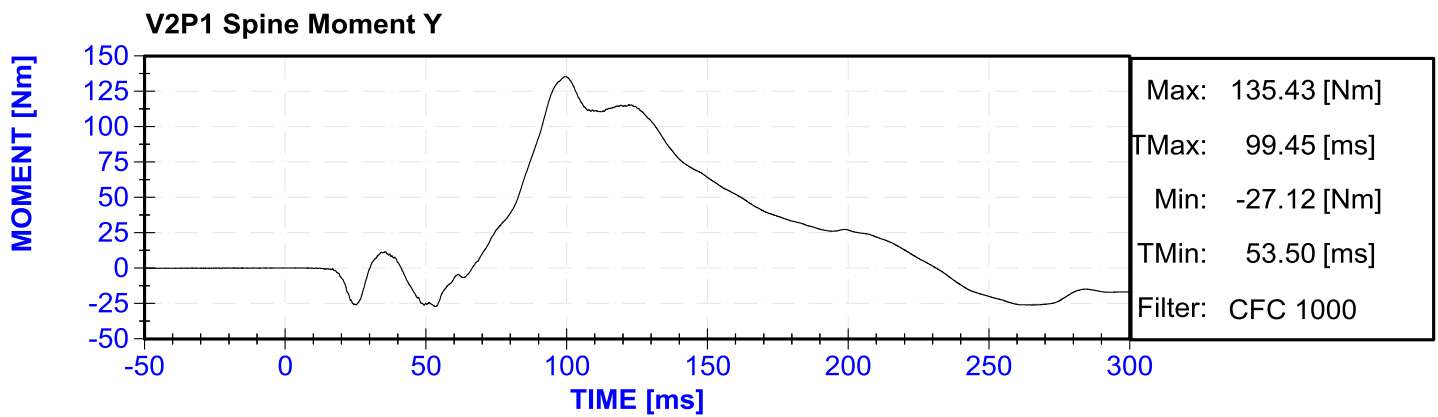
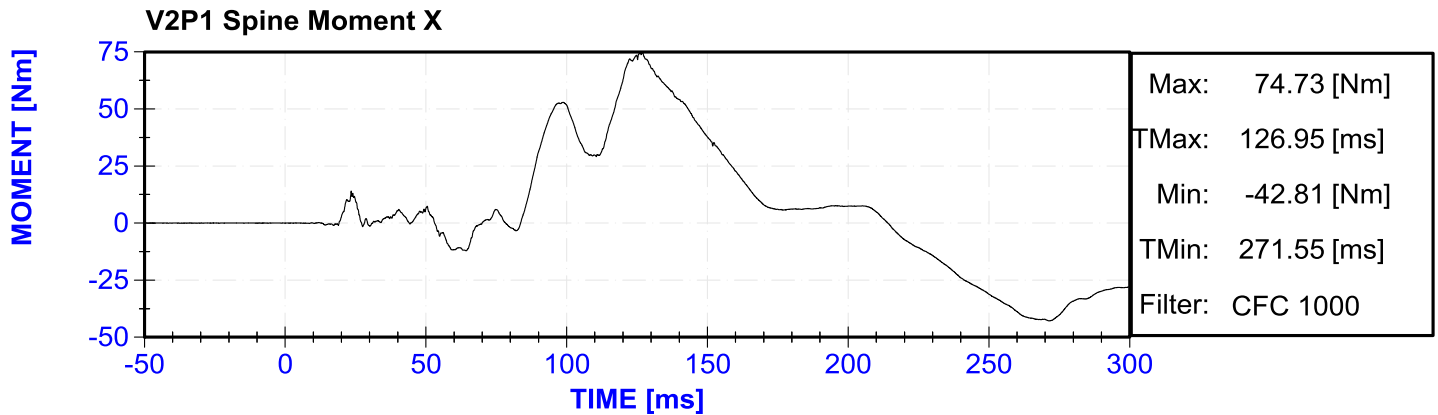


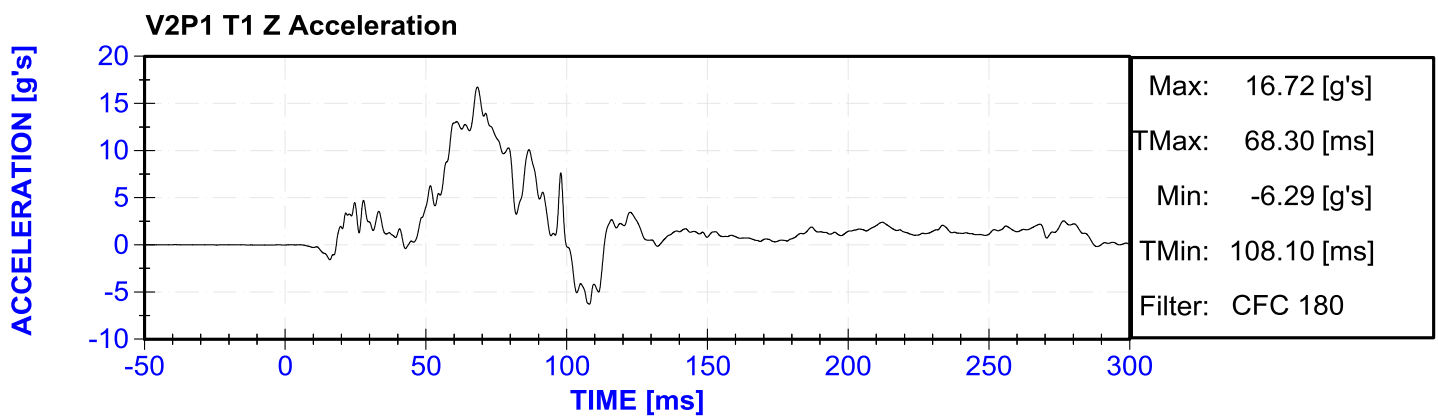
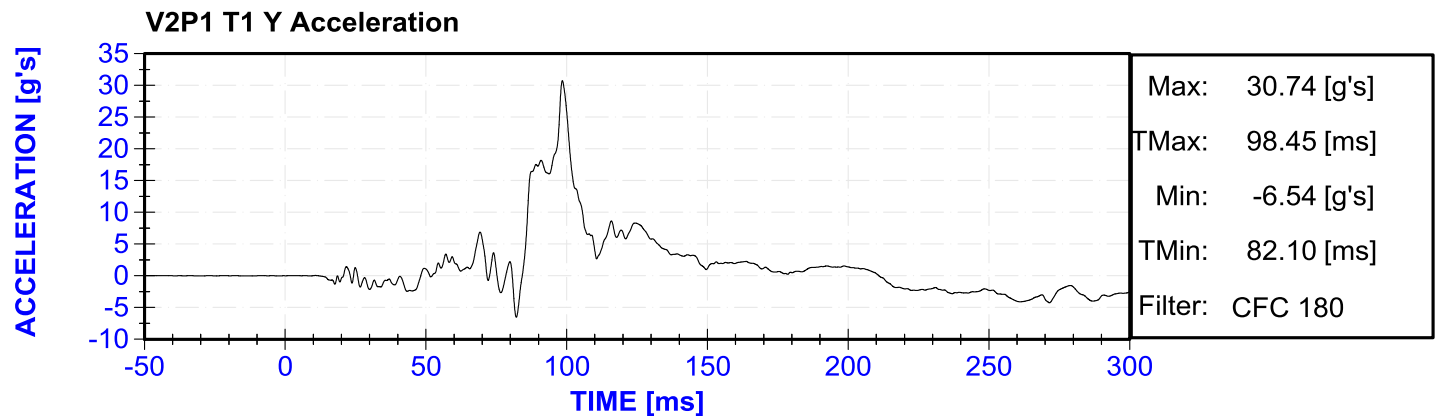
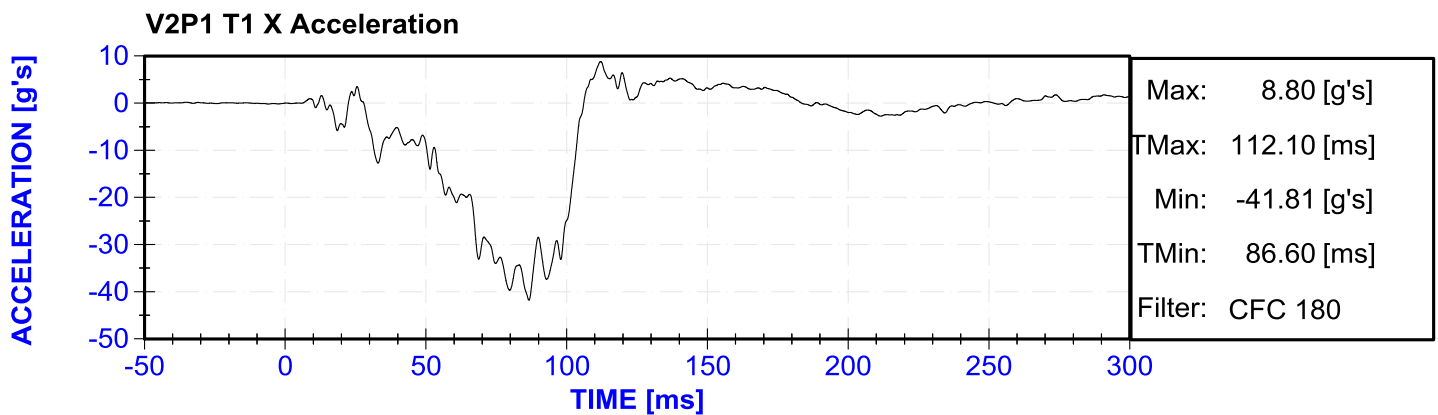
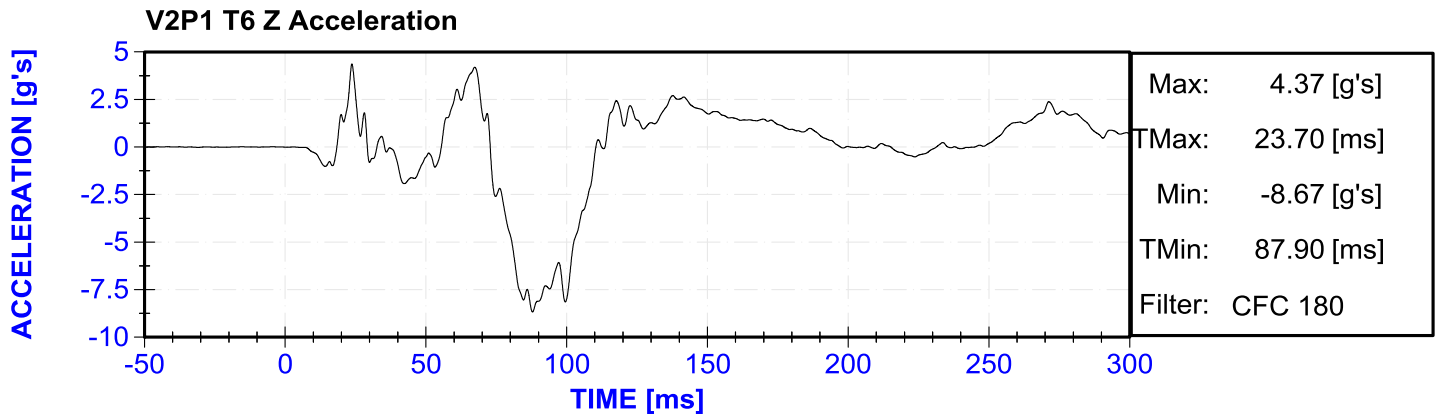
V2P1 Lower Left DGIR X Displacement

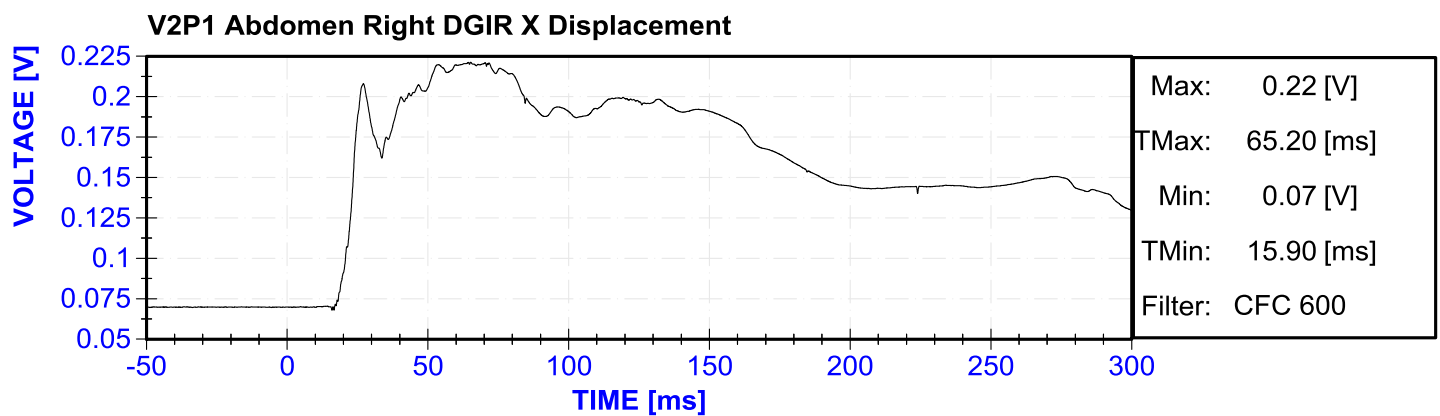
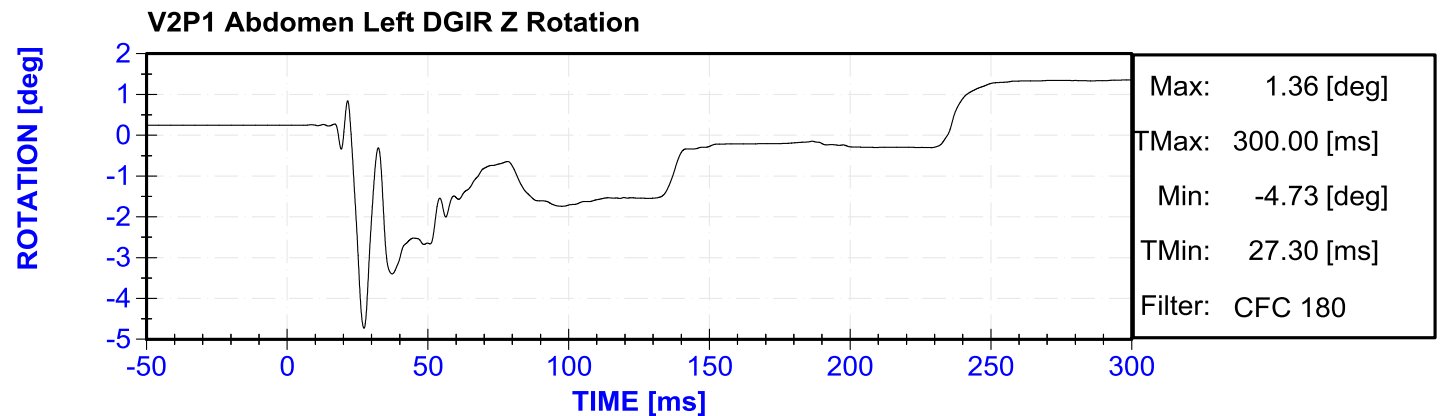
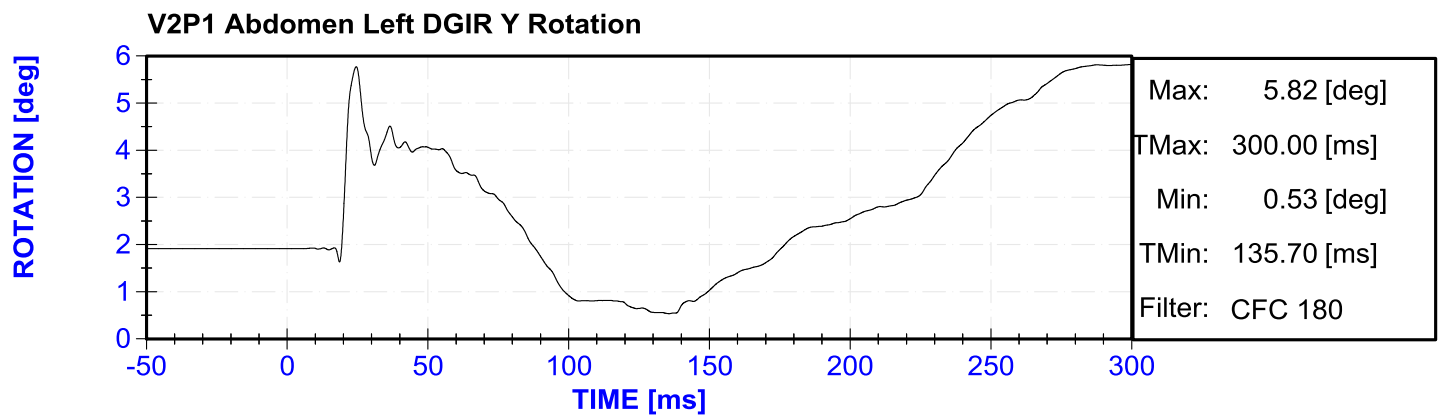
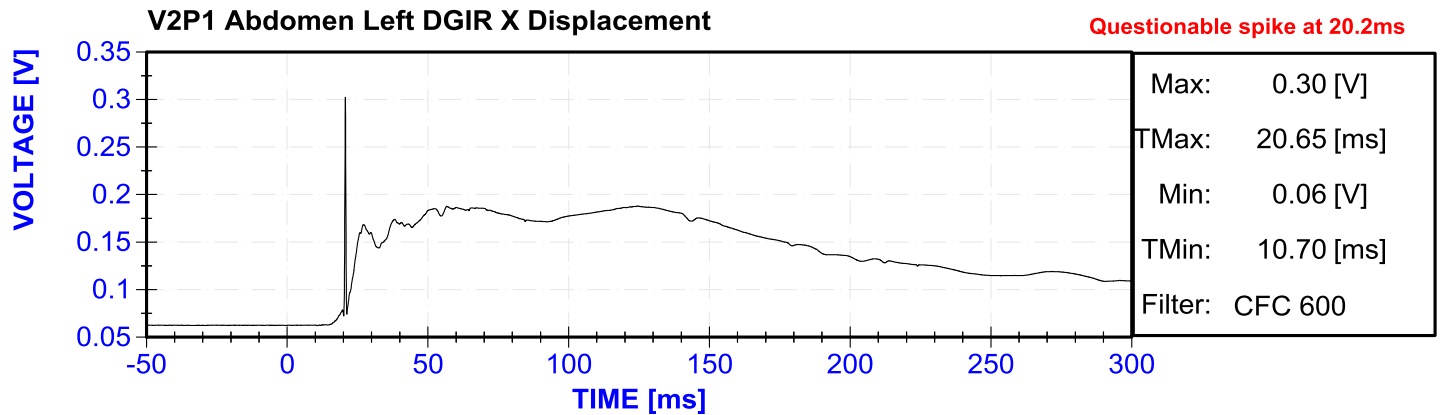


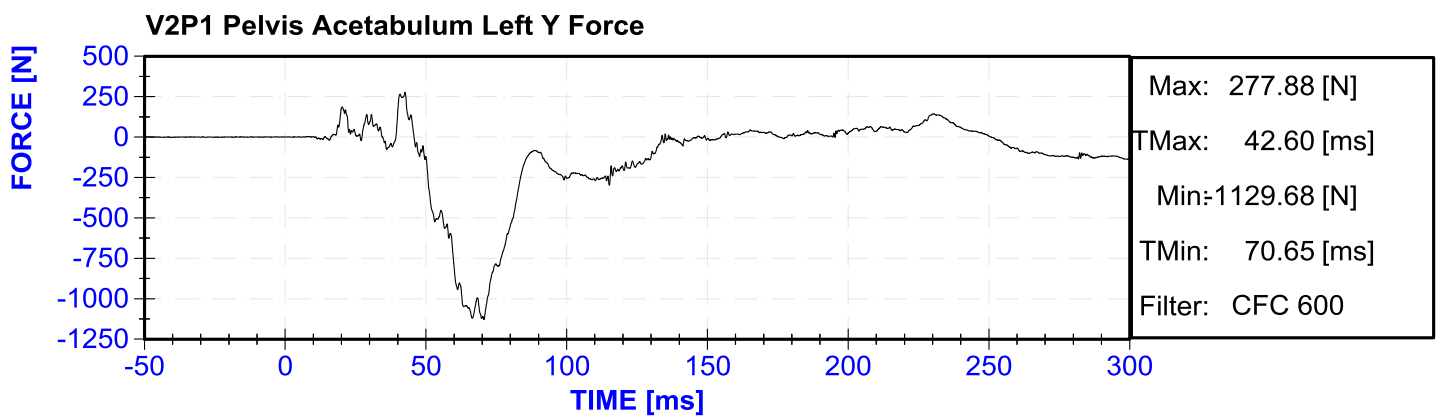
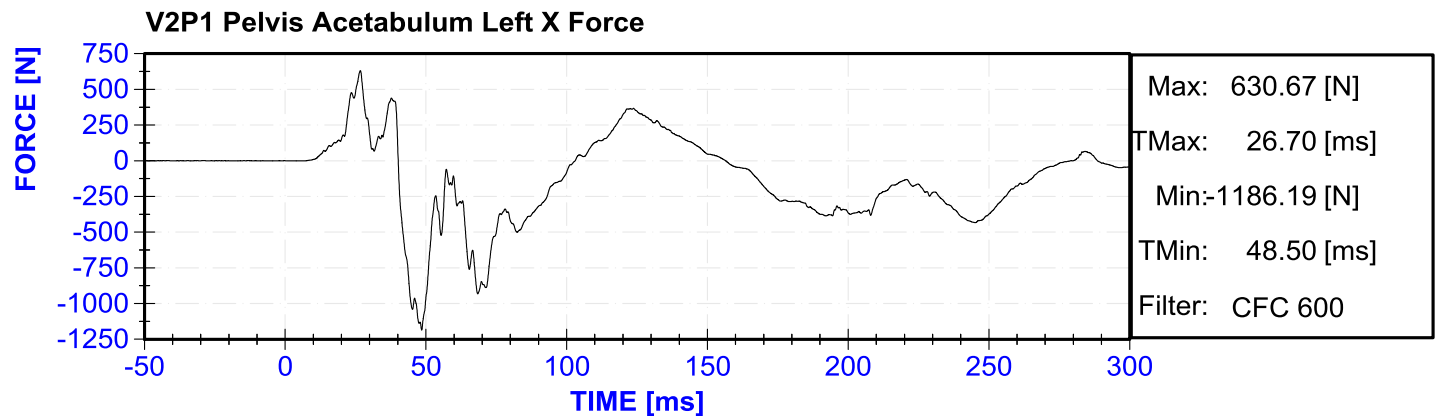
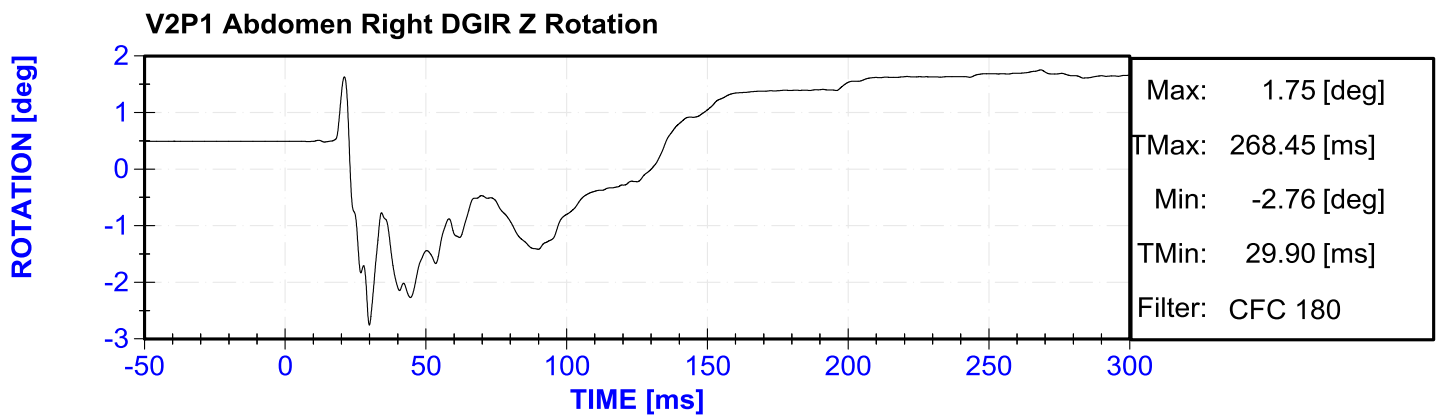
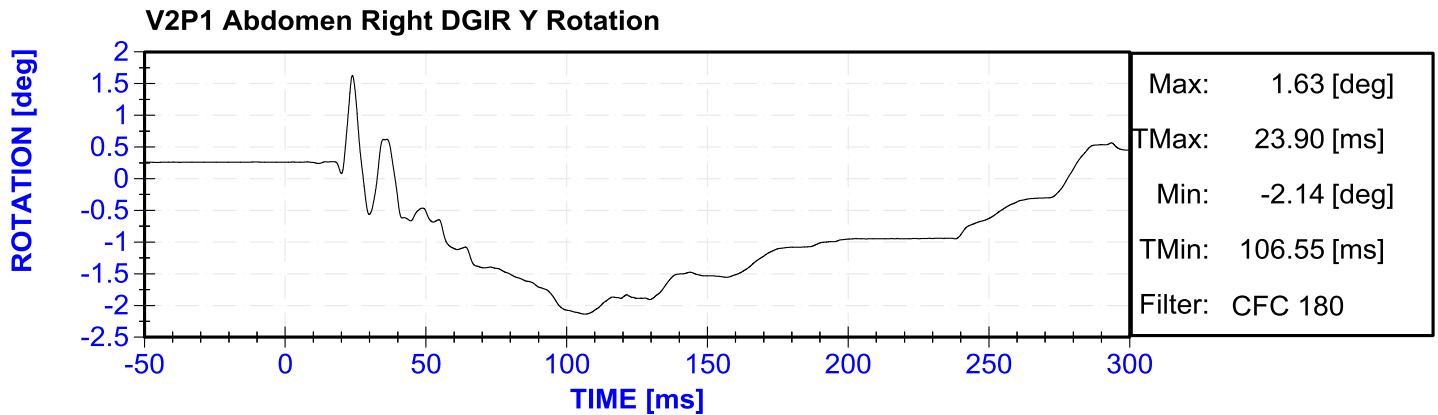


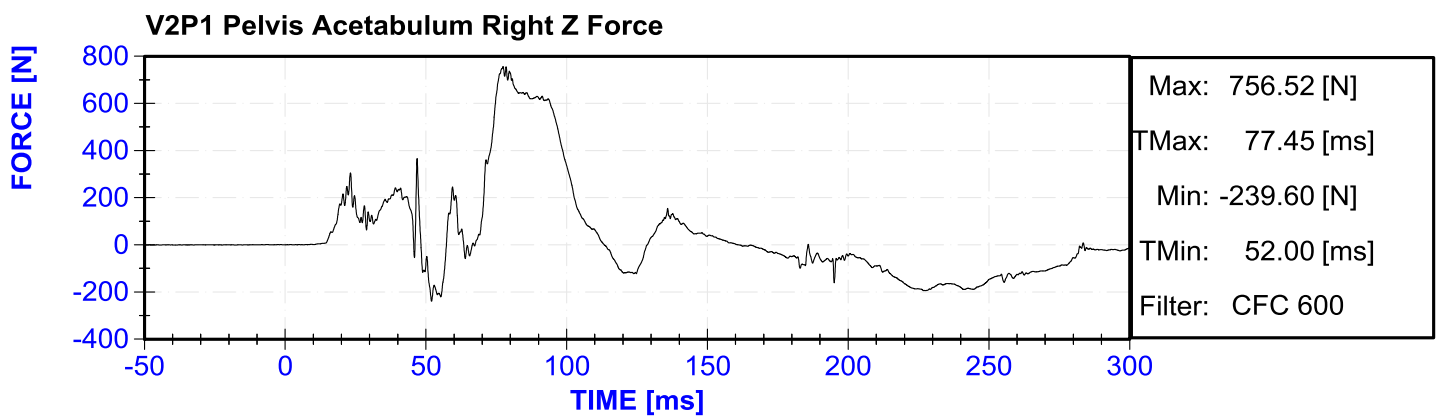
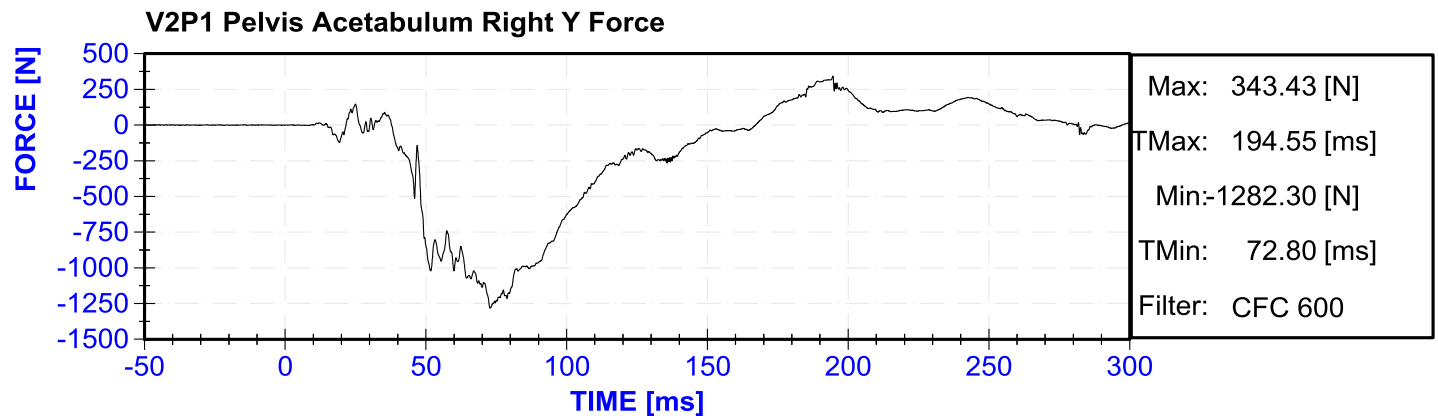
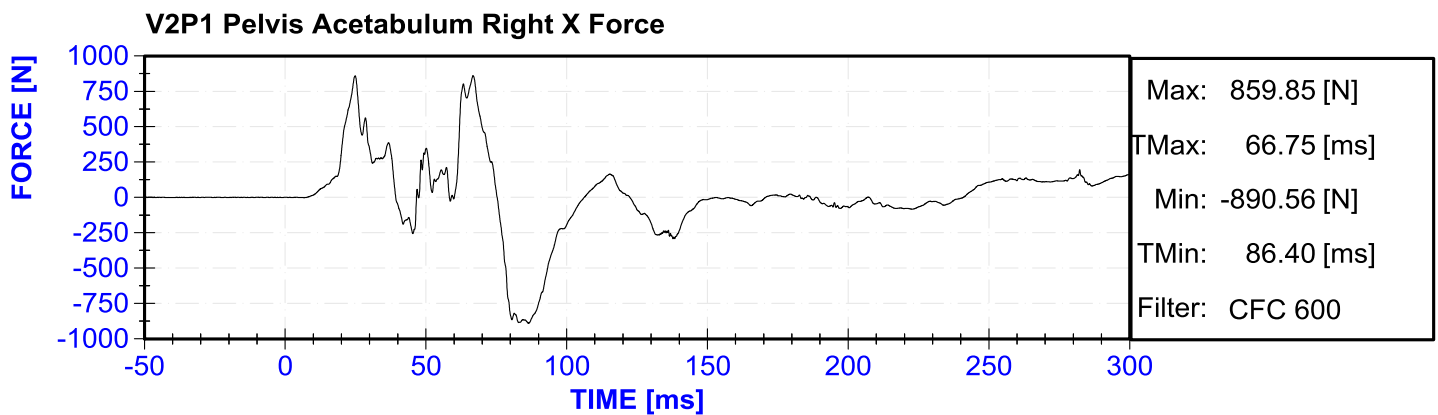
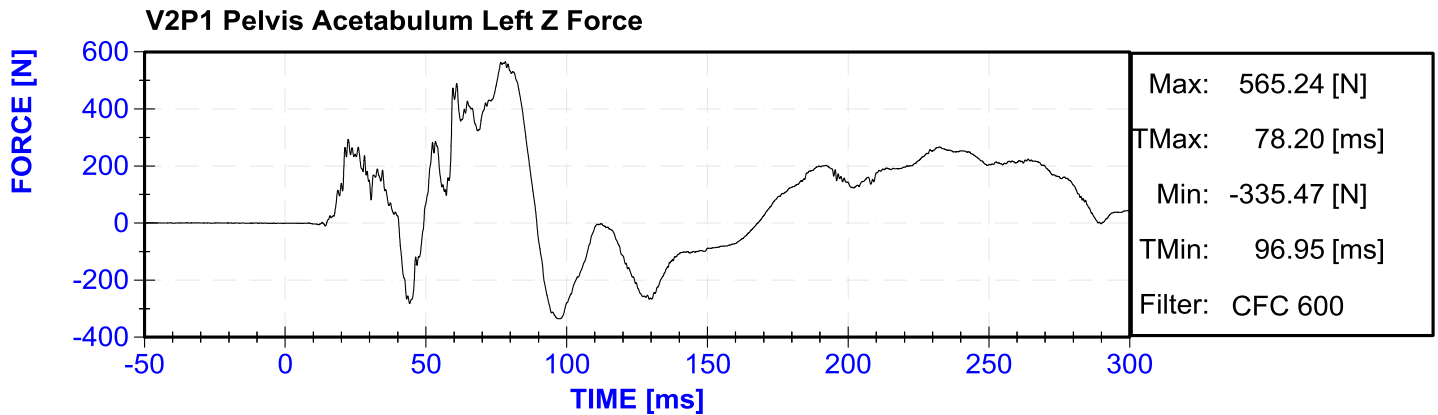


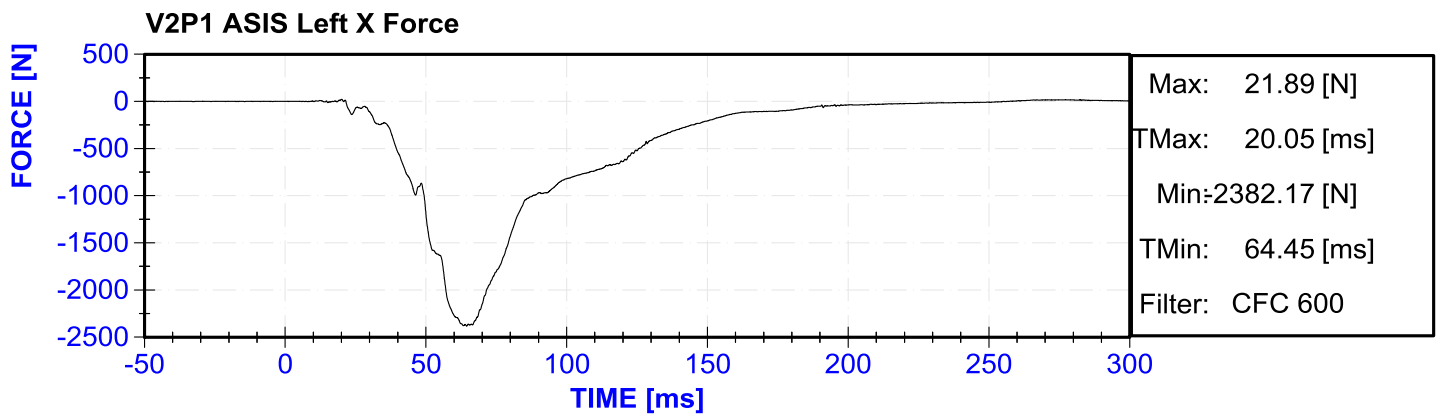
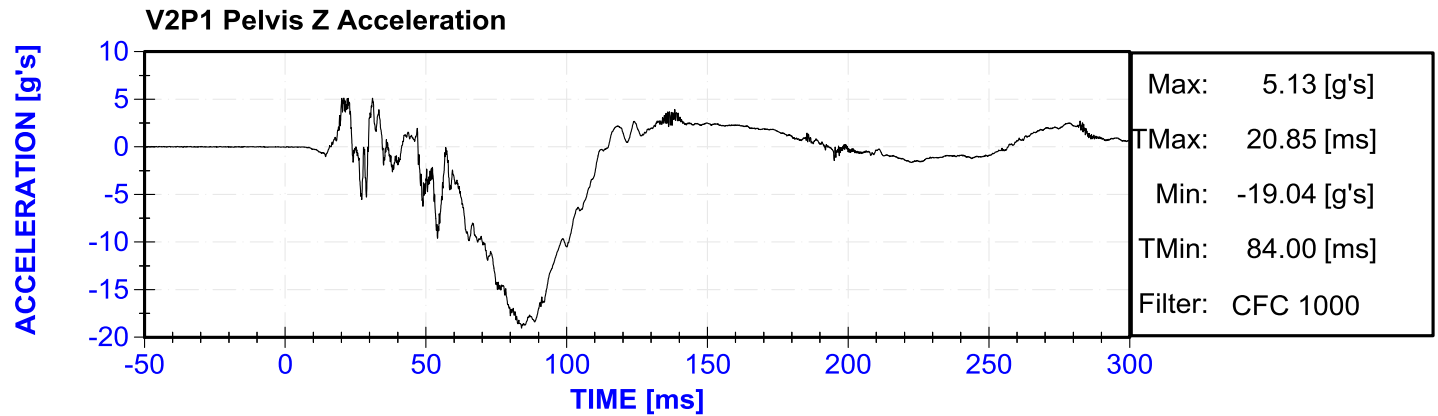
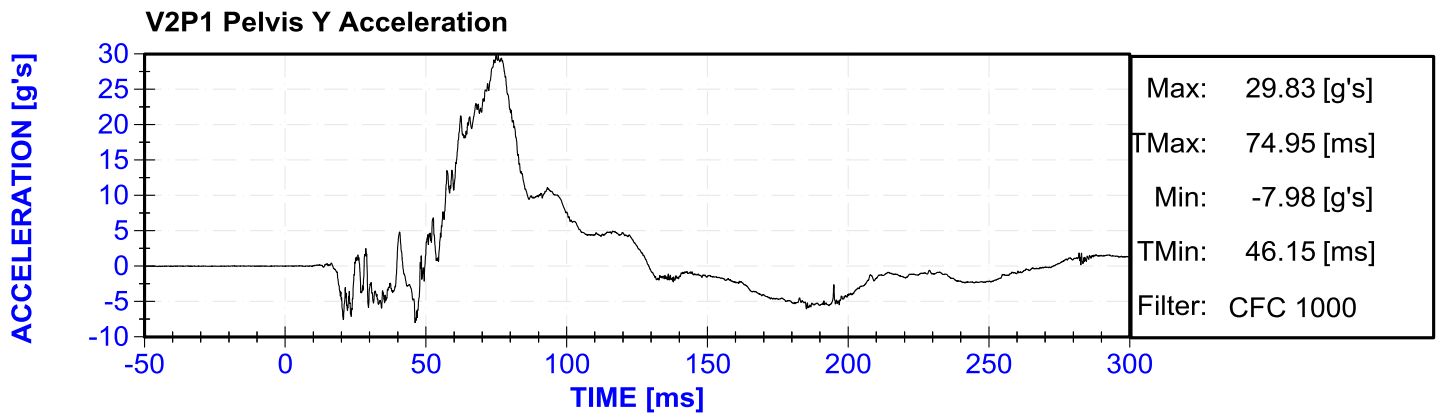
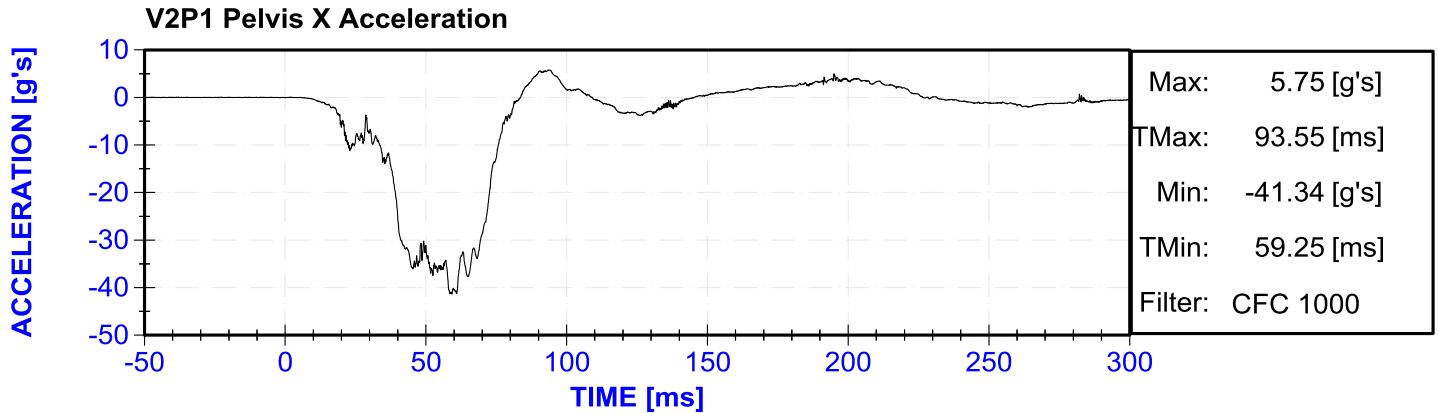


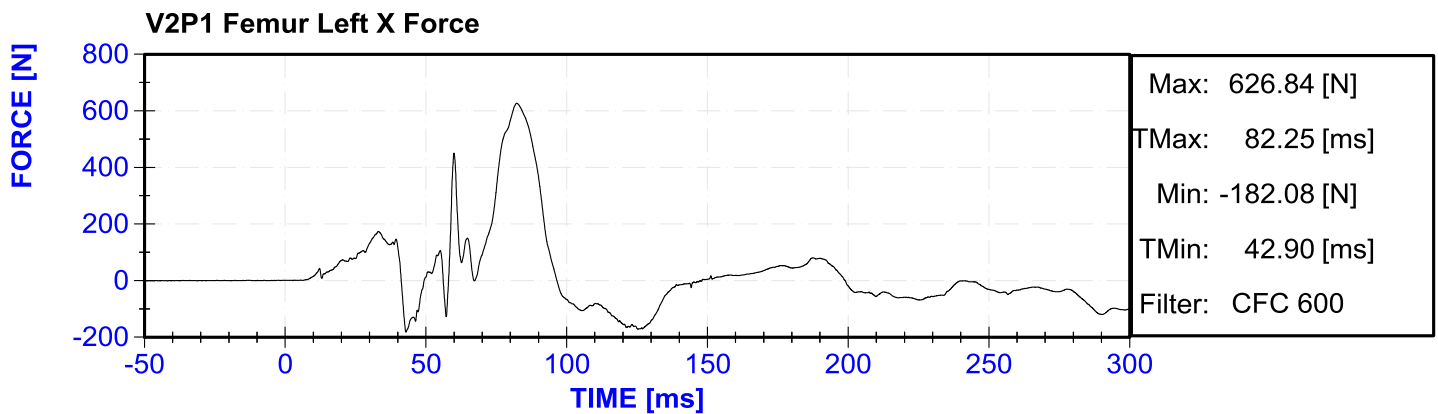
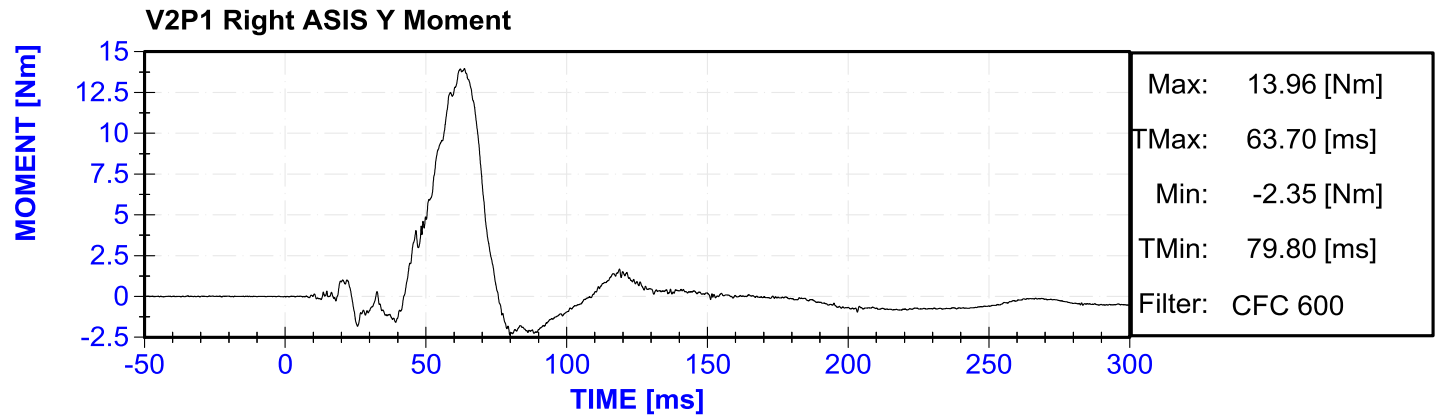
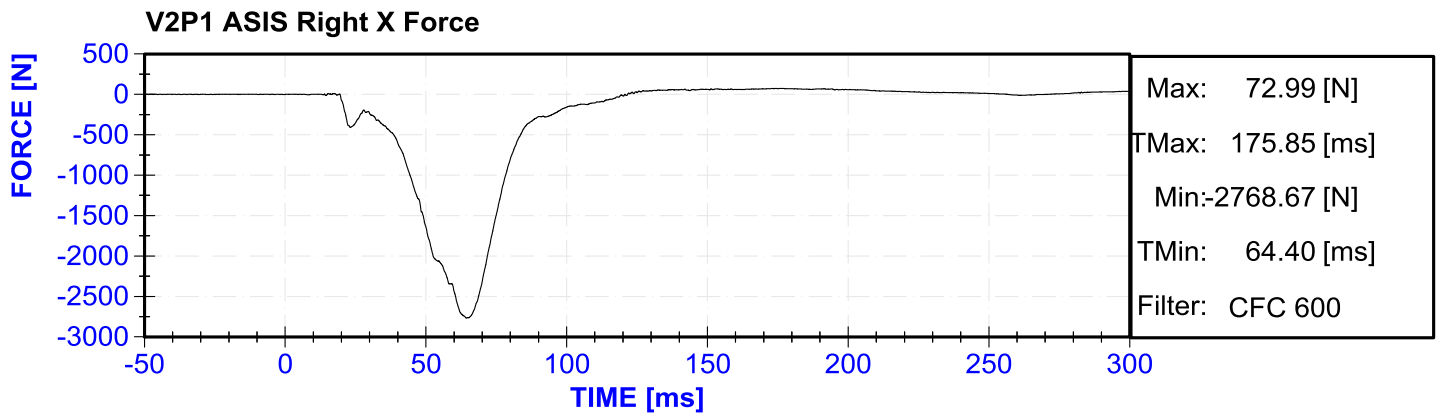
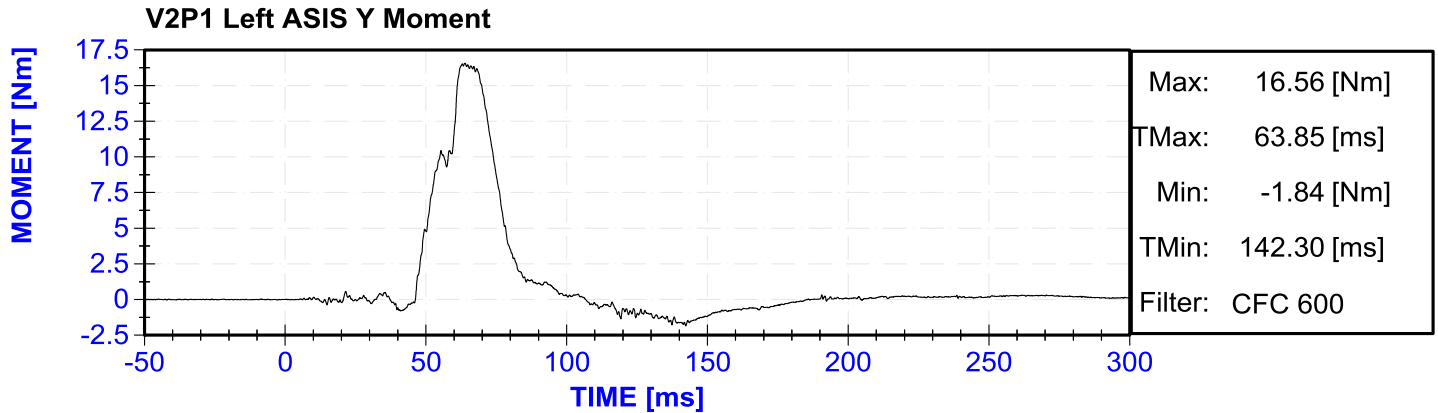


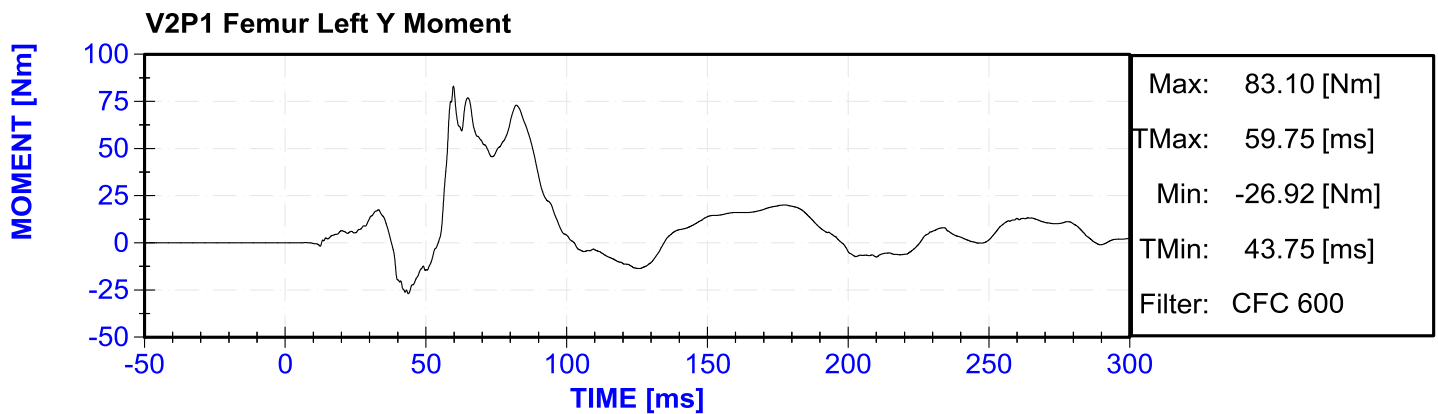
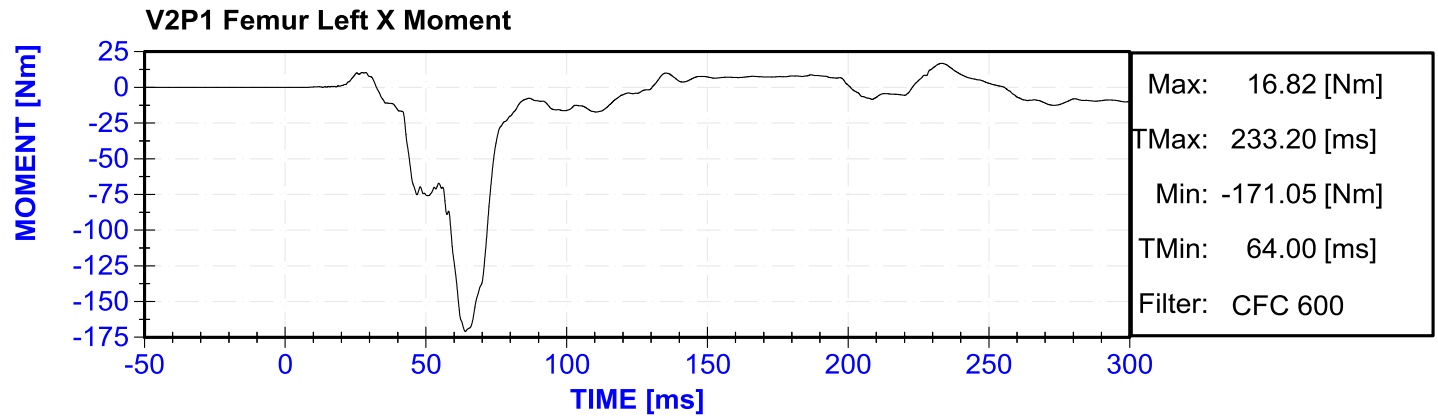
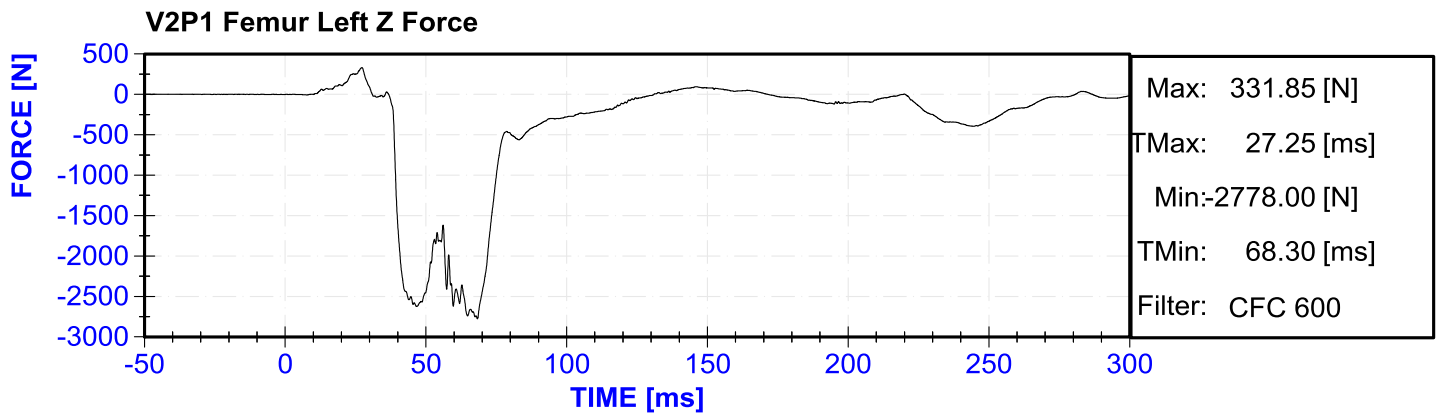
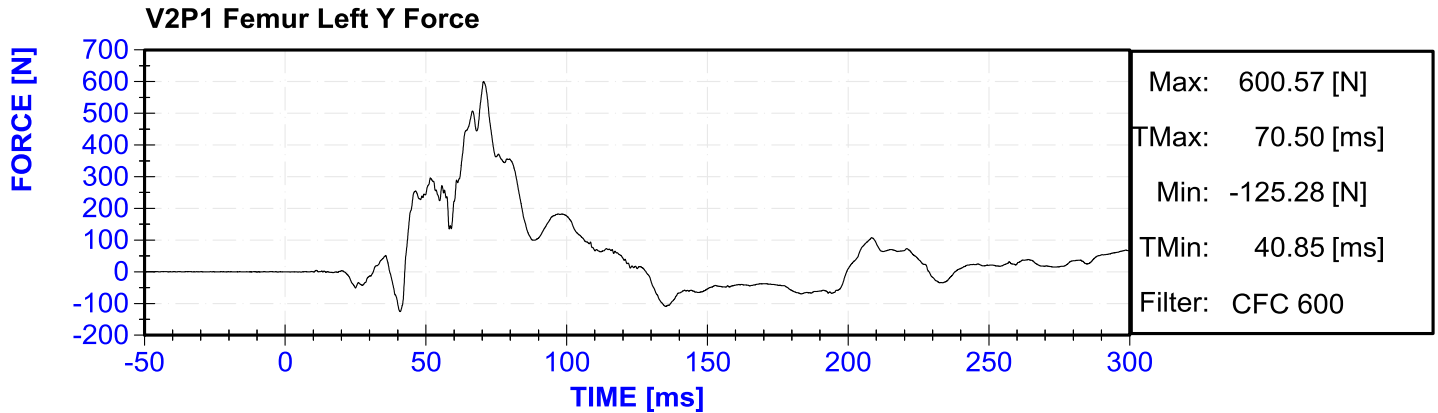


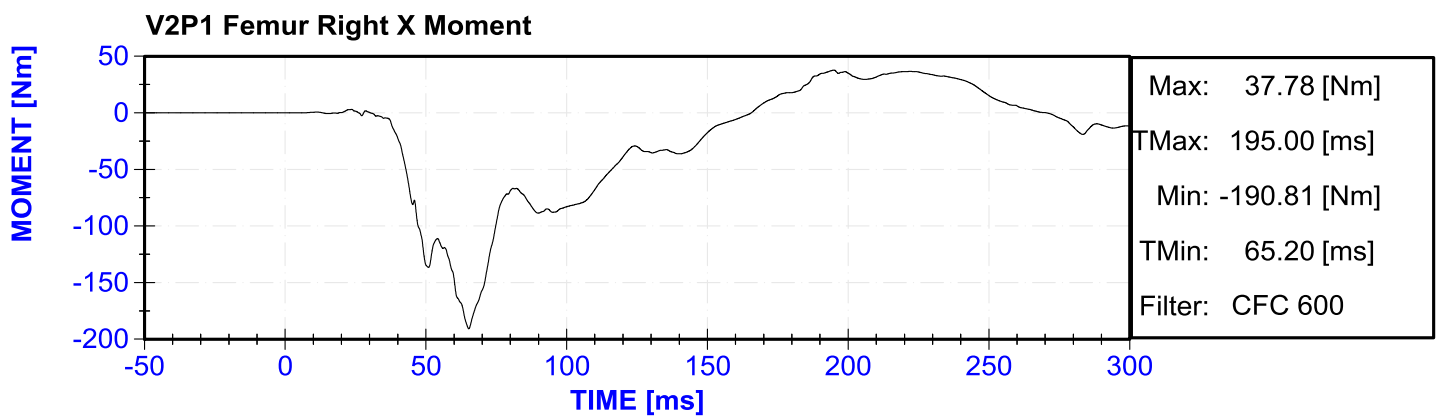
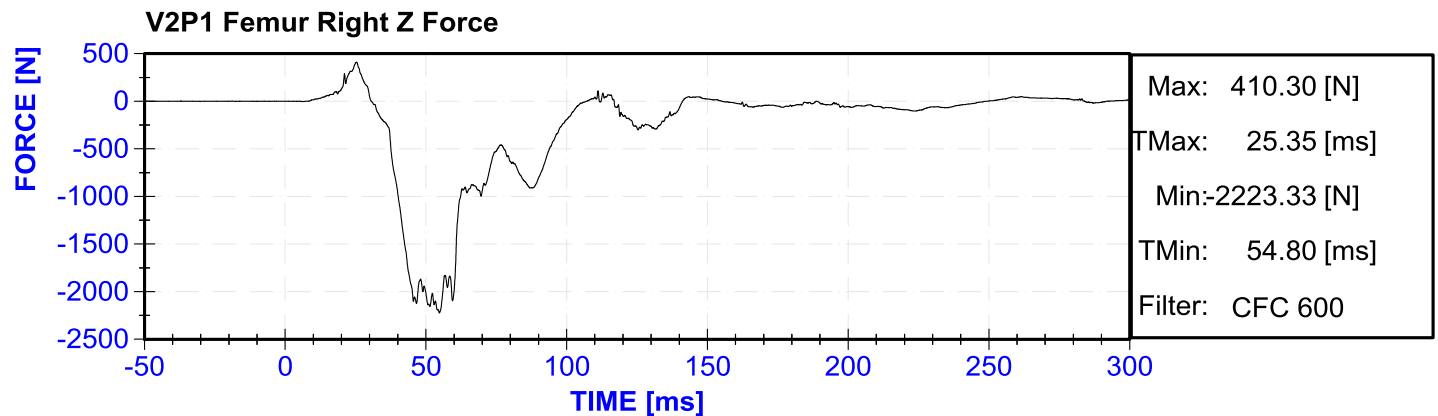
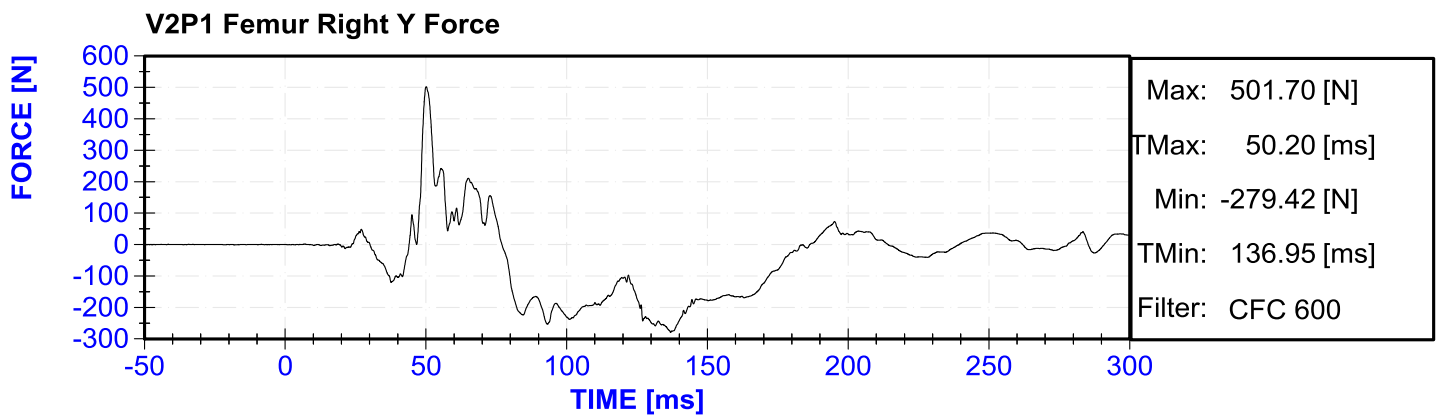
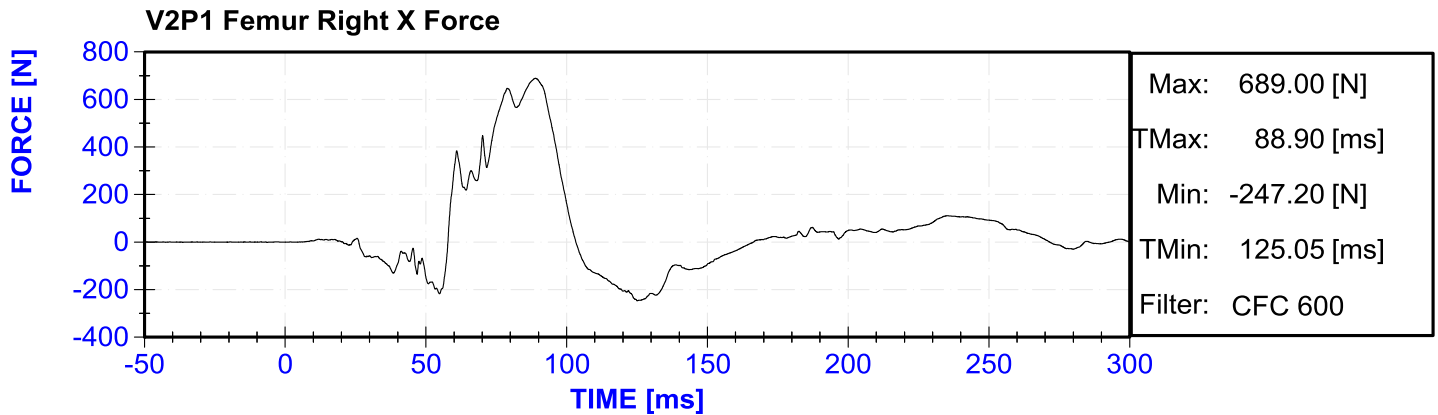


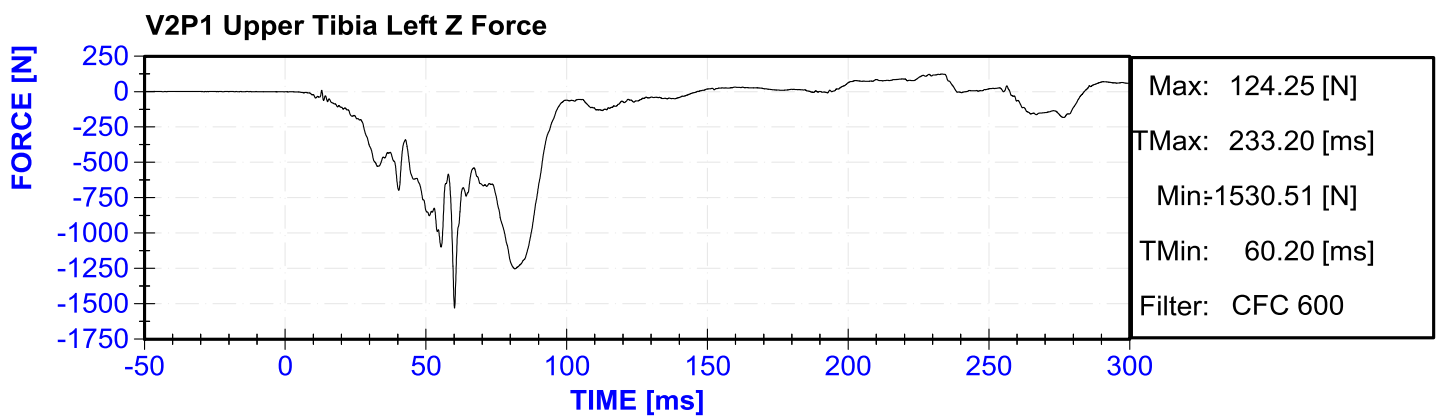
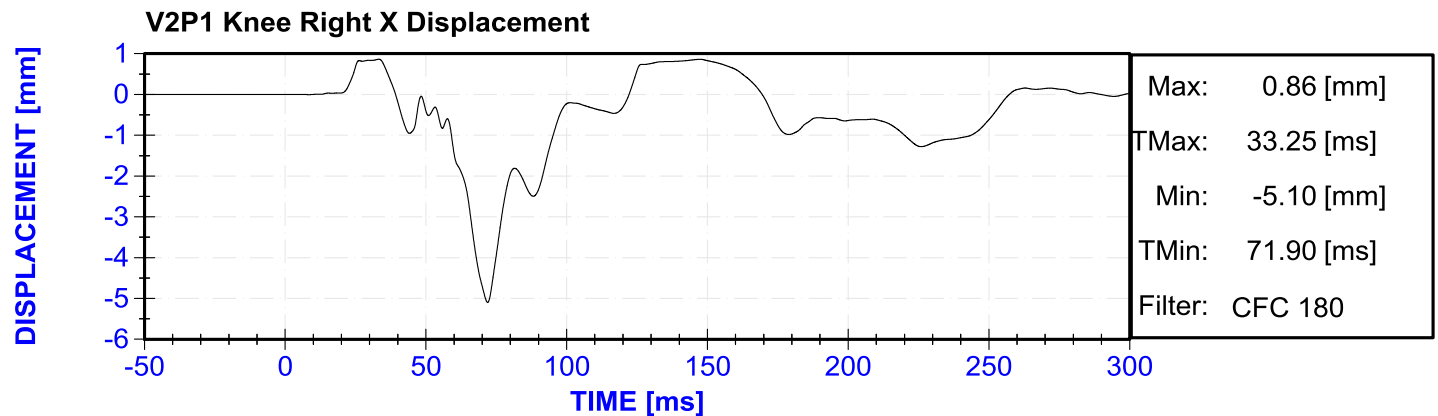
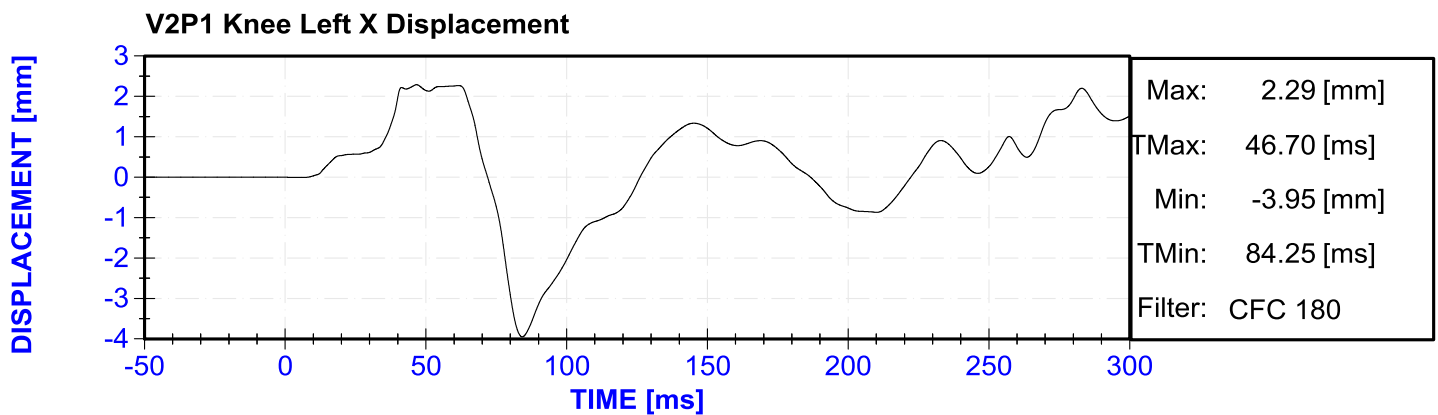
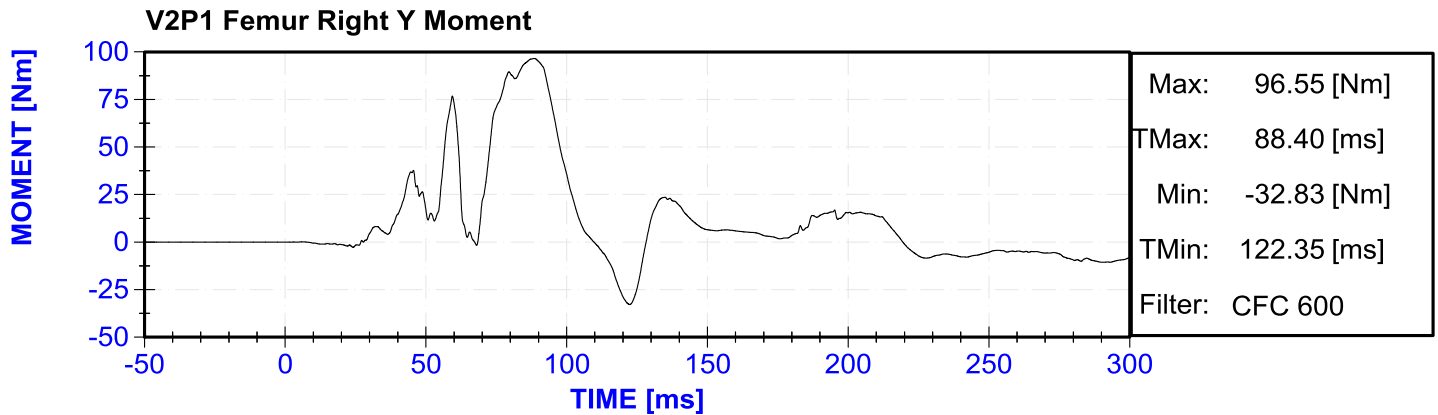


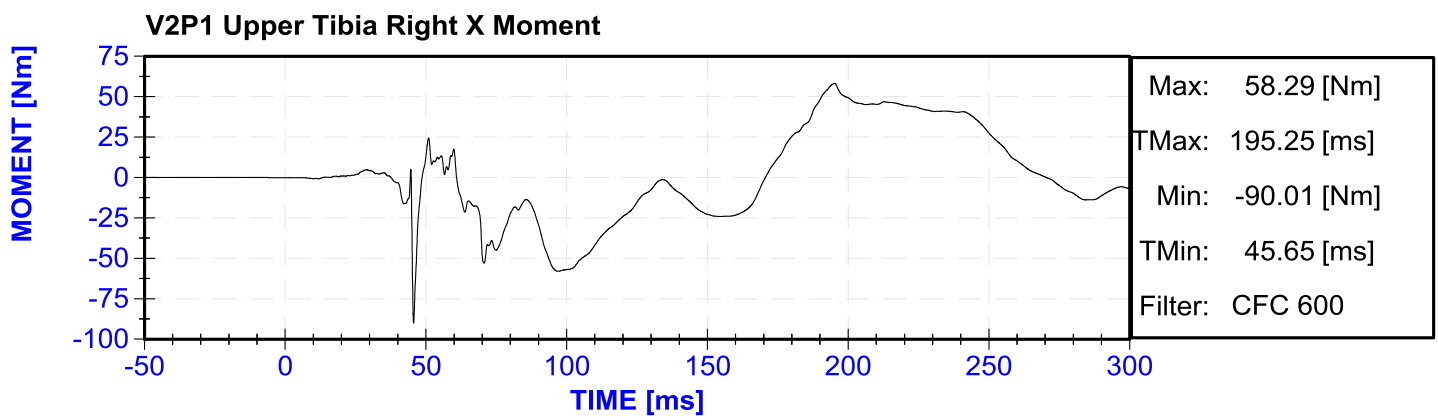
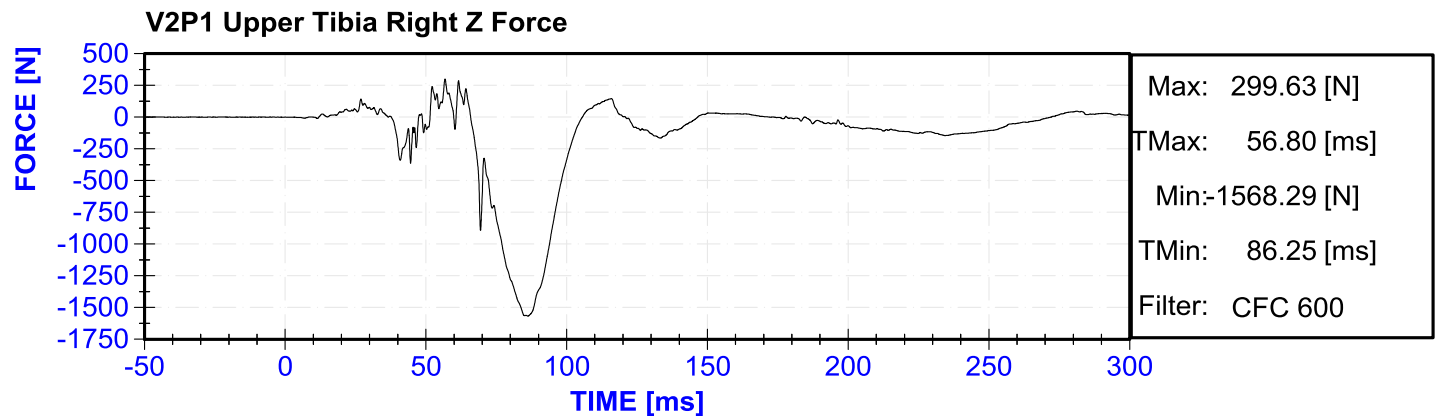
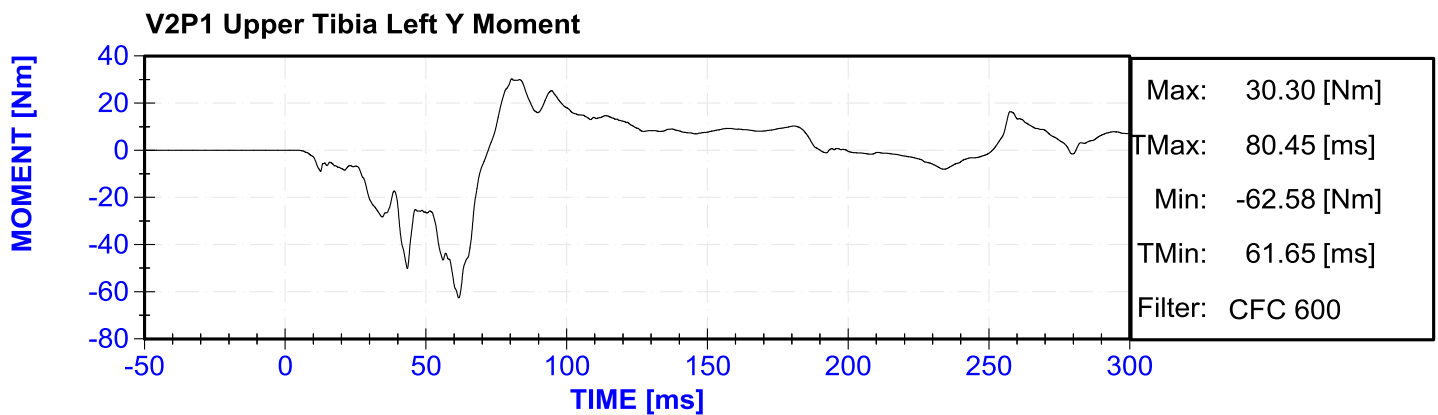
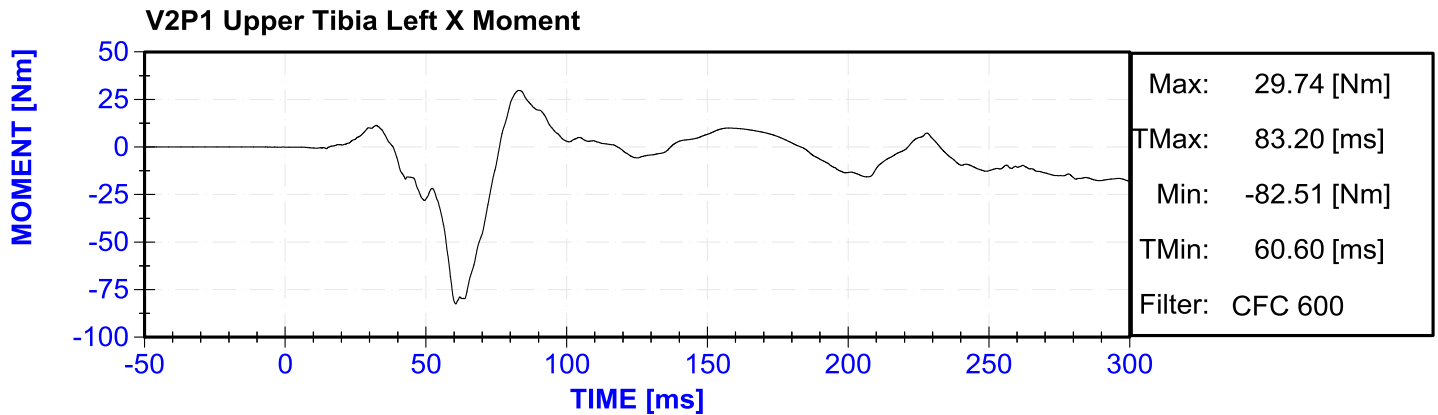


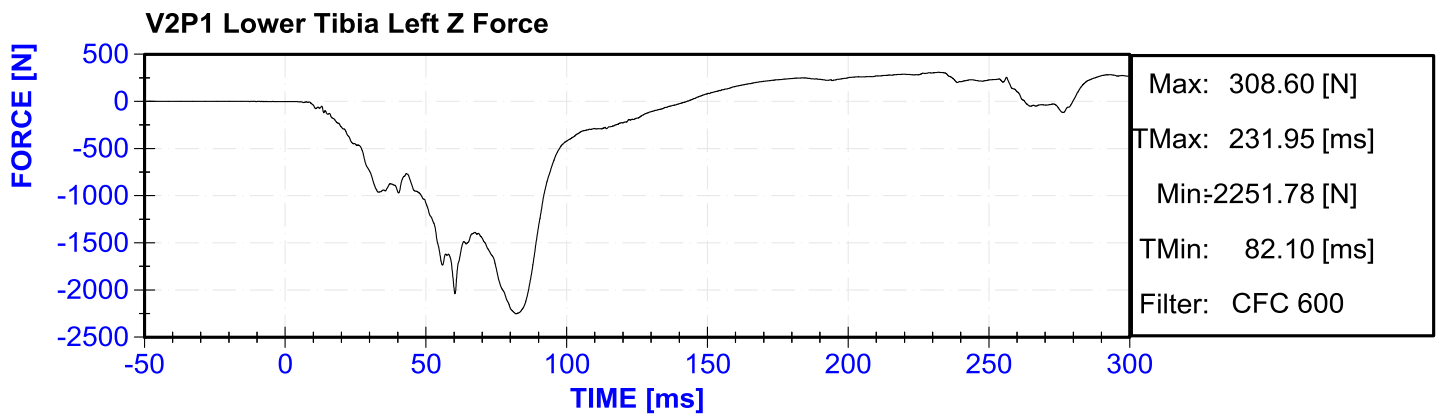
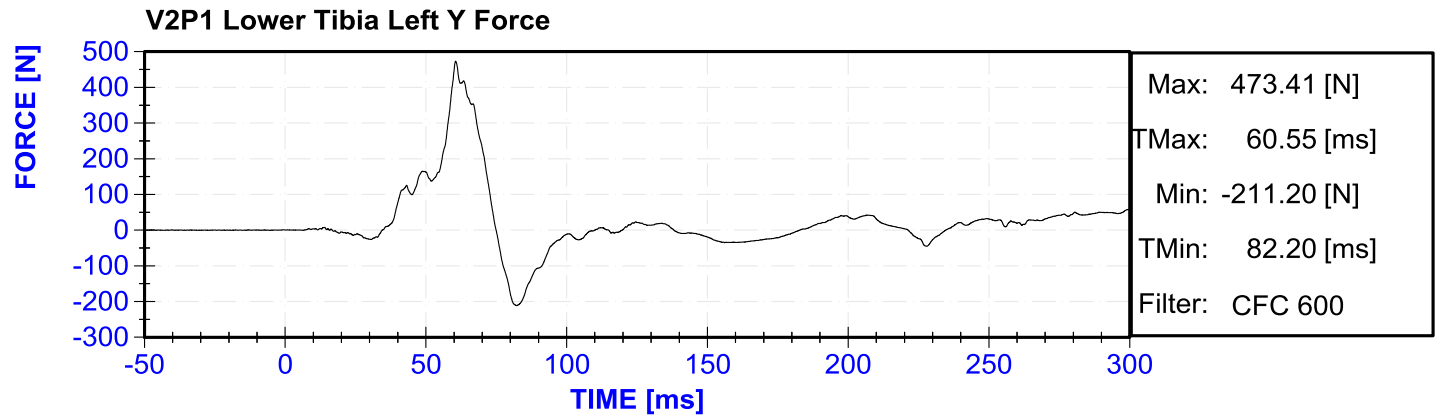
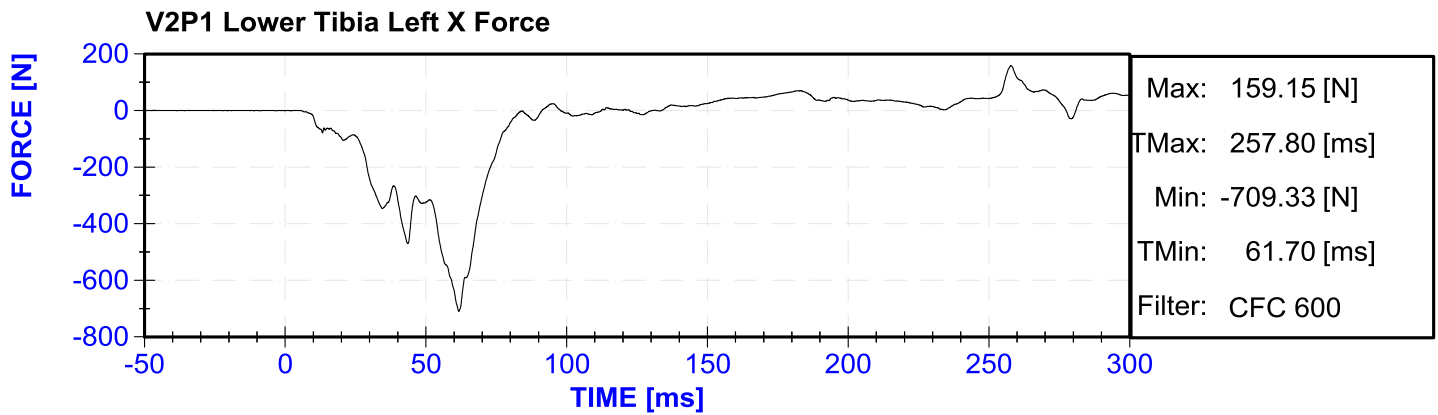
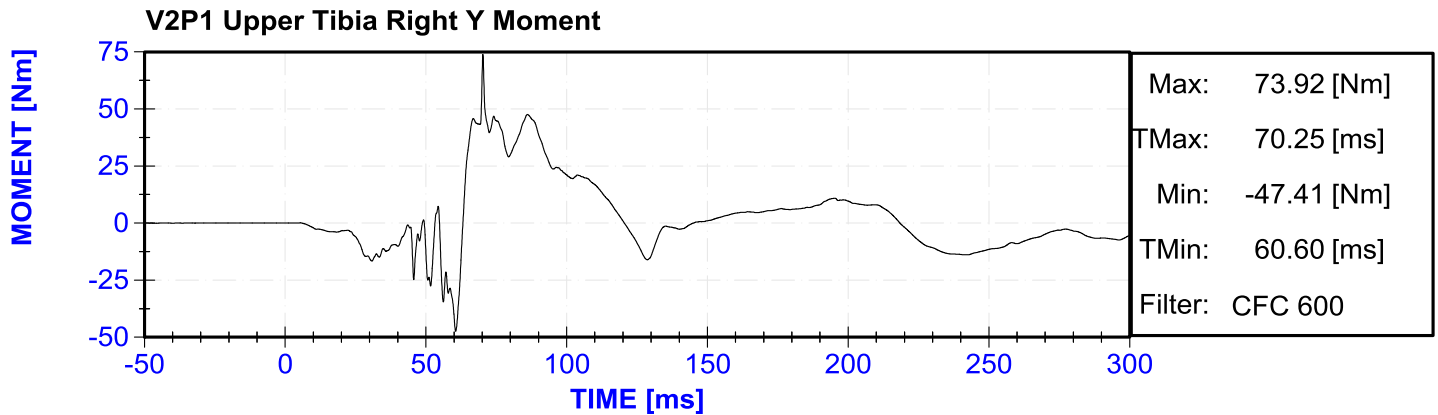


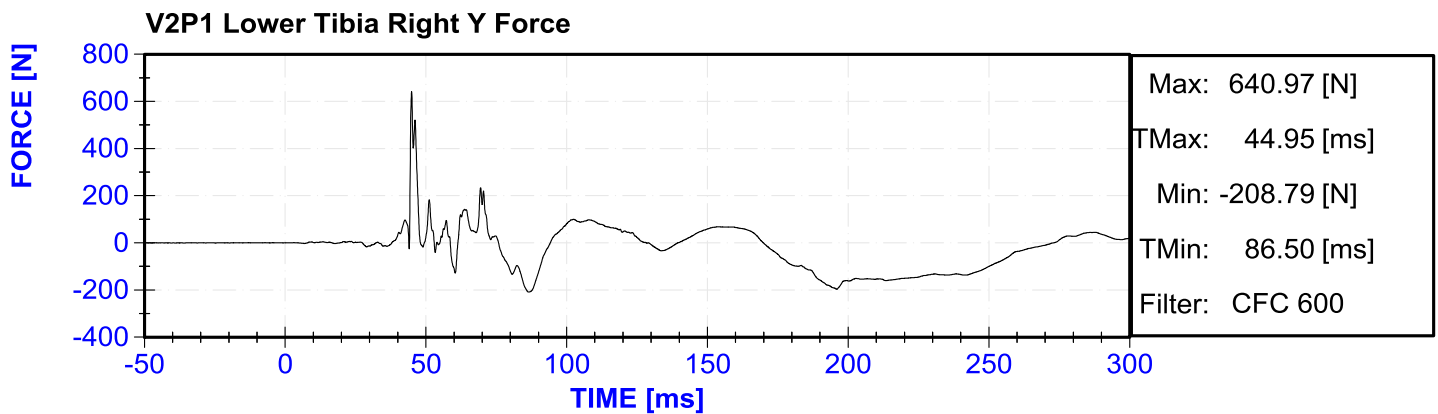
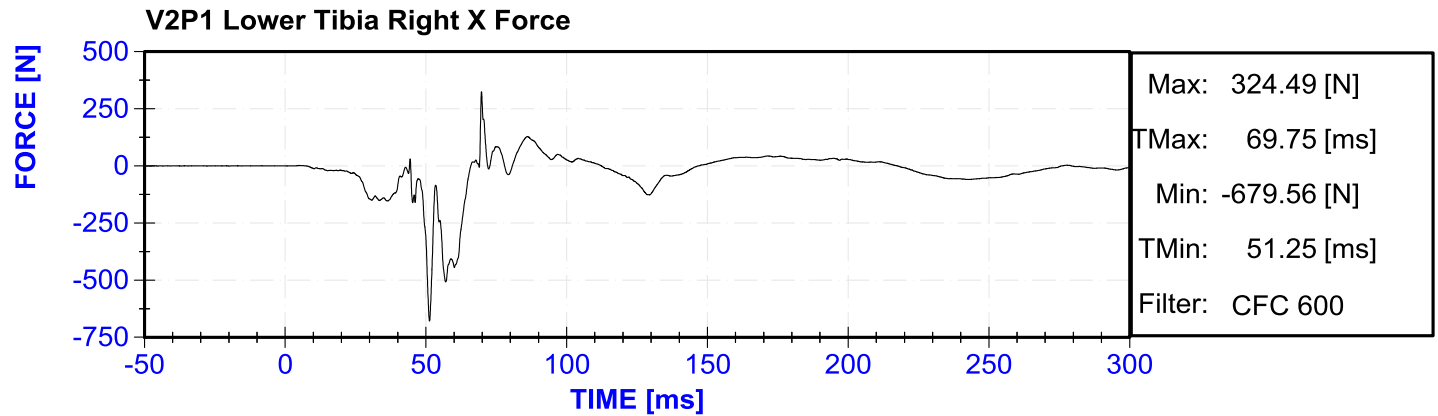
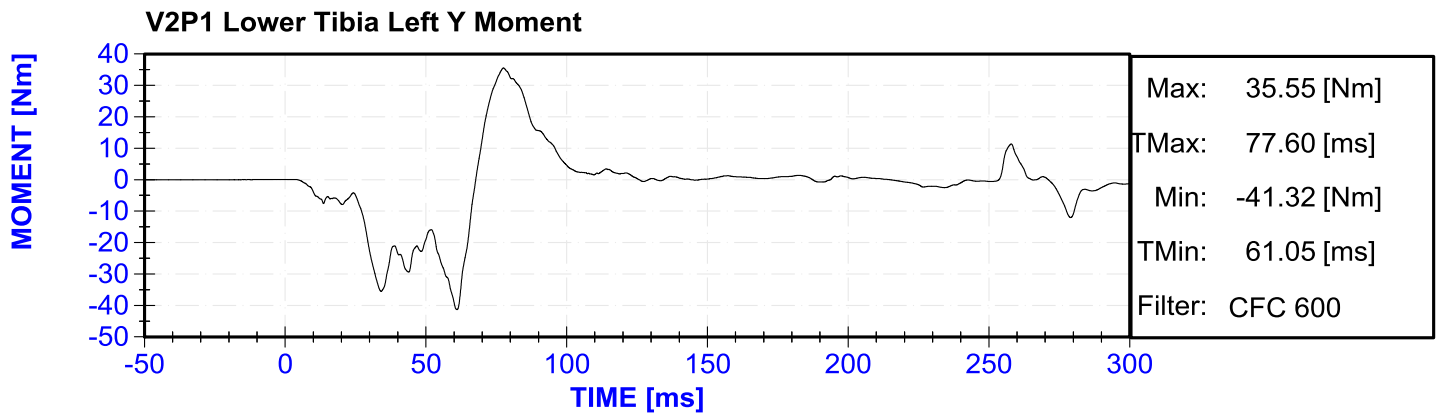
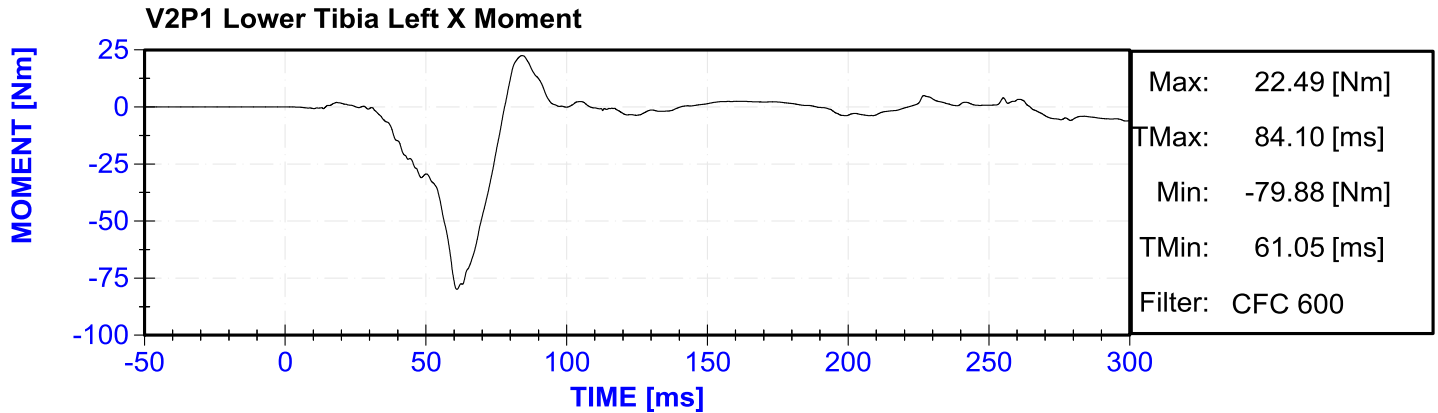


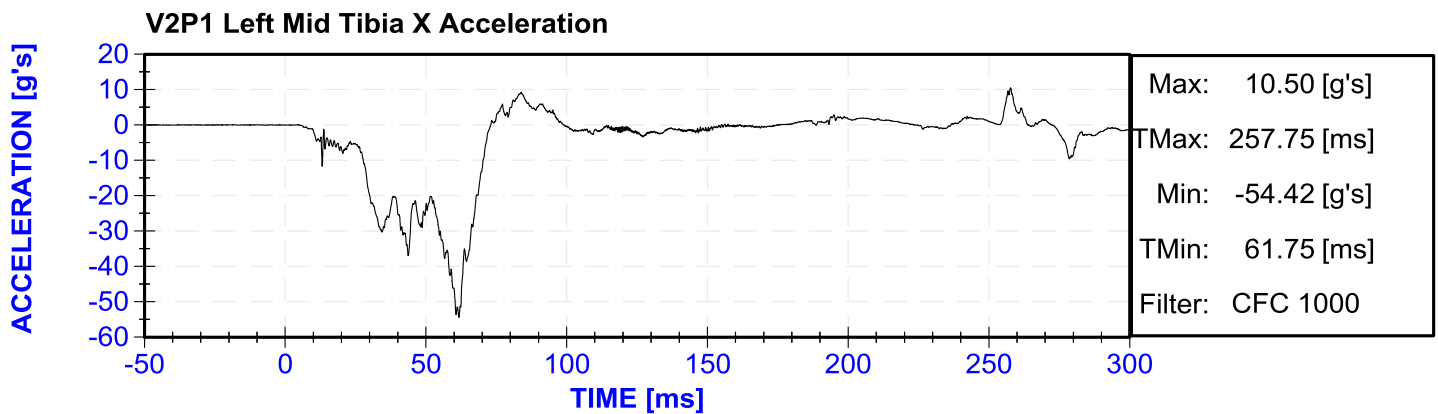
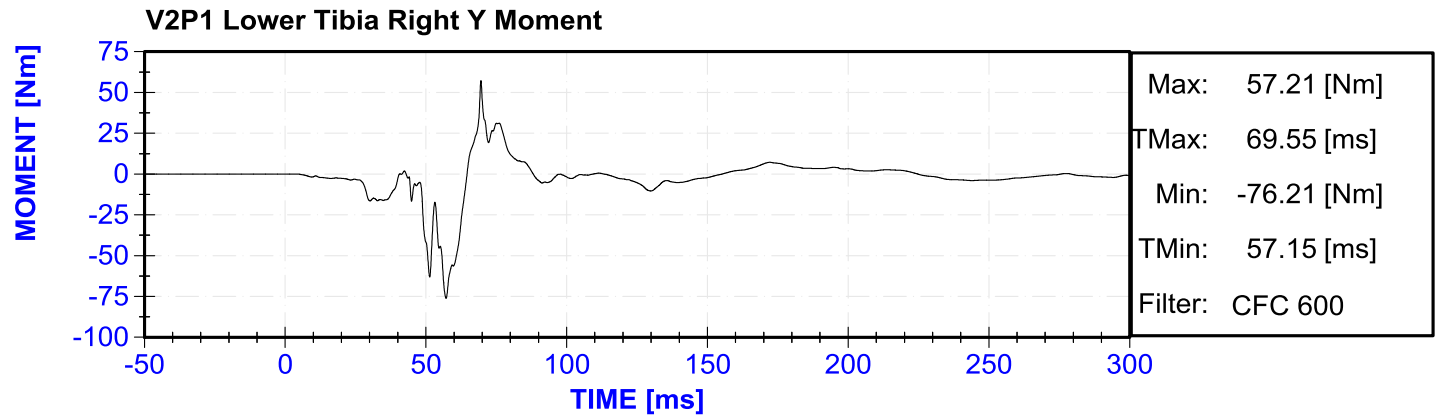
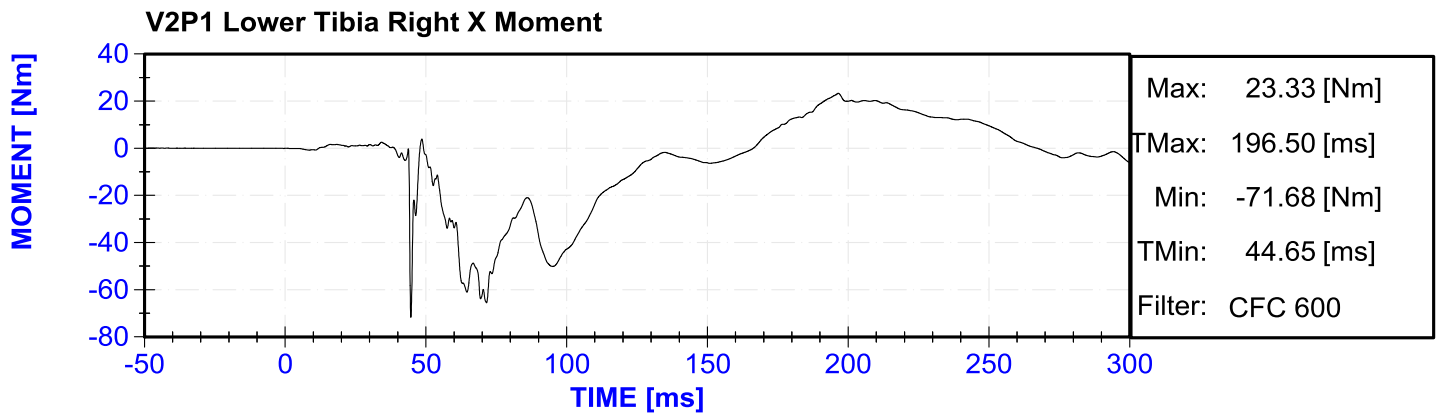
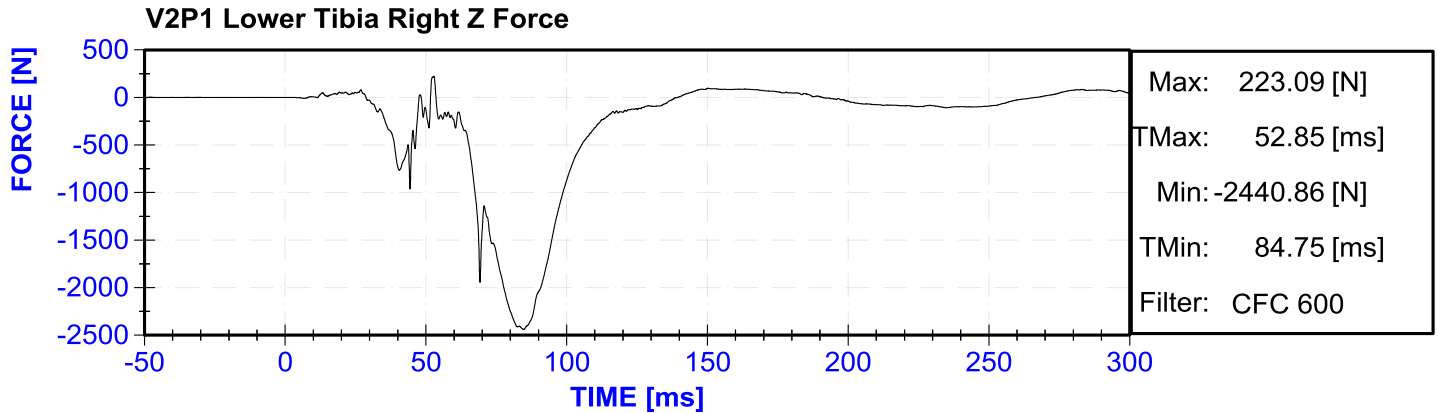


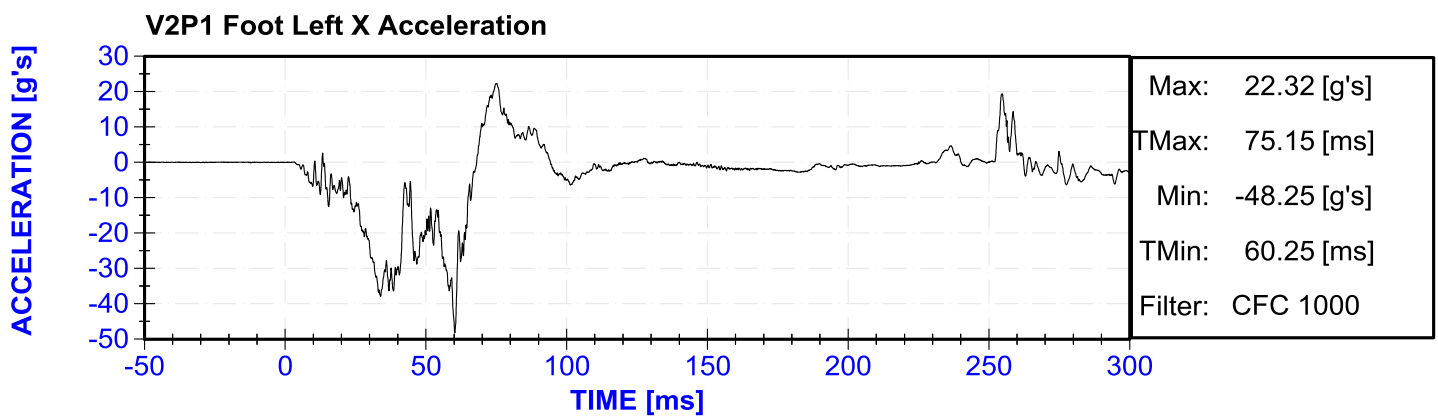
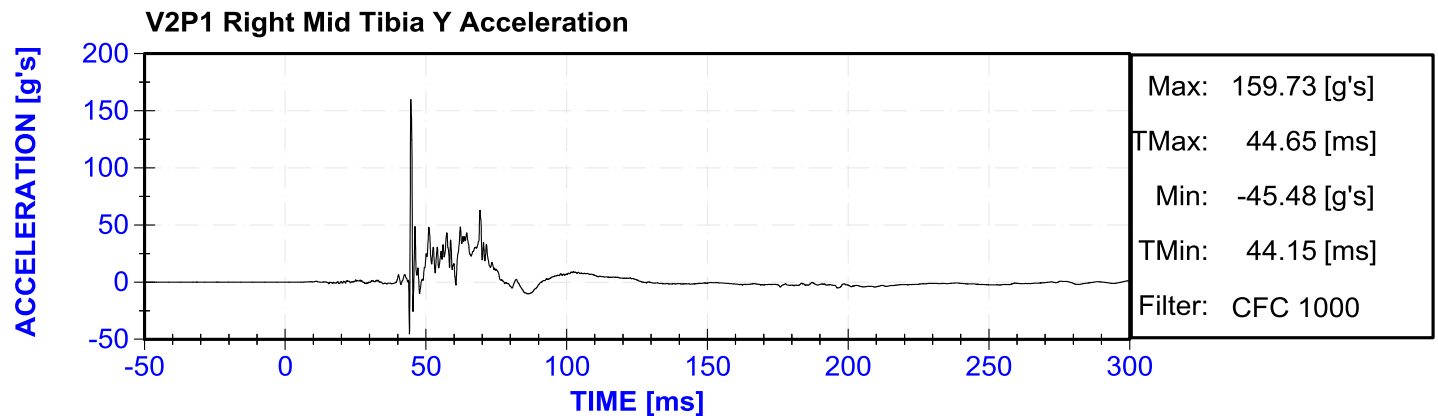
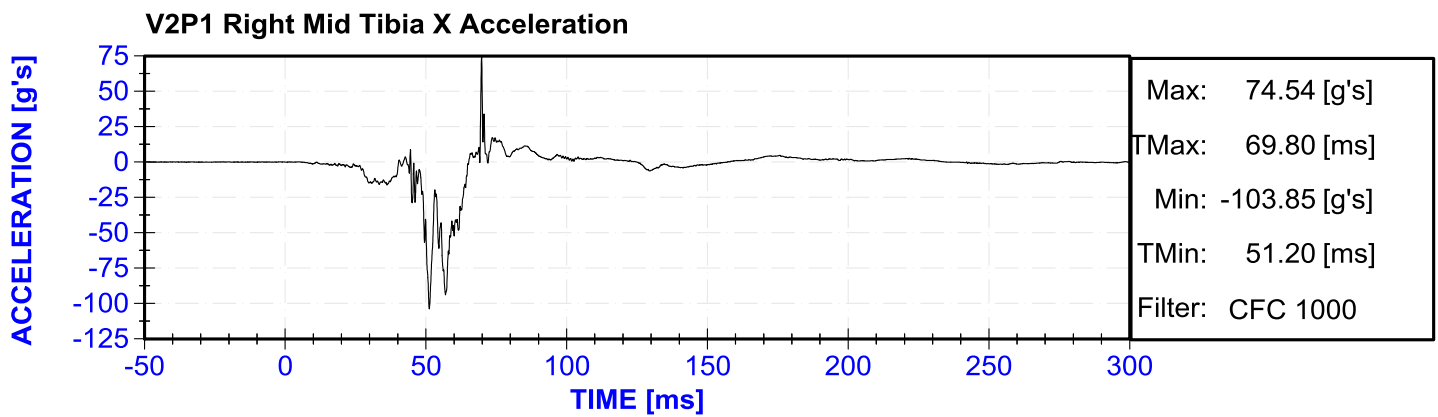
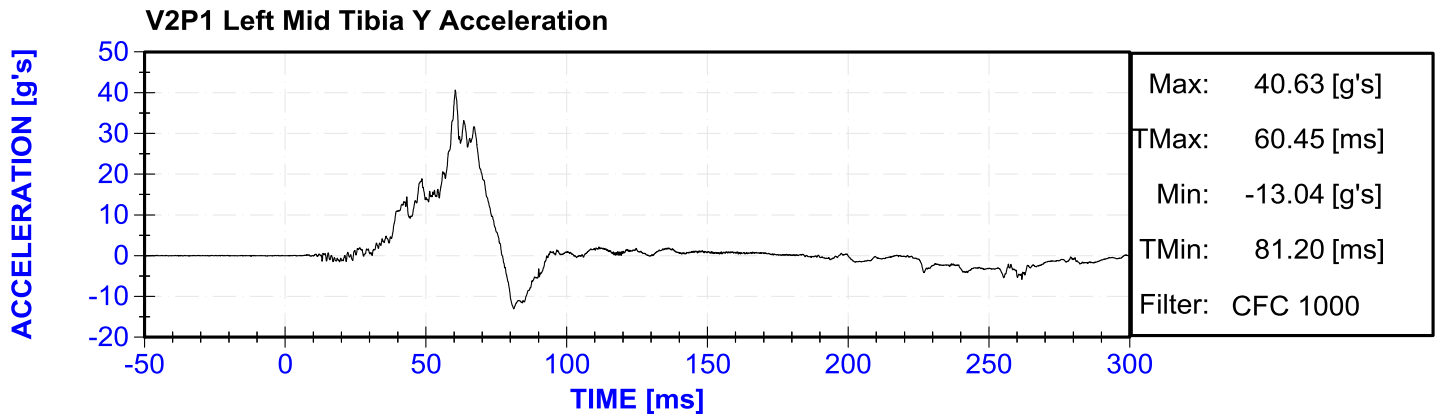


