

REPORT NUMBER: R&D-CAL-15-010

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

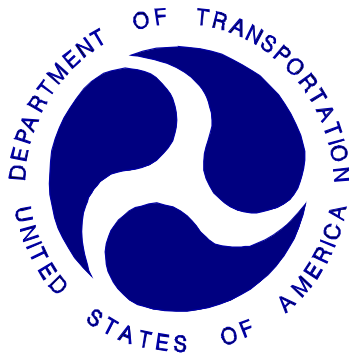
2016 Mazda CX-5

90.1KPH, 15 DEGREE ANGLE, 35% OVERLAP

TEST DATE: 11/11/2015

NHTSA No: R20165408

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FINAL REPORT SUBMITTED:

May 6, 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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Vanessa Hansen, Test Engineer

Date: May 6, 2016

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Edward J. Dutton, Operations Manager
Transportation Test Operations

Date: May 6, 2016

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

Date: _____

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

Date: _____

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. R&D-CAL-15-010	2. Government Accession No.		3. Recipient's Catalog No.																																					
4. Title and Subtitle Report for Frontal Oblique Offset Program Testing of a 2016 Mazda CX-5 SUV NHTSA No.: R20165408			5. Report Date 5/6/2016																																					
			6. Performing Organization Code CAL																																					
7. Author(s) Vanessa Hansen, Test Engineer Ed Dutton, Operations Manager			8. Performing Organization Report No. CAL-DOT-2015-010																																					
9. Performing Organization Name and Address Calspan Corporation 4455 Genesee Street Buffalo, New York 14225			10. Work Unit No.																																					
			11. Contract or Grant No. DTNH22-14-D-00359																																					
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Research 1200 New Jersey Ave SE, Room W46-446 Washington, DC 20590			13. Type of Report and Period Covered Final Report, 5/6/2016																																					
			14. Sponsoring Agency Code NVS-321																																					
15. Supplementary Notes																																								
16. Abstract A test was conducted in accordance with Contract DTNH22-14-D-00359, Task Order #003. The Test consisted of a 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 11, 2015. The OMDB impact velocity was 90.07 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 436 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>283.62</td> <td>308.37</td> </tr> <tr> <td>Brain Injury Criteria (BrIC)</td> <td>N/A</td> <td>0.73</td> <td>0.81</td> </tr> <tr> <td>Peak Neck Tension</td> <td>mm</td> <td>1711.55</td> <td>1708.35</td> </tr> <tr> <td>Peak Resultant Chest Deflection</td> <td>N/A</td> <td>52.87</td> <td>34.78</td> </tr> <tr> <td>Peak Abdomen Deflection</td> <td>N</td> <td>-62.69</td> <td>-47.90</td> </tr> <tr> <td>Peak Resultant Acetabulum force</td> <td>N</td> <td>1862.97</td> <td>3696.96</td> </tr> <tr> <td>Peak Femur Force</td> <td>N</td> <td>-2965.06</td> <td>-3564.21</td> </tr> <tr> <td>Right Tibia Index</td> <td>N</td> <td>0.59</td> <td>0.59</td> </tr> </tbody> </table>					Measurement Description	Units	Driver THOR	Pass. THOR	Head Injury Criteria (HIC ₁₅)	N/A	283.62	308.37	Brain Injury Criteria (BrIC)	N/A	0.73	0.81	Peak Neck Tension	mm	1711.55	1708.35	Peak Resultant Chest Deflection	N/A	52.87	34.78	Peak Abdomen Deflection	N	-62.69	-47.90	Peak Resultant Acetabulum force	N	1862.97	3696.96	Peak Femur Force	N	-2965.06	-3564.21	Right Tibia Index	N	0.59	0.59
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17. Key Words THOR Oblique Offset		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Reference Division 1200 New Jersey Ave, SE Washington, DC 20590																																						
19. Security Classif. (of this report) UNCLASSIFIED	20. Security Classif. (of this page) UNCLASSIFIED	21. No. of Pages	22. Price																																					

DISCLAIMER

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

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Date: May 6, 2016

Approved by: Edward J. Dutton
Edward J. Dutton, Test Engineer Director
Transportation Test Operations

Date: May 6, 2016

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Test Program:	<u>R&D 90.1kph, 15° / 35% Left Oblique Offset</u>	Test Date:	<u>11/11/2015</u>

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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.: R20165408
Test Date: 11/11/2015

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.

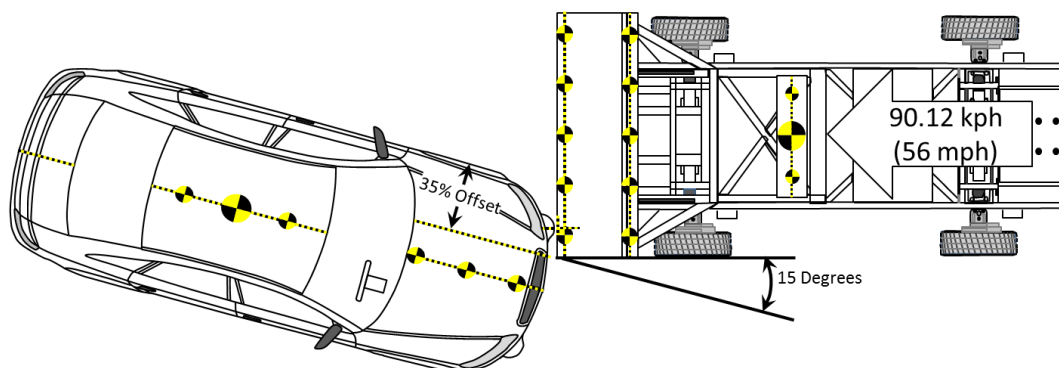
This test was conducted in accordance with the instructions set forth for a 15° angle, 35% offset moving barrier to vehicle impact, outlined in Contract No. DTNH22-14-D-00359, Task Order 0003. Data was obtained indicant of Federal Motor Vehicle Safety Standard FMVSS 208- Occupant Crash Protection, FMVSS 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.: R20165408
Test Date: 11/11/2015

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 11, 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
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165408
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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 74.4% total windshield retention, with 61.1% and 87.7% 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 436 mm at C2 to the left of the vehicle's centerline. The maximum crush of the structural bumper beam was 397 mm at B3, 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 A-Pillar, 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
- Torso contacted the frontal and torso airbag, 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
- Torso contacted the frontal airbag
- 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.: R20165408
Test Date: 11/11/2015

Primary Impact Data

Measured Parameter	Units	Value
OMDB Velocity at Impact	kph	90.07
OMDB Test Weight	kg	2519
OMDB Maximum Static Crush	mm	421
Vehicle Test Weight	kg	1775
Actual Vehicle Angle	degrees	15
Vehicle Maximum Static Crush	mm	436
Vertical Offset from Target Point (+ down / - up)*	mm	-9
Lateral Offset from Target Point (+ left / - right)*	mm	+4
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	A49-A51	Front Airbag & Headliner	A70-A72
Upper Torso Contact	Front & Torso/Pelvis Airbags	N/A	Front Airbag & shoulder hit center Instrument Panel	N/A
Lower Torso Contact	None	N/A	None	N/A
Side Torso Contact	Arm Contacted Door	N/A	None	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 Front Neck Spring Tower Load Cell, Questionable spikes 101ms to 134ms	Loose pins in Amphenol connector
Driver Lower Neck Y Force, Questionable spike 113ms to 183ms	Given permission to run with the pulsing noise existing in the pretest data... posttest fixed some loose Amphenol pins... pulsing noise still will occur.
Driver Lower Neck Z Force, Questionable spike 183ms	Given permission to run with the pulsing noise existing in the pretest data... posttest fixed some loose Amphenol pins... pulsing noise still will occur.
Driver Lower Neck X Moment, Questionable spikes throughout	Given permission to run with the pulsing noise existing in the pretest data... posttest fixed some loose Amphenol pins... pulsing noise still will occur.
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Driver Lower Neck Z Moment, Questionable spikes throughout	Given permission to run with the pulsing noise existing in the pretest data... posttest fixed some loose Amphenol pins... pulsing noise still will occur.
Driver Thorax Lower Left X Displacement, Questionable spikes 15.8ms to 88.5ms	Could not reproduce posttest – could be result of poor internal grounding
Driver Abdomen Left X Displacement, Questionable spike 20.4ms	Could not reproduce posttest – could be result of poor internal grounding
Front Passenger Thorax Upper Right X Displacement, Questionable spike 34.3ms	Could not reproduce posttest – could be result of poor internal grounding
Front Passenger T1 X Acceleration, Questionable spikes throughout	Could not reproduce posttest – could be result of poor internal grounding
Front Passenger Lower Tibia Right Y Moment, Questionable data 82.9ms to 105ms	Pins came loose in Amphenol connector
Driver Floor Pan Y Acceleration, Questionable magnitude 47.6ms	Saturated channel of 2,000G's

PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: R20165408 - 2016 Mazda CX-5 NHTSA No.: R20165408
 Test Program: NHTSA R&D Left Oblique Offset 15deg/35% Test Date: 11/11/2015

Driver: THOR Serial No. DO9798 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	HIC 15ms		Compute	283.62	
	Brain Injury Criteria (BrIC)		Compute	0.73	
	Head Rotational Velocity X	Deg/s	60	846.29	-1172.04
	Head Rotational Velocity Y	Deg/s	60	1259.27	-1668.78
	Head Rotational Velocity Z	Deg/s	60	756.49	-1012.38
Neck	Upper Neck Z-axis Force	N	1000	1711.55	-238.68
	Upper Neck Y-axis Moment	Nm	Thortest	44.85 ⁽¹⁾	-20.48 ⁽¹⁾
Chest	Upper Left Resultant Chest Deflection	mm	Thortest	25.20	
	Upper Right Resultant Chest Deflection	mm	Thortest	52.87	
	Lower Left Resultant Chest Deflection	mm	Thortest	13.13 ⁽²⁾	
	Lower Right Resultant Chest Deflection	mm	Thortest	40.51	
Abdomen	Lower Left X-axis Deflection	mm	Thortest	0.10 ⁽³⁾	-54.15 ⁽³⁾
	Lower Right X-axis Deflection	mm	Thortest	2.83	-62.69
Acetabulum	Left Acetabulum Resultant Force	N	Compute	1387.36	0.08
	Right Acetabulum Resultant Force	N	Compute	1862.97	0.06
Femur	Left Femur Force, FZ	N	600	278.53	-2965.06
	Right Femur Force, FZ	N	600	276.36	-2372.51
Tibia	Left Upper Tibia, FZ	N	600	71.21	-1243.97
	Left Upper Tibia Index		Compute	0.50	
	Right Upper Tibia, FZ	N	600	275.08	-1679.52
	Right Upper Tibia Index		Compute	0.45	
	Left Lower Tibia, FZ	N	600	266.81	-2224.32
	Left Lower Tibia Index		Compute	0.48	
	Right Lower Tibia, FZ	N	600	31.51	-2687.08
	Right Lower Tibia Index		Compute	0.59	
Ankle	Left Ankle Rotation, RX	Deg	180	2.59	-24.21
	Left Ankle Rotation, RY	Deg	180	31.95	-7.11
	Left Ankle Dorsiflexion Moment, MY	Nm	Compute	44.13	-13.11
	Left Ankle In/Eversion Moment, MX	Nm	Compute	32.37	-97.10
	Right Ankle Rotation, RX	Deg	180	0.46	-37.95
	Right Ankle Rotation, RY	Deg	180	13.38	-12.02
	Right Ankle Dorsiflexion Moment, MY	Nm	Compute	26.44	-69.30
	Right Ankle In/Eversion Moment, MX	Nm	Compute	23.17	-105.47

Anomalies: (1) Questionable spikes throughout lower neck load cell
 (2) Thorax Lower Left X Displacement, Questionable spikes 15.8ms to 88.5ms
 (3) Questionable spike 20.4ms

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: R20165408 - 2016 Mazda CX-5 NHTSA No.: R20165408
 Test Program: NHTSA R&D Left Oblique Offset 15deg/35% Test Date: 11/11/2015

Right Front Passenger: THOR Serial No. DL9207 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	HIC 15ms		Compute	308.37	
	Brain Injury Criteria (BrIC)		Compute	0.81	
	Head Rotational Velocity X	Deg/s	60	607.78	-1725.26
	Head Rotational Velocity Y	Deg/s	60	520.86	-1486.25
	Head Rotational Velocity Z	Deg/s	60	1211.28	-381.14
Neck	Upper Neck Z-axis Force	N	1000	1708.35	-52.02
	Upper Neck Y-axis Moment	Nm	Thortest	9.31	-30.06
Chest	Upper Left Resultant Chest Deflection	mm	Thortest	34.78	
	Upper Right Resultant Chest Deflection	mm	Thortest	26.02 ⁽⁴⁾	
	Lower Left Resultant Chest Deflection	mm	Thortest	28.23	
	Lower Right Resultant Chest Deflection	mm	Thortest	12.03	
Abdomen	Lower Left X-axis Deflection	mm	Thortest	0.03	-46.10
	Lower Right X-axis Deflection	mm	Thortest	0.19	-47.90
Acetabulum	Left Acetabulum Resultant Force	N	Compute	3696.96	0.08
	Right Acetabulum Resultant Force	N	Compute	1824.14	0.06
Femur	Left Femur Force, FZ	N	600	195.16	-3564.21
	Right Femur Force, FZ	N	600	1750.31	-1027.40
Tibia	Left Upper Tibia, FZ	N	600	125.55	-2621.56
	Left Upper Tibia Index		Compute	0.60	
	Right Upper Tibia, FZ	N	600	170.11	-2093.39
	Right Upper Tibia Index		Compute	0.59	
	Left Lower Tibia, FZ	N	600	177.49	-3289.18
	Left Lower Tibia Index		Compute	0.70	
	Right Lower Tibia, FZ	N	600	275.03	-2531.06
	Right Lower Tibia Index		Compute	1.93 ⁽⁵⁾	
Ankle	Left Ankle Rotation, RX	Deg	180	20.11	-31.50
	Left Ankle Rotation, RY	Deg	180	2.26	-26.80
	Left Ankle Dorsiflexion Moment, MY	Nm	Compute	9.59	-54.16
	Left Ankle In/Eversion Moment, MX	Nm	Compute	52.58	-115.15
	Right Ankle Rotation, RX	Deg	180	25.91	-31.01
	Right Ankle Rotation, RY	Deg	180	-4.92	-26.13
	Right Ankle Dorsiflexion Moment, MY	Nm	Compute	10.53 ⁽⁵⁾	-434.75 ⁽⁵⁾
	Right Ankle In/Eversion Moment, MX	Nm	Compute	116.40	-108.84
Anomalies: (4) Thorax Upper Right X Displacement, Questionable spike 34.3ms (5) Lower Tibia Right Y Moment, Questionable data 82.9ms to 105ms					

SECTION 3 DATA SHEETS

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

NHTSA No.: R20165408
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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.: R20165408
 Test Date: 11/11/2015

VEHICLE INFORMATION

NHTSA No.	R20165408
Model Year	2016
Make	Mazda
Model	CX-5
Body Style	SUV
VIN	JM3KE4BY3G0669286
Body Color	Charcoal Gray
Odometer Reading (km/mi)	72.4 km / 45 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

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

VEHICLE SEATING AND WEIGHT CAPACITY

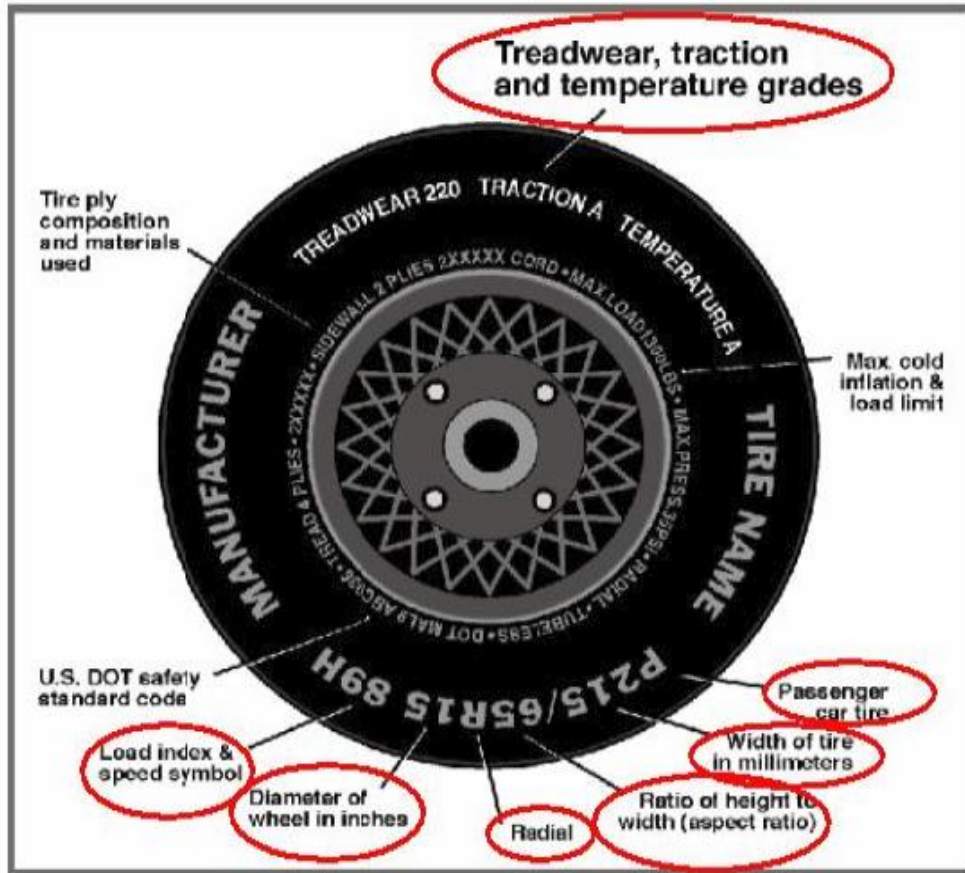
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	-	
Number of Occupants	2	3	-	5
Capacity Wt. (VCW) (kg)				385
Cargo Wt. (RCLW) (kg)				44.8

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

NHTSA No.: R20165408
 Test Date: 11/11/2015

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



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	230	230
Recommended Tire Size	P225/65R17	P225/65R17
Tire Size on Vehicle	P225/65R17	P225/65R17
Tire Manufacturer	Yokohama	Yokohama
Tire Model	Geolander G91	Geolander G91
Treadwear	280	280
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	100H	100H
Tire Material	Rubber	Rubber
DOT Safety Code Right	FDFSPC5201520	FDFSPC5201520
DOT Safety Code Left	FDFSPC5201520	FDFSPC5201520

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

NHTSA No.: R20165408
 Test Date: 11/11/2015

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	467	322		522	381	
Right	kg	429	333		461	411	
Ratio	%	57.8	42.2		55	45	
Totals	kg	896	655	1551	983	792	1775

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1551
Weight of 2 THOR ATDs	kg	184
Rated Cargo/Luggage Weight (RCLW)	kg	44.8
Calculated Vehicle Target Weight (TVTW)	kg	1779.8

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	877	881	886	897	1138
As Tested	mm	862	862	867	868	1202
Post Test	mm	825	838	812	956	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2695
Total Vehicle Length at Left Side	mm	4408
Total Vehicle Length at Centerline	mm	4541
Total Vehicle Length at Right Side	mm	4408
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:

Trunk carpeting, spare tire, jack, tail light, rear seats, rear door windows and panels,
Rear bumper skin and bumper beam, muffler, side view mirrors

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

NHTSA No.: R20165408
 Test Date: 11/11/2015

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Units	Pre-Test
1	Total Length	mm	4541
2	Total Width	mm	1830
3*	Bumper Top Height	mm	631
4*	Bumper Bottom Height	mm	547
5*	Longitudinal Member Top Height	mm	649
6	Distance Between Longitudinal Members	mm	1008
7	Longitudinal Member Width	mm	61
8*	Engine Top Height	mm	938
9*	Engine Bottom Height	mm	275
10	Engine and Gearbox Width	mm	567
11	Front Bumper-Engine Distance	mm	496
12*	Front Shock Absorber Fixing Height	mm	1020
13*	Bonnet Leading Edge Height	mm	909
14	Front Shock Absorber Fixing Width	mm	1185
15	Front Bumper – Front Axle Distance	mm	935
16	Front Axle – A Pillar Distance	mm	560
17	A-Pillar – B-Pillar Distance	mm	1073
18	B-Pillar – Rear Axle Distance	mm	1062
19	B-Pillar – C-Pillar Distance	mm	925
20*	Roof Sill Bottom Height	mm	1552
21*	Roof Sill Top Height	mm	1608
22*	Floor Sill Bottom Height	mm	455
23*	Floor Sill Top Height	mm	500

*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

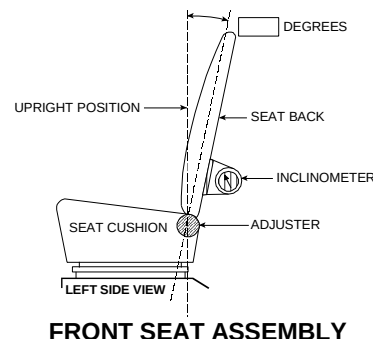
NHTSA No.: R20165408
 Test Date: 11/11/2015

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 moved rearward per THOR procedure to level the head.

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



	UNIT	FORM 1 POSITION	AFTER ATD POSITIONING
Driver Seat Back Angle	deg	5.6	7.1
Passenger Seat Back Angle	deg	3.6	5.9

SEAT FORE/AFT POSITIONS

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

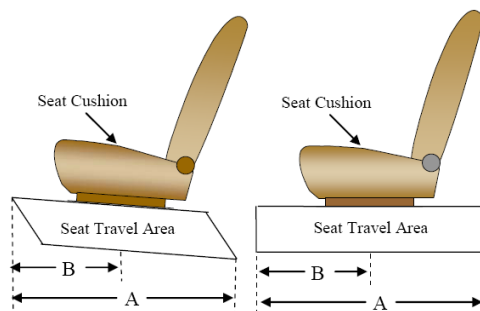
The driver's seat was positioned at its mid angle position and at the mid-point of fore/aft travel. The passenger's seat was positioned at the mid-point of fore/aft travel. Passenger was moved rearward for clearance per THOR seating procedure.

	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.: R20165408
 Test Date: 11/11/2015

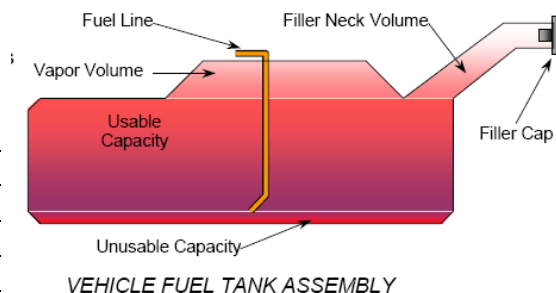
FUEL TANK CAPACITY

	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.

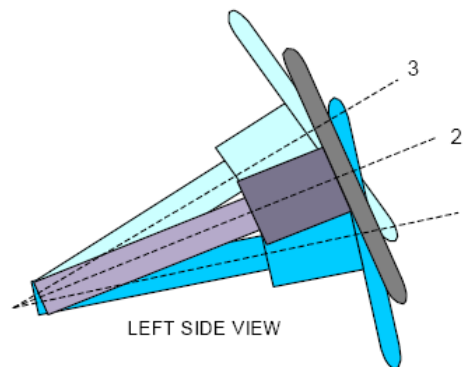
Fuel evacuated according to the specifications provided by the manufacturer in Form 1. Electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the left rear wheel.



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 ASSEMBLY

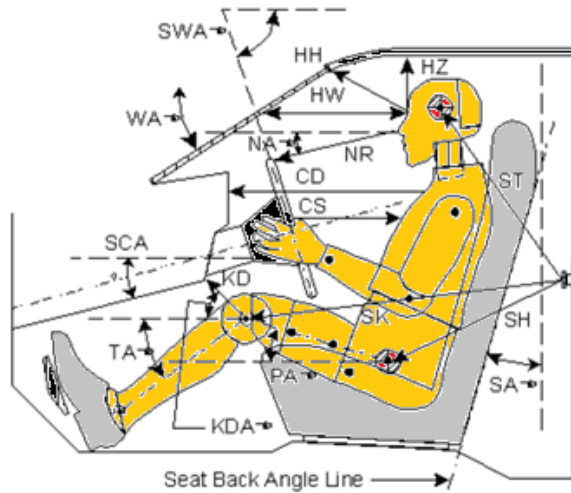
STEERING COLUMN POSITIONS

	Tilt (degrees)	Fore/Aft Position (mm)
Lowermost position No. 1	23	
Geometric center position No. 2	25.7	
Uppermost position No. 3	28.3	
Telescoping Steering Wheel Travel		50
Test Position	25.7	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.: R20165408
 Test Date: 11/11/2015

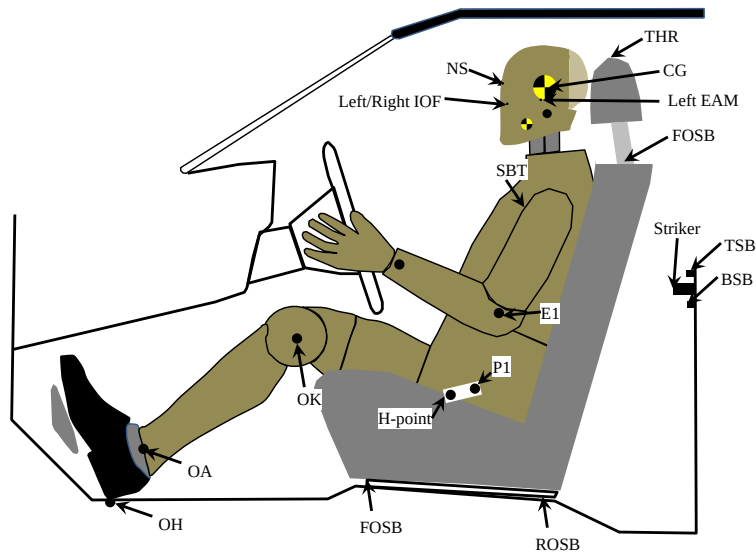


Code	Measurement Description	Driver (Serial#THOR DO9798)		Passenger (Serial#THOR DL9207)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		32		
SWA°	Steering Wheel Angle		26.1		
SCA°	Steering Column Angle		63.9		
SA°	Seat Back Angle (on headrest post)		7.1		5.9
SA°	Seat Back Angle				
HZ	Head to Roof (Z)	223	90	214	90
HH	Head to Header	421	21.0	428	18.3
HW	Head to Windshield	702	0	728	0
NR	Nose to Rim	507	17.0	674	32.6
CD	Chest to Dash	576		547	
CS	Chest to Steering Hub	363	10.4		
RA	Rim to Abdomen	173	0		
KDL	Left Knee to Dash	97	26.0	80	26.5
KDR	Right Knee to Dash	99	27.2	113	26.2
PA°	Pelvic Angle		32.2		33.1
TA°	Tibia Angle		51.2		45.9
SK	Striker to Knee	644	2.0	655	5.7
ST	Striker to Head	523	86.5	523	87.3
SH	Striker to H-Point	278	28.8	269	28.8
HAX°	Head Angle (X)		0.2		0.4
HAY°	Head Angle (Y)		-5.1		-6.6
TAX°	T6 Angle (X)		-0.1		0.6
TAY°	T6 Angle (Y)		22.4		23.1
TAX°	T1 (X)		0		0
TAY°	T1 (Y)		2.2		2.4
TAX°	T12 (X)		-0.2		0.3
TAY°	T12 (Y)		31.9		31.8
PAX	Pelvis (X)		-0.6		0.8
PAY	Pelvis (Y)		32.2		33.1

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.: R20165408
Test Date: 11/11/2015



Description	Units	Driver			Passenger		
		X	Y	Z	X	Y	Z
Head CG	mm	2102	-442	-759	2098	450	-759
Nasion	mm	2198	-366	-760	2193	369	-762
Tip of Nose	mm	2198	-368	-725	2189	371	-725
Tip of Chin	mm	2187	-368	-627	2176	368	-628
Left EAM	mm	2107	-438	-732	2100	299	-734
Right EAM	mm	2112	-292	-727	2103	446	-732
Left IOF	mm	2192	-399	-724	2184	337	-726
Right IOF	mm	2194	-335	-722	2185	403	-724
Outboard Elbow	mm	2313	-620	-288	2221	641	-245
H-Point	mm	2314	-621	-103	2309	612	-106
H-Point Tool	mm	2240	-617	-134	2235	611	-136
Outboard Knee Bolt	mm	2714	-575	-214	2725	540	-171
Inboard Knee Bolt	mm	2721	-275	-226	2724	305	-180
Outboard Ankle Bolt	mm	2965	-587	124	3016	515	125
Outer Heel Point	mm	2983	-566	257	2986	473	257
Inboard Heel Point	mm	2926	-209	266	2986	266	253
Striker Top Bolt	mm	2038	-801	-253	2040	800	-252
Striker Bottom Bolt	mm	2039	-803	-217	2042	802	-216
Center Tip of Striker	mm	2070	-801	-237	2073	800	-236
Front Outboard Seat Anchor Bolt	mm	2542	-612	166	2547	609	166
Rear Outboard Seat Anchor Bolt	mm	2098	-608	189	2102	610	189
Outboard Head Restraint Post	mm	1900	-452	-622	1894	455	-628
Top of Head Restraint	mm	1941	-367	-889	1946	370	-895
Center of Steering Wheel	mm	2585	-372	-446			

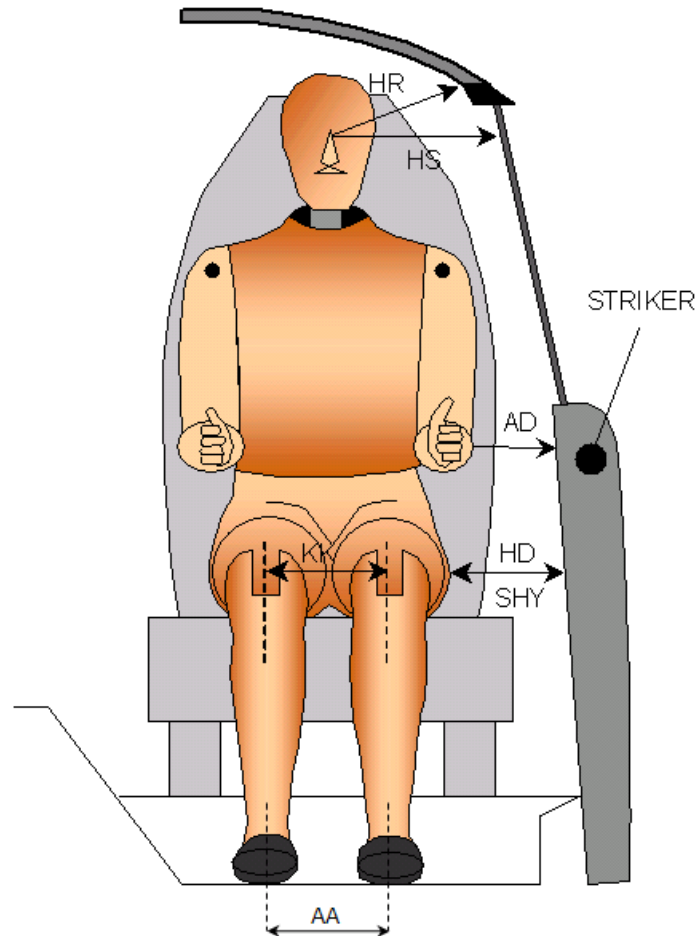
Reference point:

- +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.: R20165408
 Test Date: 11/11/2015

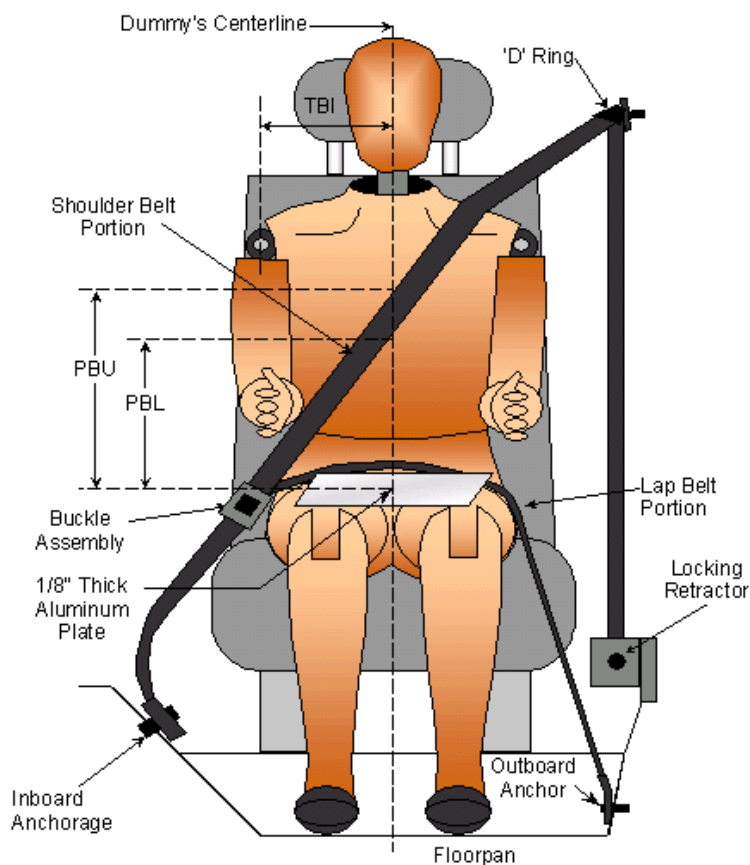


Code	Description	Units	Driver	Passenger
AD	Arm to Door	mm	142	50
HD	H-Point to Door	mm	195	197
HR	Head to Side Header	mm	238	233
HS	Head to Side Window	mm	345	340
KK	Knee to Knee	mm	345	270
SHY	Striker to H-Point (Y Direction)	mm	240	240
AA	Ankle to Ankle	mm	333	210

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.: R20165408
 Test Date: 11/11/2015



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

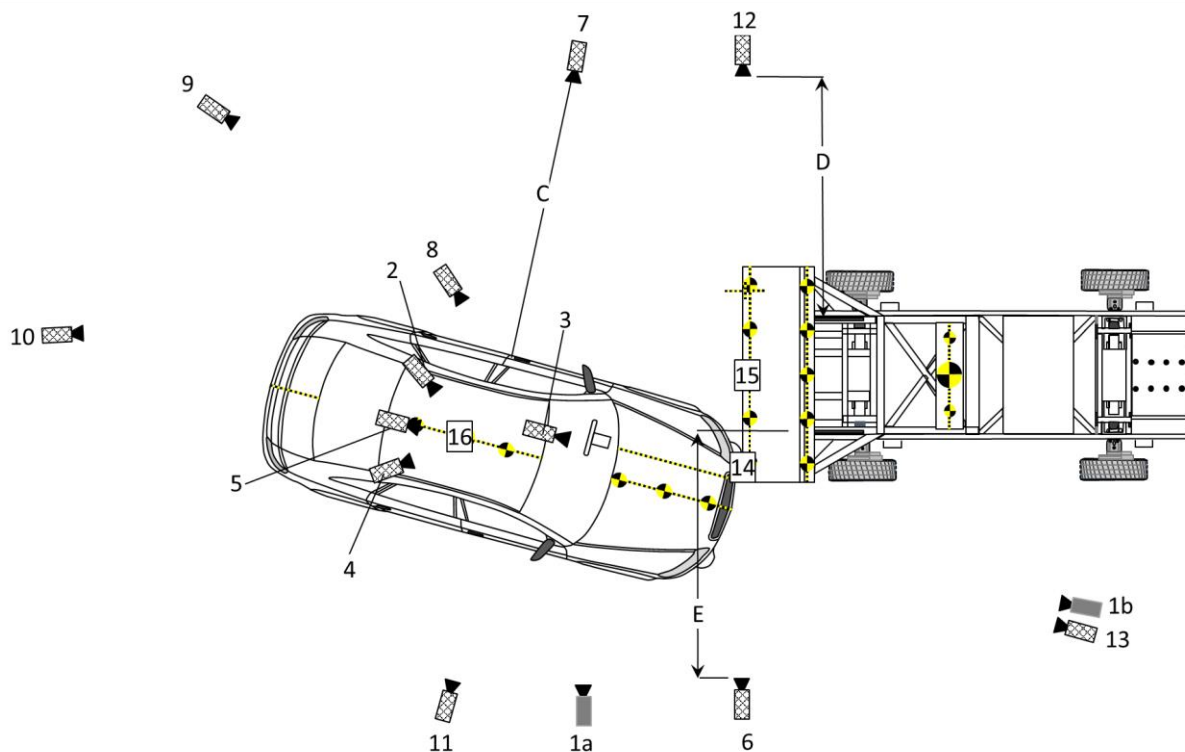
Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	875	895
Lap Belt Length as measured on ATD	mm	835	860
Remainder of belt on reel	mm	910	865
Total belt length for continuous webbing systems	mm	2620	2620

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

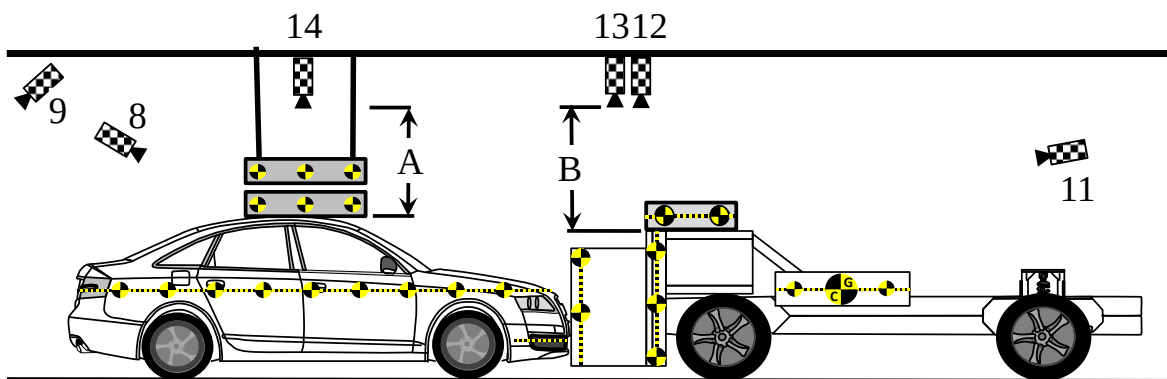
Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165408
 Test Date: 11/11/2015

HORIZONTAL LOCATION



VERTICAL LOCATION



A	mm	3631
B	mm	4136
C	mm	7823
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.: R20165408
 Test Date: 11/11/2015

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	7506	-384	1454	8	1000
3	Onboard Passenger Lower Leg	6587	-461	320	6.5	1000
4	Onboard Driver Movement	7592	-926	1454	8	1000
5	Onboard Centerline	7829	-598	1444	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

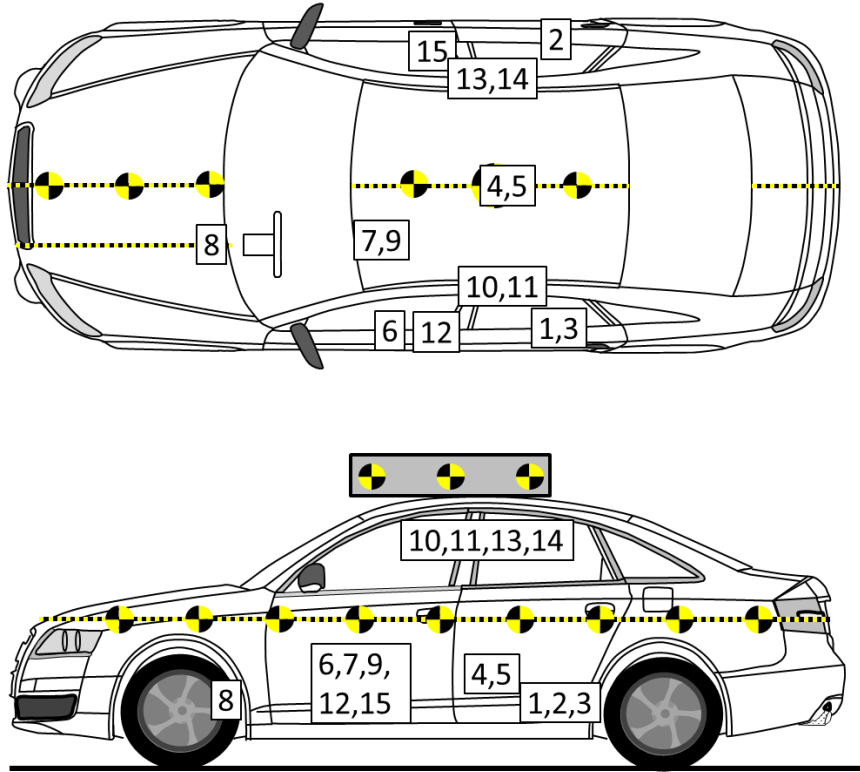
Reference Point:

- +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.: R20165408
Test Date: 11/11/2015



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	1775	-692	182
2	Right Rear Sill	X,Y	mm	1775	697	181
3	Left Rear Sill Redundant	X,Y	mm	1760	-691	182
4	Vehicle CG	X,Y,Z	mm	1855	0	94
5	Vehicle CG Angular Displacement	X	mm	1866	0	96
		Y	mm	1854	11	96
		Z	mm	1855	0	94
6	Left Side Seat Track	X,Y,Z	mm	2298	-598	201
8	Left Side Toe Pan	X,Y,Z	mm	3370	-374	78
7	Left Side String Pot	N/A	mm	3288	-329	164

Reference point:

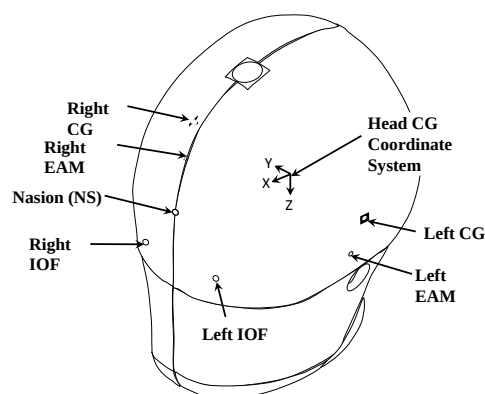
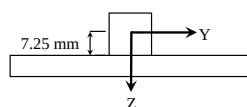
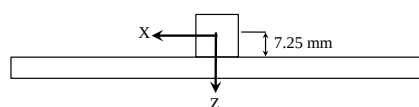
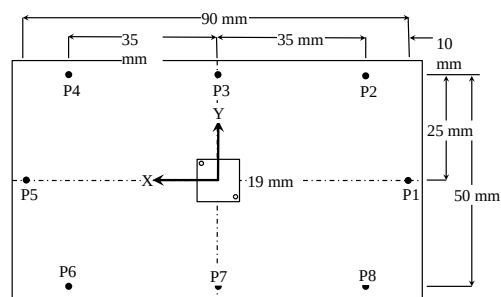
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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.: R20165408
 Test Date: 11/11/2015

ANGULAR RATE SENSOR MOUNTING PLATE & THOR HEAT POINT DEFINITIONS



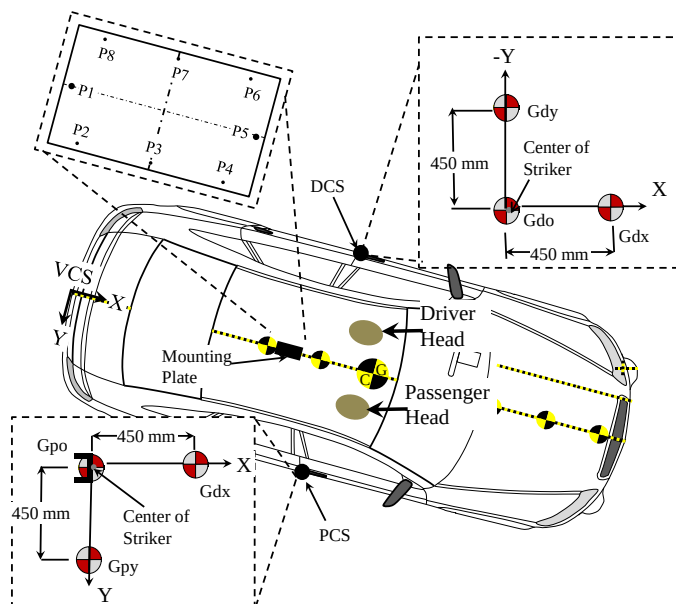
ARS MOUNTING PLATE - VEHICLE COORDINATE SYSTEM					
No.	Description	Units	Measurements (mm)		
			X	Y	Z
P1	Plate Point 1	mm	1810	0	109
P2	Plate Point 2	mm	1820	25	108
P3	Plate Point 3	mm	1855	25	108
P4	Plate Point 4	mm	1890	25	109
P5	Plate Point 5	mm	1900	0	109
P6	Plate Point 6	mm	1890	-25	109
P7	Plate Point 7	mm	1855	-25	109
P8	Plate Point 8	mm	1820	-25	109

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.: R20165408
Test Date: 11/11/2015



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	-2	451	0	-1
G _y	1	-450	0	-1	450	-2
P1	-435	710	-496	-22	-838	-493
P2	-432	737	-496	-19	-811	-493
P3	-398	746	-496	15	-802	-493
P4	-364	755	-496	49	-793	-493
P5	-348	734	-496	65	-814	-493
P6	-351	707	-496	62	-841	-493
P7	-385	698	-496	28	-850	-493
P8	-419	689	-496	-6	-859	-493
Left CG	-39	359	-1364			
Right CG				138	-328	-1361
Left EAM	-34	364	-1337			
Right EAM				144	-331	-1334
Left IOF	38	424	-1329	250	-414	-1328
Right IOF	23	486	-1327	234	-351	-1326
Nasion	35	457	-1365	251	-381	-1364

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.: R20165408
Test Date: 11/11/2015

No.	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Max	Time (ms)
1	Left Rear Sill	X	g	2.77	118.35	-37.54	40.80
		Y	g	23.33	48.55	-4.06	11.15
2	Right Rear Sill	X	g	3.67	106.00	-43.39	45.75
		Y	g	25.52	49.95	-2.40	105.60
3	Impact Side Rear Sill Redundant	X	g	2.93	119.30	-36.79	40.65
		Y	g	22.34	48.80	-4.20	11.15
4	Vehicle CG Acceleration	X	g	3.59	112.25	-37.11	47.00
		Y	g	22.46	38.55	-4.07	77.30
		Z	g	18.83	47.85	-17.95	43.15
5	Impact Side Seat Track	X	g	2.38	120.95	-36.75	40.40
		Y	g	36.31	46.60	-2.60	111.85
		Z	g	22.20	54.65	-18.76	68.90
6	Impact Side Seat Crossmember	X	g	5.90	77.80	-47.76	63.25
		Z	g	24.77	55.55	-22.83	89.20
7	Impact Side Toe Pan	X	g	34.01	48.95	-135.50	42.00
		Y	g	461.35	47.80	-869.67	111.30
		Z	g	34.39	36.30	-117.27	41.90
8	Angular Rate Sensors	X	Deg/s	629.55	46.10	-148.47	57.45
		Y	Deg/s	213.84	40.90	-270.16	55.40
		Z	Deg/s	128.48	52.50	-19.28	10.65
9	Driver Shoulder Displacement		mm	104.82	23.85	-52.09	90.20
10	Driver Shoulder Belt		N	4116.28	83.90	-35.63	8.95
11	Driver Lap Belt		N	4284.44	61.30	-21.51	12.50
12	Passenger Shoulder Displacement		mm	84.19	21.10	-241.12	103.00
13	Passenger Shoulder Belt		N	3913.15	47.35	-54.41	196.05
14	Passenger Lap Belt		N	7639.36	61.70	-13.24	12.35
15	Impact Side Floor String Pot		mm	11.11	74.80	-34.53	59.65

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	9.40
2	Driver Air Bag Squib 2	*	A	14.40
3	Driver Curtain Airbag	*	A	40.40
4	Driver Torso Airbag	*	A	40.40
5	Driver Knee Airbag	*	A	N/A
6	Driver Pretensioner	*	A	9.40
7	Passenger Air Bag Squib 1	*	A	9.40
8	Passenger Air Bag Squib 2	*	A	14.35
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	9.40

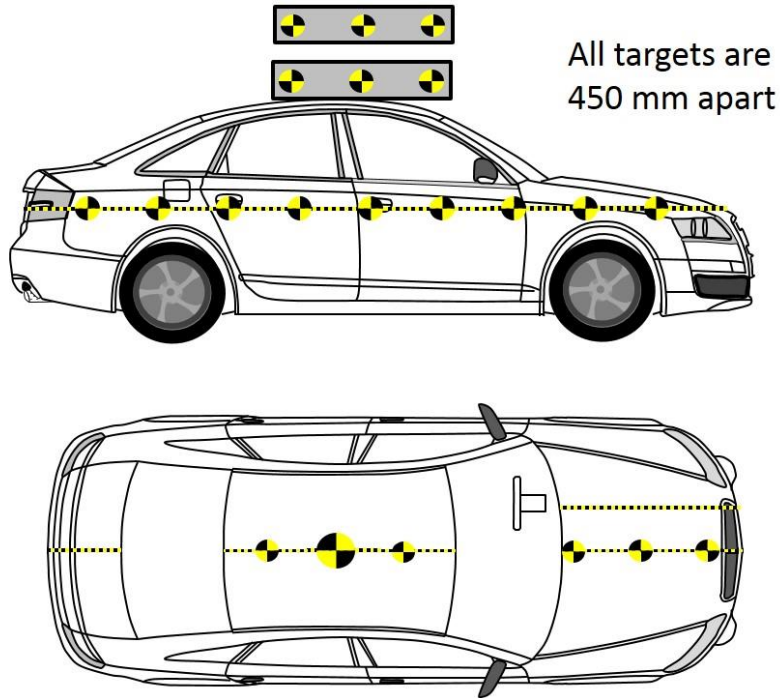
* The measurement indicates the time the voltage changed

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

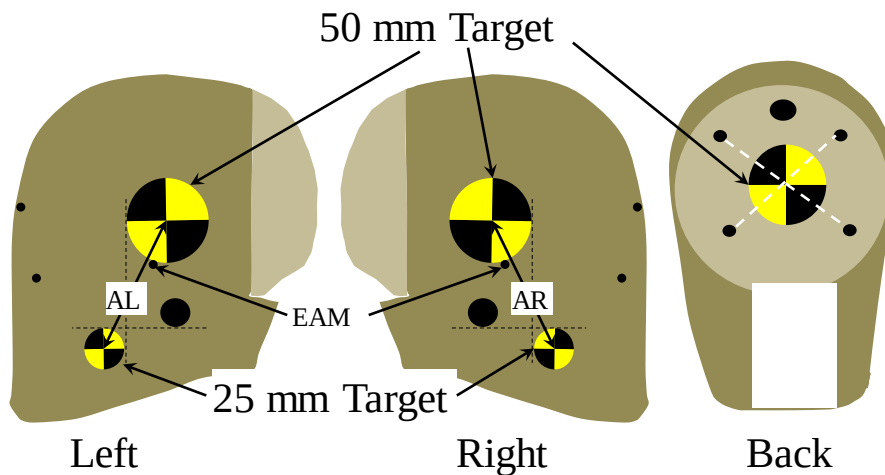
Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165408
 Test Date: 11/11/2015

VEHICLE TARGETS



ATD HEAD TARGETS



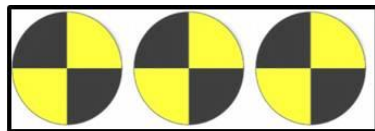
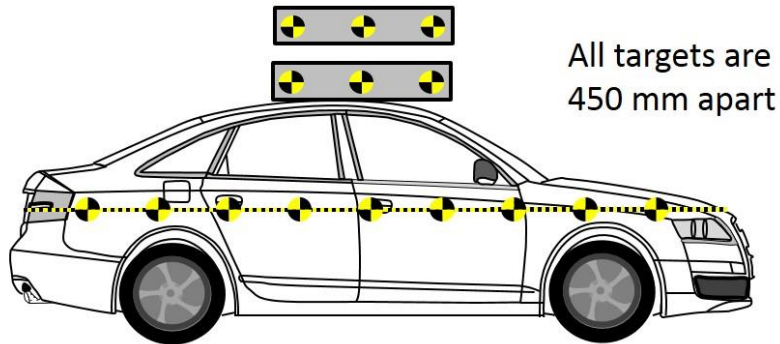
Target	Measurement
AL	91 mm
AR	91 mm

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

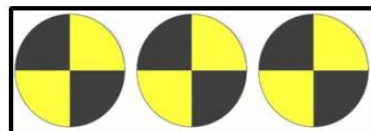
NHTSA No.: R20165408
 Test Date: 11/11/2015

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	2473	-400	-1376
2	mm	2020	-402	-1371
3	mm	1566	-394	-1368
4	mm	2488	386	-1393
5	mm	2037	383	-1391
6	mm	1583	377	-1382

Reference point:

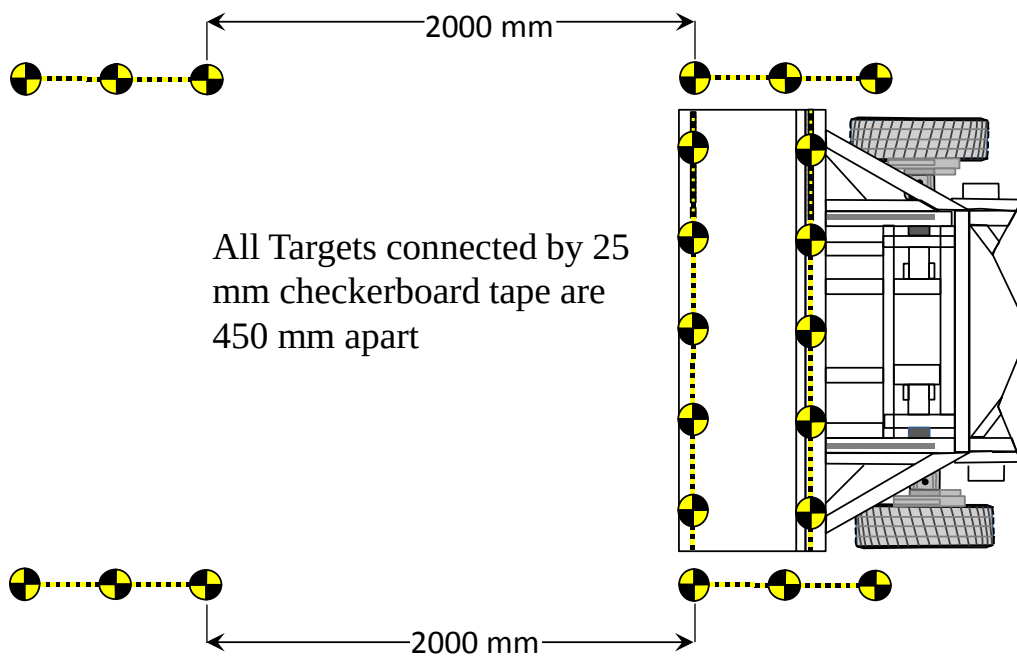
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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.: R20165408
Test Date: 11/11/2015

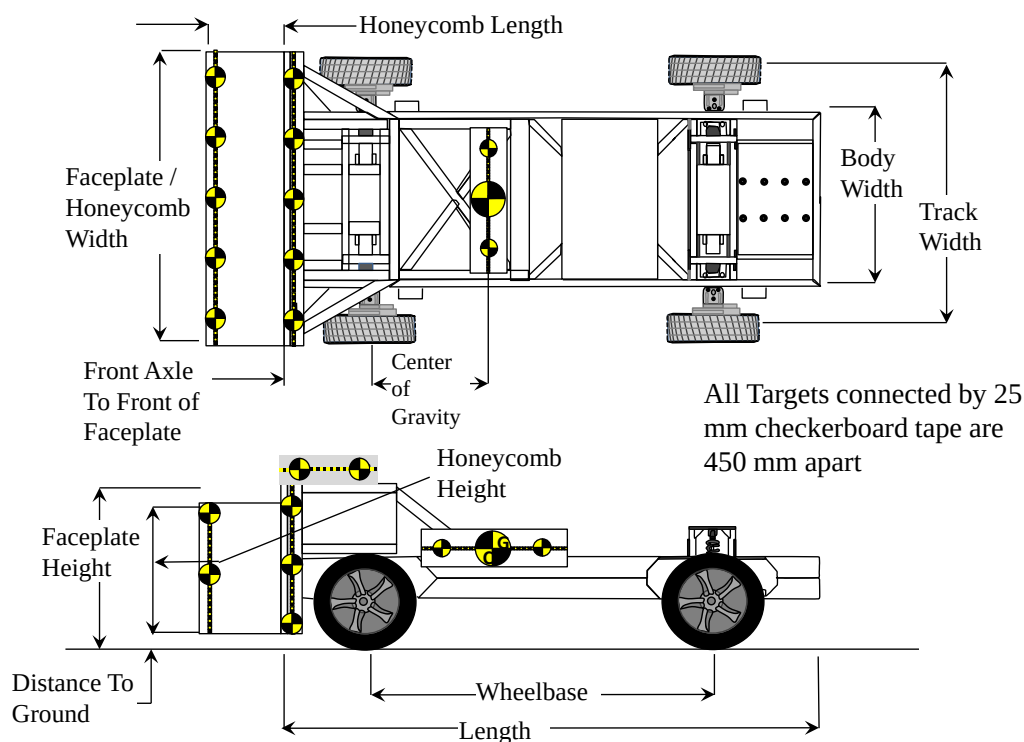
GROUND TARGETS LOCATED IN REFERENCE TO OMDB



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.: R20165408
 Test Date: 11/11/2015



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.: R20165408
 Test Date: 11/11/2015

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.: R20165408
Test Date: 11/11/2015

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	Front Airbag
Upper Torso Contact	Front & Torso/Pelvis Airbag, Arm contacts door	Front Airbag, Shoulder contacts 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	A-Pillar, 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.: R20165408
 Test Date: 11/11/2015

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4541	4420	121
2	Rear Surface of Vehicle (RSOV) to Front of Engine	mm	4045	3900	145
3	RSOV to Firewall	mm	3566	3473	93
4	RSOV to Upper Leading Edge of Right Door	mm	3054	3043	11
5	RSOV to Upper Leading Edge of Left Door	mm	3051	3045	5
6	RSOV to Lower Leading Edge of Right Door	mm	3080	3056	24
7	RSOV to Lower Leading Edge of Left Door	mm	3078	3073	5
8	RSOV to Upper Trailing Edge of Right Door	mm	1973	1963	10
9	RSOV to Upper Trailing Edge of Left Door	mm	1973	1969	4
10	RSOV to Lower Trailing Edge of Right Door	mm	2028	2011	17
11	RSOV to Lower Trailing Edge of Left Door	mm	2027	2023	4
12	RSOV to Bottom of "A" Post of Right Side	mm	3098	3086	11
13	RSOV to Bottom of "A" Post of Left Side	mm	3096	3090	5
14	RSOV to Firewall, Right Side	mm	3563	3552	10
15	RSOV to Firewall, Left Side	mm	3560	3375	185
16	RSOV to Steering Column	mm	2597	2624	-27
17	Center of Steering Column to "A" Post	mm	302	279	23
18	Center of Steering Column to Headliner	mm	451	411	41
19	RSOV to Right Side of Front Bumper	mm	4475	4455	20
20	RSOV to Left Side of Front Bumper	mm	4477	4194	283
21	Length of Engine Block	mm	434	431	4
RD	RSOV to Right Side of Dash Panel	mm	2825	2843	-18
CD	RSOV to Center of Dash Panel	mm	2719	2697	22
LD	RSOV to Left Side of Dash Panel	mm	2821	2806	15

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

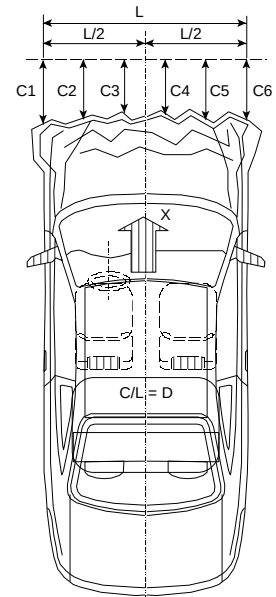
NHTSA No.: R20165408
Test Date: 11/11/2015

VEHICLE INFORMATION

VIN: JM3KE4BY3G0669286 Wheelbase (mm): 2695
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): 90.07
Velocity Change (kph): 90.07



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	3919	371
C2	Crush zone 2 at left side	mm	4454	4018	436
C3	Crush zone 3 at left side	mm	4512	4156	356
C4	Crush zone 4 at right side	mm	4512	4334	178
C5	Crush zone 5 at right side	mm	4455	4427	28
C6	Crush zone 6 at right side	mm	4288	4260	28
L	C1 to C6	mm	1358	1171	187

Crush Measurements: Bumper Cover Removed

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
B1	Bumper Beam 1 at left side	mm	4343	4034	-309
B2	Bumper Beam 2 at left side	mm	4370	4015	-355
B3	Bumper Beam 3 at left side	mm	4399	4002	-397
B4	Bumper Beam 4 at left side	mm	4410	4091	-319
B5	Bumper Beam 5 at right side	mm	4415	4159	-256
B6	Bumper Beam 6 at right side	mm	4412	4219	-193
B7	Bumper Beam 7 at right side	mm	4398	4273	-125
B8	Bumper Beam 8 at right side	mm	4371	4313	-58
B9	Bumper Beam 9 at right side	mm	4343	4350	7
L	B1 to B9	mm	1009	886	-123

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

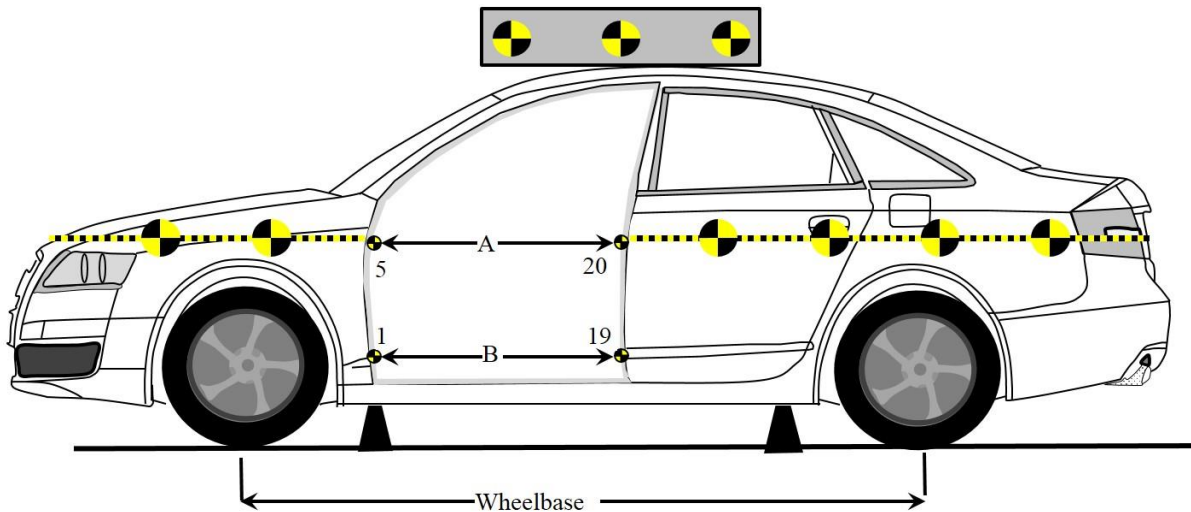
NHTSA No.: R20165408
Test Date: 11/11/2015

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	854	845	-9
B	Left Side Lower	mm	700	697	-3
D	Right Side Upper	mm	854	851	-3
E	Right Side Lower	mm	700	698	-2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2695	2479	-216
F	Right Side Wheelbase	mm	2695	2680	-15



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

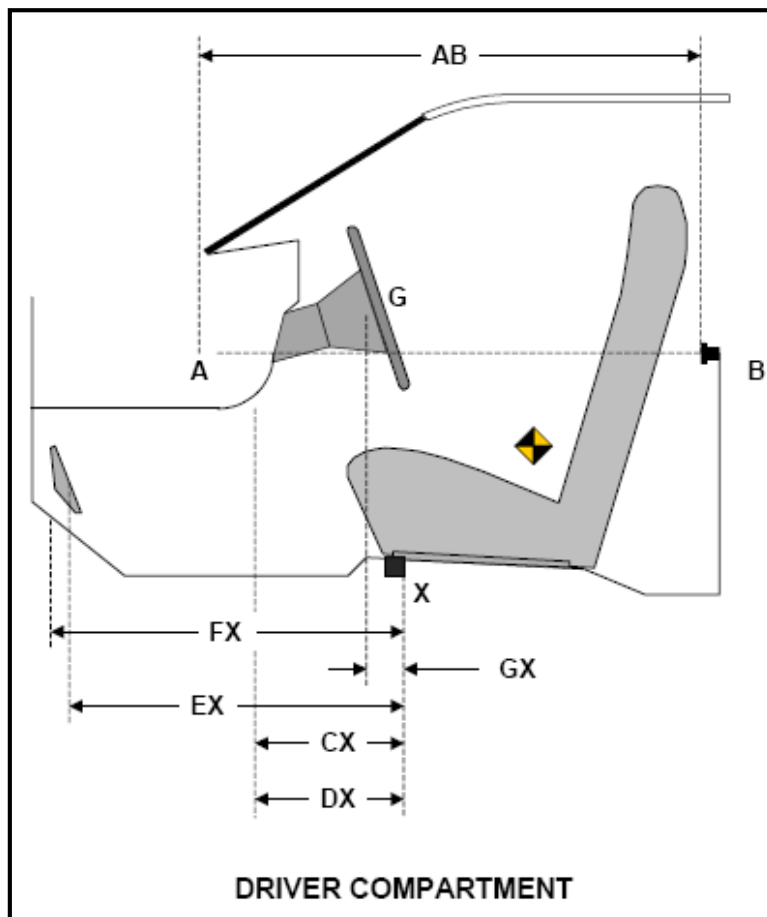
Test Vehicle: 2016 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165408
 Test Date: 11/11/2015

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	292	285	-7
DX	Right Knee Bolster to X	mm	291	280	-11
EX	Brake Pedal to X	mm	527	535	8
FX	Foot Rest to X	mm	672	649	-23
GX	Center of Steering Column Wheel Hub to X	mm	43	74	31

X = Front of Seat Track (Stationary)

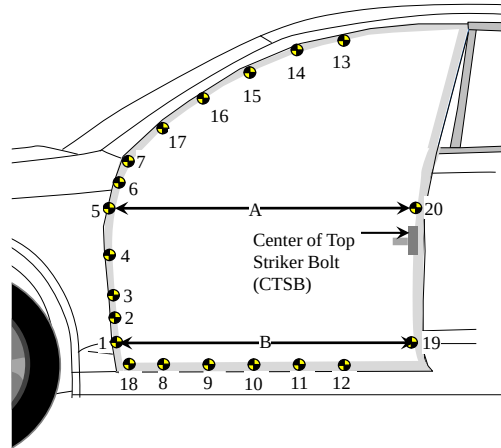


DATA SHEET NO.13 (CONTINUED) **VEHICLE INTRUSION MEASUREMENTS**

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

NHTSA No.: R20165408
 Test Date: 11/11/2015

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

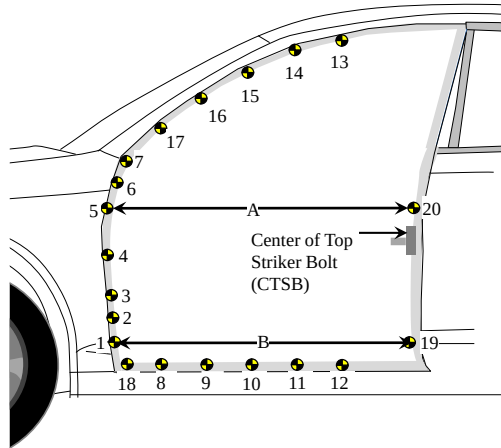
Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2943	-759	98	2937	-738	101	-6	21	3
2	2955	-753	23	2947	-734	26	-8	19	3
3	2950	-750	-52	2939	-746	-51	-11	4	1
4	2939	-745	-202	2928	-748	-202	-11	-3	0
5	2928	-748	-352	2919	-757	-351	-9	-9	1
6	2924	-751	-427	2915	-762	-427	-9	-11	0
7	2914	-752	-502	2908	-765	-502	-6	-13	0
17	2836	-731	-601	2832	-742	-601	-4	-11	0
16	2722	-705	-681	2719	-715	-681	-3	-10	0
15	2601	-678	-754	2600	-685	-754	-1	-7	0
14	2475	-650	-814	2476	-656	-816	1	-6	-2
13	2342	-628	-862	2342	-632	-861	0	-4	1
20	2074	-747	-353	2074	-741	-350	0	6	3
19	2243	-760	97	2239	-749	99	-4	11	2
12	2192	-758	35	2191	-748	39	-1	10	4
11	2342	-761	152	2340	-749	154	-2	12	2
10	2492	-762	163	2489	-749	165	-3	13	2
9	2643	-761	163	2641	-747	165	-2	14	2
8	2792	-761	163	2791	-743	165	-1	18	2
18	2867	-761	158	2864	-742	160	-3	19	2

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.: R20165408
 Test Date: 11/11/2015

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

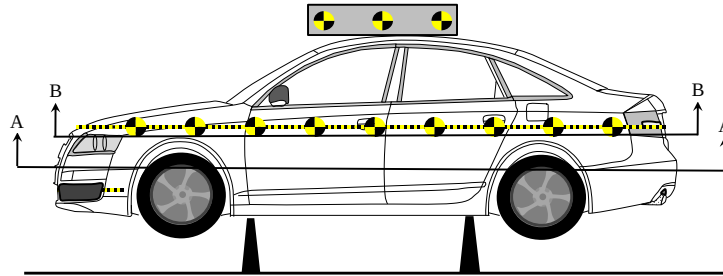
Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2946	756	99	2943	766	98	-3	10	-1
2	2957	751	23	2955	763	22	-2	12	-1
3	2953	747	-52	2951	761	-53	-2	14	-1
4	2941	744	-202	2938	756	-204	-3	12	-2
5	2930	747	-352	2926	760	-354	-4	13	-2
6	2925	749	-427	2921	763	-430	-4	14	-3
7	2916	751	-502	2912	762	-505	-4	11	-3
17	2836	730	-602	2832	740	-601	-4	10	1
16	2720	704	-681	2717	709	-680	-3	5	1
15	2602	677	-753	2599	679	-751	-3	2	2
14	2477	650	-814	2475	649	-811	-2	-1	3
13	2345	628	-860	2344	625	-857	-1	-3	3
20	2076	743	-352	2076	741	-354	0	-2	-2
19	2245	759	99	2245	759	97	0	0	-2
12	2196	756	40	2198	755	40	2	-1	0
11	2345	759	153	2346	761	150	1	2	-3
10	2496	759	164	2495	763	161	-1	4	-3
9	2646	758	164	2645	765	161	-1	7	-3
8	2795	758	164	2795	766	161	0	8	-3
18	2871	758	159	2871	766	156	0	8	-3

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.: R20165408
 Test Date: 11/11/2015

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	2014	-913	60	1	2009	-901	60
2	2211	-915	61	2	2133	-903	60
3	2592	-910	61	3	2258	-902	60
4	2994	-906	60	4	2431	-901	60
5	3124	-910	61	5	2606	-899	60
6	3190	-916	60	6	2757	-896	60
7	4003	-910	61	7	2940	-892	60
8	4135	-876	60	8	3058	-911	61
9	4203	-843	61	9	3106	-972	60
10	4333	-635	61	10	3619	-759	60
11	4440	-475	60	11	3662	-738	60
12	4496	-250	60	12	3669	-761	61
13	4529	-2	61	13	3655	-639	60
14	4529	3	60	14	3549	-494	60
15	4517	134	60	15	3615	-425	61
16	4484	330	60	16	3748	-466	60
17	4400	584	61	17	3811	-470	61
18	4206	842	61	18	3865	-494	60
19	4065	894	61	19	3906	-461	61
20	4004	911	60	20	3934	-414	60
21	3191	914	60	21	3867	-351	61
22	3064	907	60	22	3900	-285	61
23	2793	907	60	23	3957	-258	60
24	2517	910	61	24	3959	-216	60
25	2233	914	60	25	3968	-140	60

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.: R20165408
 Test Date: 11/11/2015

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A (Continued)

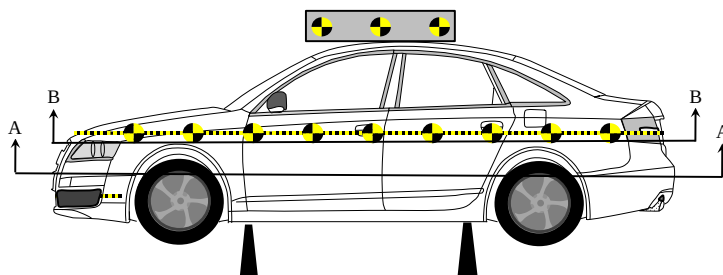
Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	2016	913	61	26	4010	-21	61
				27	4086	104	61
				28	4170	272	60
				29	4287	291	61
				30	4321	390	60
				31	4362	523	61
				32	4300	528	60
				33	4200	535	60
				34	4131	541	61
				35	4125	600	61
				36	4127	688	61
				37	4119	780	60
				38	4117	806	60
				39	4059	815	60
				40	3988	814	61
				41	3964	897	60
				42	3850	947	60
				43	3811	992	61
				44	3719	990	60
				45	3586	933	60
				46	3182	942	60
				47	3135	939	61
				48	3067	932	60
				49	2890	918	60
				50	2597	897	60
				51	2389	910	60
				52	2268	901	61
				53	2136	906	61
				54	1999	910	60

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.: R20165408
 Test Date: 11/11/2015

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	2005	-910	-234	1	2002	-908	-233
2	2187	-910	-234	2	2156	-911	-233
3	2455	-909	-233	3	2360	-912	-234
4	2751	-908	-233	4	2550	-913	-233
5	3047	-908	-234	5	2756	-915	-234
6	3292	-917	-233	6	2842	-915	-234
7	3514	-919	-234	7	2981	-915	-233
8	3734	-911	-234	8	3078	-918	-233
9	3907	-899	-233	9	3089	-963	-233
10	4115	-847	-234	10	3103	-994	-243
11	4284	-676	-234	11	3099	-990	-234
12	4432	-416	-234	12	3159	-992	-232
13	4473	-268	-234	13	3193	-975	-233
14	4494	-68	-234	14	3262	-842	-234
15	4500	3	-233	15	3353	-755	-230
16	4494	62	-234	16	3383	-699	-233
17	4483	209	-234	17	3413	-589	-233
18	4450	383	-233	18	3465	-466	-233
19	4352	544	-234	19	3548	-443	-233
20	4229	759	-233	20	3598	-335	-234
21	4022	869	-234	21	3629	-274	-233
22	3766	909	-234	22	3722	-257	-233
23	3445	919	-233	23	3768	-185	-234
24	3252	914	-233	24	3849	-126	-233
25	3101	909	-233	25	3878	-82	-234

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.: R20165408
 Test Date: 11/11/2015

VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B (Continued)

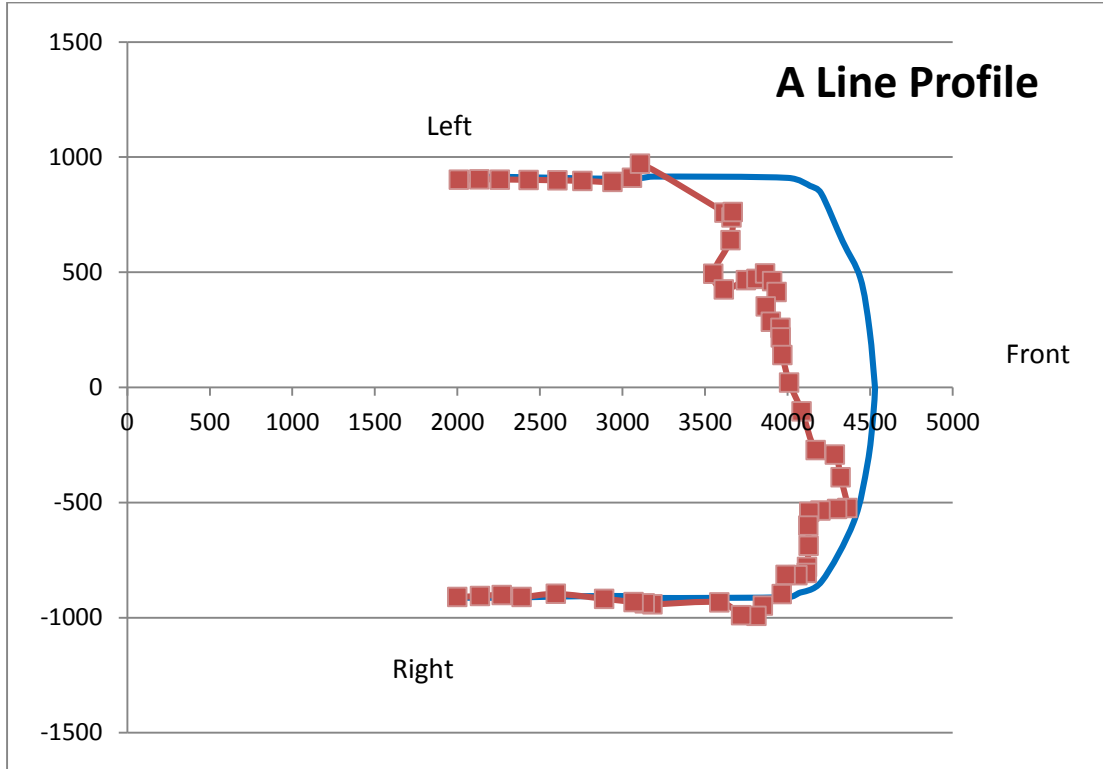
Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	2825	907	-234	26	3968	-45	-233
27	2364	910	-234	27	4033	16	-233
28	2100	910	-234	28	4055	108	-233
29	2008	910	-234	29	4118	242	-233
				30	4209	353	-233
				31	4268	334	-234
				32	4277	422	-234
				33	4242	518	-233
				34	4254	668	-234
				35	4201	772	-234
				36	4114	864	-233
				37	4025	898	-234
				38	3893	917	-233
				39	3705	940	-233
				40	3518	939	-233
				41	3289	937	-234
				42	3078	930	-233
				43	3037	930	-234
				44	2790	925	-233
				45	2533	916	-234
				46	2398	902	-233
				47	2101	904	-233
				48	1994	913	-234

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

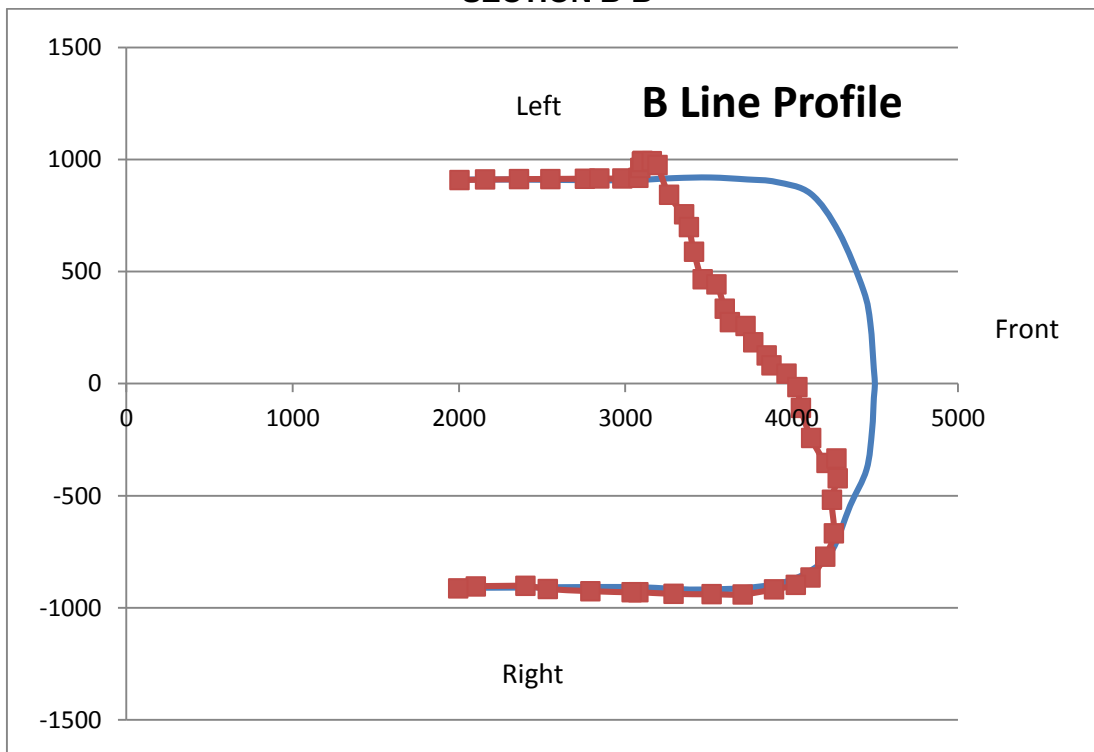
Test Vehicle: 2016 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165408
Test Date: 11/11/2015

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.: R20165408
 Test Date: 11/11/2015

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	4343	-506	62	4034	-398	-59	-309	108	-121
	B2	4370	-379	62	4015	-271	-52	-355	108	-114
	B3	4399	-253	62	4002	-161	-51	-397	92	-113
	B4	4410	-128	62	4091	-84	-35	-319	44	-97
	B5	4415	5	62	4159	29	-17	-256	24	-79
	B6	4412	130	62	4219	137	1	-193	7	-61
	B7	4398	258	62	4273	253	20	-125	-5	-42
	B8	4371	382	61	4313	371	40	-58	-11	-21
	B9	4343	503	62	4350	488	58	7	-15	-4

Reference point:

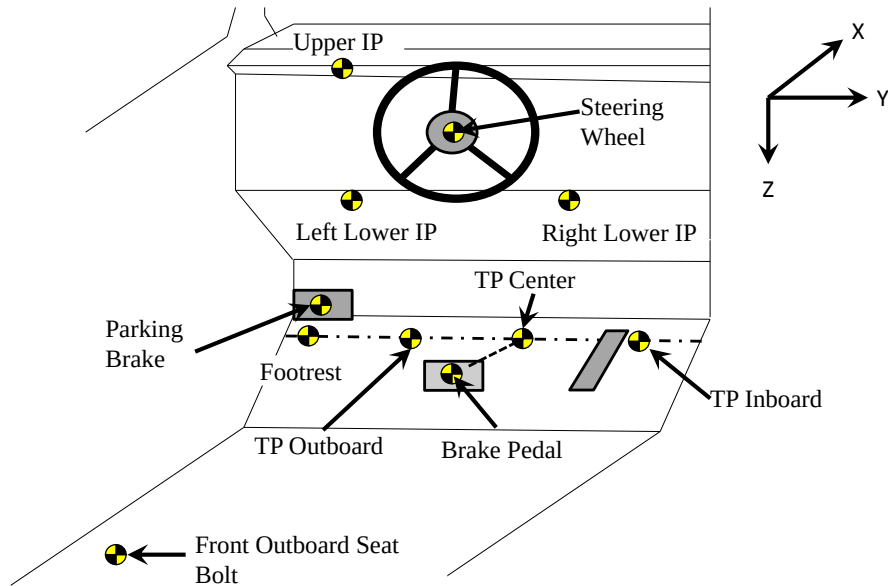
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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.: R20165408
 Test Date: 11/11/2015

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	3346	-179	98	3306	-162	95	-40	17	-3
TP Center	3357	-330	99	3269	-301	79	-88	29	-20
TP Outboard	3307	-479	99	3247	-432	81	-60	47	-18
TP Footrest	3214	-580	98	3187	-549	92	-27	31	-6
Brake Pedal	3069	-329	98	3073	-326	140	4	3	42
Left Lower IP	2835	-522	-189	2822	-524	-198	-13	-2	-9
Right Lower IP	2833	-222	-188	2817	-230	-196	-16	-8	-8
Upper IP	2794	-622	-322	2781	-628	-329	-13	-6	-7
Steering Wheel	2585	-372	-446	2612	-403	-472	27	-31	-26
Front Outboard Bolt	2542	-612	166	2538	-596	171	-4	16	5
Emergency Brake									

Reference point:

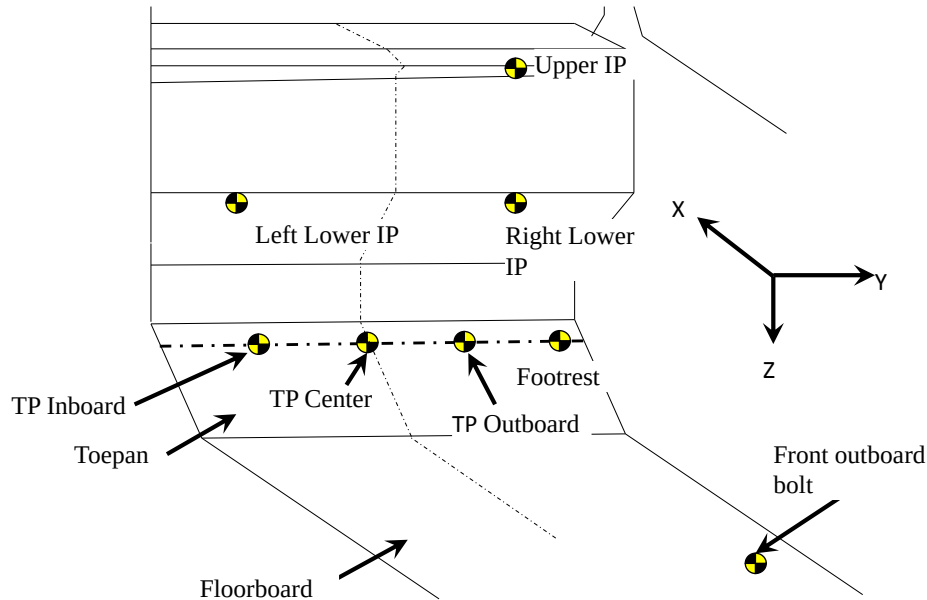
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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.: R20165408
 Test Date: 11/11/2015

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	3338	217	98	3280	274	49	-58	57	-49
TP Center	3359	367	99	3359	381	87	0	14	-12
TP Outboard	3254	517	98	3257	530	92	3	13	-6
TP Footrest	3198	618	99	3200	633	95	2	15	-4
Left Lower IP	2798	217	-194	2845	188	-217	47	-29	-23
Right Lower IP	2839	517	-194	2871	488	-197	32	-29	-3
Upper IP	2794	618	-381	2805	602	-387	11	-16	-6
Front Outboard Bolt	2547	609	166	2549	612	162	2	3	-4

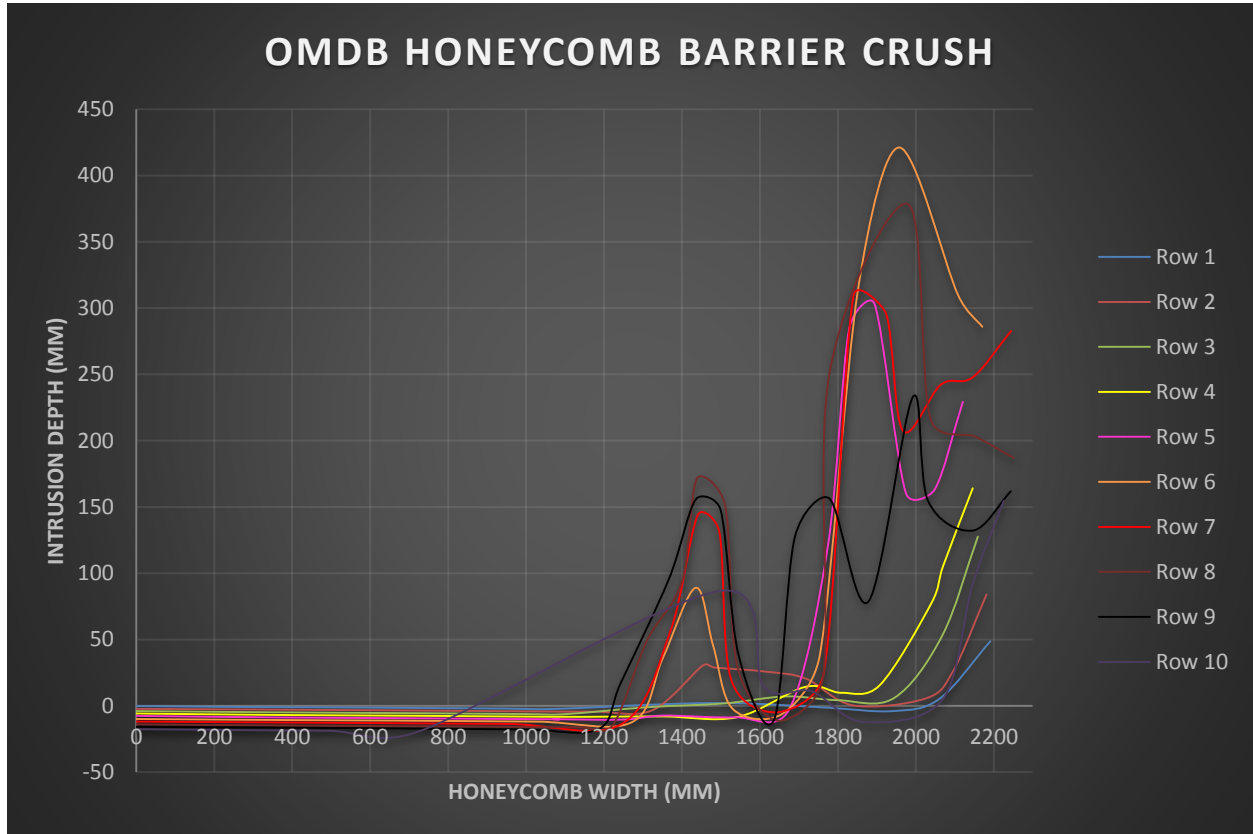
Reference point:

- +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.: R20165408
Test Date: 11/11/2015



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.: R20165408
 Test Date: 11/11/2015

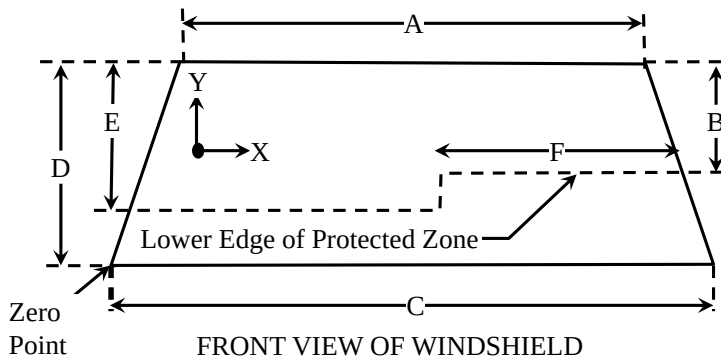
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2233	1364	61.1%
Right Side	2233	1958	87.7%
Total	4465	3322	74.4%



Item	Units	Value
A	mm	1247
B	mm	512
C	mm	1510
D	mm	854
E	mm	523
F	mm	484

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:	<u>2016 Mazda CX-5 SUV</u>	NHTSA No.:	<u>R20165408</u>
Test Program:	<u>R&D 90.1kph, 15° / 35% Left Oblique Offset</u>	Test Date:	<u>11/11/2015</u>

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

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

Test Time: 12:25 PM

Stoddard Solvent Spillage Measurements

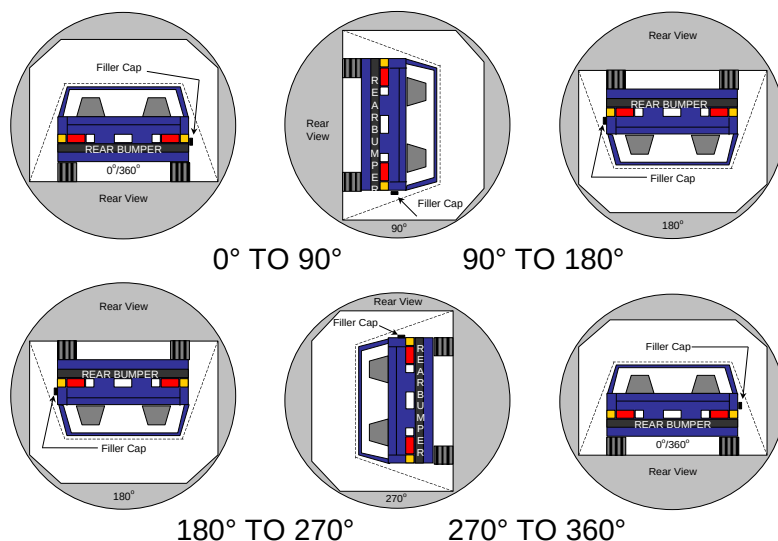
A.	From impact until vehicle motion ceases: (Maximum allowable = 1 oz.)	<u>0</u>	oz
B.	For the 5-minute period after motion ceases: (Maximum allowable = 5 oz.)	<u>0</u>	oz
C.	For the following 25 minutes: (Maximum allowable = 1 oz./minute)	<u>0</u>	oz
D.	Spillage	<u>0</u>	oz

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.: R20165408
 Test Date: 11/11/2015



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°	72	300	372
90° to 180°	63	300	363
180° to 270°	61	300	361
270° to 360°	68	300	368

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	

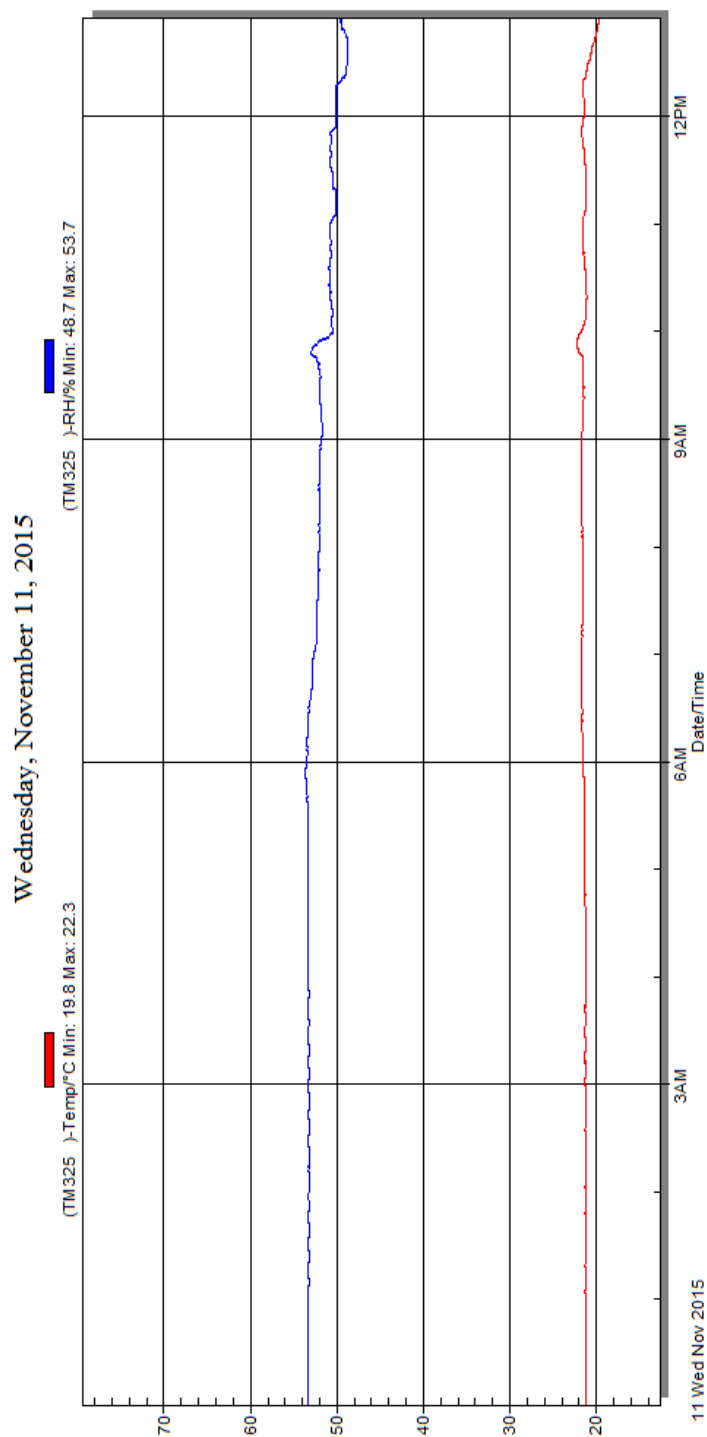
SOLVENT SPILLAGE LOCATION TABLE

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.: R20165408
Test Date: 11/11/2015



Temperature Stabilization Chart/Data

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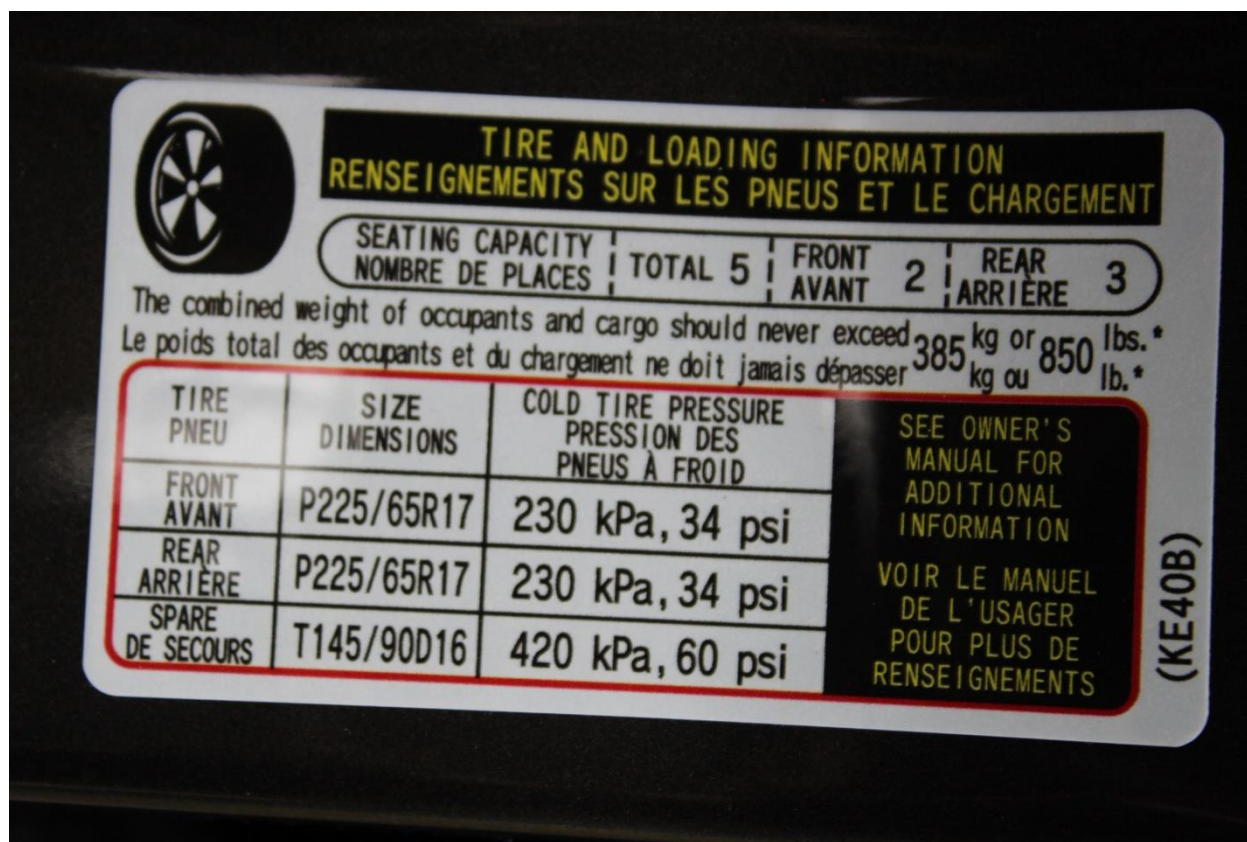
No. 001 As Delivered Right Front 3-4 View of Test Vehicle



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



No. 016 Post-Test Right Rear 3-4 View of Test Vehicle



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: TITANIUM FLASH 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 33 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 (gasoline only)

1 6 10 Best

Smog Rating (gasoline only)

1 5 10 Best

This vehicle emits 337 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions, learn more at fuelconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 25 MPG and costs \$9,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.00 per gallon. Vehicle is rated per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov
 calculate personalized estimates and compare vehicles

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
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		
Side Crash	Front seat	★★★★★
	Rear seat	★★★★★
Based on the risk of injury in a side impact.		
Rollover		★★★★★
Based on the risk of rollover in a single vehicle crash.		

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

SALES
 SOLD TO: 61617
 ROSEN MAZDA
 100 N. GREEN BAY RD
 WAUKEGAN, IL 60085

SHIP TO: 61617 LP
 ROSEN MAZDA
 100 N. GREEN BAY RD
 WAUKEGAN, IL 60085

JM3KE4BY3G0669286



CAS-SP-XA-KASPNAD-YA-TA-20100015

MAZDAUSA.COM

PARTS CONTENT INFORMATION:
 FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 0%
 MAJOR SOURCES OF FOREIGN PARTS CONTENT: JAPAN 95%
 NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION OR OTHER NON-PARTS COSTS.
 FOR THIS VEHICLE:
 FINAL ASSEMBLY POINT: HIROSHIMA, JAPAN
 COUNTRY OF ORIGIN: ENGINE: JAPAN
 TRANSMISSION: JAPAN
 This label is affixed pursuant to the Federal Automobile Disclosure Act. Gasoline, license and title fees, state and local taxes, and dealer installed options are not included.