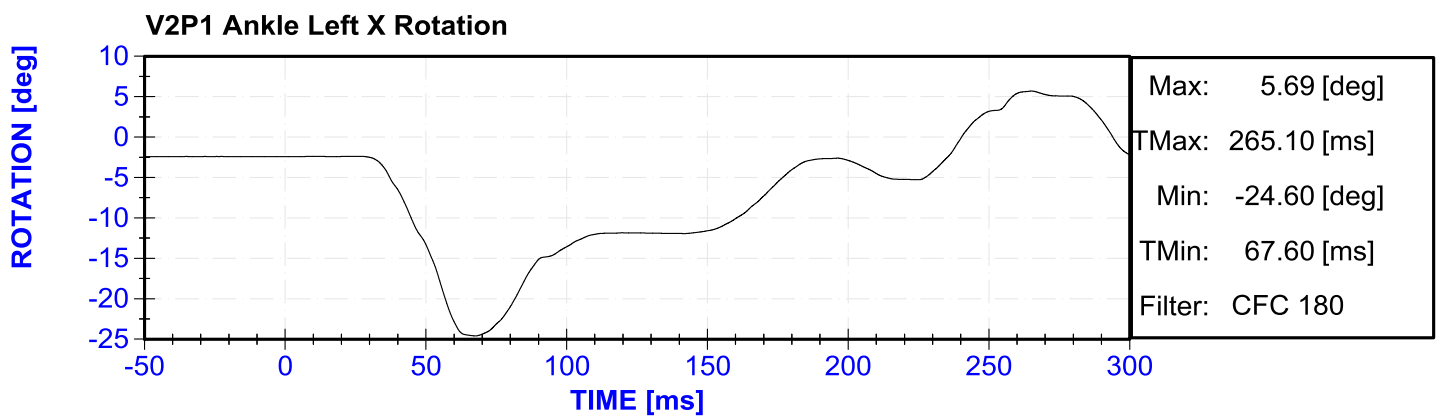
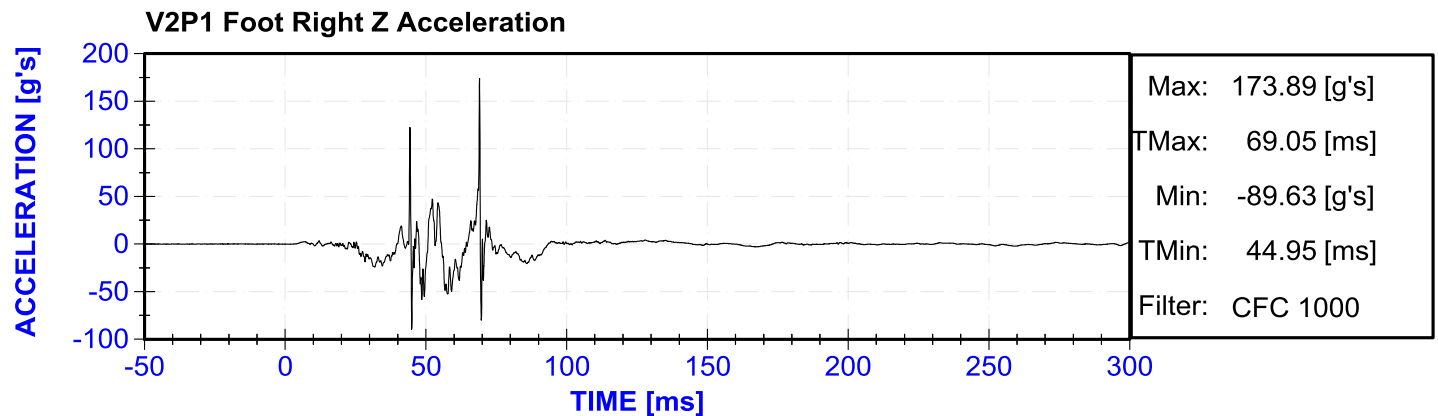
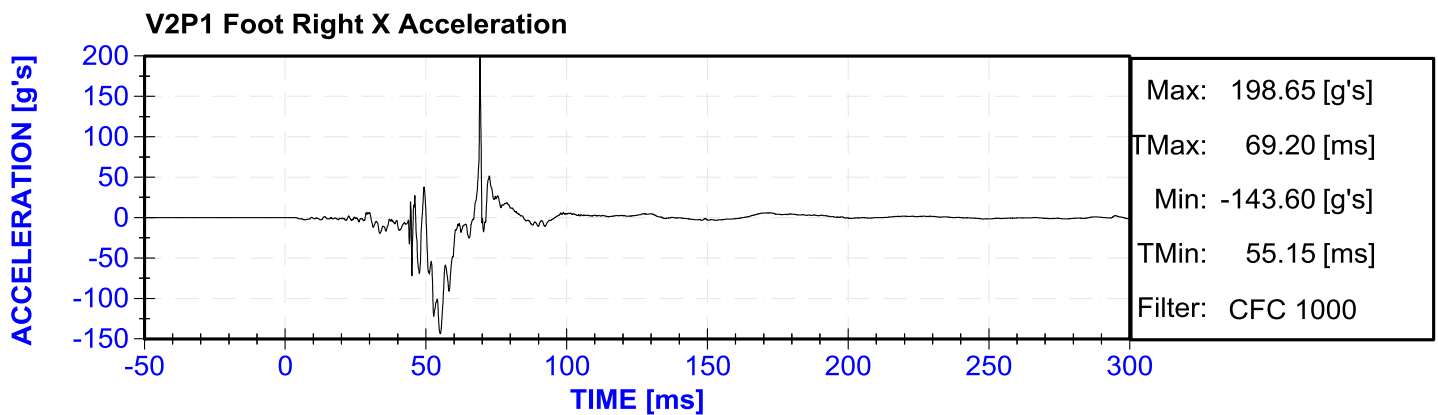
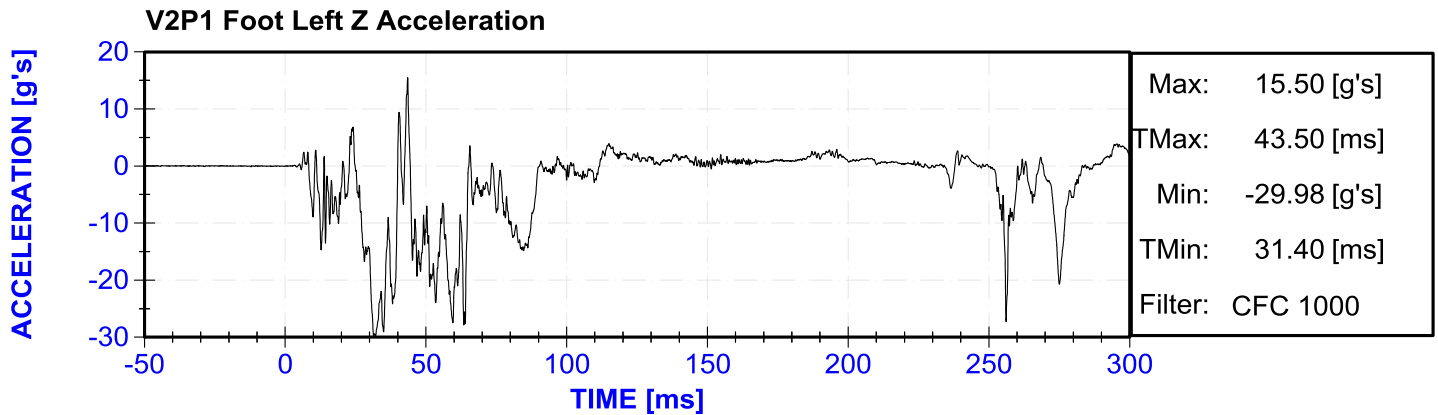


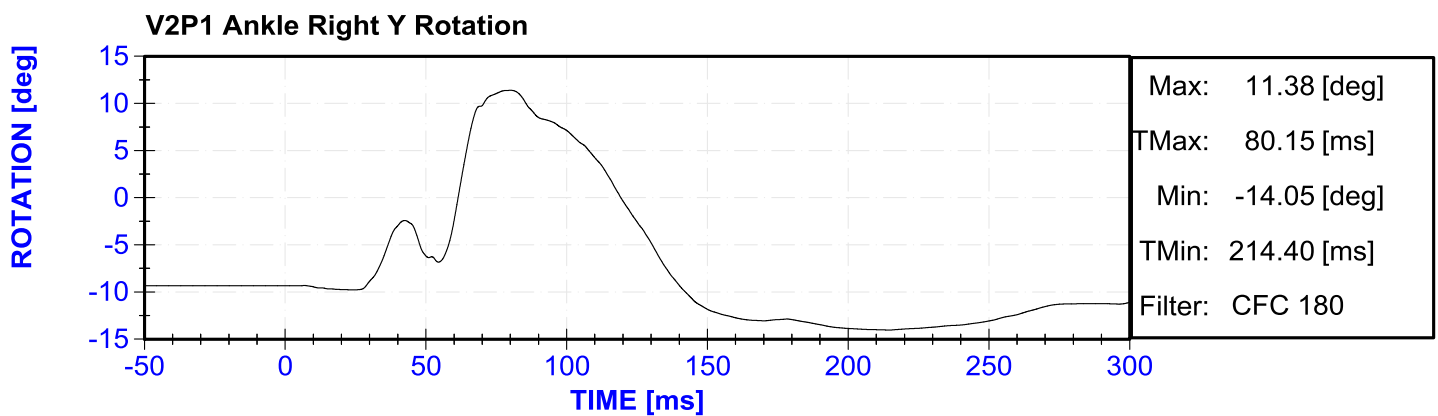
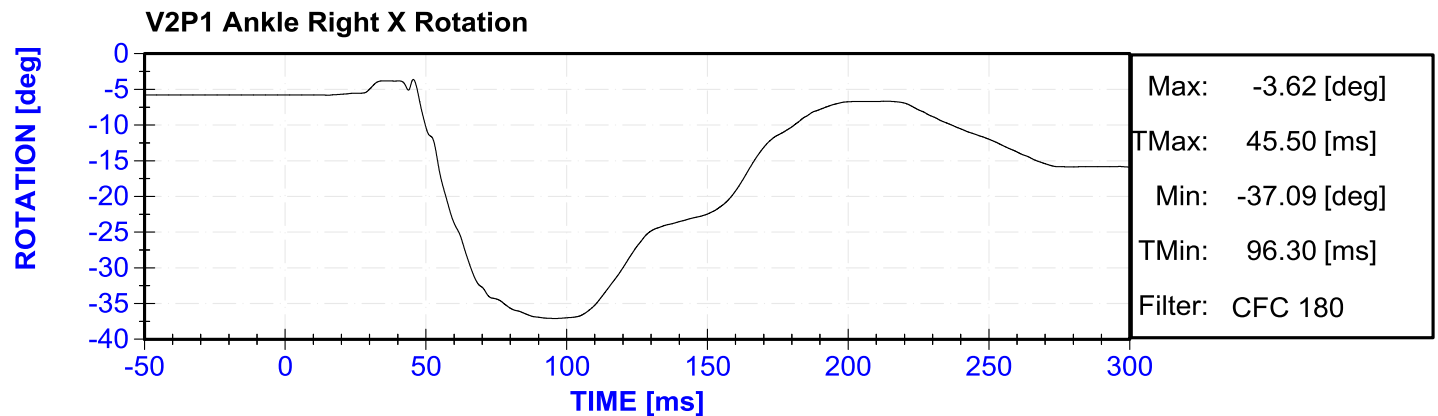
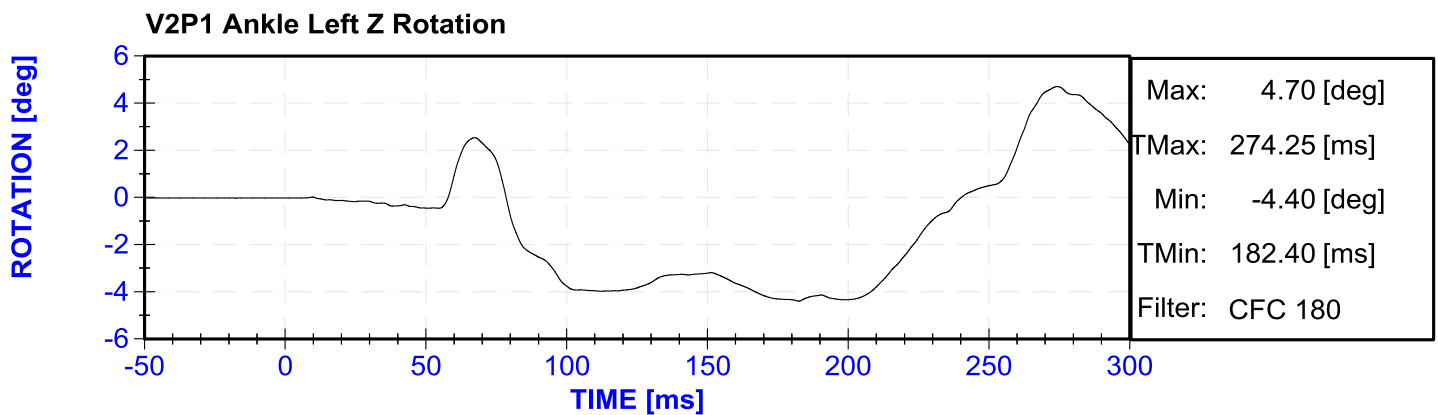
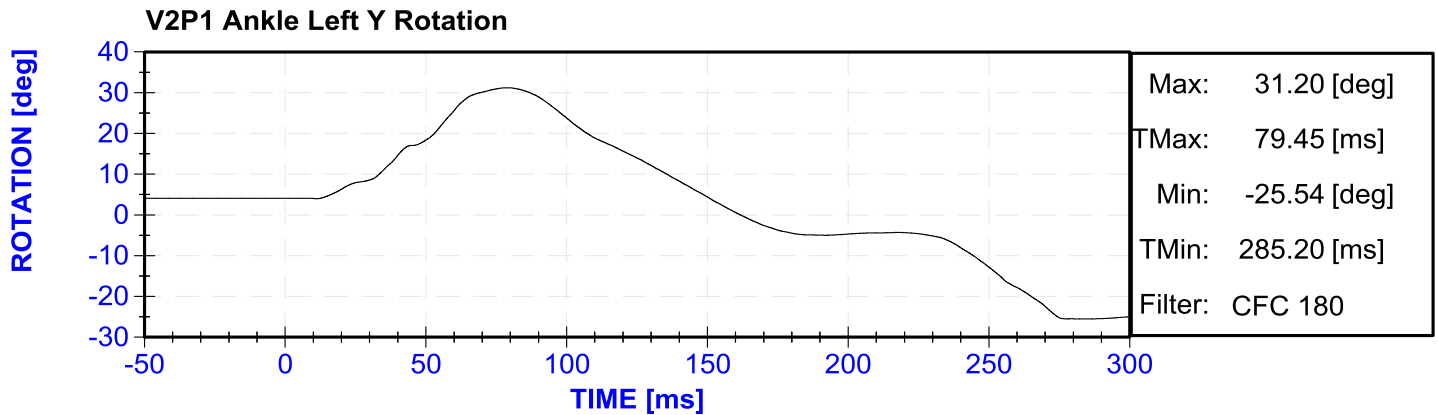


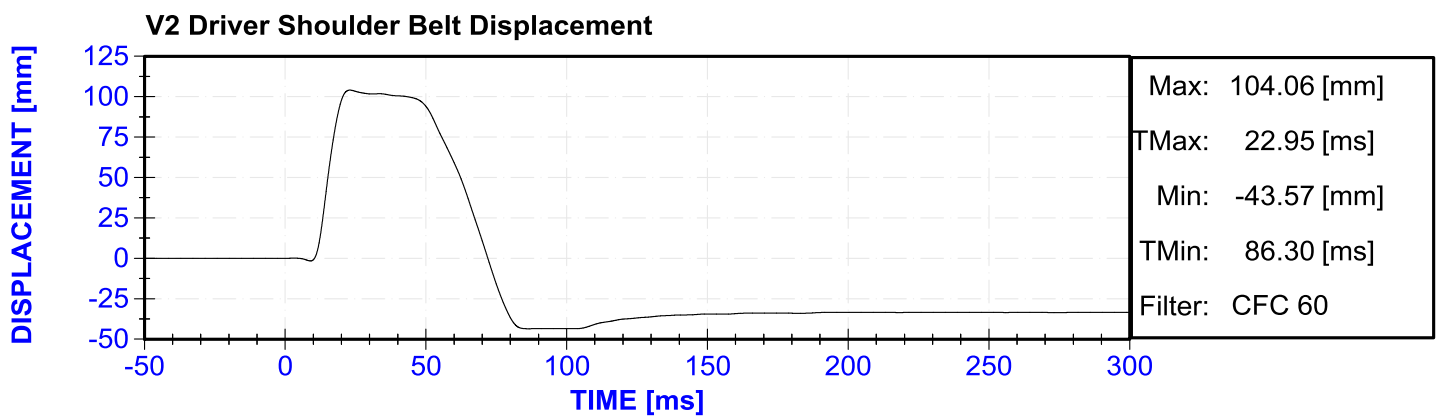
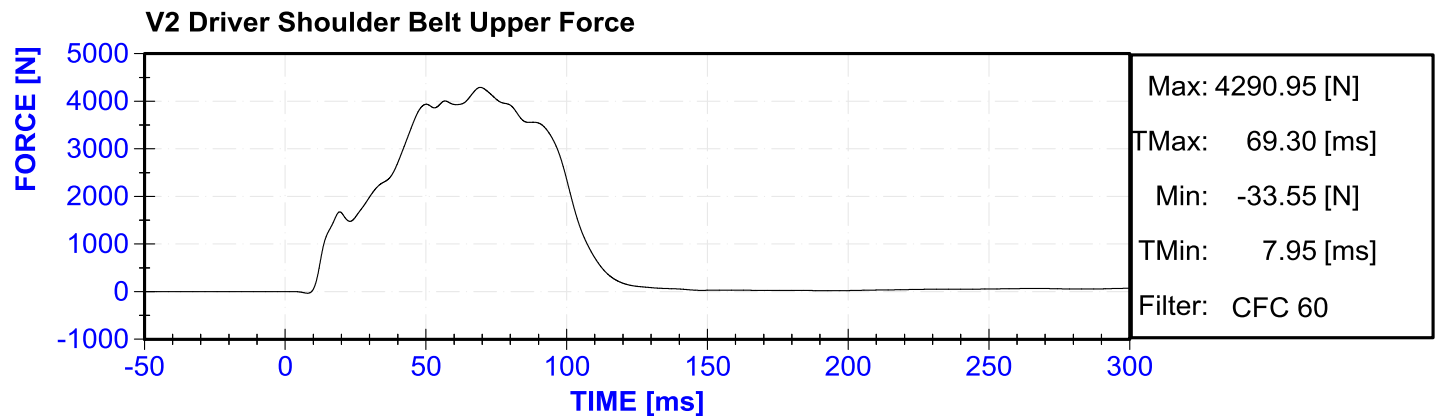
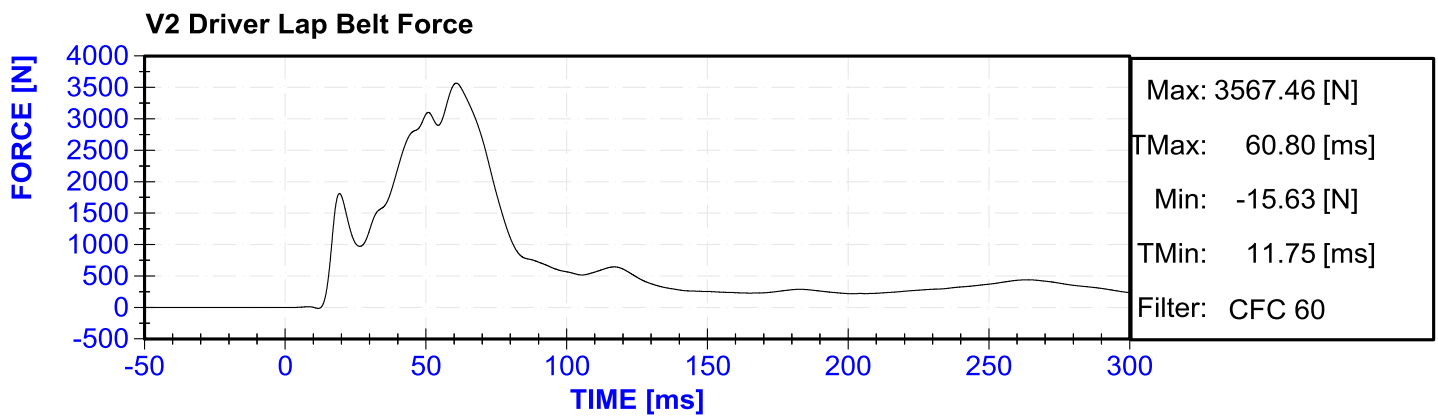
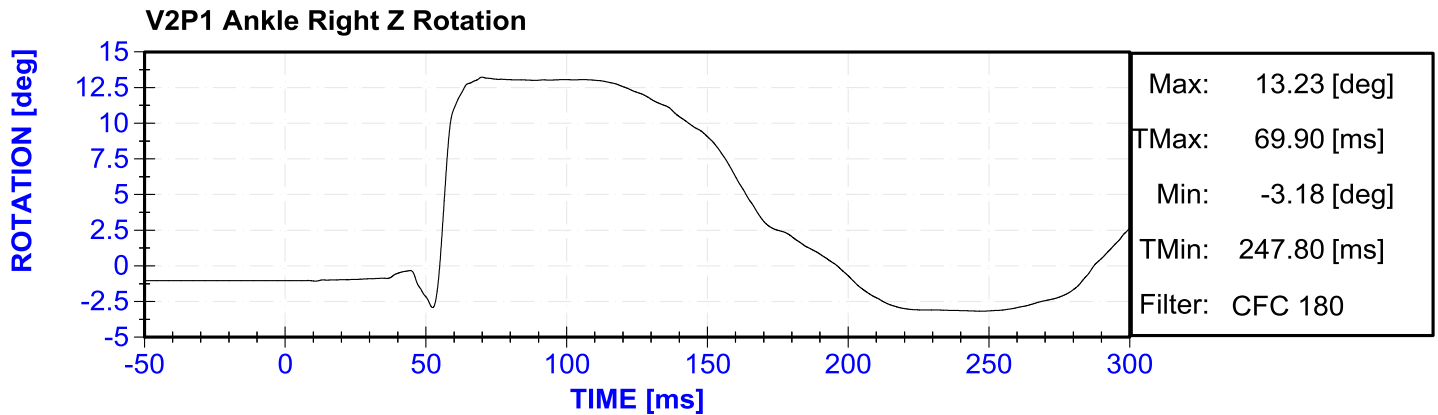


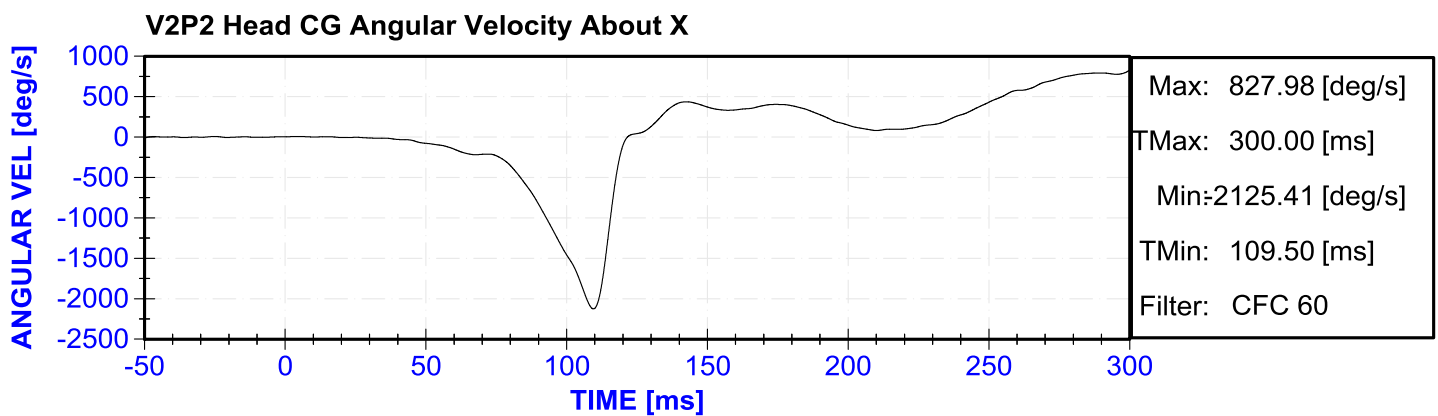
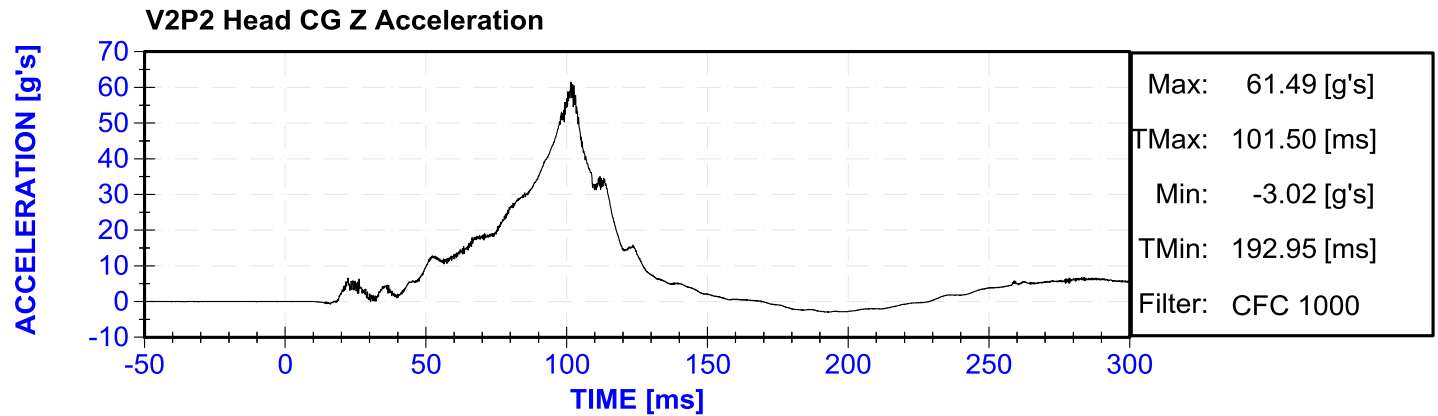
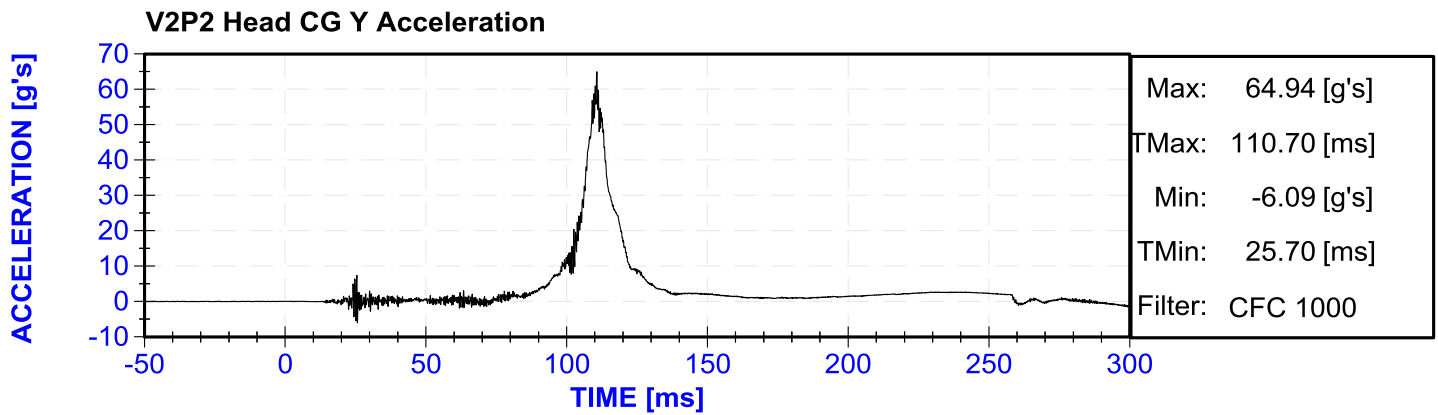
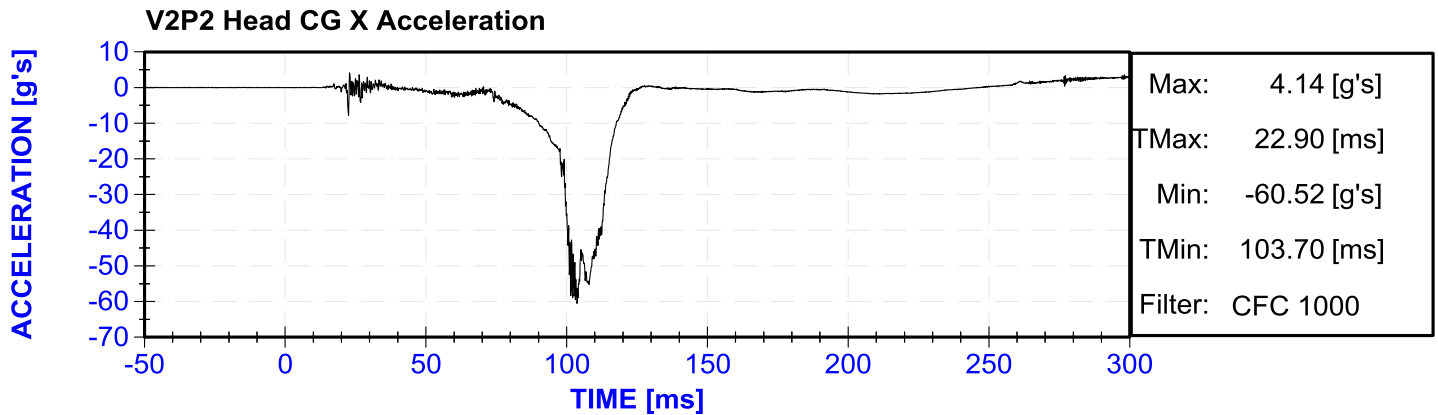


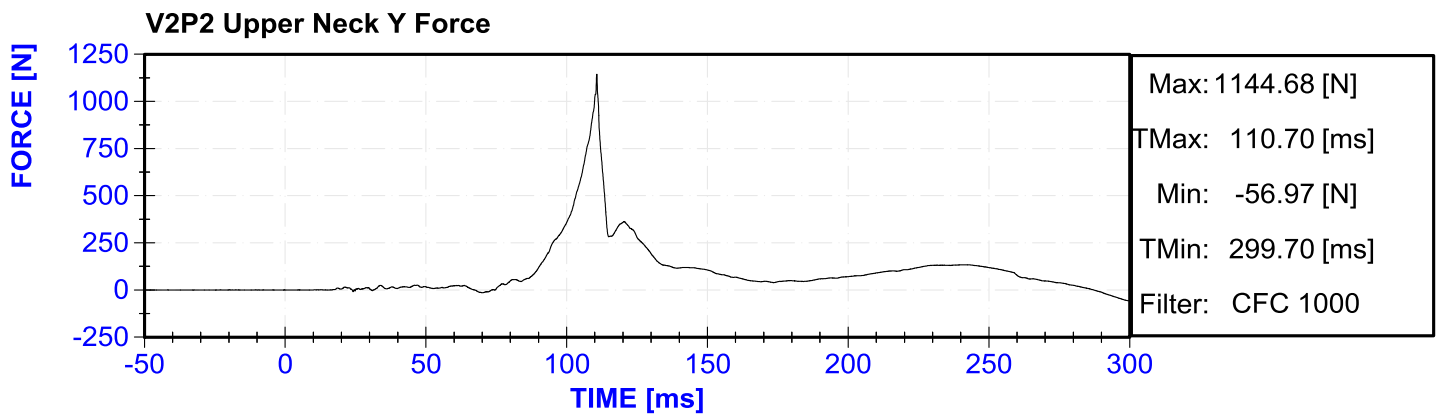
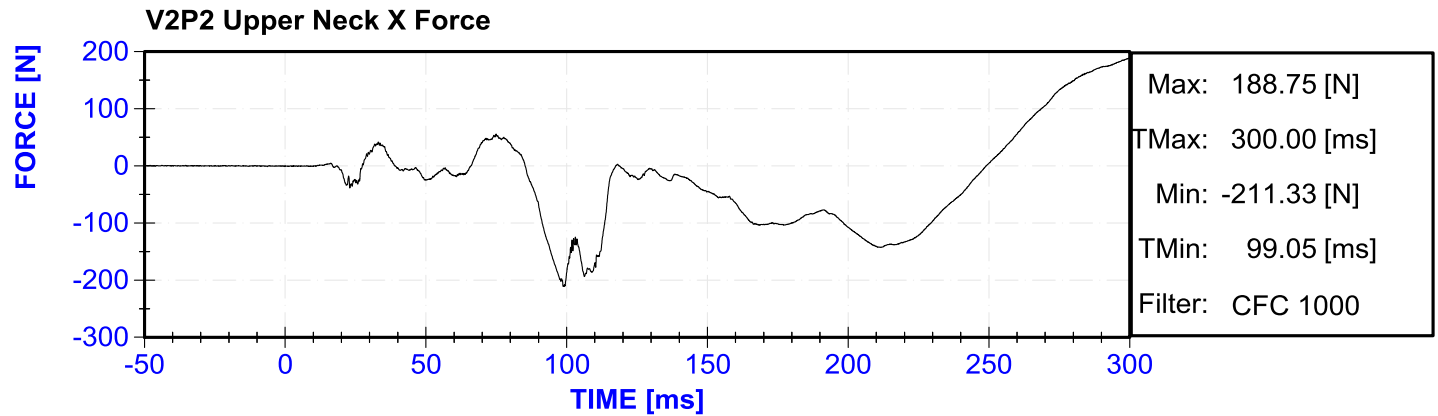
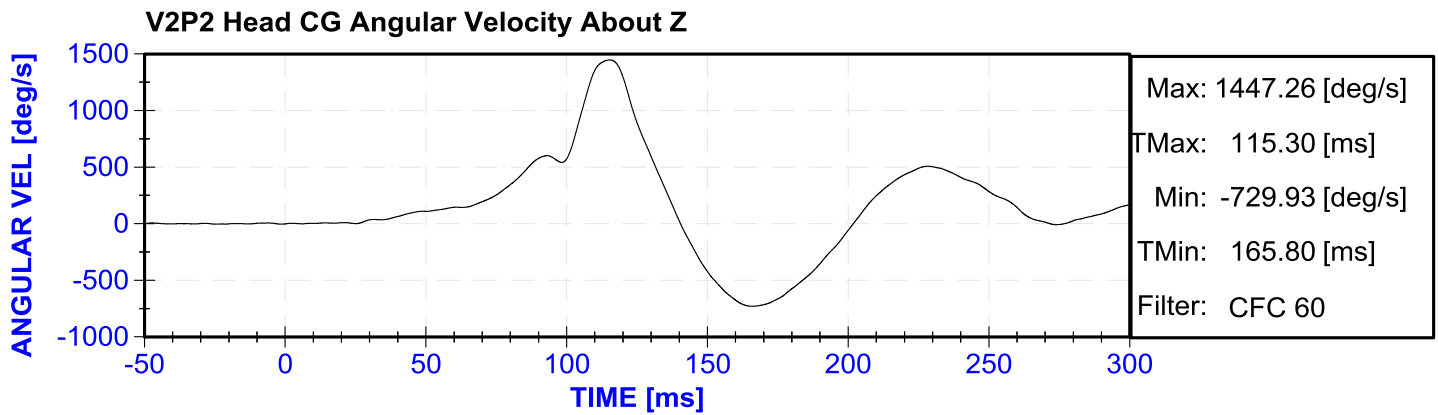
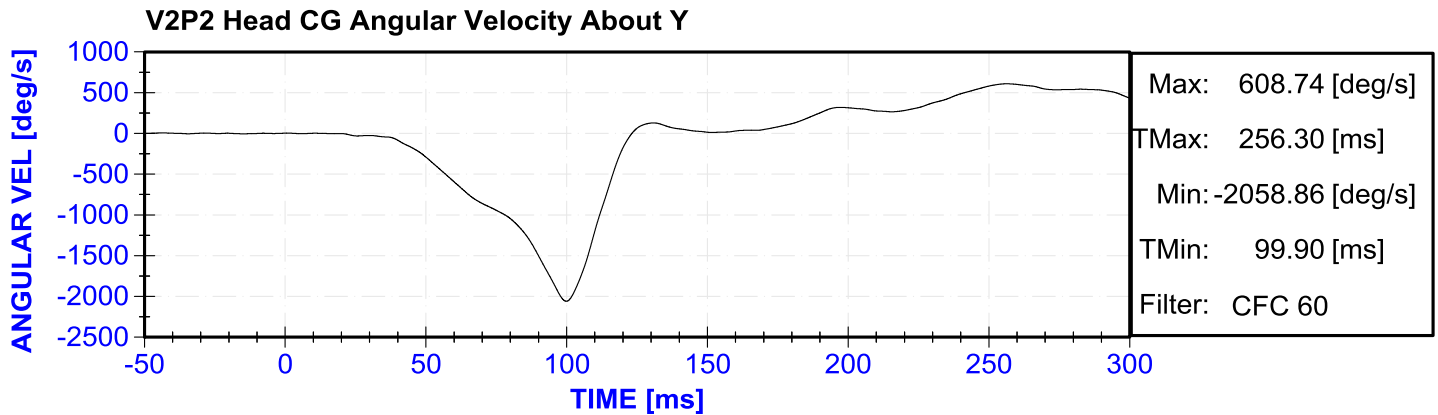


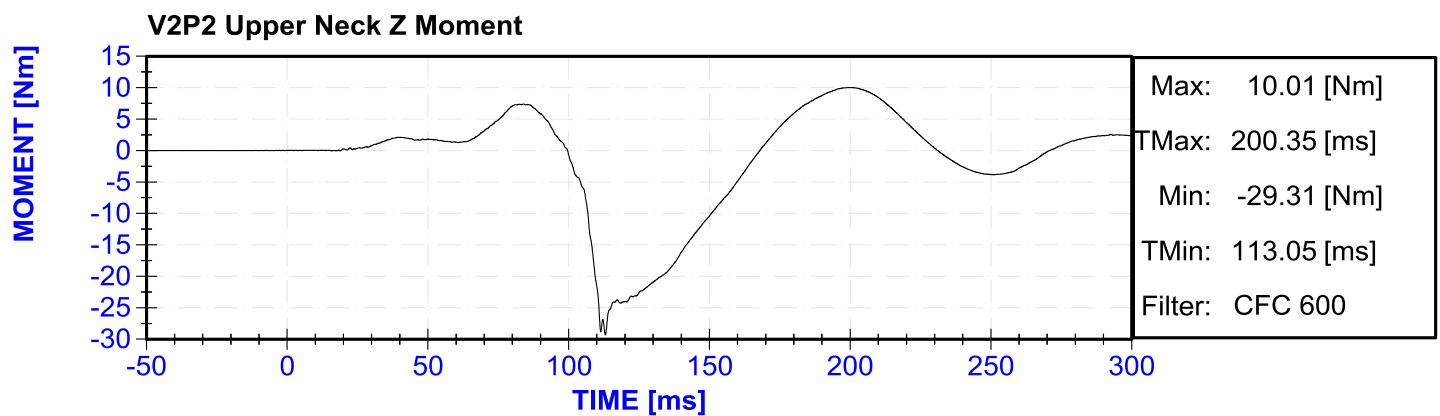
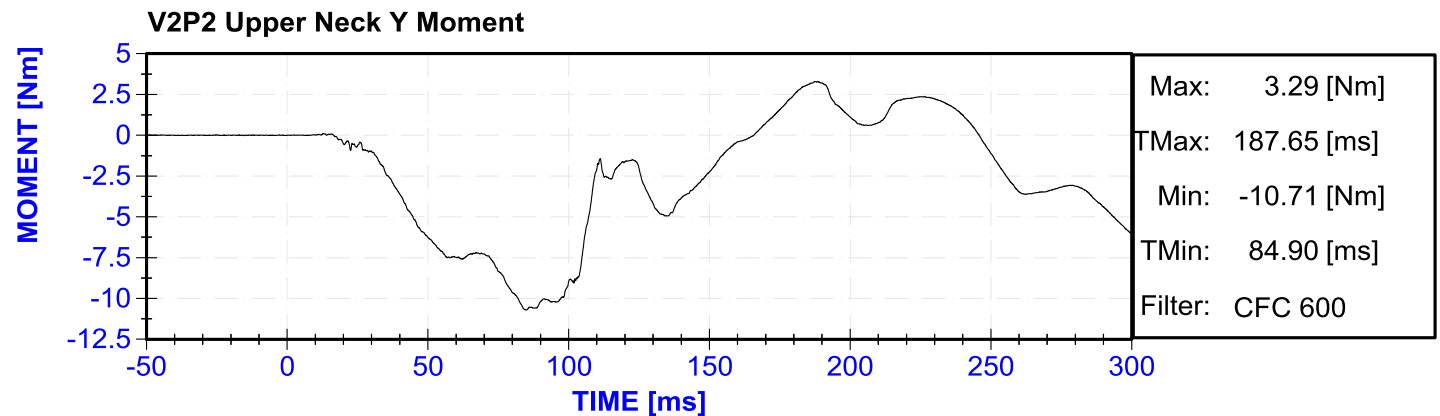
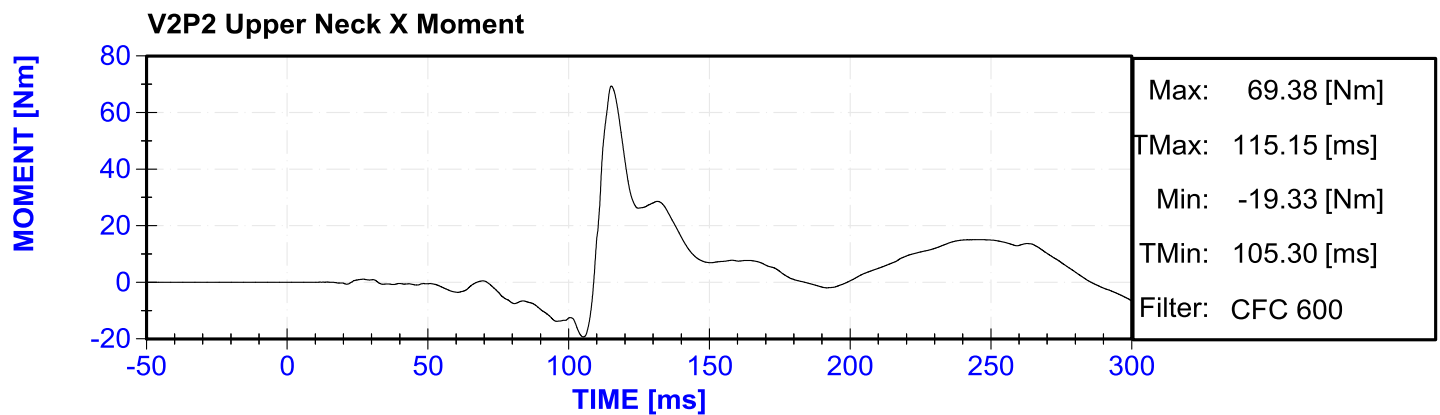
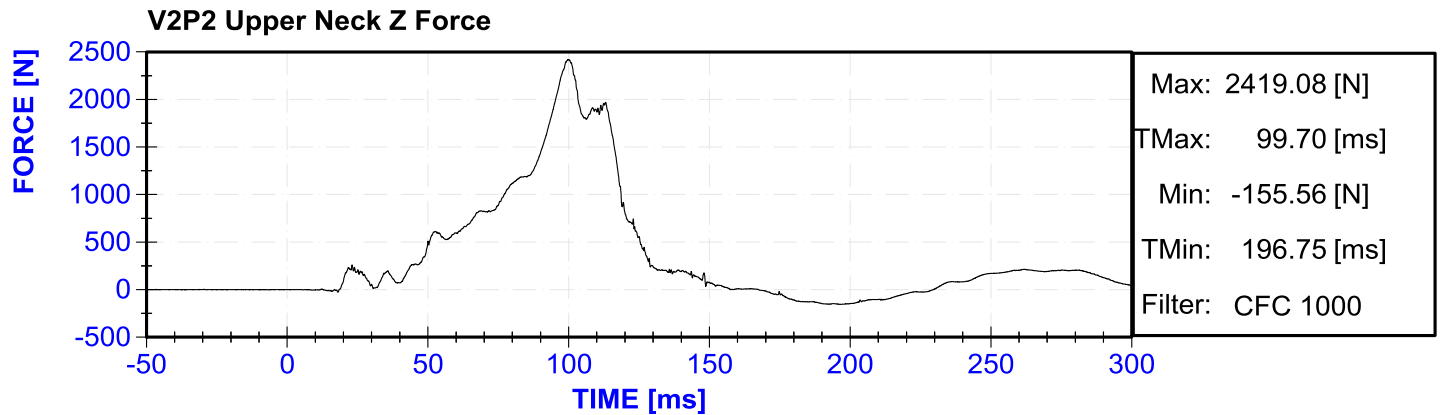


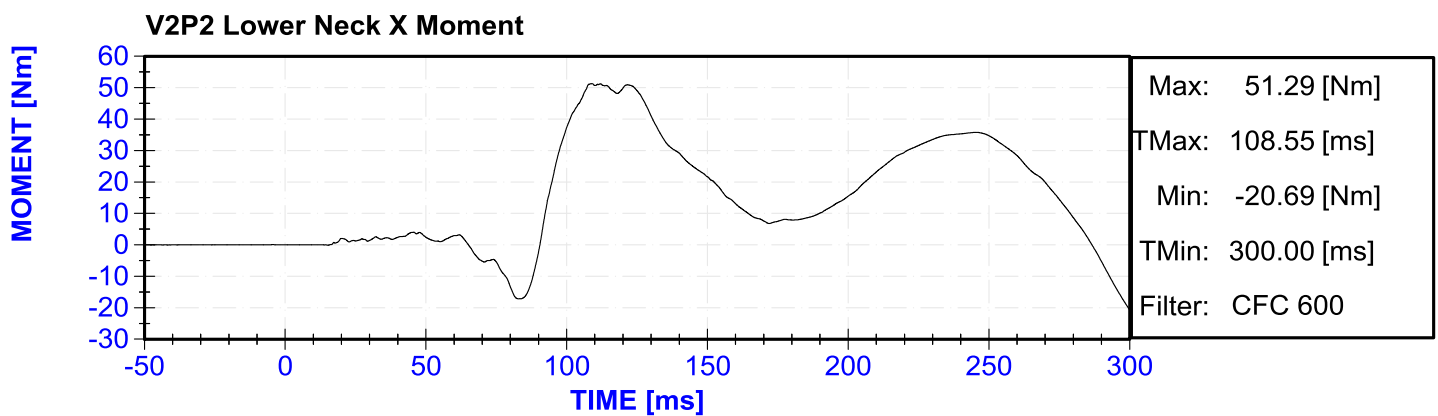
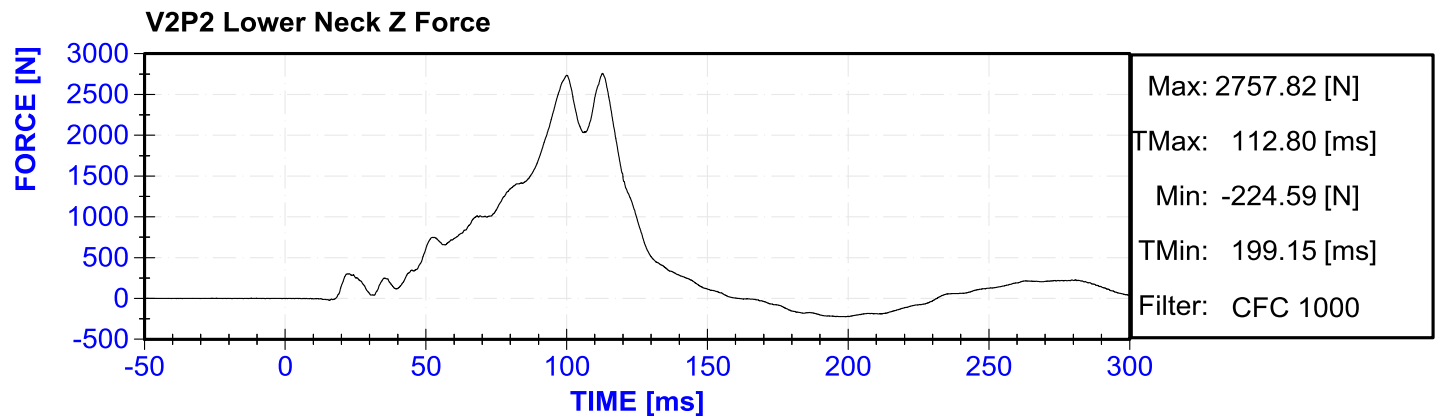
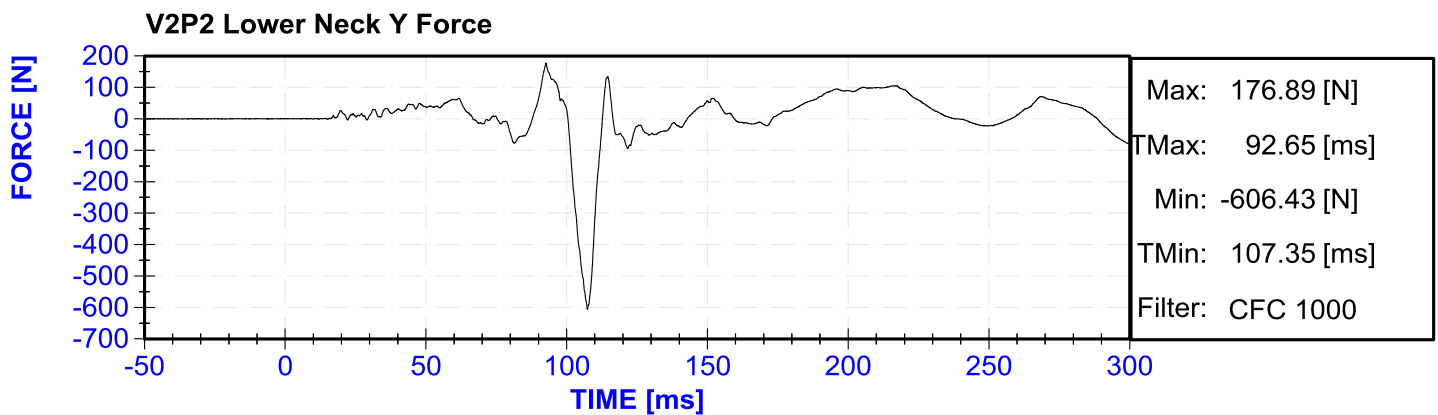
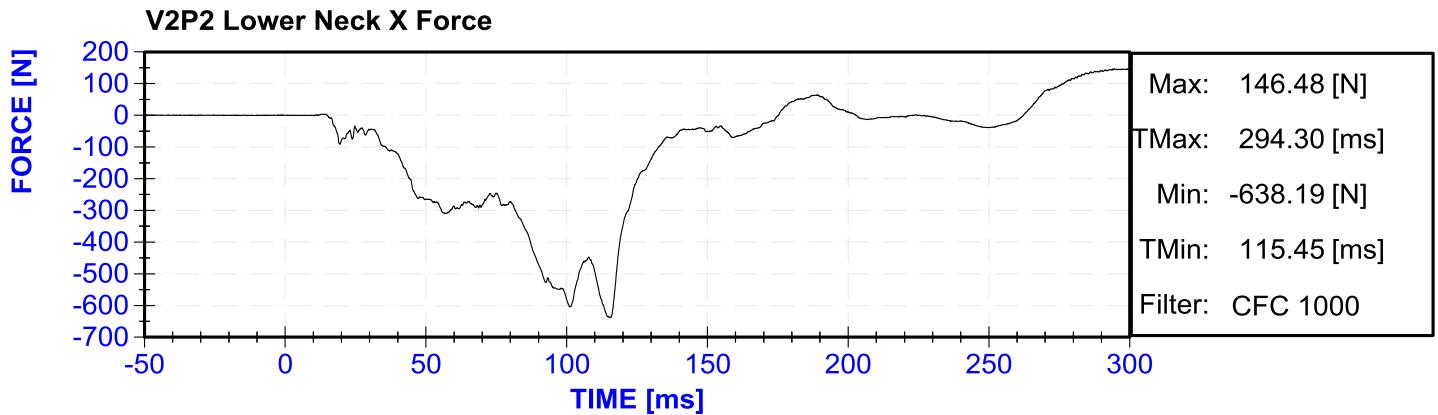


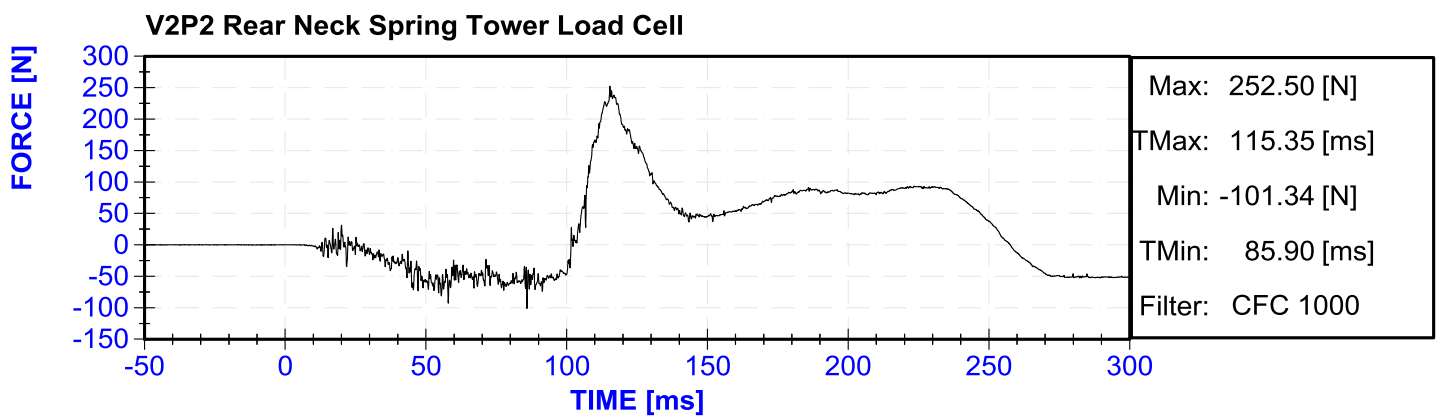
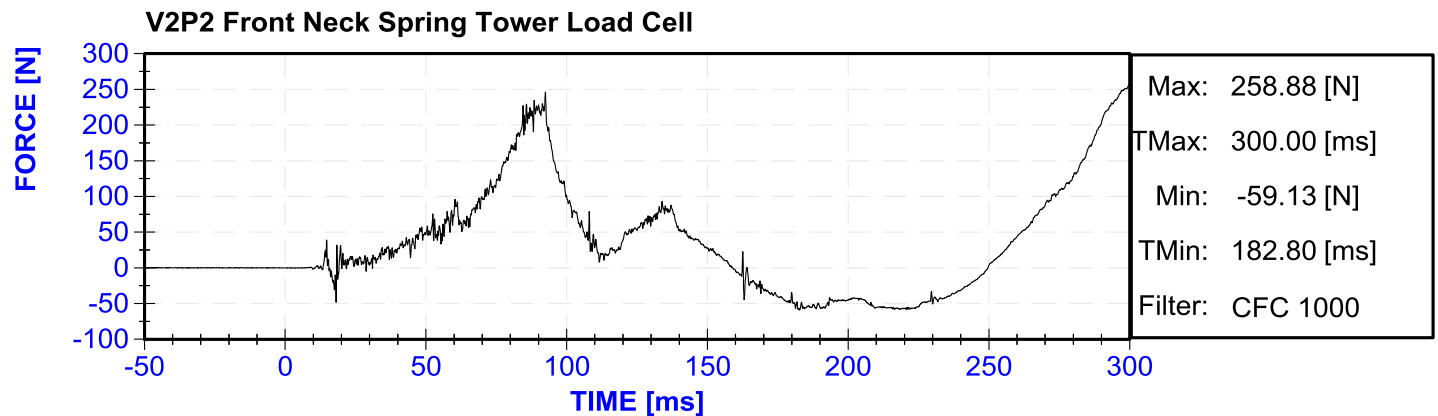
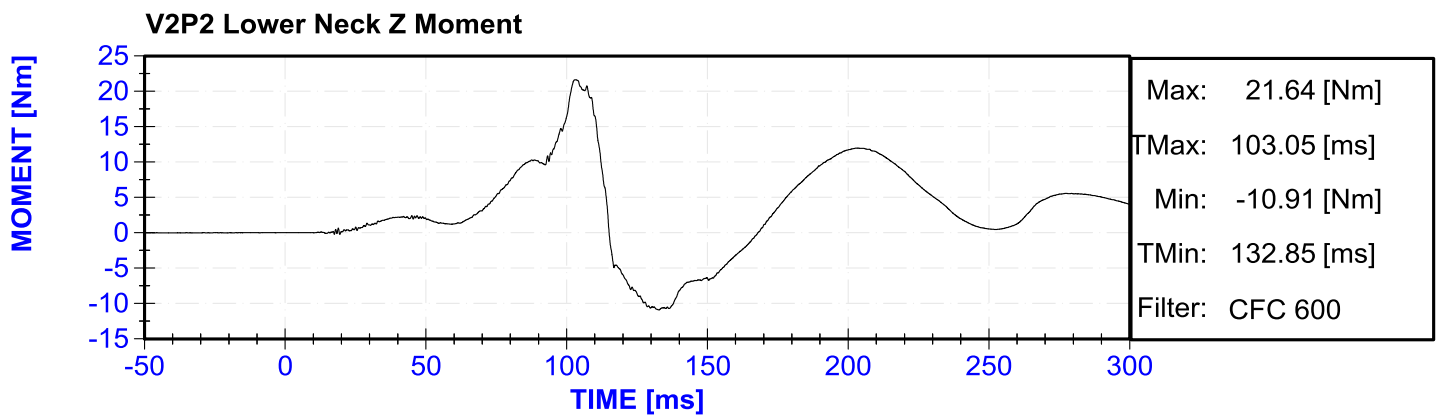
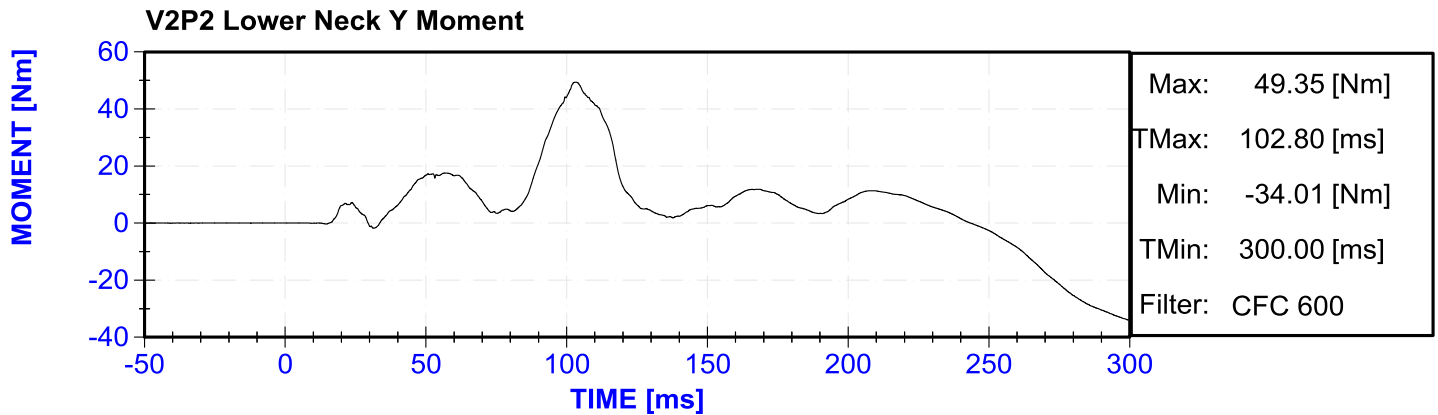




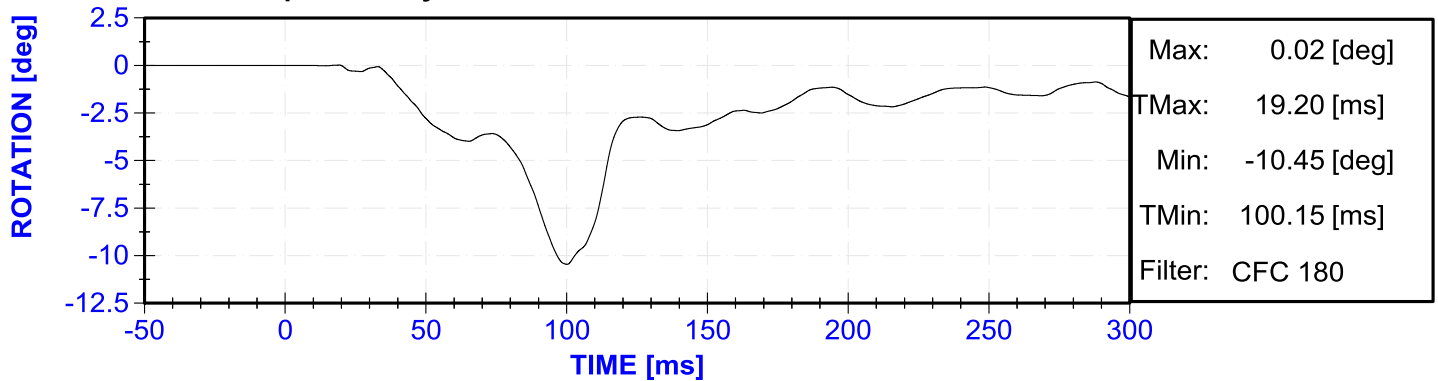




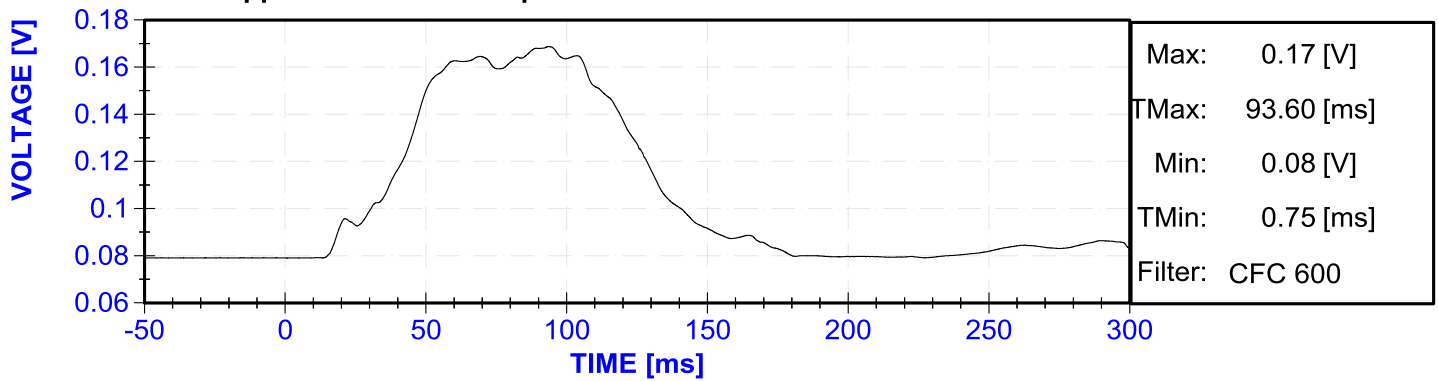




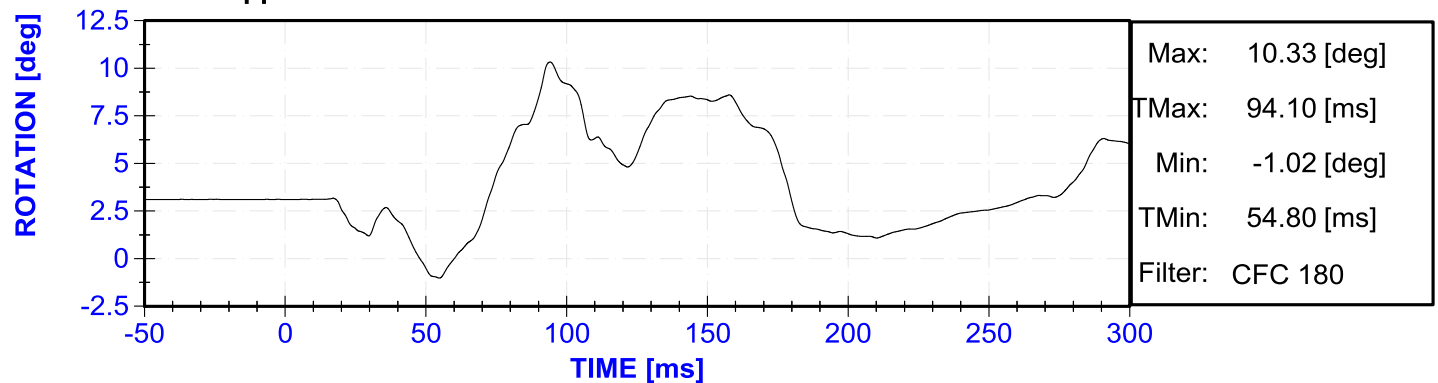
V2P2 Occipital Condyle Rotation Potentiometer



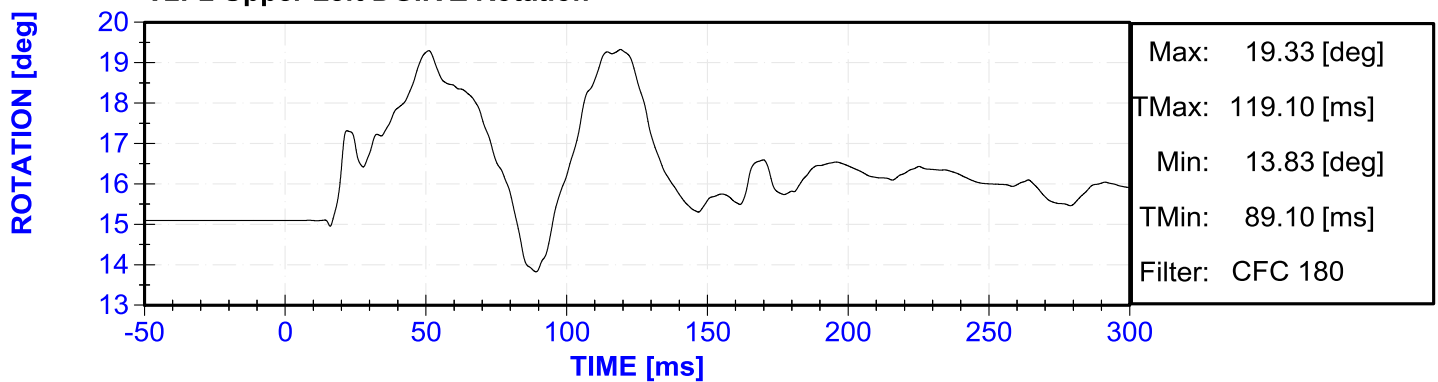
V2P2 Upper Left DGIR X Displacement



V2P2 Upper Left DGIR Y Rotation

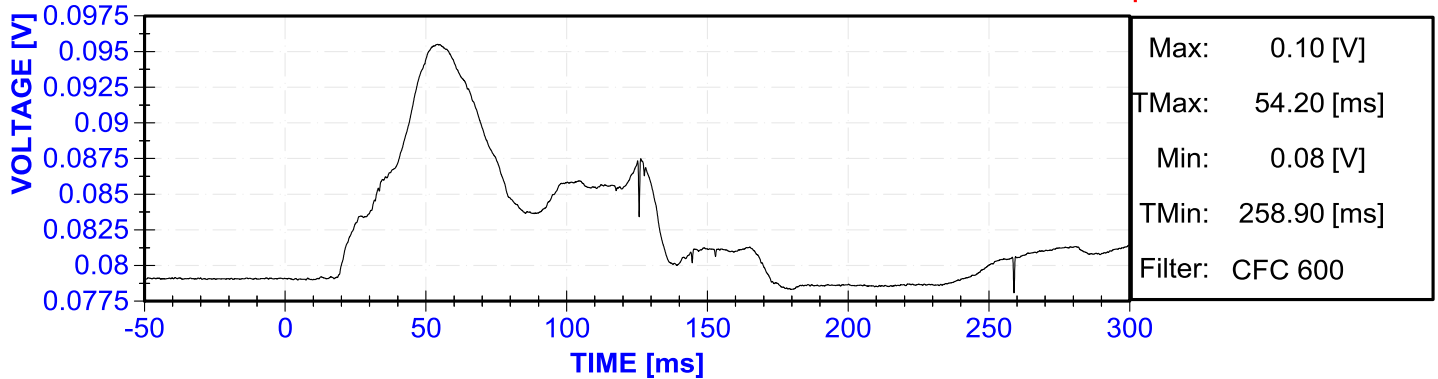


V2P2 Upper Left DGIR Z Rotation

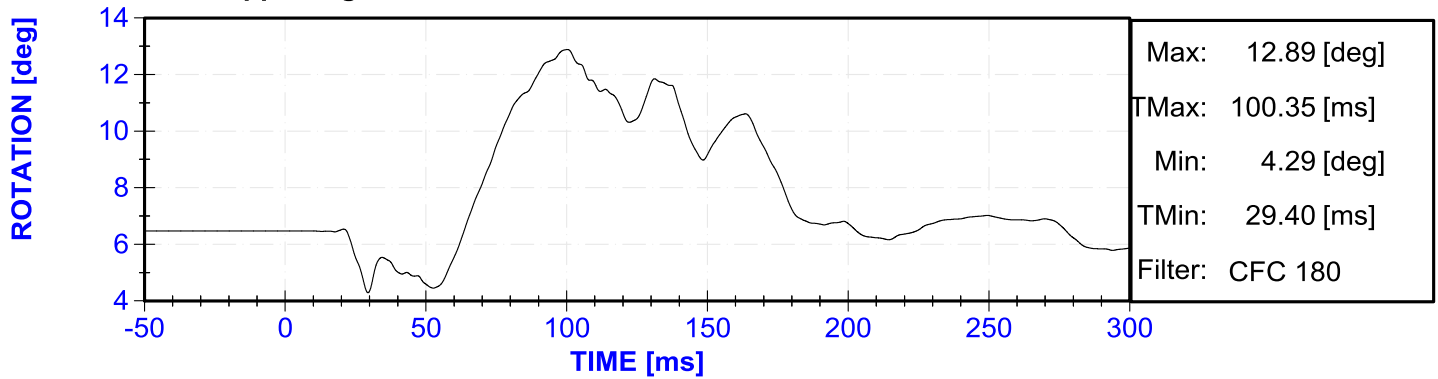


V2P2 Upper Right DGIR X Displacement

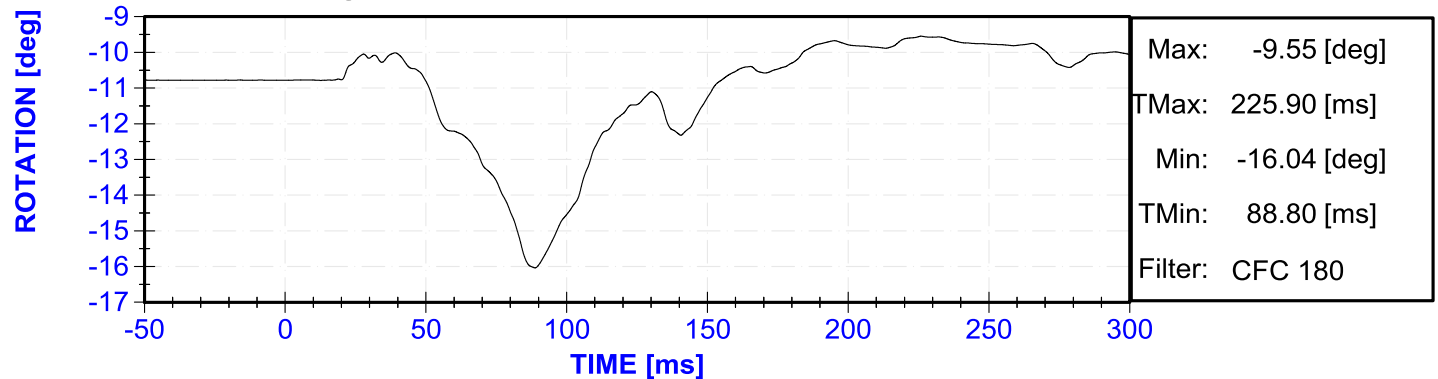
Questionable spike at 126ms and 259ms



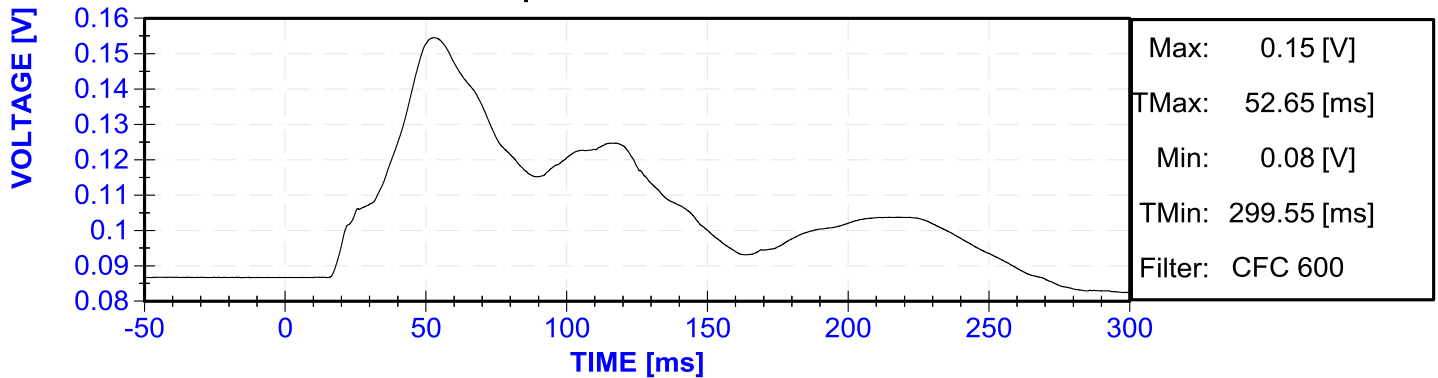
V2P2 Upper Right DGIR Y Rotation

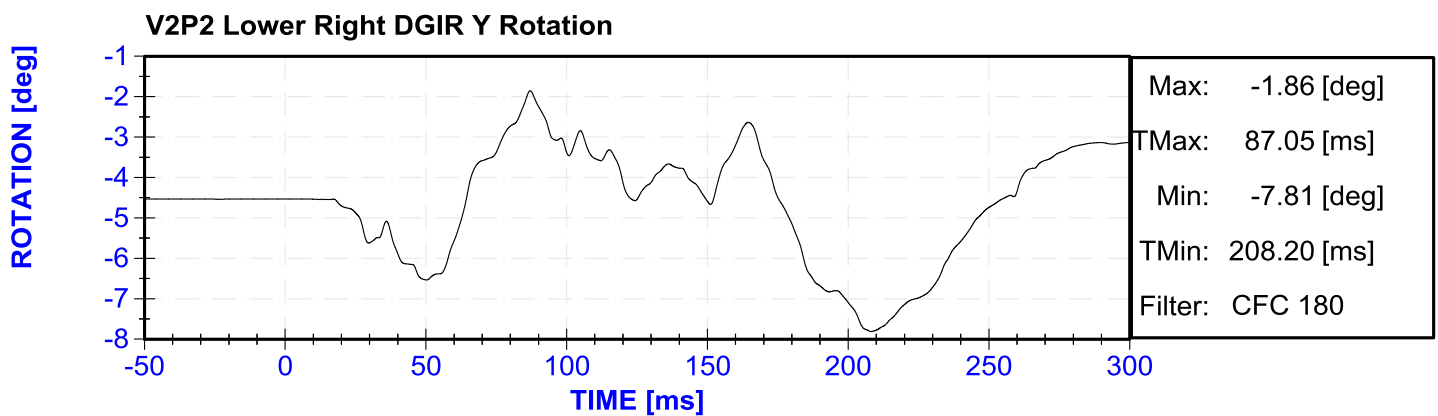
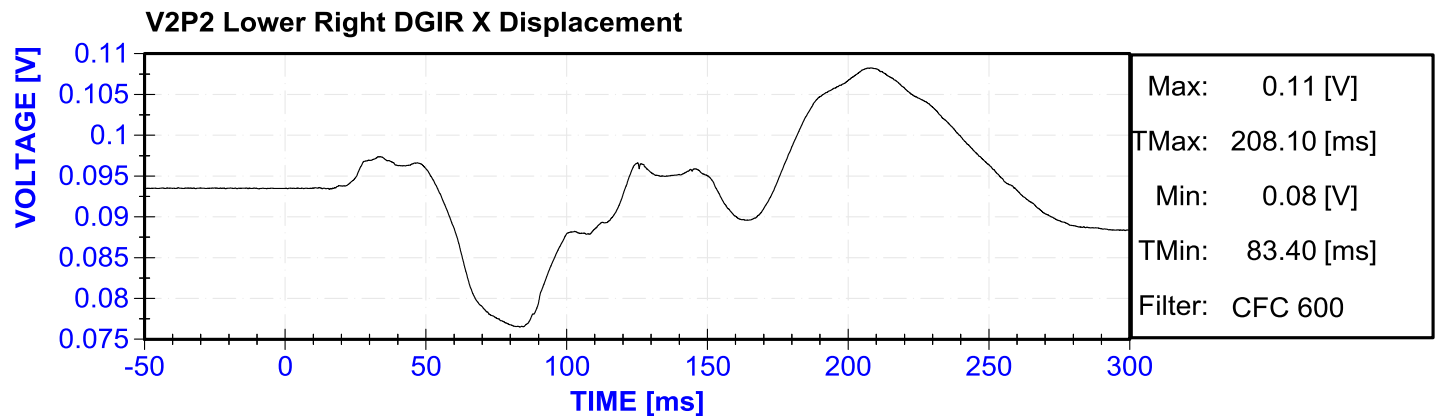
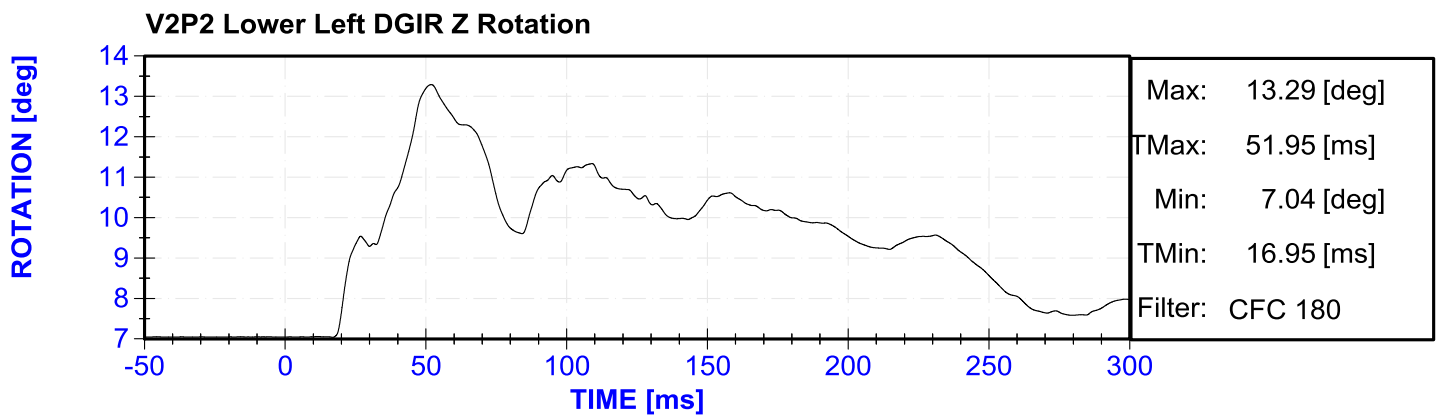
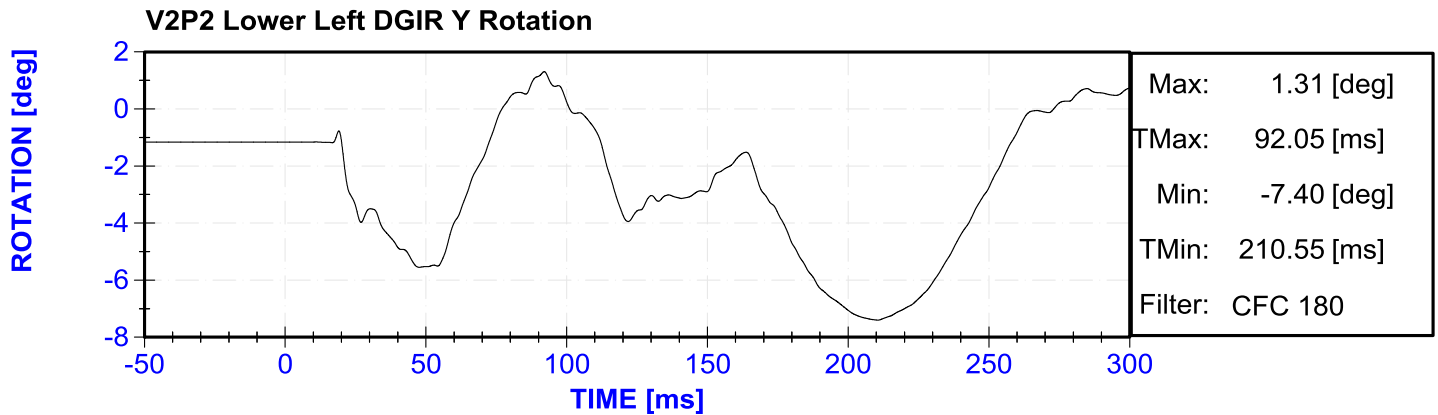


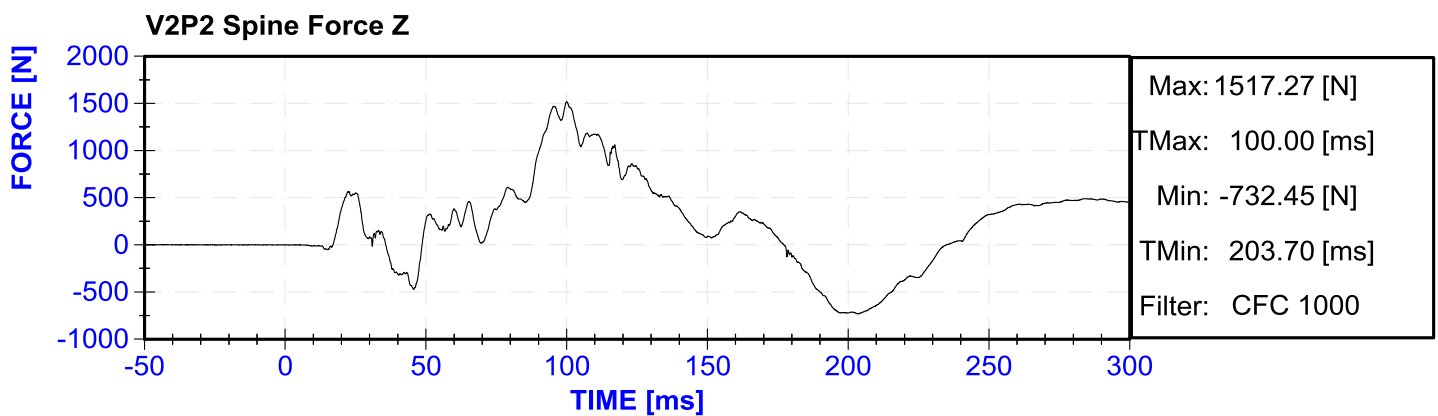
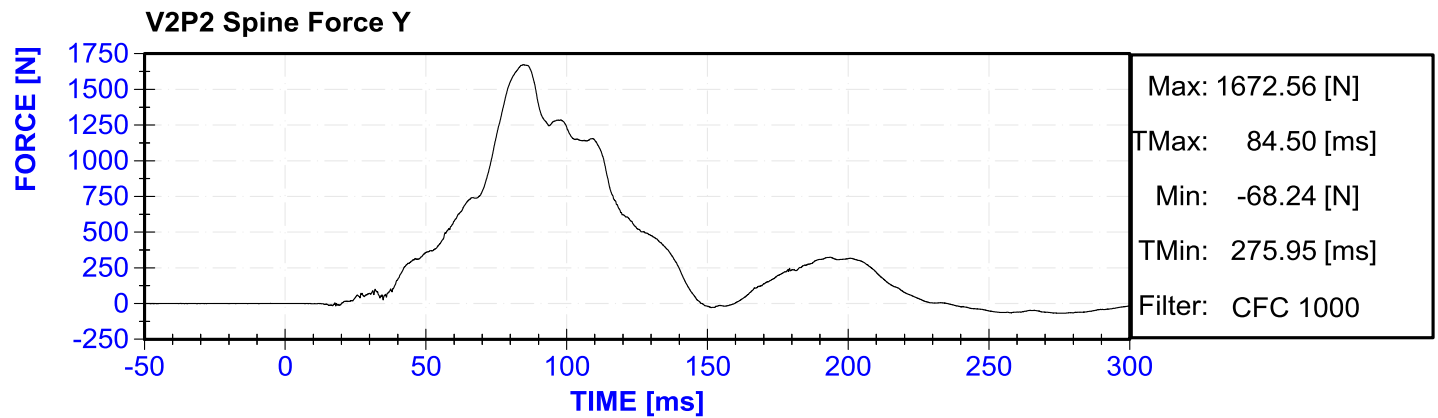
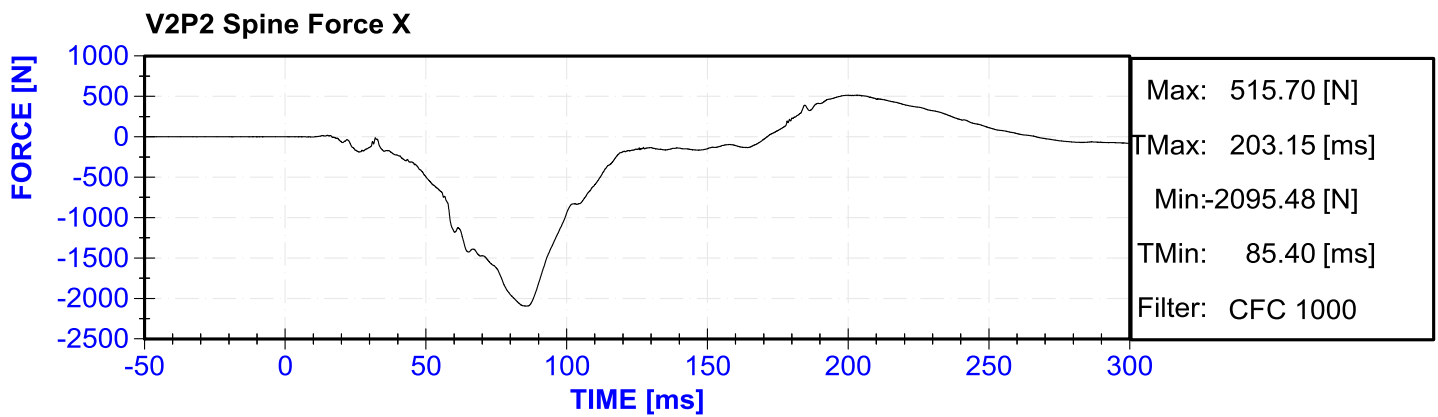
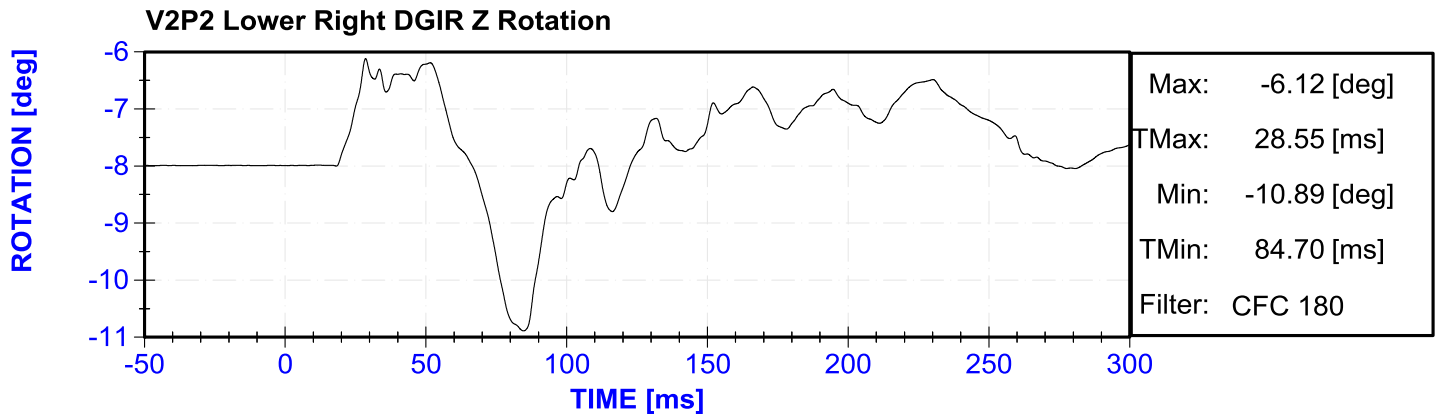
V2P2 Upper Right DGIR Z Rotation

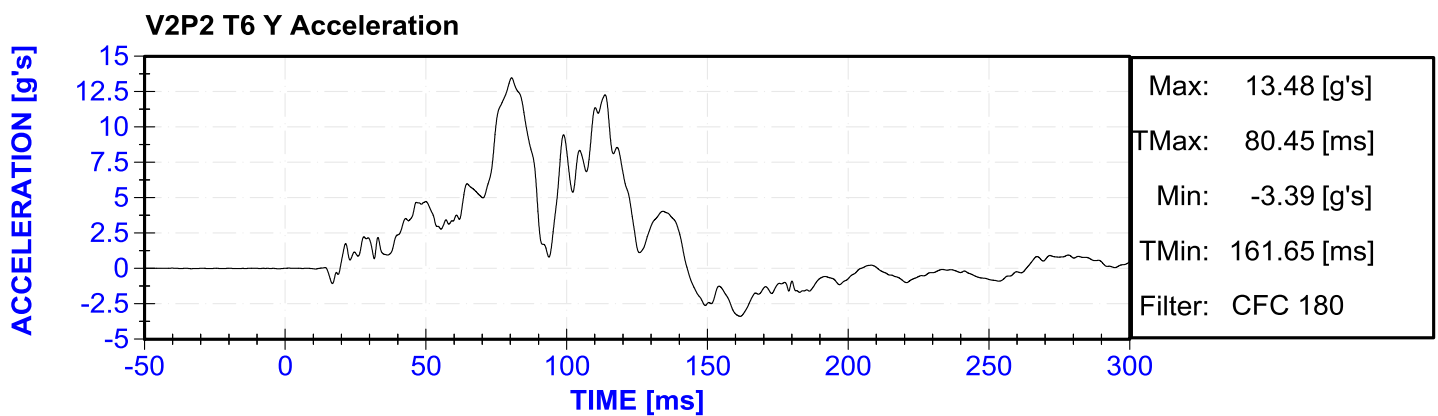
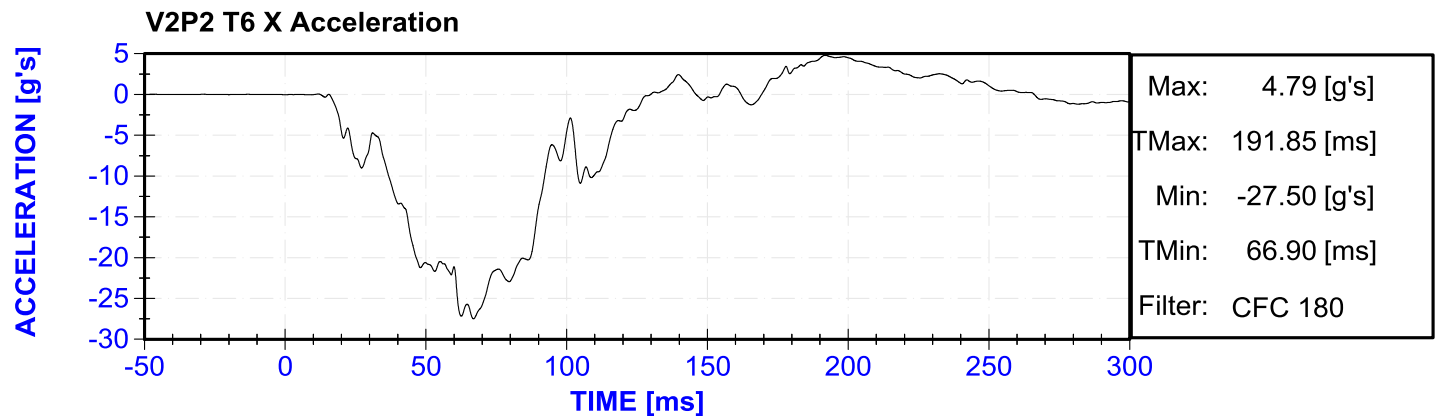
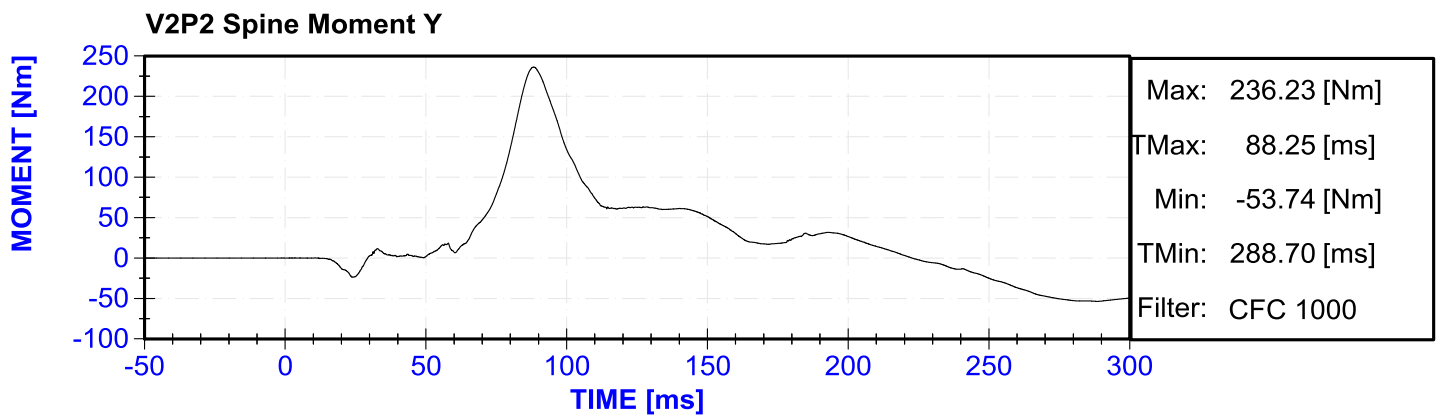
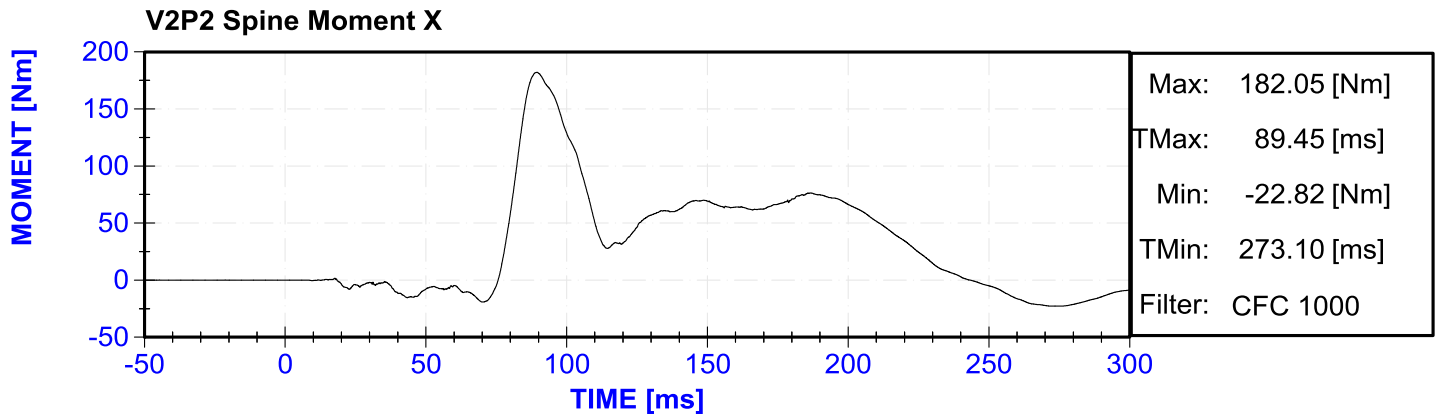


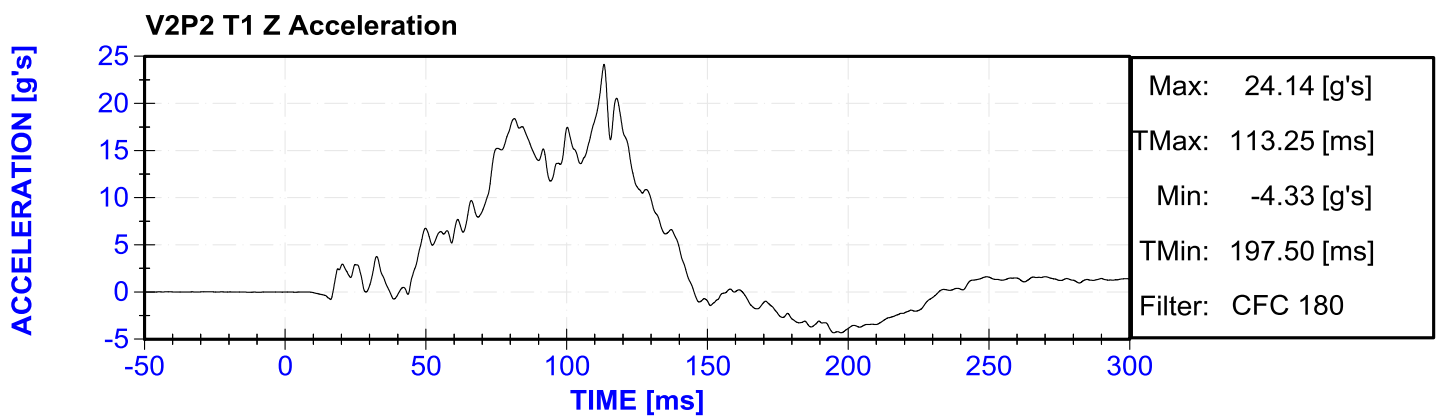
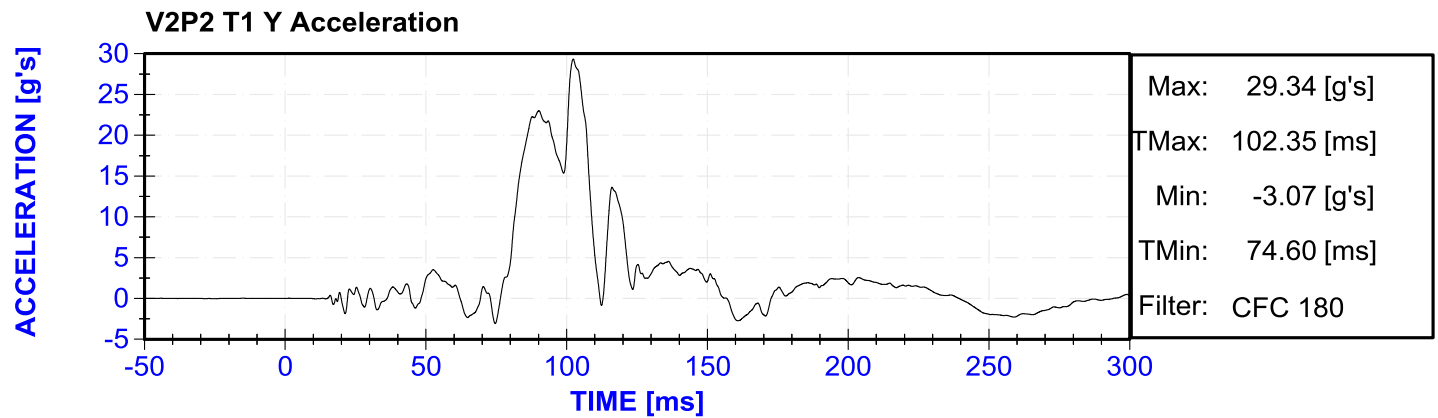
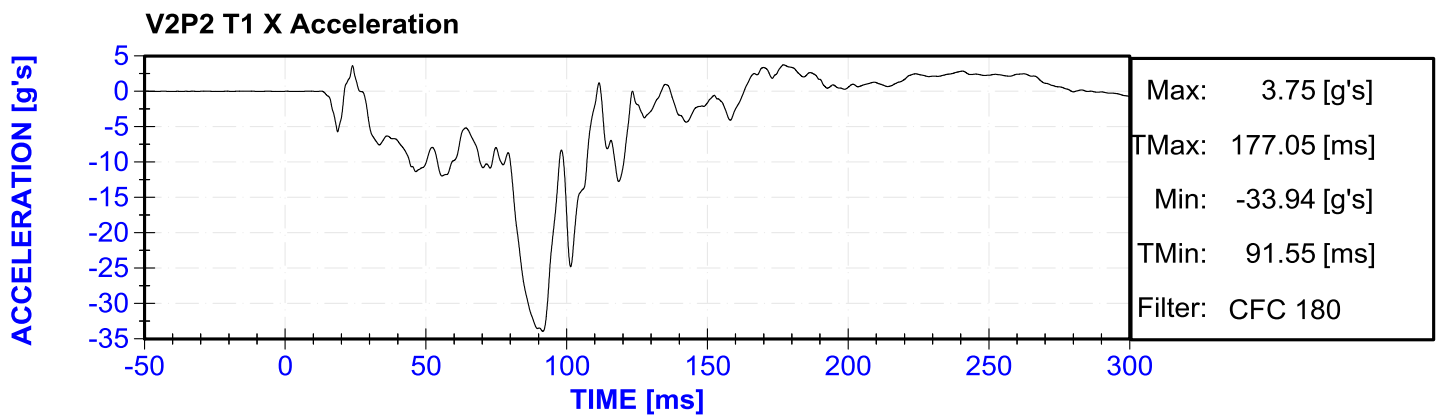
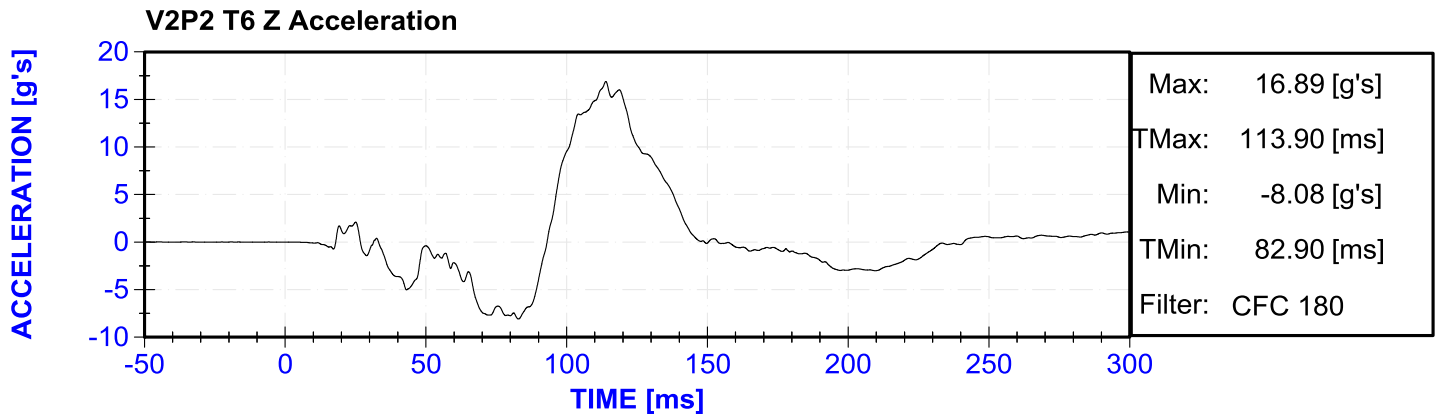
V2P2 Lower Left DGIR X Displacement



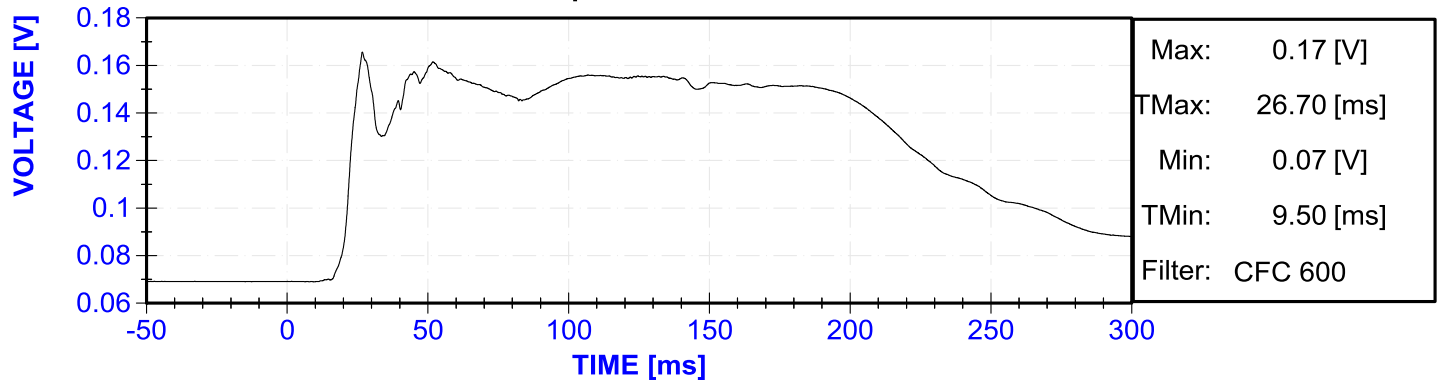




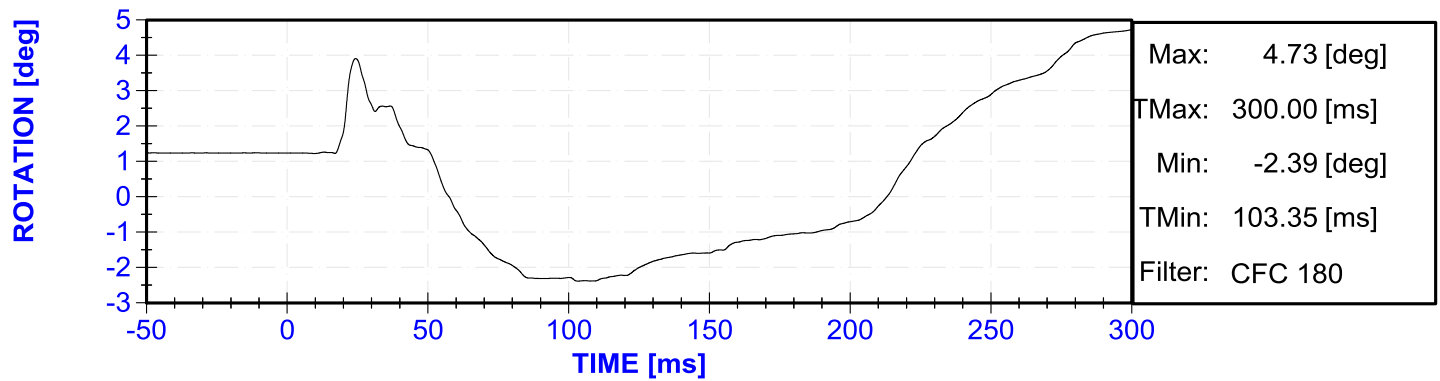




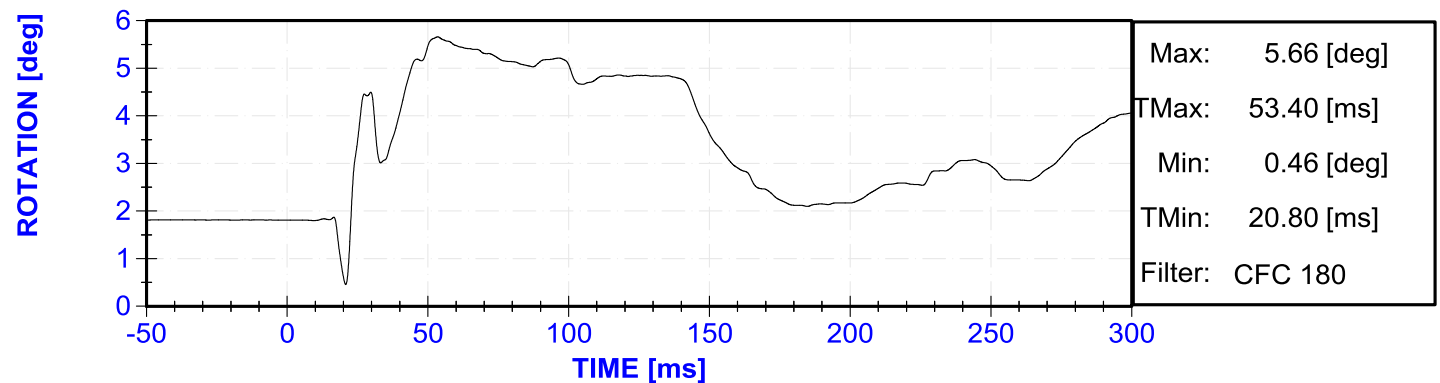
V2P2 Abdomen Left DGIR X Displacement



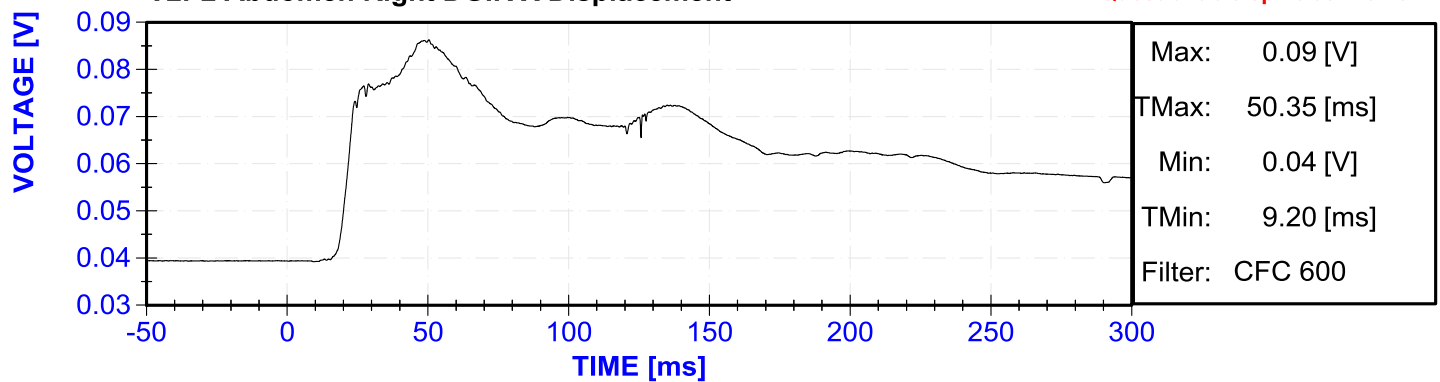
V2P2 Abdomen Left DGIR Y Rotation

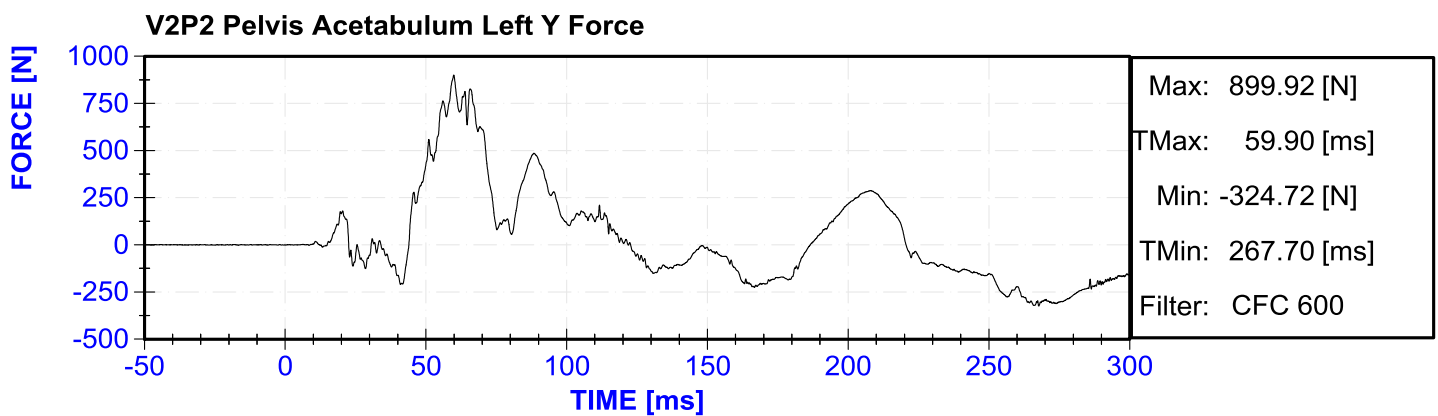
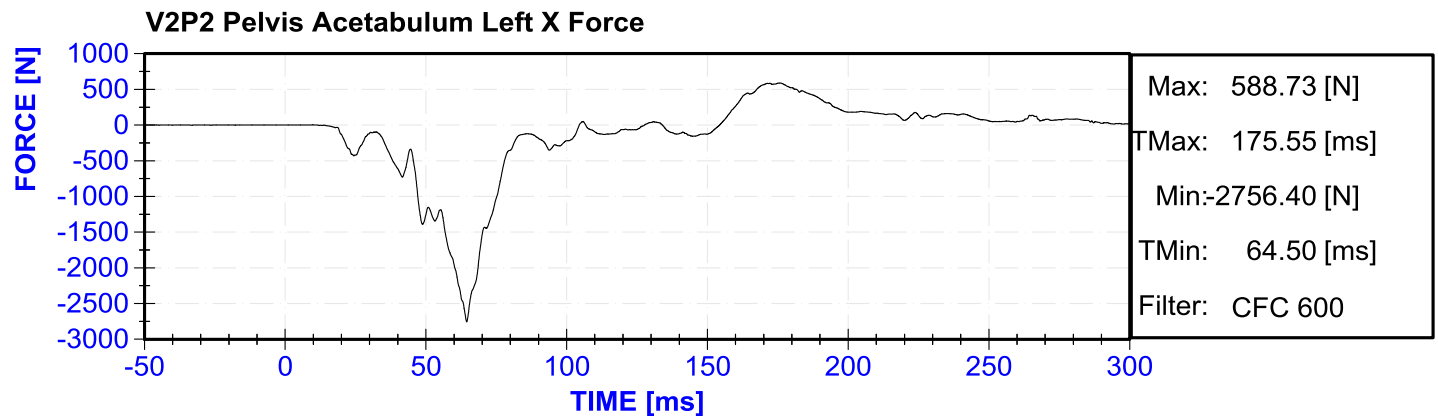
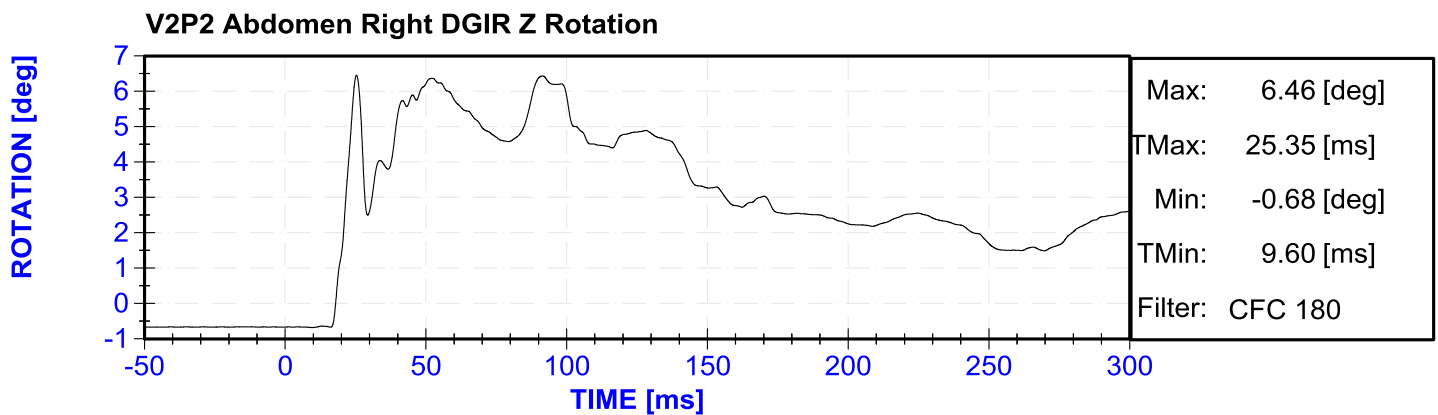
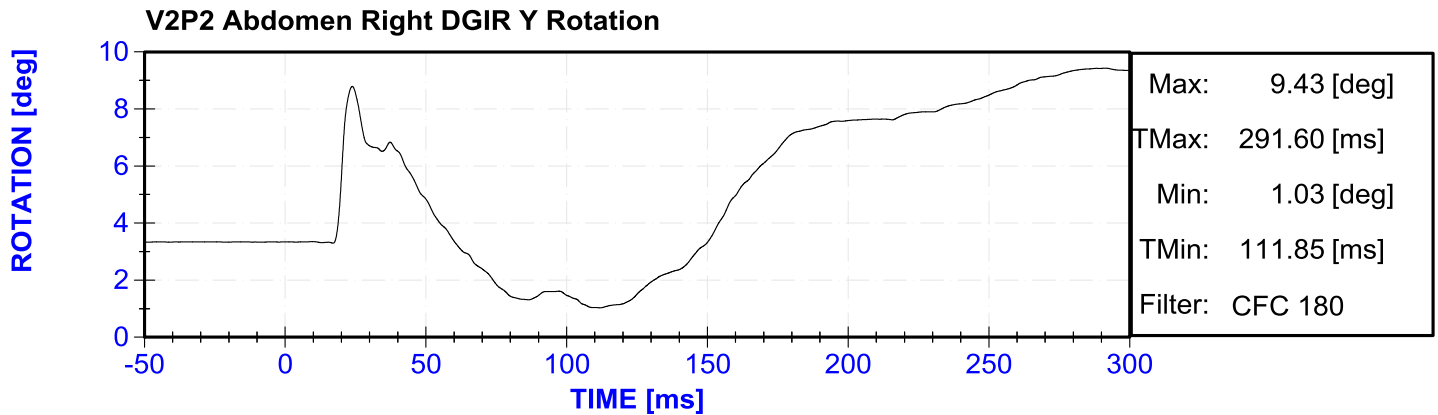