STANDARD EQUIPMENT

ENGINE/MECHANICAL FEATURES

- SKYACTIV 2.5L ENGINE
- SKYACTIV-DRIVE 6SPD SPORT MODE AT 184 HORSEPOWER, 185 LB-FT TORQUE
- ALL-WHEEL DRIVE

EXTERIOR FEATURES

- 17-INCH ALLOY WHEELS
- P225/55R17 ALL-SEASON TIRES
- VARIABLE INTERMITTENT WIPERS
- FIXED INTERMITTENT REAR WIPER
- POWER MIRRORS WITH TURN LAMPS

INTERIOR FEATURES

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

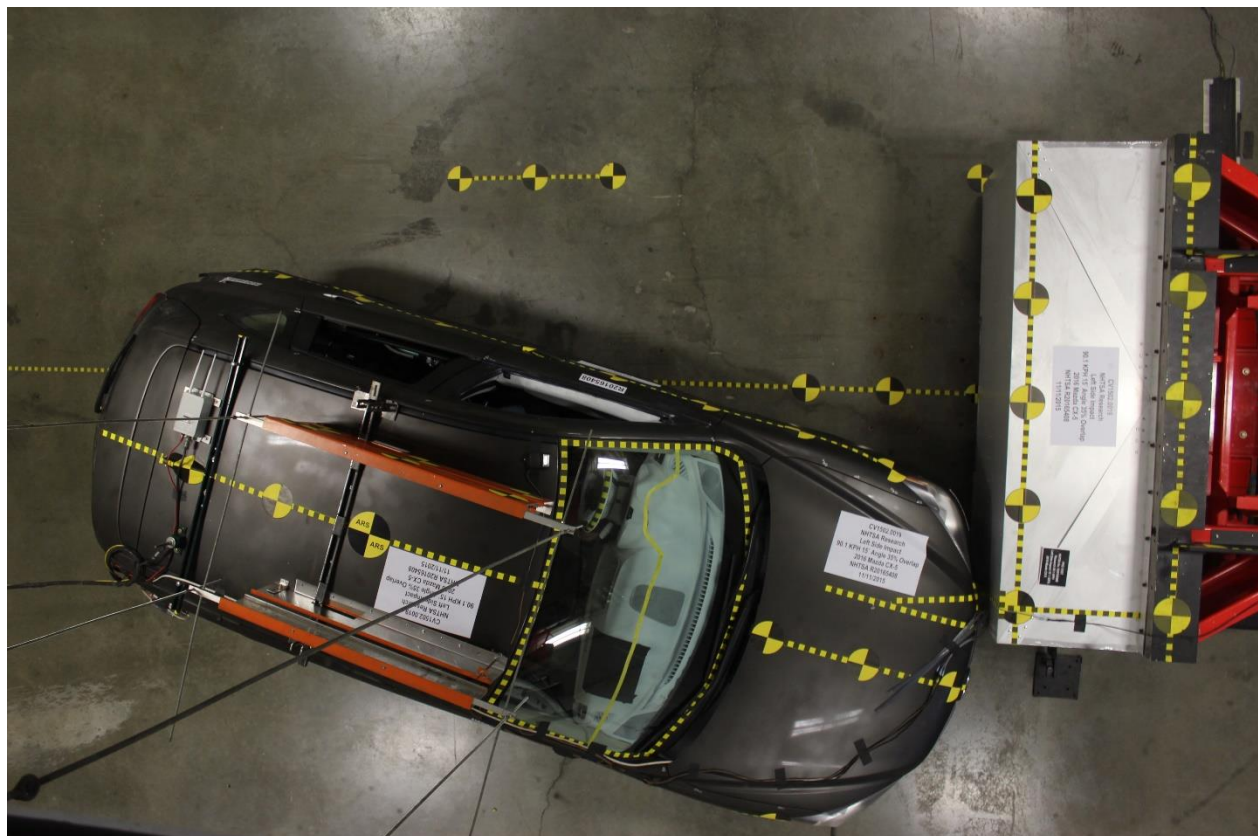
SAFETY AND SECURITY FEATURES

- 6MM/0.016 IN POWERTRAIN & 3MM/0.012 IN 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

- 4-WHEEL DISC BRAKES
- ELECTRIC POWER ASSISTED STEERING
- INDEPENDENT FRONT/REAR SUSPENSION
- FRONT & REAR STABILIZER BARS
- HALOGEN HEADLIGHTS
- DAYTIME RUNNING LIGHTS
- BRIGHT FINISH EXHAUST OUTLETS
- REAR ROOF SPOILER
- ROOF MOUNTED SHARK FIN ANTENNA
- REMOTE KEYLESS ENTRY
- PUSH BUTTON ENGINE START
- AIR CONDITIONING W/POLLEN FILTER
- AM/FM/CD/MP3 4-SPEAKER AUDIO
- AUXILIARY JACK & USB AUDIO INPUT
- BLUETOOTH HANDS FREE PHONE/AUDIO
- DUAL VANITY MIRRORS
- CENTER ARMREST W/COVERED STORAGE
- 60/40 SPLIT FOLD-DOWN REAR SEAT
- CARPETED FLOOR MATS
- ANTI-LOCK BRAKE SYSTEM (ABS) WITH EBD & BRAKE ASSIST
- DYNAMIC STABILITY CONTROL (DSC)
- TRACTION CONTROL SYSTEM (TCS)
- HILL LAUNCH ASSIST
- ADVANCED DUAL FRONT AIRBAGS
- FRONT SIDE-IMPACT AIR BAGS
- FRONT & REAR SIDE AIR CURTAINS

MSRP \$24,445
 Total Vehicle and Options \$24,445
 Delivery, Processing and Handling Fee \$930
Total MSRP \$25,325

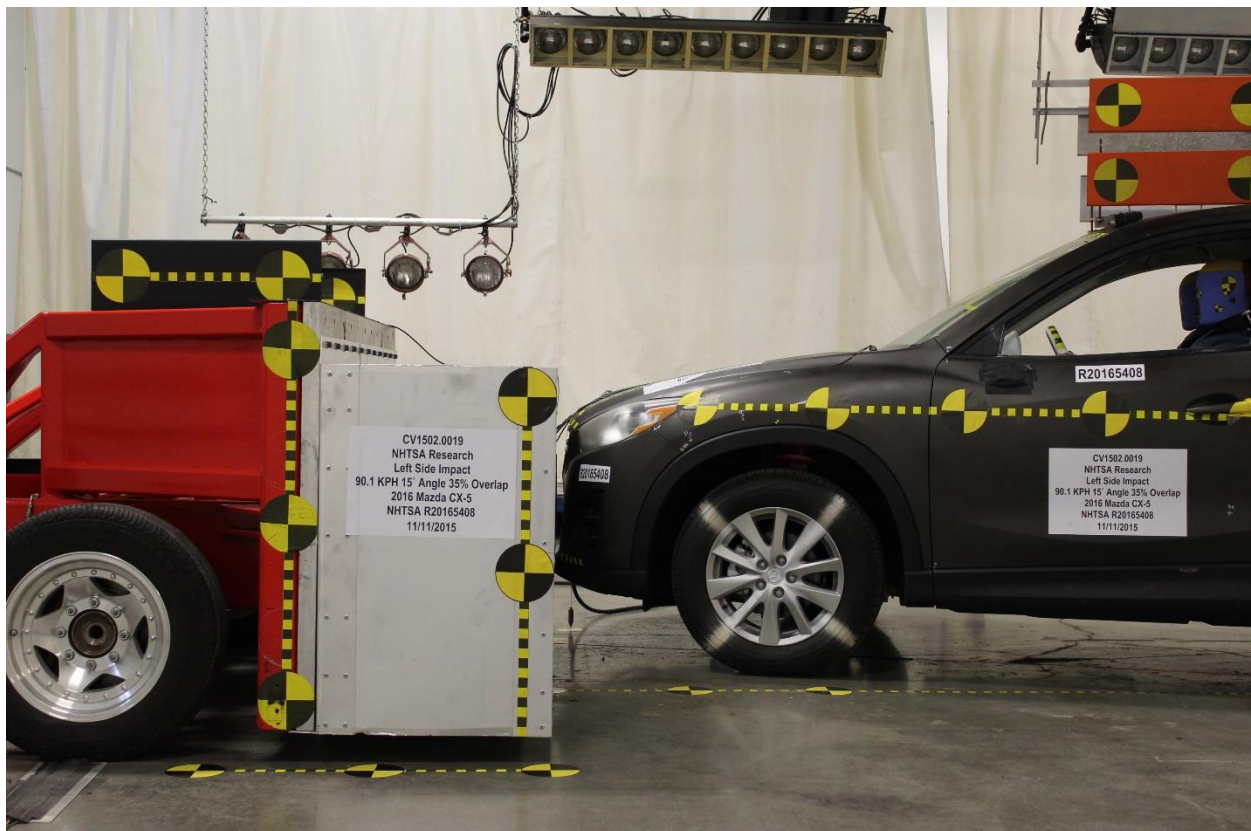
No. 021 Monroney Label Photograph



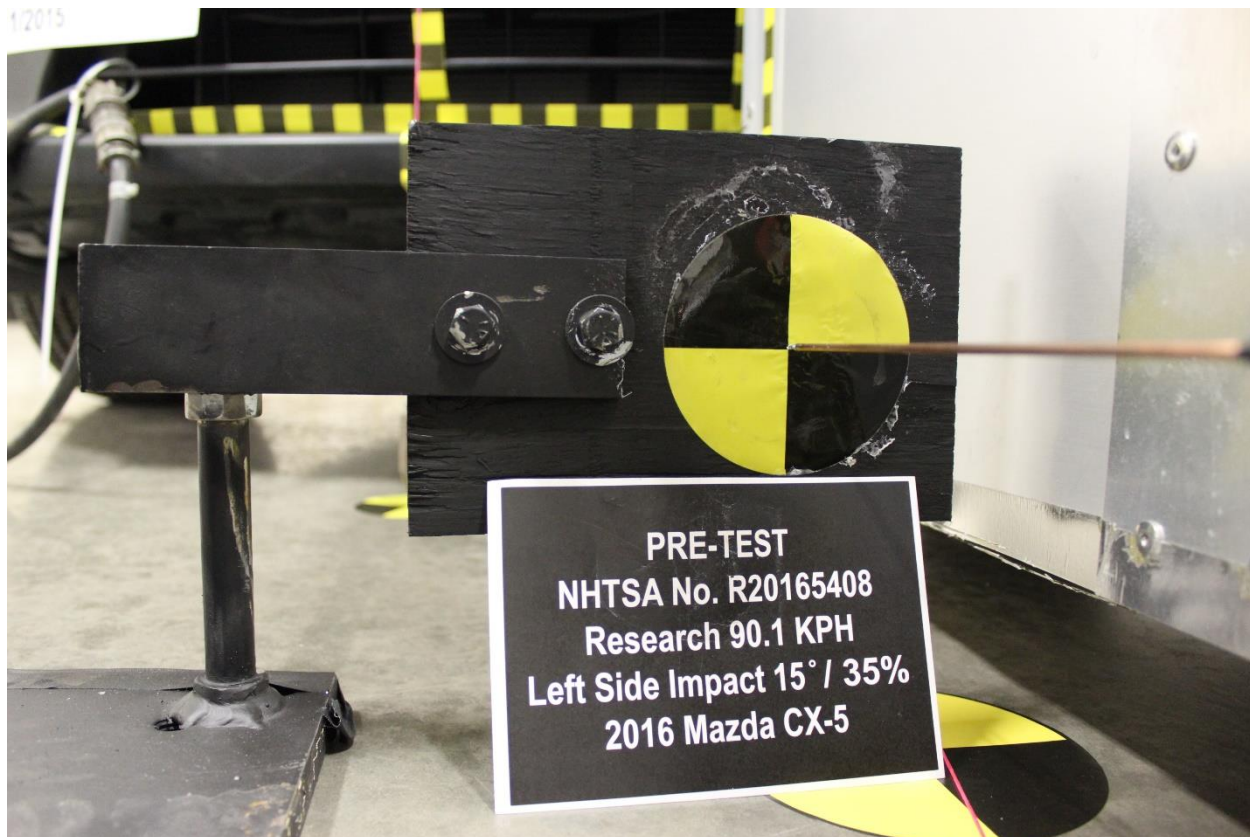
No. 022 Pre-Test Overhead View of OMDB against target vehicle at ideal Impact Point



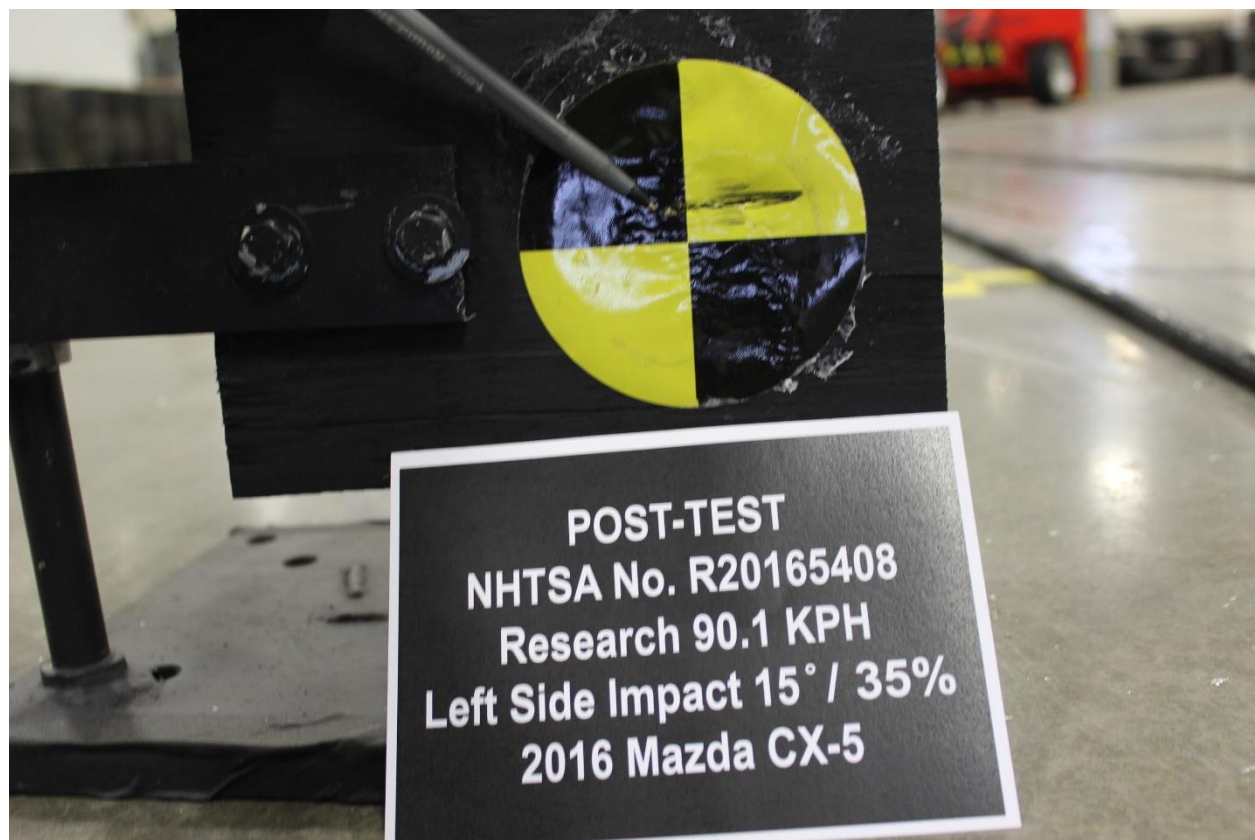
No. 023 Pre-Test Left Side View of OMDB against target vehicle at ideal Impact Point



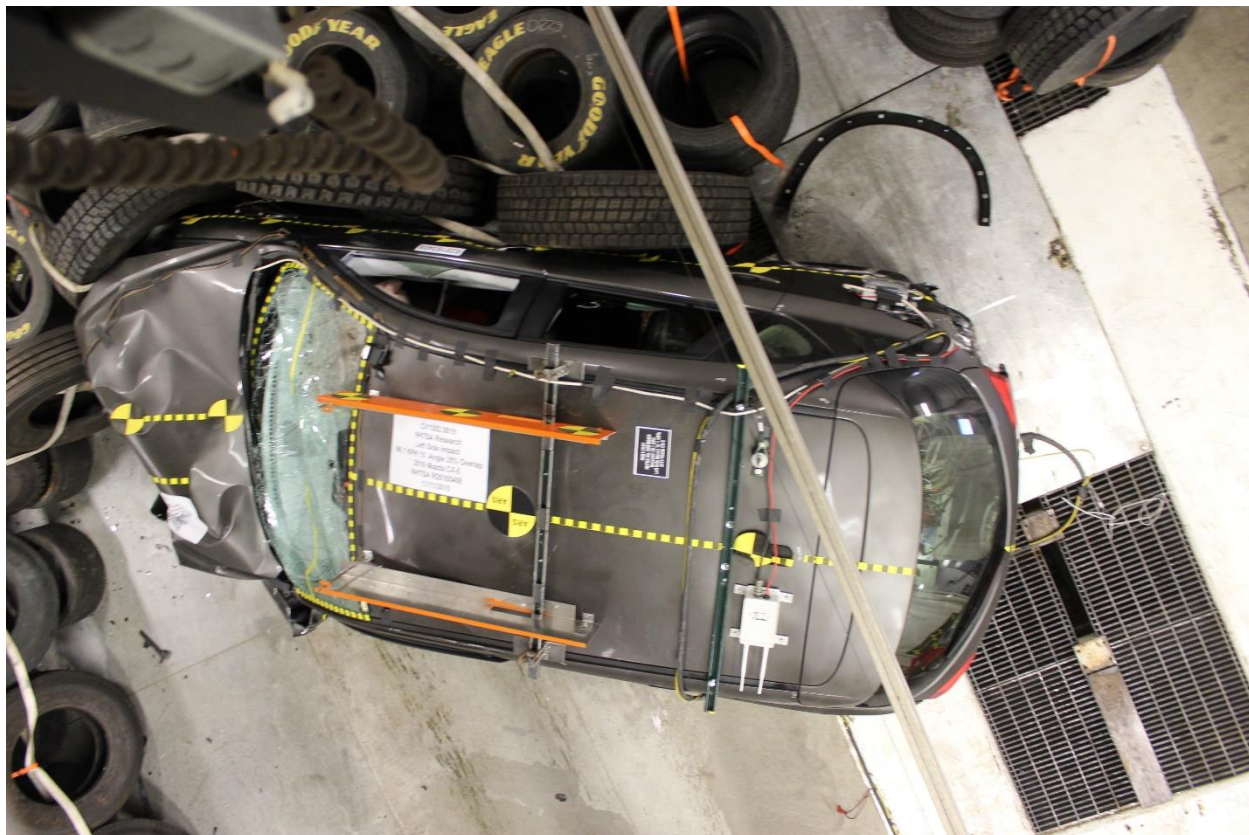
No. 024 Pre-Test Right Side View of OMDB against target vehicle at ideal Impact Point

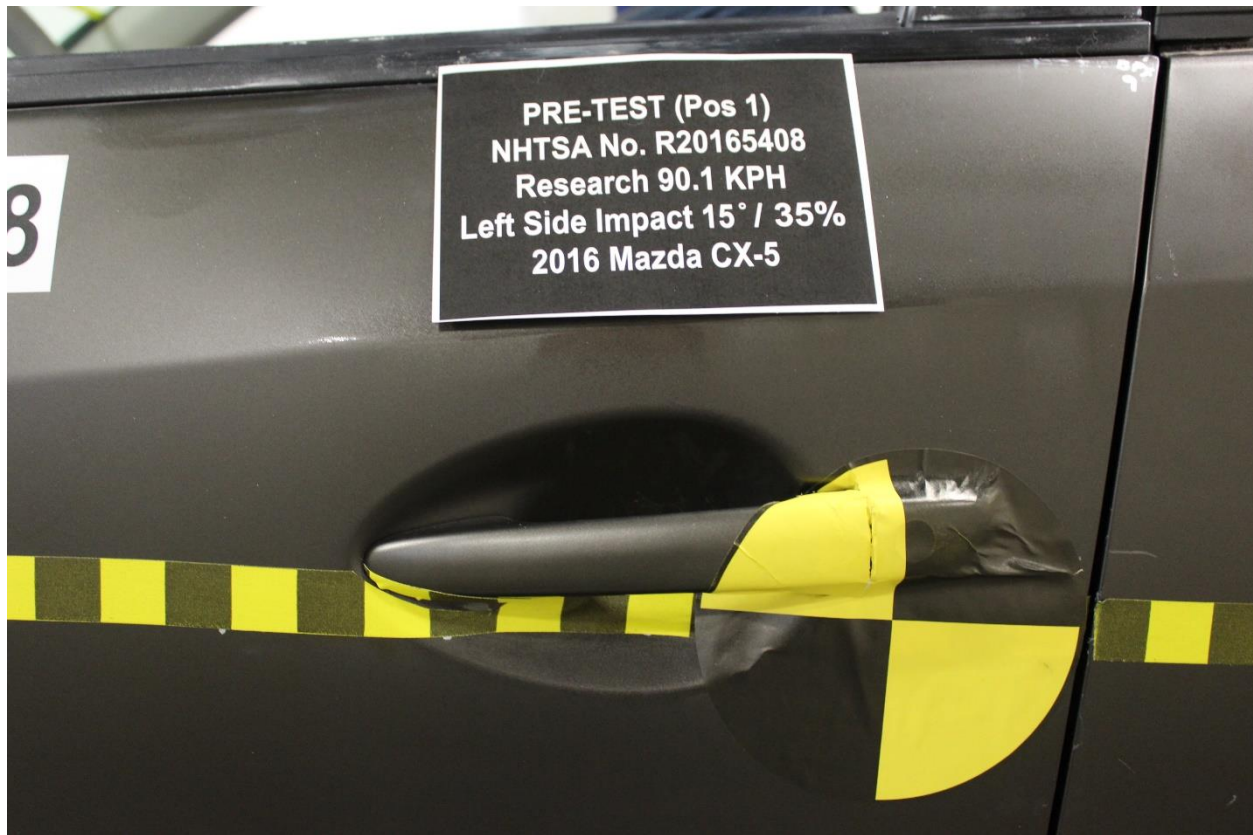


No. 025 Pre-Test Close-up View of Impact Point

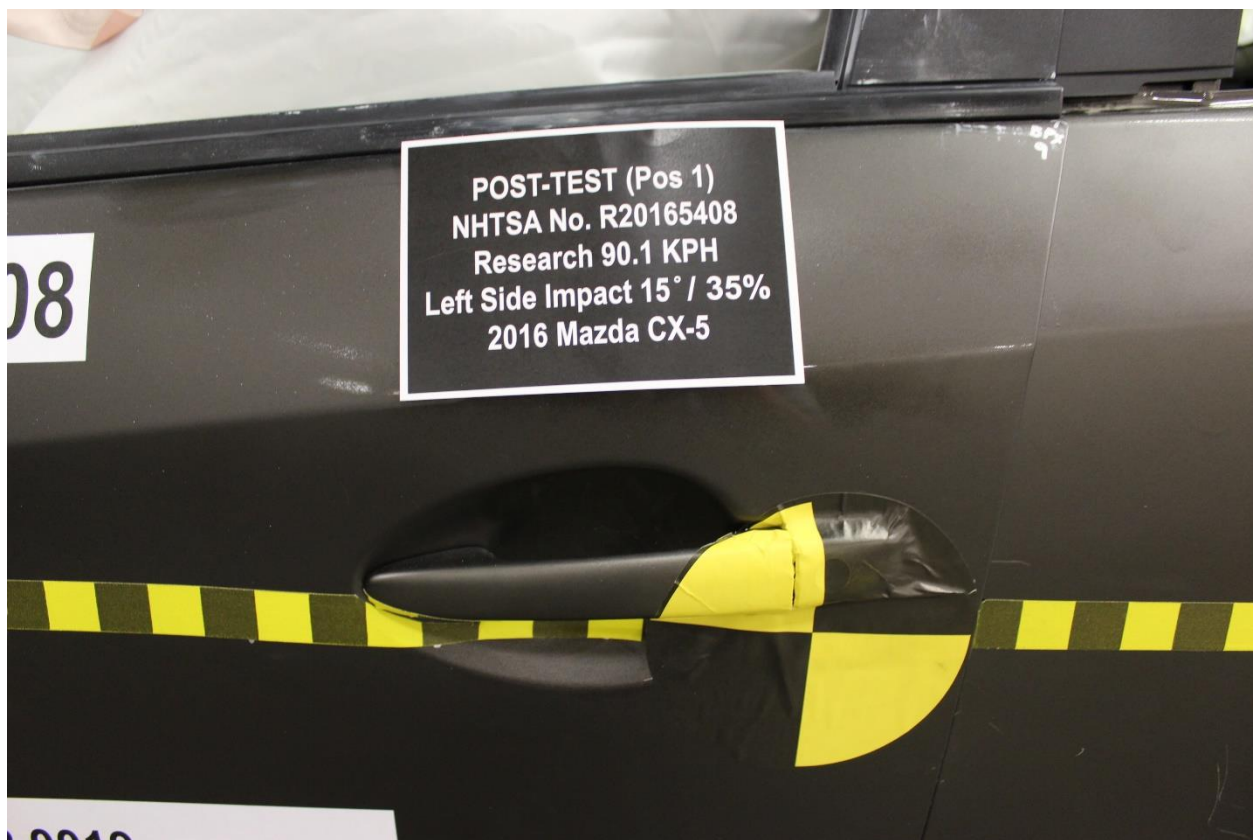


No. 026 Post-Test Close-up View of Impact Point

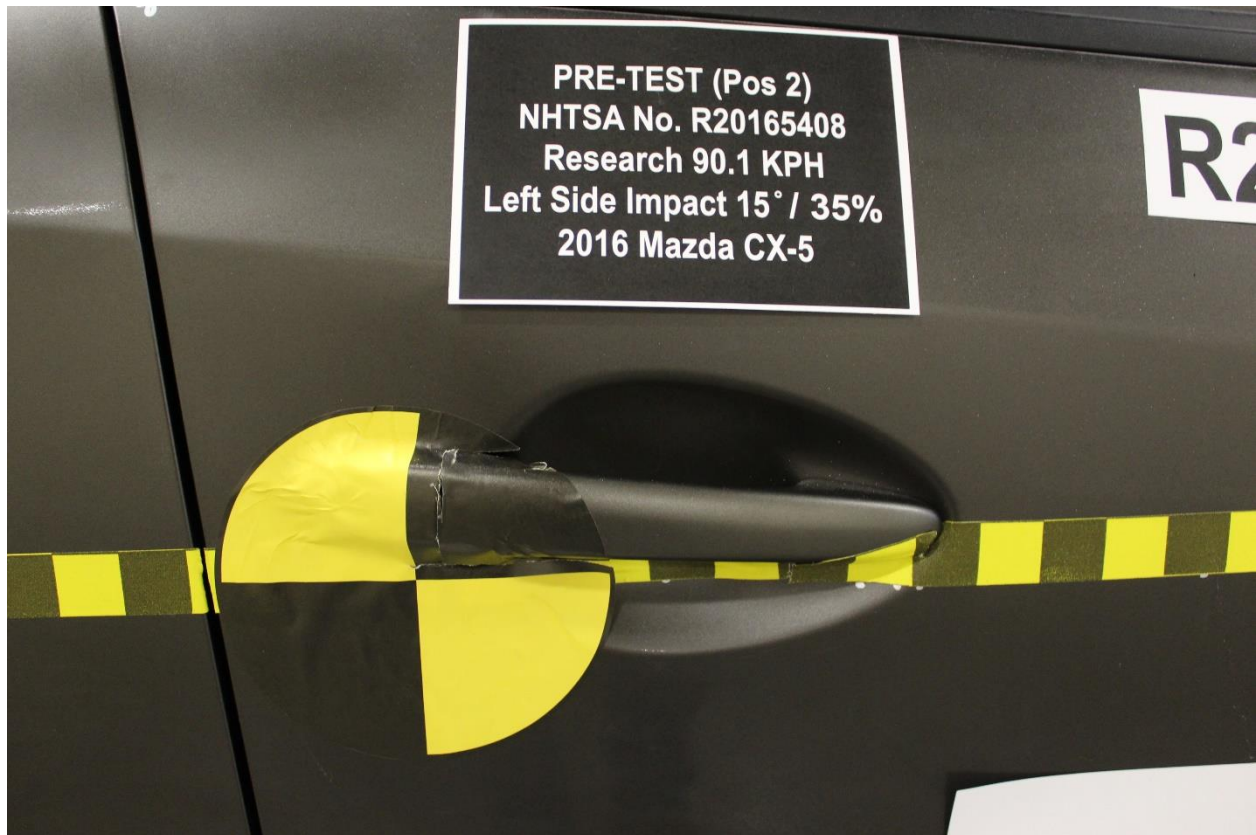




No. 028 Pre-Test Close-up View of Driver Door Latch



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



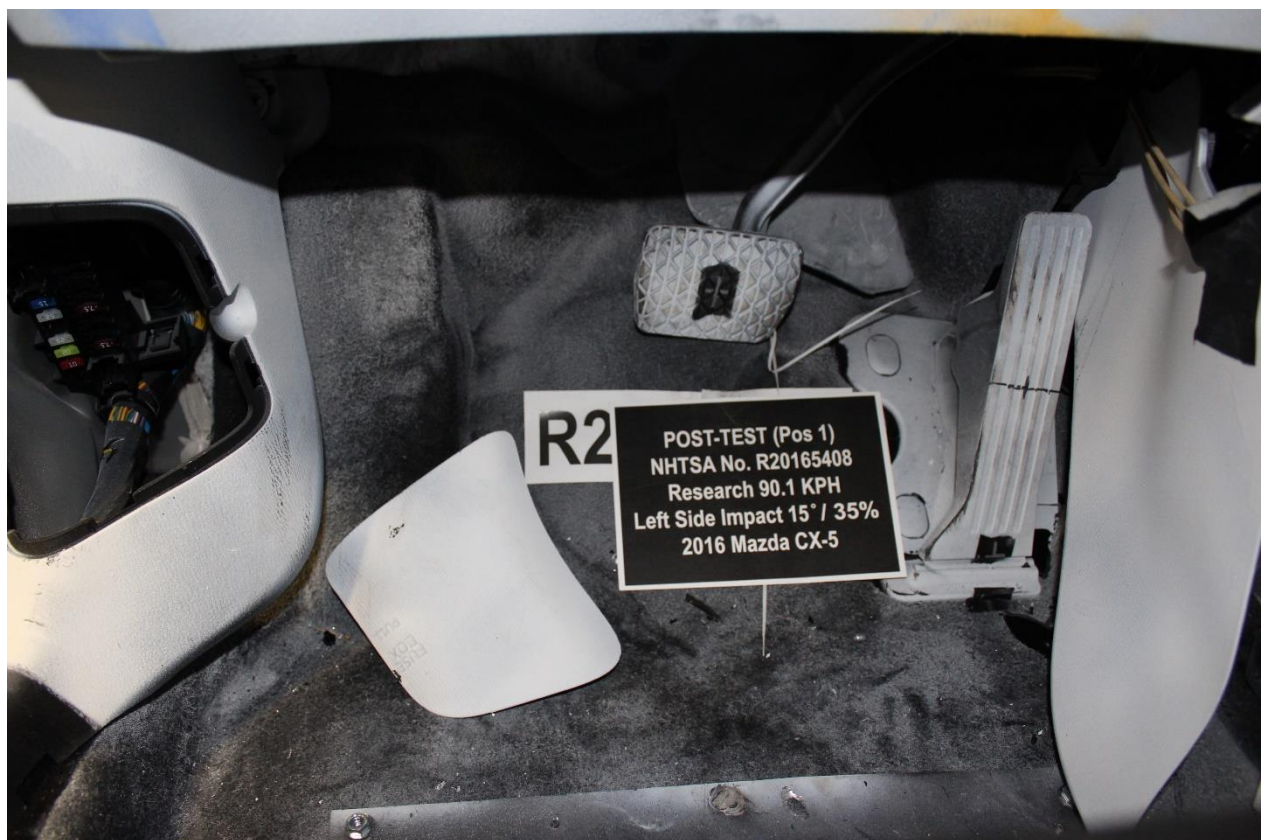
No. 044 Pre-Test View of Driver Floor pan at Left sill level, w/carpet



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



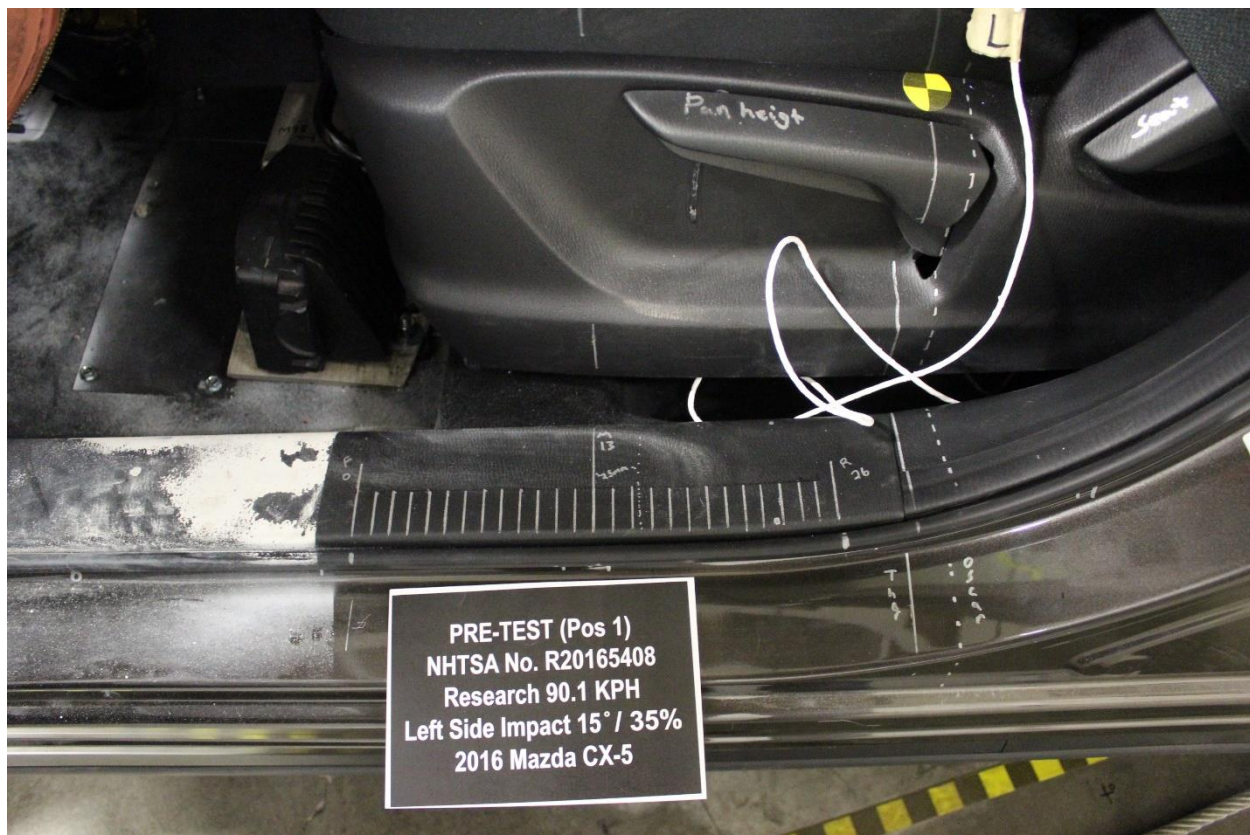
No. 058 Pre-Test View of Driver Door Clearance



No. 059 Post-Test View of Driver Door Clearance



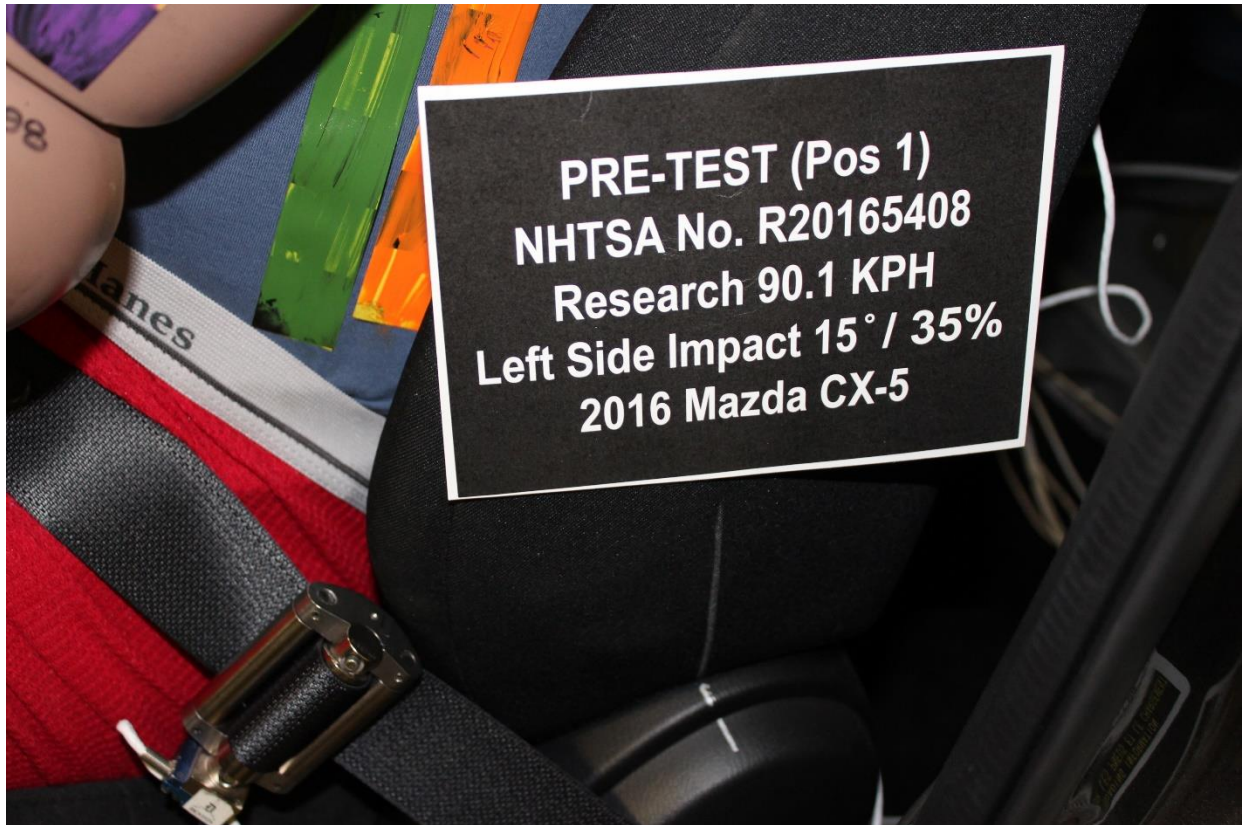
No. 060 Pre-Test View of Parking Brake



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



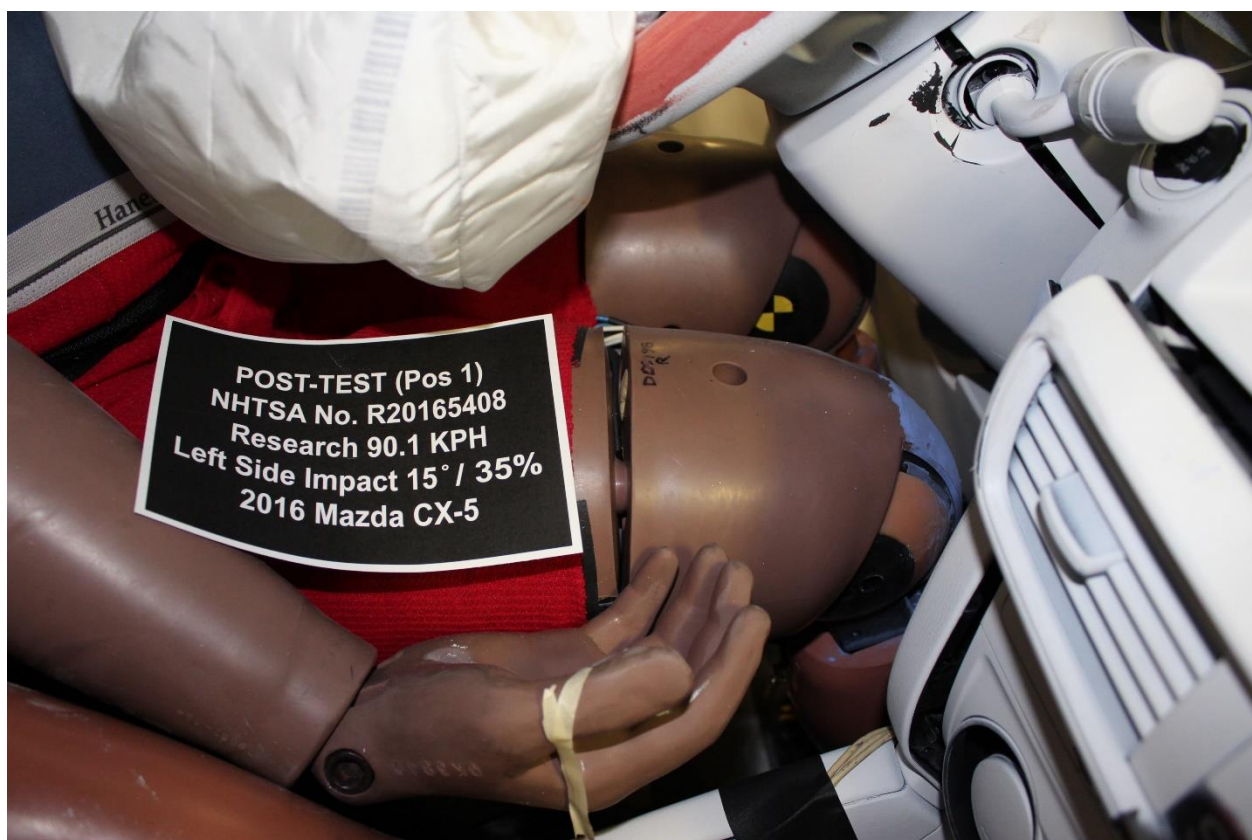
No. 067 Pre-Test Driver Feet



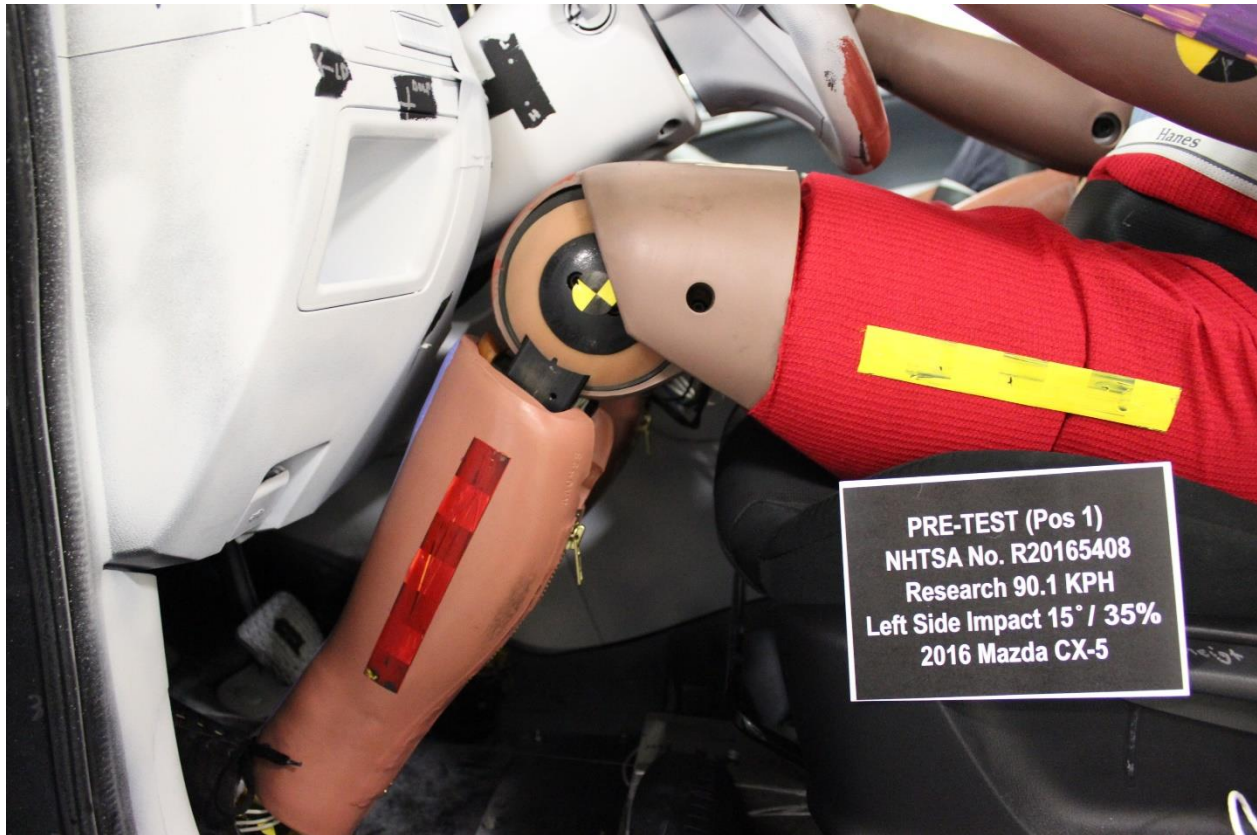
No. 068 Post-Test Driver Feet



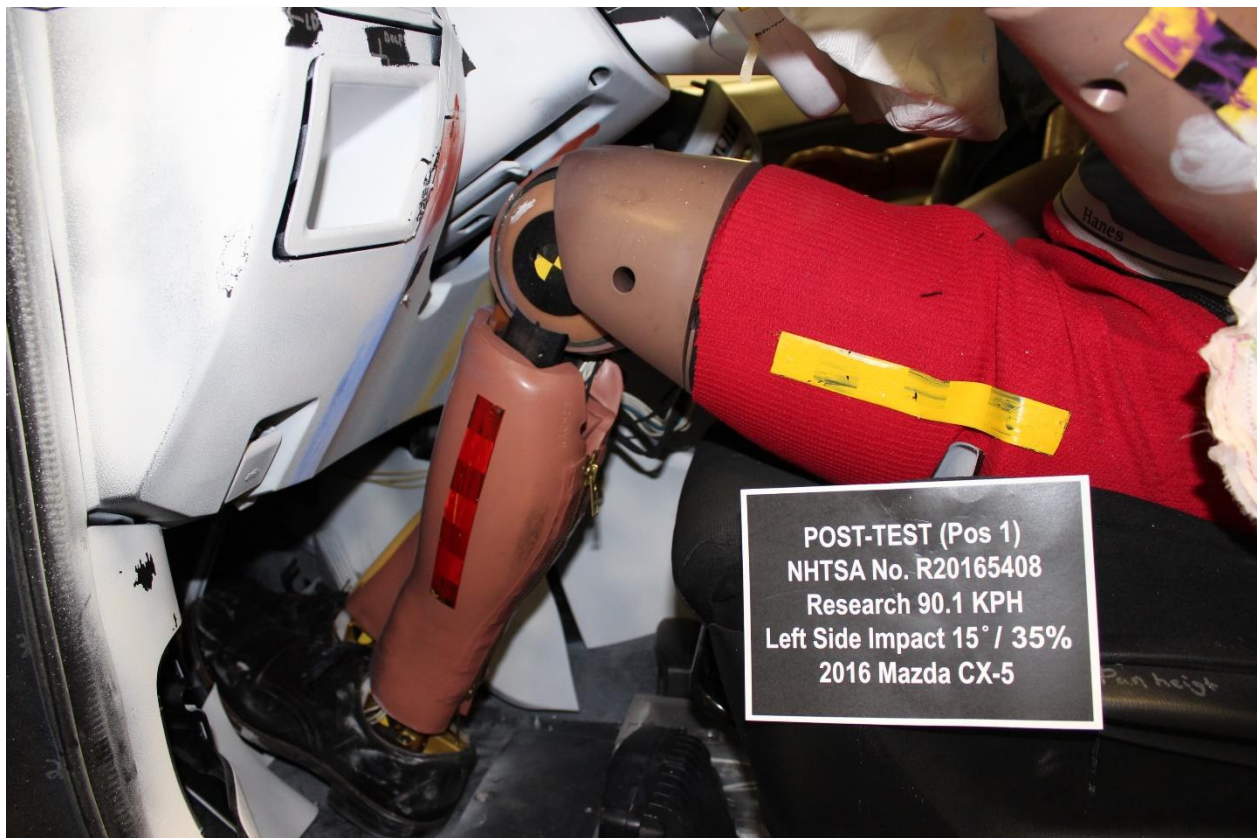
No. 069 Pre-Test View of Driver Right Knee and Bolster



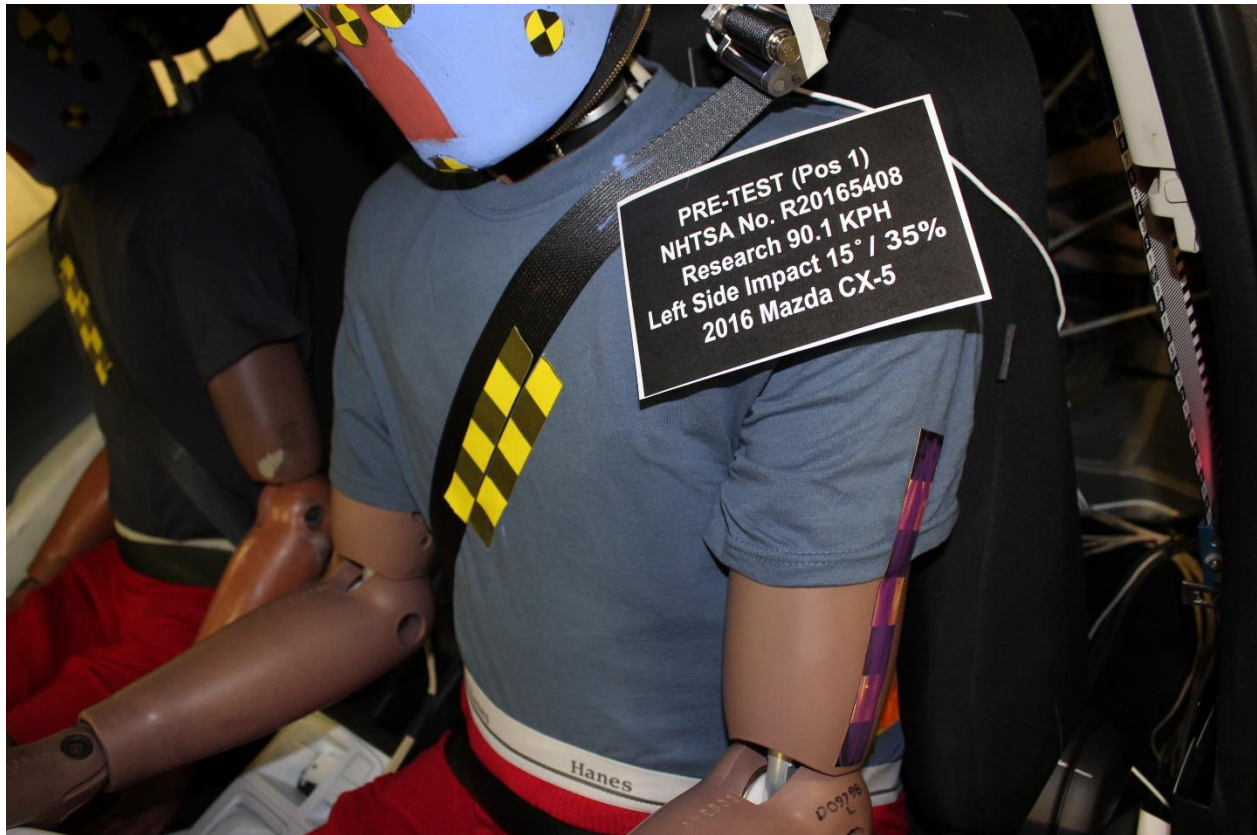
No. 070 Post-Test View of Driver Right Knee and Bolster



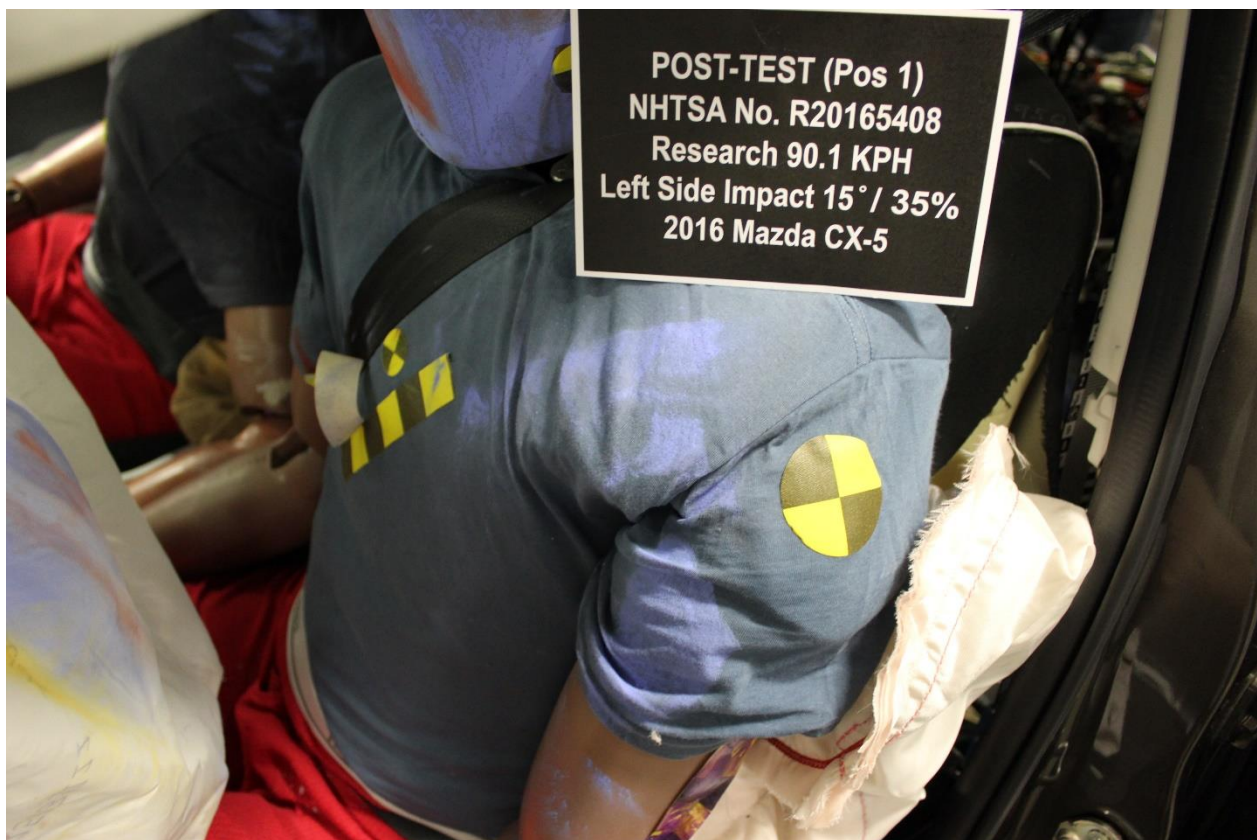
No. 071 Pre-Test View of Driver Left Knee and Bolster



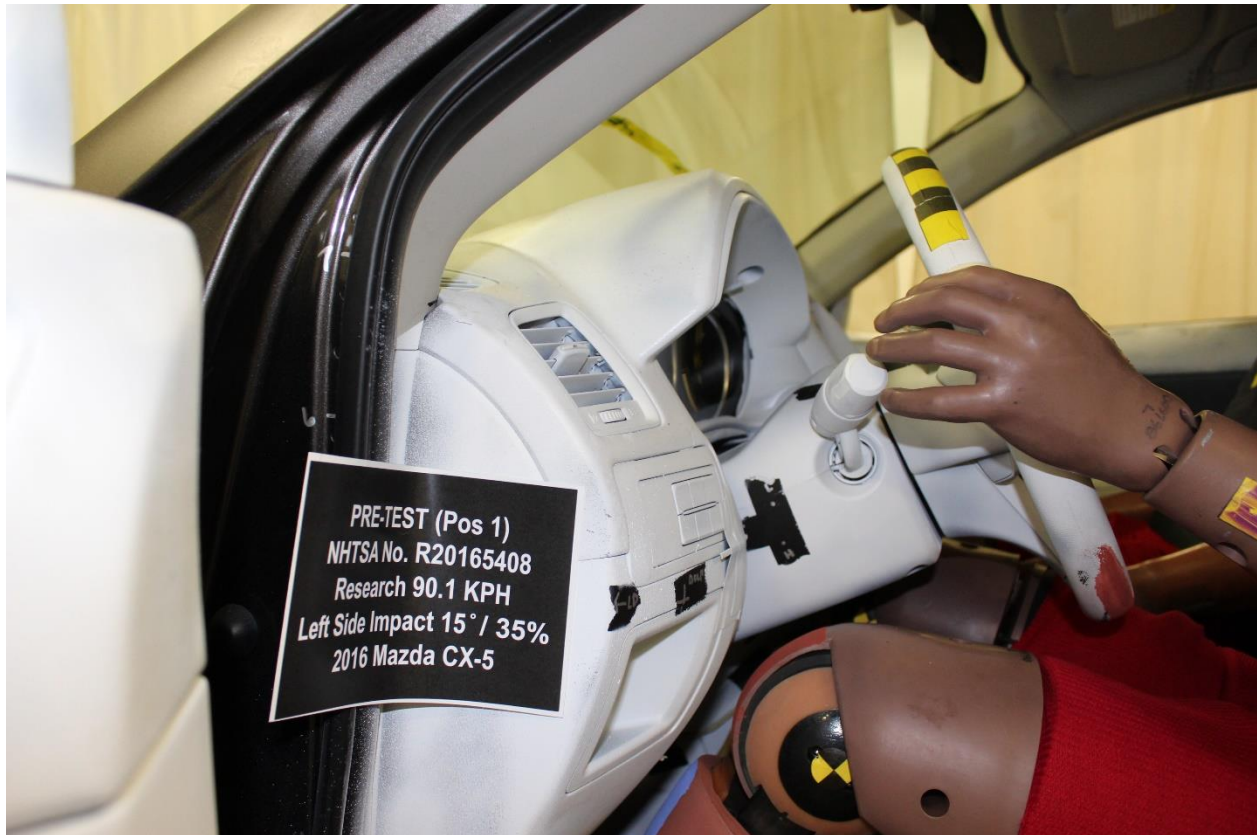
No. 072 Post-Test View of Driver Left Knee and Bolster



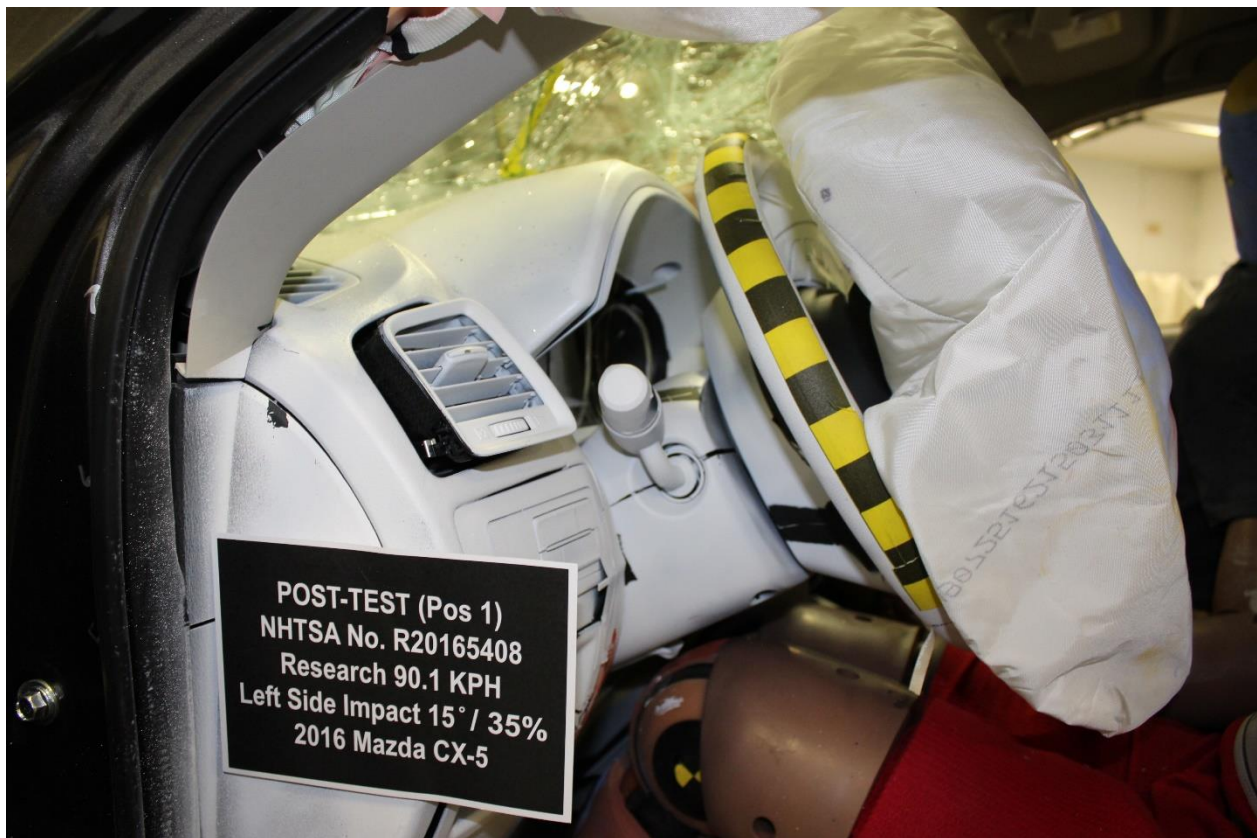
No. 073 Pre-Test View of Driver Abdomen



No. 074 Post-Test View of Driver Abdomen



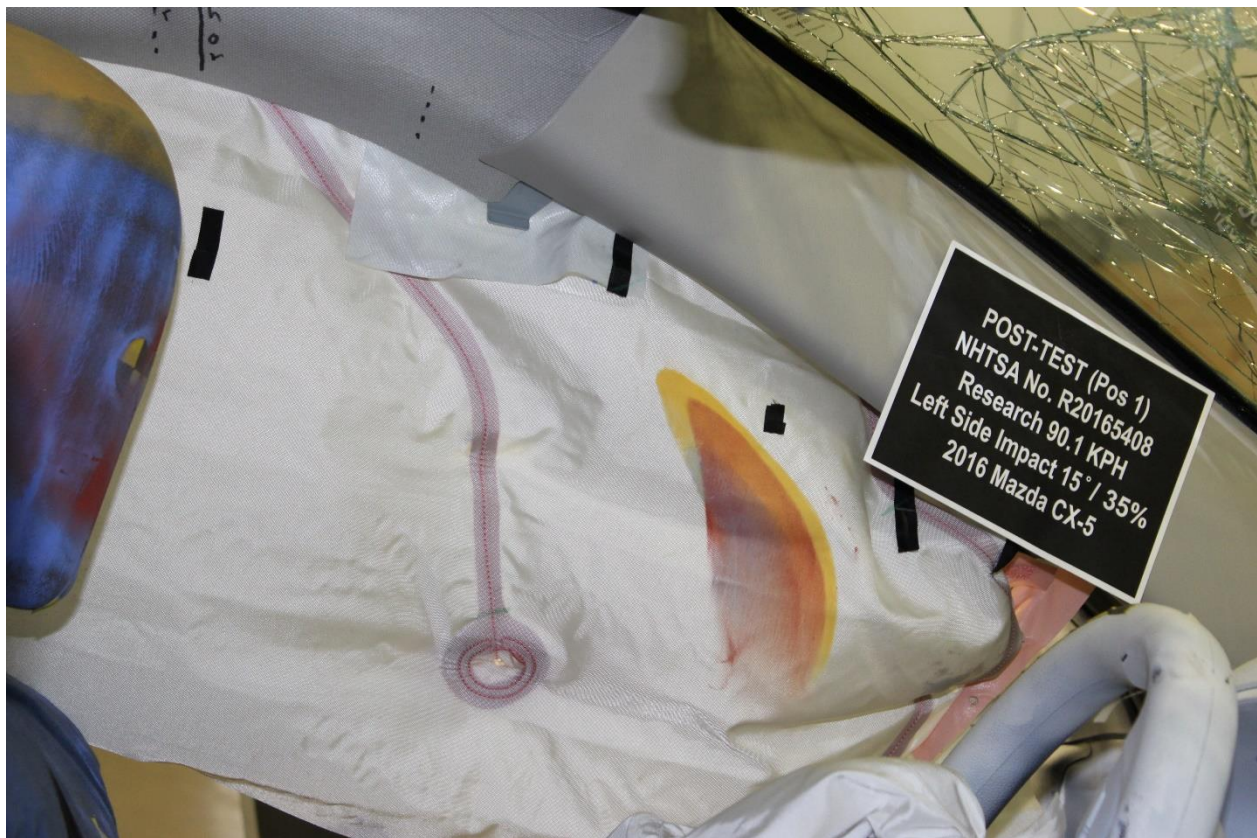
No. 075 Pre-Test Left Side View of Steering Wheel set position



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

Photo Not Applicable

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



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



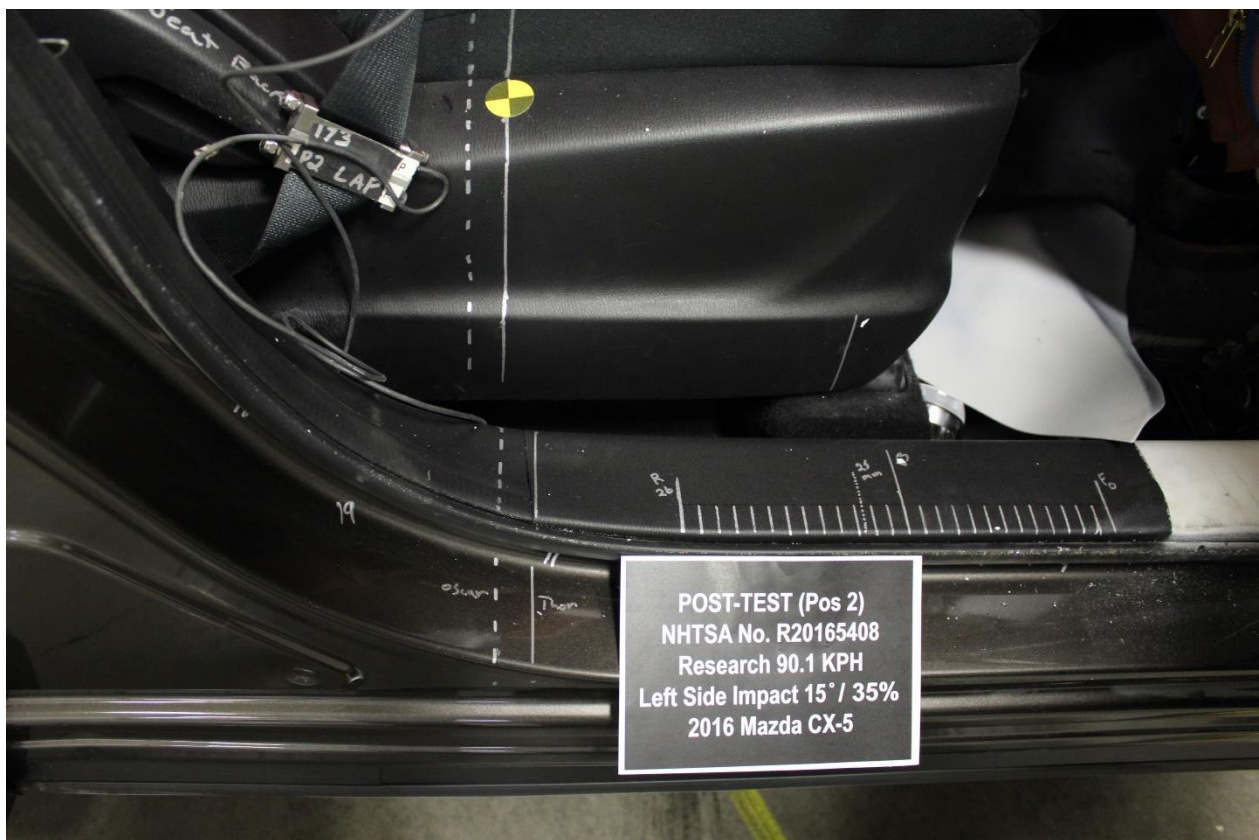
No. 102: Pre-Test View of Passenger Door Clearance



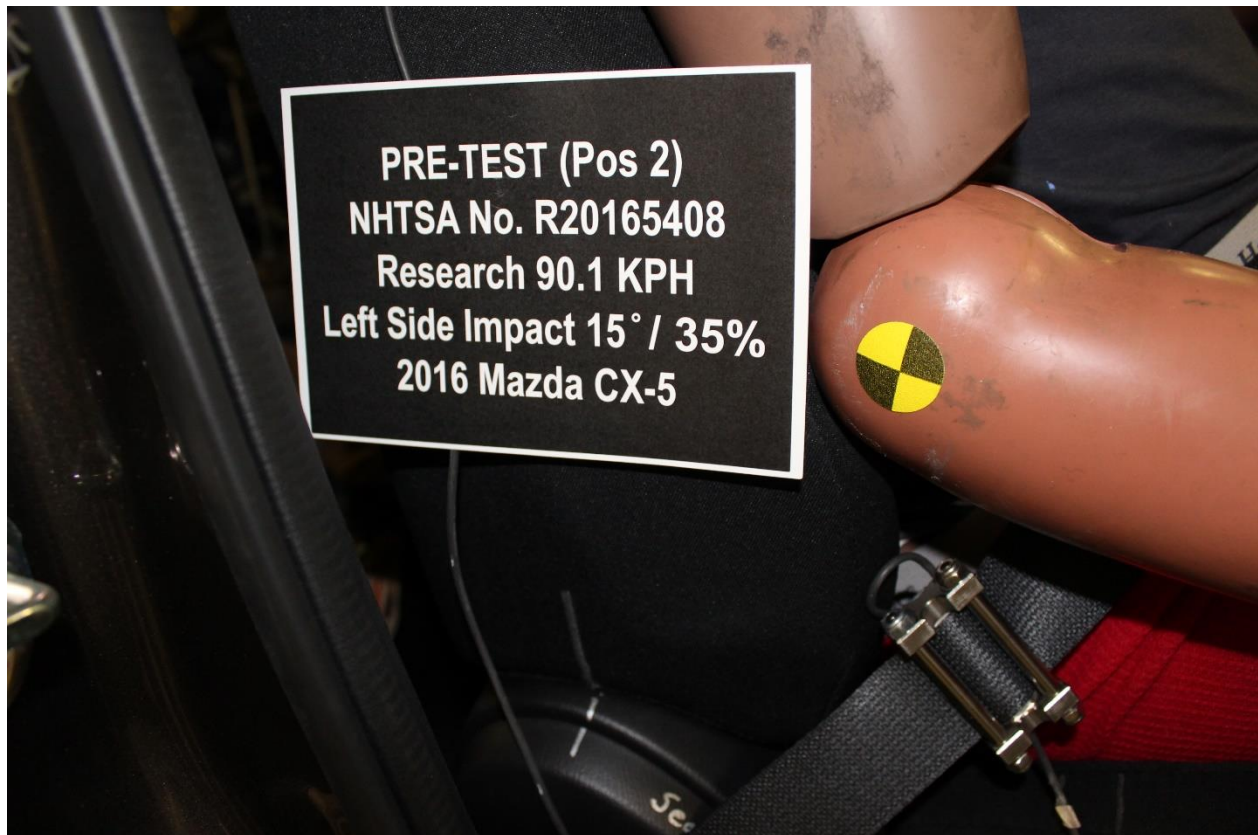
No. 103: Post-Test View of Passenger Door Clearance



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



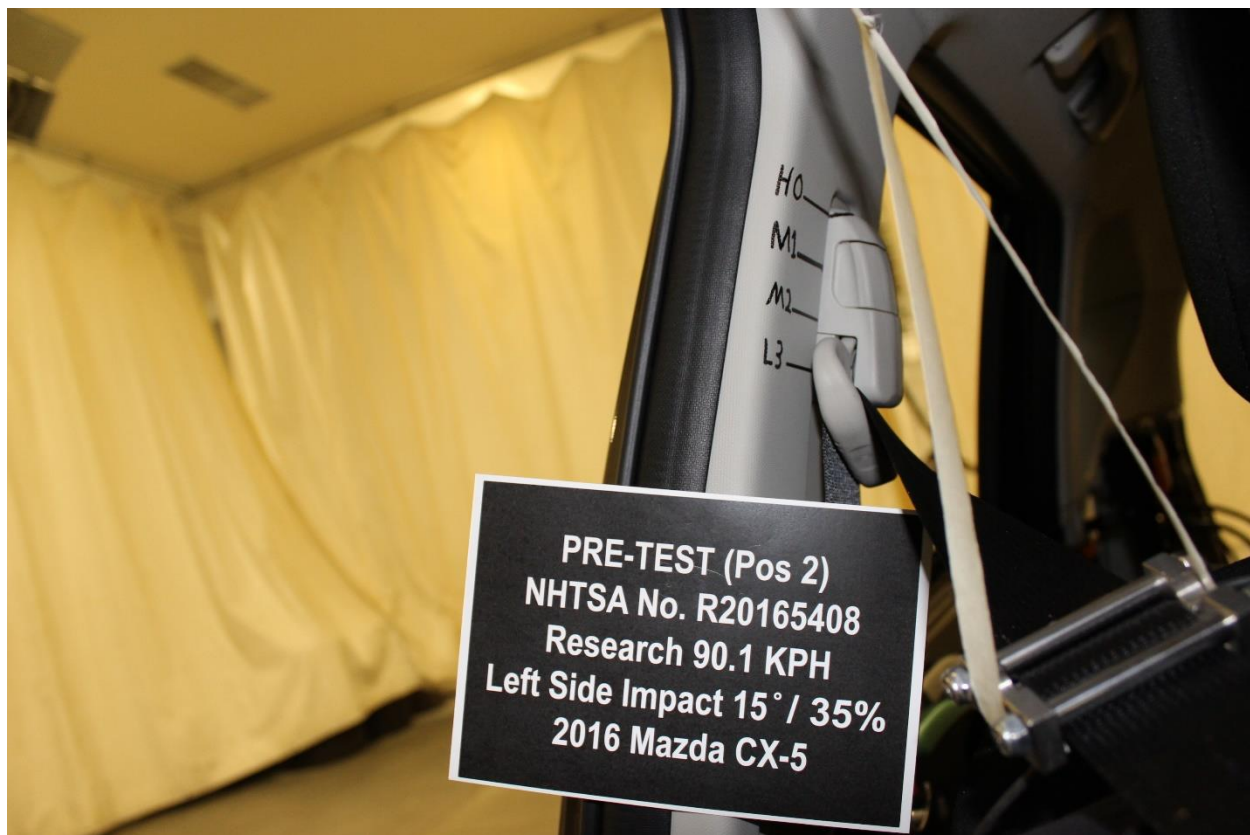
No. 105: Post-Test Passenger Seat Fore-Aft Markings (plastic moved not seat)



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



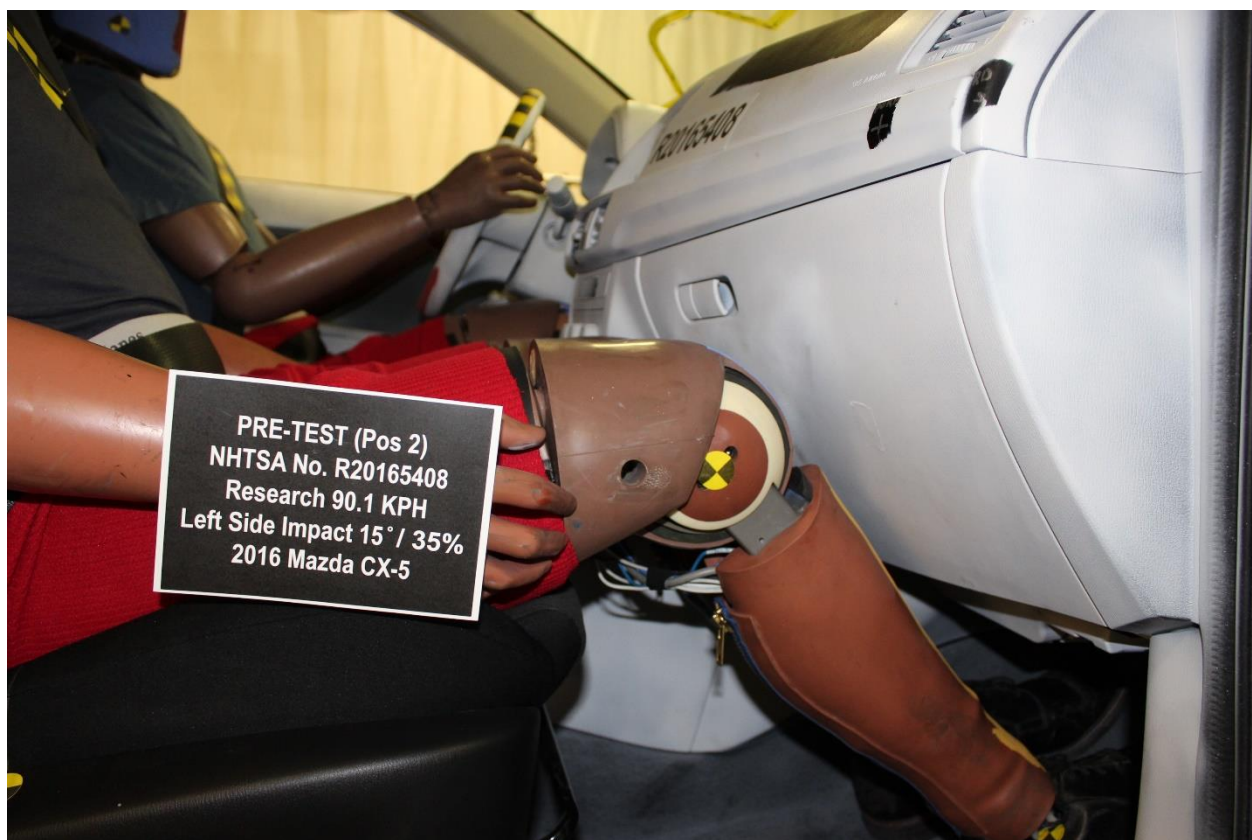
No. 109: Post-Test Passenger Adjustable D-ring



No. 110: Pre-Test View of Passenger Feet



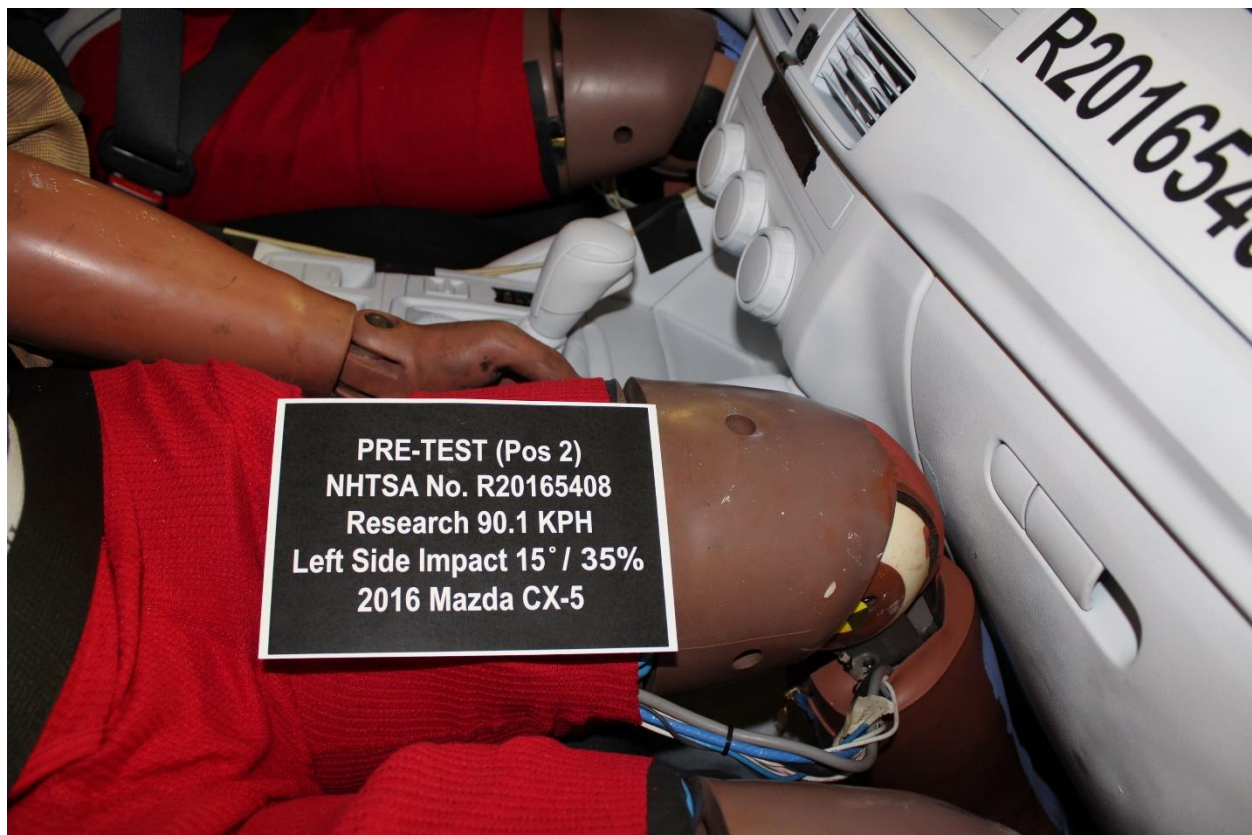
No. 111: Post-Test View of Passenger Feet



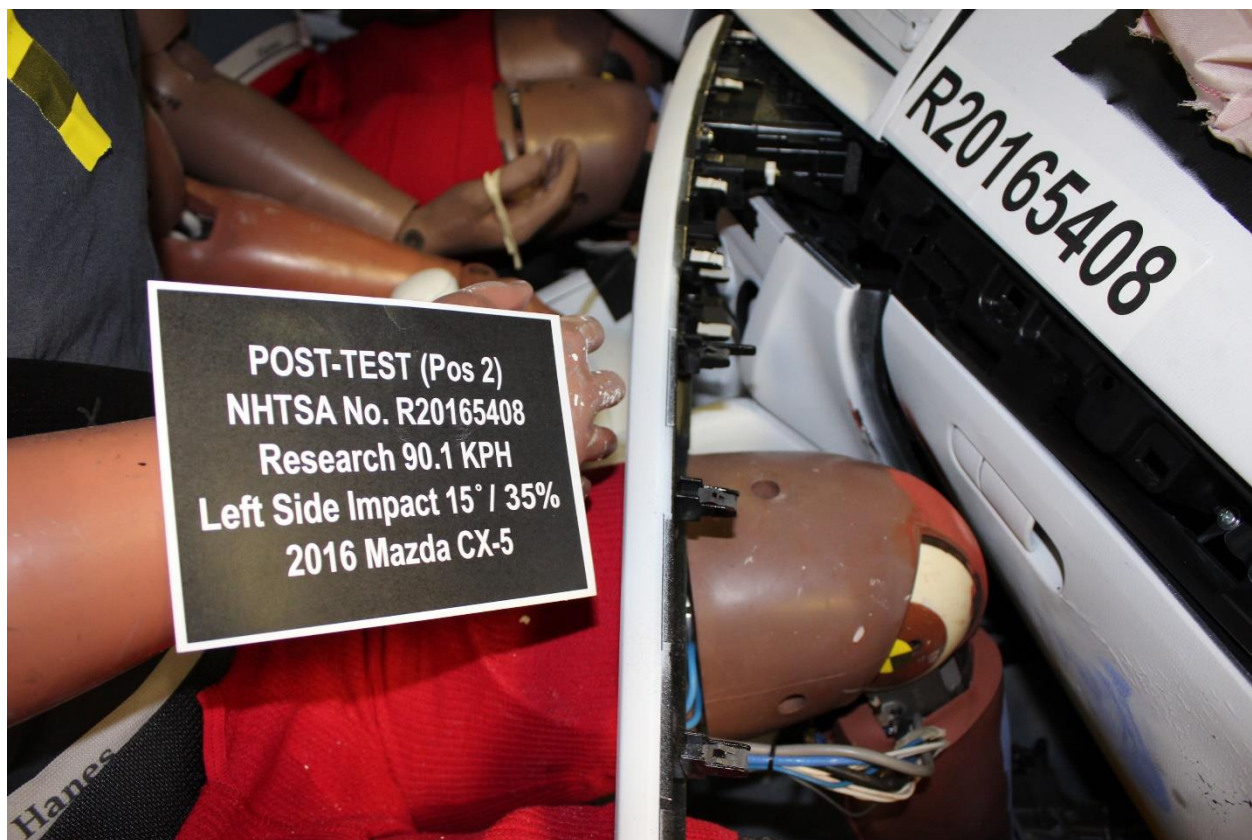
No. 112: Pre-Test View of Passenger Right Knee and Bolster



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



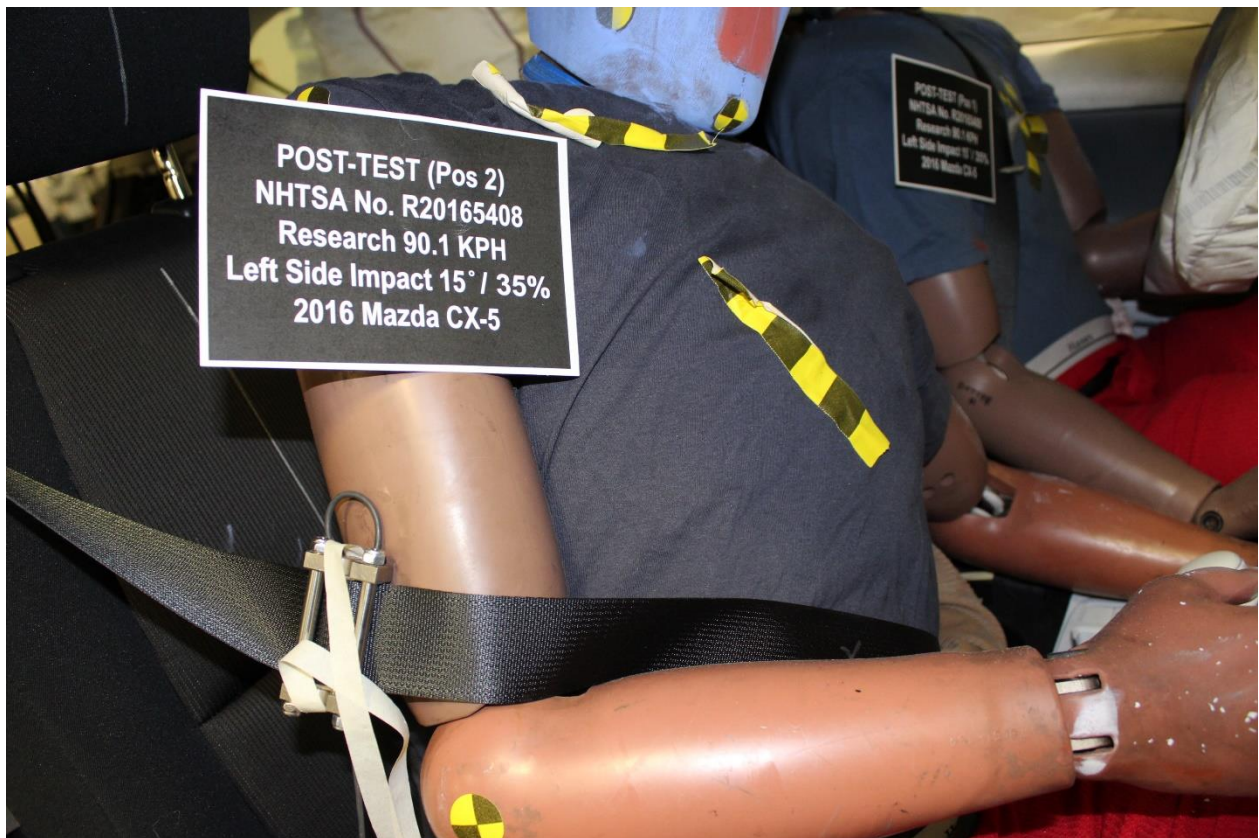
No. 114: Pre-Test View of Passenger Left Knee and Bolster



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

Photo Not Applicable

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

Photo Not Applicable

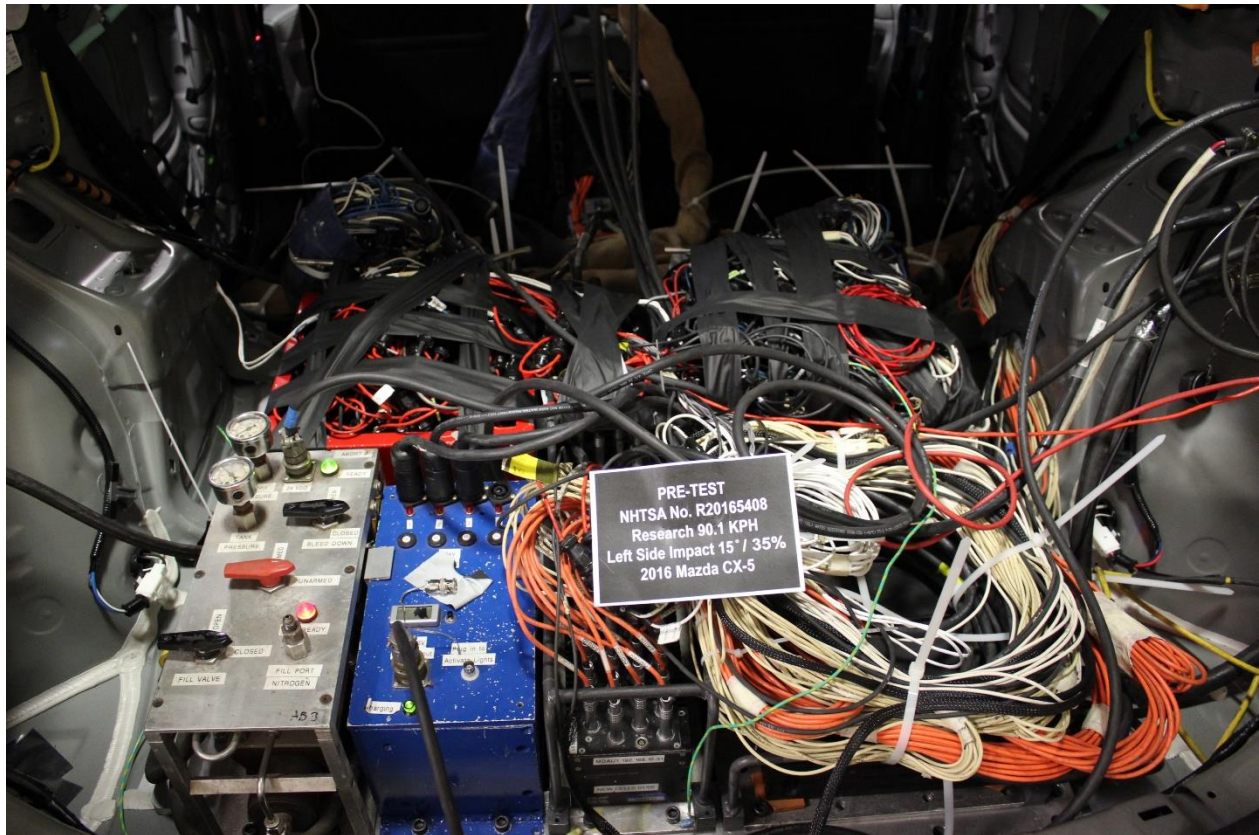
No. 121: Post-Test View of Passenger Body contact with Interior

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



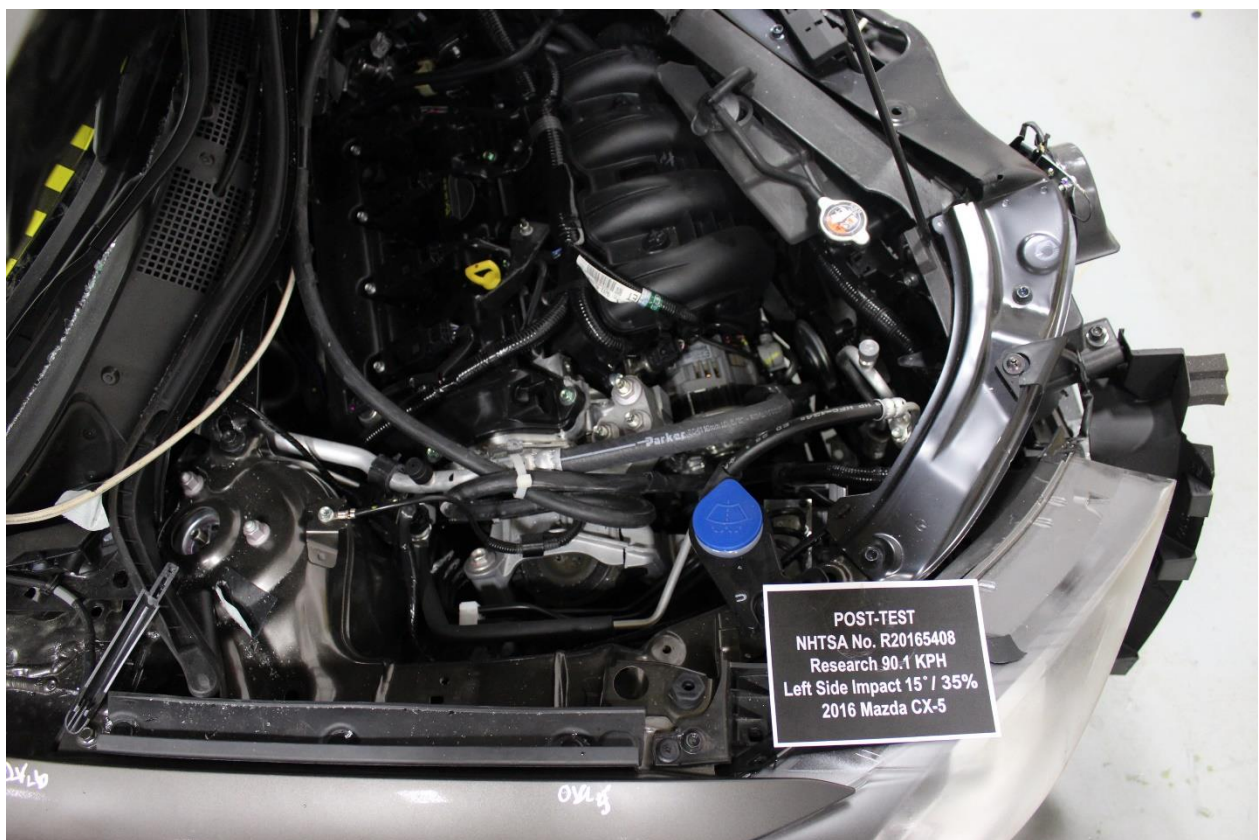
No. 128: Pre-Test Engine Compartment View



No. 129: Post-Test Engine Compartment View



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



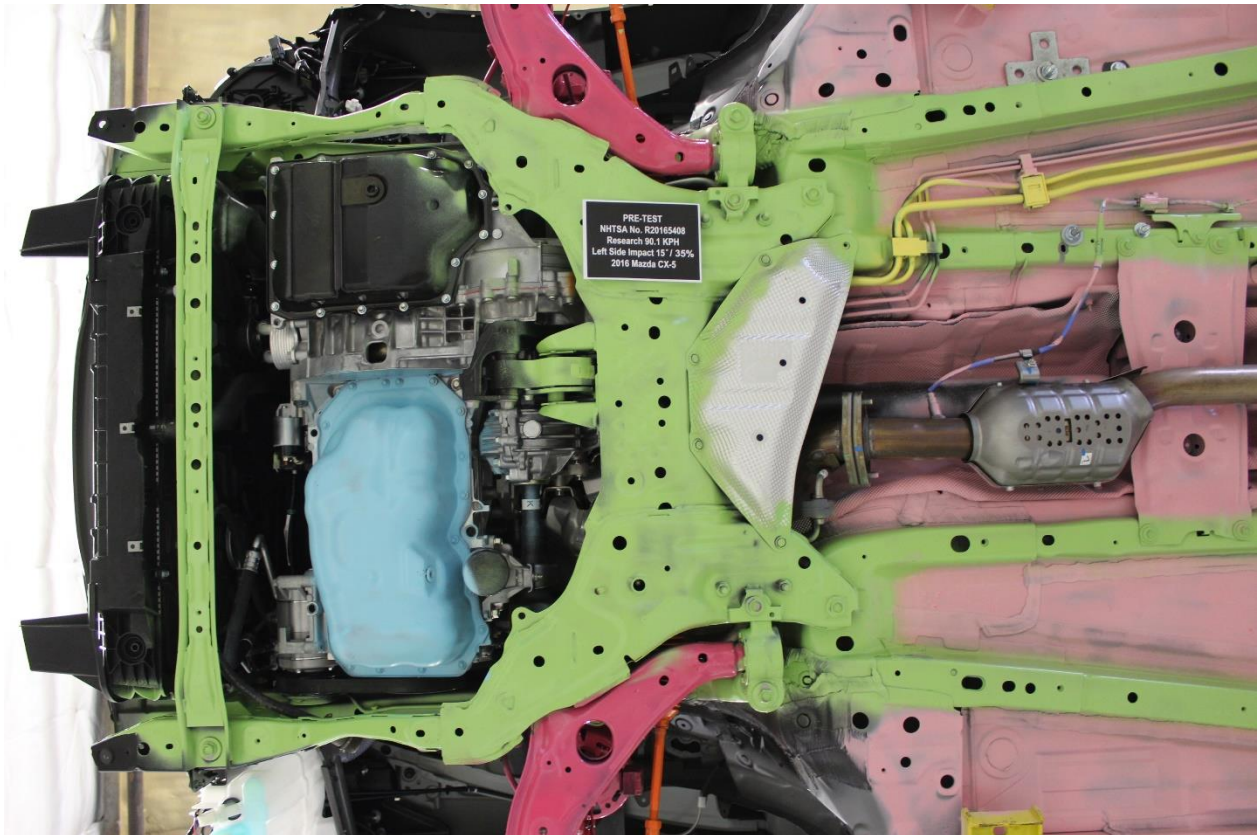
No. 131: Post-Test Right Side Engine Compartment View



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



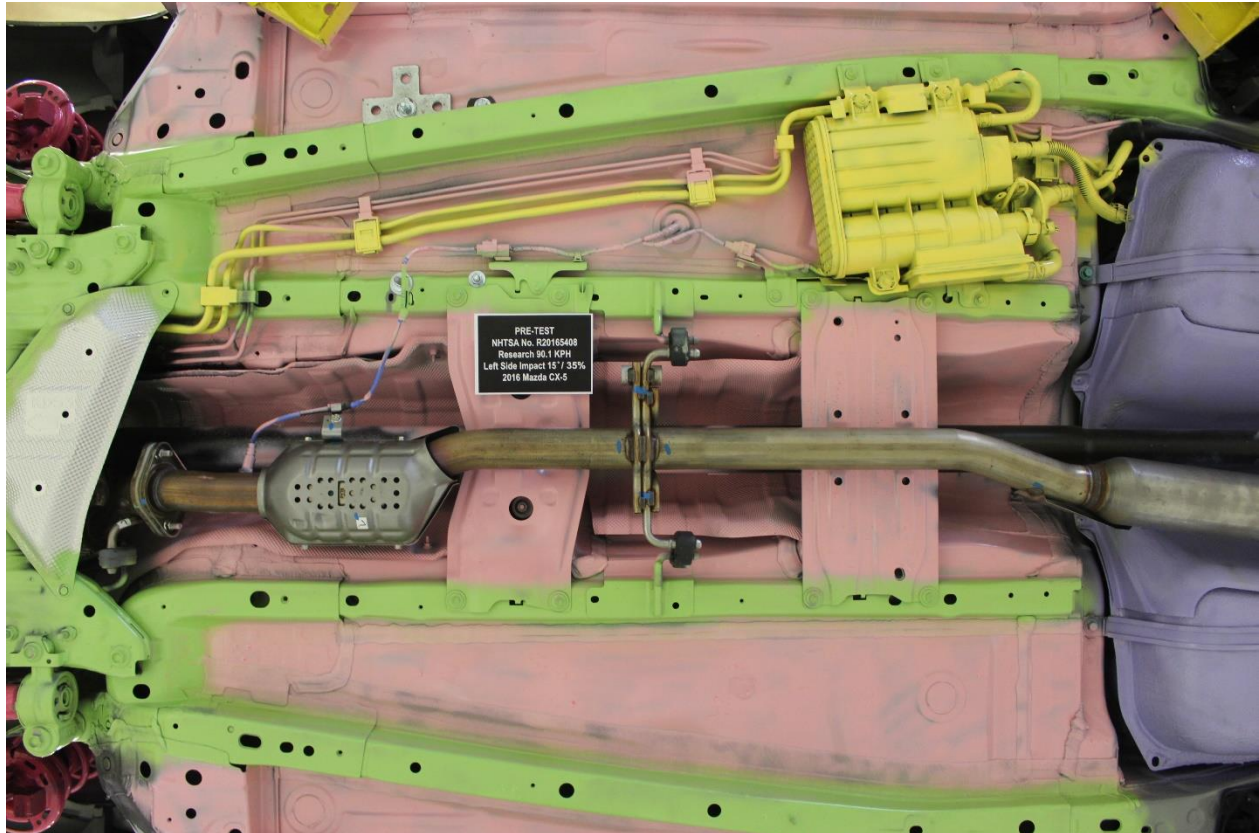
No. 133: Post-Test Left Side Engine Compartment View



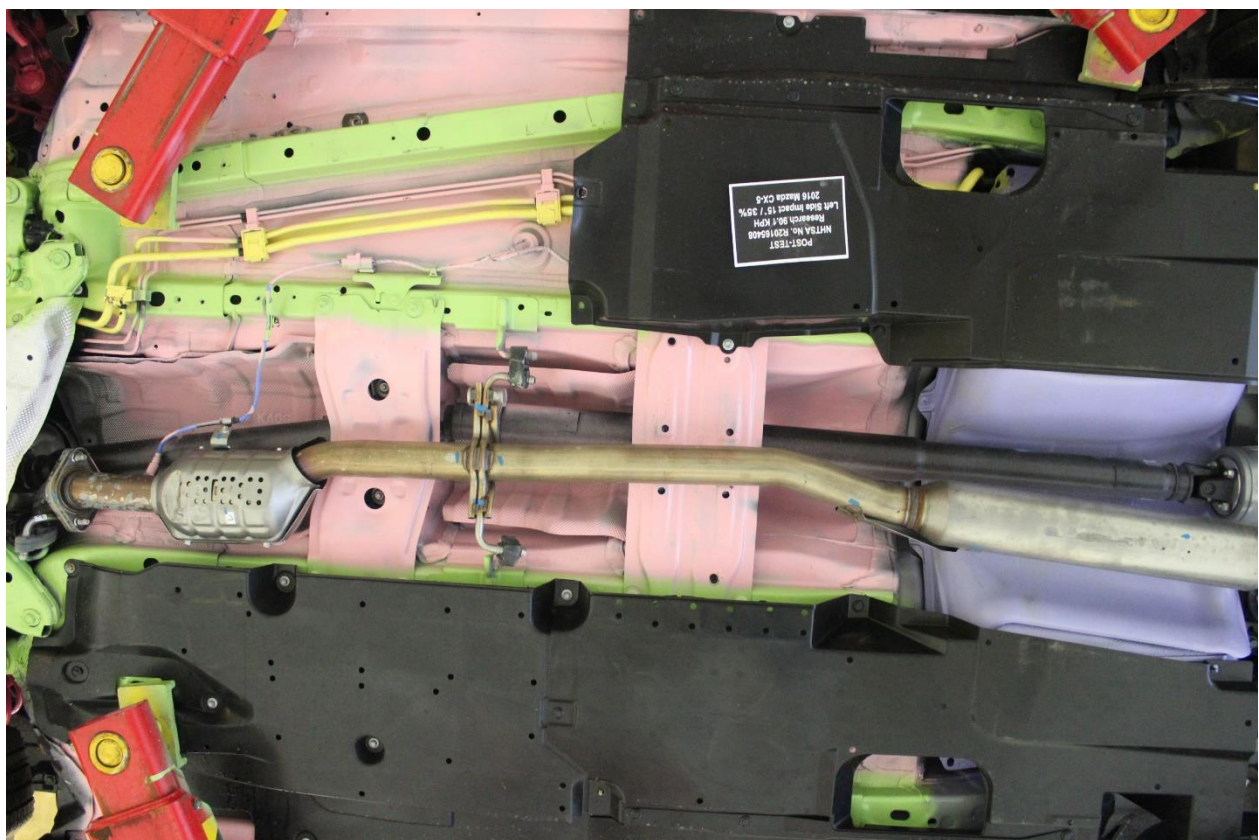
No. 134: Pre-Test View of Front Underbody (perpendicular to vehicle)



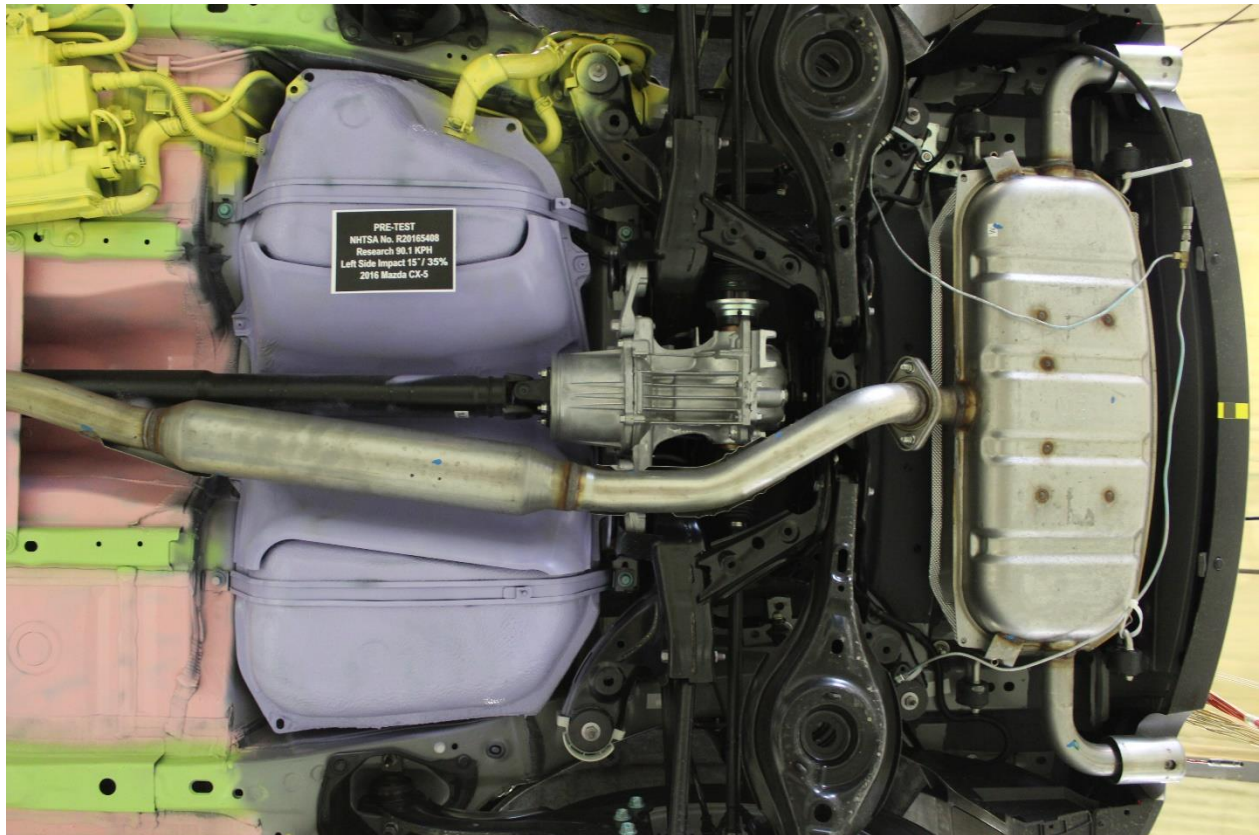
No. 135: Post-Test View of Front Underbody (perpendicular to vehicle)



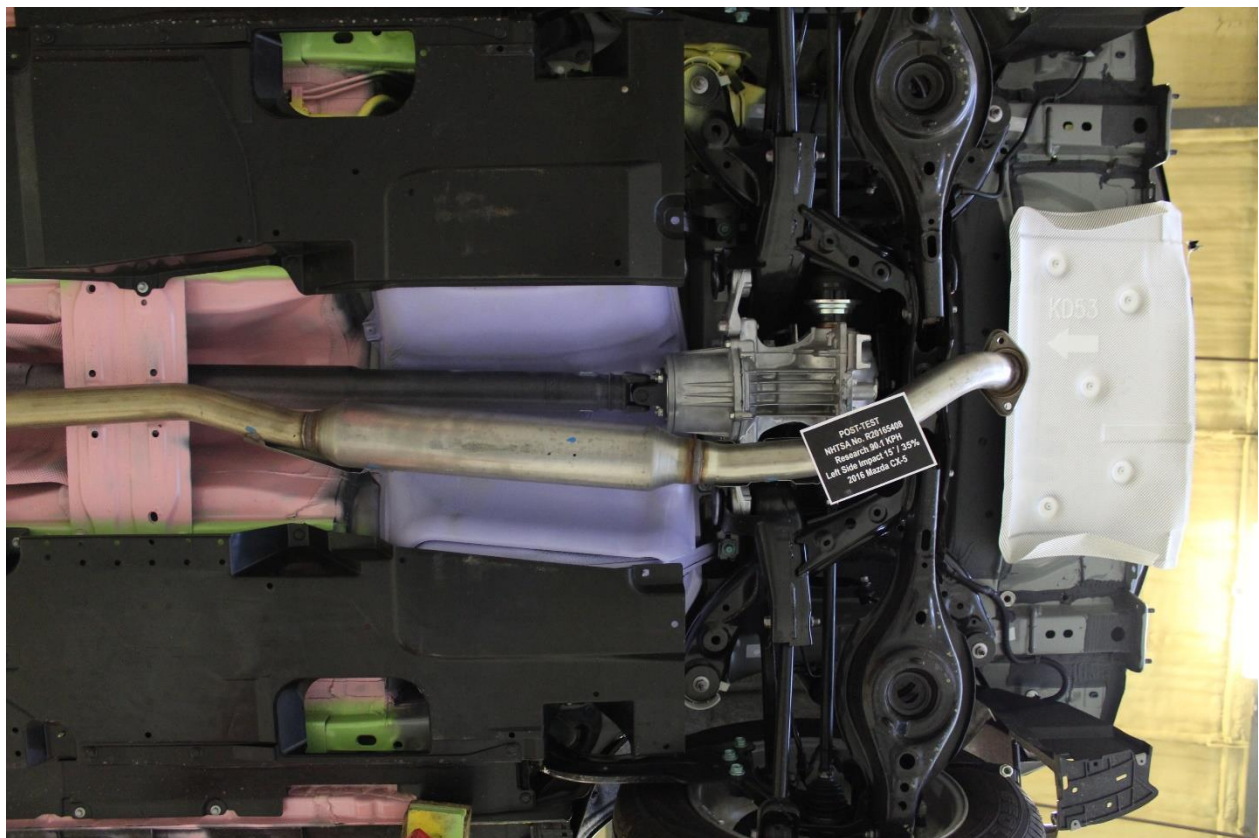
No. 136: Pre-Test View of Mid Underbody (perpendicular to vehicle)



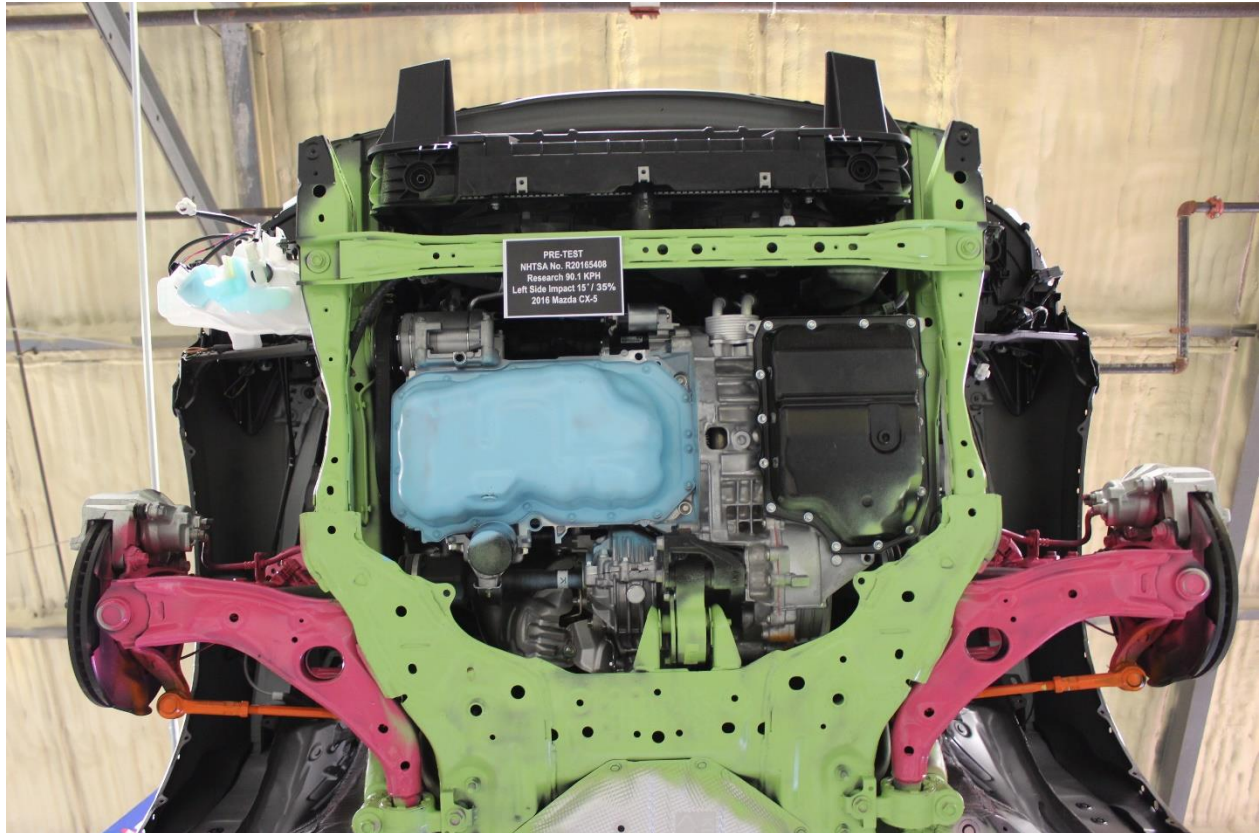
No. 137: Post-Test View of Mid Underbody (perpendicular to vehicle)



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



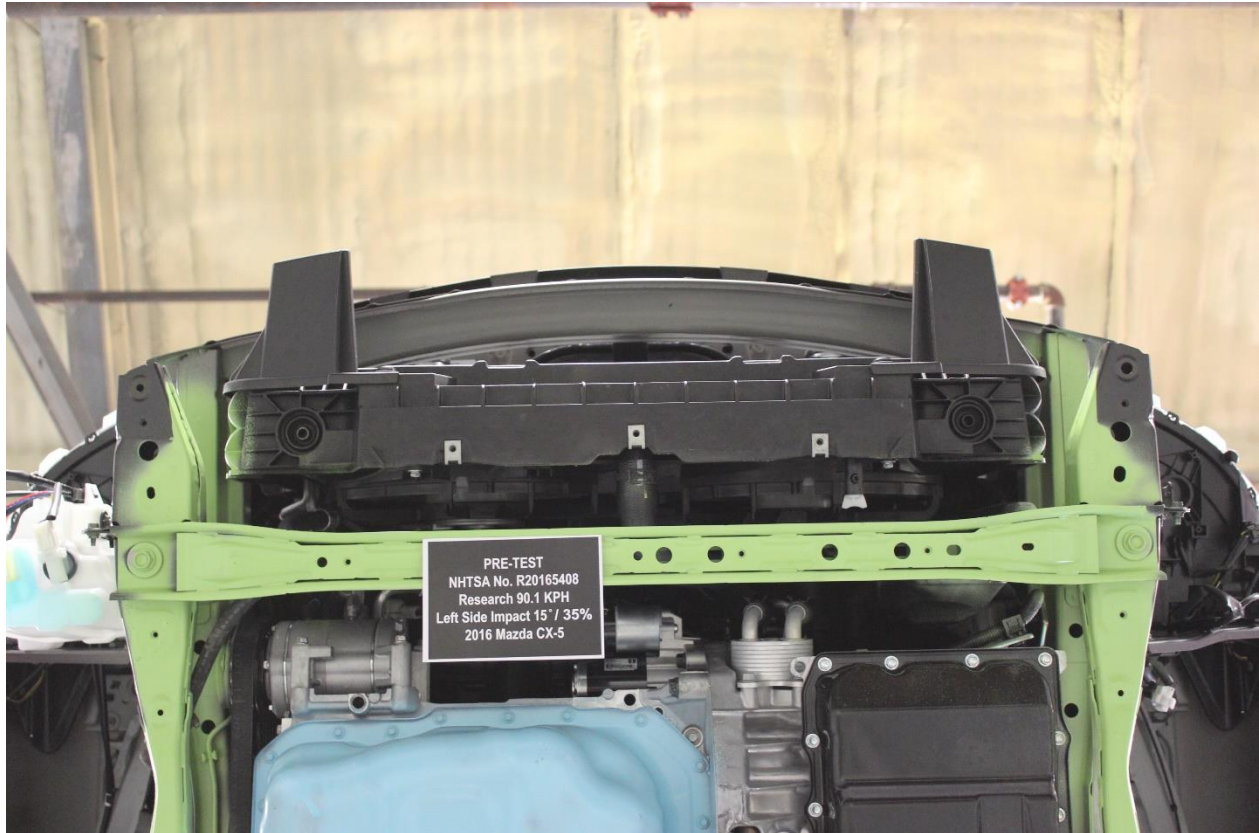
No. 139: Post-Test View of Rear Underbody (perpendicular to vehicle)



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



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



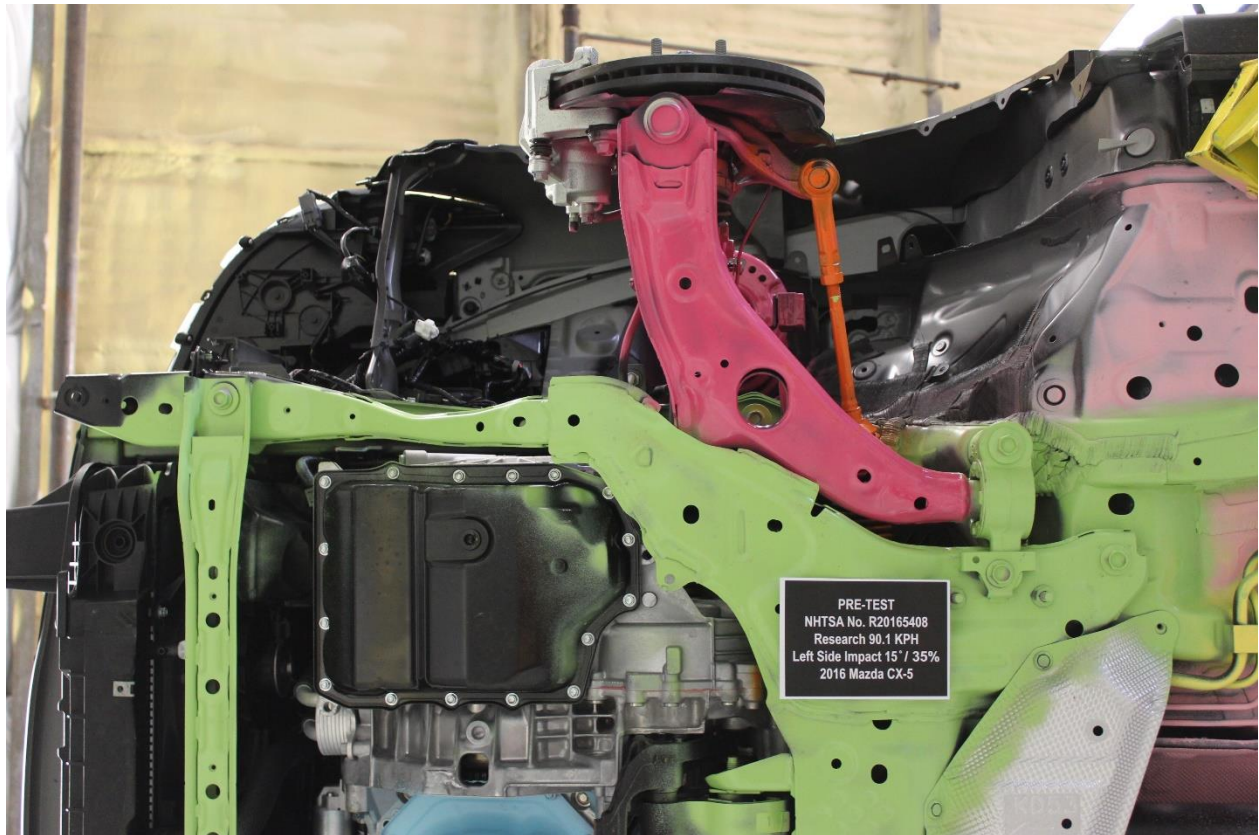
No. 142: Pre-Test Bumper to Rail Attachments and Crush Initiators



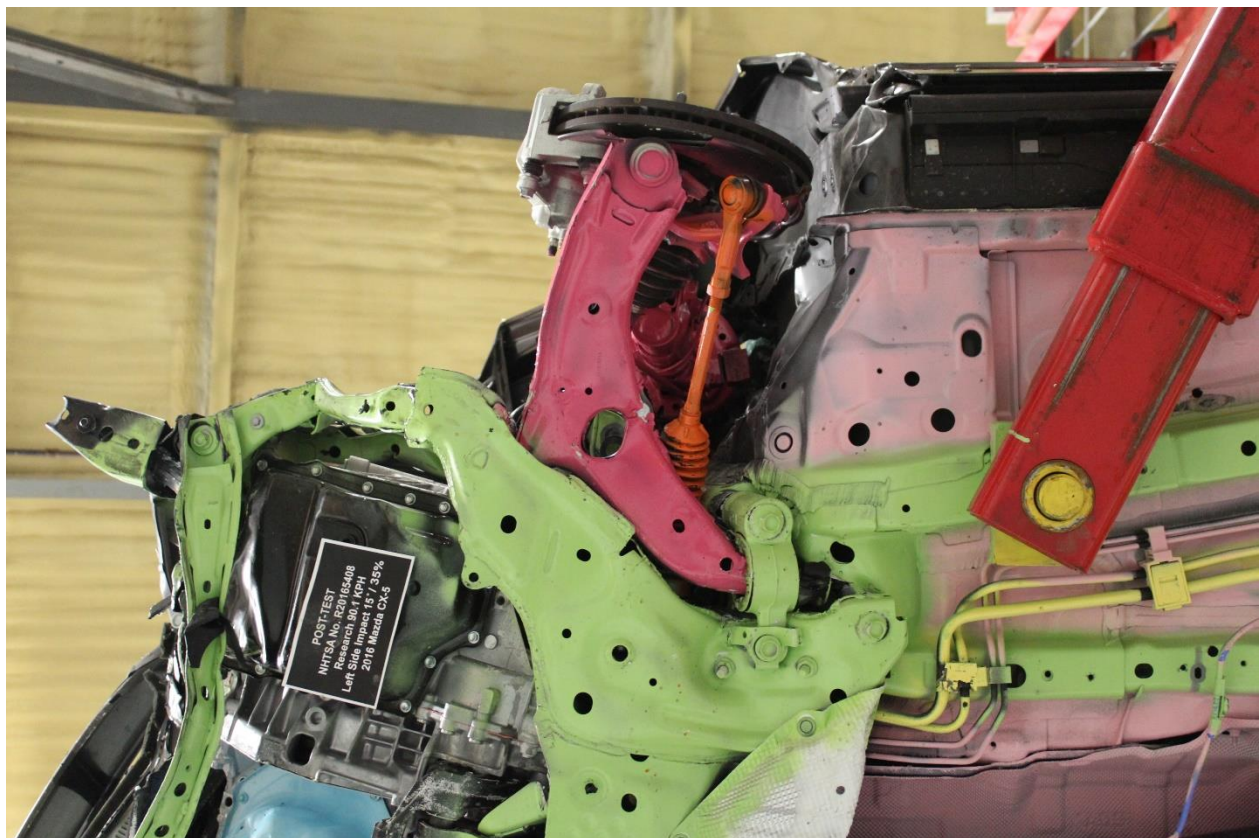
No. 143: Post-Test Bumper to Rail Attachments and Crush Initiators