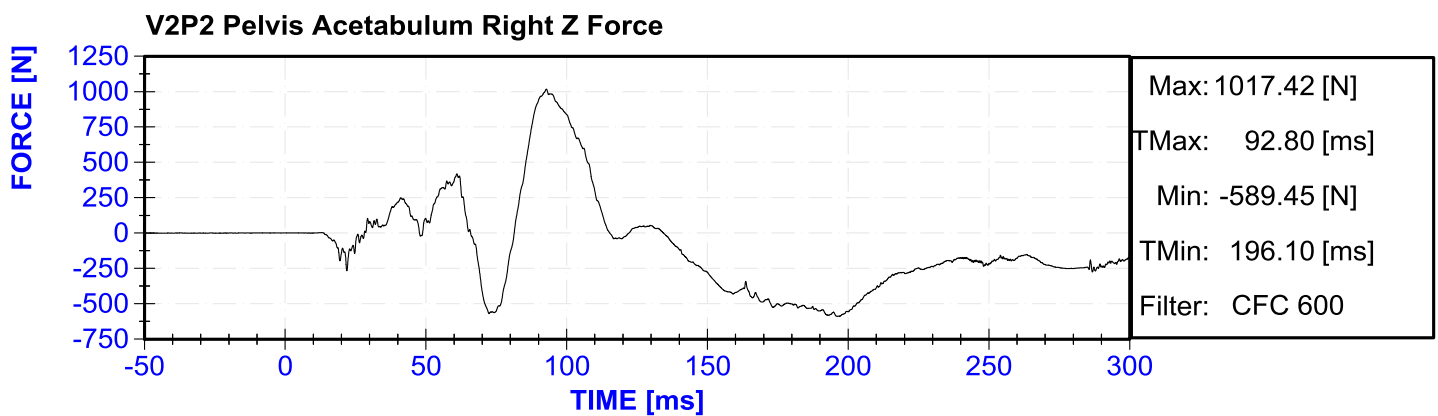
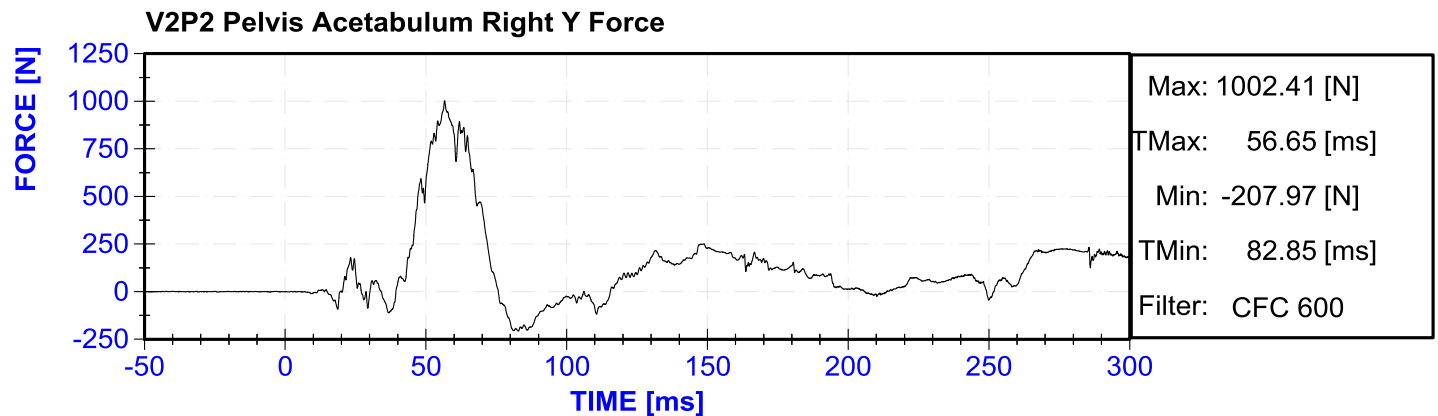
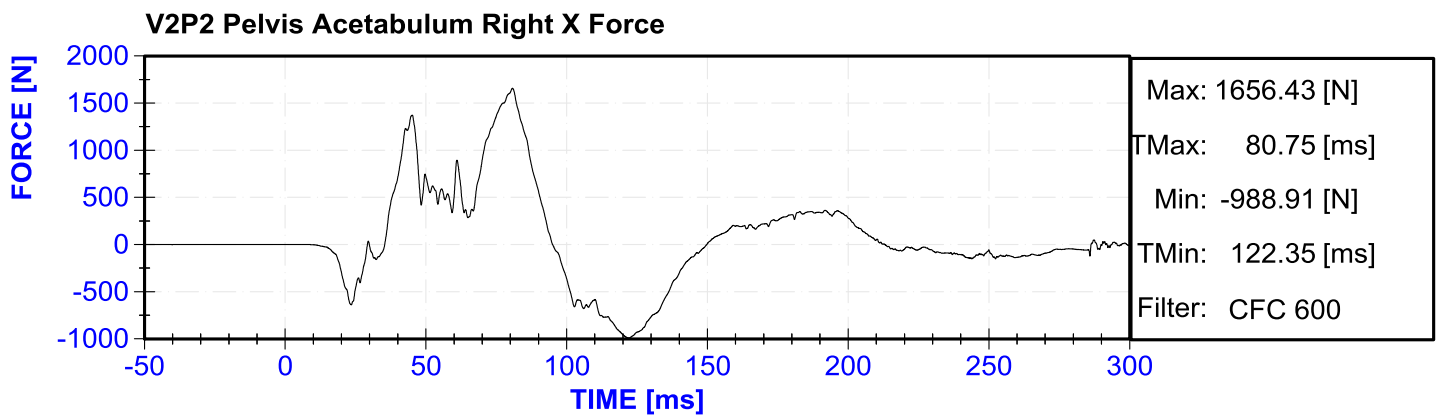
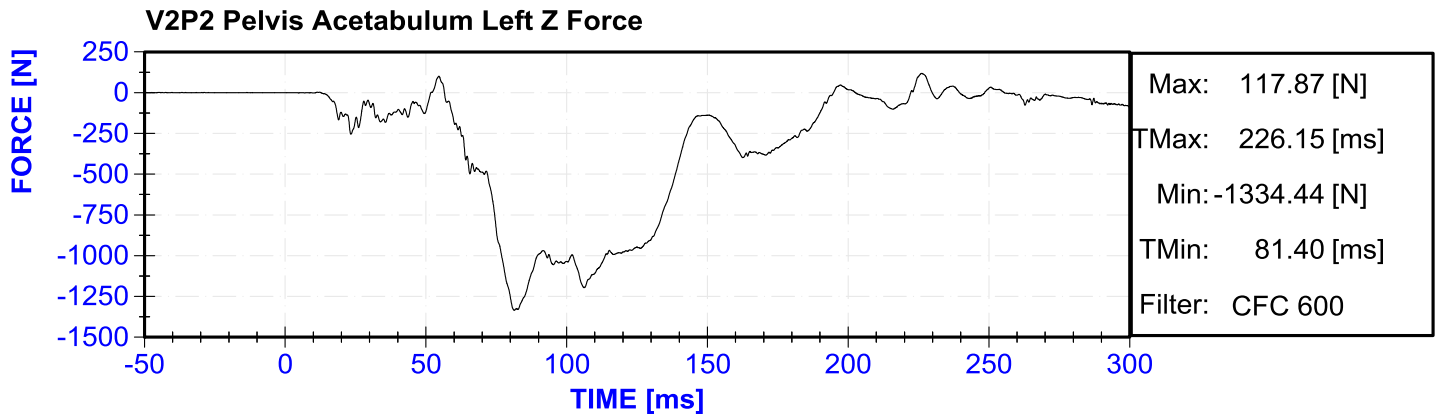
V2P2 Abdomen Left DGIR Z Rotation

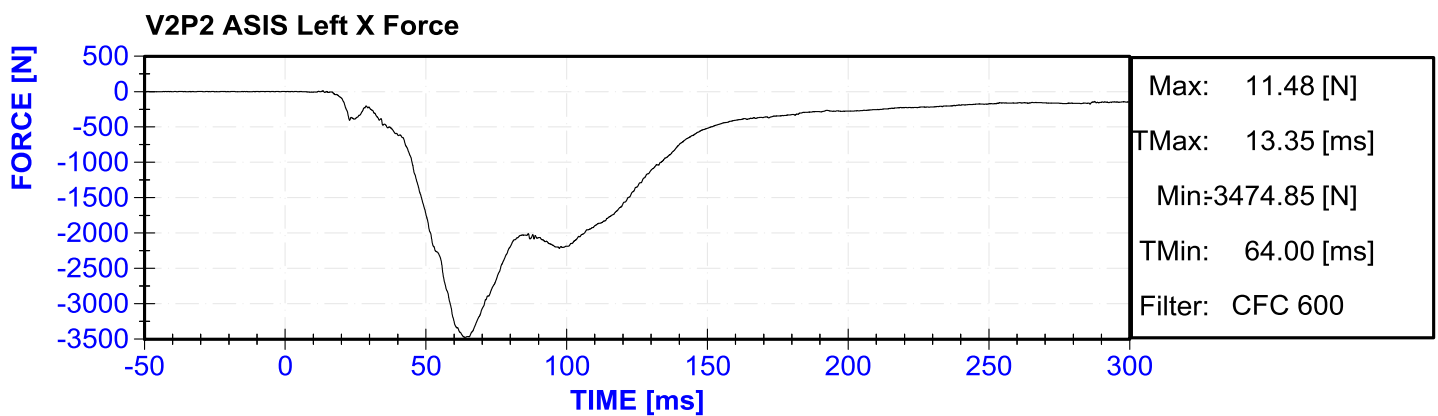
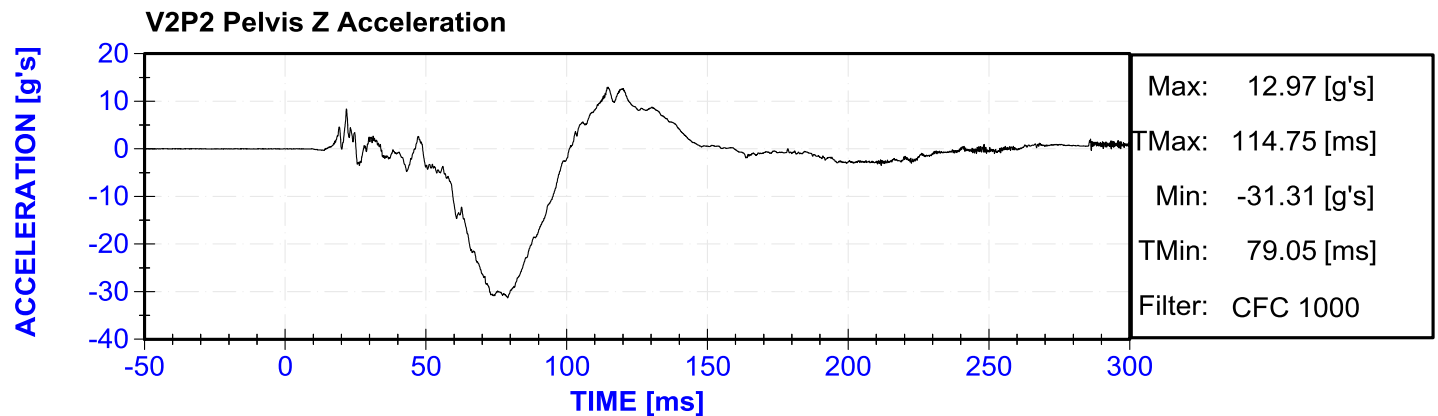
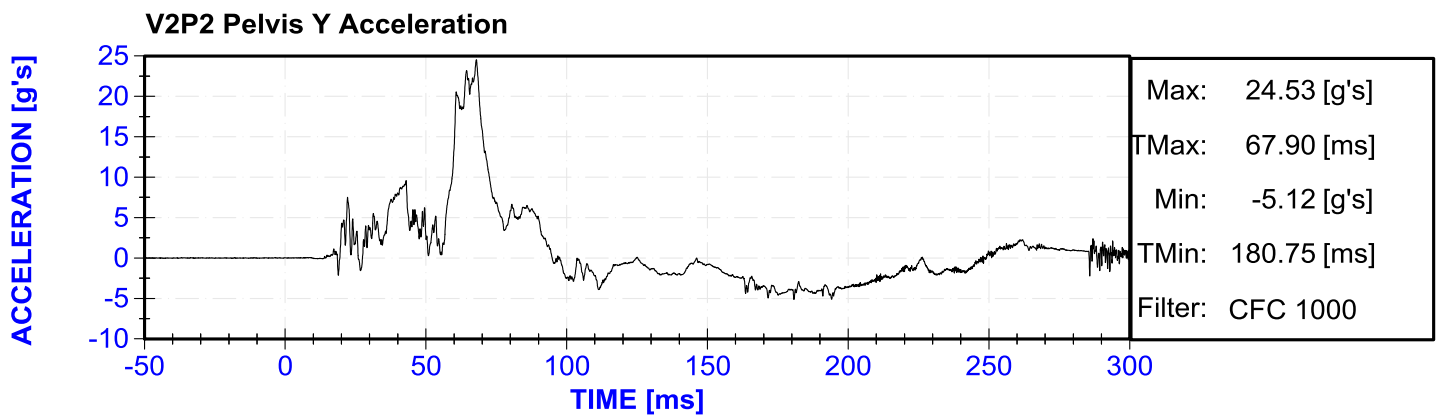
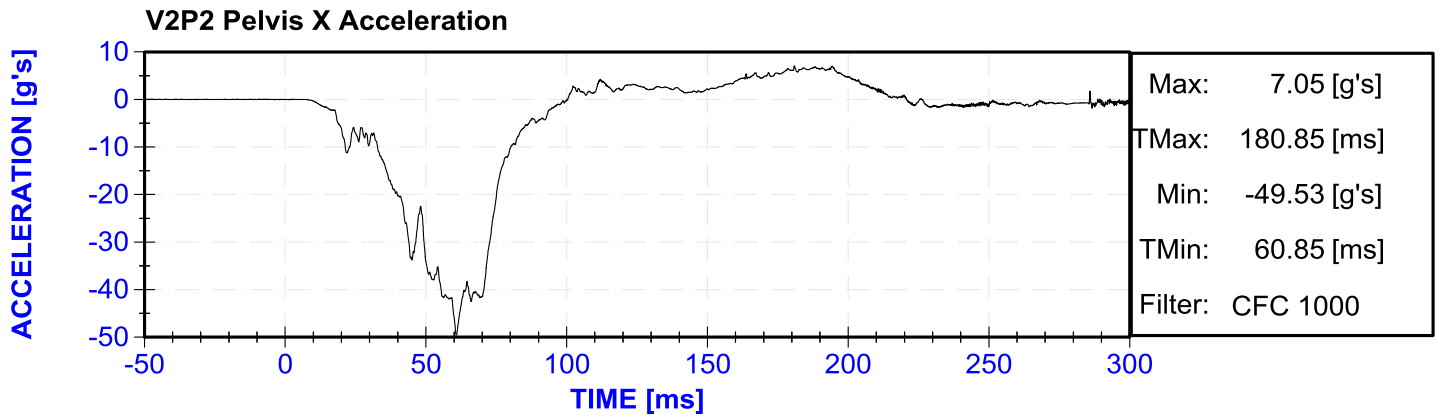


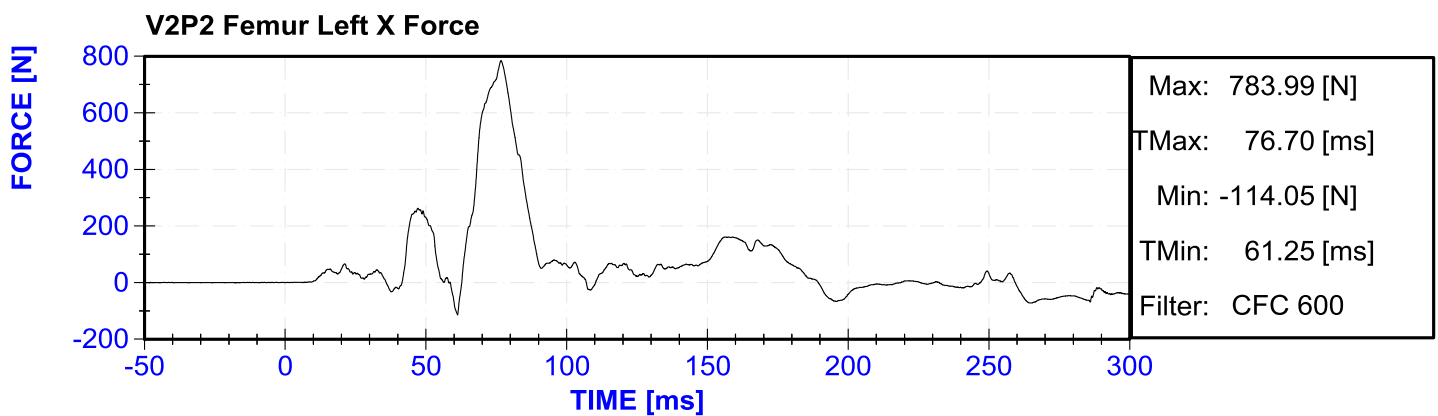
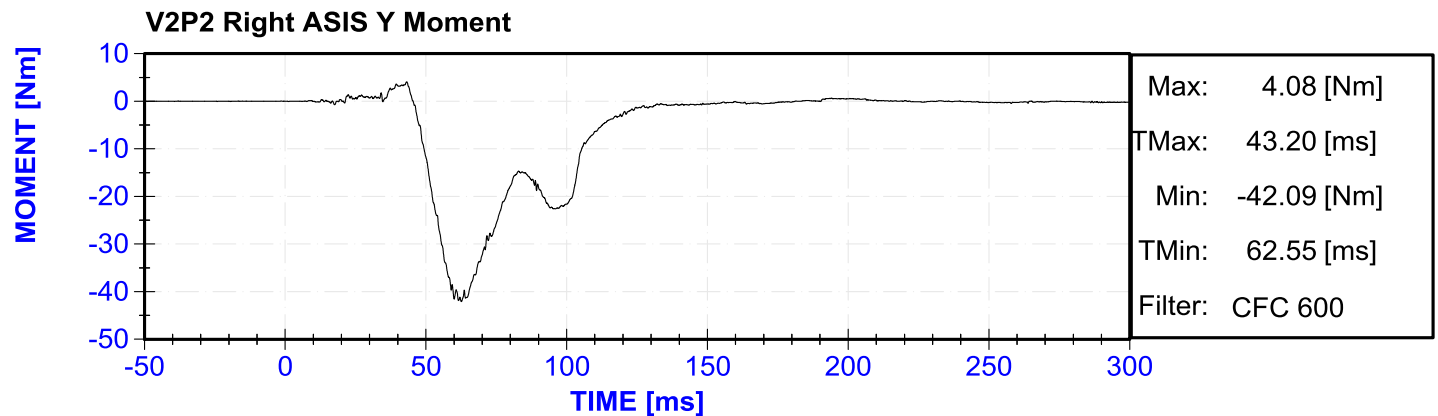
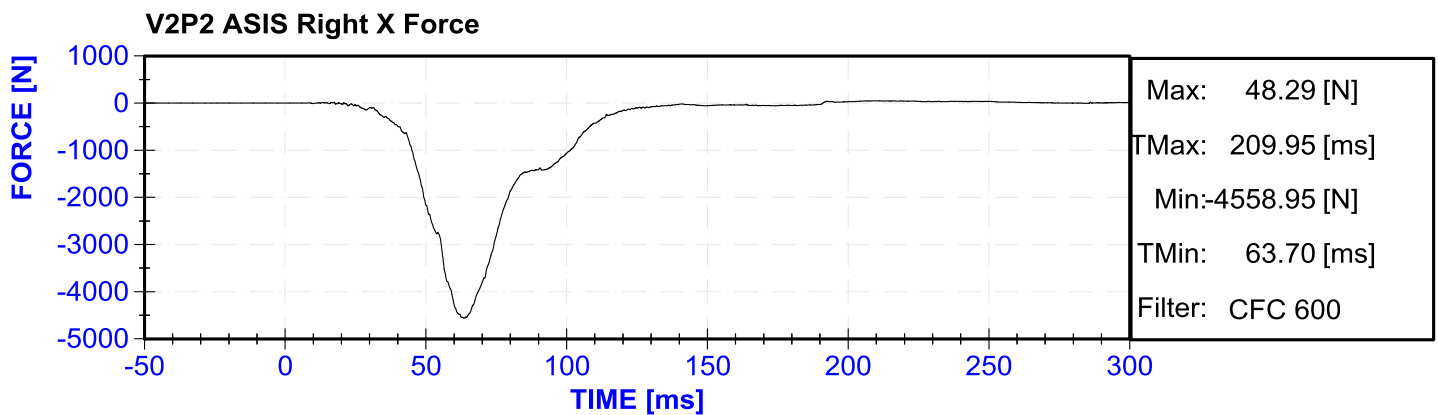
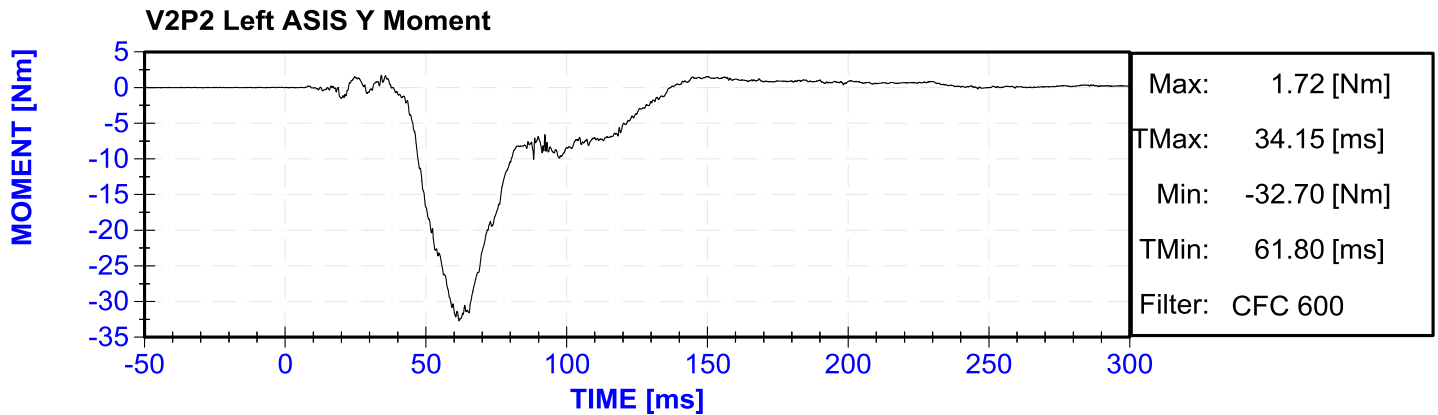
V2P2 Abdomen Right DGIR X Displacement

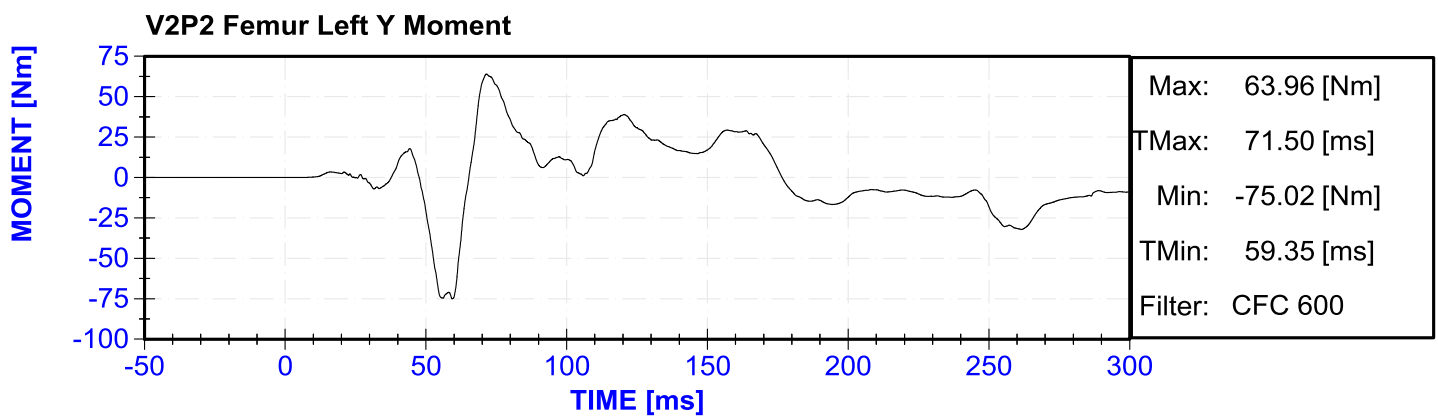
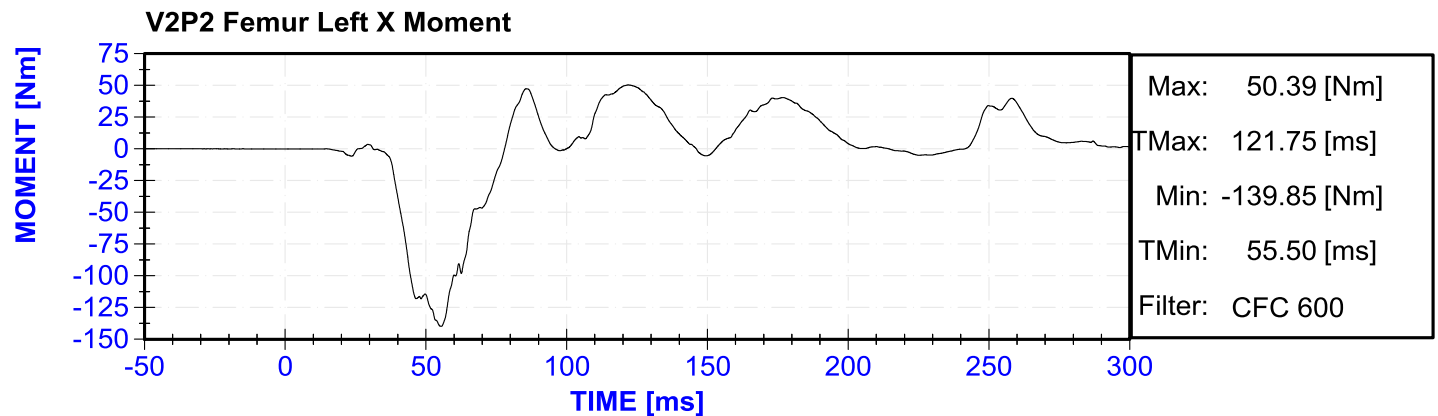
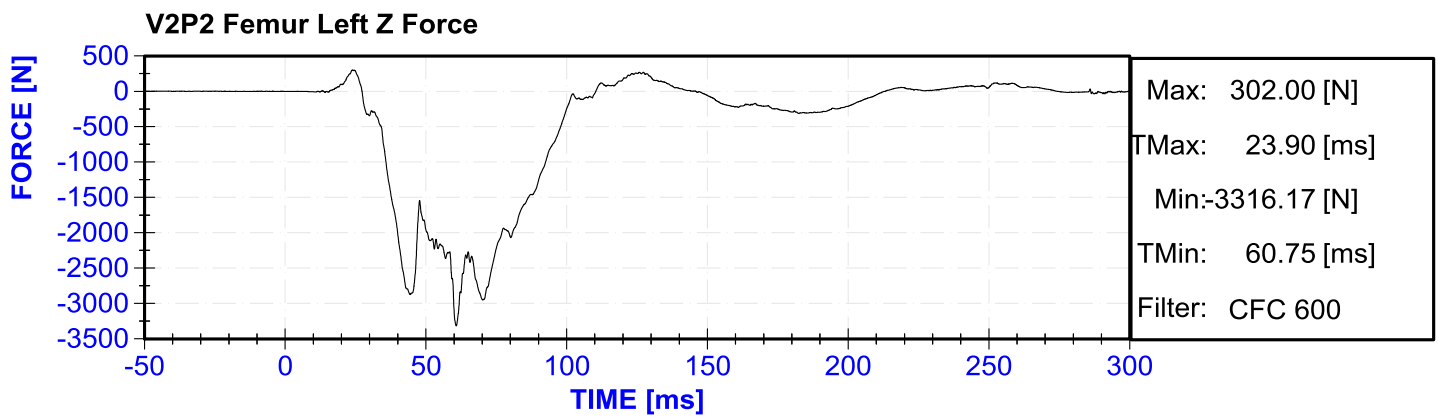
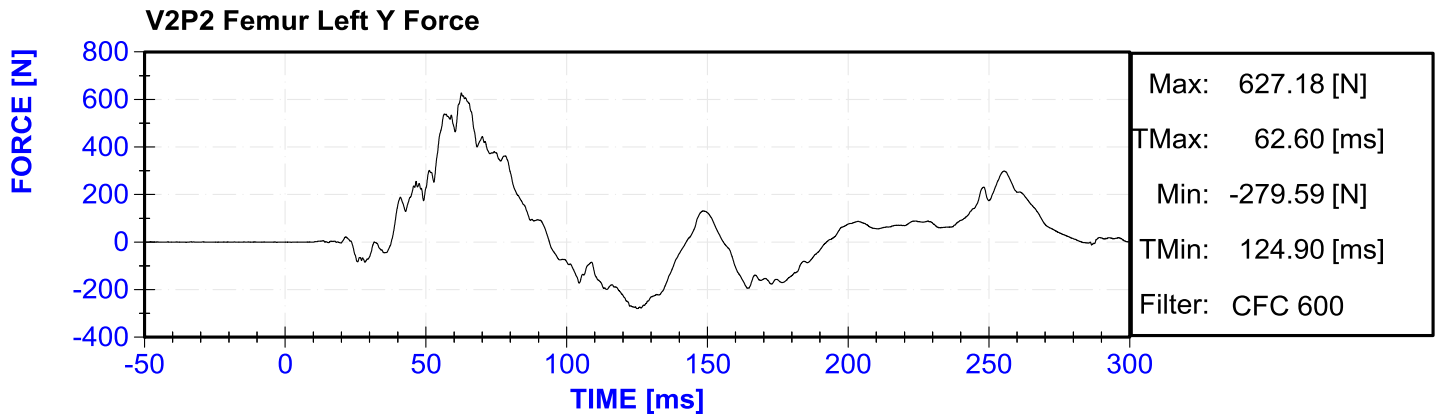


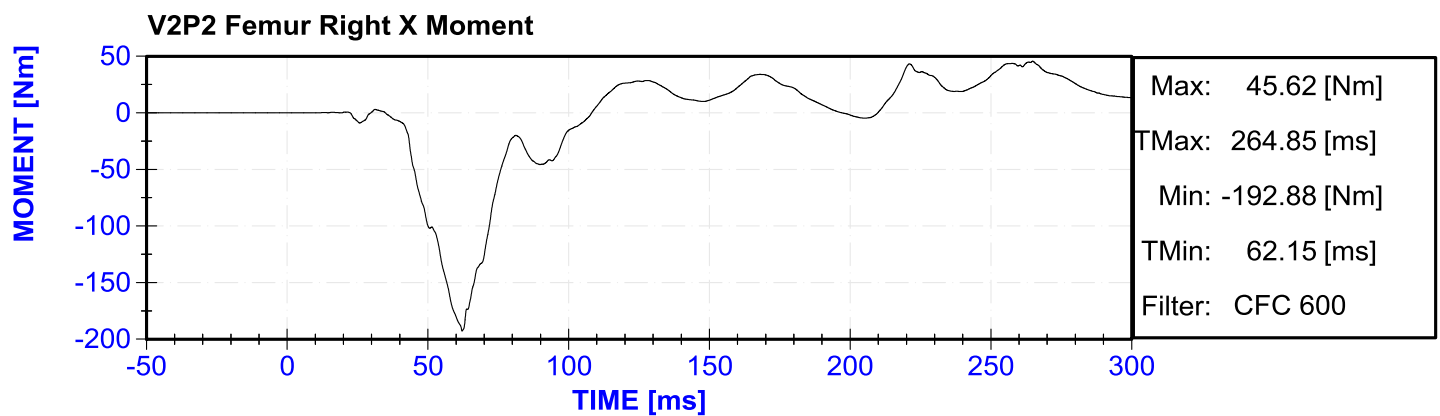
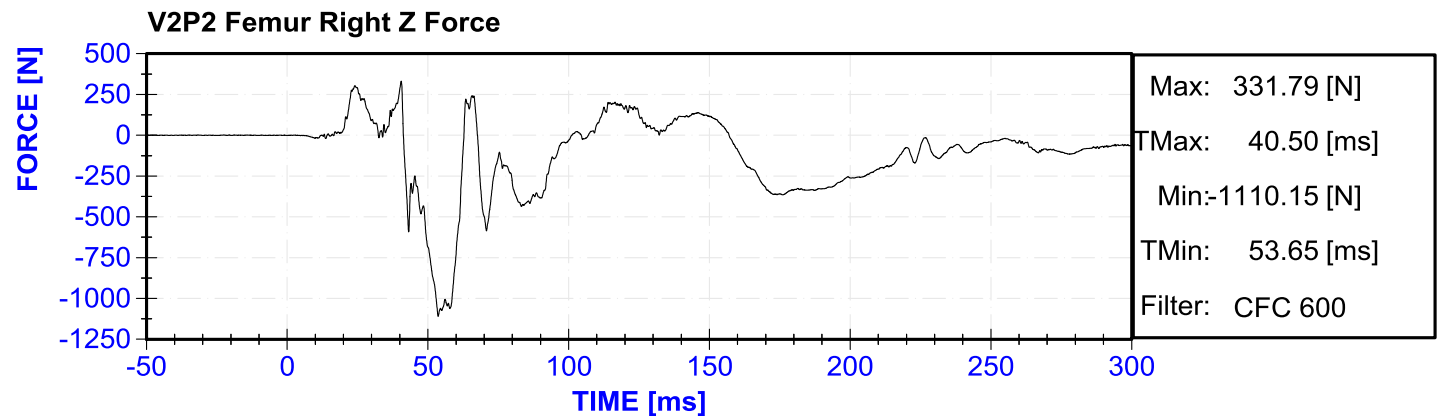
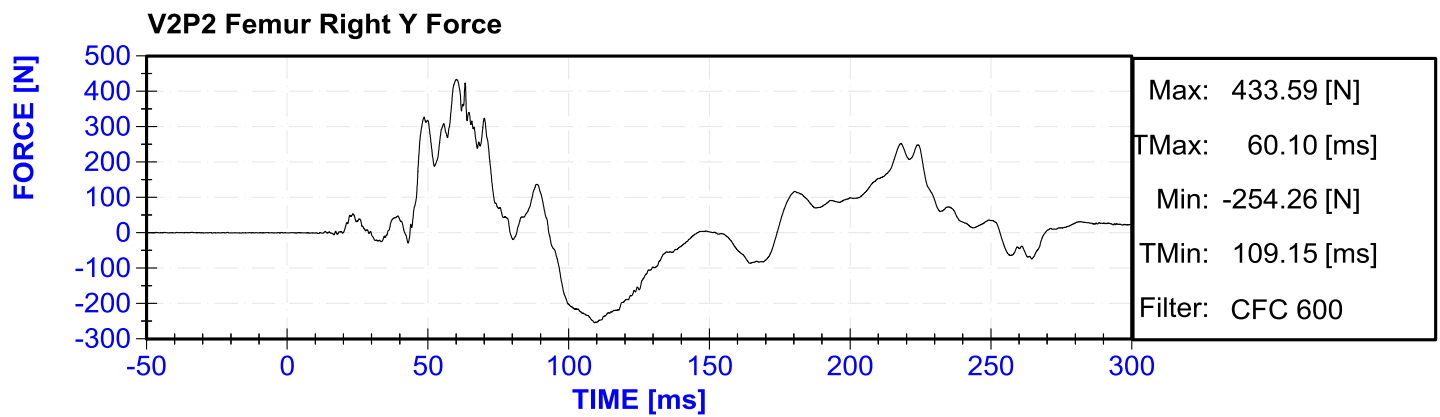
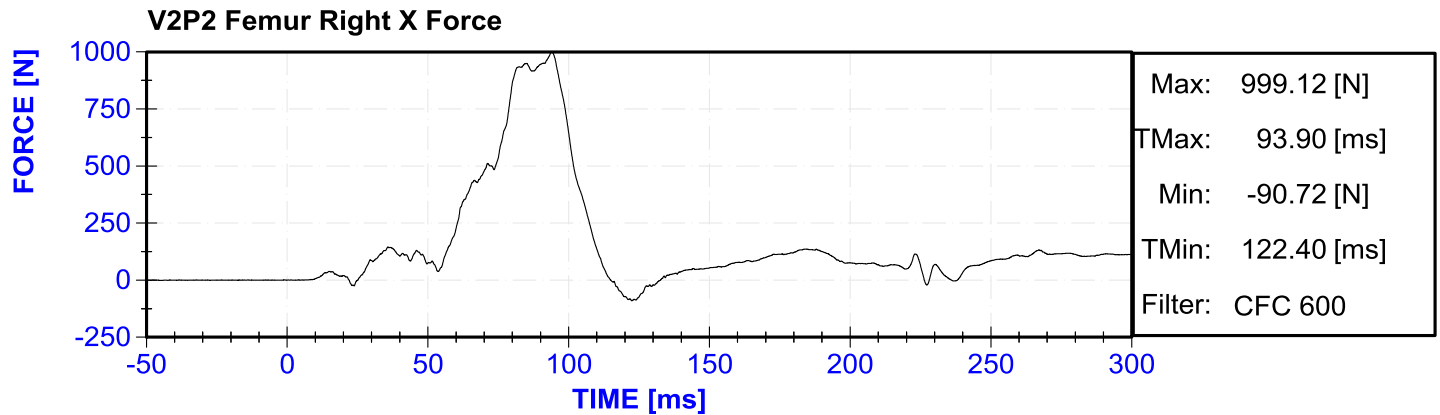


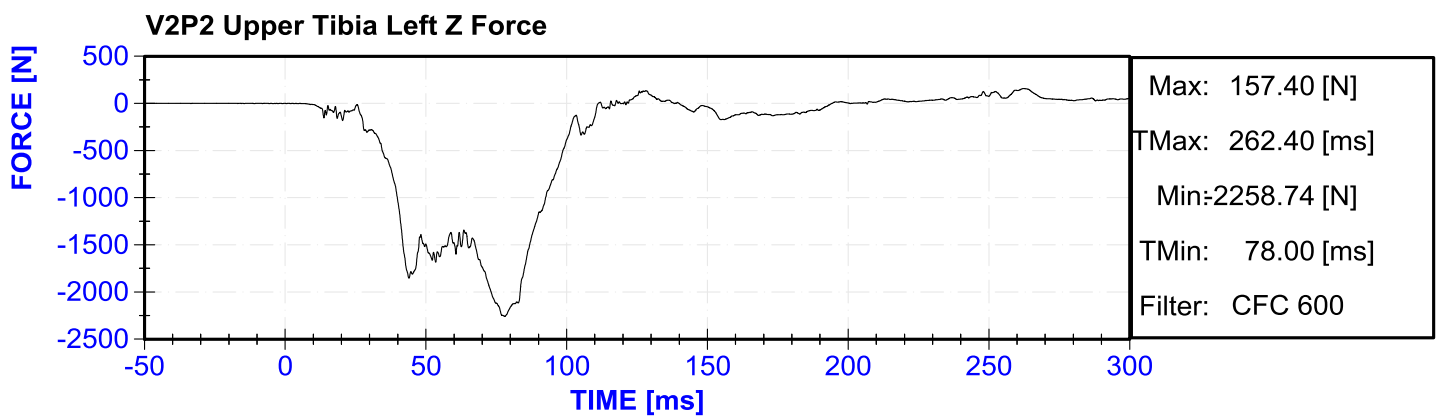
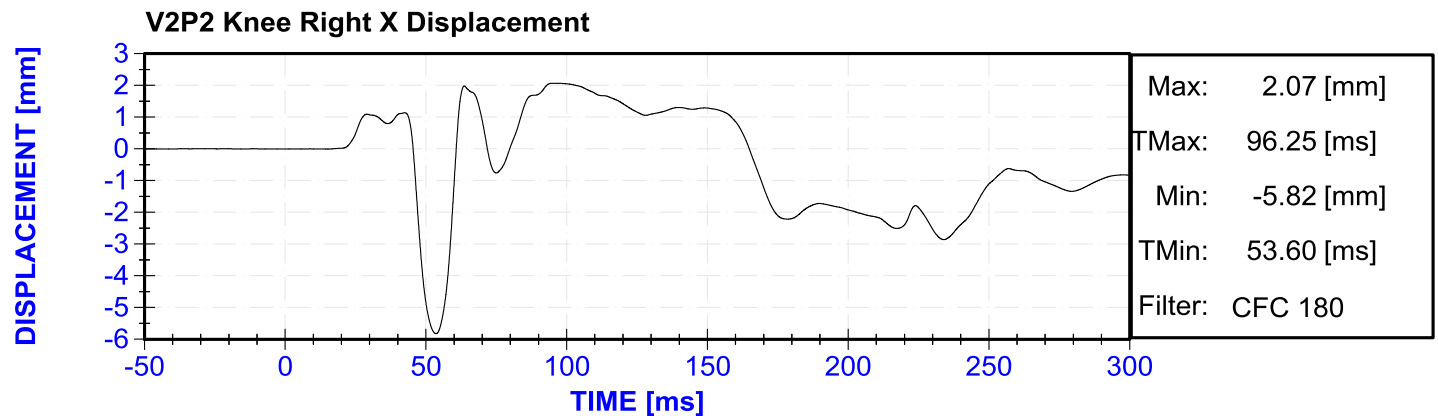
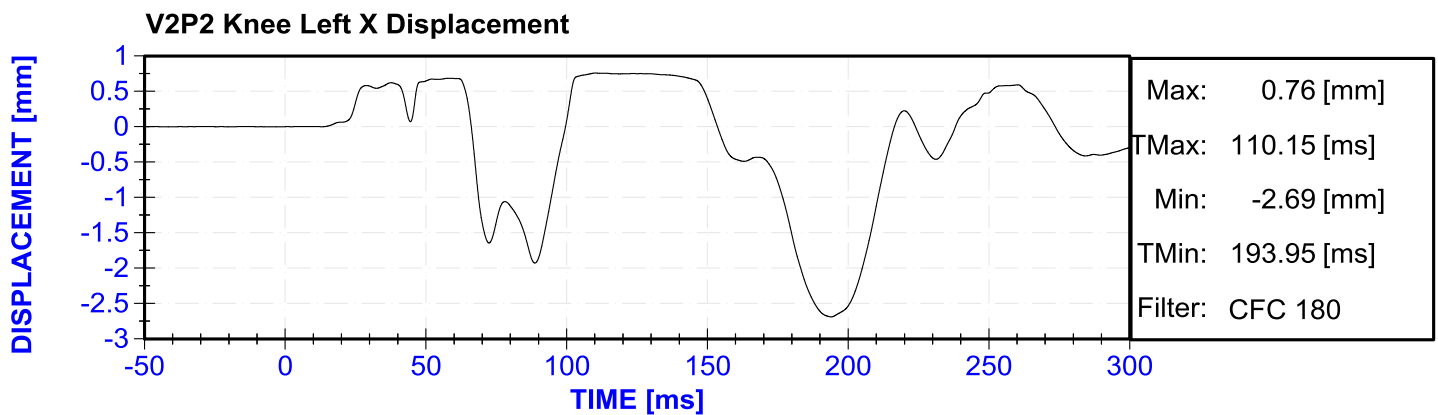
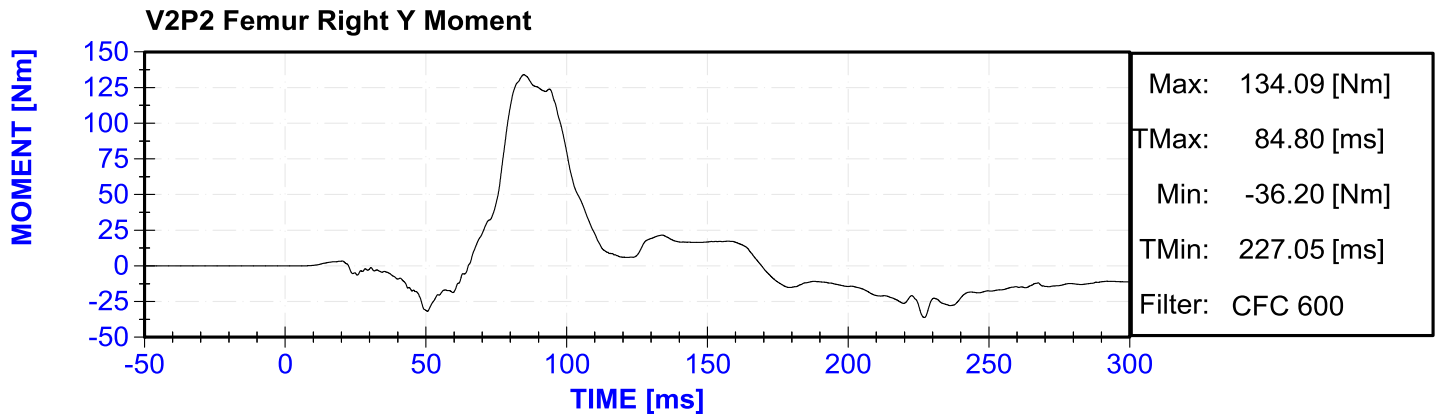


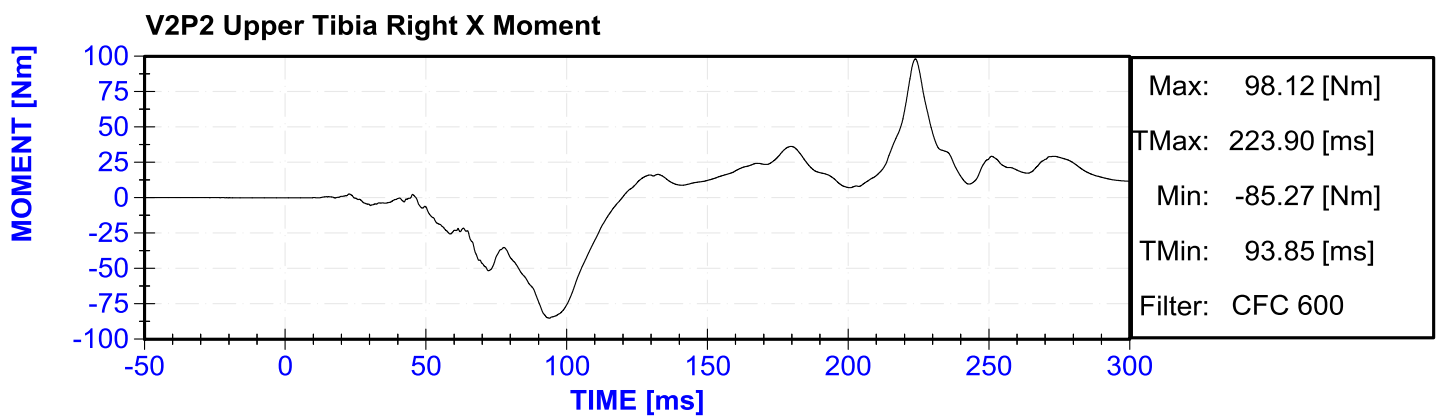
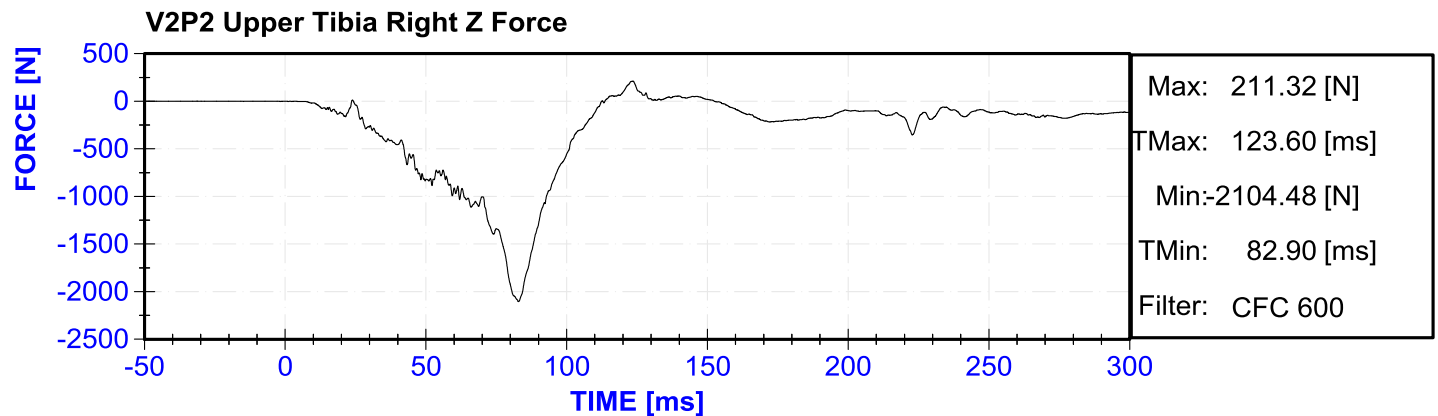
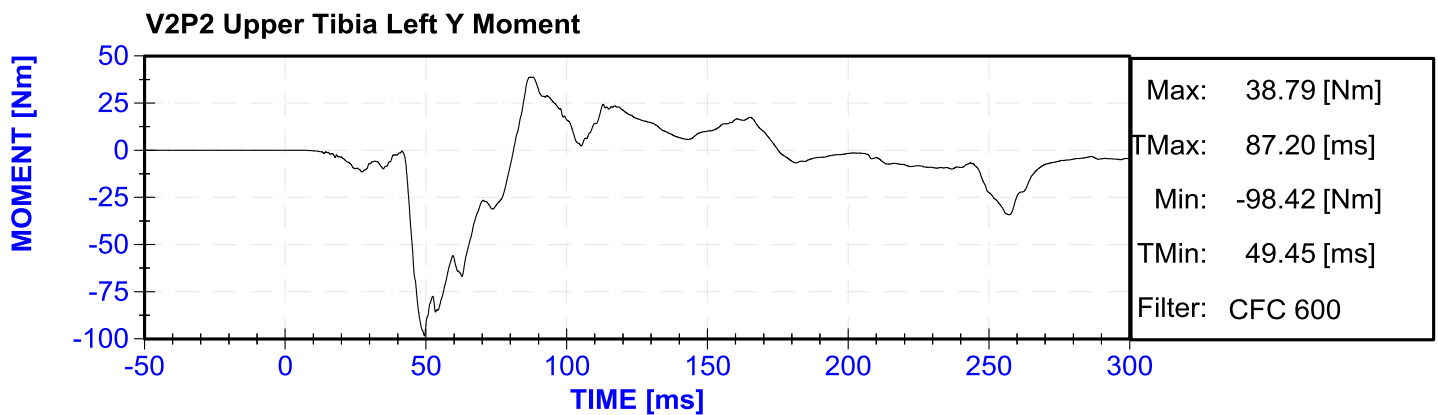
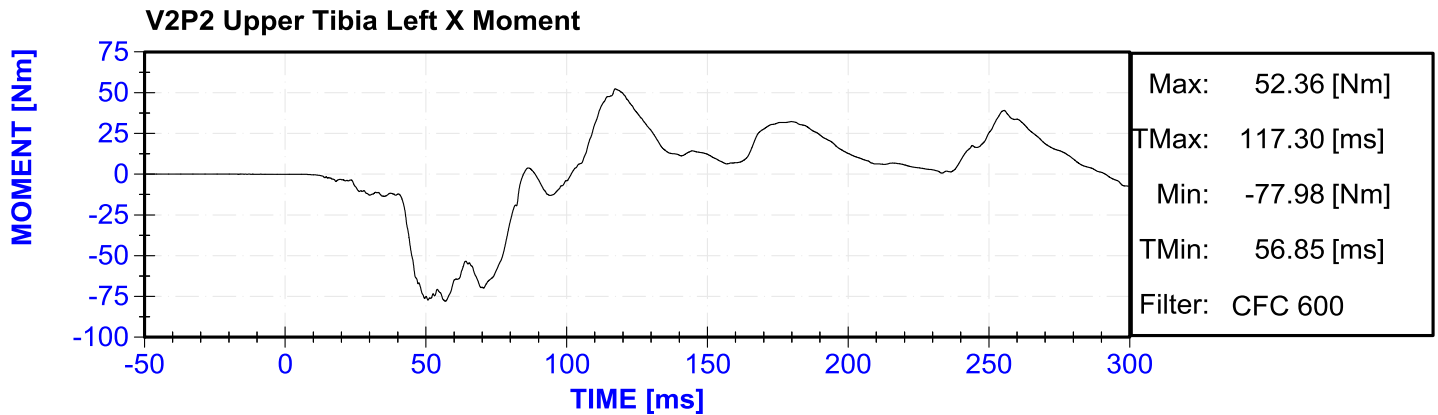


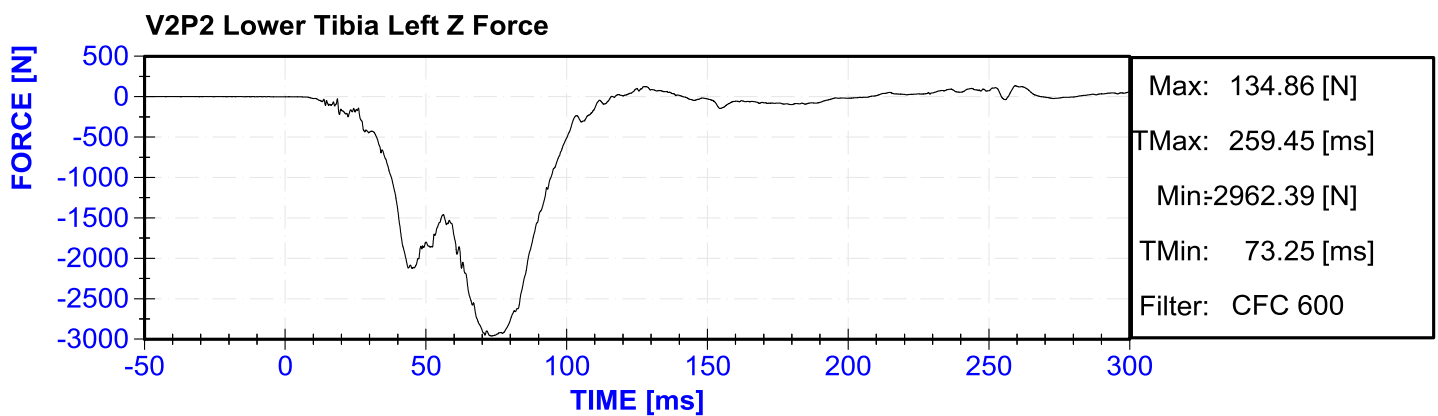
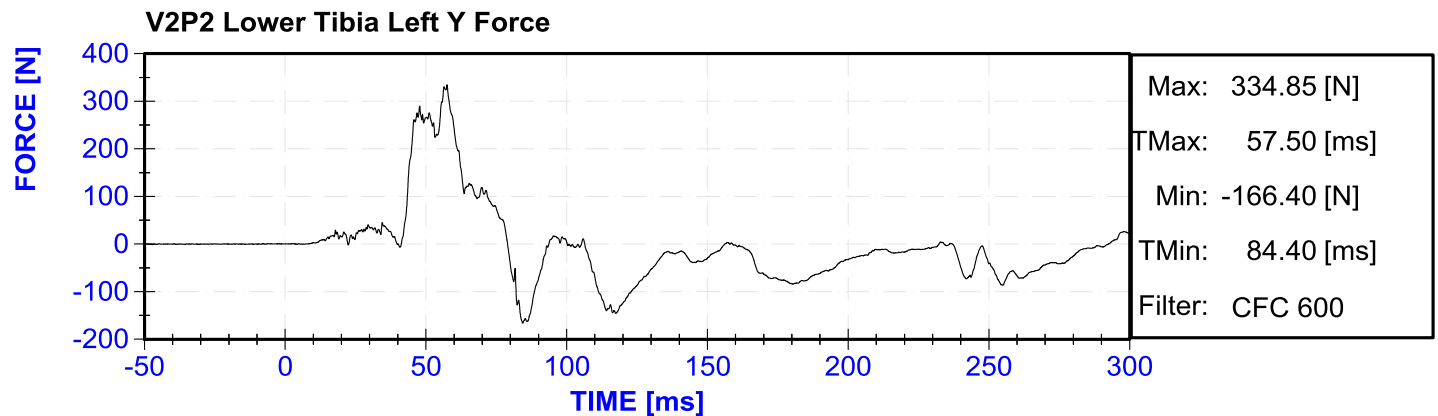
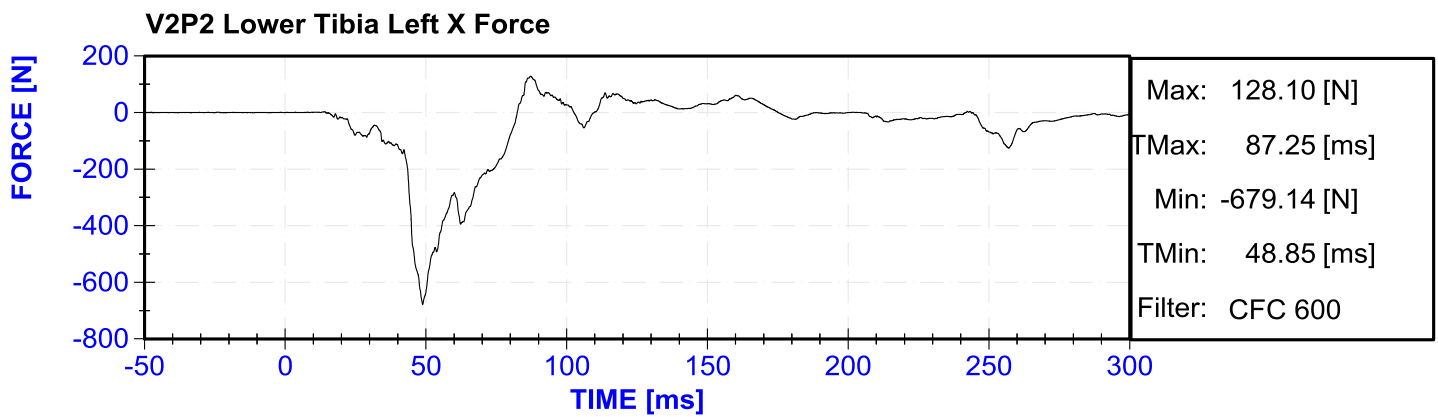
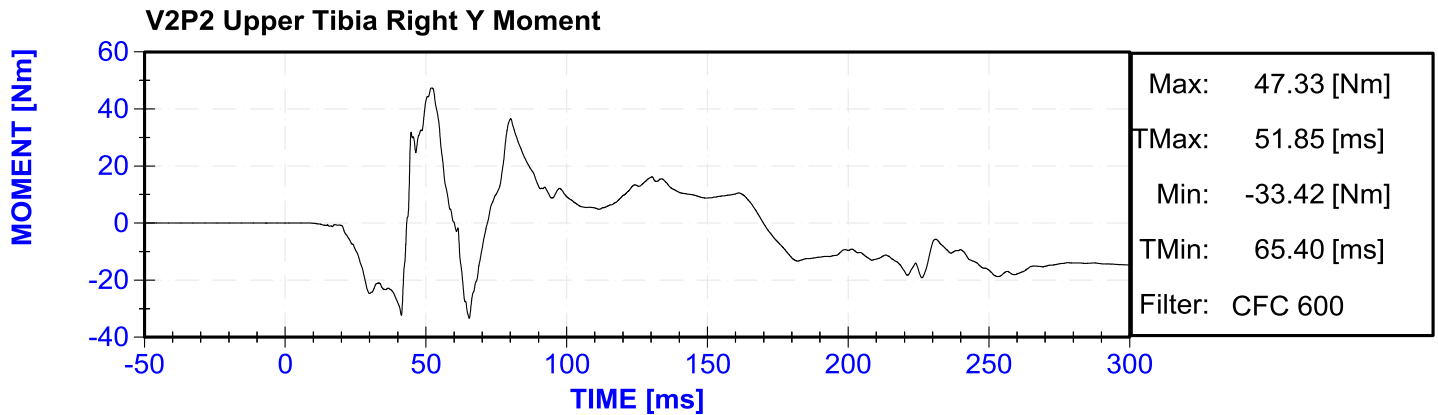


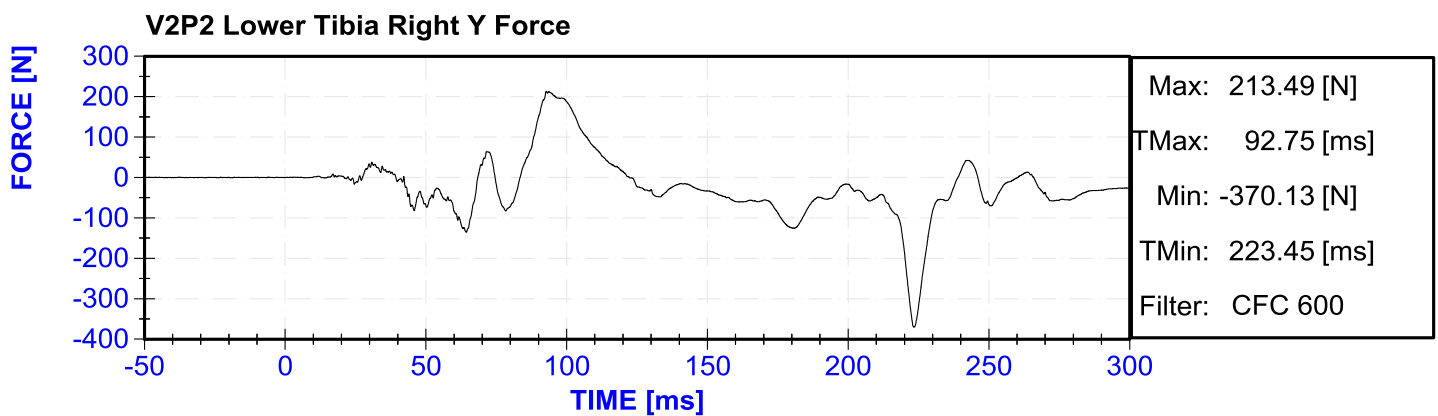
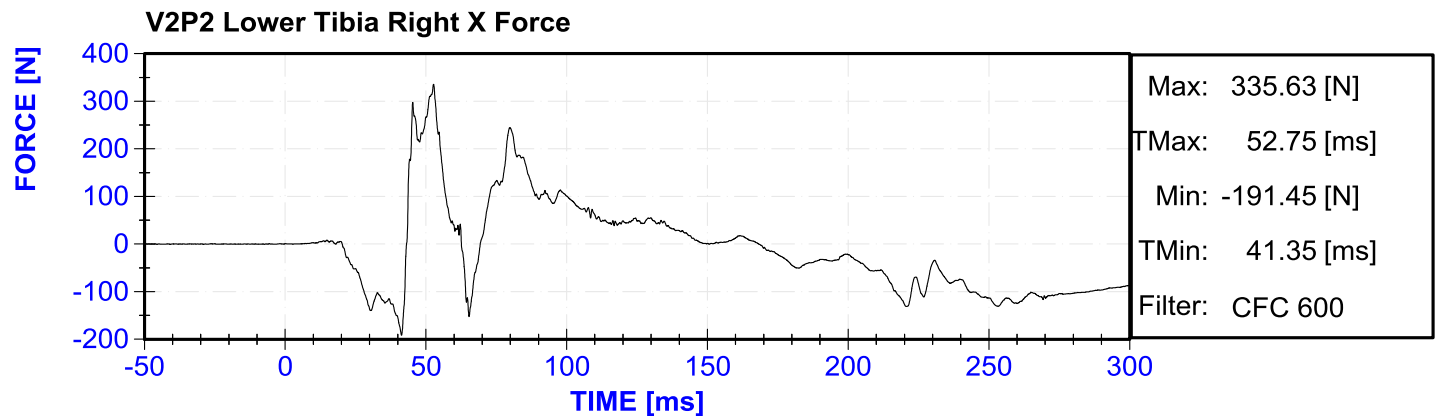
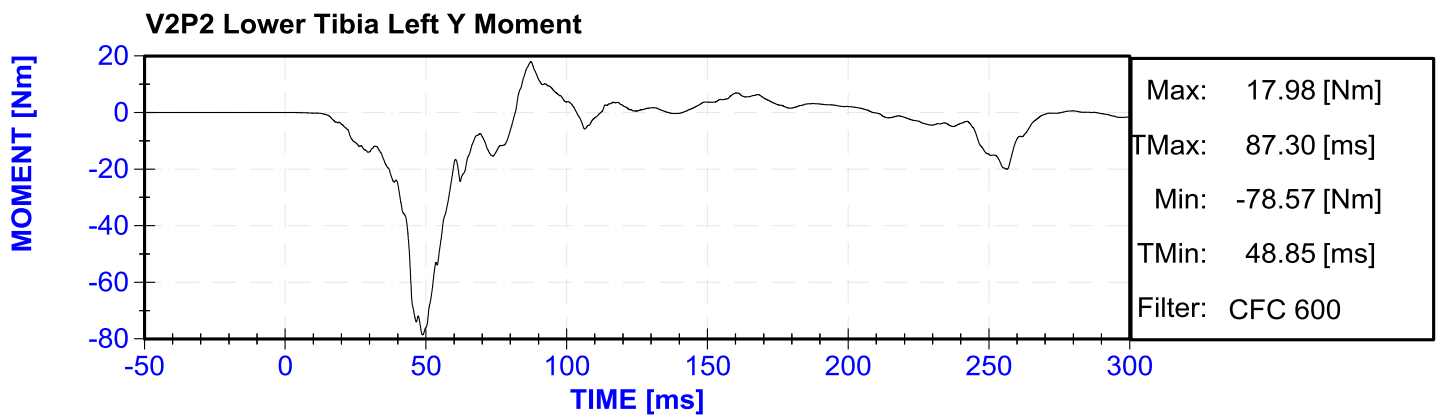
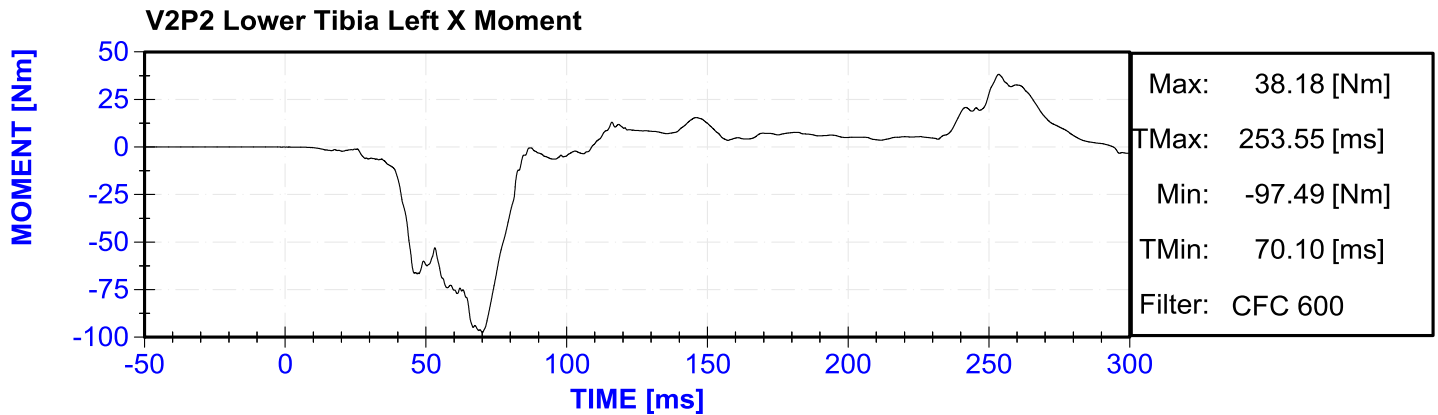


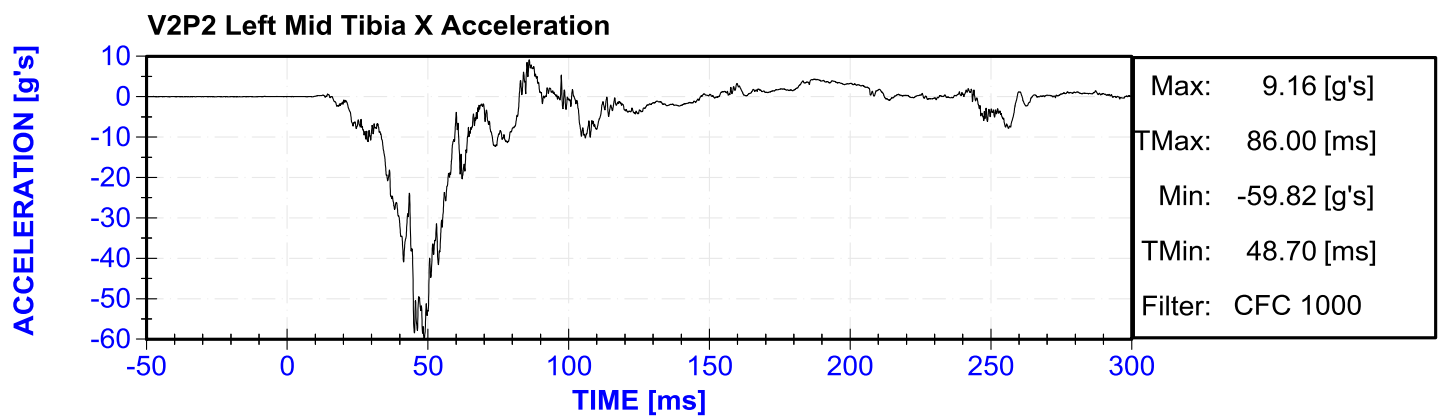
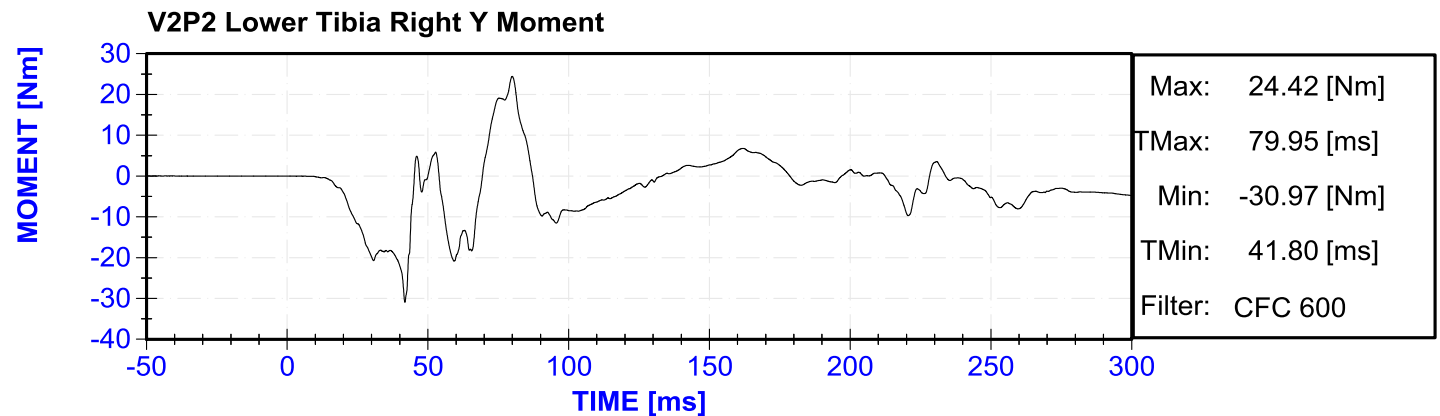
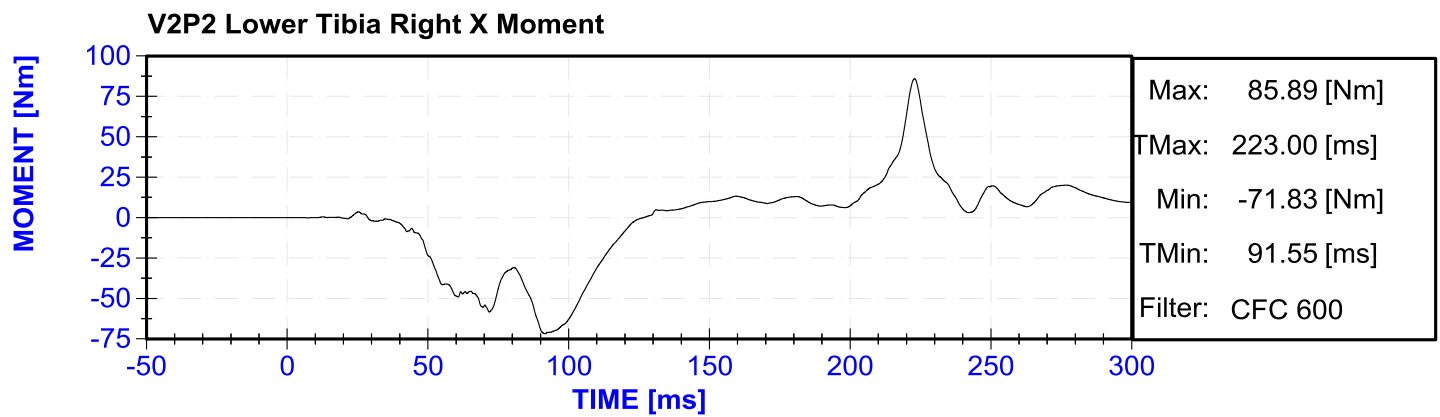
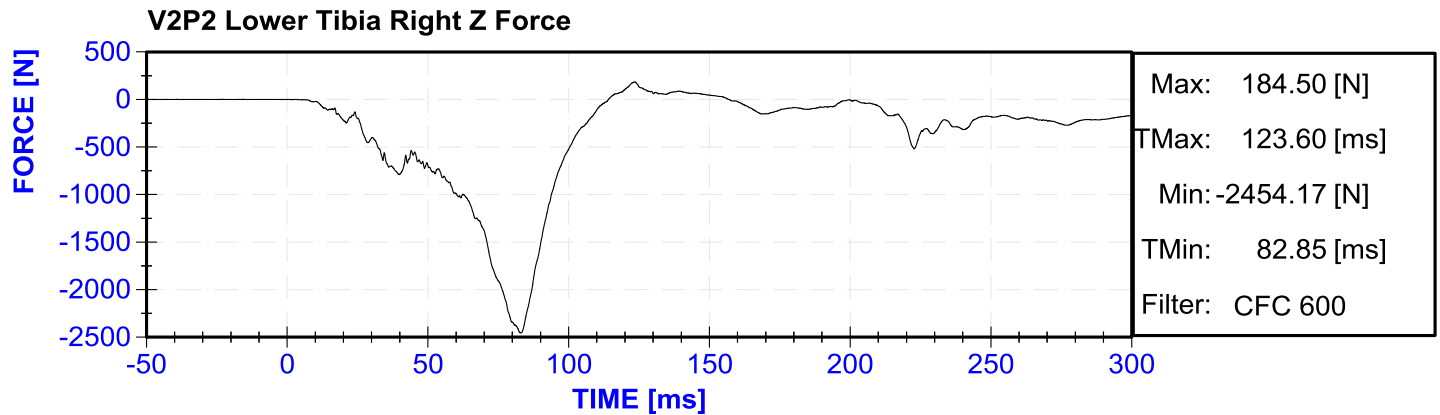


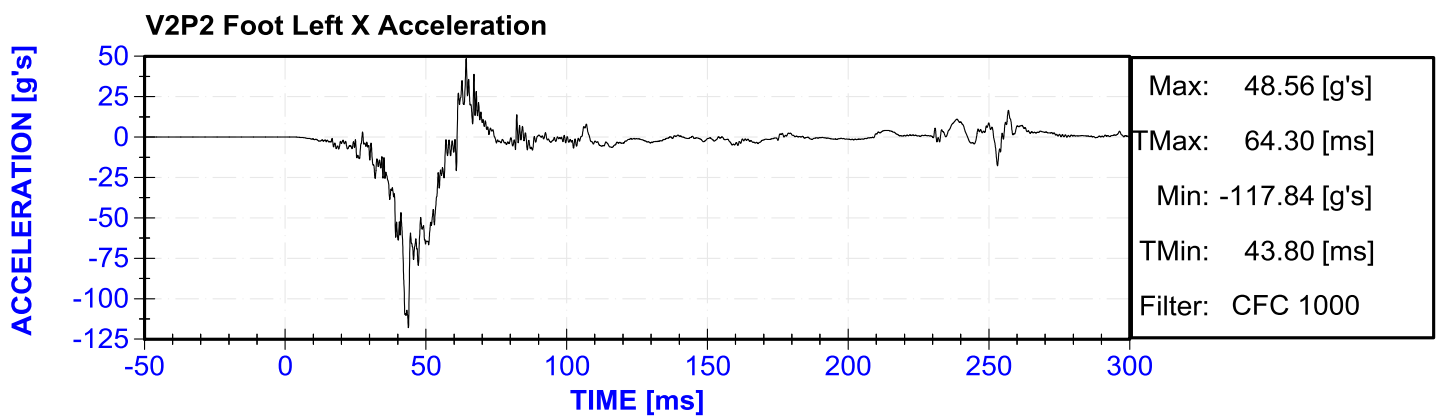
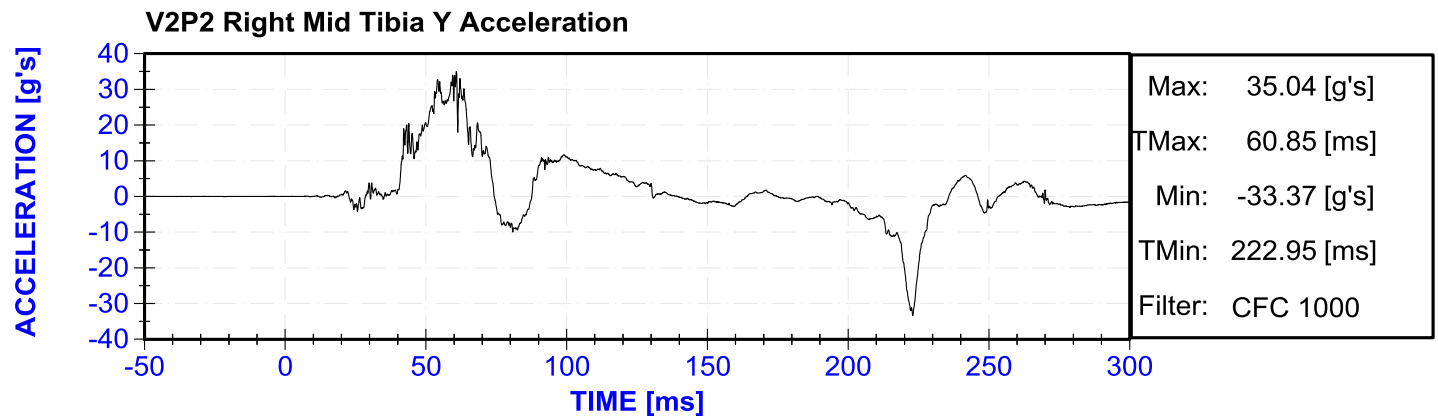
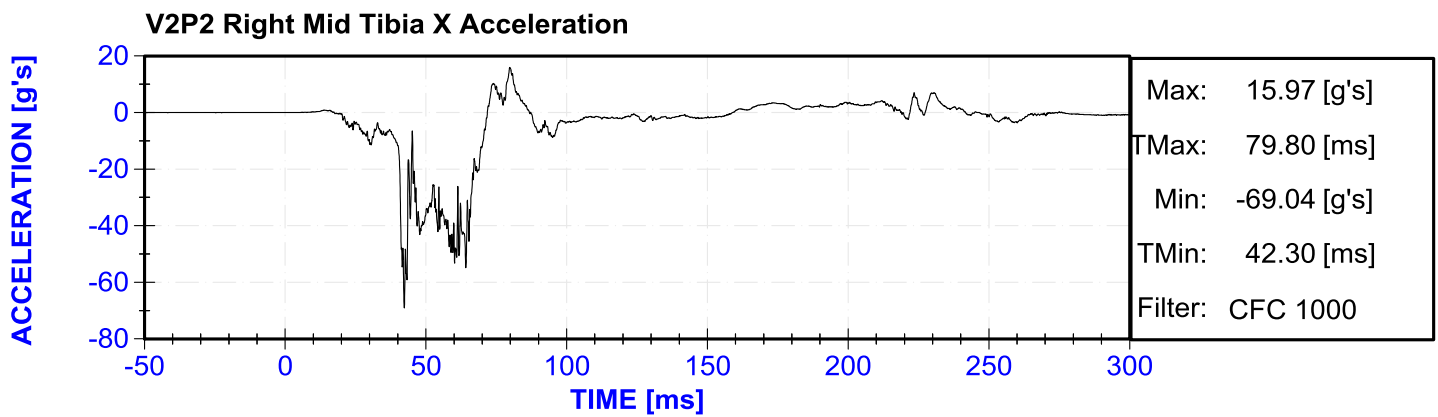
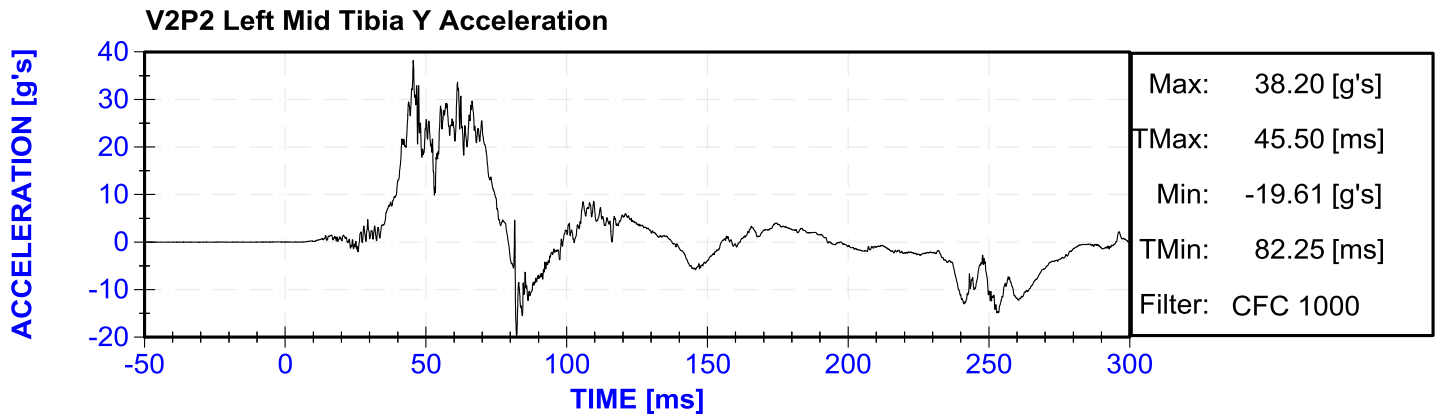


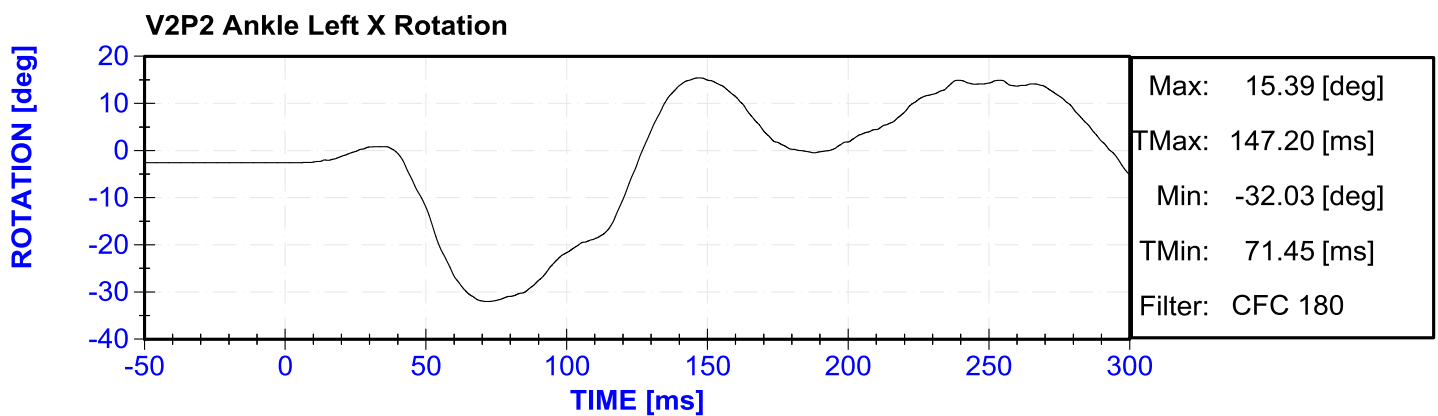
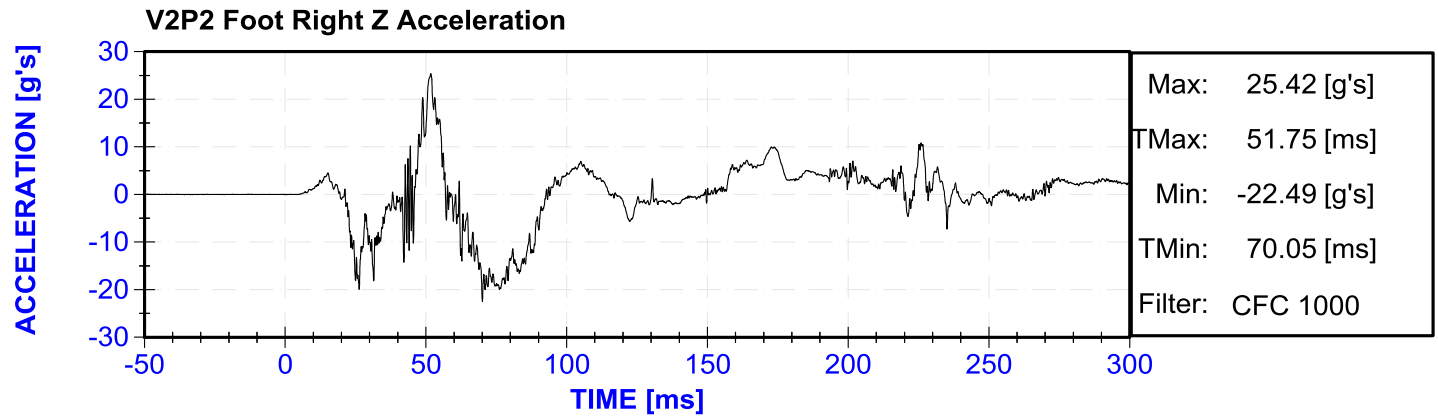
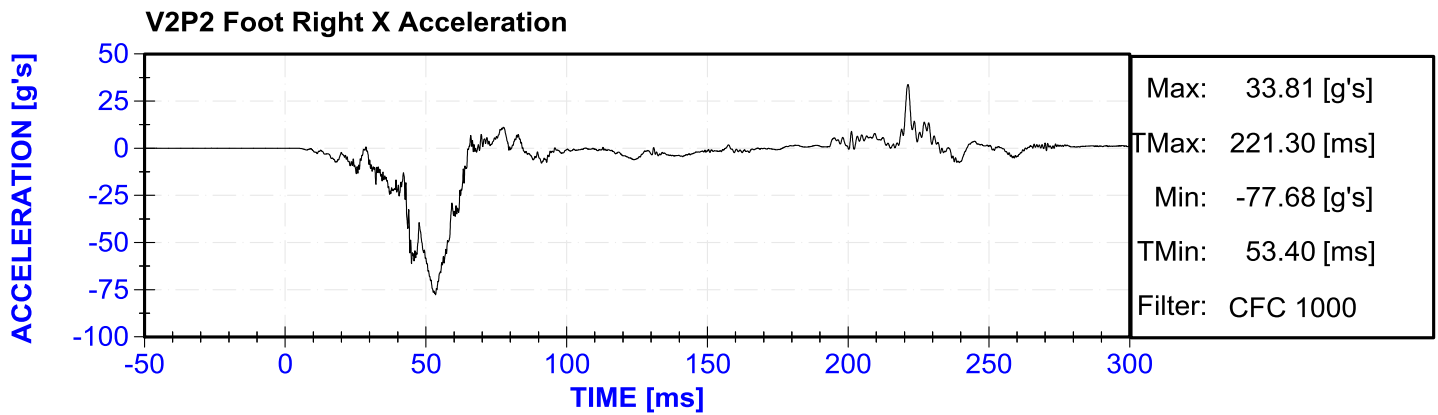
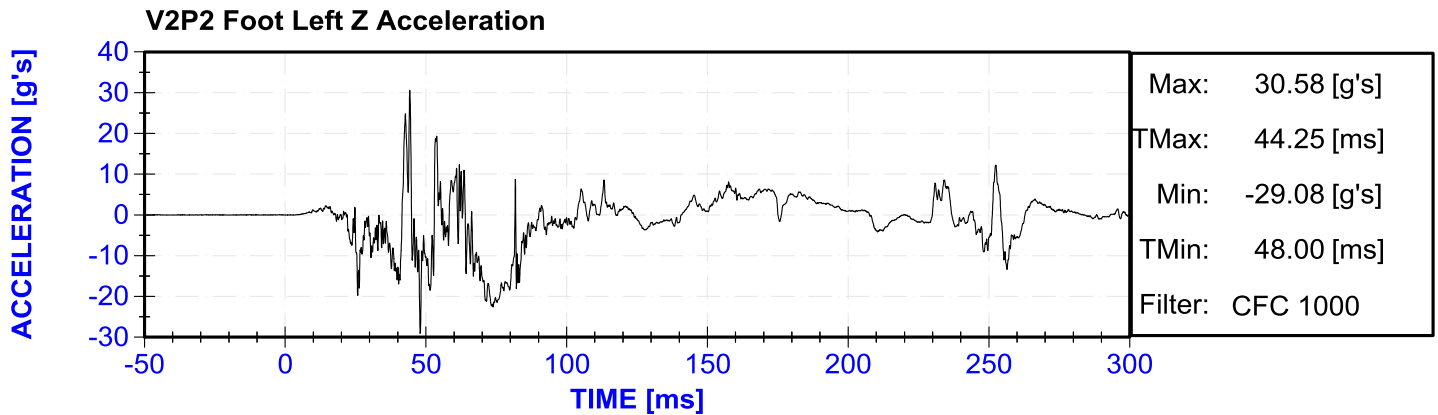


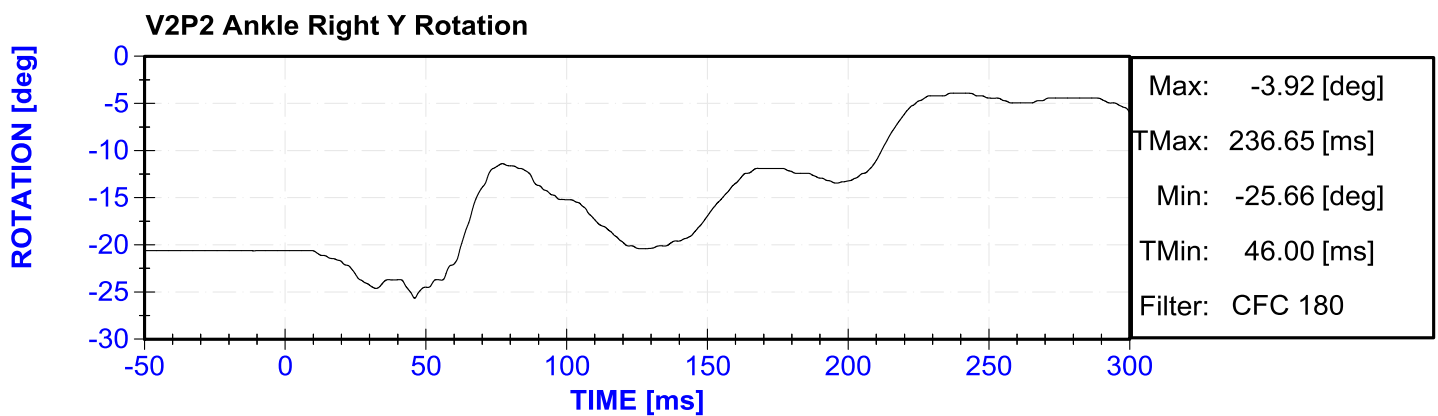
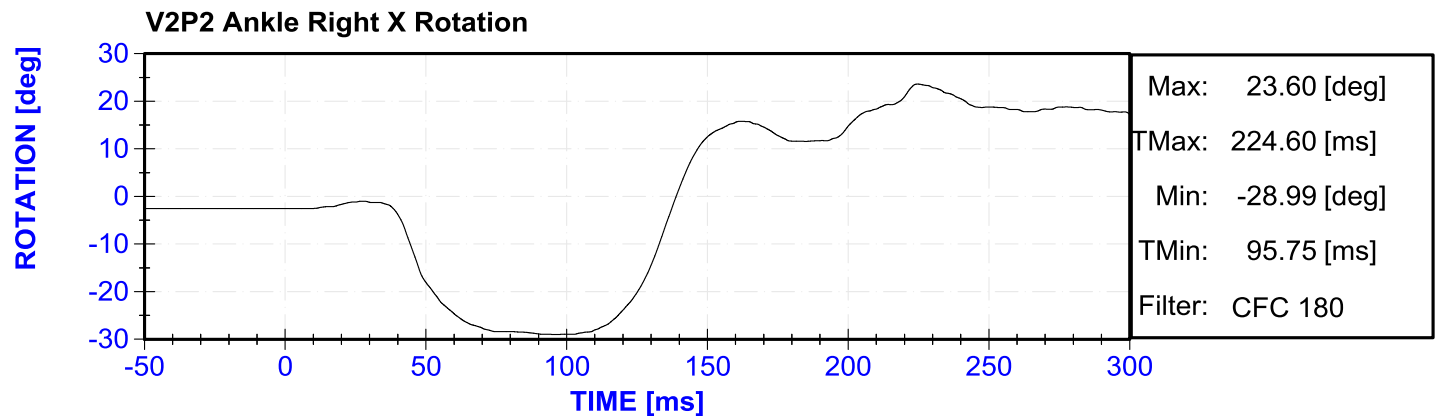
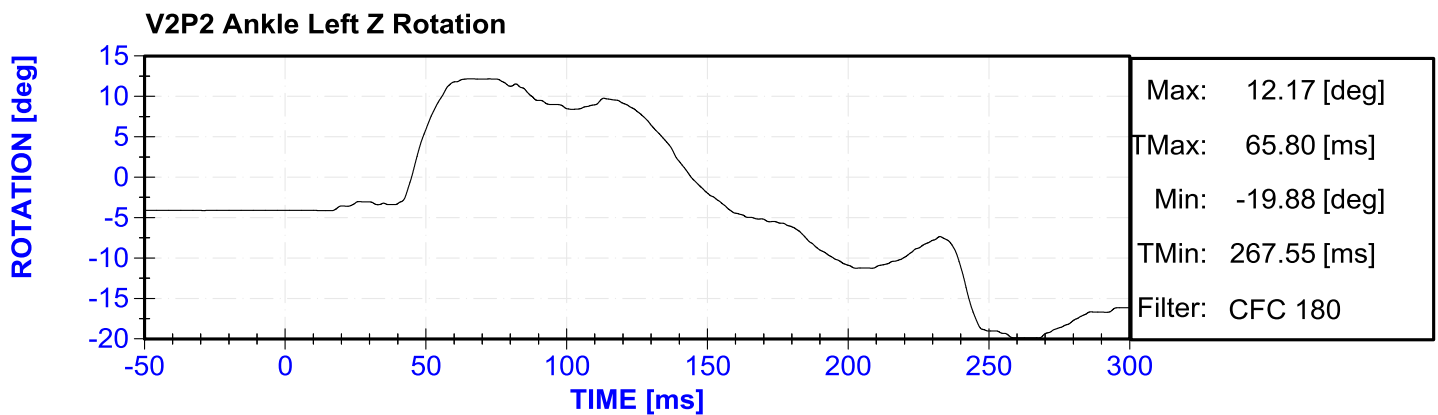
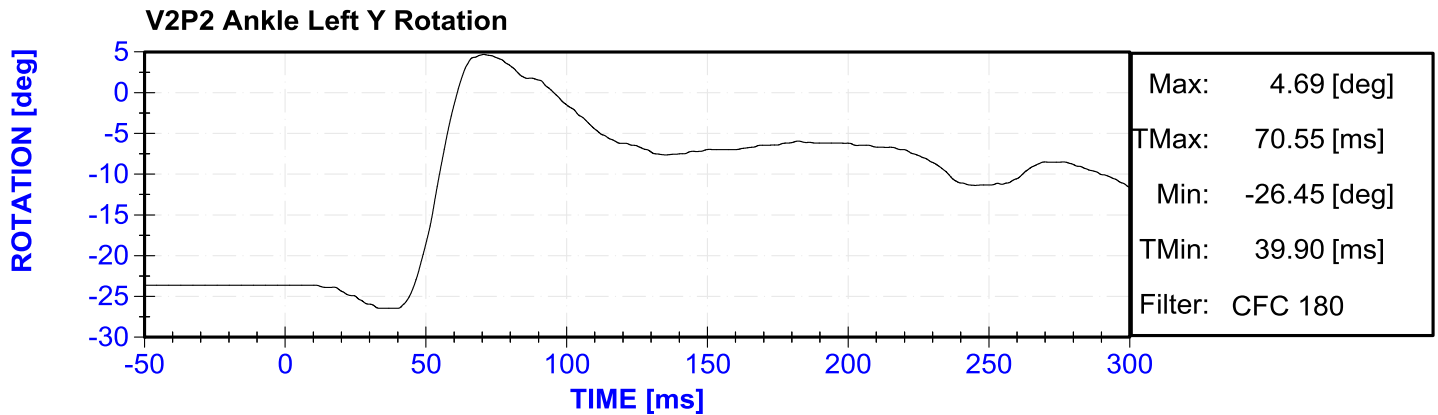


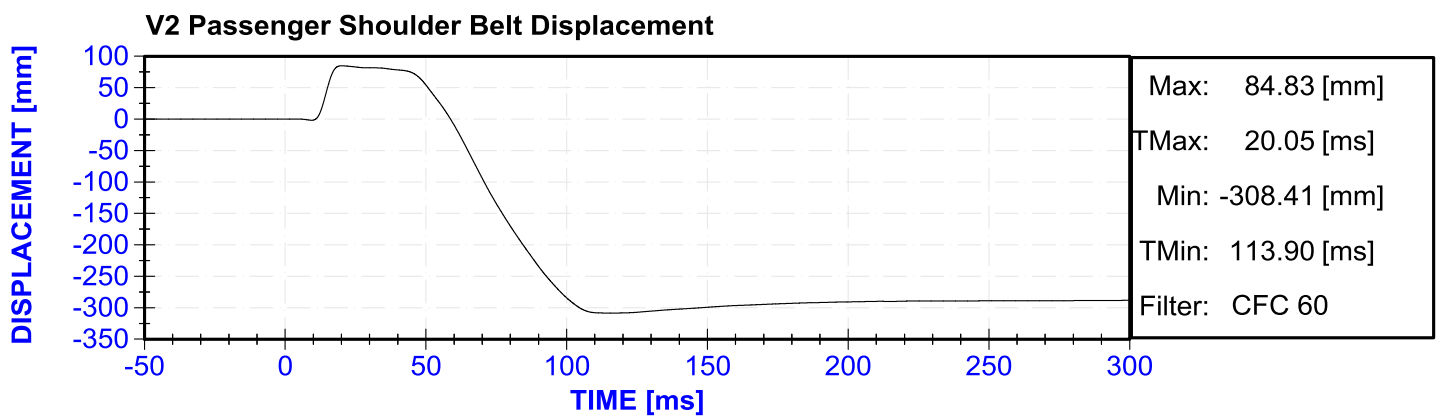
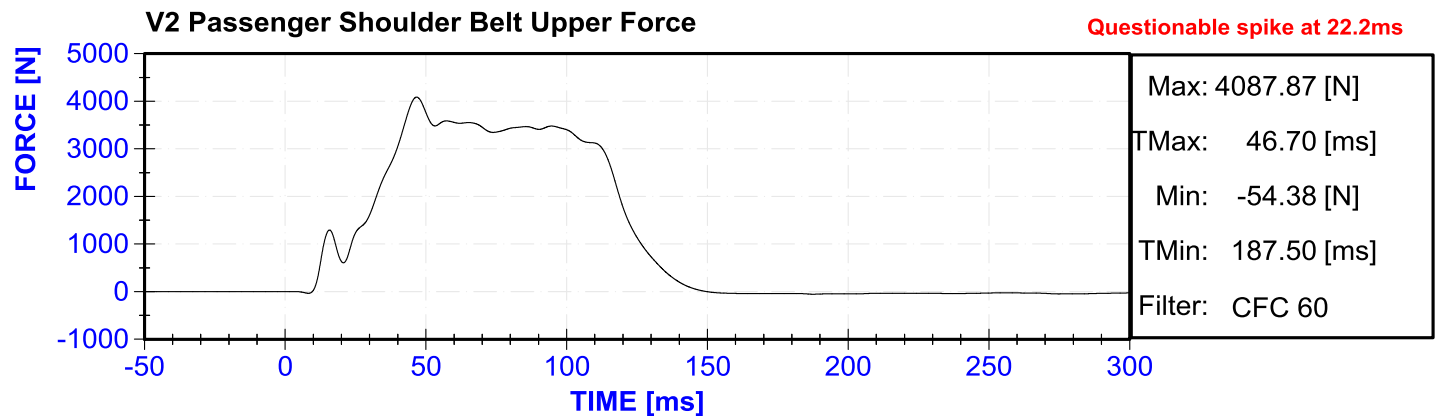
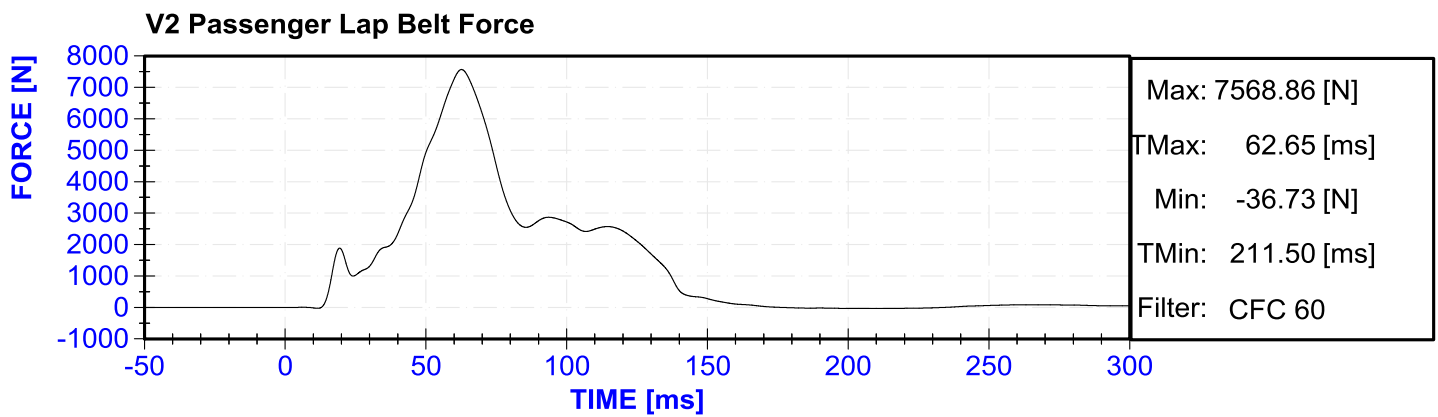
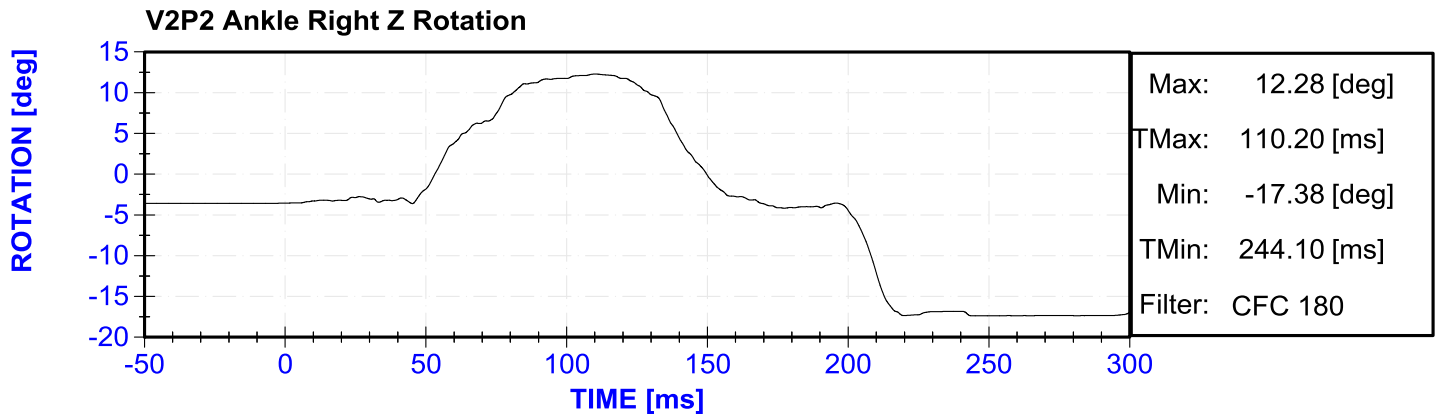


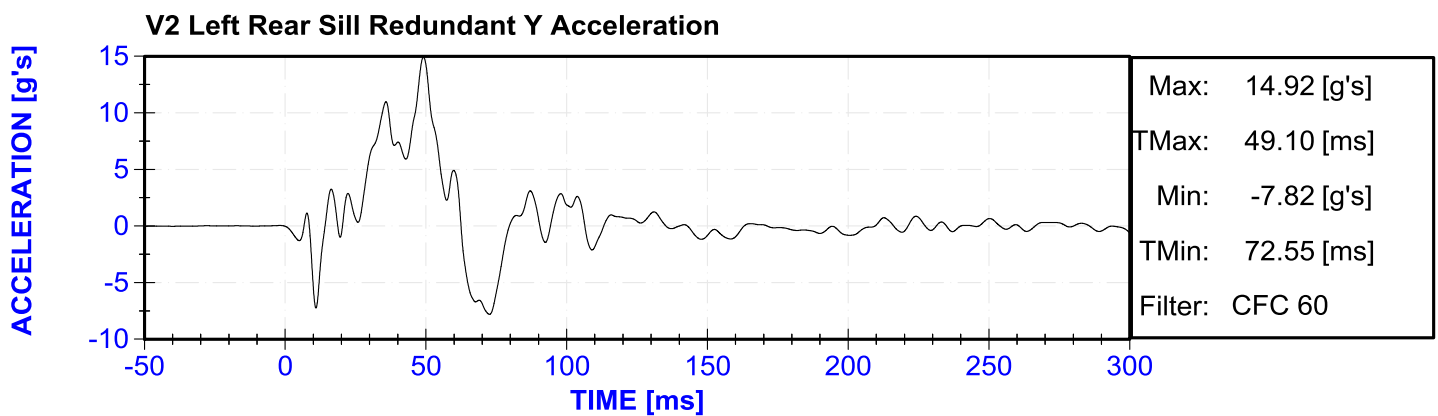
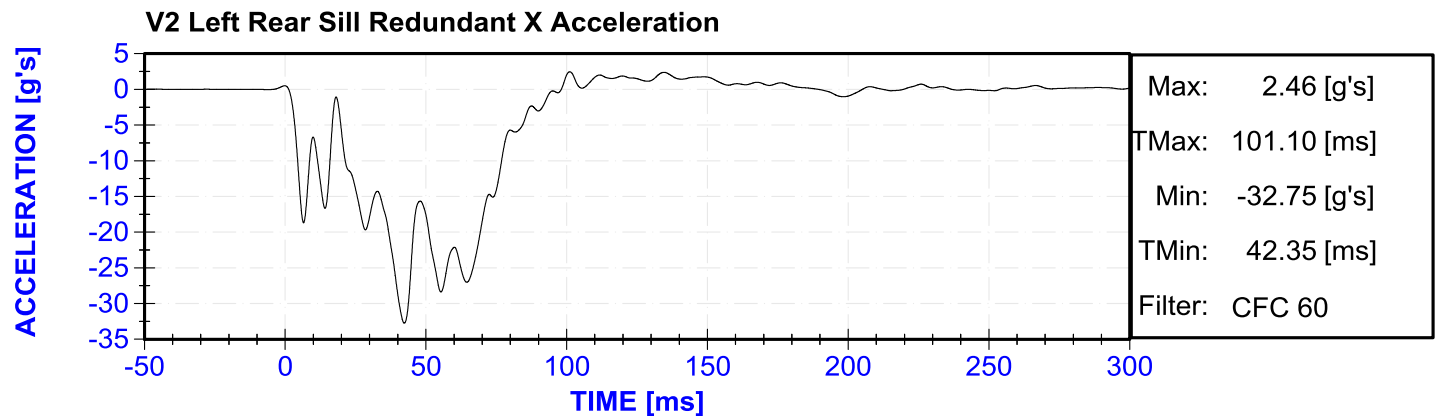
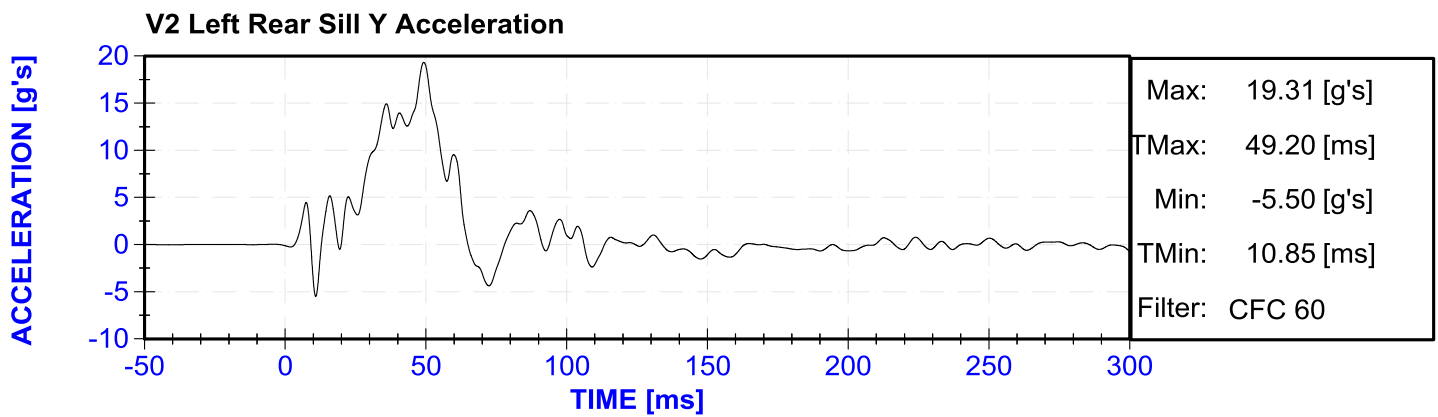
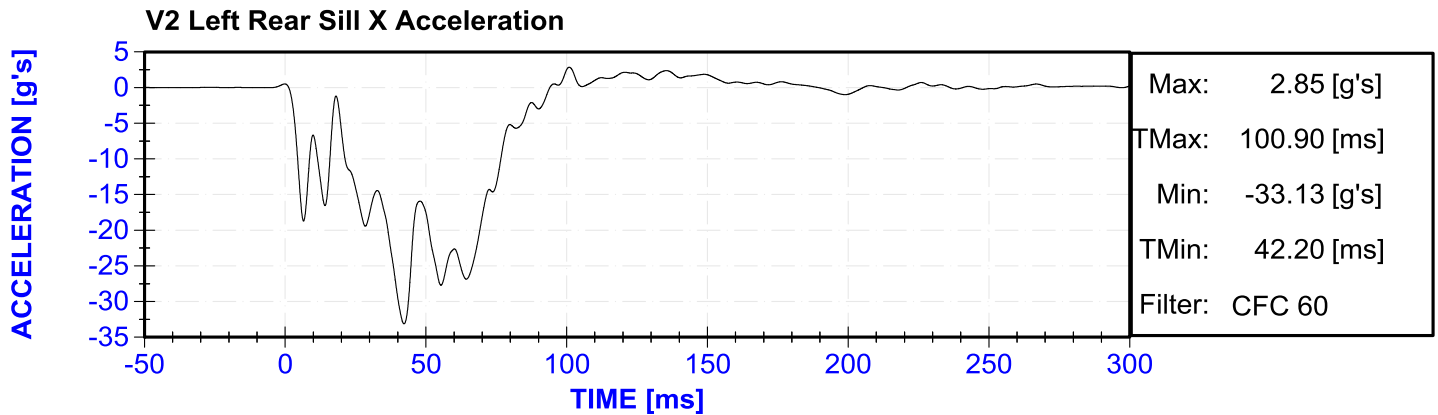


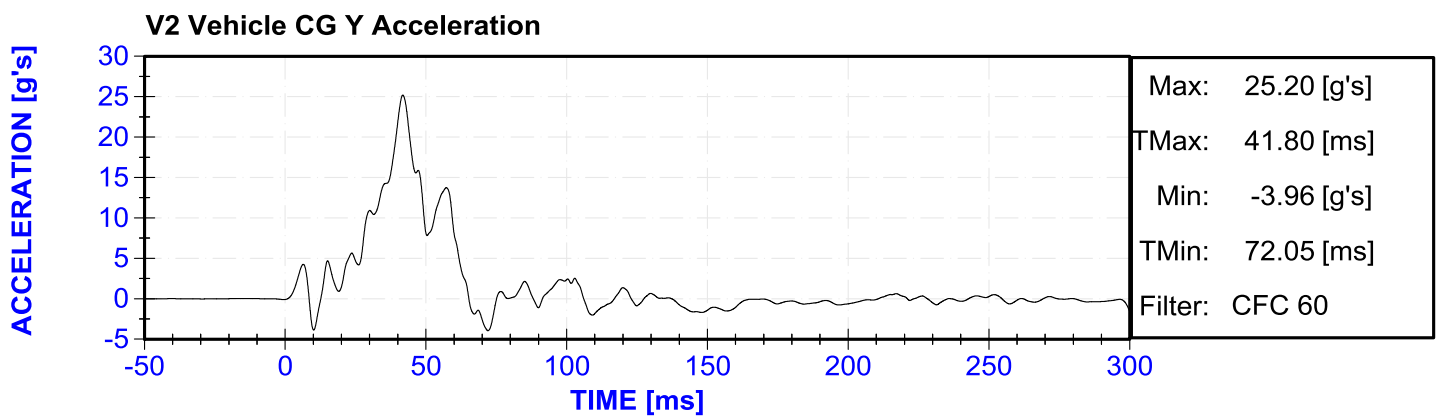
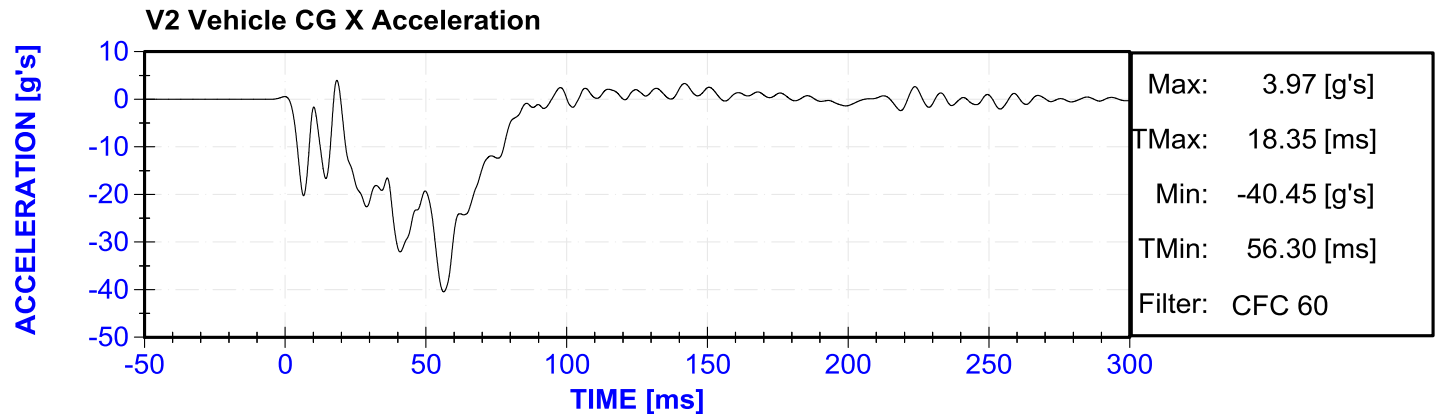
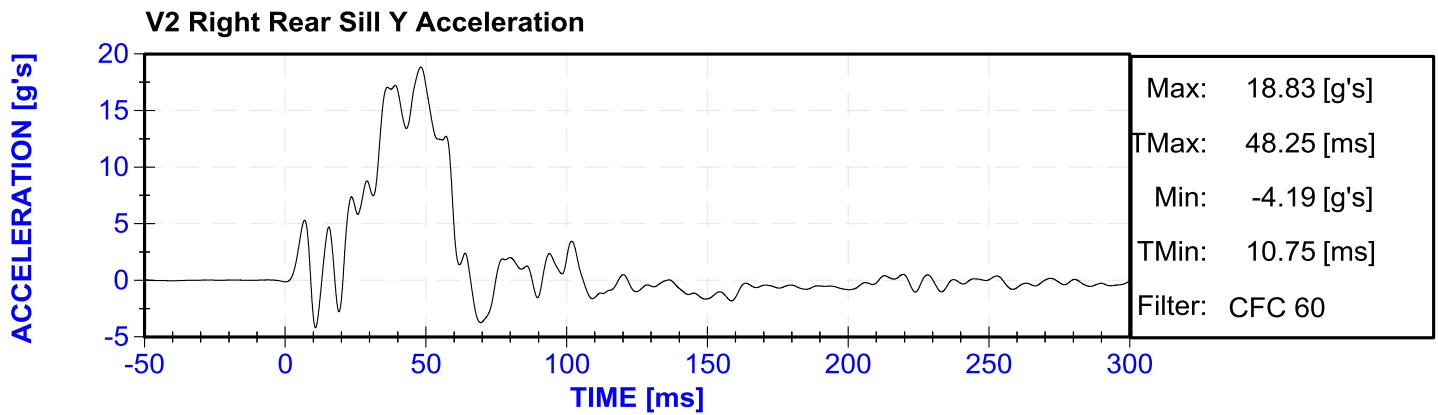
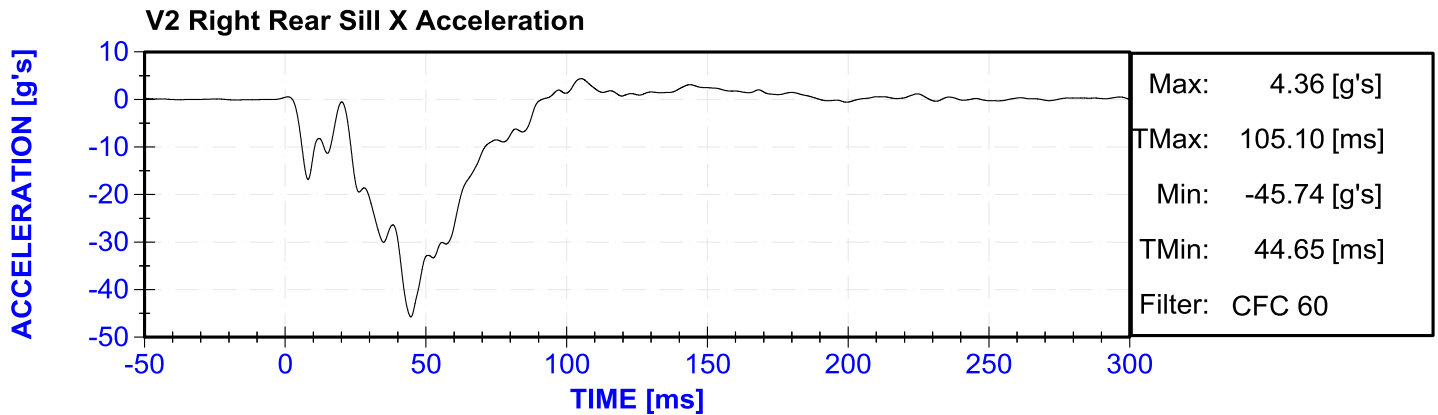


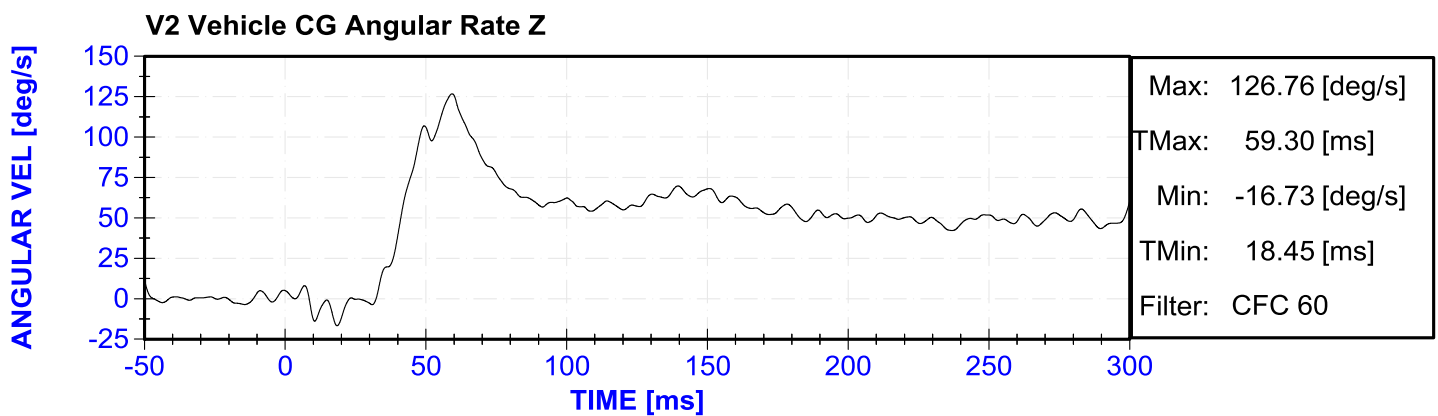
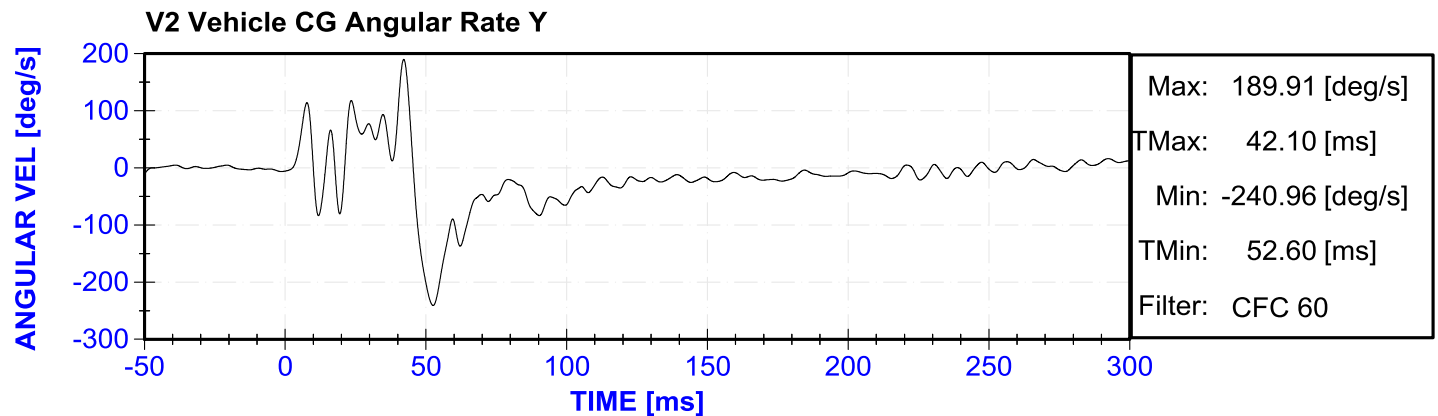
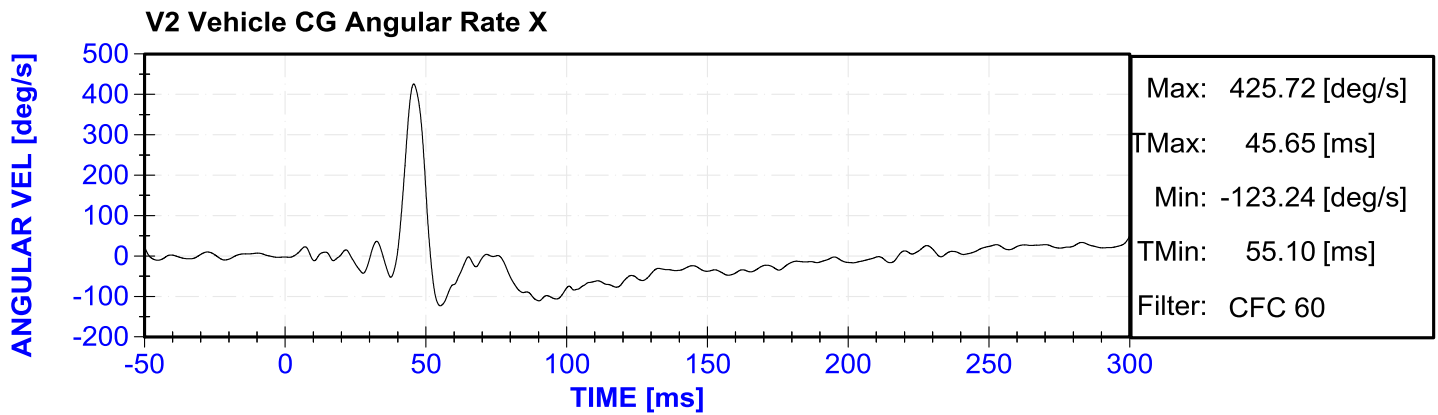
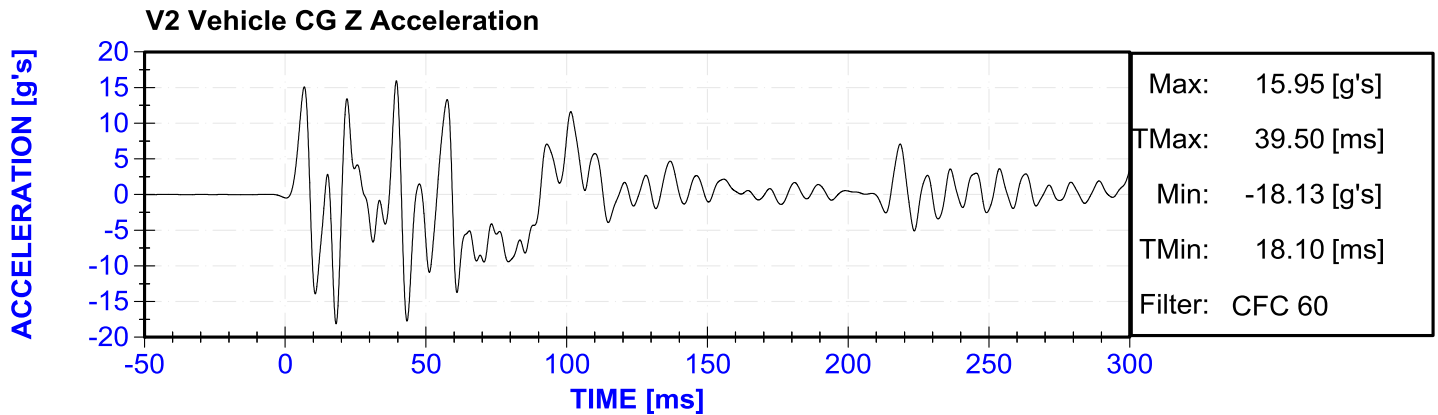


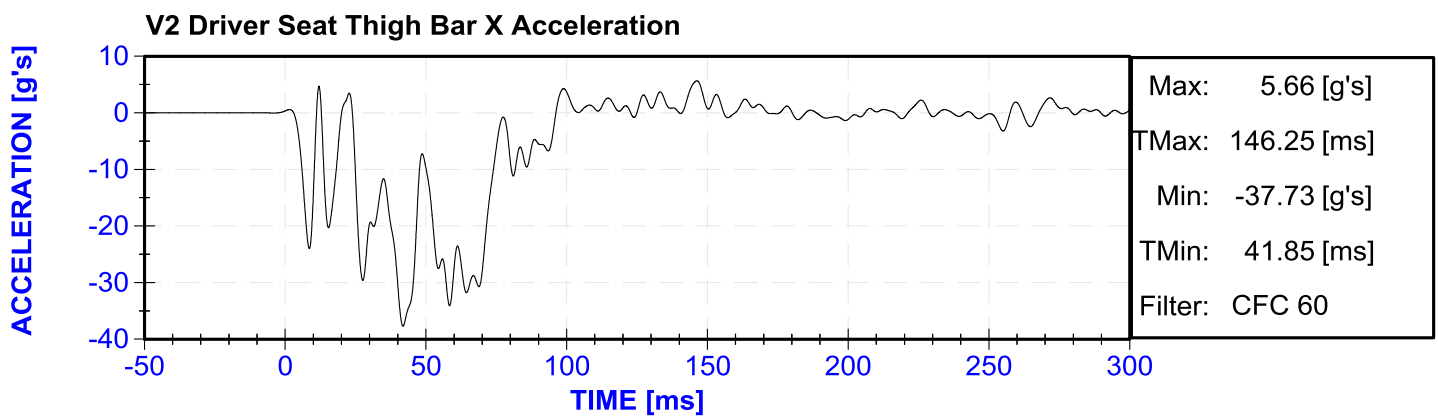
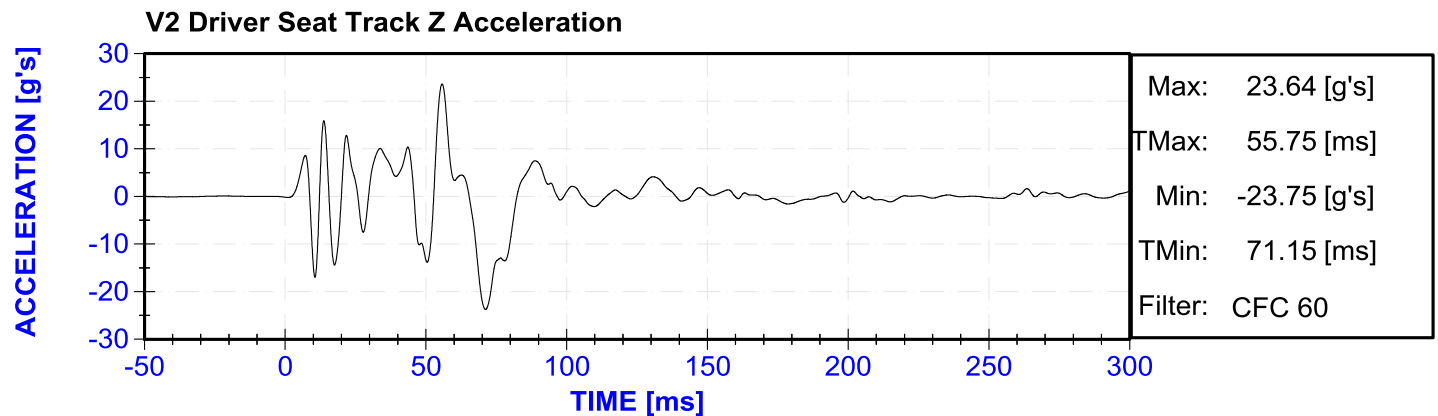
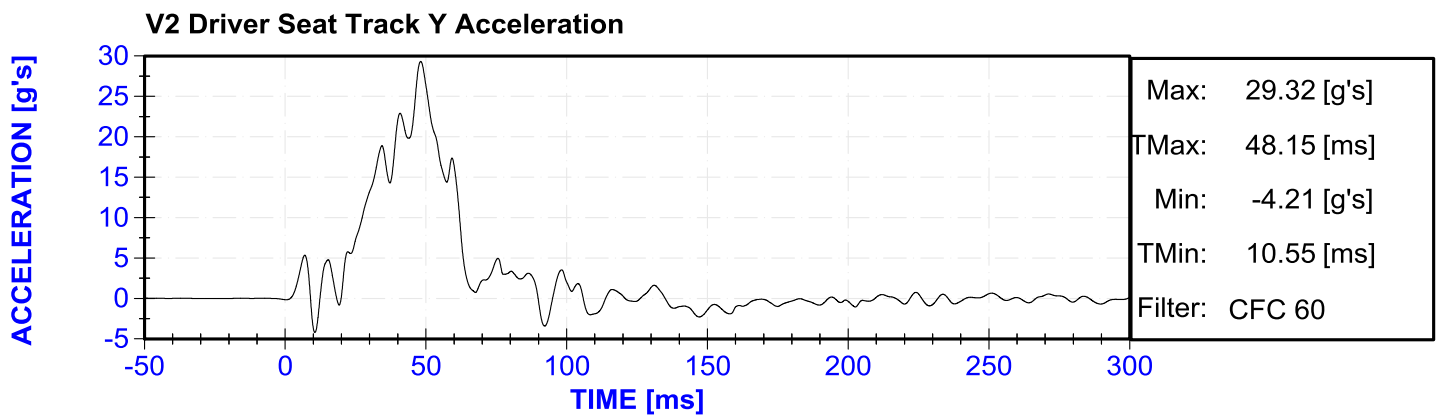
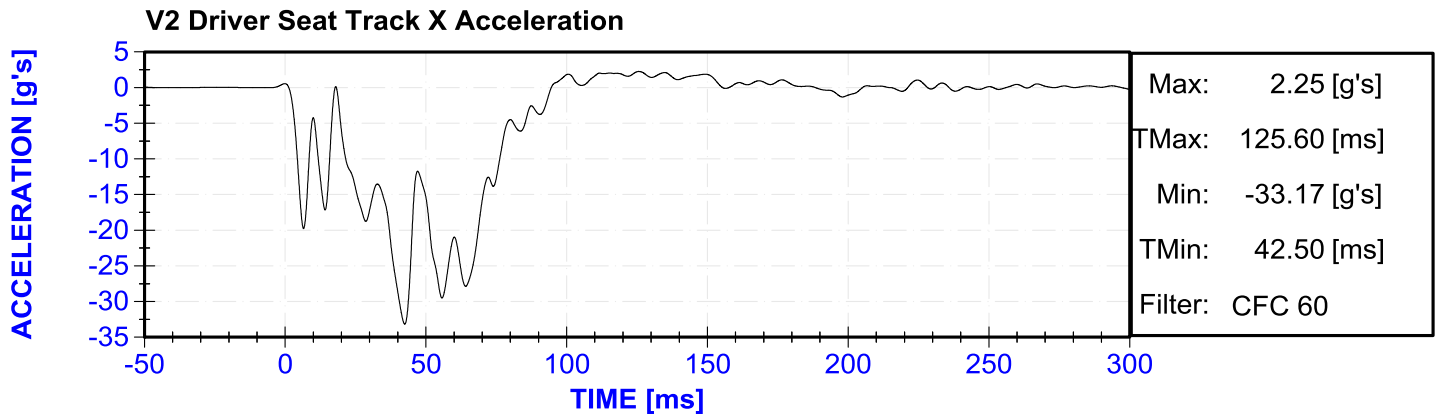




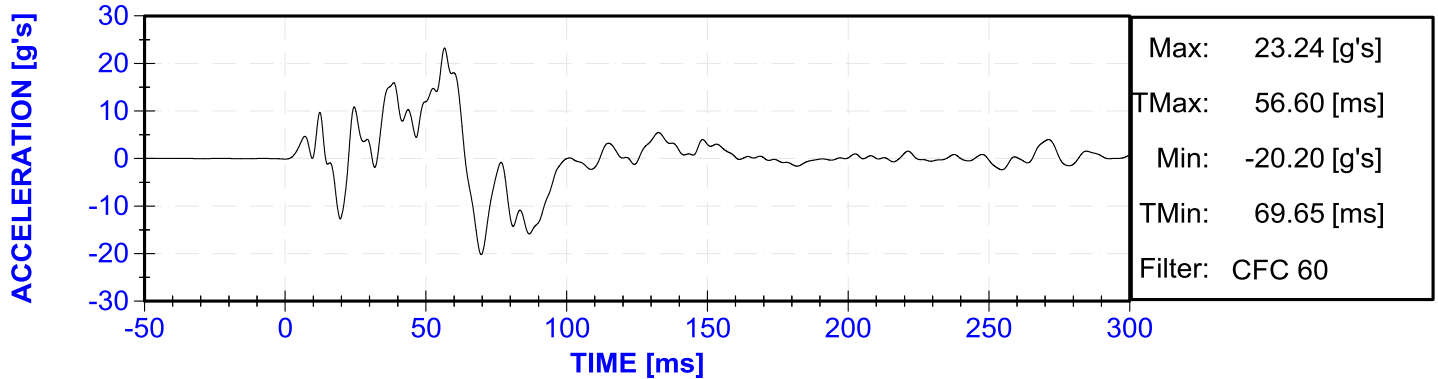




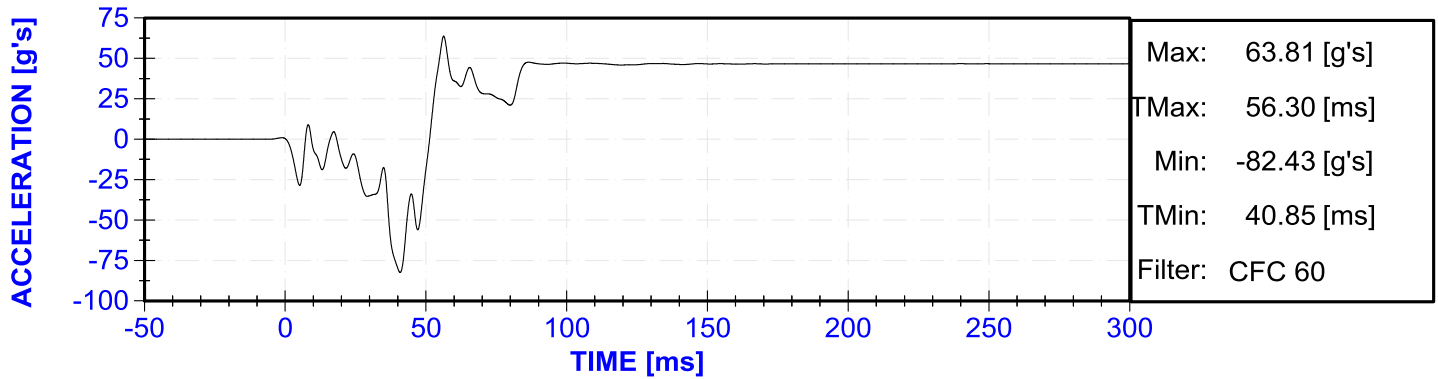




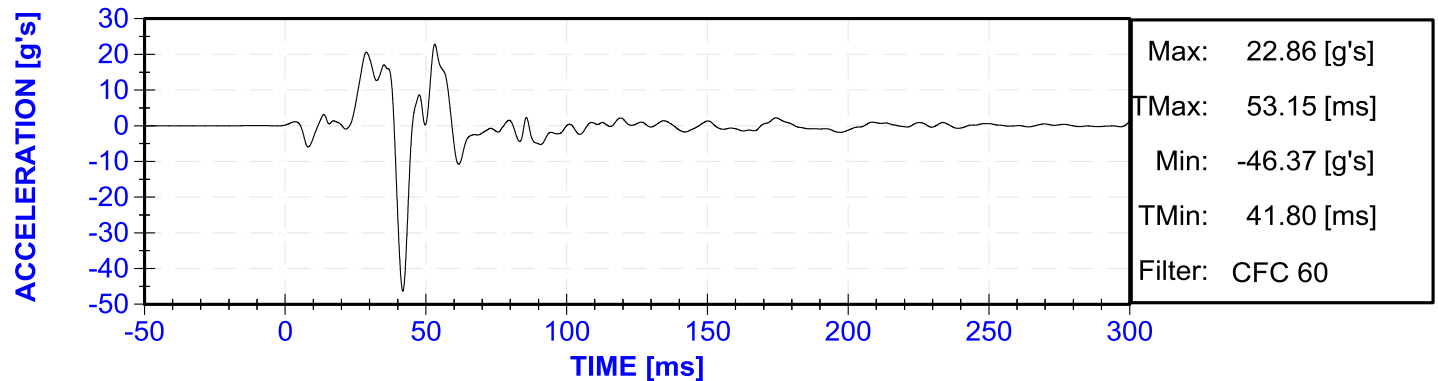
V2 Driver Seat Thigh Bar Z Acceleration



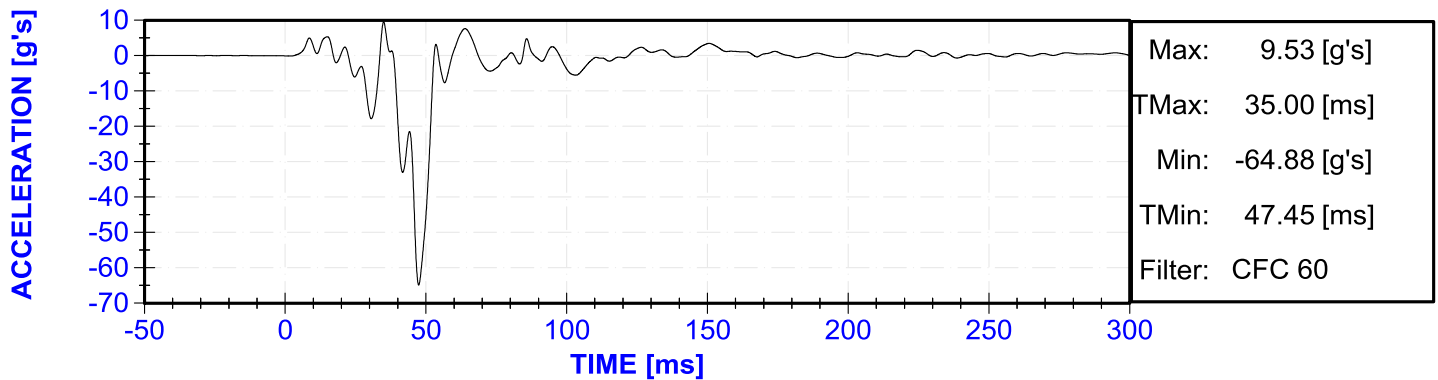
V2 Driver Floor Pan X Acceleration

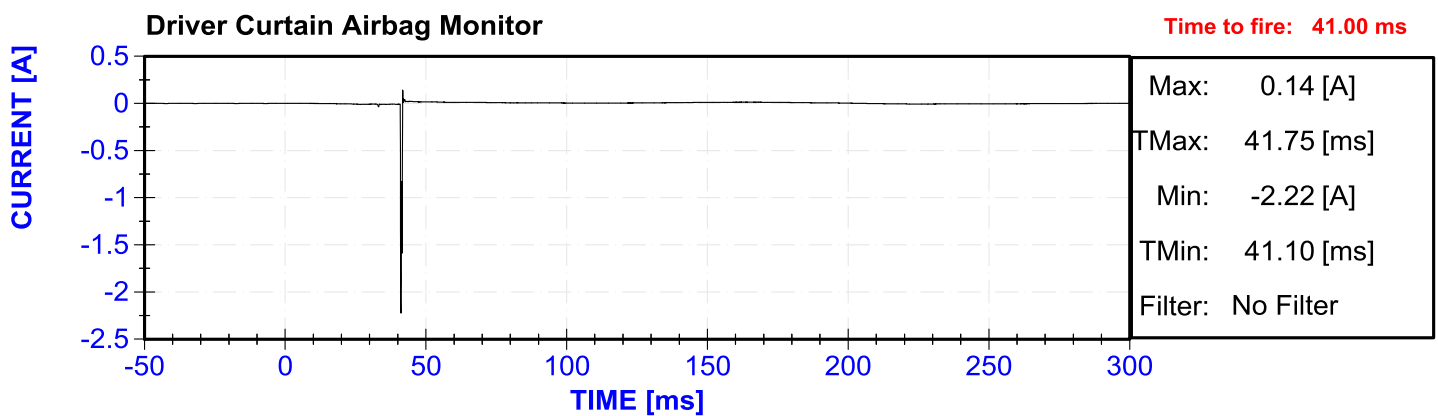
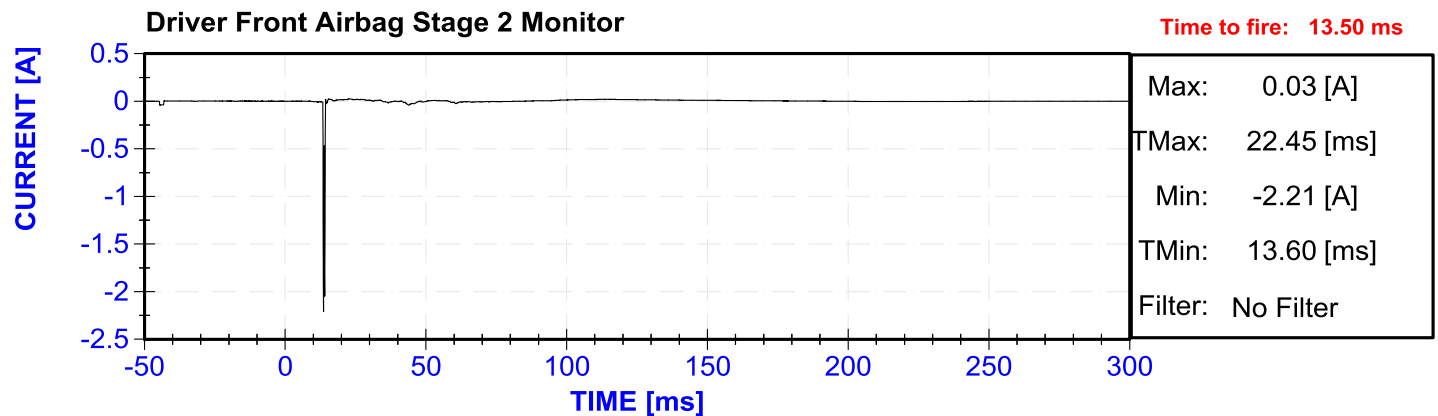
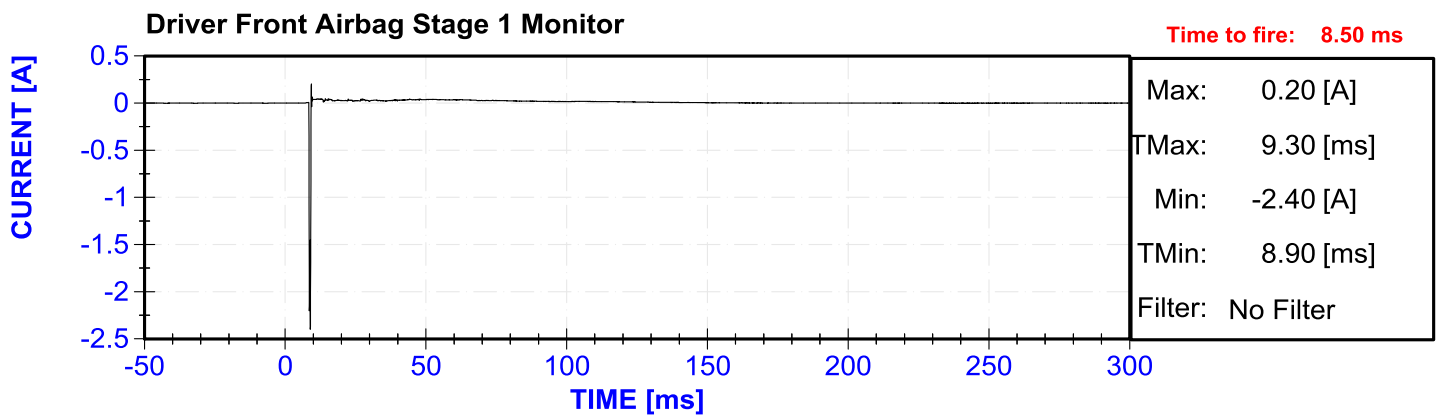
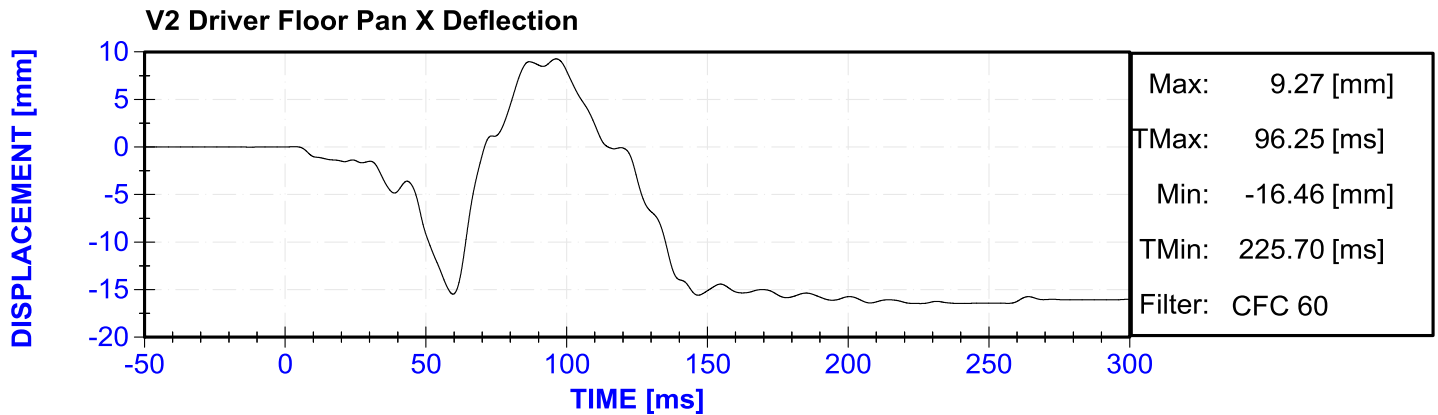


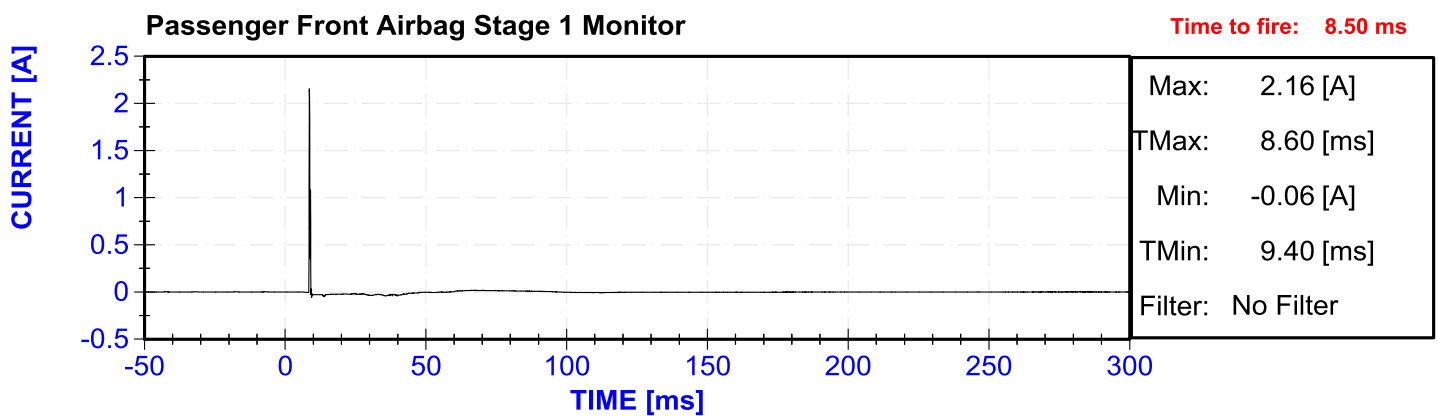
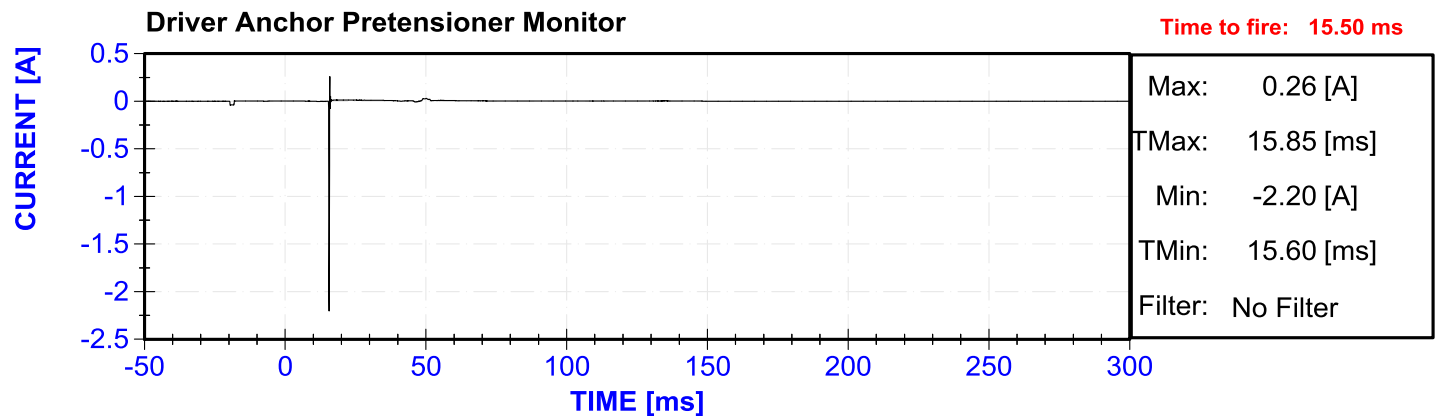
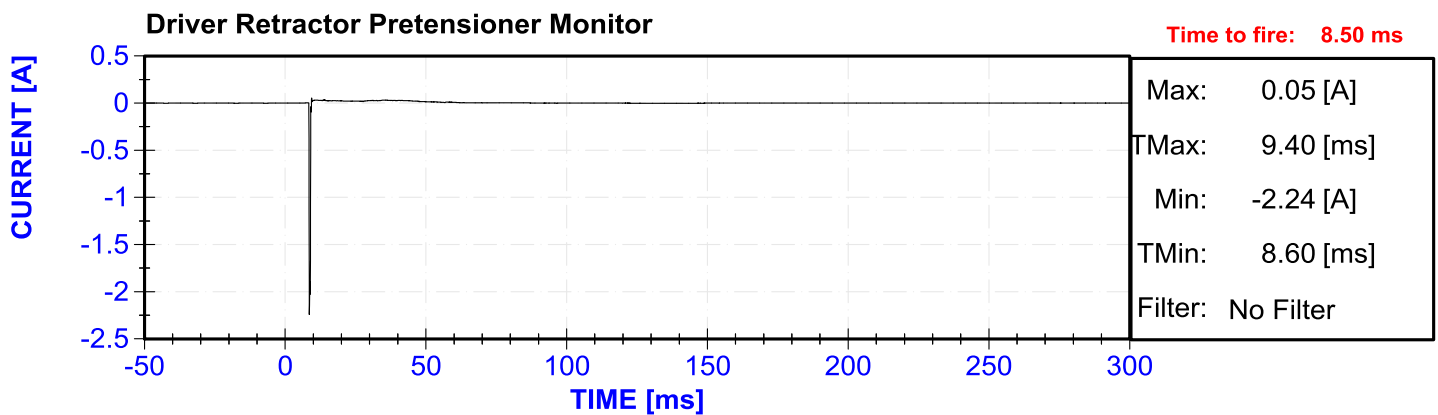
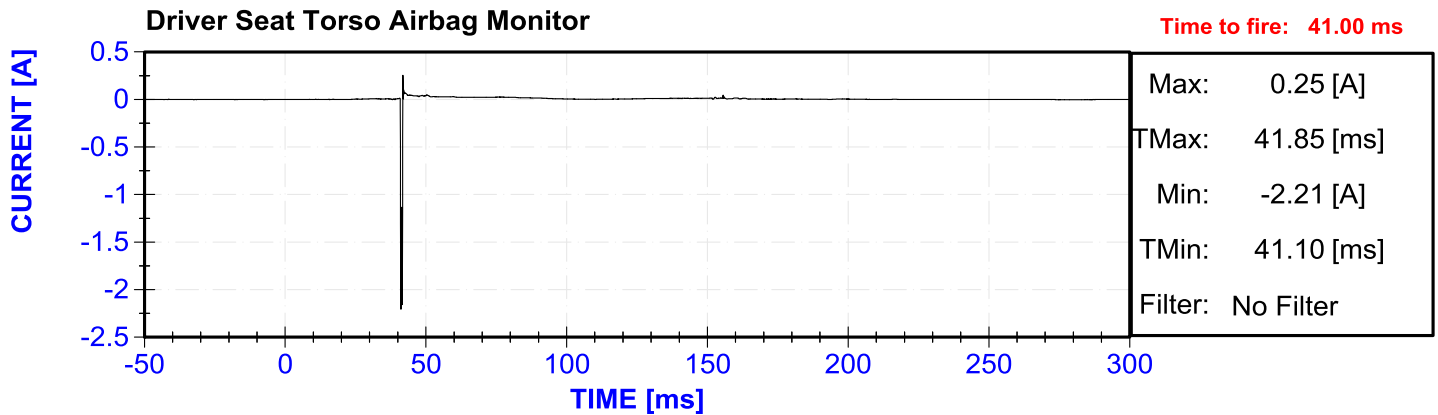
V2 Driver Floor Pan Y Acceleration

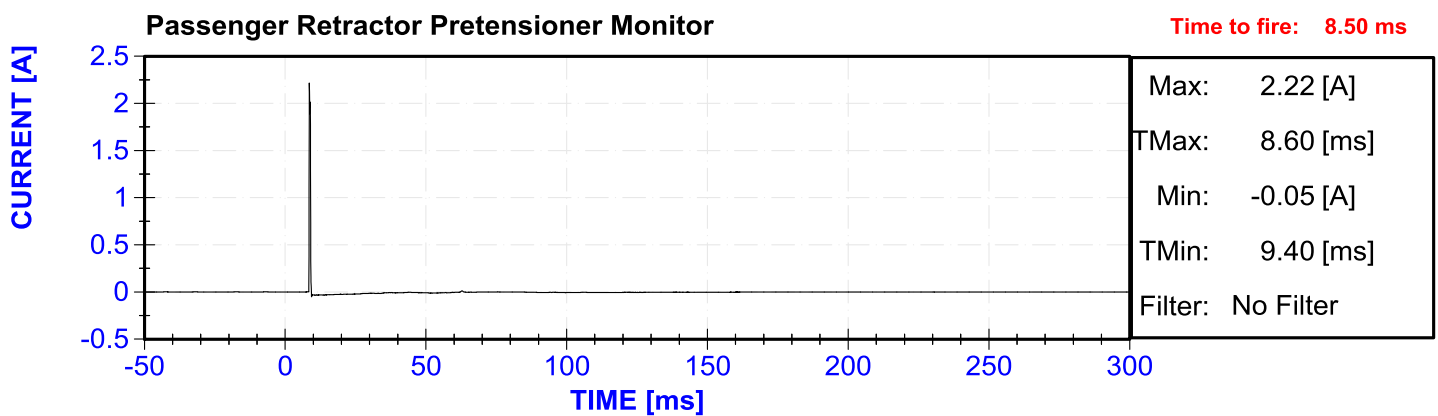
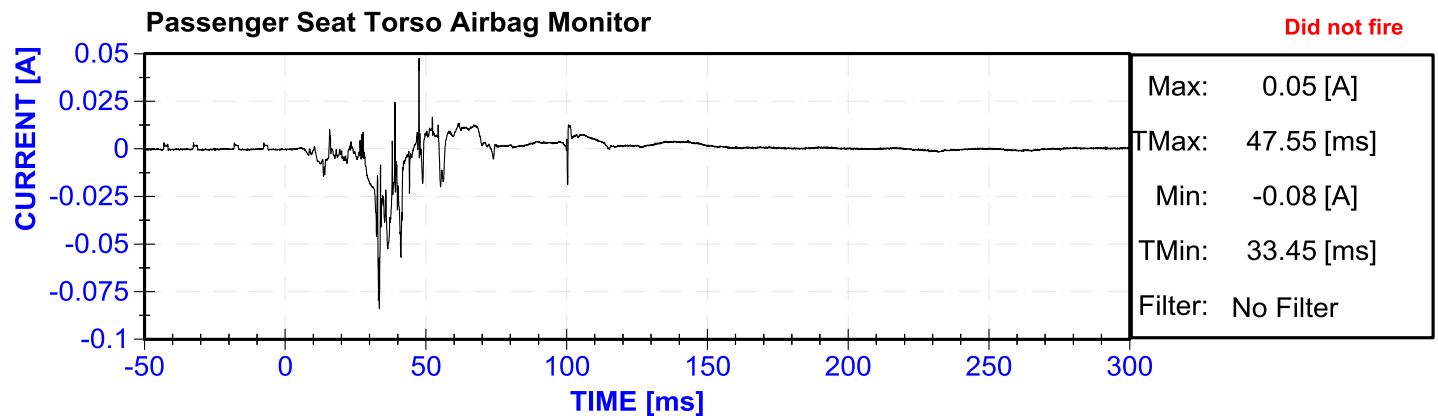
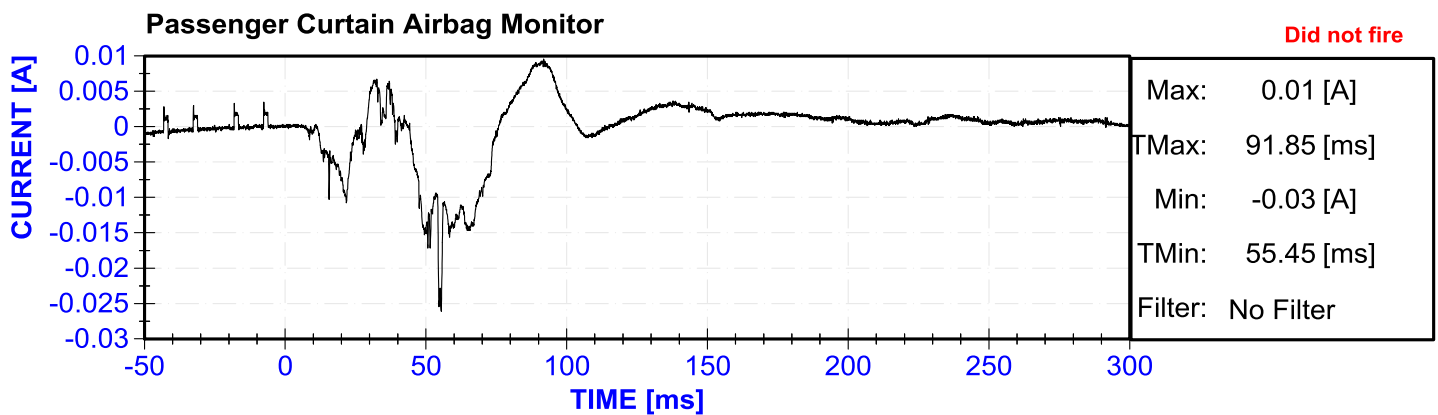
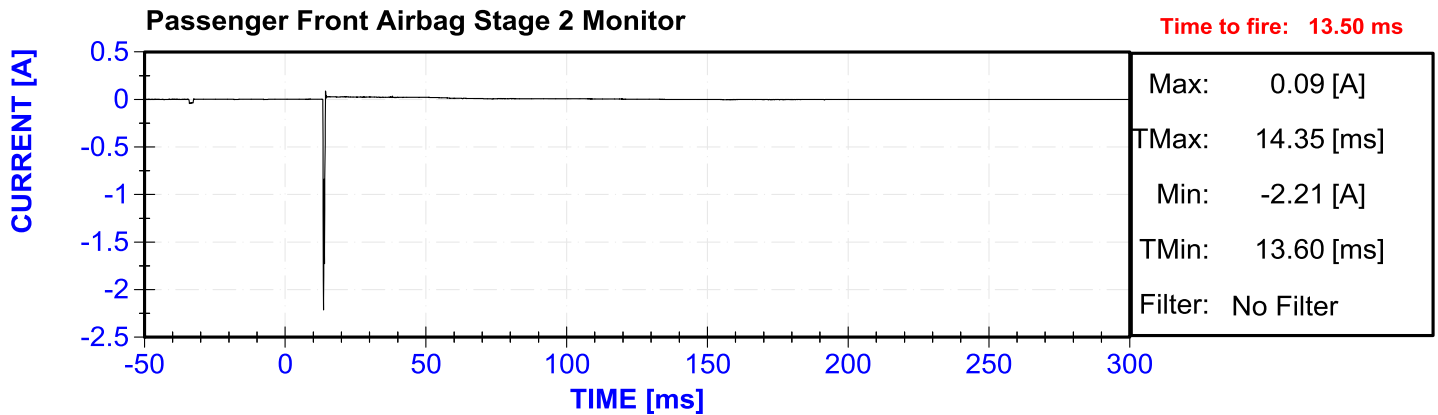


V2 Driver Floor Pan Z Acceleration



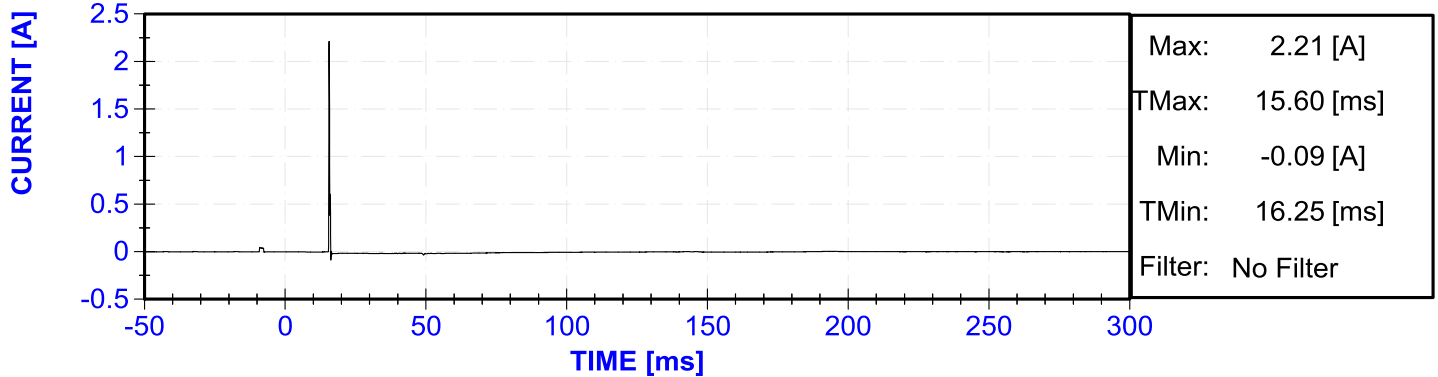




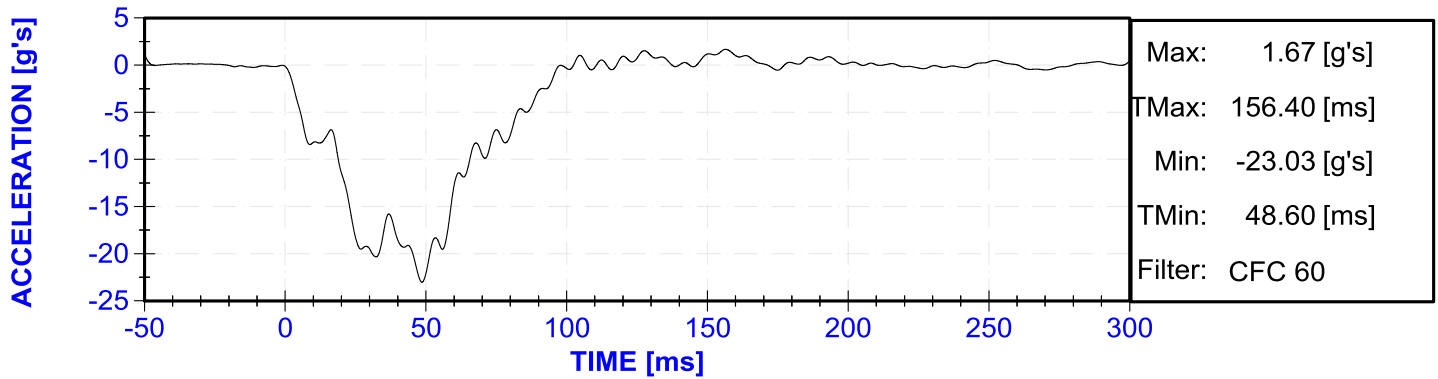


Passenger Anchor Pretensioner Monitor

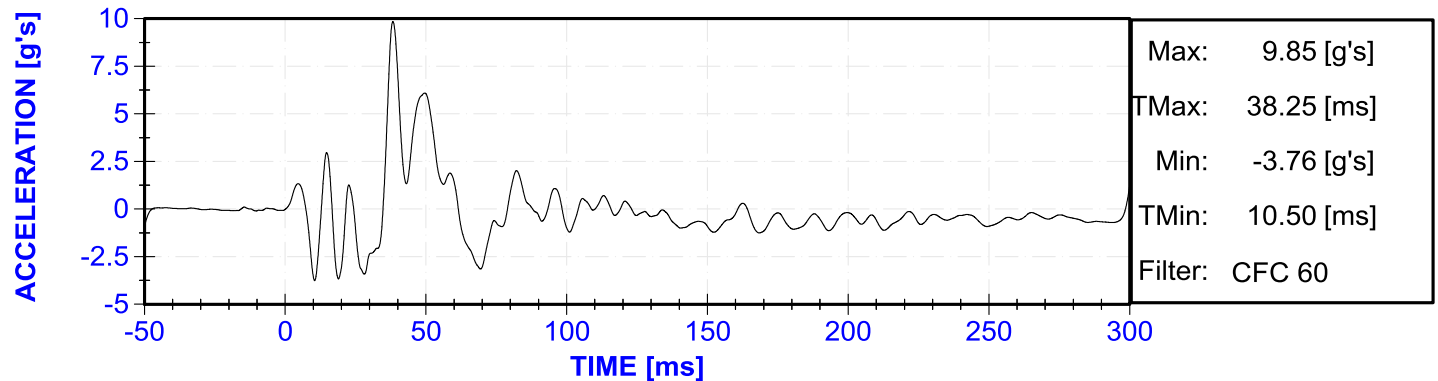
Time to fire: 15.50 ms



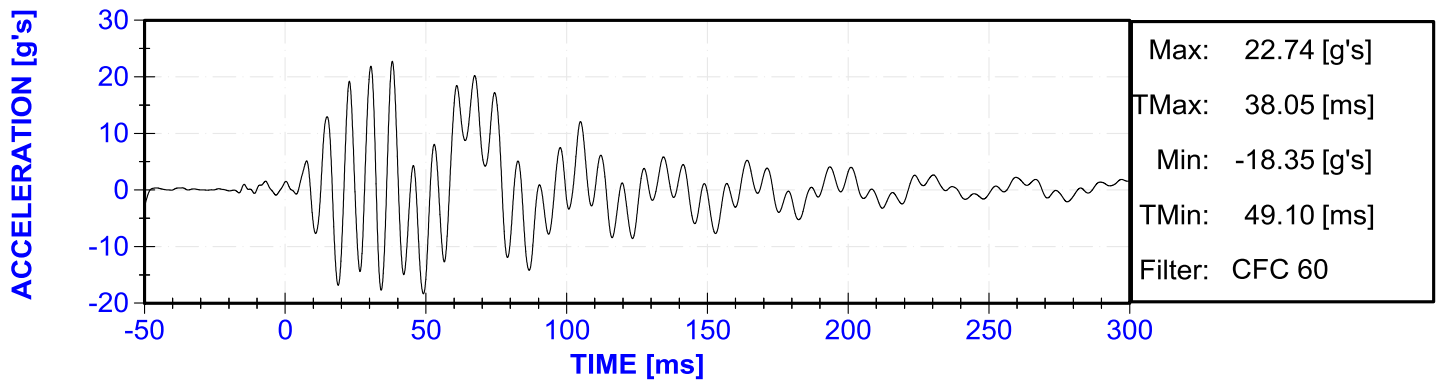
V1 OMDB CG X Acceleration

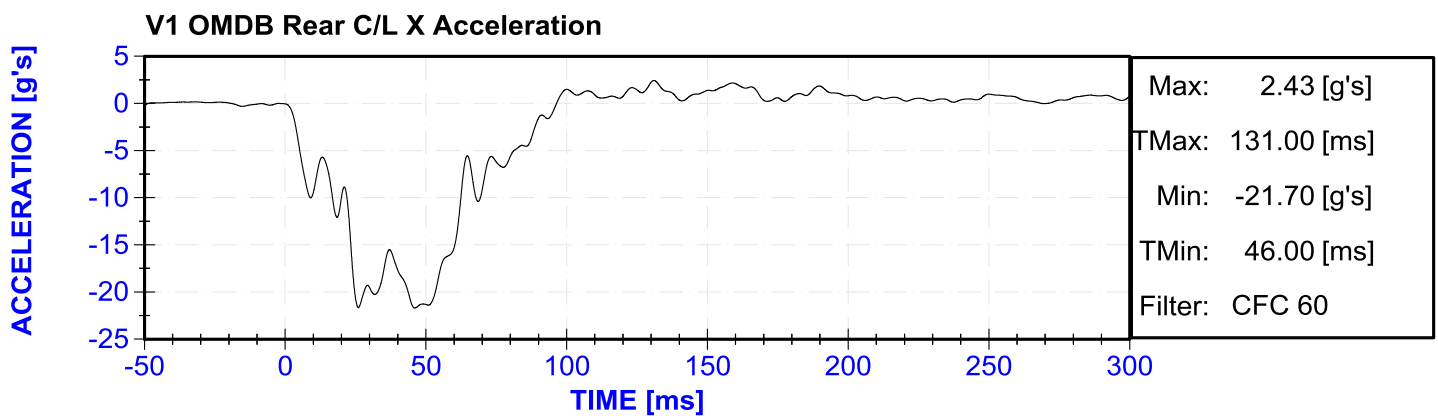
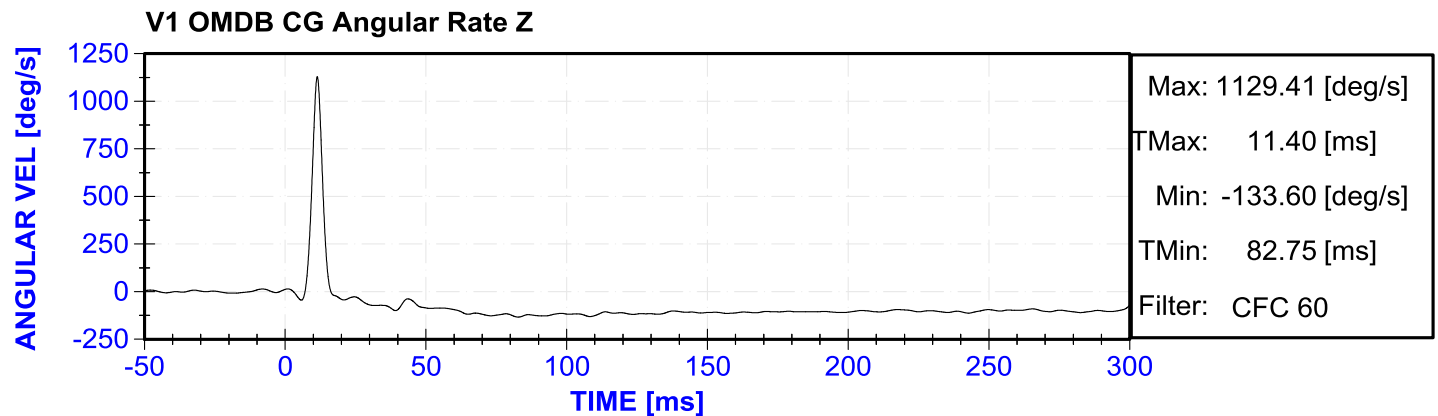
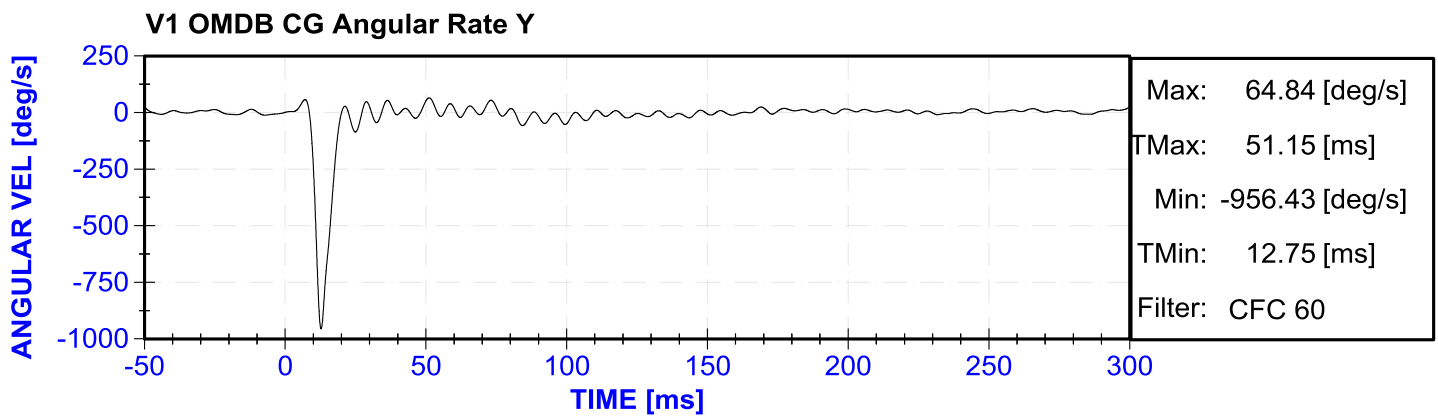
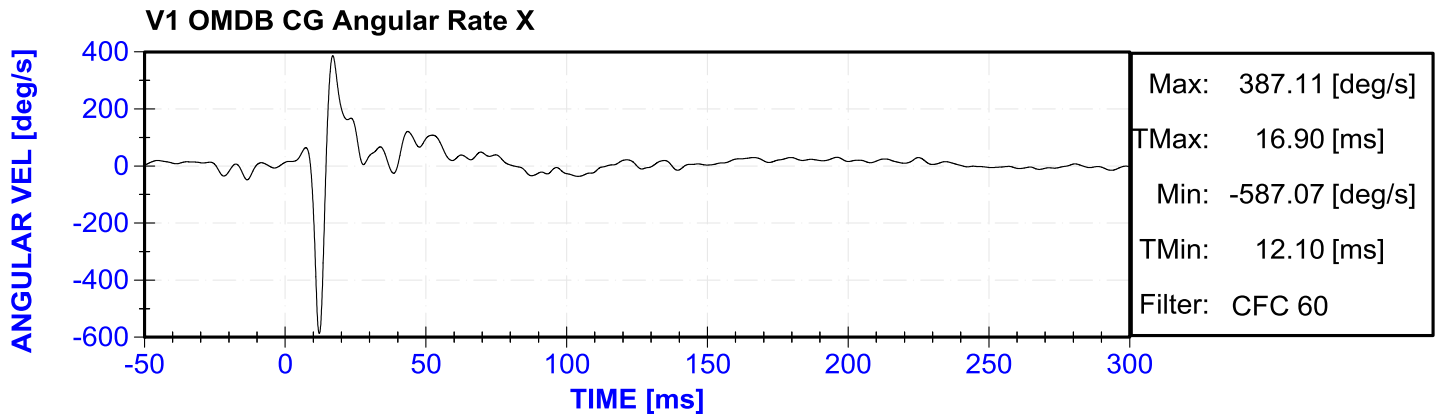


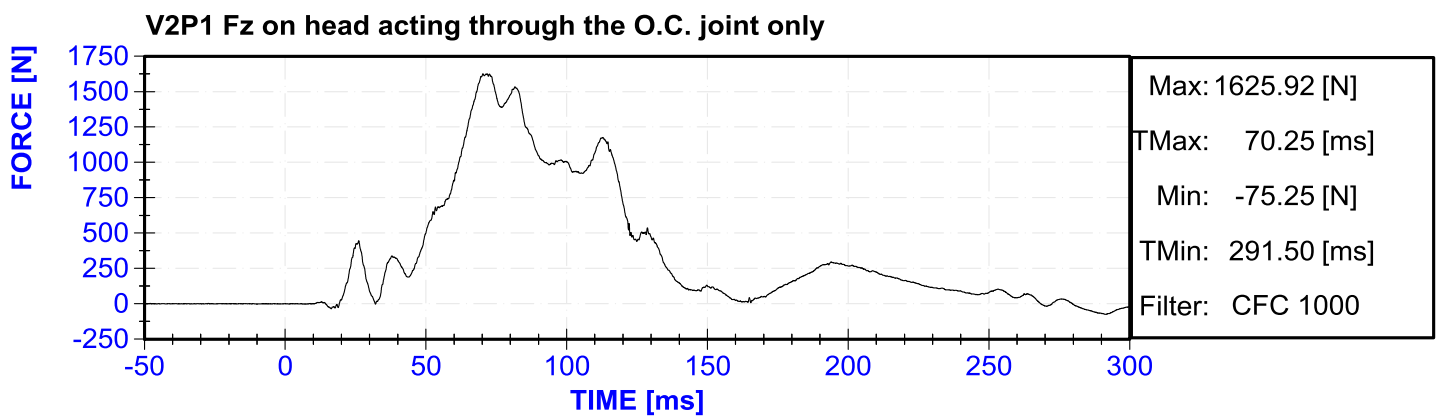
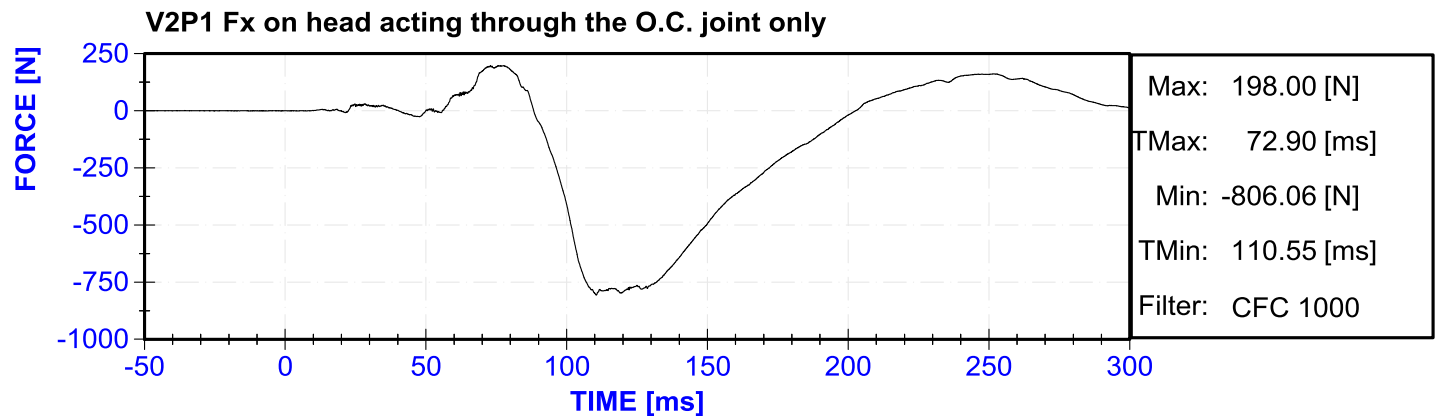
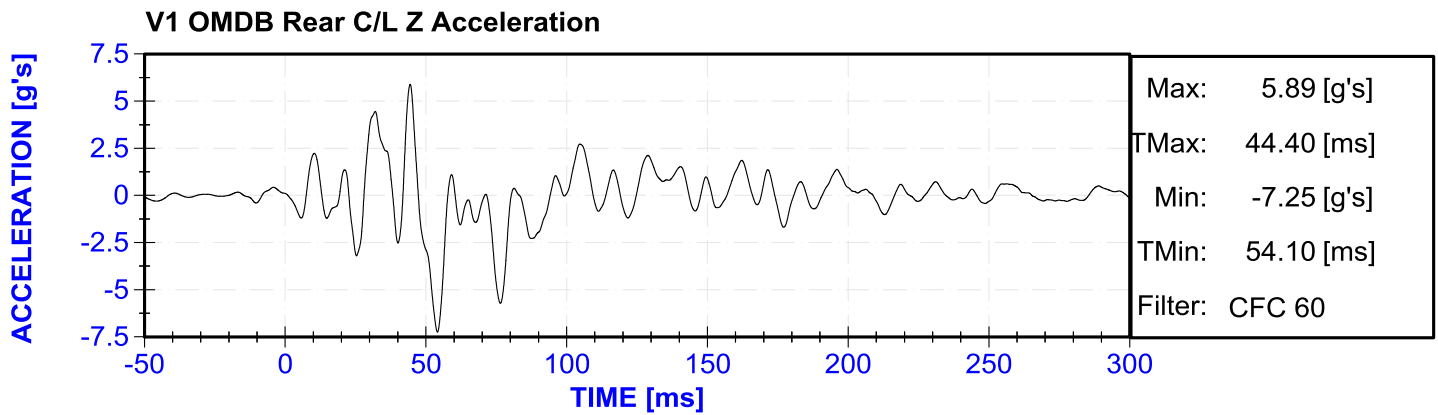
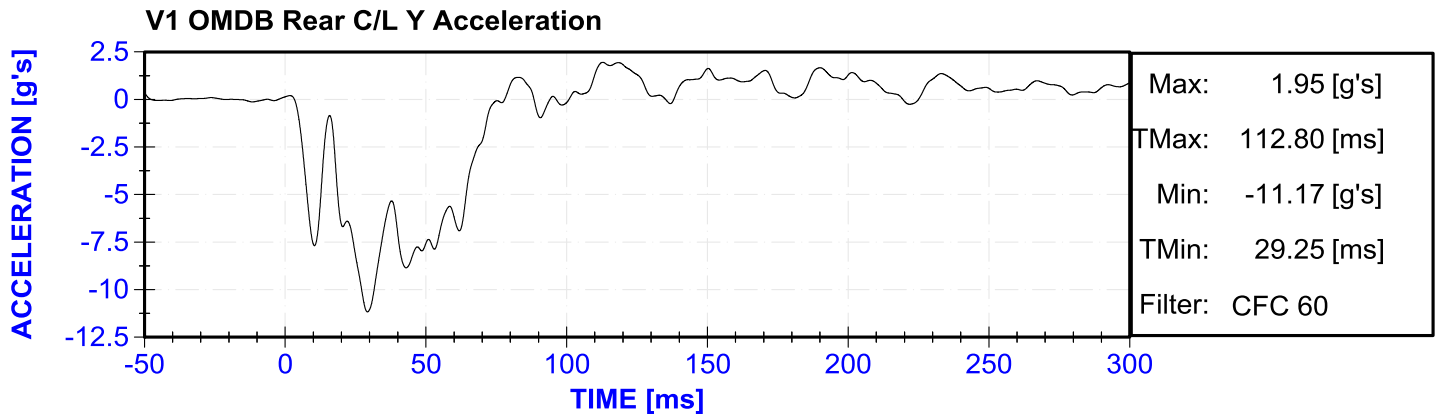
V1 OMDB CG Y Acceleration



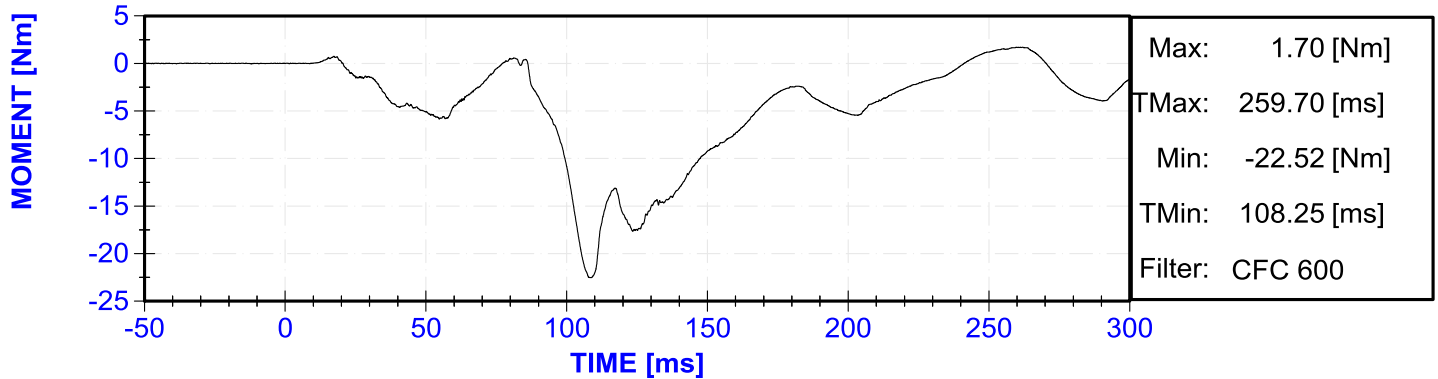
V1 OMDB CG Z Acceleration



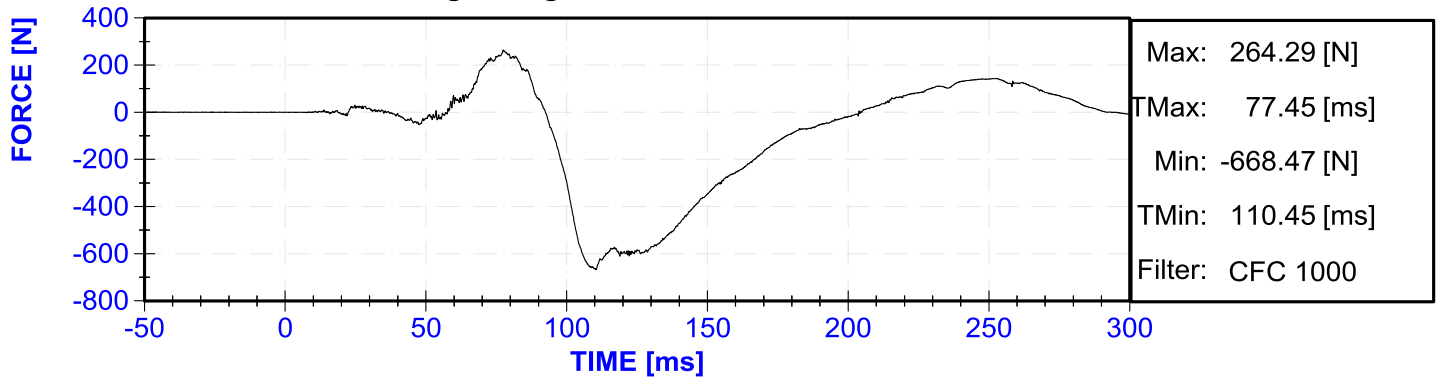




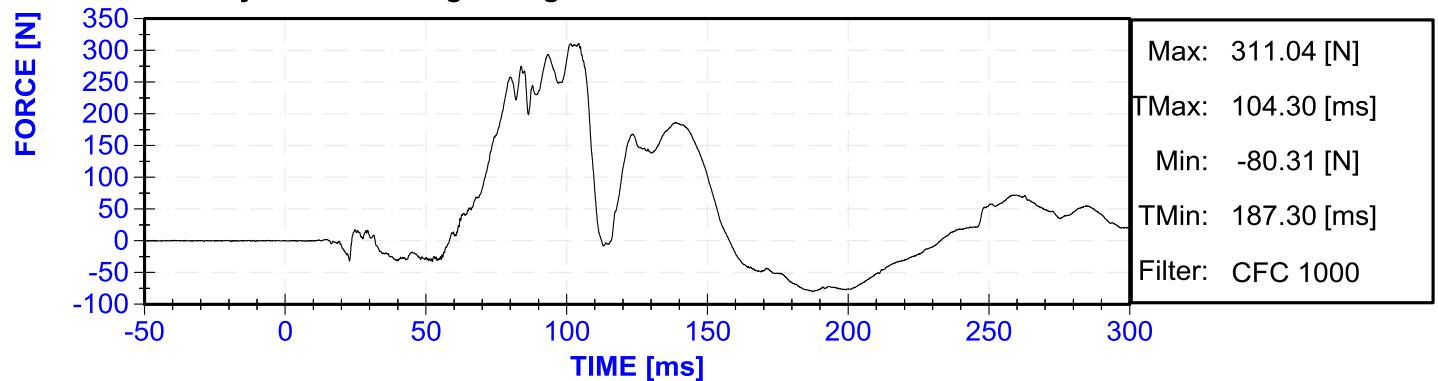
V2P1 My on head acting through the O.C. joint only



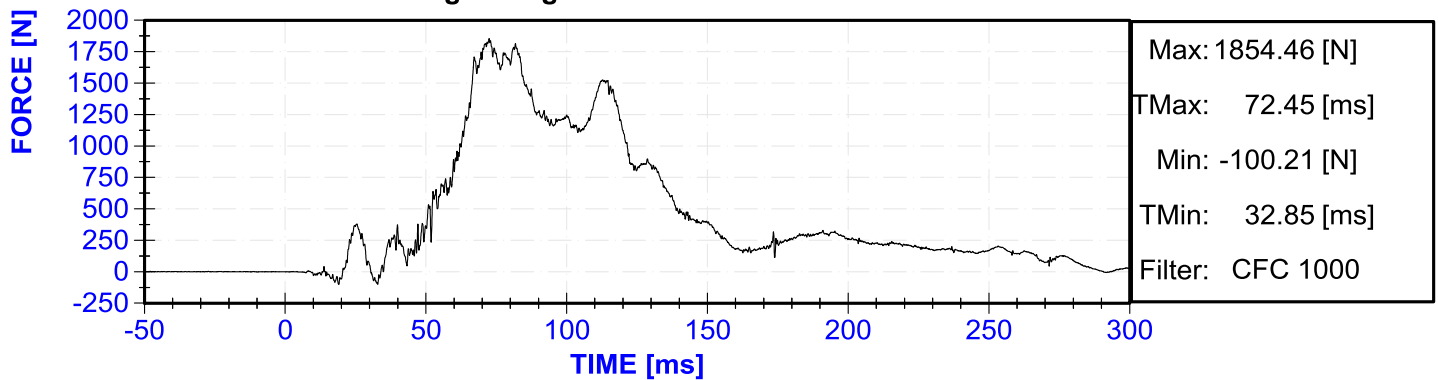
V2P1 Fx on head acting through the total neck section

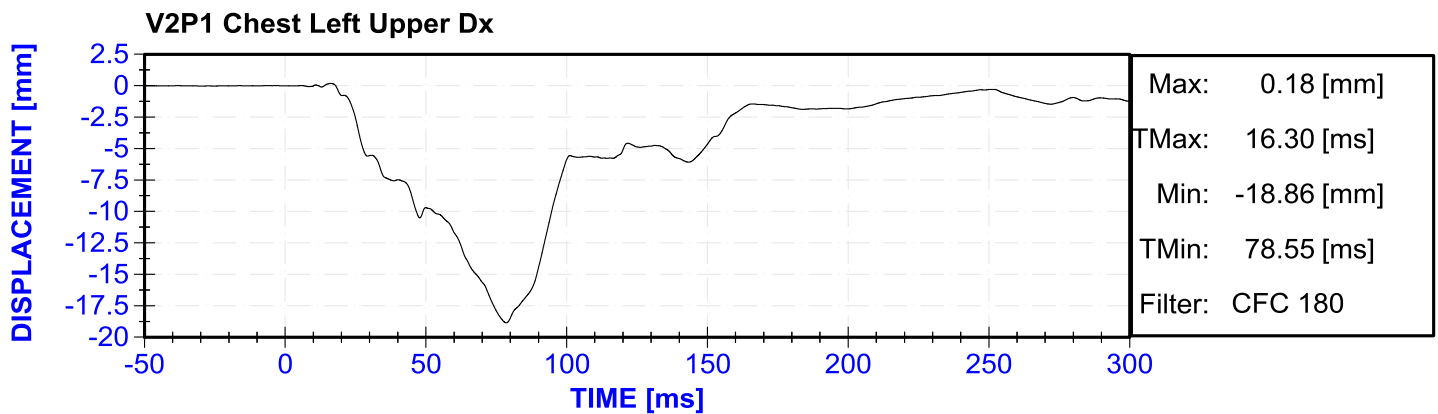
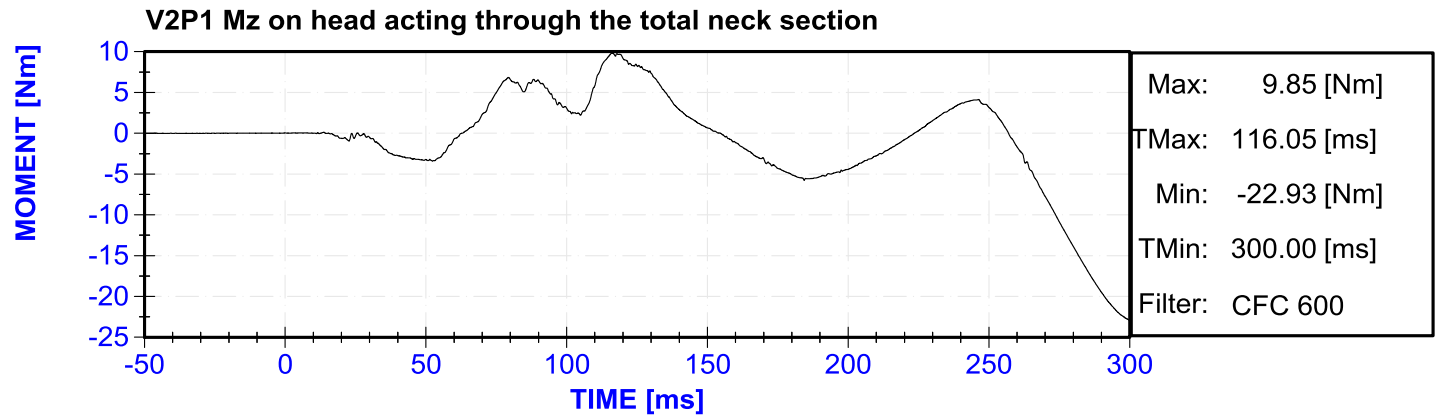
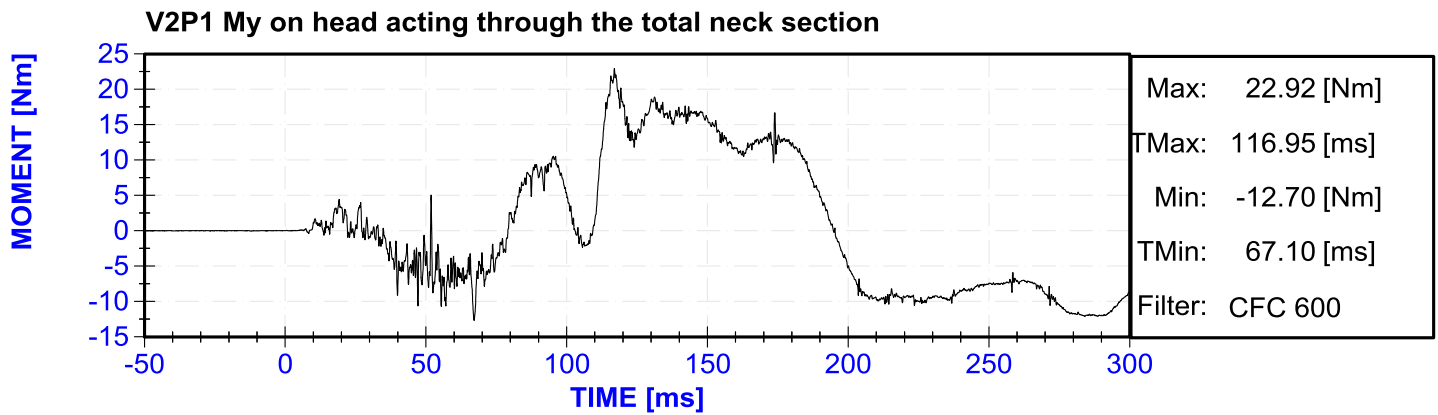
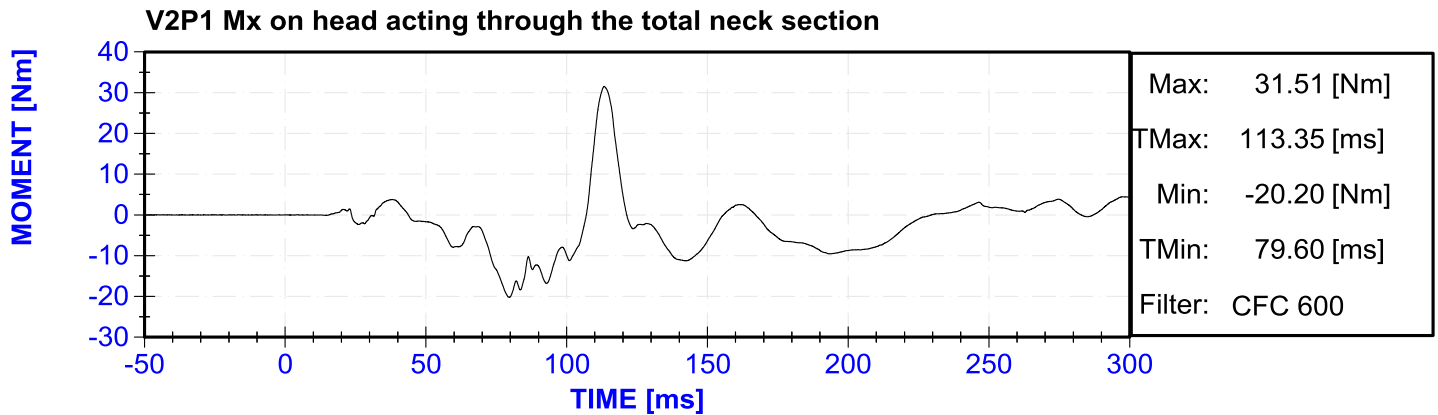


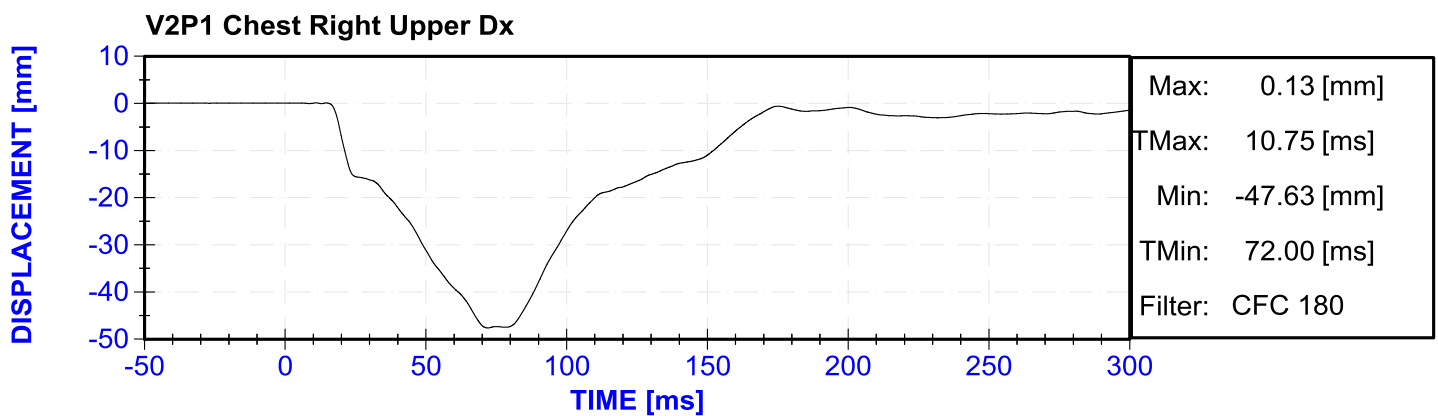
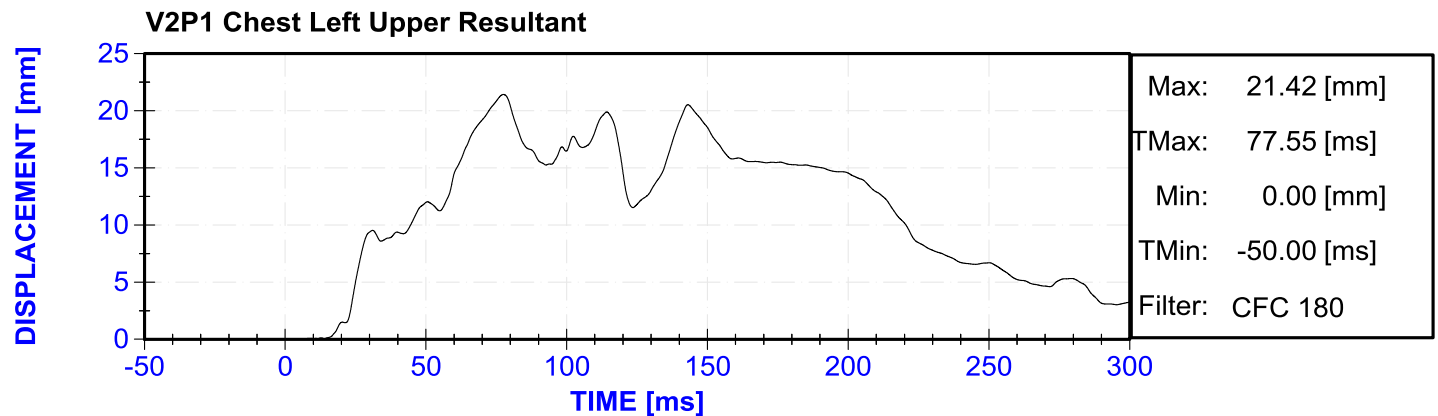
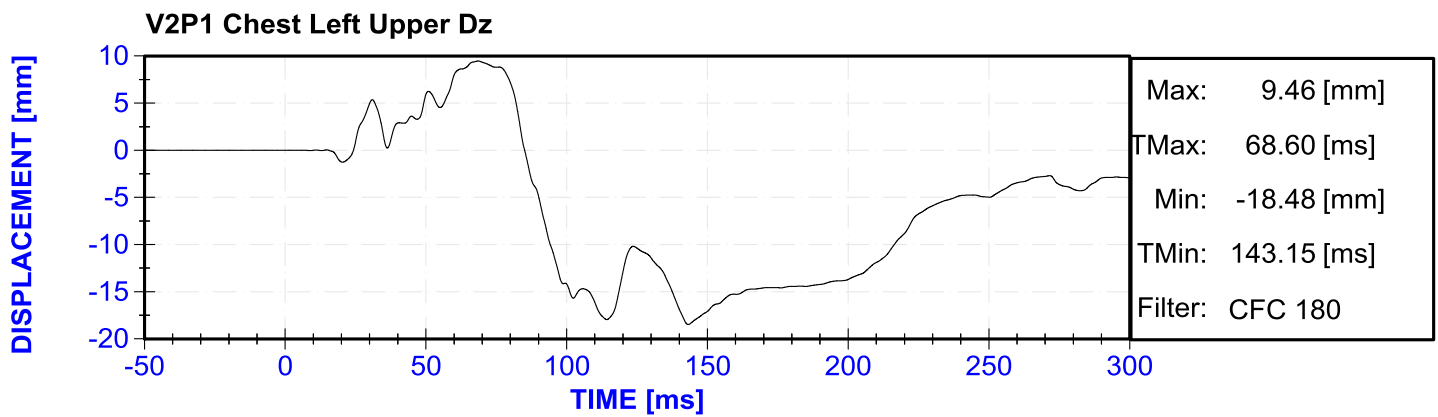
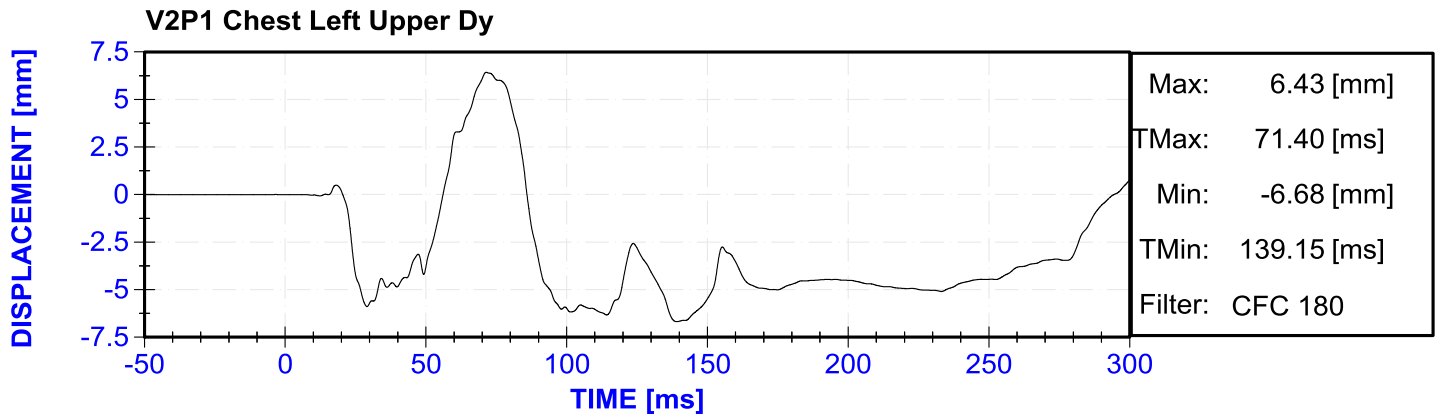
V2P1 Fy on head acting through the total neck section

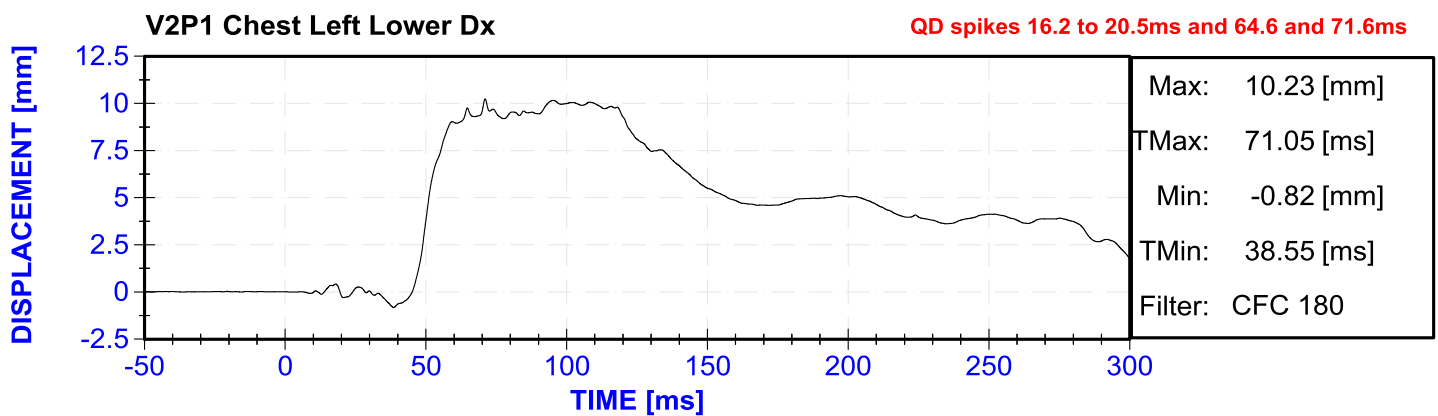
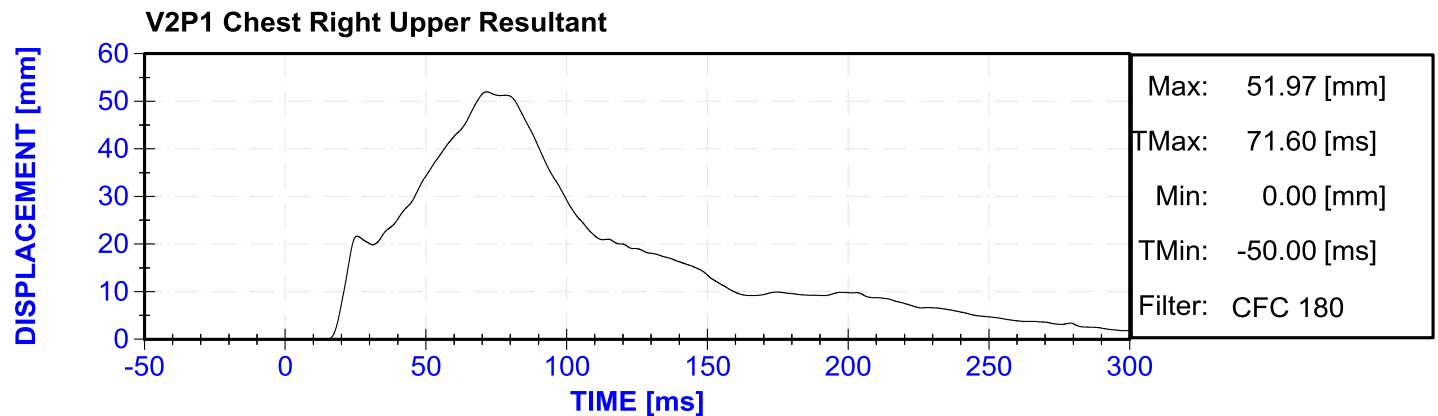
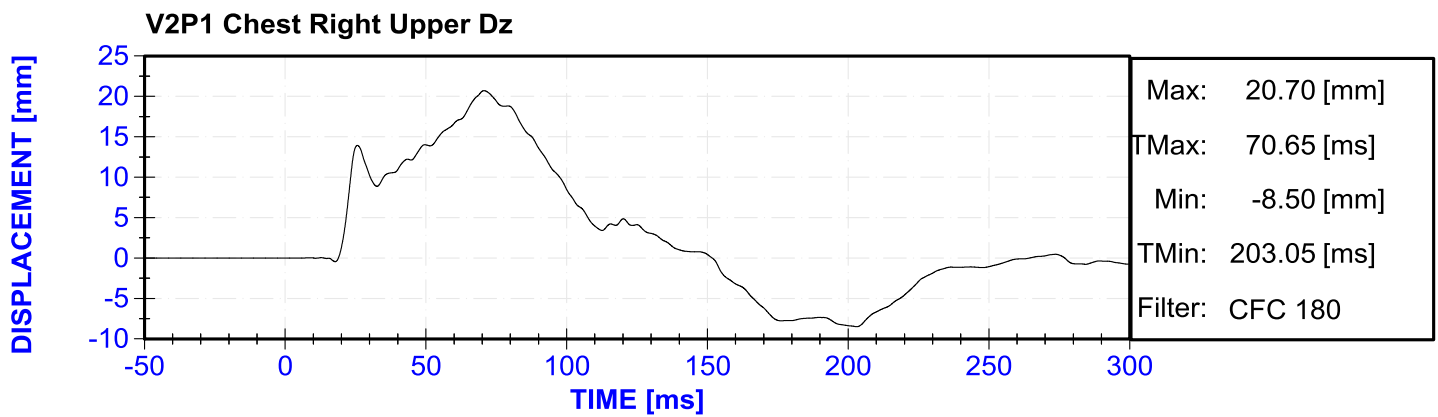
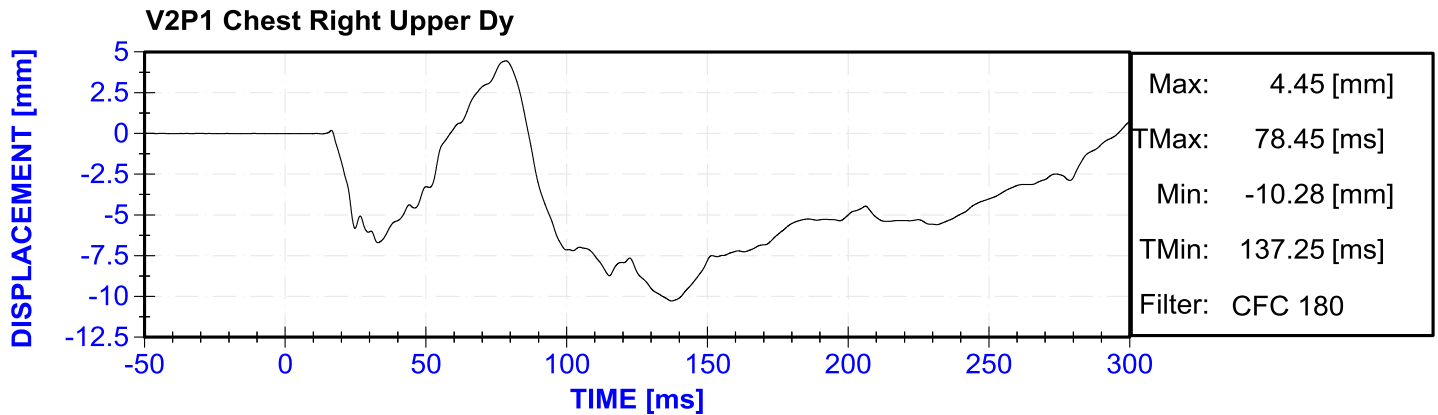