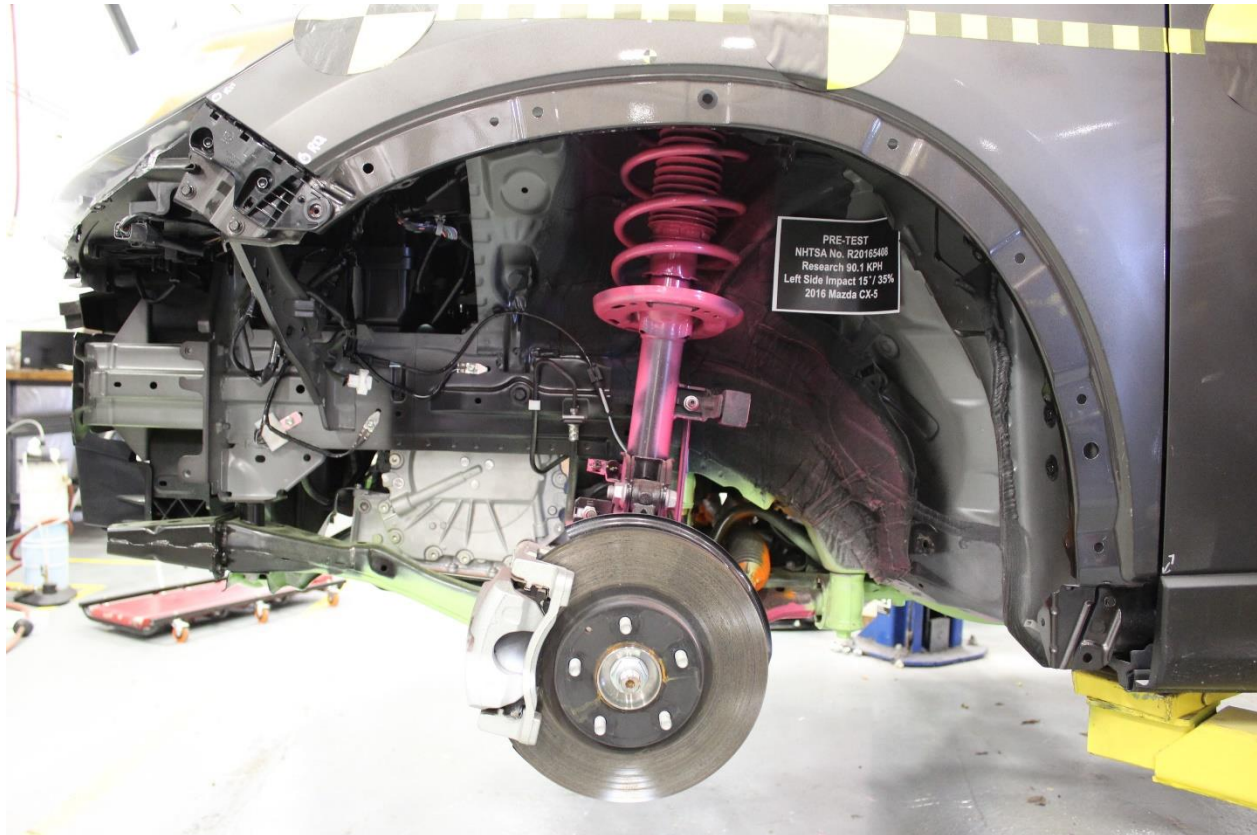
No. 144: Post-Test View of Front Sub-Frame Deformation



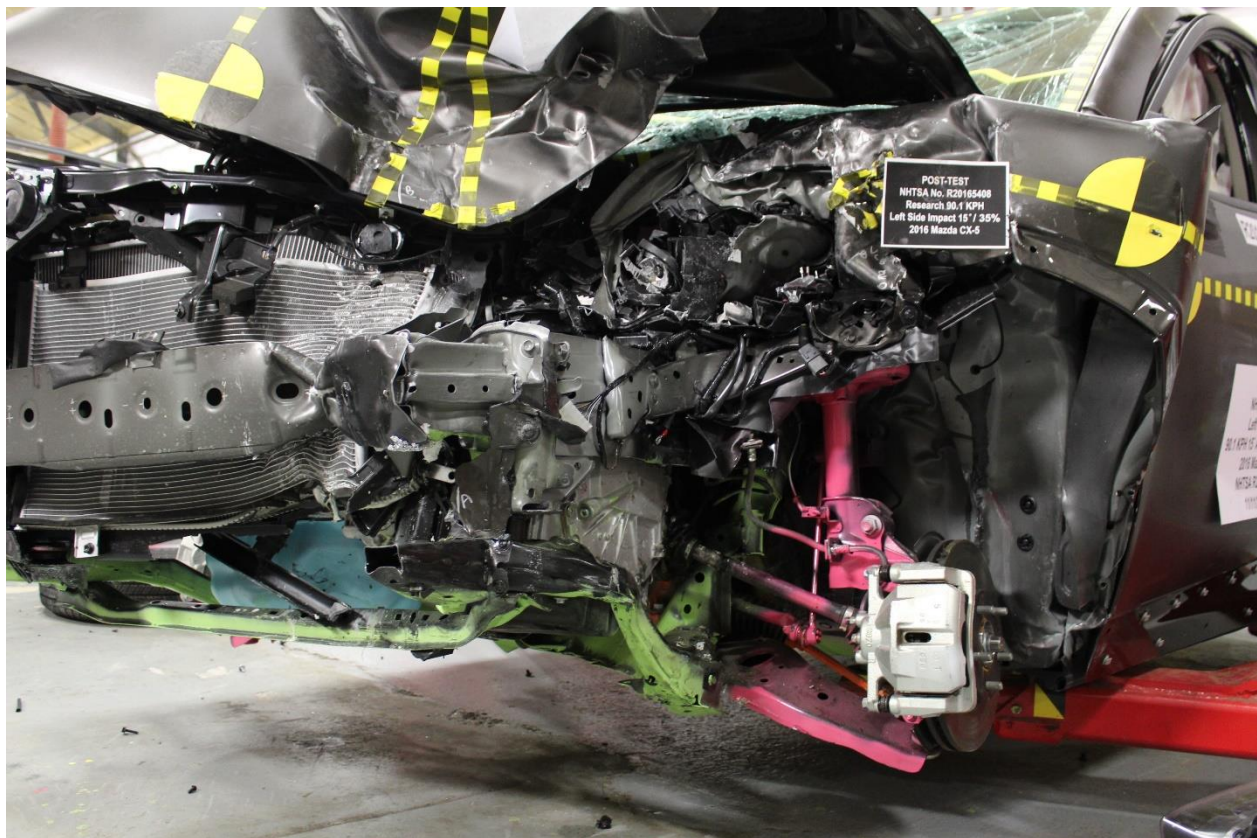
No. 145: Pre-Test Frame Rail with tire removed



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



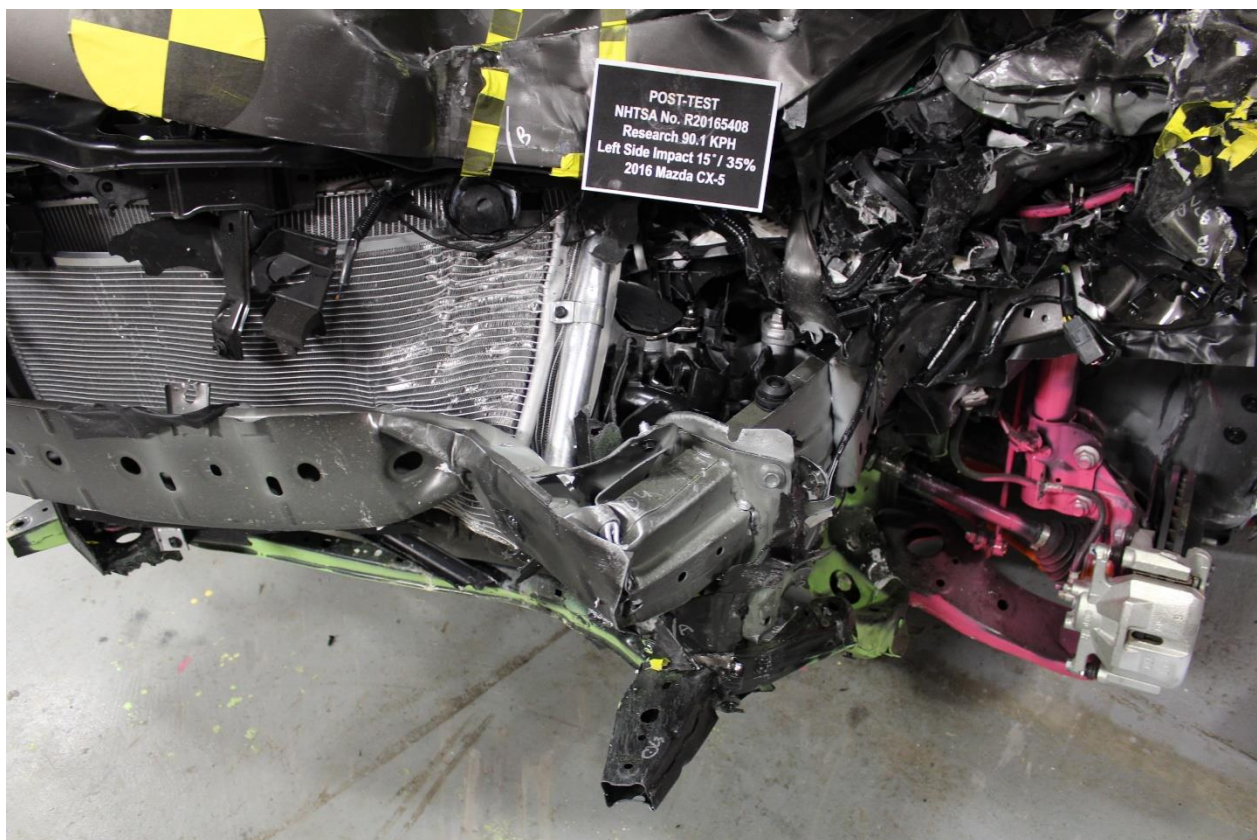
No. 149: Post-Test Side View of Front Driver Wheel Well w/ Tire Removed



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



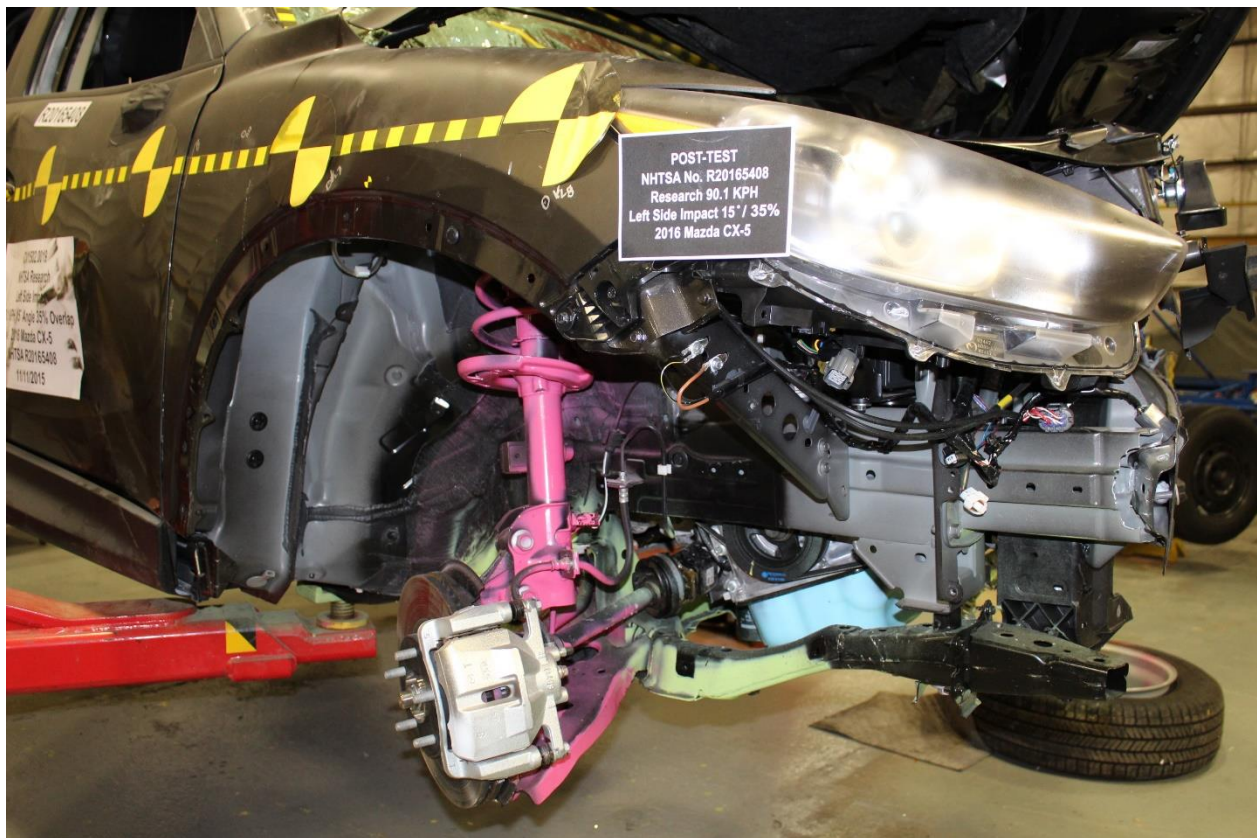
No. 151: Post-Test Looking Down at the Front Driver Shotgun



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



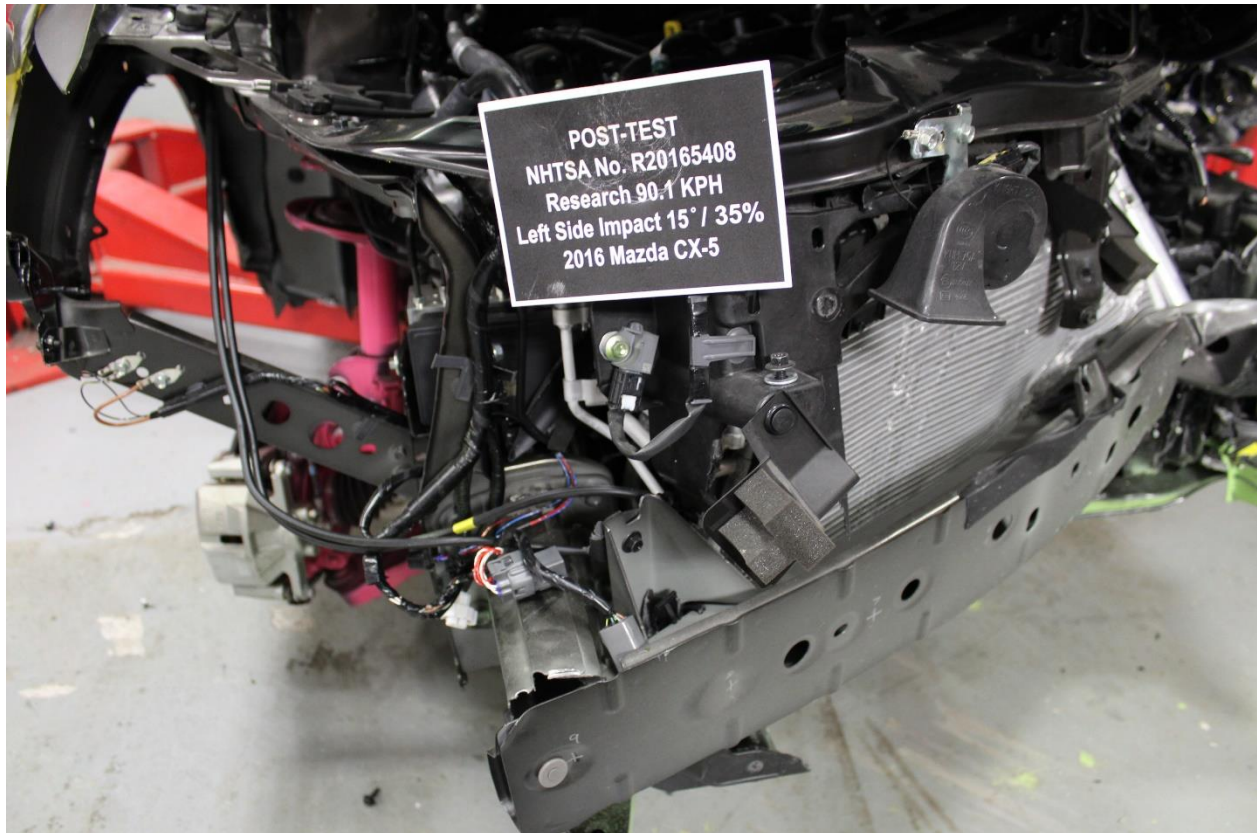
No. 154: Post-Test ¾ View of Front Passenger Wheel Well w/ Tire Removed



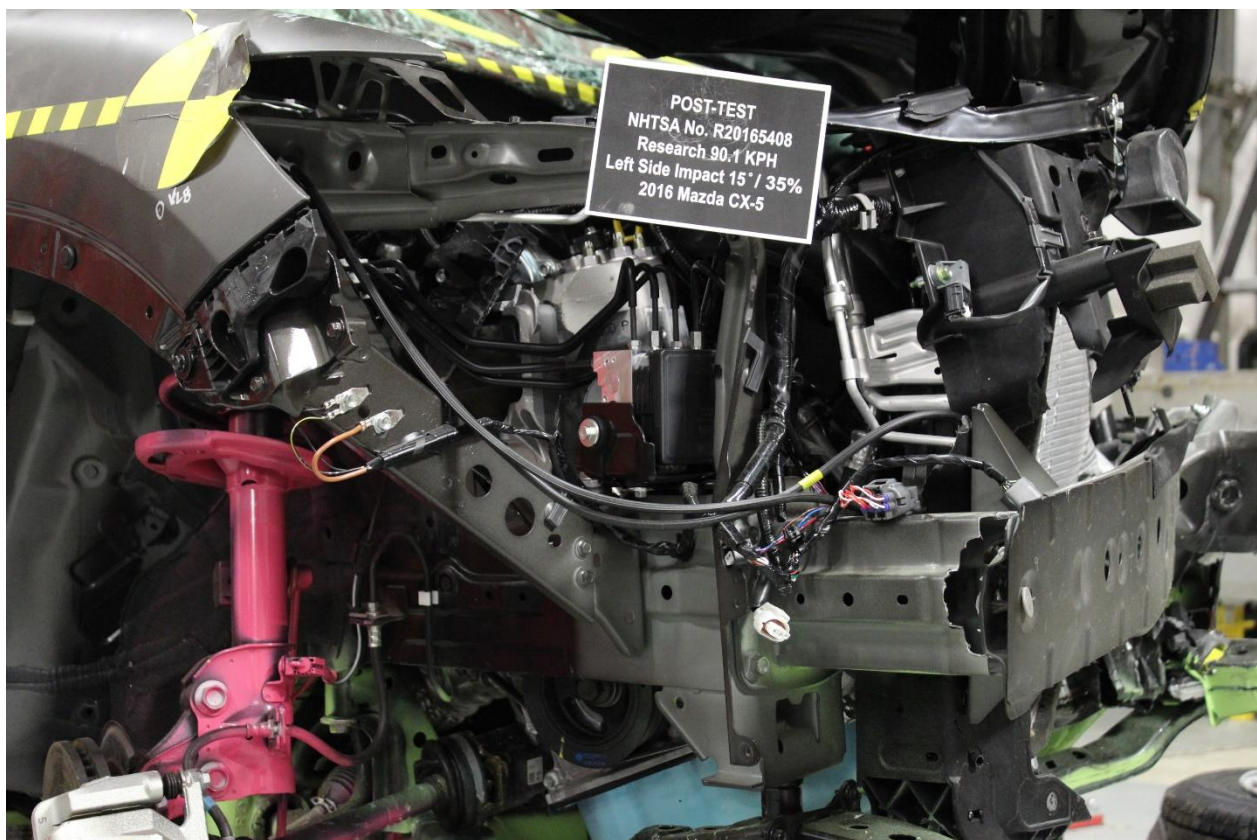
No. 155: Post-Test Side View of Front Passenger Wheel Well w/ Tire Removed



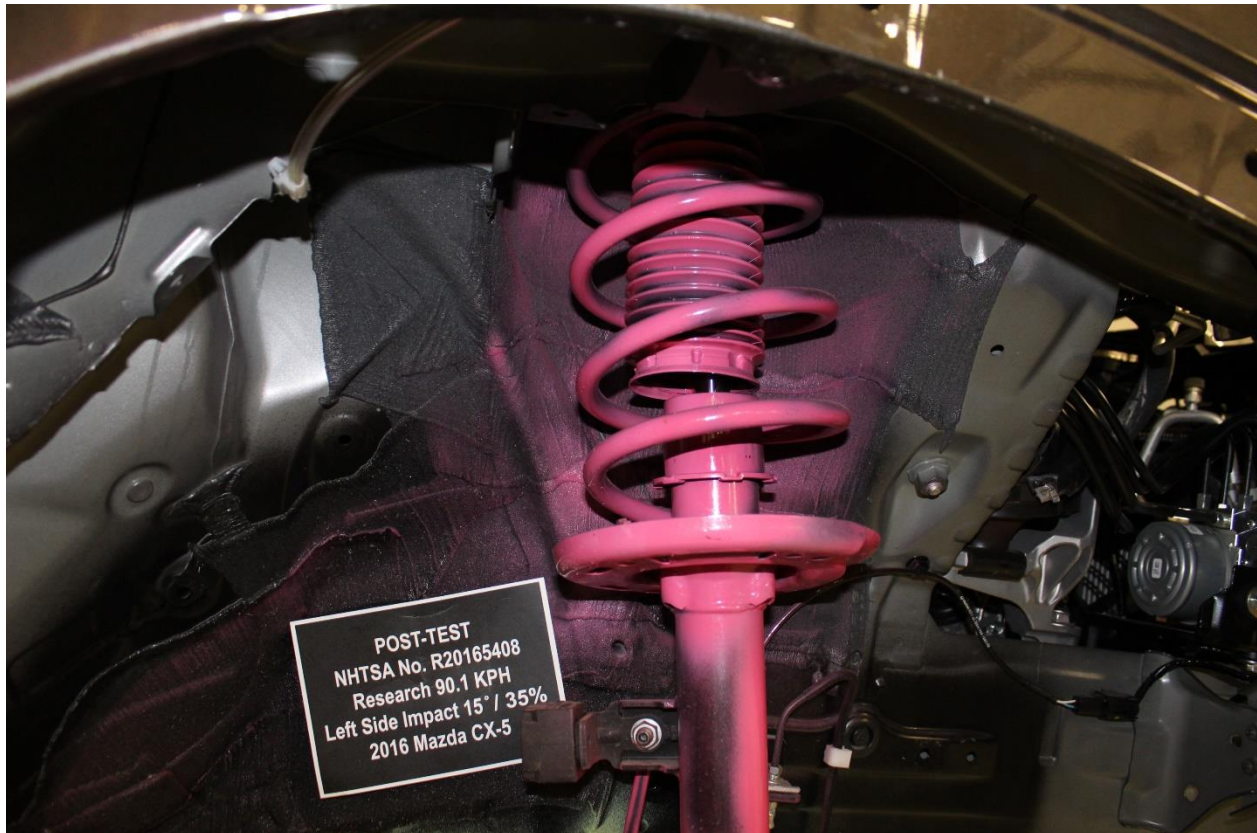
No. 156: Post-Test Right Side 3/4 Rear View of the Front Passenger Wheel Well w/ Tire Removed



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



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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



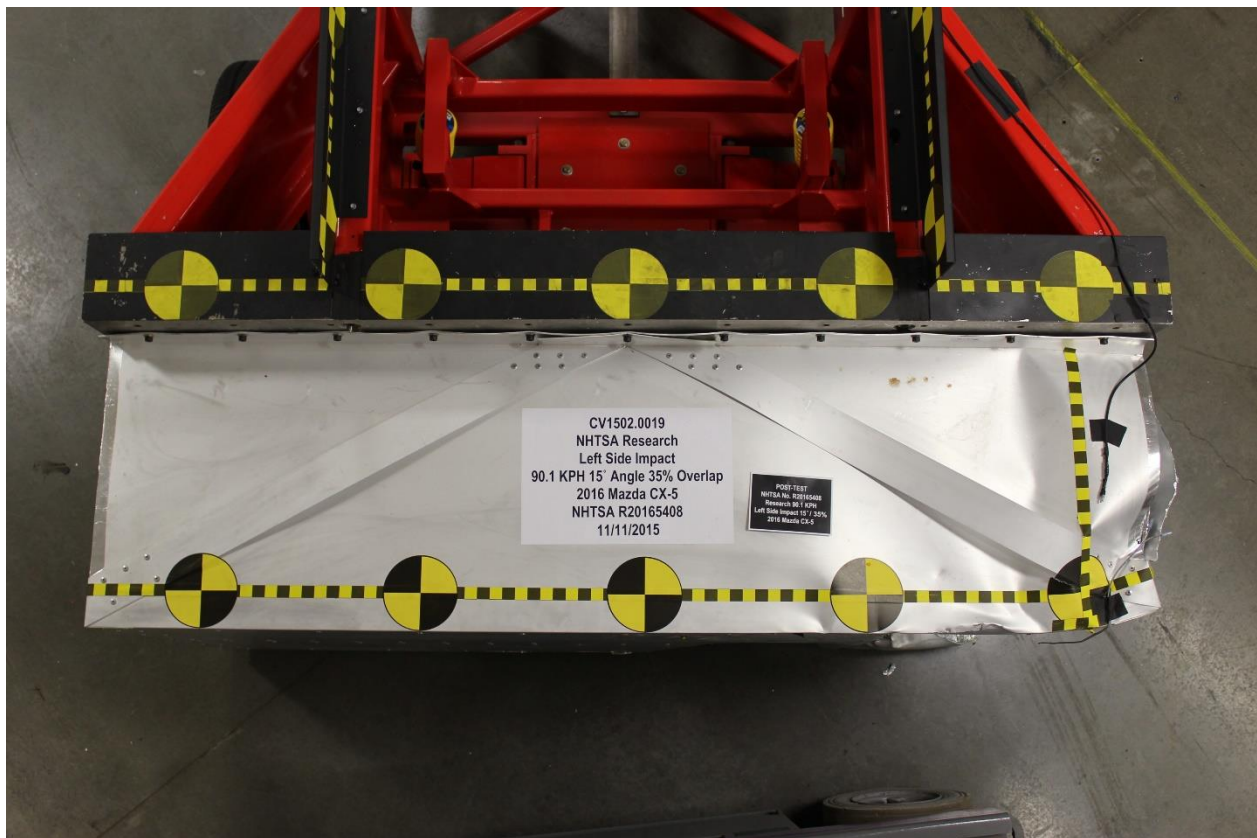
No. 169: Pre-Test Right Side View of O MDB



No. 170: Post-Test Right Side View of O MDB



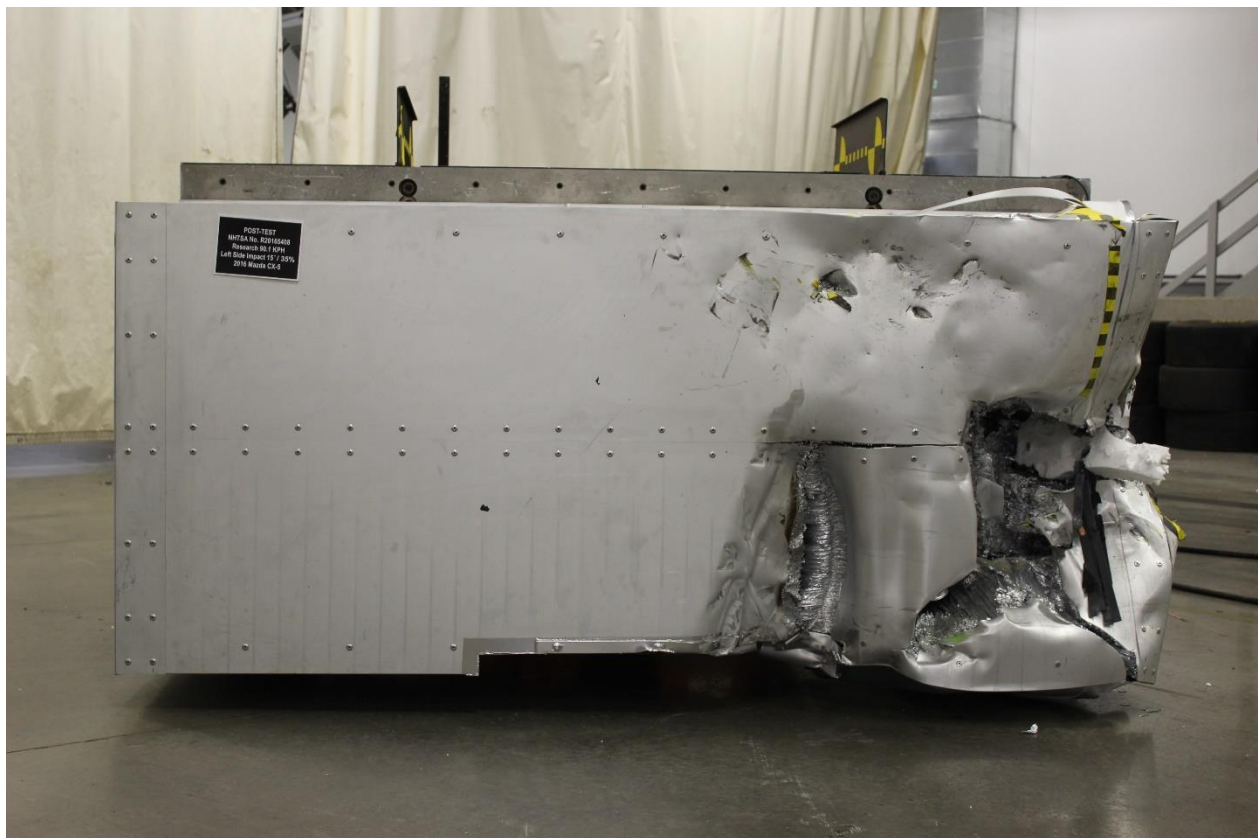
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No. 172: Post-Test Top View of OMDB



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



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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

Photo Not Available

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



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



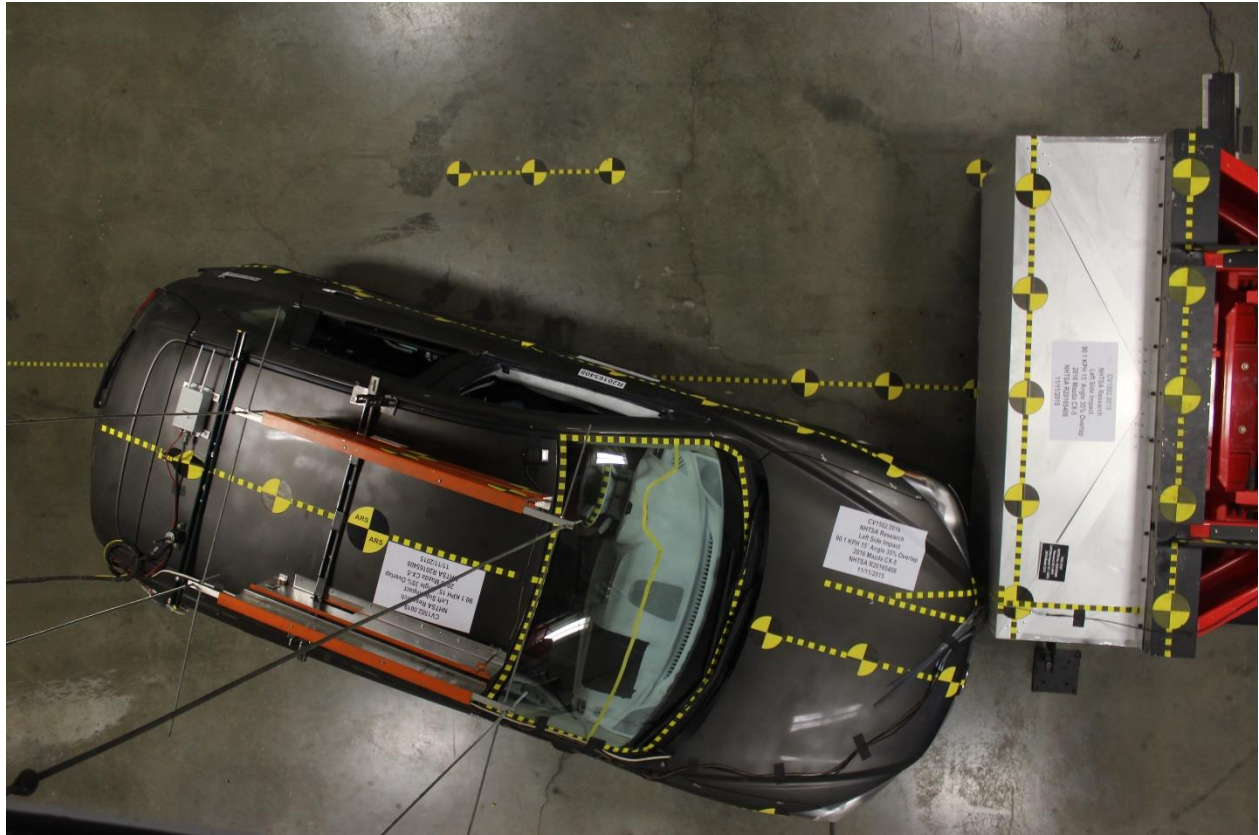
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No. 185: Pre-Test OMDB & Vehicle, Left Side



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



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No. 193: Pre-Test O MDB & 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



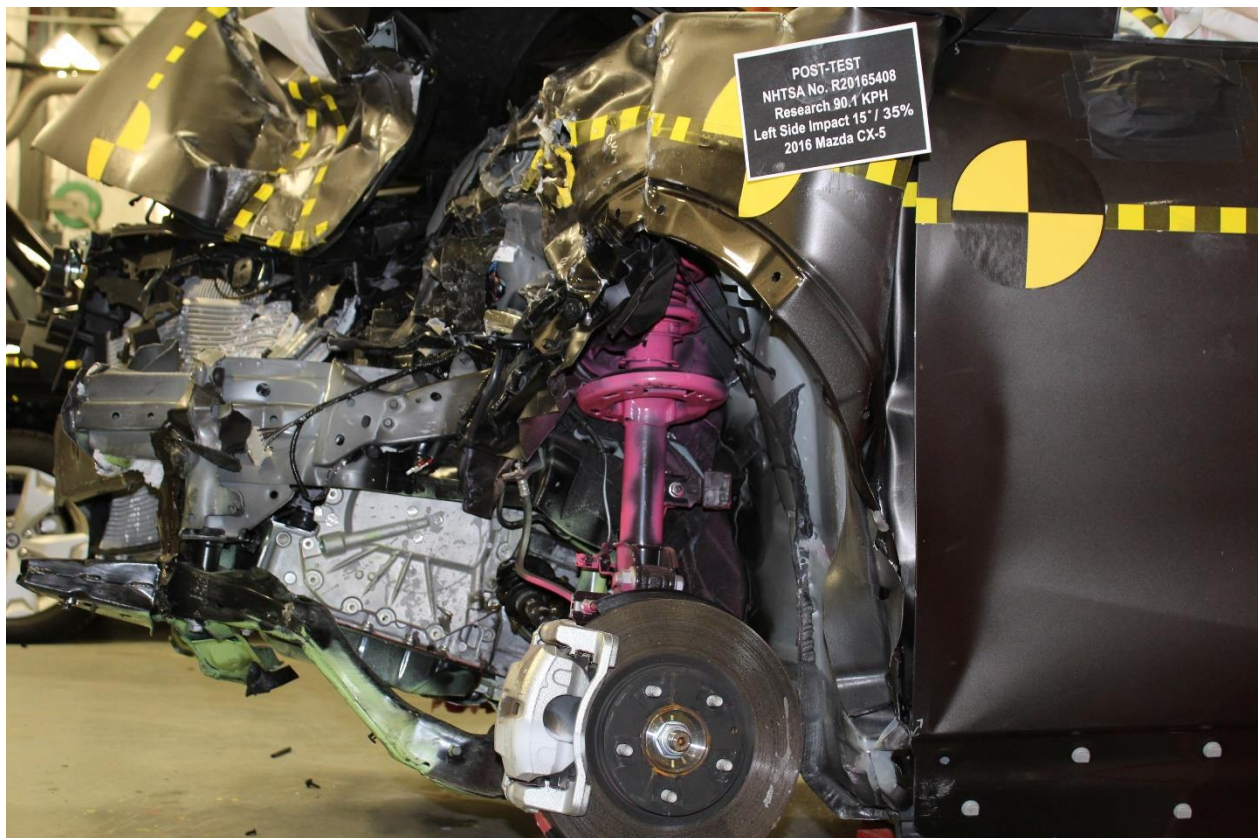
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No. 199: Impact Photo



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



No. 201 Post-Test Vehicle Bumper Left View



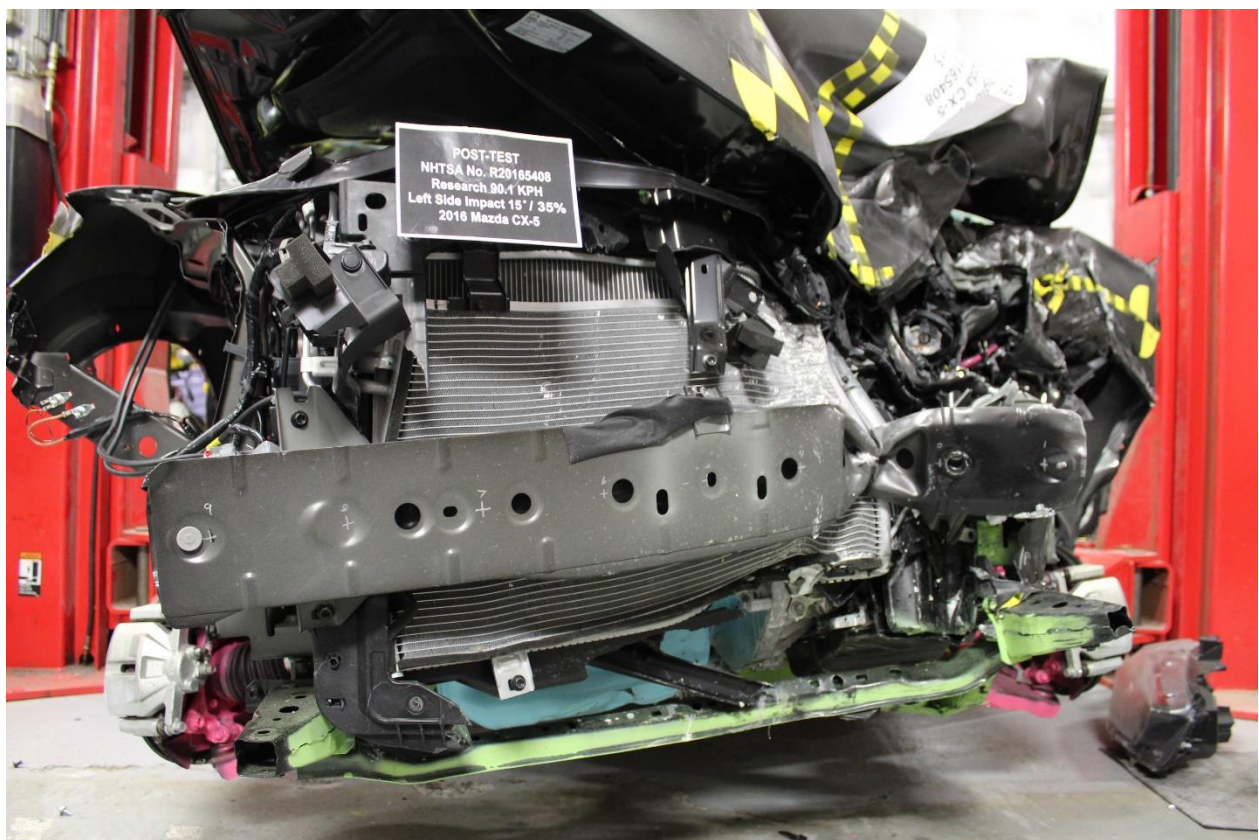
No. 202 Pre-Test Vehicle Bumper Left Front View



No. 203 Post-Test Vehicle Bumper Left Front View



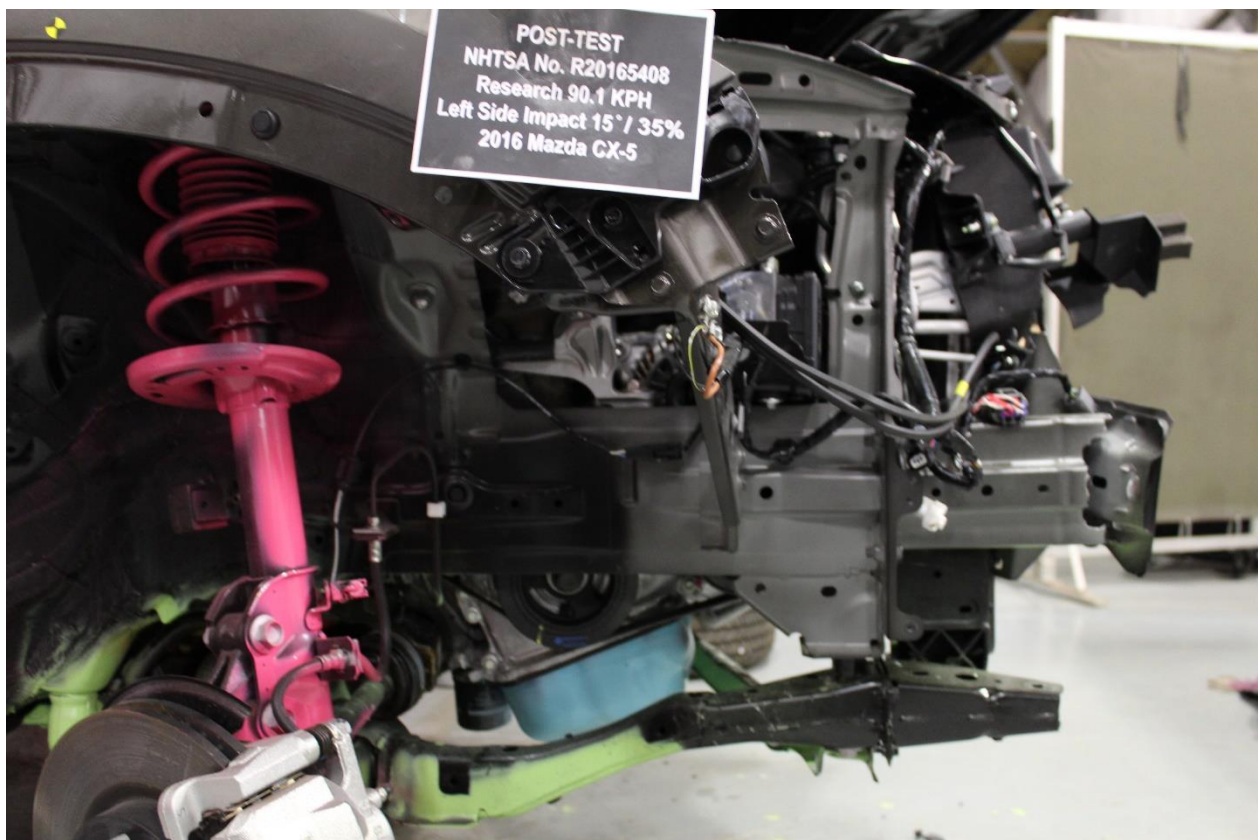
No. 204 Pre-Test Vehicle Bumper Front View



No. 205 Post-Test Vehicle Bumper Front View



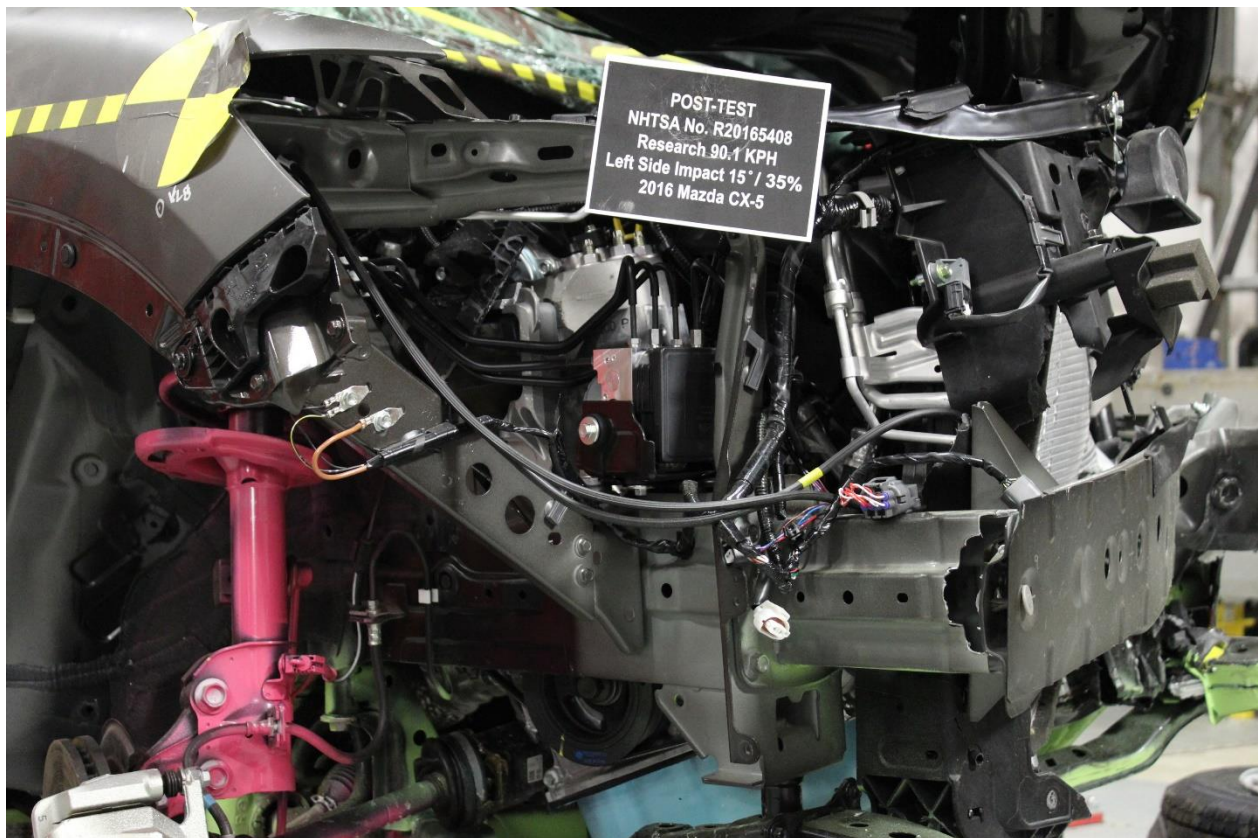
No. 206 Pre-Test Vehicle Bumper Right Side View



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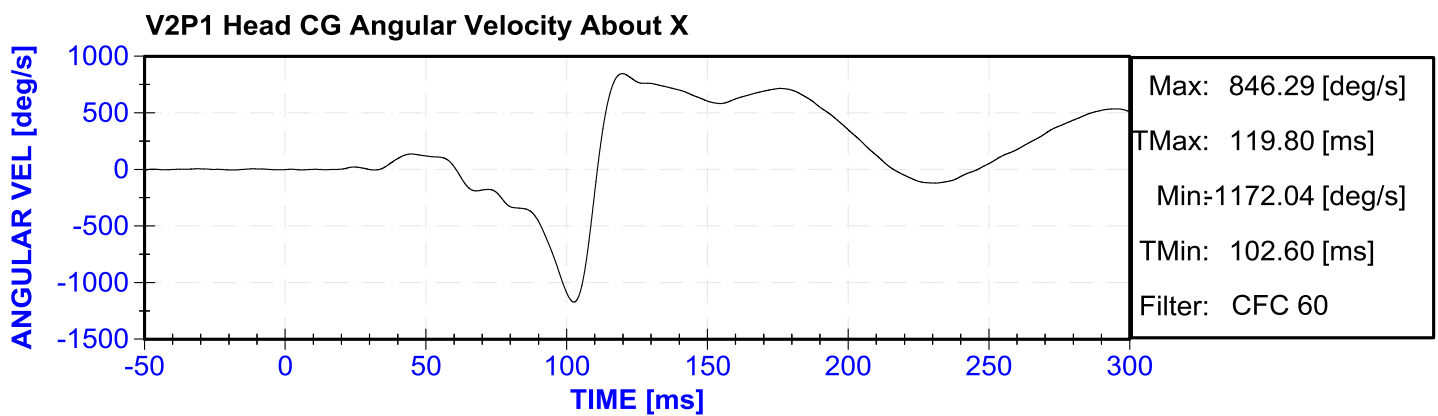
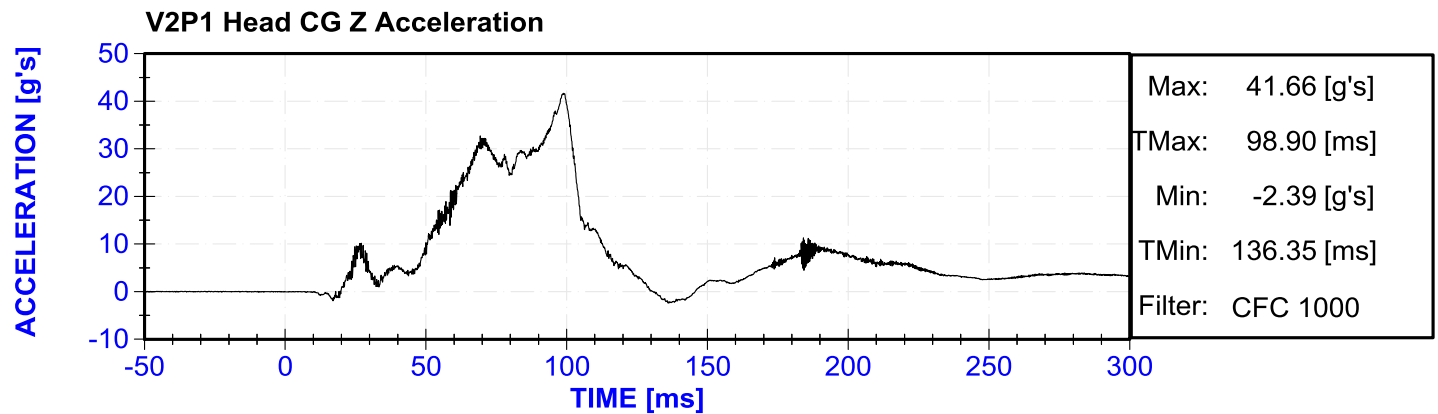
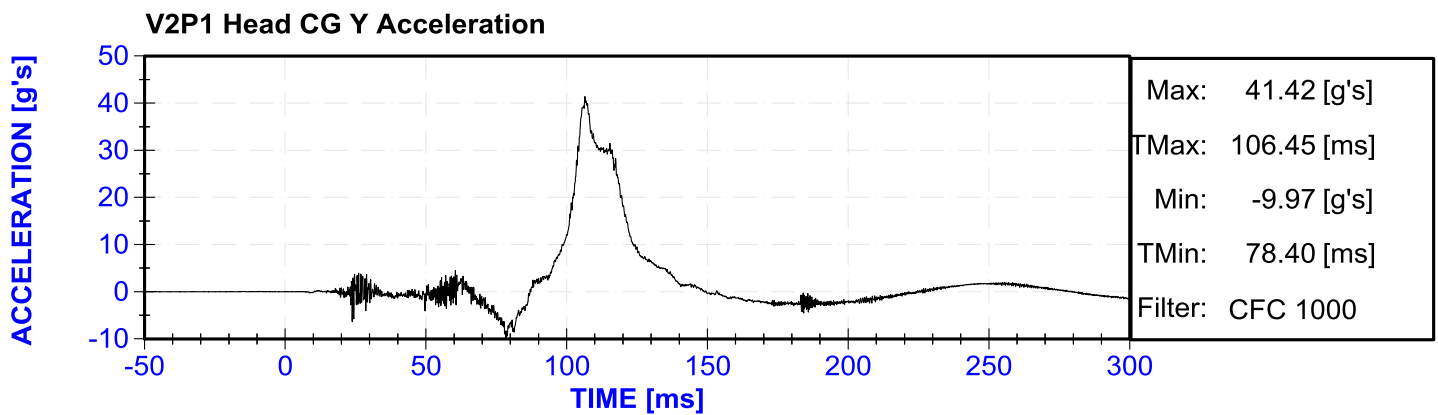
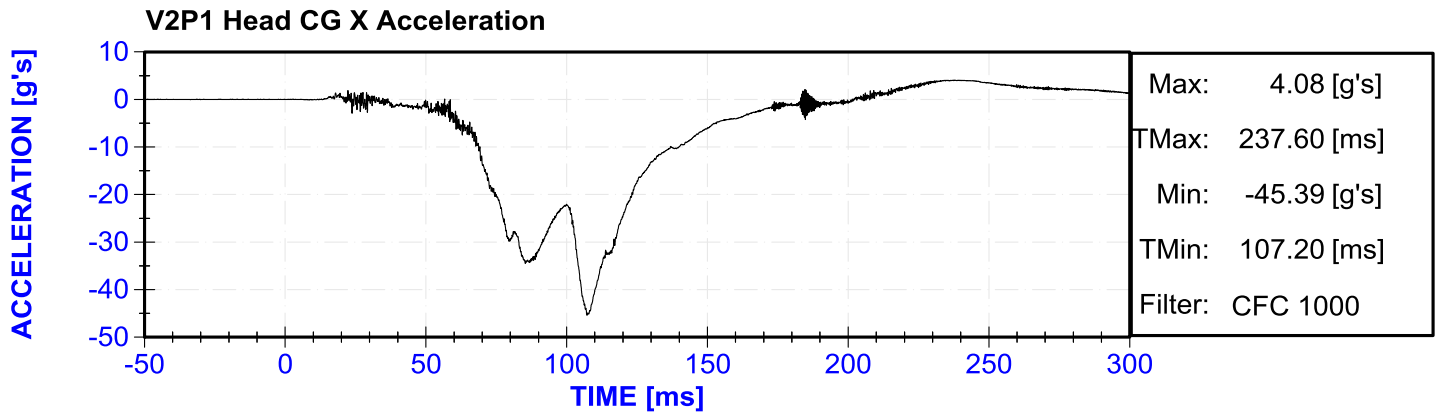
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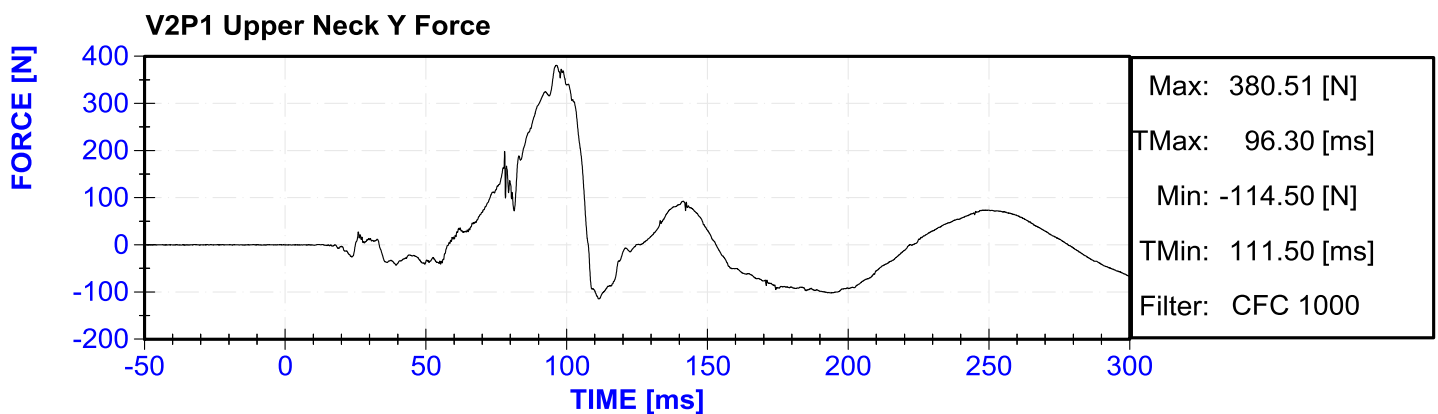
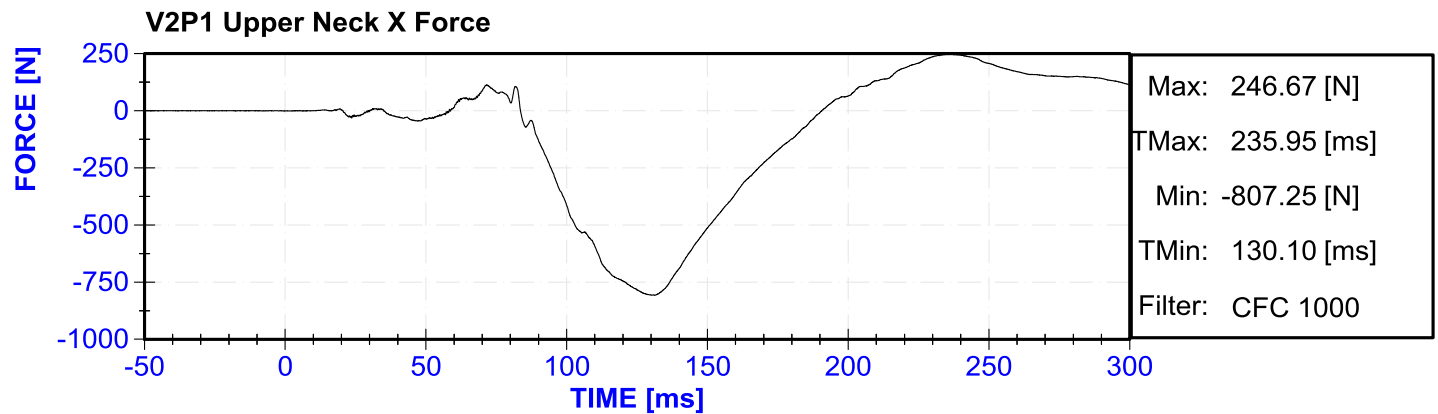
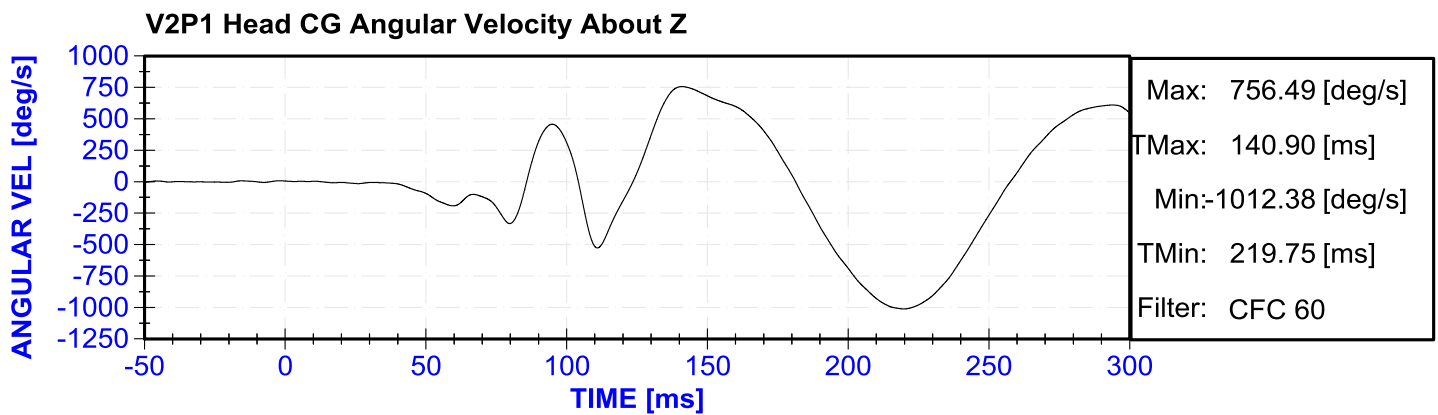
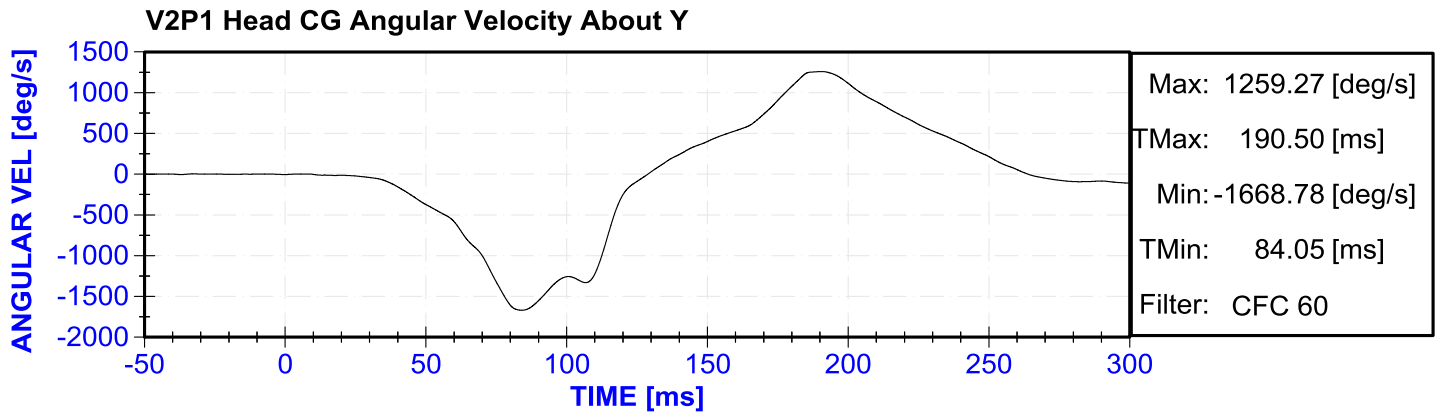
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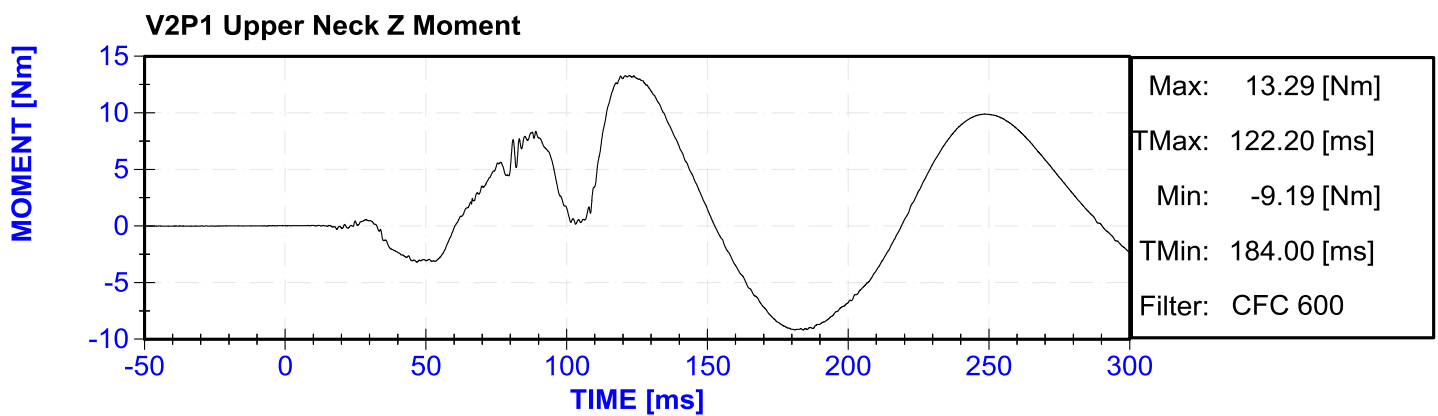
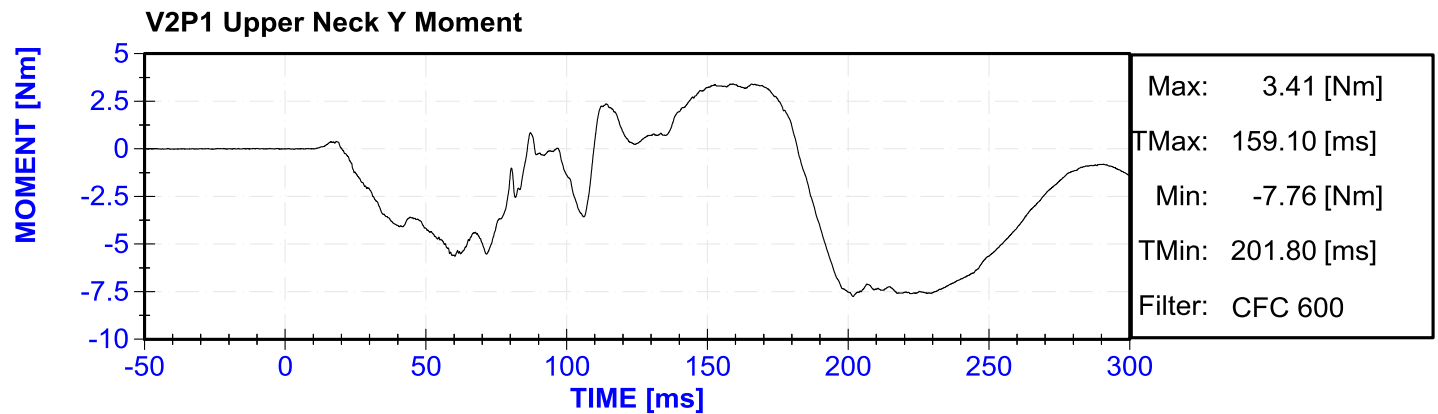
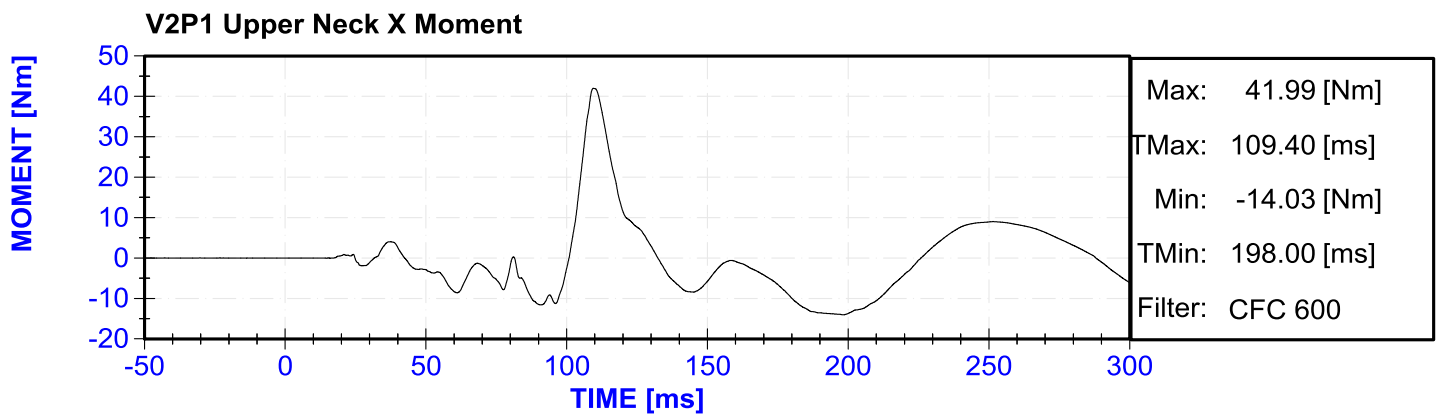
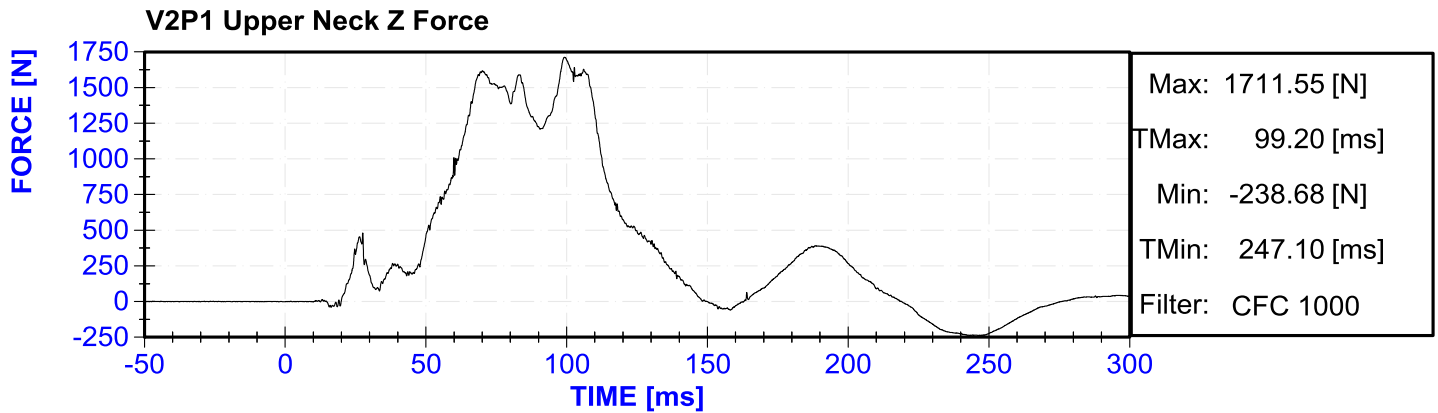
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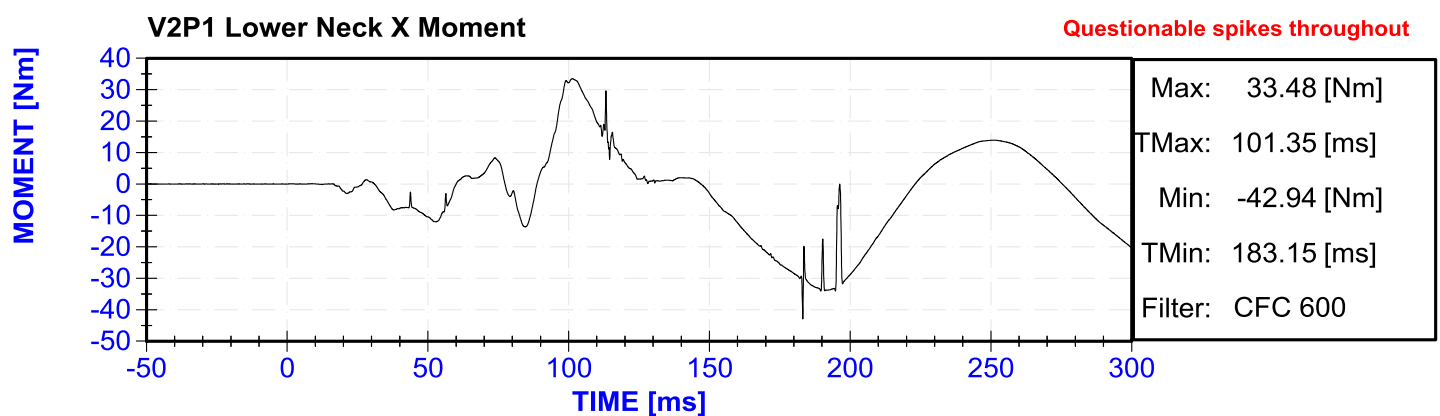
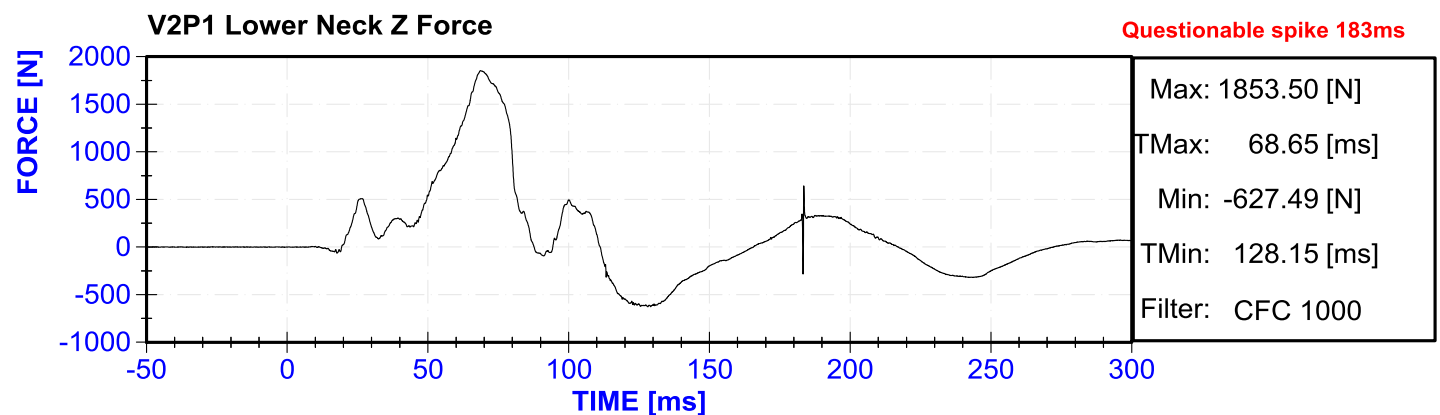
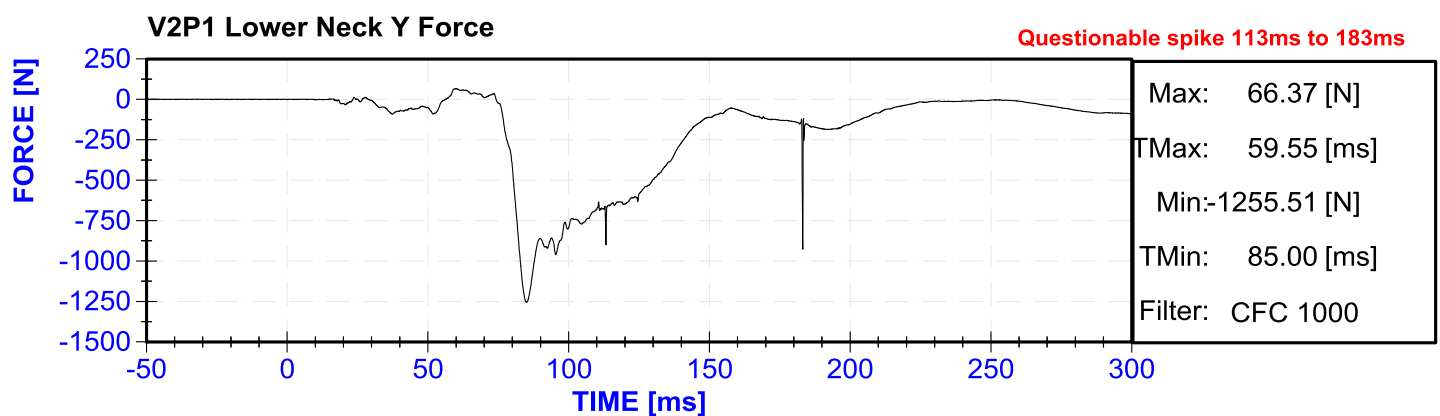
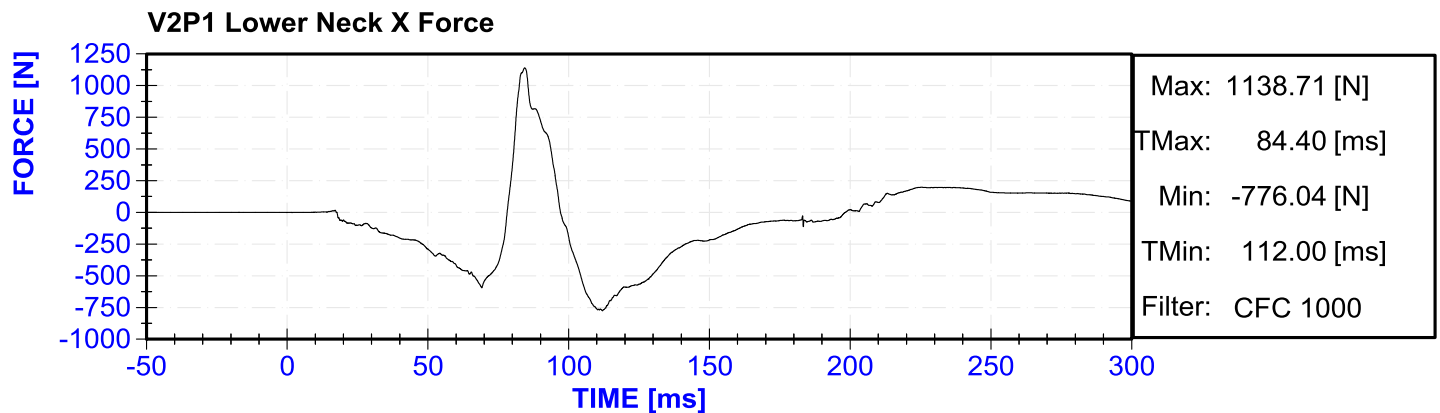
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Plot 263	V2P1 Fy on head acting through the total neck section	B-74
Plot 264	V2P1 Fz on head acting through the total neck section	B-74
Plot 265	V2P1 Mx on head acting through the total neck section	B-75
Plot 266	V2P1 My on head acting through the total neck section	B-75
Plot 267	V2P1 Mz on head acting through the total neck section	B-75
Plot 268	V2P1 Chest Left Upper Dx	B-75
Plot 269	V2P1 Chest Left Upper Dy	B-76
Plot 270	V2P1 Chest Left Upper Dz	B-76
Plot 271	V2P1 Chest Left Upper Resultant	B-76
Plot 272	V2P1 Chest Right Upper Dx	B-76
Plot 273	V2P1 Chest Right Upper Dy	B-77
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Plot 275	V2P1 Chest Right Upper Resultant	B-77
Plot 276	V2P1 Chest Left Lower Dx	B-77
Plot 277	V2P1 Chest Left Lower Dy	B-78
Plot 278	V2P1 Chest Left Lower Dz	B-78
Plot 279	V2P1 Chest Left Lower Resultant	B-78
Plot 280	V2P1 Chest Right Lower Dx	B-78
Plot 281	V2P1 Chest Right Lower Dy	B-79
Plot 282	V2P1 Chest Right Lower Dz	B-79
Plot 283	V2P1 Chest Right Lower Resultant	B-79
Plot 284	V2P1 Abdomen Left Lower Dx	B-79
Plot 285	V2P1 Abdomen Left Lower Dy	B-80
Plot 286	V2P1 Abdomen Left Lower Dz	B-80
Plot 287	V2P1 Abdomen Left Lower Resultant	B-80
Plot 288	V2P1 Abdomen Right Lower Dx	B-80
Plot 289	V2P1 Abdomen Right Lower Dy	B-81
Plot 290	V2P1 Abdomen Right Lower Dz	B-81
Plot 291	V2P1 Abdomen Right Lower Resultant	B-81
Plot 292	V2P2 Fx on head acting through the O.C. joint only	B-81
Plot 293	V2P2 Fz on head acting through the O.C. joint only	B-82

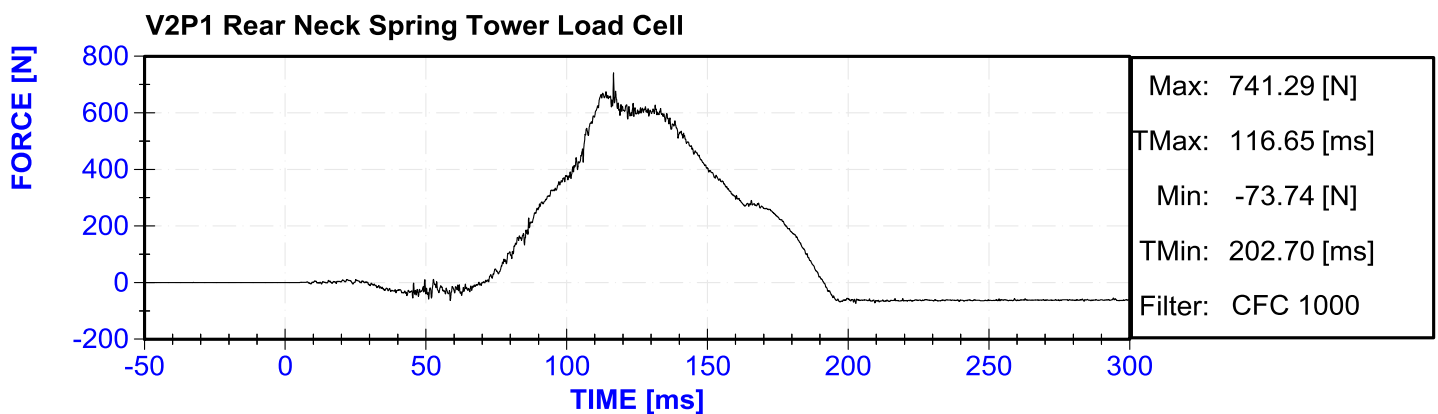
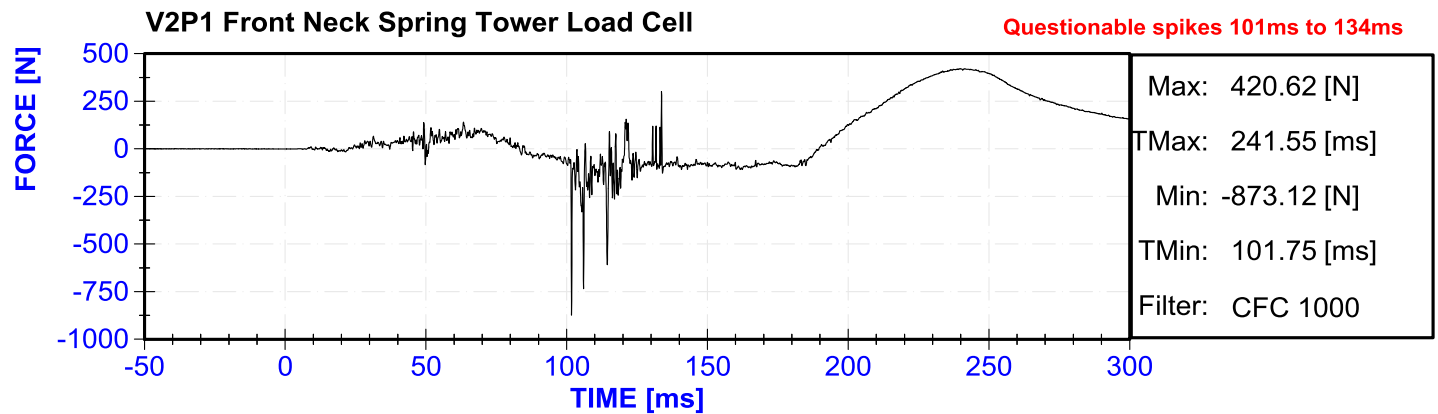
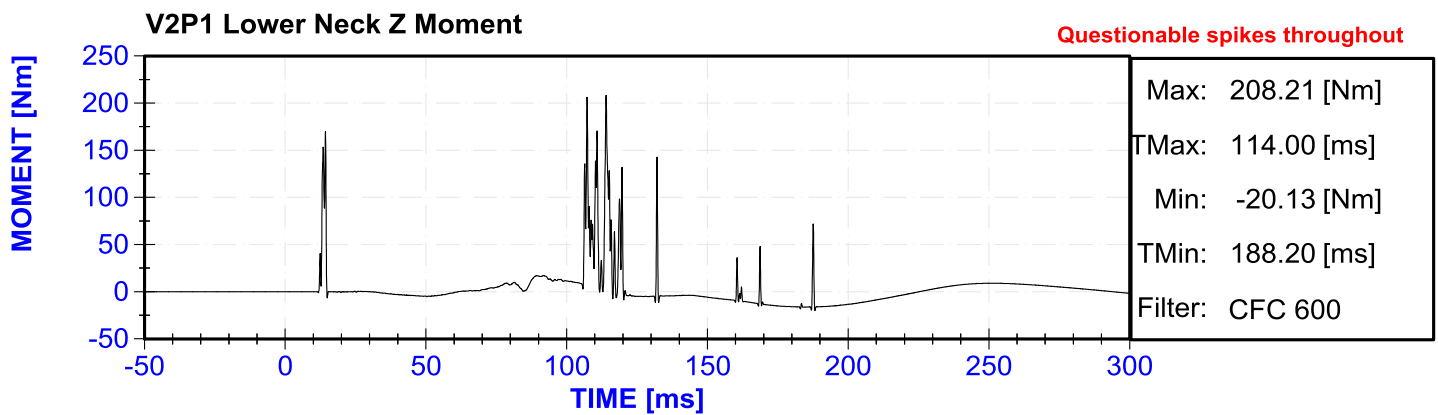
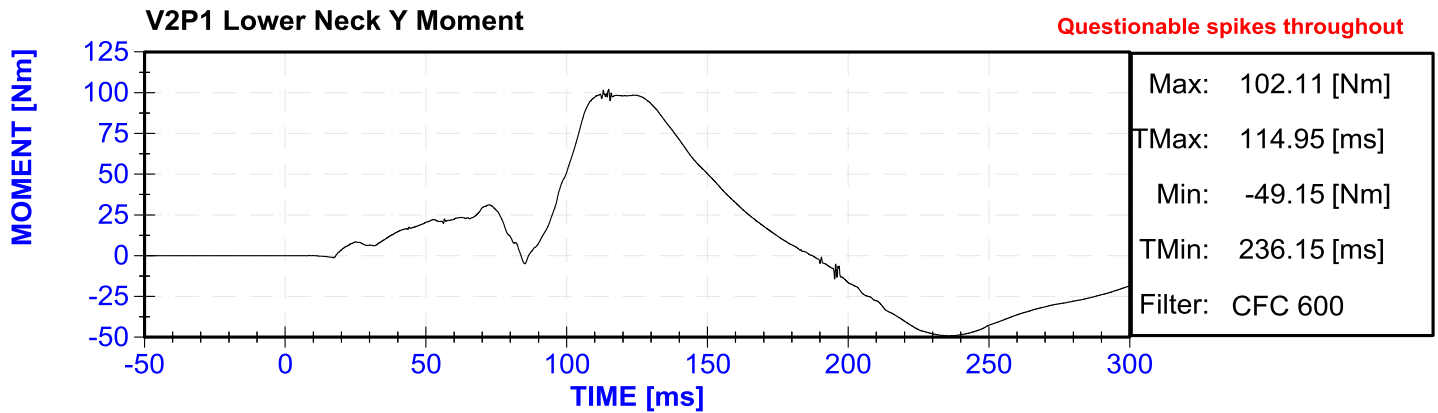
Plot 294	V2P2 My on head acting through the O.C. joint only	B-82
Plot 295	V2P2 Fx on head acting through the total neck section	B-82
Plot 296	V2P2 Fy on head acting through the total neck section	B-82
Plot 297	V2P2 Fz on head acting through the total neck section	B-83
Plot 298	V2P2 Mx on head acting through the total neck section	B-83
Plot 299	V2P2 My on head acting through the total neck section	B-83
Plot 300	V2P2 Mz on head acting through the total neck section	B-83
Plot 301	V2P2 Chest Left Upper Dx	B-84
Plot 302	V2P2 Chest Left Upper Dy	B-84
Plot 303	V2P2 Chest Left Upper Dz	B-84
Plot 304	V2P2 Chest Left Upper Resultant	B-84
Plot 305	V2P2 Chest Right Upper Dx	B-85
Plot 306	V2P2 Chest Right Upper Dy	B-85
Plot 307	V2P2 Chest Right Upper Dz	B-85
Plot 308	V2P2 Chest Right Upper Resultant	B-85
Plot 309	V2P2 Chest Left Lower Dx	B-86
Plot 310	V2P2 Chest Left Lower Dy	B-86
Plot 311	V2P2 Chest Left Lower Dz	B-86
Plot 312	V2P2 Chest Left Lower Resultant	B-86
Plot 313	V2P2 Chest Right Lower Dx	B-87
Plot 314	V2P2 Chest Right Lower Dy	B-87
Plot 315	V2P2 Chest Right Lower Dz	B-87
Plot 316	V2P2 Chest Right Lower Resultant	B-87
Plot 317	V2P2 Abdomen Left Lower Dx	B-88
Plot 318	V2P2 Abdomen Left Lower Dy	B-88
Plot 319	V2P2 Abdomen Left Lower Dz	B-88
Plot 320	V2P2 Abdomen Left Lower Resultant	B-88
Plot 321	V2P2 Abdomen Right Lower Dx	B-89
Plot 322	V2P2 Abdomen Right Lower Dy	B-89
Plot 323	V2P2 Abdomen Right Lower Dz	B-89
Plot 324	V2P2 Abdomen Right Lower Resultant	B-89



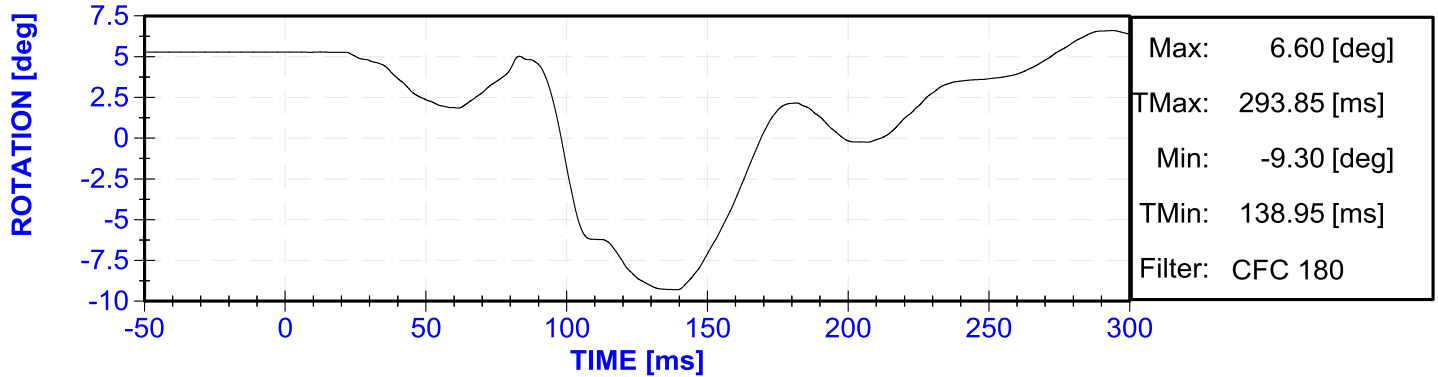




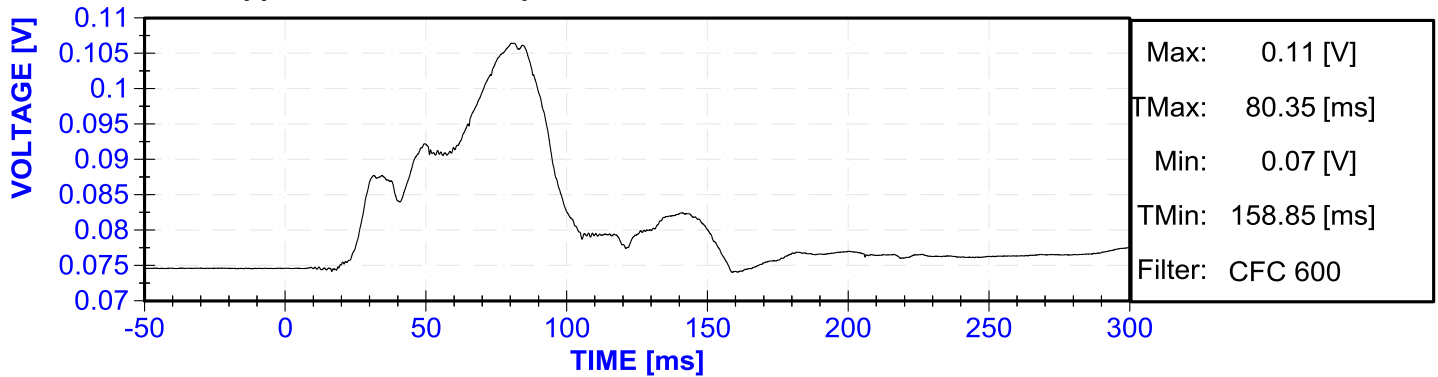




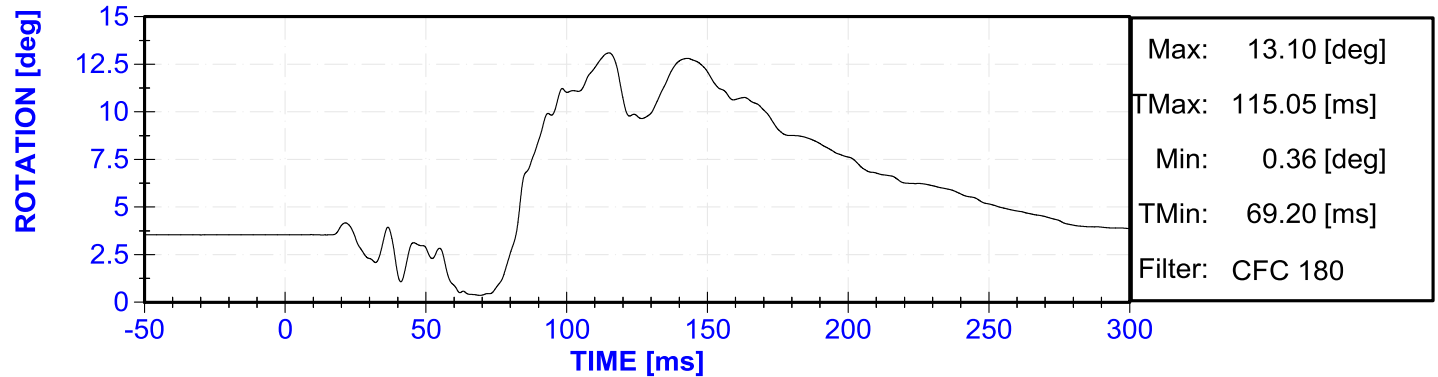
V2P1 Occipital Condyle Rotation Potentiometer



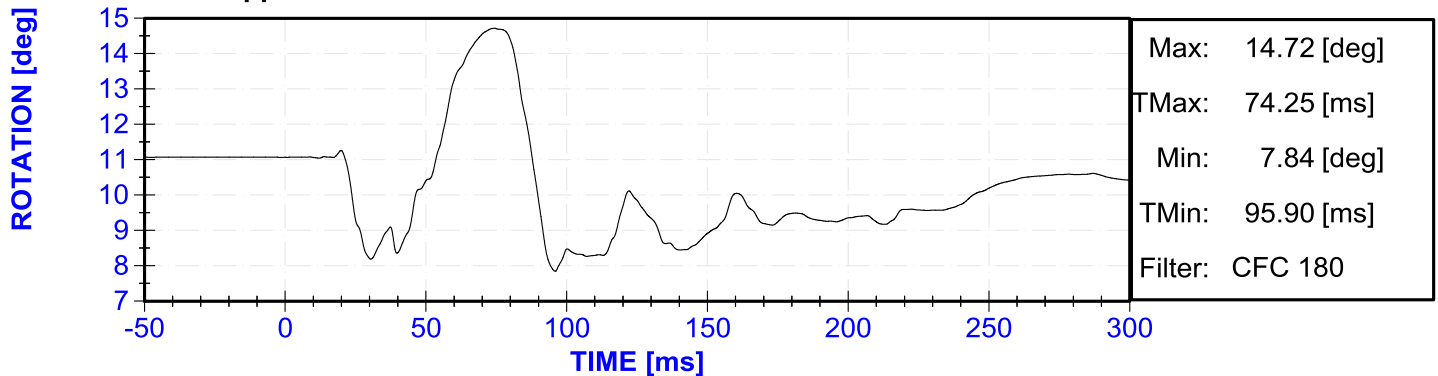
V2P1 Upper Left DGIR X Displacement



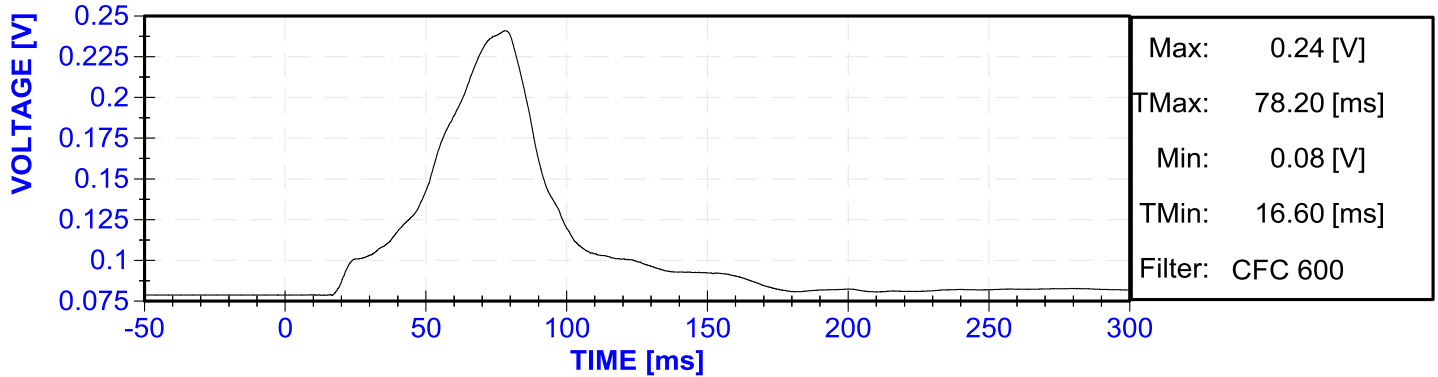
V2P1 Upper Left DGIR Y Rotation



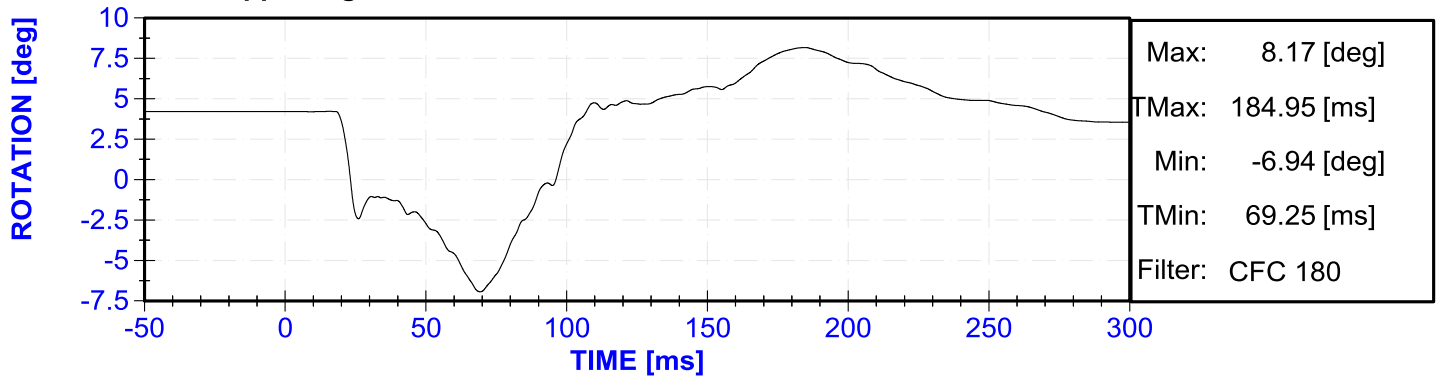
V2P1 Upper Left DGIR Z Rotation



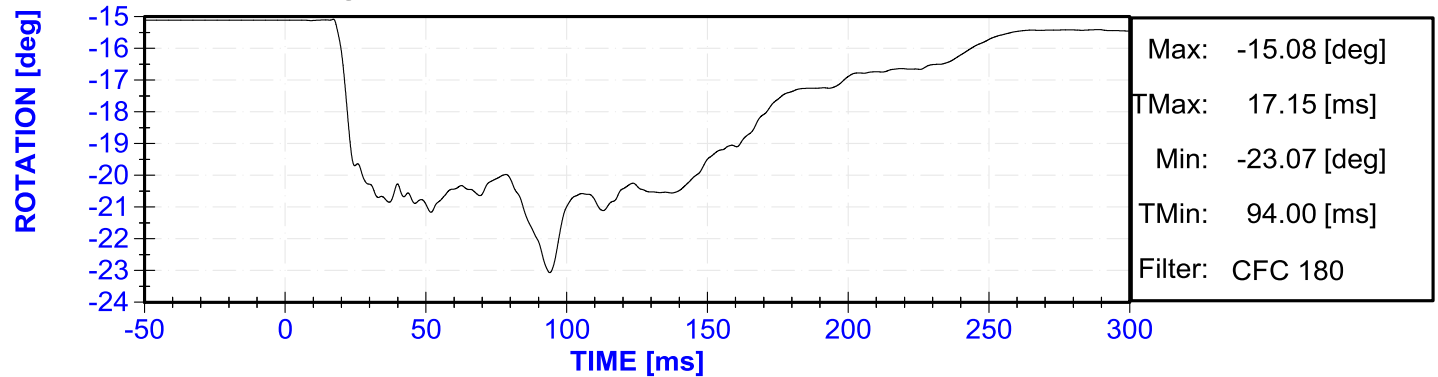
V2P1 Upper Right DGIR X Displacement



V2P1 Upper Right DGIR Y Rotation

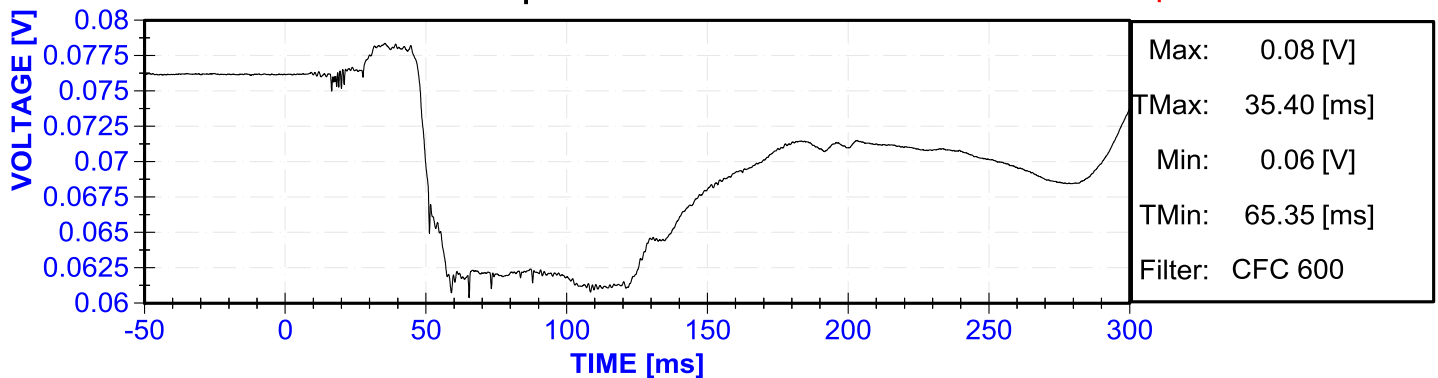


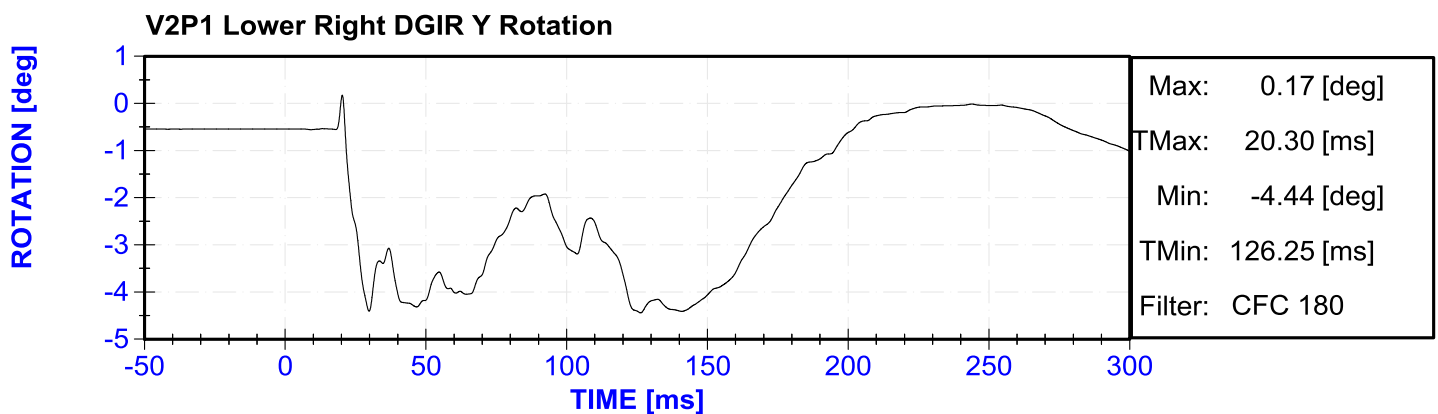
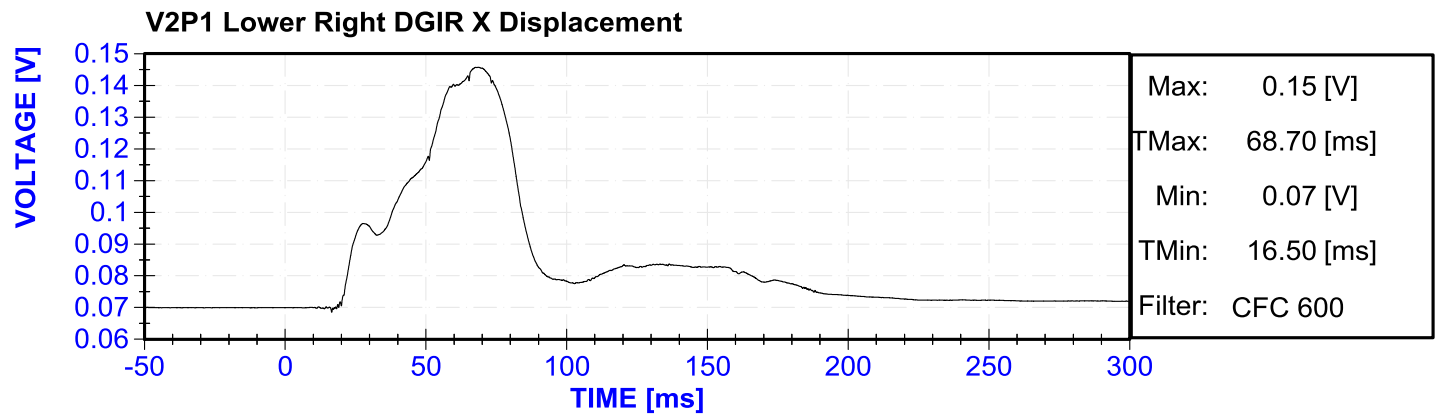
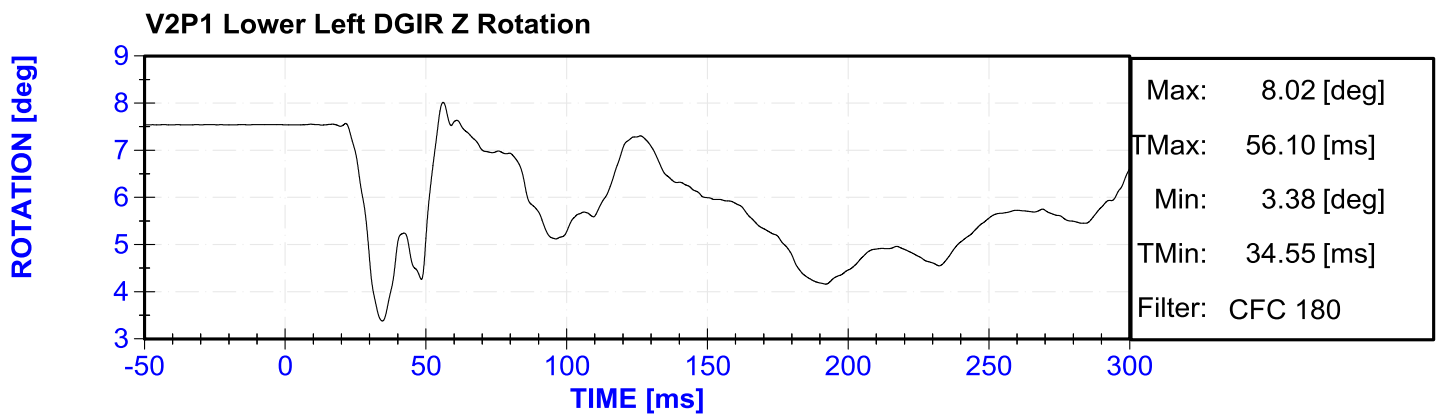
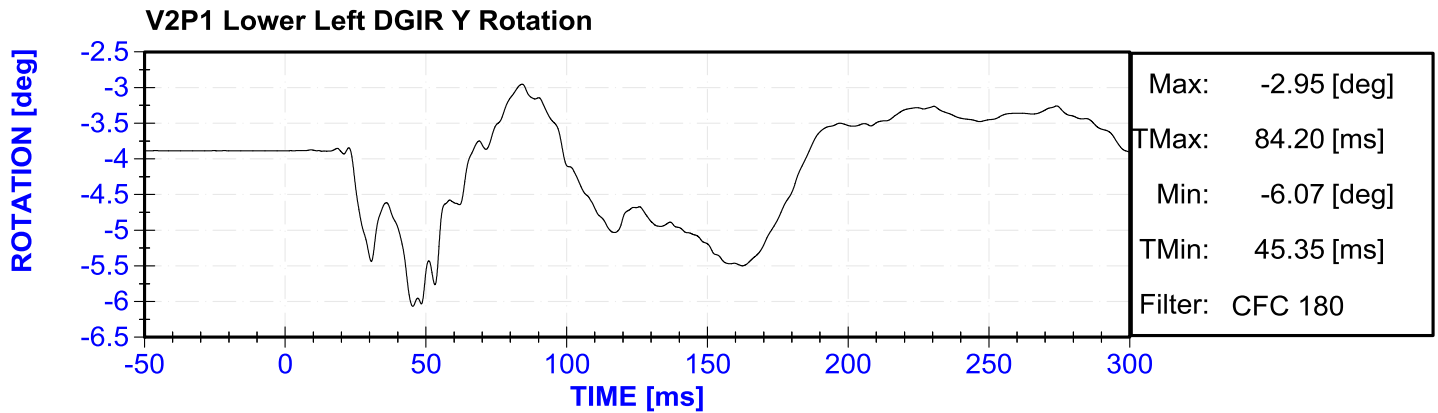
V2P1 Upper Right DGIR Z Rotation