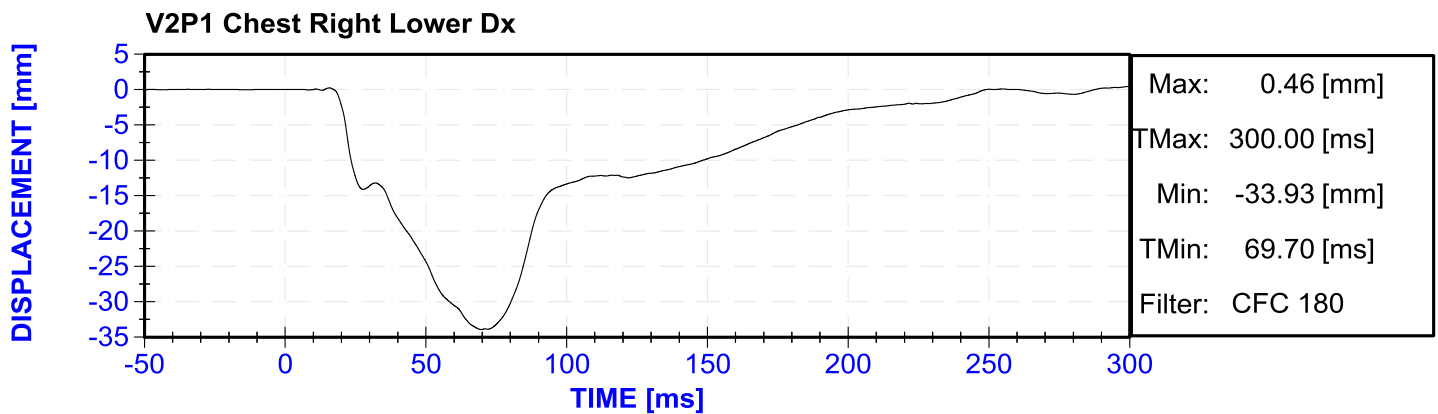
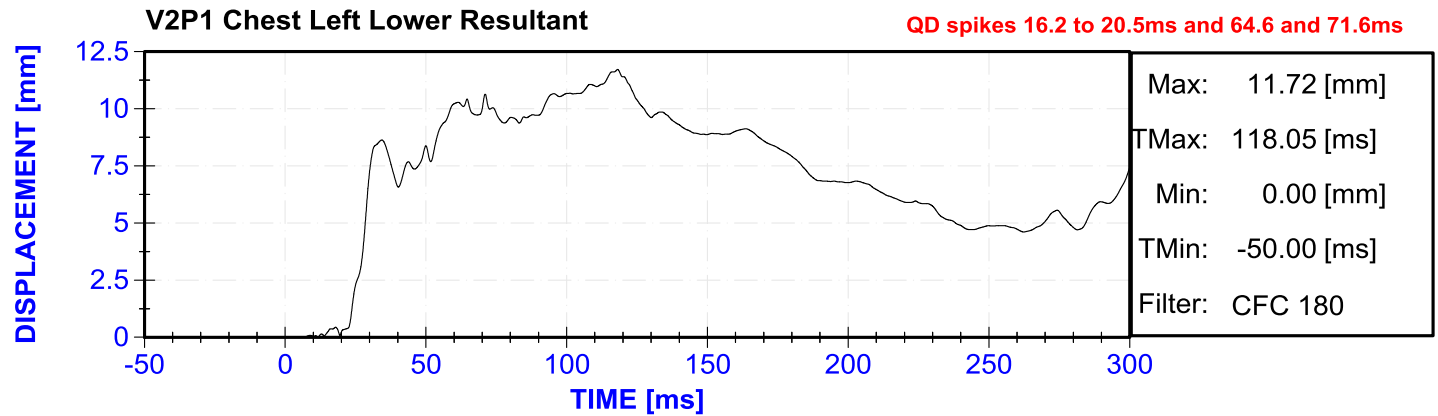
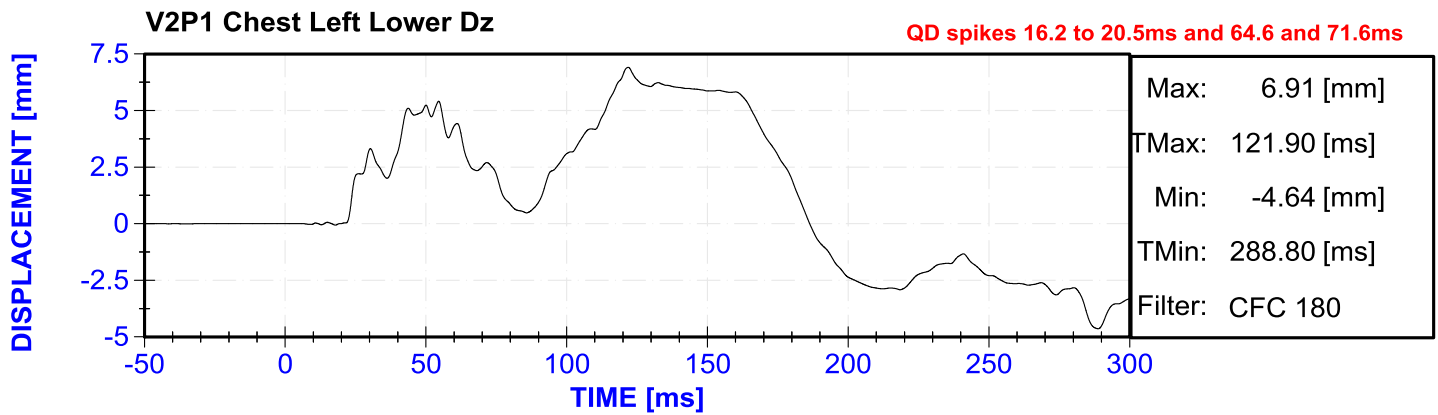
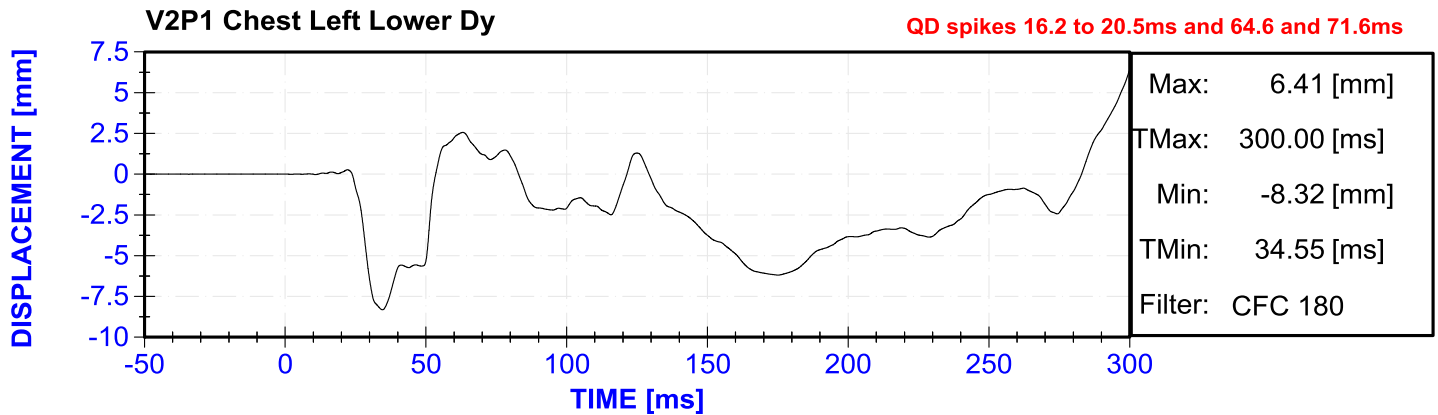
V2P1 Fz on head acting through the total neck section

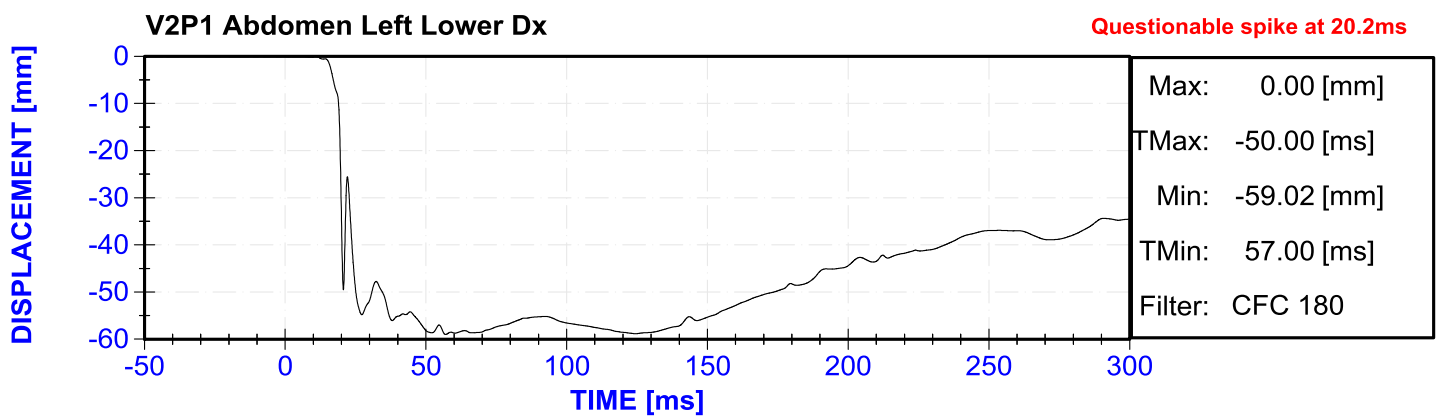
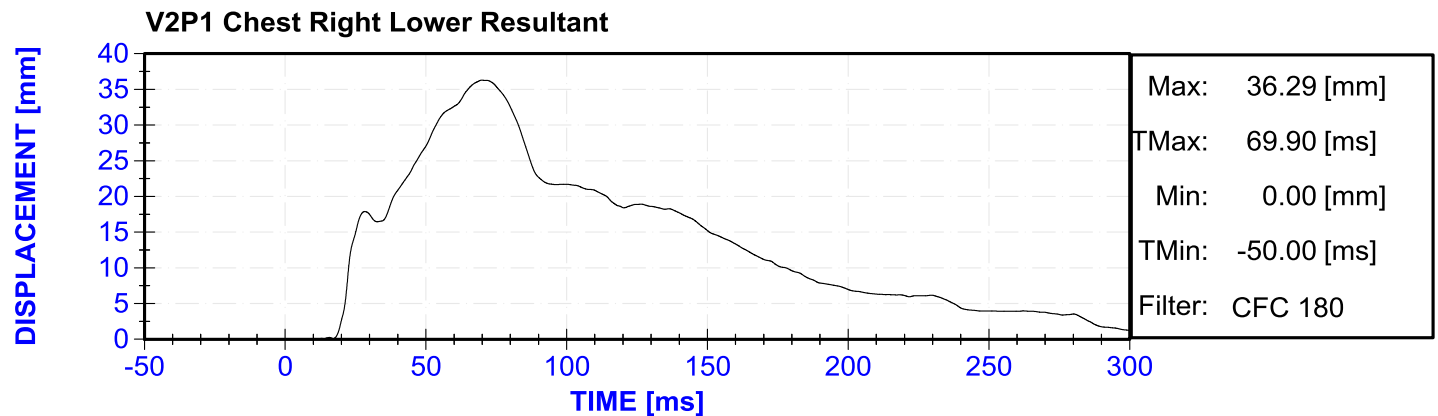
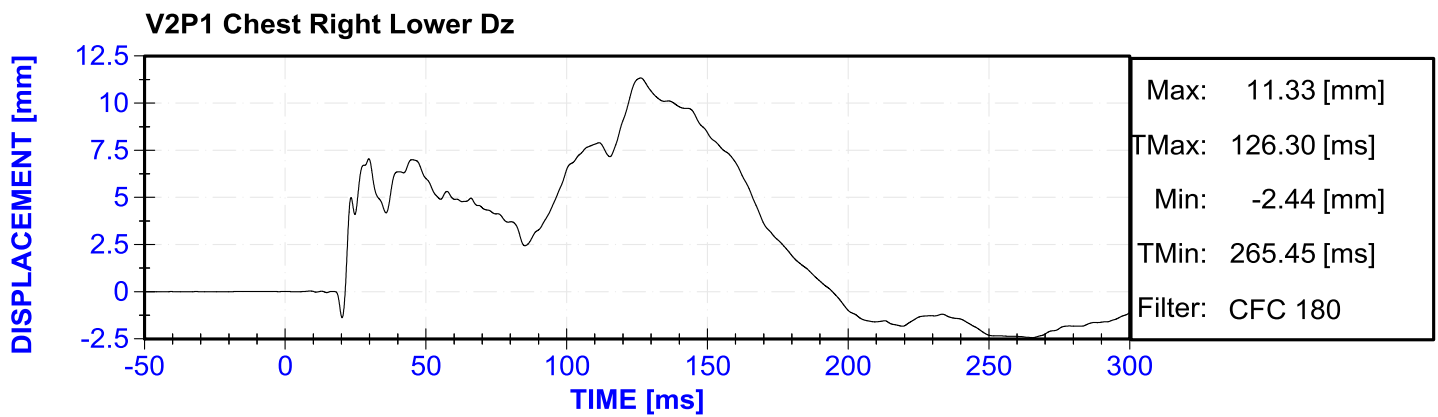
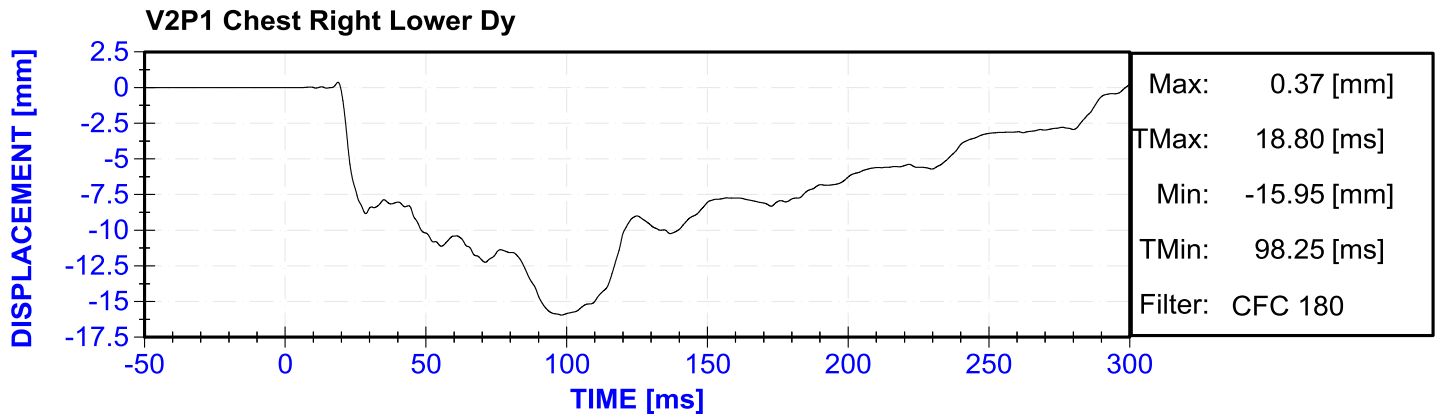


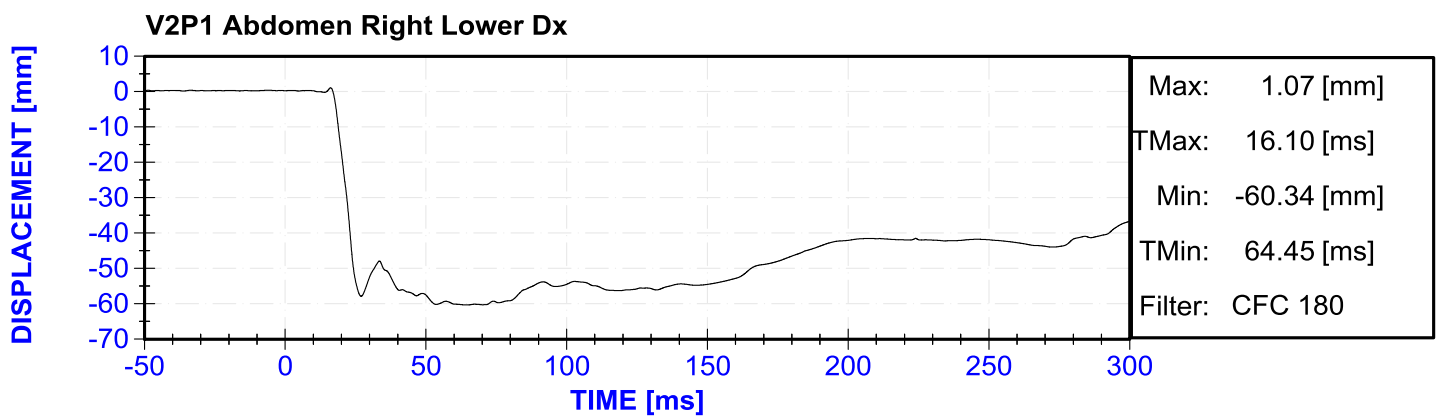
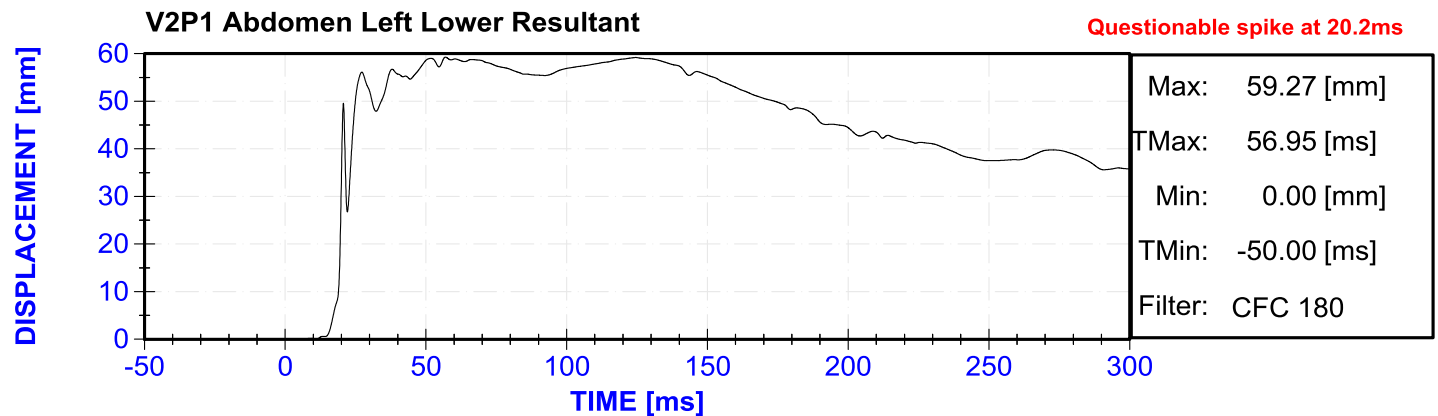
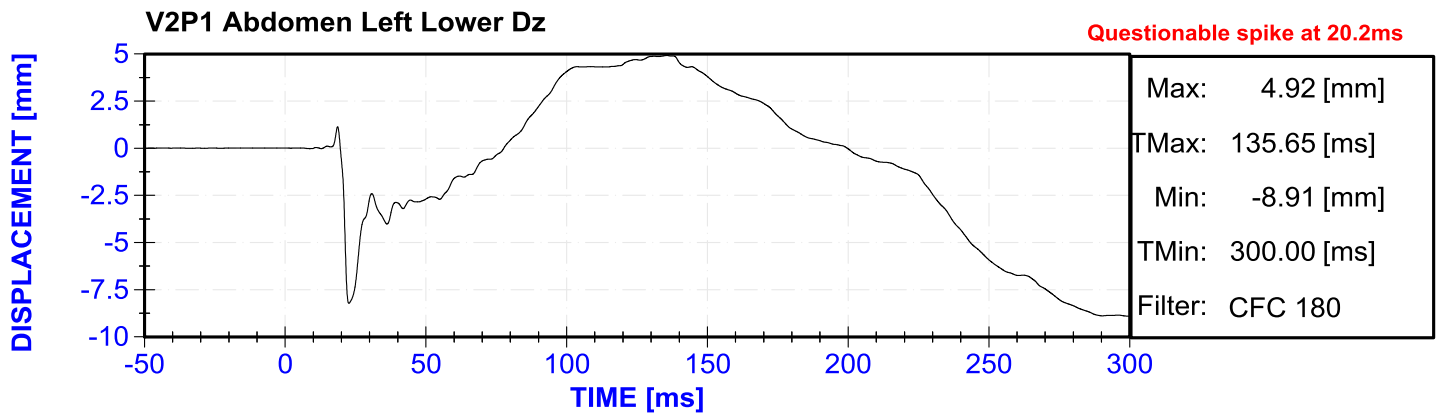
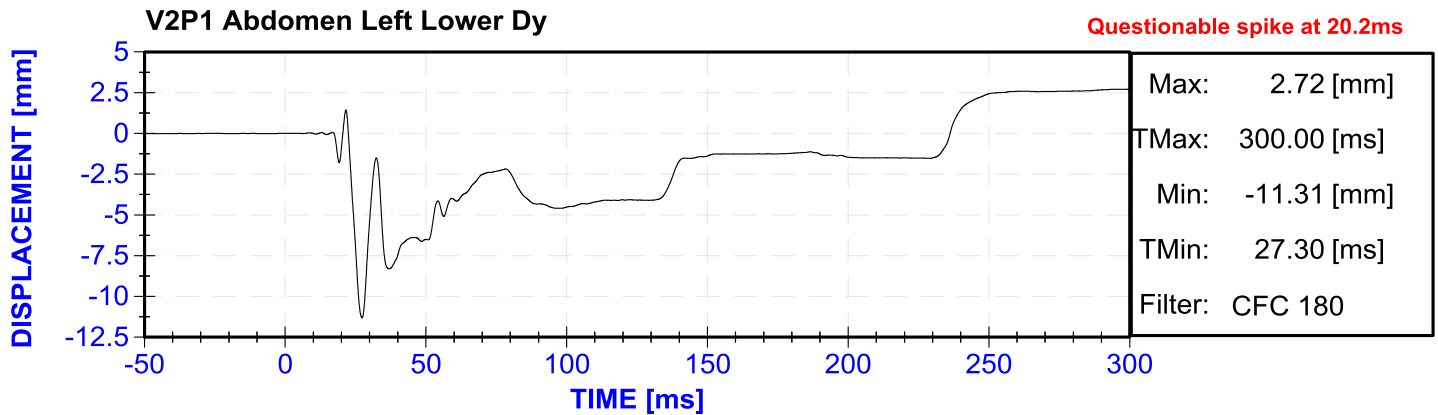


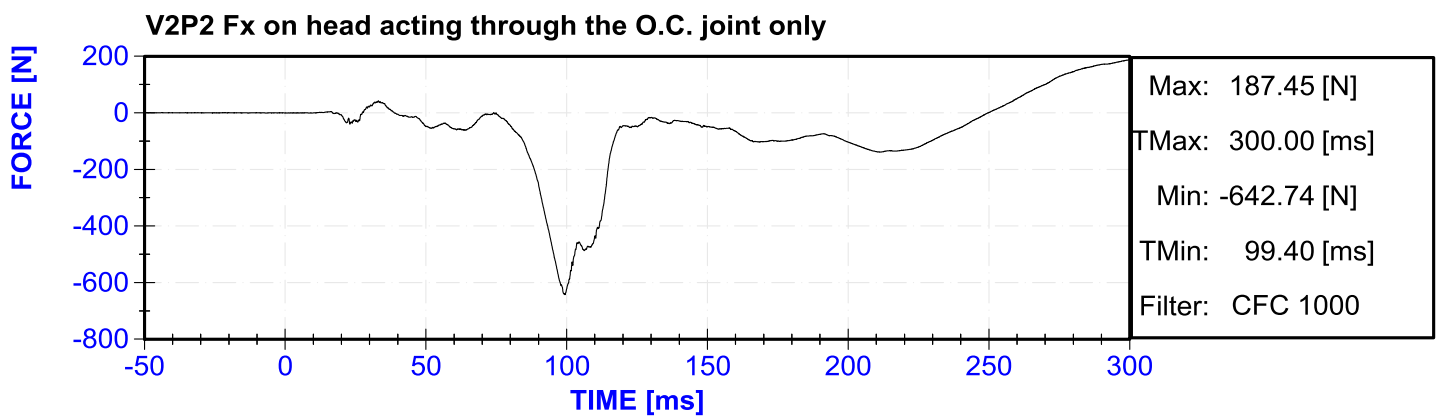
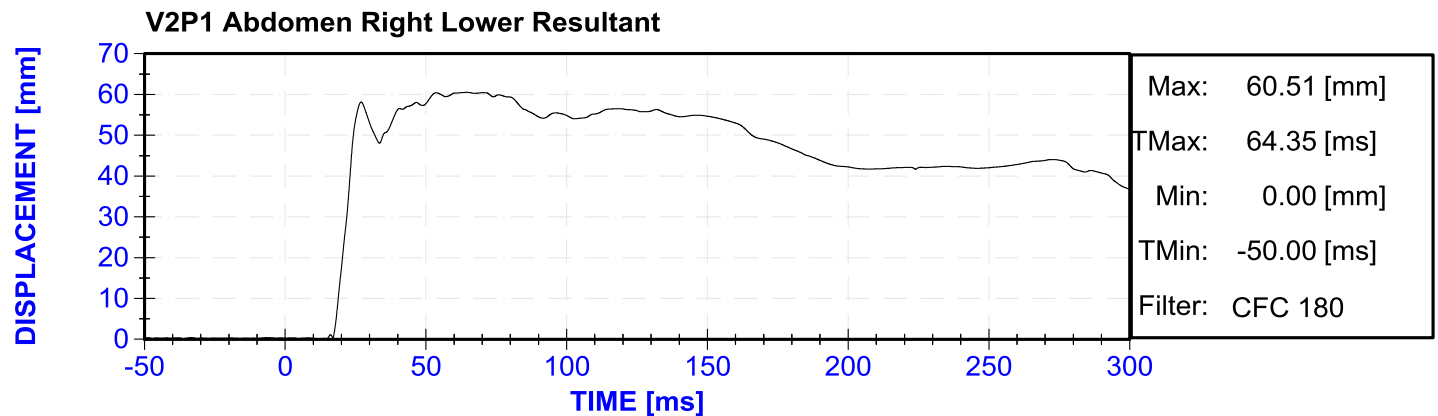
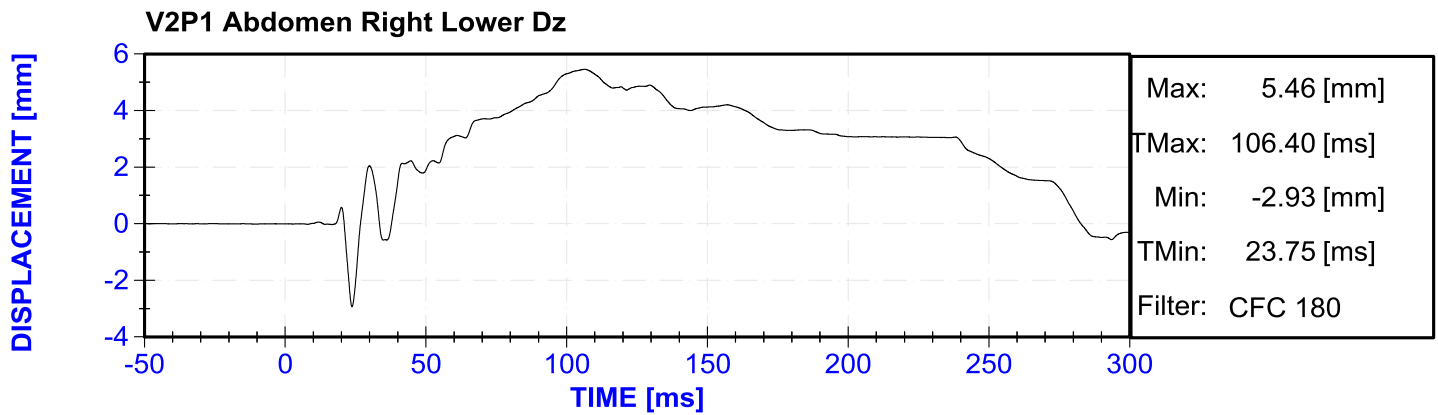
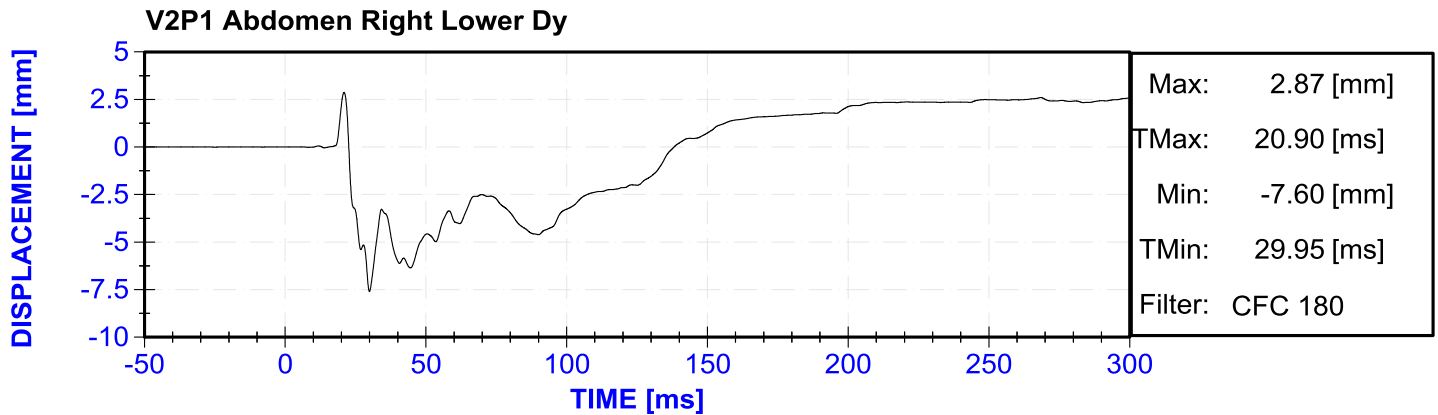


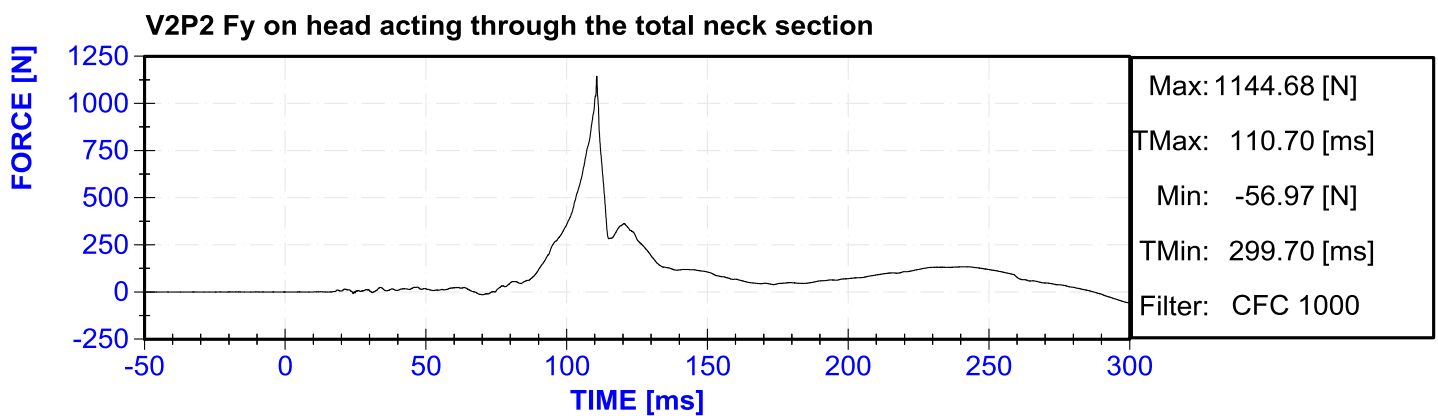
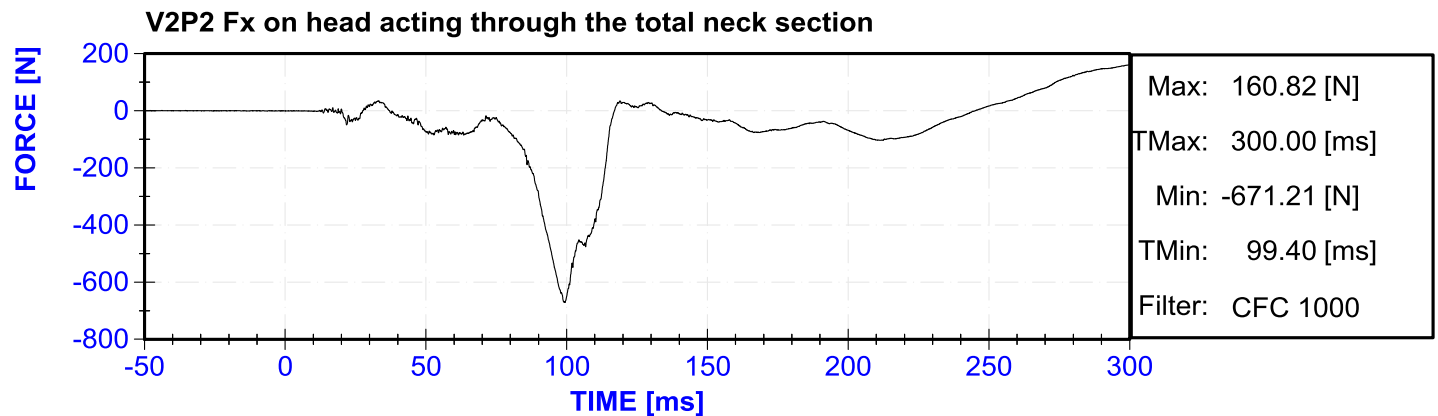
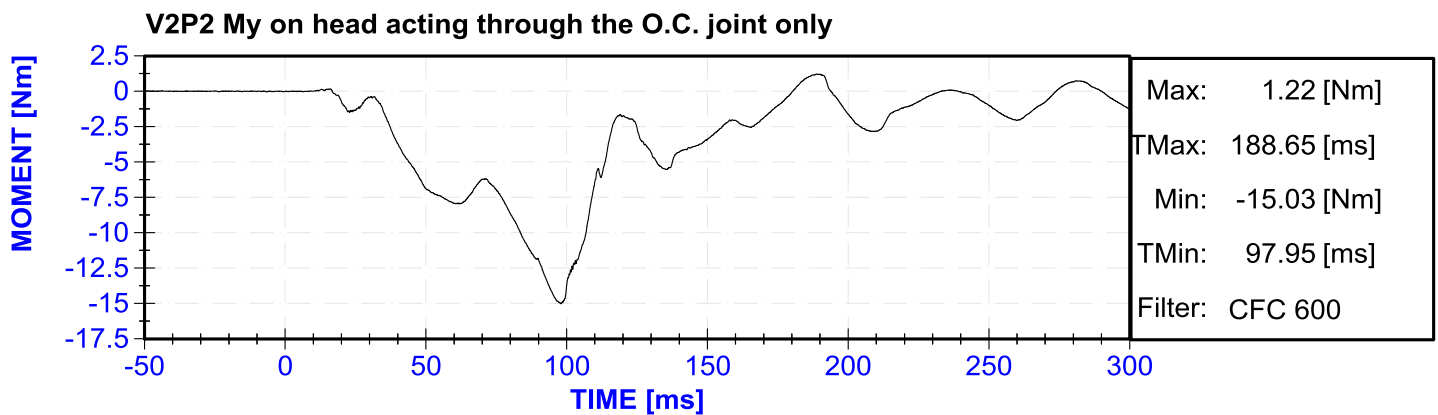
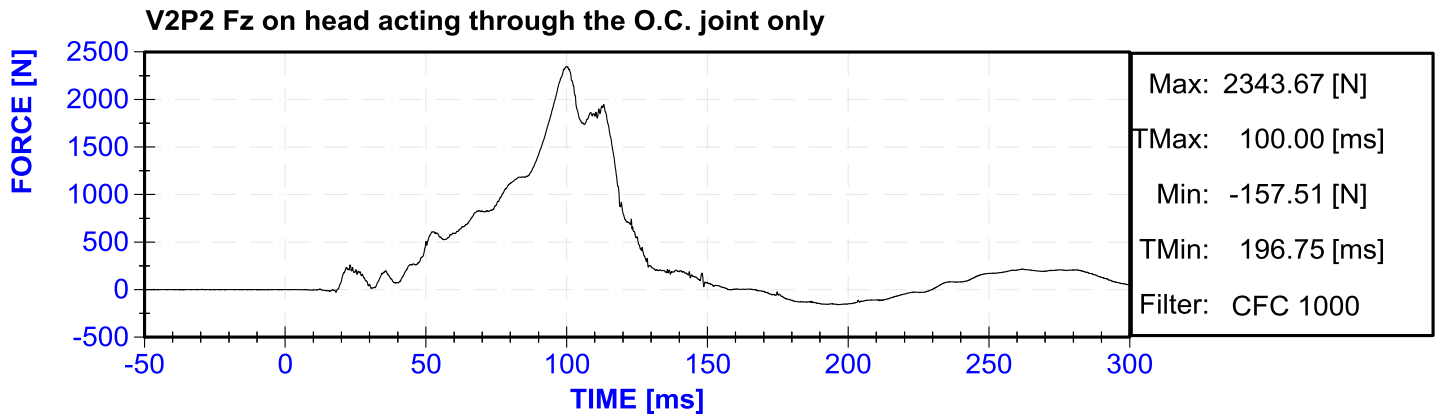


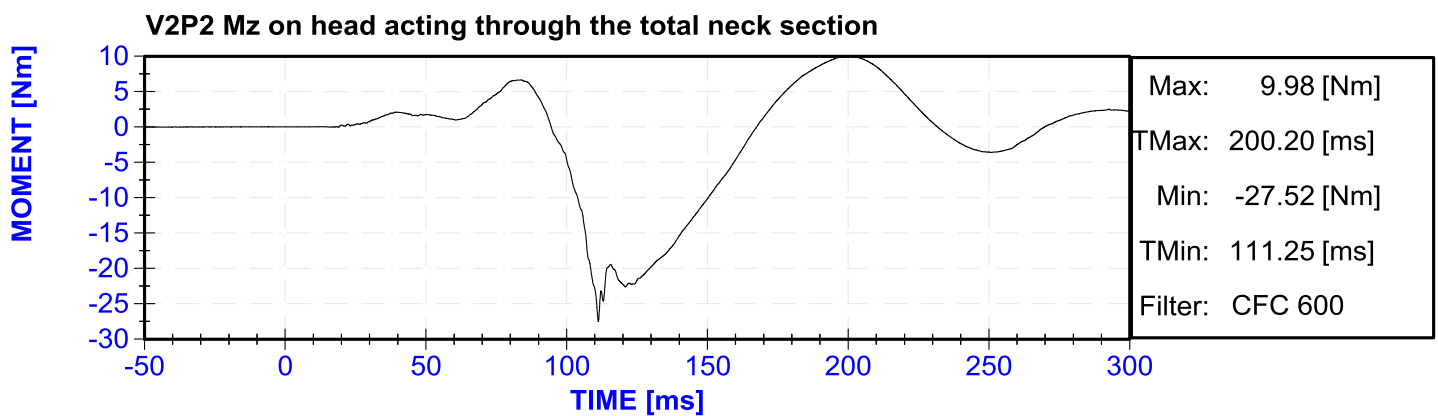
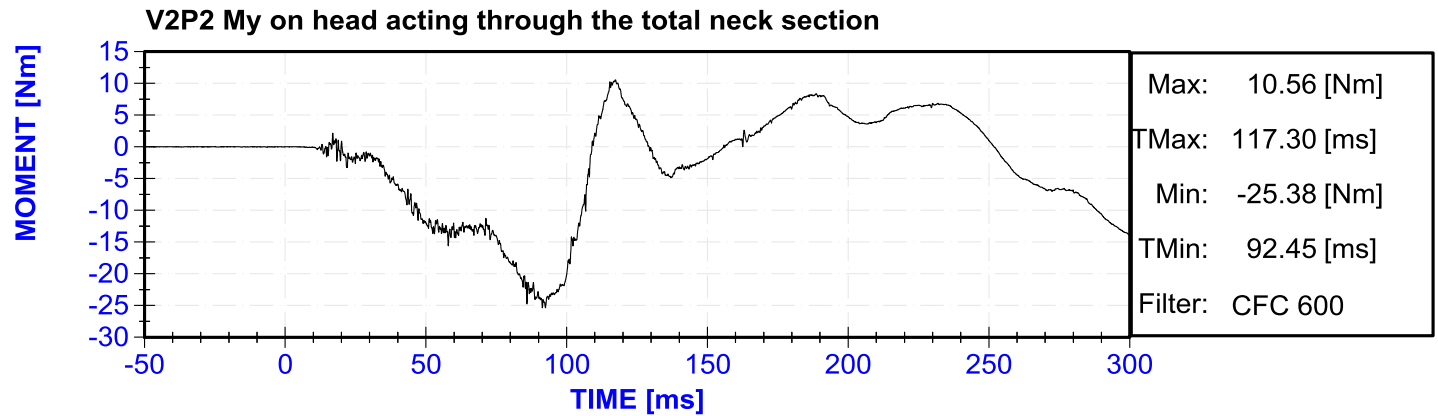
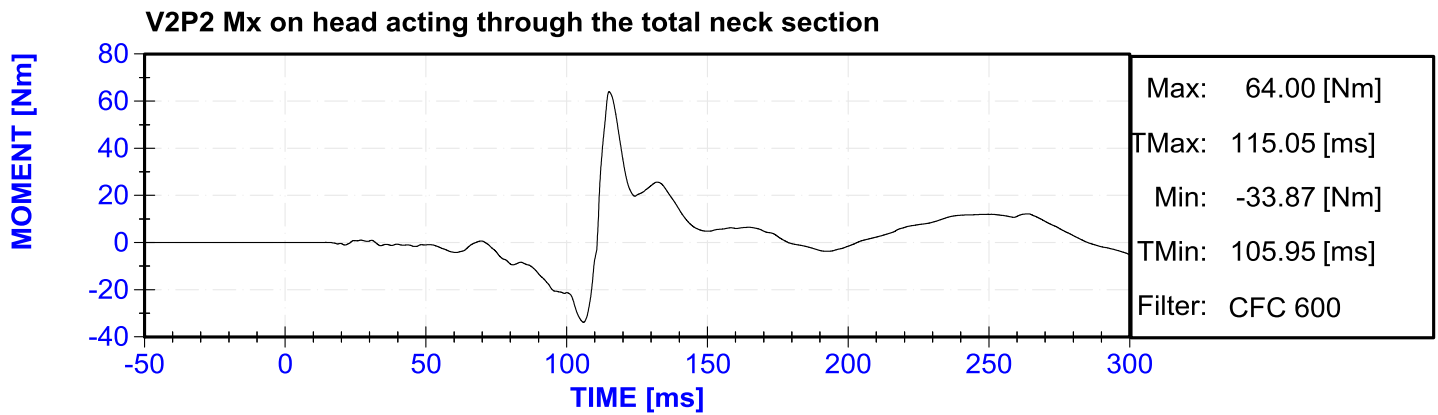
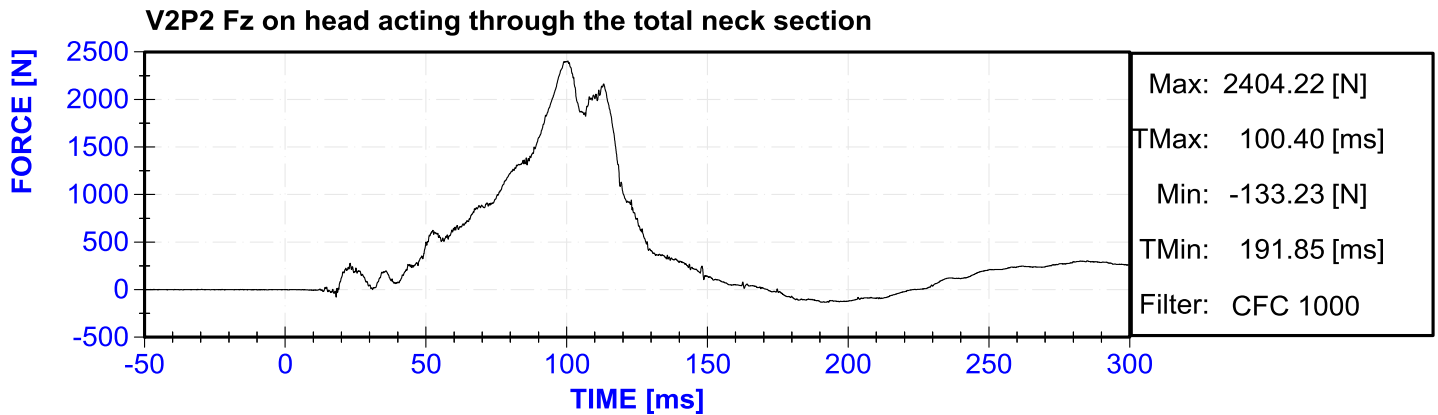


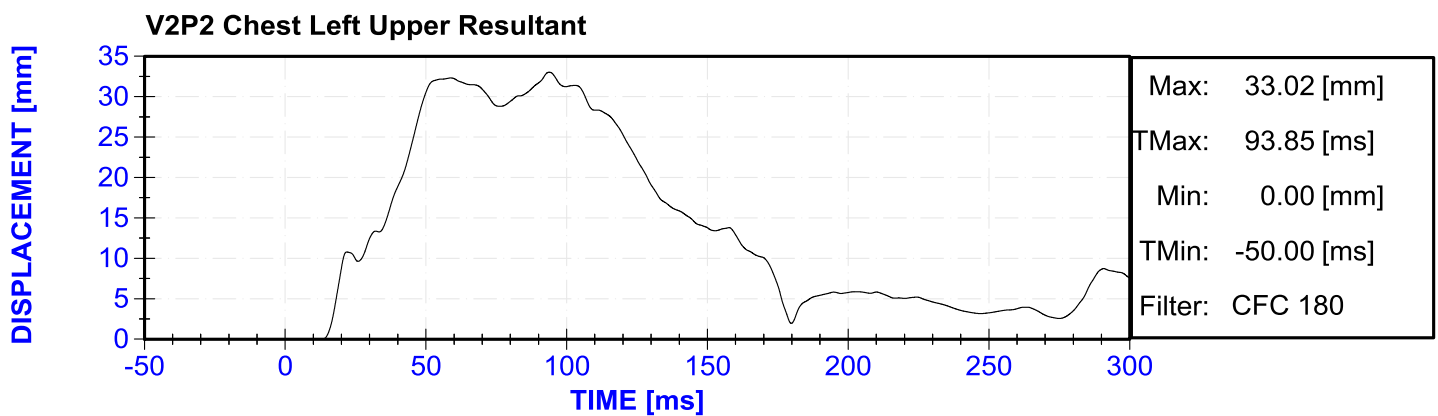
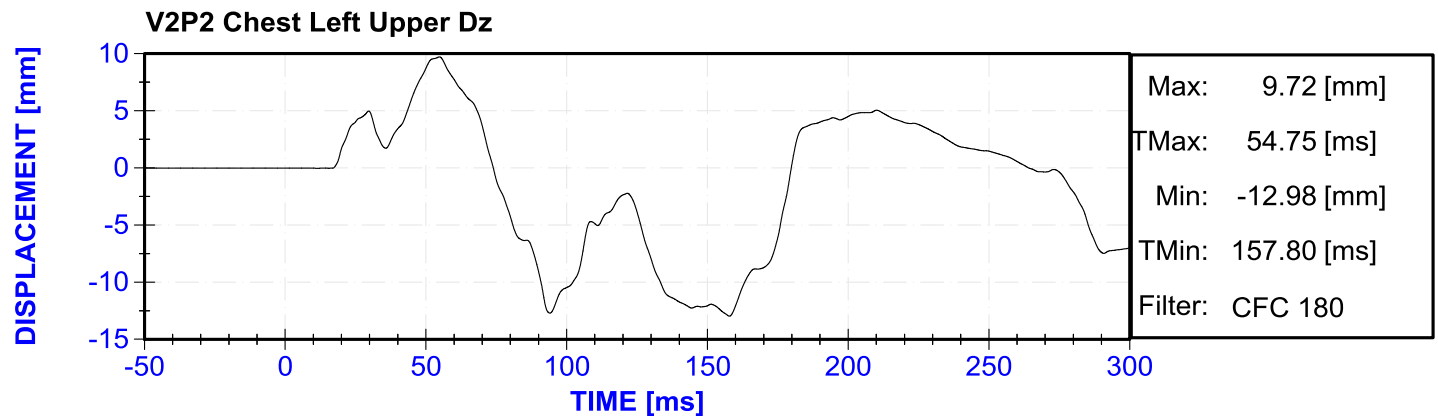
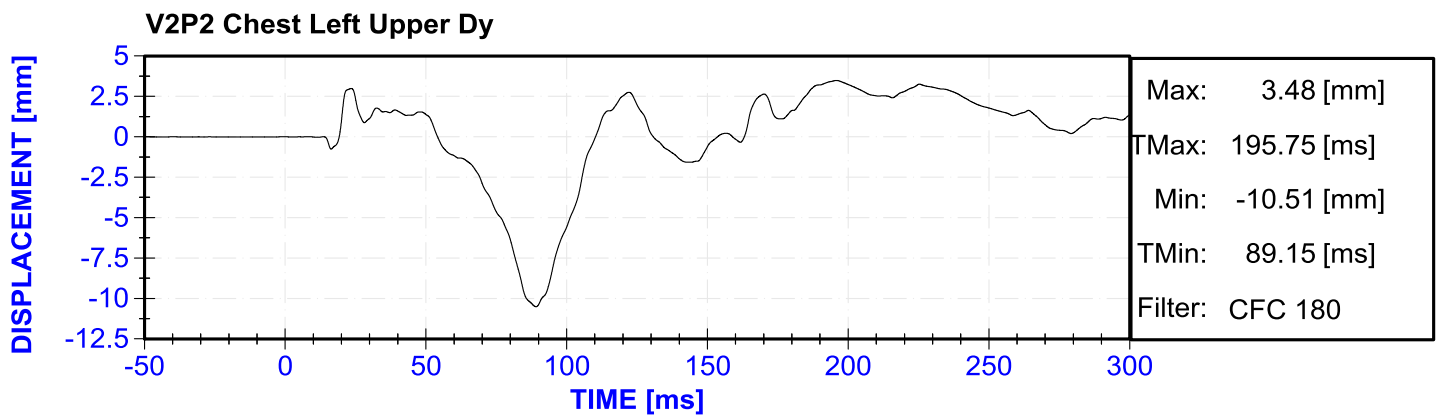
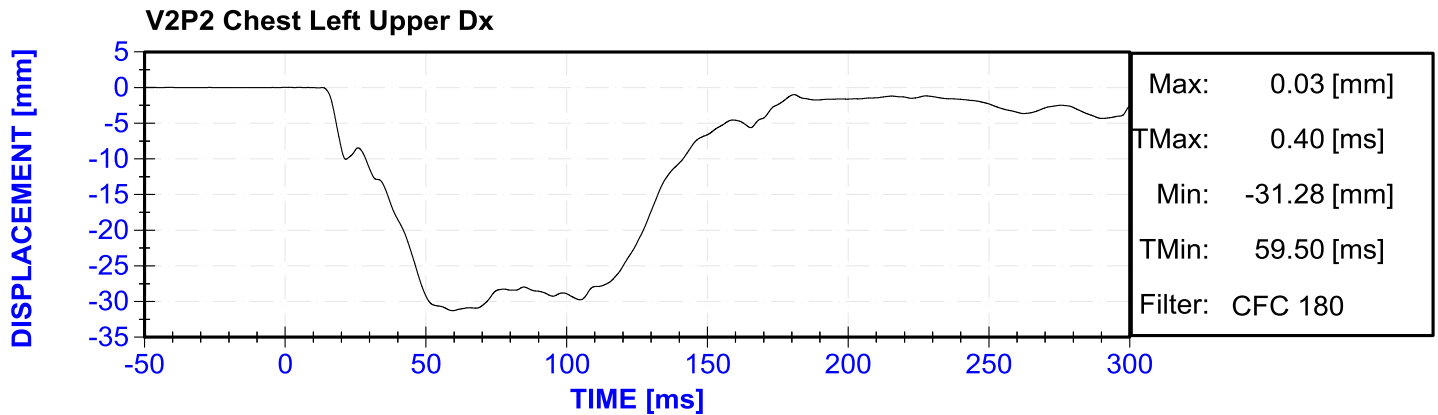


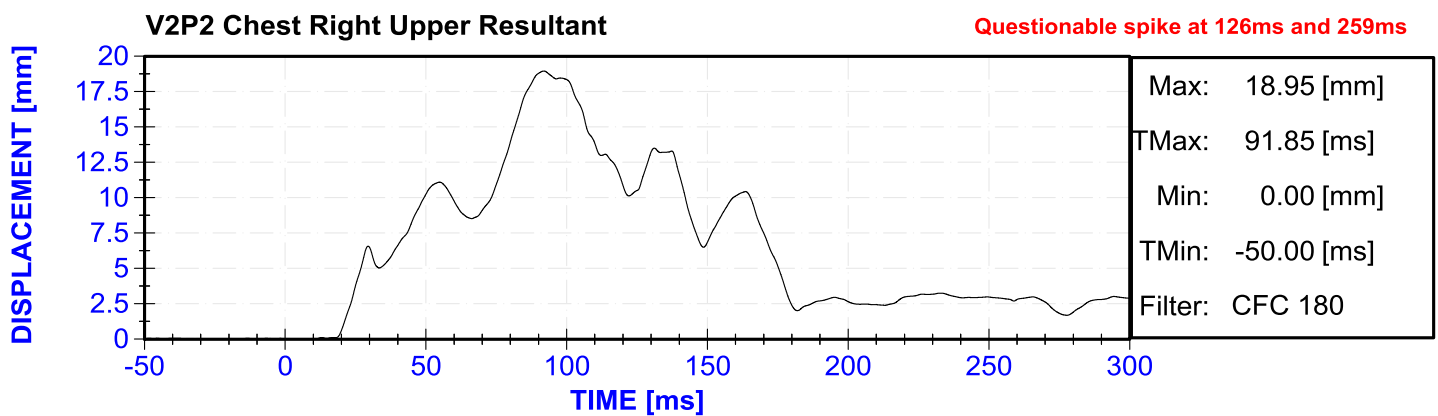
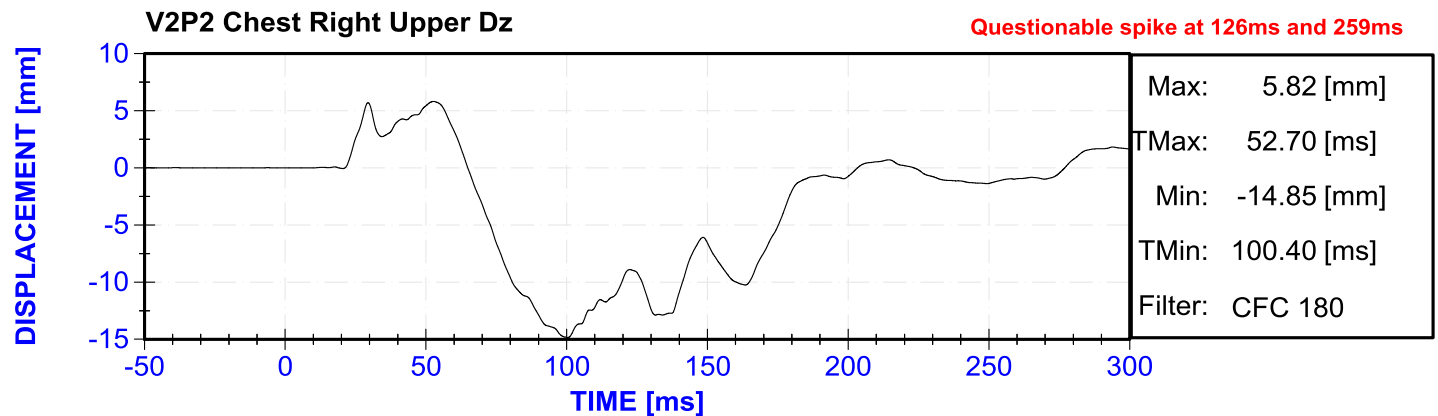
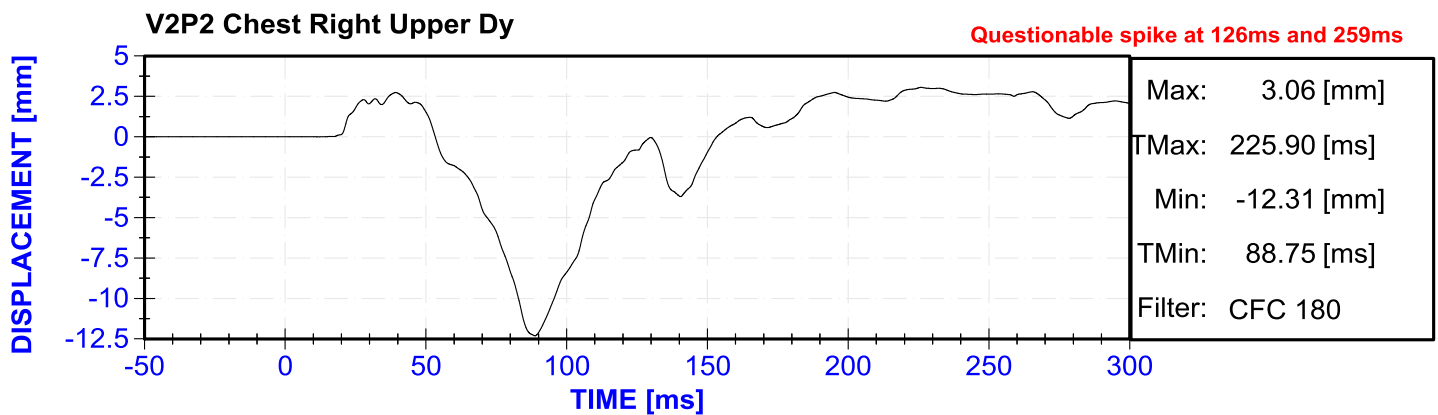
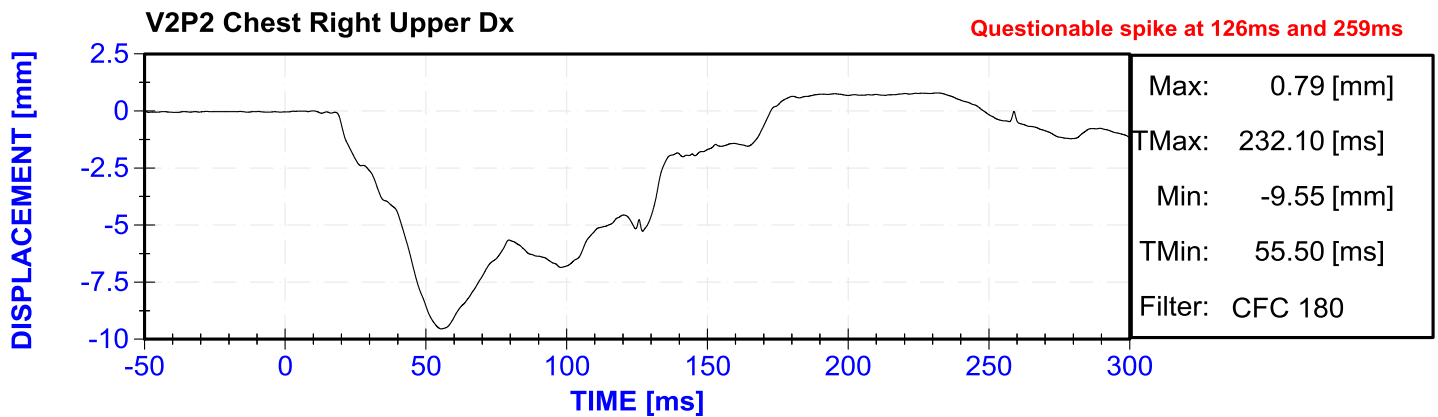


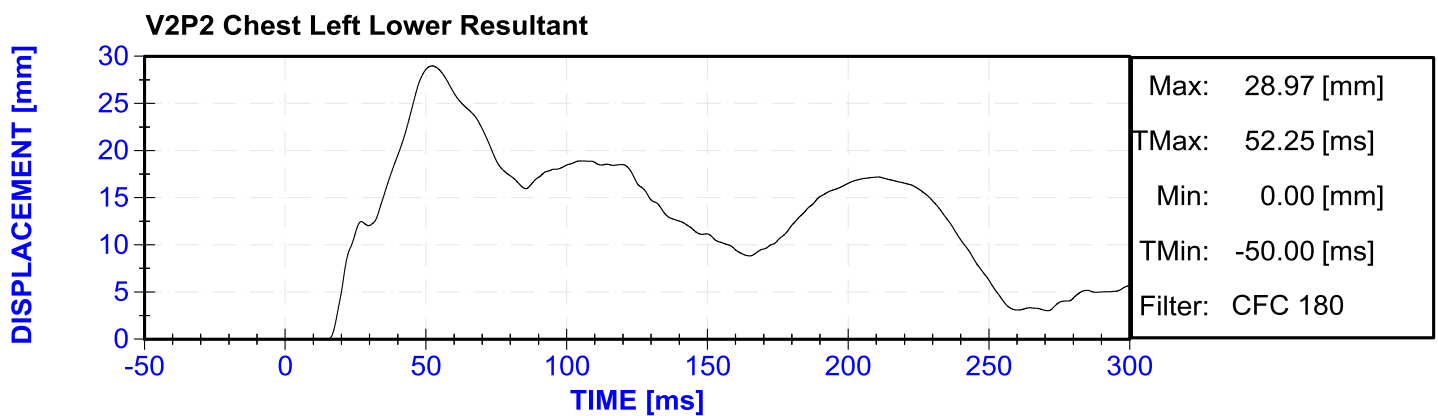
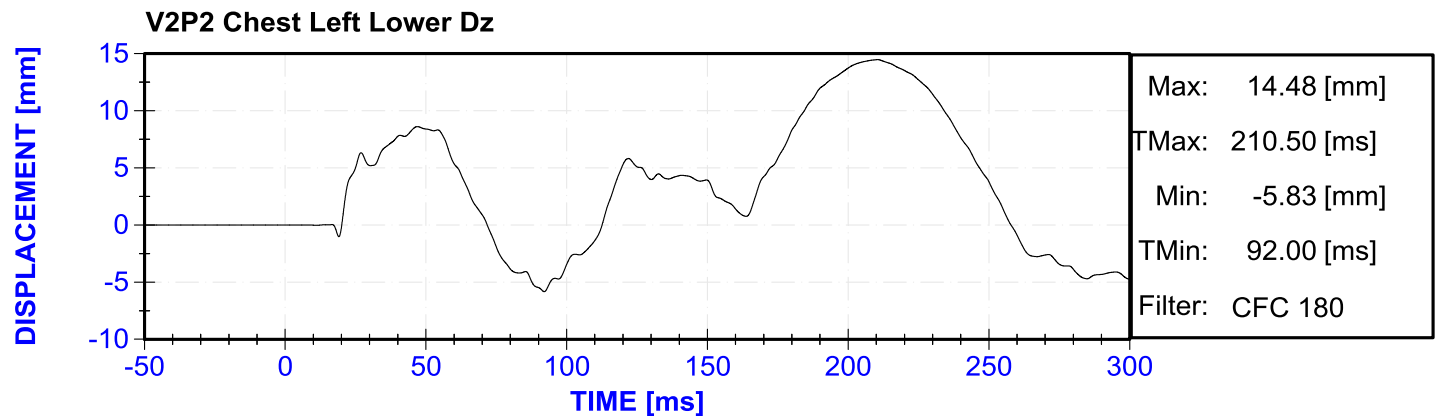
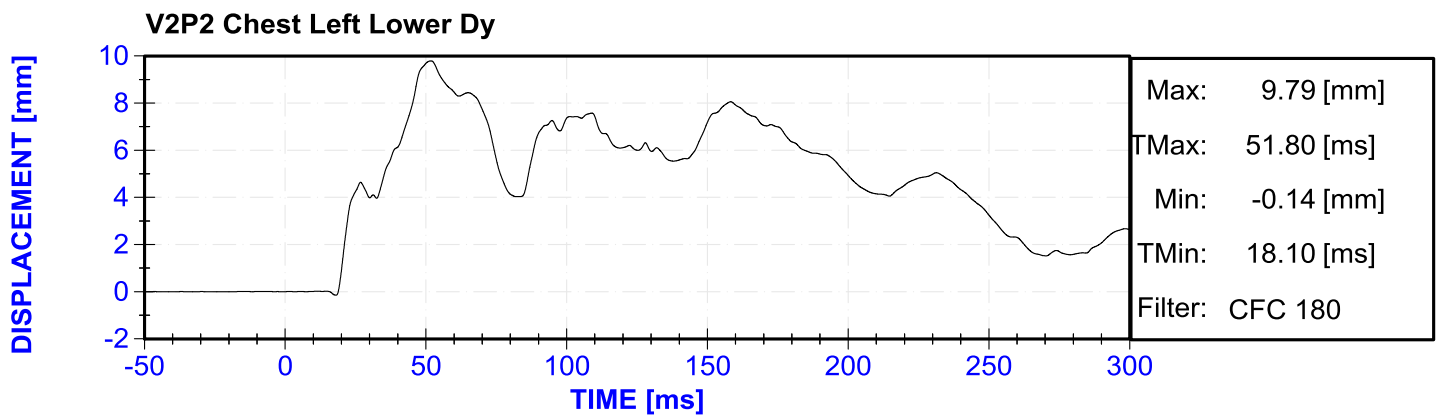
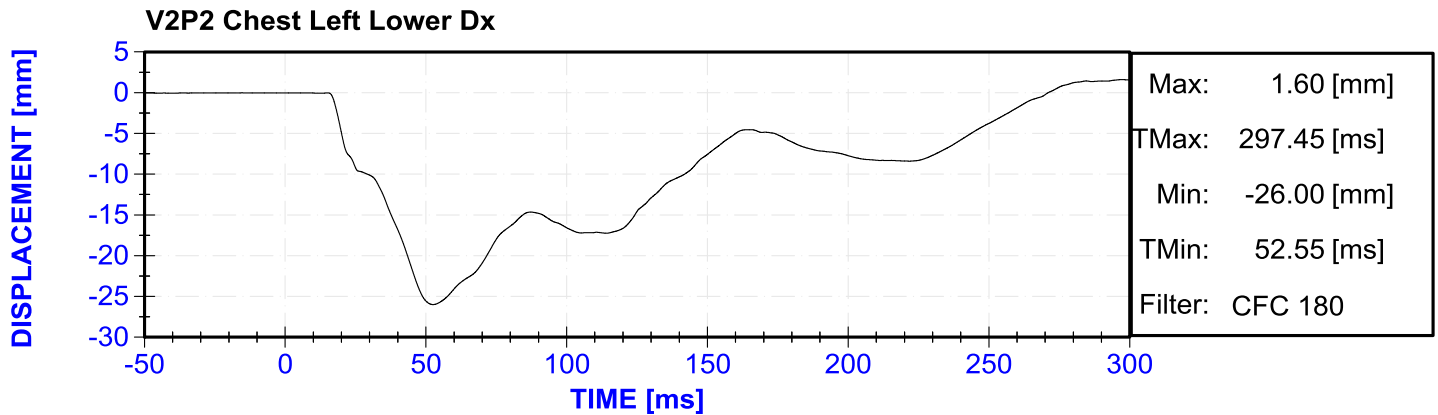


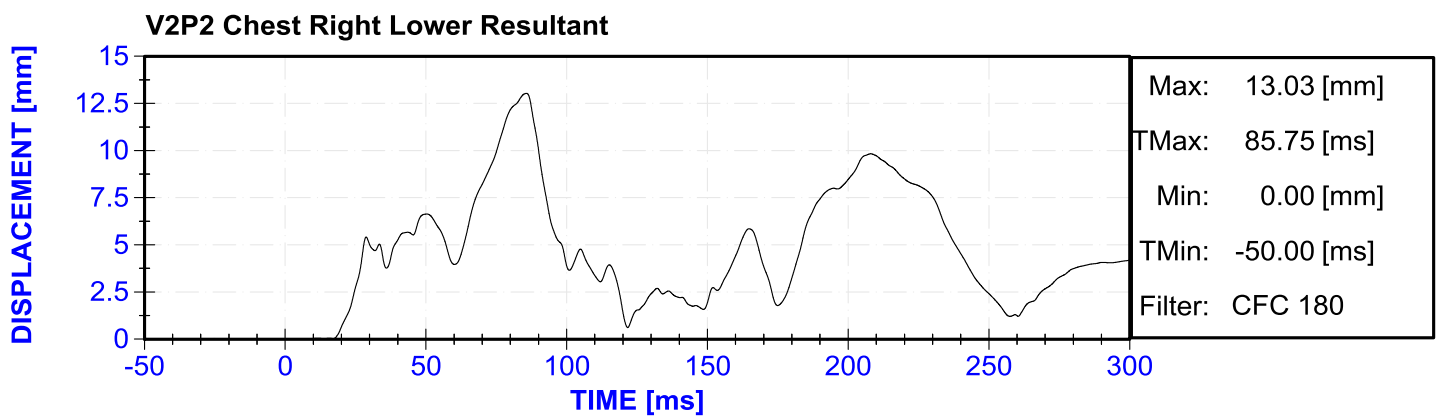
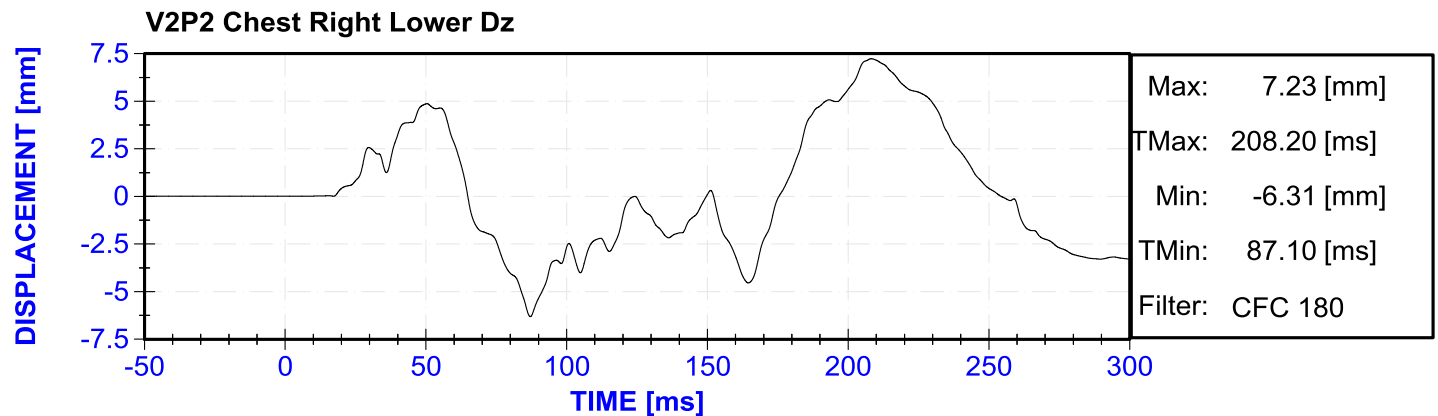
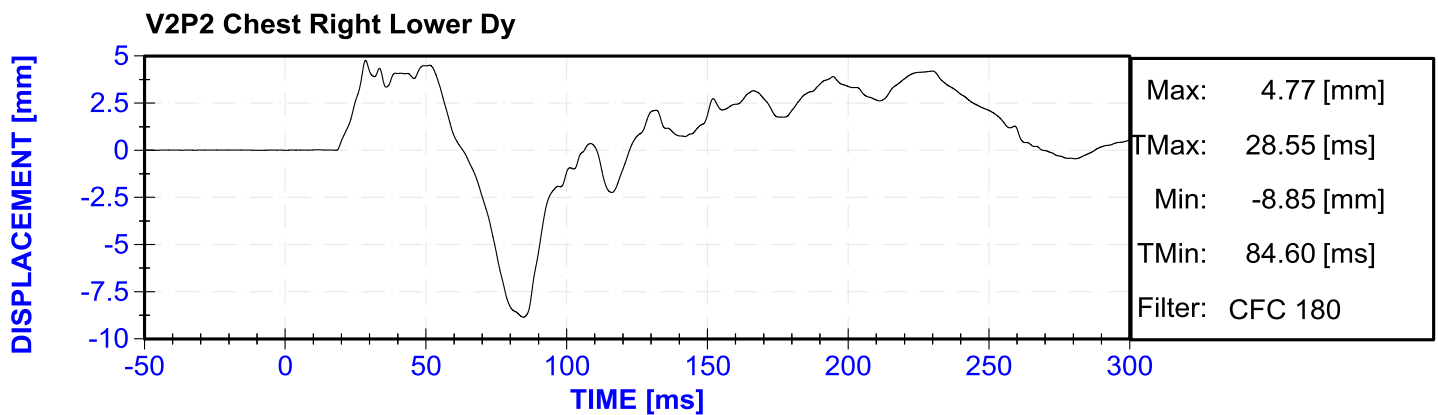
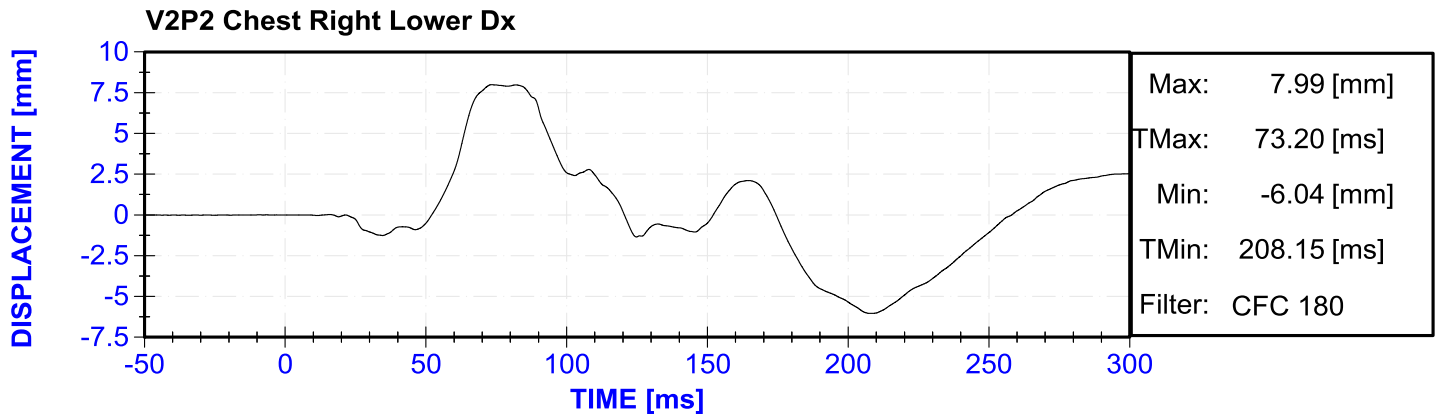


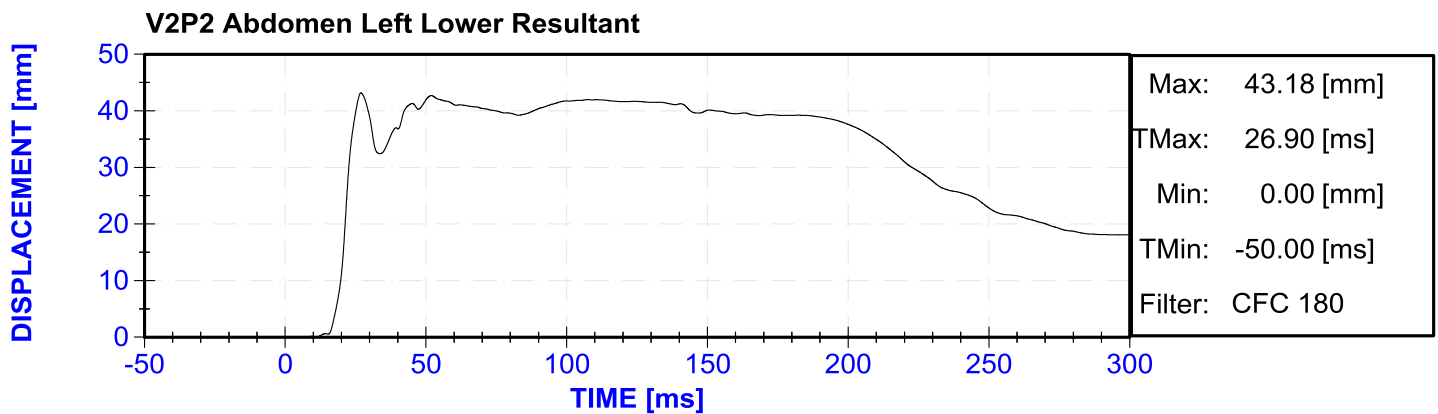
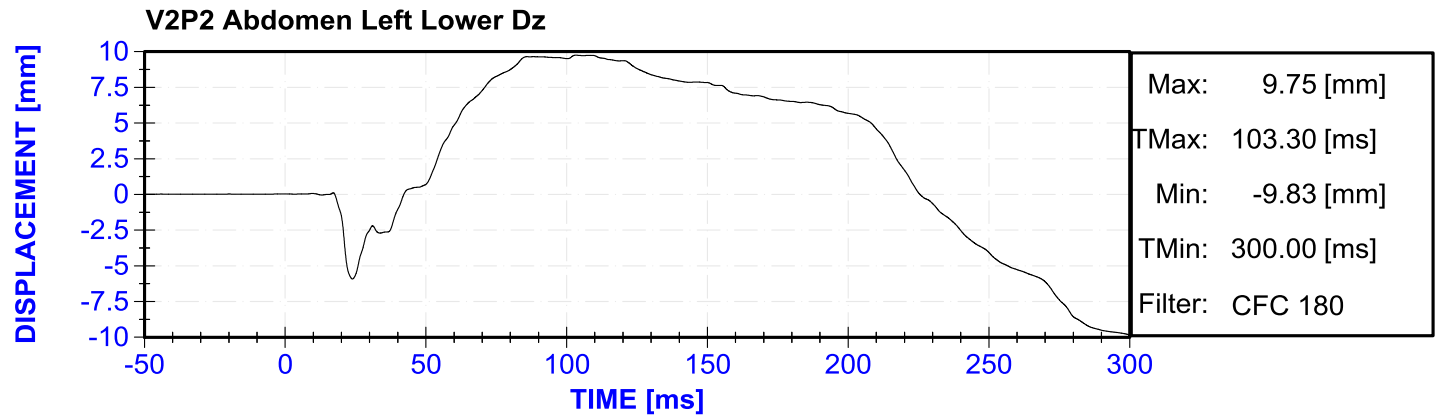
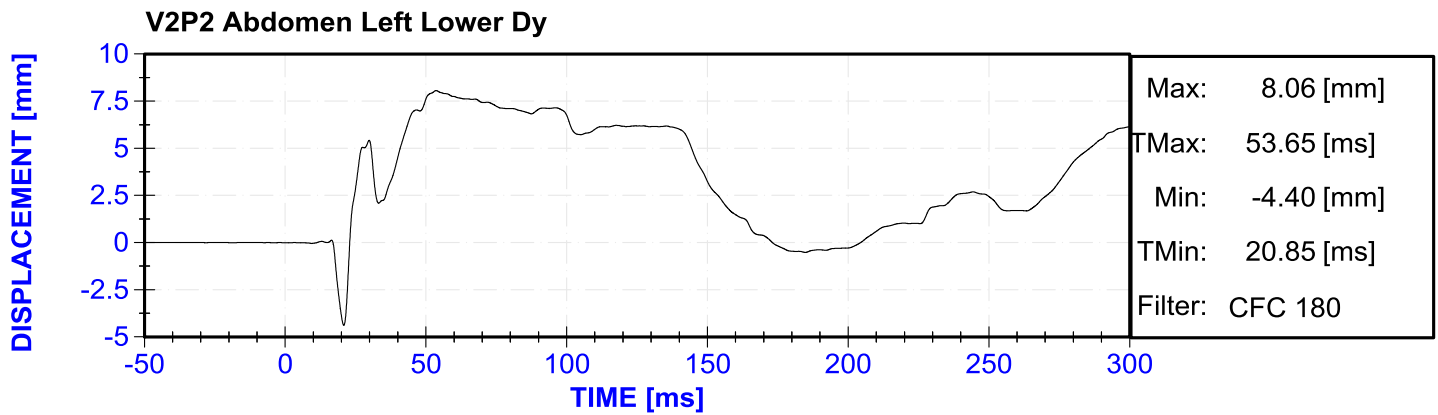
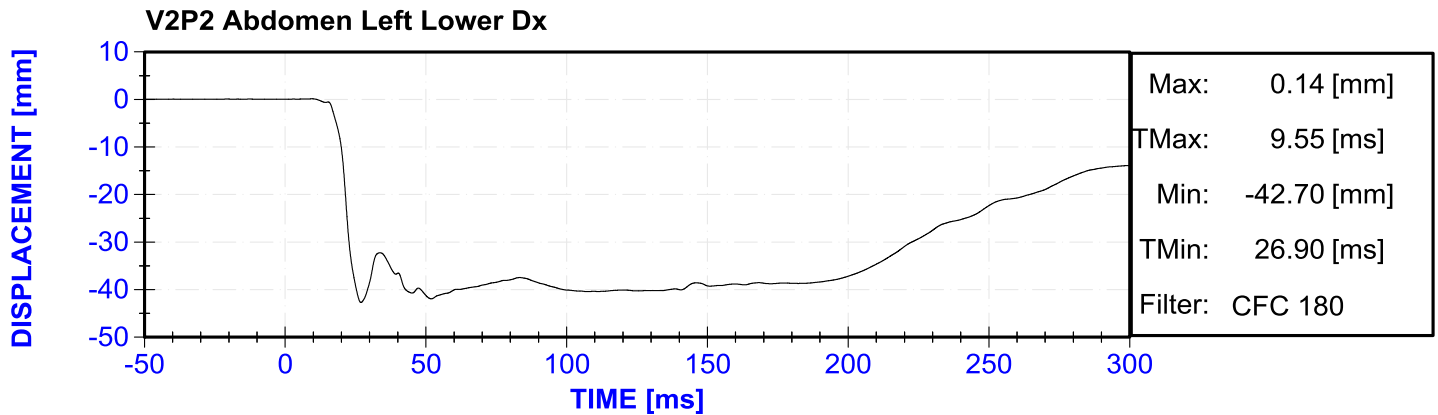


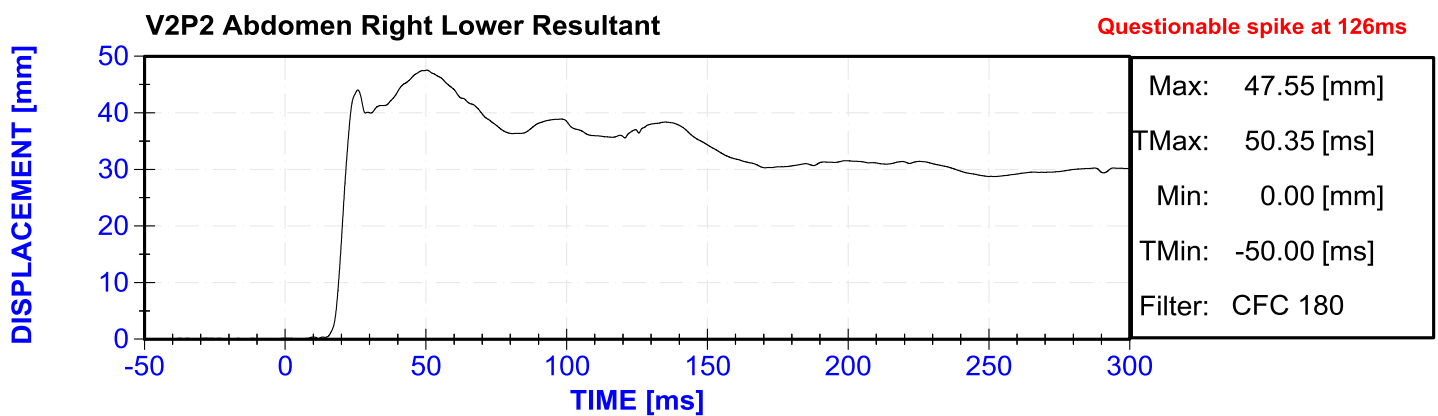
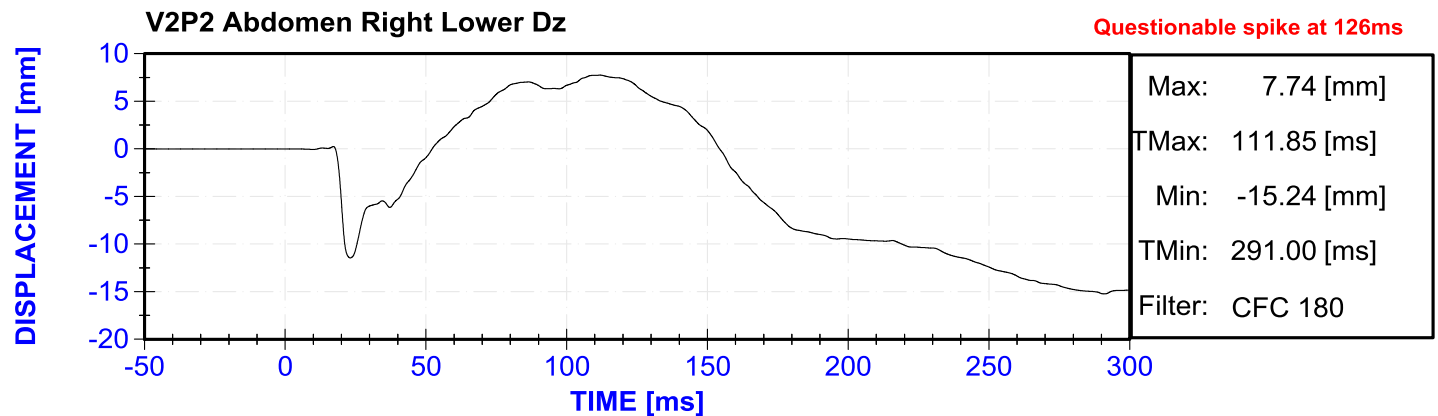
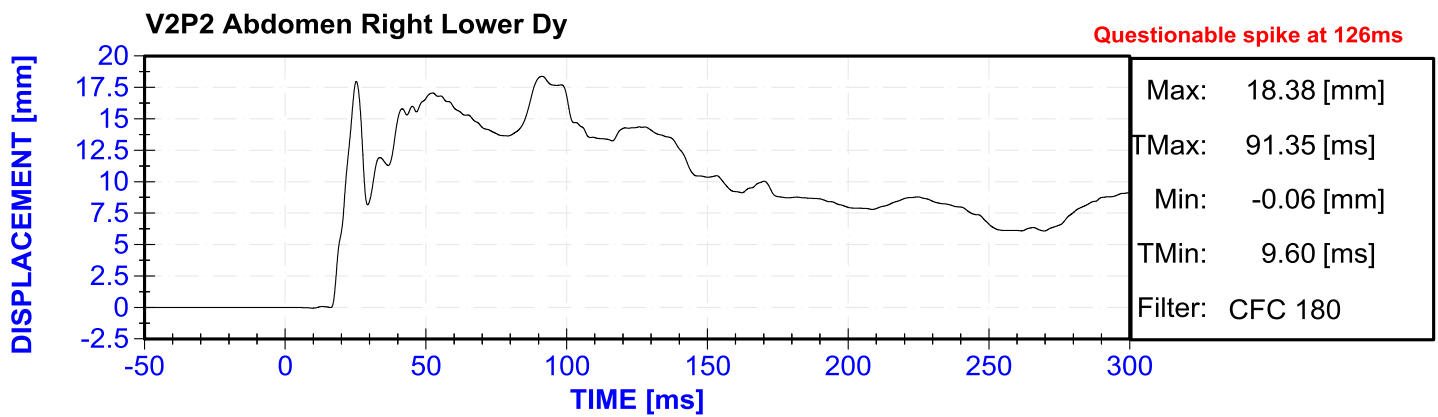
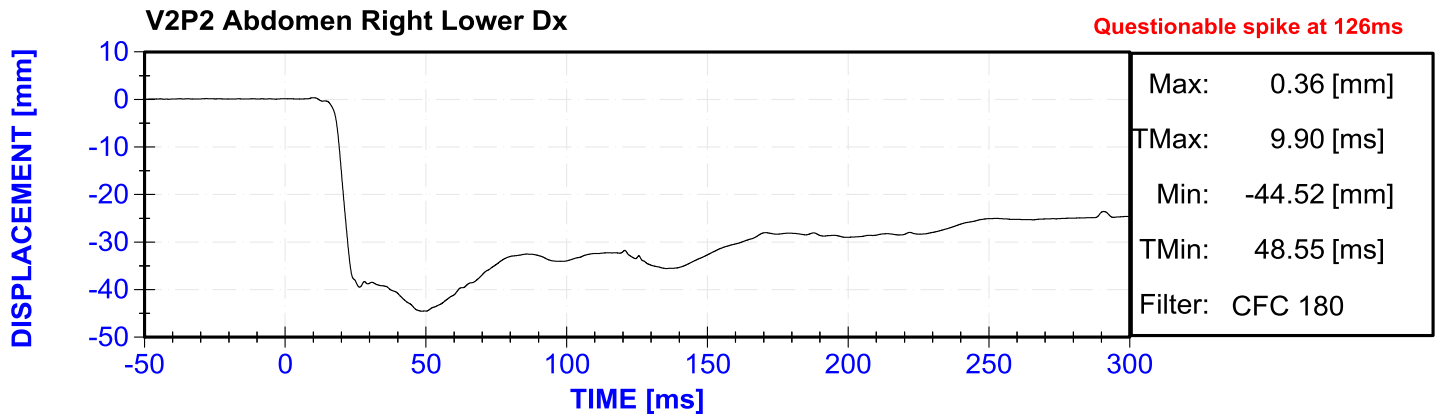












APPENDIX C

DUMMY CALIBRATION DATA

Table C-1: Dummy Information

TYPE	SERIAL NUMBER
THOR 50 TH Male	015
THOR 50 TH Male	016

Table C-2: THOR Ankle Zero Offset Information

THOR 50 th Male S/N: 015					
LFTX Left Ankle X	LFTY Left Ankle Y	LFTZ Left Ankle Z	RFTX Right Ankle X	RFTY Right Ankle Y	RFTZ Right Ankle Z
0.00893 deg	-15.7295 deg	-49.551 deg	-2.40521 deg	-12.1317 deg	-88.5479 deg
THOR 50 th Male S/N: 016					
LFTX Left Ankle X	LFTY Left Ankle Y	LFTZ Left Ankle Z	RFTX Right Ankle X	RFTY Right Ankle Y	RFTZ Right Ankle Z
2.16286 deg	-16.3445 deg	-44.58 deg	-3.53702 deg	-15.8108 deg	-46.565 deg

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

THOR 50 th Male S/N: 015					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	AC-P63993	2000	0.020850001	mV/V/g
Head CG Ay	Endevco	AC-P51641	2000	0.019360001	mV/V/g
Head CG Az	Endevco	AC-P52011	2000	0.019339999	mV/V/g
Head Wx	DTS	ARS-5921	18000	0.094919997	mV/deg/sec
Head Wy	DTS	ARS-6120	18000	0.093950002	mV/deg/sec
Head Wz	DTS	ARS-6640	18000	0.094540002	mV/deg/sec
Upper Neck Fx	Humanetics	LC-76Fx	8896.4	0.000231699	mV/V/N
Upper Neck Fy	Humanetics	LC-76Fy	8896.4	0.000234116	mV/V/N
Upper Neck Fz	Humanetics	LC-76Fz	13344.7	8.84E-05	mV/V/N
Upper Neck Mx	Humanetics	LC-76Mx	282.5	0.005946997	mV/V/Nm
Upper Neck My	Humanetics	LC-76My	282.5	0.005957618	mV/V/Nm
Upper Neck Mz	Humanetics	LC-76Mz	282.5	0.009966654	mV/V/Nm
Lower Neck Fx	Humanetics	LC-DM4552Fx	13344.7	0.00017042	mV/V/N
Lower Neck Fy	Humanetics	LC-DM4552Fy	13344.7	0.000169911	mV/V/N
Lower Neck Fz	Humanetics	LC-DM4552Fz	13344.7	7.10E-05	mV/V/N
Lower Neck Mx	Humanetics	LC-DM4552Mx	451.9	0.004082851	mV/V/Nm
Lower Neck My	Humanetics	LC-DM4552My	451.9	0.004110952	mV/V/Nm
Lower Neck Mz	Humanetics	LC-DM4552Mz	226	0.006743385	mV/V/Nm
Skull Spring Front Fz	Humanetics	LC-DI7617 Fz	4448.2	0.000498224	mV/V/N
Skull Spring Rear Fz	Humanetics	LC-80 Fz	4448.2	0.000868662	mV/V/N
Condyle Pot Ry	Sfernice	LC-DI7189	180	3.035299946	mV/V/deg
T1 Ax	Endevco	AC-P80336	2000	0.016559999	mV/V/g
T1 Ay	Endevco	AC-P80338	2000	0.01672	mV/V/g
T1 Az	Endevco	AC-P72696	2000	0.02044	mV/V/g

THOR 50 th Male (Continued) S/N: 015					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
T4 Ax	Endevco	AC-P80288	2000	0.020150001	mV/V/g
T4 Ay	Endevco	AC-P82328	2000	0.018279999	mV/V/g
T4 Az	Endevco	AC-P78985	2000	0.01835	mV/V/g
Thoracic Spine Fx	Denton	LC-92Fx	13344.7	0.000137193	mV/V/N
Thoracic Spine Fy	Denton	LC-92Fy	13344.7	0.000137958	mV/V/N
Thoracic Spine Fz	Denton	LC-92Fz	17792.9	5.26E-05	mV/V/N
Thoracic Spine Mx	Denton	LC-92Mx	677.9	0.002160616	mV/V/Nm
Thoracic Spine My	Denton	LC-92My	903.9	0.001779222	mV/V/Nm
Upper Left Thorax Dx	Humanetics	DS-DP1394	160 mm	Non-linear Scale	
Upper Left Thorax Ry	Sfernice	DS-DO7273	180	3.04979994	mV/V/deg
Upper Left Thorax Rz	Sfernice	DS-DP3884	180	3.048900049	mV/V/deg
Upper Right Thorax Dx	Humanetics	DS-DP1387	160 mm	Non-linear Scale	
Upper Right Thorax Ry	Sfernice	DS-DO7282	180	3.034099936	mV/V/deg
Upper Right Thorax Rz	Sfernice	DS-DO7285	180	3.021700075	mV/V/deg
Lower Left Thorax Dx	Humanetics	DS-DM1151	160 mm	Non-linear Scale	
Lower Left Thorax Ry	Sfernice	DS-DI2386	180	2.952900017	mV/V/deg
Lower Left Thorax Rz	Sfernice	DS-DI6129	180	3.087900113	mV/V/deg
Lower Right Thorax Dx	Humanetics	DS-DI4717	160 mm	Non-linear Scale	
Lower Right Thorax Ry	Sfernice	DS-DI2385	180	2.602899913	mV/V/deg
Lower Right Thorax Rz	Sfernice	DS-DO7286	180	3.08299996	mV/V/deg
Abdomen Left Dx	Humanetics	DS-DJ5441	192 mm	Non-linear Scale	
Abdomen Left Ry	Sfernice	DS-VR31	150	3.035200061	mV/V/deg
Abdomen Left Rz	Sfernice	DS-VR30	150	3.023399971	mV/V/deg
Abdomen Right Dx	Humanetics	DS-DI4778	192 mm	Non-linear Scale	
Abdomen Right Ry	Sfernice	DS-DI7754	150	3.015900031	mV/V/deg
Abdomen Right Rz	Sfernice	DS-DI7902	150	3.029200016	mV/V/deg
Pelvis Ax	Endevco	AC-P52130	2000	0.017099999	mV/V/g
Pelvis Ay	Endevco	AC-P51678	2000	0.020879999	mV/V/g
Pelvis Az	Endevco	AC-P63840	2000	0.0222	mV/V/g
Acetabulum Left Fx	Humanetics	LC-DM5055Fx	22241.1	0.000121887	mV/V/N
Acetabulum Left Fy	Humanetics	LC-DM5055Fy	13344.7	5.93E-05	mV/V/N
Acetabulum Left Fz	Humanetics	LC-DM5055Fz	13344.7	0.000163534	mV/V/N
Acetabulum Right Fx	Denton	LC-87Fx	22241.1	0.000124068	mV/V/N
Acetabulum Right Fy	Denton	LC-87Fy	13344.7	6.08E-05	mV/V/N
Acetabulum Right Fz	Denton	LC-87Fz	13344.7	0.000167363	mV/V/N
ASIS Left Fx	Humanetics	LC-DI4774 Fx	13000	6.84E-05	mV/V/N
ASIS Left My	Humanetics	LC-DI4774 My	325	0.003740923	mV/V/Nm
ASIS Right Fx	Humanetics	LC-DI4775 Fx	13000	6.77E-05	mV/V/N
ASIS Right My	Humanetics	LC-DI4775 My	325	0.003728923	mV/V/Nm
Femur Left Fx	Humanetics	LC-DT1833Fx	15000	0.000146287	mV/V/N
Femur Left Fy	Humanetics	LC-DT1833Fy	15000	0.000145733	mV/V/N
Femur Left Fz	Humanetics	LC-DT1833Fz	15000	7.36E-05	mV/V/N
Femur Left Mx	Humanetics	LC-DT1833Mx	350	0.006617429	mV/V/Nm
Femur Left My	Humanetics	LC-DT1833My	350	0.006614857	mV/V/Nm
Femur Right Fx	Humanetics	LC-DT1830Fx	15000	0.00014712	mV/V/N
Femur Right Fy	Humanetics	LC-DT1830Fy	15000	0.000147193	mV/V/N
Femur Right Fz	Humanetics	LC-DT1830Fz	15000	7.29E-05	mV/V/N
Femur Right Mx	Humanetics	LC-DT1830Mx	350	0.006648857	mV/V/Nm

THOR 50 th Male (Continued) S/N: 015					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Femur Right My	Humanetics	LC-DT1830My	350	0.006598	mV/V/Nm
Knee Dx	Space Age	DS-D2103665B	33	23.88590015	mv/v/mm
Upper Tibia Fz	Denton	LC-DS8145 Fz	11120	9.56E-05	mv/v/N
Upper Tibia Mx	Denton	LC-DS8145 Mx	395	0.0074603	mv/v/Nm
Upper Tibia My	Denton	LC-DS8145 My	395	0.0074283	mv/v/Nm
Lower Tibia Fx	Denton	LC-78 Fx	11100	0.0001747	mv/v/N
Lower Tibia Fy	Denton	LC-78 Fy	11100	0.0001706	mv/v/N
Lower Tibia Fz	Denton	LC-78 Fz	11100	9.64E-05	mv/v/N
Lower Tibia Mx	Denton	LC-78 Mx	395	0.0074895	mv/v/Nm
Lower Tibia My	Denton	LC-78 My	395	0.007513	mv/v/Nm
Leg Ax	Endevco	AC-P74940	2000	0.016620001	mv/v/g
Leg Ay	Endevco	AC-P51732	2000	0.01896	mv/v/g
Ankle Rx	Contelec	DS-0382	180	3.178999992	mv/v/deg
Ankle Ry	Contelec	DS-0386	180	3.176100086	mv/v/deg
Ankle Rz	Contelec	DS-0543	180	3.198399907	mv/v/deg
Foot Ax	Endevco	AC-P68071	2000	0.02365	mv/v/g
Foot Az	Endevco	AC-P51294	2000	0.02195	mv/v/g
Knee Dx	Space Age	DS-D2103657B	30	24.01199937	mv/v/mm
Upper Tibia Fz	Denton	LC-DS8144 Fz	11120	9.63E-05	mv/v/N
Upper Tibia Mx	Denton	LC-DS8144 Mx	395	0.0074676	mv/v/Nm
Upper Tibia My	Denton	LC-DS8144 My	395	0.0074022	mv/v/Nm
Lower Tibia Fx	Denton	LC-77 Fx	11100	0.0001737	mv/v/N
Lower Tibia Fy	Denton	LC-77 Fy	11100	0.0001715	mv/v/N
Lower Tibia Fz	Denton	LC-77 Fz	11100	9.61E-05	mv/v/N
Lower Tibia Mx	Denton	LC-77 Mx	395	0.0074698	mv/v/Nm
Lower Tibia My	Denton	LC-77 My	395	0.0073378	mv/v/Nm
Leg Ax	Endevco	AC-P79622	2000	0.02118	mv/v/g
Leg Ay	Endevco	AC-P83316	2000	0.01946	mv/v/g
Ankle Rx	Contelec	DS-0385	180	3.178199986	mv/v/deg
Ankle Ry	Contelec	DS-0383	180	3.153099911	mv/v/deg
Ankle Rz	Contelec	DS-0401	180	3.186699934	mv/v/deg
Foot Ax	Endevco	AC-P72691	2000	0.02014	mv/v/g
Foot Az	Endevco	AC-P83310	2000	0.01946	mv/v/g

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

THOR 50 th Male S/N: 016					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	AC-P81382	2000	0.01759	mV/V/g
Head CG Ay	Endevco	AC-P80275	2000	0.020490001	mV/V/g
Head CG Az	Endevco	AC-P74947	2000	0.016690001	mV/V/g
Head Wx	DTS	ARS-6629	18000	0.094080002	mV/deg/sec
Head Wy	DTS	ARS-4735	18000	0.095700001	mV/deg/sec

THOR 50 th Male (Continued) S/N: 016					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head Wz	DTS	ARS-4069	18000	0.09311	mV/deg/sec
Upper Neck Fx	Humanetics	LC-75Fx	8896.4	0.000228159	mV/V/N
Upper Neck Fy	Humanetics	LC-75Fy	8896.4	0.000229418	mV/V/N
Upper Neck Fz	Humanetics	LC-75Fz	13344.7	8.76E-05	mV/V/N
Upper Neck Mx	Humanetics	LC-75Mx	282.5	0.005912656	mV/V/Nm
Upper Neck My	Humanetics	LC-75My	282.5	0.005966114	mV/V/Nm
Upper Neck Mz	Humanetics	LC-75Mz	282.5	0.009657586	mV/V/Nm
Lower Neck Fx	Humanetics	LC-79Fx	13344.7	0.000168262	mV/V/N
Lower Neck Fy	Humanetics	LC-79Fy	13344.7	0.000168472	mV/V/N
Lower Neck Fz	Humanetics	LC-79Fz	13344.7	7.02E-05	mV/V/N
Lower Neck Mx	Humanetics	LC-79Mx	451.9	0.003947435	mV/V/Nm
Lower Neck My	Humanetics	LC-79My	451.9	0.00396934	mV/V/Nm
Lower Neck Mz	Humanetics	LC-79Mz	226	0.006685855	mV/V/Nm
Skull Spring Front Fz	Humanetics	LC-130 Fz	4448.2	0.000493186	mV/V/N
Skull Spring Rear Fz	Humanetics	LC-DM2829Fz	4448.2	0.000514633	mV/V/N
Condyle Pot Ry	Sfernice	DS-0007	180	3.052179934	mV/V/deg
T1 Ax	Endevco	AC-P74948	2000	0.01686	mV/V/g
T1 Ay	Endevco	AC-P83429	2000	0.018139999	mV/V/g
T1 Az	Endevco	AC-P83430	2000	0.0177	mV/V/g
T4 Ax	Endevco	AC-P80268	2000	0.020920001	mV/V/g
T4 Ay	Endevco	AC-P81791	2000	0.01917	mV/V/g
T4 Az	Endevco	AC-P80269	2000	0.021170001	mV/V/g
Thoracic Spine Fx	Denton	LC-123Fx	13344.7	0.000139239	mV/V/N
Thoracic Spine Fy	Denton	LC-123Fy	13344.7	0.000140453	mV/V/N
Thoracic Spine Fz	Denton	LC-123Fz	17792.9	5.33E-05	mV/V/N
Thoracic Spine Mx	Denton	LC-123Mx	677.9	0.002083467	mV/V/Nm
Thoracic Spine My	Denton	LC-123My	903.9	0.001837305	mV/V/Nm
Upper Left Thorax Dx	Humanetics	DS-DS6356	160 mm	Non-linear Scale	
Upper Left Thorax Ry	Sfernice	DS-DJ4106	180	3.059499897	mV/V/deg
Upper Left Thorax Rz	Sfernice	DS-DJ4108	180	3.046100028	mV/V/deg
Upper Right Thorax Dx	Humanetics	DS-DM3232	160 mm	Non-linear Scale	
Upper Right Thorax Ry	Sfernice	DS-DI2381	180	3.058299888	mV/V/deg
Upper Right Thorax Rz	Sfernice	DS-DI2380	180	3.06040002	mV/V/deg
Lower Left Thorax Dx	Humanetics	DS-DP1389	160 mm	Non-linear Scale	
Lower Left Thorax Ry	Sfernice	DS-DP1972	180	3.044900019	mV/V/deg
Lower Left Thorax Rz	Sfernice	DS-DO7288	180	3.039200092	mV/V/deg
Lower Right Thorax Dx	Humanetics	DS-DP1393	160 mm	Non-linear Scale	
Lower Right Thorax Ry	Sfernice	DS-DO7275	180	3.038000083	mV/V/deg
Lower Right Thorax Rz	Sfernice	DS-DO7276	180	3.021999961	mV/V/deg
Abdomen Left Dx	Humanetics	DS-DJ5440	192 mm	Non-linear Scale	
Abdomen Left Ry	Sfernice	DS-DI7755	150	3.025599988	mV/V/deg
Abdomen Left Rz	Sfernice	DS-DI7901	150	3.057899885	mV/V/deg
Abdomen Right Dx	Humanetics	DS-DQ2304	192 mm	Non-linear Scale	
Abdomen Right Ry	Sfernice	DS-218	150	3.012799891	mV/V/deg
Abdomen Right Rz	Sfernice	DS-DI6580	150	2.744599944	mV/V/deg
Pelvis Ax	Endevco	AC-P82402	2000	0.01788	mV/V/g
Pelvis Ay	Endevco	AC-P82403	2000	0.01799	mV/V/g
Pelvis Az	Endevco	AC-P82332	2000	0.01715	mV/V/g

THOR 50 th Male (Continued) S/N: 016					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Acetabulum Left Fx	Humanetics	LC-83Fx	22241.1	0.000120471	mV/V/N
Acetabulum Left Fy	Humanetics	LC-83Fy	13344.7	5.91E-05	mV/V/N
Acetabulum Left Fz	Humanetics	LC-83Fz	13344.7	0.000162964	mV/V/N
Acetabulum Right Fx	Denton	LC-84Fx	22241.1	0.000122579	mV/V/N
Acetabulum Right Fy	Denton	LC-84Fy	13344.7	5.82E-05	mV/V/N
Acetabulum Right Fz	Denton	LC-84Fz	13344.7	0.000165272	mV/V/N
ASIS Left Fx	Humanetics	LC-DT1000Fx	13000	6.88E-05	mV/V/N
ASIS Left My	Humanetics	LC-DT1000My	325	0.003827634	mV/V/Nm
ASIS Right Fx	Humanetics	LC-DT1001Fx	13000	6.94E-05	mV/V/N
ASIS Right My	Humanetics	LC-DT1001My	325	0.003849914	mV/V/Nm
Femur Left Fx	Humanetics	LC-DP4630Fx	15000	0.000142	mV/V/N
Femur Left Fy	Humanetics	LC-DP4630Fy	15000	0.0001419	mV/V/N
Femur Left Fz	Humanetics	LC-DP4630Fz	15000	7.16E-05	mV/V/N
Femur Left Mx	Humanetics	LC-DP4630Mx	350	0.0064409	mV/V/Nm
Femur Left My	Humanetics	LC-DP4630My	350	0.0064306	mV/V/Nm
Femur Right Fx	Humanetics	LC-DP3959Fx	15000	0.000142	mV/V/N
Femur Right Fy	Humanetics	LC-DP3959Fy	15000	0.0001422	mV/V/N
Femur Right Fz	Humanetics	LC-DP3959Fz	15000	7.24E-05	mV/V/N
Femur Right Mx	Humanetics	LC-DP3959Mx	350	0.006592	mV/V/Nm
Femur Right My	Humanetics	LC-DP3959My	350	0.0064729	mV/V/Nm
Knee Dx	Space Age	DS-017169	33	22.93870039	mv/v/mm
Upper Tibia Fz	Denton	LC-95 Fz	11120	9.60E-05	mv/v/N
Upper Tibia Mx	Denton	LC-95 Mx	395	0.0074226	mv/v/Nm
Upper Tibia My	Denton	LC-95 My	395	0.0073786	mv/v/Nm
Lower Tibia Fx	Denton	LC-139 Fx	11100	0.00017407	mv/v/N
Lower Tibia Fy	Denton	LC-139 Fy	11100	0.00017491	mv/v/N
Lower Tibia Fz	Denton	LC-139 Fz	11100	9.63E-05	mv/v/N
Lower Tibia Mx	Denton	LC-139 Mx	395	0.0074679	mv/v/Nm
Lower Tibia My	Denton	LC-139 My	395	0.007503	mv/v/Nm
Leg Ax	Endevco	AC-P67924	2000	0.02107	mv/v/g
Leg Ay	Endevco	AC-P51711	2000	0.01915	mv/v/g
Ankle Rx	Contelec	DS-0544	180	3.173100064	mv/v/deg
Ankle Ry	Contelec	DS-0527	180	3.160400083	mv/v/deg
Ankle Rz	Contelec	DS-0541	180	3.15340003	mv/v/deg
Foot Ax	Endevco	AC-P63979	2000	0.020310001	mv/v/g
Foot Az	Endevco	AC-P82182	2000	0.018090001	mv/v/g
Knee Dx	Space Age	DS-12070382	30	24.1260007	mv/v/mm
Upper Tibia Fz	Denton	LC-88 Fz	11120	9.33E-05	mv/v/N
Upper Tibia Mx	Denton	LC-88 Mx	395	0.0072837	mv/v/Nm
Upper Tibia My	Denton	LC-88 My	395	0.0071822	mv/v/Nm
Lower Tibia Fx	Denton	LC-140 Fx	11100	0.0001784	mv/v/N
Lower Tibia Fy	Denton	LC-140 Fy	11100	0.0001764	mv/v/N
Lower Tibia Fz	Denton	LC-140 Fz	11100	9.65E-05	mv/v/N
Lower Tibia Mx	Denton	LC-140 Mx	395	0.0076118	mv/v/Nm
Lower Tibia My	Denton	LC-140 My	395	0.0076405	mv/v/Nm
Leg Ax	Endevco	AC-P50100	2000	0.017660001	mv/v/g

THOR 50 th Male (Continued) S/N: 016					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Leg Ay	Endevco	AC-P80922	2000	0.018160001	mv/v/g
Ankle Rx	Contelec	DS-0254	180	3.179399995	mv/v/deg
Ankle Ry	Contelec	DS-0525-1	180	3.179399995	mv/v/deg
Ankle Rz	Contelec	DS-0256	180	3.160899971	mv/v/deg
Foot Ax	Endevco	AC-P58836	2000	0.01903	mv/v/g
Foot Az	Endevco	AC-P72351	2000	0.021059999	mv/v/g

Table 4 – THOR IR-TRACC Polarity

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

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

THOR 50th Male 015

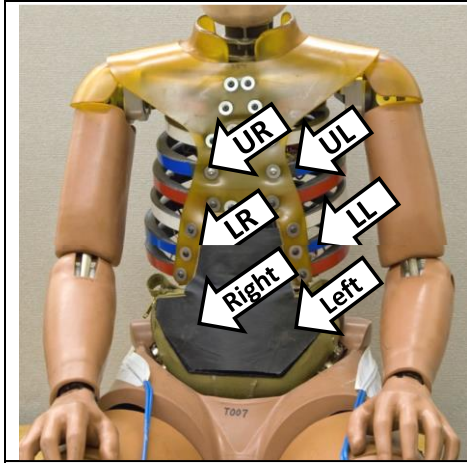


Figure 1. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

Channel	Motion
DX	Push inward
RY	Push upward
RZ	Push rightward

Upper Right Thorax				Upper Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.11203	+	+	DX (V)	0.10139	+	+
RY (Deg)	10.5792	+	+	RY (Deg)	11.7954	+	+
RZ (Deg)	-12.961	+	+	RZ (Deg)	13.0209	+	+
Lower Right Thorax				Lower Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.09578	+	+	DX (V)	0.08445	+	+
RY (Deg)	-3.4367	+	+	RY (Deg)	-2.3055	+	+
RZ (Deg)	-5.1227	+	+	RZ (Deg)	5.23523	+	+
Abdomen Right				Abdomen Left			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.06672	+	+	DX (V)	0.06328	+	+
RY (Deg)	2.86058	+	+	RY (Deg)	1.87899	+	+
RZ (Deg)	-0.8069	+	+	RZ (Deg)	1.53933	+	+

THOR 50th Male 016

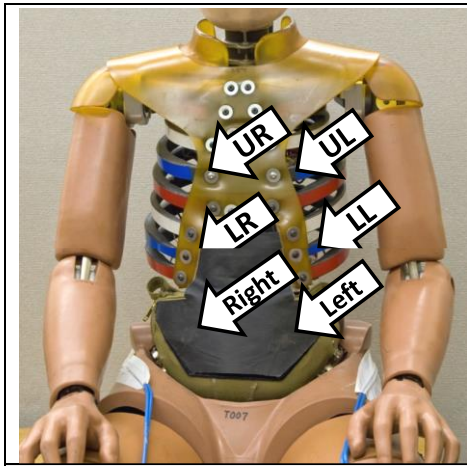


Figure 2. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

Channel	Motion
DX	Push inward
RY	Push upward
RZ	Push rightward

Upper Right Thorax				Upper Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.08380	+	+	DX (V)	0.85751	+	+
RY (Deg)	10.0137	+	+	RY (Deg)	4.55342	+	+
RZ (Deg)	-11.962	+	+	RZ (Deg)	11.7694	+	+
Lower Right Thorax				Lower Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.08025	+	+	DX (V)	0.08125	+	+
RY (Deg)	-6.1346	+	+	RY (Deg)	-4.0026	+	+
RZ (Deg)	-2.2819	+	+	RZ (Deg)	7.84761	+	+
Abdomen Right				Abdomen Left			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.07470	+	+	DX (V)	0.07571	+	+
RY (Deg)	3.52947	+	+	RY (Deg)	3.10074	+	+
RZ (Deg)	1.27844	+	+	RZ (Deg)	5.10226	+	+

Test Data/Sensor Repair Notes

THOR Inspection Checklist

Date: 11/11/2015		
NHTSA Representative: James Saunders		
Inspection Reporter: Mike Hartung		
Inspection type (check one): ☒ Pre-Test ☐ Post-Test		
Dummy S/N: DO9798	Legs S/N: LX655/LX654	
Dummy Description: THOR-M 50th Male		
Date of last Certification: 11/4/2015		
<u>Tests conducted:</u> Since last inspection: R20165408 2016 Mazda CX-5 Since last certification: R20165408 - 2016 Mazda CX-5		
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 11NECKFR00THFOZP,Front Neck Spring Tower Load Cell, Questionable spikes - 11NECKLO00THFOYP,Lower Neck Y Force, Questionable spike - 11NECKLO00THFOZP,Lower Neck Z Force, Questionable spike - 11NECKLO00THMOXP,Lower Neck X Moment, Questionable spikes - 11NECKLO00THMOYP,Lower Neck Y Moment, Questionable spikes - 11NECKLO00THMOZP,Lower Neck Z Moment, Questionable spikes - 11CHSTLELOTHVO0P,Thorax Lower Left X Displacement, Questionable spikes - 11ABDOLE00THVO0P,Abdomen Left X Displacement, Questionable spike		
<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
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 Tear in center of bag.
	
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
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: 11/16/2015		
NHTSA Representative: James Saunders		
Inspection Reporter: Matt Goehle		
Inspection type (check one): ☐ Pre-Test ☒ Post-Test		
Dummy S/N: DO9798		Legs S/N: LX655/LX654
Dummy Description: THOR-M 50 th Male		
Date of last Certification: 11/4/2015		
<u>Tests conducted:</u> <u>Since last inspection:</u> R20165409 2016 Mazda CX-5	<u>Since last certification:</u> R20165408 - 2016 Mazda CX-5 R20165409 2016 Mazda CX-5	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 11CHSTLELOTHVO0P,Thorax Lower Left X Displacement, Questionable spikes - 11ABDOLE00THVO0P,Abdomen Left X Displacement, Questionable spike		
<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
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 Tear in center of bag.
	
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
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: 11/11/2015		
NHTSA Representative: James Saunders		
Inspection Reporter: Mike Hartung		
Inspection type (check one): ☒ Pre-Test ☐ Post-Test		
Dummy S/N: DL9207	Legs S/N: LX0045/LX0046	
Dummy Description: THOR-M 50th Male		
Date of last Certification: 10/14/2015		
<u>Tests conducted:</u> R20165408 - 2016 Mazda CX-5 <u>Since last inspection:</u> R20165408 - 2016 Mazda CX-5		
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 13CHSTRIUPTHVO0P, Thorax Upper Right X Displacement, Questionable spike - 13THSP0100THACXP, T1 X Acceleration, Questionable spikes - 13TIBIRILOTHMOYP, Lower Tibia Right Y Moment, Questionable data 82.9ms to 105ms		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> None		
<u>Equipment delivered to Borrower:</u> THOR DL9207 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 6 IRTraccs 12 Rotational Pots 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC	<i>Continued</i> 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers 2 Knee Sliders 1 Neck Skin 1 Neck Foam 1 Tiltview Interface Cable 4 Tilt Sensors 1 H-Point Tool 1 Tool Box 1 Laptop	

Note: New Damage is Noted in Red

HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	
NECK	
Y / N	Neck cables slide freely through holes in neck plates
Y / N	Neck cables show no sign of fraying, broken strands, or kinking
Y / N	No evidence of de-bonding between neck pucks and plates
Y / N	No evidence of de-bonding or permanent compression in neck soft stop assemblies
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
	Multiple tears and broken stitches in lower abdomen bag. The upper and lower abdomen bags appear to be from THOR SN007
	

	
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
OTHER	
PELVIS	
Y / N	Pelvis flesh fits securely over pelvis bones
Y / N	H-point tool fits securely into hole on both sides of pelvis
OTHER	
FEMUR	
Y / N	Acetabular load cells firmly attached
Y / N	Femur load cells firmly attached
Y / N	No evidence of deformation of knee slider bump stop
Y / N	No cuts, tears, or scuffing of knee flesh Right knee flesh torn
	
OTHER	Left femur flesh is separating from zipper. We placed gaffer's tape across zipper to prevent further damage. 

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

THOR Inspection Checklist

Date: 11/16/2015		
NHTSA Representative: James Saunders		
Inspection Reporter: Matt Goehle		
Inspection type (check one): ☐ Pre-Test ☒ Post-Test		
Dummy S/N: DL9207	Legs S/N: LX0045/LX0046	
Dummy Description: THOR-M 50th Male		
Date of last Certification: 10/14/2015		
<u>Tests conducted:</u> R20165409 - 2016 Mazda CX-5	<u>Since last inspection:</u> R20165408 - 2016 Mazda CX-5 R20165409 - 2016 Mazda CX-5	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 13CHSTRIUPTHVO0P, Thorax Upper Right X Displacement, Questionable spike - 13ABDORI00THVO0P, Abdomen Right X Displacement, Questionable spike		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> None		
<u>Equipment delivered to Borrower:</u> THOR DL9207 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 6 IRTraccs 12 Rotational Pots 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC	<i>Continued</i> 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers 2 Knee Sliders 1 Neck Skin 1 Neck Foam 1 Tiltview Interface Cable 4 Tilt Sensors 1 H-Point Tool 1 Tool Box 1 Laptop	

Note: New Damage is Noted in Red

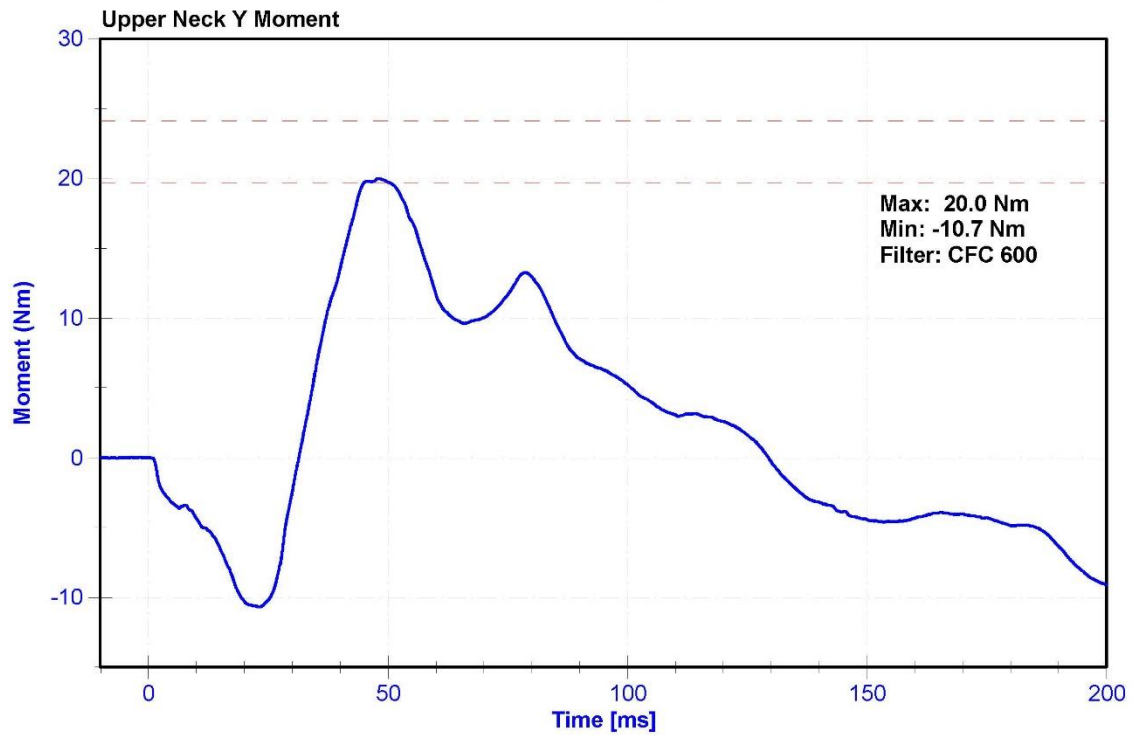
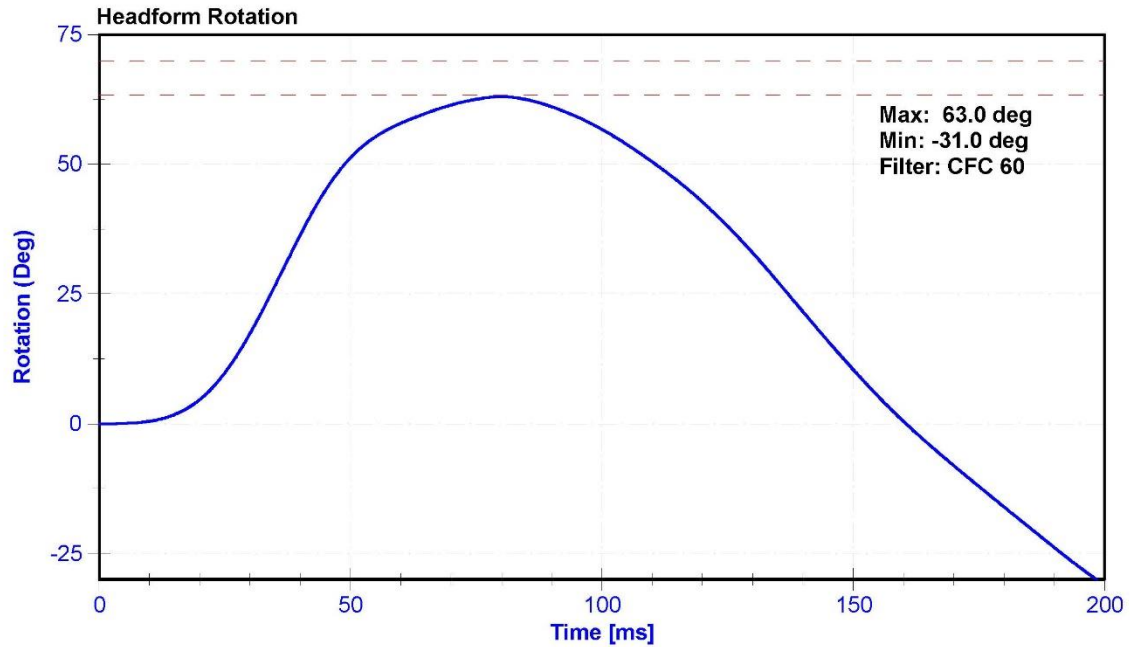
HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	
NECK	
Y / N	Neck cables slide freely through holes in neck plates
Y / N	Neck cables show no sign of fraying, broken strands, or kinking
Y / N	No evidence of de-bonding between neck pucks and plates
Y / N	No evidence of de-bonding or permanent compression in neck soft stop assemblies
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
	Multiple tears and broken stitches in lower abdomen bag. The upper and lower abdomen bags appear to be from THOR SN007
	

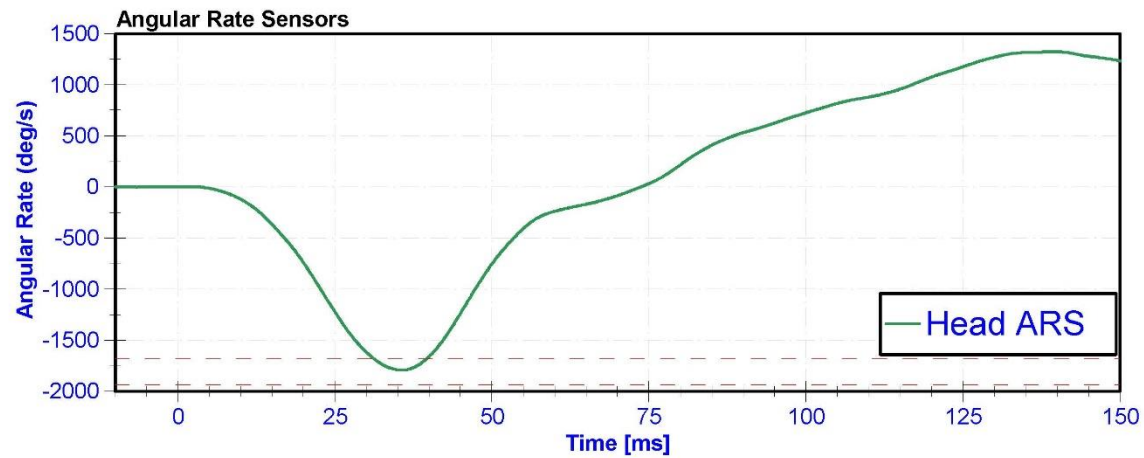
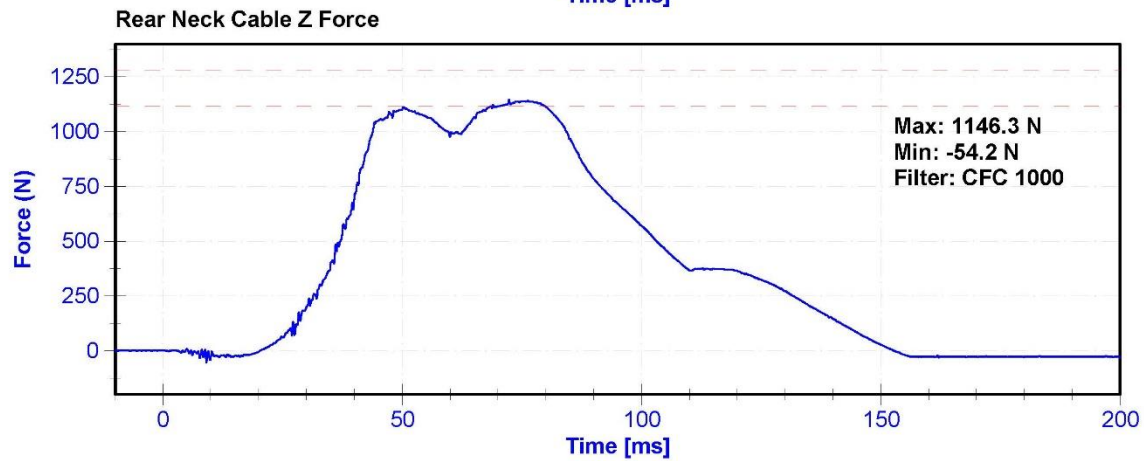
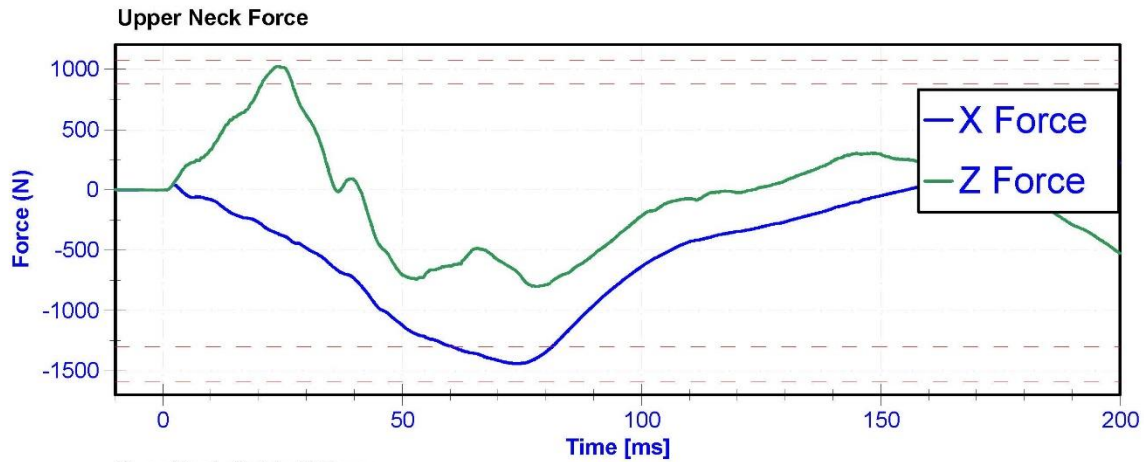
	
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
OTHER	
PELVIS	
Y / N	Pelvis flesh fits securely over pelvis bones
Y / N	H-point tool fits securely into hole on both sides of pelvis
OTHER	
FEMUR	
Y / N	Acetabular load cells firmly attached
Y / N	Femur load cells firmly attached
Y / N	No evidence of deformation of knee slider bump stop
Y / N	No cuts, tears, or scuffing of knee flesh Right knee flesh torn 
OTHER	Left femur flesh is separating from zipper. We placed gaffer's tape across zipper to prevent further damage. 

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

DUMMY CALIBRATIONS

50% ADULT MALE THOR DO9798 DUMMY CALIBRATIONS





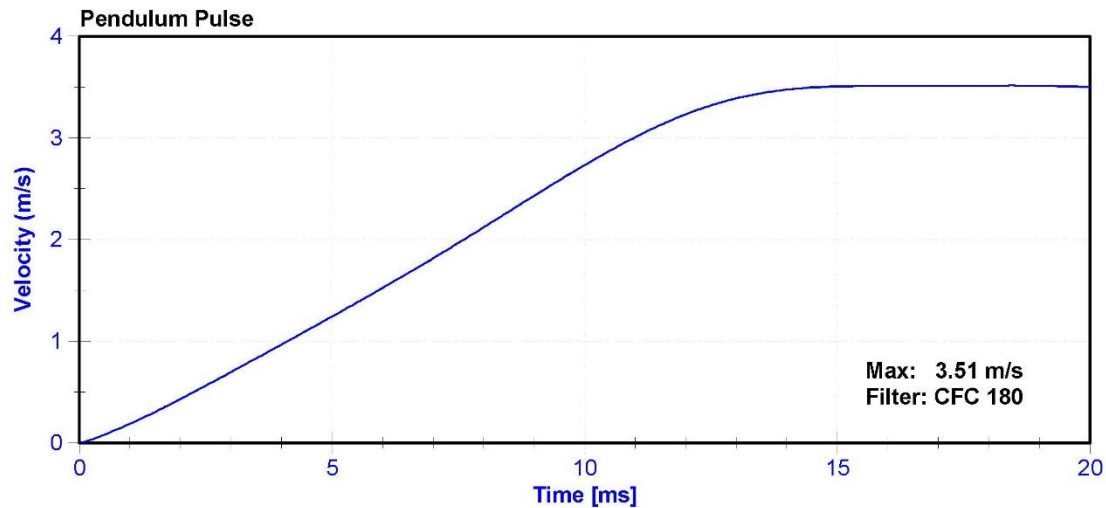
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

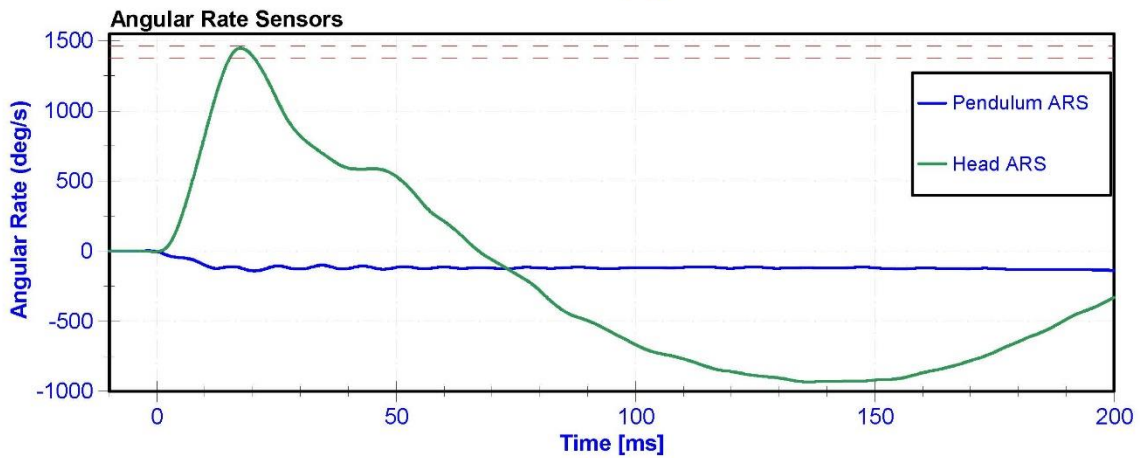
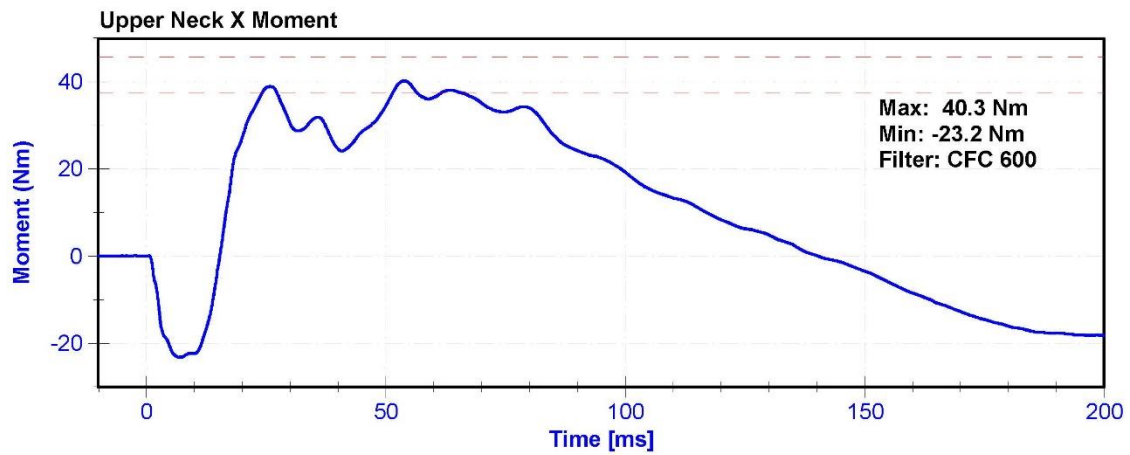
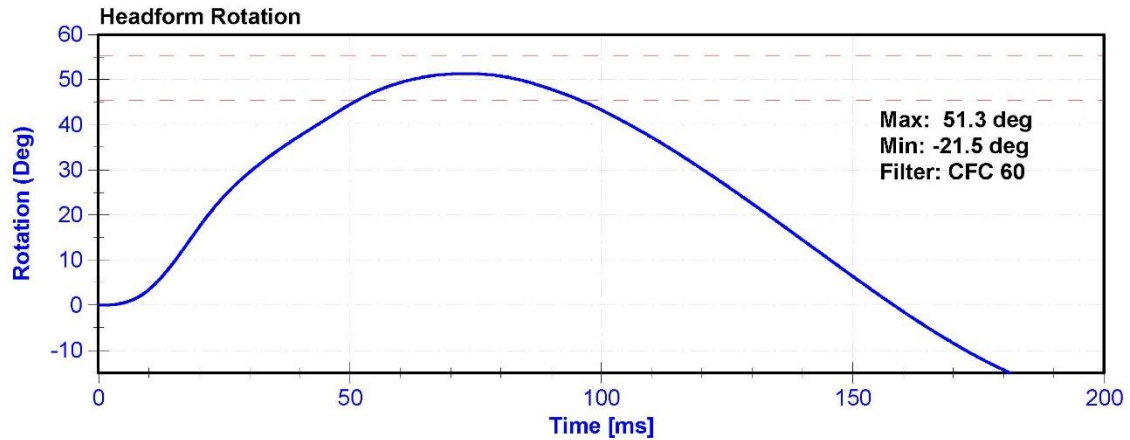
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	46.2	Pass
Velocity	3.35	3.45	m/s	3.42	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.968	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.120	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.232	Pass
Peak Upper Neck X Moment 40-300ms	37.4	45.7	Nm	40.25	Pass
Peak Head X Angular Rate	1375	1462	deg/s	1447.0	Pass
Peak Head Rotation	45.4	55.3	deg	51.33	Pass
Rotation Decay to Zero	83.7	90.9	ms	85.10	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Upper Neck Load Cell	Humanetics 10380Jl4	LC-DS9758 Mx	12/3/2014	12/3/2015
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head ARS Y-Axis	DTS ARS 18k	ARS-6733	4/27/2015	4/26/2016





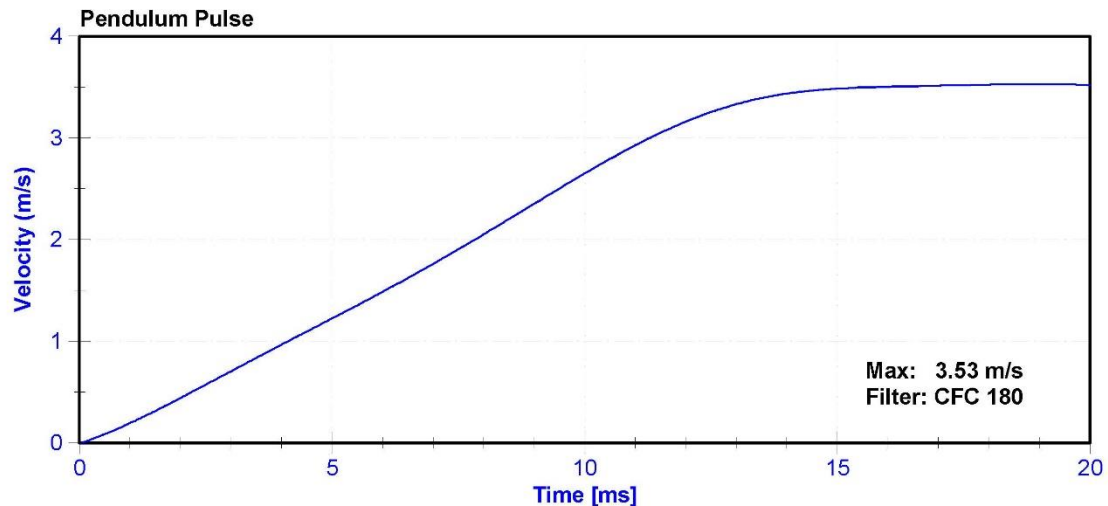
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	46.5	Pass
Velocity	3.35	3.45	m/s	3.43	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.966	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.051	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.160	Fail
Peak Upper Neck X Moment 40-300ms	-45.7	-37.4	Nm	-42.00	Pass
Peak Head X Angular Rate	-1462	-1375	deg/s	-1437.2	Pass
Peak Head Rotation	-55.3	-45.4	deg	-51.08	Pass
Rotation Decay to Zero	83.7	90.9	ms	84.80	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Upper Neck Load Cell	Humanetics 10380Jl4	LC-DS9758 Mx	12/3/2014	12/3/2015
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head ARS Y-Axis	DTS ARS 18k	ARS-6733	4/27/2015	4/26/2016



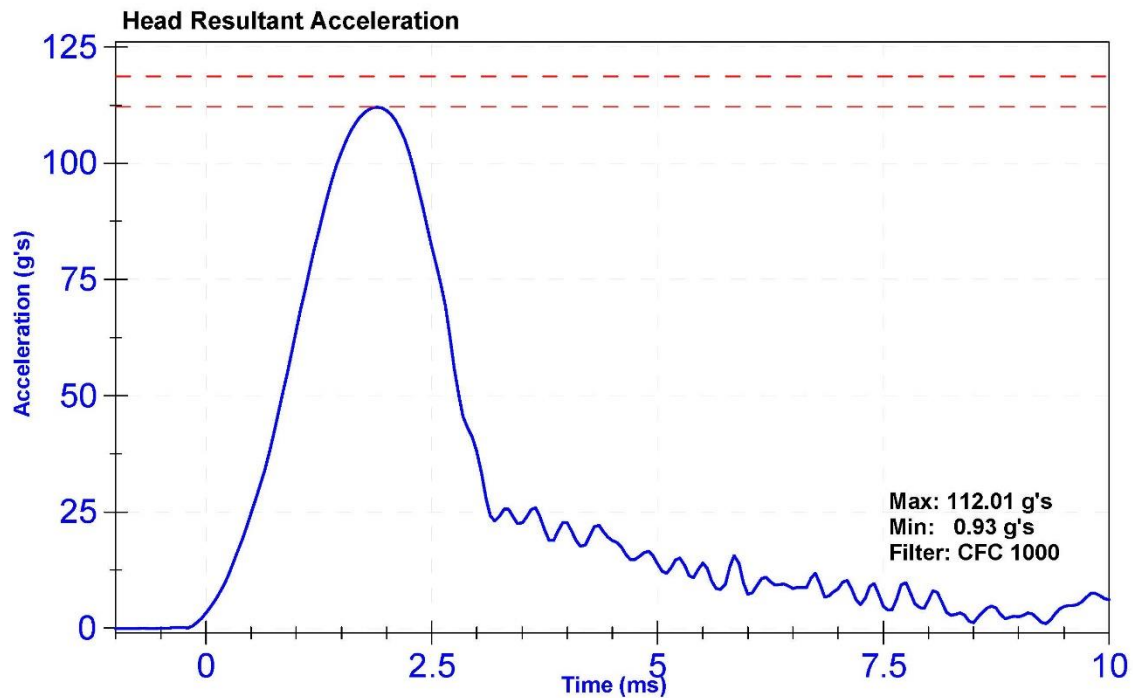
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

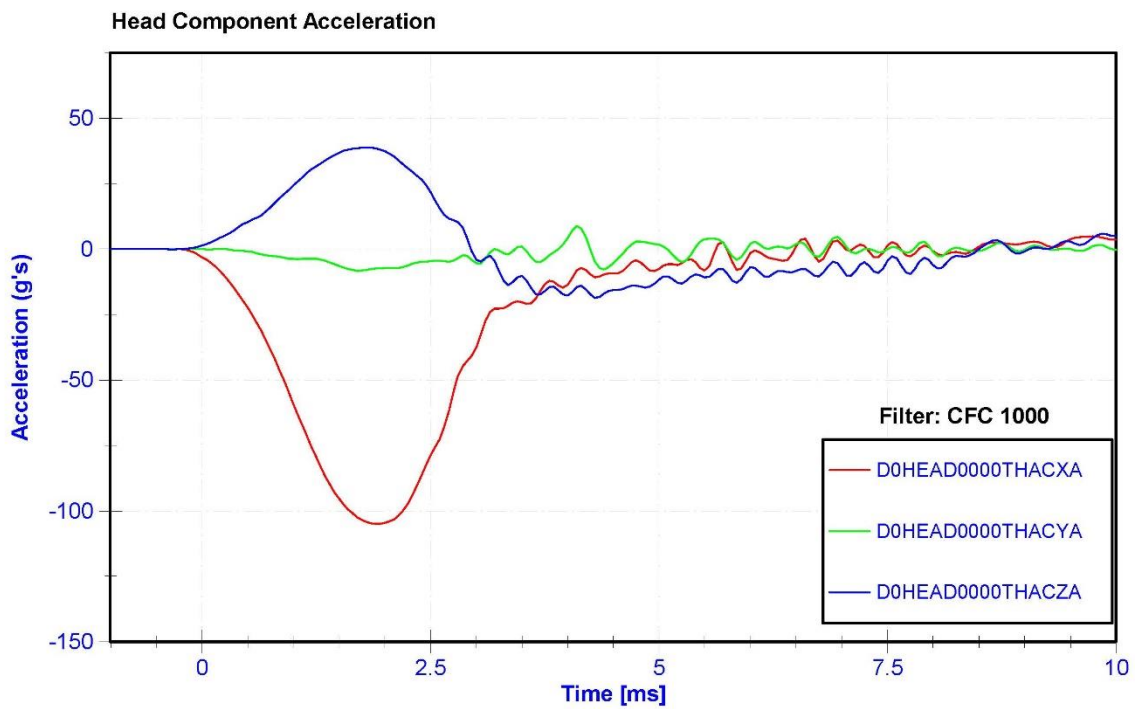
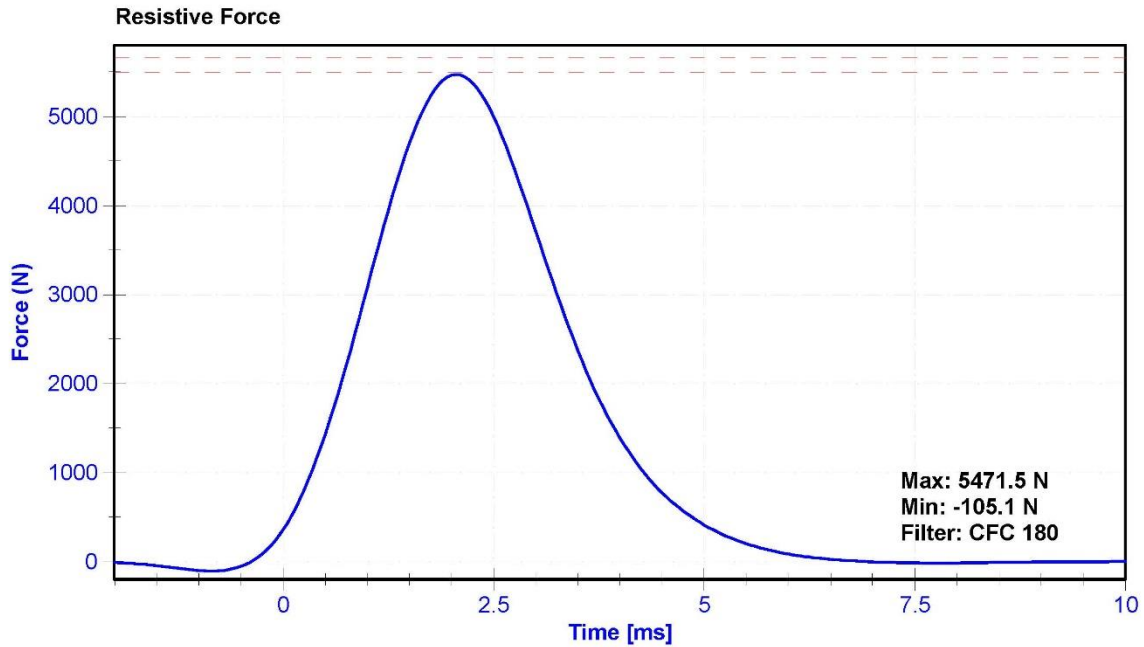
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	30.8	Pass
Impact Velocity	1.95	2.05	m/s	1.958	Pass
Probe Force	5,498	5,660	N	5471.5	Fail
Resultant Acceleration	112.2	118.7	g's	112.01	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Head X Accel	Endevco 7264	AC-P52001	9/24/2015	3/24/2016
Head Y Accel	Endevco 7264	AC-P51697	9/28/2015	3/28/2016
Head Z Accel	Endevco 7264	AC-P75155	9/24/2015	3/24/2016
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016





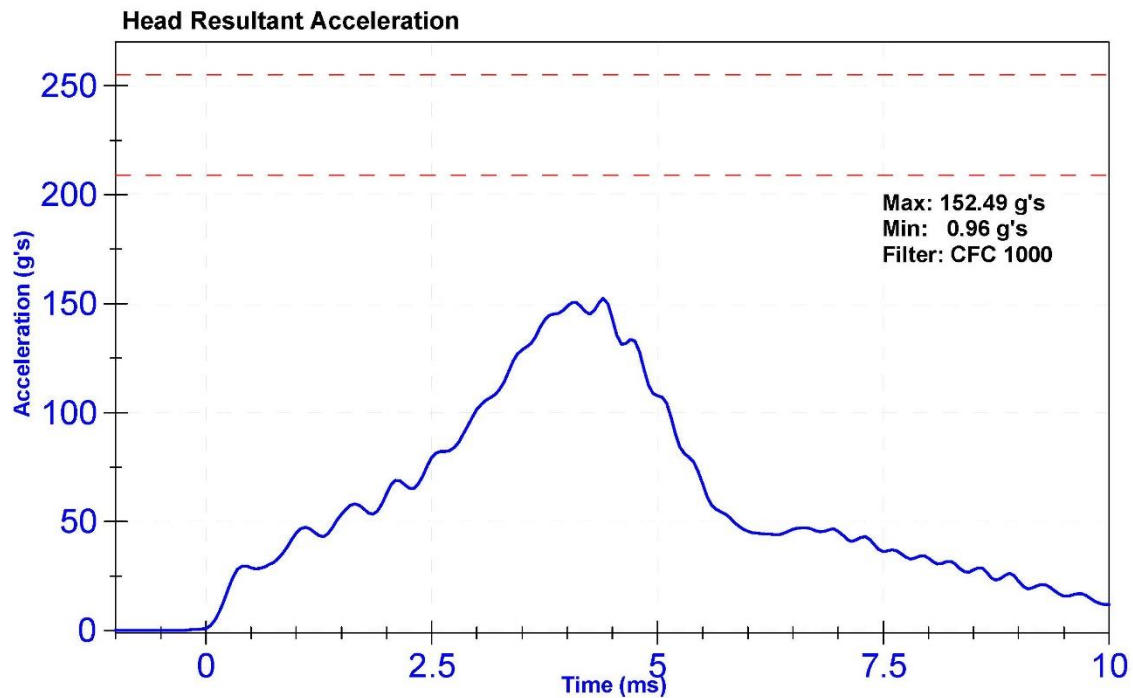
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

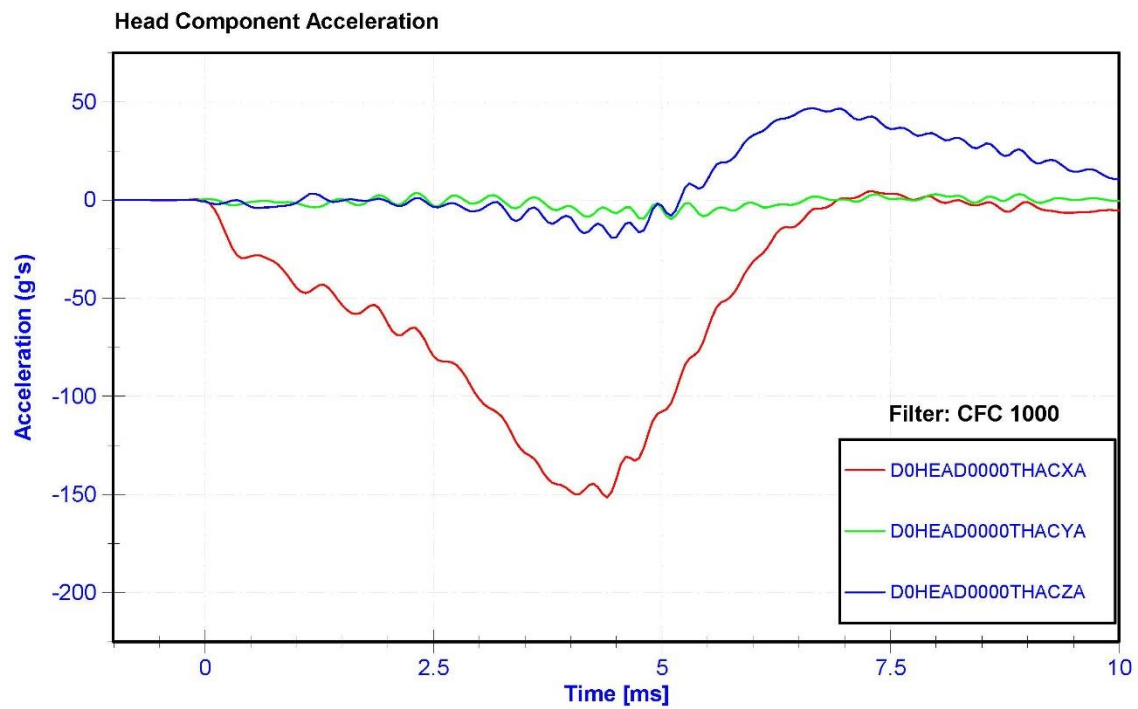
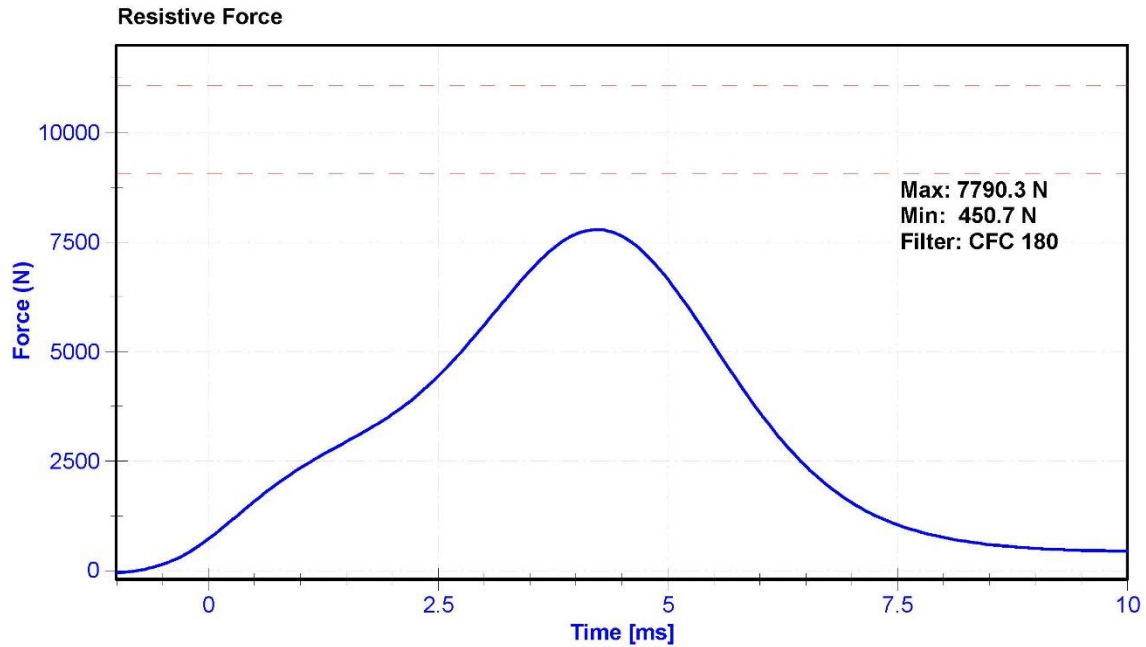
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	26.5	Pass
Impact Velocity	6.68	6.78	m/s	6.773	Pass
Probe Force	9067	11082	N	7790.3	Fail
Resultant Acceleration	209	255	g's	152.5	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Head X Accel	Endevco 7264	AC-P52001	9/24/2015	3/24/2016
Head Y Accel	Endevco 7264	AC-P51697	9/28/2015	3/28/2016
Head Z Accel	Endevco 7264	AC-P75155	9/24/2015	3/24/2016
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016





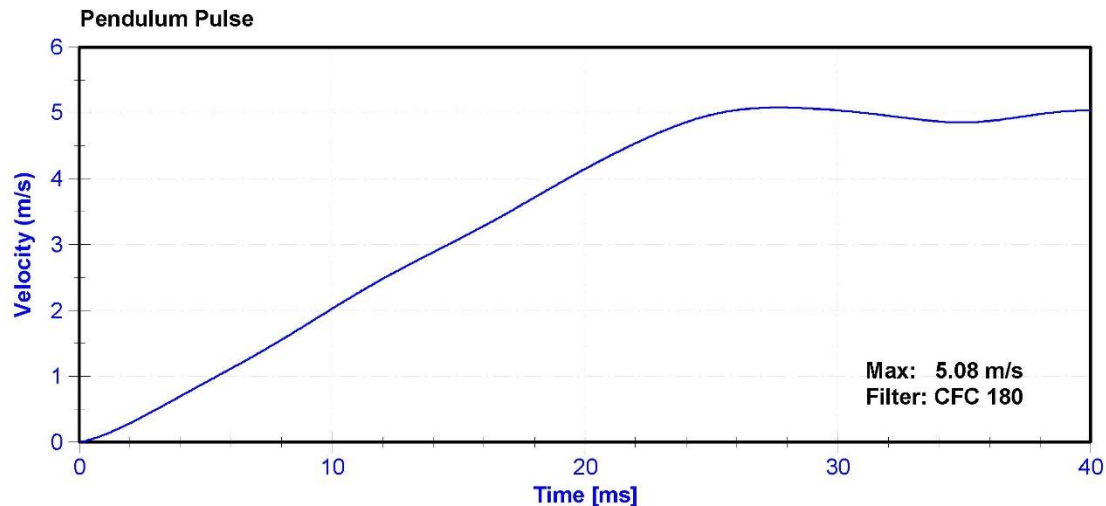
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

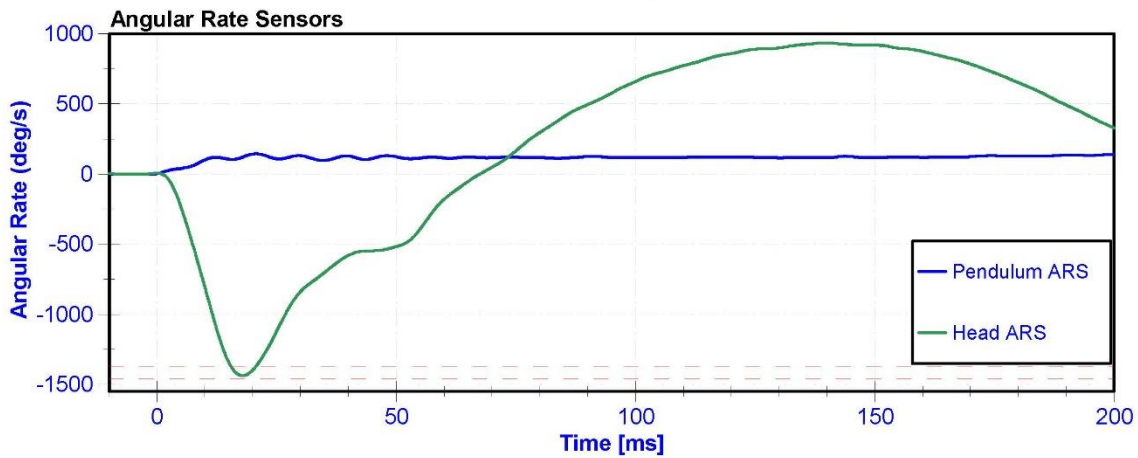
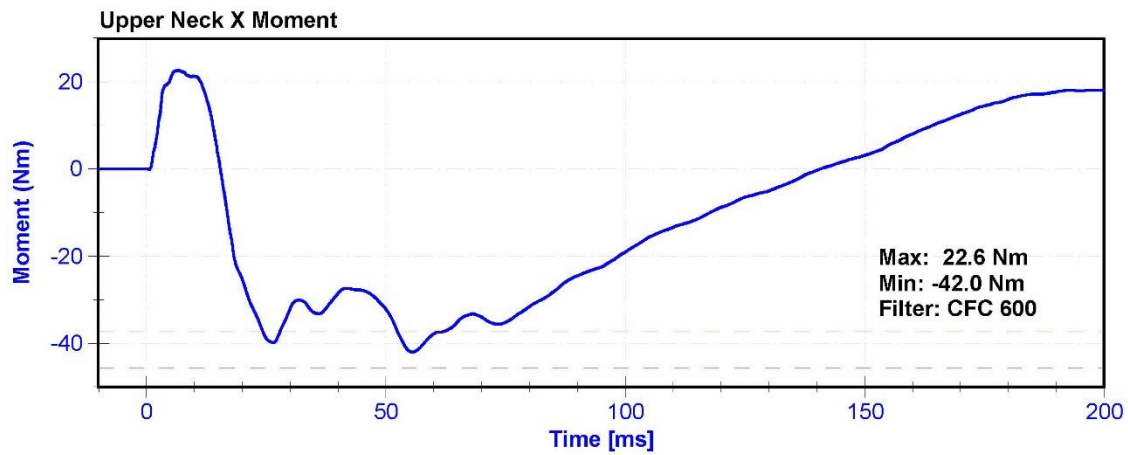
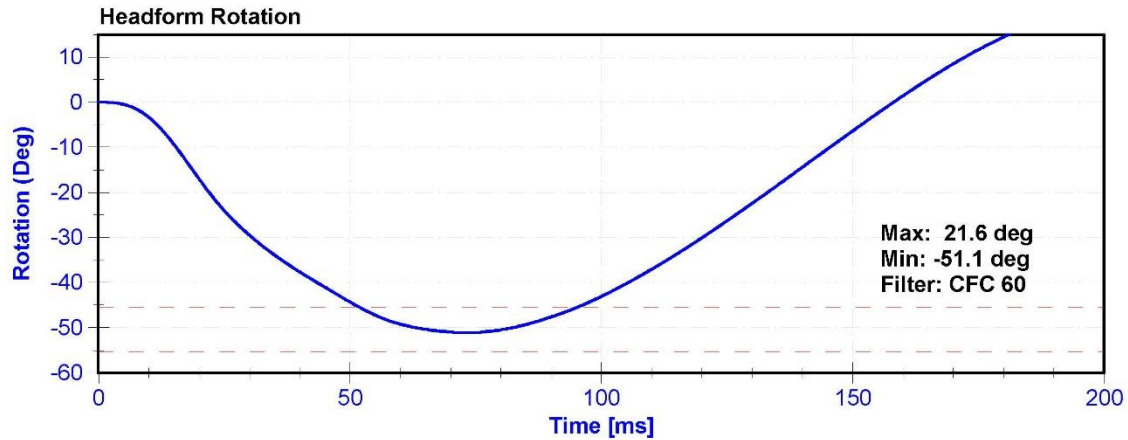
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	39.4	Pass
Velocity	4.95	5.05	m/s	4.93	Pass
Pendulum Impulse at 8ms	1.49	1.85	m/s	1.556	Pass
Pendulum Impulse at 16ms	3.08	3.86	m/s	3.283	Pass
Pendulum Impulse at 24ms	4.48	5.26	m/s	4.858	Pass
Peak Upper Neck Y Moment	19.7	24.1	Nm	20.00	Pass
Peak Upper Neck X Force	-1592	-1302	N	-1440.4	Pass
Maximum Upper Neck Z Force	877	1072	N	1021.6	Pass
First Peak Rear Neck Cable Force	1115	1282	N	1146.3	Pass
Peak Head Y Angular Rate	-1935	-1675	deg/s	-1790.1	Pass
Peak Head Angle	63.3	69.9	deg	63.01	Fail
Rotation Decay to Zero	83.0	86.2	ms	80.0	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Upper Neck Load Cell	Humanetics 10380J14	LC-DS9758 Fx	12/3/2014	12/3/2015
Rear Neck Cable Load Cell	Humanetics 6005JFL	LC-132	9/17/2015	9/16/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head ARS Y-Axis	DTS ARS 18k	ARS-4071	3/31/2015	3/30/2016





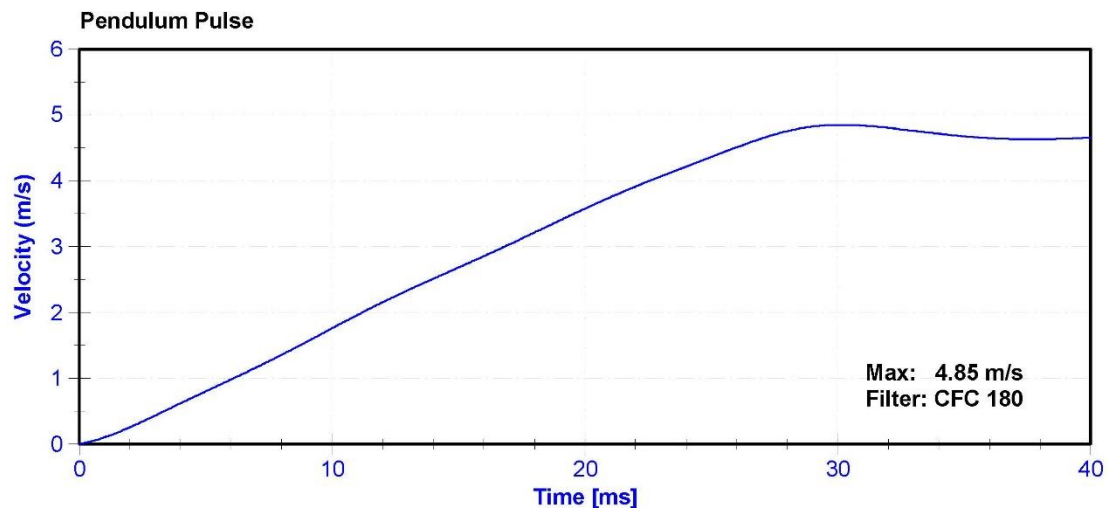
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

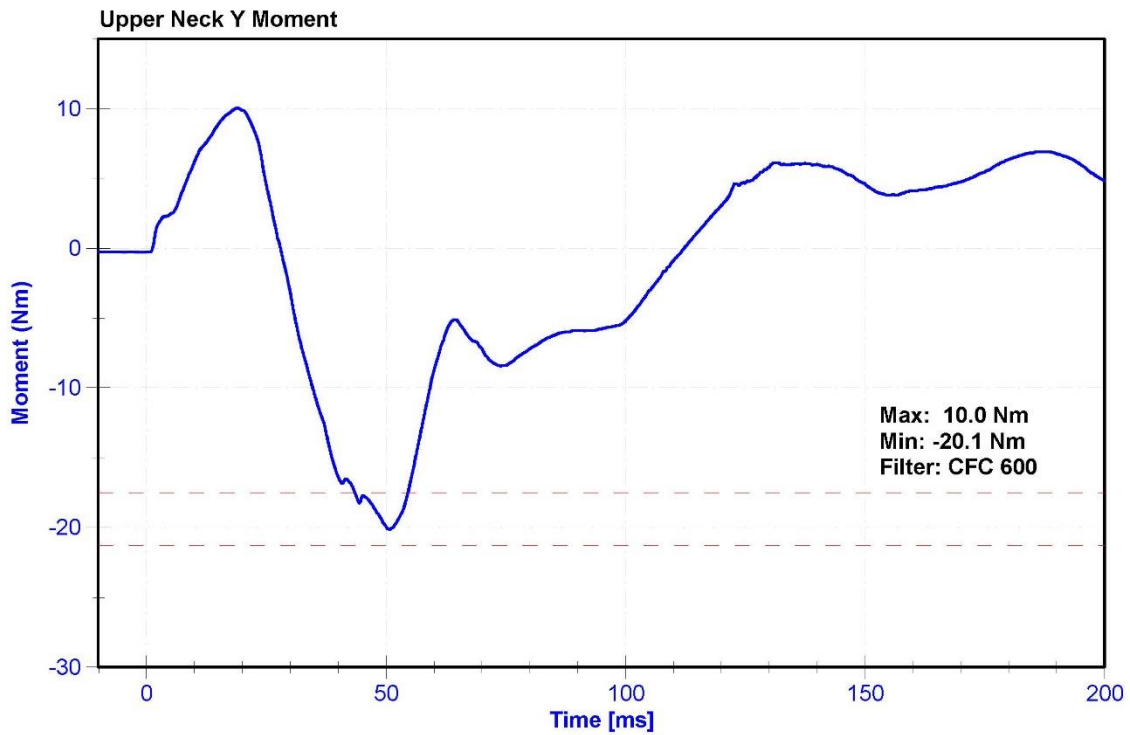
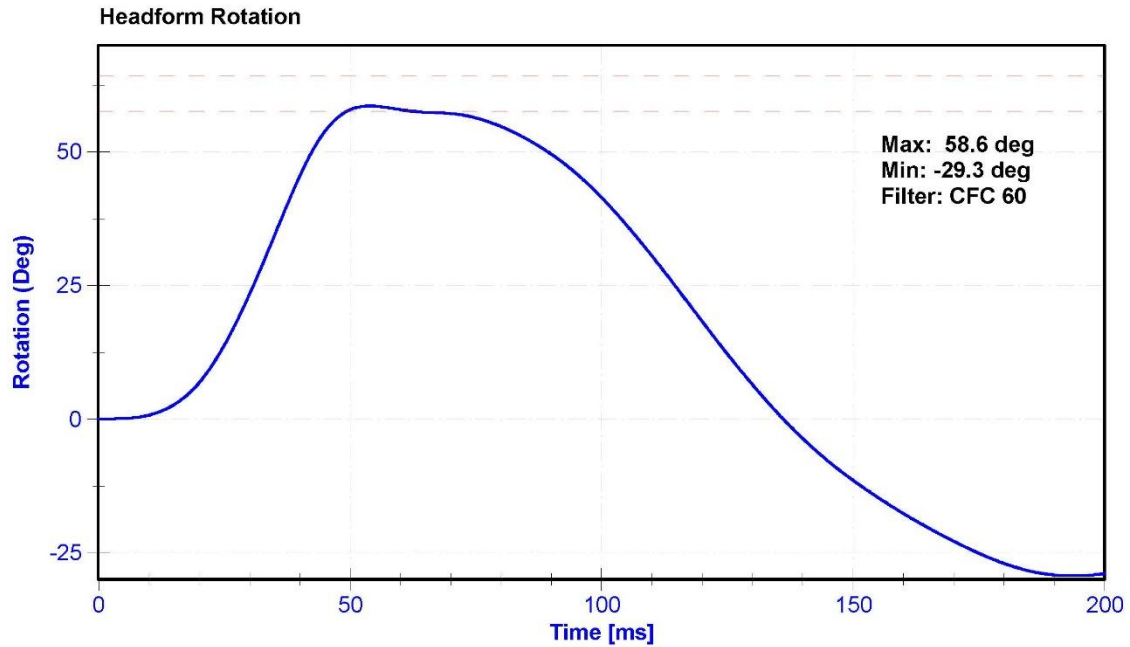
Results

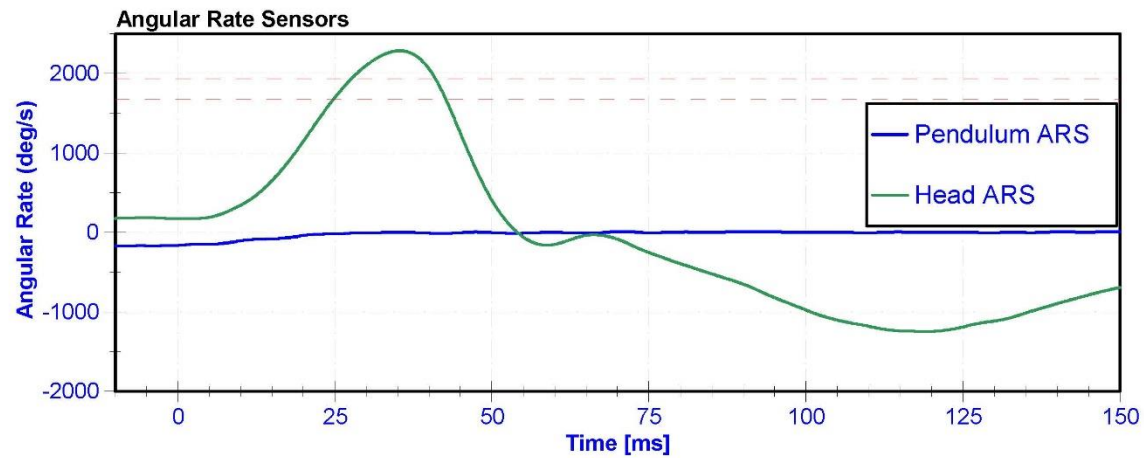
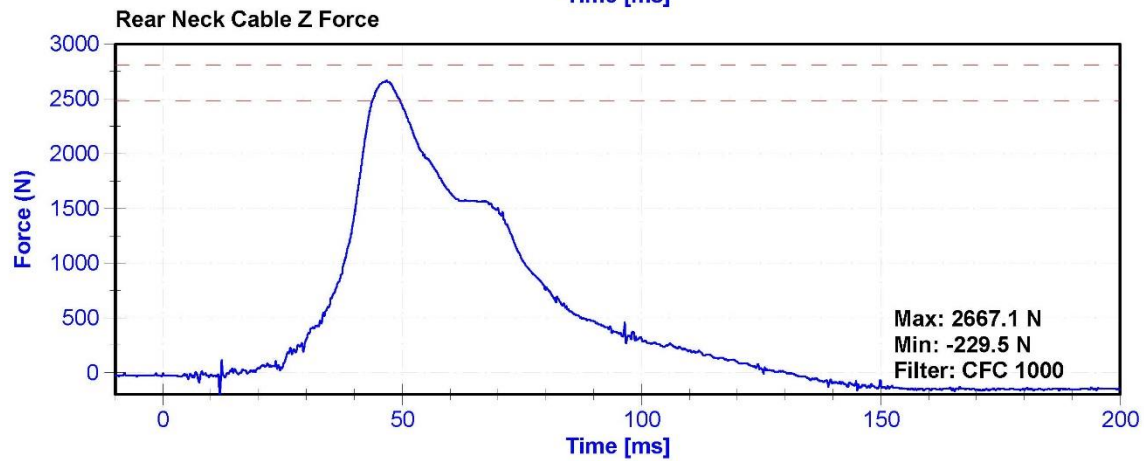
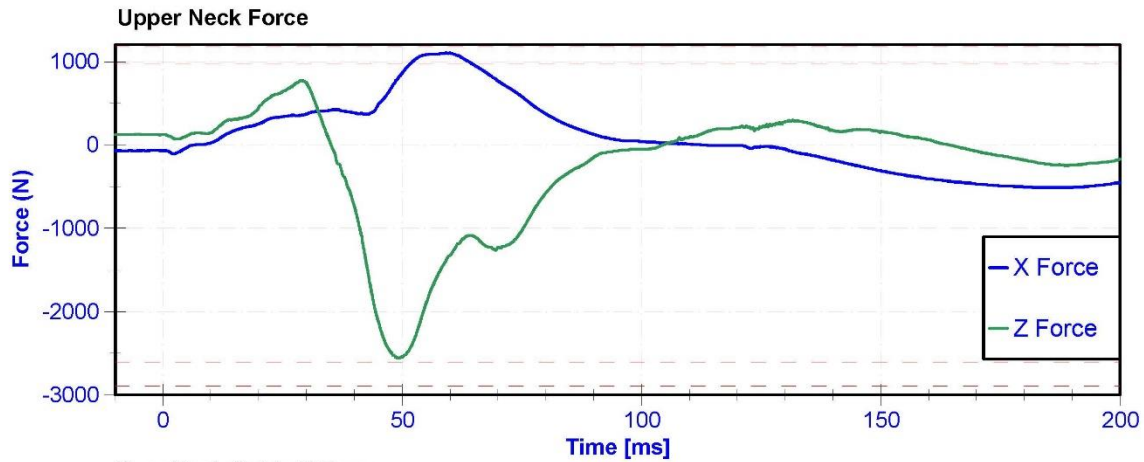
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	45.0	Pass
Velocity	4.95	5.05	m/s	4.98	Pass
Pendulum Impulse at 10ms	1.76	1.91	m/s	1.762	Pass
Pendulum Impulse at 20ms	3.50	3.75	m/s	3.577	Pass
Pendulum Impulse at 30ms	4.88	5.20	m/s	4.850	Fail
Peak Upper Neck Y Moment	-21.3	-17.5	Nm	-20.12	Pass
Peak Upper Neck X Force	967	1182	N	1101.7	Pass
Peak Upper Neck Z Force	-2893	-2603	N	-2558.9	Fail
Peak Front Neck Cable Force	2482	2809	N	2667.1	Pass
Peak Head Y Angular Rate	1907	2043	deg/s	2285.0	Fail
Peak Head Rotation	57.6	64.2	deg	58.64	Pass
Rotation Decay to Zero	79.3	82.5	ms	82.20	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Upper Neck Load Cell	Humanetics 10380J14	LC-DS9758 Fx	12/3/2014	12/3/2015
Front Neck Cable Load Cell	Humanetics 6005JFL	LC-93	9/3/2015	9/2/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head ARS Y-Axis	DTS ARS 18k	ARS-4071	3/31/2015	3/30/2016







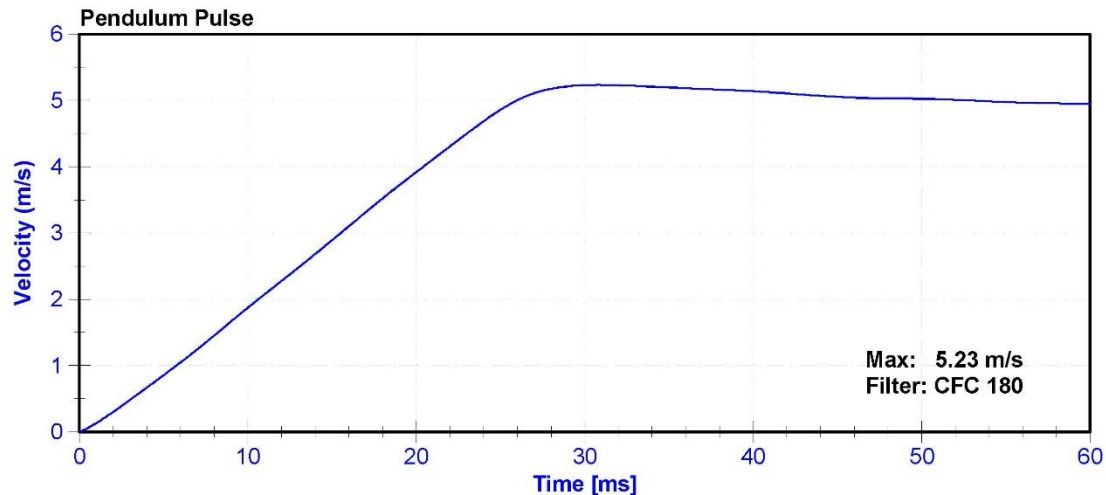
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

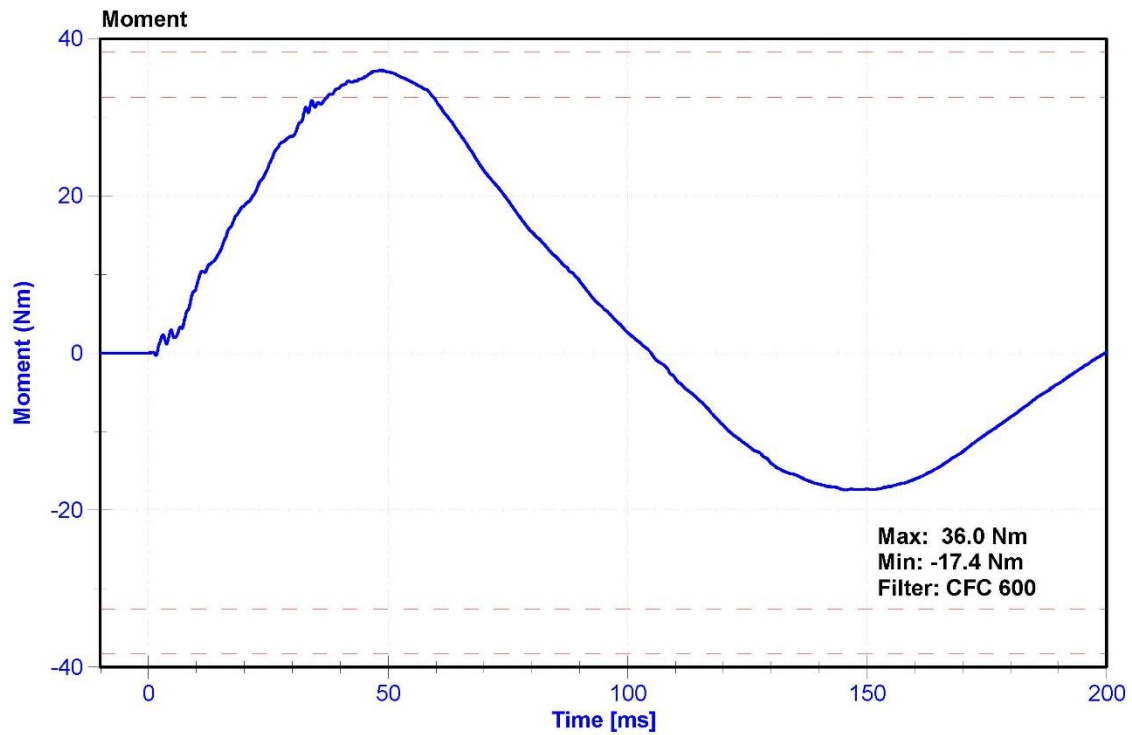
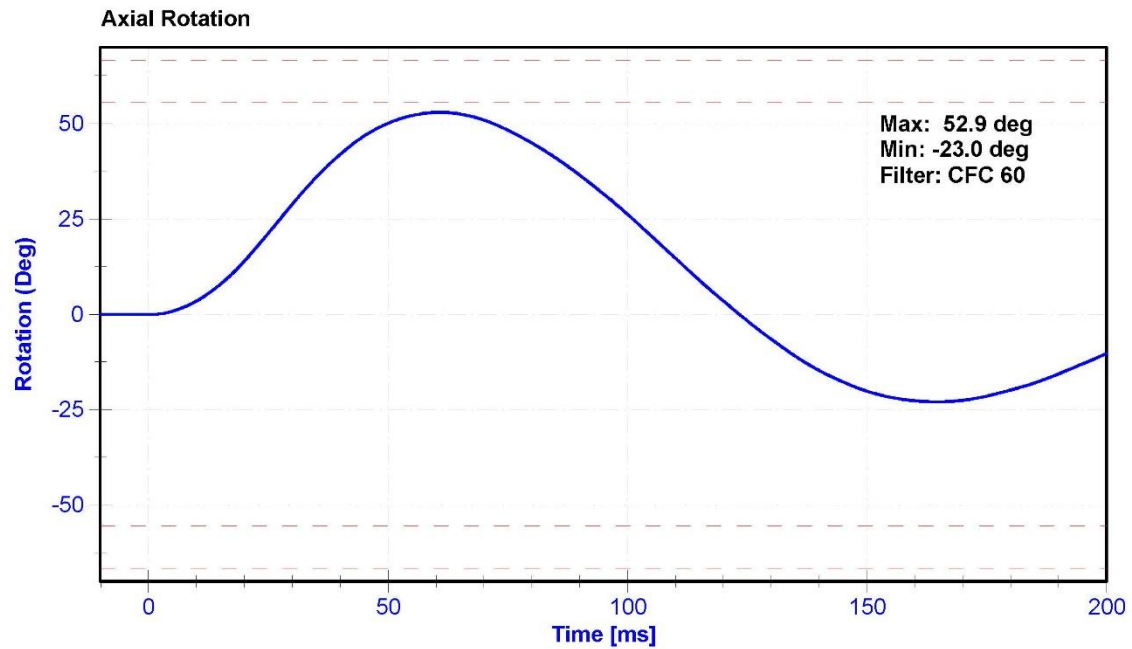
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	38.7	Pass
Velocity	4.95	5.05	m/s	5.01	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.873	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.891	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.920	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.860	Pass
Maximum Upper Neck Moment	32.6	38.3	Nm	35.97	Pass
Peak Axial Rotation	55.6	66.6	deg	52.95	Fail
Rotation Decay to Zero	58.0	61.6	ms	62.45	Fail
Peak Upper Neck Angular Velocity	1559	1709	deg/s	1622.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Upper Neck Load Cell	Humanetics 10380J14	LC-DS9758 Mz	12/3/2014	12/3/2015
Upper Neck ARS	DTS ARS PRO-18K	ARS-9112	9/30/2015	9/29/2016





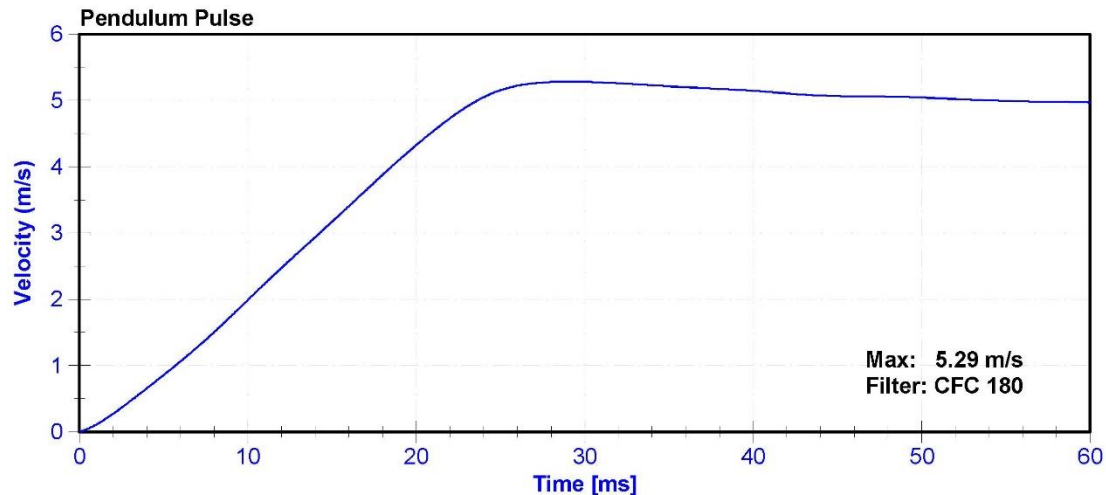
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

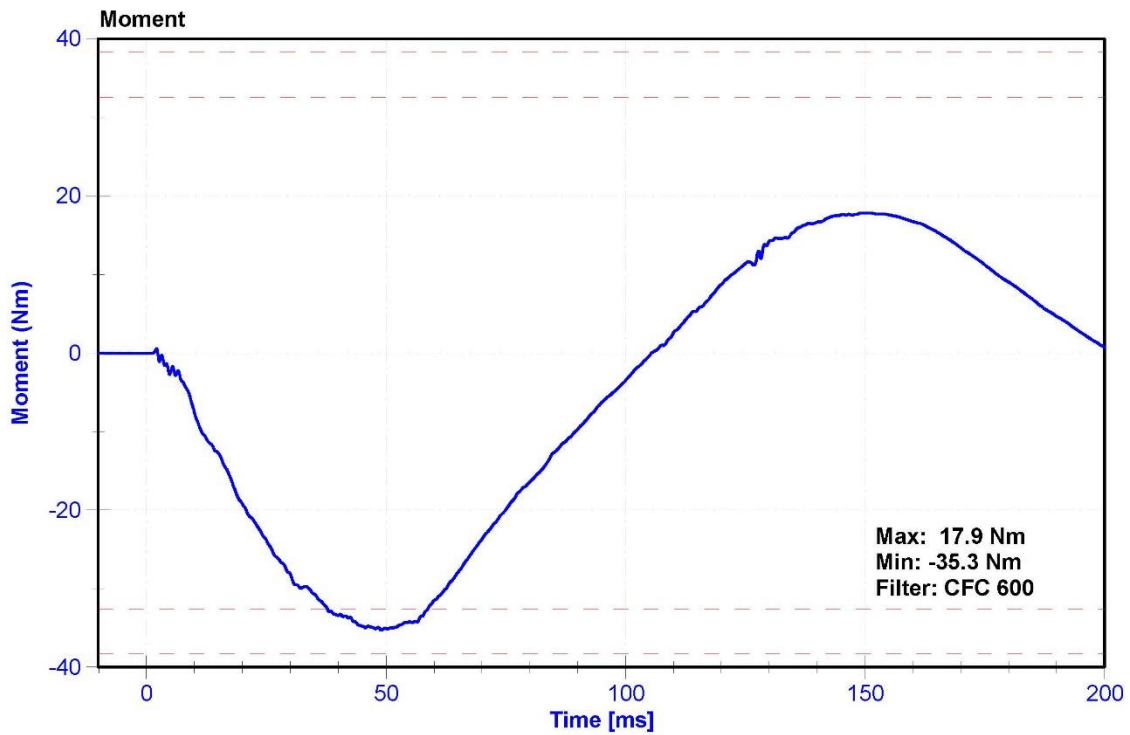
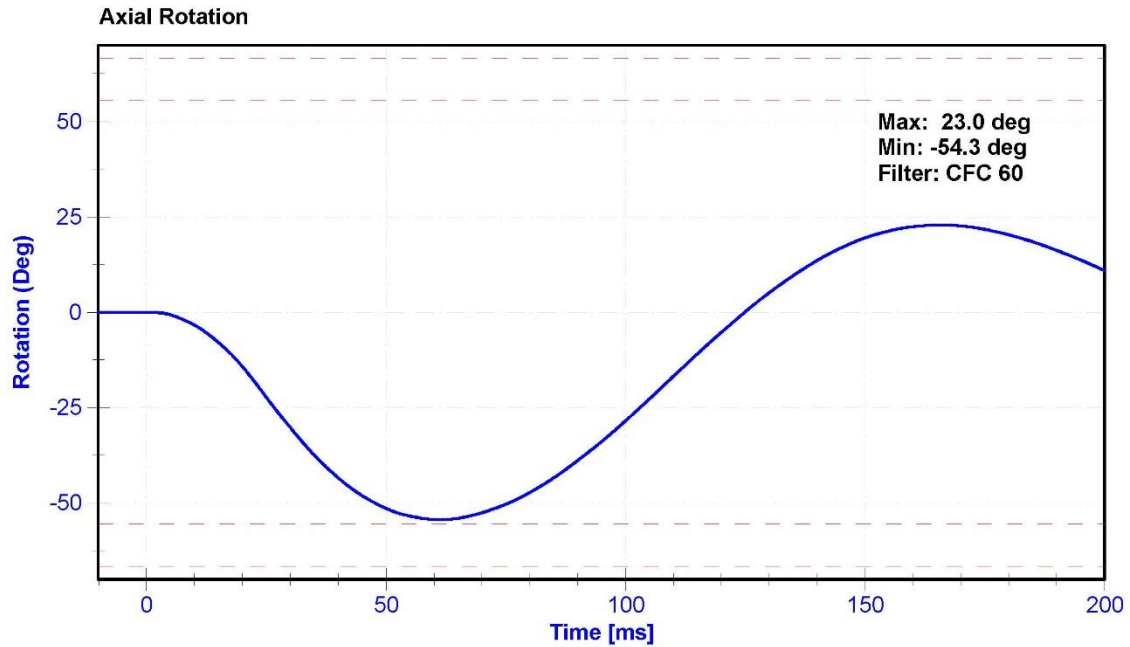
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	37.4	Pass
Velocity	4.95	5.05	m/s	4.98	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.990	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	3.170	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	4.328	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	5.155	Pass
Maximum Upper Neck Moment	32.6	38.3	Nm	35.26	Pass
Peak Axial Rotation	55.6	66.6	deg	54.32	Fail
Rotation Decay to Zero	58.0	61.6	ms	53.75	Fail
Peak Upper Neck Angular Velocity	1559	1709	deg/s	1765.26	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Upper Neck Rotation	Servo 14CB1-3615	DS-0001	10/21/2015	10/20/2016
Upper Neck Load Cell	Humanetics 10380J14	LC-DS9758 Mz	12/3/2014	12/3/2015
Upper Neck ARS	DTS ARS PRO-18K	ARS-9112	9/30/2015	9/29/2016





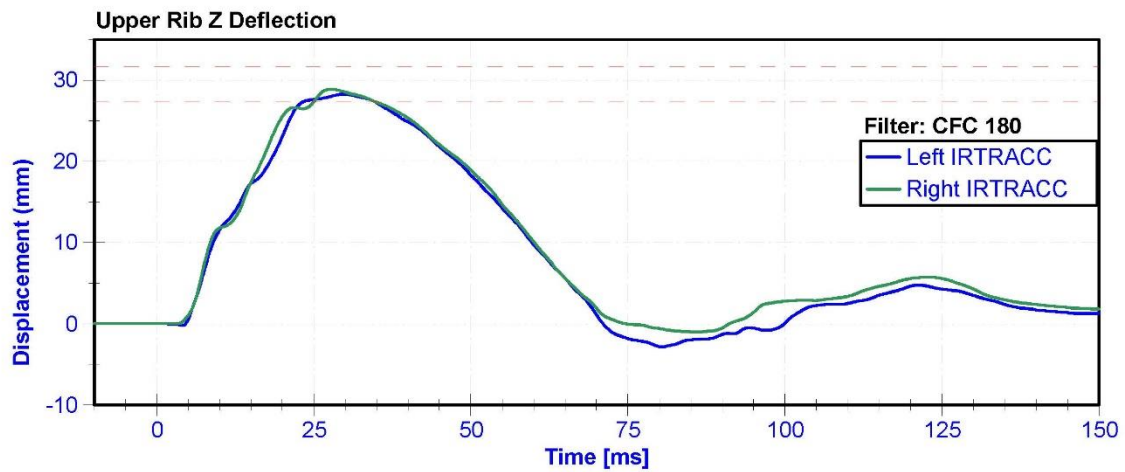
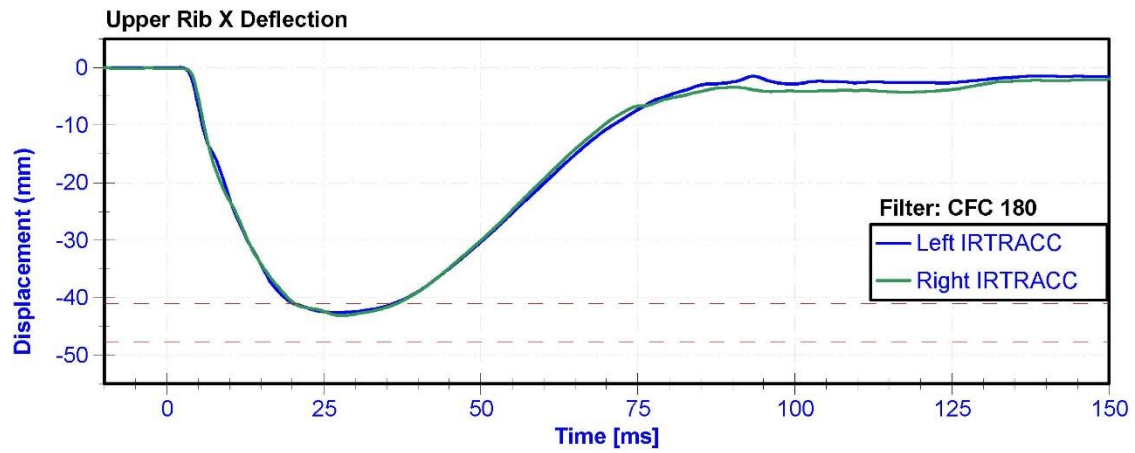
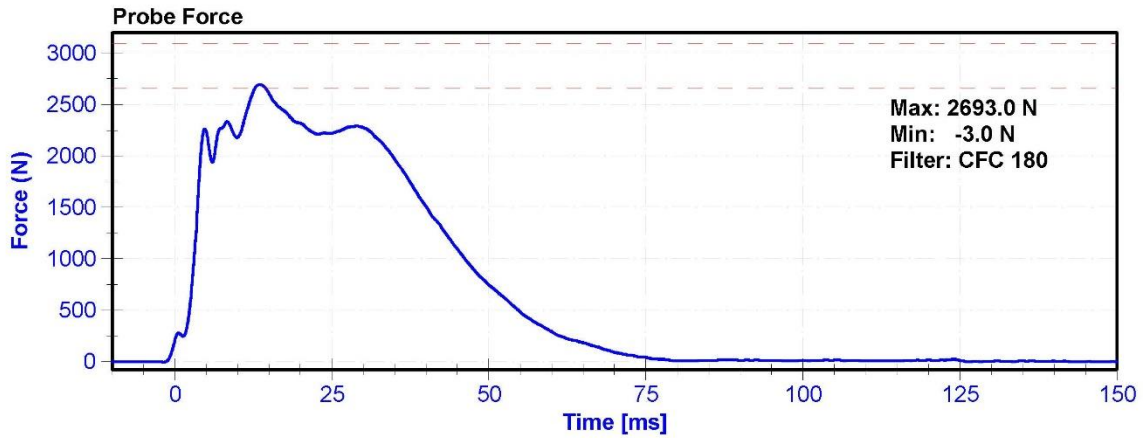
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	D09798	Laboratory Supervisor	M. Goehle

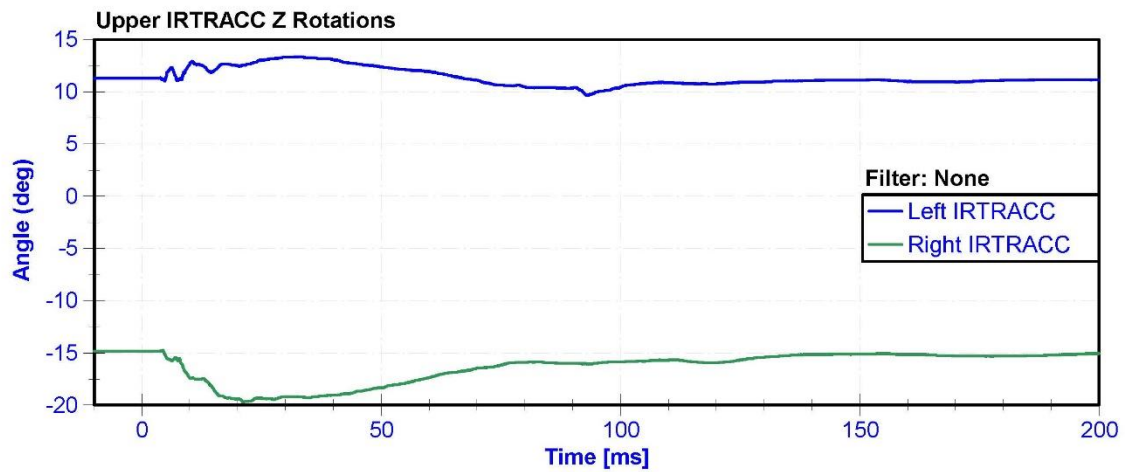
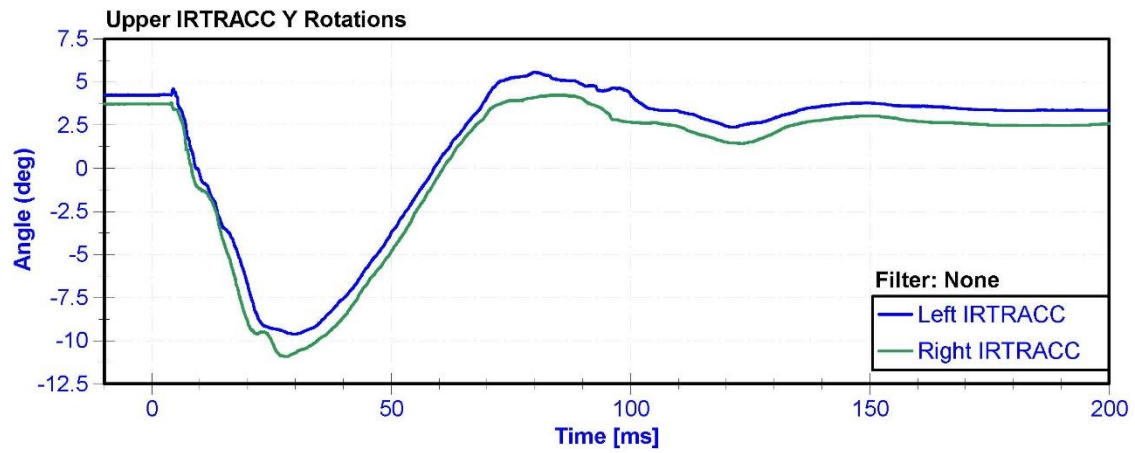
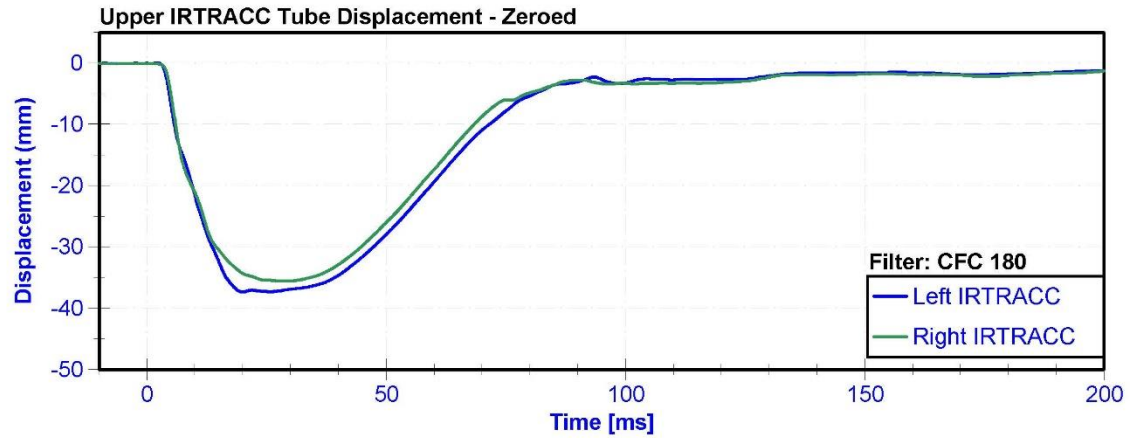
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.9	Pass
Humidity	10	70	%	56.2	Pass
Impact Velocity	4.25	4.35	m/s	4.299	Pass
Probe Force	2,654	3,092	N	2693.0	Pass
Upper Left X Rib Deflection	-47.6	-41.0	mm	-42.54	Pass
Upper Right X Rib Deflection	-47.6	-41.0	mm	-43.09	Pass
Left/Right X Rib Deviation	-7.00	7.00	mm	0.559	Pass
Upper Left Z Rib Deflection	27.3	31.7	mm	28.26	Pass
Upper Right Z Rib Deflection	27.3	31.7	mm	28.88	Pass
Left/Right Z Rib Deviation	-7.00	7.00	mm	-0.628	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Upper Left IRTRACC	Humanetics IF-364-C-R3	DS-DQ2255	4/8/2015	4/7/2016
Upper Left Y Potentiometer	Sfernice 9945	DS-DM4779	4/8/2015	4/7/2016
Upper Left Z Potentiometer	Sfernice 9945	DS-DM4778	4/8/2015	4/7/2016
Upper Right IRTRACC	Humanetics IF-364-C-R3	DS-DQ2254	4/8/2015	4/7/2016
Upper Right Y Potentiometer	Sfernice 9945	DS-DM4774	4/8/2015	4/7/2016
Upper Right Z Potentiometer	Sfernice 9945	DS-DM4775	4/8/2015	4/7/2016





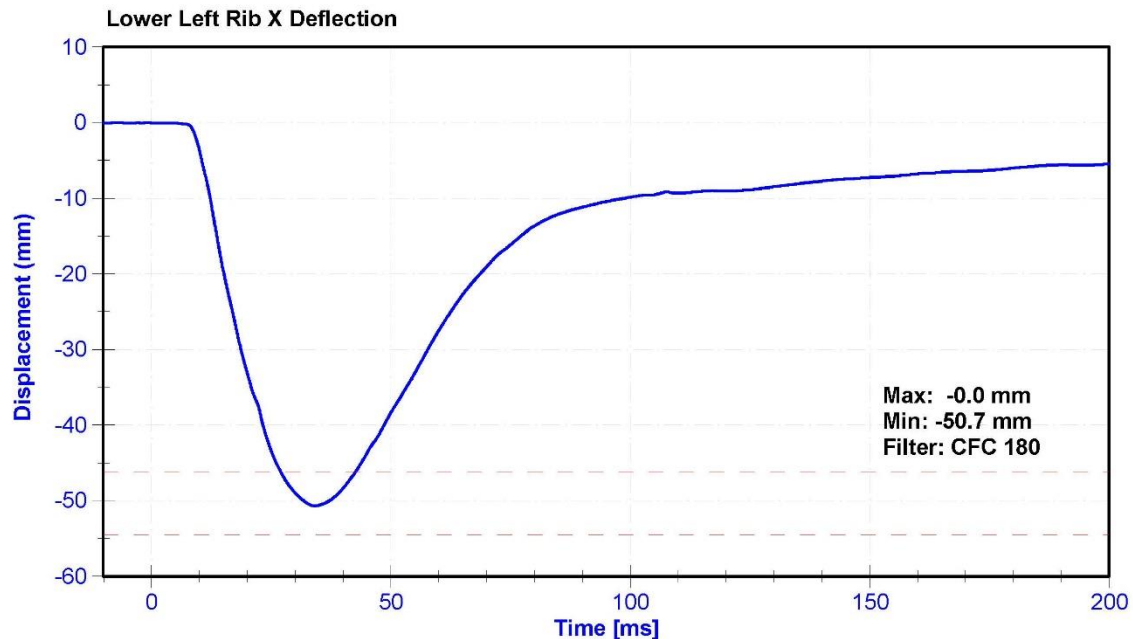
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

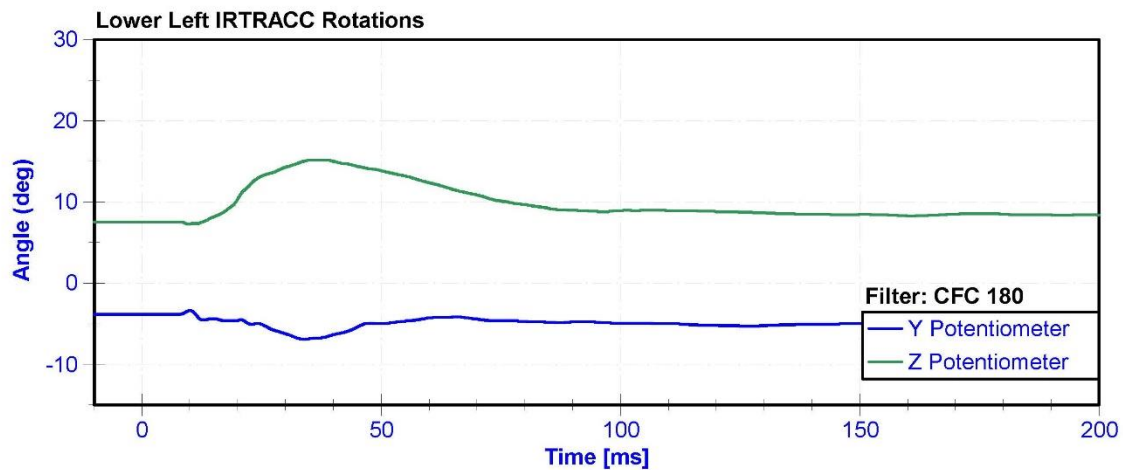
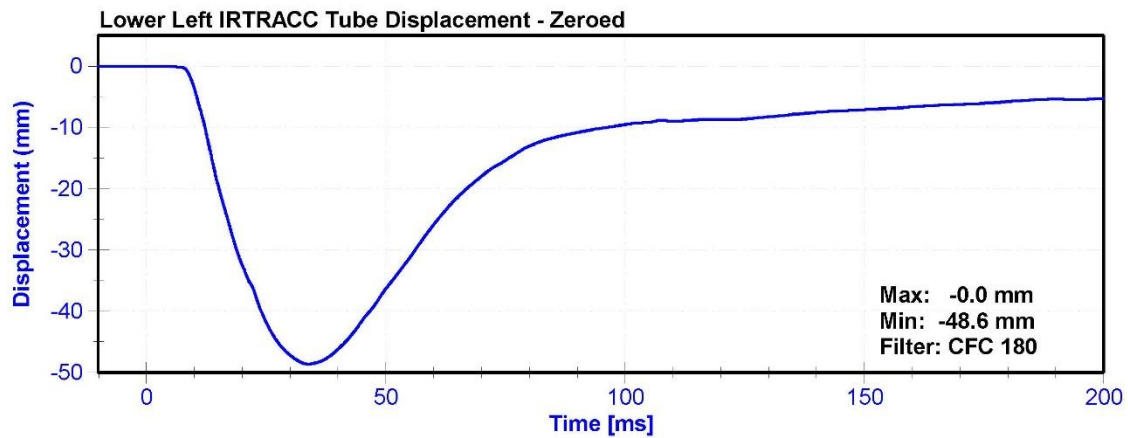
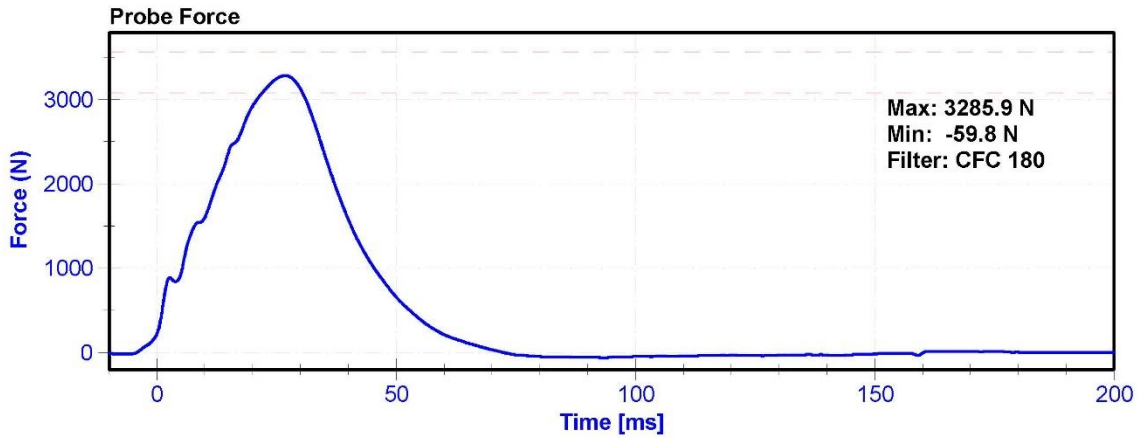
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	55.6	Pass
Impact Velocity	4.25	4.35	m/s	4.278	Pass
Peak Left X Rib Deflection	-54.5	-46.2	mm	-50.70	Pass
Probe Force during Peak Deflection	3083	3571	N	3285.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Lower Left IRTACC	Humanetics IF-364-C-R3	DS-DK3866	4/8/2015	4/7/2016
Lower Left Y Potentiometer	Sfernice 9945	DS-DJ5455	4/8/2015	4/7/2016
Lower Left Z Potentiometer	Sfernice 9945	DS-DJ5454	4/8/2015	4/7/2016





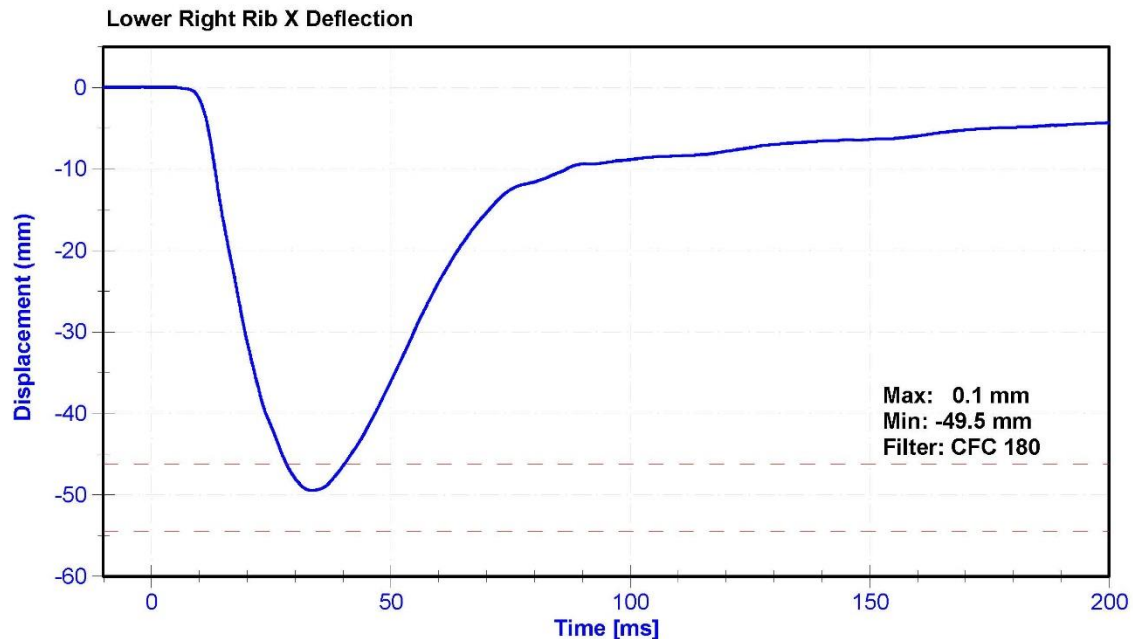
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

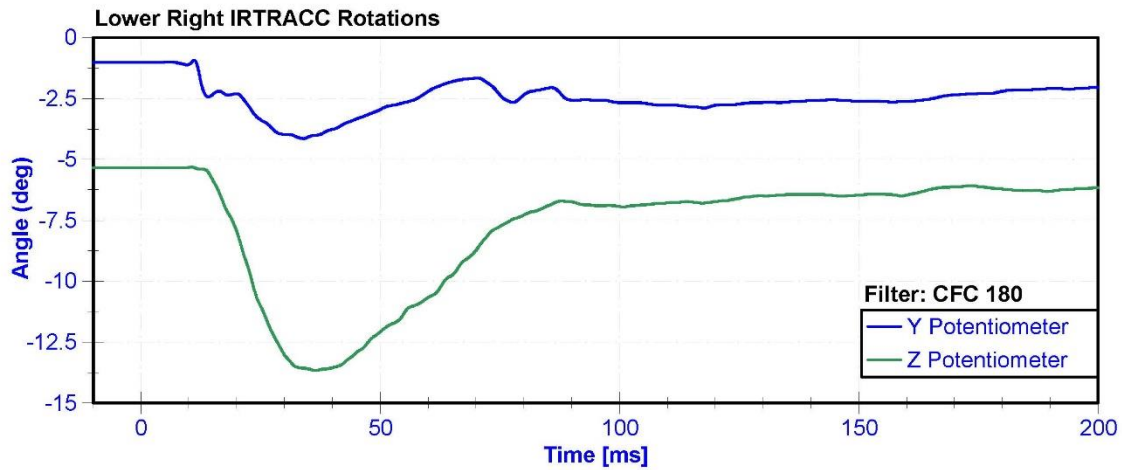
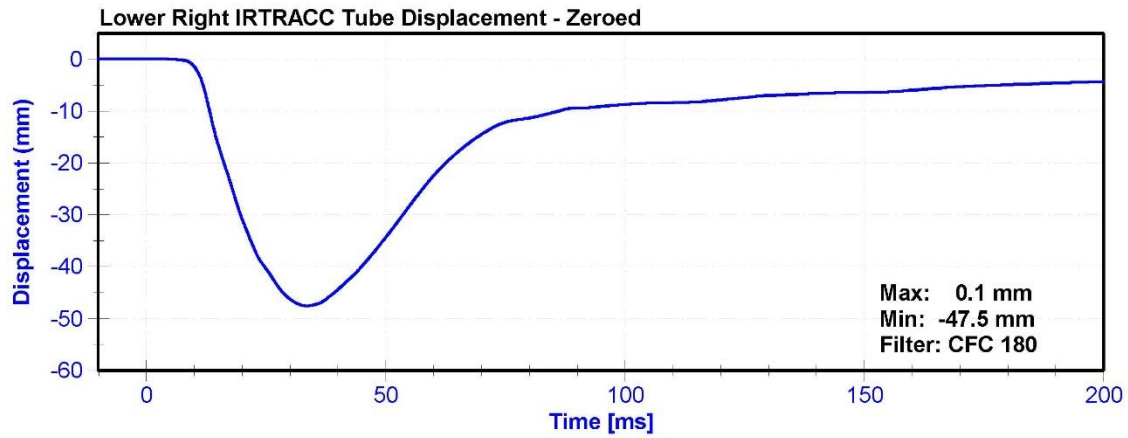
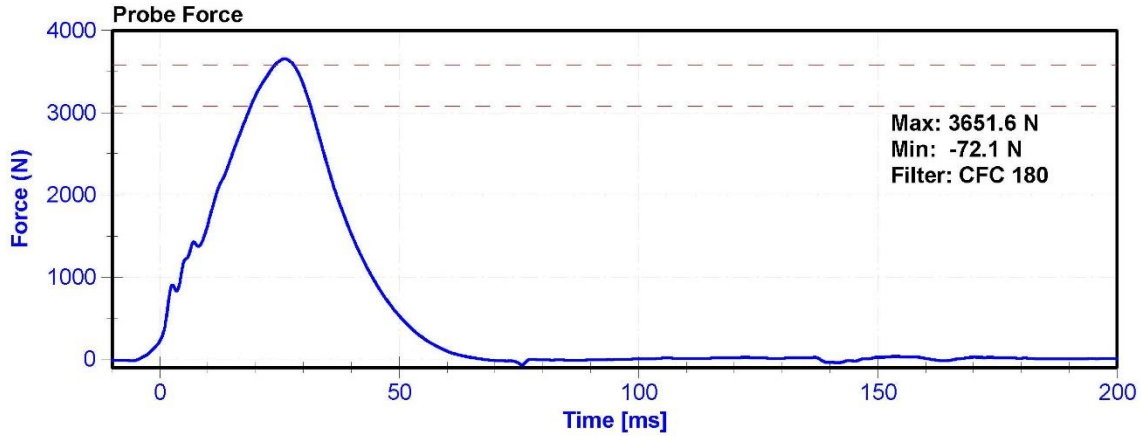
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	60.6	Pass
Impact Velocity	4.25	4.35	m/s	4.269	Pass
Peak Right X Rib Deflection	-54.5	-46.2	mm	-49.47	Pass
Probe Force during Peak Deflection	3083	3571	N	3560.93	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Lower Right IRTACC	Humanetics IF-364-C-R3	DS-DK3865	4/8/2015	4/7/2016
Lower Right Y Potentiometer	Sfernice 9945	DS-DJ5453	4/8/2015	4/7/2016
Lower Right Z Potentiometer	Sfernice 9945	DS-DJ5452	4/8/2015	4/7/2016





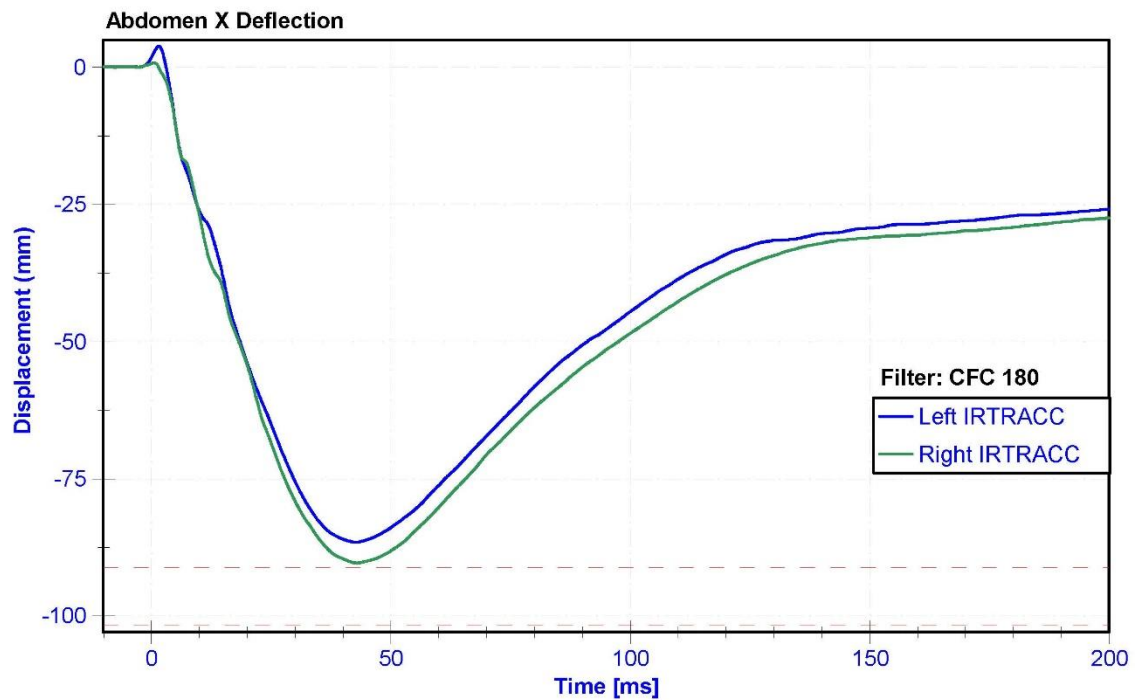
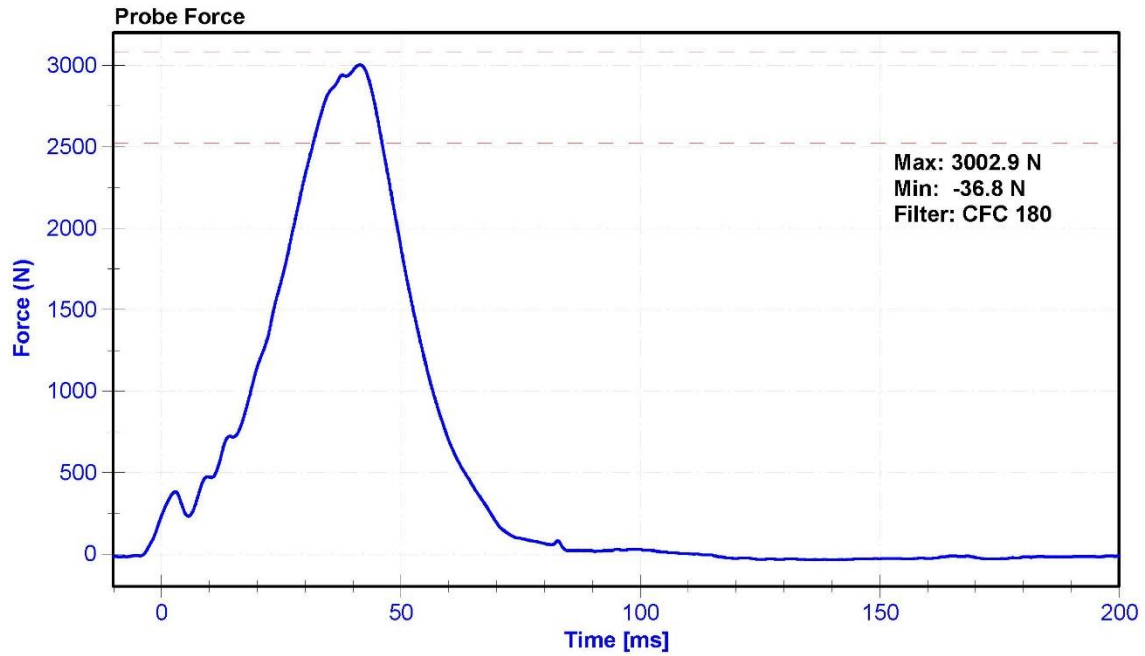
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