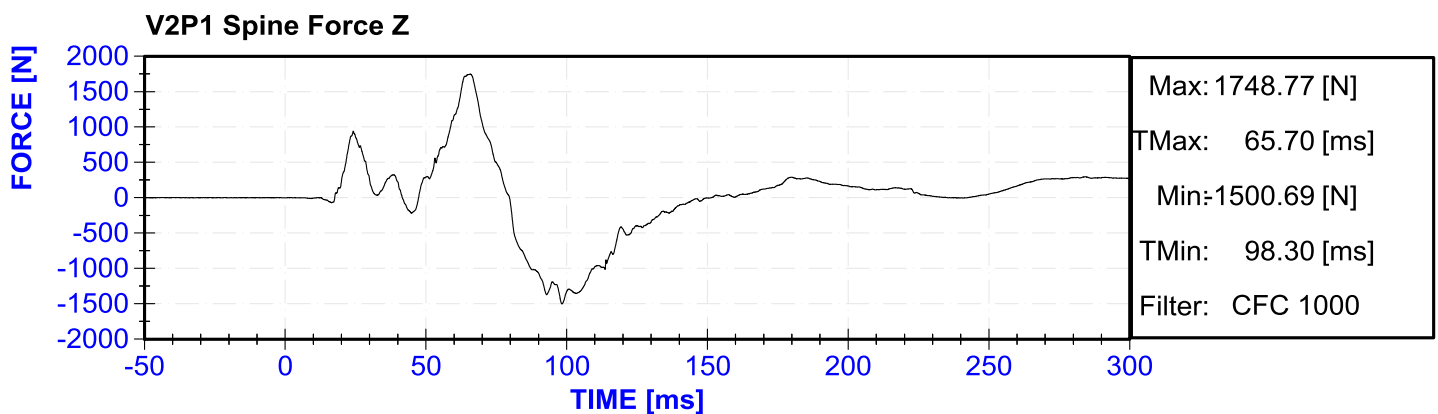
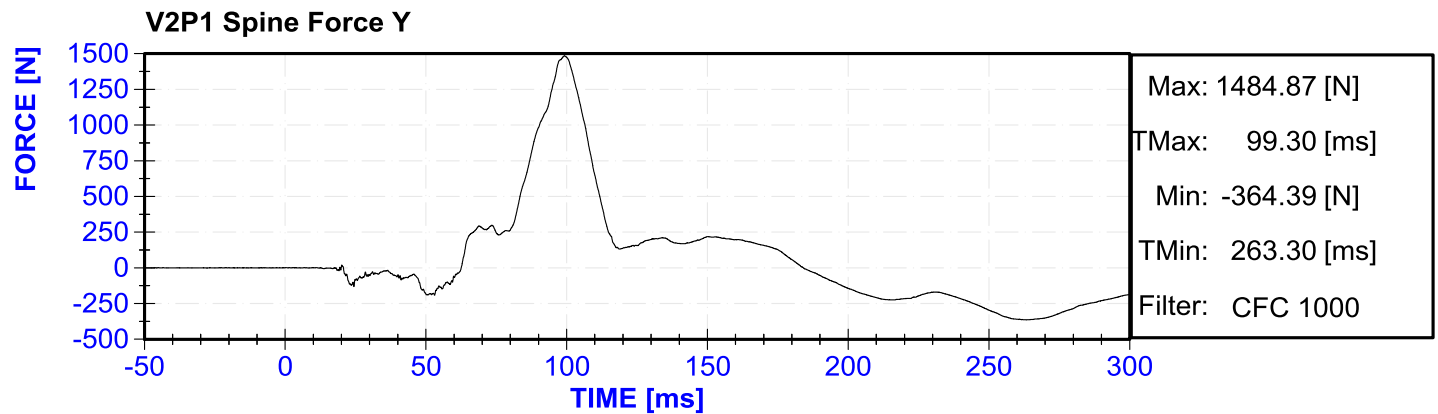
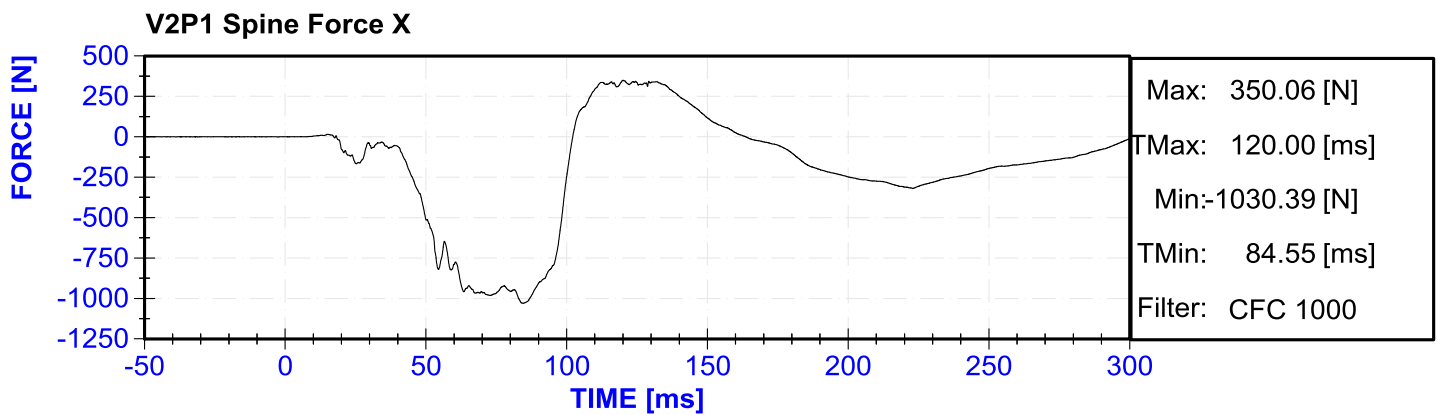
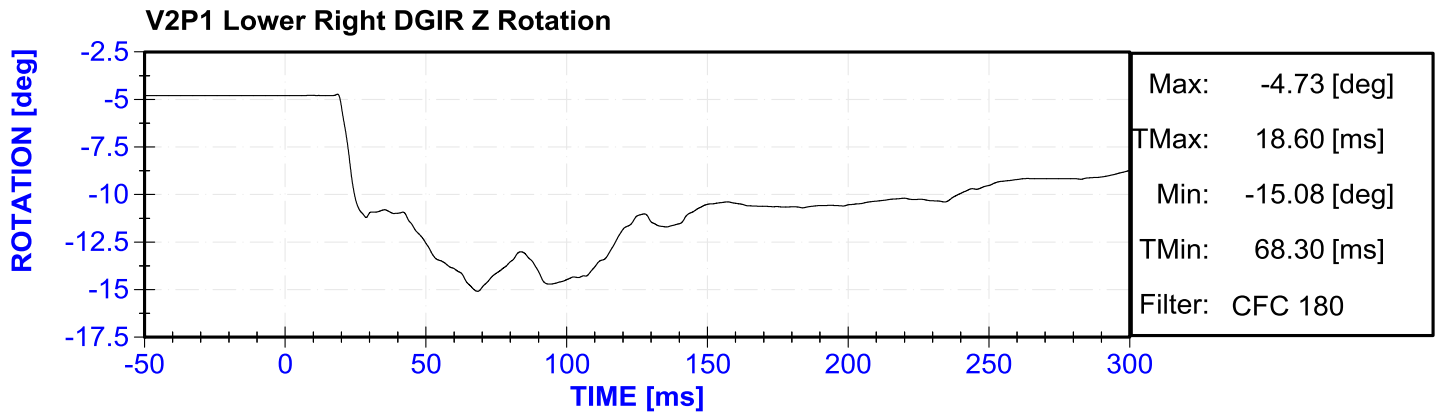


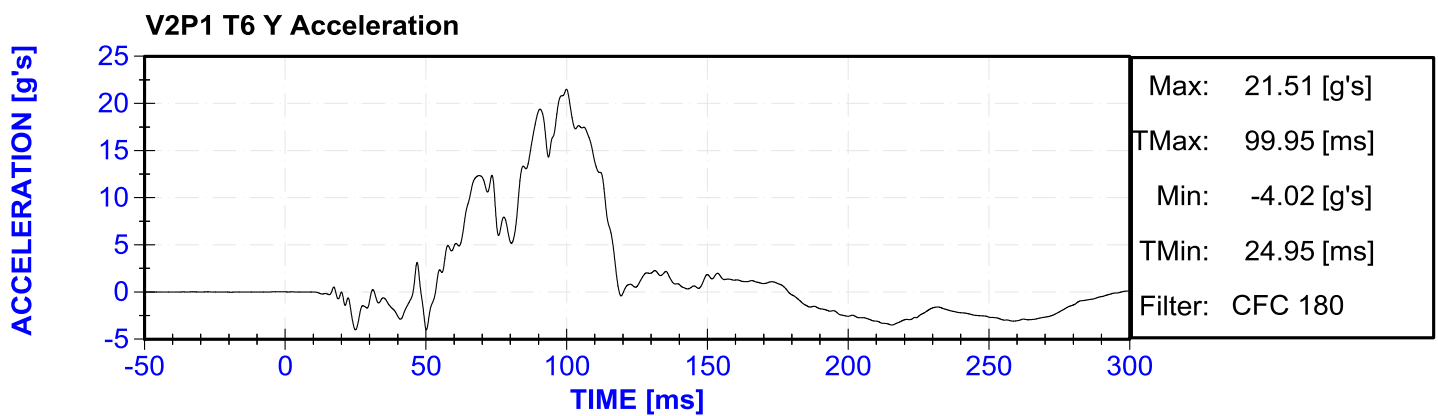
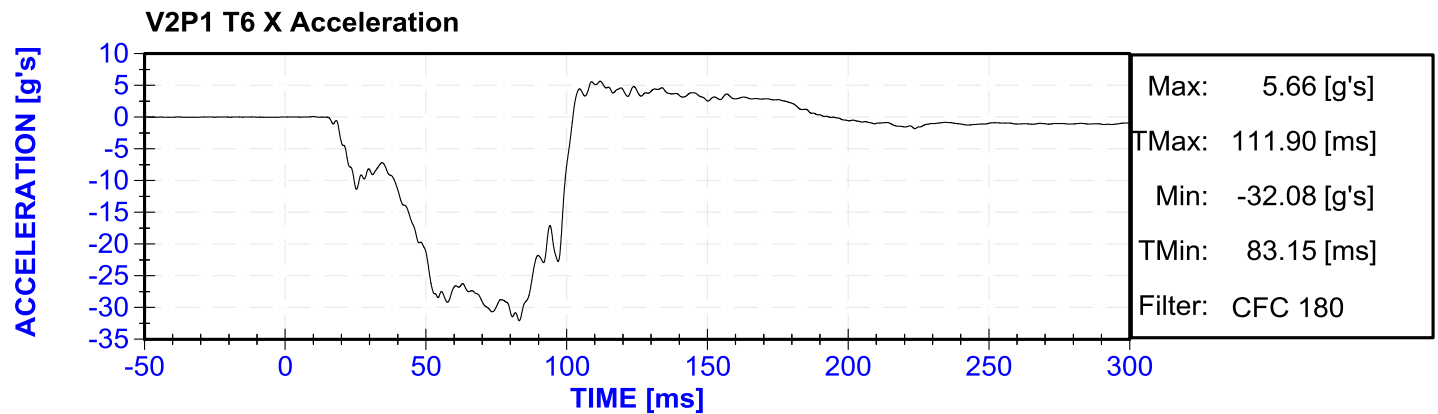
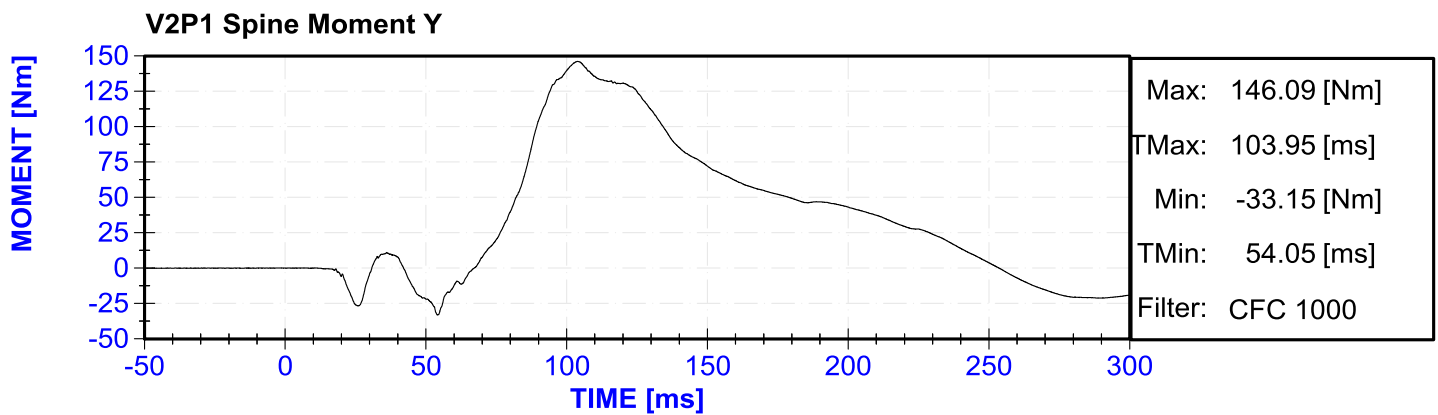
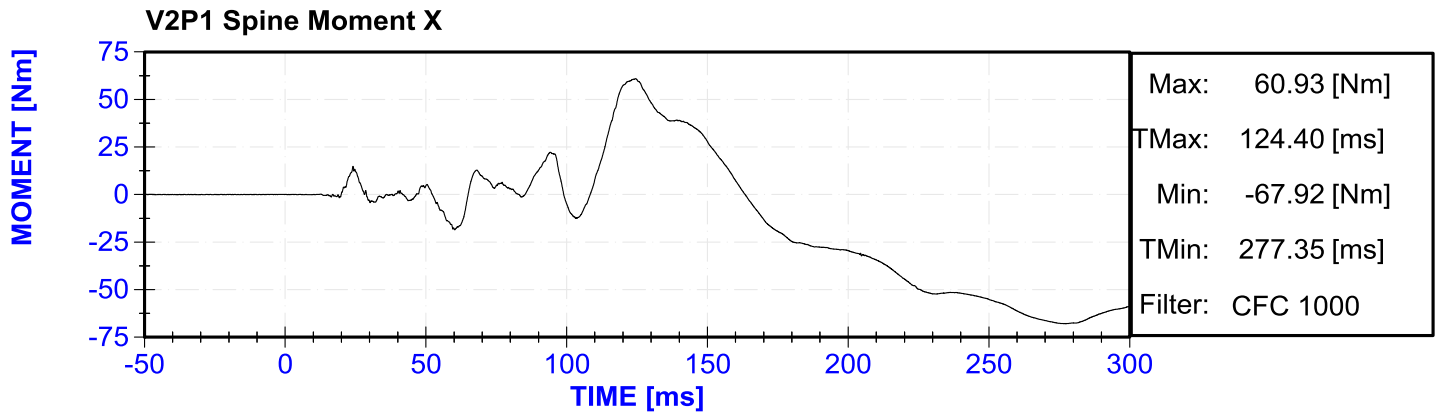
V2P1 Lower Left DGIR X Displacement

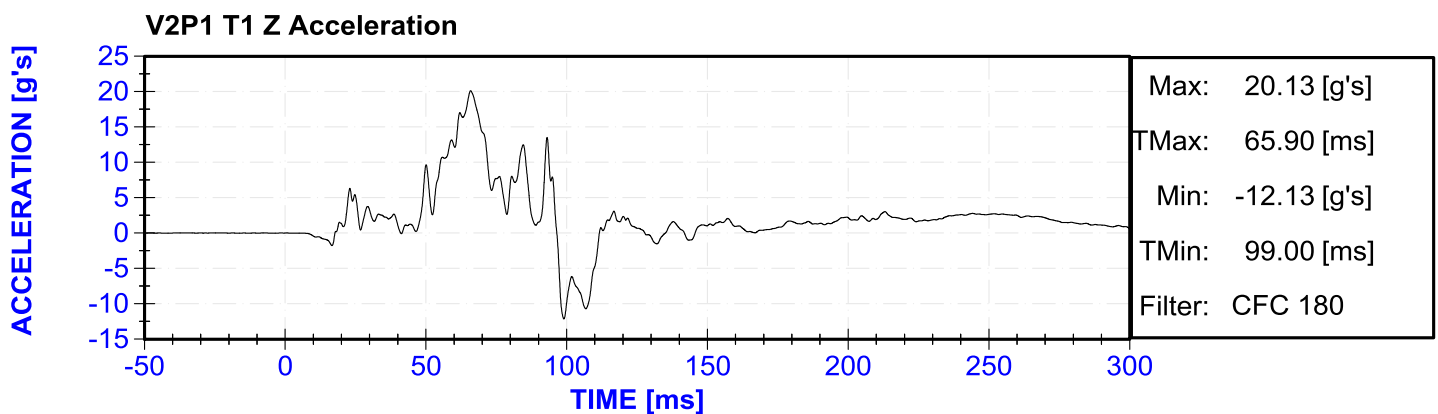
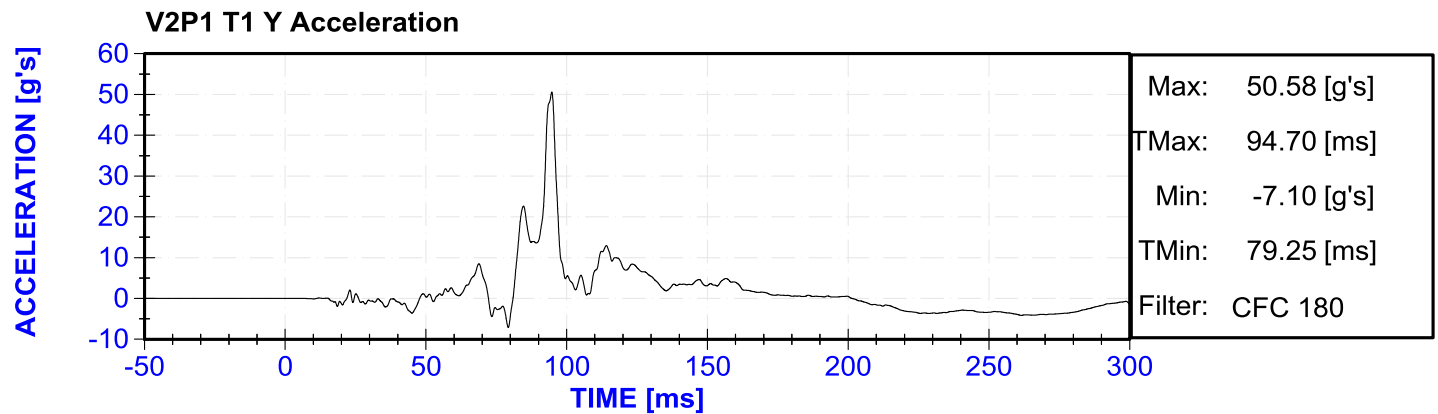
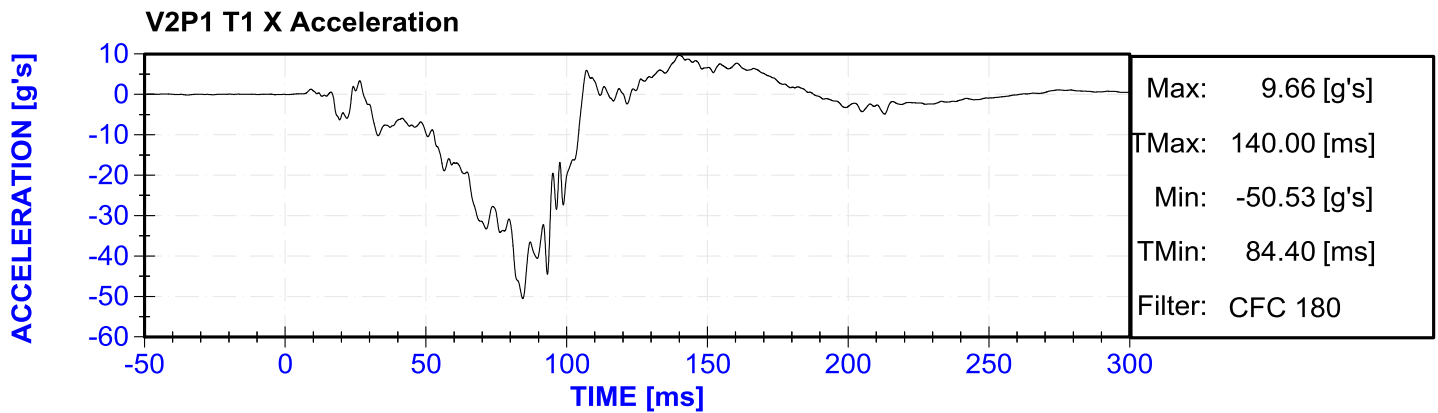
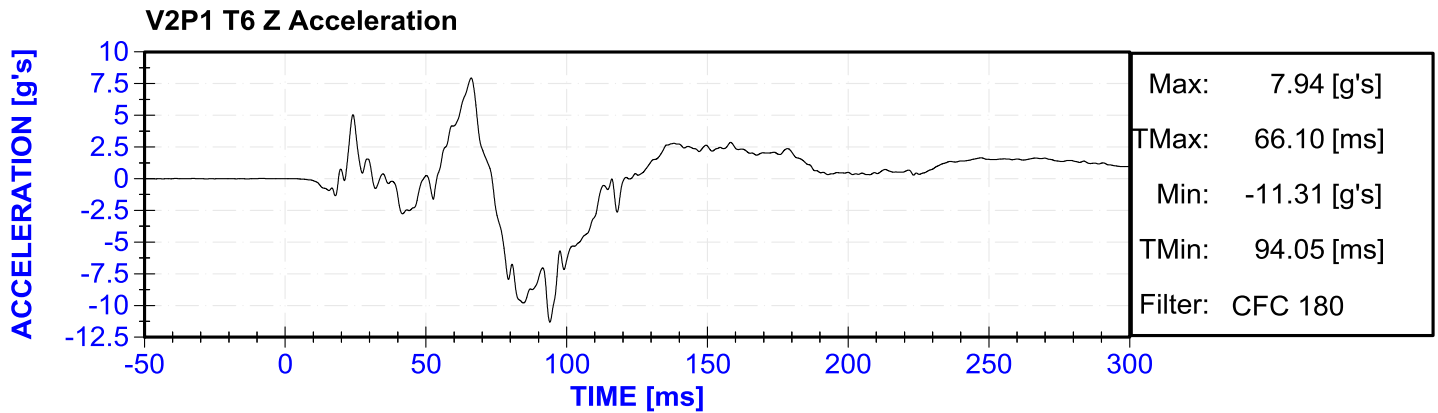
Questionable spikes 15.8ms to 88.5ms

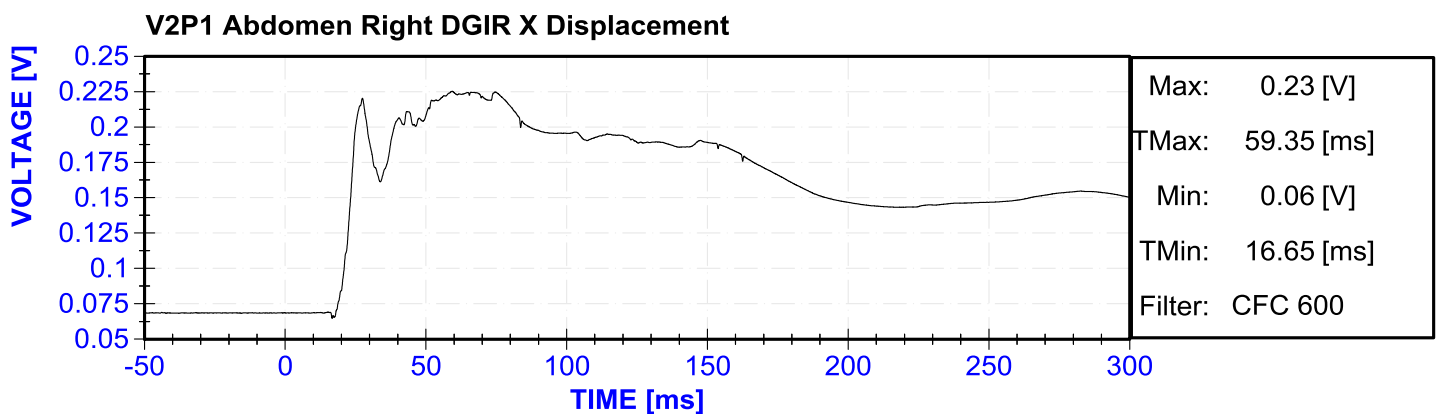
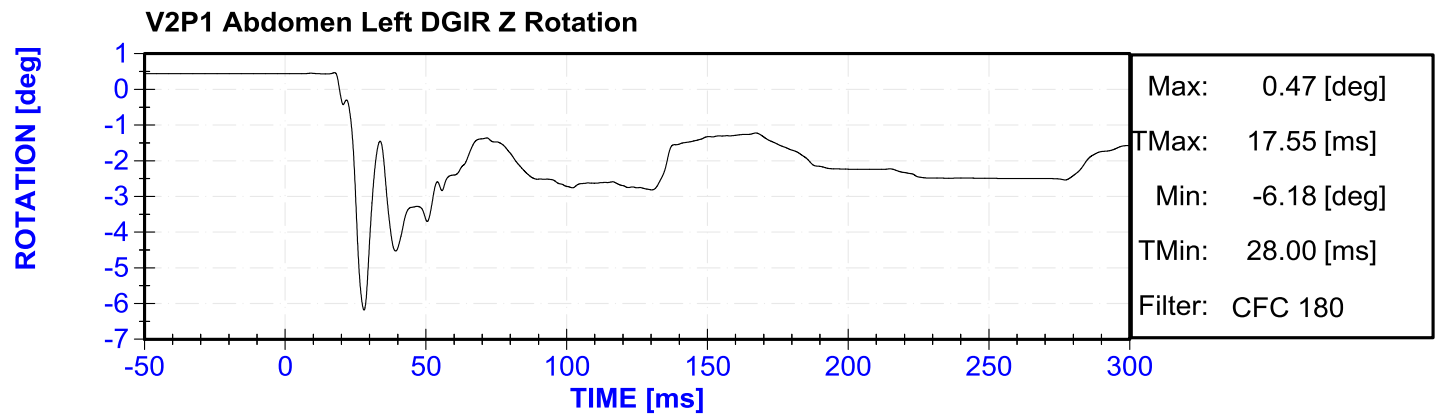
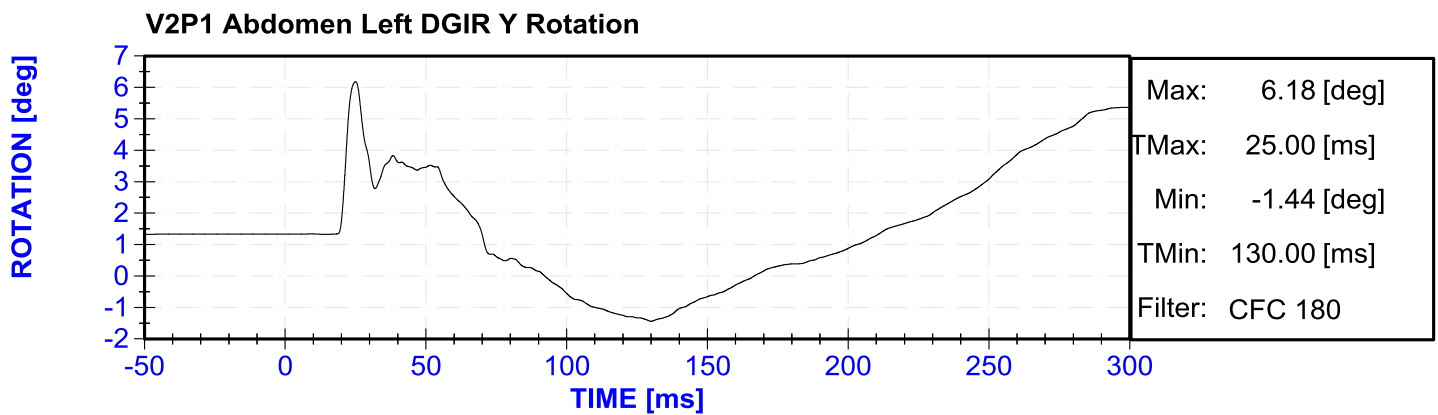
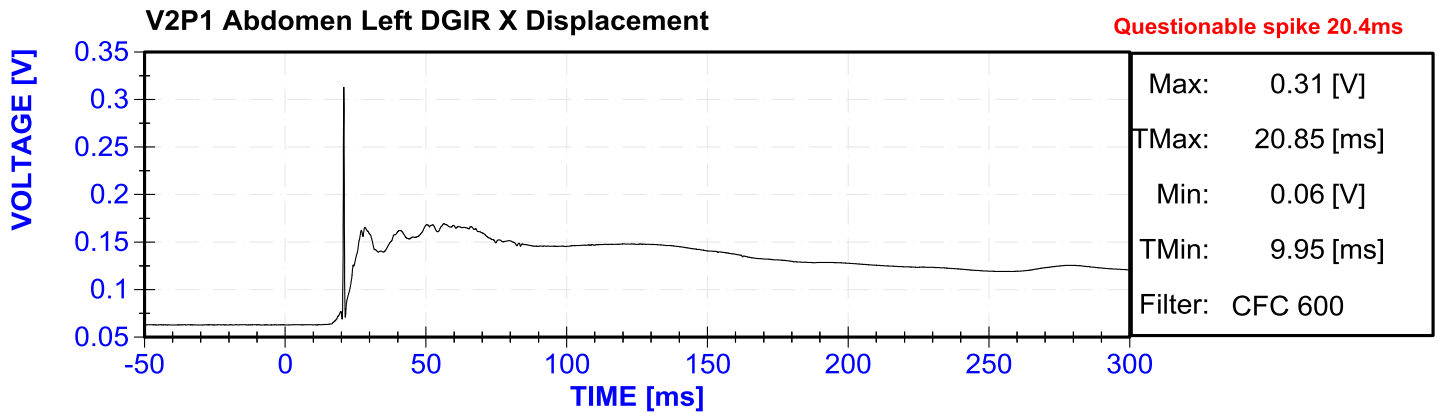


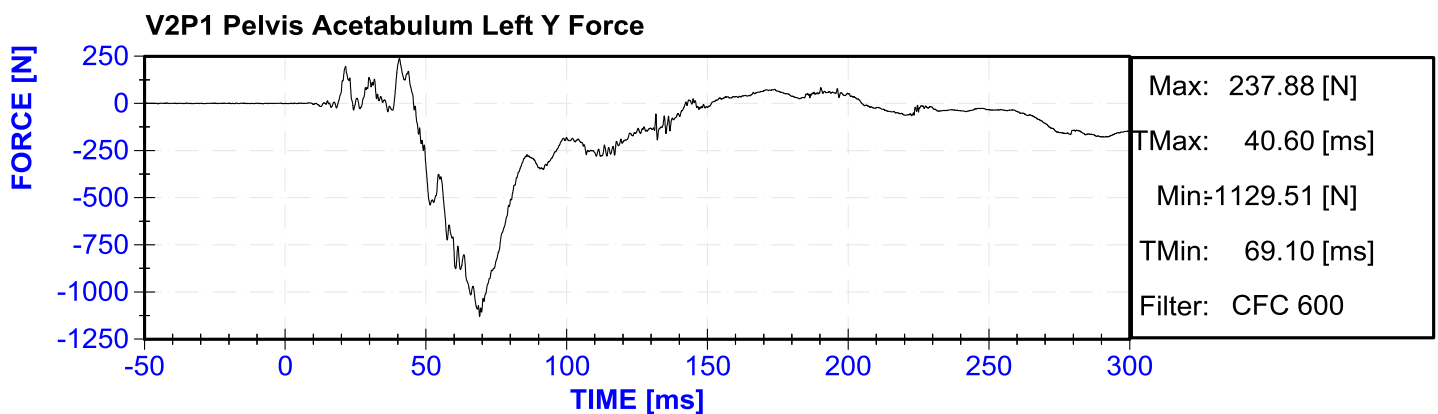
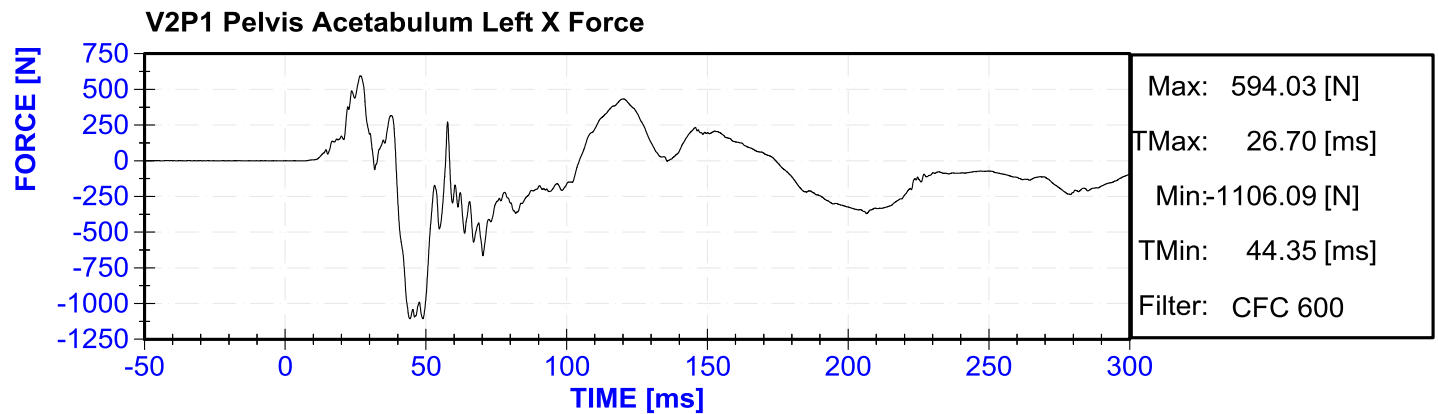
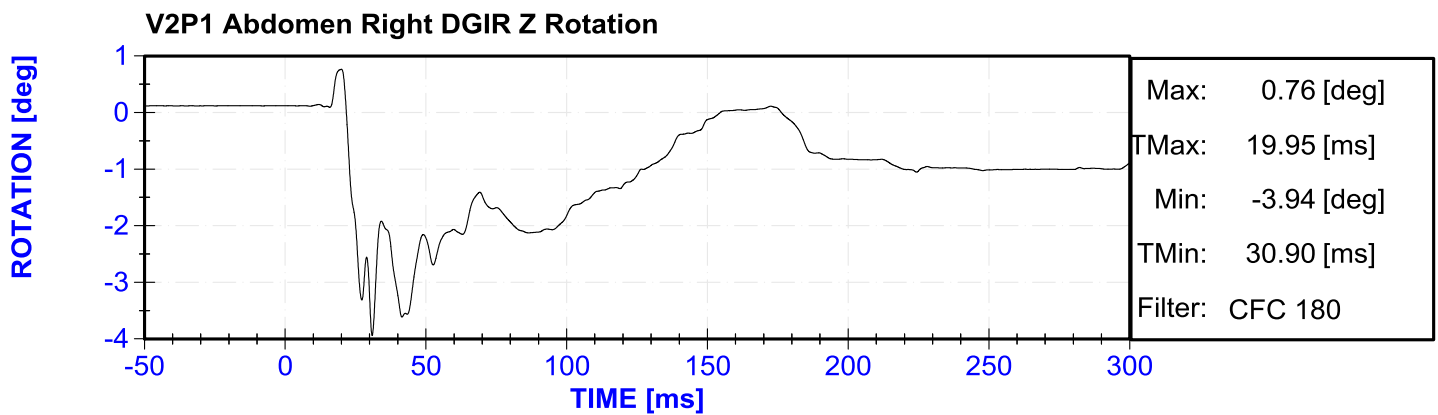
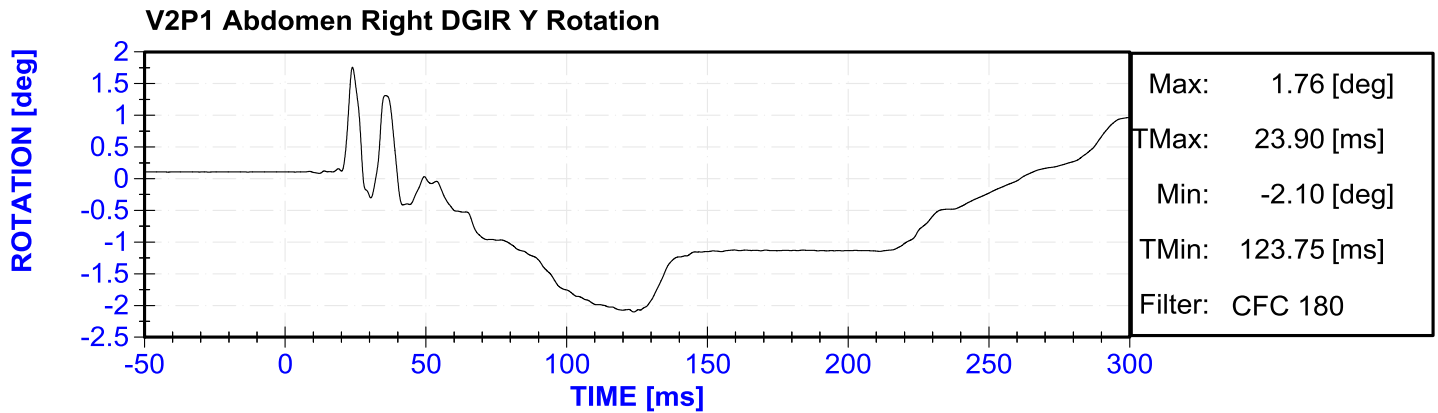


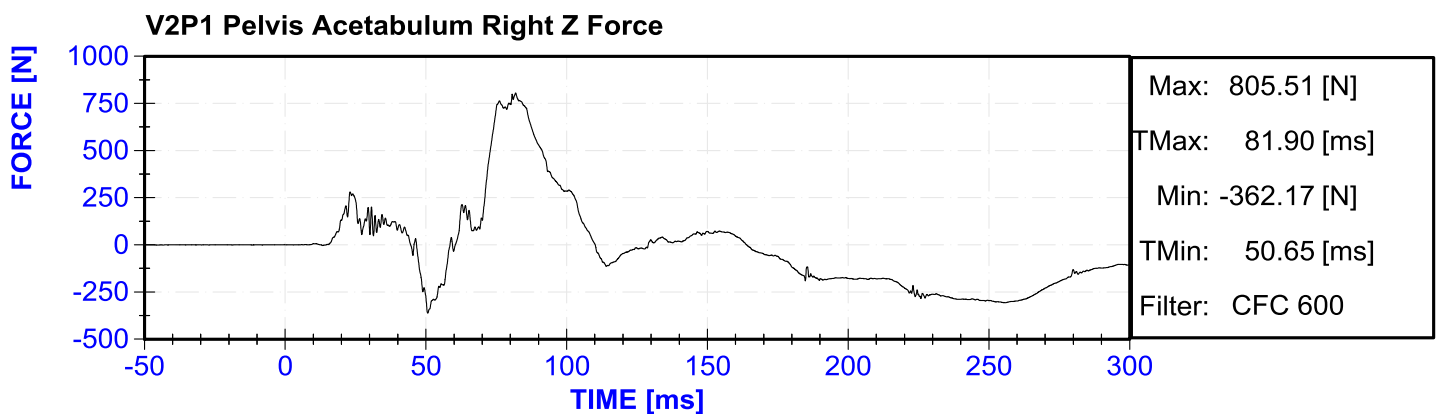
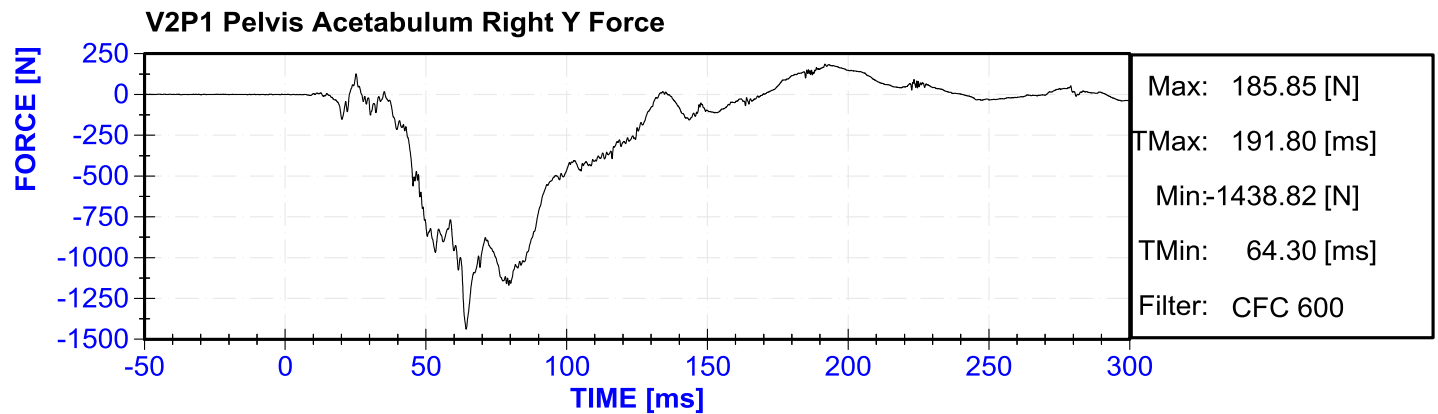
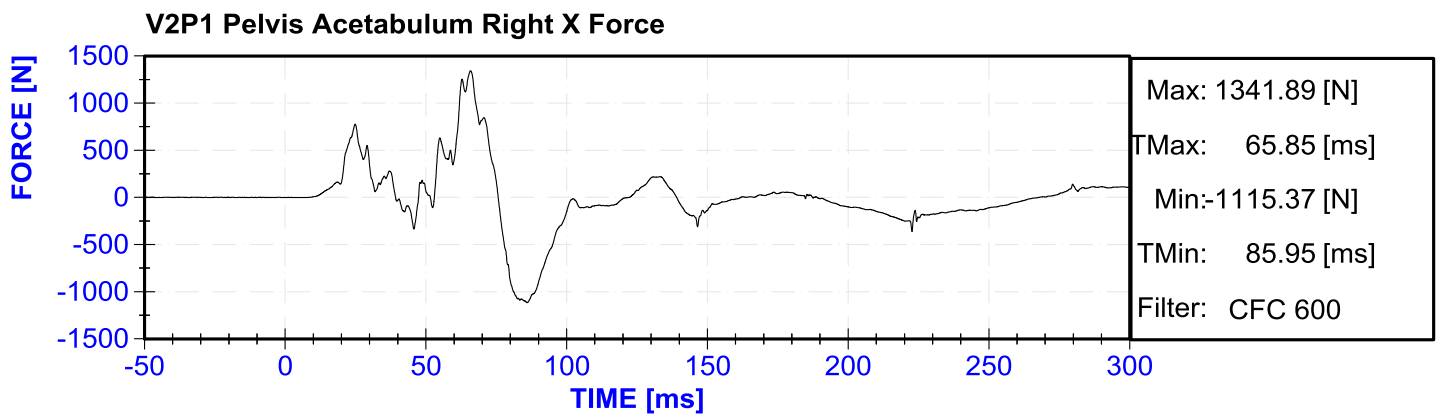
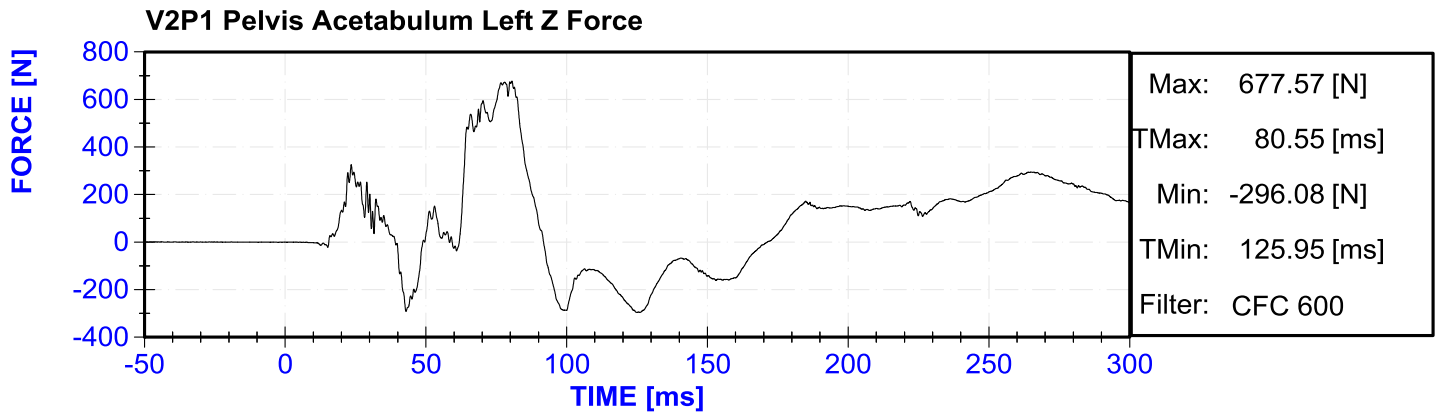


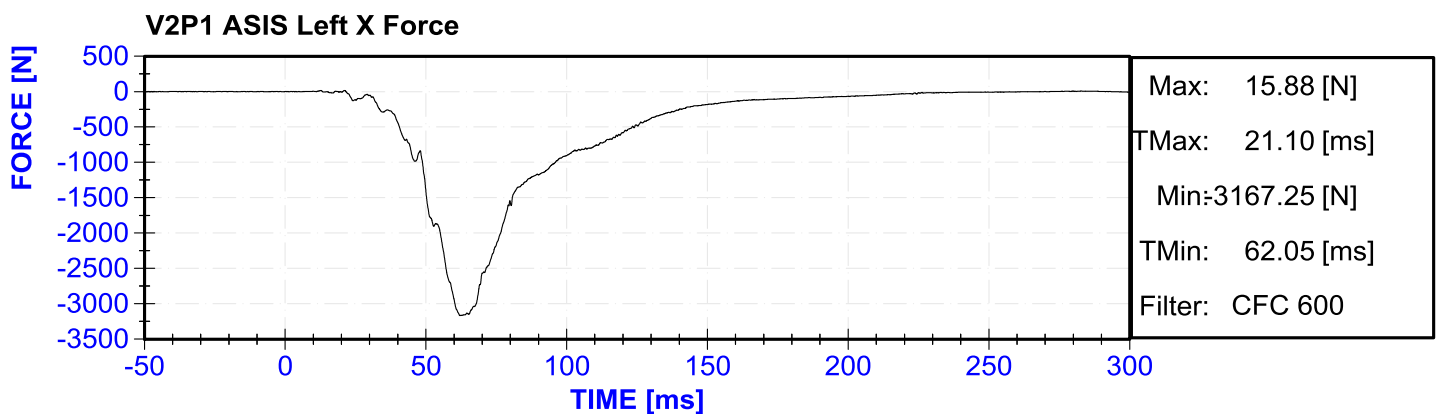
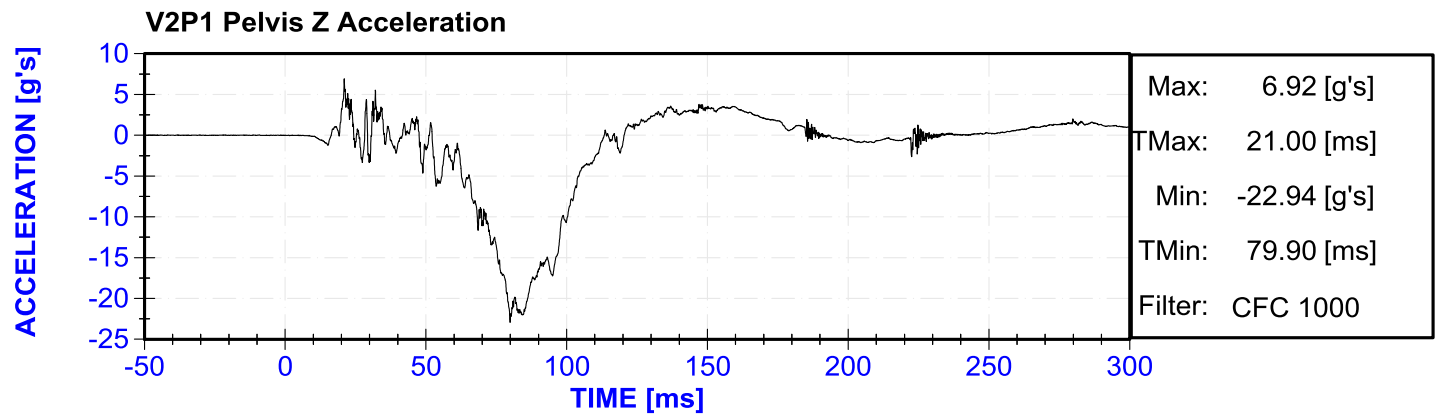
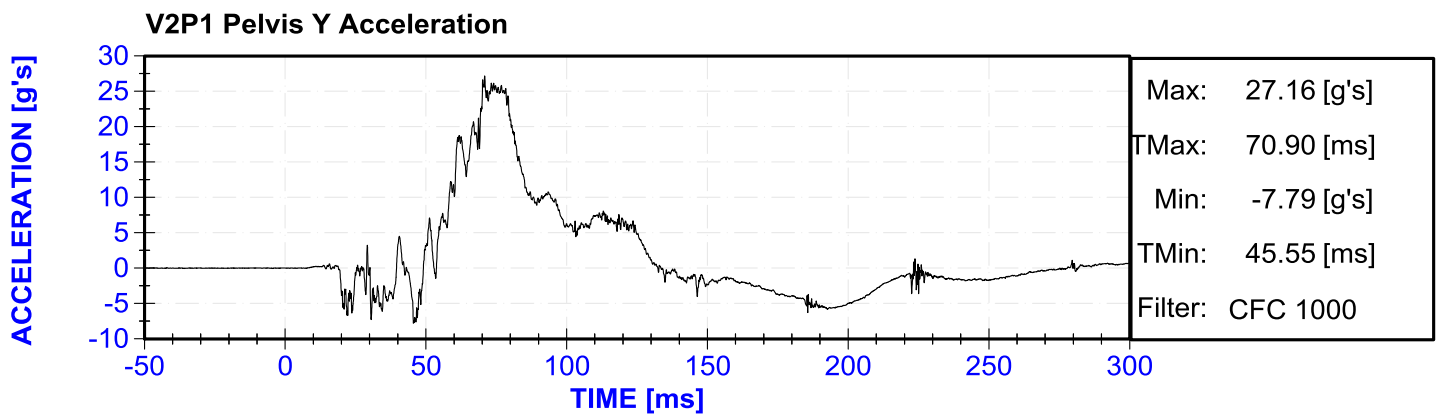
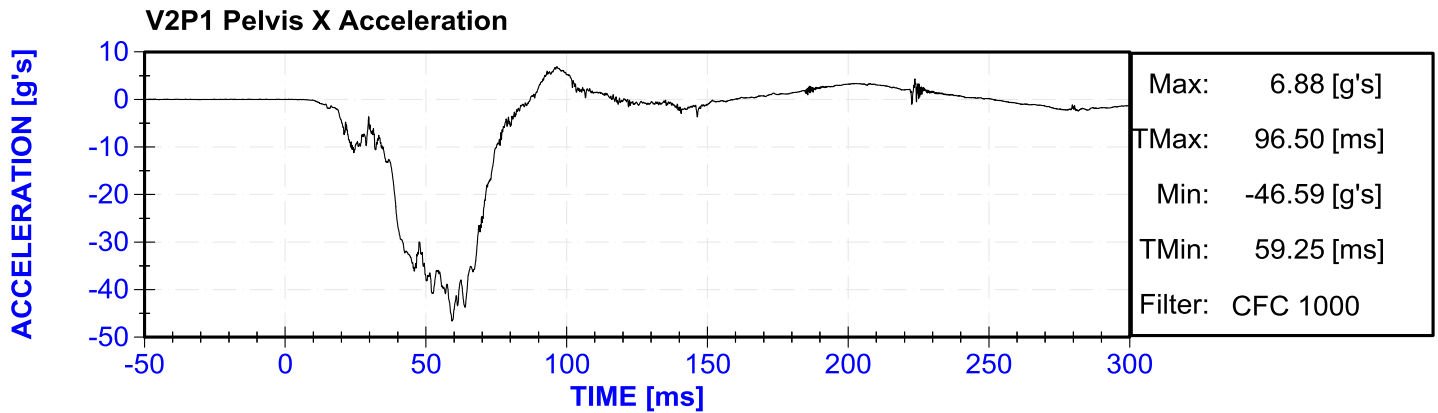


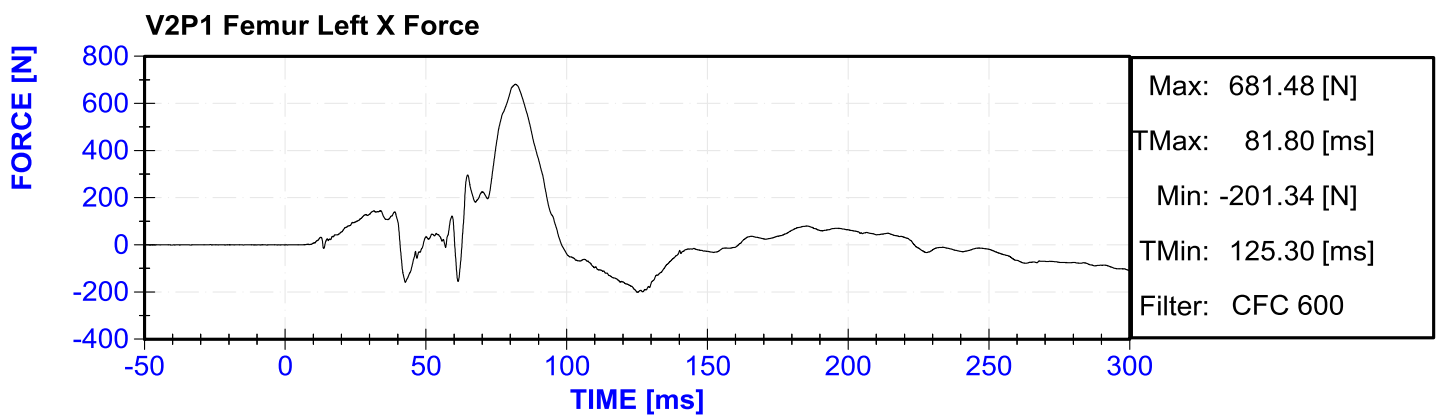
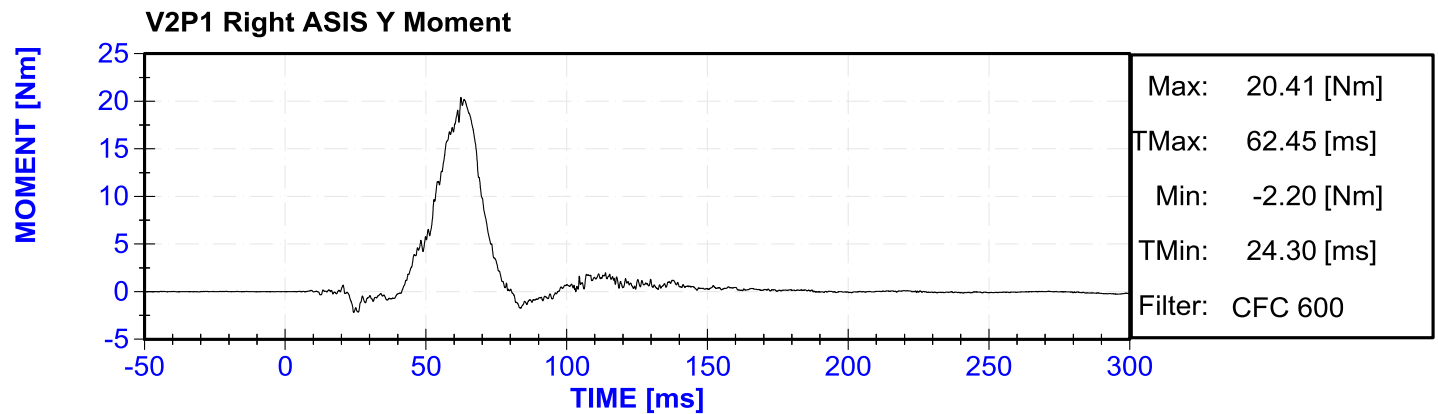
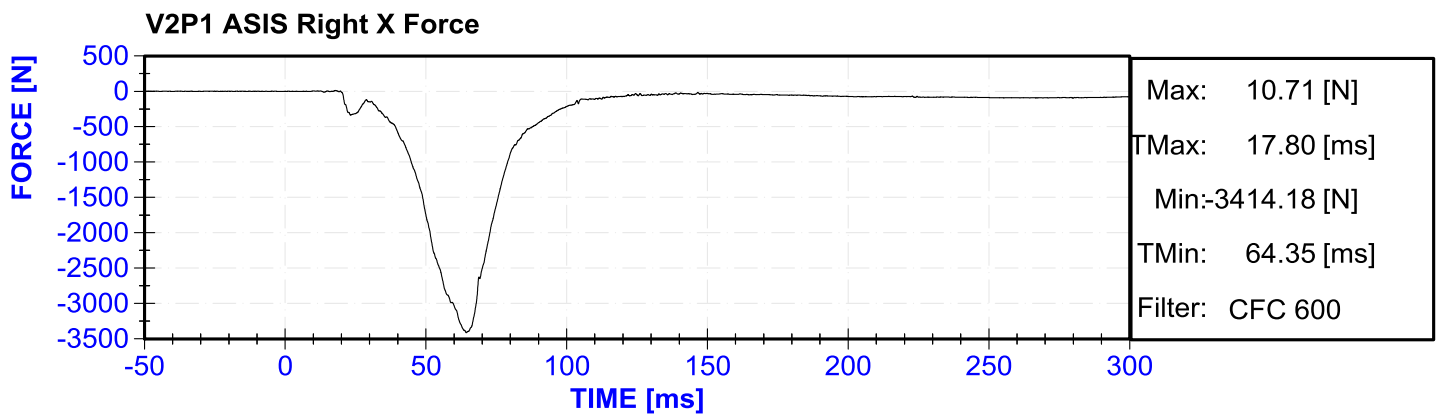
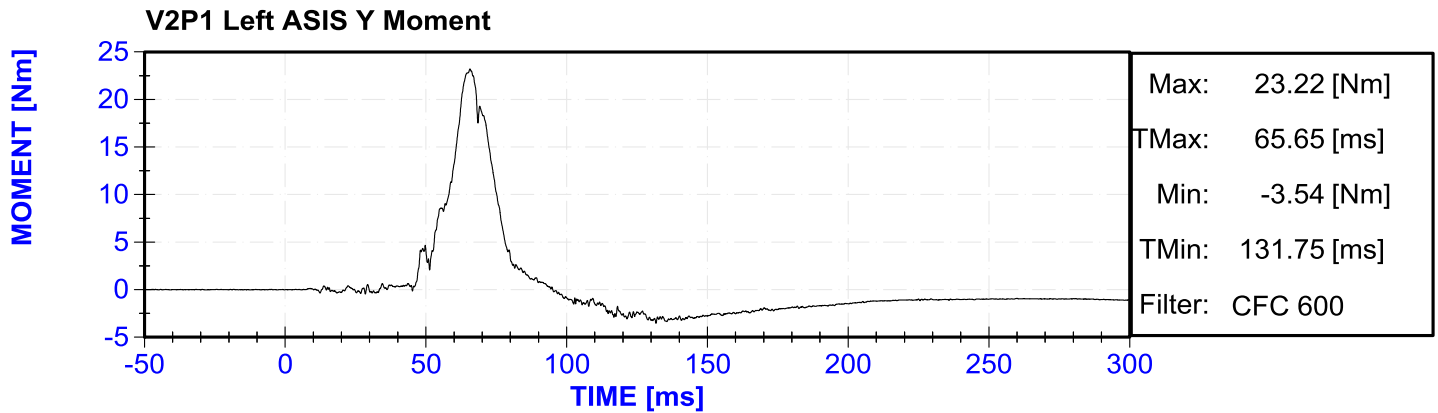


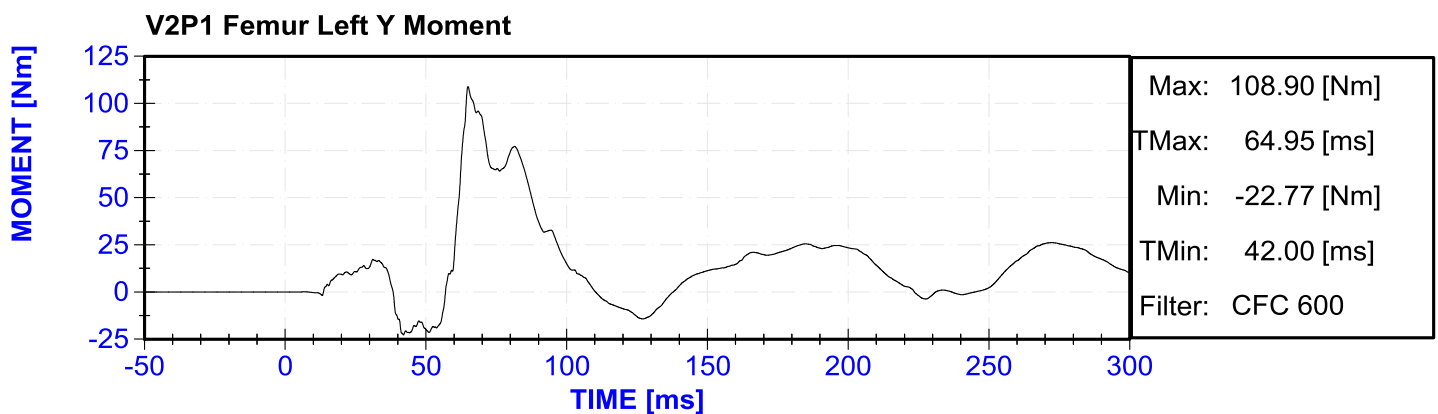
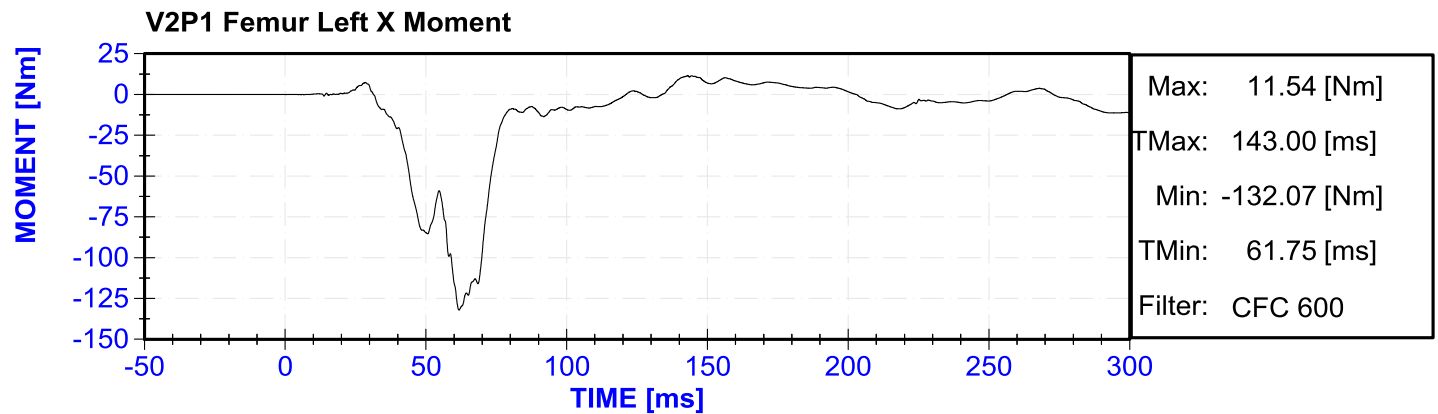
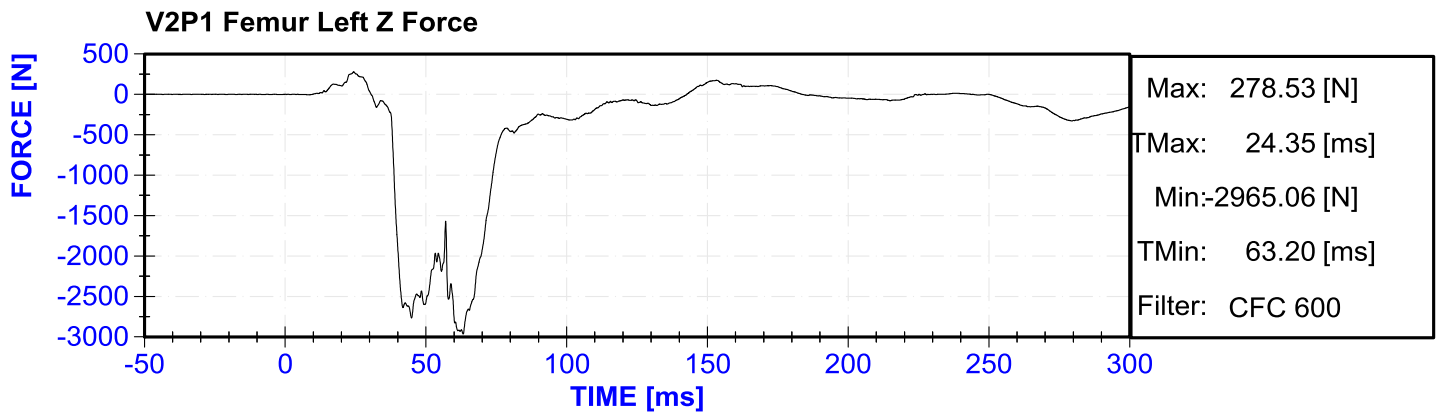
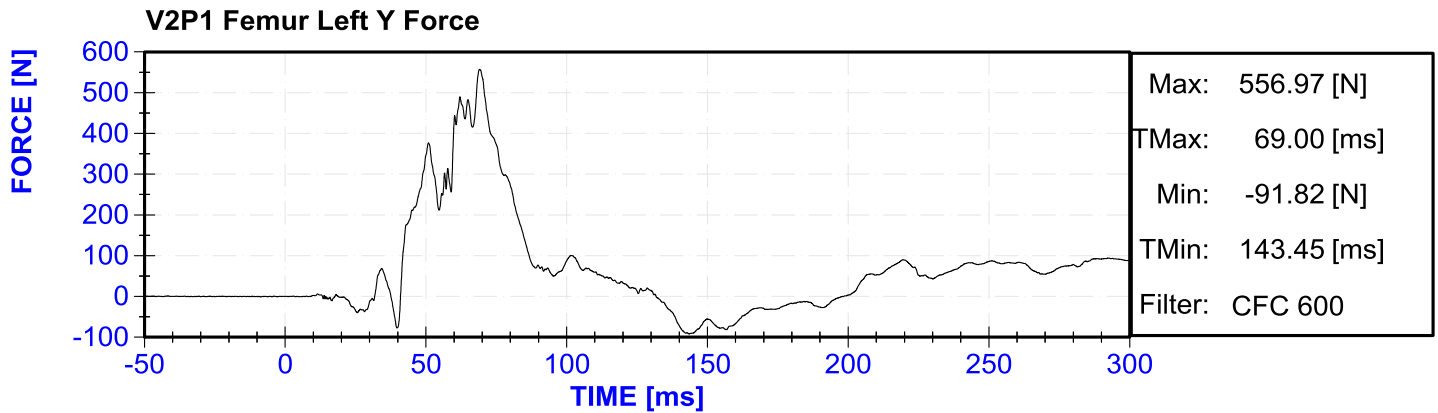


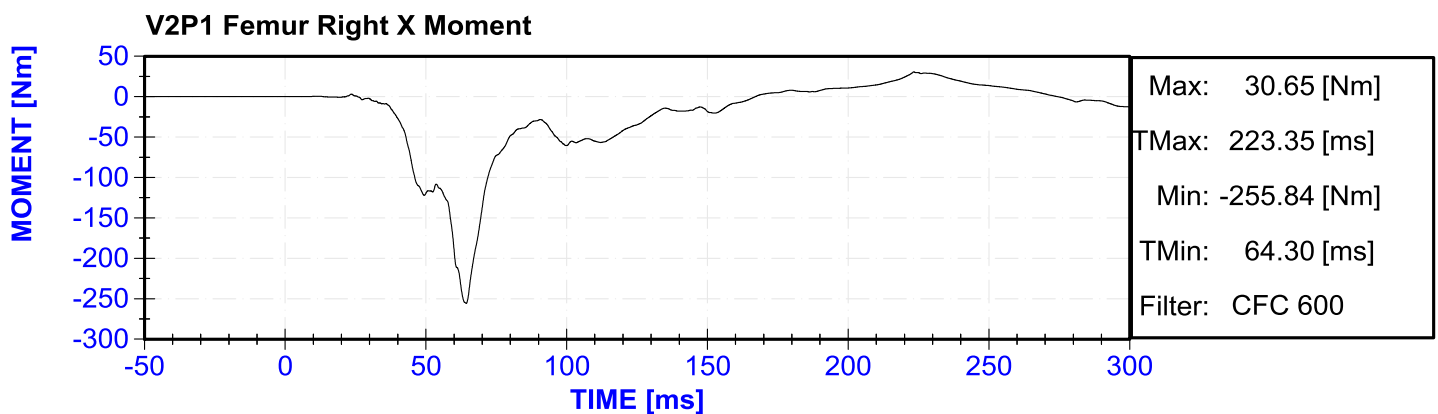
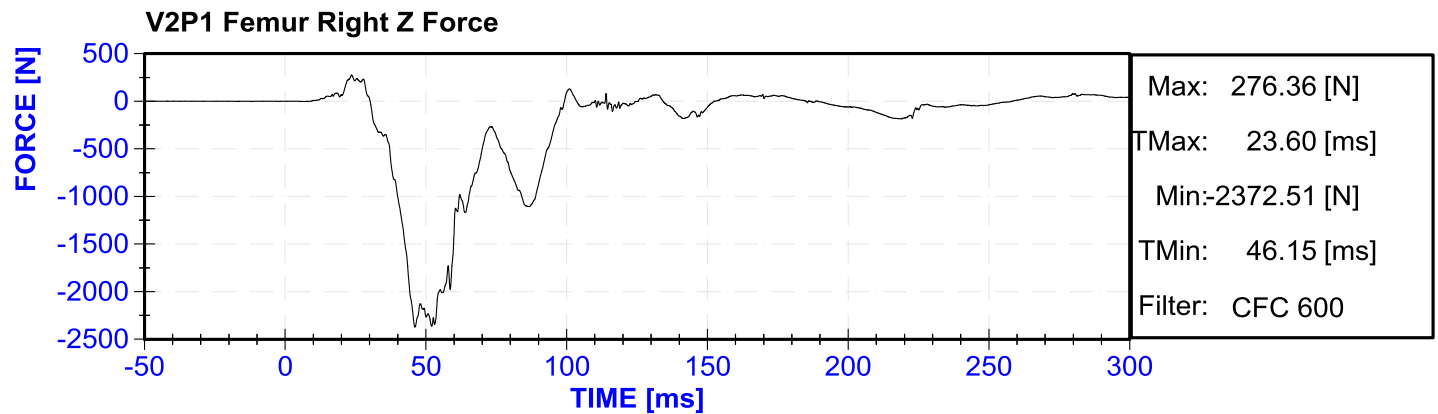
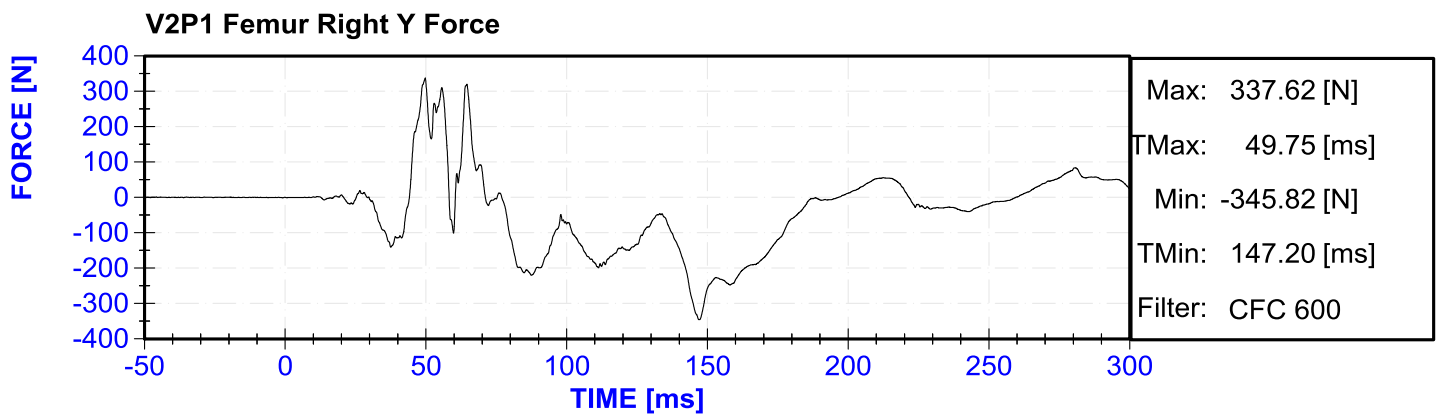
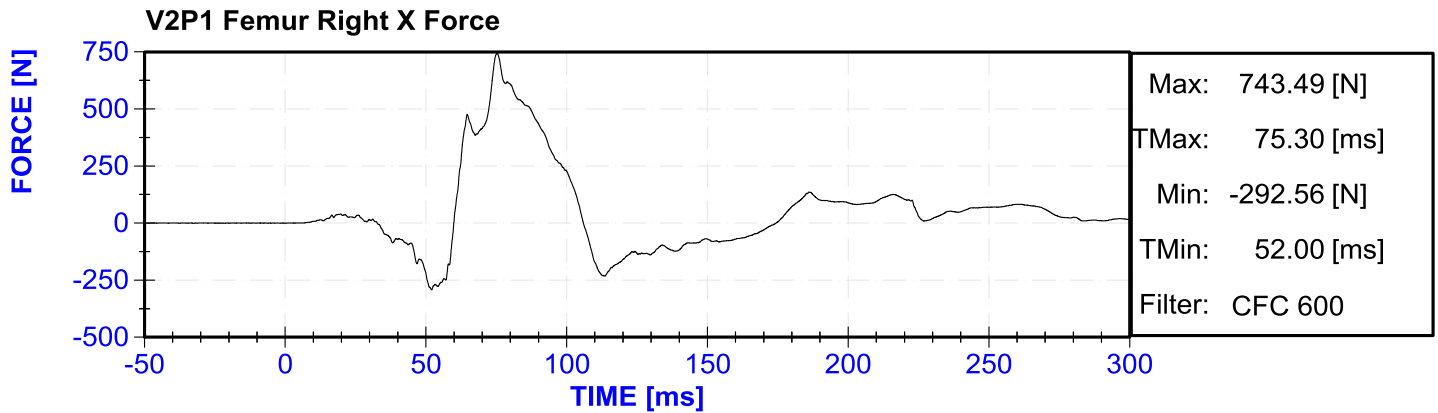


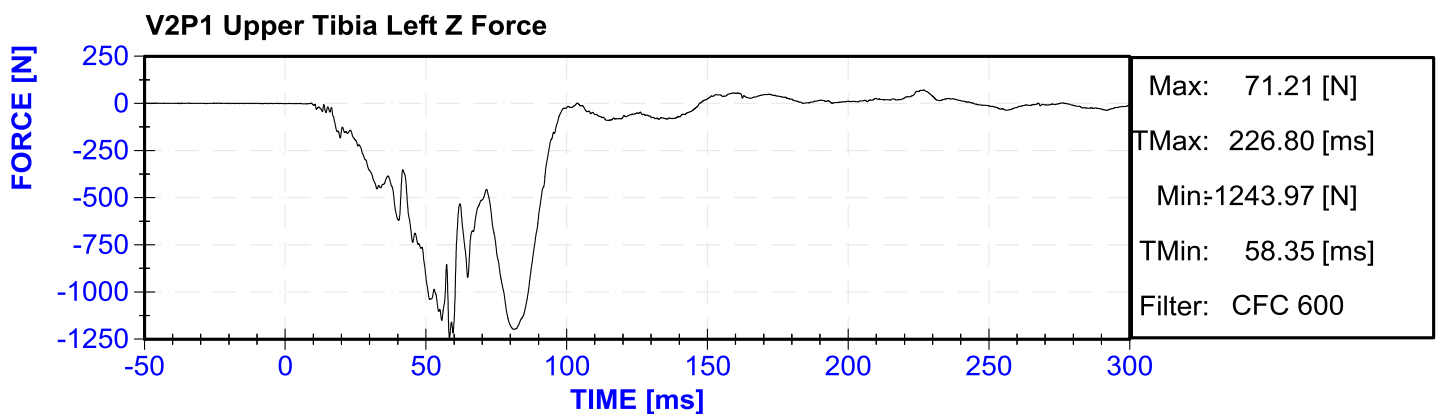
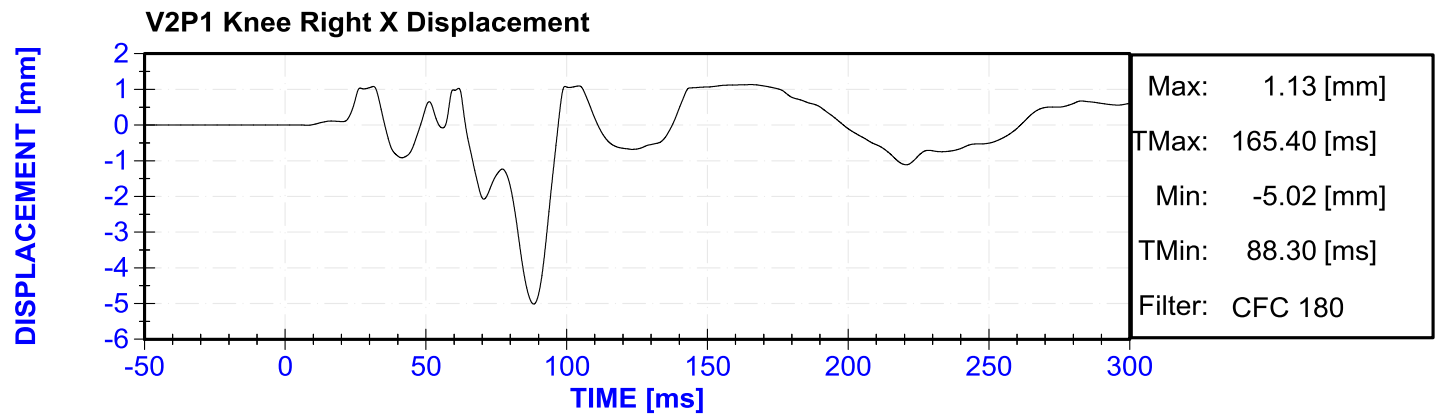
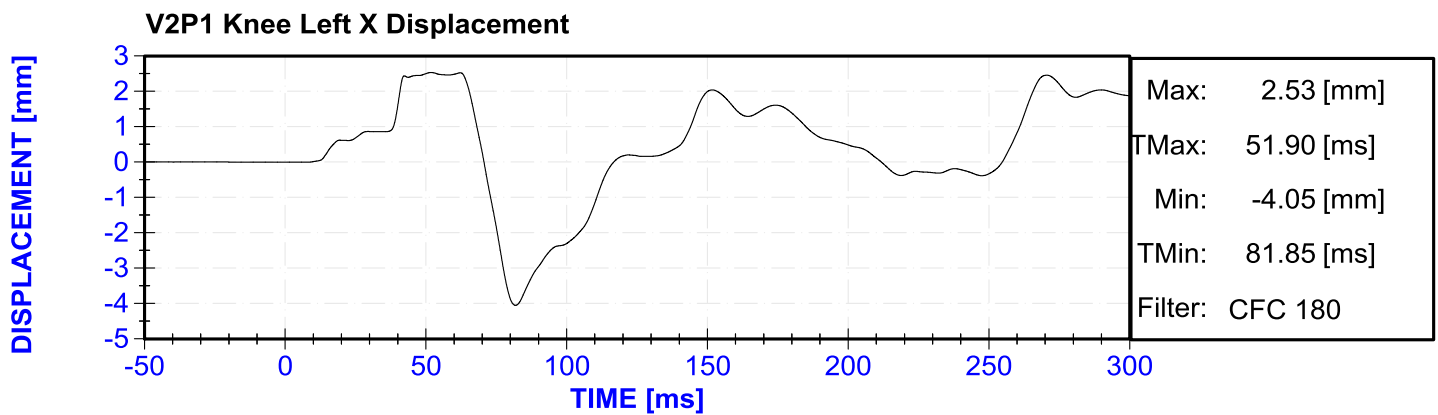
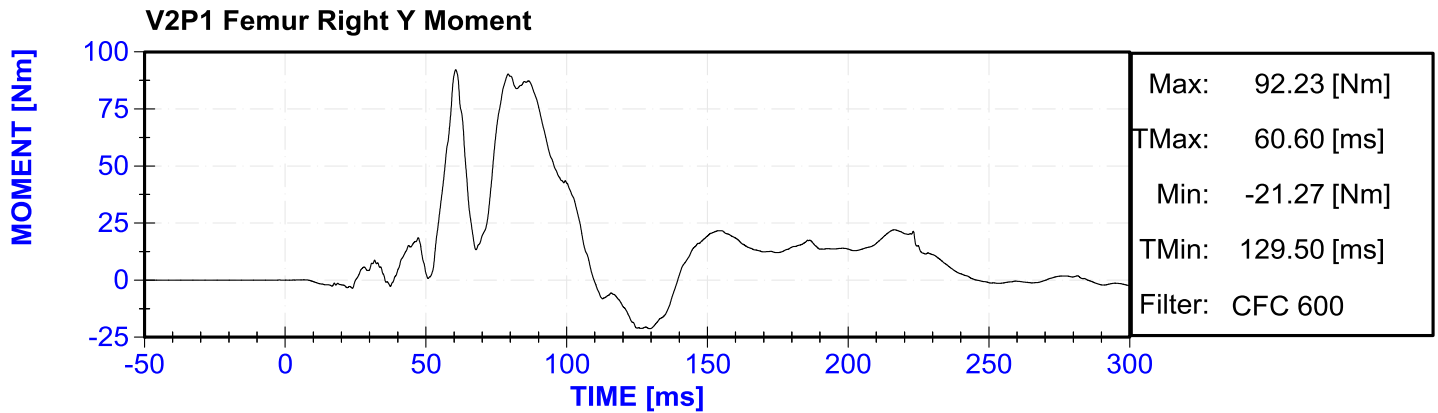


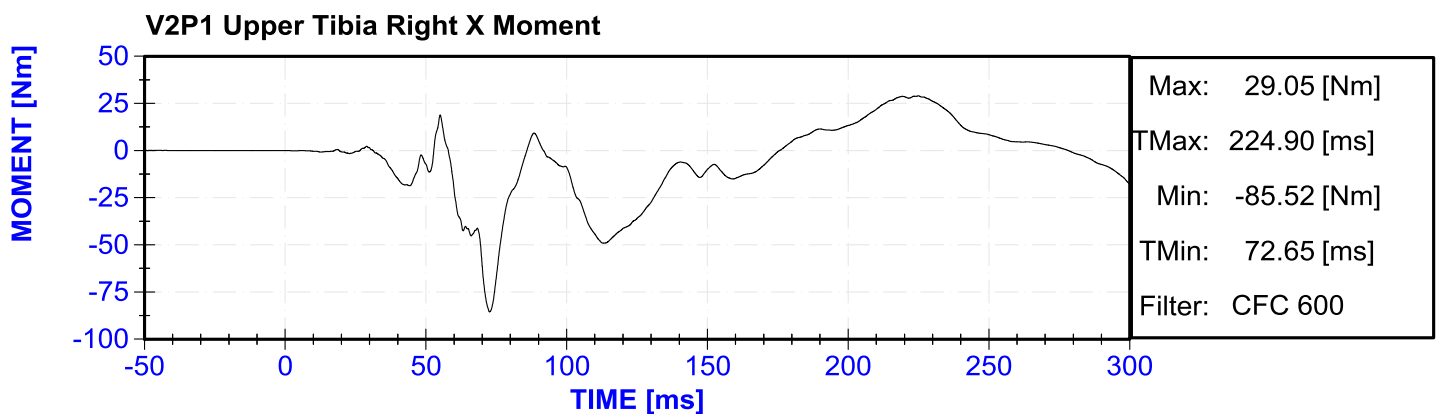
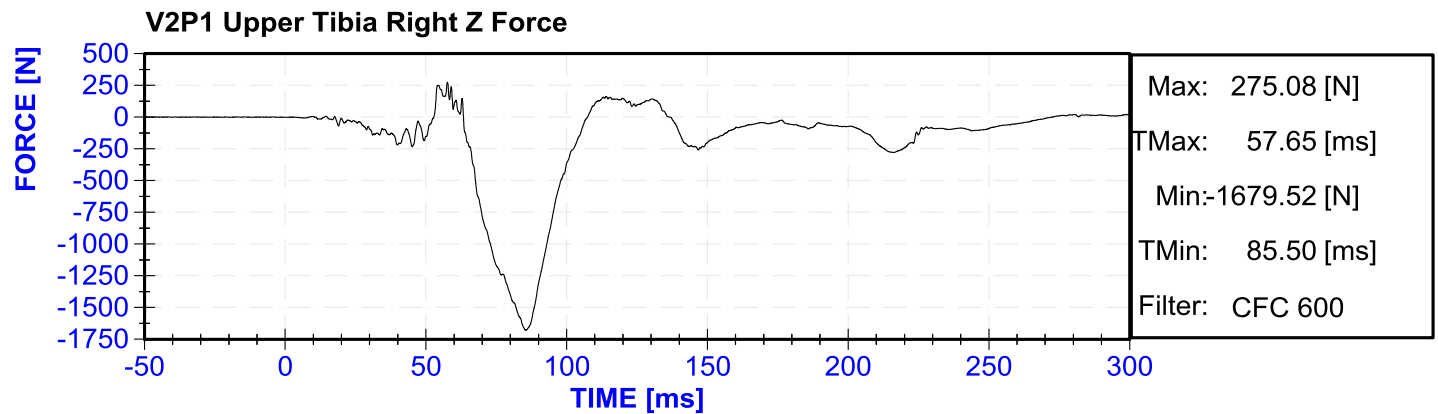
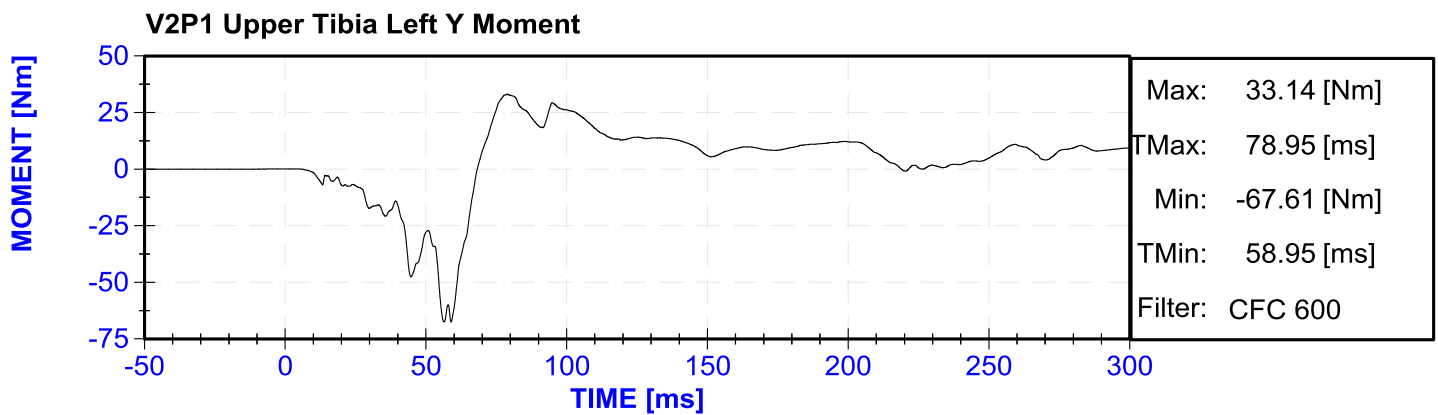
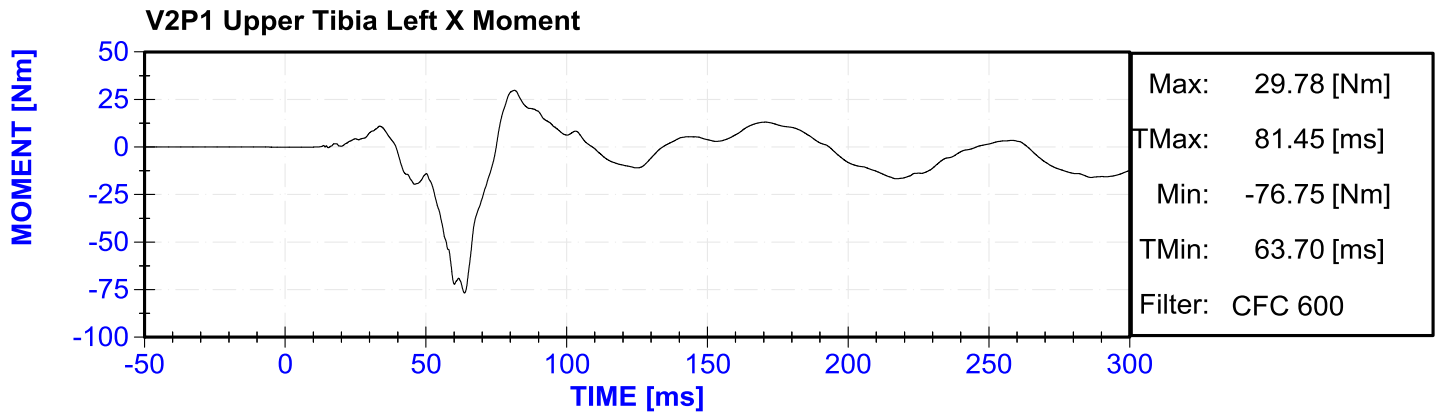


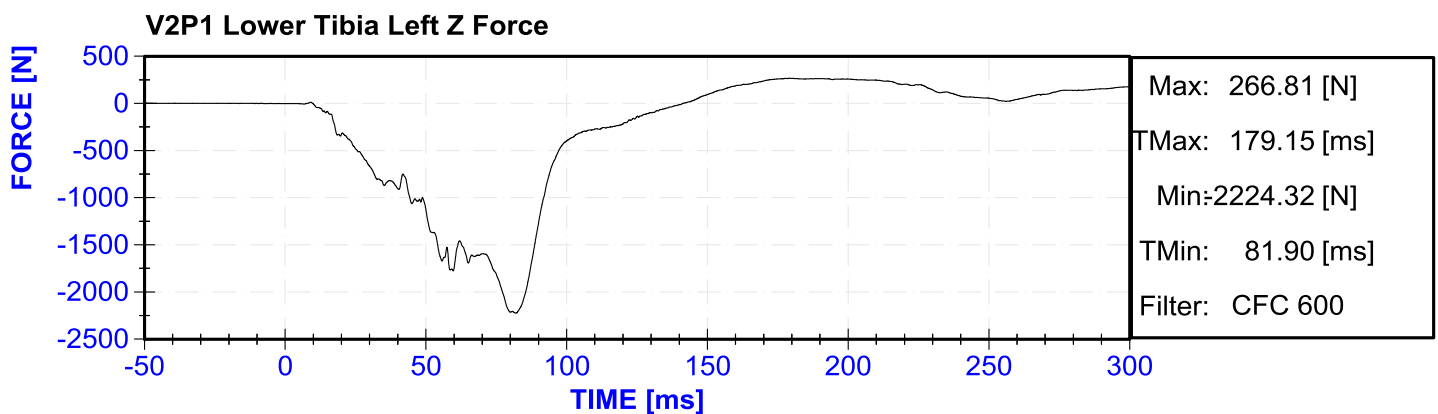
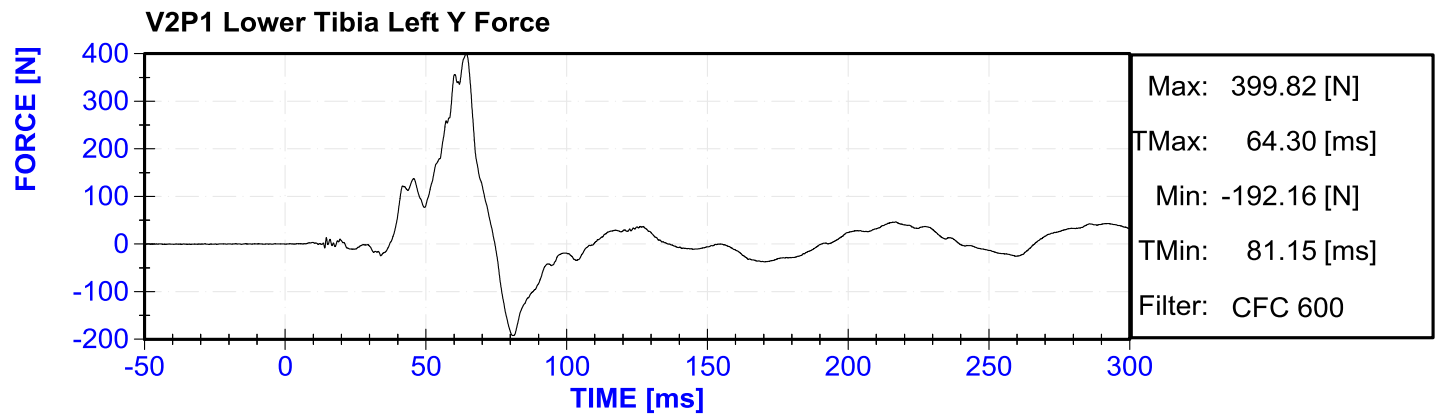
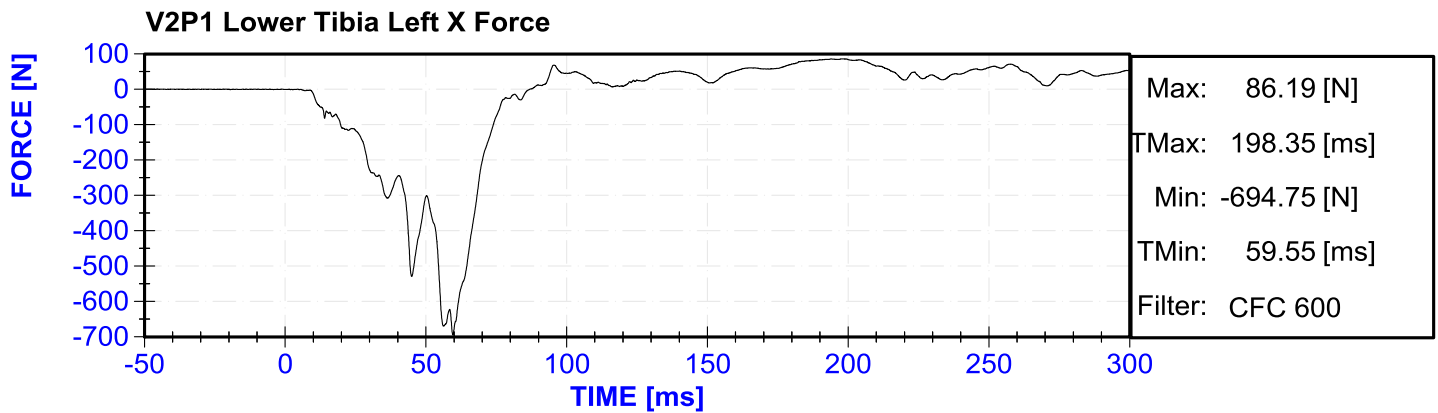
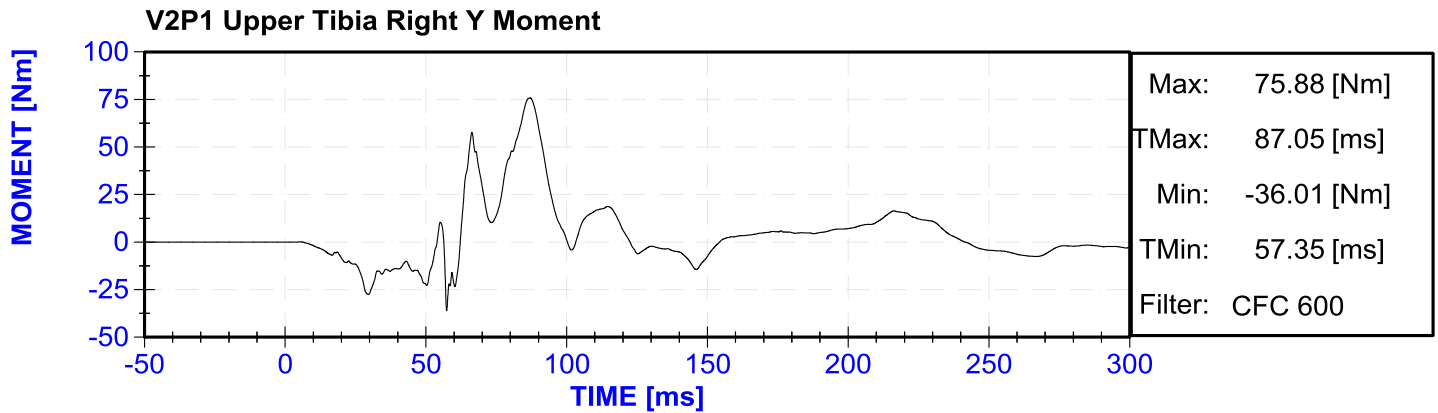


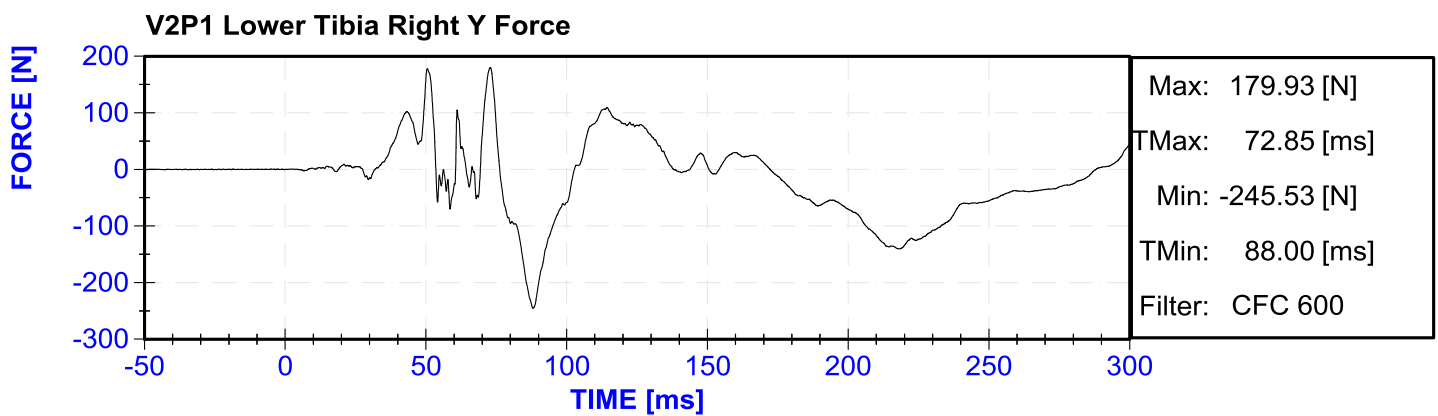
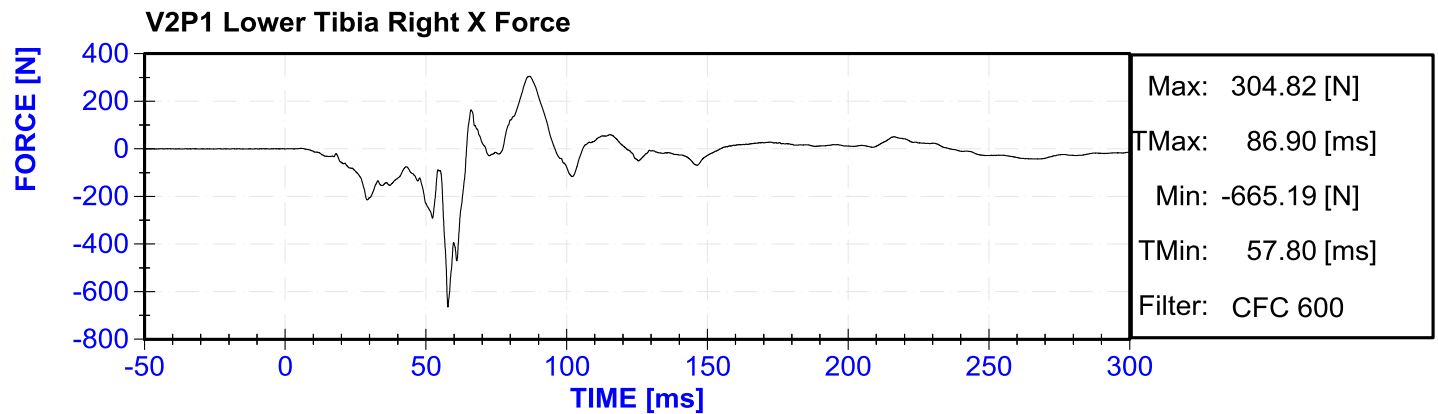
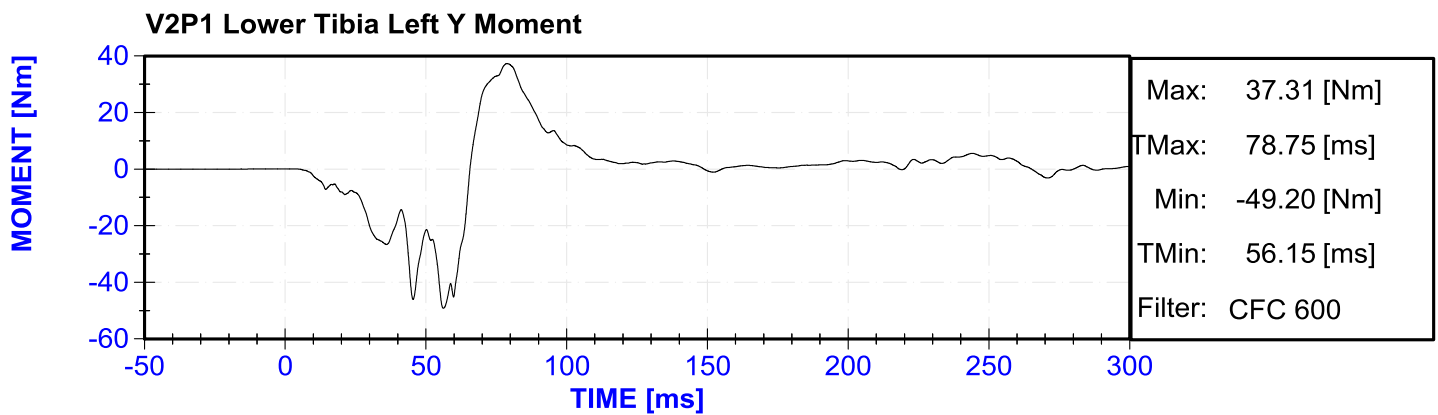
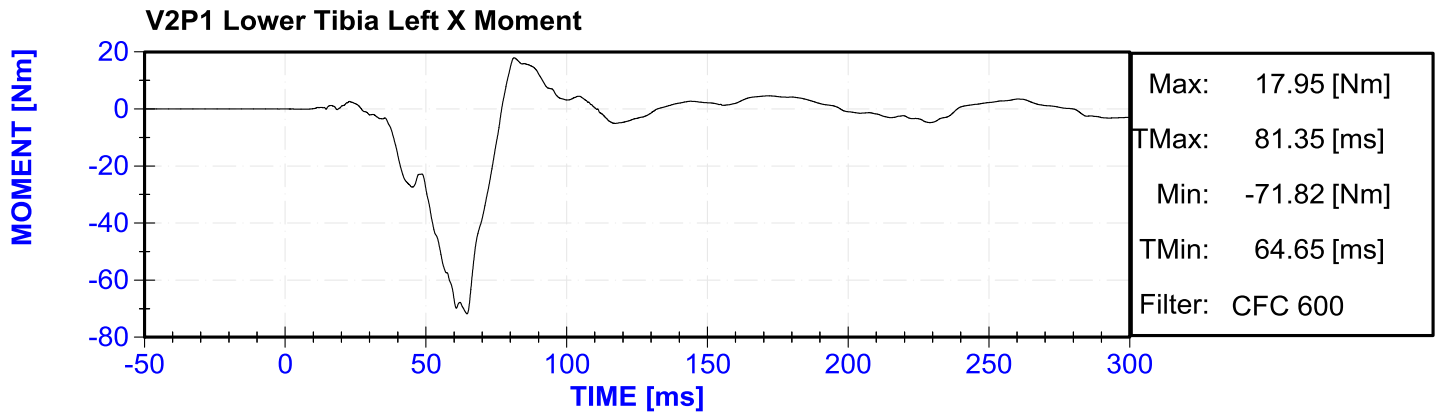


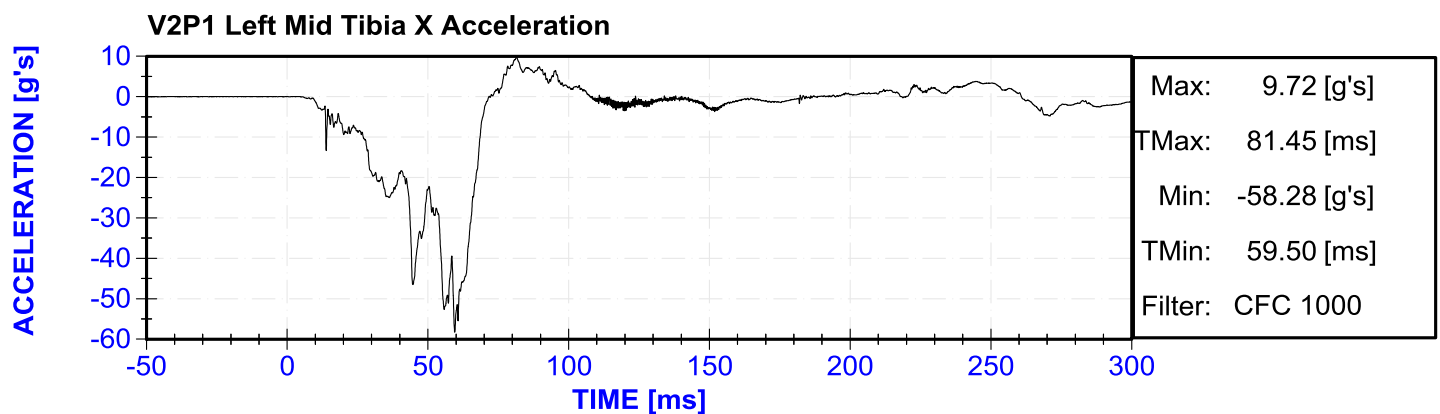
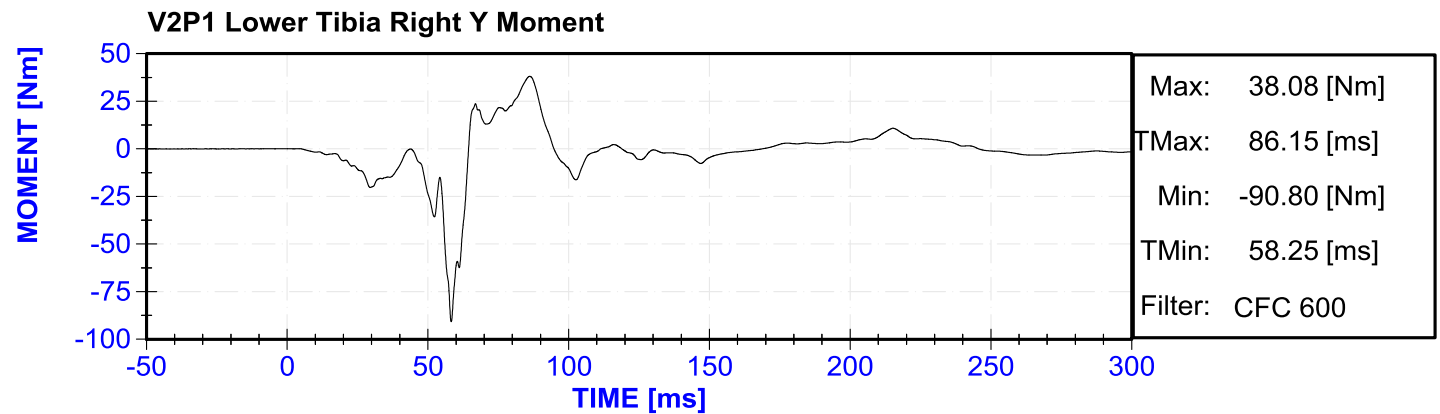
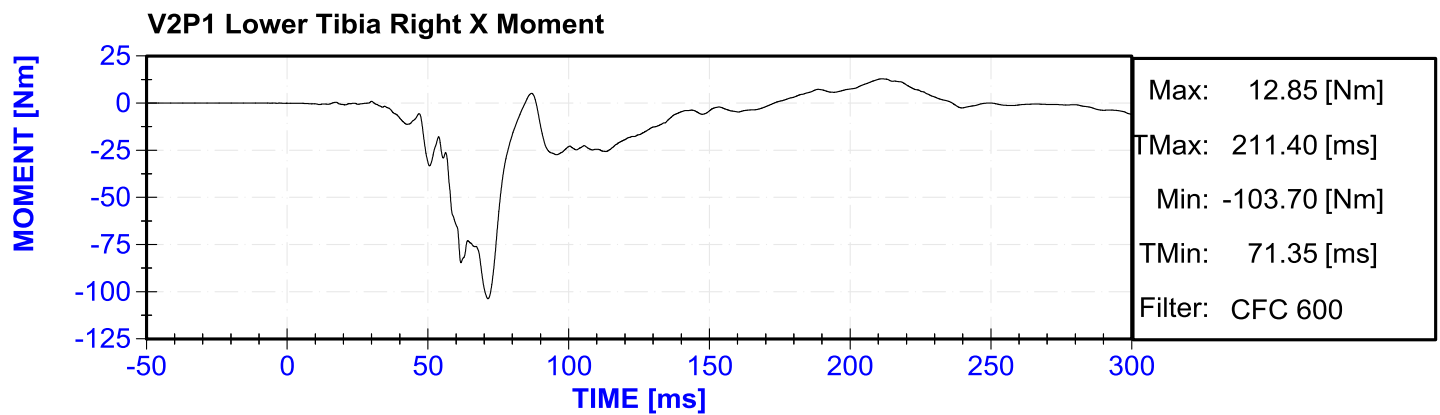
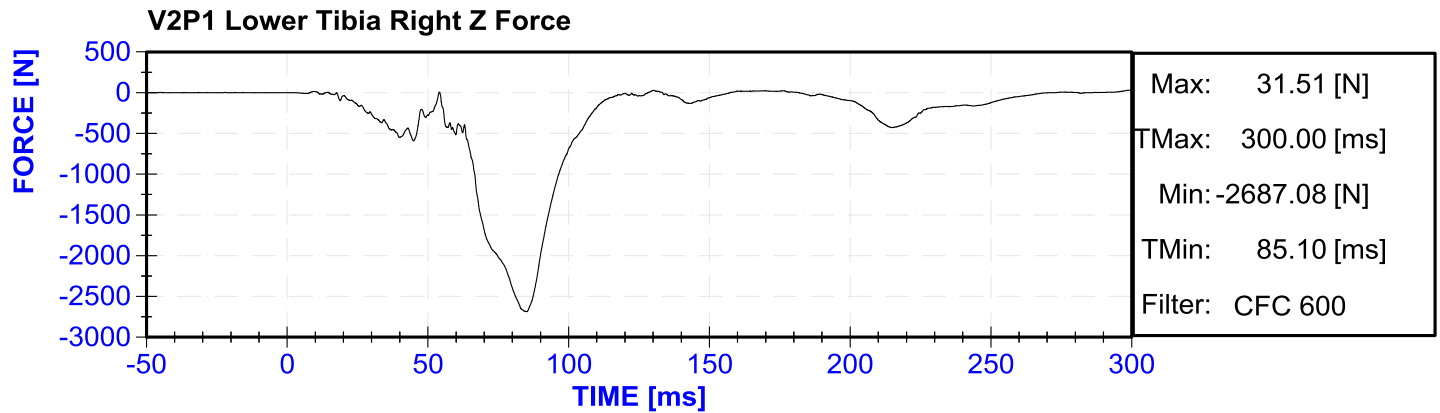


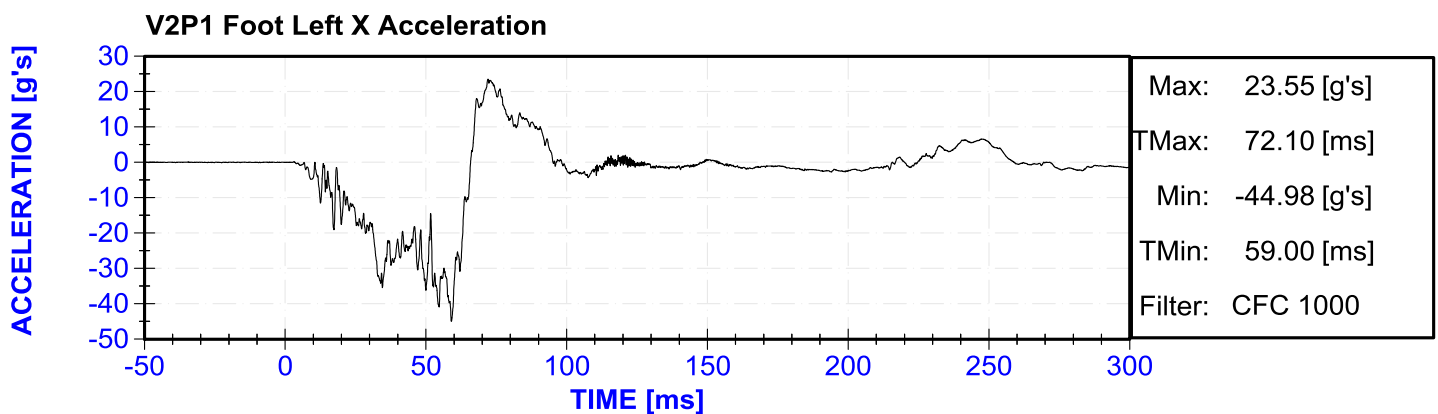
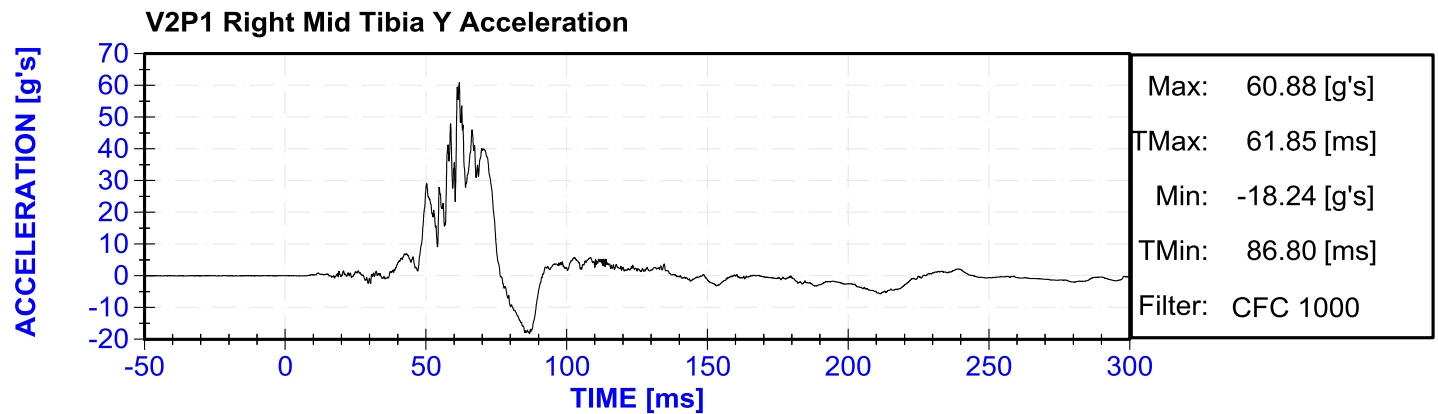
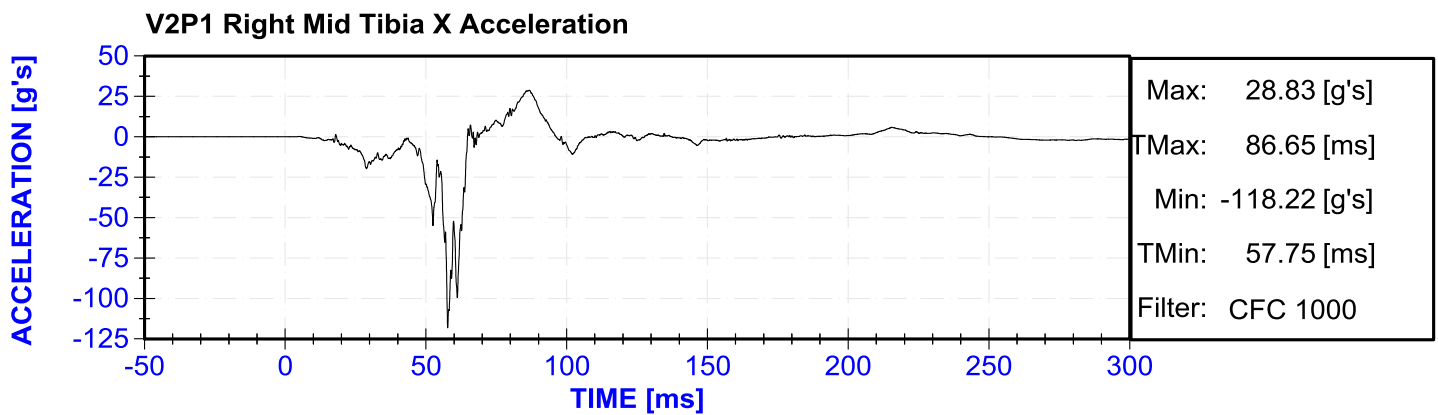
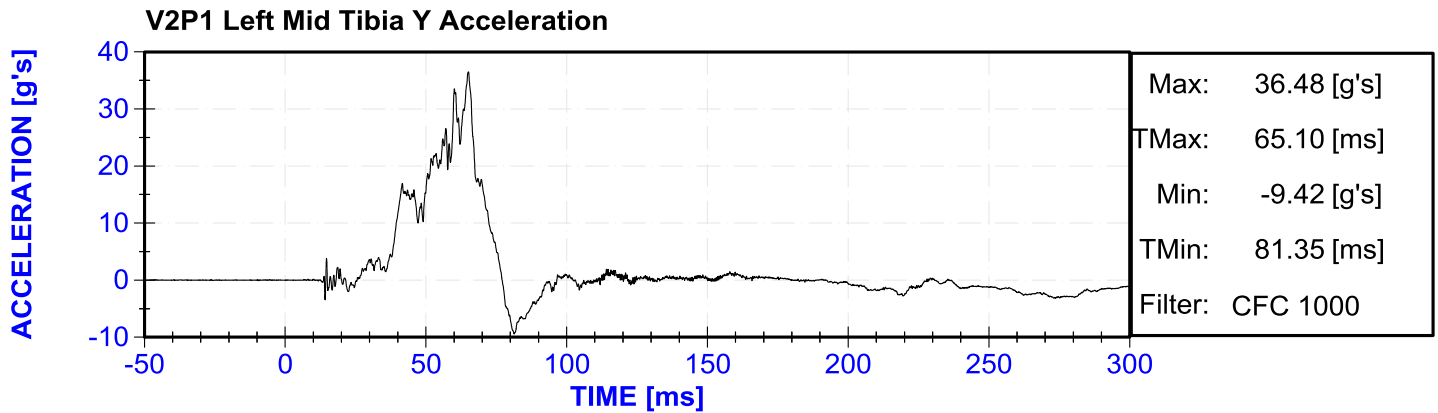


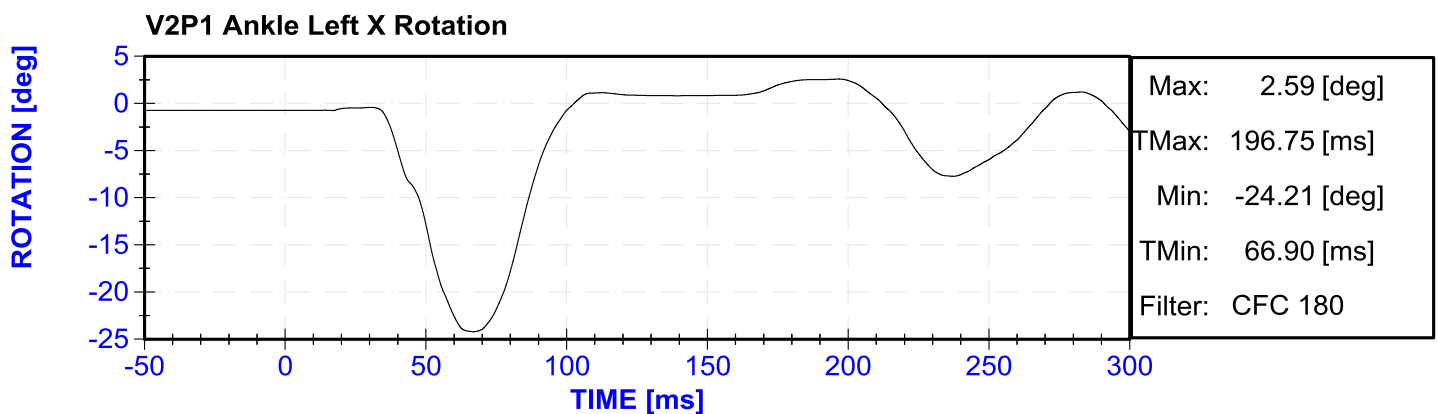
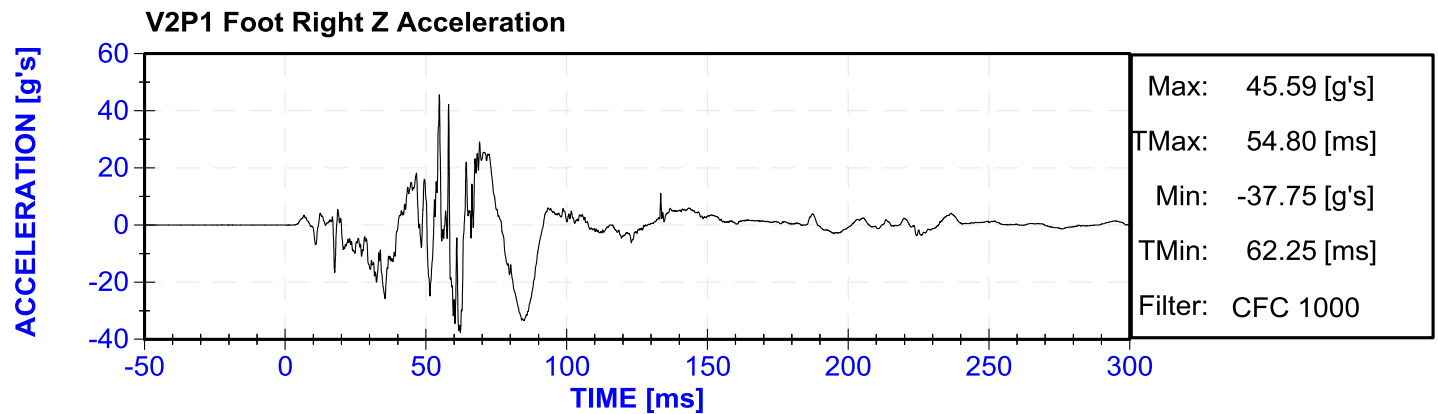
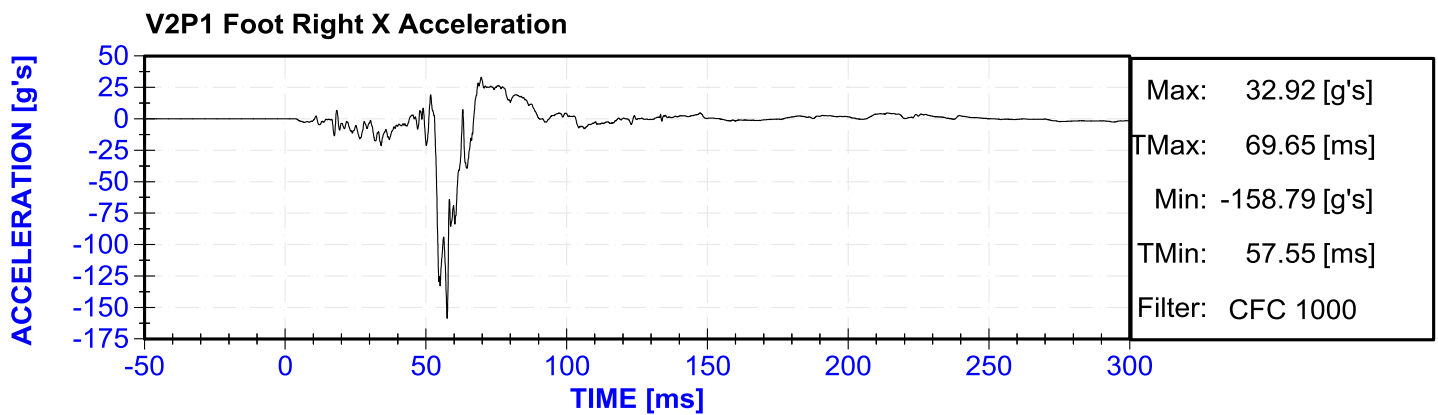
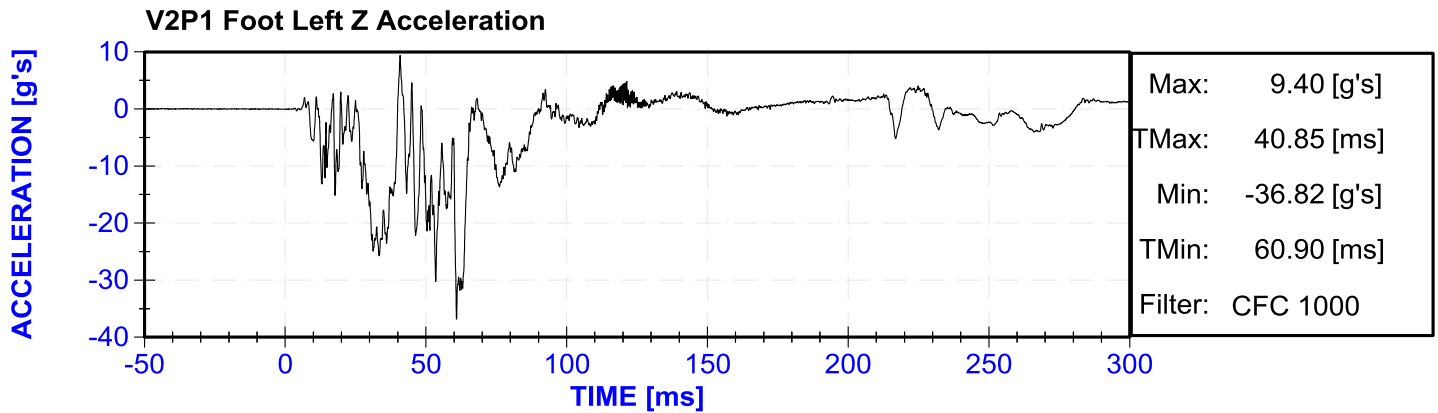


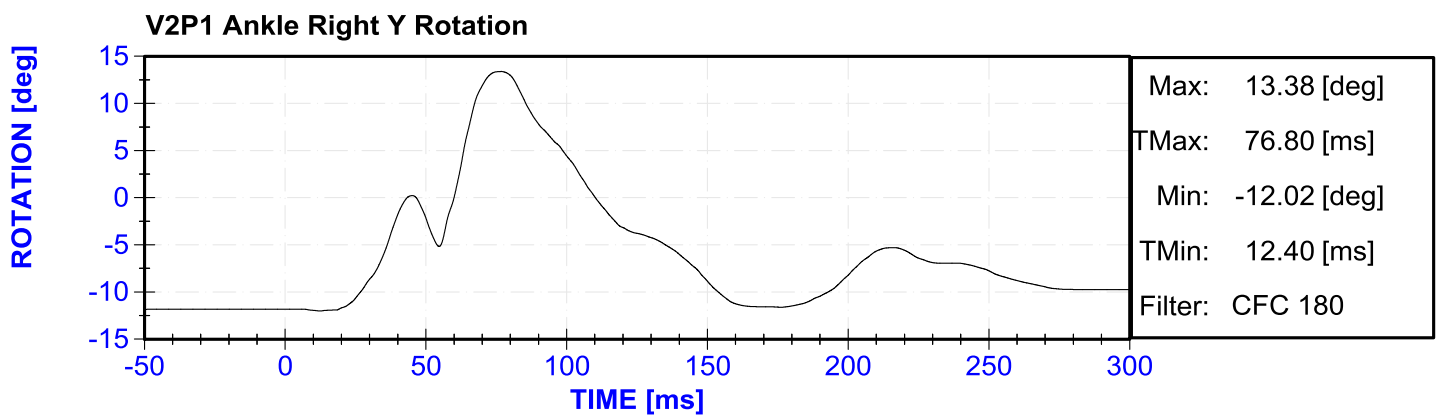
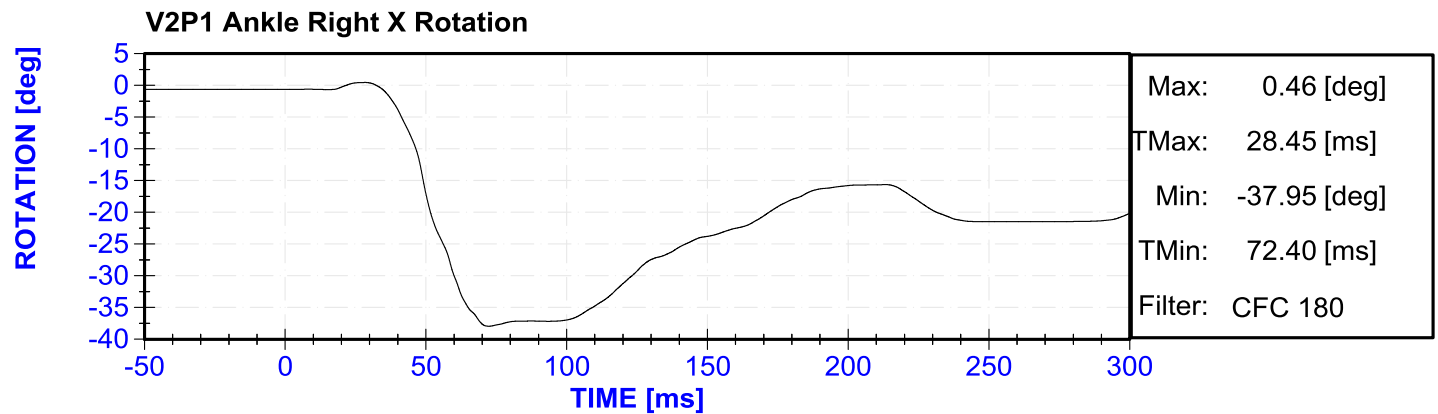
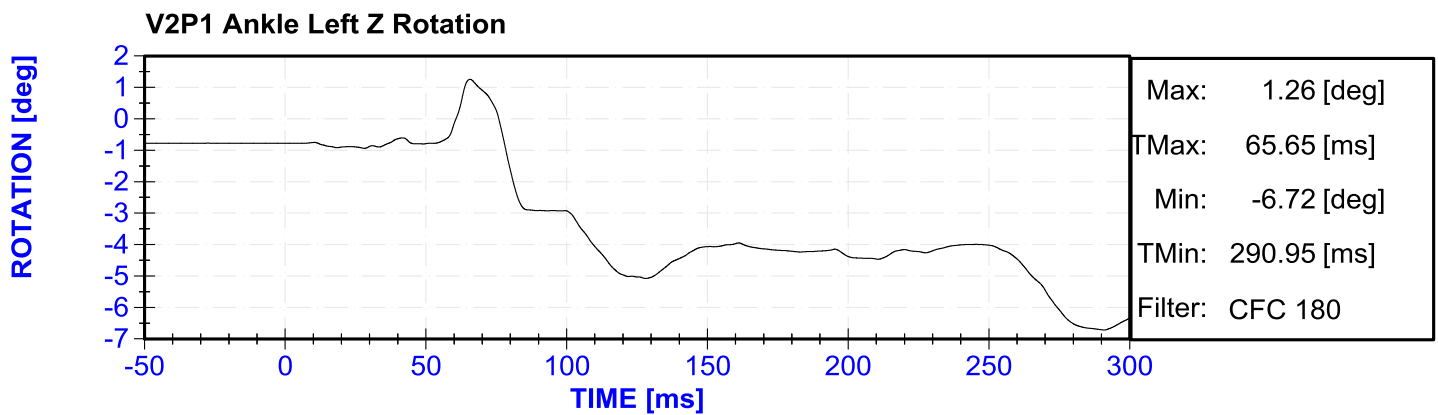
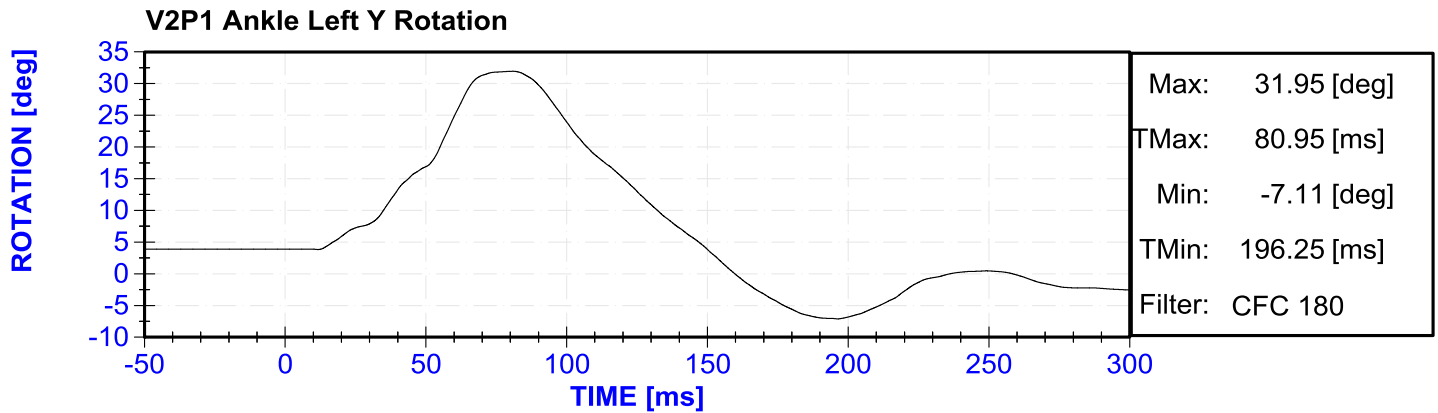


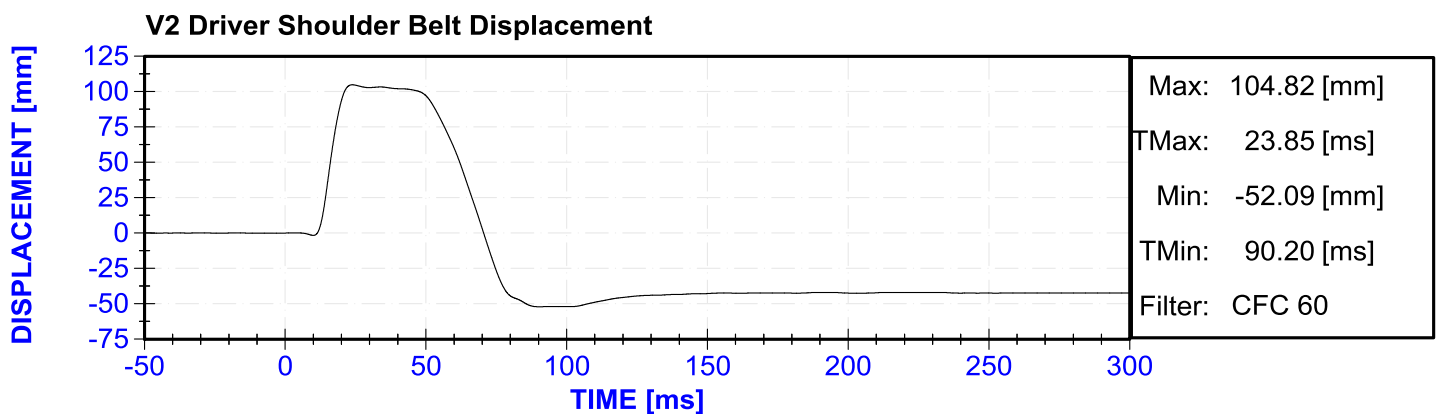
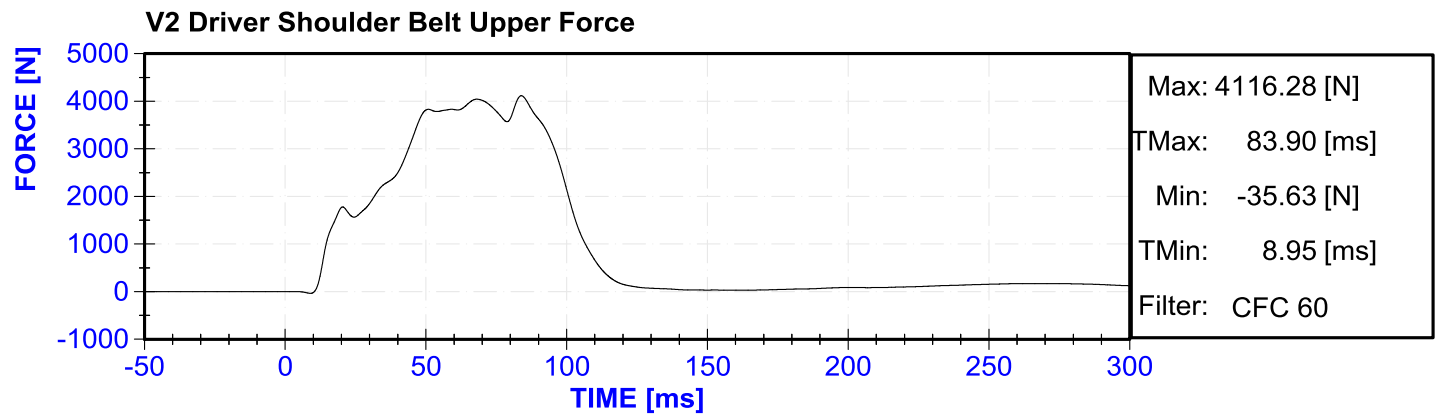
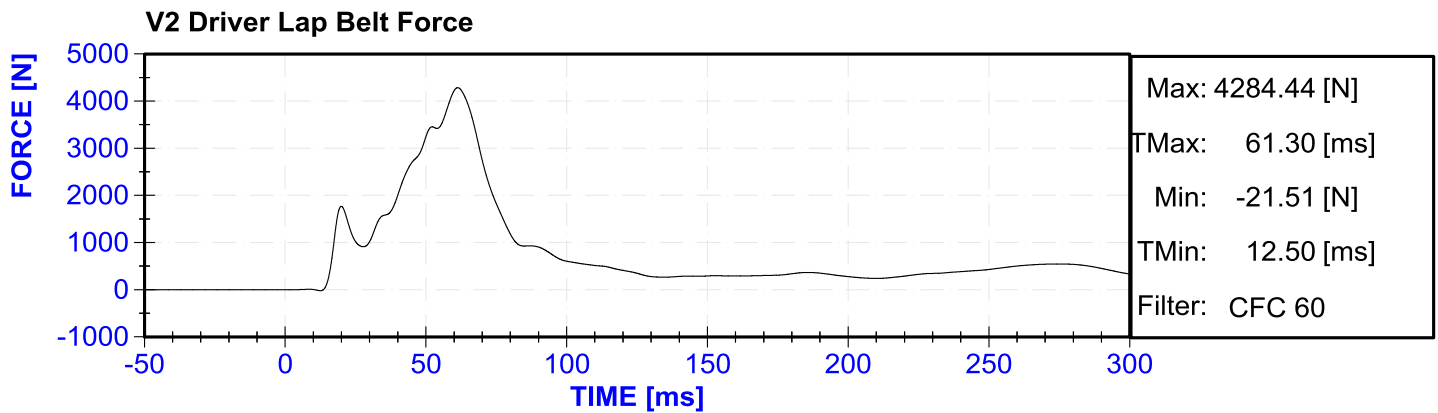
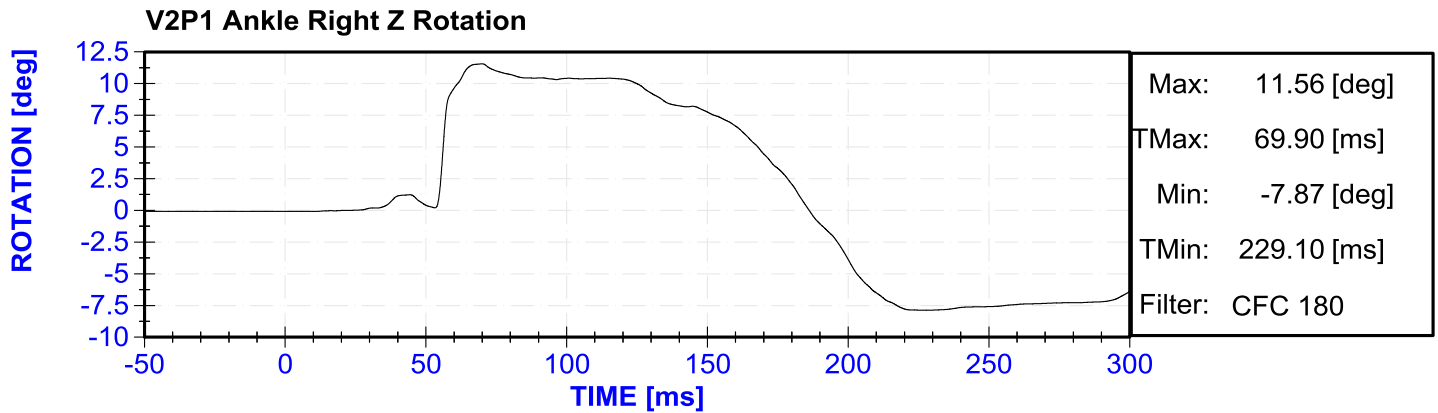


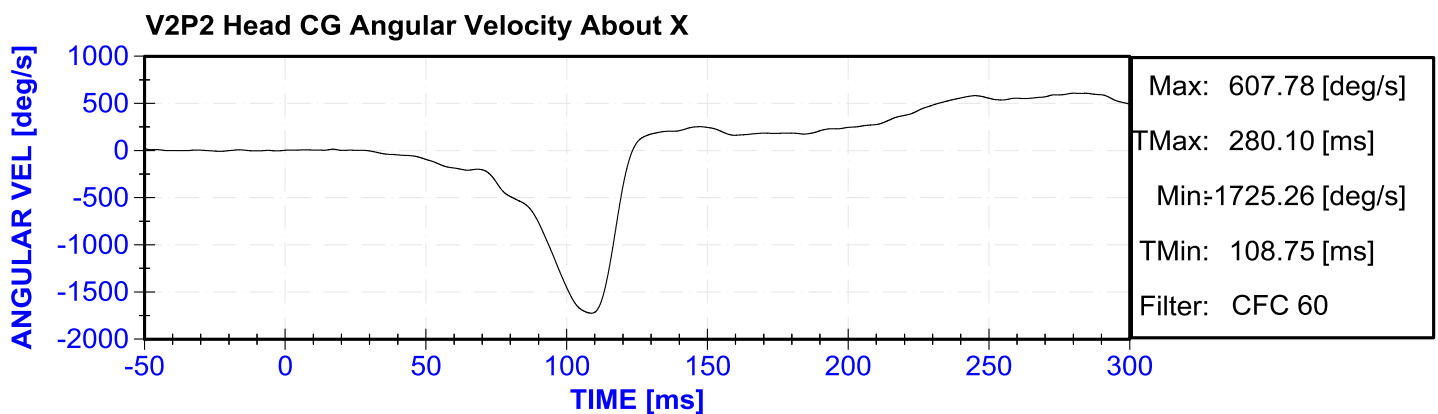
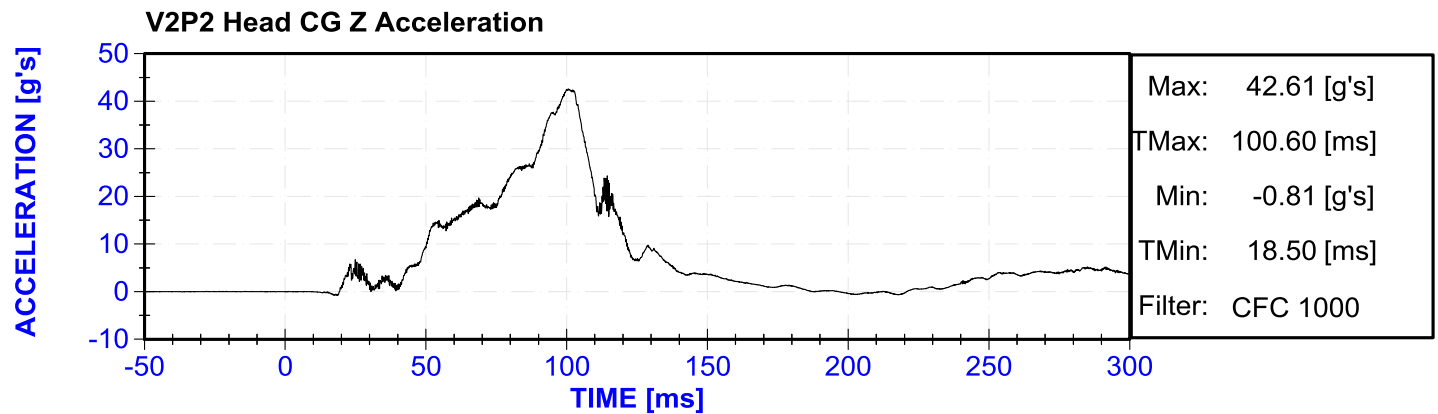
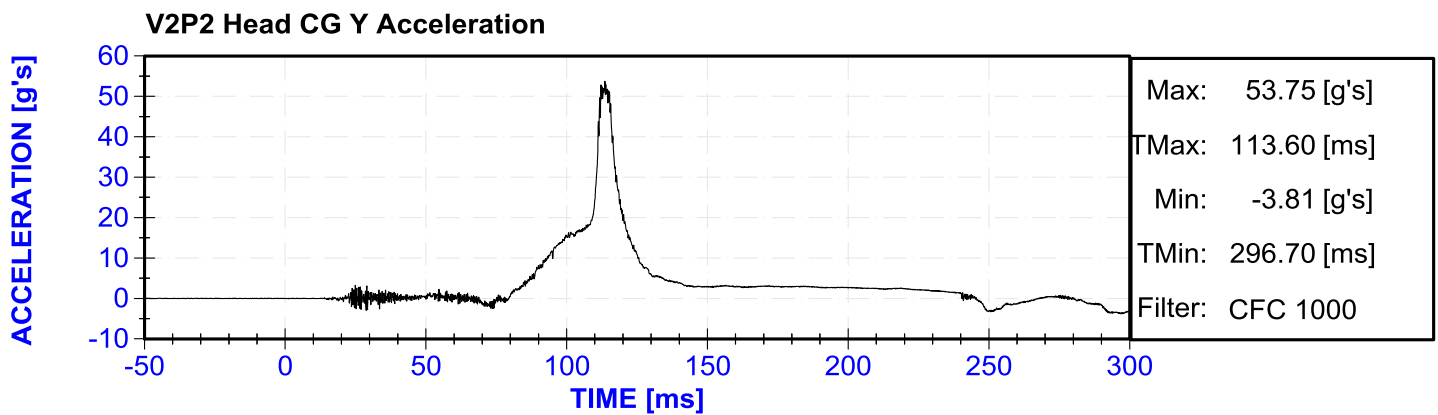
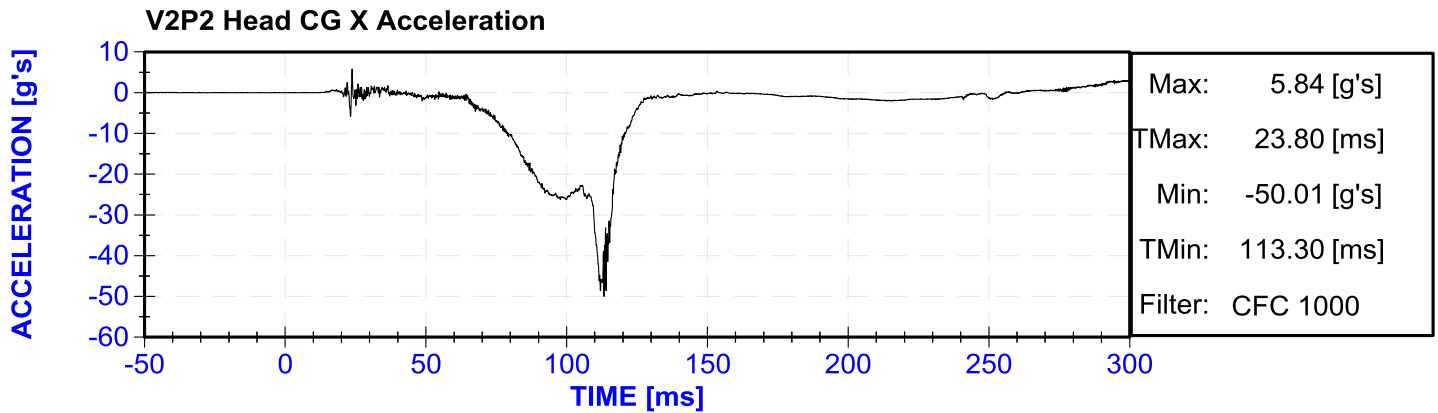


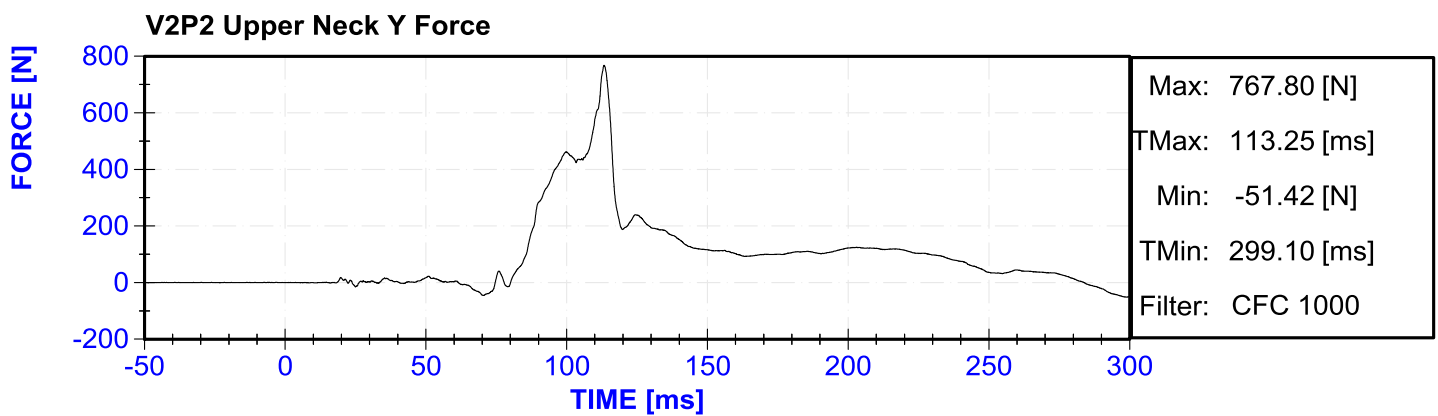
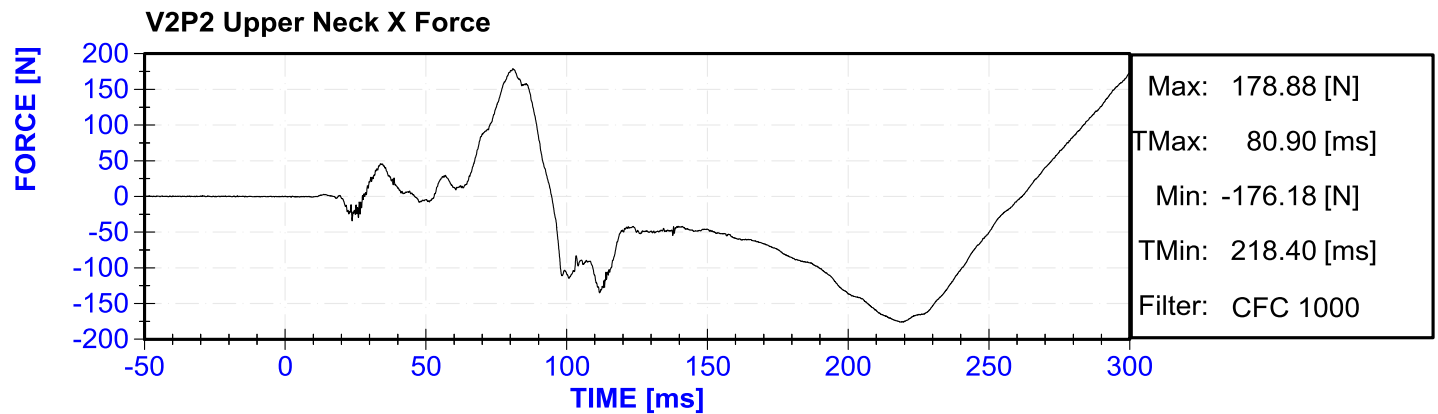
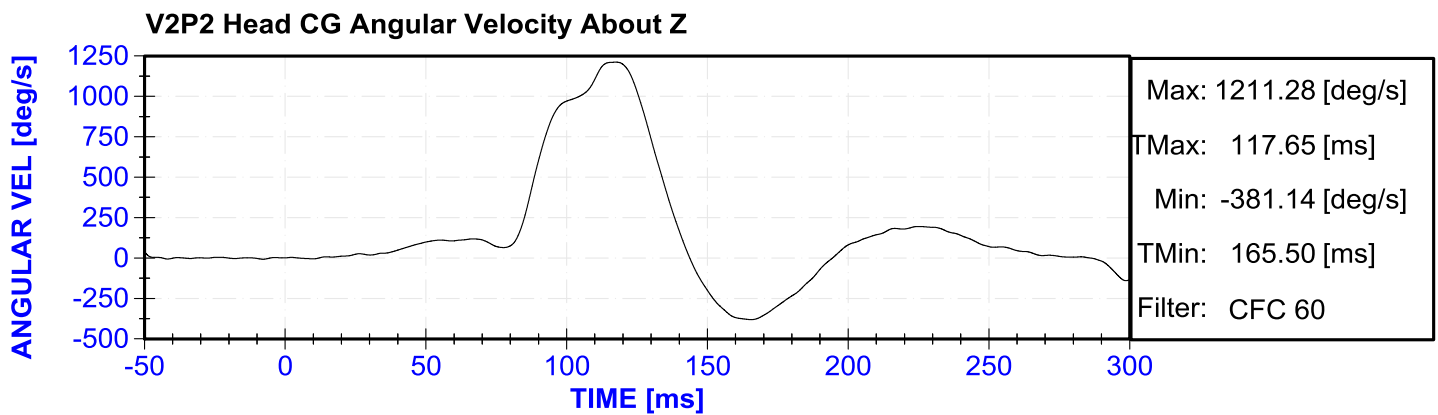
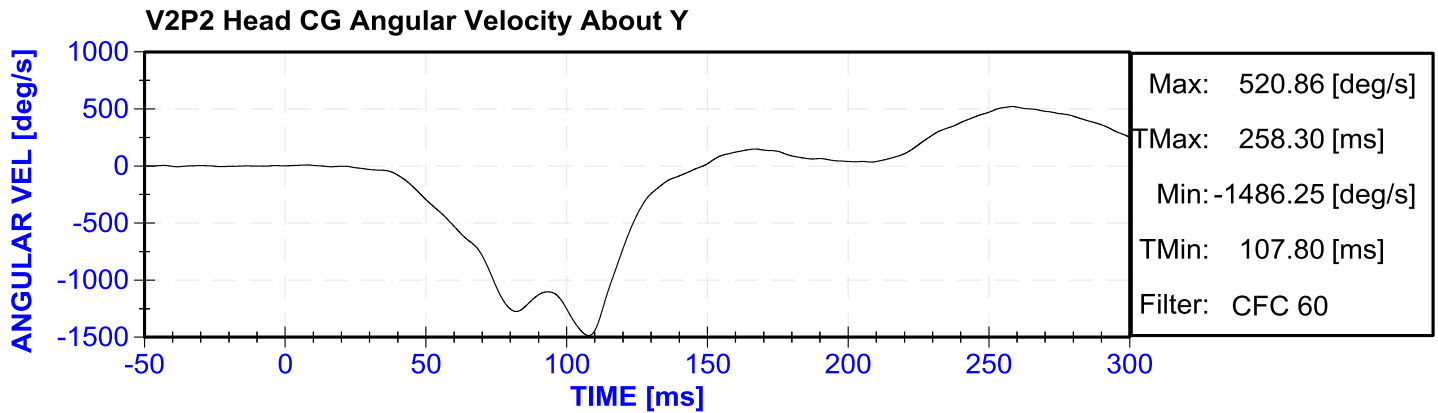


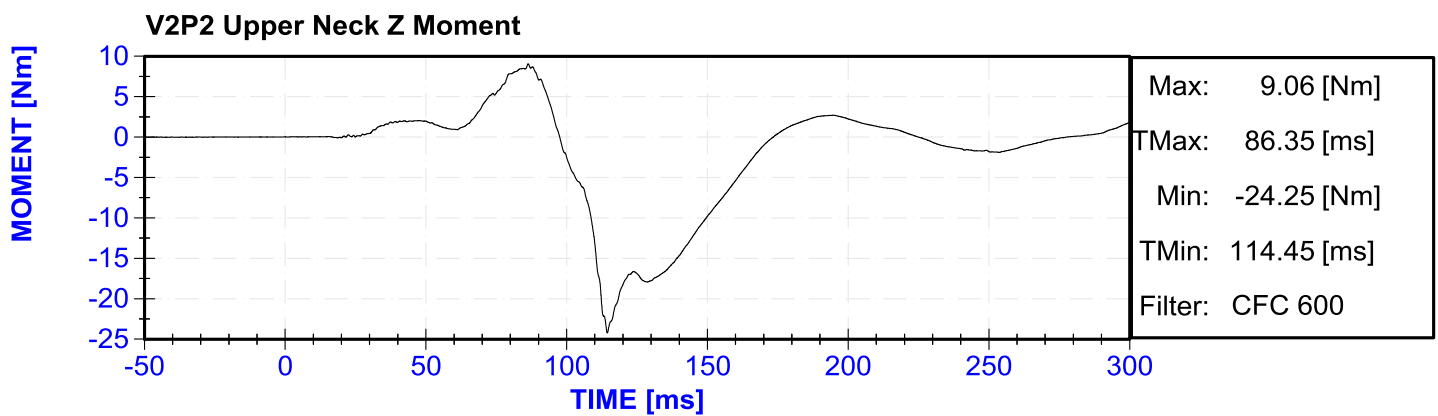
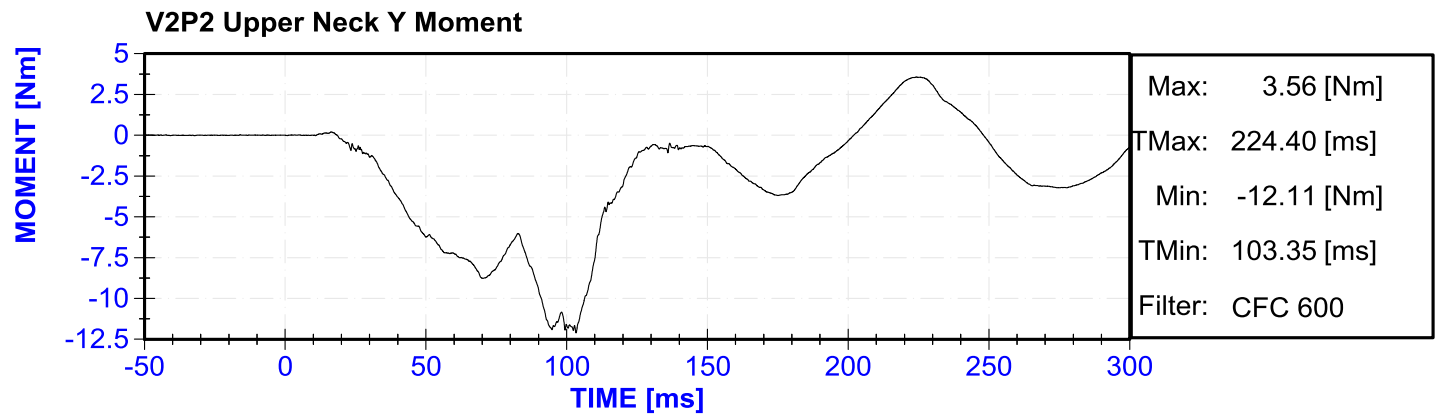
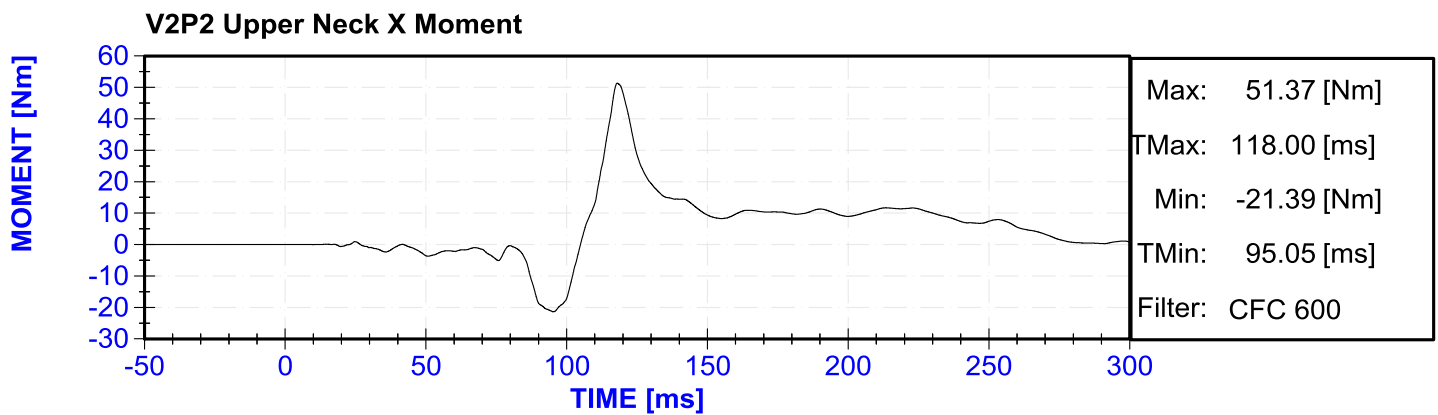
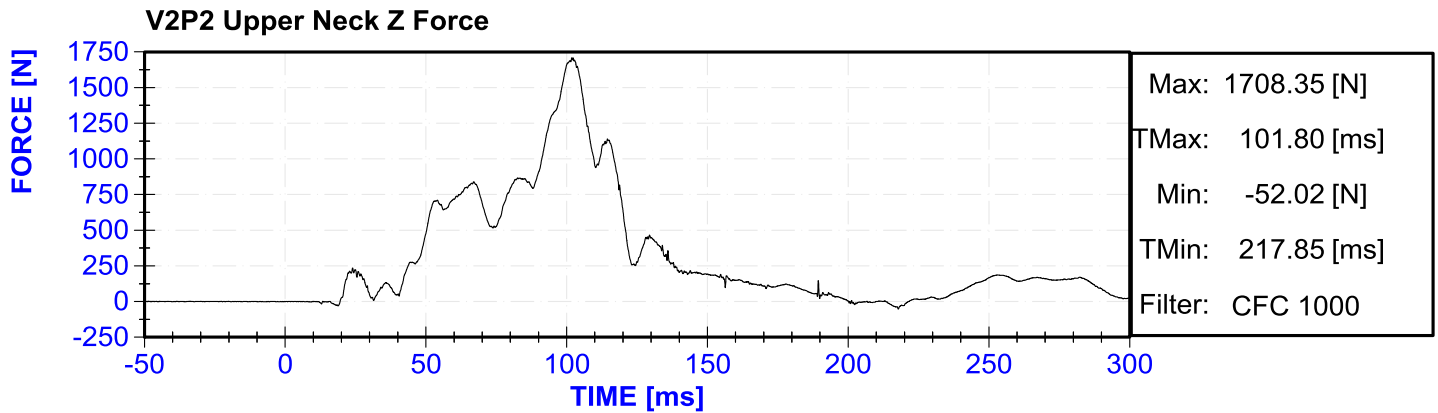


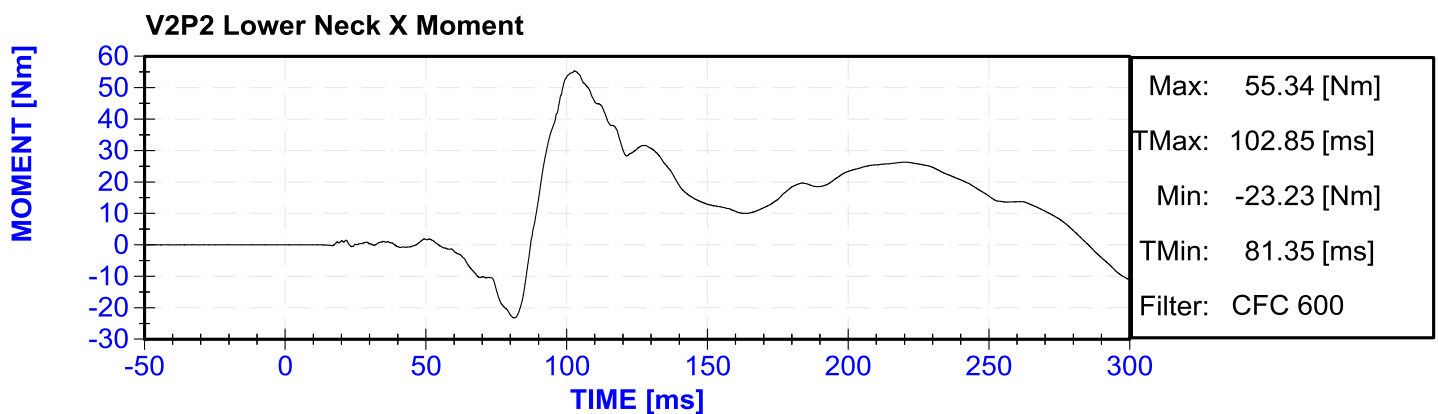
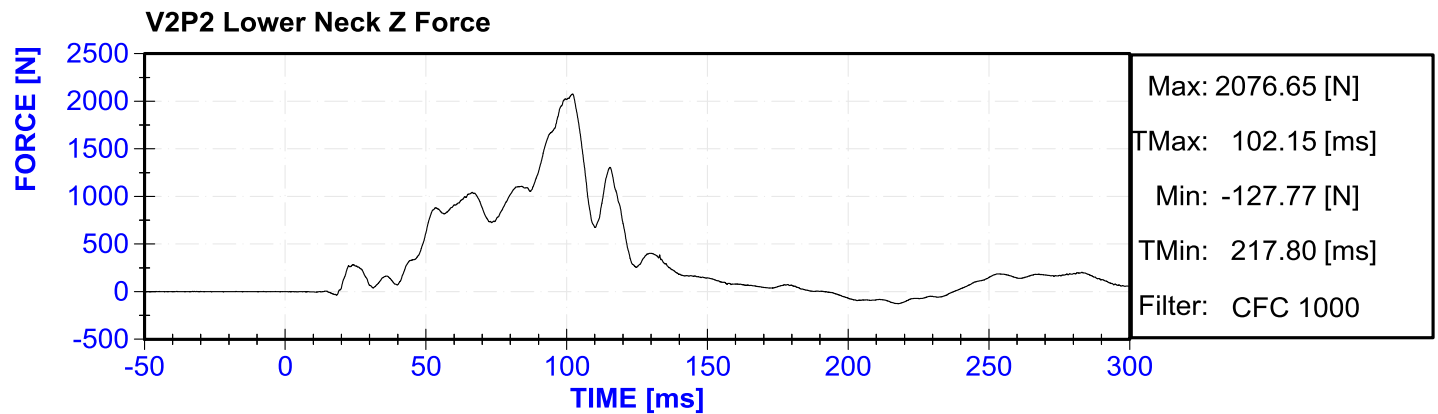
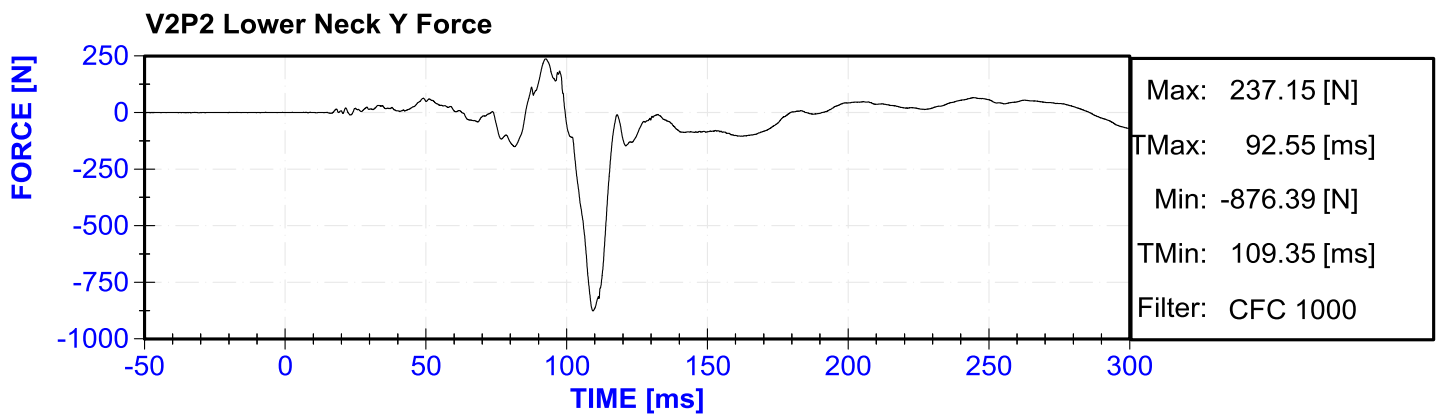
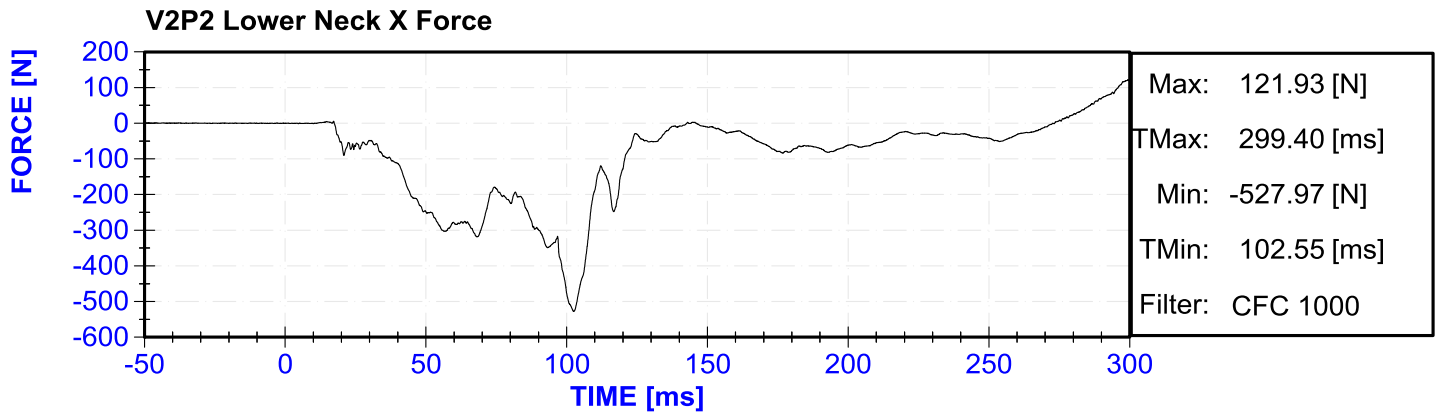


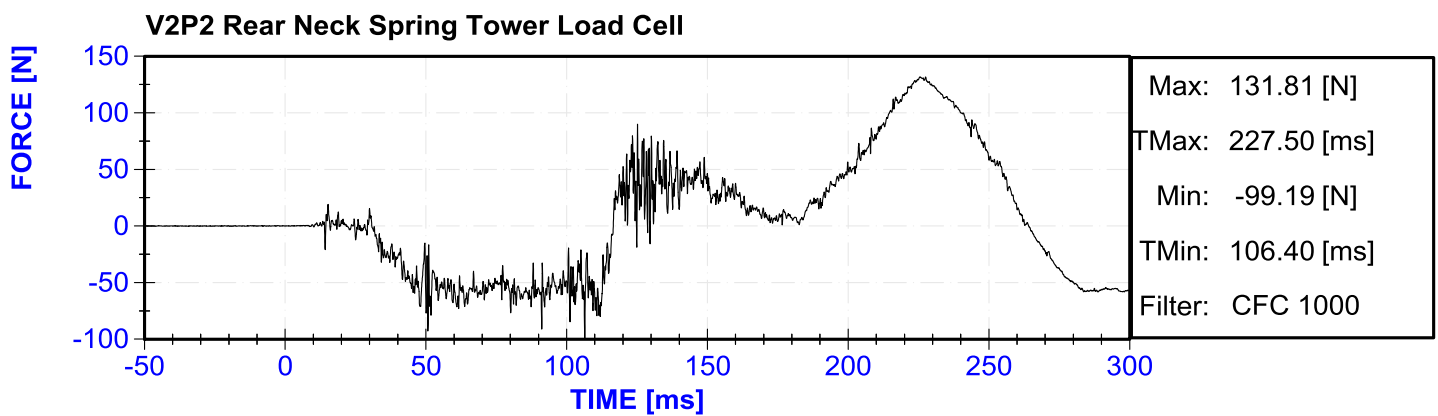
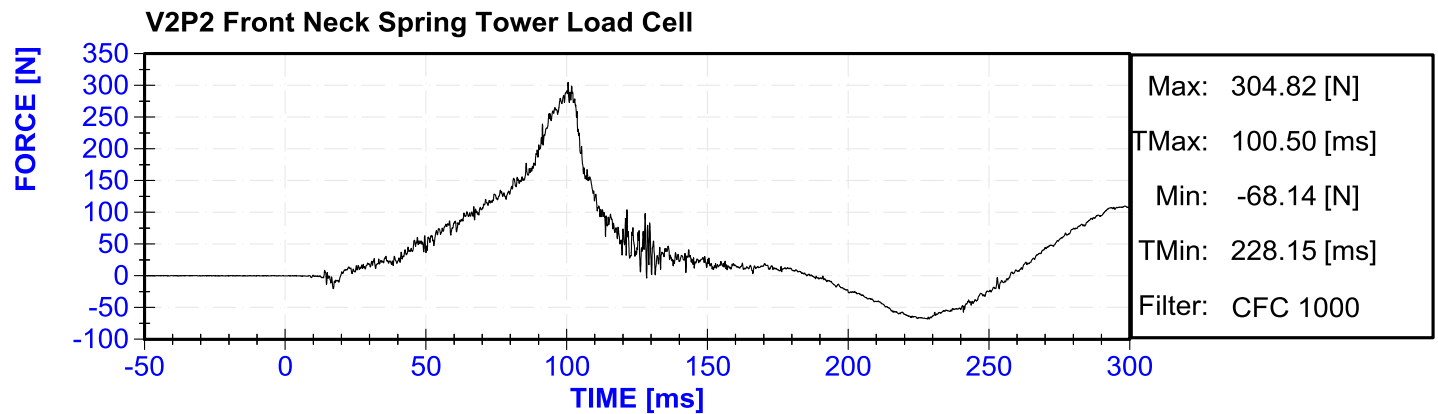
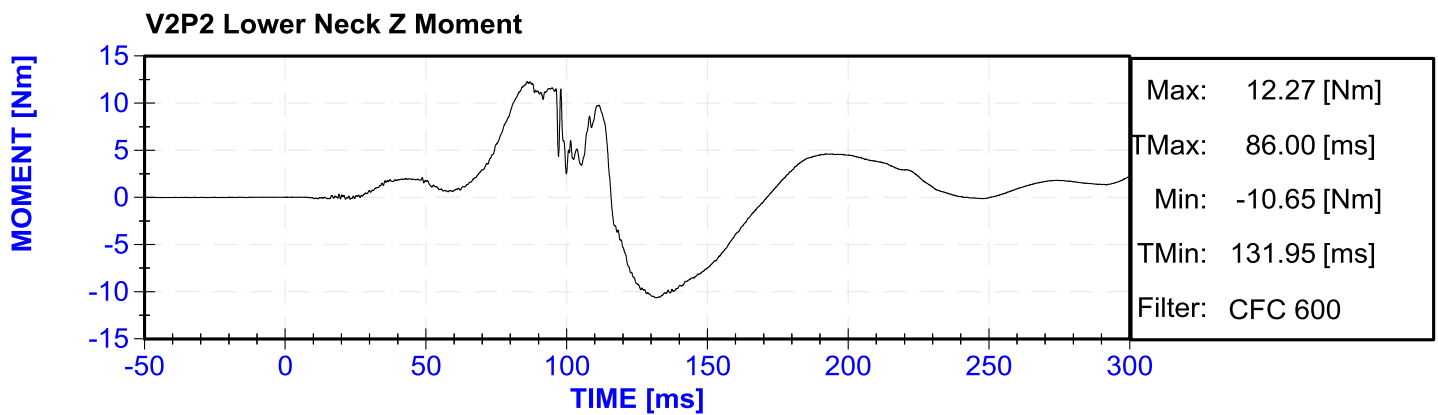
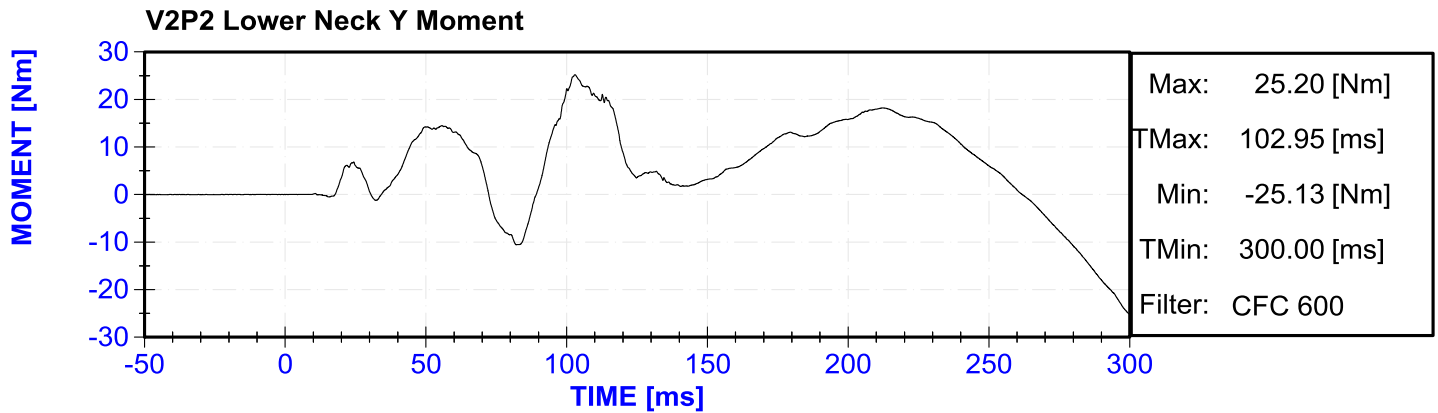




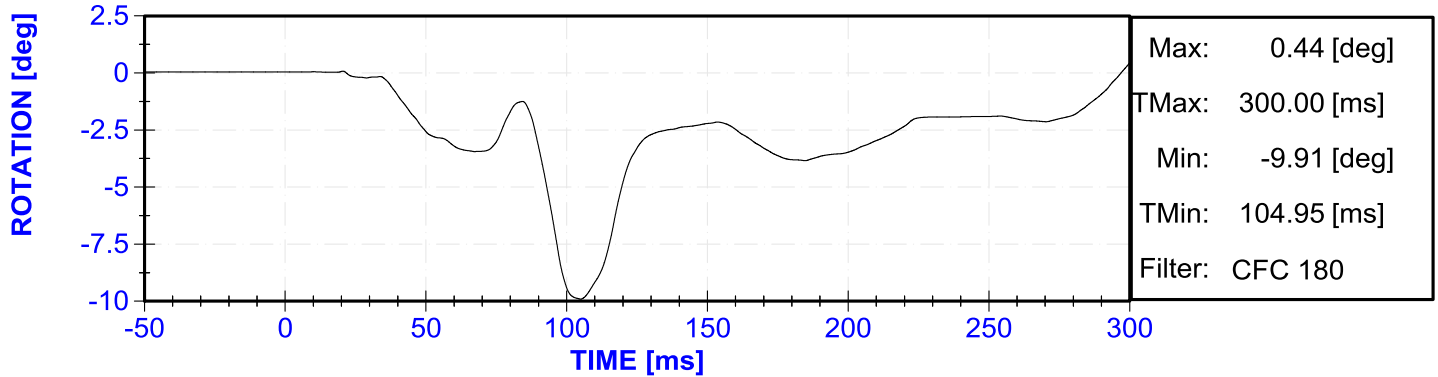




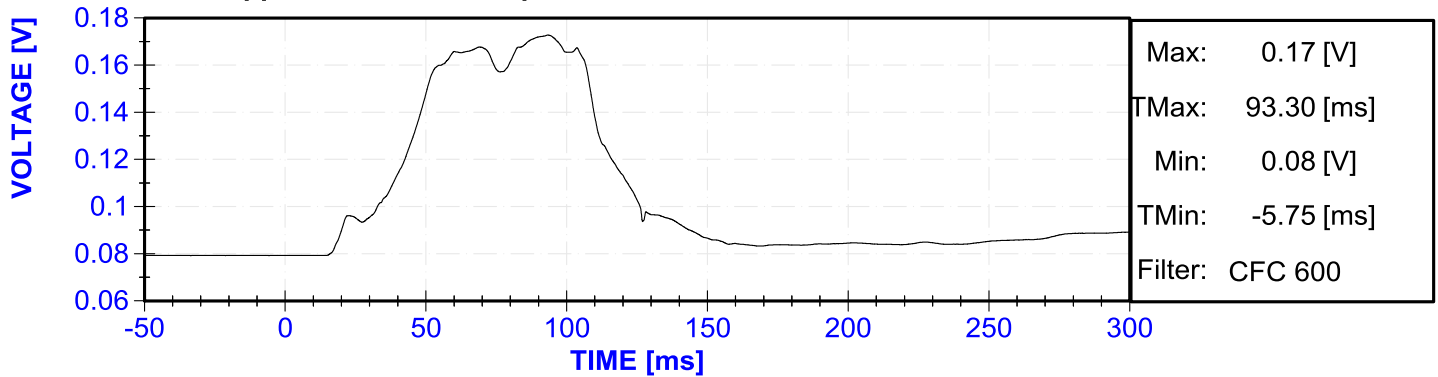




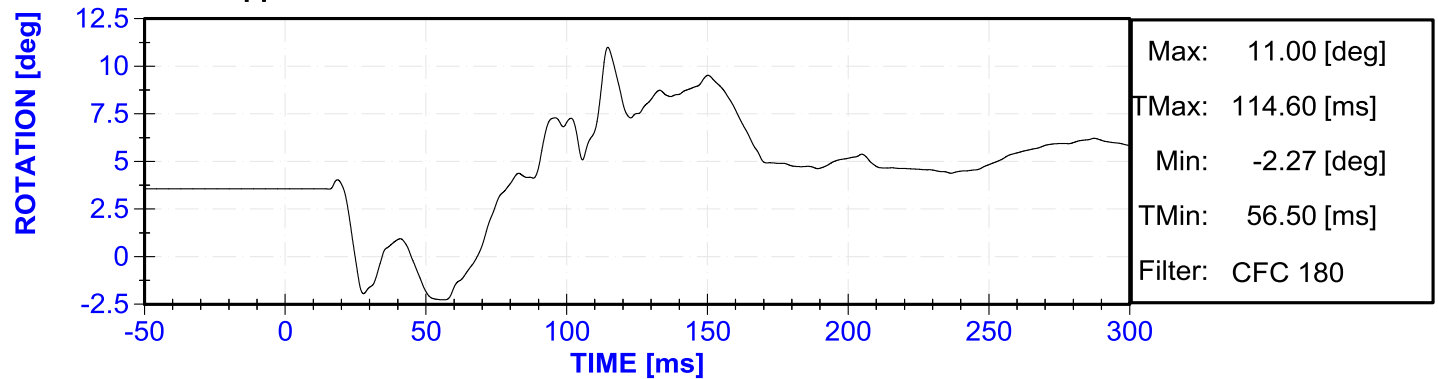
V2P2 Occipital Condyle Rotation Potentiometer



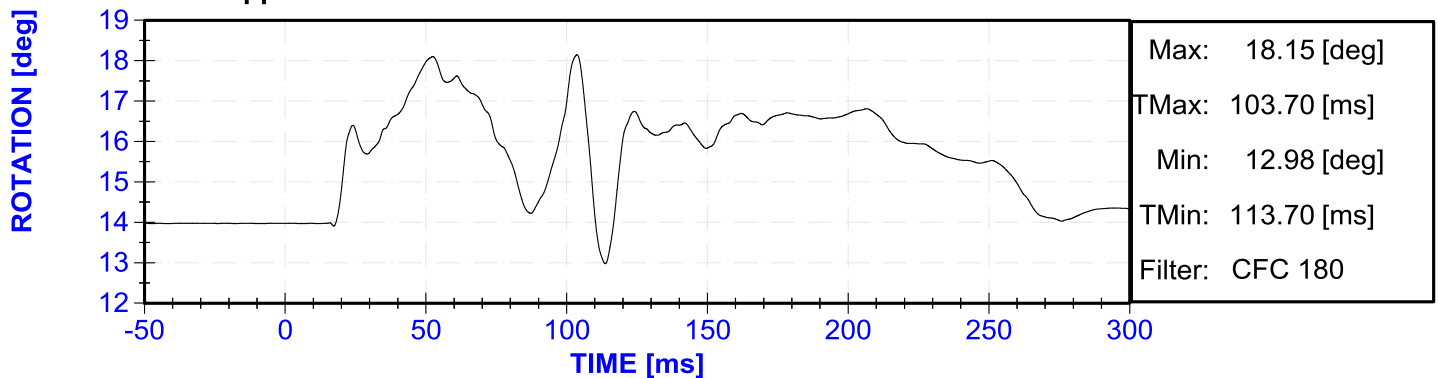
V2P2 Upper Left DGIR X Displacement



V2P2 Upper Left DGIR Y Rotation

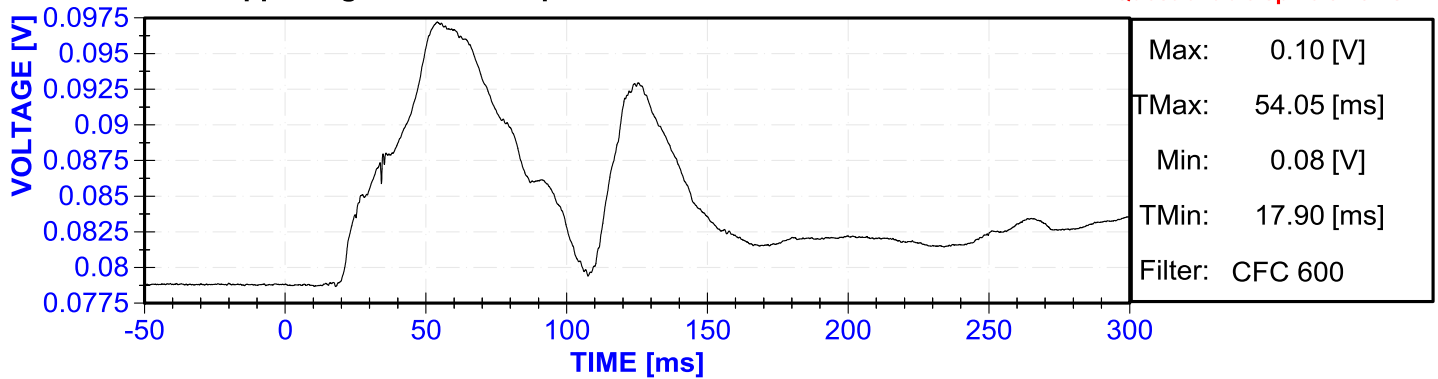


V2P2 Upper Left DGIR Z Rotation

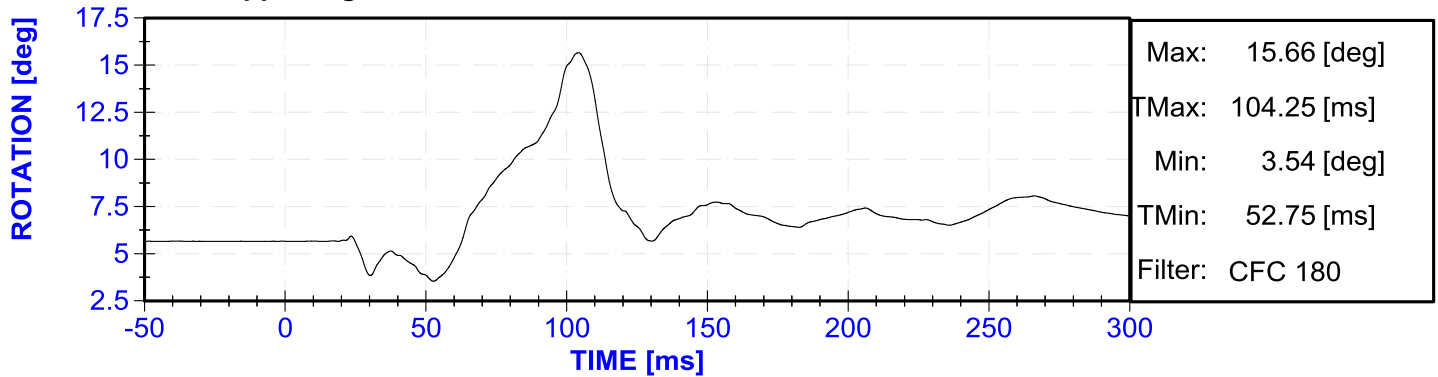


V2P2 Upper Right DGIR X Displacement

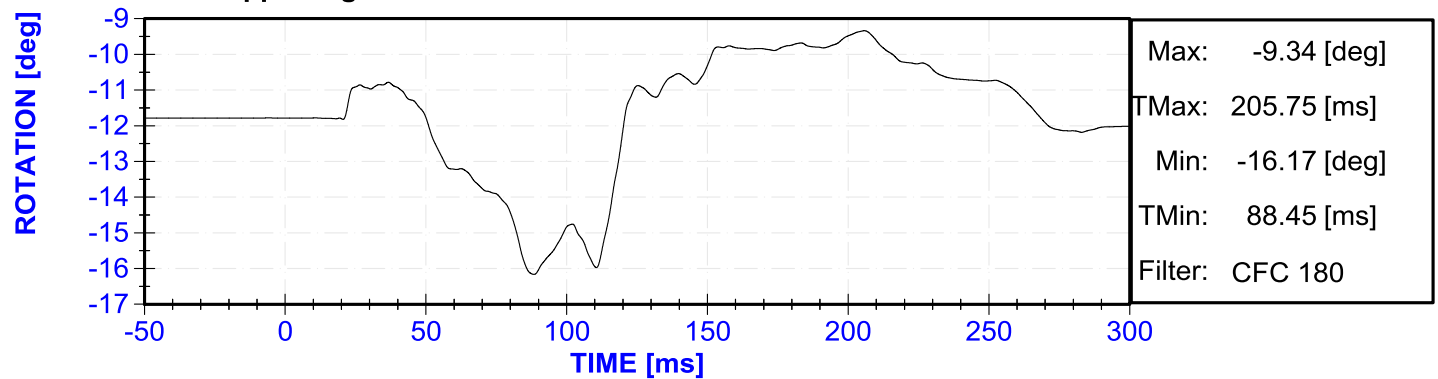
Questionable spike 34.3ms



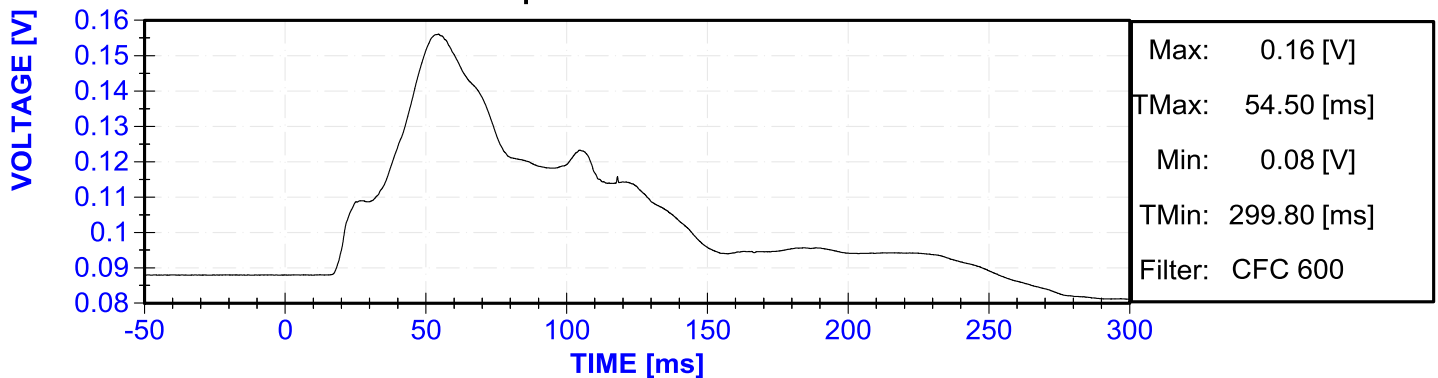
V2P2 Upper Right DGIR Y Rotation

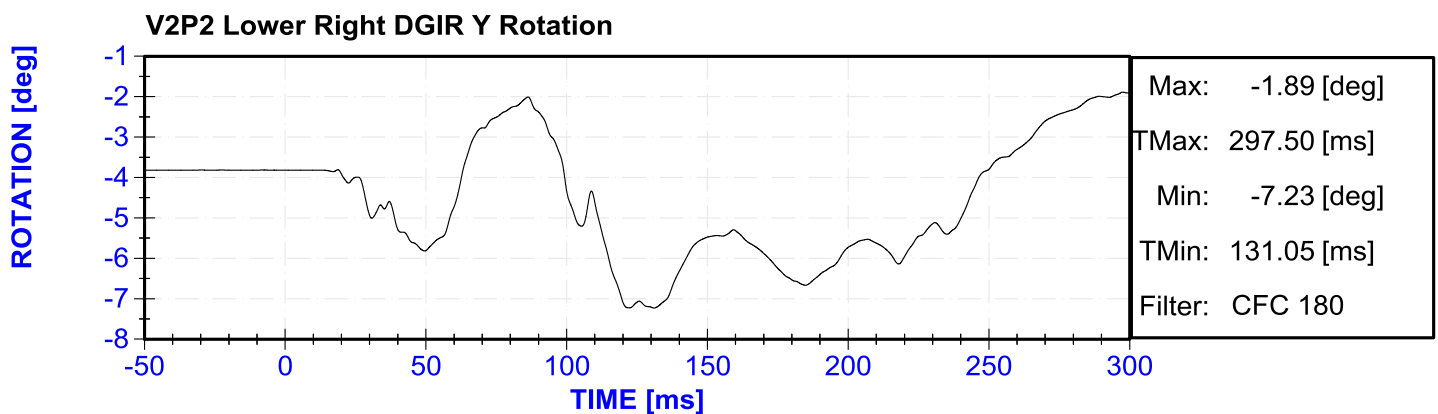
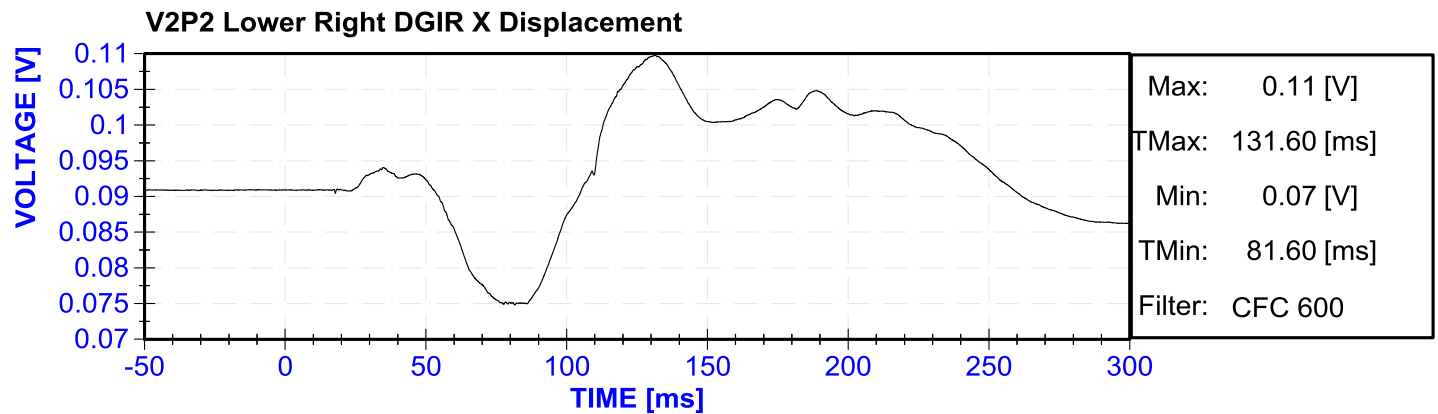
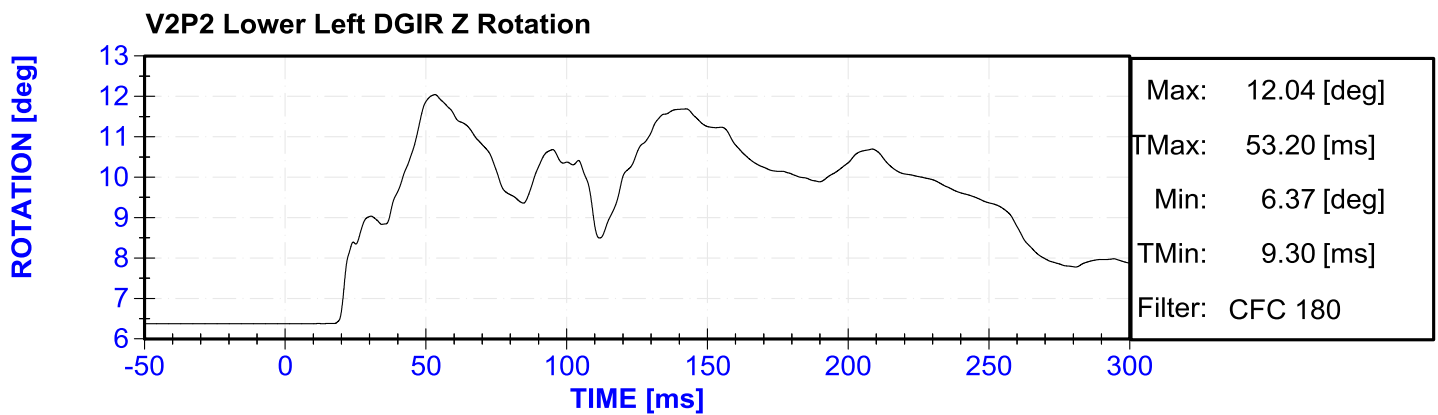
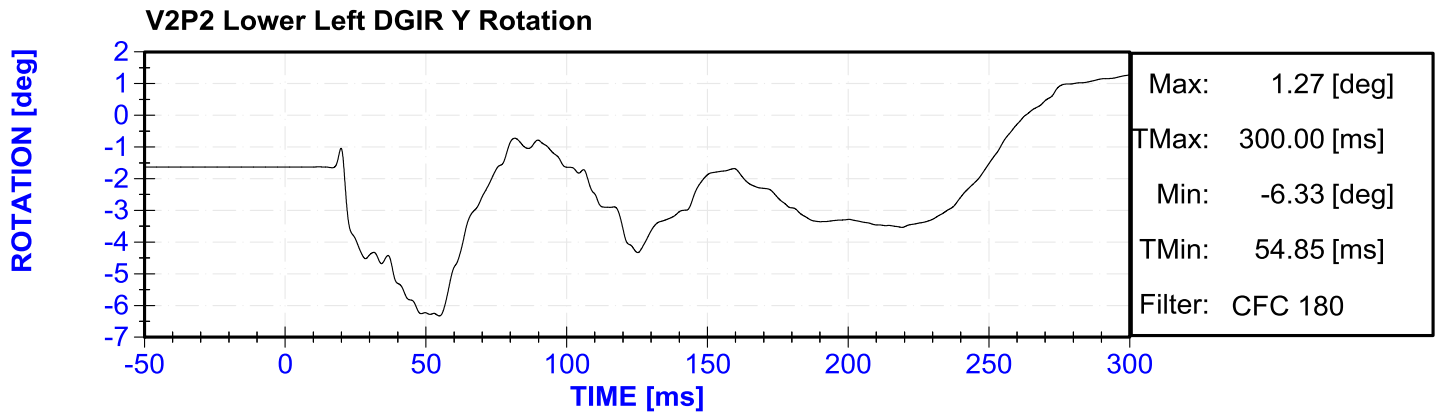


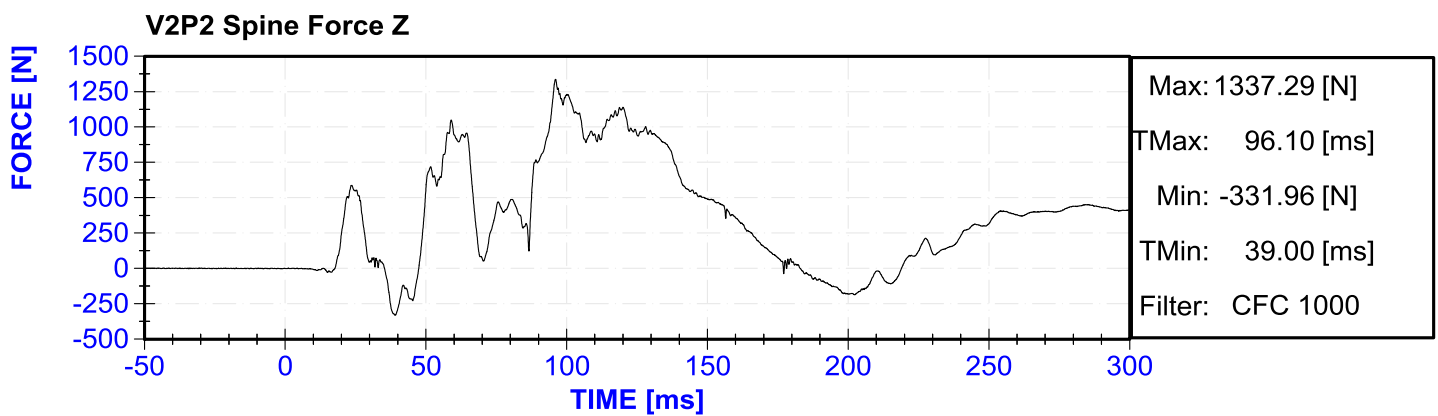
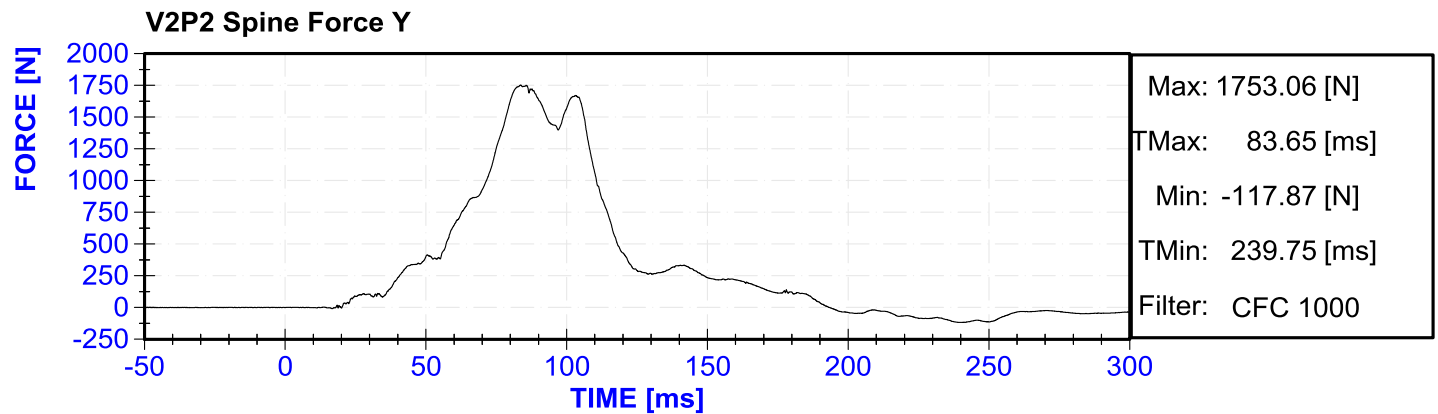
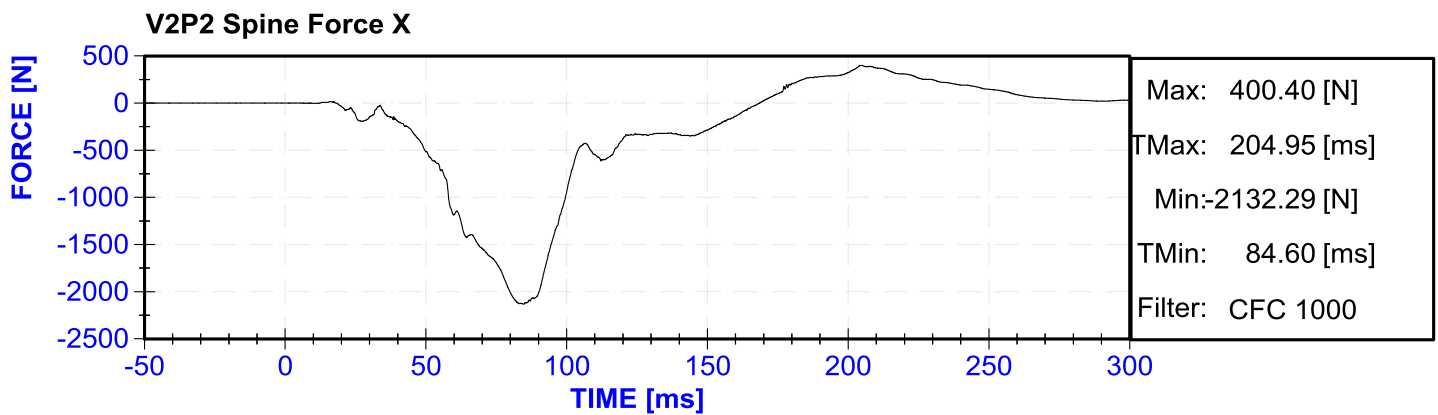
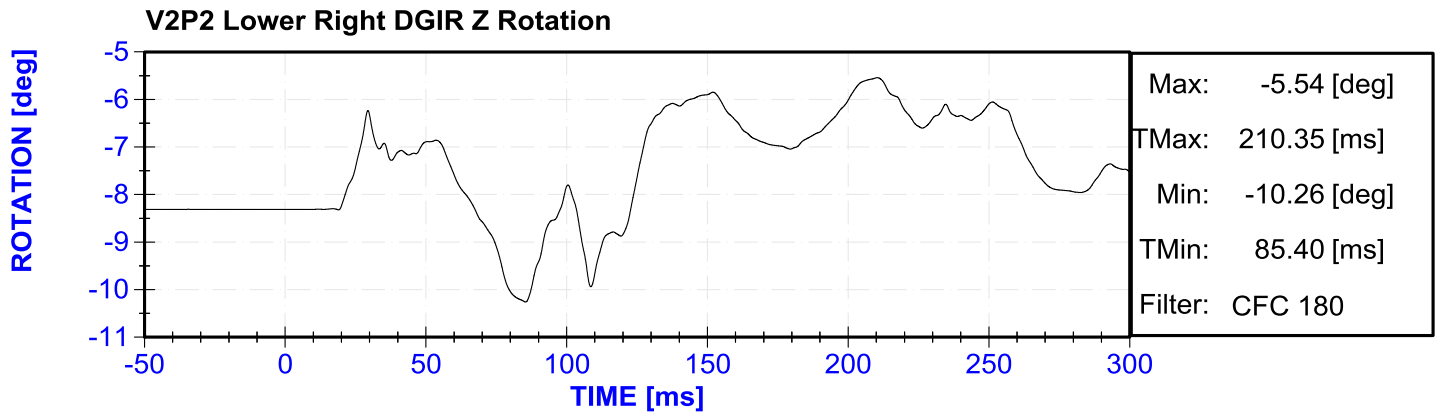
V2P2 Upper Right DGIR Z Rotation

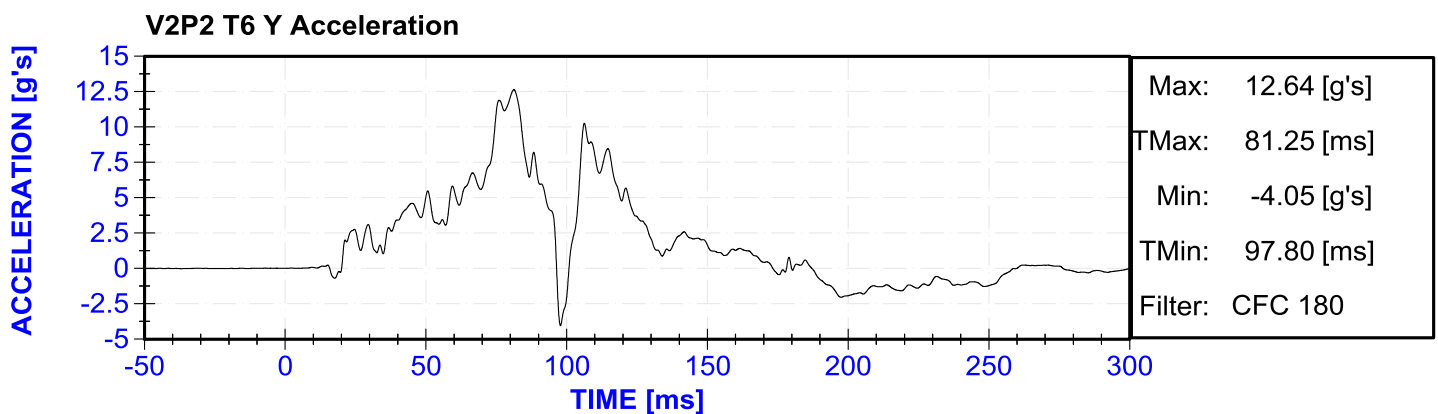
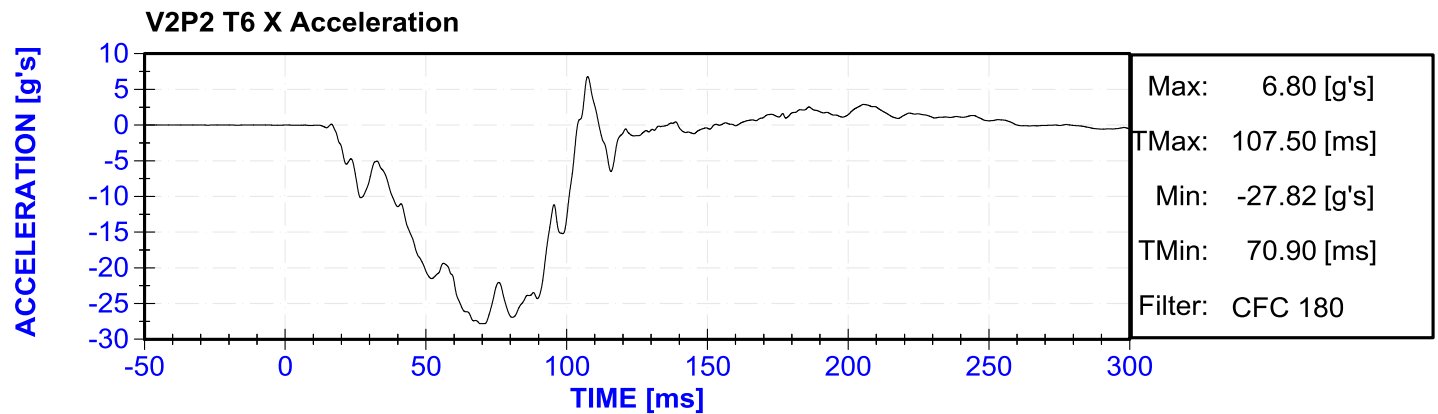
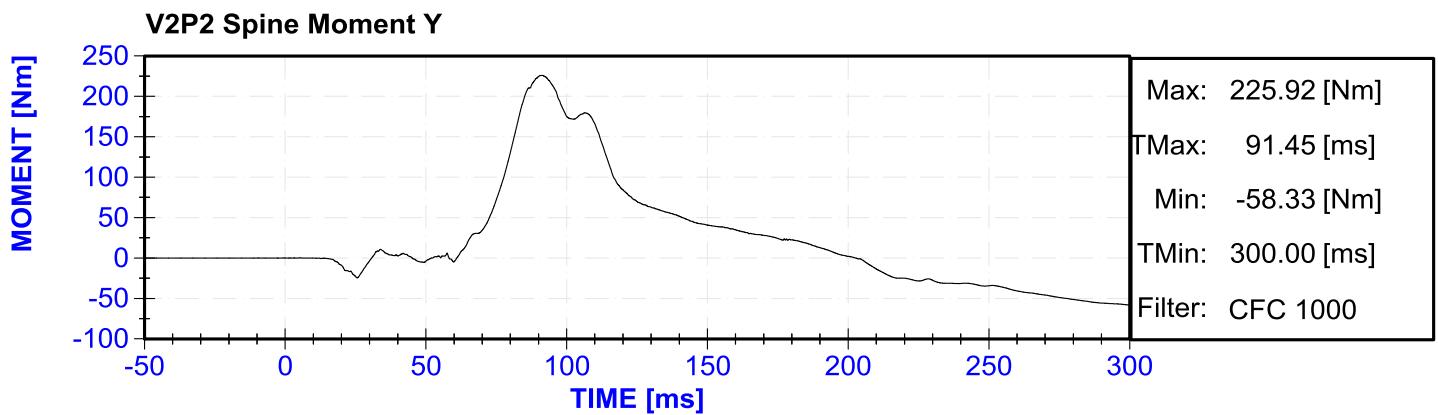
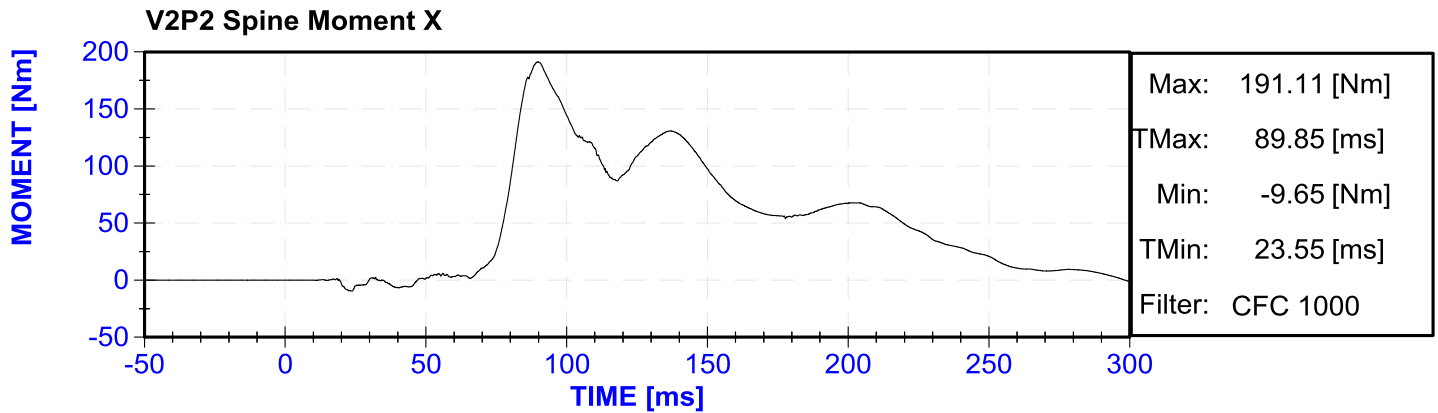


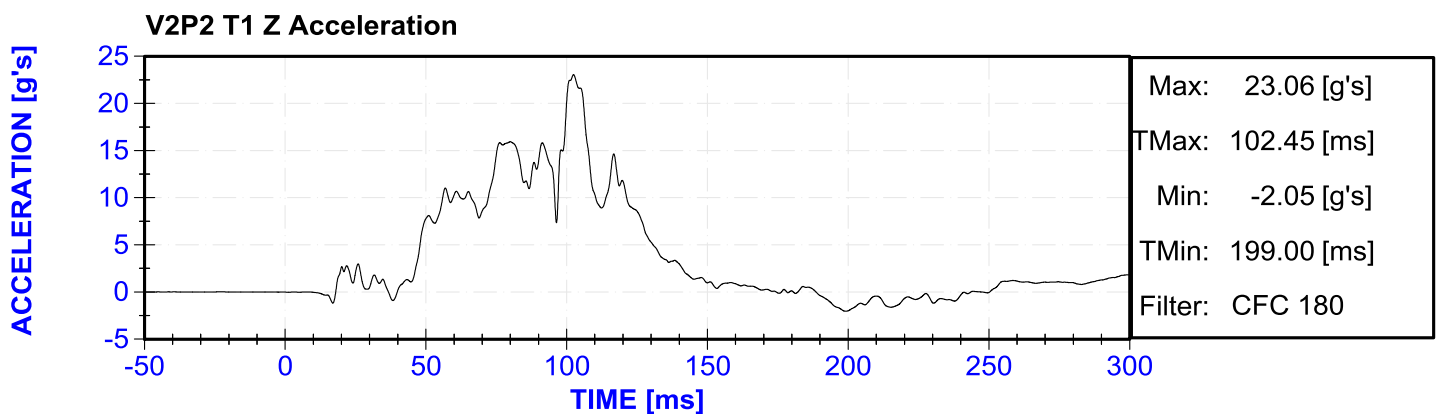
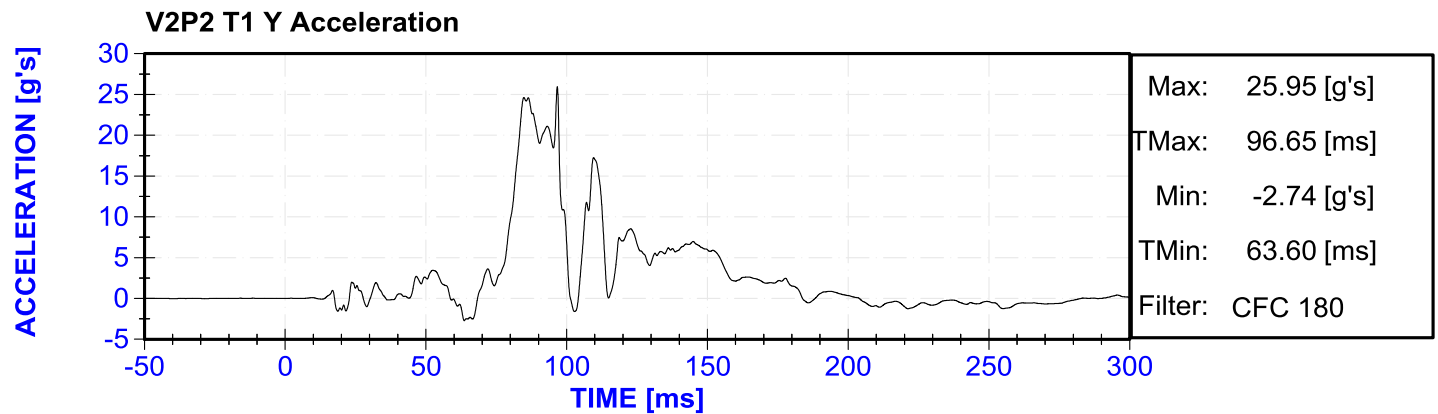
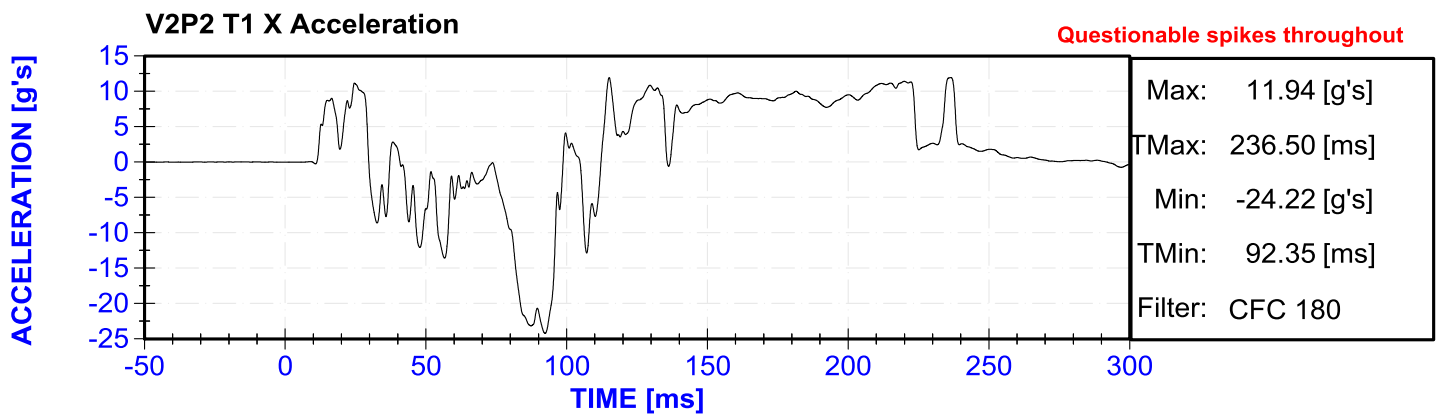
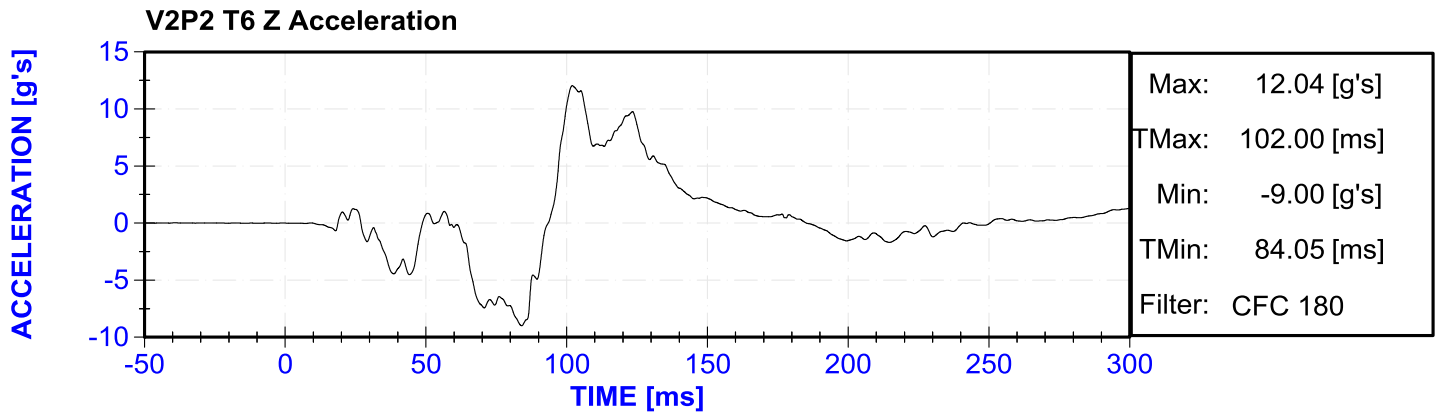
V2P2 Lower Left DGIR X Displacement

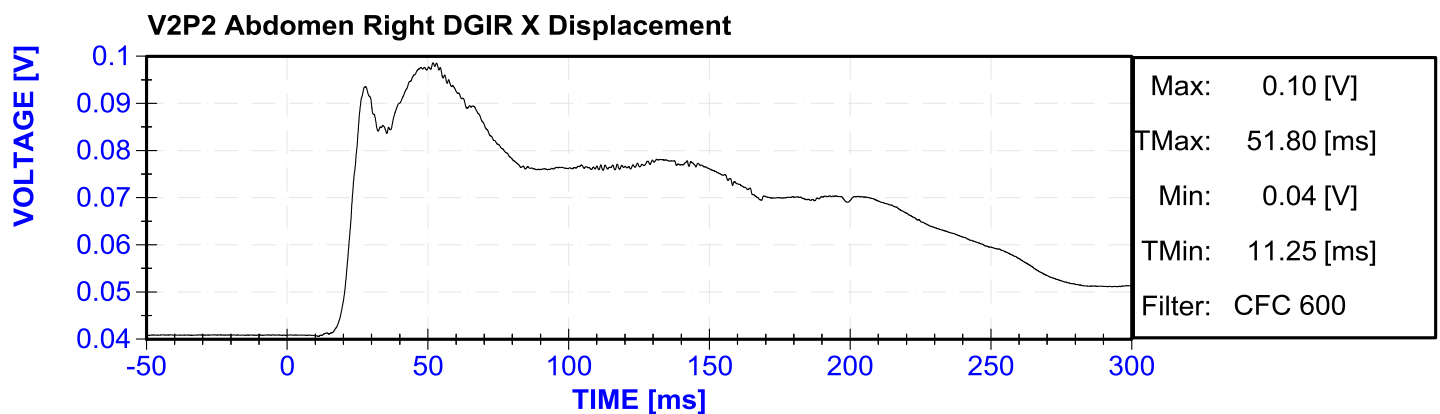
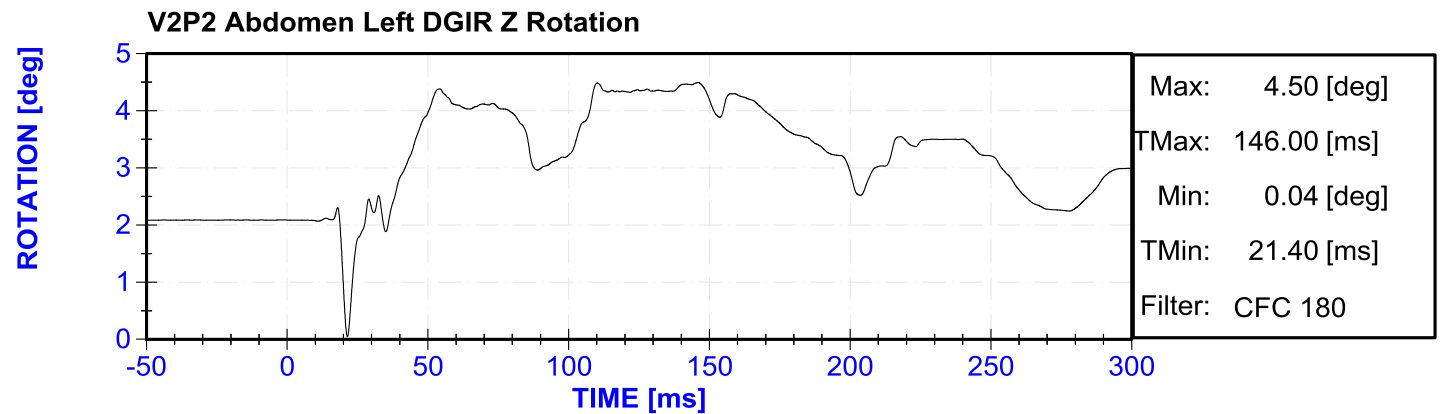
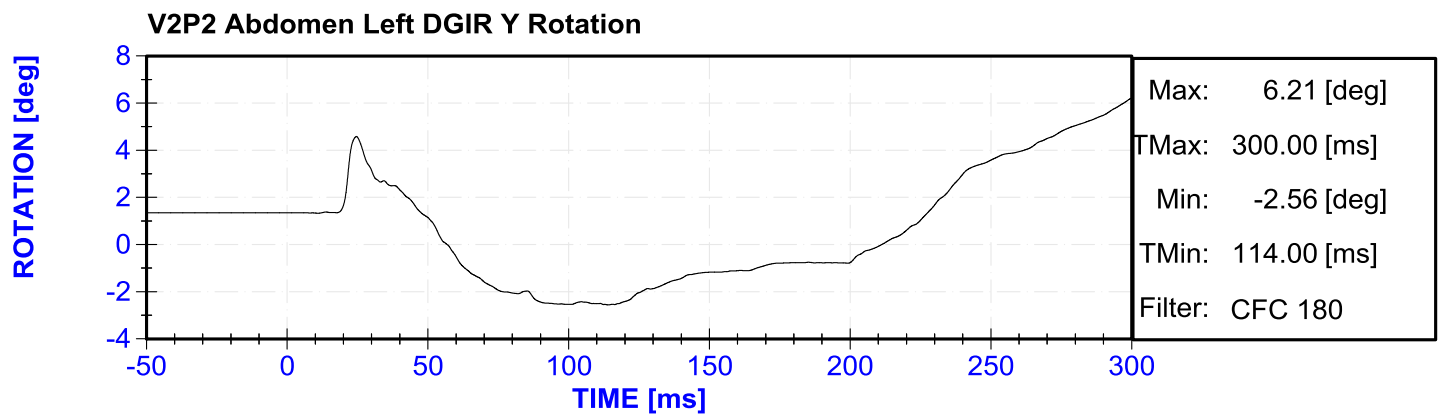
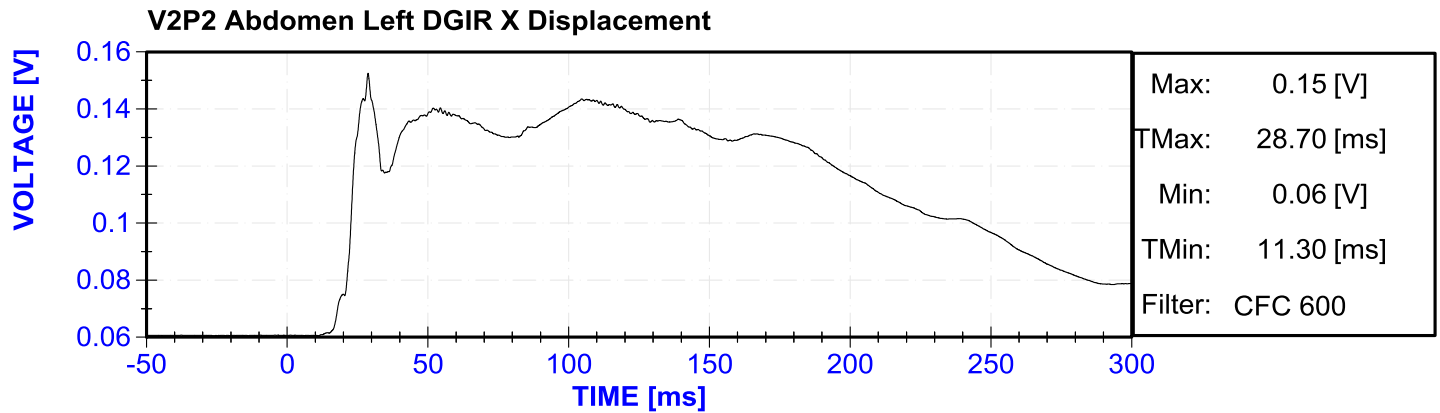