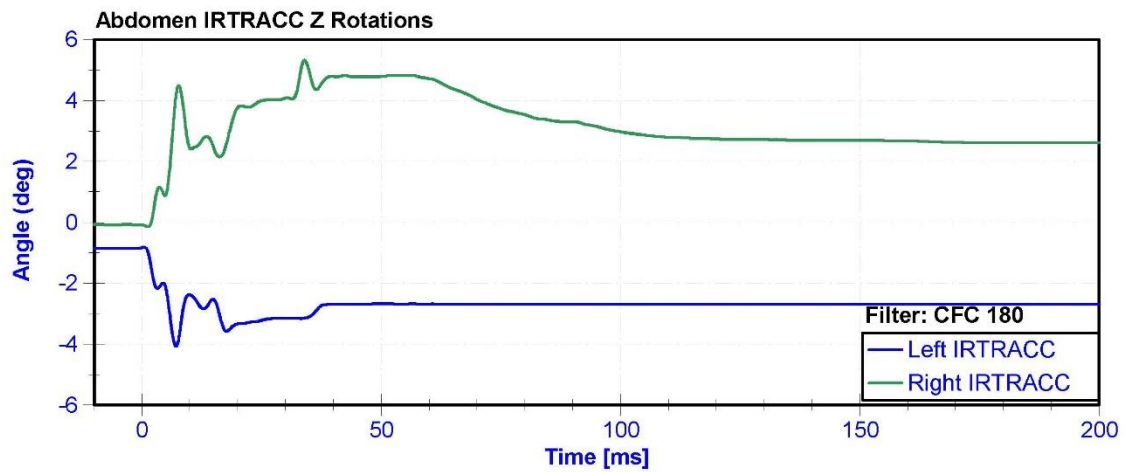
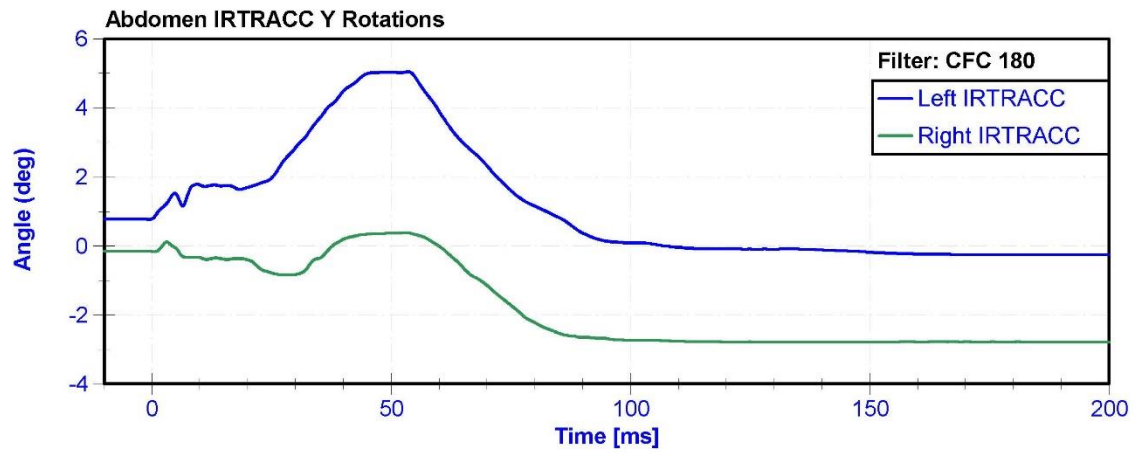
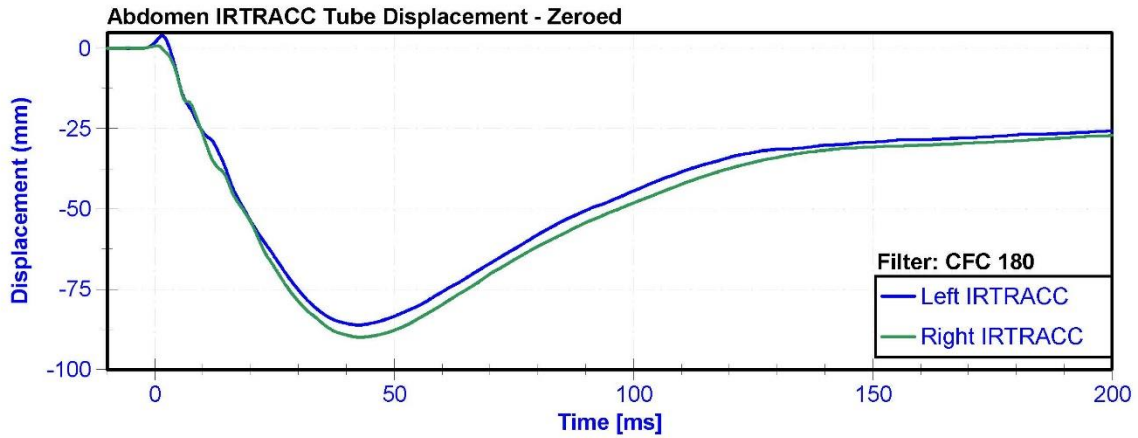
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	31.1	Pass
Impact Velocity	3.25	3.35	m/s	3.304	Pass
Probe Force	2,523	3,083	N	3002.9	Pass
Left Abdomen X Deflection	-101.6	-91.2	mm	-86.54	Fail
Right Abdomen X Deflection	-101.6	-91.2	mm	-90.32	Fail
Left/Right X Deviation	-7.00	7.00	mm	3.781	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Abdomen Left IRTRACC	Humanetics 9910	DS-183	3/9/2015	3/8/2016
Abdomen Left Y Potentiometer	Sfernice 9945	DS-DJ5443	5/18/2015	5/17/2016
Abdomen Left Z Potentiometer	Sfernice 9945	DS-DJ5444	5/18/2015	5/17/2016





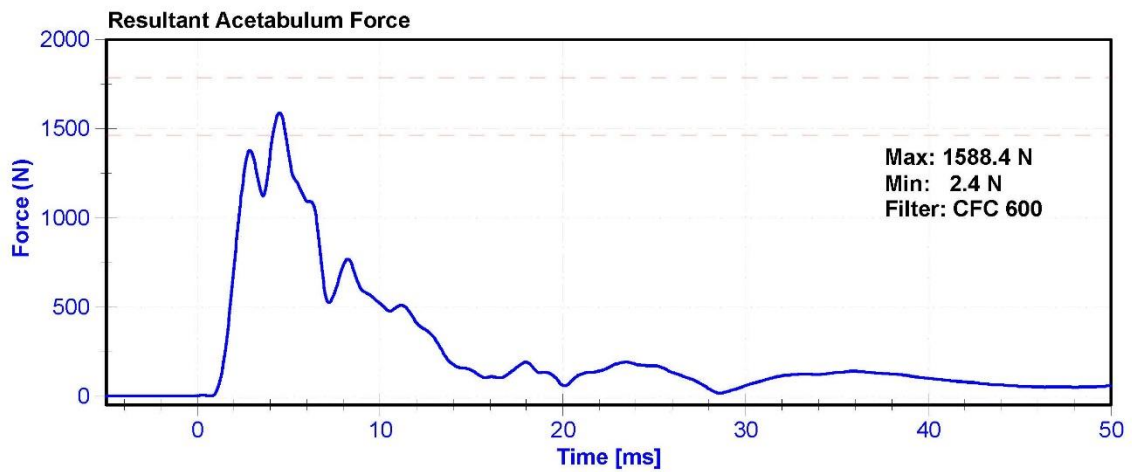
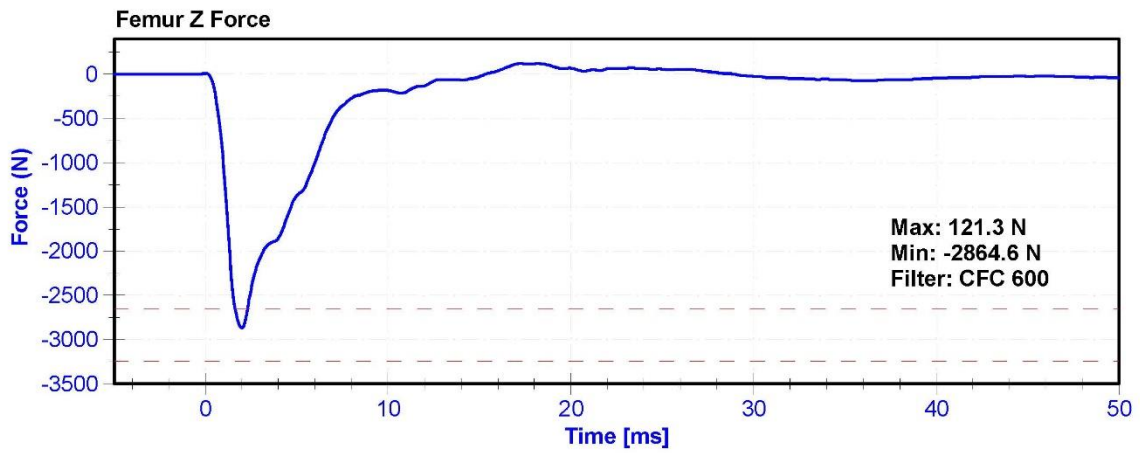
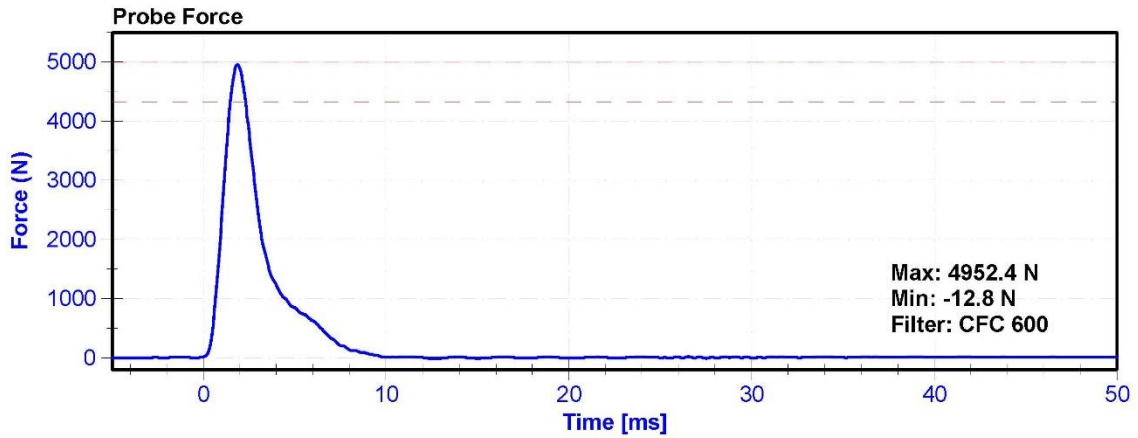
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	26.9	Pass
Impact Velocity	2.55	2.65	m/s	2.592	Pass
Probe Force	4,318	4,989	N	4952.4	Pass
Peak Femur Z Force	-3,241	-2,652	N	-2864.63	Pass
Peak Resultant Acetabulum Force	1,462	1,787	N	1588.39	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Left Femur Load Cell	Humanetics W50-71010	LC-DK0842 Fz	2/11/2015	2/11/2016
Left Acetabulum Load Cell	Humanetics 10530JI4	LC-DM1945 Fx	3/7/2015	3/6/2016



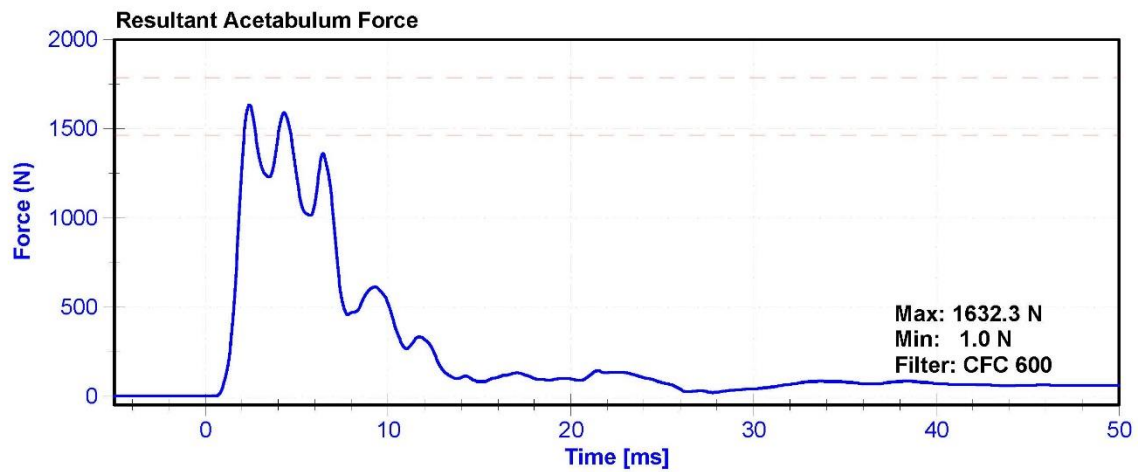
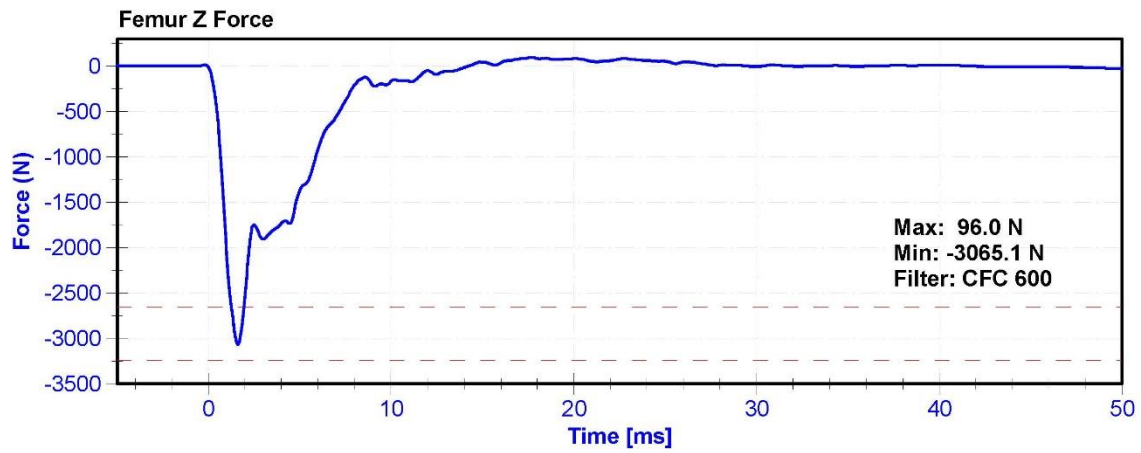
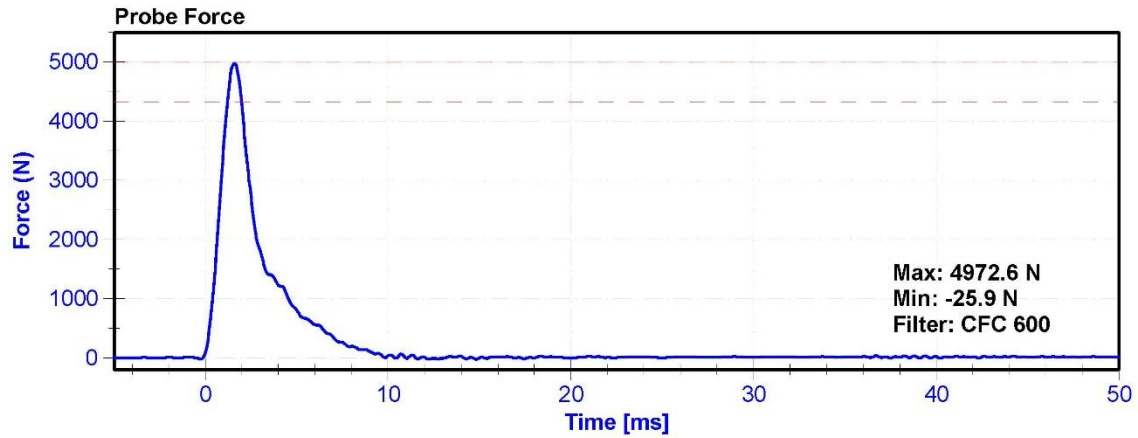
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	28.1	Pass
Impact Velocity	2.55	2.65	m/s	2.572	Pass
Probe Force	4,318	4,989	N	4972.6	Pass
Peak Femur Z Force	-3,241	-2,652	N	-3065.07	Pass
Peak Resultant Acetabulum Force	1,462	1,787	N	1632.26	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Left Femur Load Cell	Humanetics W50-71010	LC-DK3608 Fz	3/3/2015	3/2/2016
Left Acetabulum Load Cell	Humanetics 10670J14	LC-DL9552 Fx	3/7/2015	3/6/2016



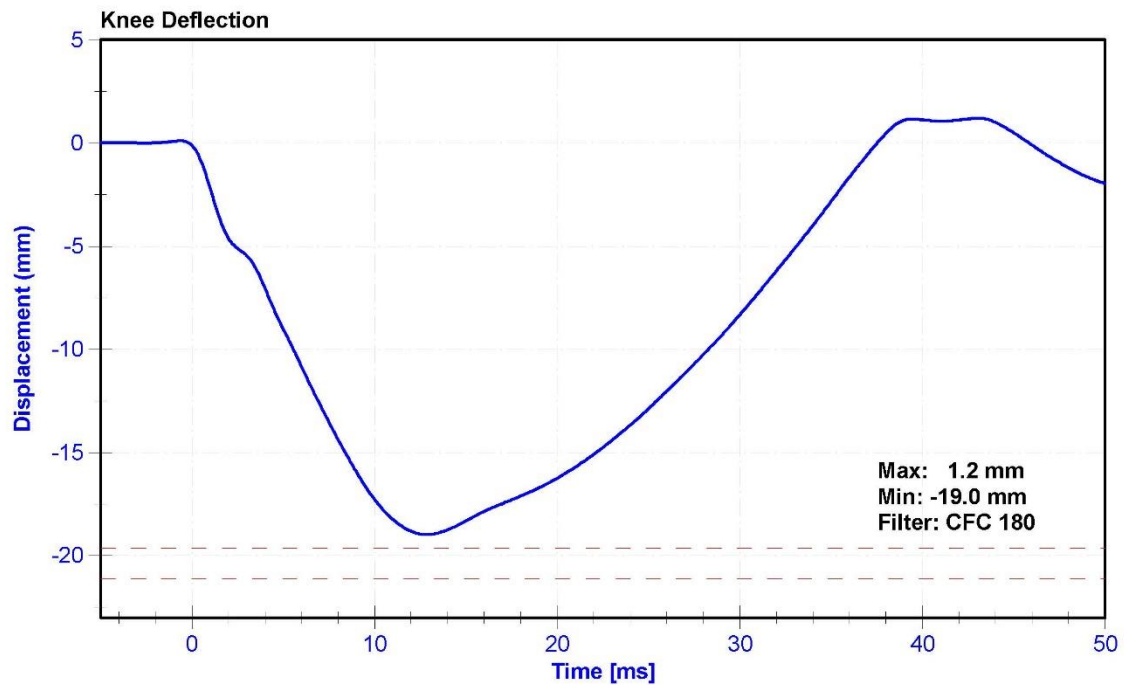
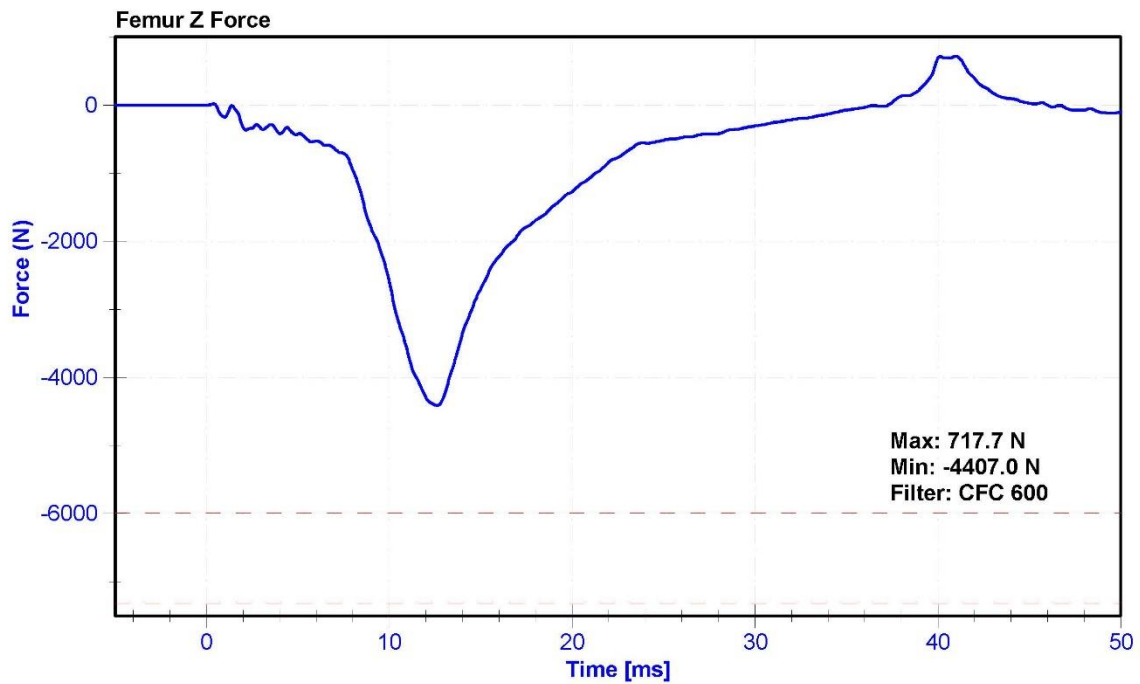
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	36.4	Pass
Impact Velocity	2.15	2.25	m/s	2.223	Pass
Peak Femur Z Force	-7,317	-5,987	N	-4407.0	Fail
Knee Deflection at Peak Force	-21.12	-19.62	mm	-18.97	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Femur Load Cell	Humanetics W50-71010	LC-DK0842 Fz	2/11/2015	2/11/2016
Knee Potentiometer	Space Age 150-0121V	DS-13073811	6/24/2015	6/23/2016



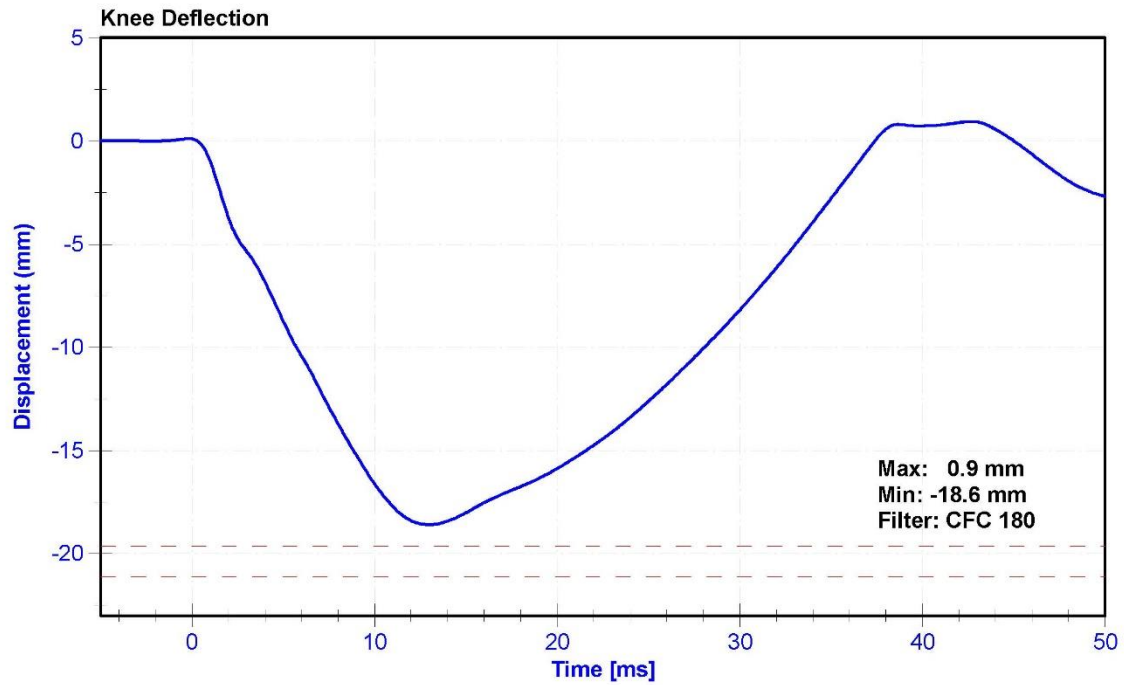
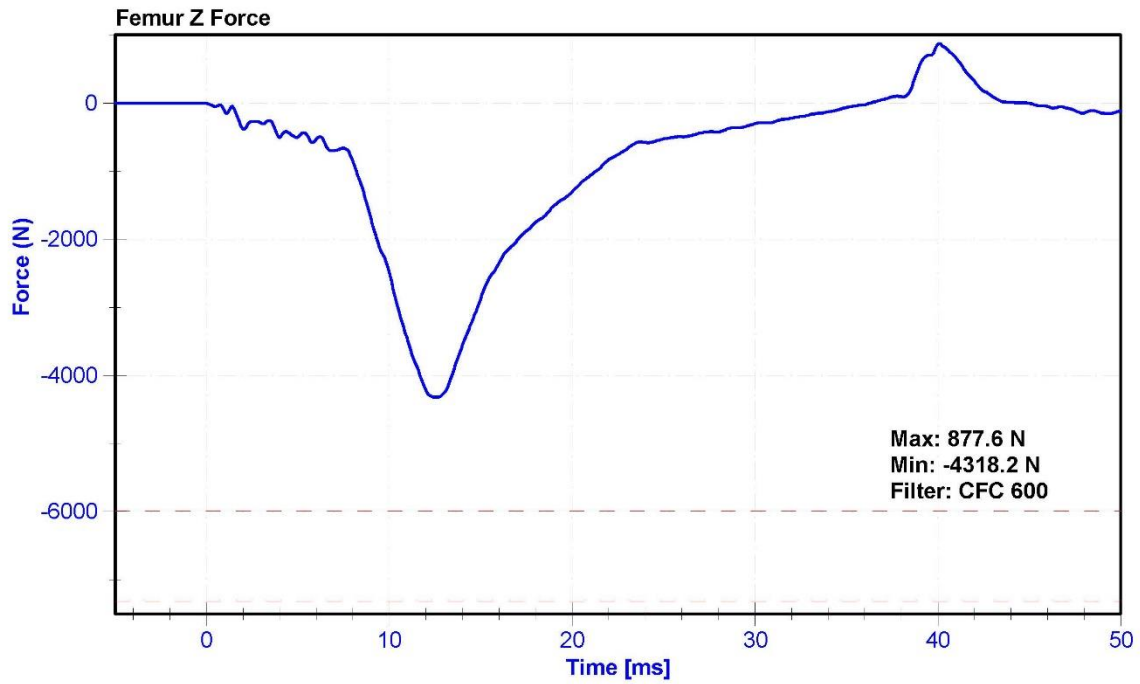
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	39.3	Pass
Impact Velocity	2.15	2.25	m/s	2.210	Pass
Peak Femur Z Force	-7,317	-5,987	N	-4318.2	Fail
Knee Deflection at Peak Force	-21.12	-19.62	mm	-18.59	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Femur Load Cell	Humanetics W50-71010	LC-DK3608 Fz	3/3/2015	3/2/2016
Knee Potentiometer	Space Age 150-0121V	DS-13073814	6/24/2015	6/23/2016



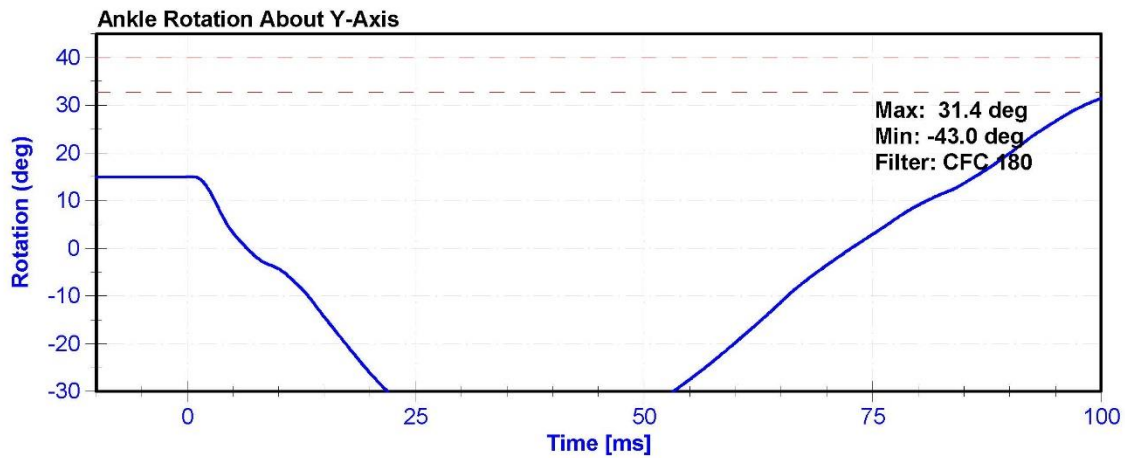
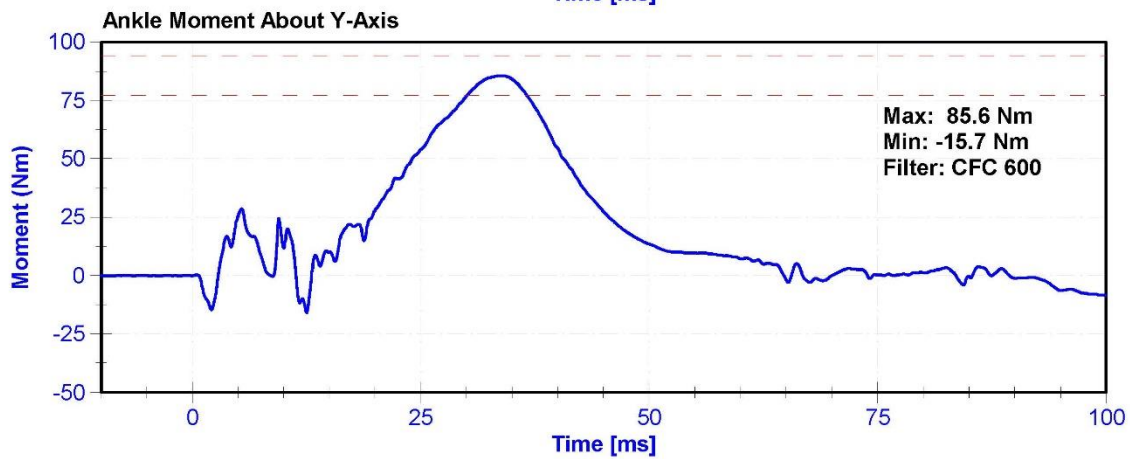
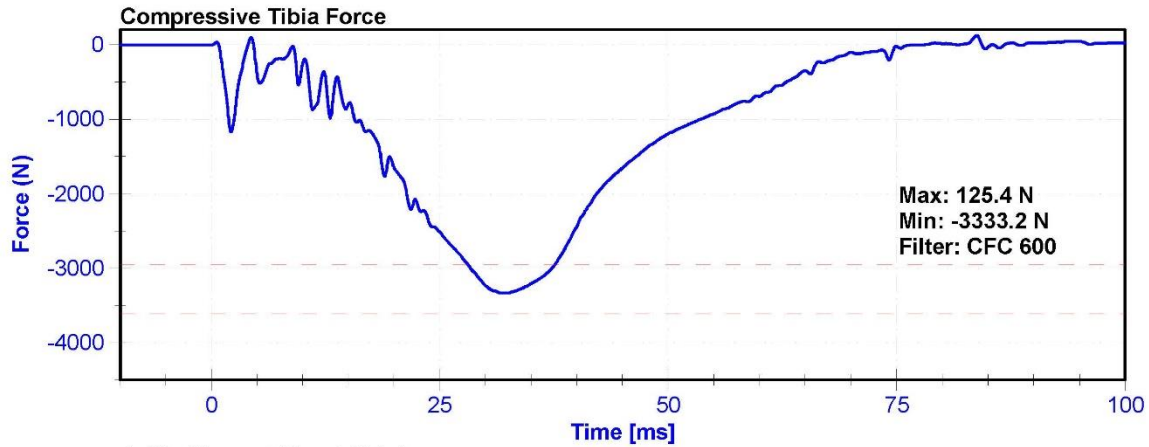
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	53.7	Pass
Velocity	4.9	5.1	m/s	4.885	Pass
Lower Tibia Compressive Force	-3,613	-2,956	N	-3333.2	Pass
Peak Moment about Y-Axis	77.1	94.2	Nm	85.56	Pass
Peak Rotation about Y-Axis	32.7	39.9	deg	35.62	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 9329J	LC-DQ9685 Fz	5/5/2015	5/4/2016
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-ANKL005	5/27/2015	5/26/2016



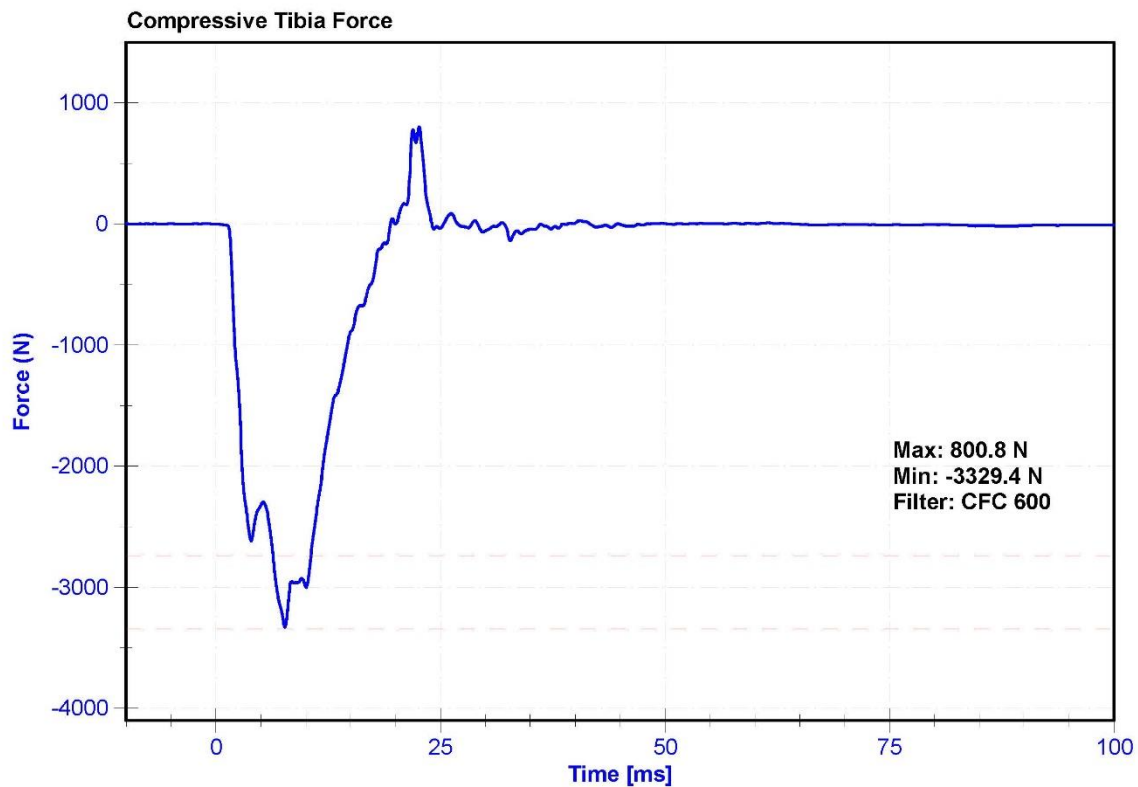
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	50.4	Pass
Velocity	3.9	4.1	m/s	3.990	Pass
Lower Tibia Compressive Force	-3,346	-2,738	N	-3329.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 9329J	LC-DQ9685 Fz	5/5/2015	5/4/2016



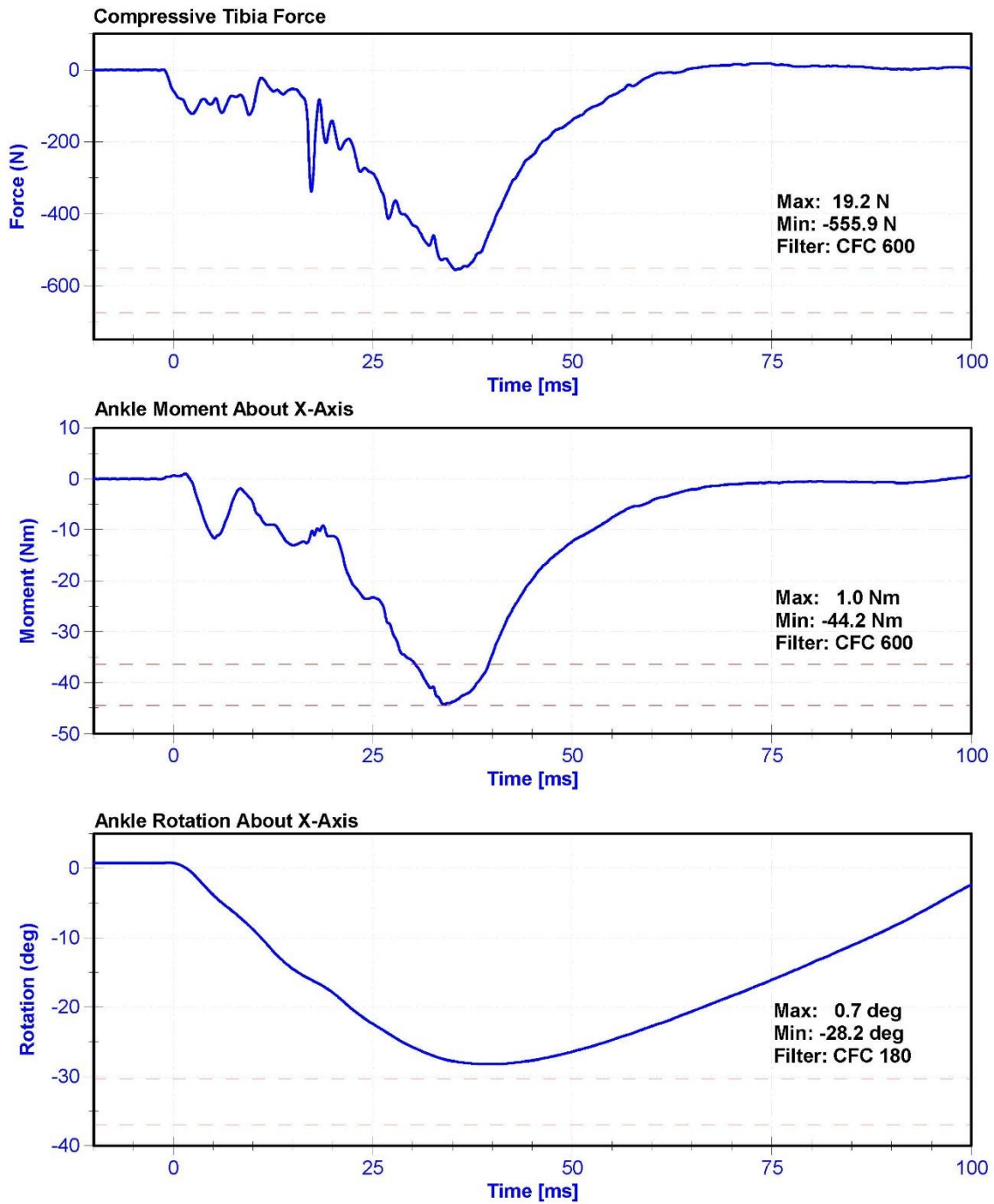
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	D09798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	50.4	Pass
Velocity	1.9	2.1	m/s	1.934	Pass
Lower Tibia Compressive Force	-675	-552	N	-555.9	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-44.23	Pass
Peak Rotation about X-Axis	-37.0	-30.3	deg	-28.24	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 9329J	LC-DQ9685 Fz	5/5/2015	5/4/2016
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-ANKL004	5/27/2015	5/26/2016



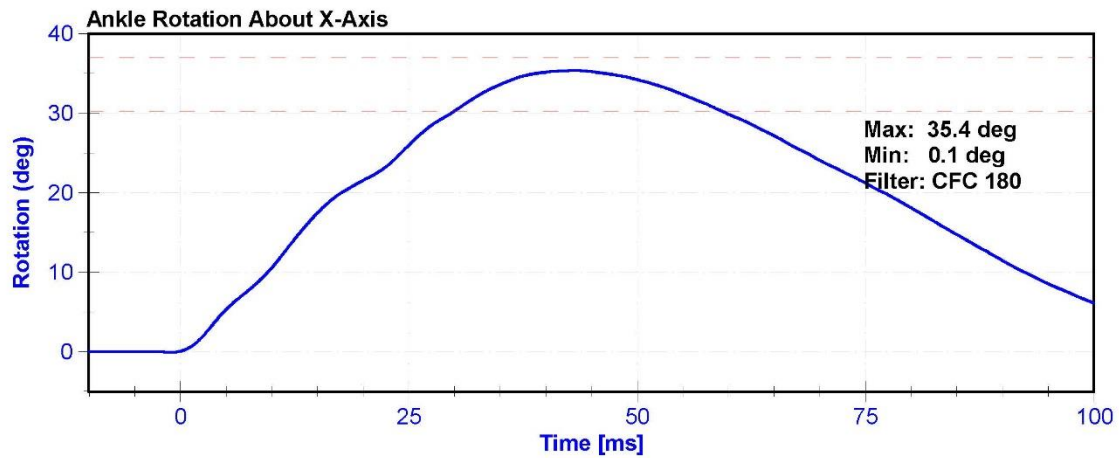
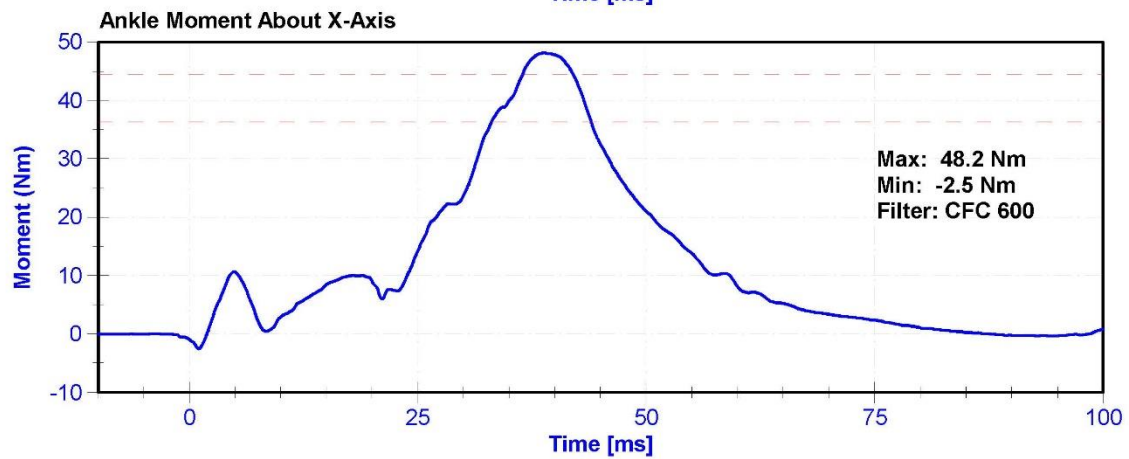
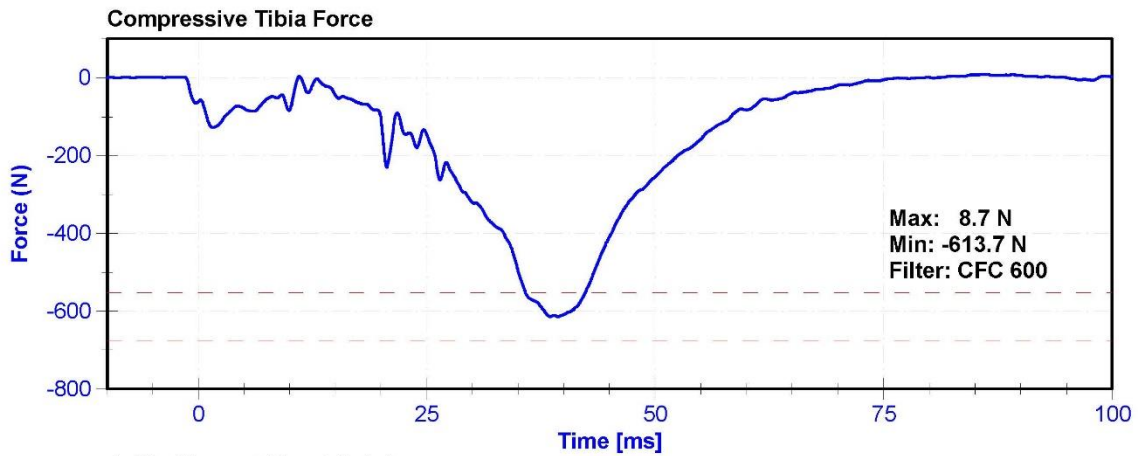
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	50.7	Pass
Velocity	1.9	2.1	m/s	1.959	Pass
Lower Tibia Compressive Force	-675	-552	N	-613.7	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	48.15	Fail
Peak Rotation about X-Axis	30.3	37.0	deg	35.35	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 9329J	LC-DQ9685 Fz	5/5/2015	5/4/2016
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-ANKL004	5/27/2015	5/26/2016



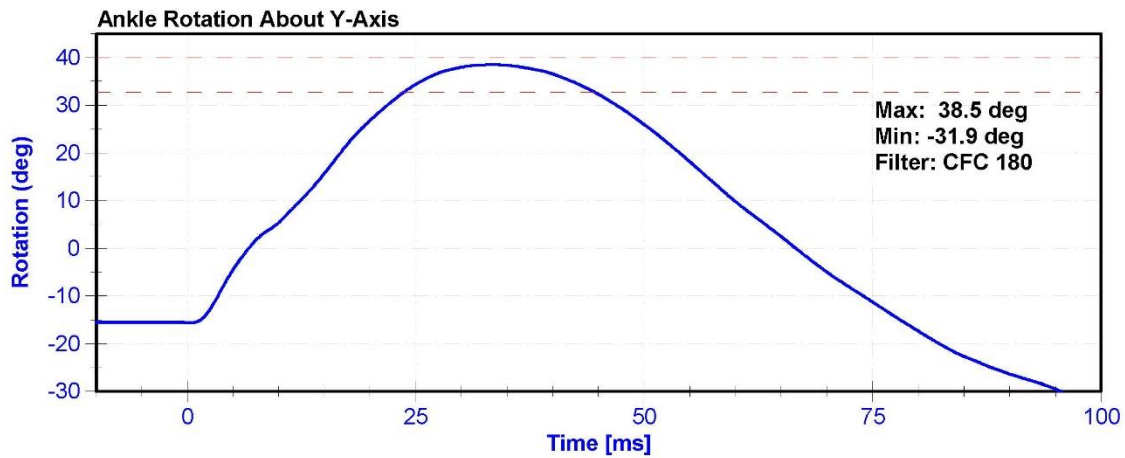
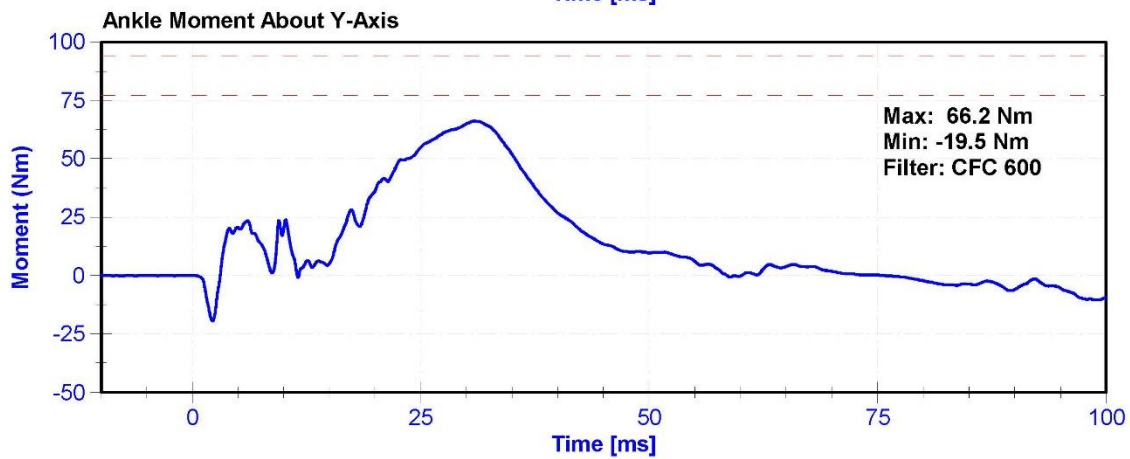
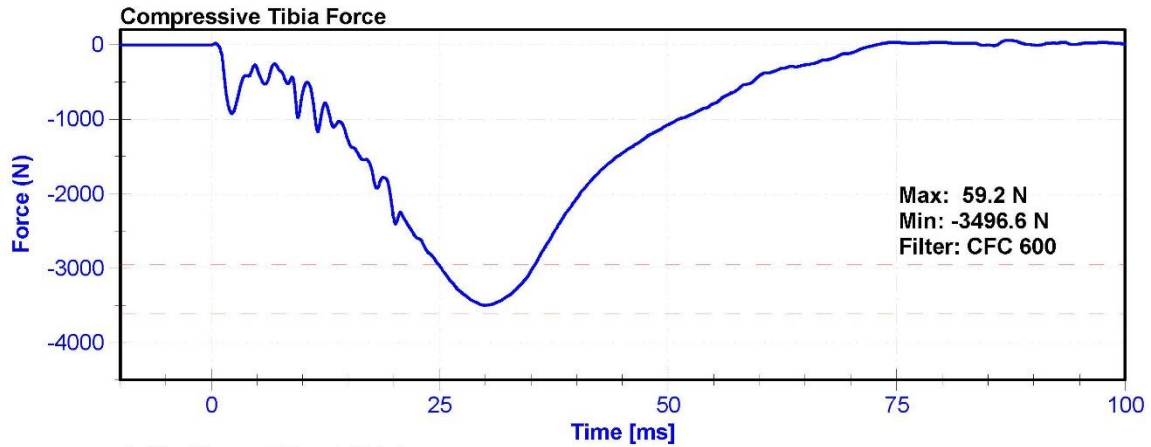
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	D09798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	29.9	Pass
Velocity	4.9	5.1	m/s	4.948	Pass
Lower Tibia Compressive Force	-3,613	-2,956	N	-3496.6	Pass
Peak Moment about Y-Axis	77.1	94.2	Nm	66.15	Fail
Peak Rotation about Y-Axis	32.7	39.9	deg	38.51	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 9329J	LC-DQ9684 Fz	4/13/2015	4/12/2016
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-ANKL002	4/2/2015	4/1/2016



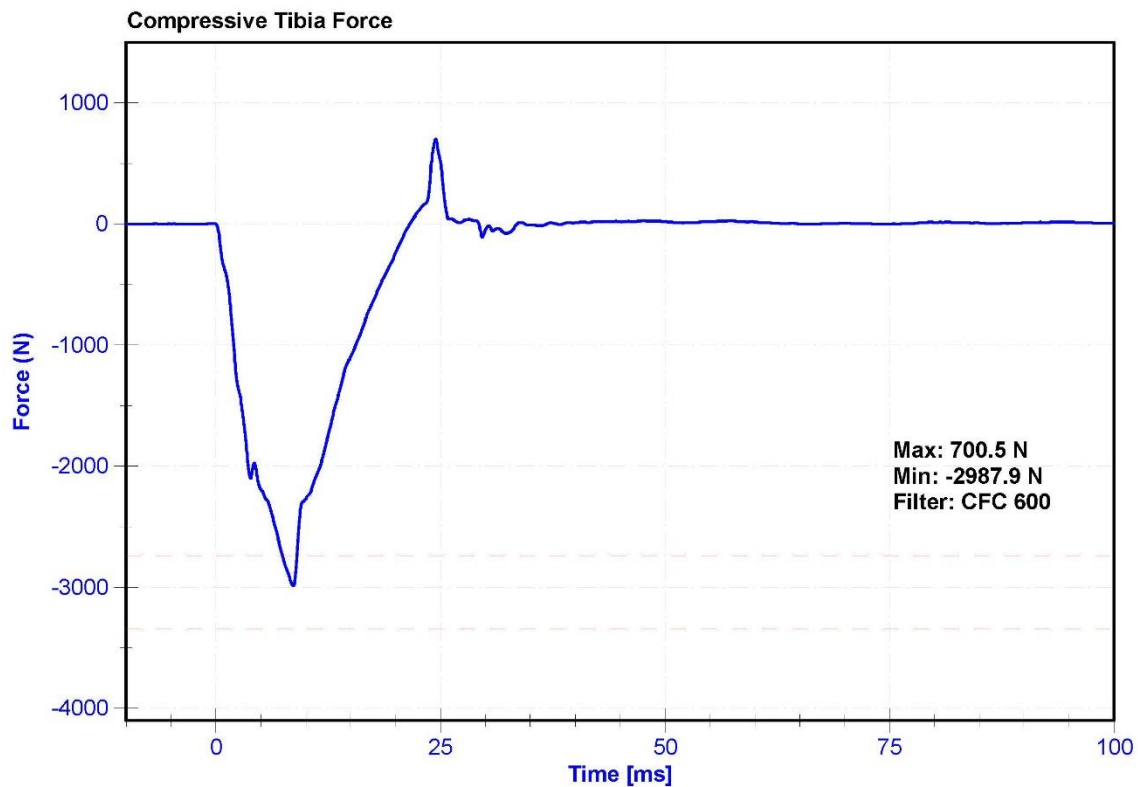
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	28.2	Pass
Velocity	3.9	4.1	m/s	3.990	Pass
Lower Tibia Compressive Force	-3,346	-2,738	N	-2987.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 9329J	LC-DQ9684 Fz	4/13/2015	4/12/2016



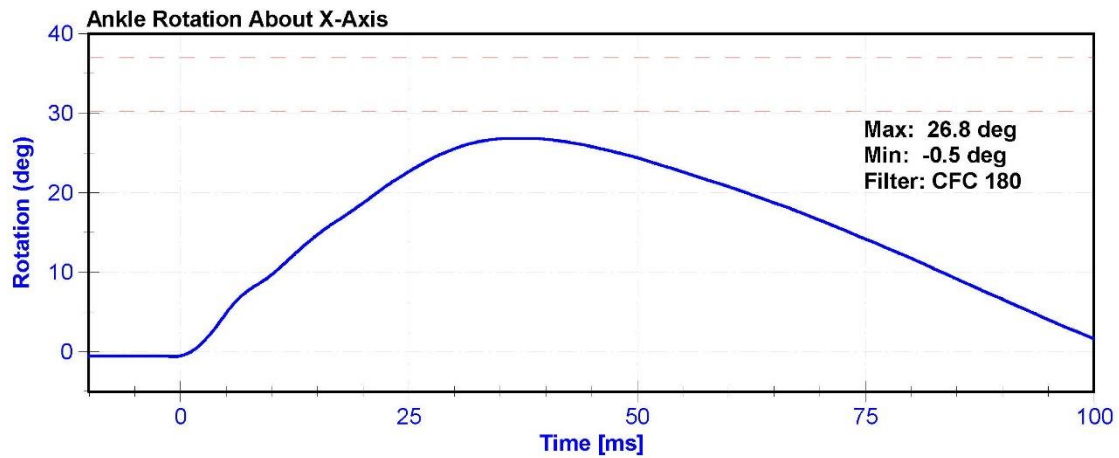
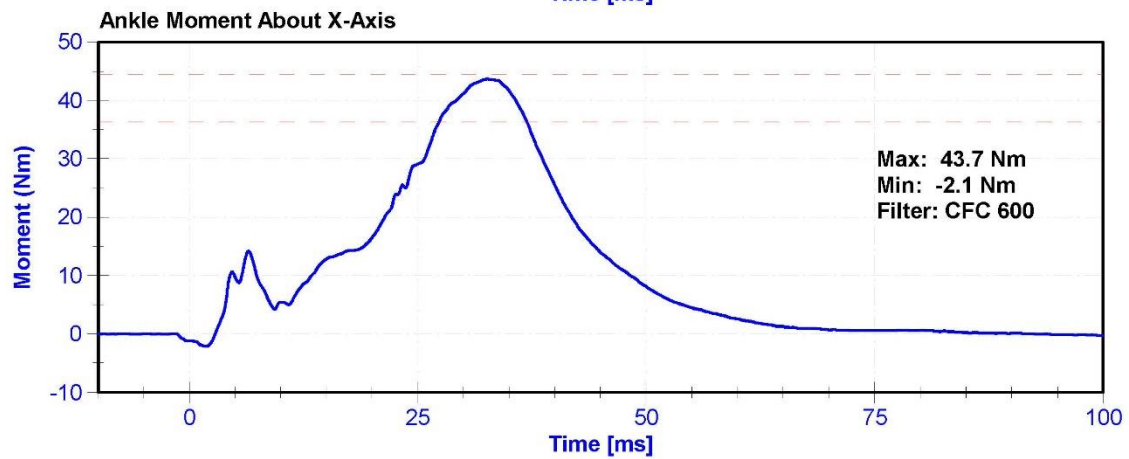
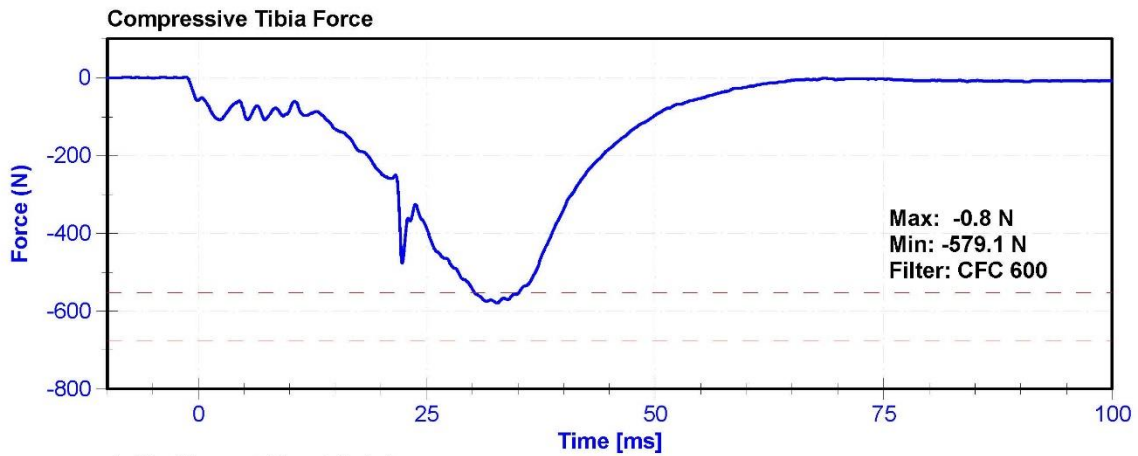
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	30.1	Pass
Velocity	1.9	2.1	m/s	1.924	Pass
Lower Tibia Compressive Force	-675	-552	N	-579.1	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	43.69	Pass
Peak Rotation about X-Axis	30.3	37.0	deg	26.85	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 9329J	LC-DQ9684 Fz	4/13/2015	4/12/2016
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-ANKL001	4/2/2015	4/1/2016



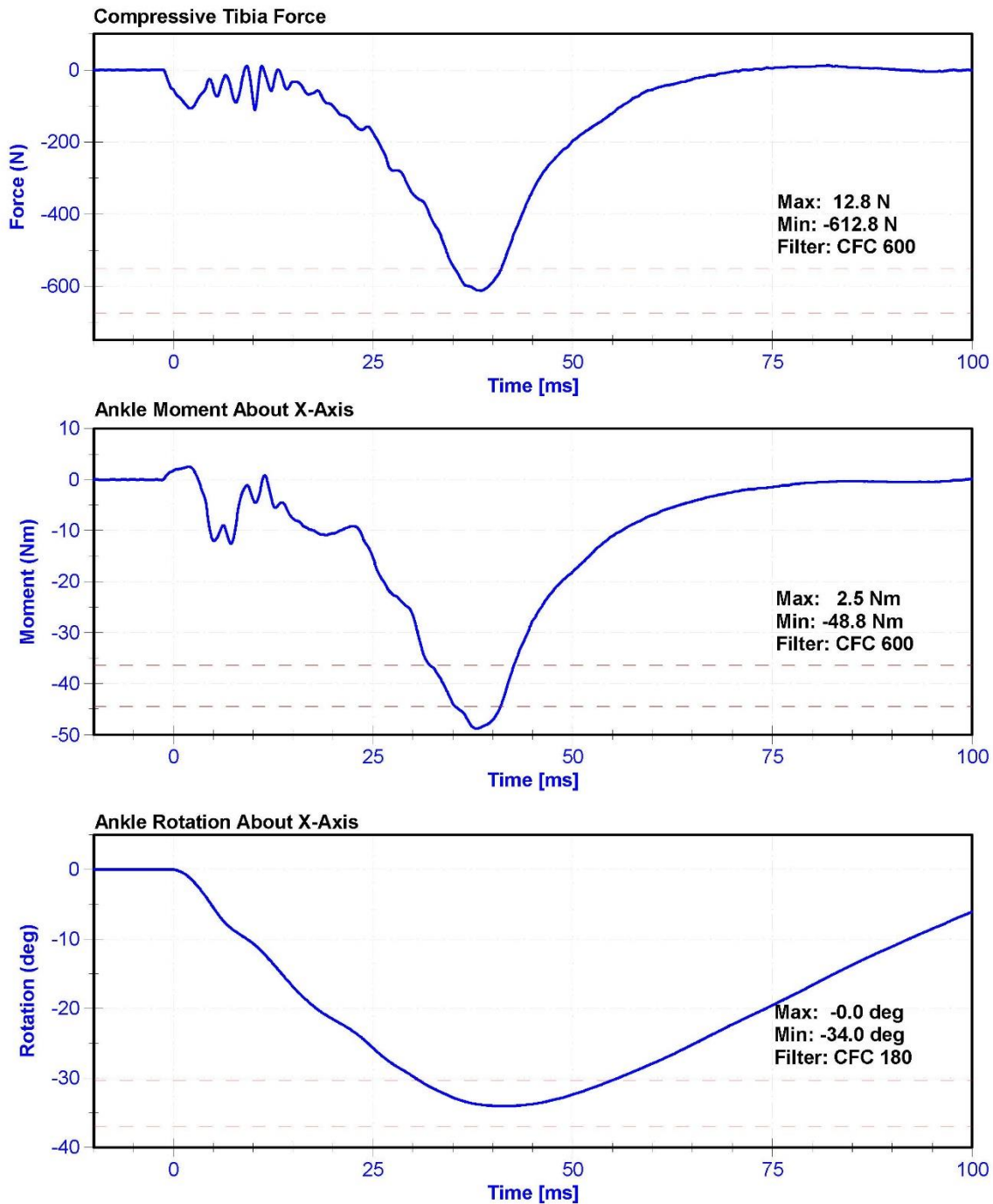
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	29.4	Pass
Velocity	1.9	2.1	m/s	1.934	Pass
Lower Tibia Compressive Force	-675	-552	N	-612.8	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-48.80	Fail
Peak Rotation about X-Axis	-37.0	-30.3	deg	-33.99	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 9329J	LC-DQ9684 Fz	4/13/2015	4/12/2016
Ankle Y Potentiometer	SFERNICE ECO50ESC10	DS-ANKL001	4/2/2015	4/1/2016



50% ADULT MALE THOR DL9207 DUMMY CALIBRATIONS

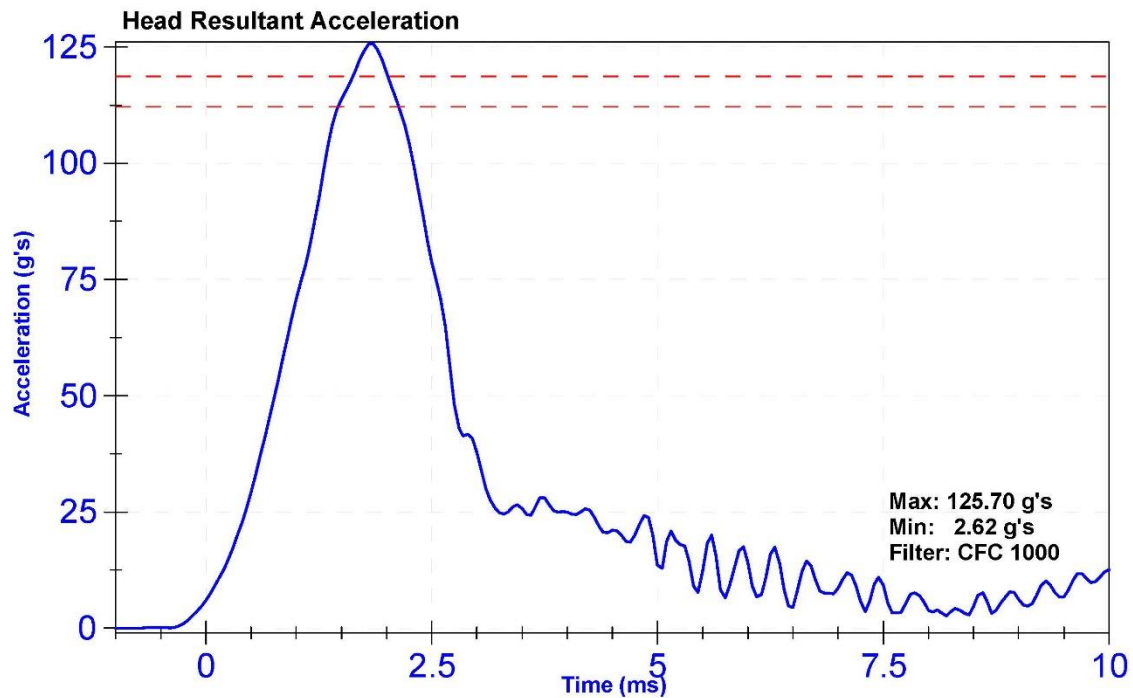
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

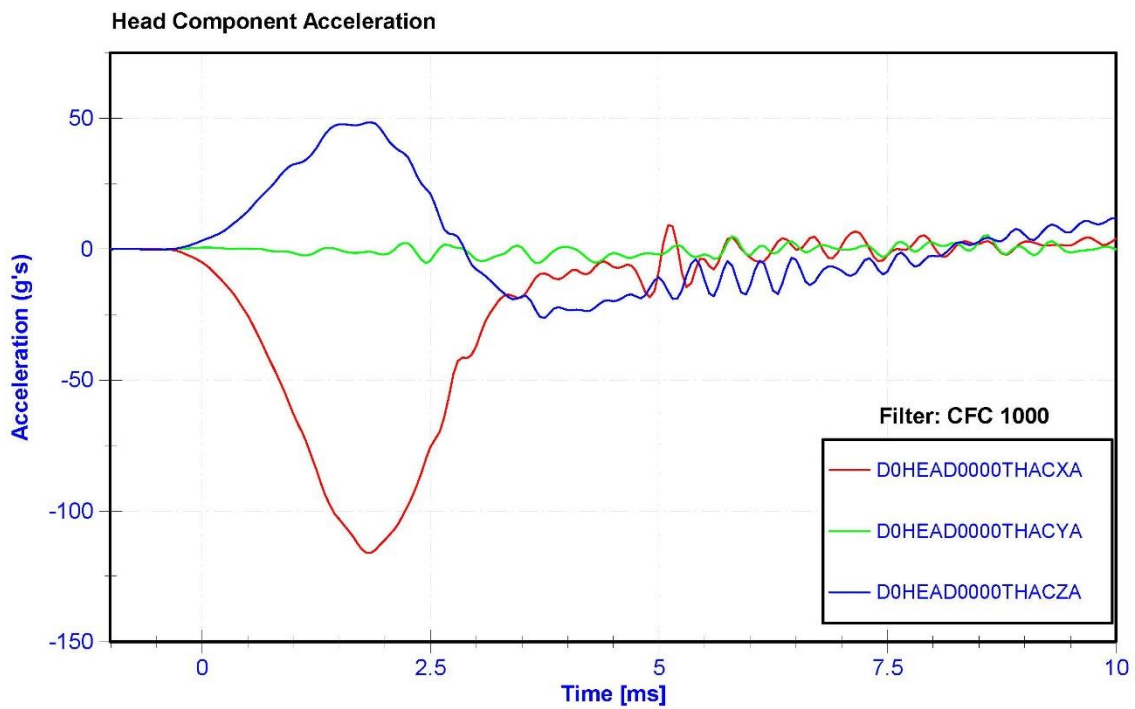
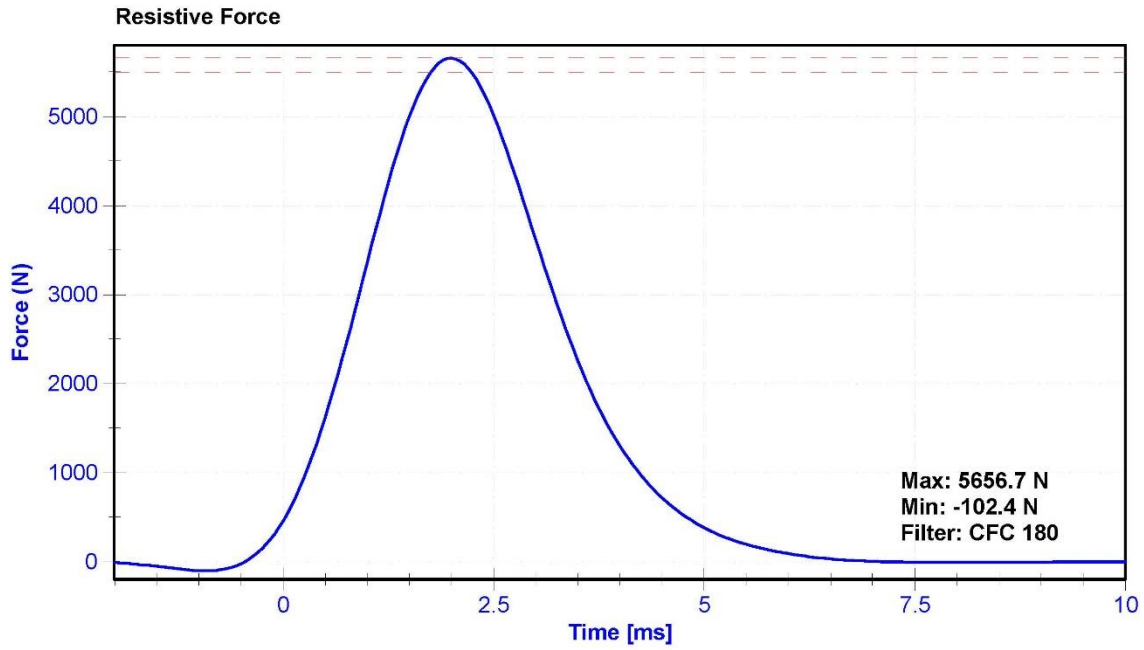
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	37.1	Pass
Impact Velocity	1.95	2.05	m/s	1.988	Pass
Probe Force	5,498	5,660	N	5656.7	Pass
Resultant Acceleration	112.2	118.7	g's	125.70	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Head X Accel	Endevco 7264	AC-P82183	4/3/2015	4/2/2016
Head Y Accel	Endevco 7264	AC-P81384	4/3/2015	4/2/2016
Head Z Accel	Endevco 7264	AC-P81797	4/3/2015	4/2/2016
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016





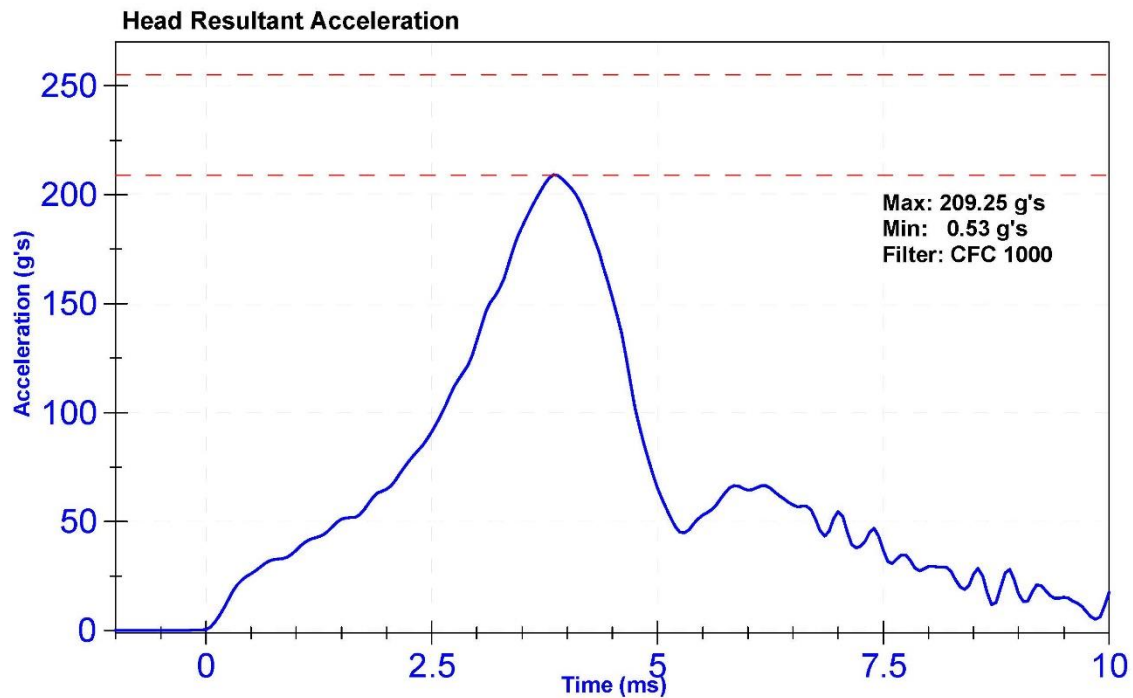
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

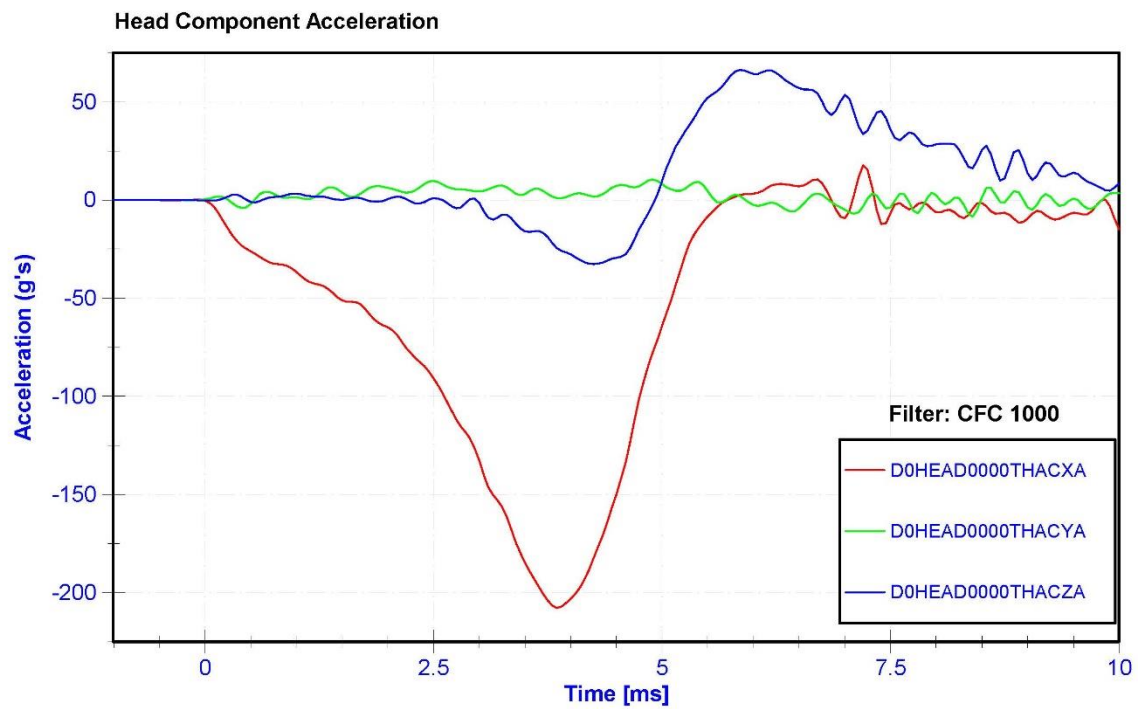
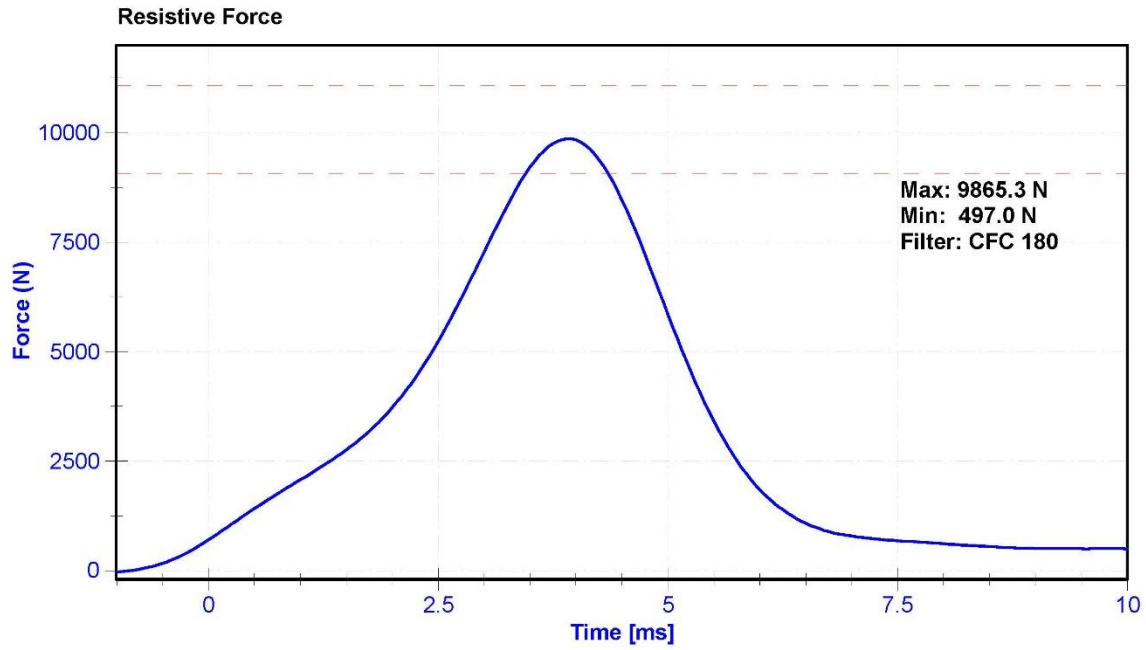
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	42.3	Pass
Impact Velocity	6.68	6.78	m/s	6.728	Pass
Probe Force	9067	11082	N	9865.3	Pass
Resultant Acceleration	209	255	g's	209.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Head X Accel	Endevco 7264	AC-P82183	4/3/2015	4/2/2016
Head Y Accel	Endevco 7264	AC-P81384	4/3/2015	4/2/2016
Head Z Accel	Endevco 7264	AC-P81797	4/3/2015	4/2/2016
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016





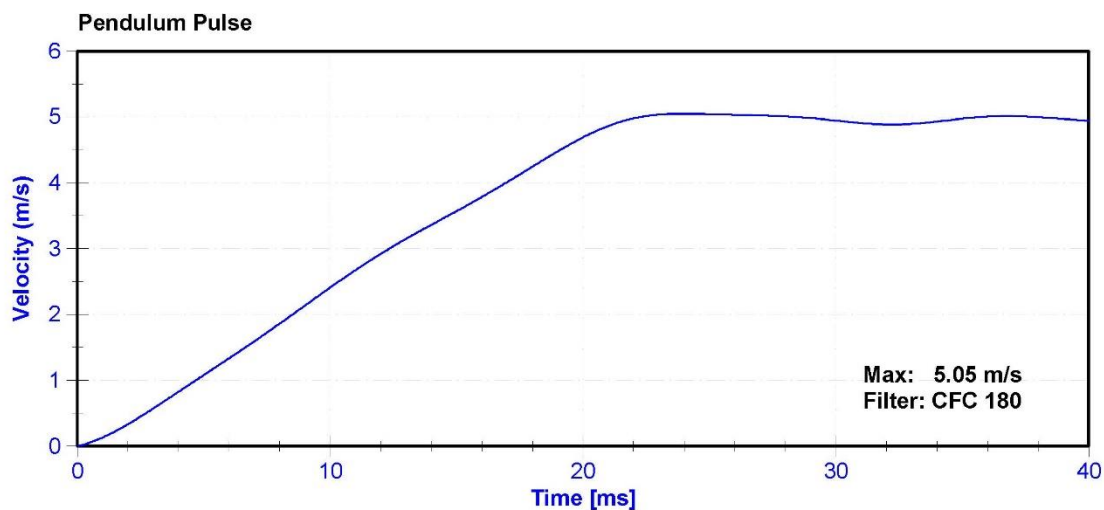
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

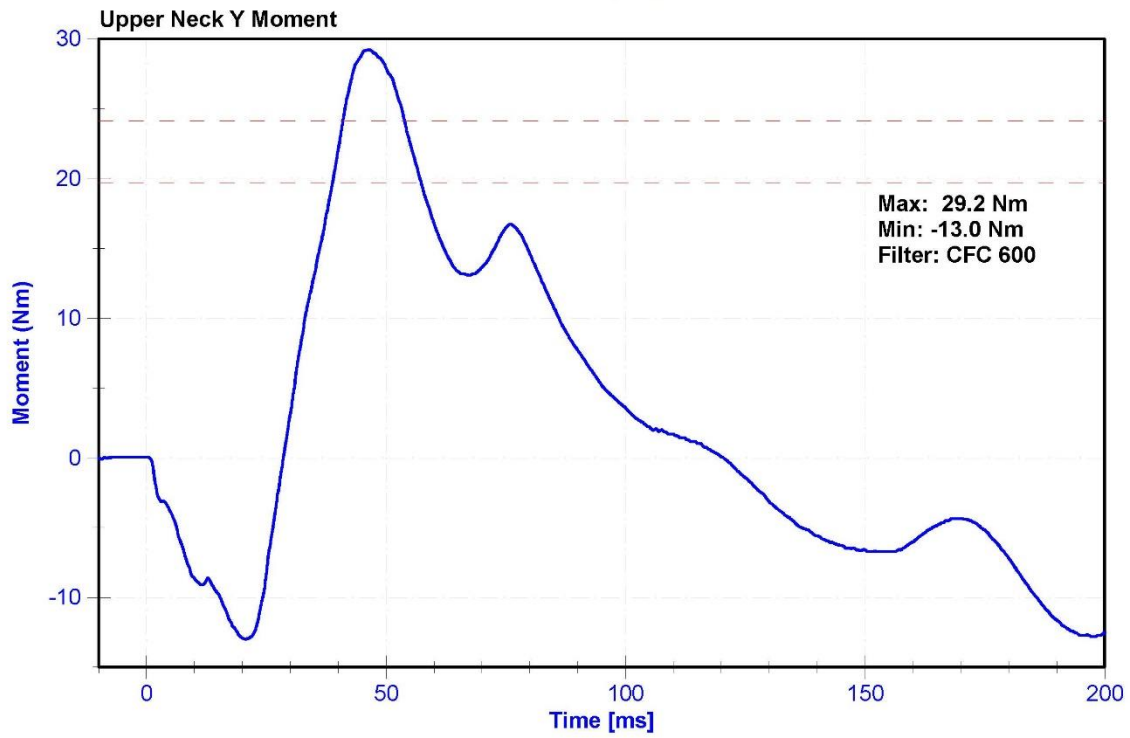
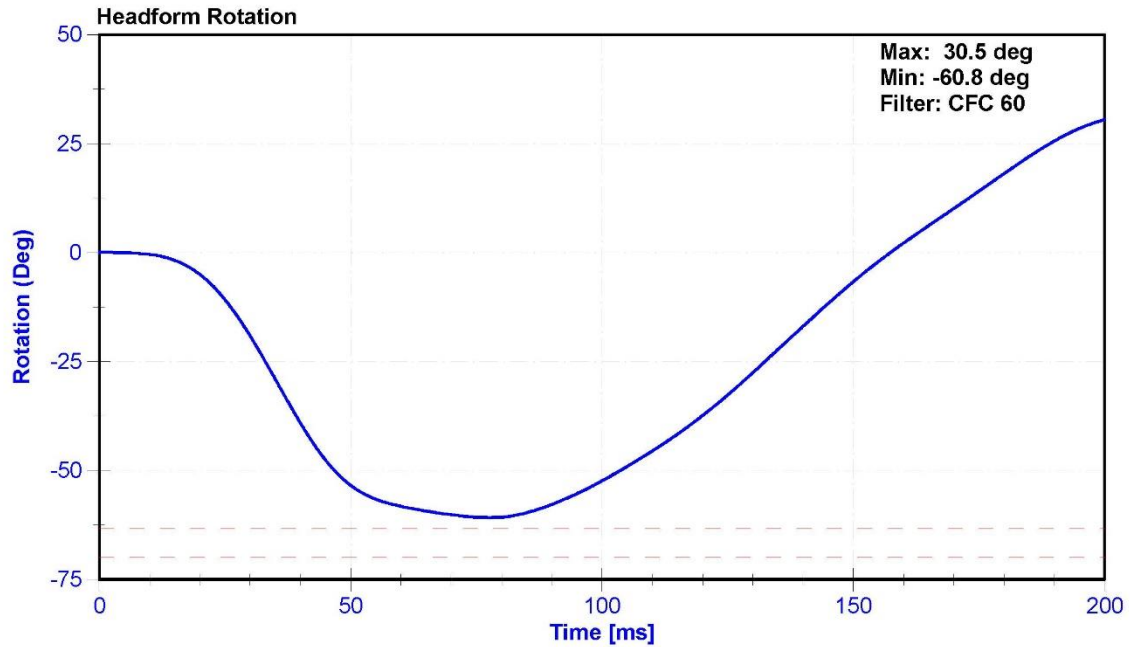
Results

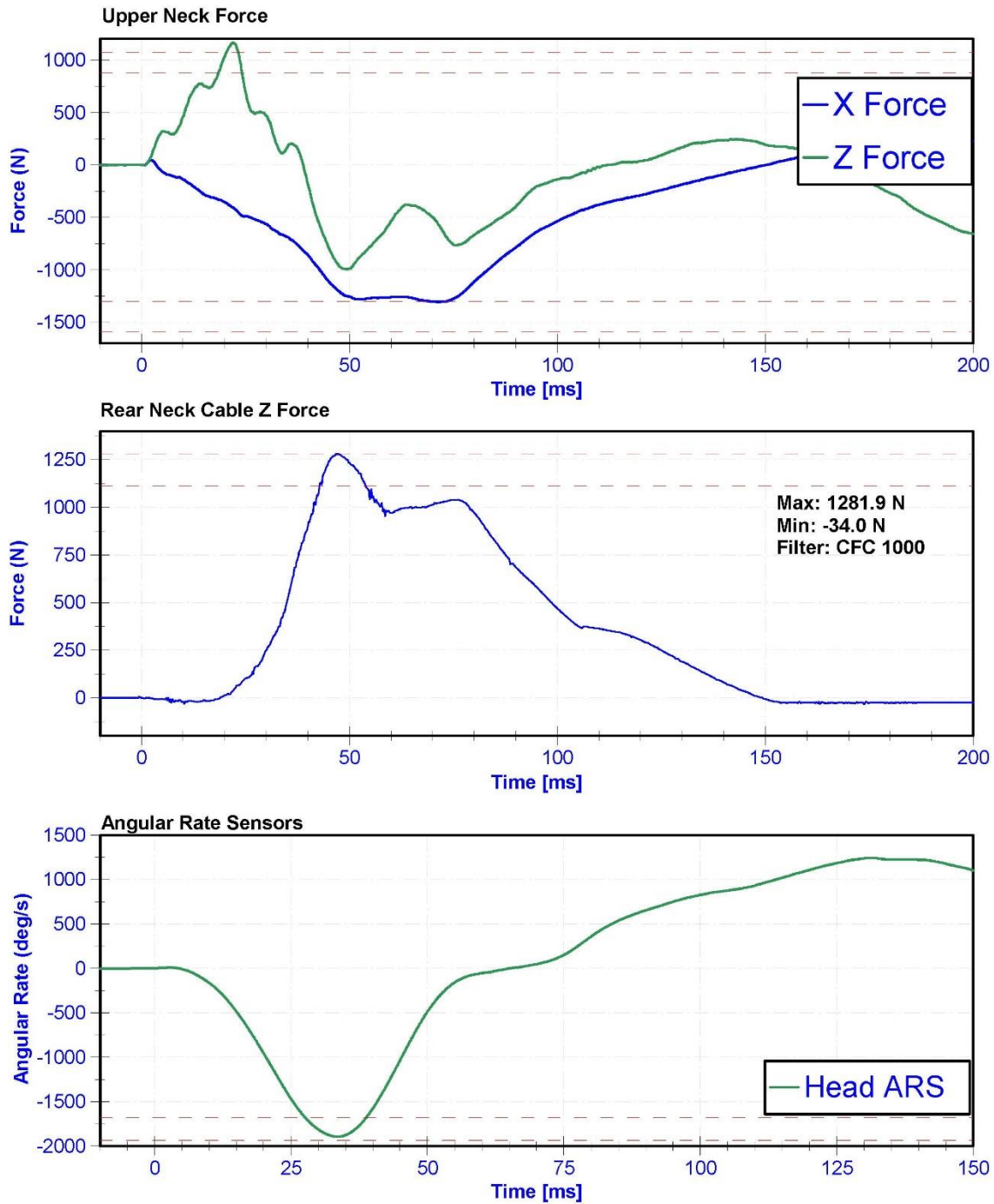
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Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	46.7	Pass
Velocity	4.95	5.05	m/s	4.96	Pass
Pendulum Impulse at 8ms	1.49	1.85	m/s	1.861	Fail
Pendulum Impulse at 16ms	3.08	3.86	m/s	3.784	Pass
Pendulum Impulse at 24ms	4.48	5.26	m/s	5.048	Pass
Peak Upper Neck Y Moment	19.7	24.1	Nm	29.22	Fail
Peak Upper Neck X Force	-1592	-1302	N	-1306.6	Pass
Maximum Upper Neck Z Force	877	1072	N	1166.0	Pass
First Peak Rear Neck Cable Force	1115	1282	N	1281.9	Pass
Peak Head Y Angular Rate	-1935	-1675	deg/s	-1891.6	Pass
Peak Head Angle	-69.9	-63.3	deg	-60.81	Fail
Rotation Decay to Zero	83.0	86.2	ms	77.7	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Upper Neck Load Cell	Humanetics 10380J14	LC-DP3956 Fx	3/5/2015	3/4/2016
Rear Neck Cable Load Cell	Humanetics 10386J14	LC-DO9741	3/6/2015	3/5/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9121	9/30/2015	9/29/2016
Head ARS Y-Axis	DTS ARS-18K	ARS-4737	3/30/2015	3/29/2016







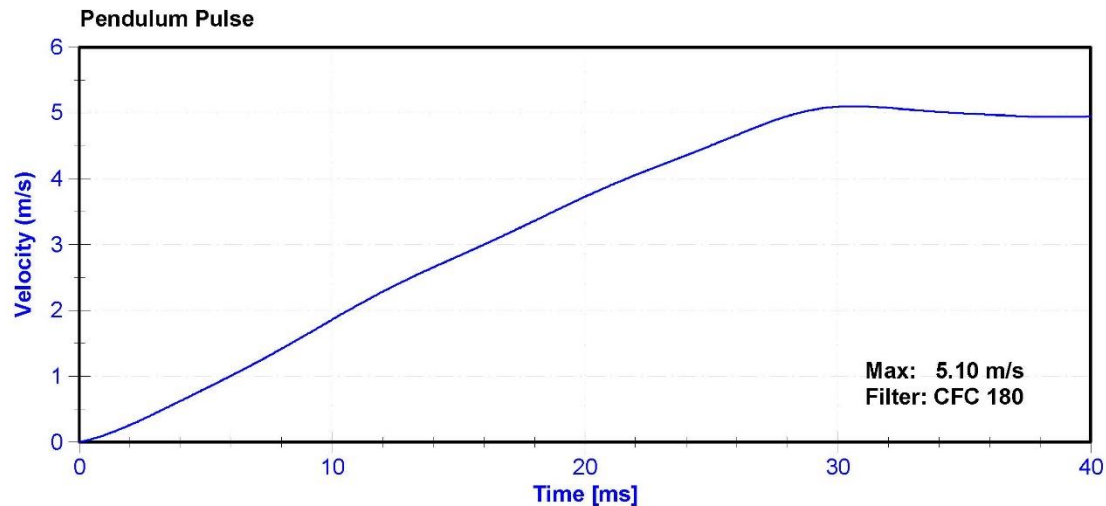
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

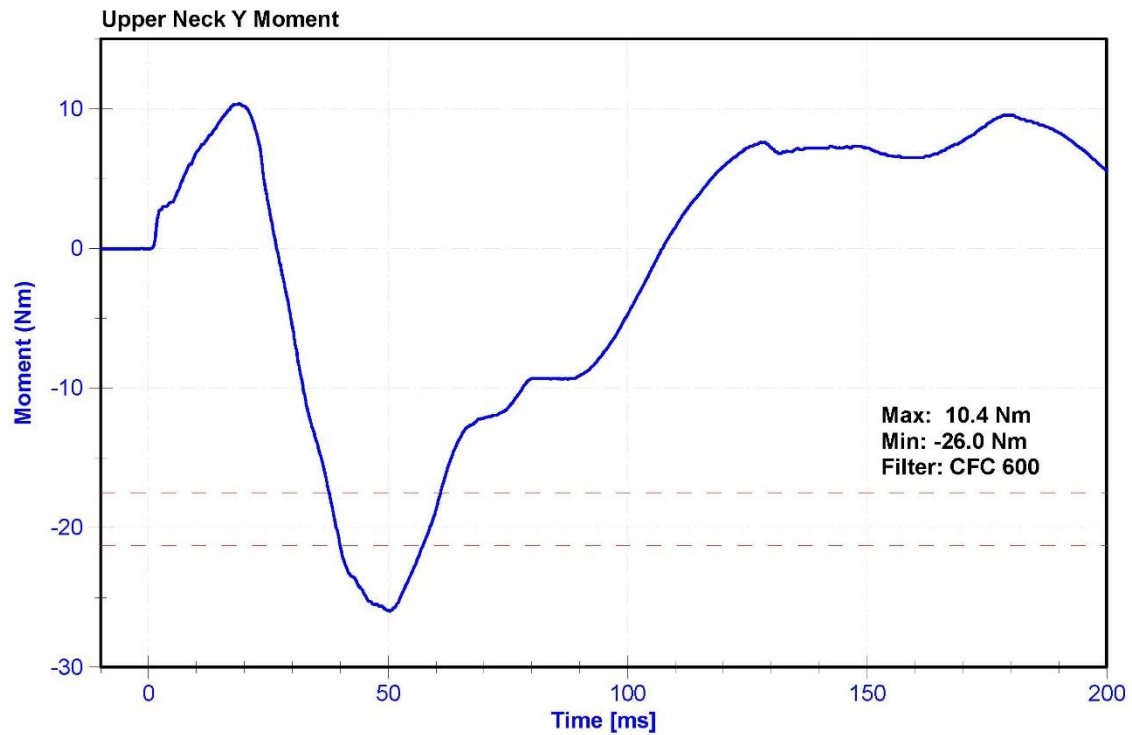
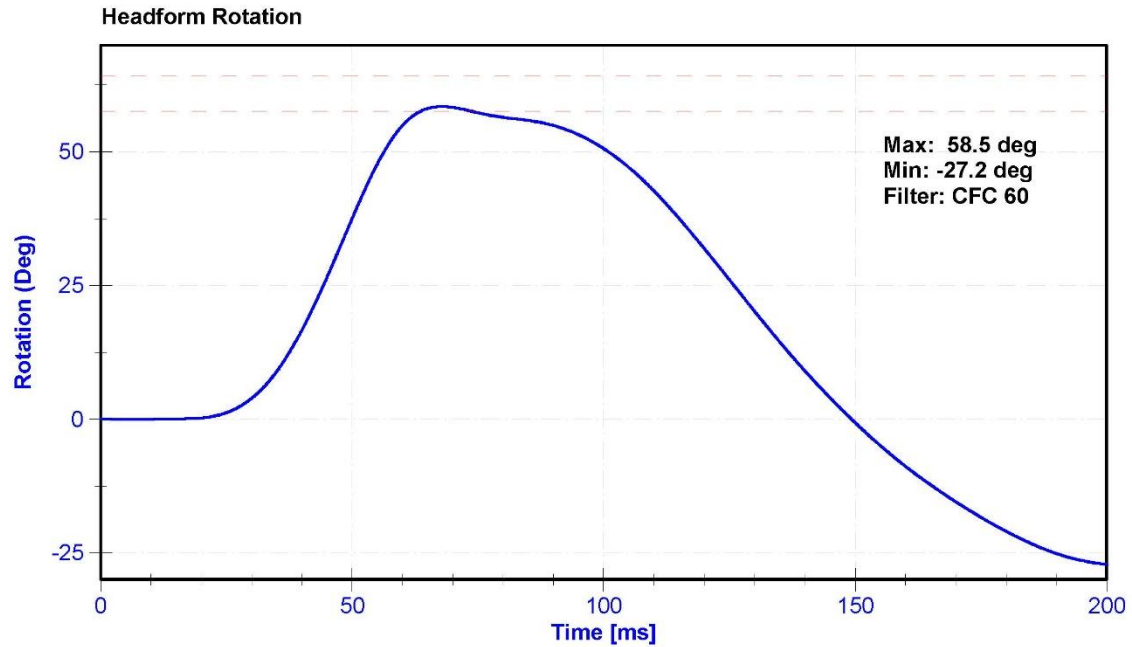
Results

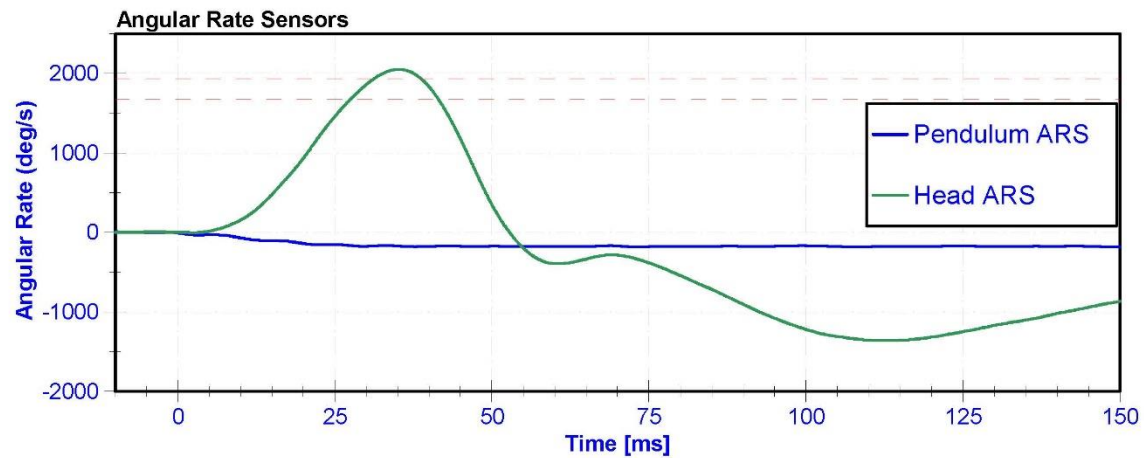
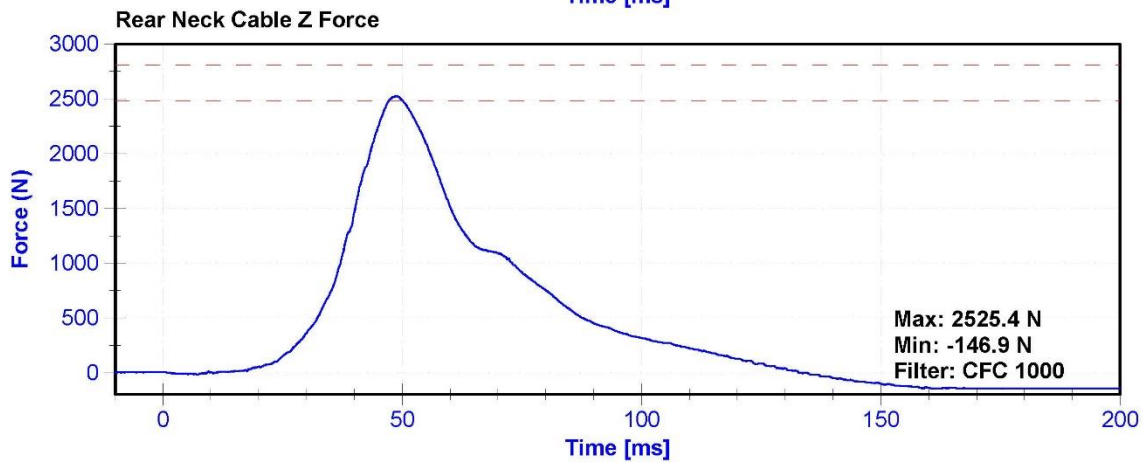
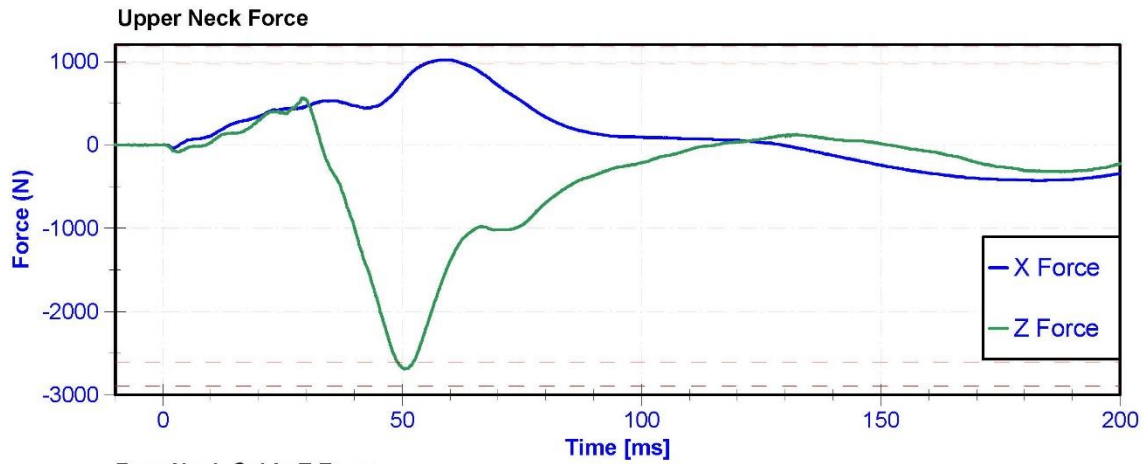
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	44.3	Pass
Velocity	4.95	5.05	m/s	4.96	Pass
Pendulum Impulse at 10ms	1.76	1.91	m/s	1.861	Pass
Pendulum Impulse at 20ms	3.50	3.75	m/s	3.728	Pass
Pendulum Impulse at 30ms	4.88	5.20	m/s	5.094	Pass
Peak Upper Neck Y Moment	-21.3	-17.5	Nm	-25.98	Fail
Peak Upper Neck X Force	967	1182	N	1025.8	Pass
Peak Upper Neck Z Force	-2893	-2603	N	-2692.3	Pass
Peak Front Neck Cable Force	2482	2809	N	2525.4	Pass
Peak Head Y Angular Rate	1907	2043	deg/s	2052.1	Fail
Peak Head Rotation	57.6	64.2	deg	58.51	Pass
Rotation Decay to Zero	79.3	82.5	ms	81.45	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Upper Neck Load Cell	Humanetics 10380J14	LC-DP3956 Fx	3/5/2015	3/4/2016
Front Neck Cable Load Cell	Humanetics 10386J14	LC-DO9740	3/6/2015	3/5/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9121	9/30/2015	9/29/2016
Head ARS Y-Axis	DTS ARS-18K	ARS-4737	3/30/2015	3/29/2016







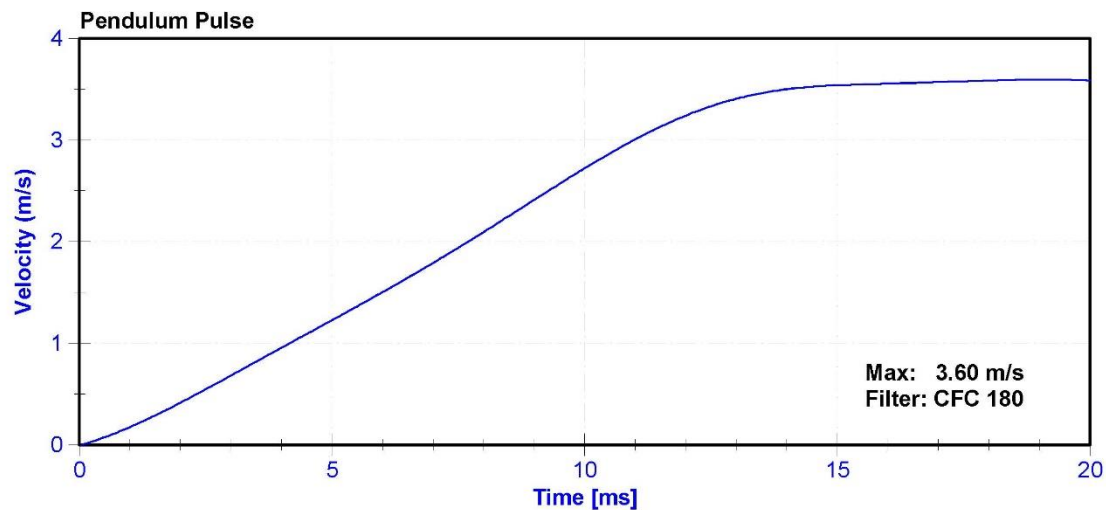
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

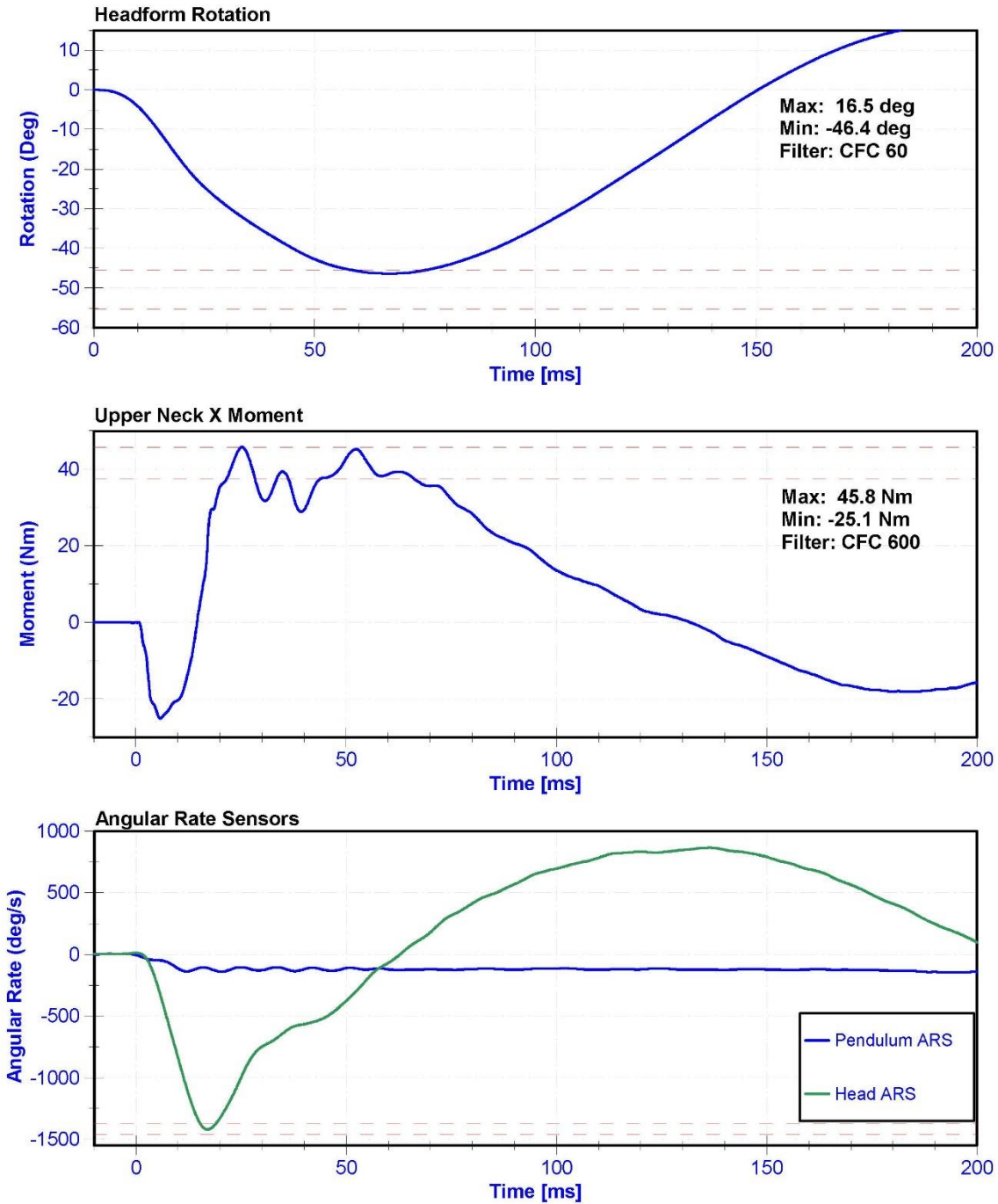
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	43.5	Pass
Velocity	3.35	3.45	m/s	3.42	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.956	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.095	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.378	Pass
Peak Upper Neck X Moment 40-300ms	37.4	45.7	Nm	39.37	Pass
Peak Head X Angular Rate	-1462	-1375	deg/s	-1419.7	Pass
Peak Head Rotation	45.4	55.3	deg	-46.37	Pass
Rotation Decay to Zero	83.7	90.9	ms	83.45	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Upper Neck Load Cell	Humanetics 10380J14	LC-DP3956 Mx	3/5/2015	3/4/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9121	9/30/2015	9/29/2016
Head ARS Y-Axis	DTS ARS-18K	ARS-4740	3/30/2015	3/29/2016





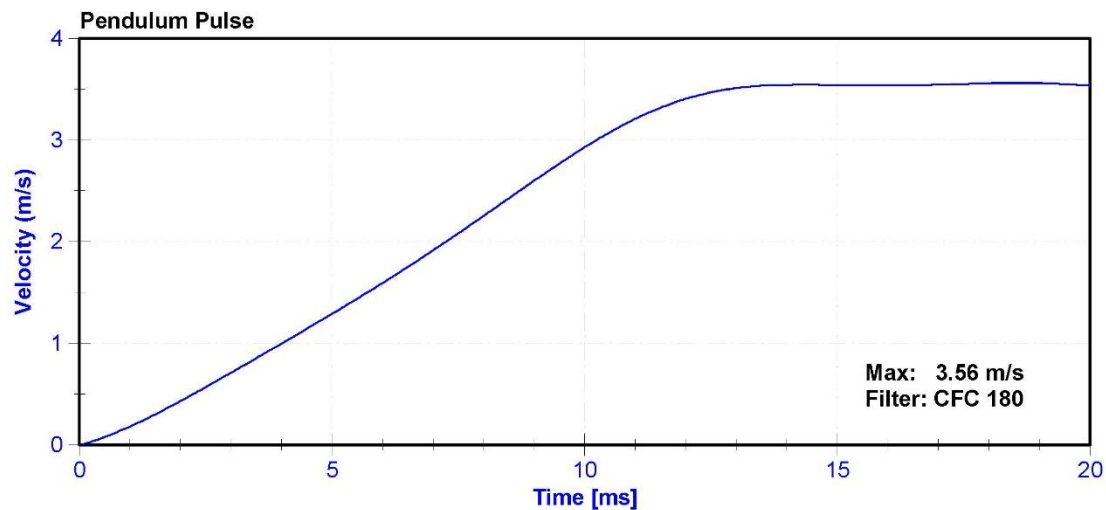
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