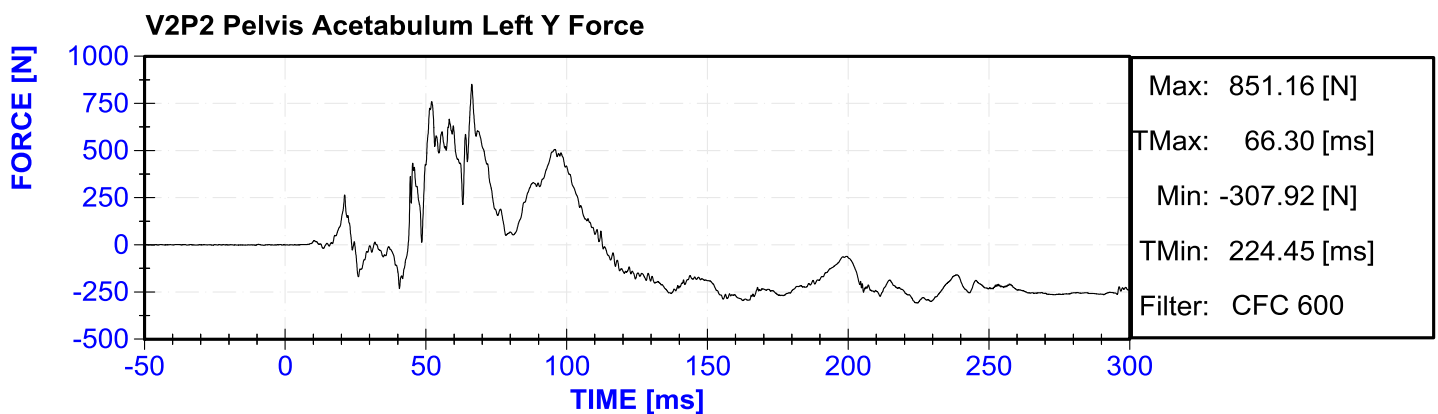
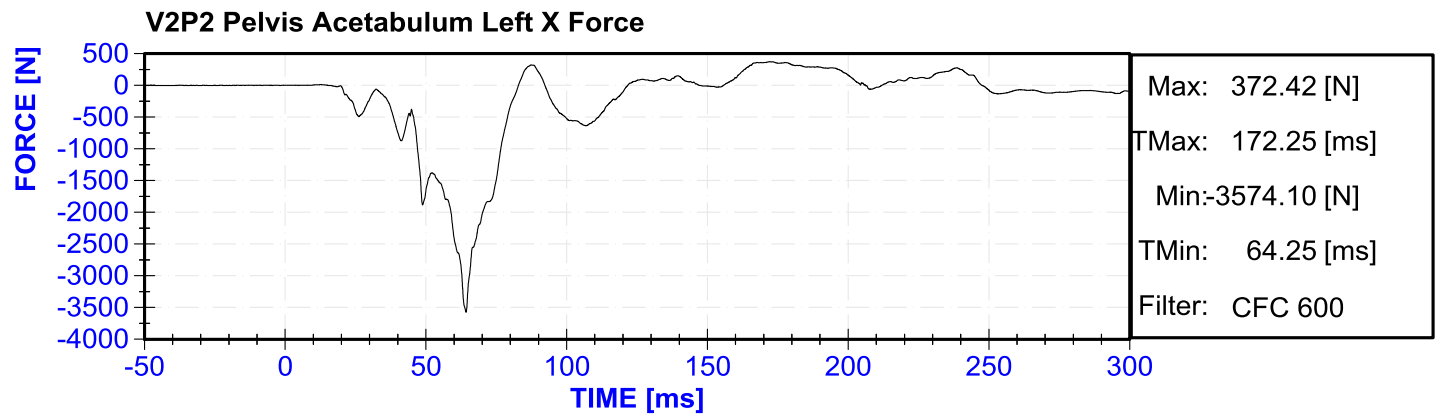
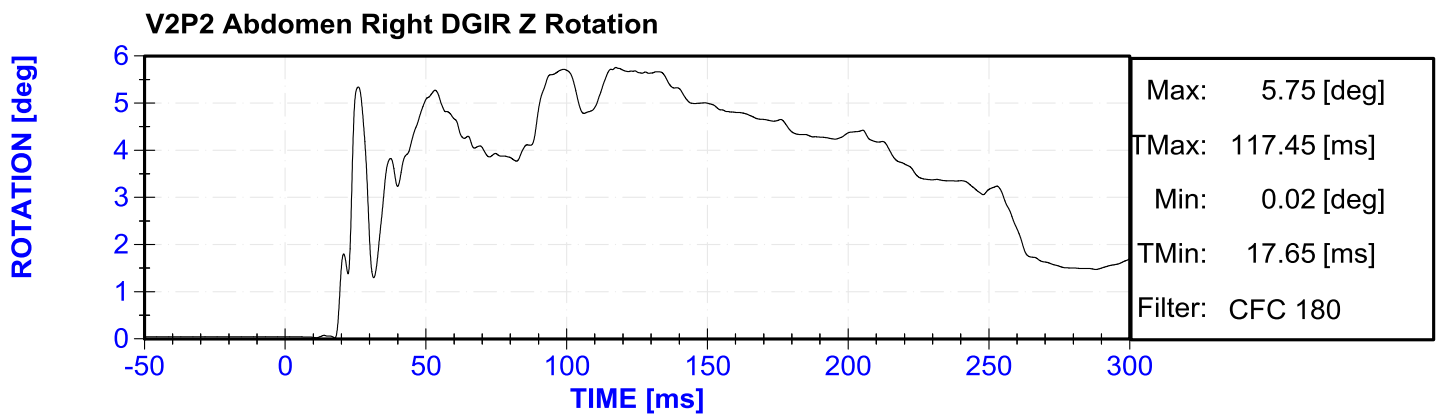
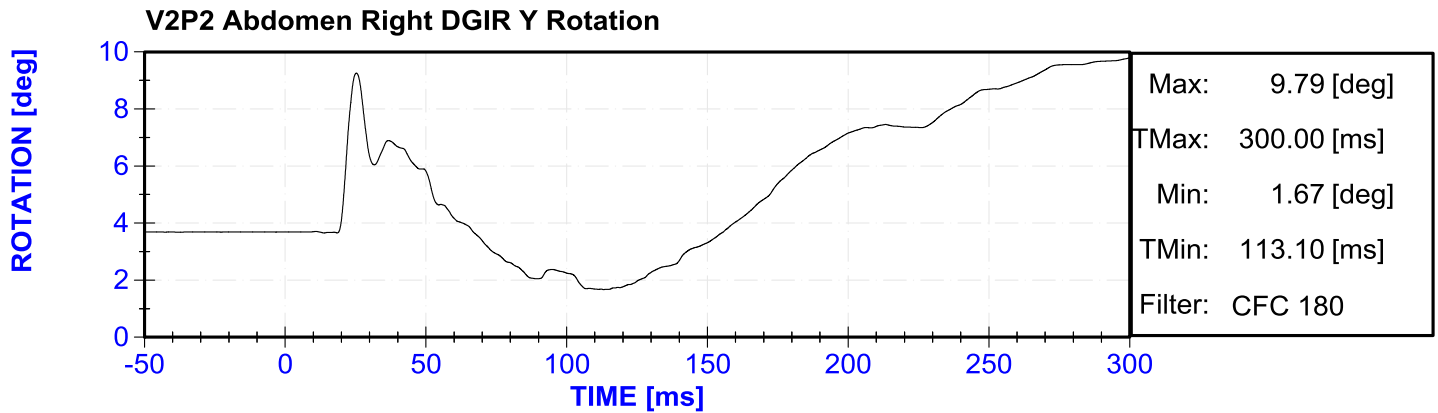


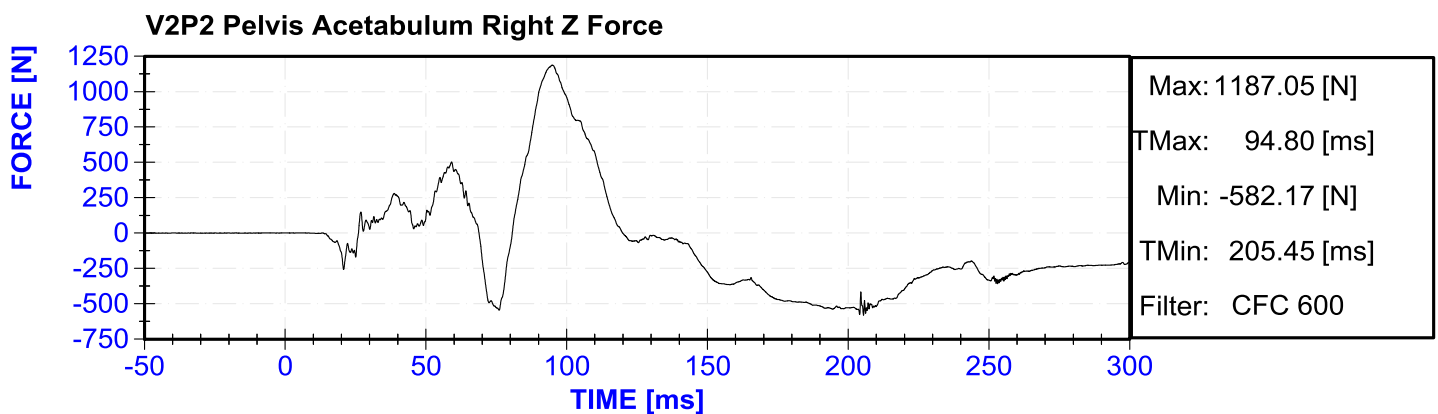
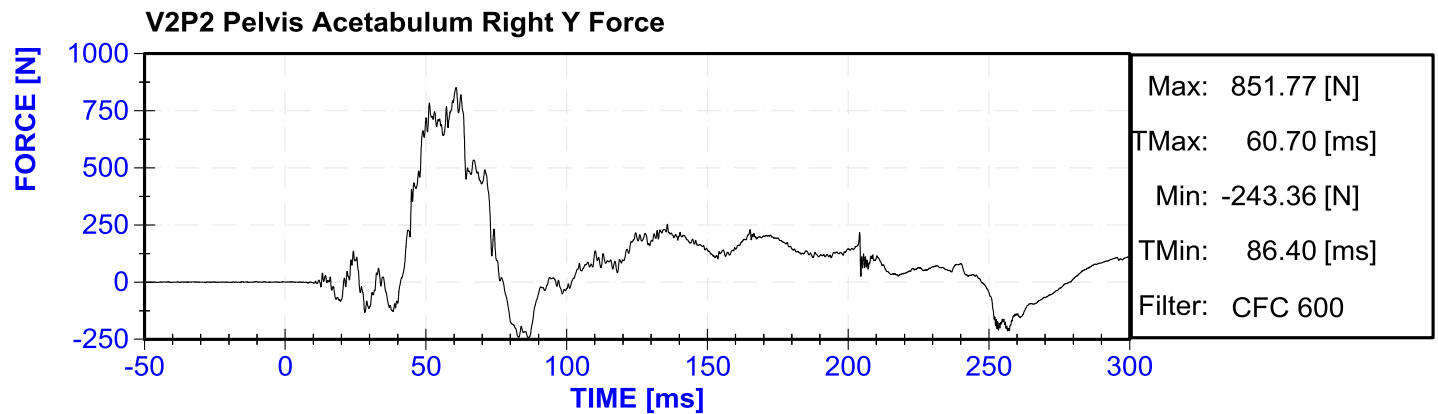
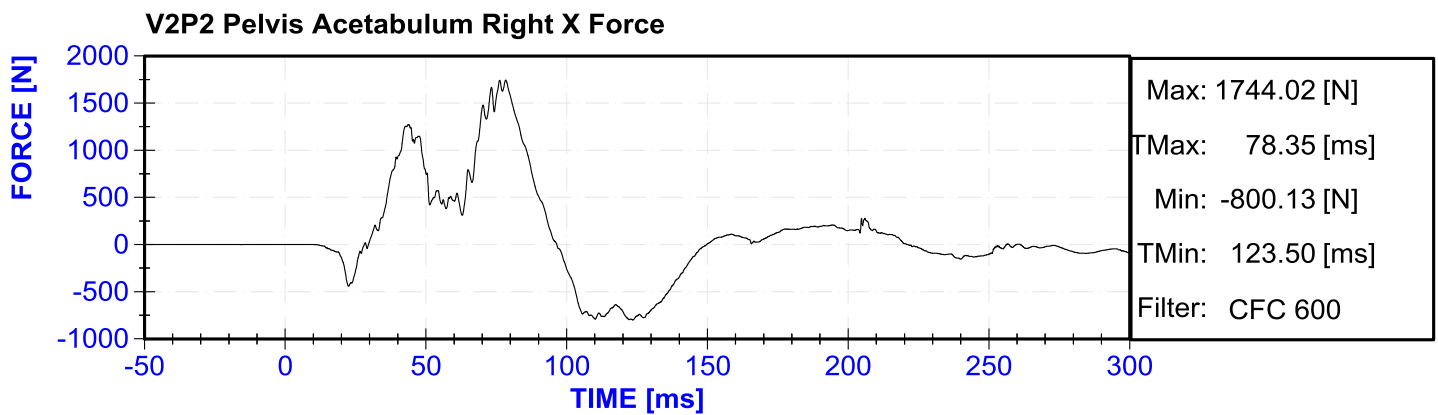
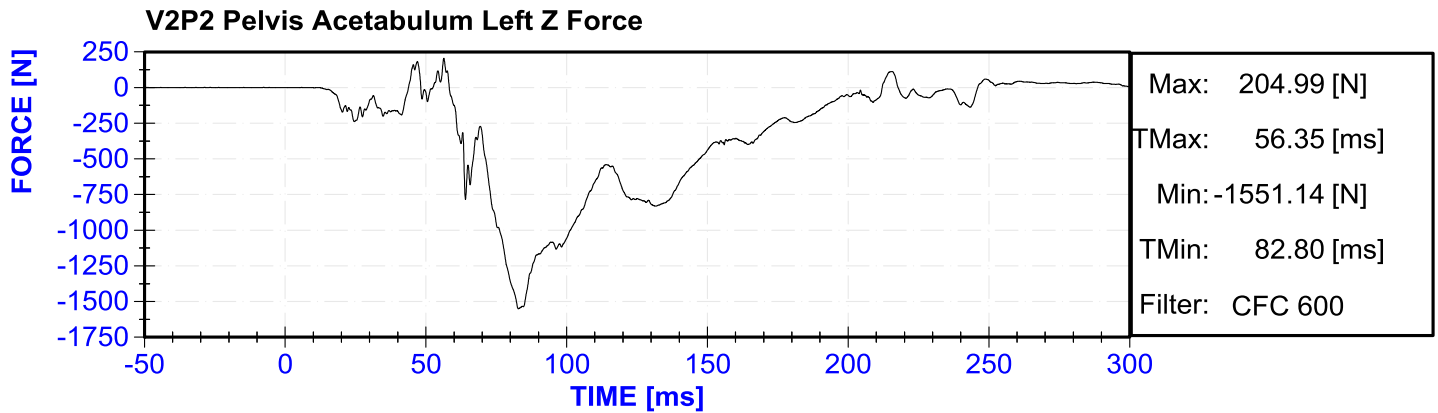


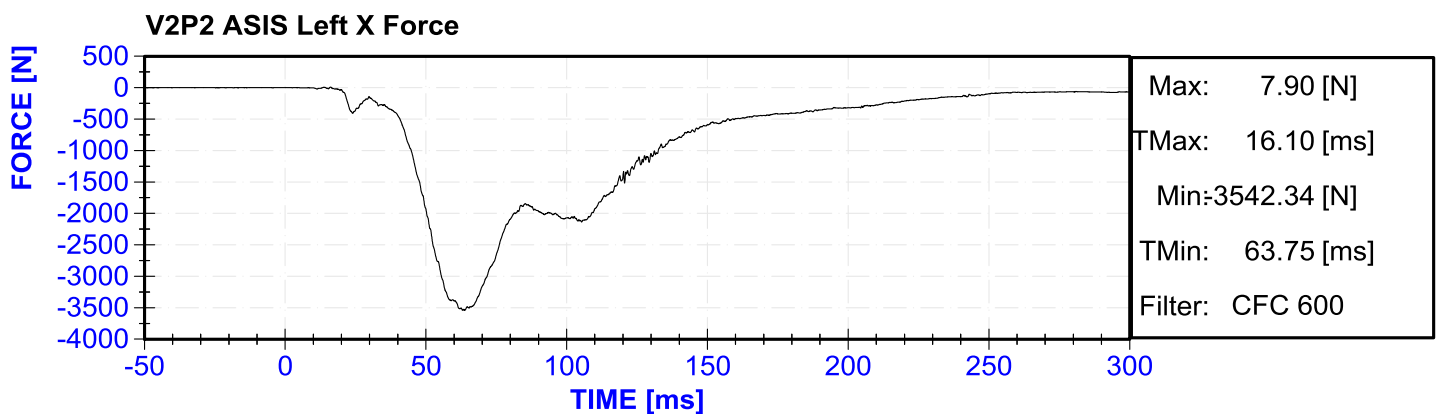
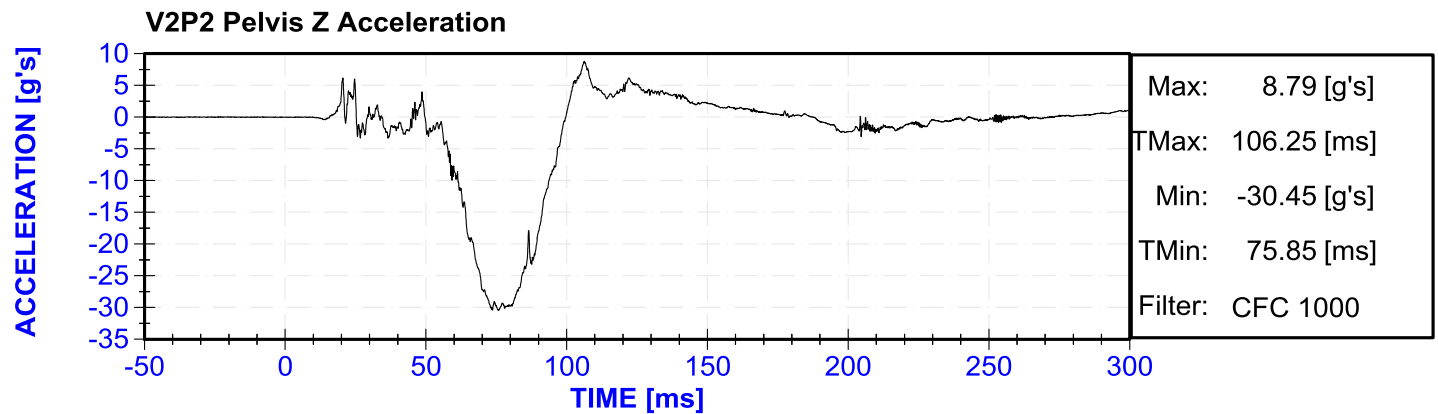
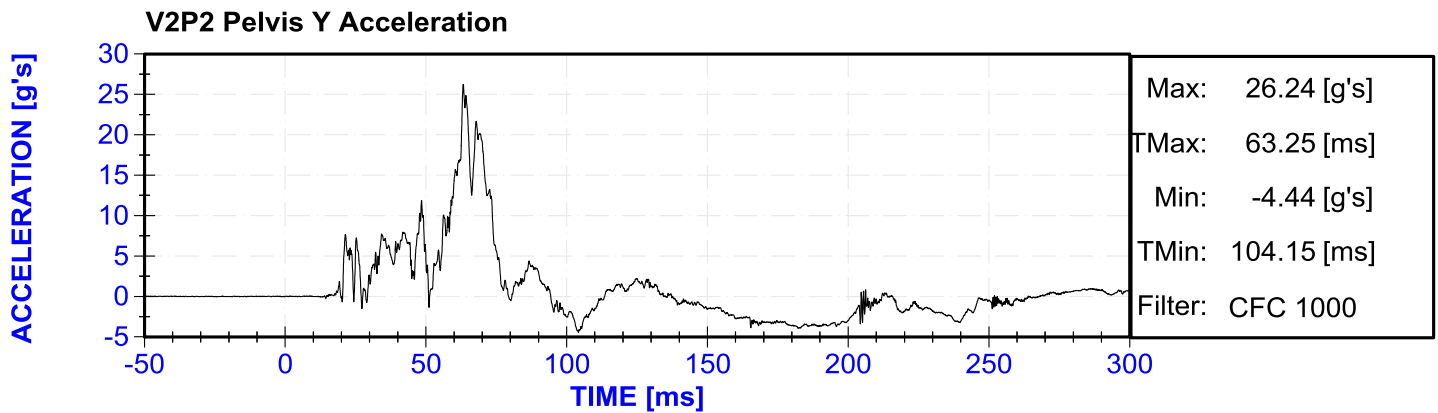
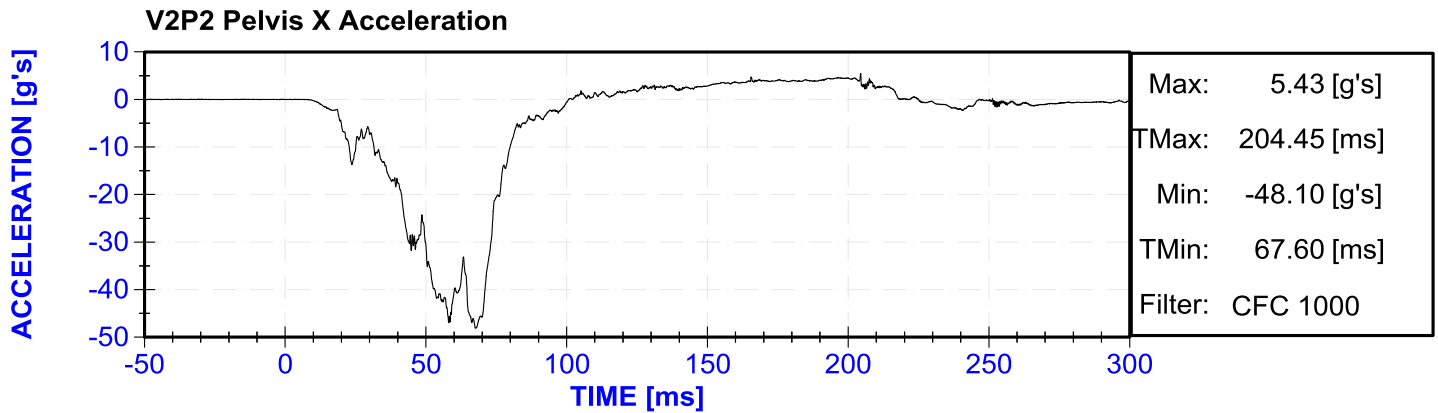


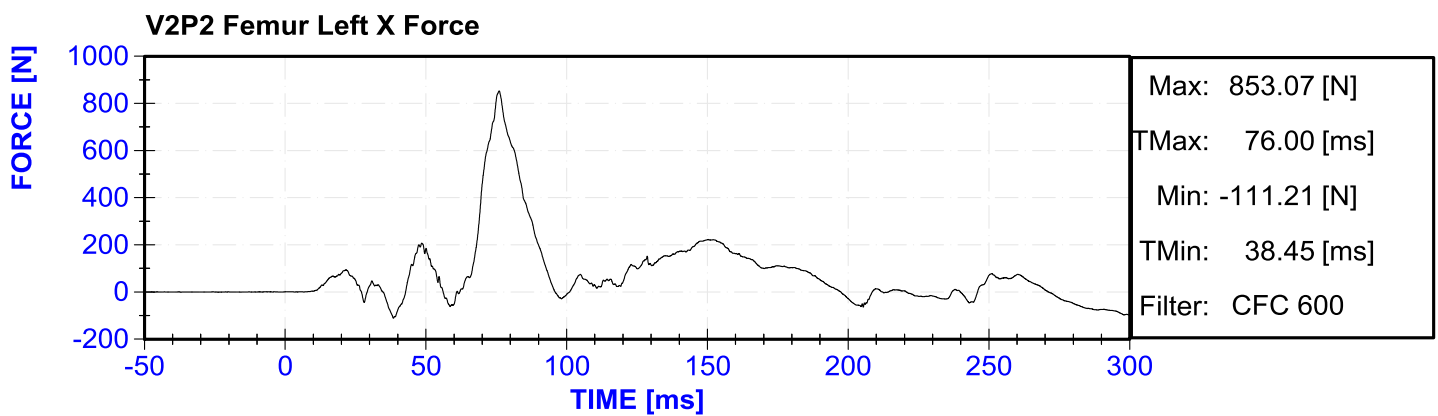
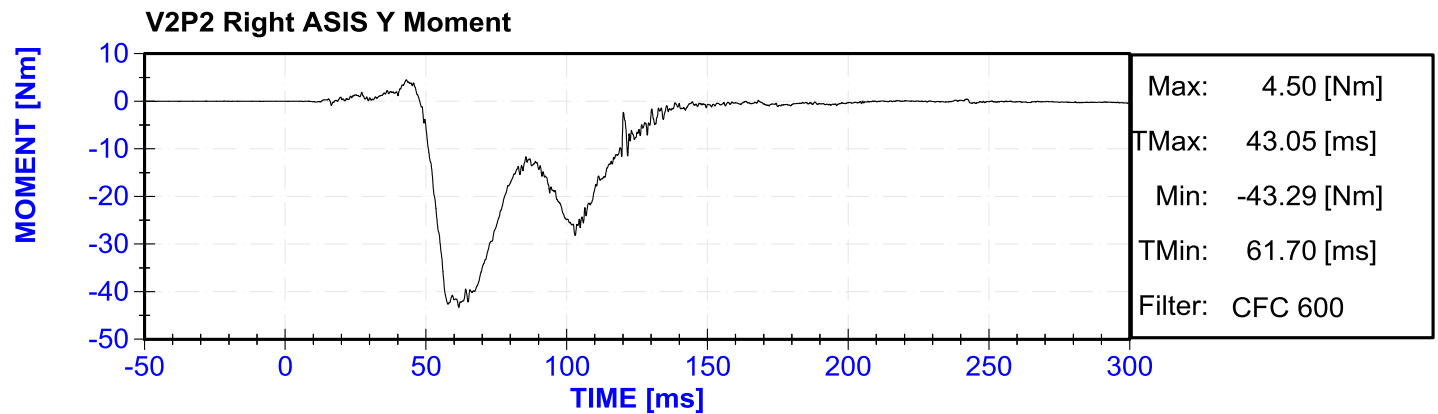
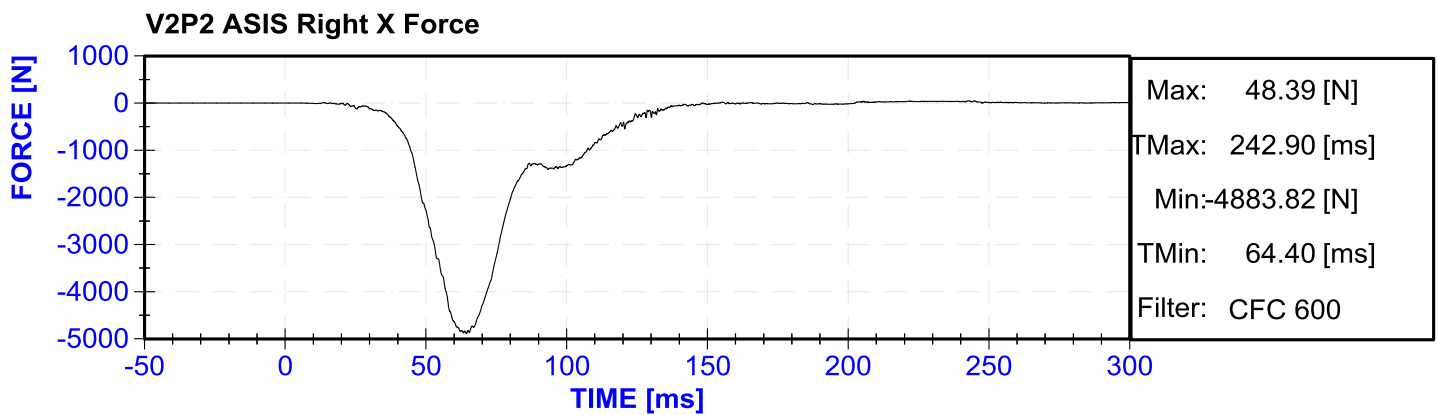
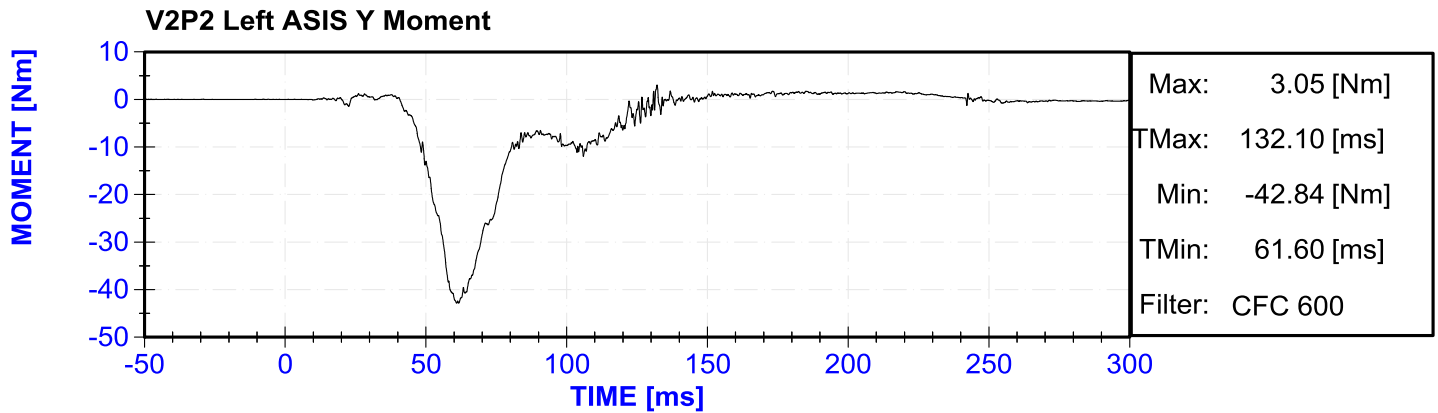


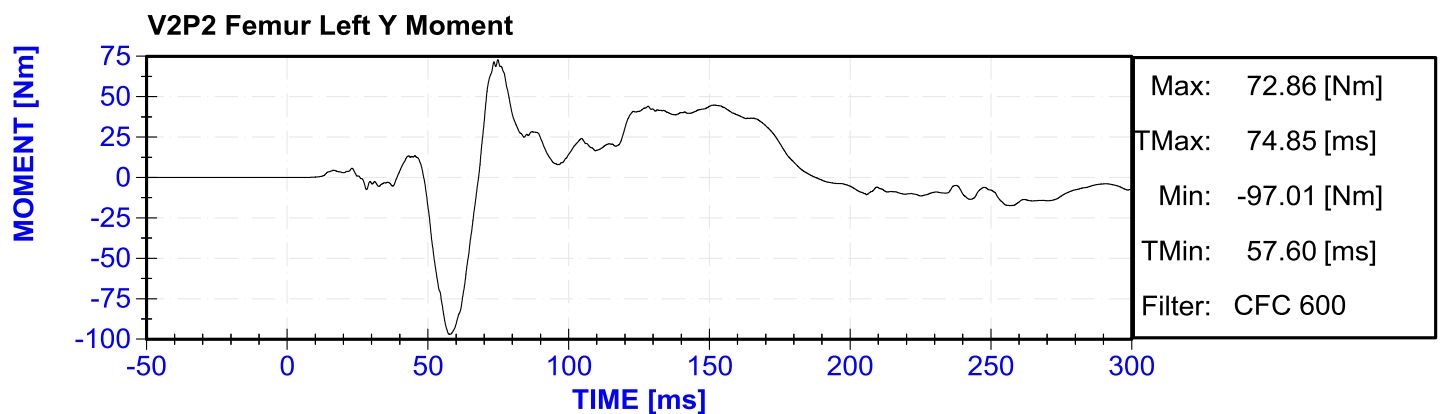
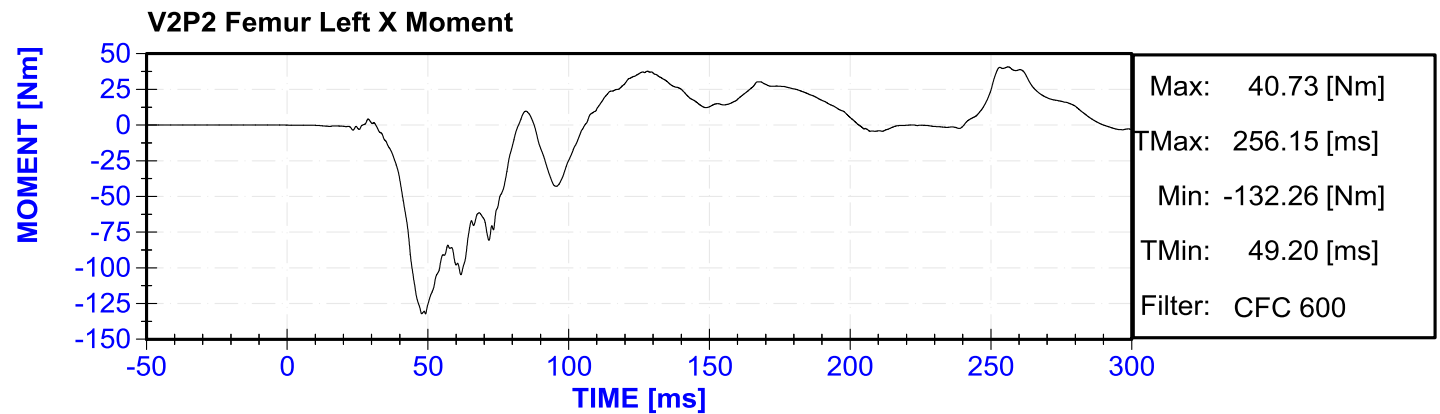
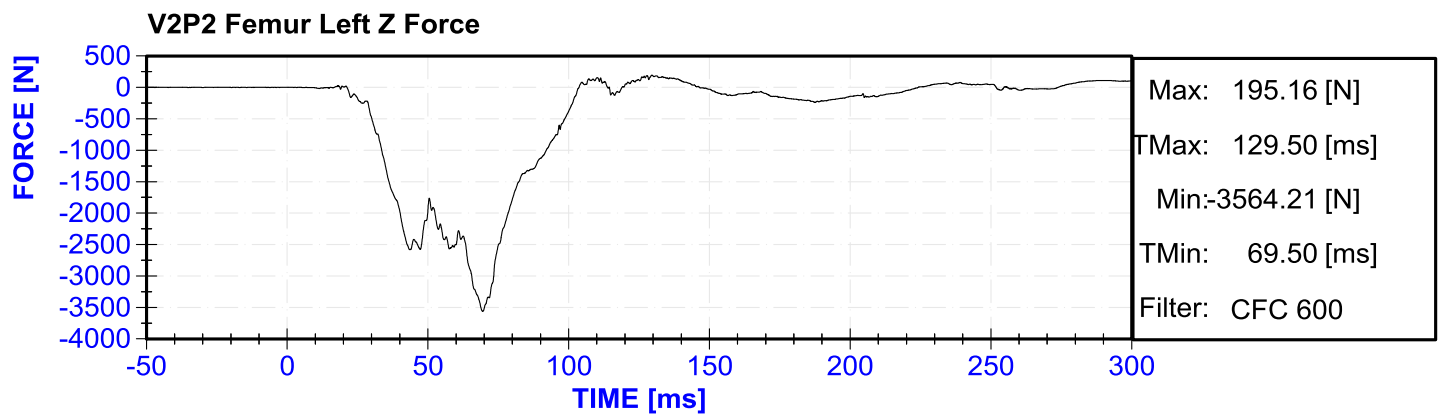
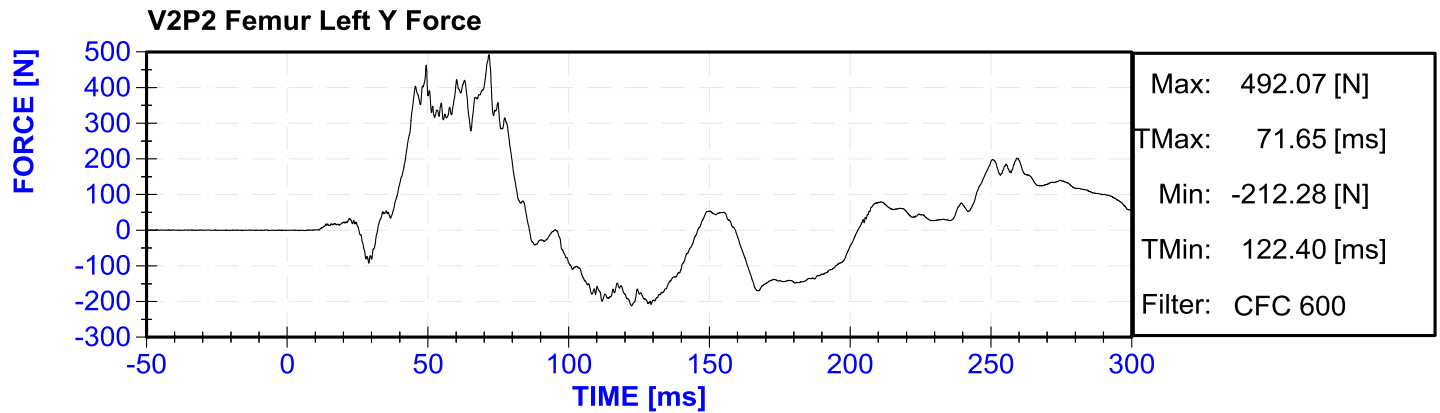


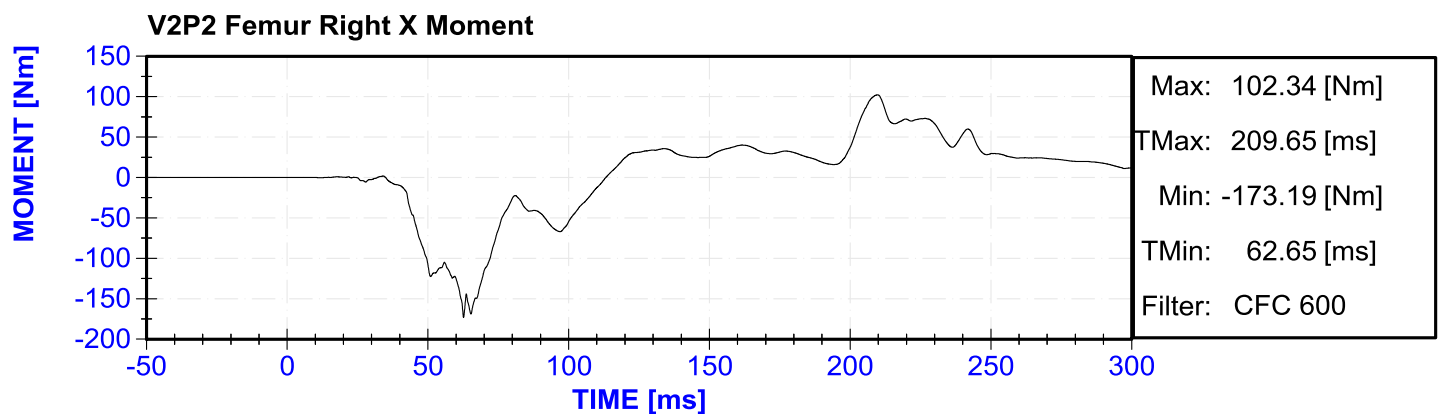
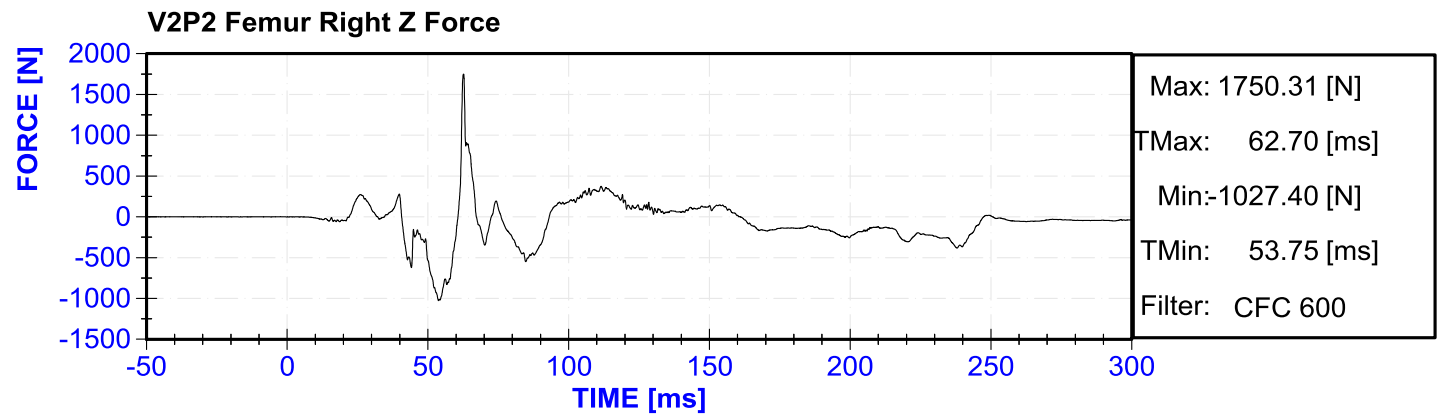
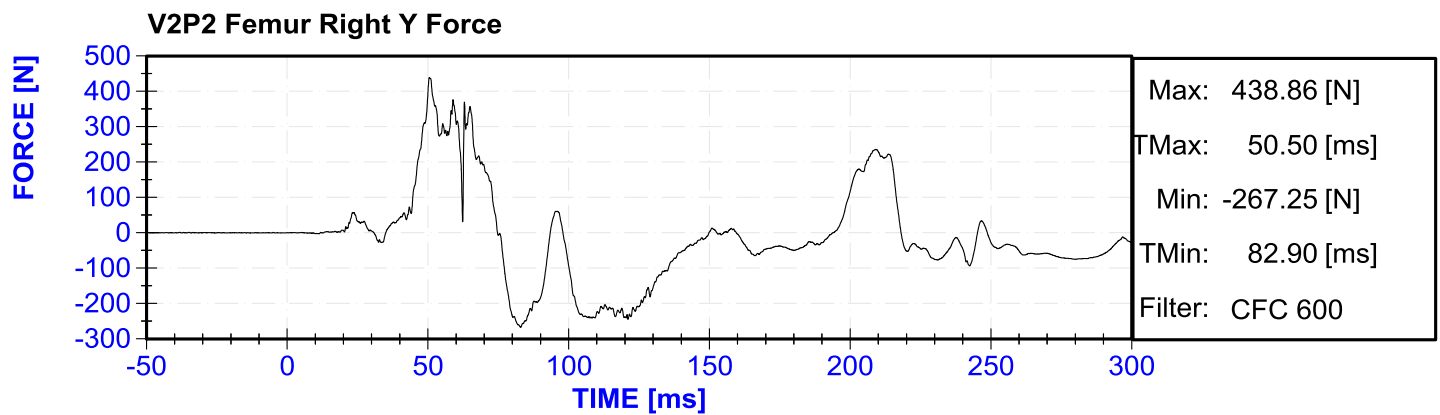
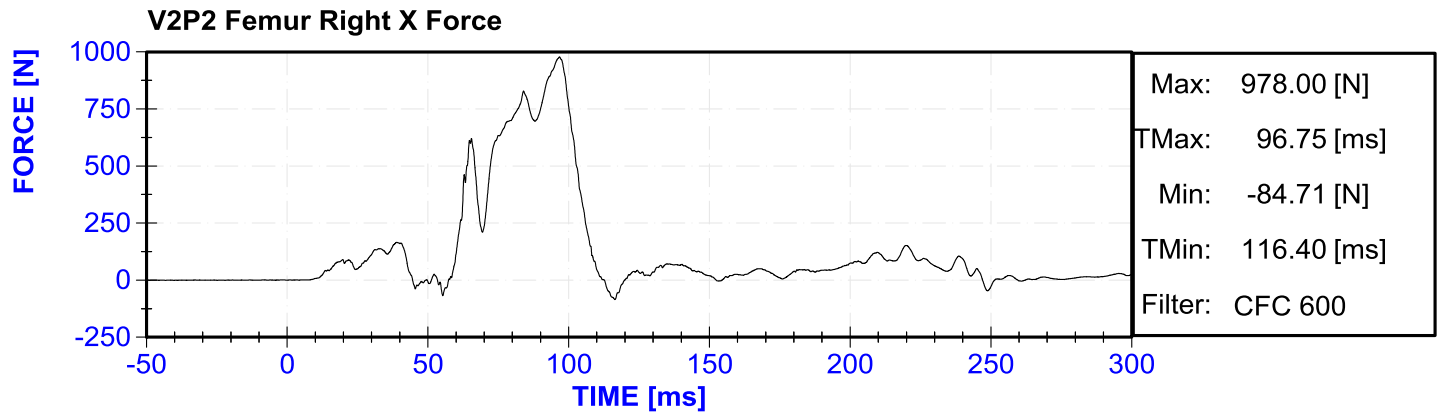


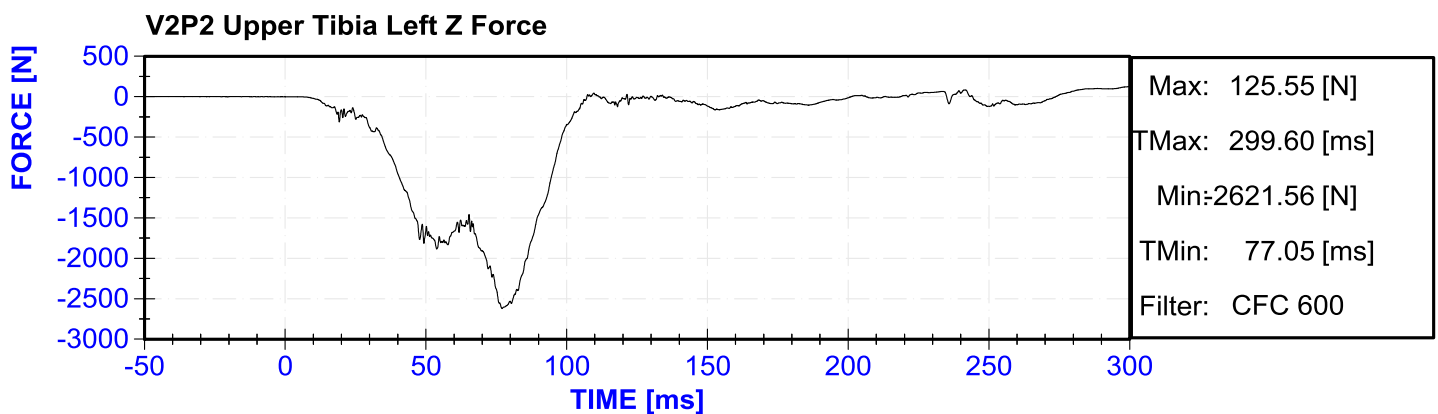
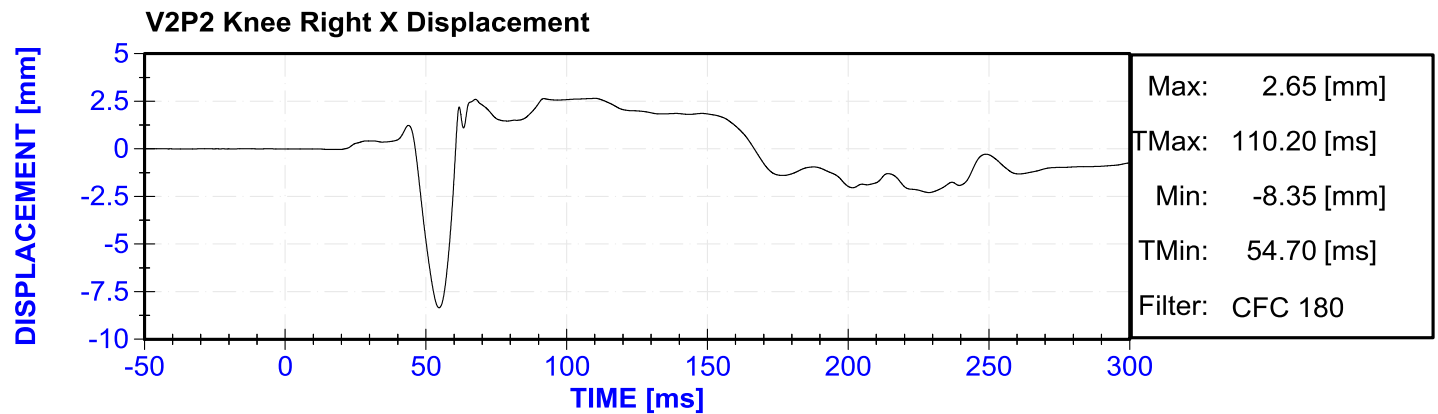
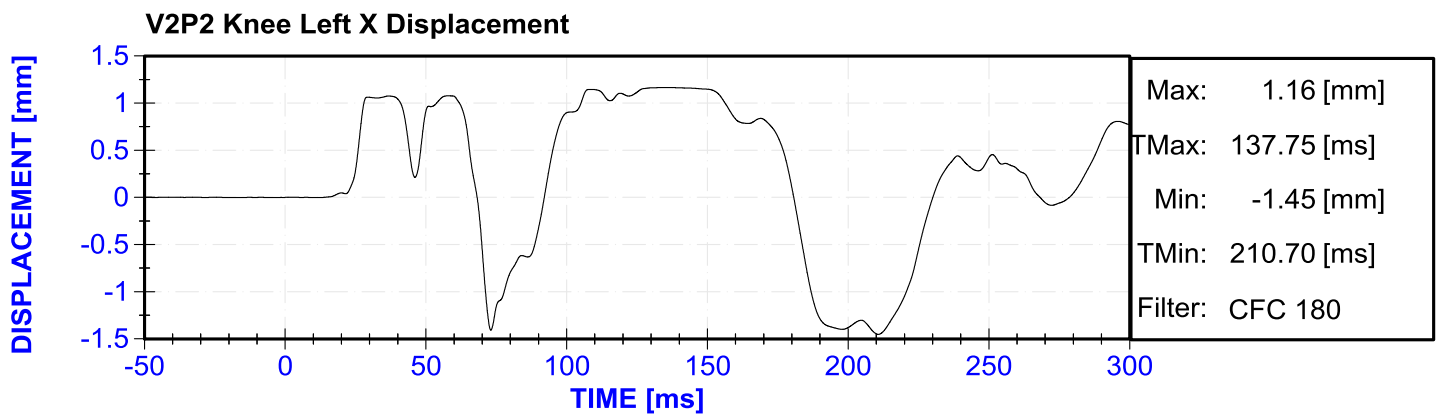
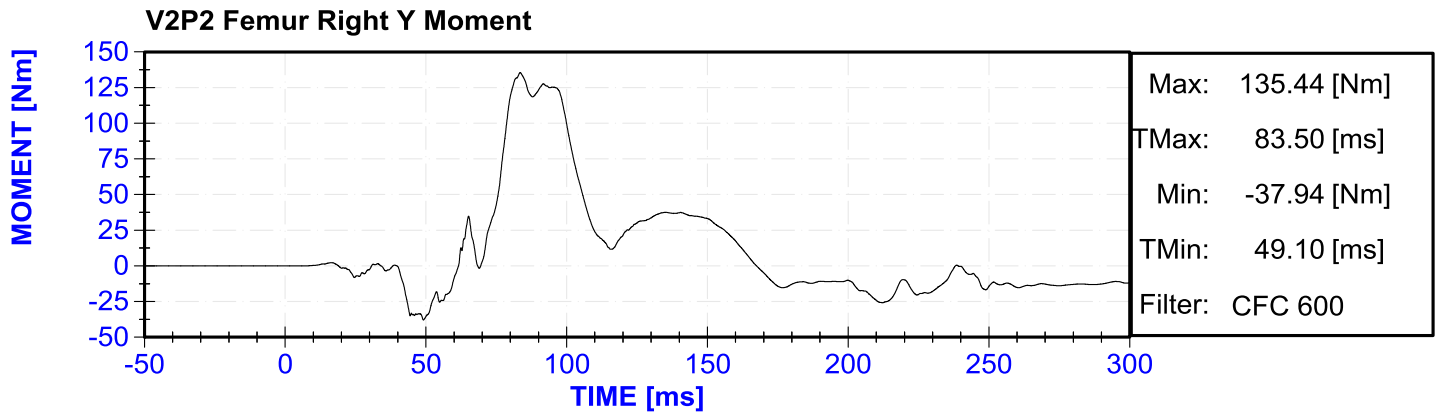


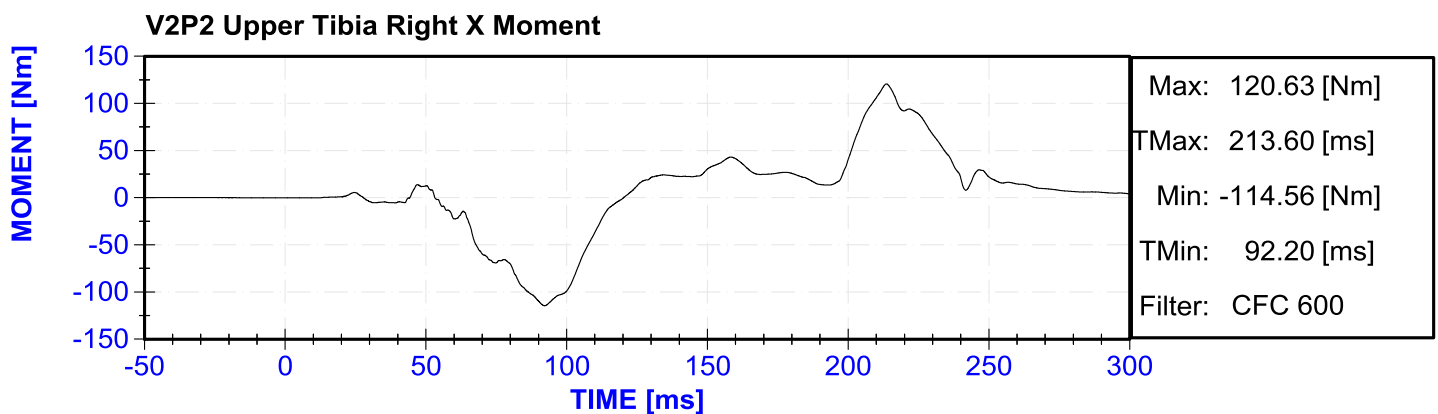
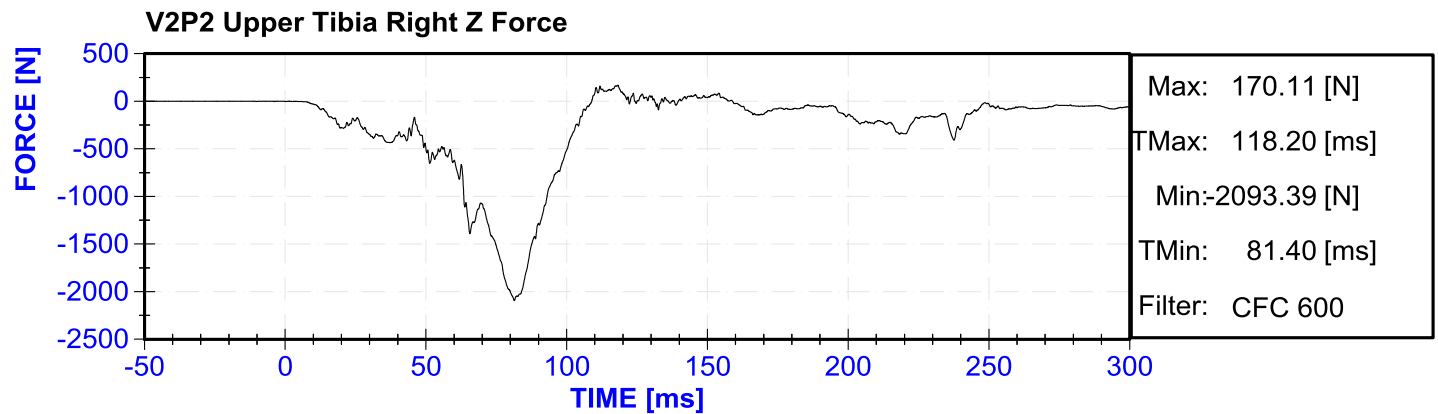
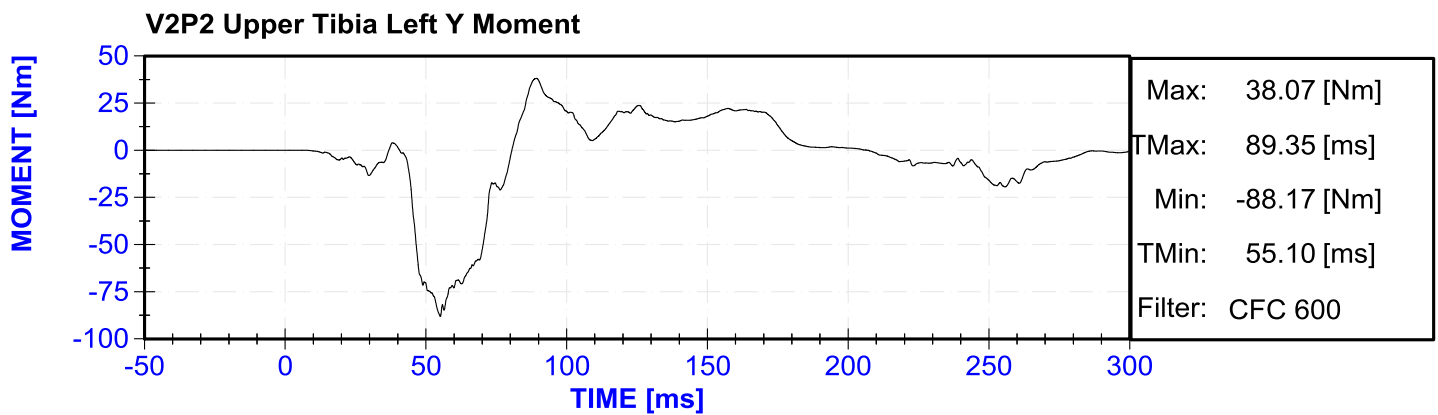
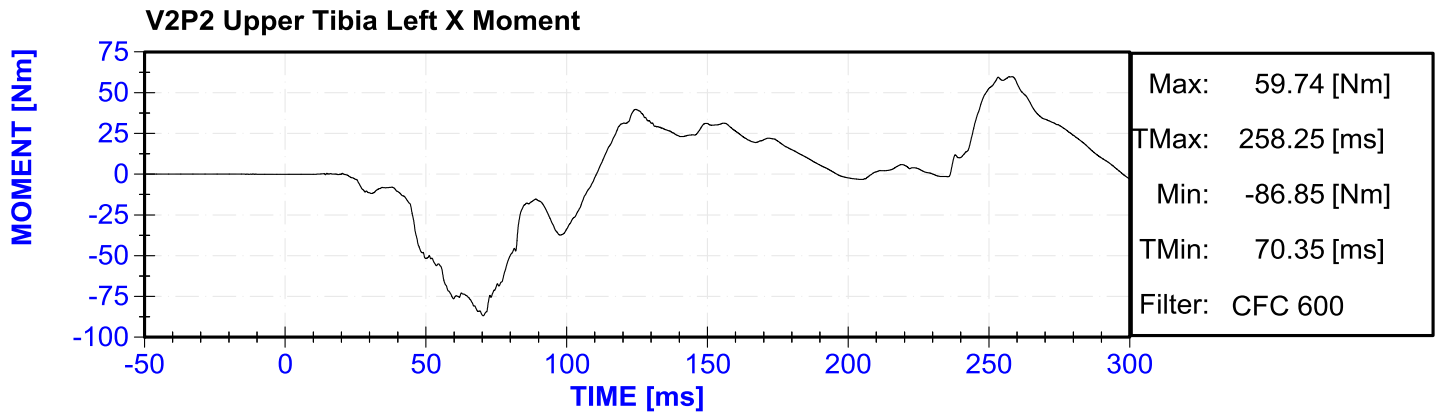


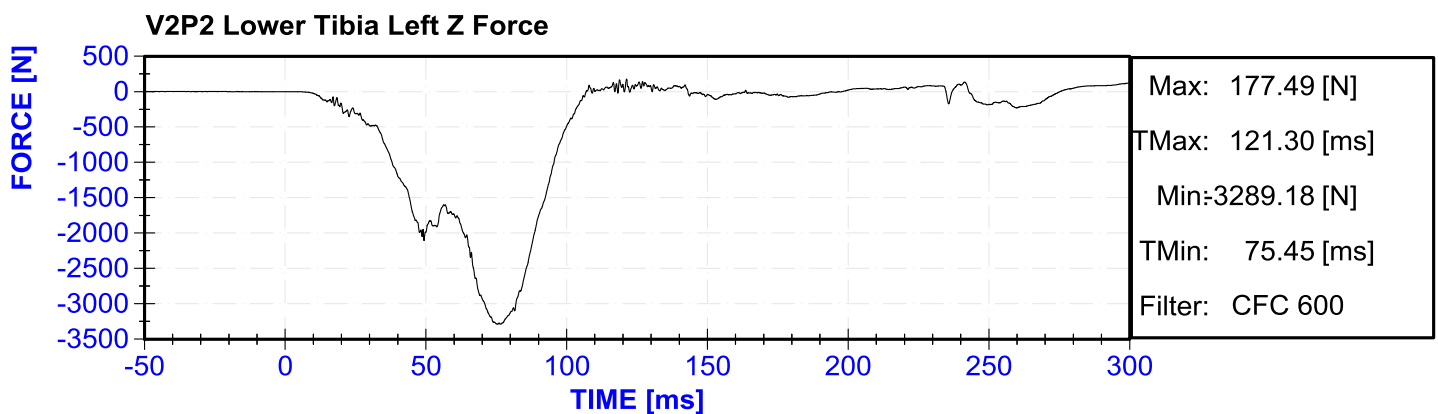
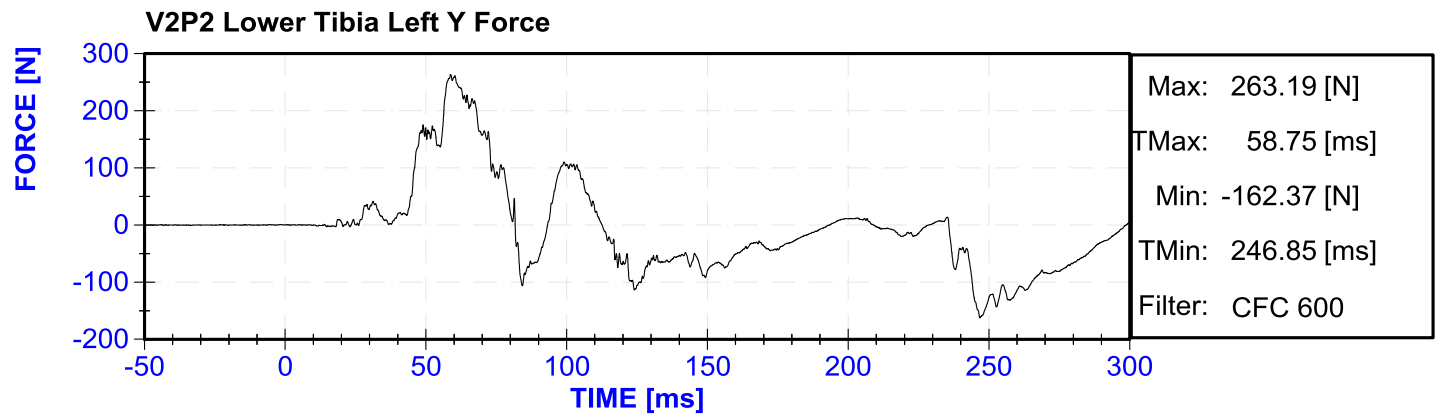
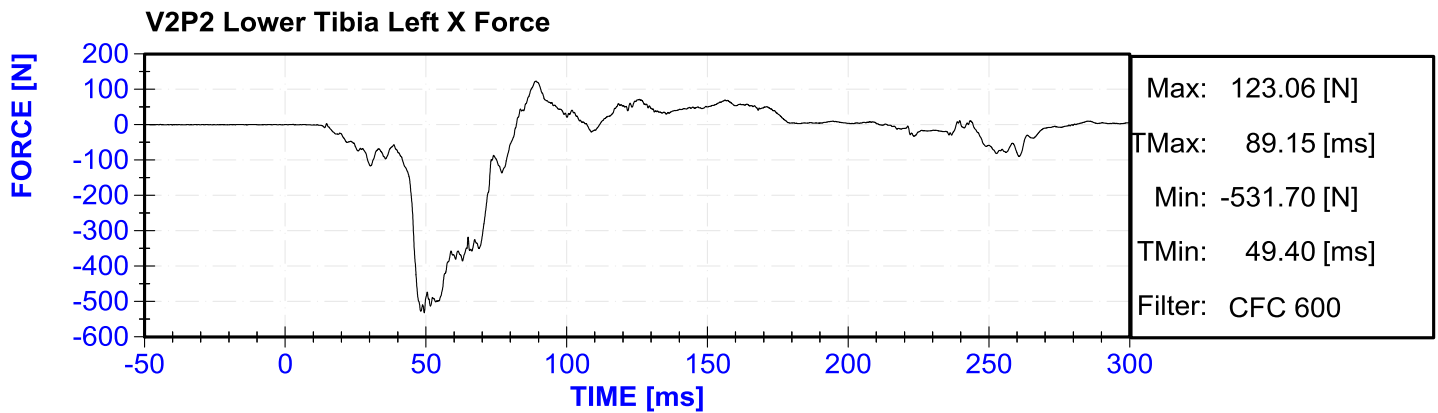
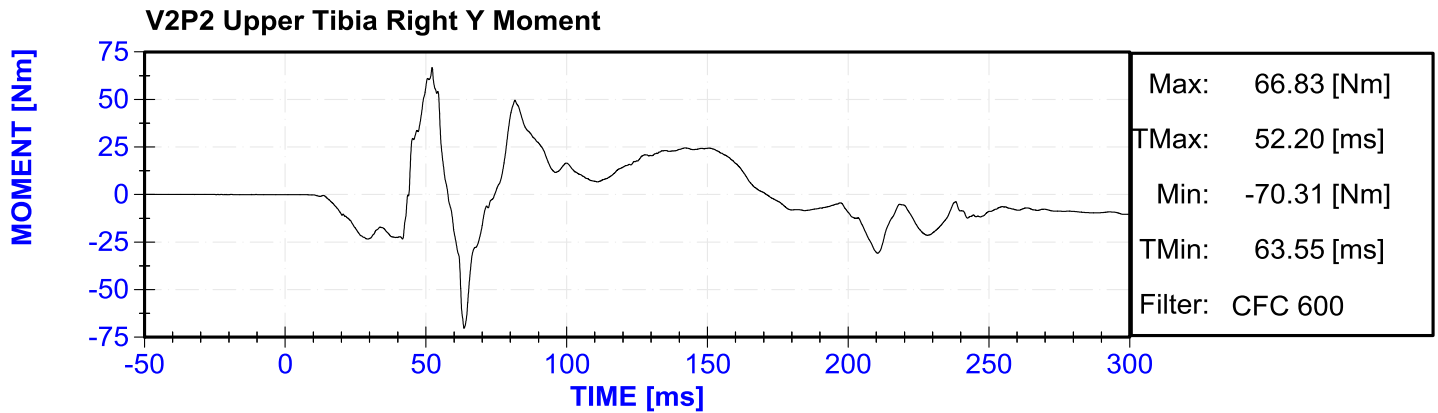


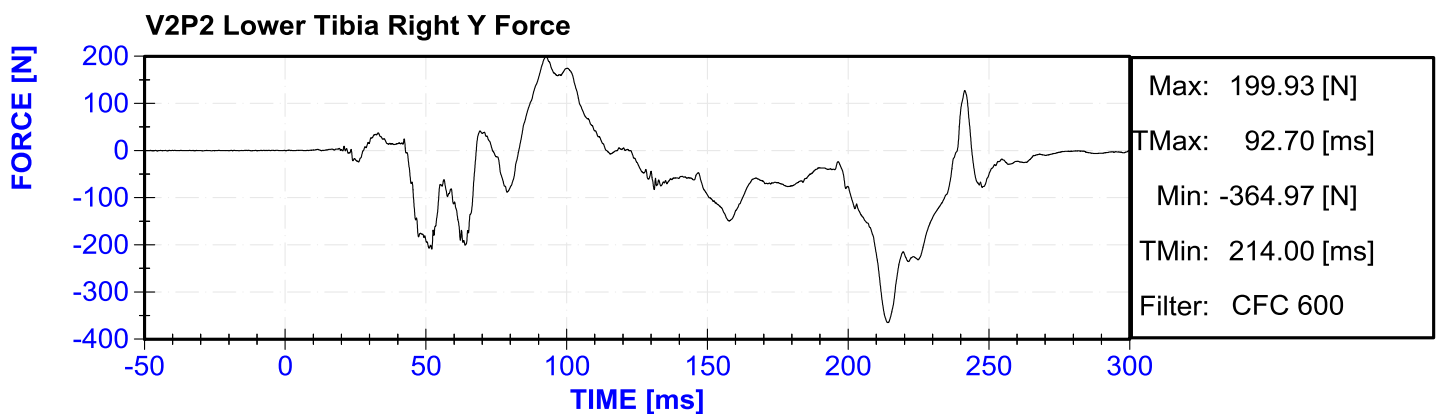
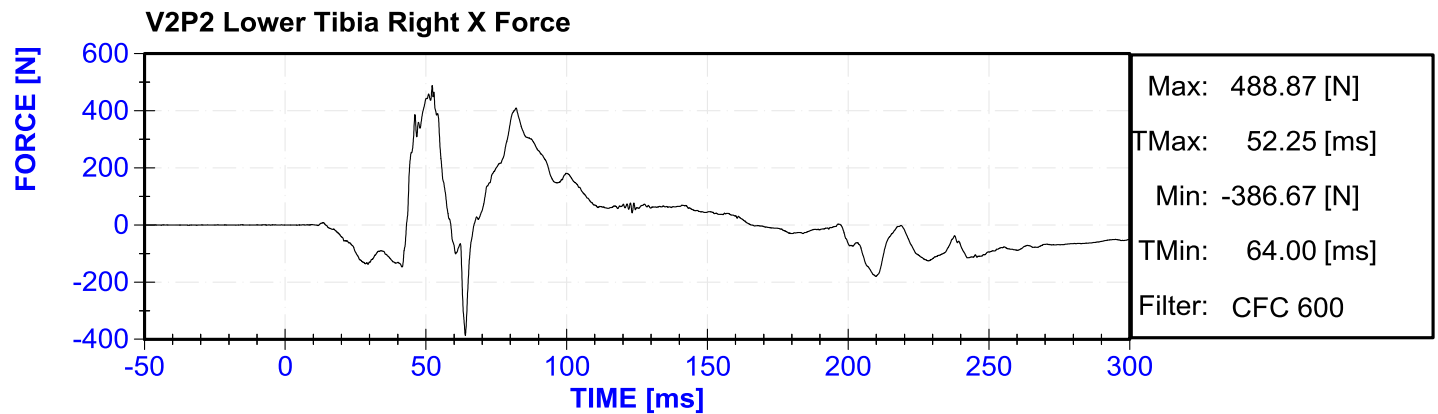
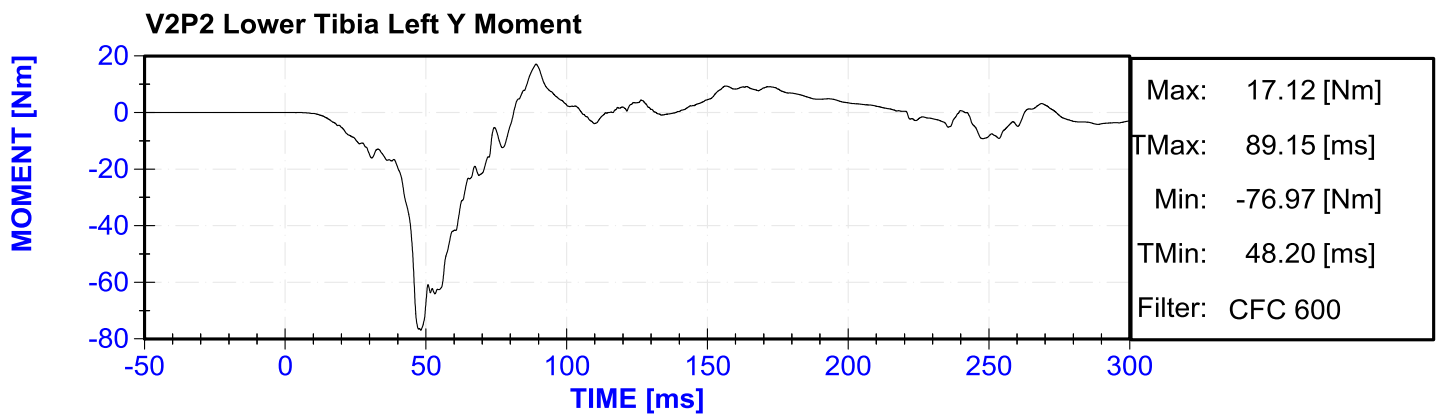
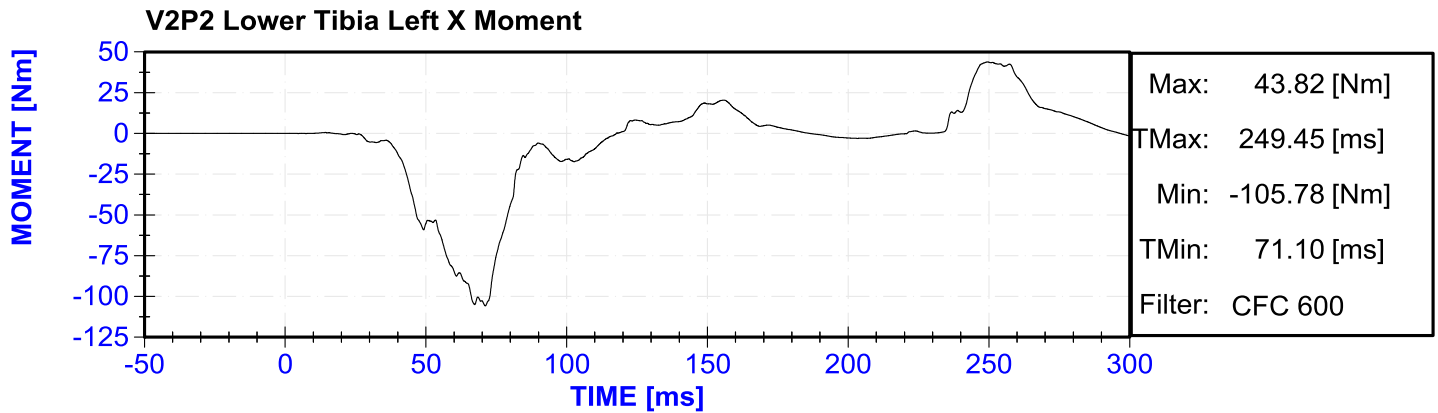


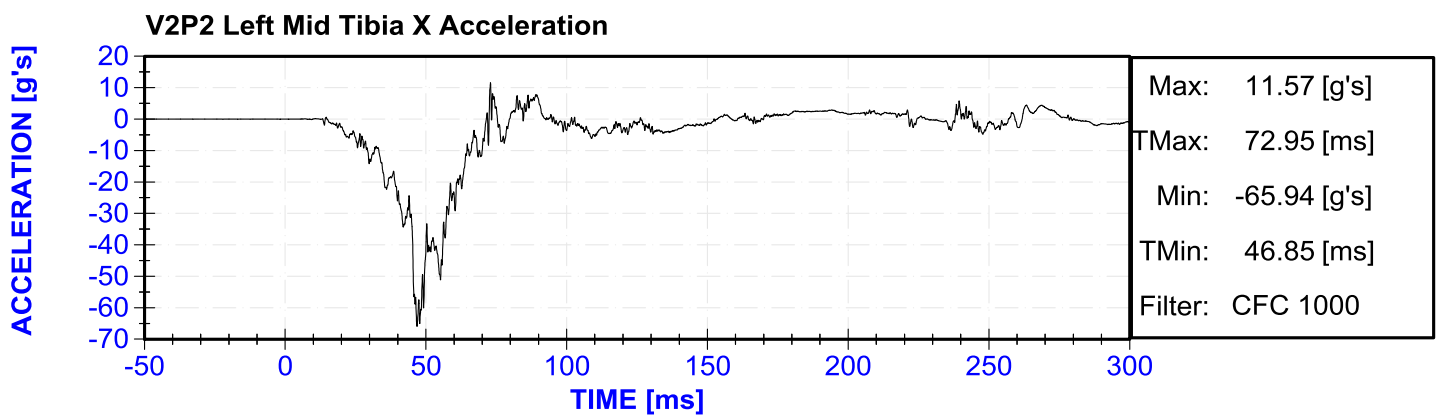
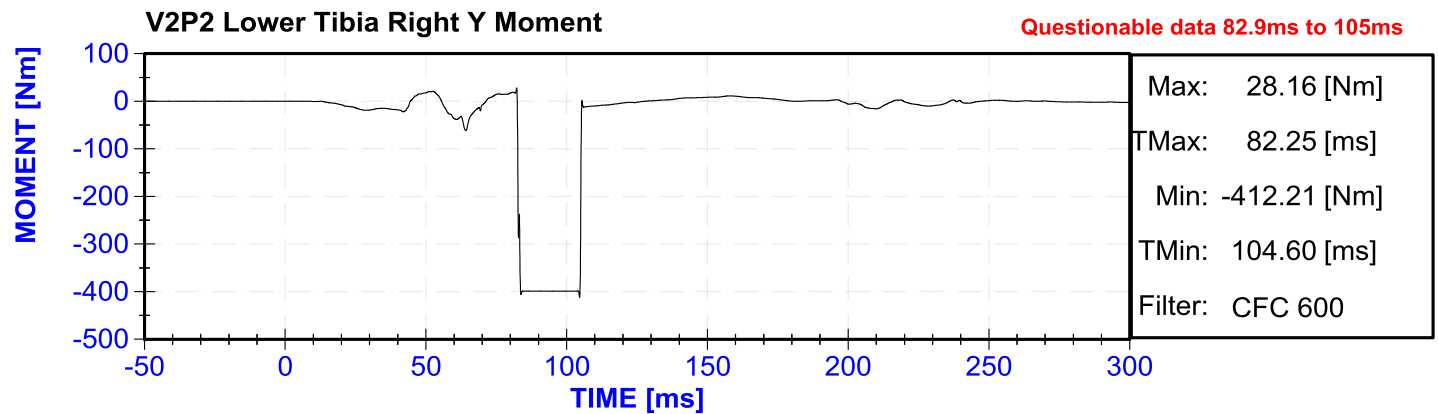
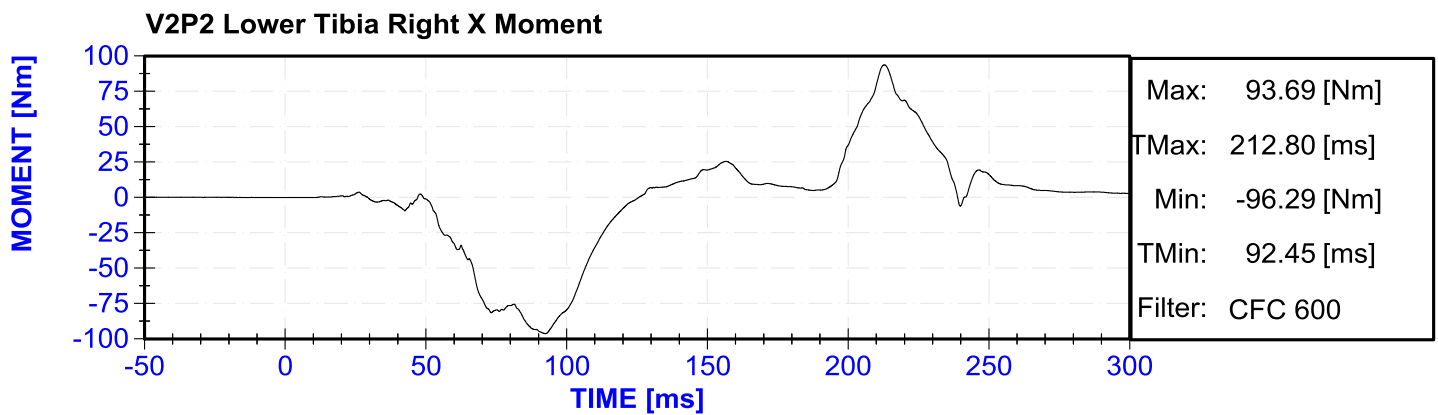
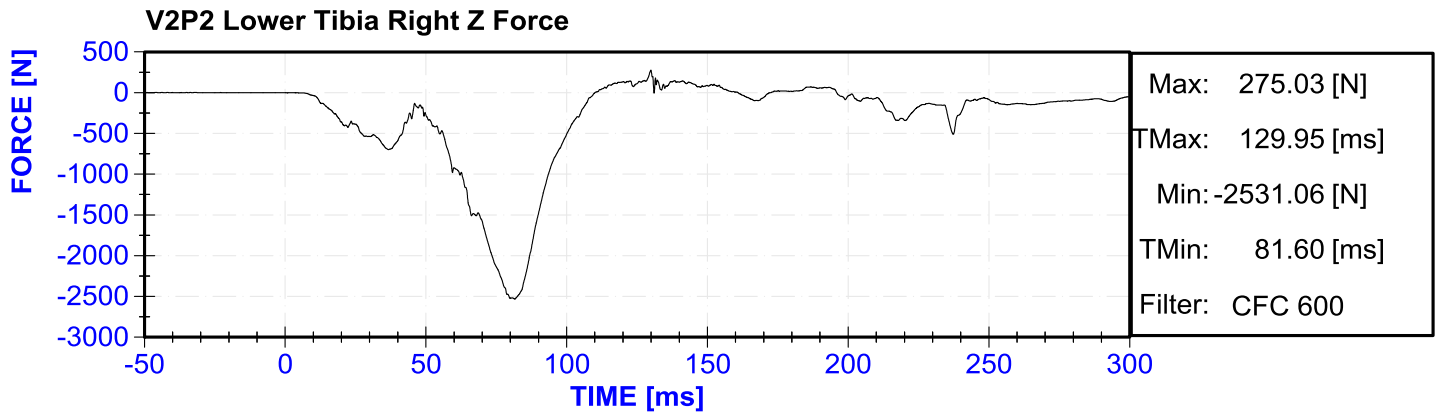


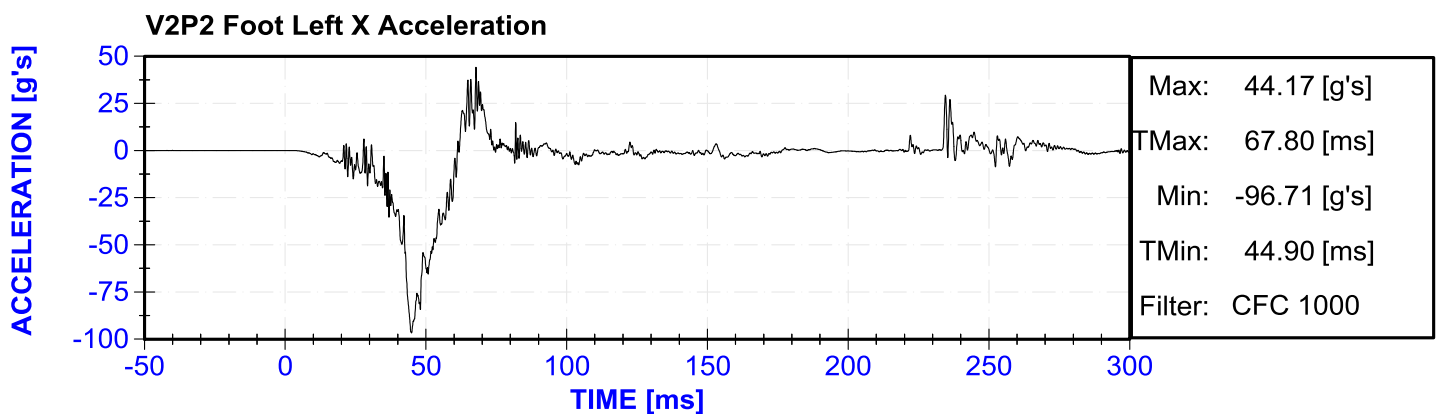
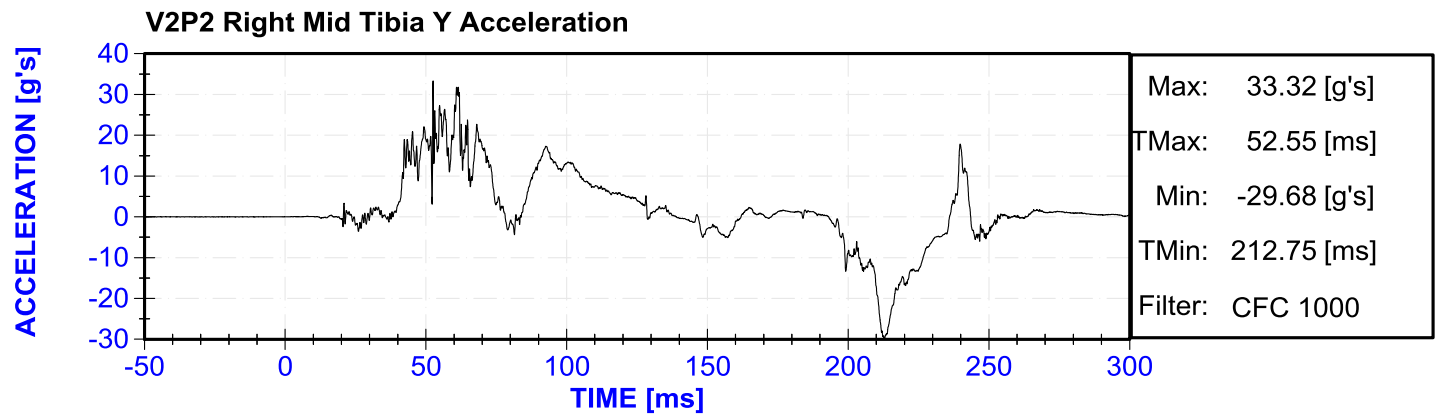
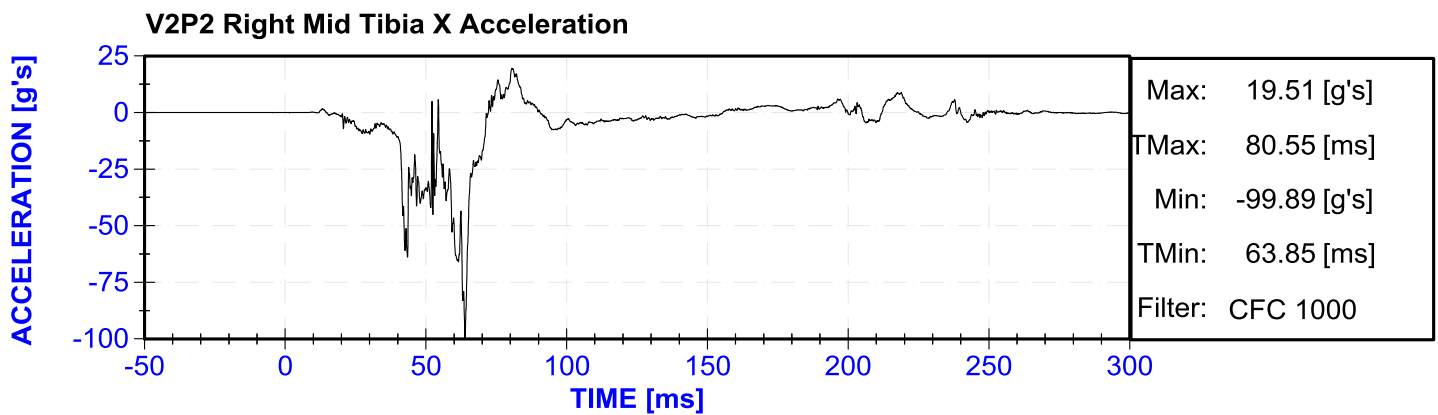
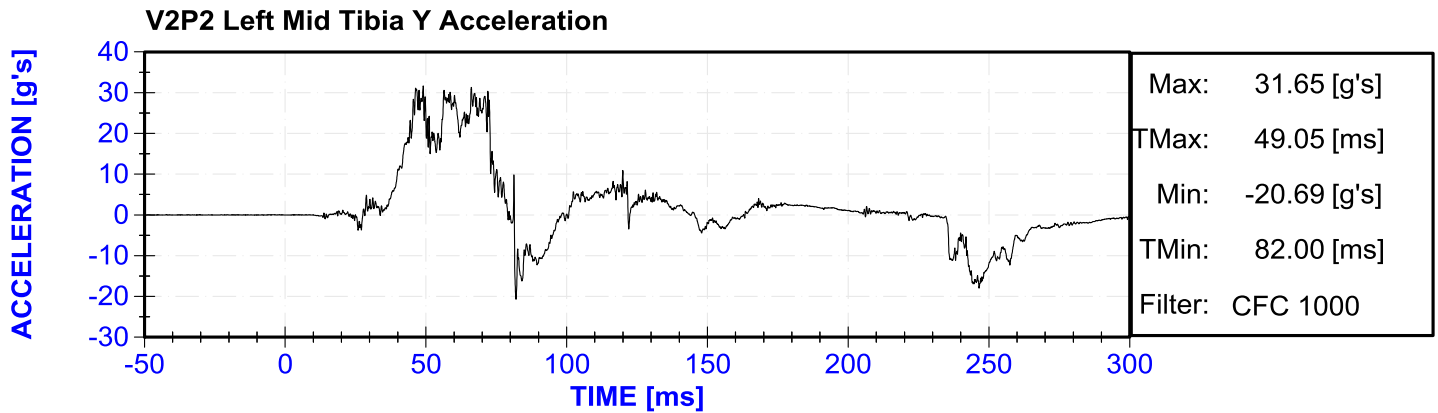


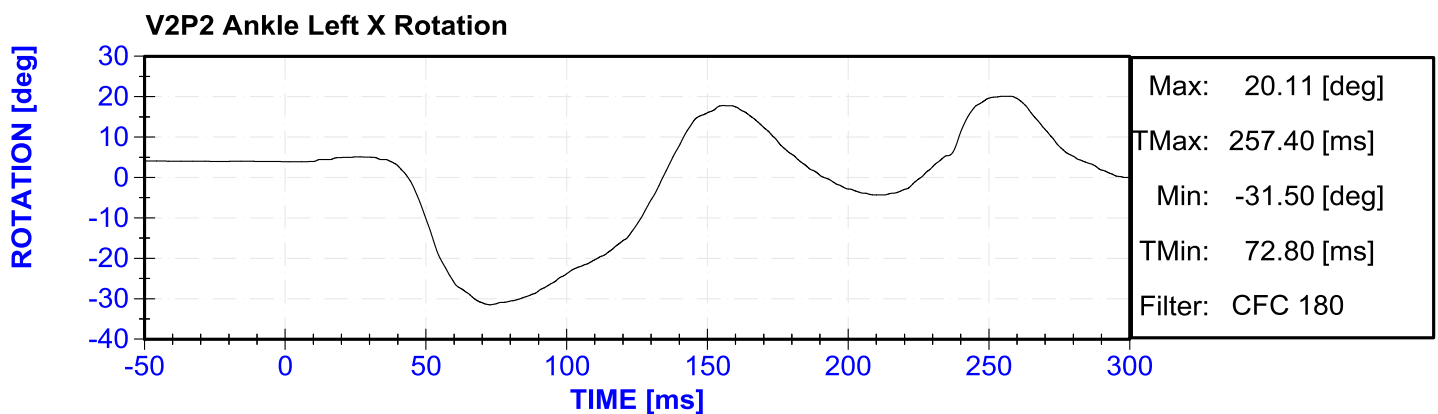
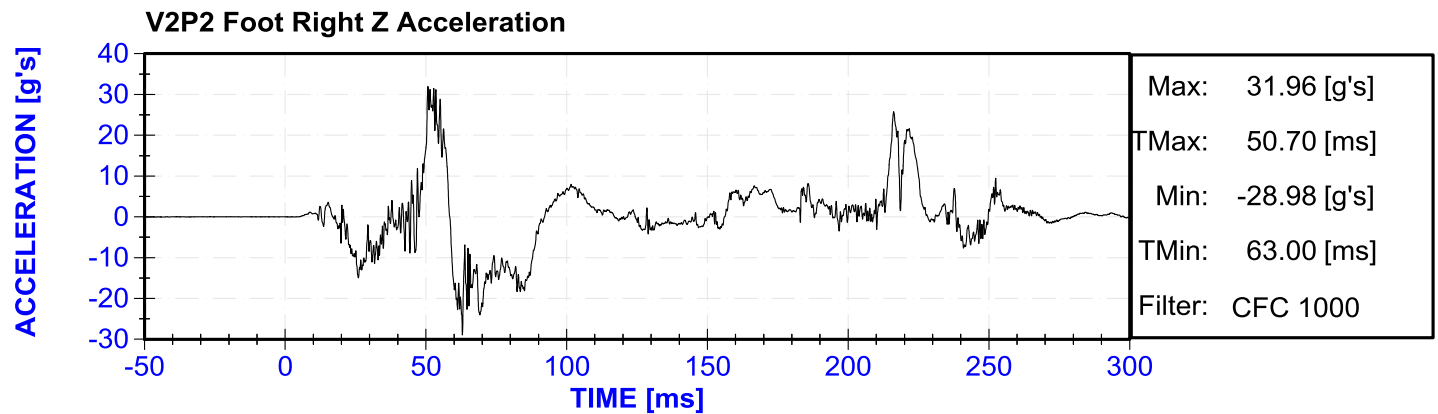
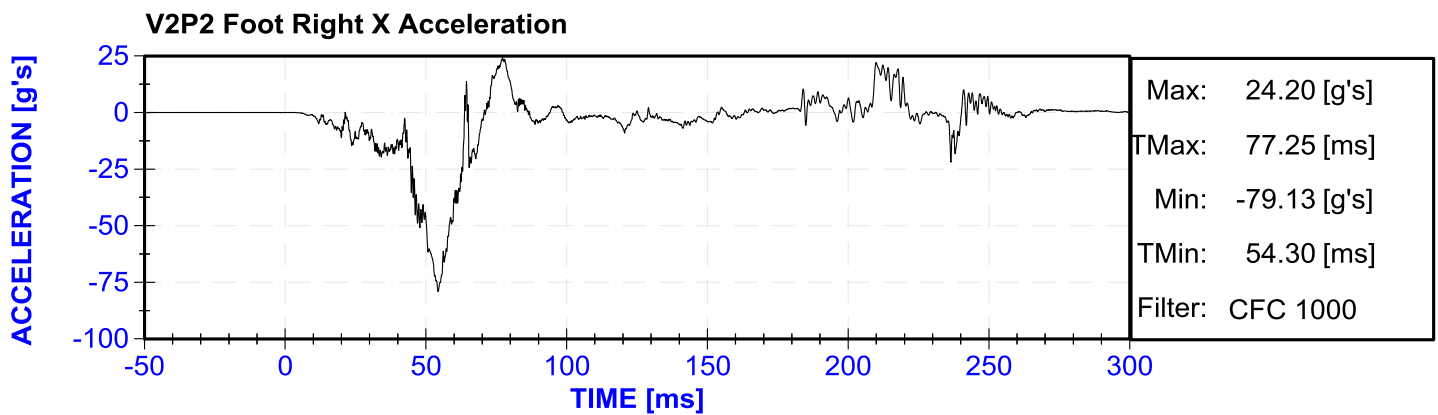
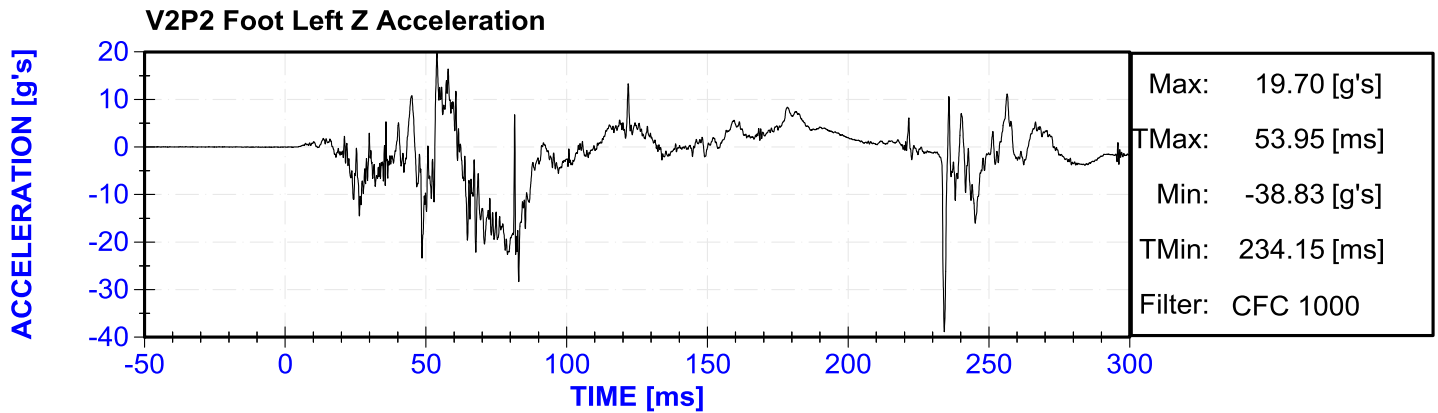


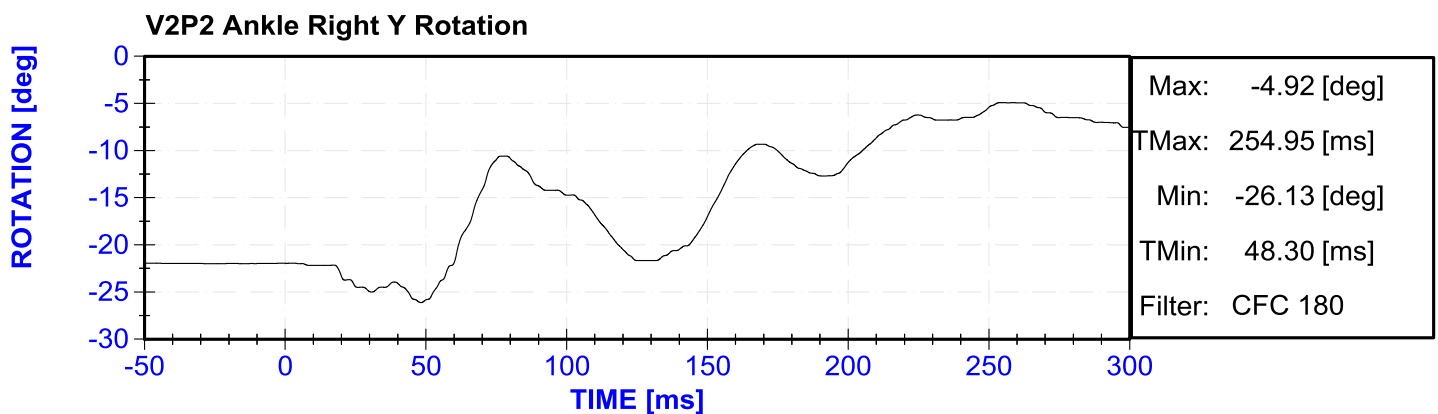
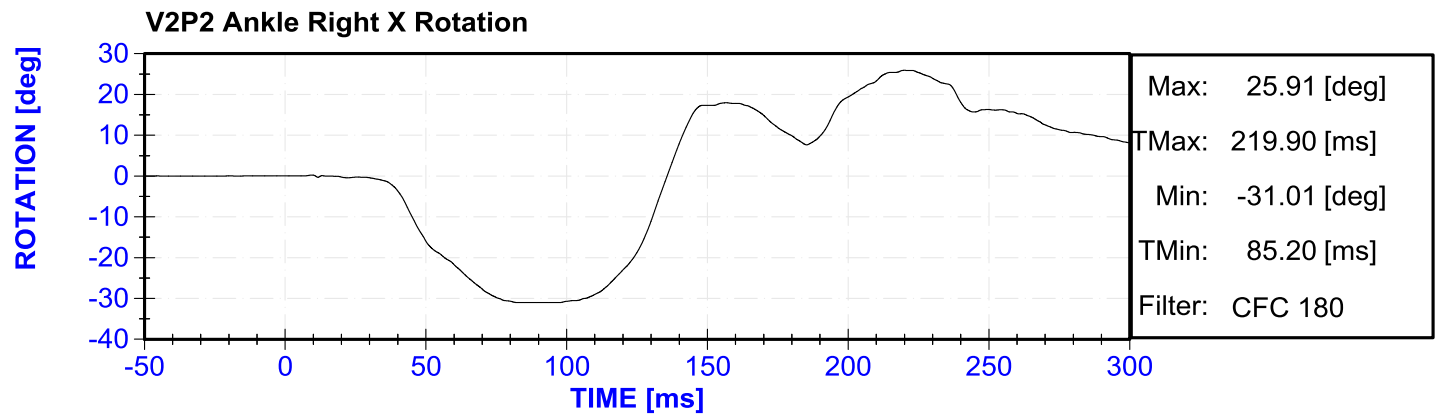
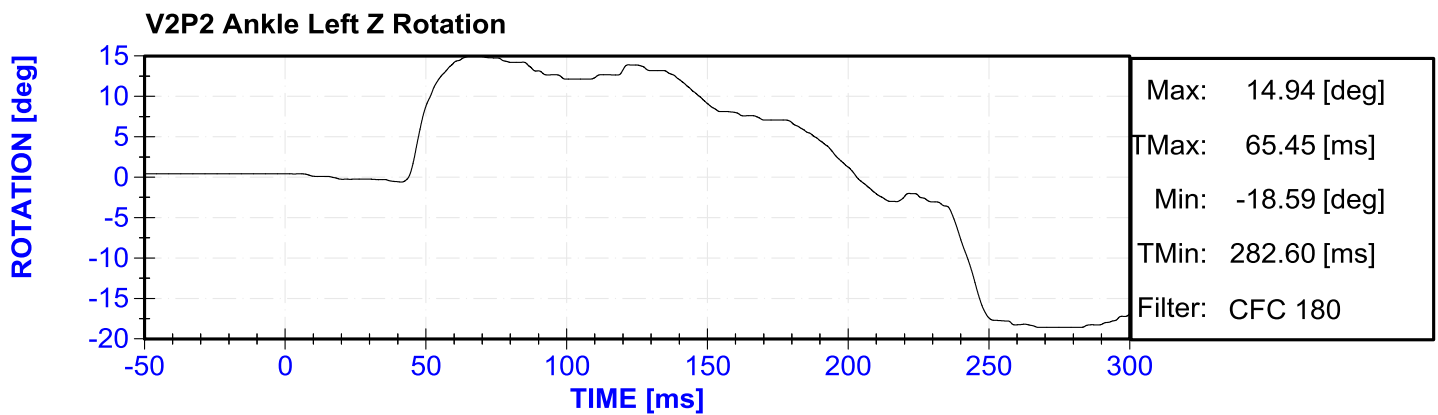
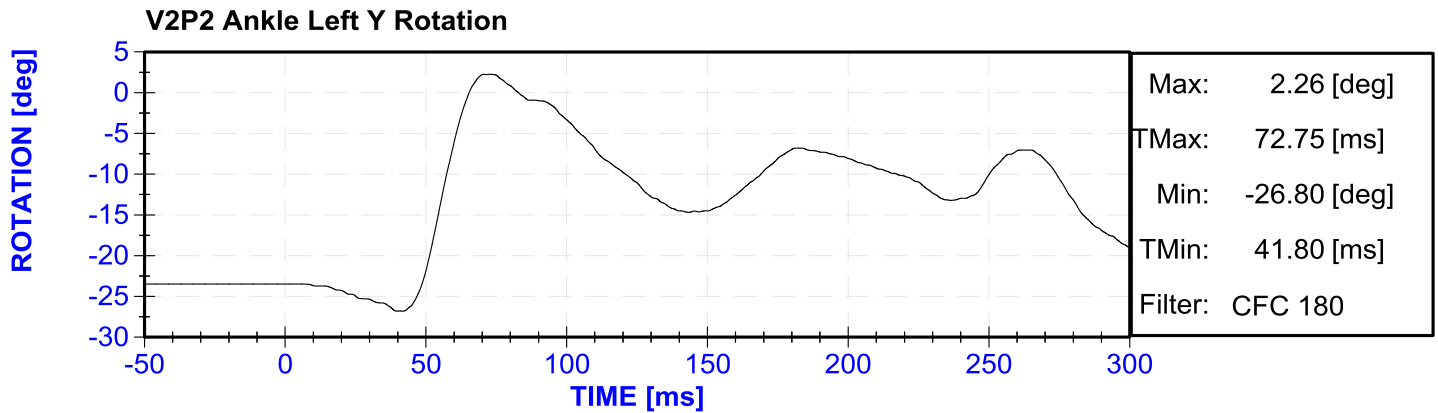


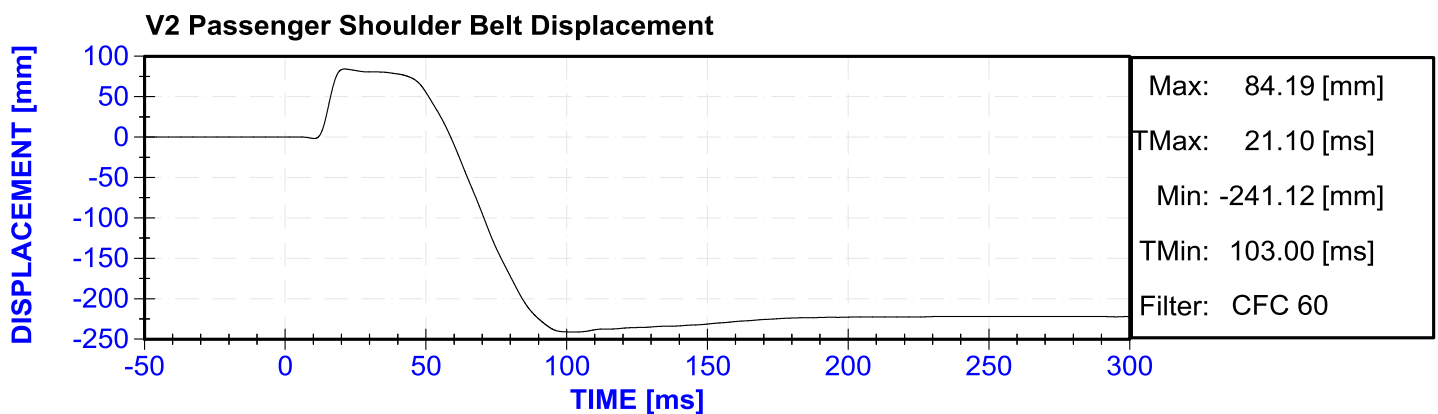
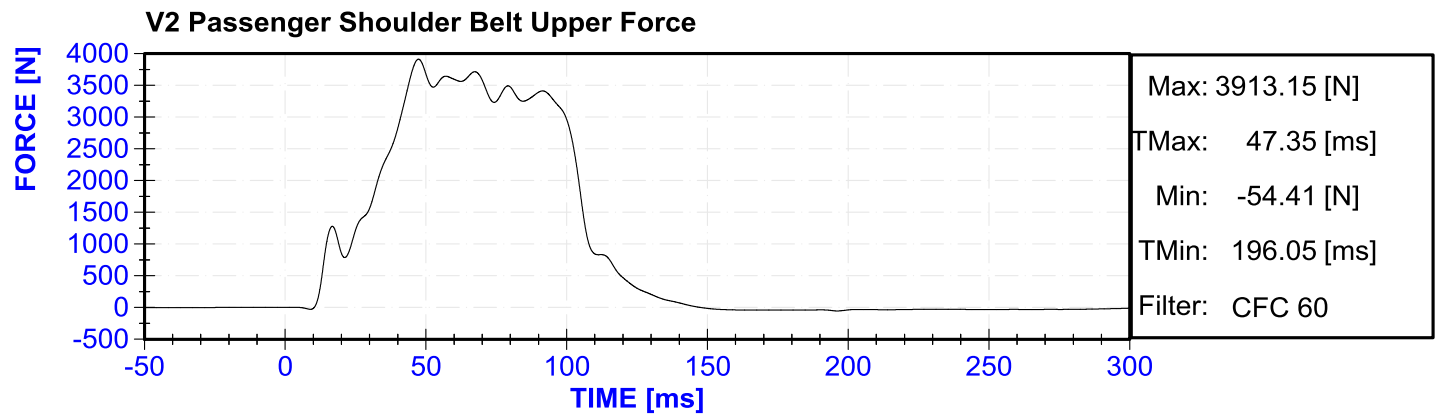
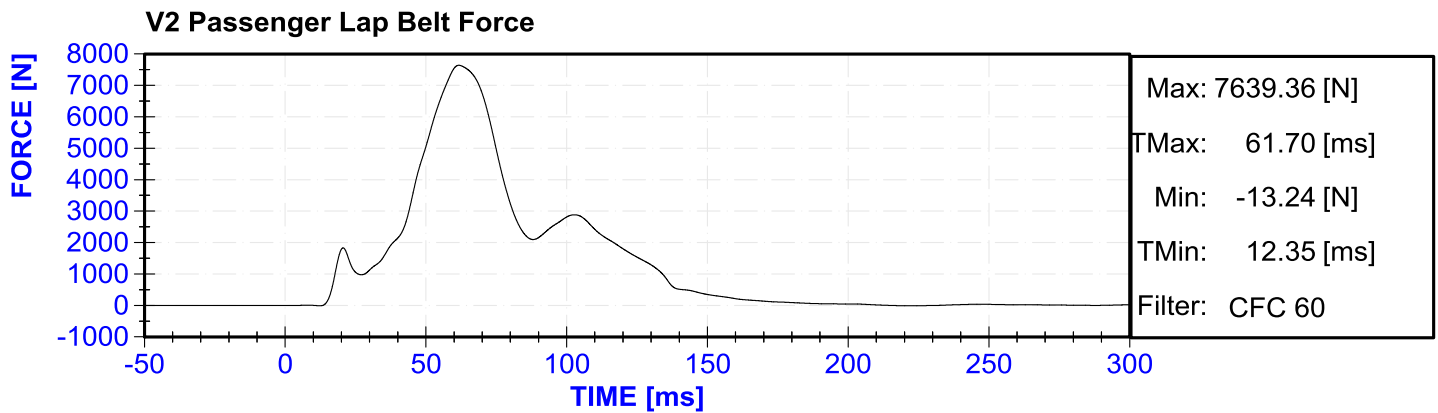
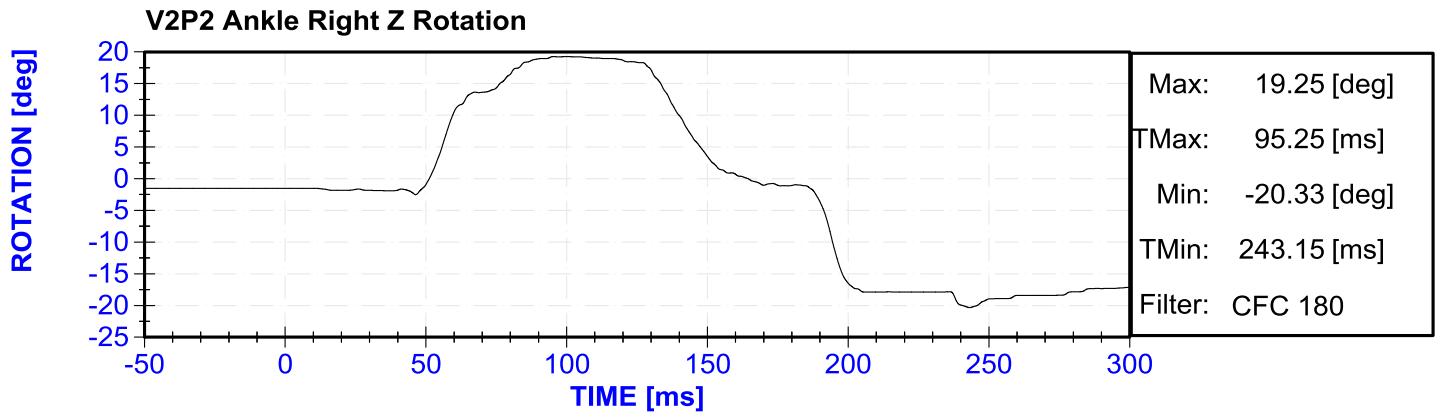


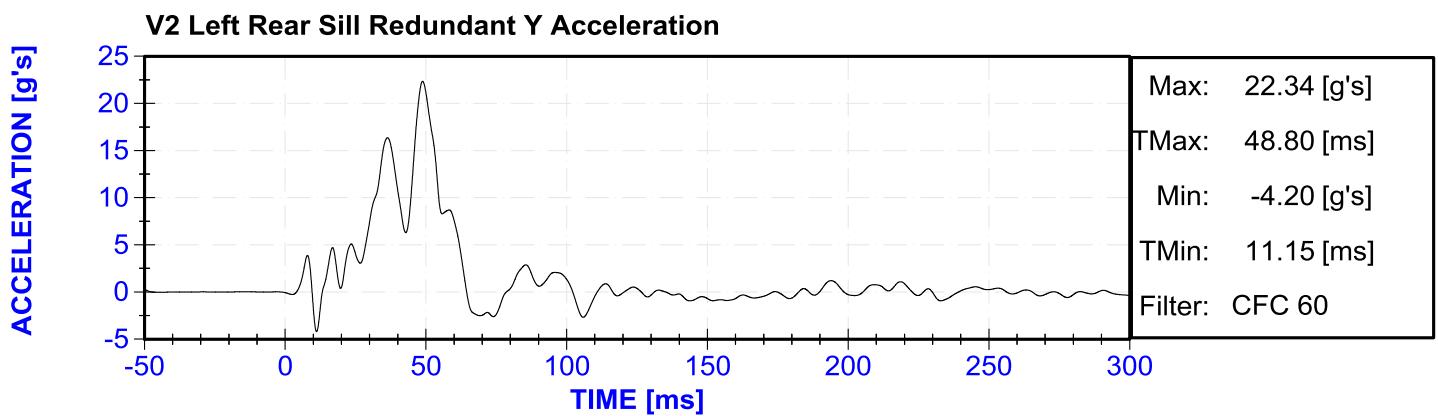
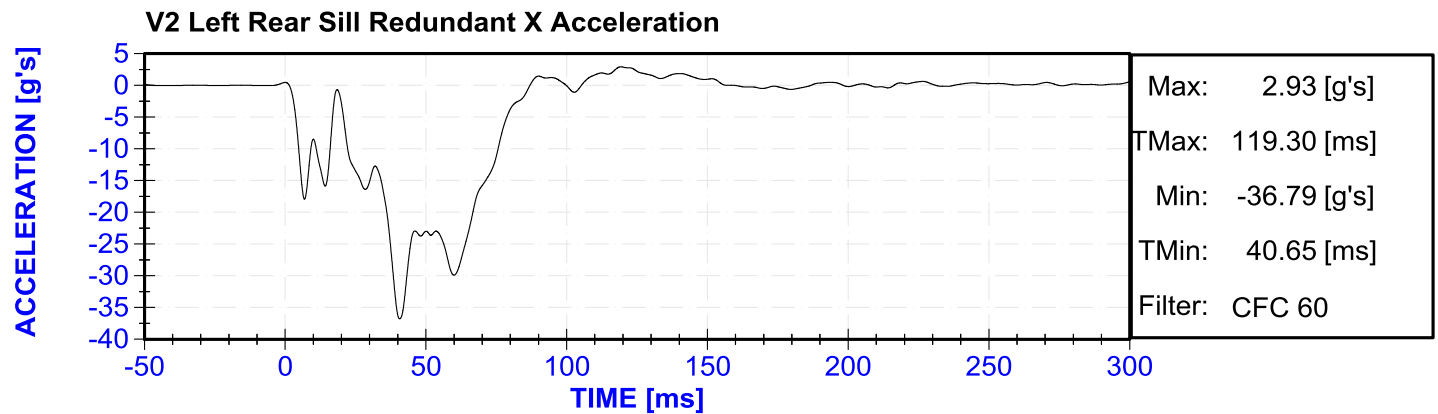
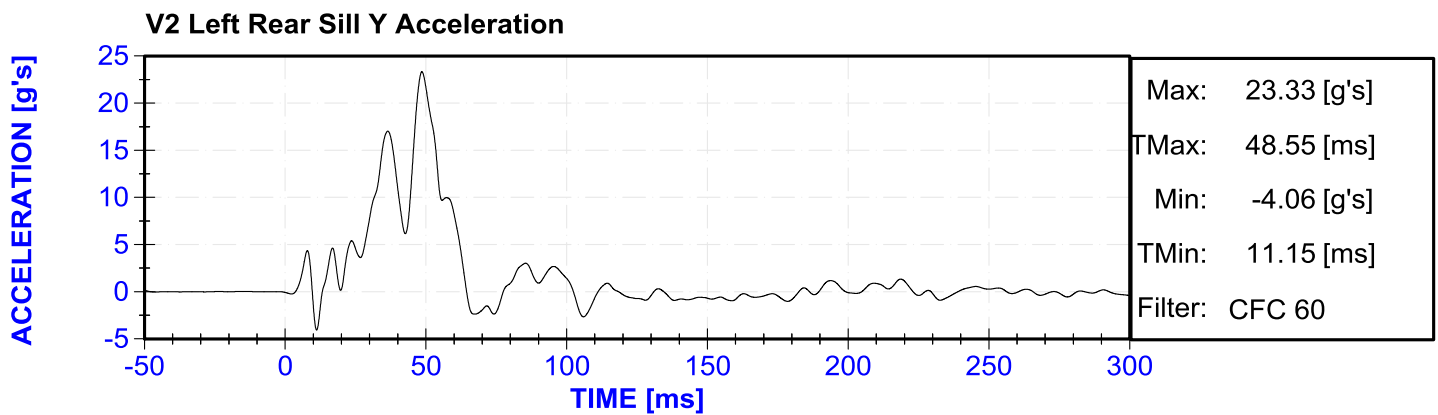
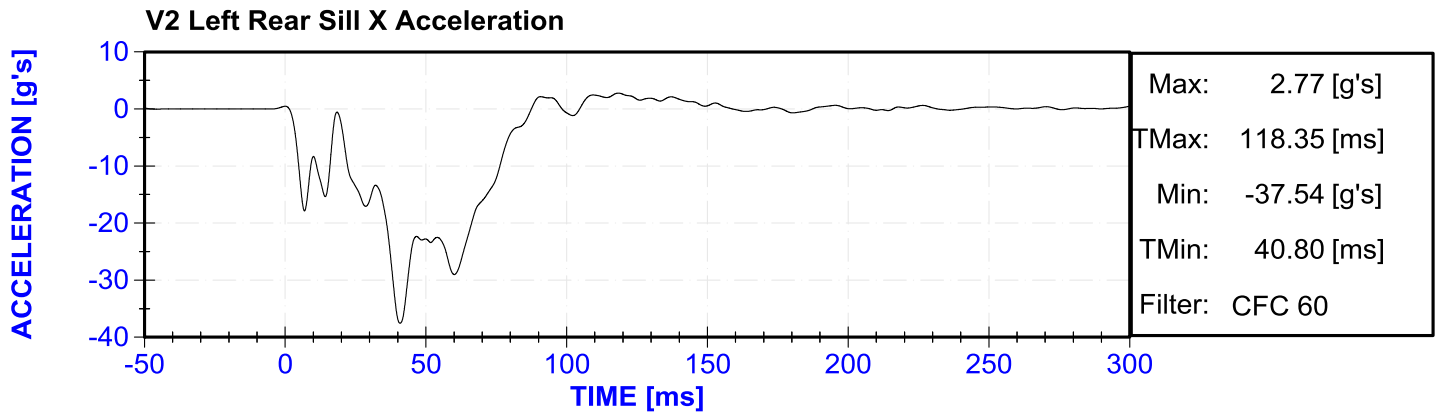


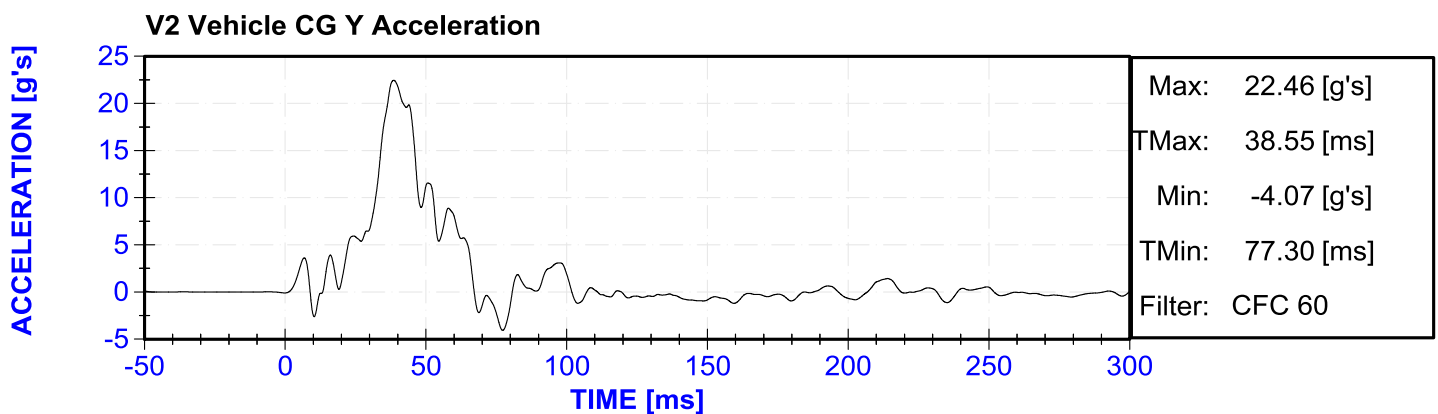
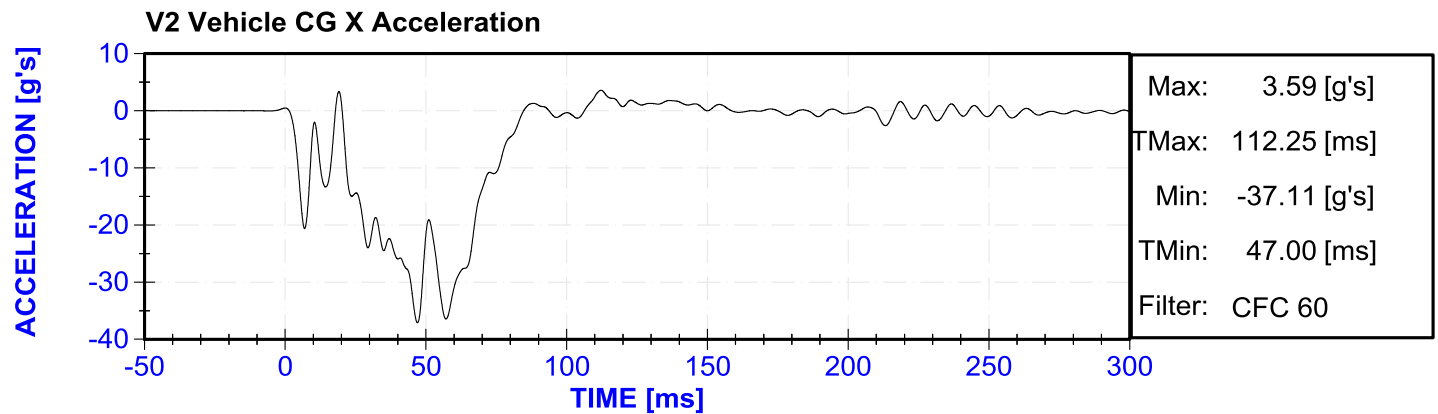
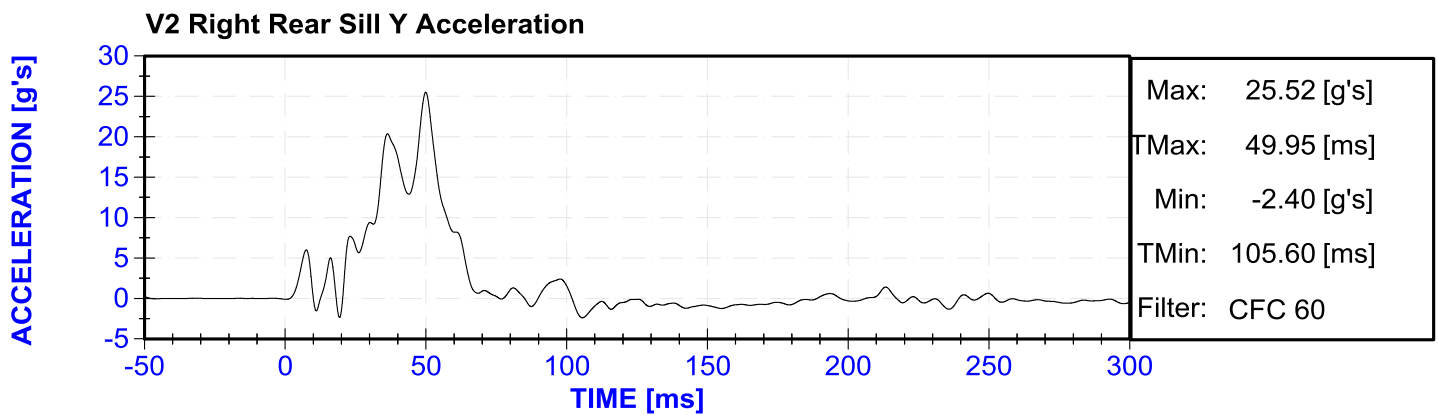
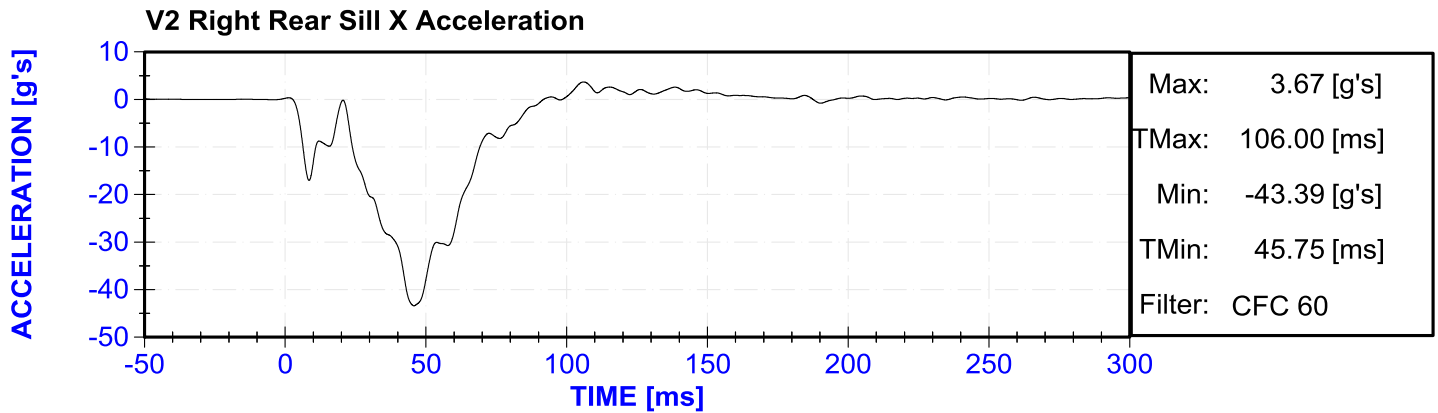


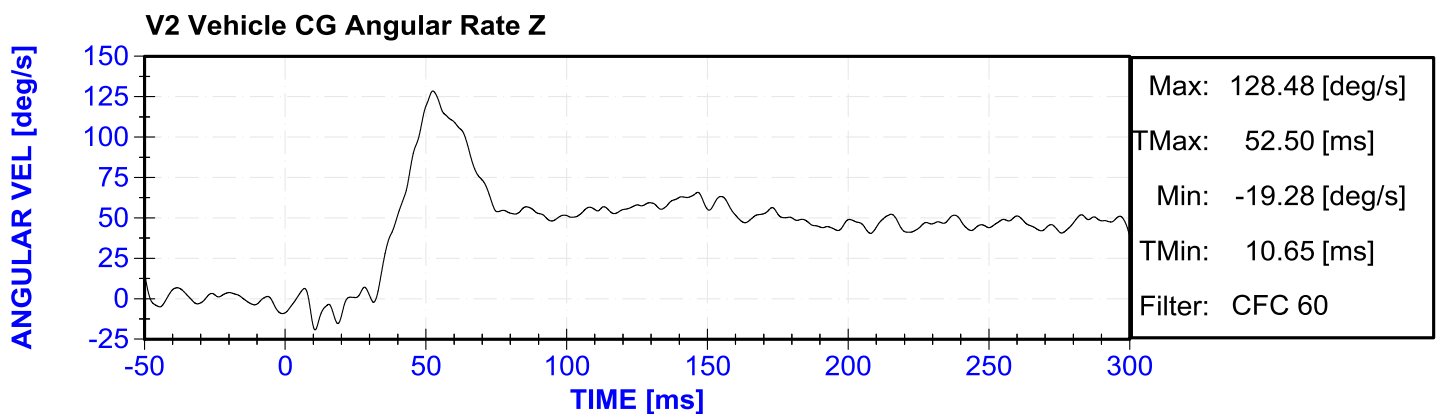
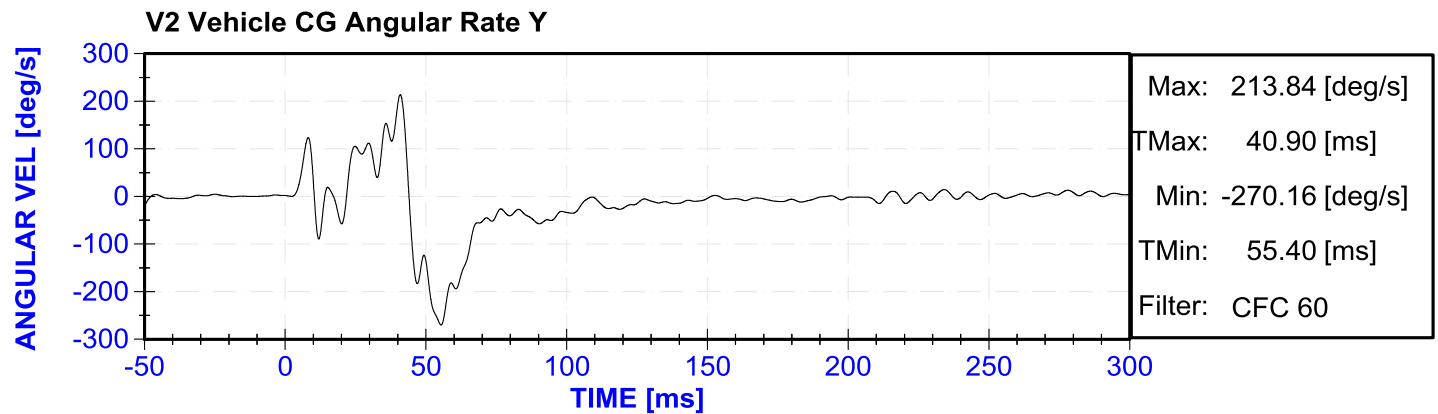
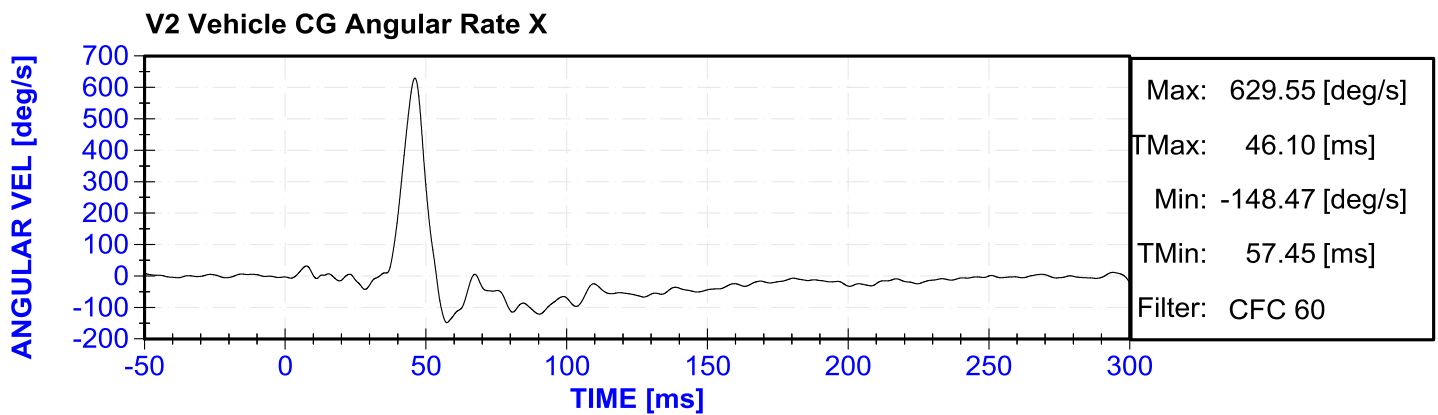
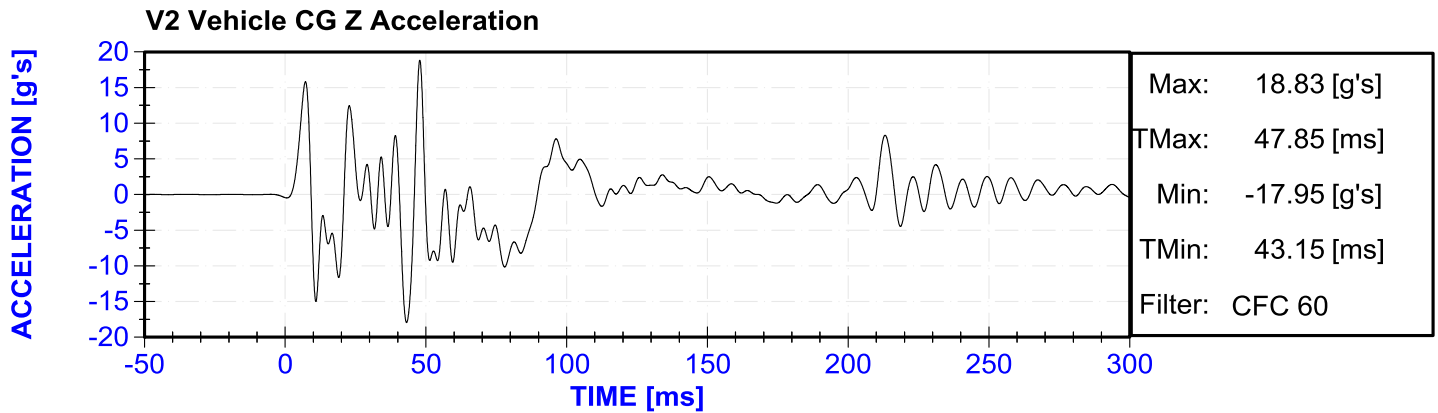


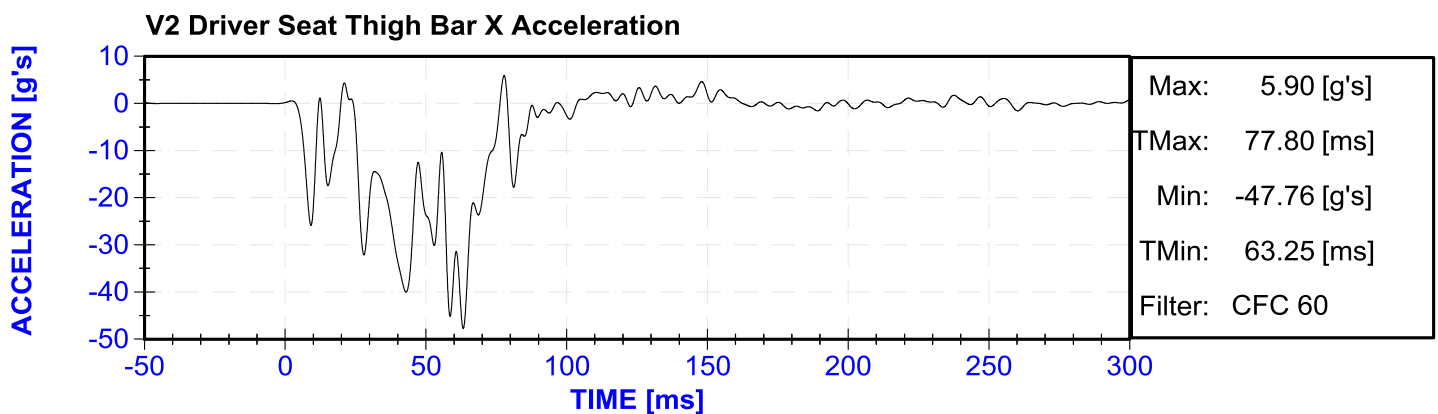
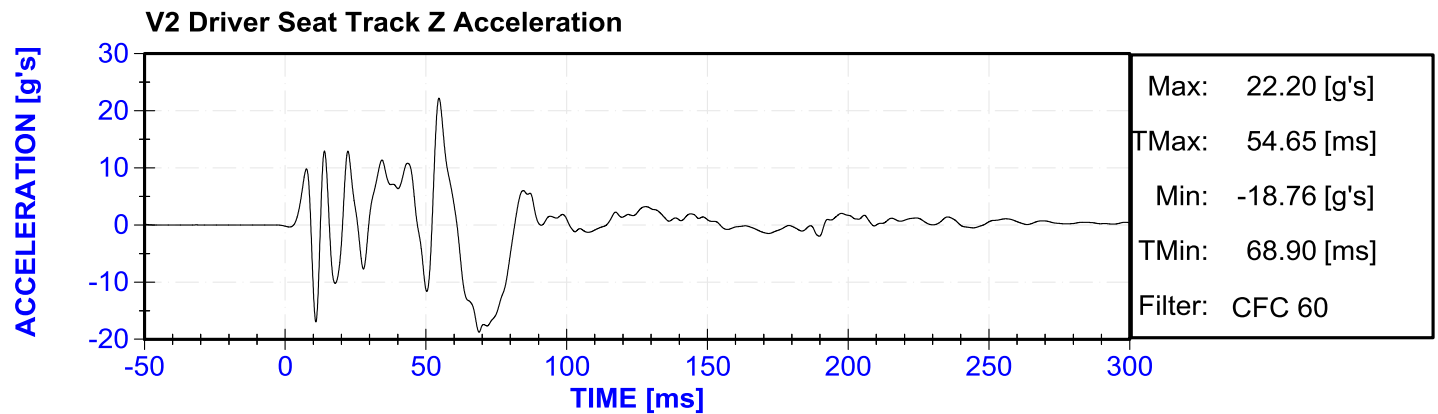
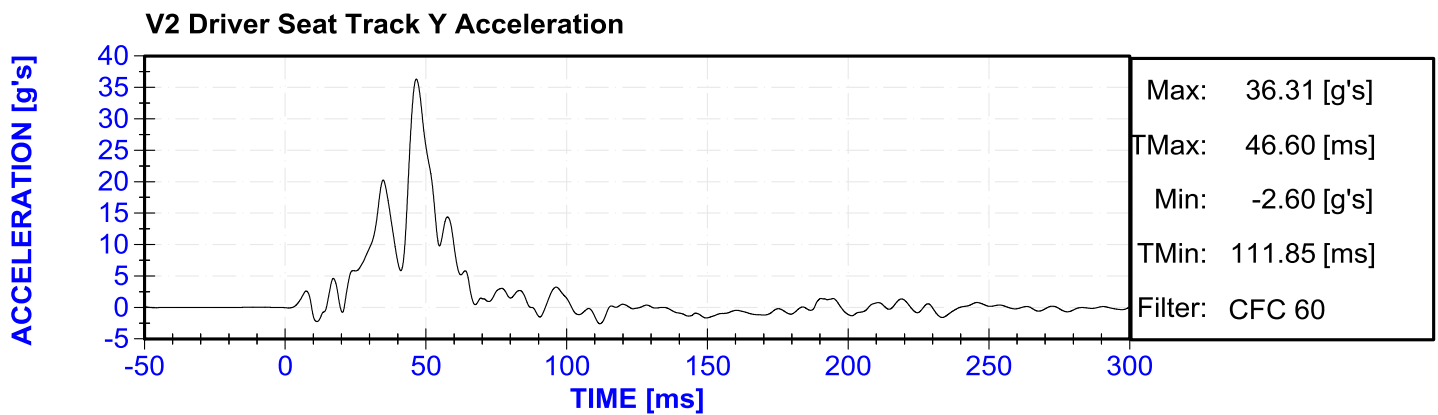
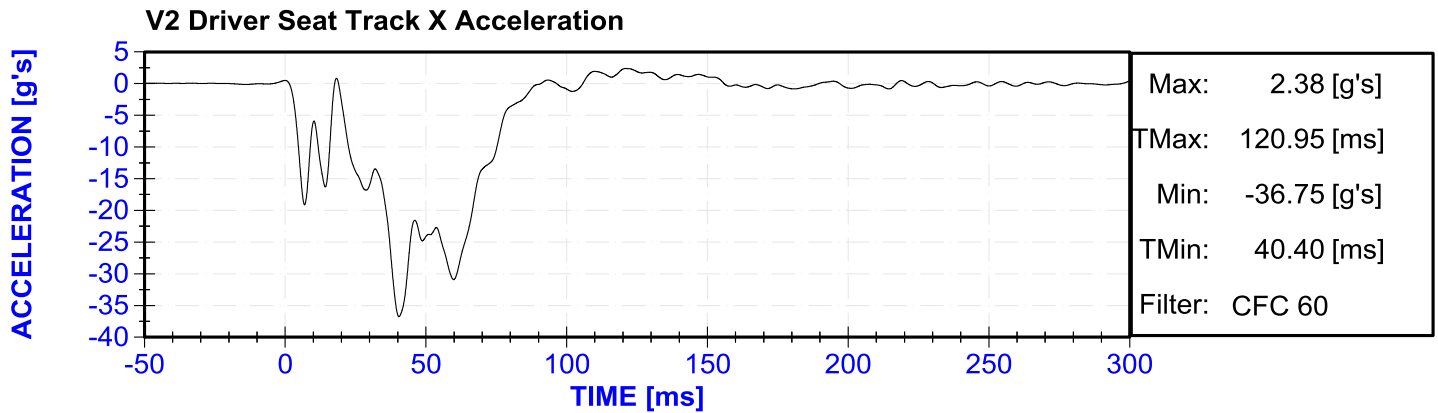




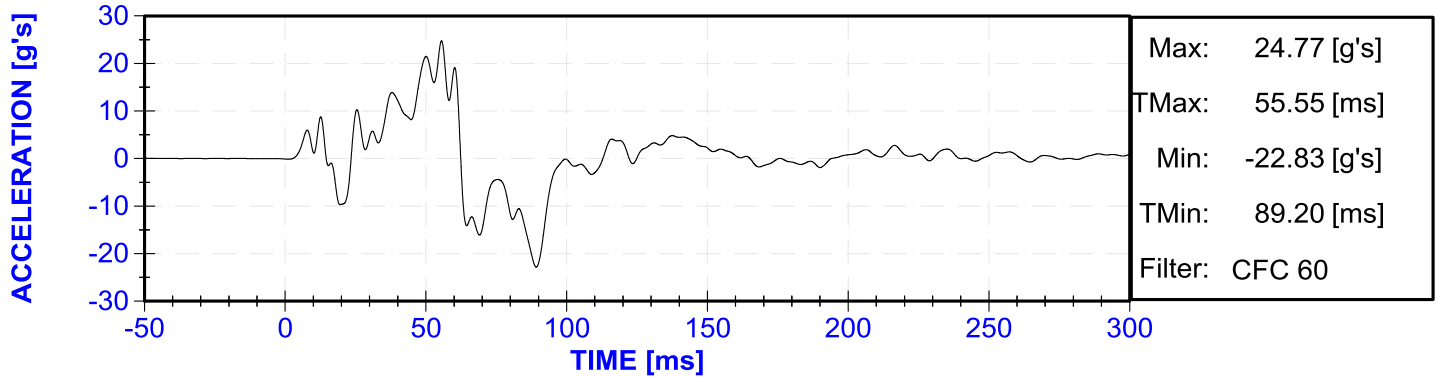




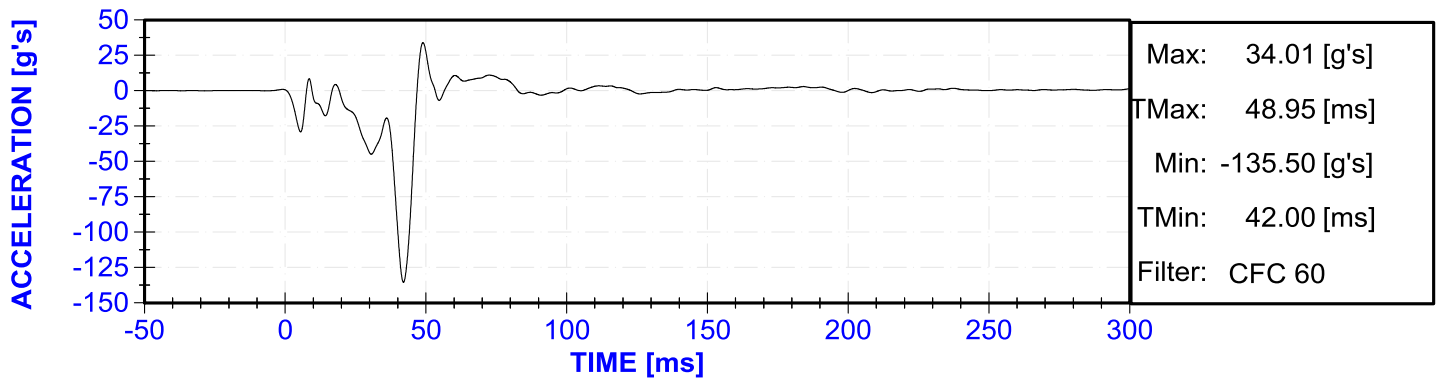




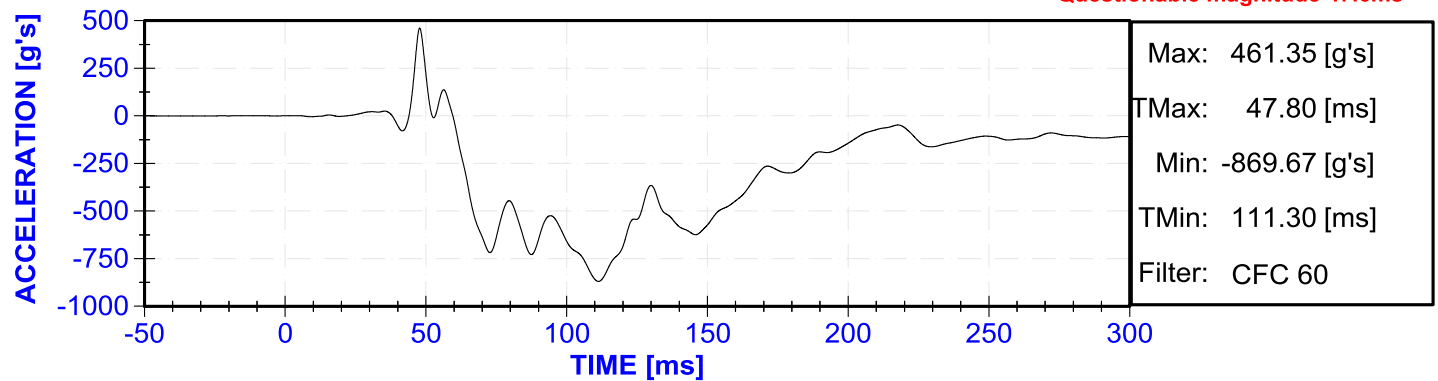
V2 Driver Seat Thigh Bar Z Acceleration



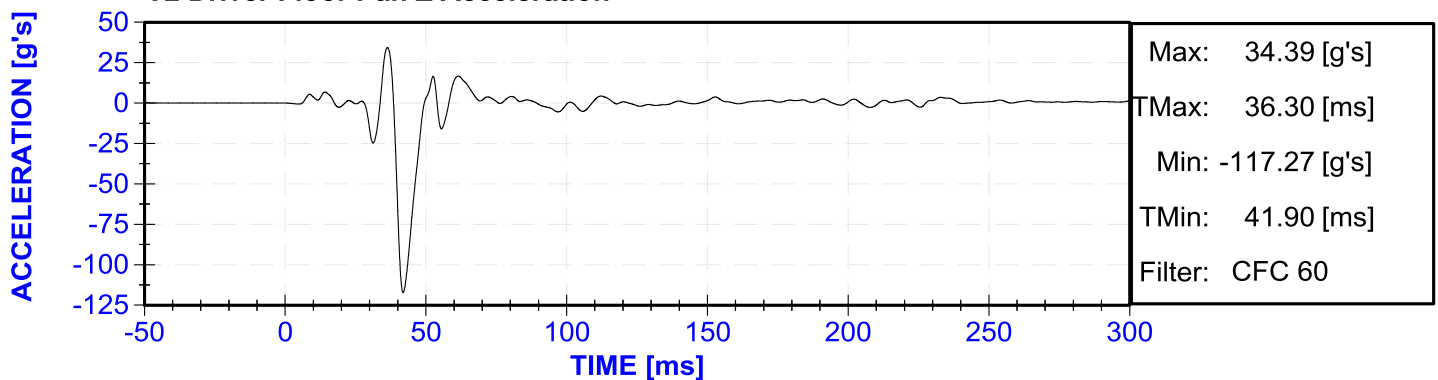
V2 Driver Floor Pan X Acceleration

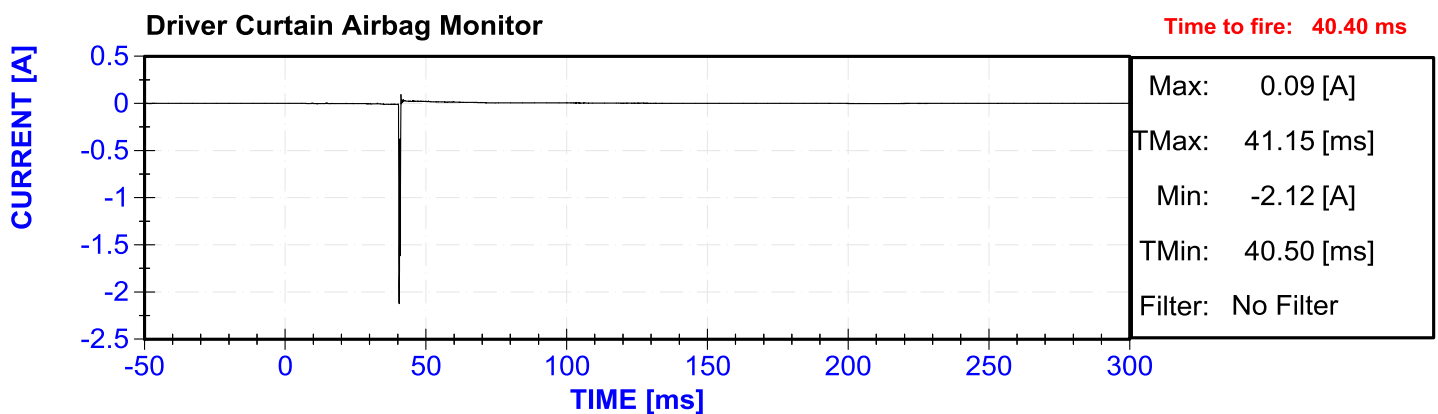
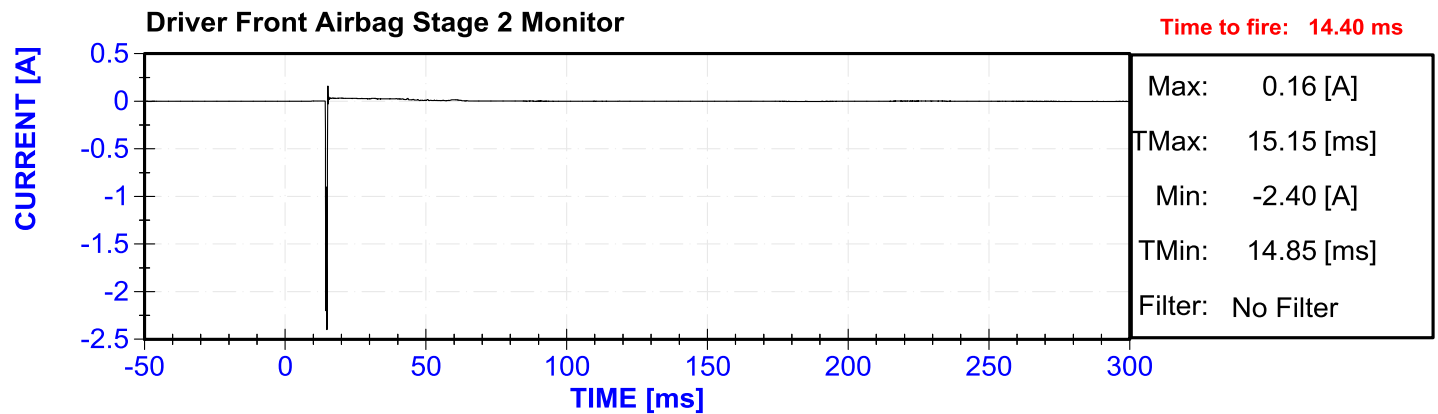
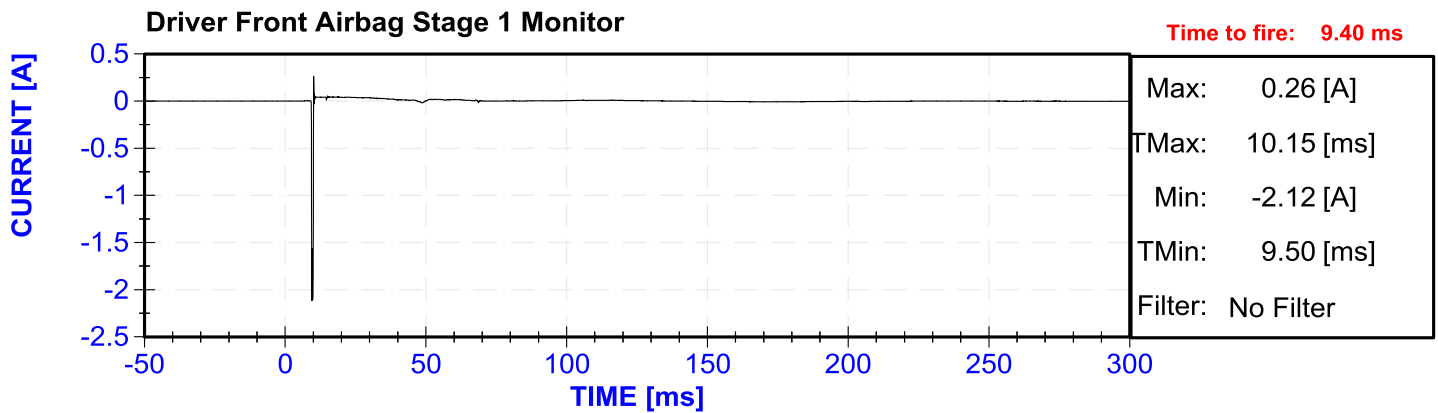
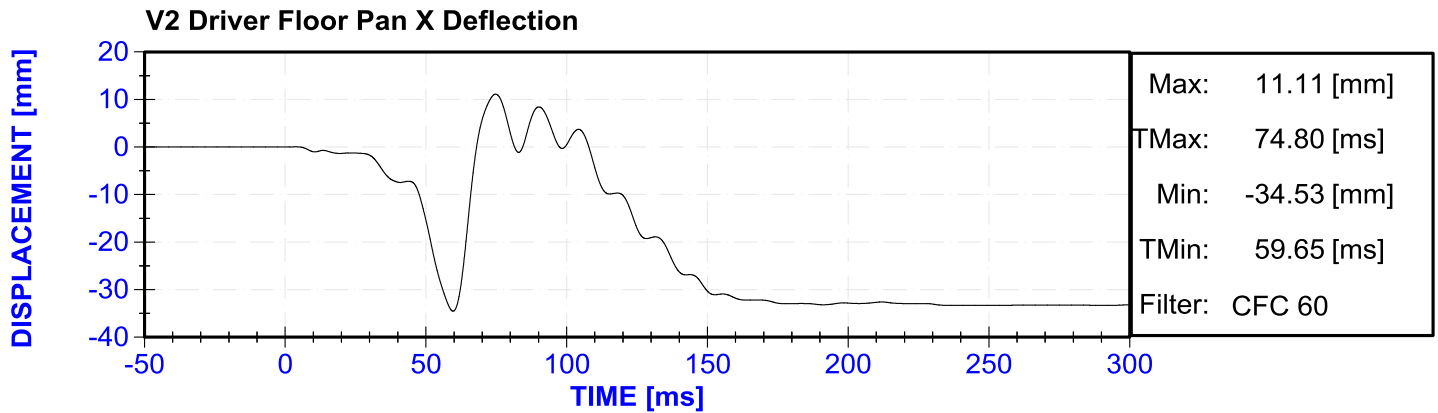


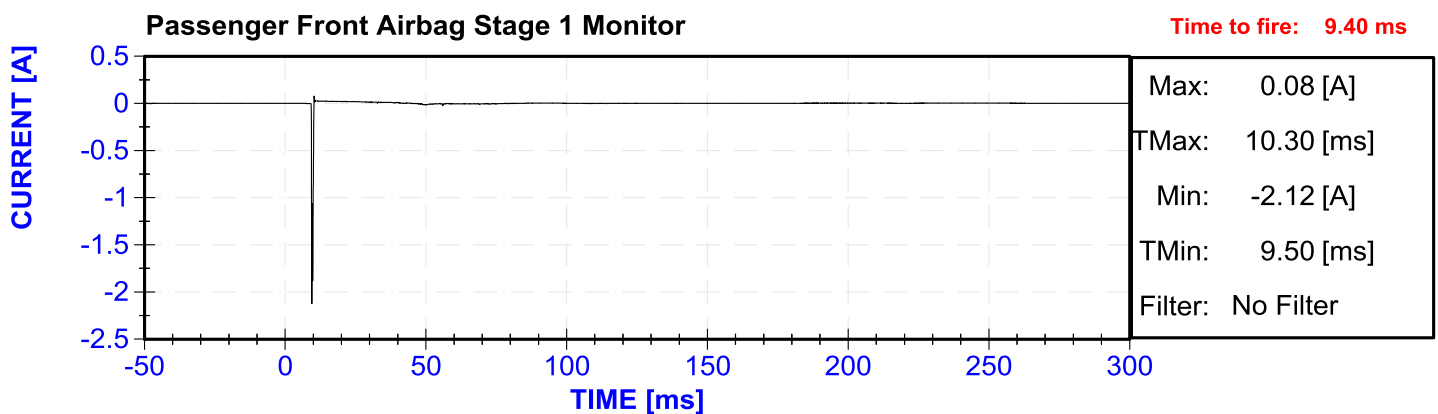
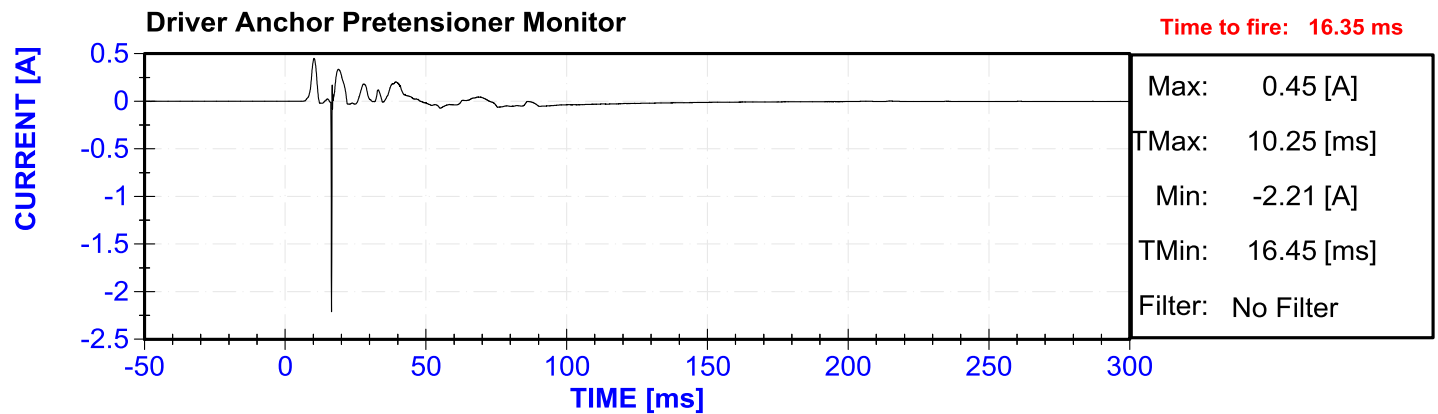
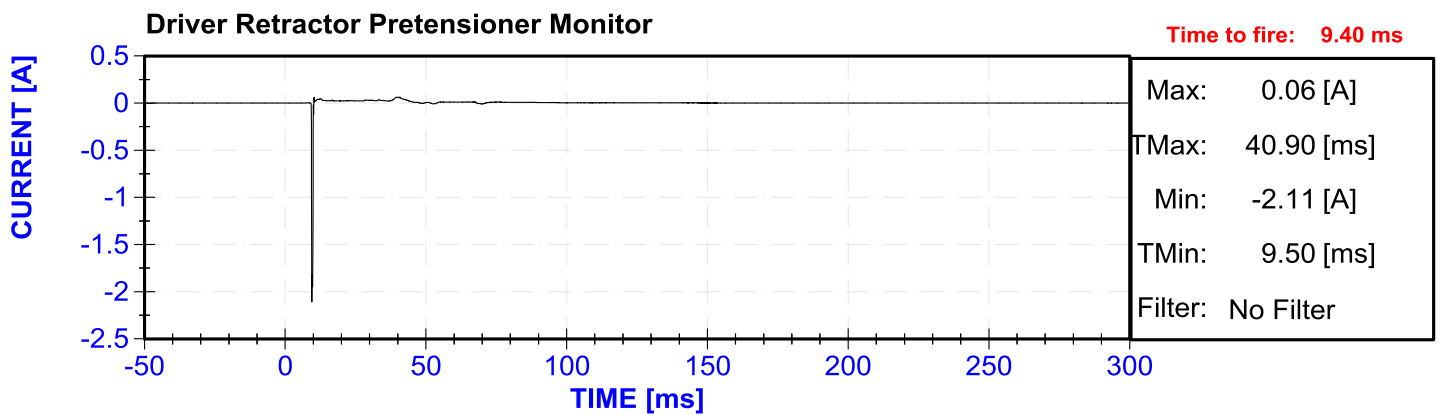
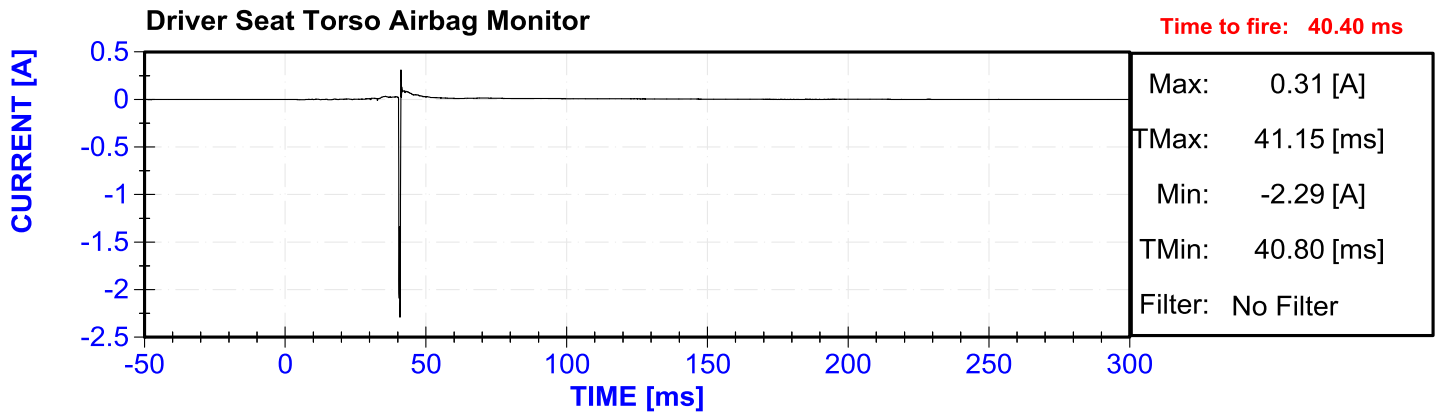
V2 Driver Floor Pan Y Acceleration

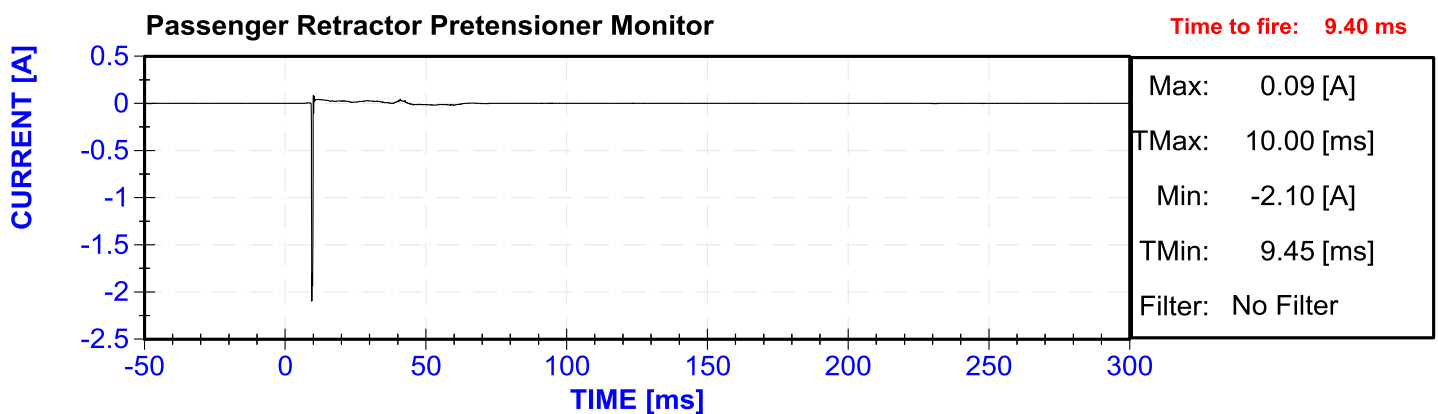
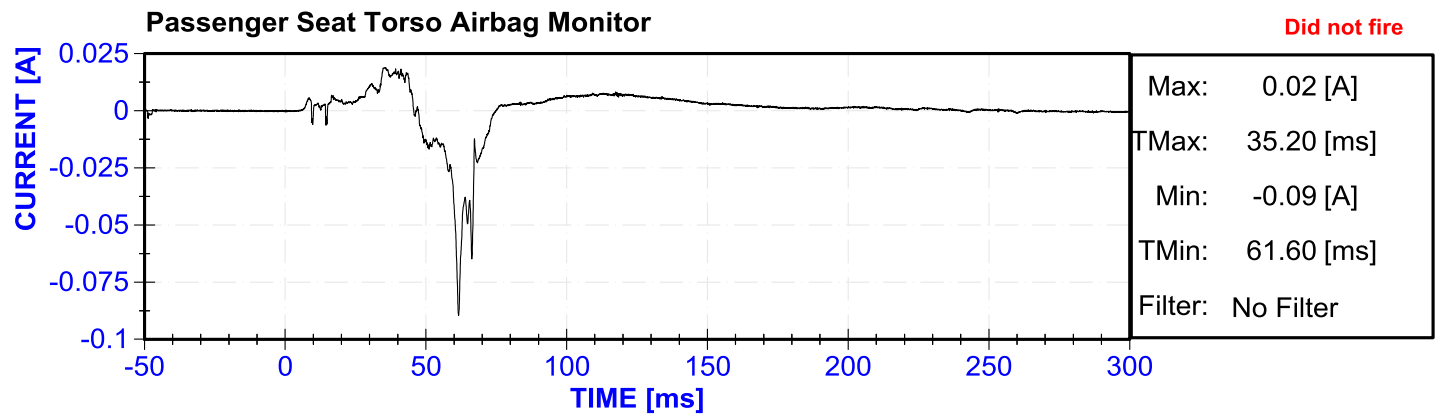
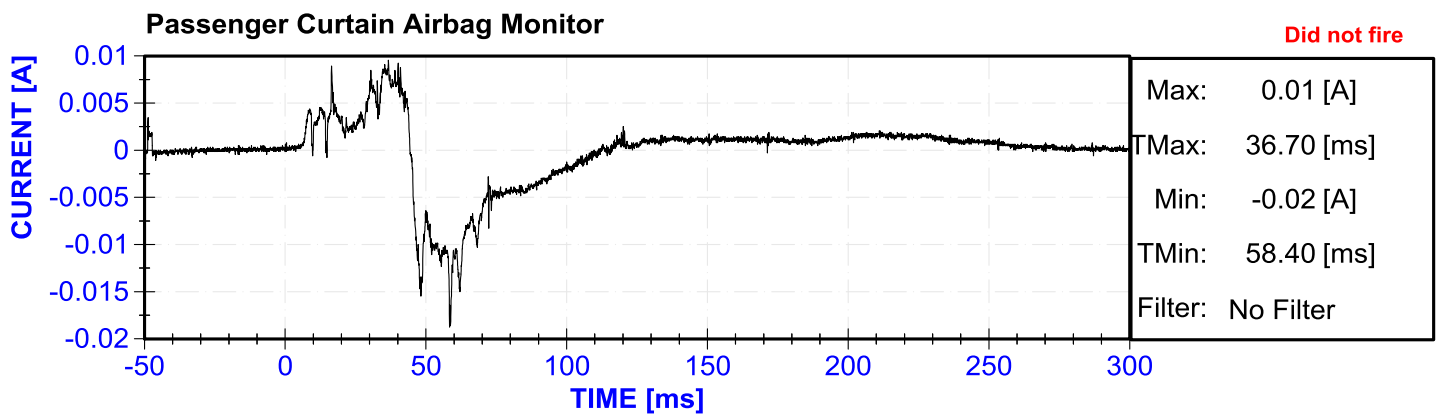
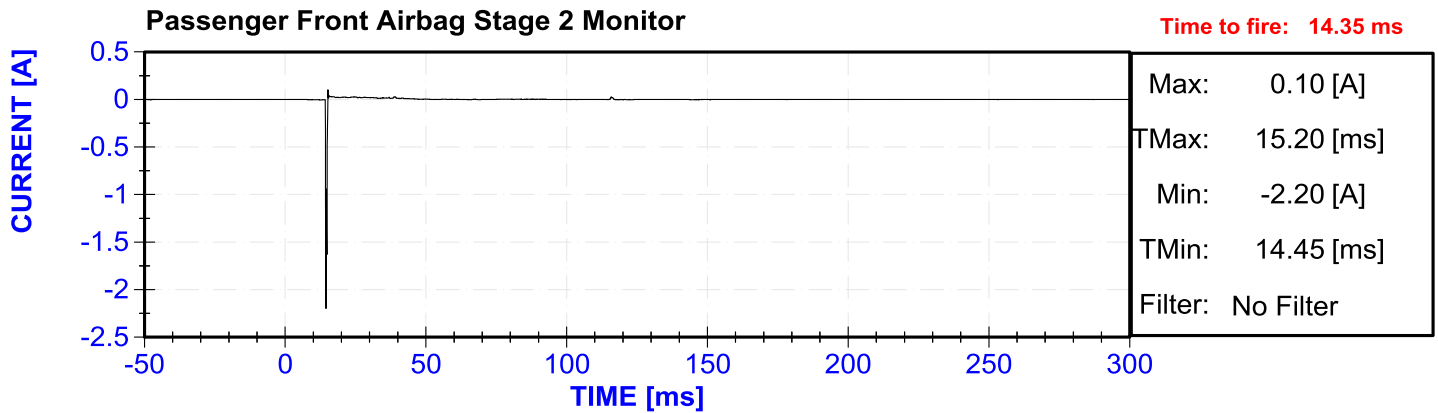


V2 Driver Floor Pan Z Acceleration



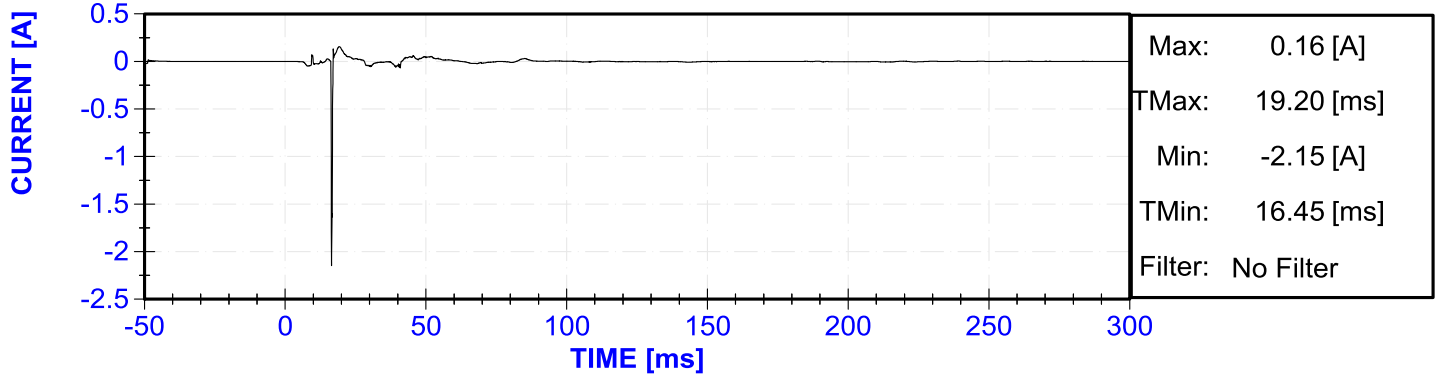




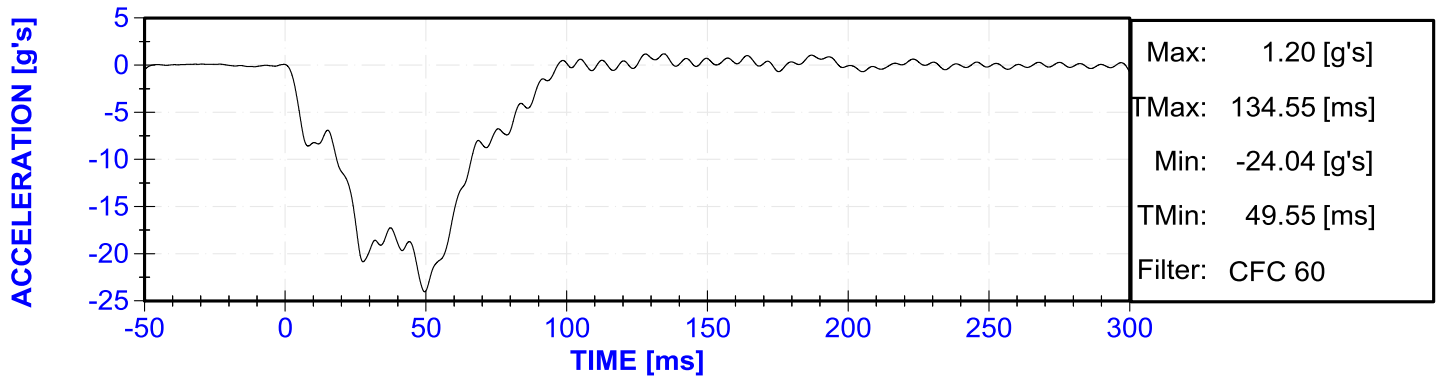


Passenger Anchor Pretensioner Monitor

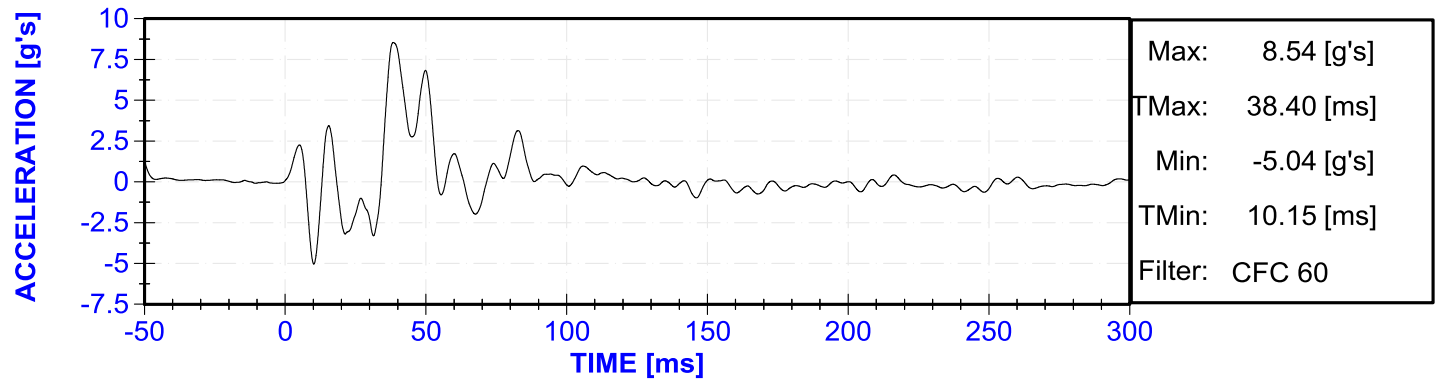
Time to fire: 16.35 ms



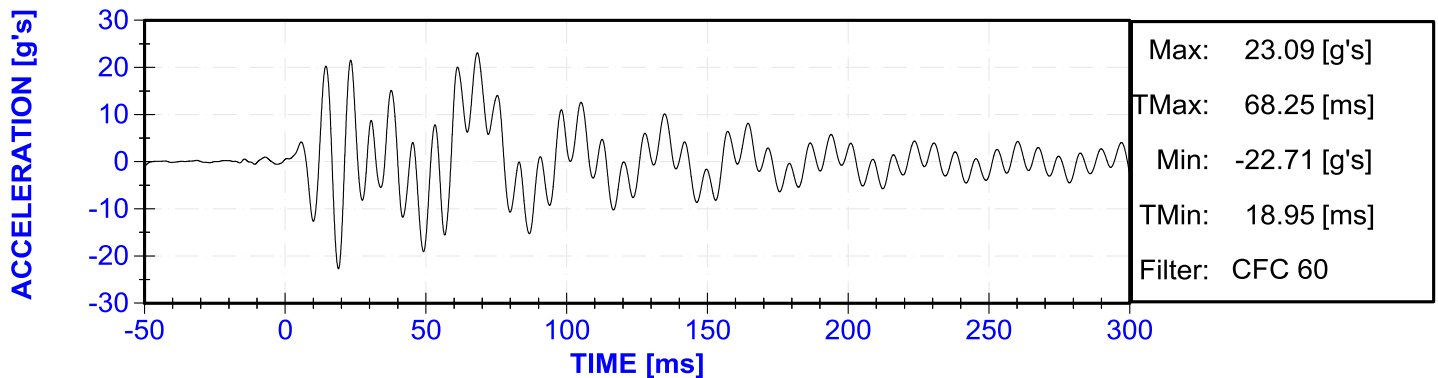
V1 OMDB CG X Acceleration

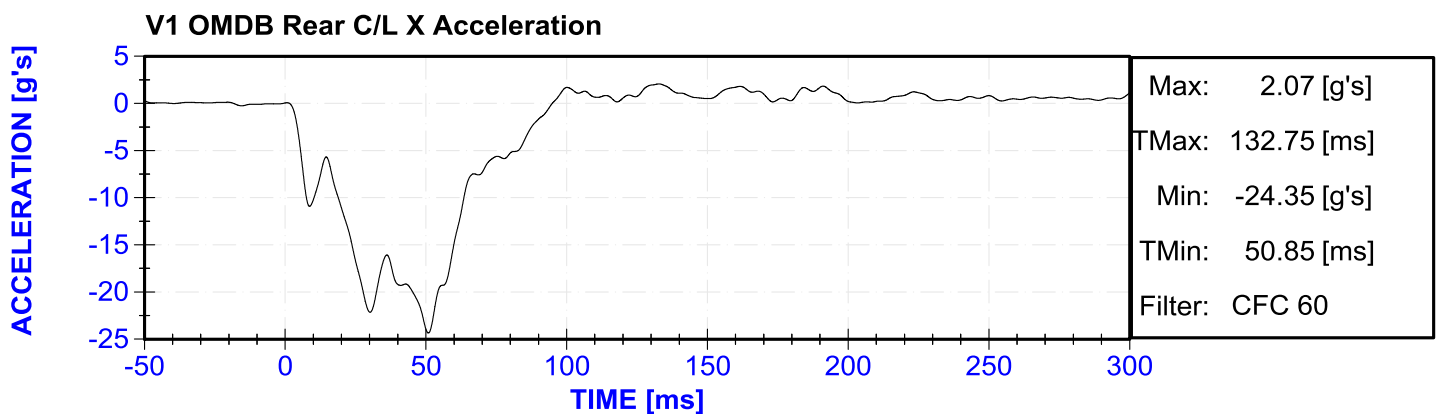
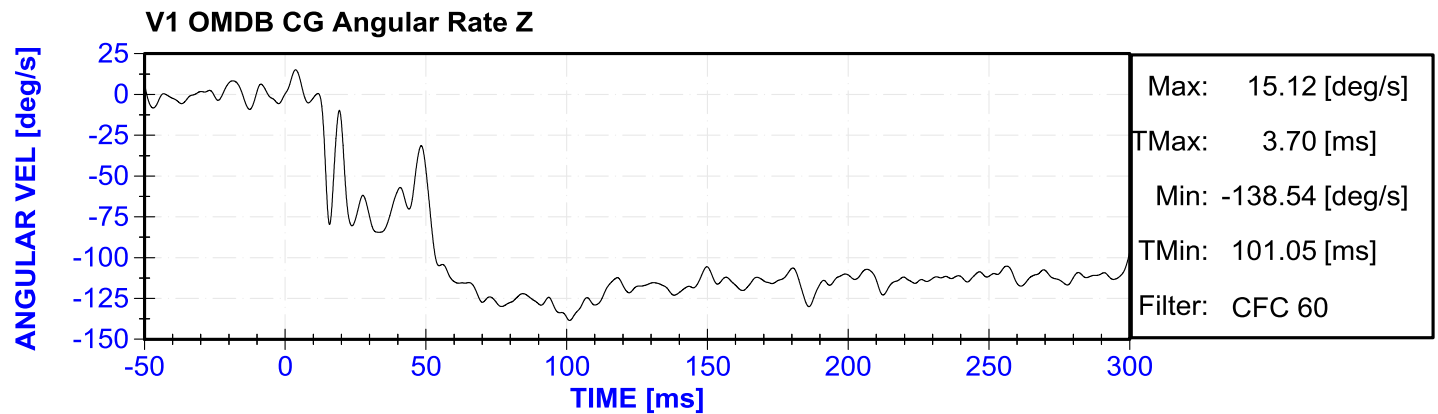
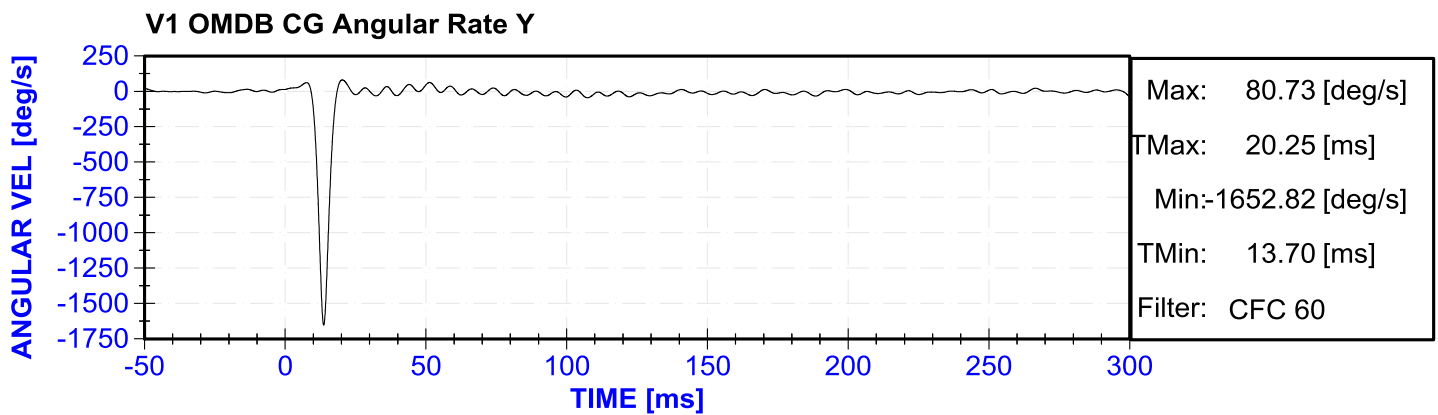
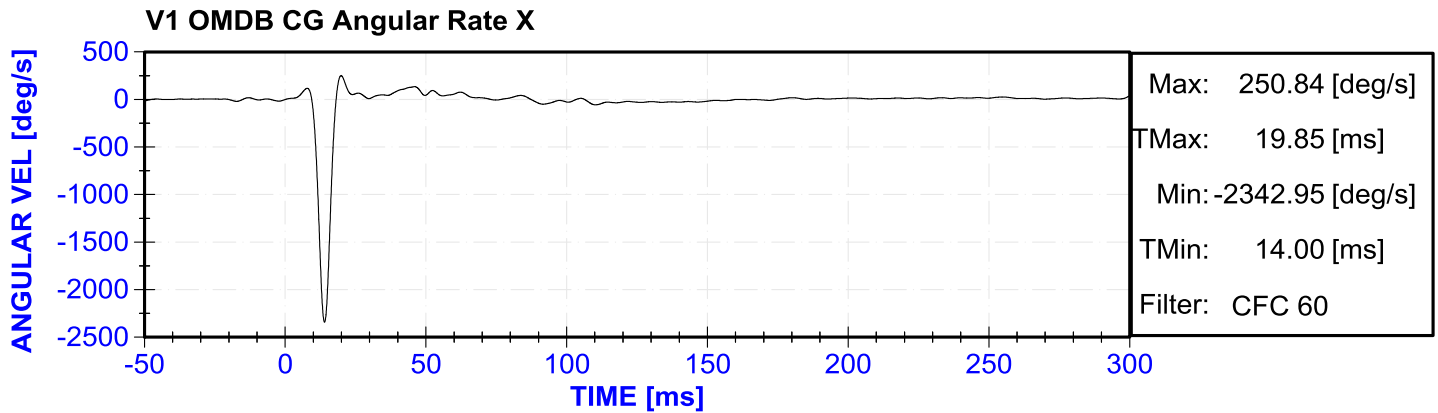


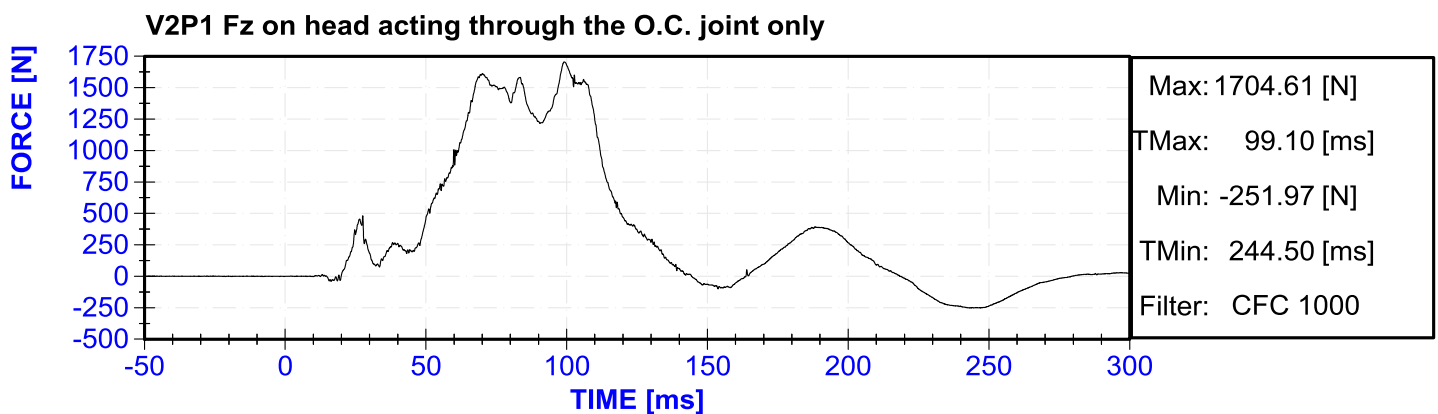
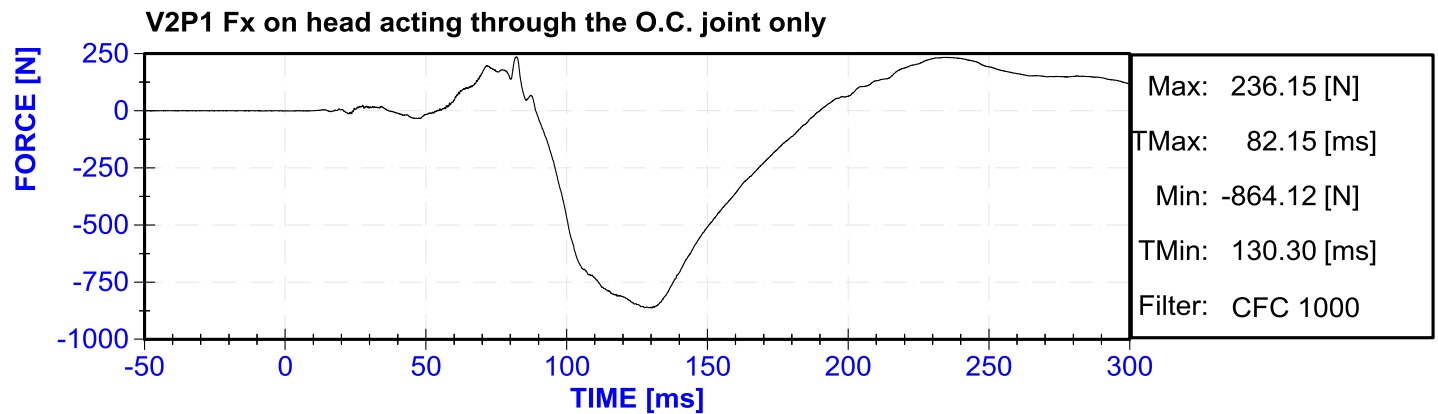
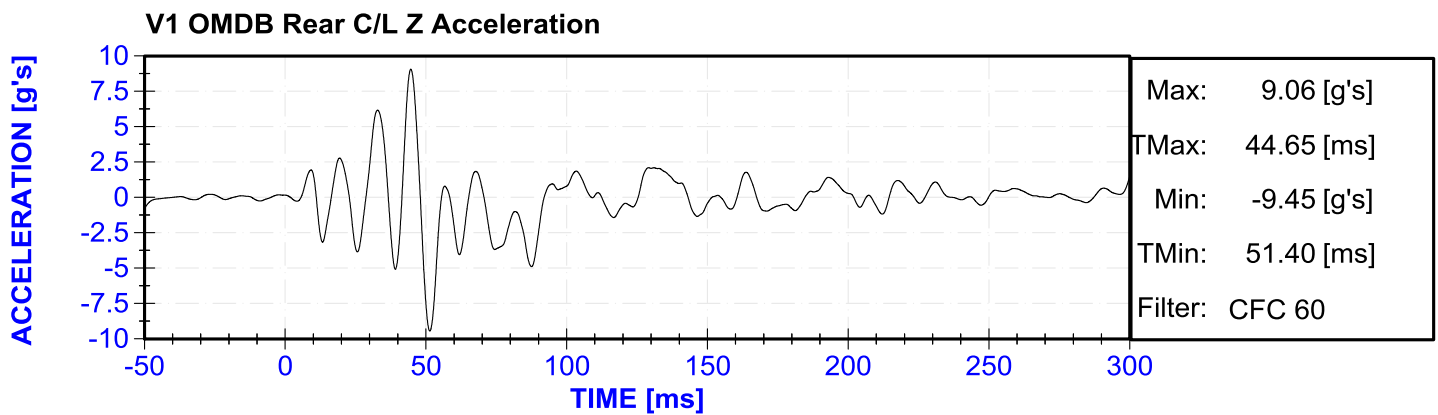
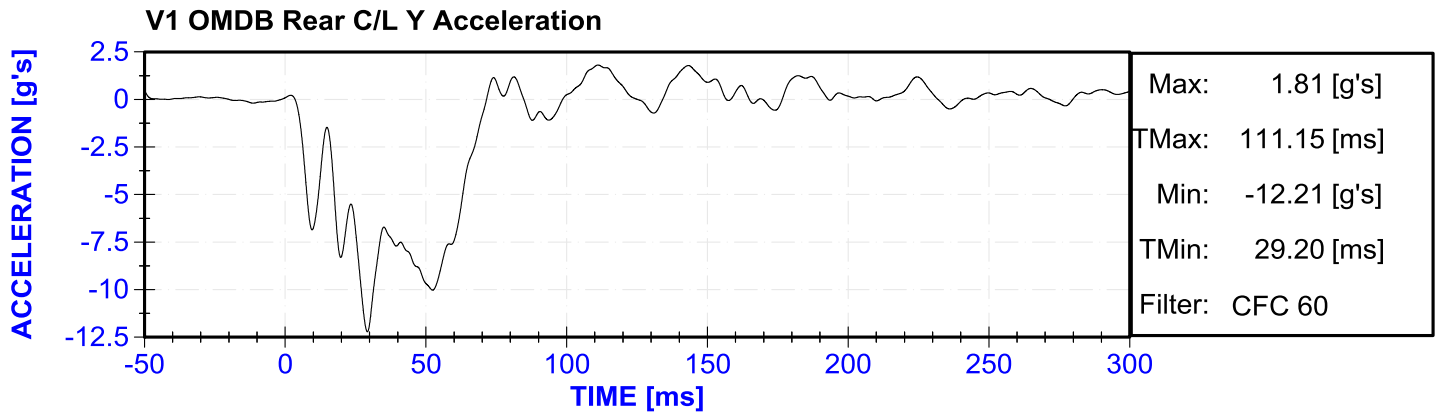
V1 OMDB CG Y Acceleration

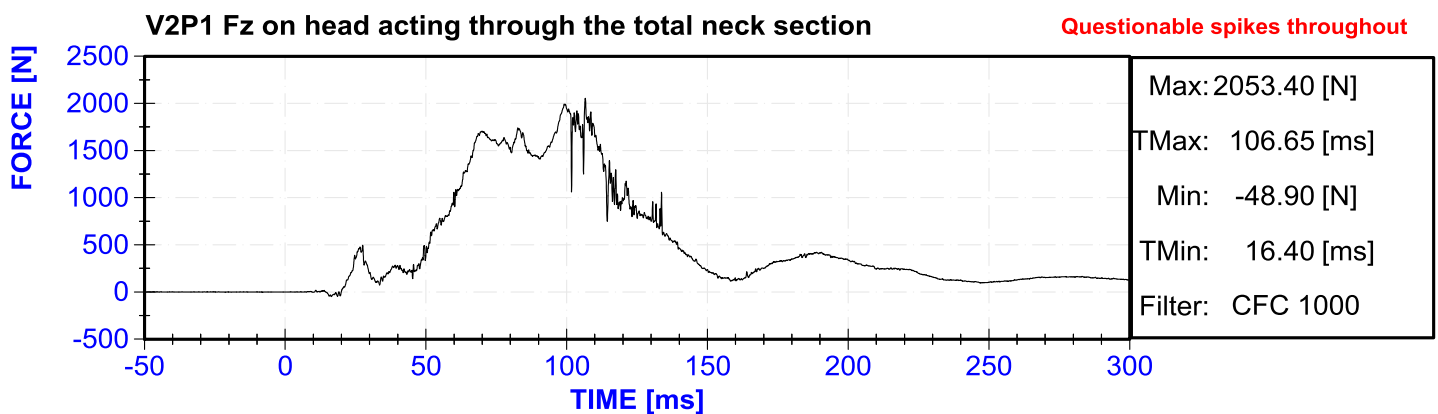
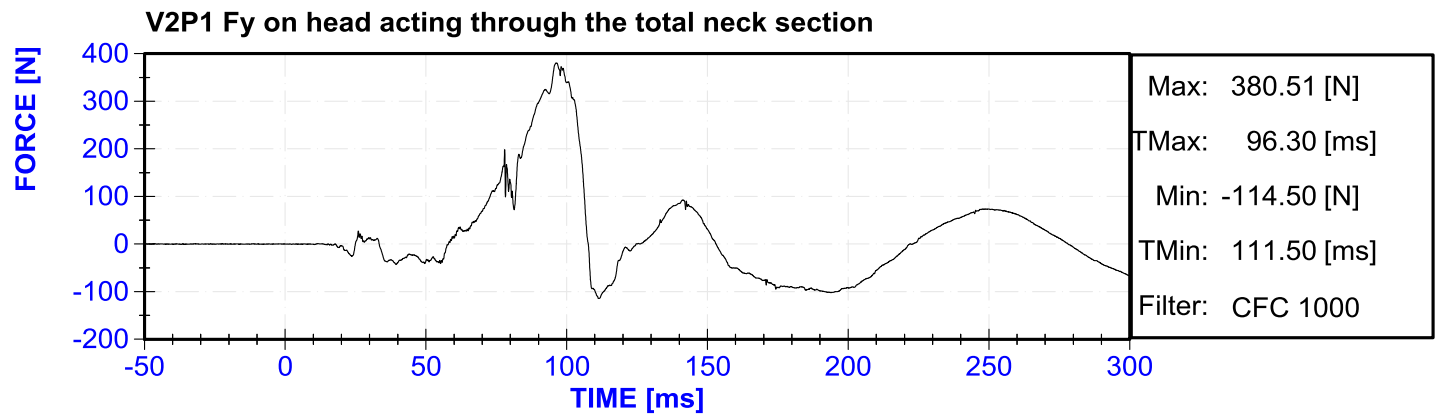
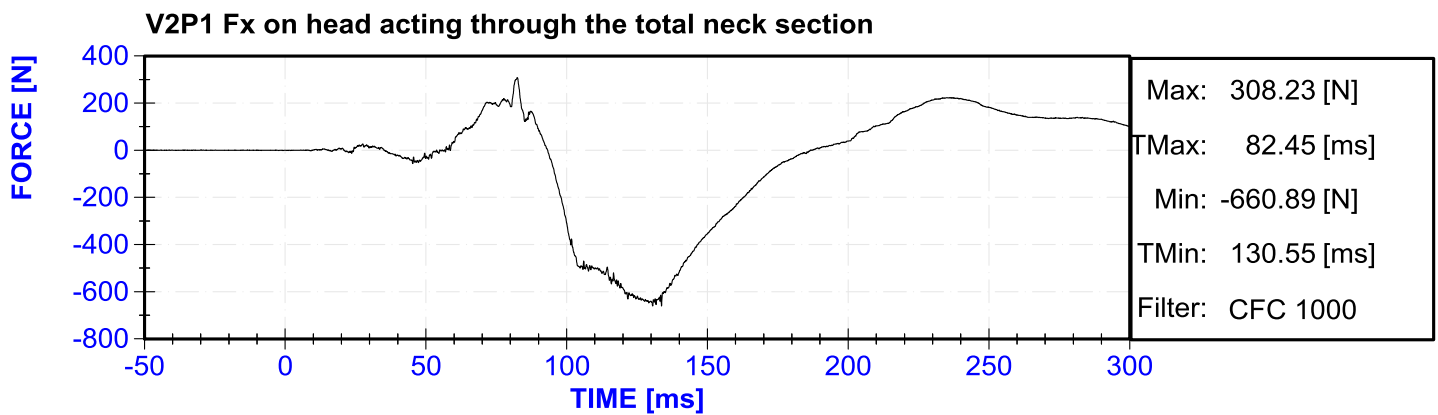
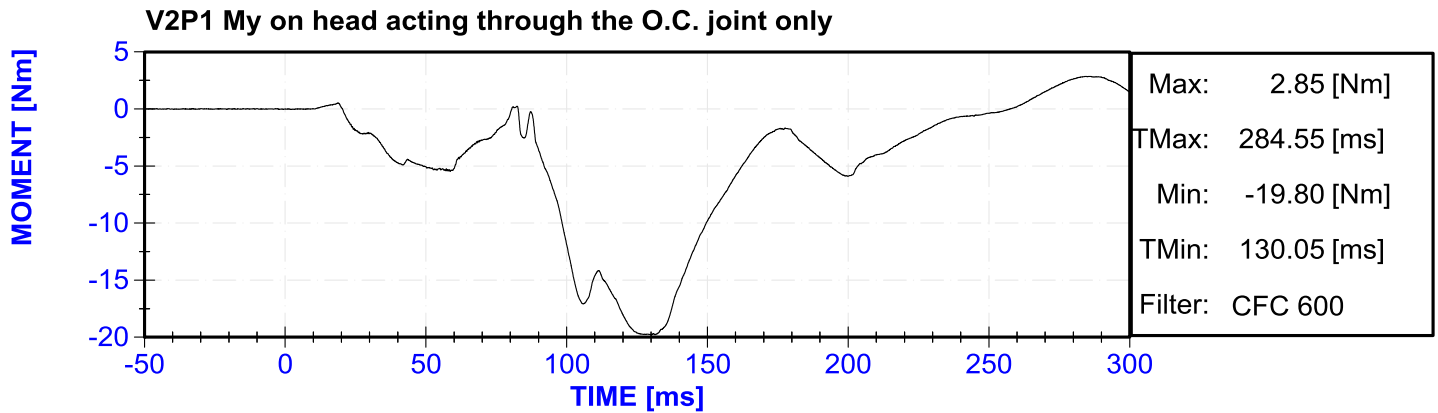


V1 OMDB CG Z Acceleration

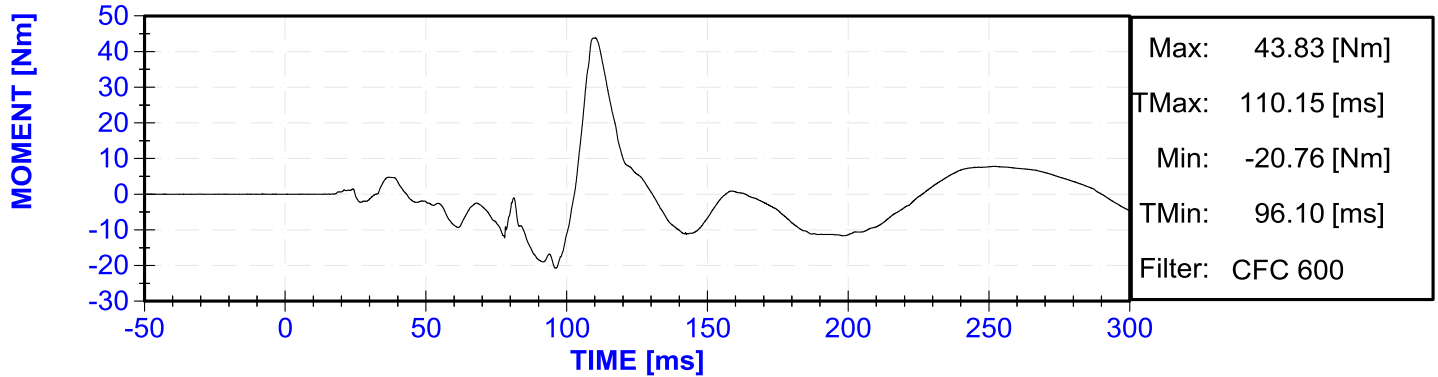




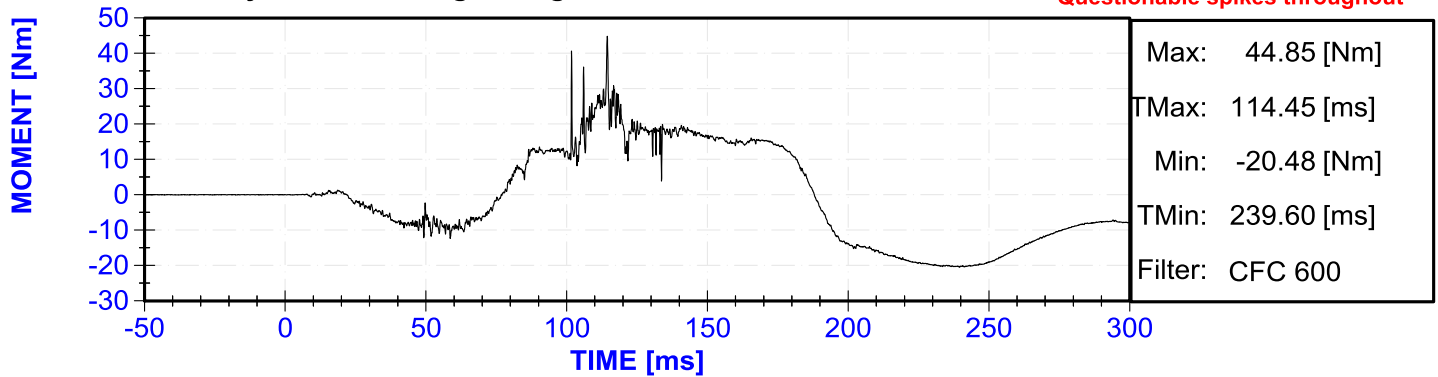




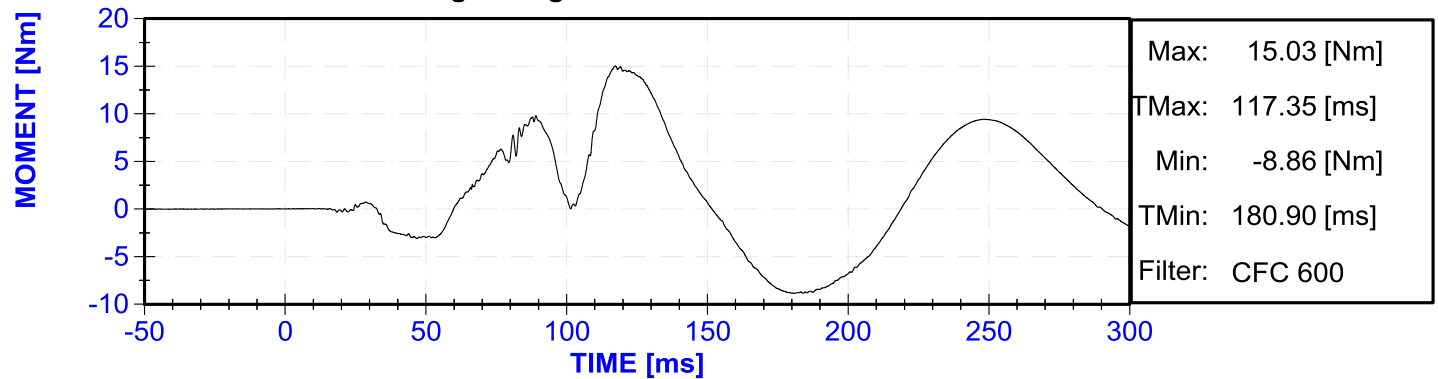
V2P1 Mx on head acting through the total neck section



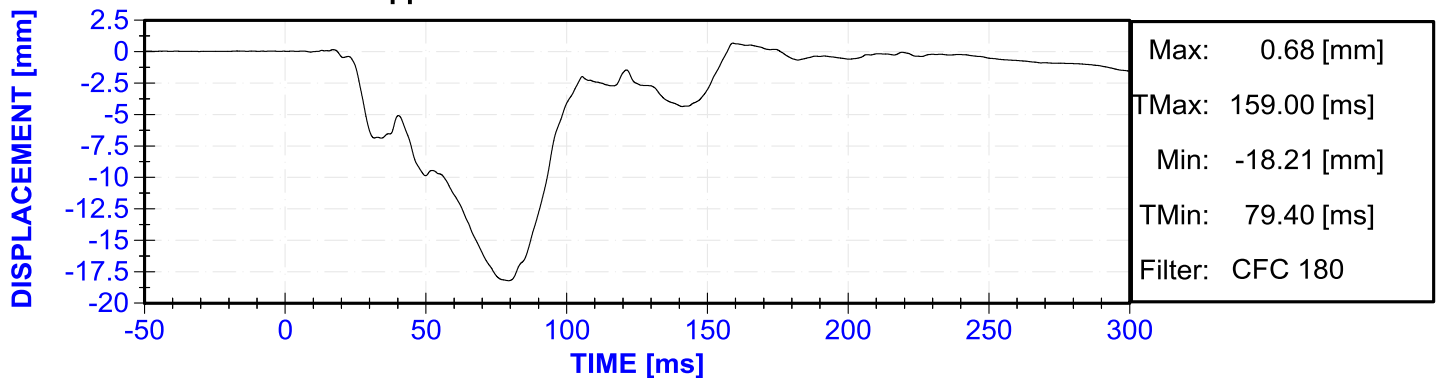
V2P1 My on head acting through the total neck section

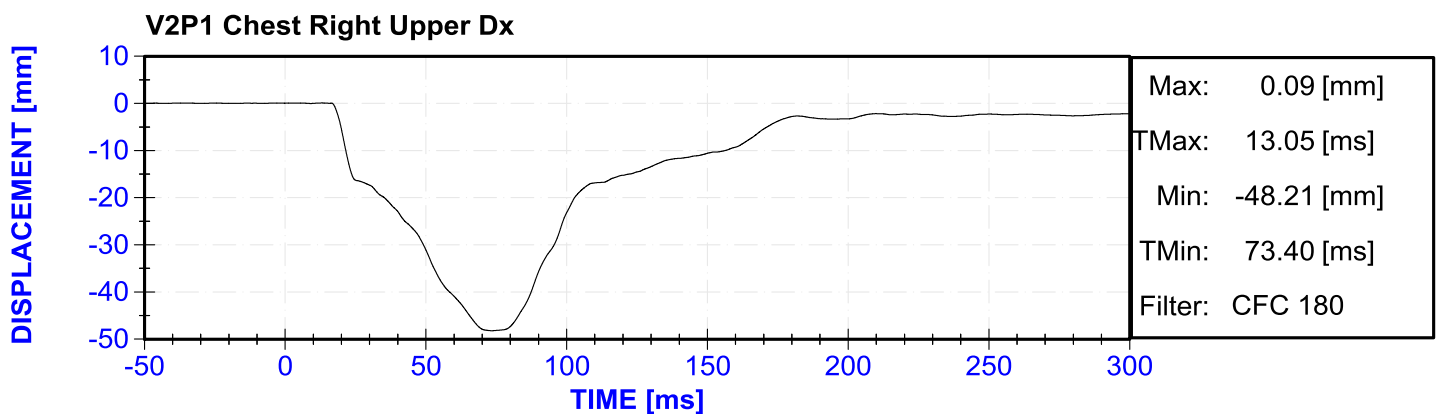
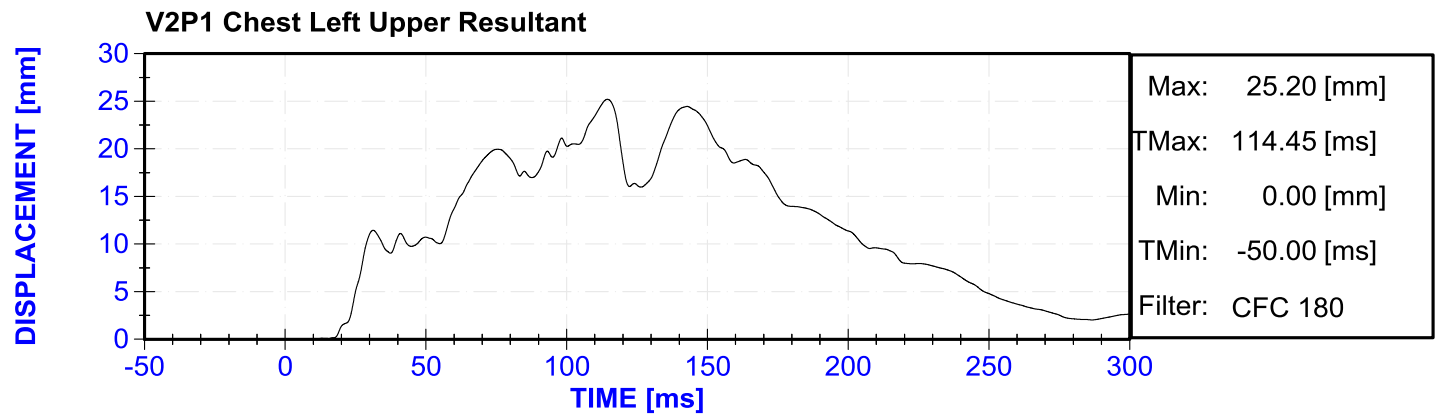
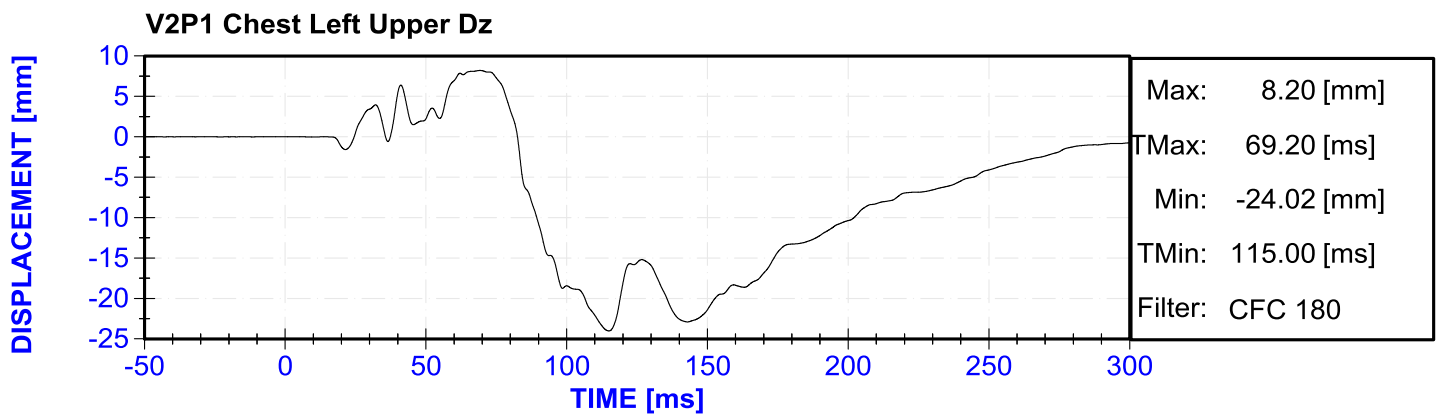
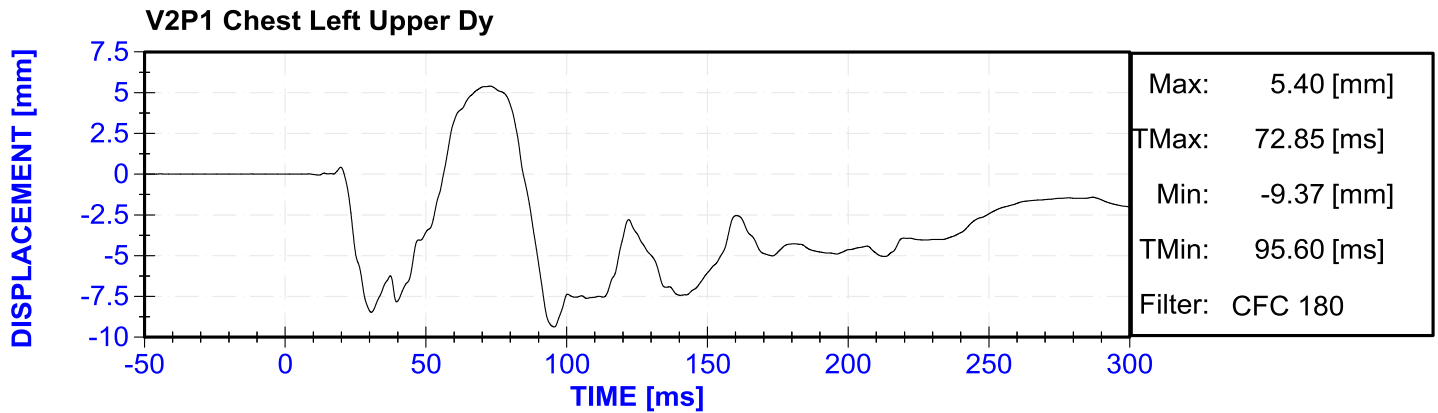


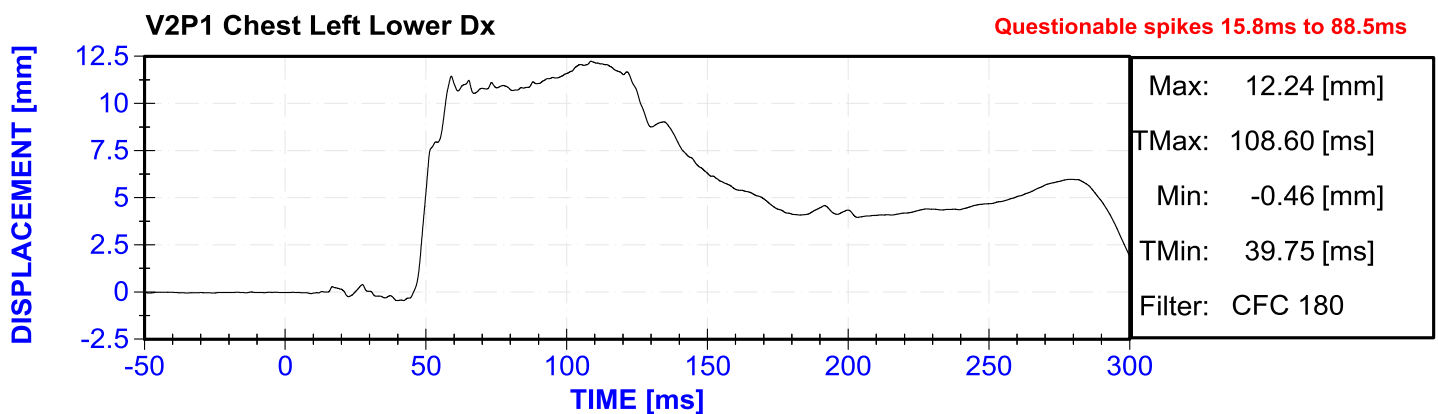
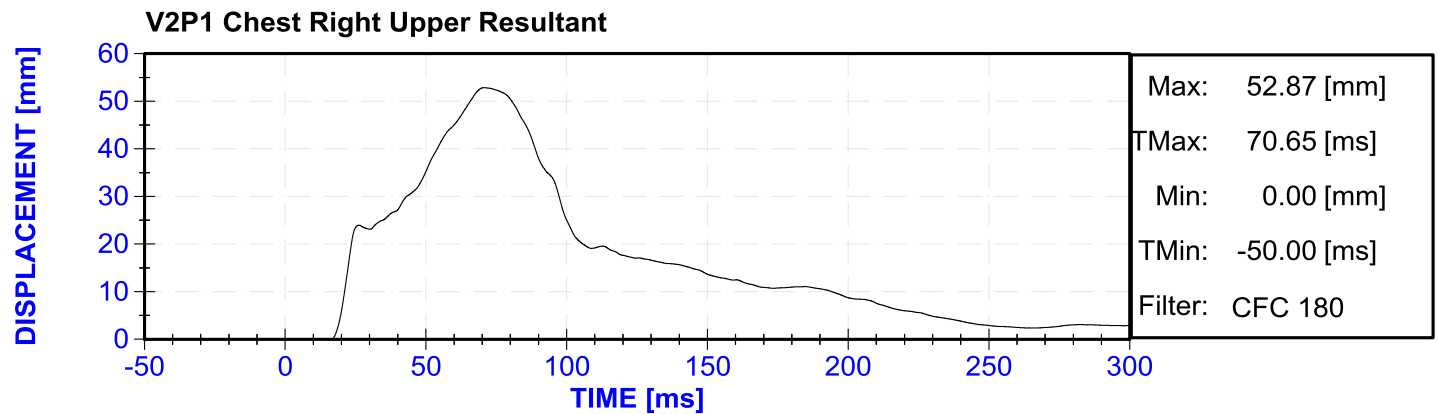
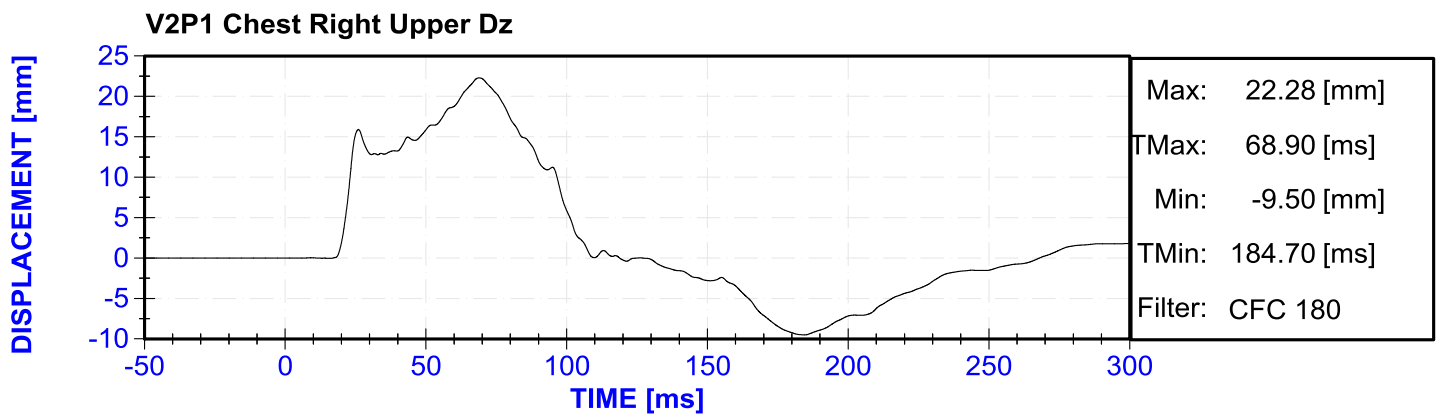
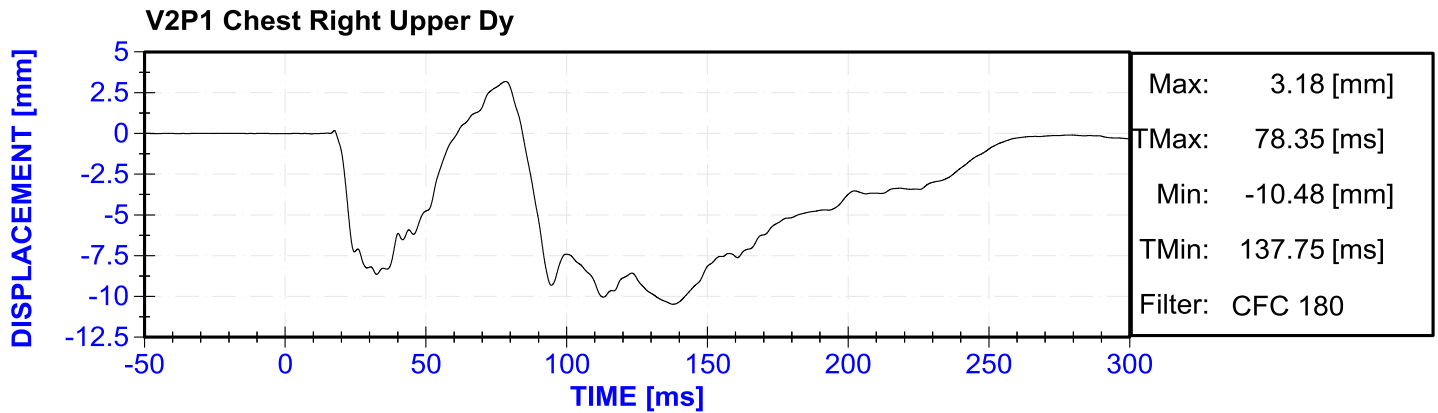
V2P1 Mz on head acting through the total neck section