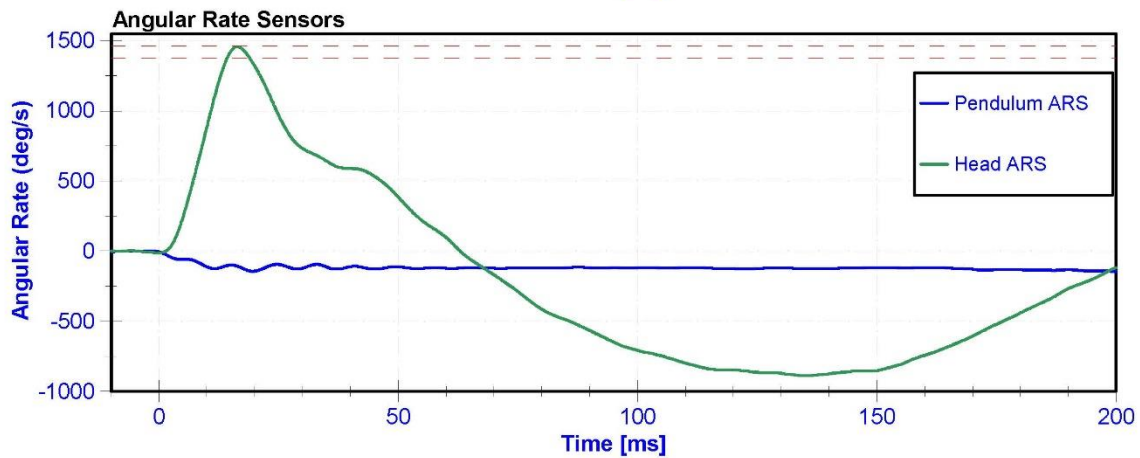
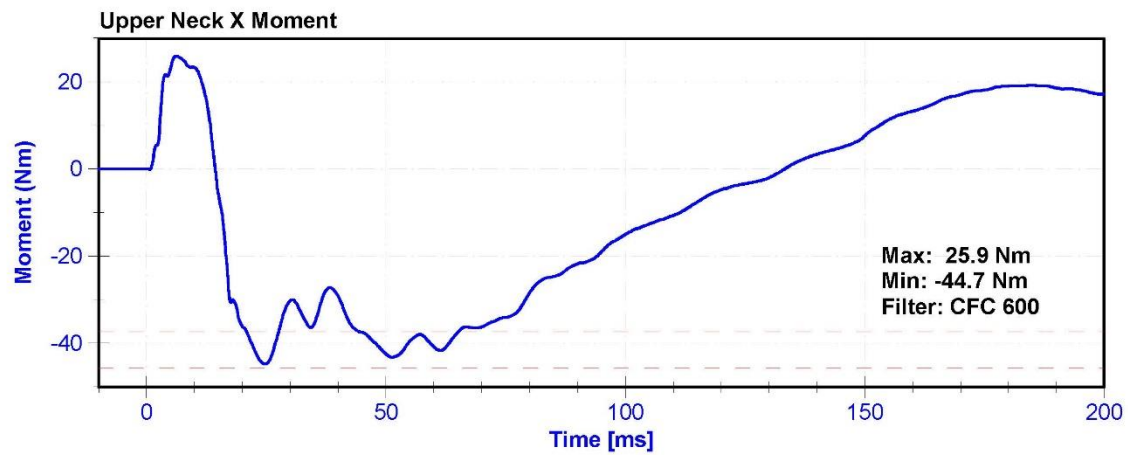
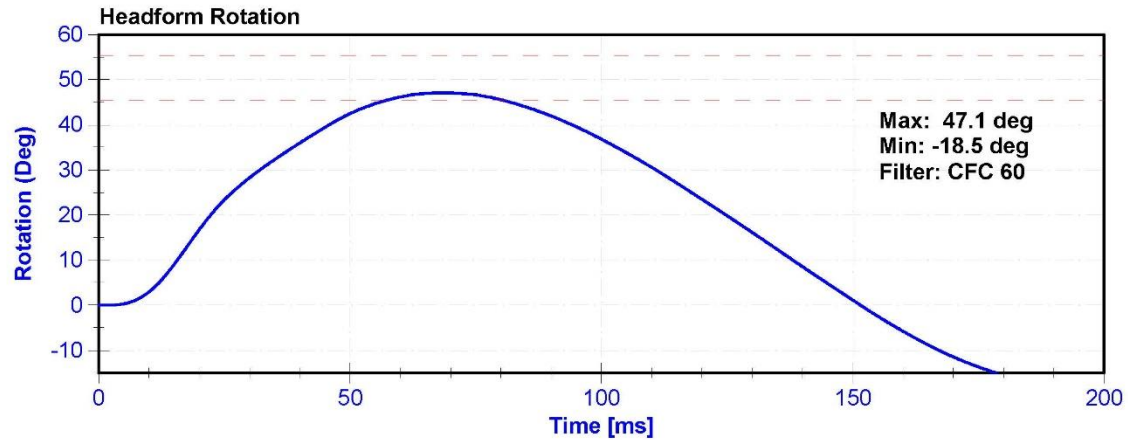
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	43.1	Pass
Velocity	3.35	3.45	m/s	3.43	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.998	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.254	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.347	Pass
Peak Upper Neck X Moment 40-300ms	-45.7	-37.4	Nm	-44.67	Pass
Peak Head X Angular Rate	1375	1462	deg/s	1456.8	Pass
Peak Head Rotation	45.4	55.3	deg	47.09	Pass
Rotation Decay to Zero	83.7	90.9	ms	83.05	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Upper Neck Load Cell	Humanetics 10380J14	LC-DP3956 Mx	3/5/2015	3/4/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9121	9/30/2015	9/29/2016
Head ARS Y-Axis	DTS ARS-18K	ARS-4740	3/30/2015	3/29/2016





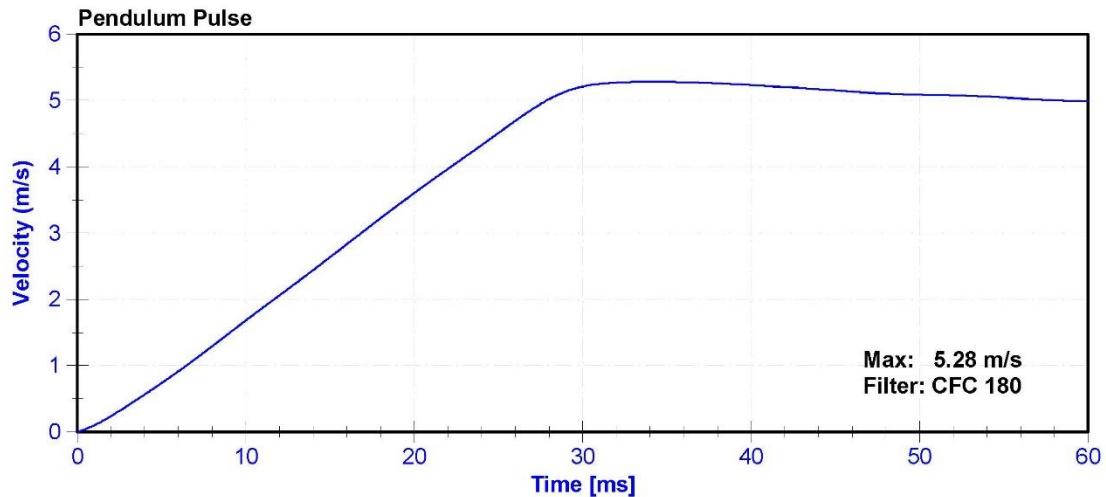
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

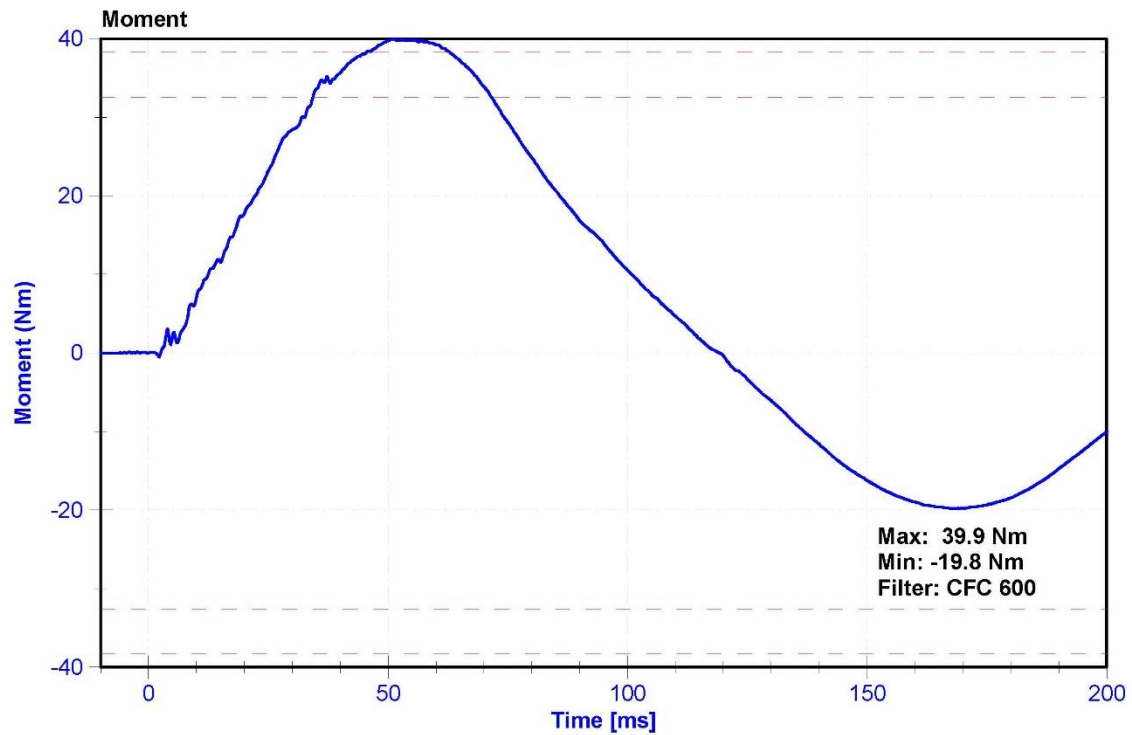
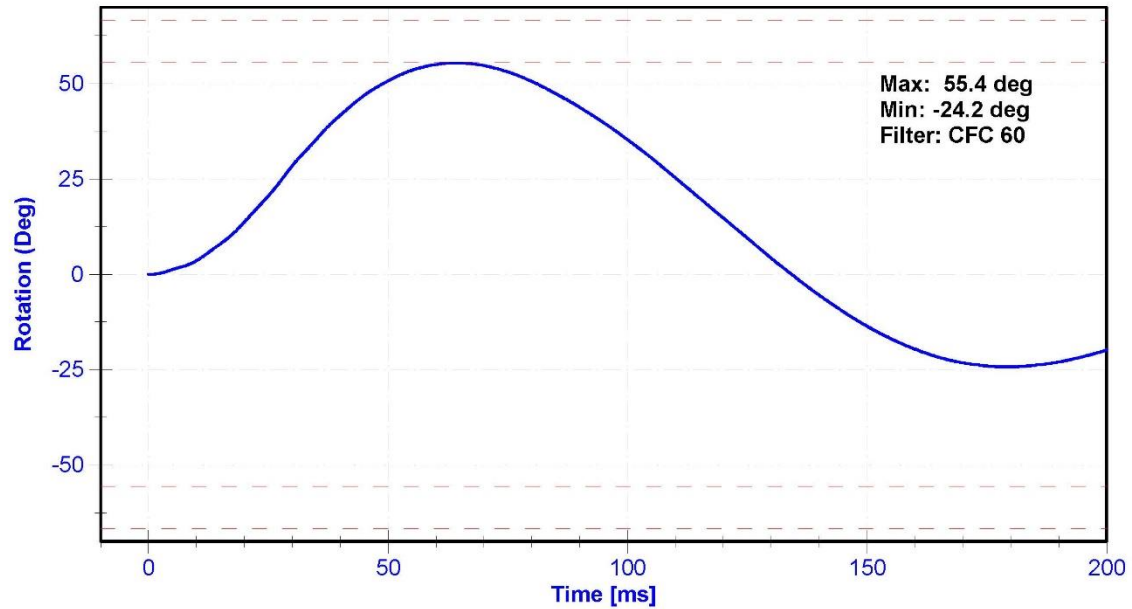
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	44.2	Pass
Velocity	4.95	5.05	m/s	5.04	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.681	Fail
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.636	Fail
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.605	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.510	Pass
Maximum Upper Neck Moment	32.6	38.3	Nm	39.9	Fail
Peak Axial Rotation	55.6	66.6	deg	55.37	Fail
Rotation Decay to Zero	58.0	61.6	ms	70.20	Fail
Peak Upper Neck Angular Velocity	1559	1709	deg/s	1427.3	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Pendulum ARS	DTS ARS PRO-18K	ARS-9121	9/30/2015	9/29/2016
Upper Neck Load Cell	Humanetics 10380JL4	LC-DP3956 Mz	3/5/2015	3/4/2016
Upper Neck ARS	DTS ARS PRO-18K	ARS-9141	9/30/2015	9/29/2016



Axial Rotation - Derived from Angular Rate Sensors



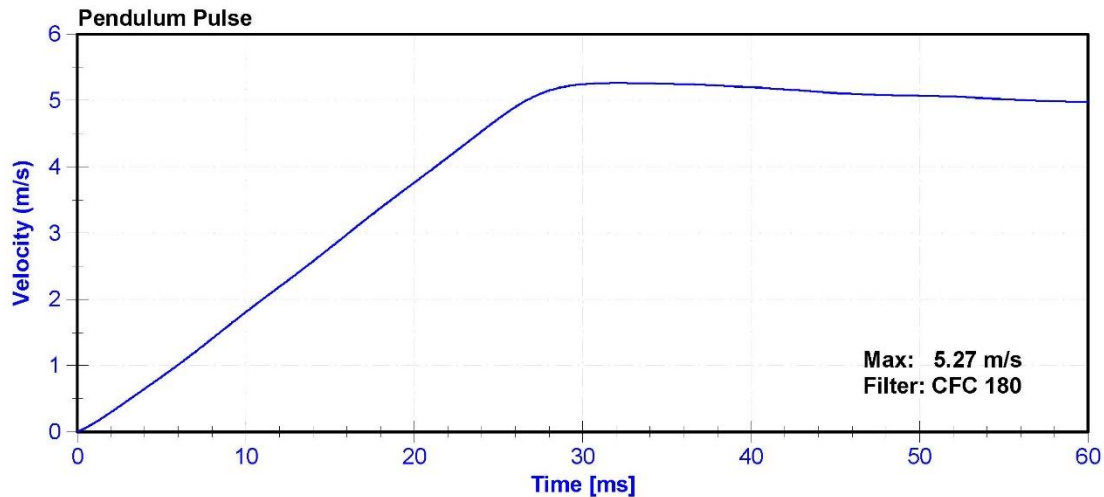
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

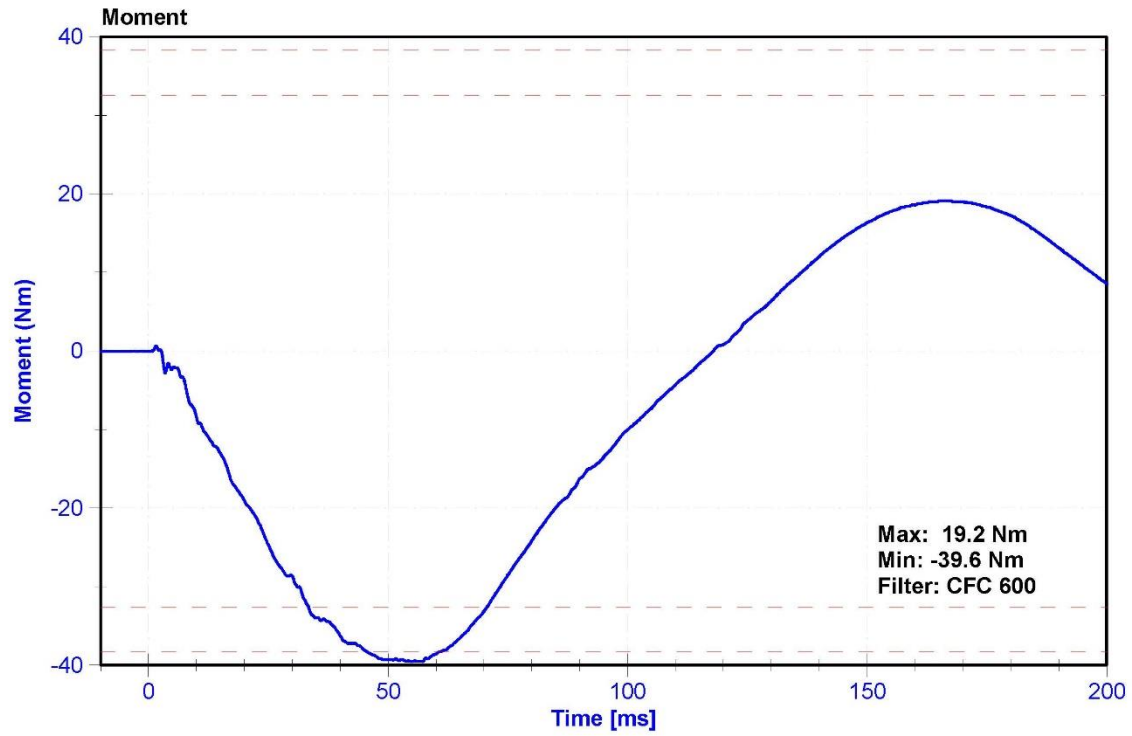
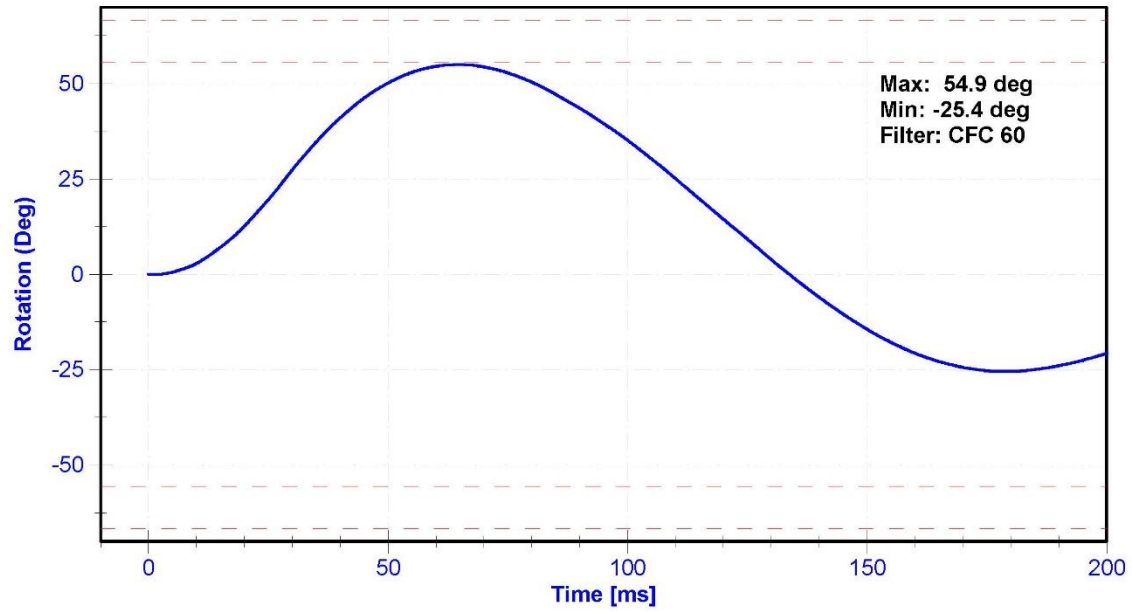
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	45.4	Pass
Velocity	4.95	5.05	m/s	5.01	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.807	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.777	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.761	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.727	Pass
Maximum Upper Neck Moment	32.6	38.3	Nm	-39.6	Fail
Peak Axial Rotation	55.6	66.6	deg	54.95	Fail
Rotation Decay to Zero	58.0	61.6	ms	68.85	Fail
Peak Upper Neck Angular Velocity	1559	1709	deg/s	1426.4	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	11/7/2015
Pendulum ARS	DTS ARS PRO-18K	ARS-9121	9/30/2015	9/29/2016
Upper Neck Load Cell	Humanetics 10380JL4	LC-DP3956 Mz	3/5/2015	3/4/2016
Upper Neck ARS	DTS ARS PRO-18K	ARS-9141	9/30/2015	9/29/2016



Axial Rotation - Derived from Angular Rate Sensors



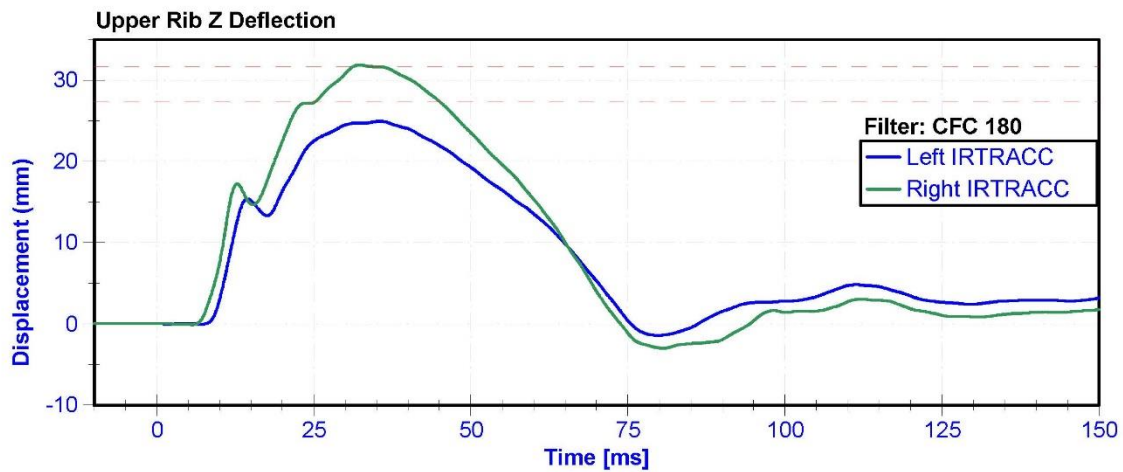
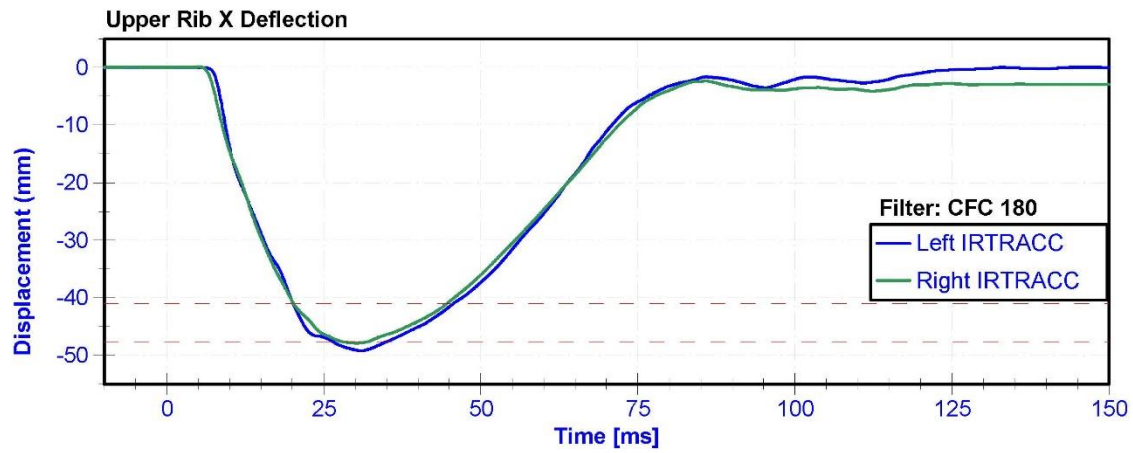
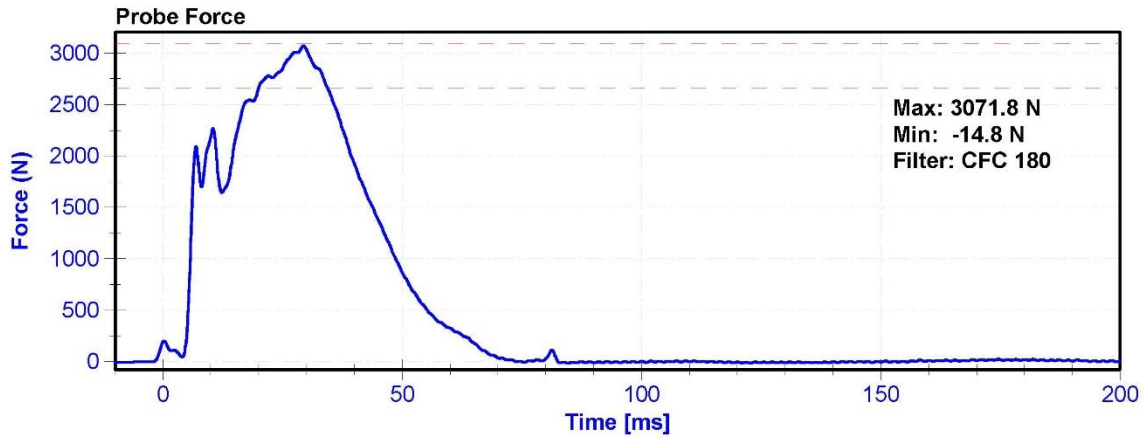
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

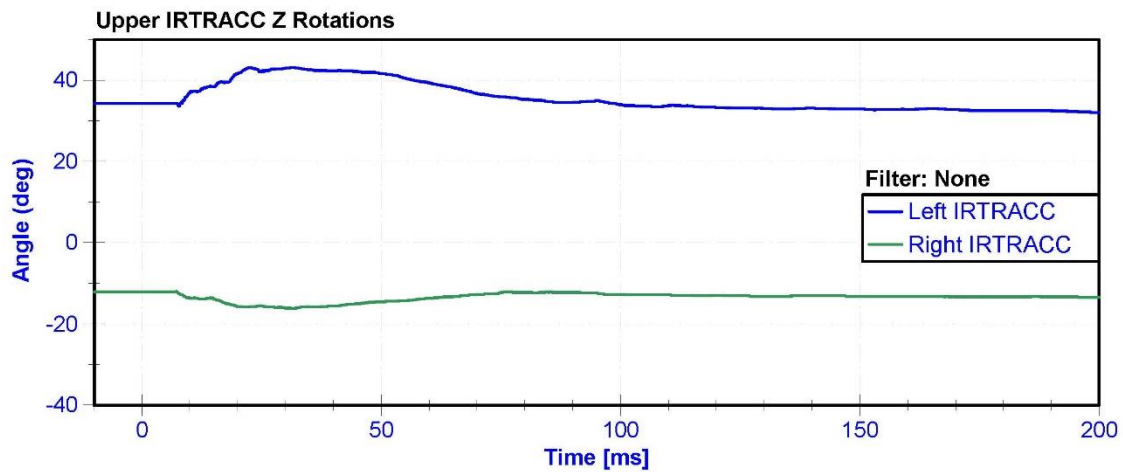
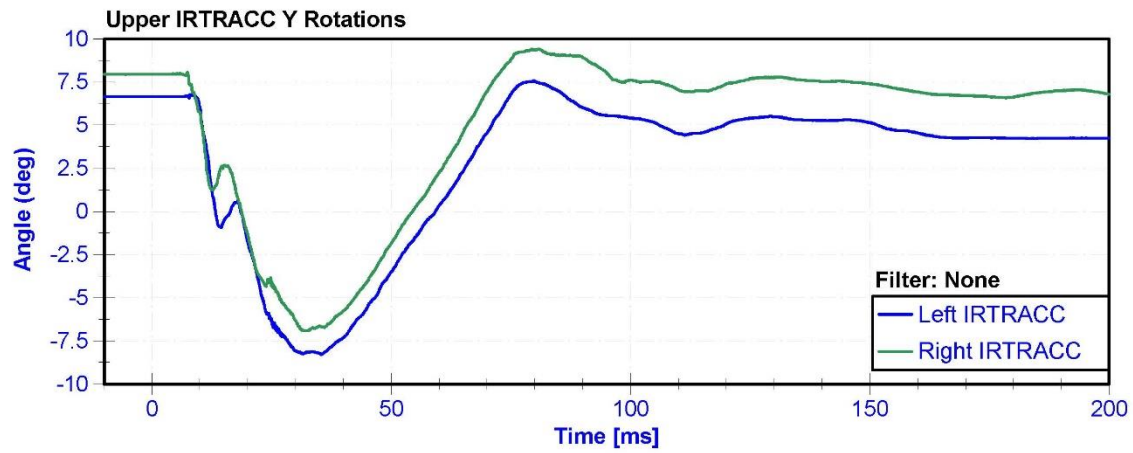
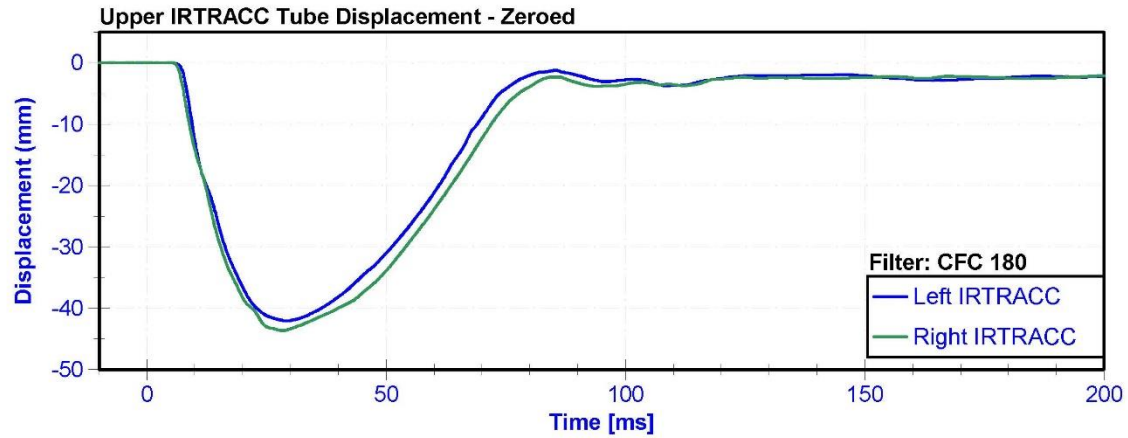
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	39.6	Pass
Impact Velocity	4.25	4.35	m/s	4.311	Pass
Probe Force	2,654	3,092	N	3071.8	Pass
Upper Left X Rib Deflection	-47.6	-41.0	mm	-49.18	Fail
Upper Right X Rib Deflection	-47.6	-41.0	mm	-47.87	Fail
Left/Right X Rib Deviation	-7.00	7.00	mm	-1.306	Pass
Upper Left Z Rib Deflection	27.3	31.7	mm	24.97	Fail
Upper Right Z Rib Deflection	27.3	31.7	mm	31.89	Fail
Left/Right Z Rib Deviation	-7.00	7.00	mm	-6.918	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Upper Left IRTRACC	Humanetics IF-364-C-R3	DS-DS6355	11/10/2014	11/10/2015
Upper Left Y Potentiometer	Humanetics 9945	DS-DI2382	4/8/2015	4/7/2016
Upper Left Z Potentiometer	Humanetics 9945	DS-DI2383	4/8/2015	4/7/2016
Upper Right IRTRACC	Humanetics IF-364-C-R3	DS-DJ2613	4/8/2015	4/7/2016
Upper Right Y Potentiometer	Humanetics 9945	DS-DI7753	4/9/2015	4/8/2016
Upper Right Z Potentiometer	Humanetics 9945	DS-DI7752	4/9/2015	4/8/2016





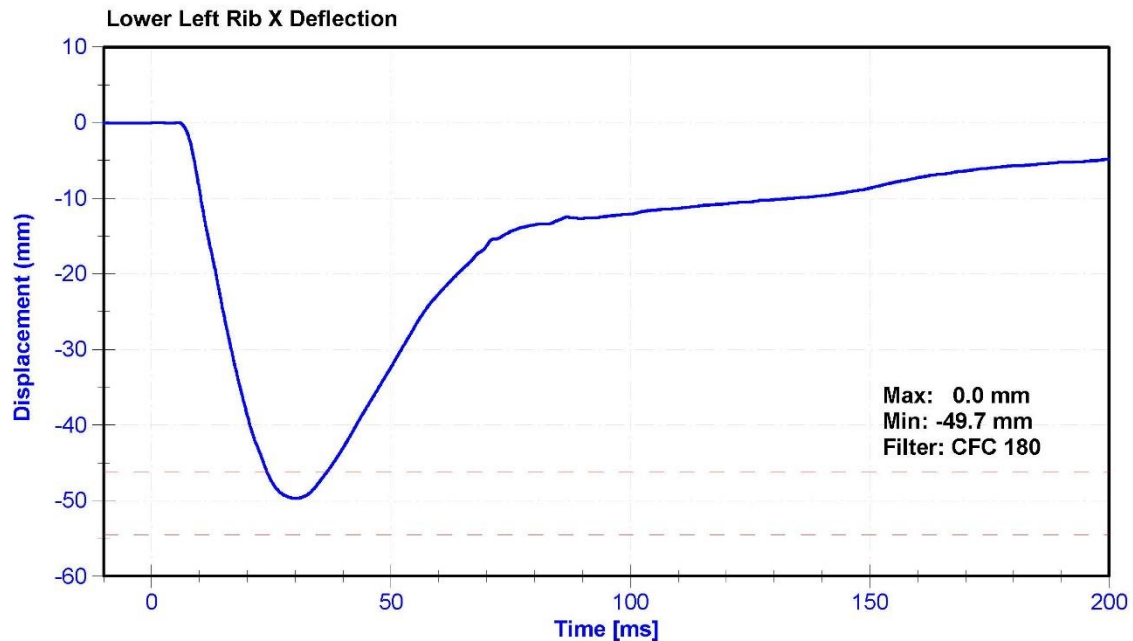
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

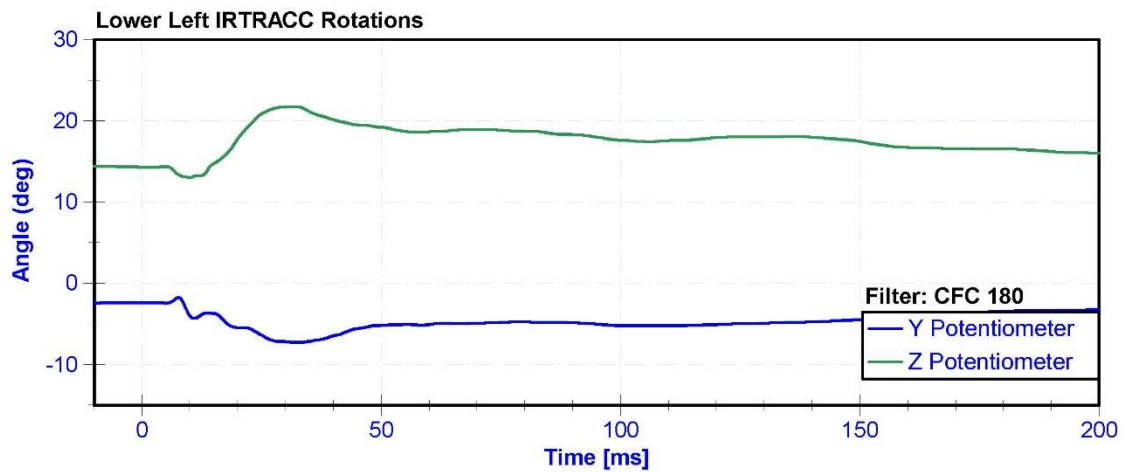
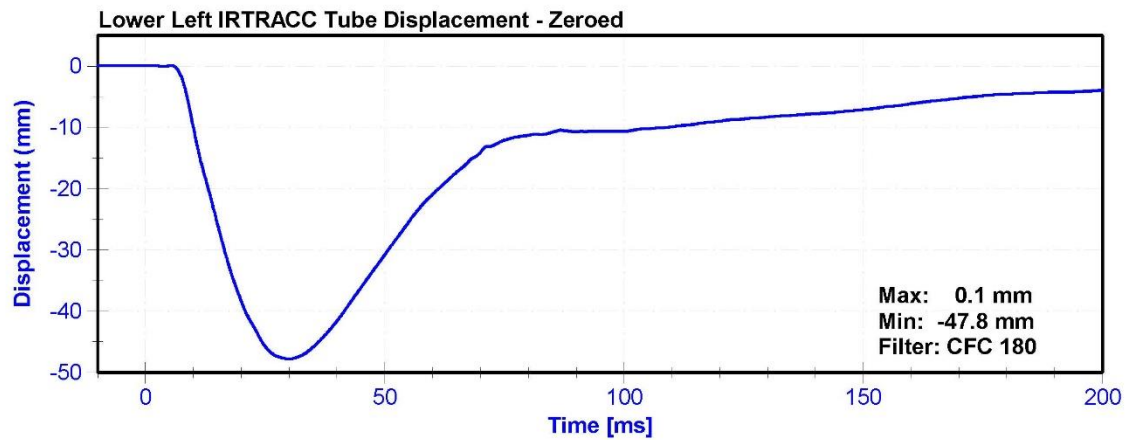
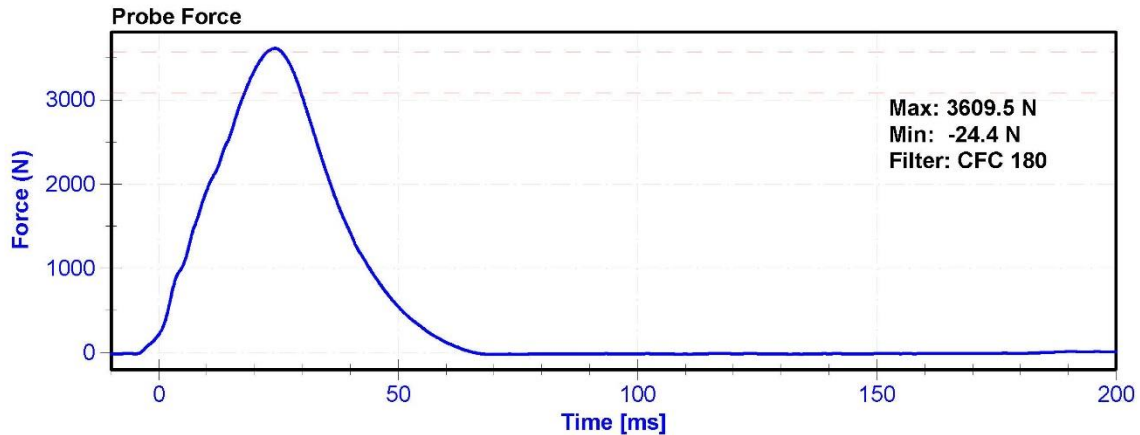
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	27.5	Pass
Impact Velocity	4.25	4.35	m/s	4.269	Pass
Peak Left X Rib Deflection	-54.5	-46.2	mm	-49.68	Pass
Probe Force during Peak Deflection	3083	3571	N	3609.5	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Lower Left IRTACC	Humanetics IF-364-C-R3	DS-DS6353	11/10/2014	11/10/2015
Lower Left Y Potentiometer	Humanetics 9945	DS-DM4781	4/7/2015	4/6/2016
Lower Left Z Potentiometer	Humanetics 9945	DS-DS4092	4/7/2015	4/6/2016





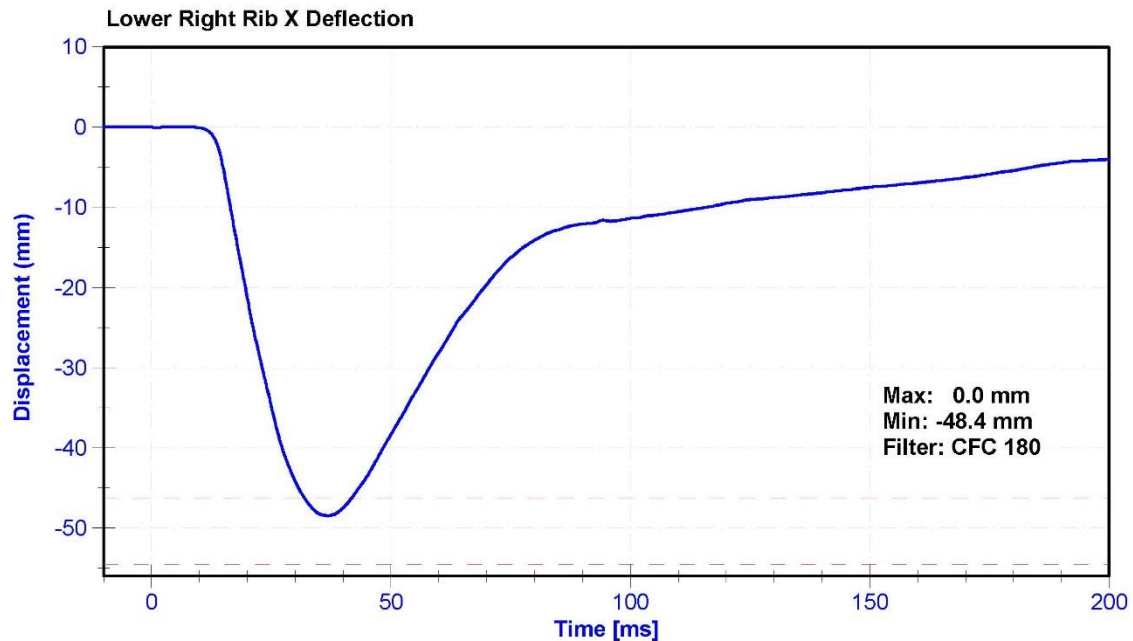
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

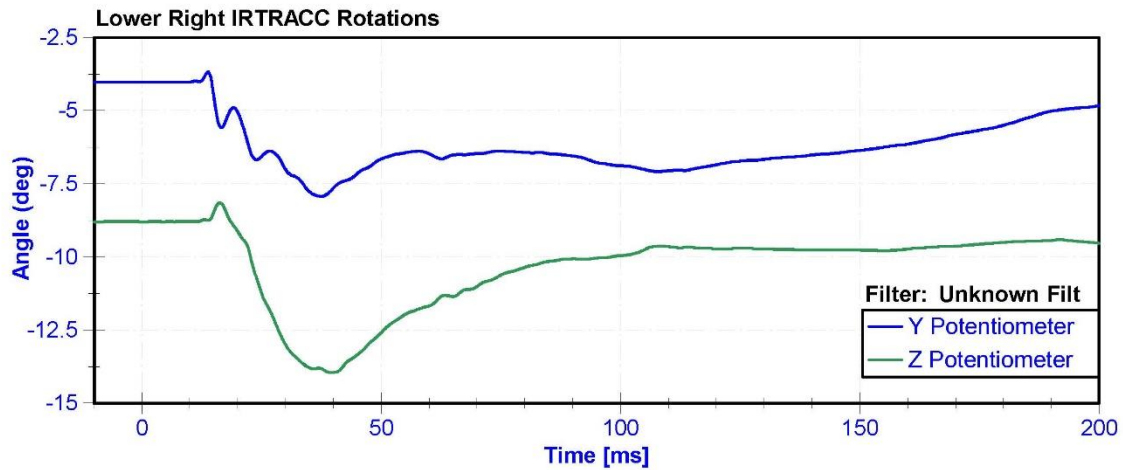
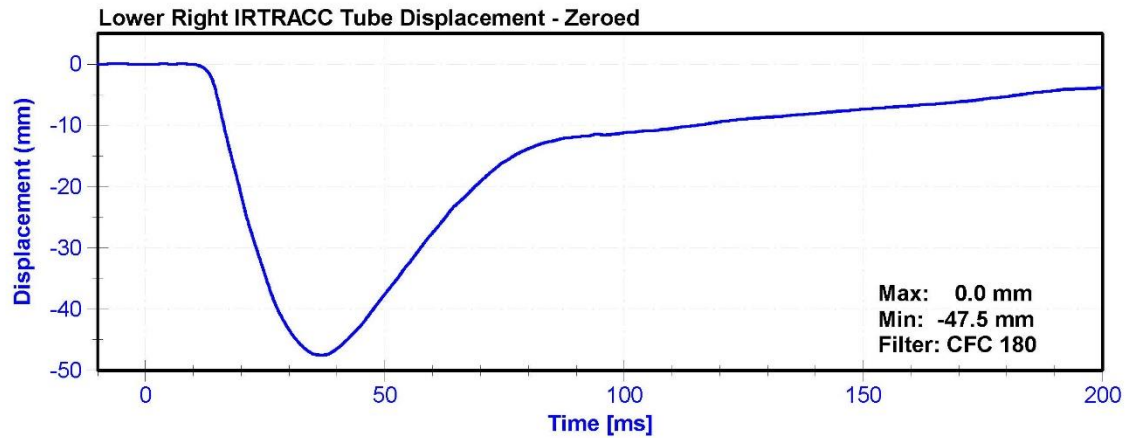
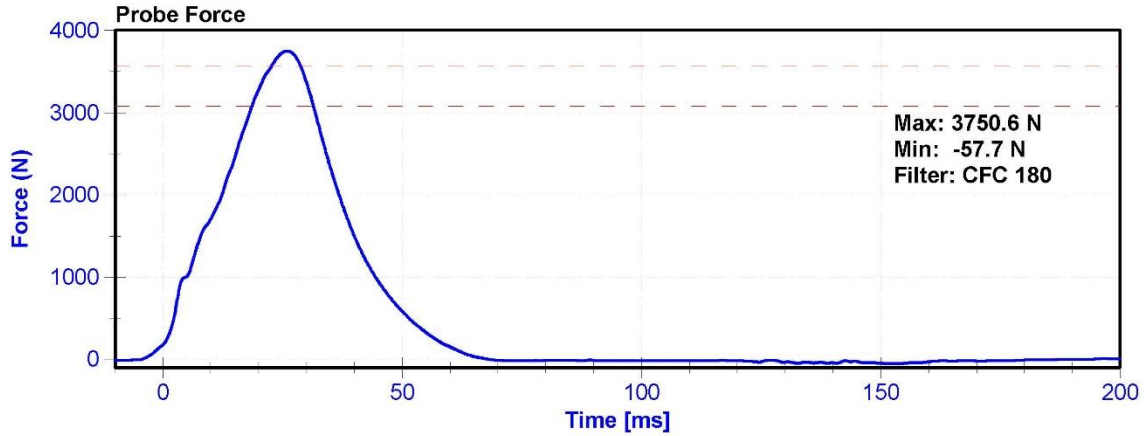
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	26.3	Pass
Impact Velocity	4.25	4.35	m/s	4.275	Pass
Peak Right X Rib Deflection	-54.5	-46.2	mm	-48.44	Pass
Probe Force during Peak Deflection	3083	3571	N	3750.6	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Lower Right IRTACC	Humanetics IF-364-C-R3	DS-DS6354	11/10/2014	11/10/2015
Lower Right Y Potentiometer	Humanetics 9945	DS-DM4776	4/7/2015	4/6/2016
Lower Right Z Potentiometer	Humanetics 9945	DS-DM4777	4/7/2015	4/6/2016





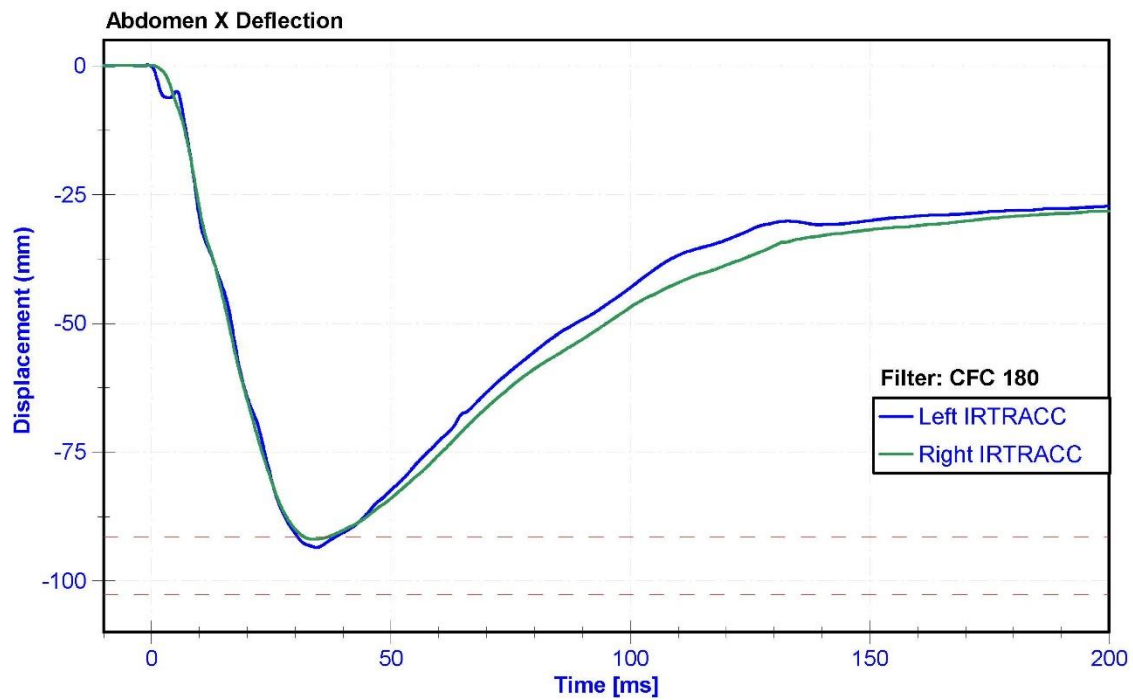
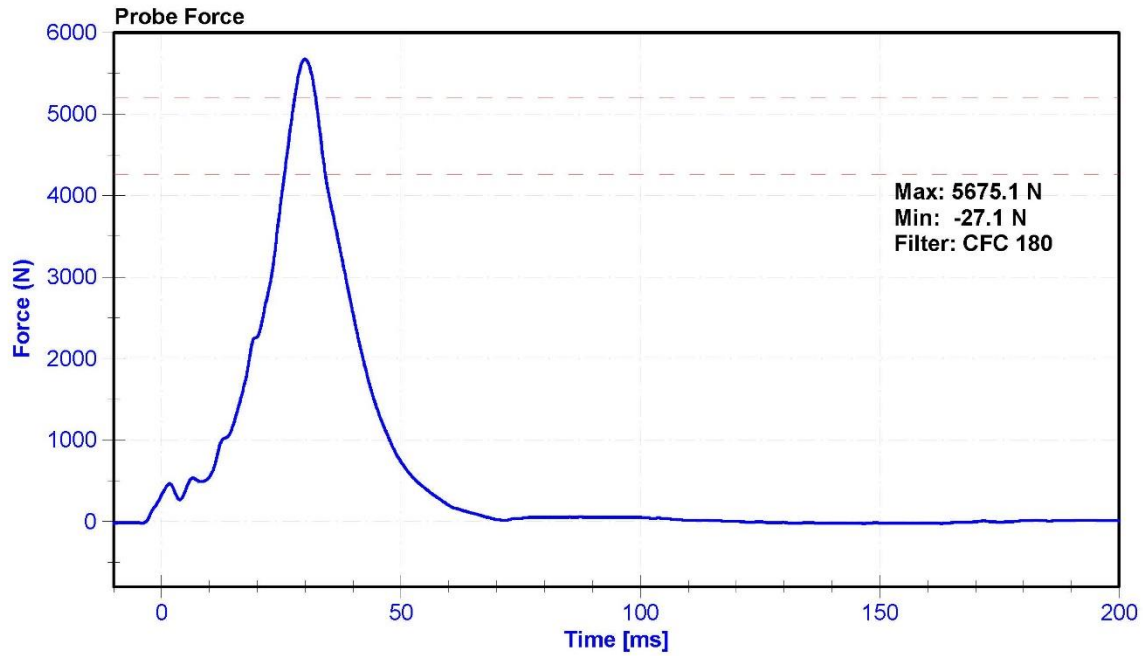
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

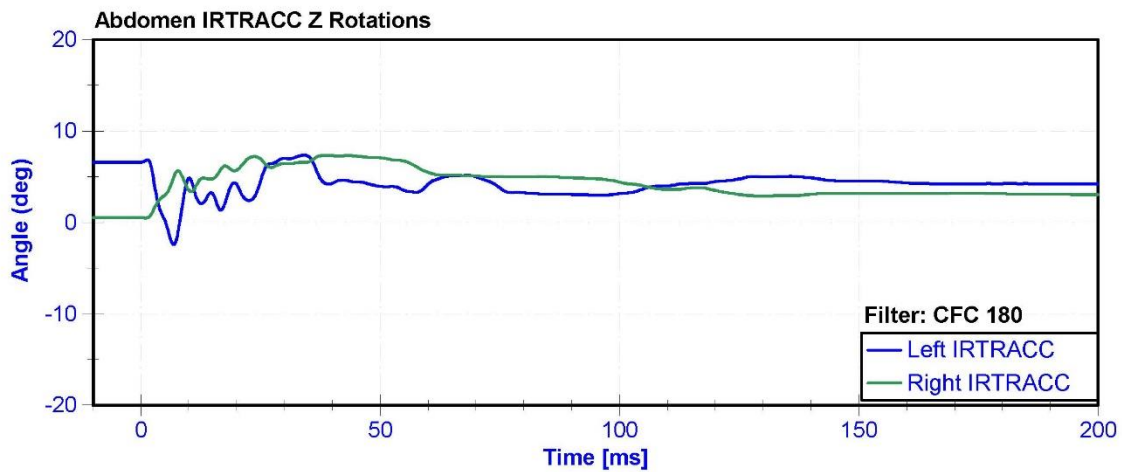
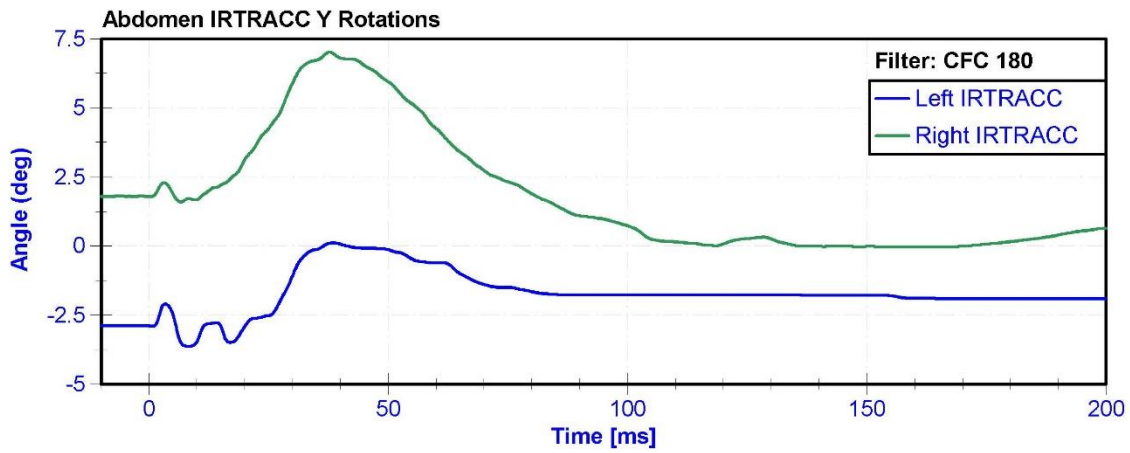
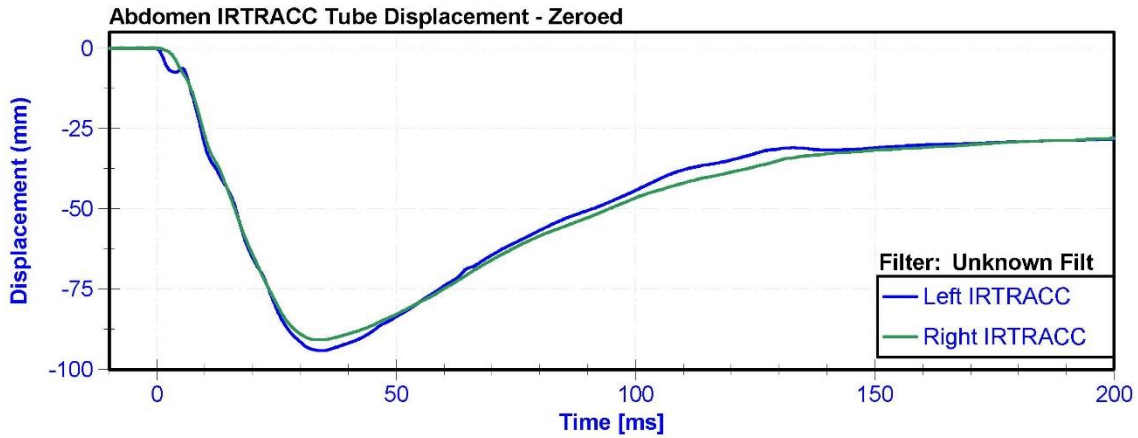
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.8	Pass
Humidity	10	70	%	27.9	Pass
Impact Velocity	4.25	4.35	m/s	4.317	Pass
Probe Force	4,263	5,211	N	5675.1	Fail
Left Abdomen X Deflection	-102.69	-91.50	mm	-93.48	Pass
Right Abdomen X Deflection	-102.69	-91.50	mm	-91.88	Pass
Left/Right X Deviation	-7.00	7.00	mm	-1.600	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Abdomen Left IRTRACC	Humanetics 9910	DS-DQ2303	4/13/2015	4/12/2016
Abdomen Left Y Potentiometer	Humanetics 9945	DS-DS8363	12/16/2014	12/16/2015
Abdomen Left Z Potentiometer	Humanetics 9945	DS-DS8361	12/16/2014	12/16/2015







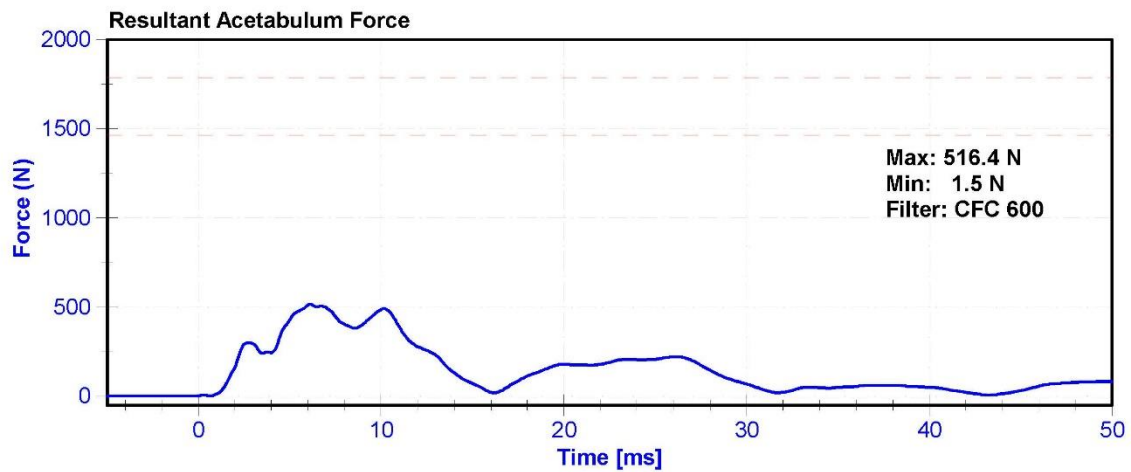
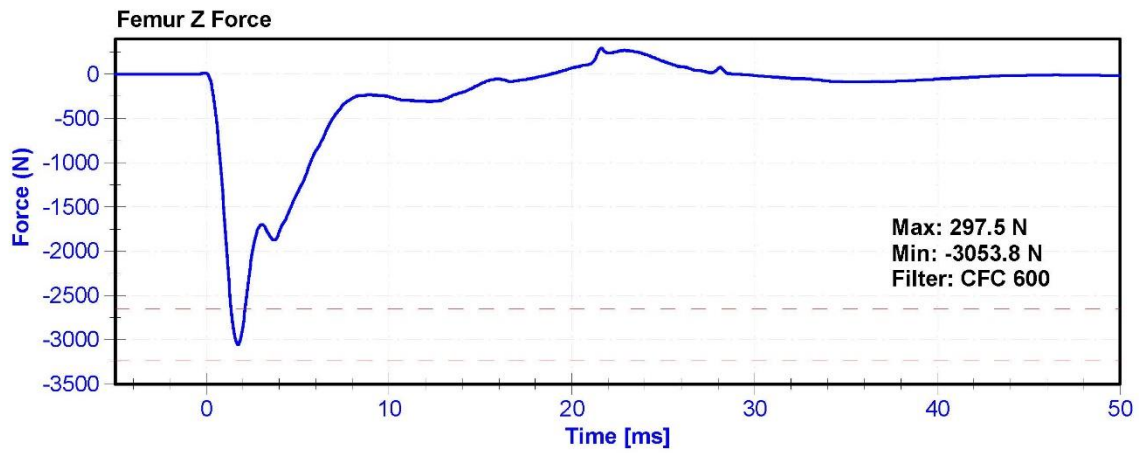
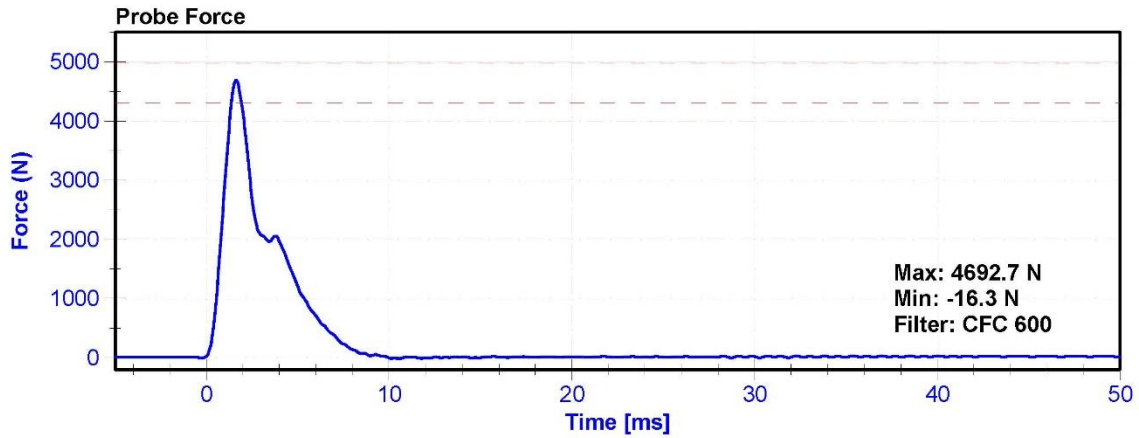
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	38.5	Pass
Impact Velocity	2.55	2.65	m/s	2.616	Pass
Probe Force	4,318	4,989	N	4692.7	Pass
Peak Femur Z Force	-3,241	-2,652	N	-3053.80	Pass
Peak Resultant Acetabulum Force	1,462	1,787	N	516.43	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Left Femur Load Cell	Denton W50-7101051	LC-DM4975 Fz	2/20/2015	2/20/2016
Left Acetabulum Load Cell	Humanetics 10670JL4	LC-DP3835 Fx	3/7/2015	3/6/2016





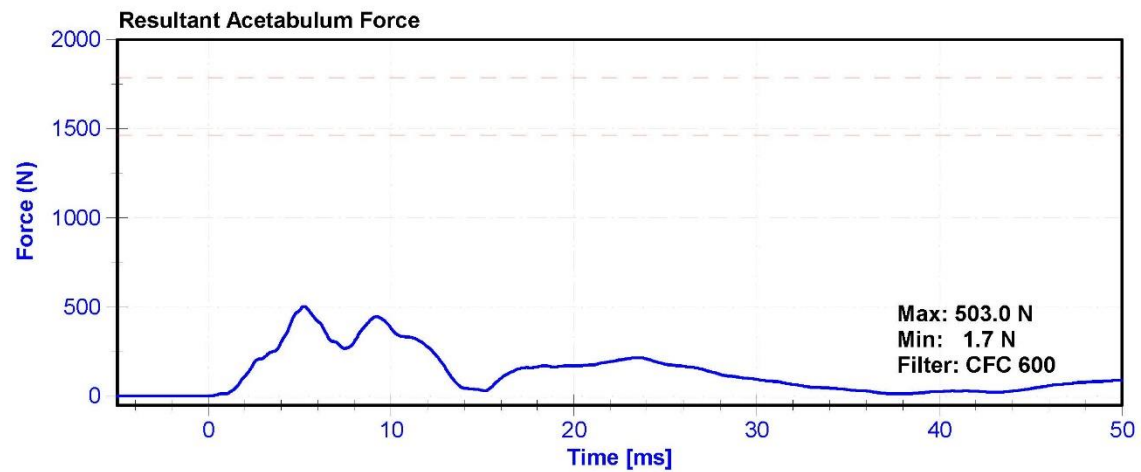
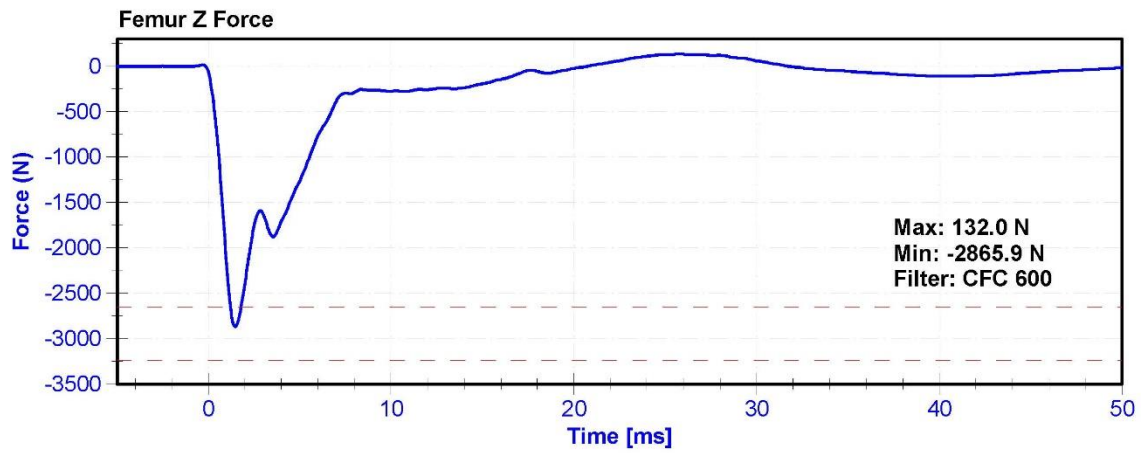
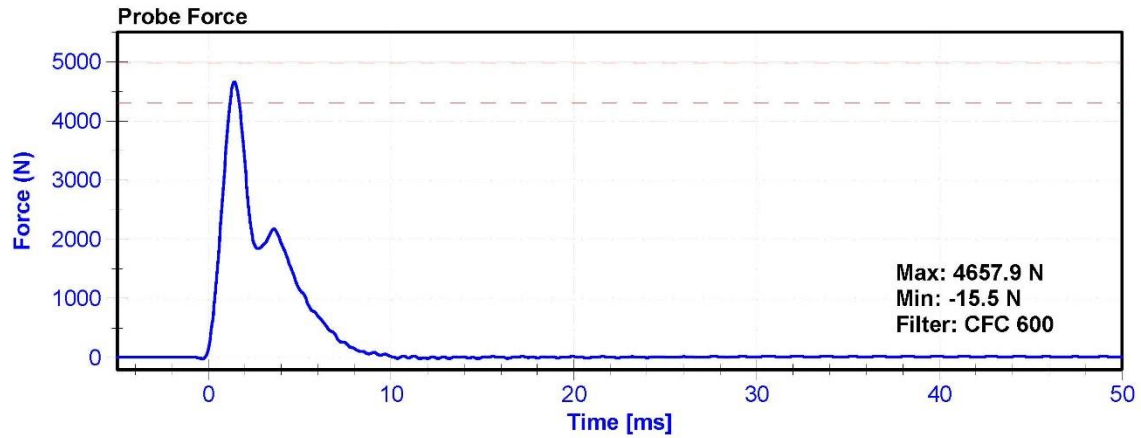
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	39.7	Pass
Impact Velocity	2.55	2.65	m/s	2.621	Pass
Probe Force	4,318	4,989	N	4657.9	Pass
Peak Femur Z Force	-3,241	-2,652	N	-2865.88	Pass
Peak Resultant Acetabulum Force	1,462	1,787	N	502.96	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accel	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Left Femur Load Cell	Denton W50-7101051	LC-DM4976 Fz	2/23/2015	2/23/2016
Left Acetabulum Load Cell	Humanetics 10530JI4	LC-DP4639 Fx	3/6/2015	3/5/2016



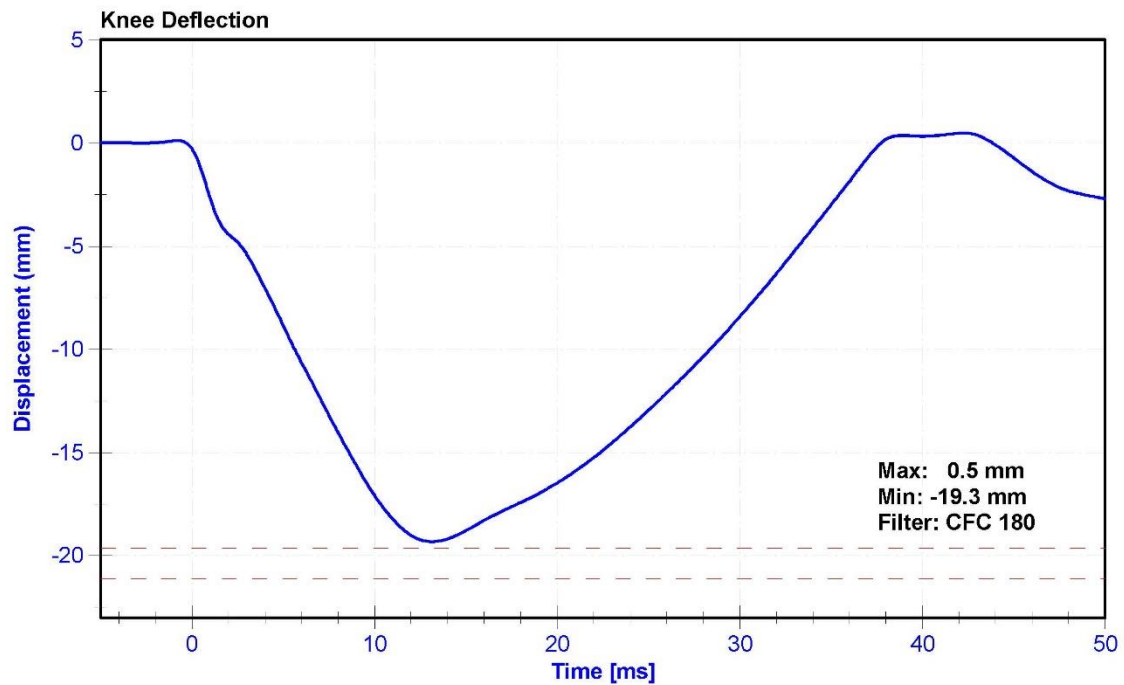
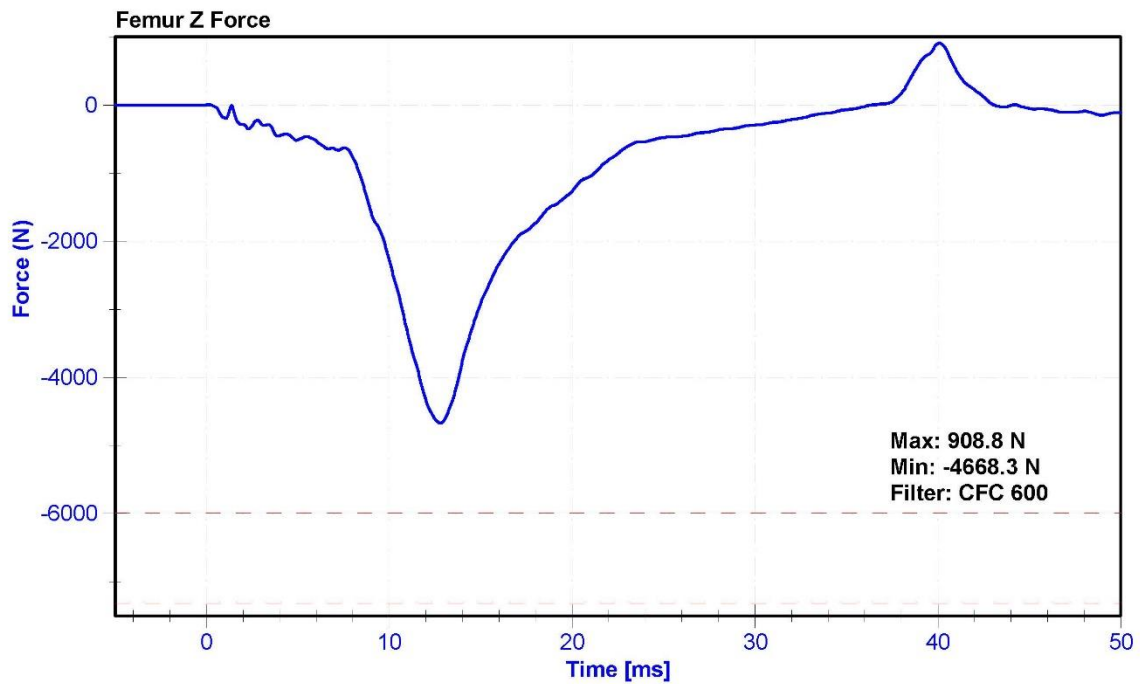
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40.9	Pass
Impact Velocity	2.15	2.25	m/s	2.205	Pass
Peak Femur Z Force	-7,317	-5,987	N	-4668.3	Fail
Knee Deflection at Peak Force	-21.12	-19.62	mm	-19.31	Fail

Transducer Calibrations

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



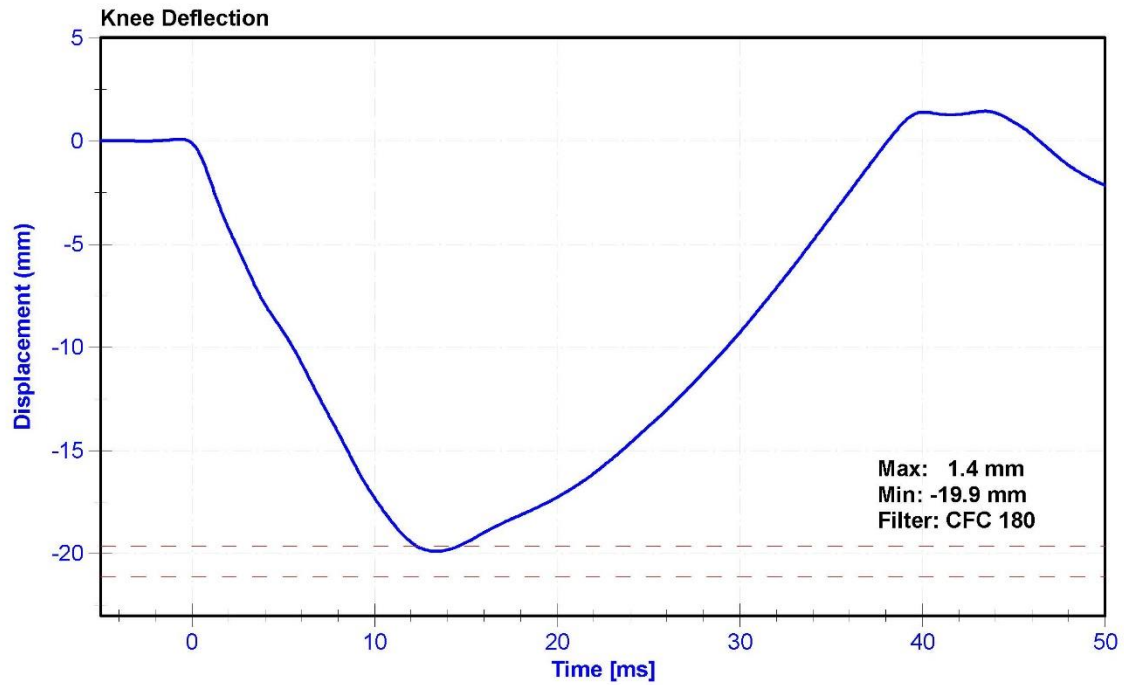
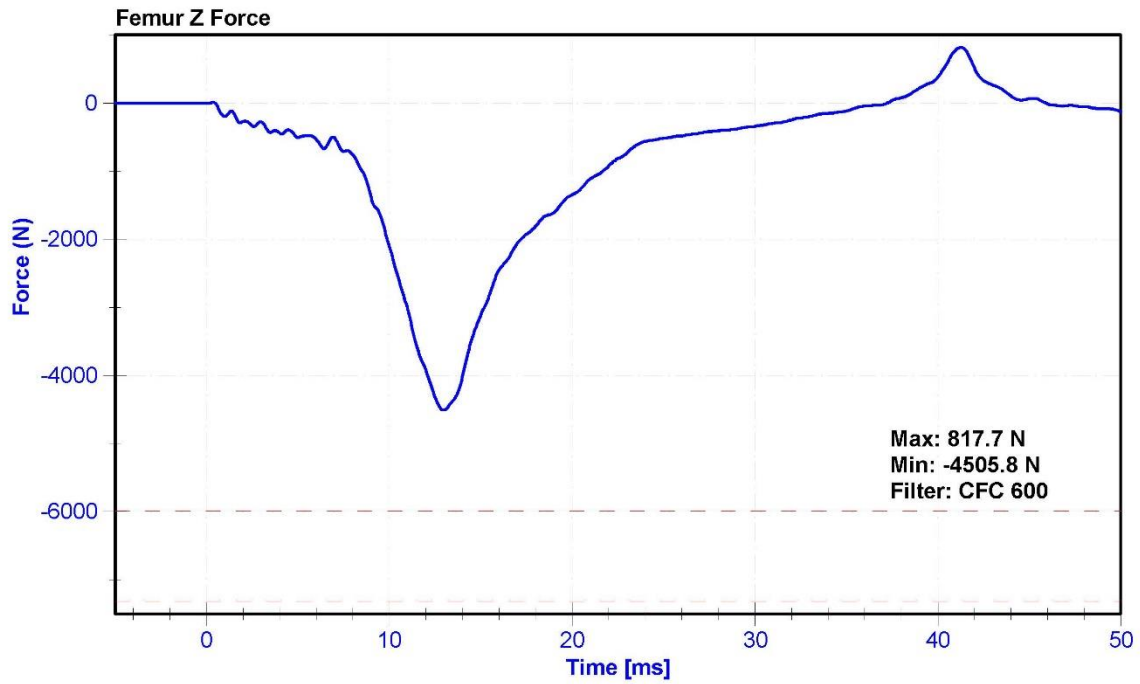
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	44.4	Pass
Impact Velocity	2.15	2.25	m/s	2.214	Pass
Peak Femur Z Force	-7,317	-5,987	N	-4505.8	Fail
Knee Deflection at Peak Force	-21.12	-19.62	mm	-19.88	Pass

Transducer Calibrations

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



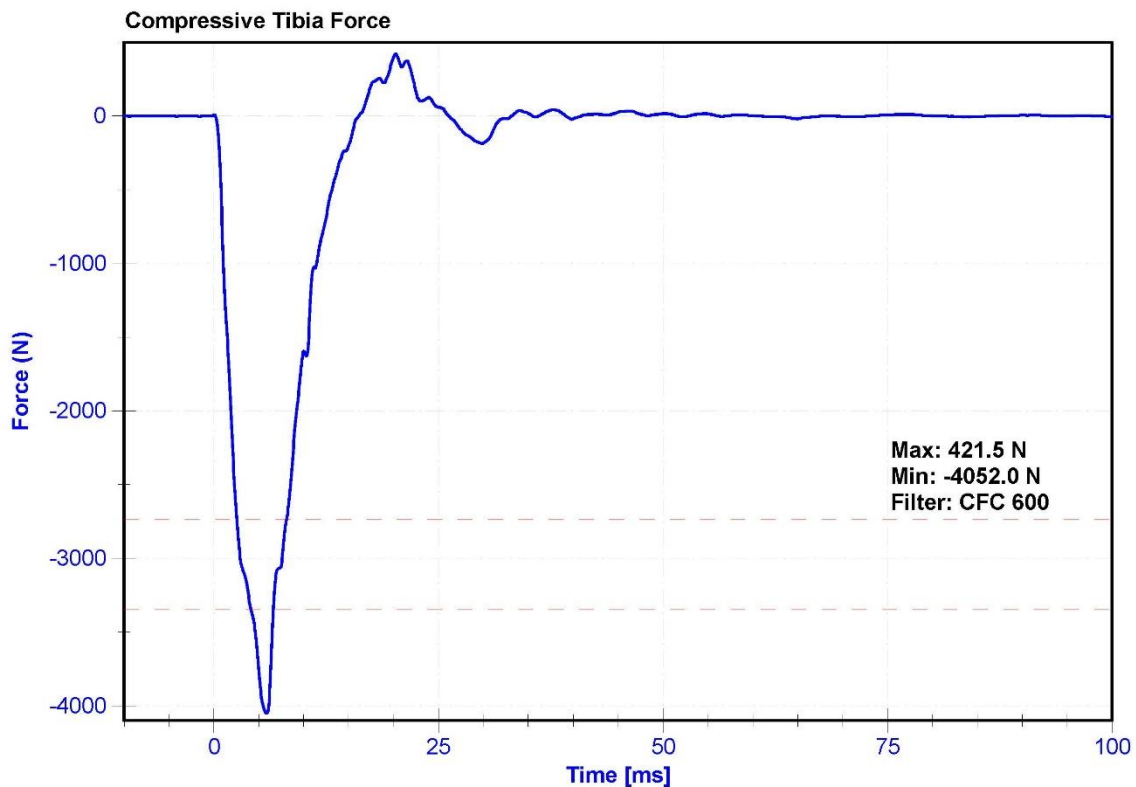
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	55.2	Pass
Velocity	3.9	4.1	m/s	3.948	Pass
Lower Tibia Compressive Force	2,738	3,346	N	-4052.0	Fail

Transducer Calibrations

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



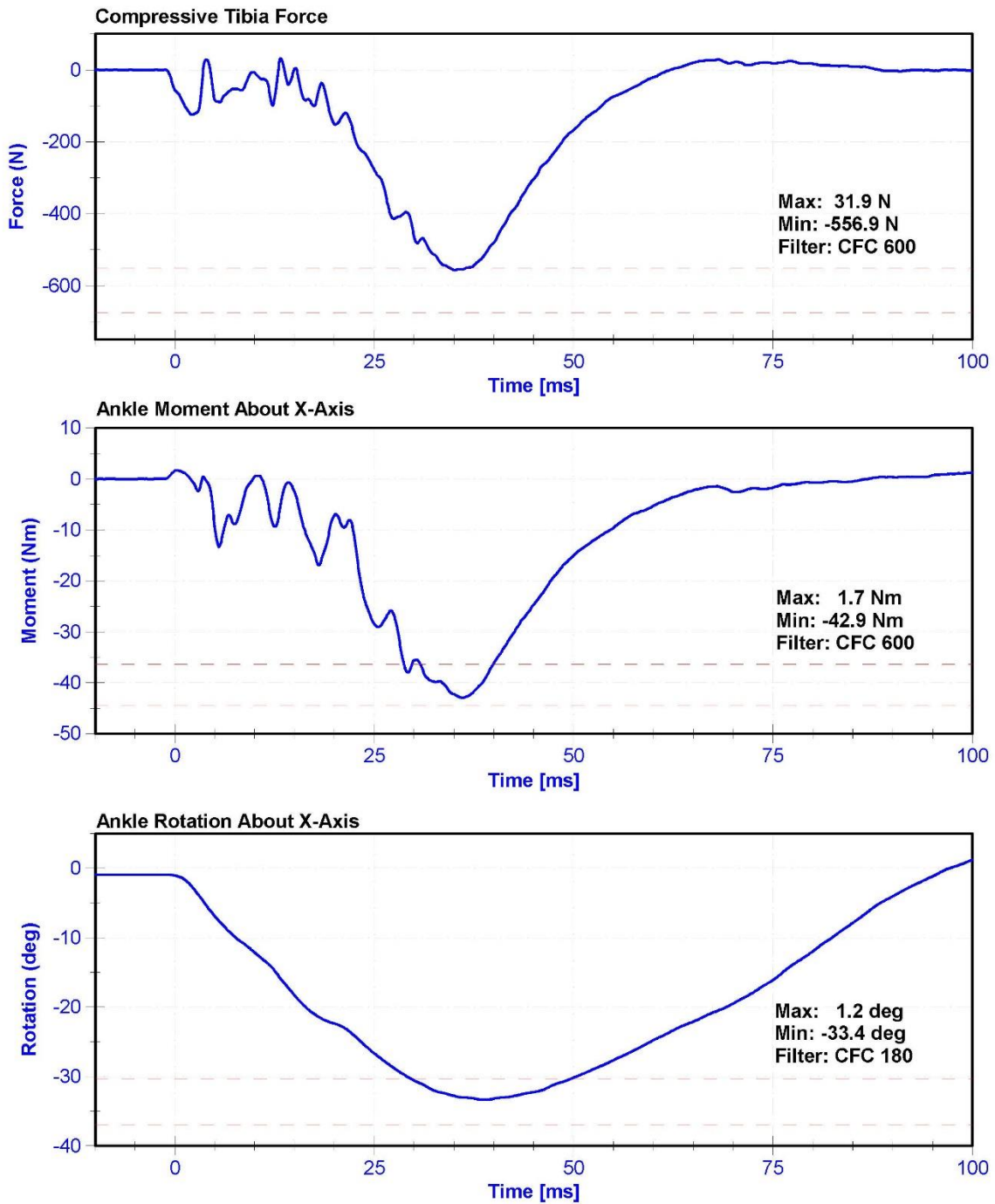
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	60.4	Pass
Velocity	1.9	2.1	m/s	1.934	Pass
Lower Tibia Compressive Force	-675	-552	N	-556.9	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-42.92	Pass
Peak Rotation about X-Axis	-37.0	-30.3	deg	-33.36	Pass

Transducer Calibrations

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



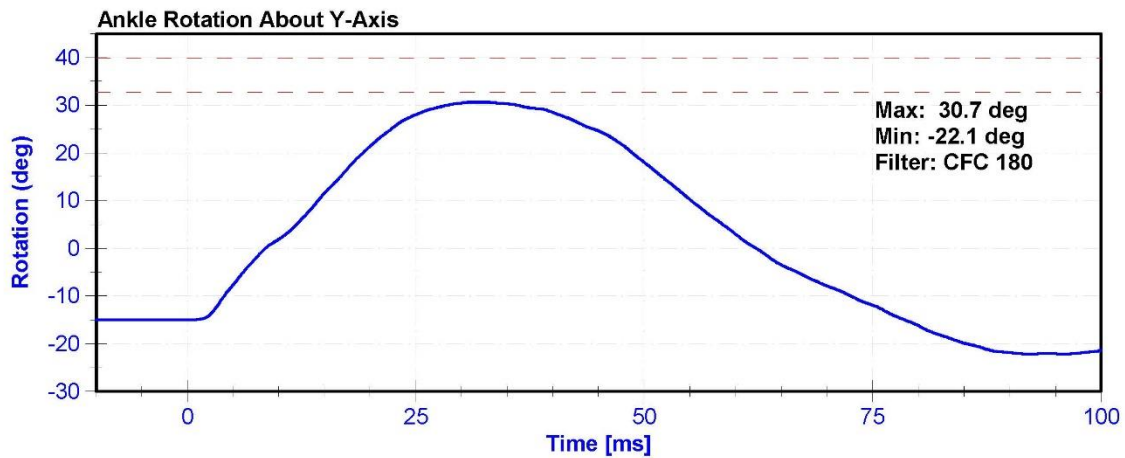
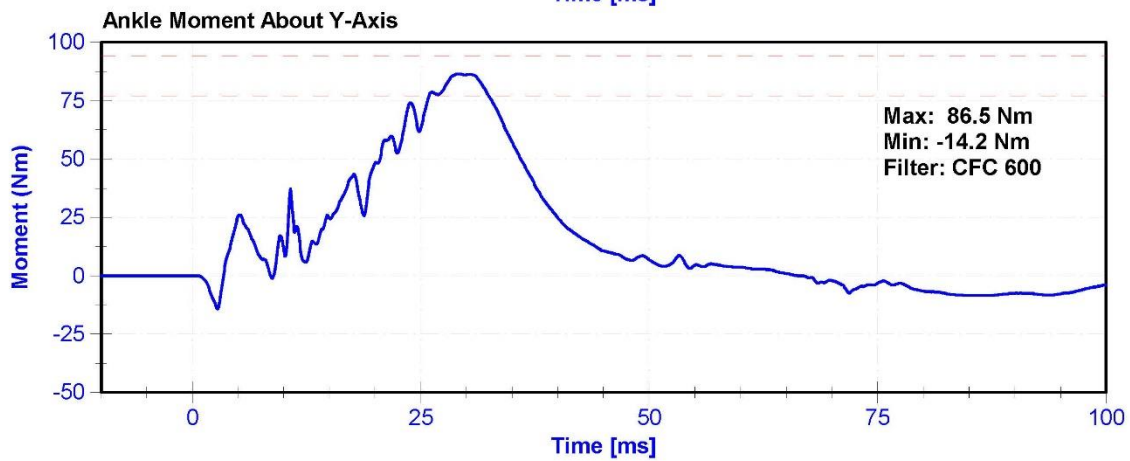
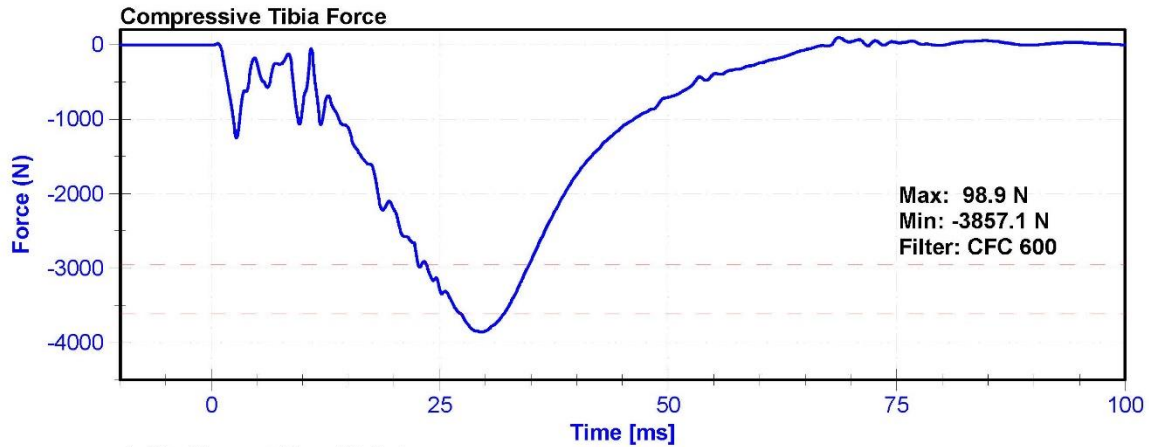
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	53.9	Pass
Velocity	4.9	5.1	m/s	4.916	Pass
Lower Tibia Compressive Force	-3,613	-2,956	N	-3857.1	Fail
Peak Moment about Y-Axis	77.1	94.2	Nm	86.48	Pass
Peak Rotation about Y-Axis	32.7	39.9	deg	30.69	Fail

Transducer Calibrations

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



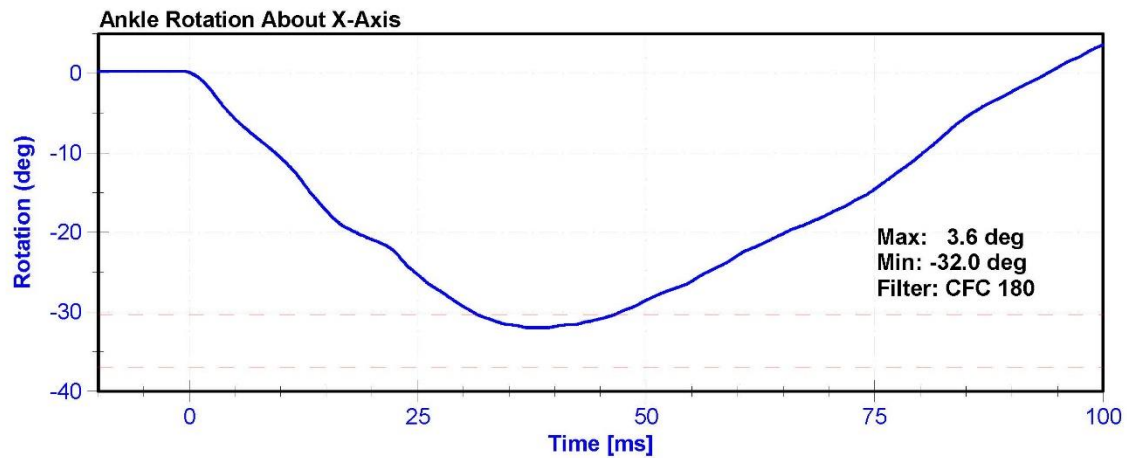
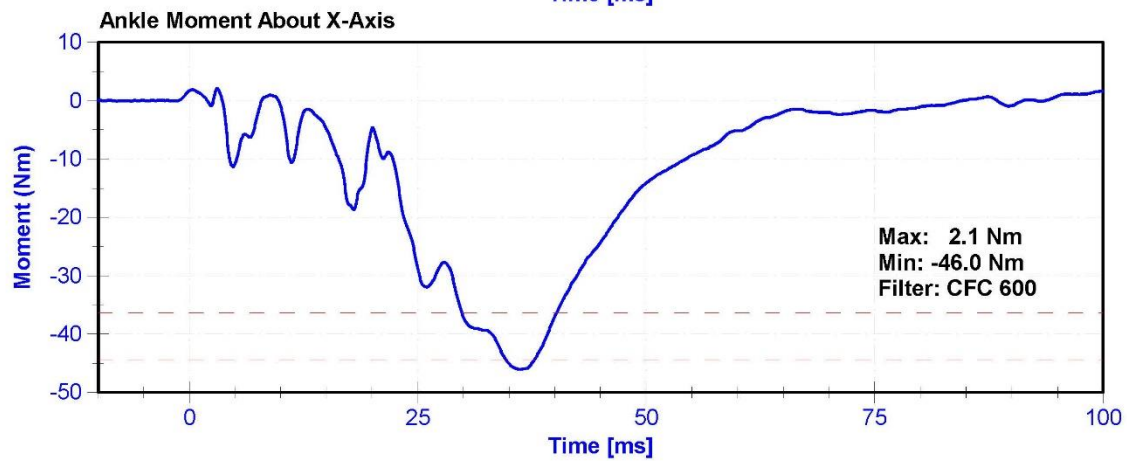
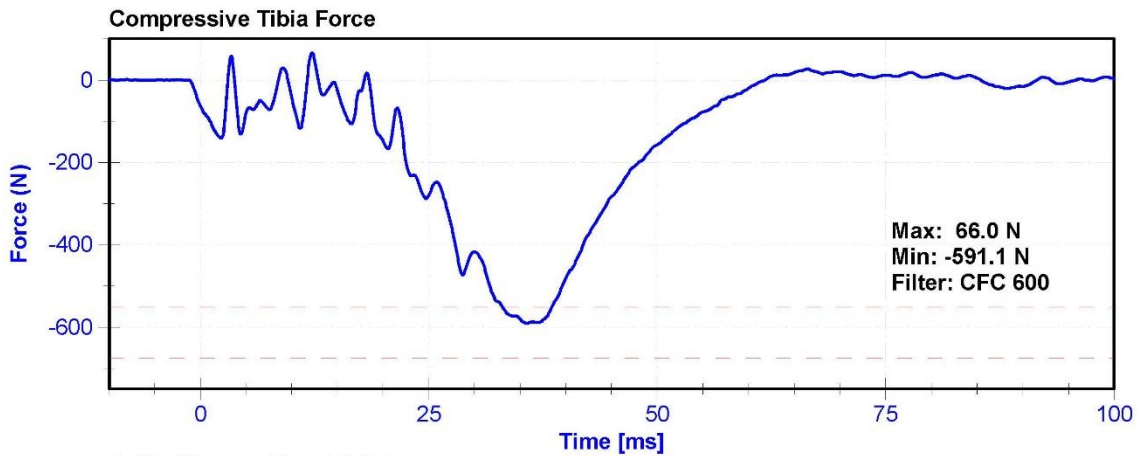
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	58.3	Pass
Velocity	1.9	2.1	m/s	1.939	Pass
Lower Tibia Compressive Force	-675	-552	N	-591.1	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-46.02	Fail
Peak Rotation about X-Axis	-37.0	-30.3	deg	-32.01	Pass

Transducer Calibrations

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



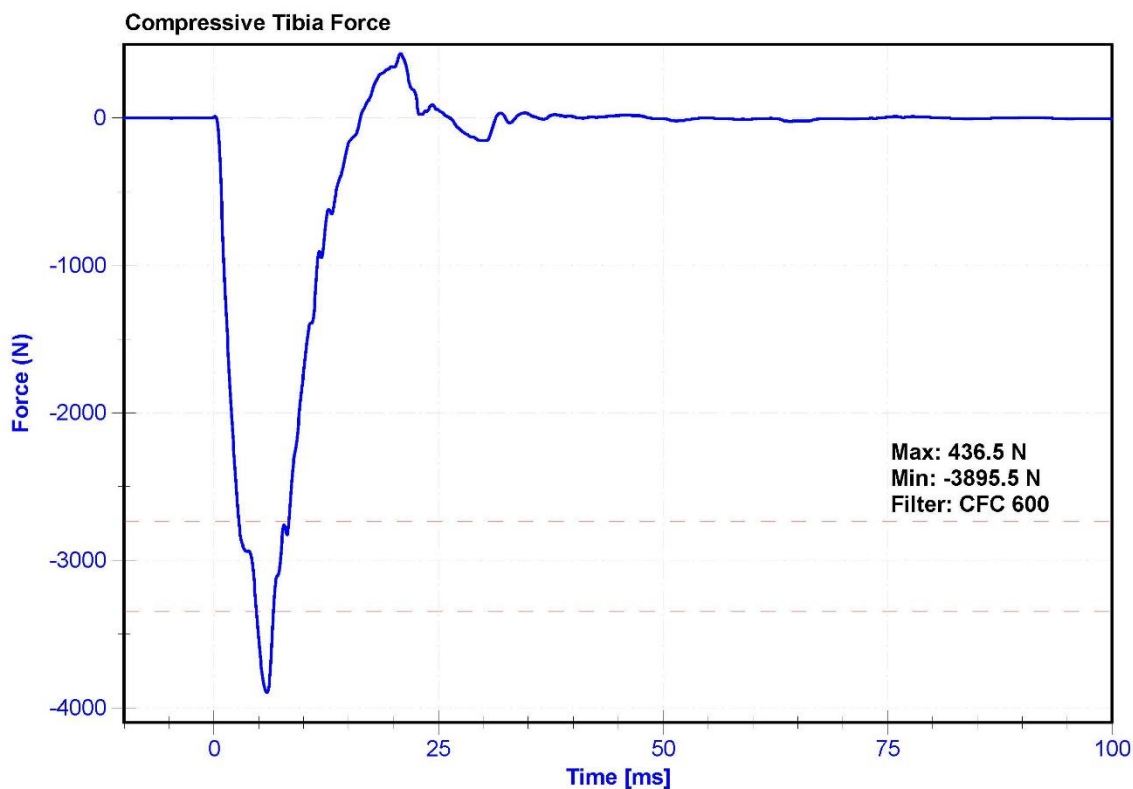
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	65.3	Pass
Velocity	3.9	4.1	m/s	3.908	Pass
Lower Tibia Compressive Force	2,738	3,346	N	-3895.5	Fail

Transducer Calibrations

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



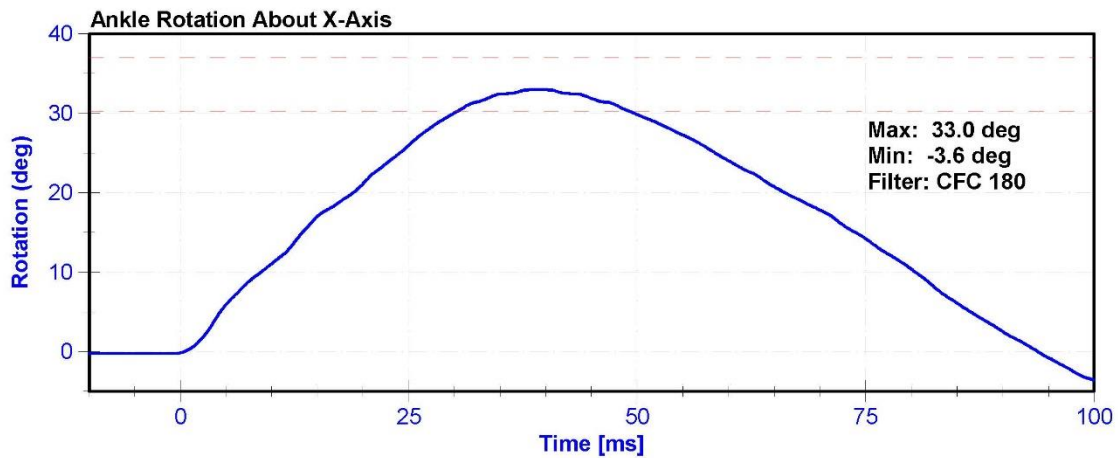
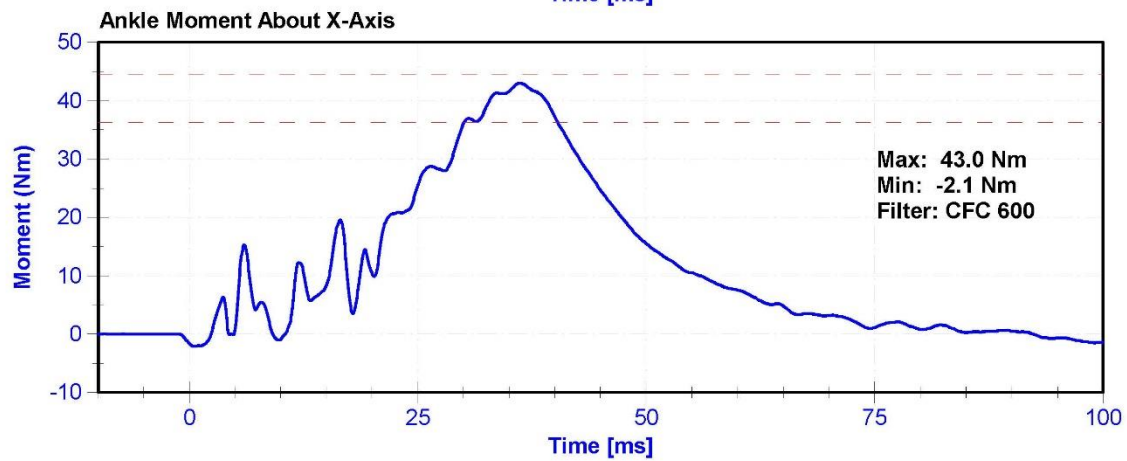
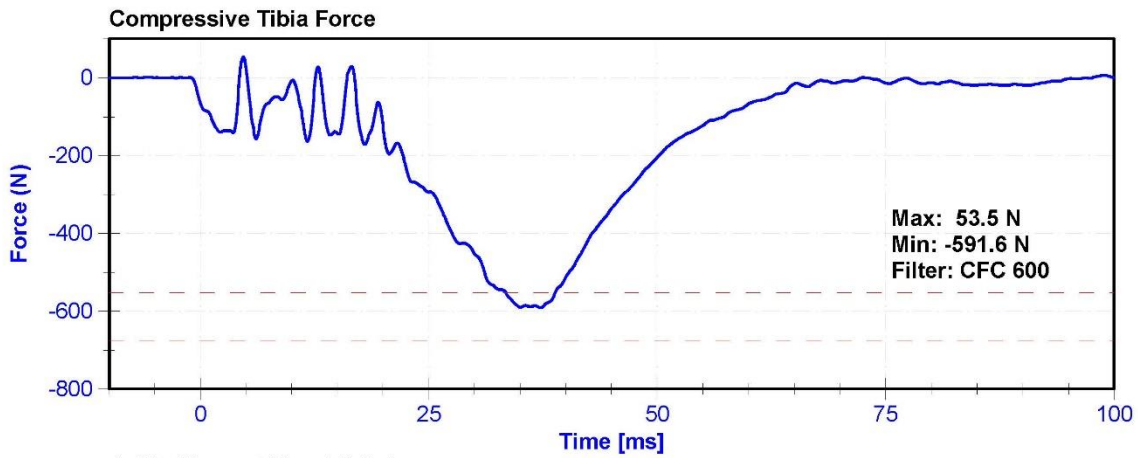
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	58.4	Pass
Velocity	1.9	2.1	m/s	2.016	Pass
Lower Tibia Compressive Force	-675	-552	N	-591.6	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	42.99	Pass
Peak Rotation about X-Axis	30.3	37.0	deg	32.97	Pass

Transducer Calibrations

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



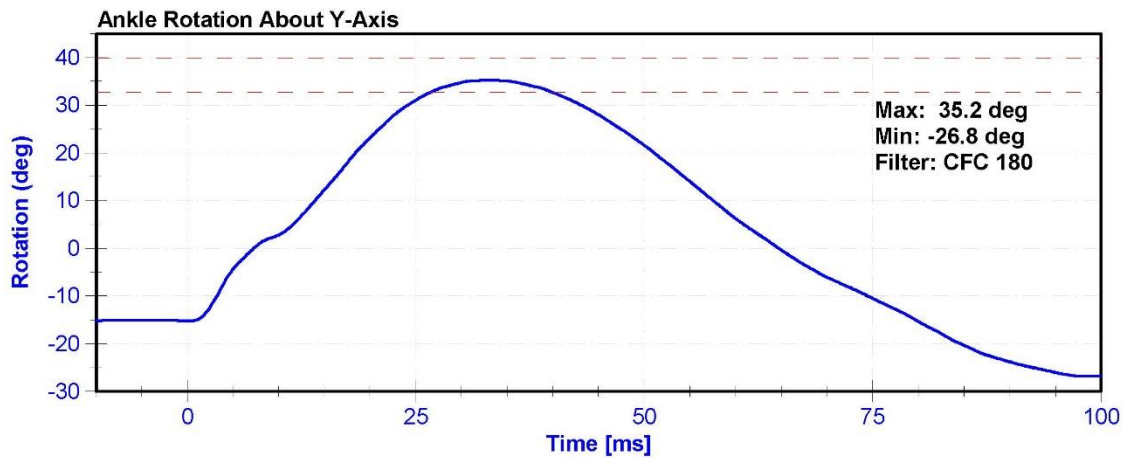
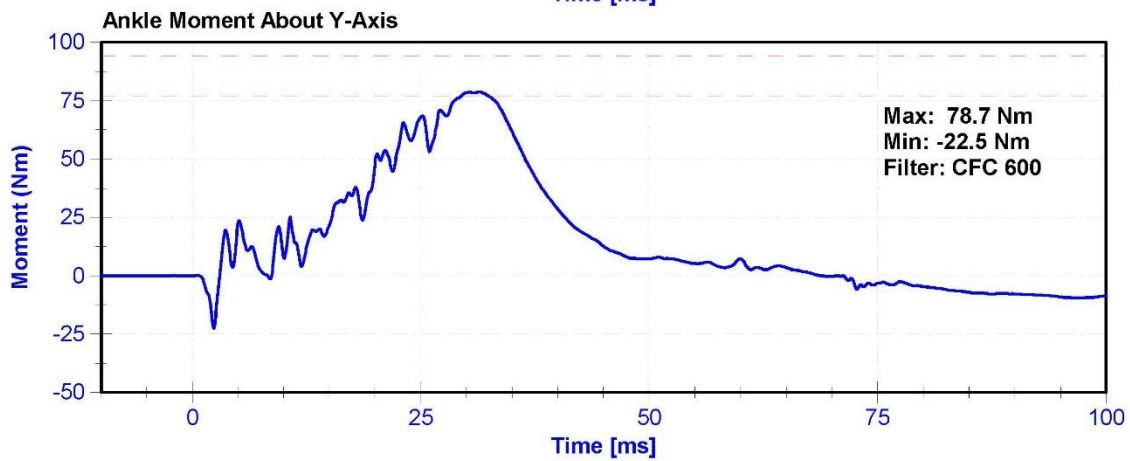
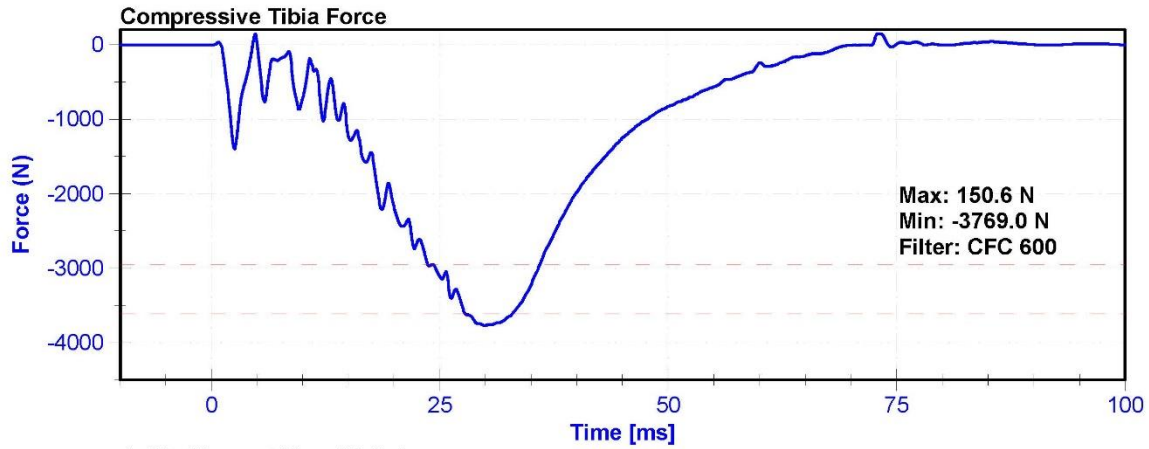
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	64.4	Pass
Velocity	4.9	5.1	m/s	4.916	Pass
Lower Tibia Compressive Force	-3,613	-2,956	N	-3769.0	Fail
Peak Moment about Y-Axis	77.1	94.2	Nm	78.73	Pass
Peak Rotation about Y-Axis	32.7	39.9	deg	35.23	Pass

Transducer Calibrations

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



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

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	58.2	Pass
Velocity	1.9	2.1	m/s	1.934	Pass
Lower Tibia Compressive Force	-675	-552	N	-596.9	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	43.63	Pass
Peak Rotation about X-Axis	30.3	37.0	deg	30.72	Pass

Transducer Calibrations

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