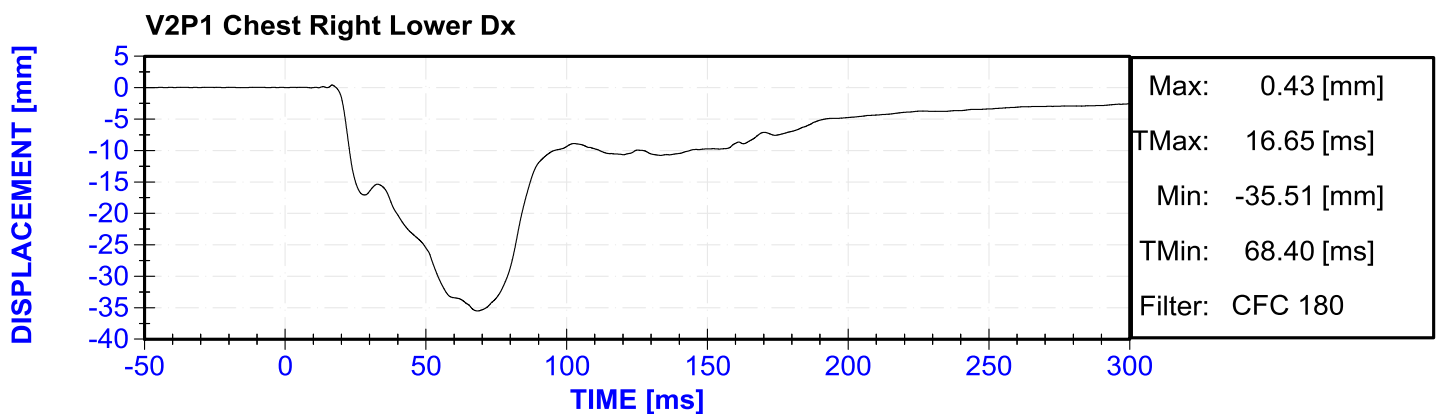
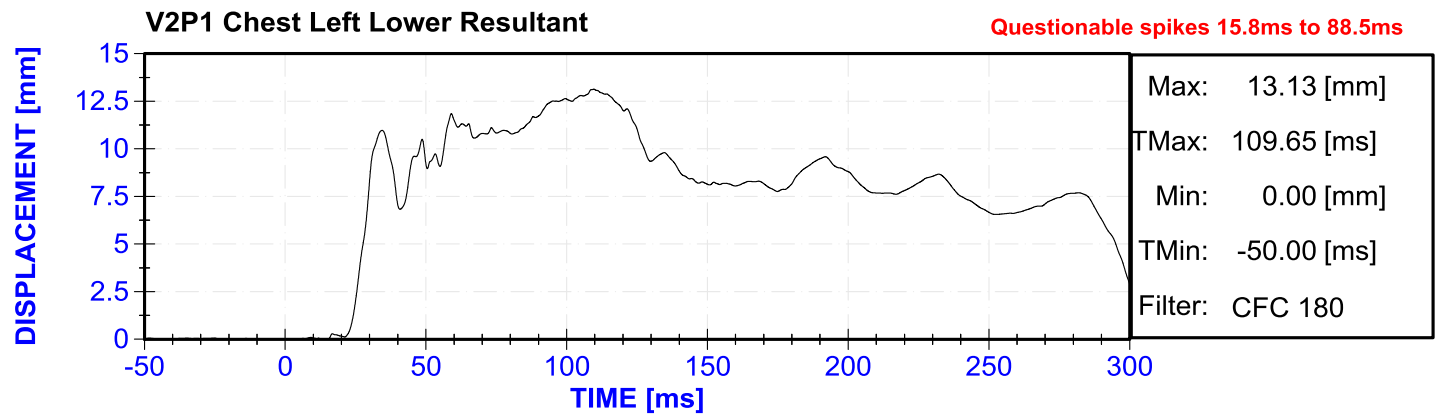
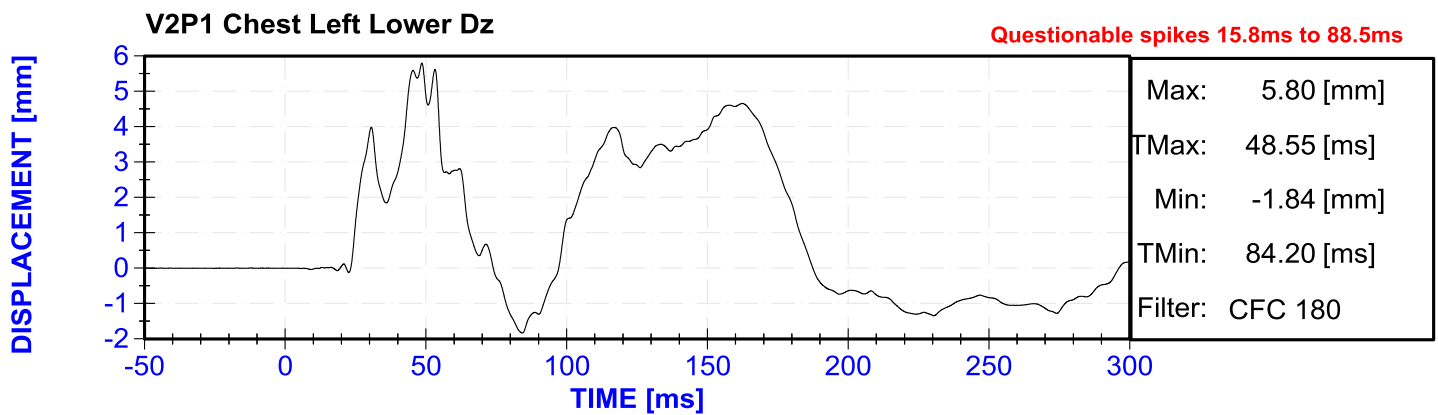
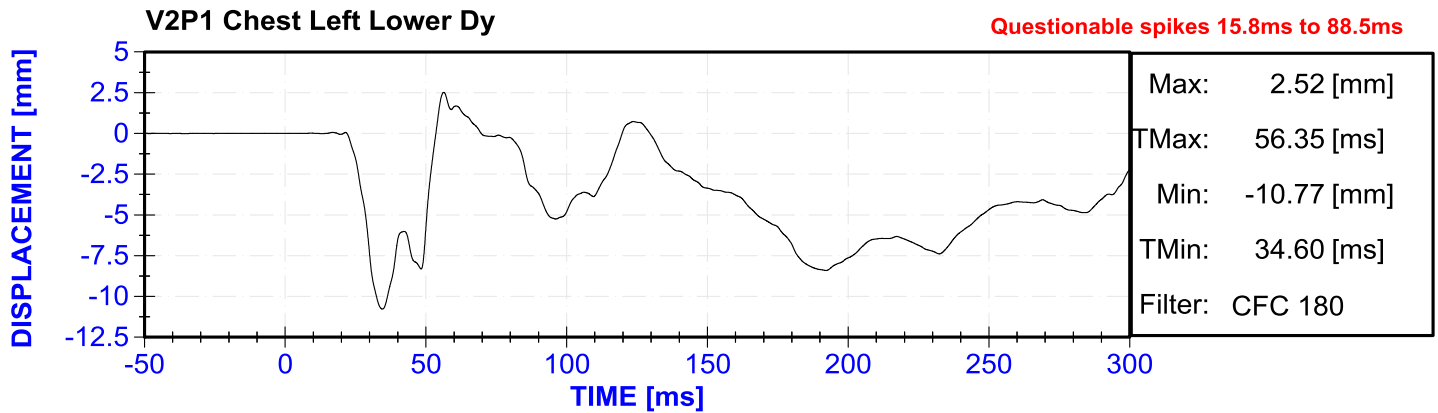


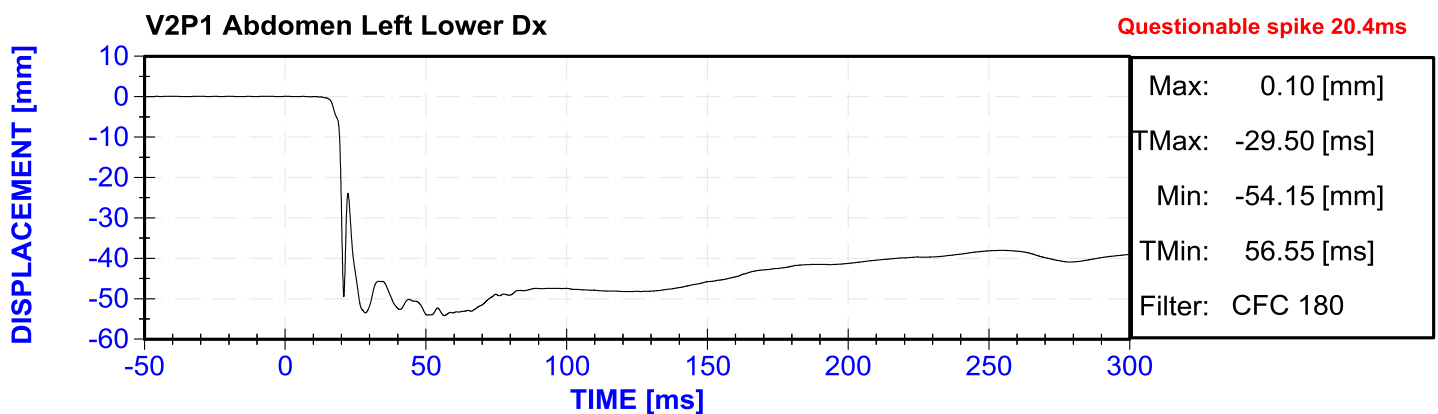
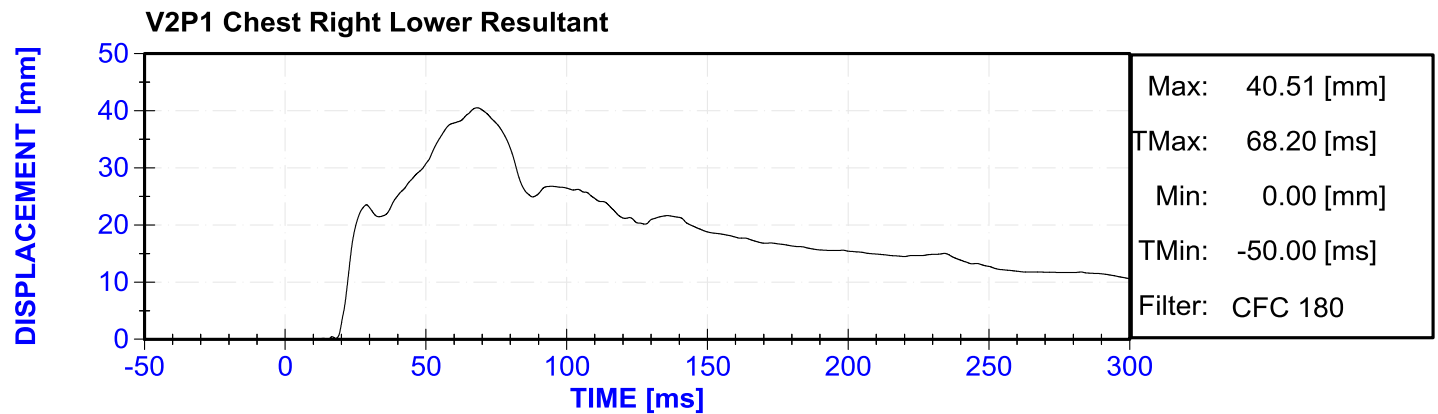
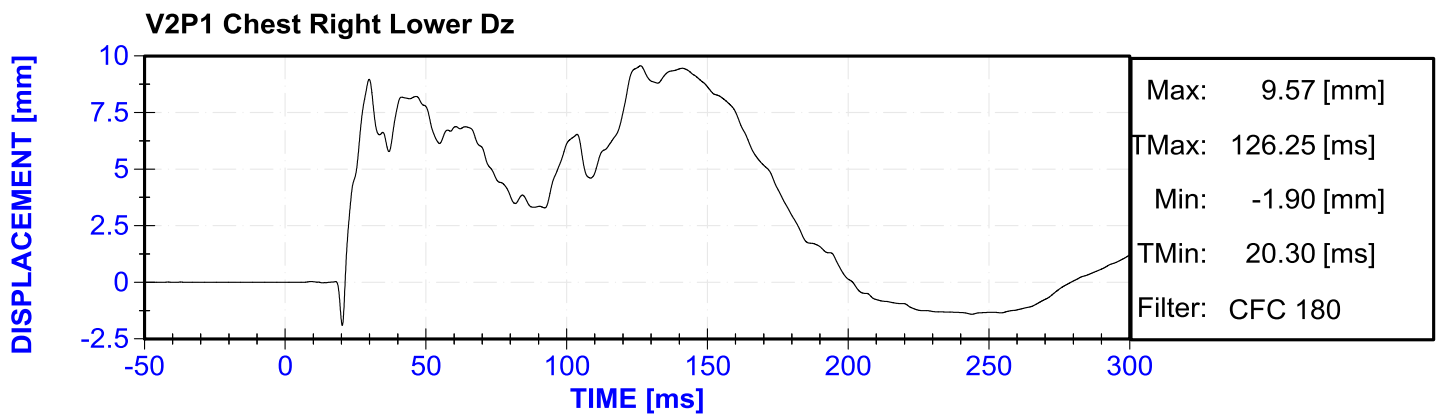
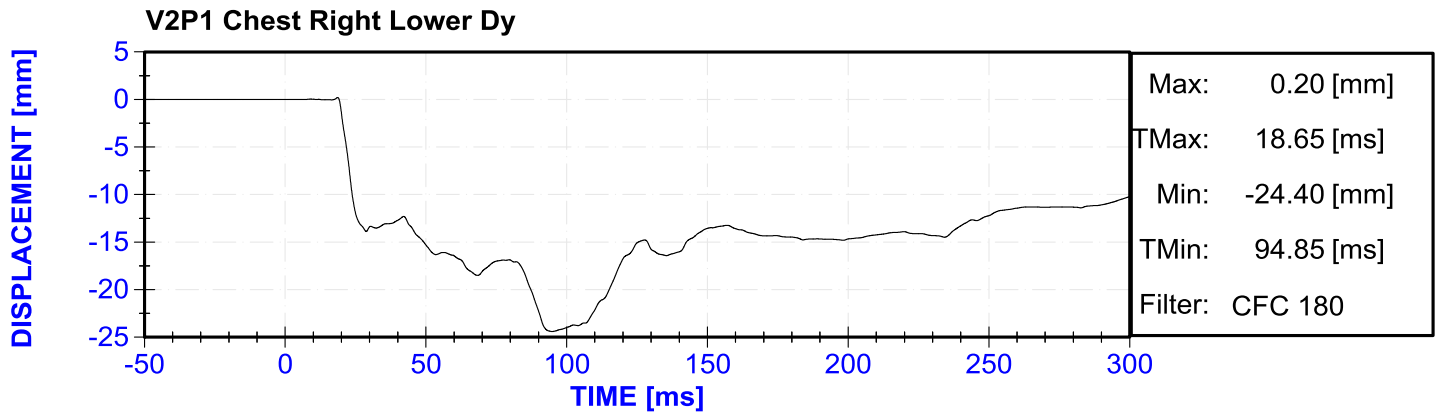
V2P1 Chest Left Upper Dx

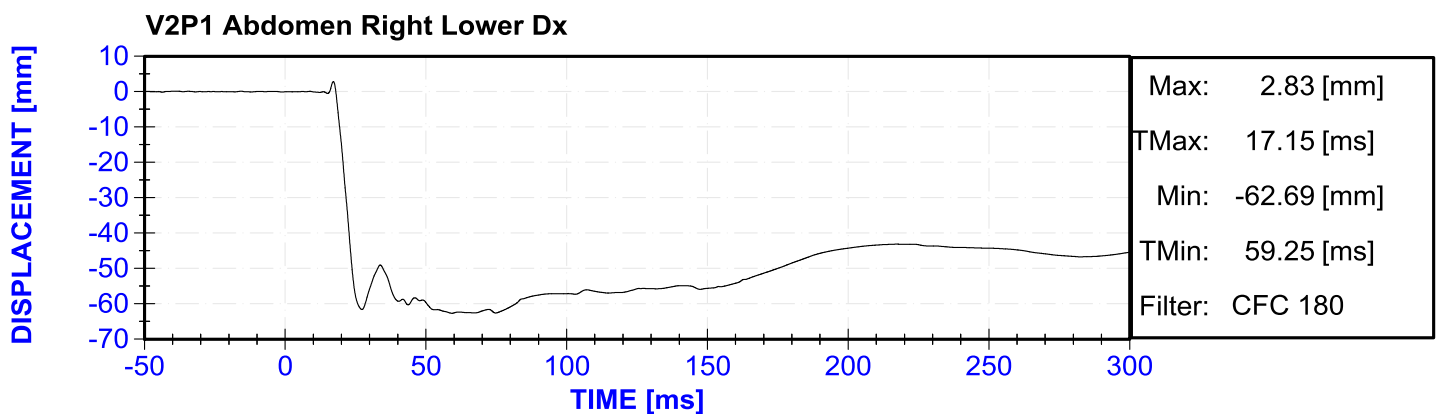
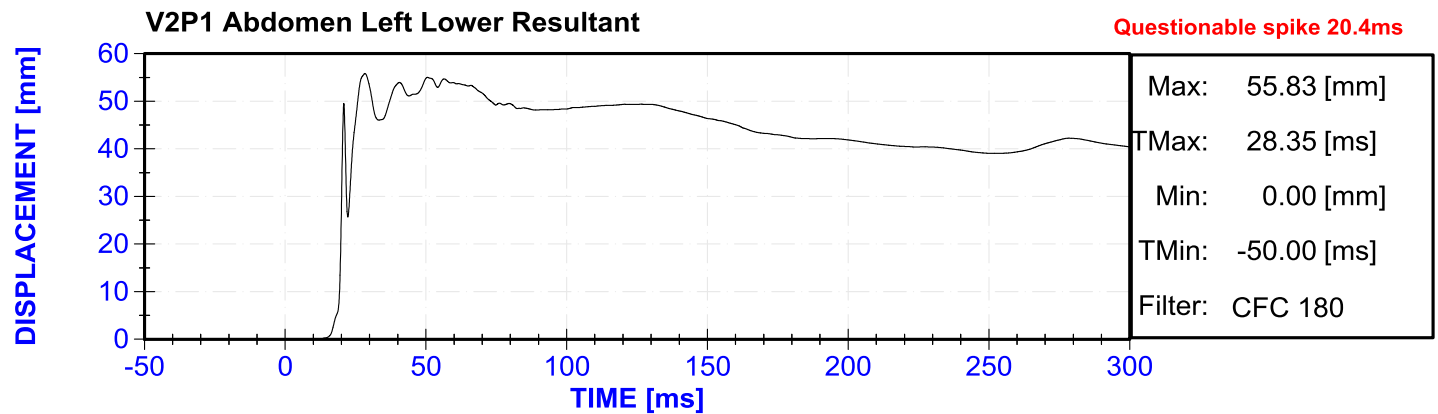
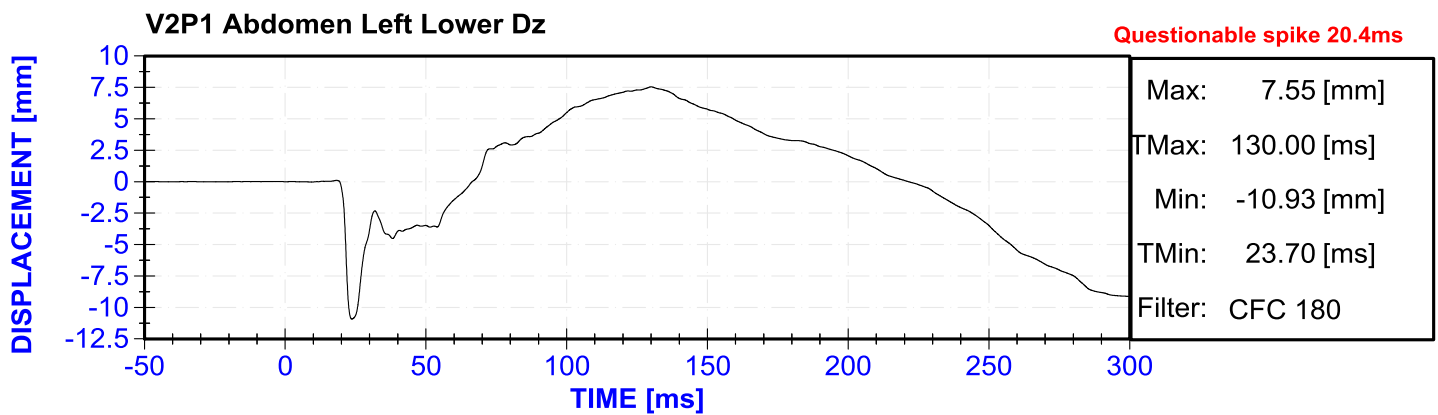
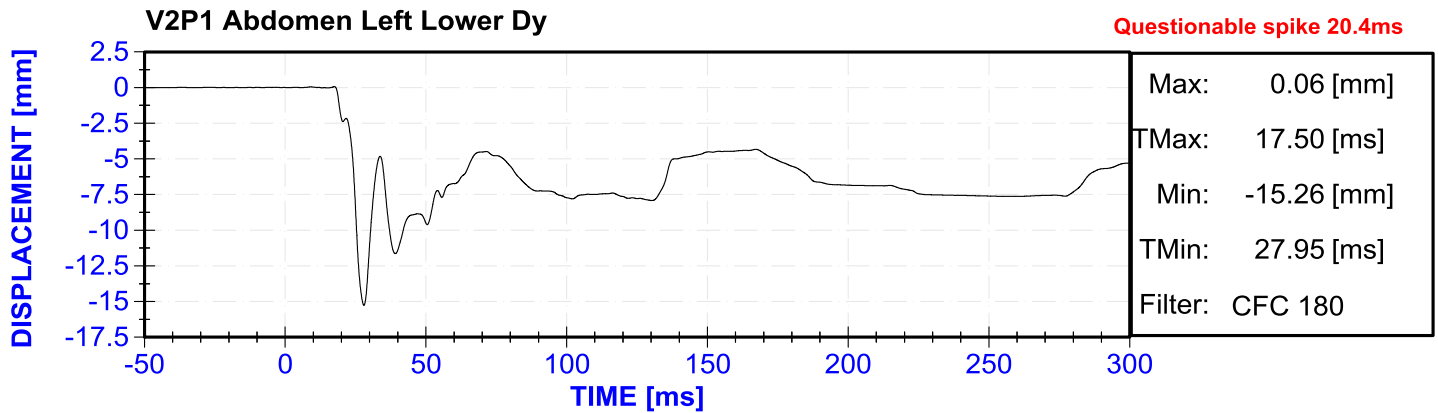


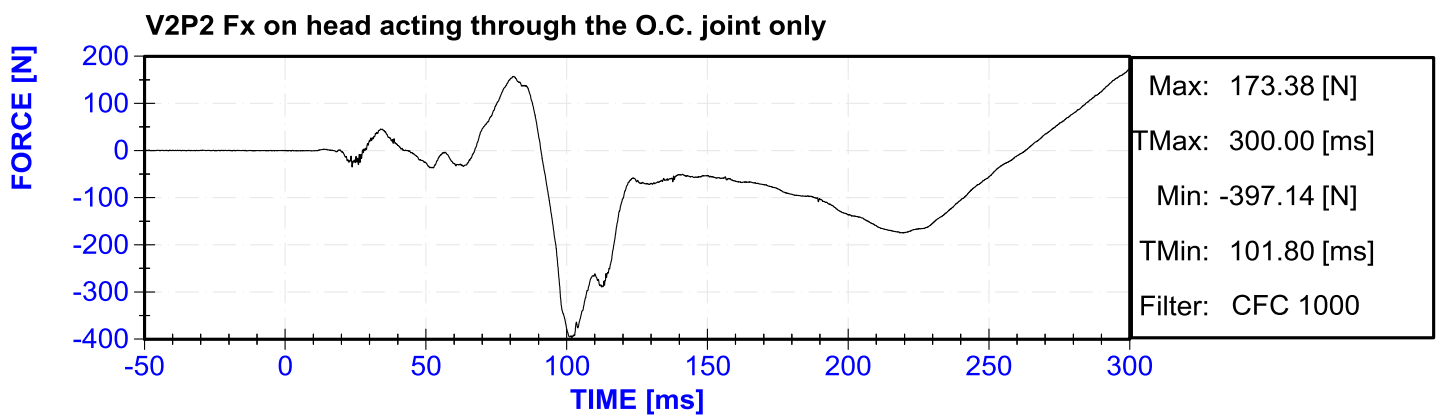
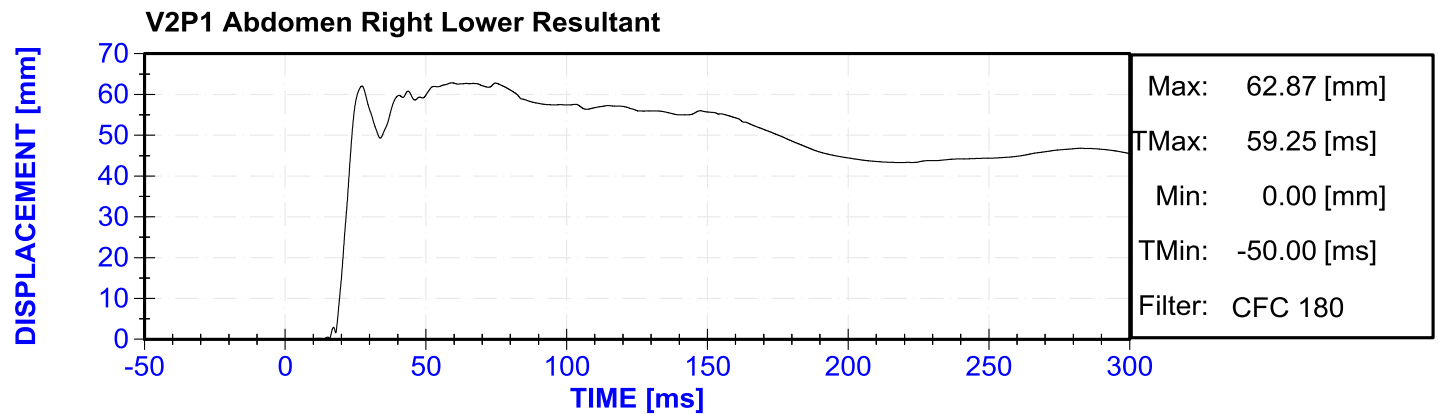
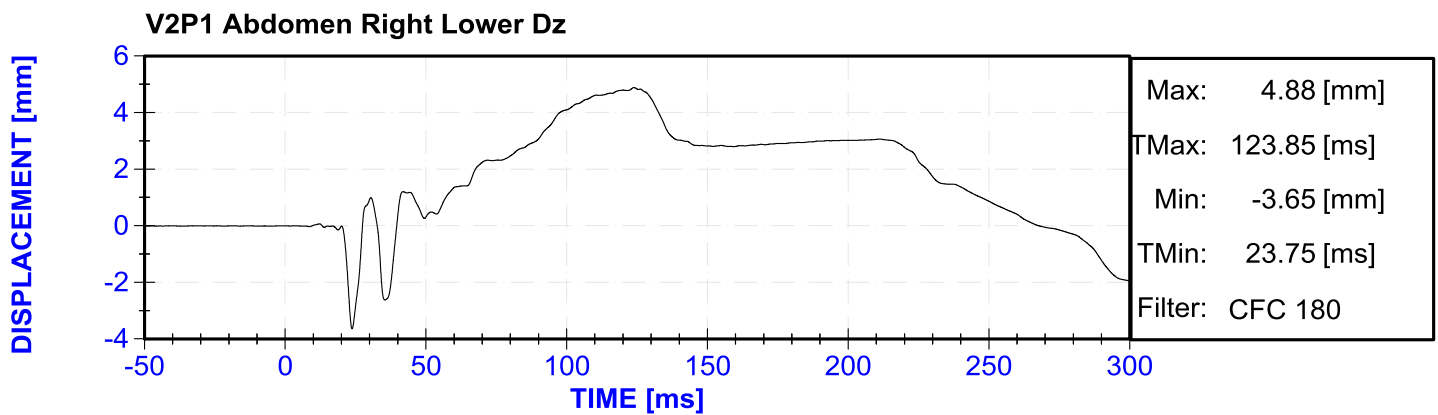
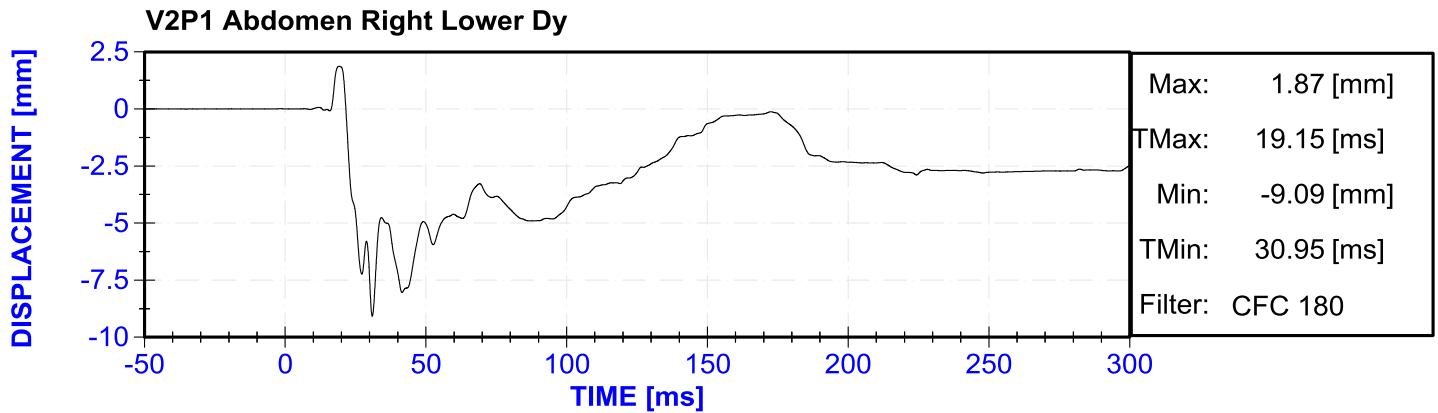




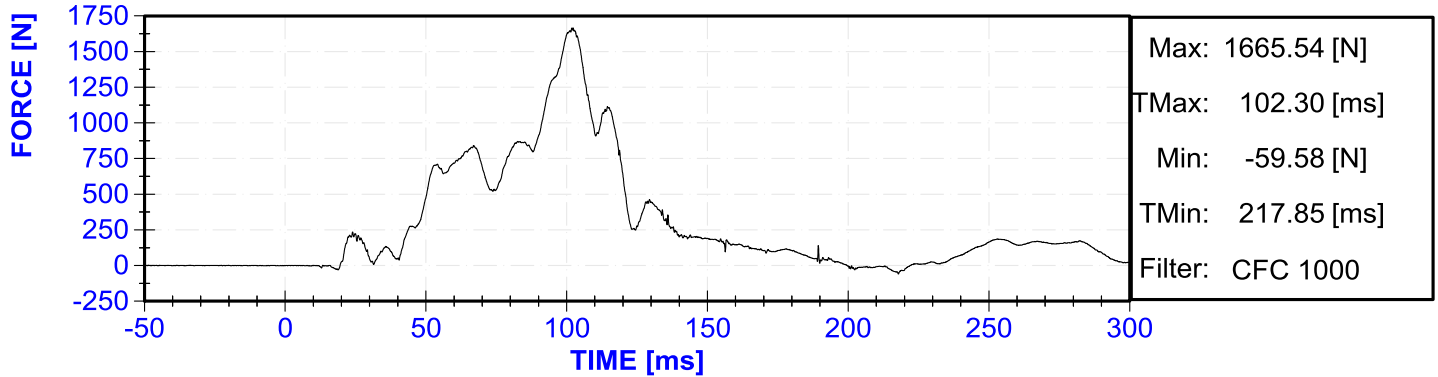




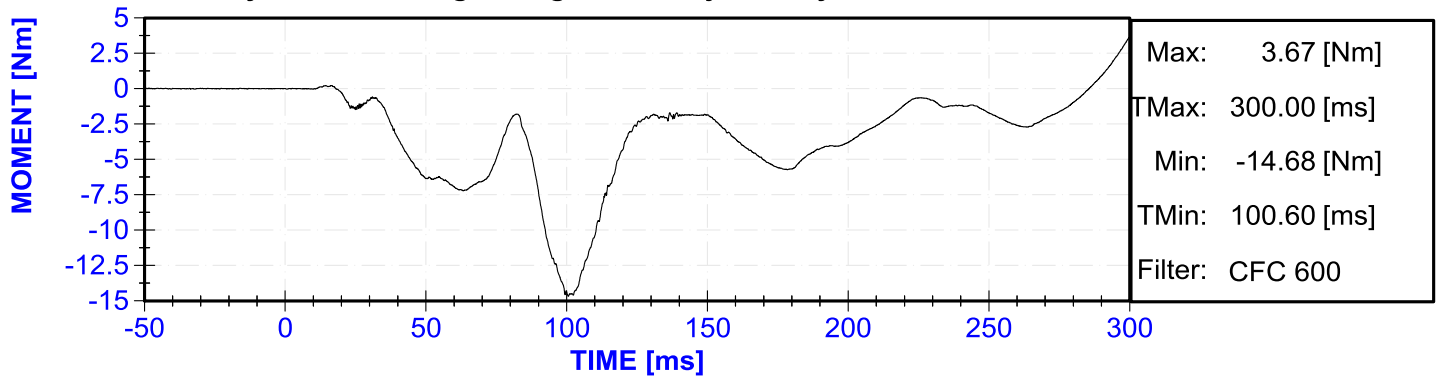




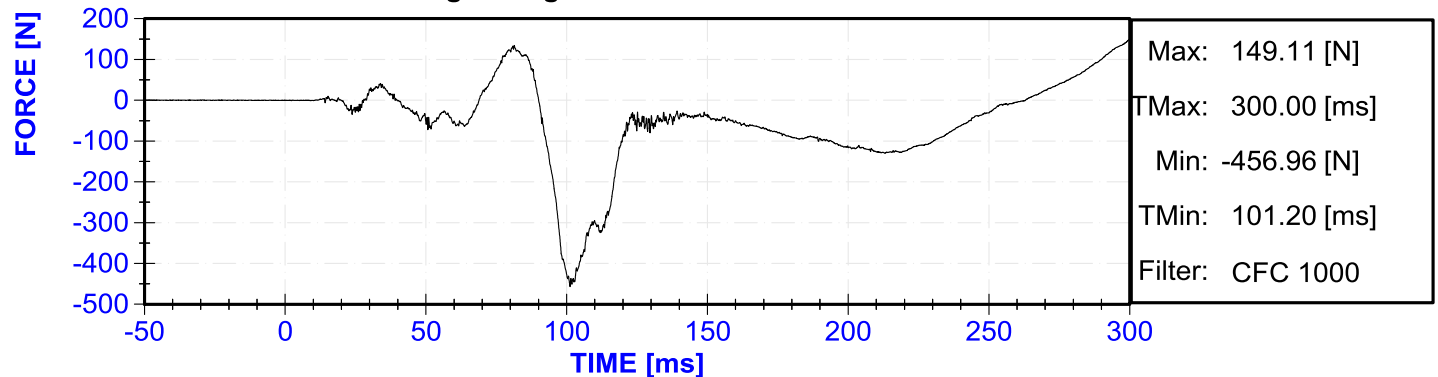
V2P2 Fz on head acting through the O.C. joint only



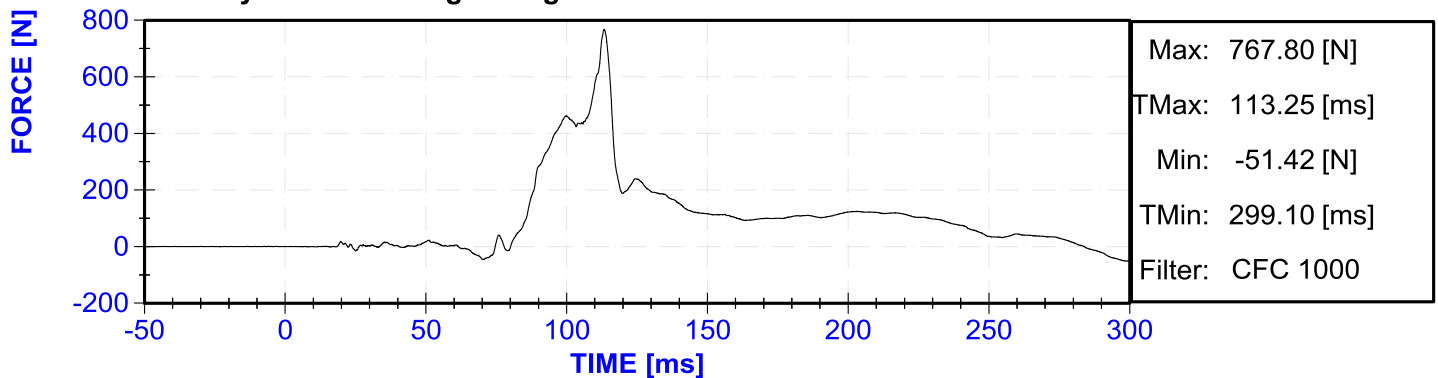
V2P2 My on head acting through the O.C. joint only



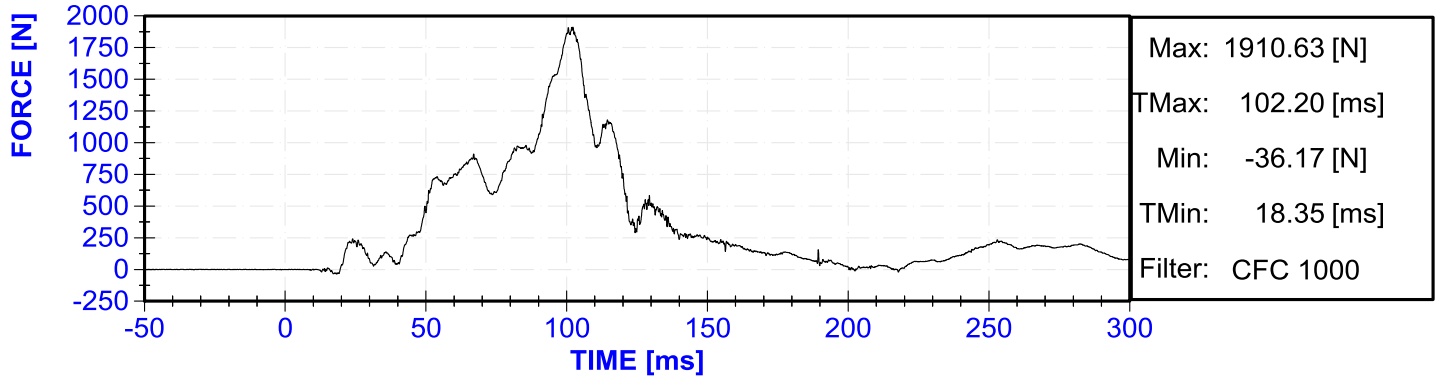
V2P2 Fx on head acting through the total neck section



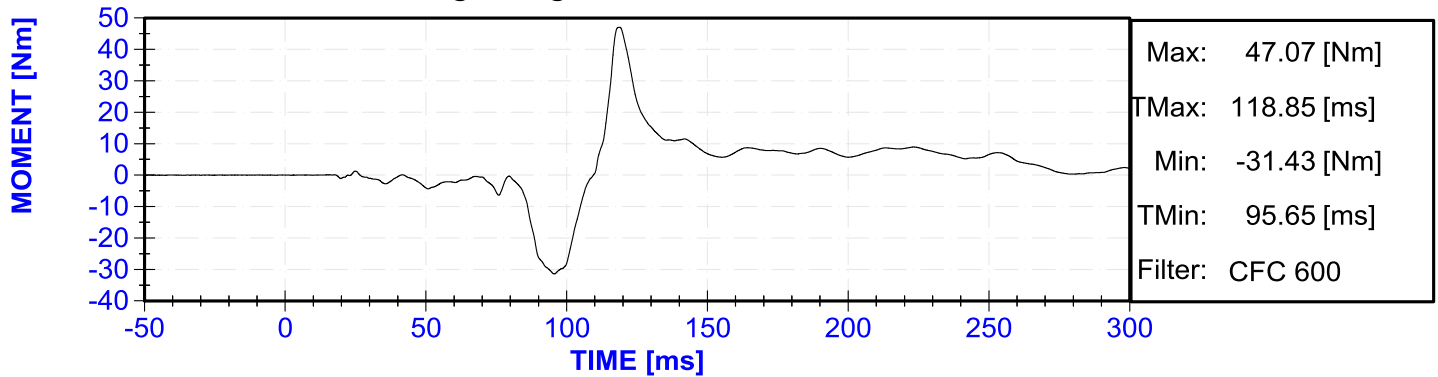
V2P2 Fy on head acting through the total neck section



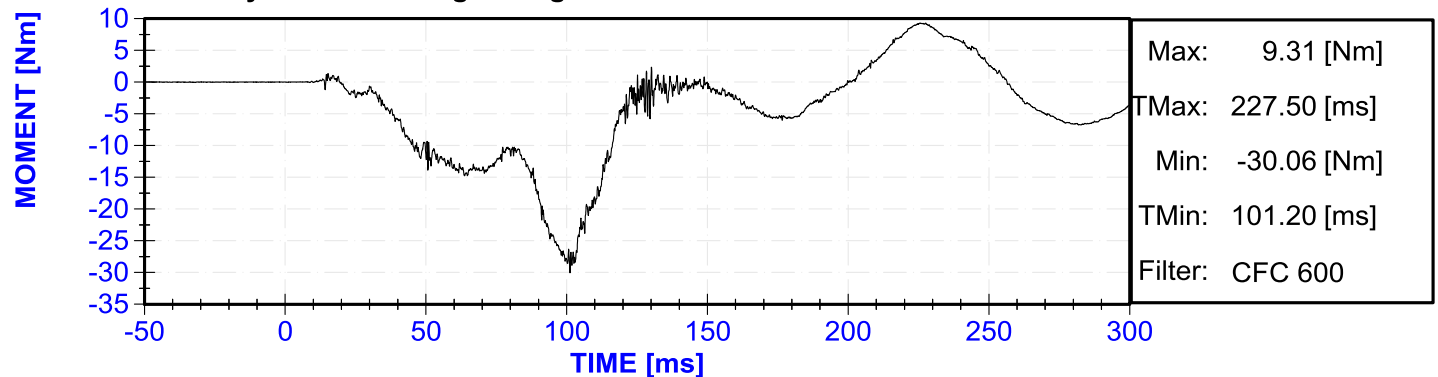
V2P2 Fz on head acting through the total neck section



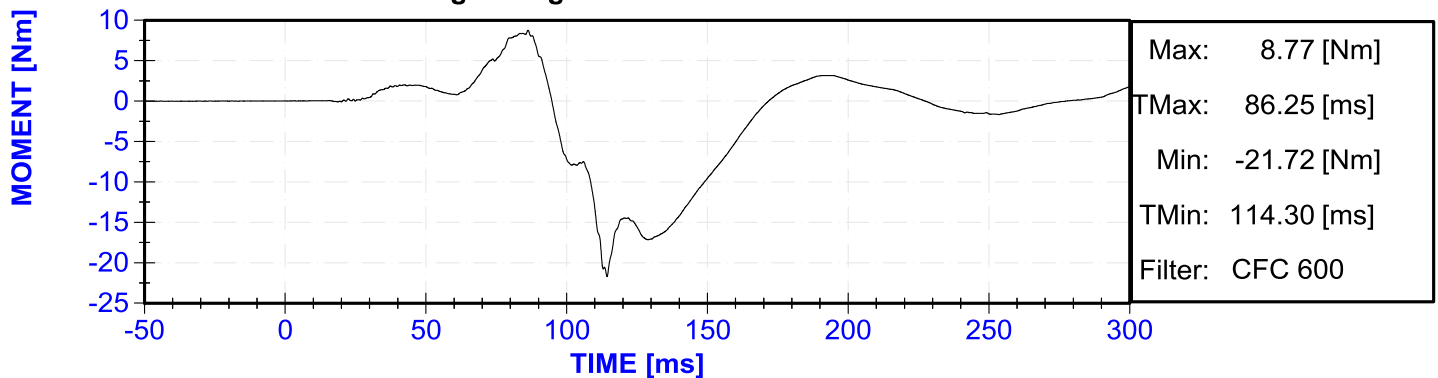
V2P2 Mx on head acting through the total neck section

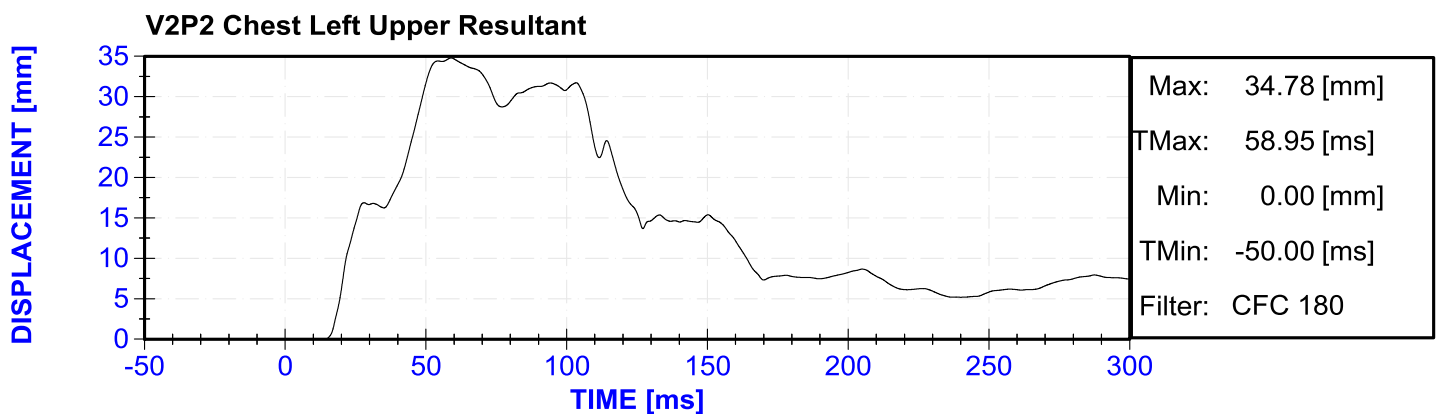
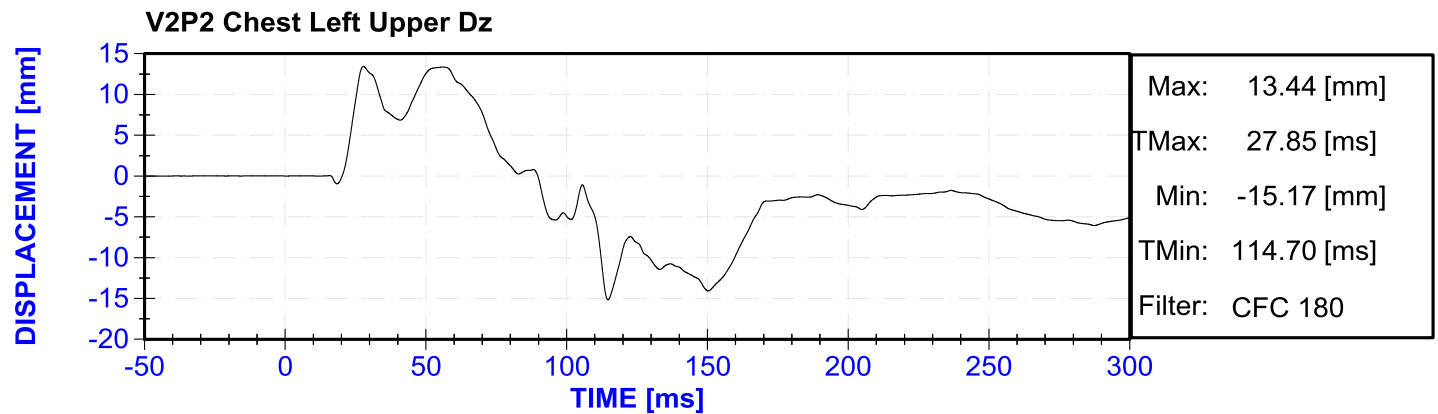
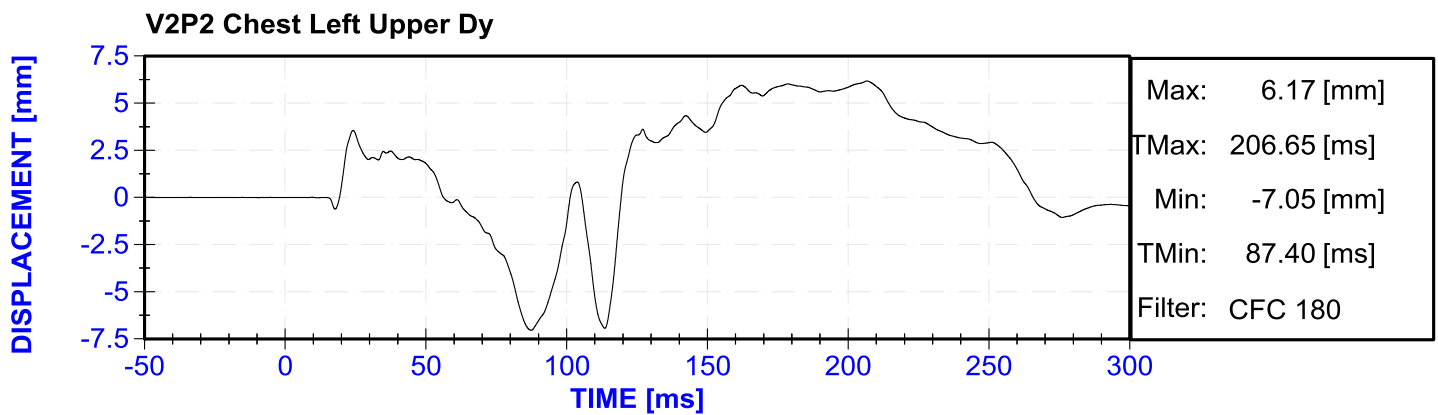
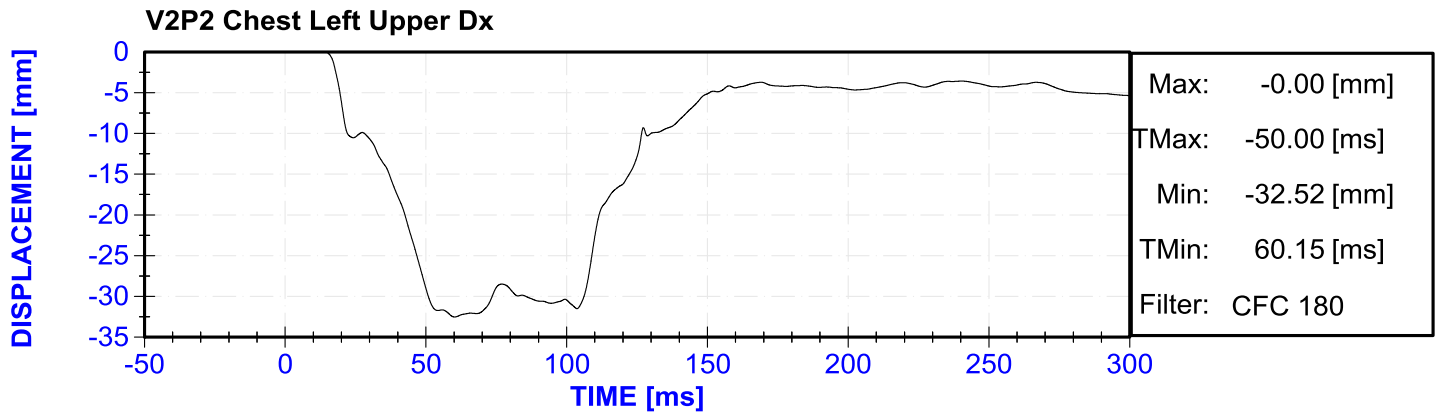


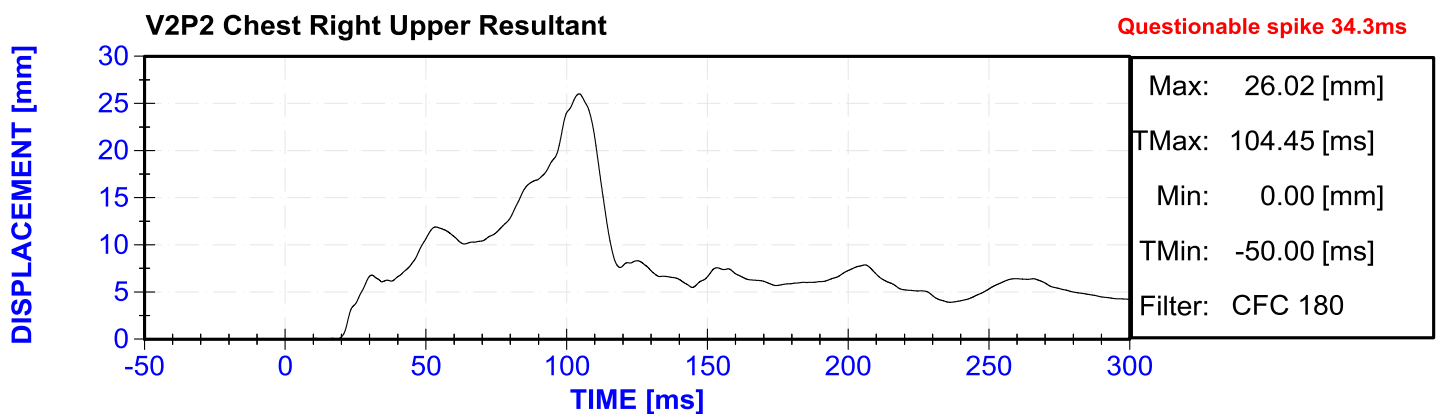
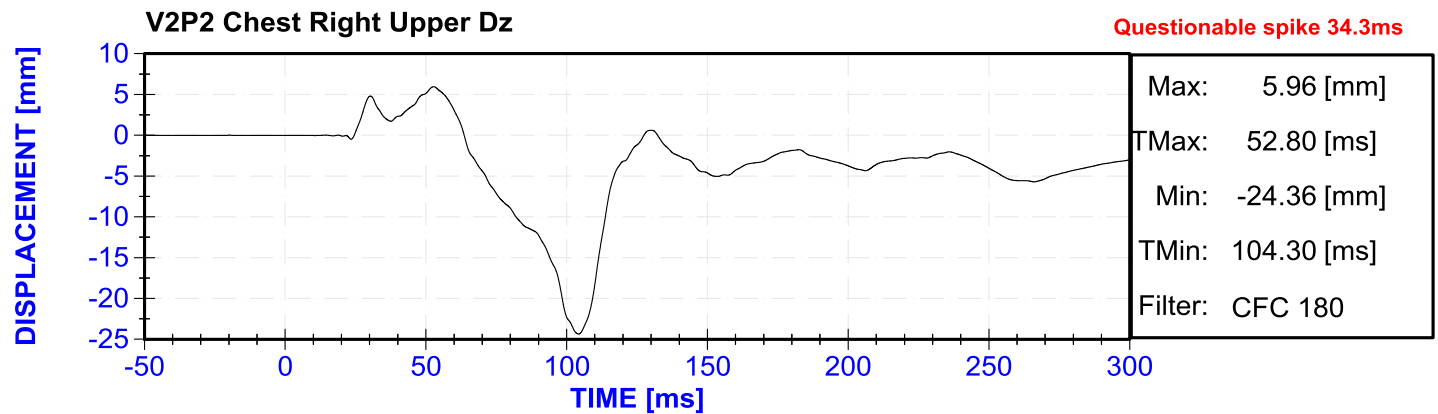
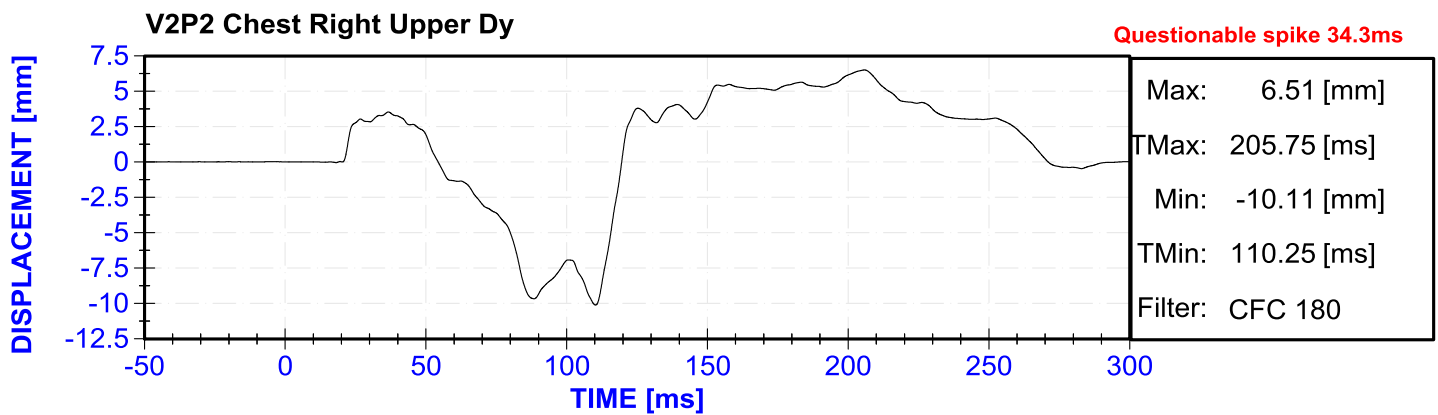
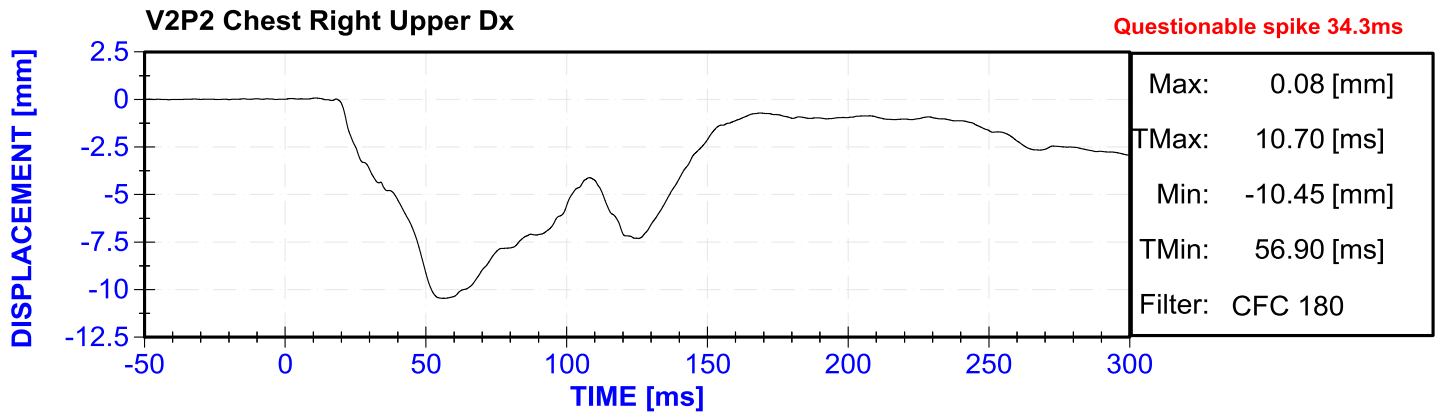
V2P2 My on head acting through the total neck section

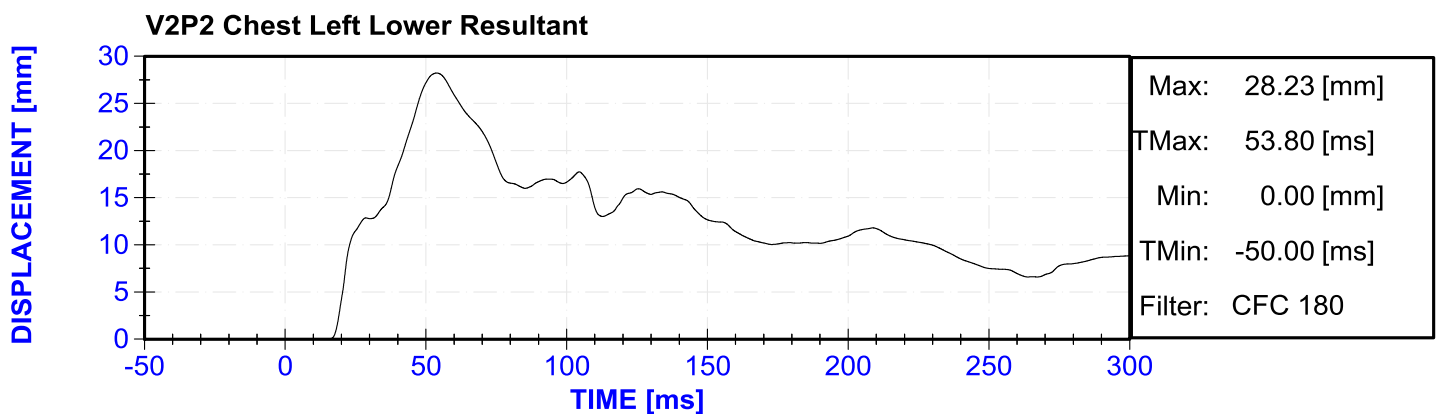
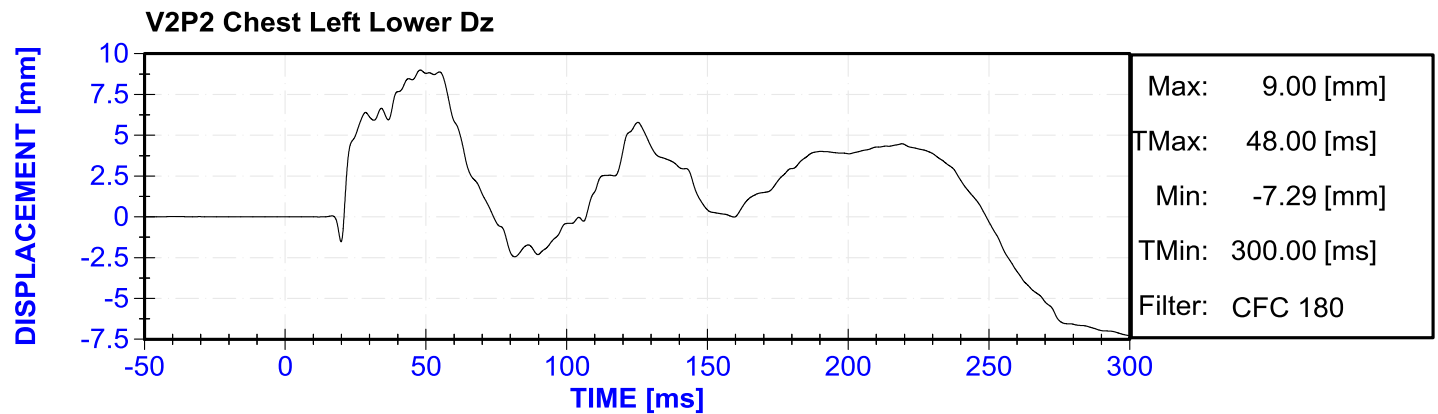
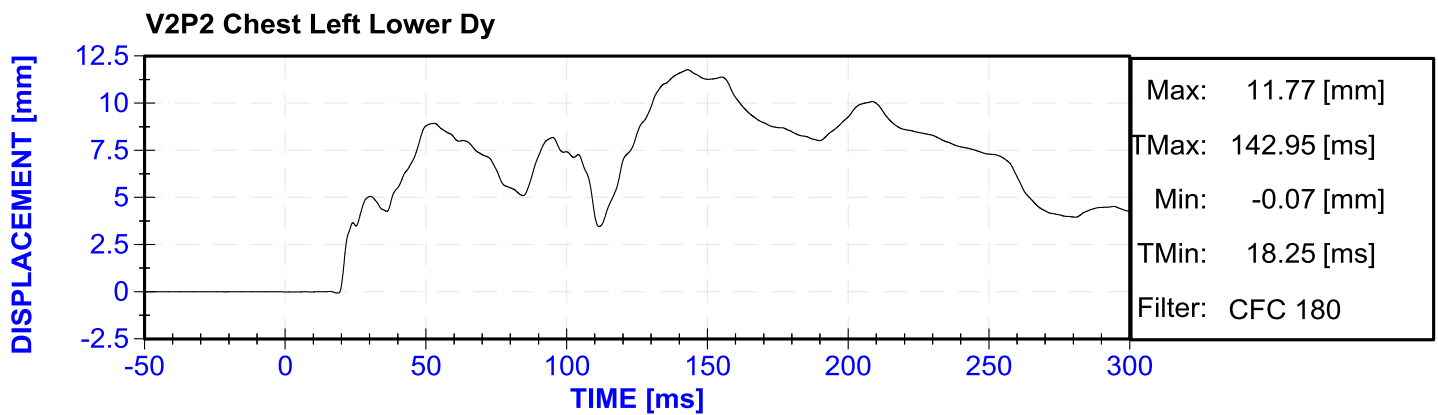
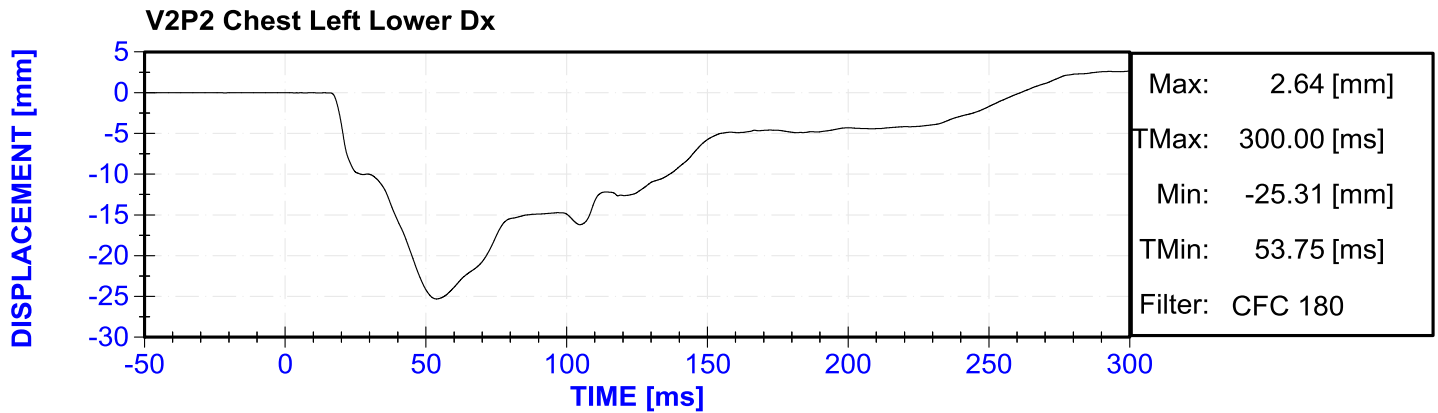


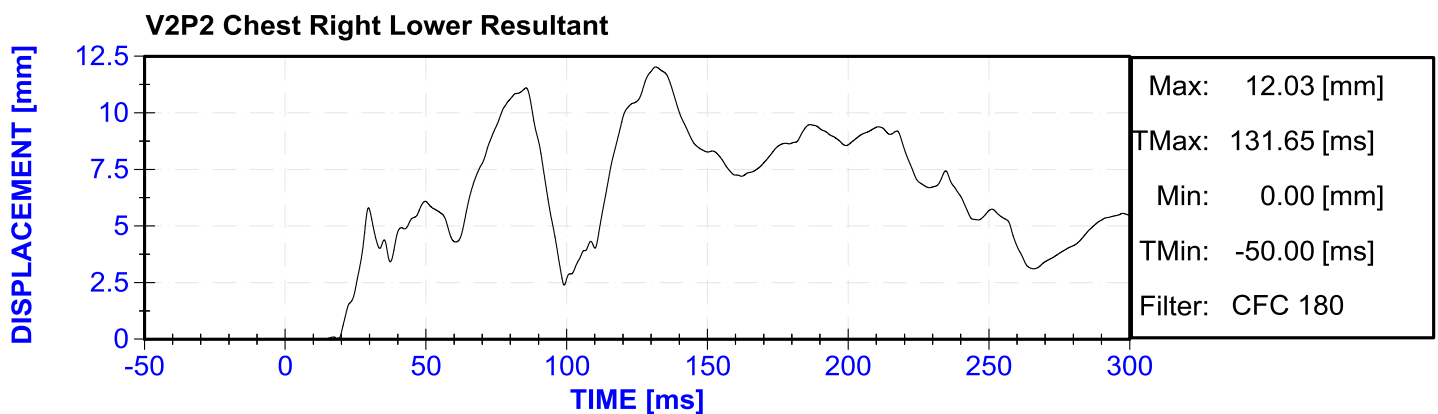
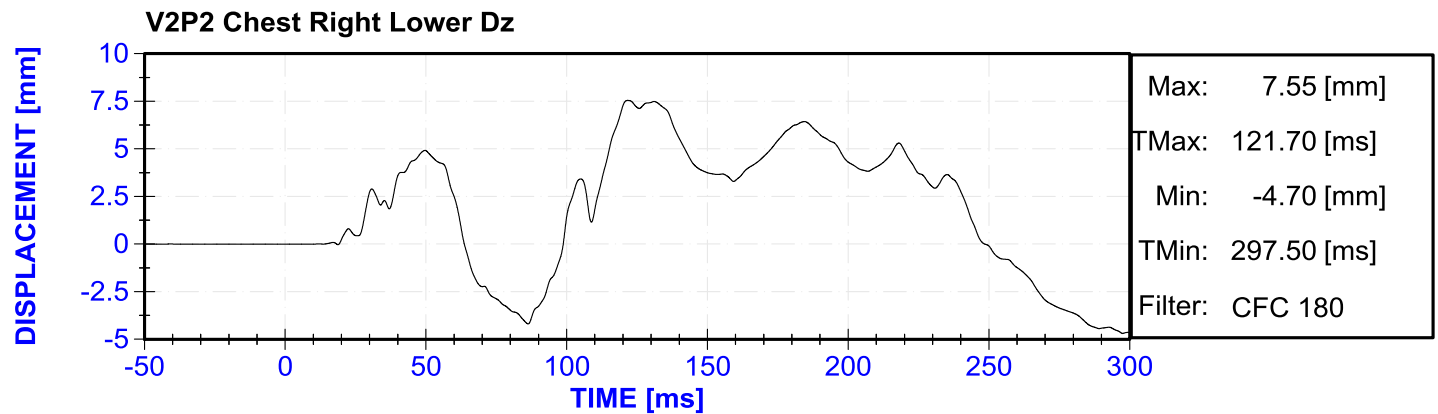
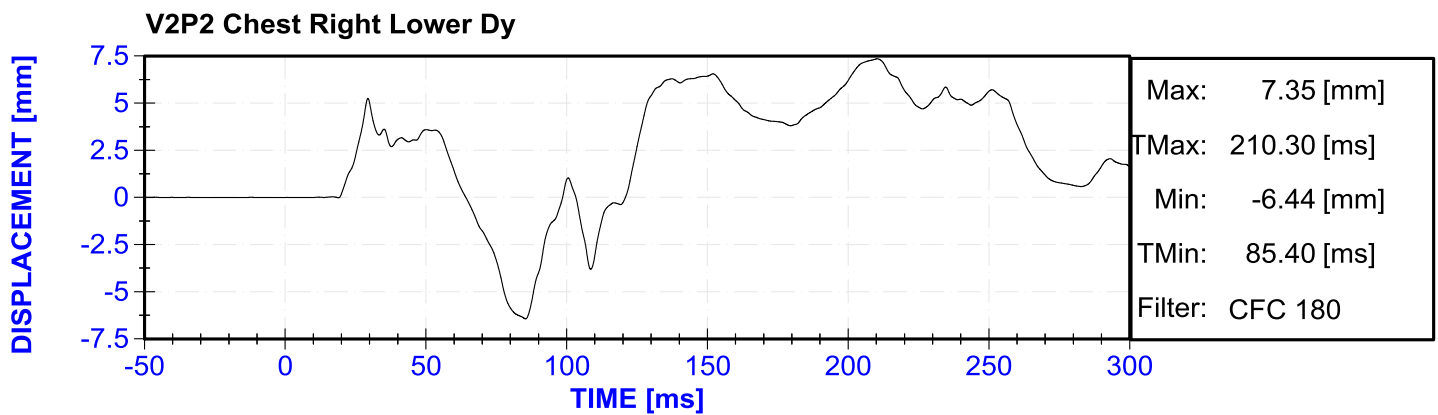
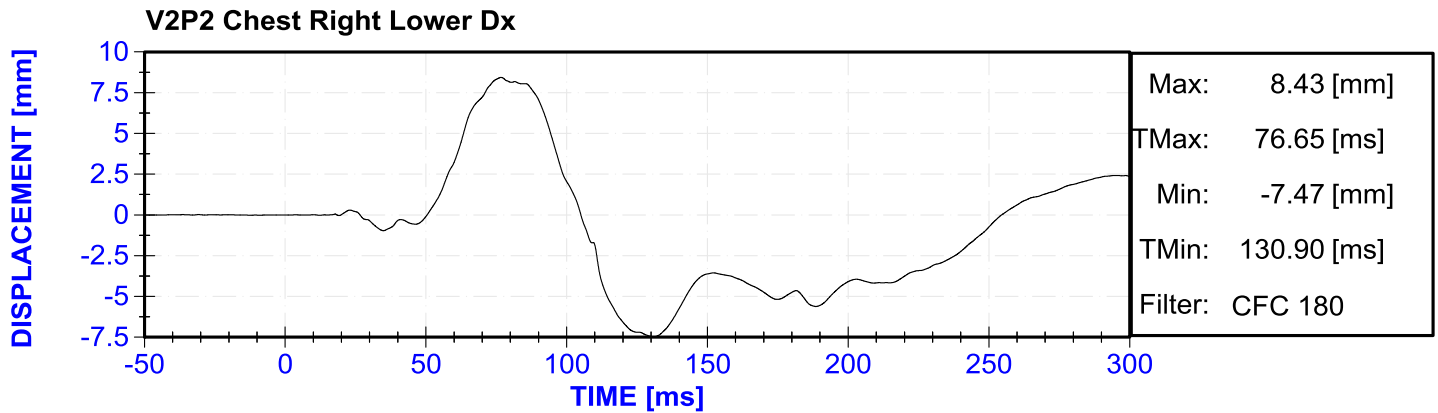
V2P2 Mz on head acting through the total neck section

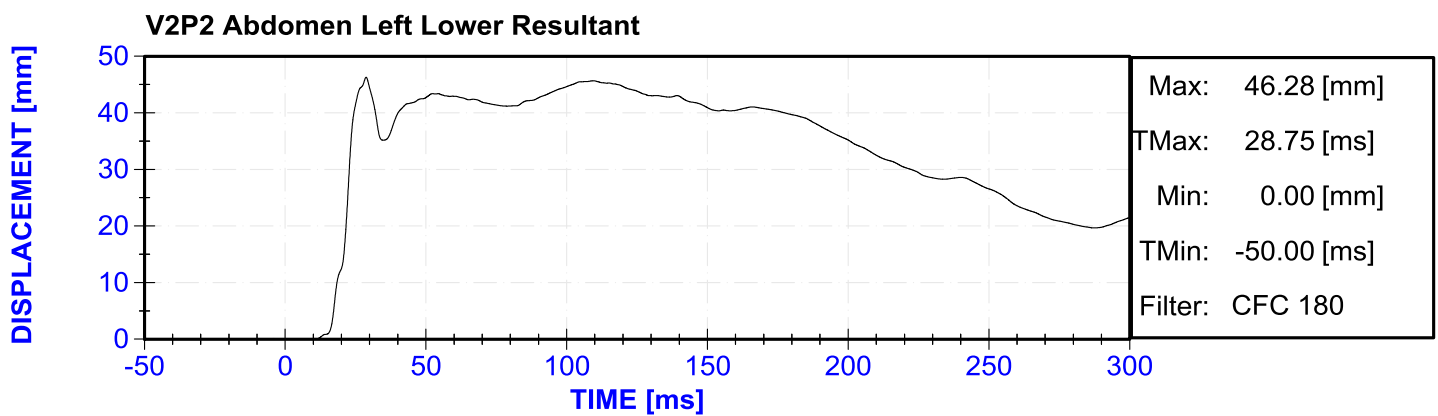
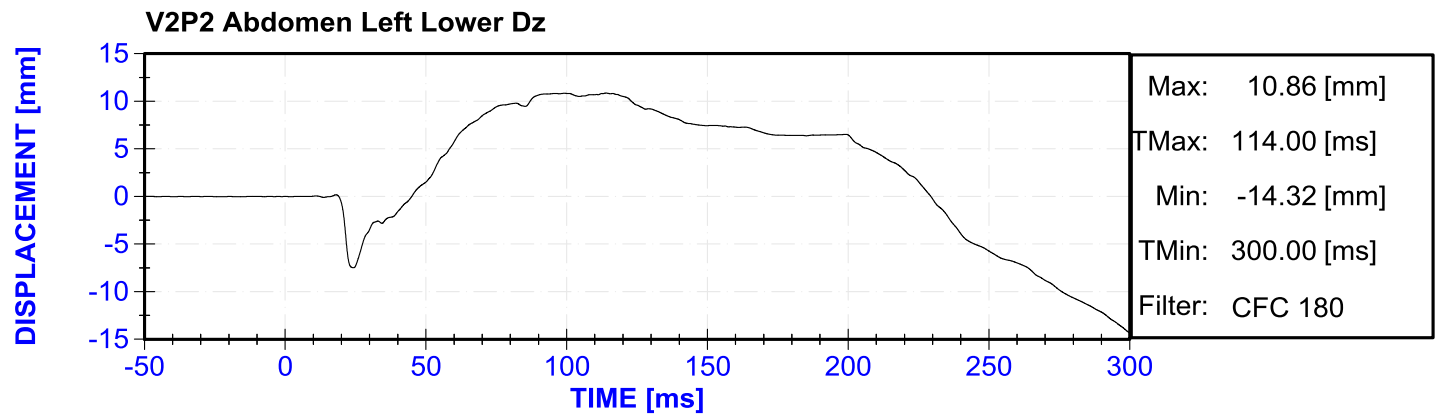
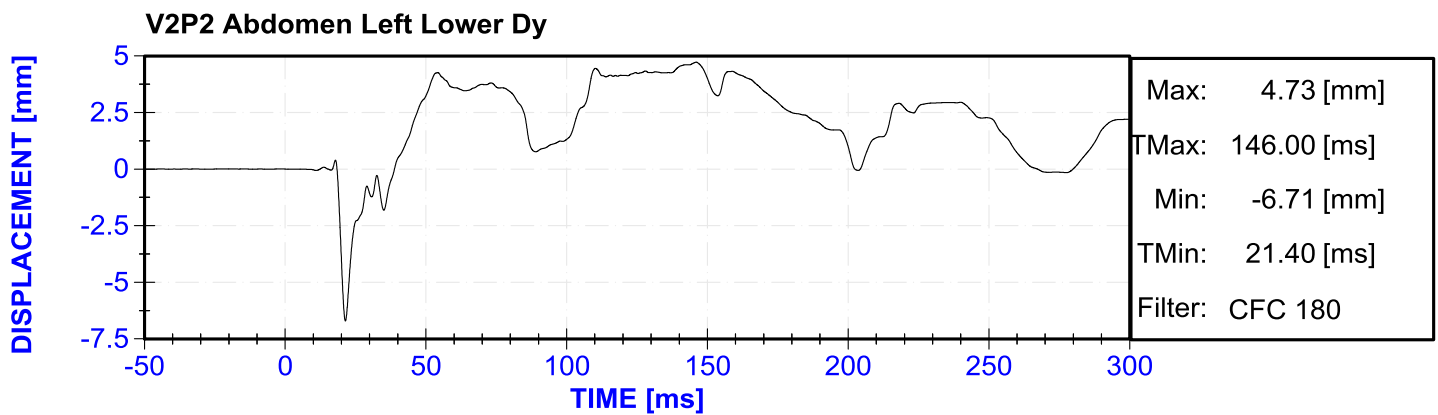
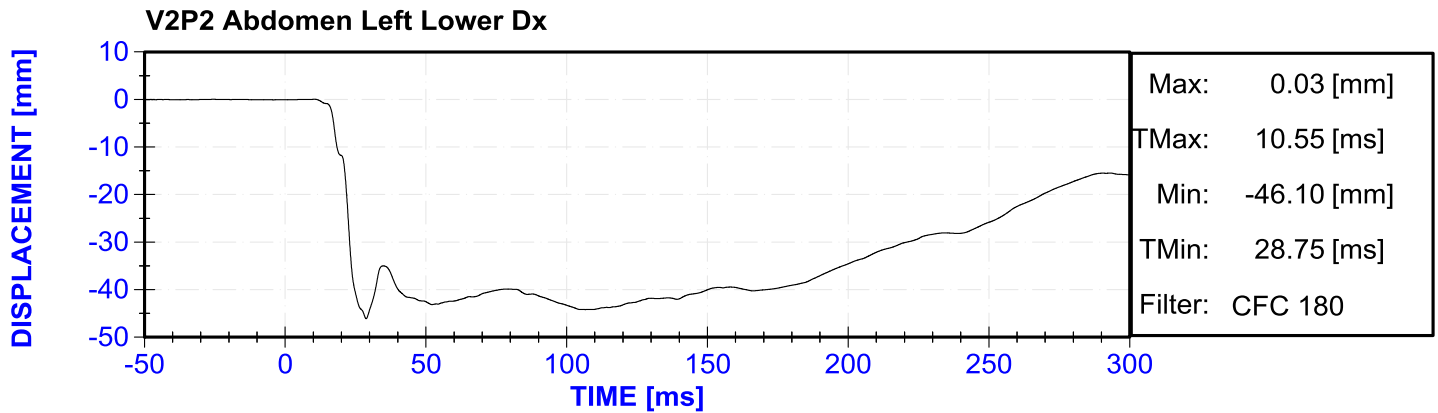


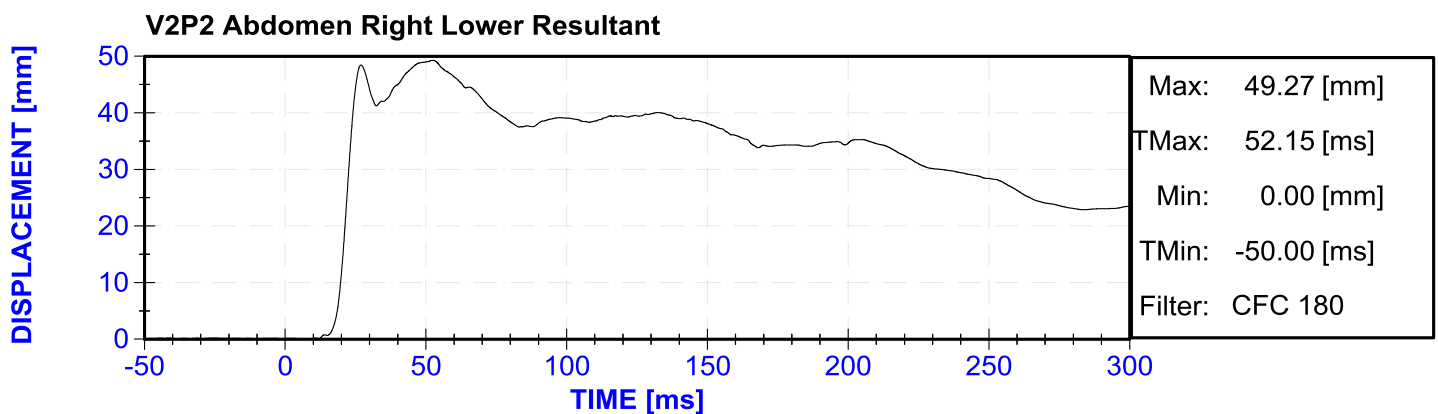
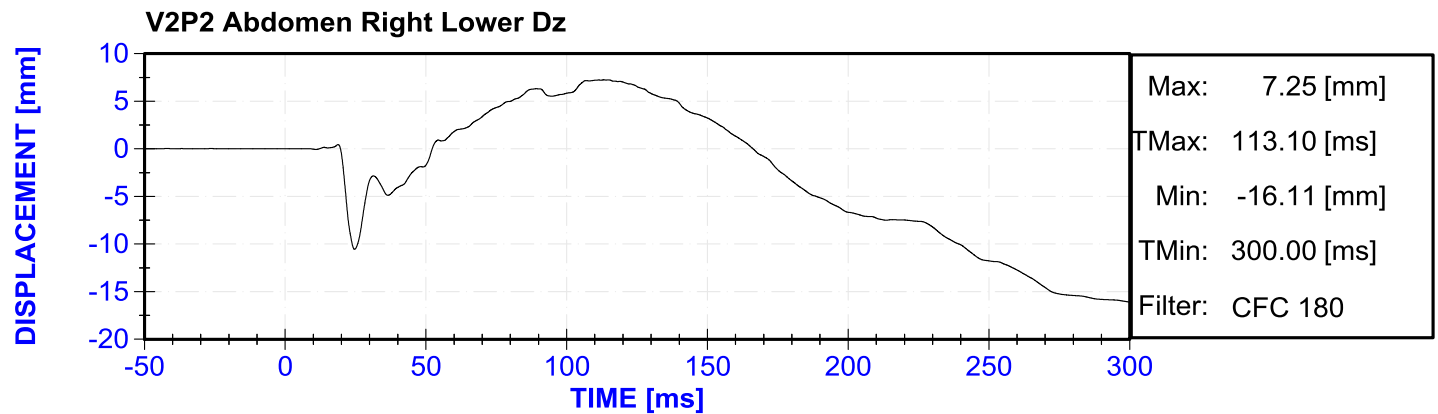
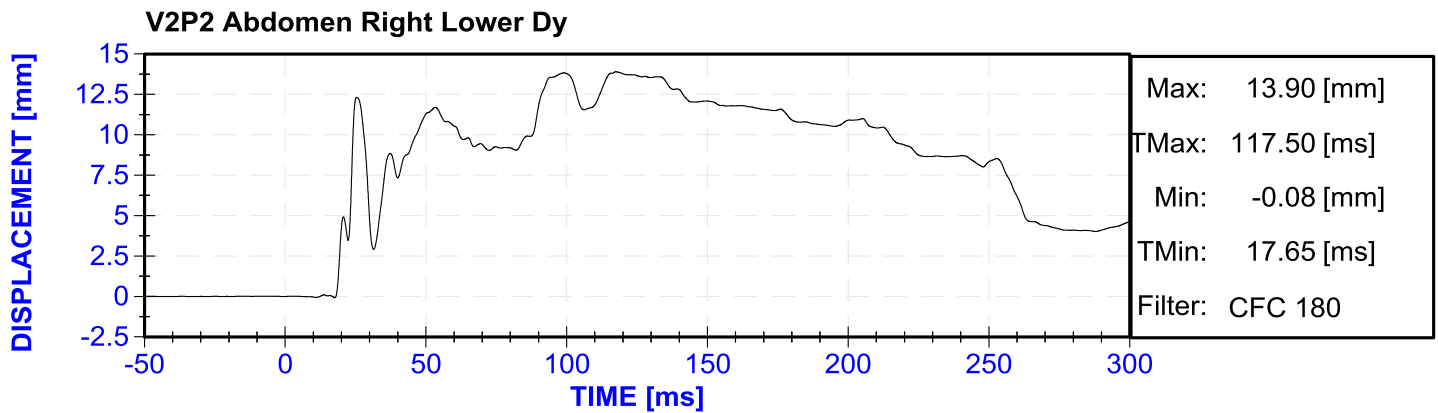
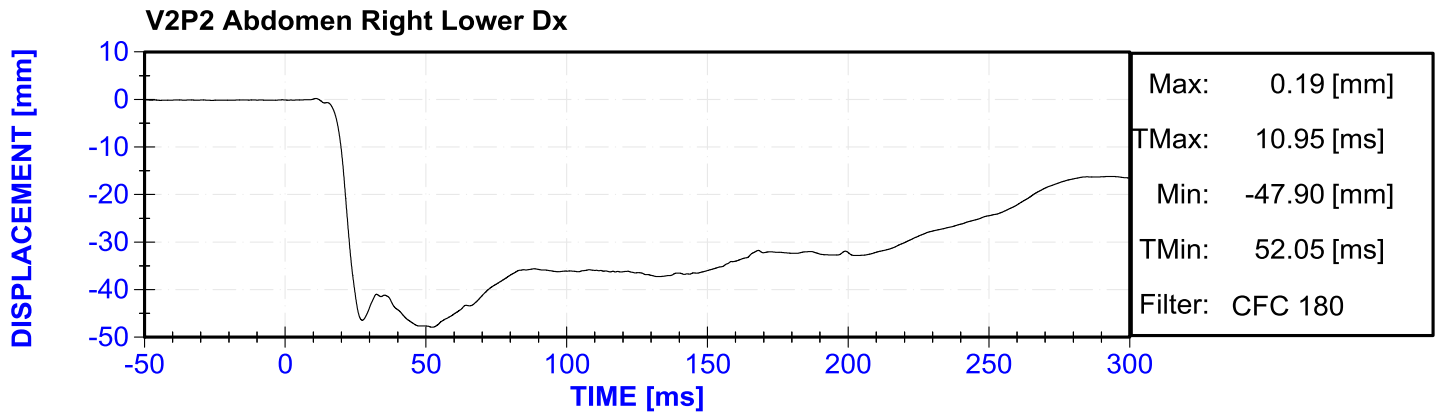












APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA SHEETS

Table C-1: Dummy Information

TYPE	SERIAL NUMBER
THOR-M 50 TH Male	DO9798
THOR-M 50 TH Male	DL9207

Table C- 2: THOR Dummy Initial Set-Up Information

THOR – M S/N: DO9798					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG X Acceleration	Endevco 7264	AC-P52001	2003	0.019659999	mV/V/g
Head CG Y Acceleration	Endevco 7264	AC-P51697	2029	0.022130000	mV/V/g
Head CG Z Acceleration	Endevco 7264	AC-P75155	2039	0.017939999	mV/V/g
Head CG Angular Velocity About X	DTS ARS 18k	ARS-6733	18098	0.094299998	mV/deg/s
Head CG Angular Velocity About Y	DTS ARS 18k	ARS-4071	18334	0.093089999	mV/deg/s
Head CG Angular Velocity About Z	DTS ARS 18k	ARS-4719	18343	0.093039998	mV/deg/s
Front Neck Spring Tower Load Cell	Humanetics 6005JFL	LC-93	4480	0.000524200	mV/V/N
Rear Neck Spring Tower Load Cell	Humanetics 6005JFL	LC-132	4480	0.000484300	mV/V/N
Occipital Condyle Rotation Potentiometer	Sfernice 9945	DS-DK5913	120	3.045160091	mV/V/deg
Upper Neck X Force	Humanetics 10380J14	LC-DS9758 Fx	8900	0.000232900	mV/V/N
Upper Neck Y Force	Humanetics 10380J14	LC-DS9758 Fy	8925	0.000230400	mV/V/N
Upper Neck Z Force	Humanetics 10380J14	LC-DS9758 Fz	13345	0.000087000	mV/V/N
Upper Neck X Moment	Humanetics 10380J14	LC-DS9758 Mx	283	0.005890300	mV/V/Nm
Upper Neck Y Moment	Humanetics 10380J14	LC-DS9758 My	283	0.005963400	mV/V/Nm
Upper Neck Z Moment	Humanetics 10380J14	LC-DS9758 Mz	283	0.009479200	mV/V/Nm
Lower Neck X Force	Humanetics 10381J14	LC-DK3607 Fx	13445	0.000168500	mV/V/N
Lower Neck Y Force	Humanetics 10381J14	LC-DK3607 Fy	13429	0.000168700	mV/V/N
Lower Neck Z Force	Humanetics 10381J14	LC-DK3607 Fz	13385	0.000068800	mV/V/N
Lower Neck X Moment	Humanetics 10381J14	LC-DK3607 Mx	452	0.004012500	mV/V/Nm
Lower Neck Y Moment	Humanetics 10381J14	LC-DK3607 My	452	0.004072100	mV/V/Nm
Lower Neck Z Moment	Humanetics 10381J14	LC-DK3607 Mz	227	0.006723800	mV/V/Nm
Thorax Upper Left X Displacement	Humanetics IF-364-C-R3	DS-DQ2255	2	1000.000000000	mV/V
Thorax Upper Left Y Rotation	Sfernice 9945	DS-DM4779	94	3.039699979	mV/V/deg
Thorax Upper Left Z Rotation	Sfernice 9945	DS-DM4778	93	3.046999918	mV/V/deg
Thorax Upper Right X Displacement	Humanetics IF-364-C-R3	DS-DQ2254	2	1000.000000000	mV/V
Thorax Upper Right Y Rotation	Sfernice 9945	DS-DM4774	94	3.041200107	mV/V/deg
Thorax Upper Right Z Rotation	Sfernice 9945	DS-DM4775	93	3.062600037	mV/V/deg
Thorax Lower Left X Displacement	Humanetics IF-364-C-R3	DS-DK3866	2	1000.000000000	mV/V
Thorax Lower Left Y Rotation	Sfernice 9945	DS-DJ5455	93	3.046999918	mV/V/deg
Thorax Lower Left Z Rotation	Sfernice 9945	DS-DJ5454	93	3.051300067	mV/V/deg
Thorax Lower Right X Displacement	Humanetics IF-364-C-R3	DS-DK3865	2	1000.000000000	mV/V

Thorax Lower Right Y Rotation	Sfernice 9945	DS-DJ5453	93	3.059299896	mV/V/deg
Thorax Lower Right Z Rotation	Sfernice 9945	DS-DJ5452	93	3.050599946	mV/V/deg
Abdomen Left X Displacement	Humanetics 9910	DS-183	2	1000.000000000	mV/V
Abdomen Left Y Rotation	Sfernice 9945	DS-DJ5443	94	3.029499901	mV/V/deg
Abdomen Left Z Rotation	Sfernice 9945	DS-DJ5444	90	2.990900073	mV/V/deg
Abdomen Right X Displacement	Humanetics 9910	DS-DI4779	2	1000.000000000	mV/V
Abdomen Right Y Rotation	Sfernice 9945	DS-DJ5445	93	3.059600014	mV/V/deg
Abdomen Right Z Rotation	Sfernice 9945	DS-DJ5446	93	3.072099993	mV/V/deg
T1 X Acceleration	Endevco 7264	AC-P63843	2012	0.023560000	mV/V/g
T1 Y Acceleration	Endevco 7264	AC-P52008	2017	0.018940000	mV/V/g
T1 Z Acceleration	Endevco 7264	AC-P51636	2032	0.021719999	mV/V/g
T4 X Acceleration	Endevco 7264	AC-P75156	2009	0.018200000	mV/V/g
T4 Y Acceleration	Endevco 7264	AC-P84363	2019	0.019810001	mV/V/g
T4 Z Acceleration	Endevco 7264	AC-P51715	2012	0.017920000	mV/V/g
Pelvis X Acceleration	Endevco 7264	AC-P58747	2004	0.018510000	mV/V/g
Pelvis Y Acceleration	Endevco 7264	AC-P52004	2031	0.021010001	mV/V/g
Pelvis Z Acceleration	Endevco 7264	AC-P71875	2029	0.020680000	mV/V/g
Spine Force X	Humanetics 10415JI4	LC-DQ5600 Fx	13376	0.000146100	mV/V/N
Spine Force Y	Humanetics 10415JI4	LC-DQ5600 Fy	13412	0.000145700	mV/V/N
Spine Force Z	Humanetics 10415JI4	LC-DQ5600 Fz	17795	0.000060700	mV/V/N
Spine Moment X	Humanetics 10415JI4	LC-DQ5600 Mx	680	0.002202000	mV/V/Nm
Spine Moment Y	Humanetics 10415JI4	LC-DQ5600 My	906	0.001909600	mV/V/Nm
Acetabular Left X Force	Humanetics 10530JI4	LC-DM1945 Fx	22315	0.000119500	mV/V/N
Acetabular Left Y Force	Humanetics 10530JI4	LC-DM1945 Fy	13348	0.000060500	mV/V/N
Acetabular Left Z Force	Humanetics 10530JI4	LC-DM1945 Fz	13358	0.000163800	mV/V/N
Acetabular Right X Force	Humanetics 10670JI4	LC-DL9552 Fx	22309	0.000118300	mV/V/N
Acetabular Right Y Force	Humanetics 10670JI4	LC-DL9552 Fy	13375	0.000060000	mV/V/N
Acetabular Right Z Force	Humanetics 10670JI4	LC-DL9552 Fz	13378	0.000160800	mV/V/N
Iliac Left X Force	Humanetics 9490JFL	LC-77 Fx	13022	0.000068500	mV/V/N
Iliac Left Y Moment	Humanetics 9490JFL	LC-77 My	326	0.003816600	mV/V/Nm
Iliac Right X Force	Humanetics 9490JFL	LC-DJ5524 Fx	13027	0.000071200	mV/V/N
Iliac Right Y Moment	Humanetics 9490JFL	LC-DJ5524 My	326	0.003790700	mV/V/Nm
Femur Left X Force	Humanetics W50-71010	LC-DK0842 Fx	15118	0.000143500	mV/V/N
Femur Left Y Force	Humanetics W50-71010	LC-DK0842 Fy	15118	0.000143500	mV/V/N
Femur Left Z Force	Humanetics W50-71010	LC-DK0842 Fz	15005	0.000072600	mV/V/N
Femur Left X Moment	Humanetics W50-71010	LC-DK0842 Mx	351	0.006399600	mV/V/Nm
Femur Left Y Moment	Humanetics W50-71010	LC-DK0842 My	352	0.006497300	mV/V/Nm
Knee Left X Displacement	Space Age 150-0121V	DS-13073811	26	23.231299594	mV/V/mm
Tibia Upper Left Z Force	Denton 10390J14	LC-DQ5598 Fz	11100	0.000095300	mV/V/N
Tibia Upper Left X Moment	Denton 10390J14	LC-DQ5598 Mx	399	0.007466800	mV/V/Nm
Tibia Upper Left Y Moment	Denton 10390J14	LC-DQ5598 My	398	0.007471200	mV/V/Nm
Tibia Lower Left X Force	Denton 9329J	LC-DQ9685 Fx	11204	0.000173100	mV/V/N
Tibia Lower Left Y Force	Denton 9329J	LC-DQ9685 Fy	11128	0.000170400	mV/V/N
Tibia Lower Left Z Force	Denton 9329J	LC-DQ9685 Fz	11134	0.000096200	mV/V/N
Tibia Lower Left X Moment	Denton 9329J	LC-DQ9685 Mx	400	0.007535600	mV/V/Nm

Tibia Lower Left Y Moment	Denton 9329J	LC-DQ9685 My	397	0.007595100	mV/V/Nm
Tibia Left X Acceleration	Endevco 7264C	AC-P81386	2003	0.017750001	mV/V/g
Tibia Left Y Acceleration	Endevco 7264C	AC-P52069	2066	0.019060000	mV/V/g
Foot Left X Acceleration	Endevco 7264C	AC-P64131	2050	0.019210000	mV/V/g
Foot Left Z Acceleration	Endevco 7264C	AC-P51725	2175	0.021399999	mV/V/g
Ankle Left X Rotation	SFERNICE ECO50ESC10	DS-ANKL004	127	3.058000002	mV/V/deg
Ankle Left Y Rotation	SFERNICE ECO50ESC10	DS-ANKL005	126	3.040000098	mV/V/deg
Ankle Left Z Rotation	SFERNICE ECO50ESC10	DS-ANKL006	120	3.036200069	mV/V/deg
Femur Right X Force	Humanetics W50-71010	LC-DK3608 Fx	15055	0.000144100	mV/V/N
Femur Right Y Force	Humanetics W50-71010	LC-DK3608 Fy	15055	0.000144100	mV/V/N
Femur Right Z Force	Humanetics W50-71010	LC-DK3608 Fz	15007	0.000072900	mV/V/N
Femur Right X Moment	Humanetics W50-71010	LC-DK3608 Mx	351	0.006456800	mV/V/Nm
Femur Right Y Moment	Humanetics W50-71010	LC-DK3608 My	353	0.006419100	mV/V/Nm
Knee Right X Displacement	Space Age 150-0121V	DS-13073814	26	23.322600871	mV/V/mm
Tibia Upper Right Z Force	Denton 10390J14	LC-DQ5734 Fz	11135	0.000095400	mV/V/N
Tibia Upper Tibia Right X Moment	Denton 10390J14	LC-DQ5734 Mx	399	0.007462700	mV/V/Nm
Tibia Upper Tibia Right Y Moment	Denton 10390J14	LC-DQ5734 My	397	0.007502400	mV/V/Nm
Tibia Lower Right X Force	Denton 9329J	LC-DQ9684 Fx	11193	0.000177300	mV/V/N
Tibia Lower Right Y Force	Denton 9329J	LC-DQ9684 Fy	11173	0.000174900	mV/V/N
Tibia Lower Right Z Force	Denton 9329J	LC-DQ9684 Fz	11161	0.000097600	mV/V/N
Tibia Lower Right X Moment	Denton 9329J	LC-DQ9684 Mx	396	0.007698000	mV/V/Nm
Tibia Lower Right Y Moment	Denton 9329J	LC-DQ9684 My	398	0.007654700	mV/V/Nm
Tibia Right X Acceleration	Endevco 7264C	AC-P79626	2026	0.021059999	mV/V/g
Tibia Right Y Acceleration	Endevco 7264C	AC-P74953	2020	0.017849999	mV/V/g
Foot Right X Acceleration	Endevco 7264C	AC-P49441	2015	0.017890001	mV/V/g
Foot Right Z Acceleration	Endevco 7264C	AC-P80272	2015	0.019550000	mV/V/g
Ankle Right X Rotation	SFERNICE ECO50ESC10	DS-ANKL001	127	3.040099982	mV/V/deg
Ankle Right Y Rotation	SFERNICE ECO50ESC10	DS-ANKL002	124	3.036200069	mV/V/deg
Ankle Right Z Rotation	SFERNICE ECO50ESC10	DS-ANKL003	120	3.044900019	mV/V/deg

Table C- 3: Initial Set-Up Information

THOR-M S/N: DL9207					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG X Acceleration	Endevco 7264	AC-P82183	2010	0.017689999	mV/V/G's
Head CG Y Acceleration	Endevco 7264	AC-P81384	2020	0.017599999	mV/V/G's
Head CG Z Acceleration	Endevco 7264	AC-P81797	2005	0.019350000	mV/V/G's
Head CG Angular Velocity About X	DTS ARS-18K	ARS-4740	18666	0.091430004	mV/Deg/s
Head CG Angular Velocity About Y	DTS ARS-18K	ARS-4737	19119	0.095640004	mV/Deg/s
Head CG Angular Velocity About Z	DTS ARS-18K	ARS-4073	18203	0.093759998	mV/Deg/s
Front Neck Spring Tower Load Cell	Humanetics 10386JI4	LC-DO9740	4457	0.000512814	mV/V/N
Rear Neck Spring Tower Load Cell	Humanetics 10386JI4	LC-DO9741	4458	0.000508183	mV/V/N
Occipital Condyle Rotation Potentiometer	Humanetics 9945	DS-DK5911	121	3.020999953	mV/V/Deg
Upper Neck X Force	Humanetics 10380JI4	LC-DP3956 Fx	8922	0.000224158	mV/V/N

Upper Neck Y Force	Humanetics 10380JI4	LC-DP3956 Fy	8921	0.000227755	mV/V/N
Upper Neck Z Force	Humanetics 10380JI4	LC-DP3956 Fz	13346	0.000085255	mV/V/N
Upper Neck X Moment	Humanetics 10380JI4	LC-DP3956 Mx	284	0.005819469	mV/V/Nm
Upper Neck Y Moment	Humanetics 10380JI4	LC-DP3956 My	283	0.005983009	mV/V/Nm
Upper Neck Z Moment	Humanetics 10380JI4	LC-DP3956 Mz	283	0.009425133	mV/V/Nm
Lower Neck X Force	Humanetics 10381JI4	LC-DP4780 Fx	13398	0.000173709	mV/V/N
Lower Neck Y Force	Humanetics 10381JI4	LC-DP4780 Fy	13460	0.000174489	mV/V/N
Lower Neck Z Force	Humanetics 10381JI4	LC-DP4780 Fz	13385	0.000070575	mV/V/N
Lower Neck X Moment	Humanetics 10381JI4	LC-DP4780 Mx	455	0.004108210	mV/V/Nm
Lower Neck Y Moment	Humanetics 10381JI4	LC-DP4780 My	454	0.004147000	mV/V/Nm
Lower Neck Z Moment	Humanetics 10381JI4	LC-DP4780 Mz	226	0.006740000	mV/V/Nm
Thorax Upper Left X Displacement	Humanetics IF-364-C-R3	DS-DS6355	3	1000.000000000	mV/V
Thorax Upper Left Y Rotation	Humanetics 9945	DS-DI2382	123	2.978800097	mV/V/deg
Thorax Upper Left Z Rotation	Humanetics 9945	DS-DI2383	122	3.007299965	mV/V/deg
Thorax Upper Right X Displacement	Humanetics IF-364-C-R3	DS-DJ2613	3	1000.000000000	mV/V
Thorax Upper Right Y Rotation	Humanetics 9945	DS-DI7753	120	3.035899950	mV/V/deg
Thorax Upper Right Z Rotation	Humanetics 9945	DS-DI7752	129	3.052399959	mV/V/deg
Thorax Lower Left X Displacement	Humanetics IF-364-C-R3	DS-DS6353	3	1000.000000000	mV/V
Thorax Lower Left Y Rotation	Humanetics 9945	DS-DM4781	122	3.001400037	mV/V/deg
Thorax Lower Left Z Rotation	Humanetics 9945	DS-DS4092	128	3.072499996	mV/V/deg
Thorax Lower Right X Displacement	Humanetics IF-364-C-R3	DS-DS6354	3	1000.000000000	mV/V
Thorax Lower Right Y Rotation	Humanetics 9945	DS-DM4776	122	3.004899947	mV/V/deg
Thorax Lower Right Z Rotation	Humanetics 9945	DS-DM4777	122	2.994700102	mV/V/deg
Abdomen Left X Displacement	Humanetics 9910	DS-DQ2303	3	1000.000000000	mV/V
Abdomen Left Y Rotation	Humanetics 9945	DS-DS8363	121	3.024100093	mV/V/deg
Abdomen Left Z Rotation	Humanetics 9945	DS-DS8361	120	3.047399921	mV/V/deg
Abdomen Right X Displacement	Humanetics 9910	DS-DM2641	3	1000.000000000	mV/V
Abdomen Right Y Rotation	Humanetics 9945	DS-DS4094	121	3.012300003	mV/V/deg
Abdomen Right Z Rotation	Humanetics 9945	DS-DS4121	121	3.021799959	mV/V/deg
T1 X Acceleration	Endevco 7264	AC-P79630	2011	0.020870000	mV/V/G's
T1 Y Acceleration	Endevco 7264	AC-P78880	2018	0.019820000	mV/V/G's
T1 Z Acceleration	Endevco 7264	AC-P82758	2023	0.018610001	mV/V/G's
T4 X Acceleration	Endevco 7264	AC-P49229	2002	0.018010000	mV/V/G's
T4 Y Acceleration	Endevco 7264	AC-P49215	2014	0.016950000	mV/V/G's
T4 Z Acceleration	Endevco 7264	AC-P52122	2002	0.017050001	mV/V/G's
Pelvis X Acceleration	Endevco 7264	AC-P83434	2027	0.017540000	mV/V/G's
Pelvis Y Acceleration	Endevco 7264	AC-P82752	2026	0.018310000	mV/V/G's
Pelvis Z Acceleration	Endevco 7264	AC-P80296	2029	0.019409999	mV/V/G's
Spine Force Y	Humanetics 10415JI4	LC-DP2984 Fy	13386	0.000147107	mV/V/N
Spine Force X	Humanetics 10415JI4	LC-DP2984 Fx	13352	0.000146365	mV/V/N
Spine Force Z	Humanetics 10415JI4	LC-DP2984 Fz	17795	0.000060193	mV/V/N
Spine Moment X	Humanetics 10415JI4	LC-DP2984 Mx	682	0.002146039	mV/V/Nm
Spine Moment Y	Humanetics 10415JI4	LC-DP2984 My	910	0.001914371	mV/V/Nm
Acetabular Left X Force	Humanetics 10670JI4	LC-DP3835 Fx	22270	0.000118506	mV/V/N
Acetabular Left Y Force	Humanetics 10670JI4	LC-DP3835 Fy	13356	0.000059342	mV/V/N

Acetabular Left Z Force	Humanetics 10670JI4	LC-DP3835 Fz	13348	0.000161173	mV/V/N
Acetabular Right X Force	Humanetics 10530JI4	LC-DP4639 Fx	22456	0.000121280	mV/V/N
Acetabular Right Y Force	Humanetics 10530JI4	LC-DP4639 Fy	13377	0.000059432	mV/V/N
Acetabular Right Z Force	Humanetics 10530JI4	LC-DP4639 Fz	13421	0.000165871	mV/V/N
Iliac Left X Force	Humanetics 10387JI4	LC-DP5092 Fx	13022	0.000067323	mV/V/N
Iliac Left Y Moment	Humanetics 10387JI4	LC-DP5092 My	326	0.003688923	mV/V/Nm
Iliac Right X Force	Humanetics 10387JI4	LC-DP5091 Fx	13041	0.000065215	mV/V/N
Iliac Right Y Moment	Humanetics 10387JI4	LC-DP5091 My	325	0.003697538	mV/V/Nm
Femur Left X Force	Denton W50-7101051	LC-DM4975 Fx	15097	0.000143700	mV/V/N
Femur Left Y Force	Denton W50-7101051	LC-DM4975 Fy	15108	0.000143600	mV/V/N
Femur Left Z Force	Denton W50-7101051	LC-DM4975 Fz	15048	0.000072700	mV/V/N
Femur Left X Moment	Denton W50-7101051	LC-DM4975 Mx	353	0.006601400	mV/V/Nm
Femur Left Y Moment	Denton W50-7101051	LC-DM4975 My	350	0.006642000	mV/V/Nm
Knee Left X Displacement	Space Age 150-0121V	DS-C2102639B	20	24.094099179	mV/V/mm
Upper Tibia Left Z Force	Denton 4353J	LC-97 Fz	11131	0.000093300	mV/V/N
Upper Tibia Left X Moment	Denton 4353J	LC-97 Mx	397	0.007333200	mV/V/Nm
Upper Tibia Left Y Moment	Denton 4353J	LC-97 My	395	0.007398000	mV/V/Nm
Lower Tibia Left X Force	Denton 4929J	LC-121 Fx	11118	0.000175100	mV/V/N
Lower Tibia Left Y Force	Denton 4929J	LC-121 Fy	11120	0.000171800	mV/V/N
Lower Tibia Left Z Force	Denton 4929J	LC-121 Fz	11111	0.000095800	mV/V/N
Lower Tibia Left X Moment	Denton 4929J	LC-121 Mx	396	0.007396500	mV/V/Nm
Lower Tibia Left Y Moment	Denton 4929J	LC-121 My	395	0.007447200	mV/V/Nm
Left Tibia X Acceleration	Endevco 7264C	AC-P77996	2028	0.018029999	mV/V/G's
Left Tibia Y Acceleration	Endevco 7264C	AC-P64094	2029	0.022140001	mV/V/G's
Foot Left X Acceleration	Endevco 7264C	AC-P80271	2032	0.021000000	mV/V/G's
Foot Left Z Acceleration	Endevco 7264C	AC-P51684	2017	0.019530000	mV/V/G's
Ankle Left X Rotation	Contelec PD210-4B	DS-0525	145	3.187899943	mV/V/deg
Ankle Left Y Rotation	Contelec PD210-4B	DS-0524	148	3.190600080	mV/V/deg
Ankle Left Z Rotation	Contelec PD210-4B	DS-0523	157	3.178599989	mV/V/deg
Femur Right X Force	Denton W50-7101051	LC-DM4976 Fx	15086	0.000142600	mV/V/N
Femur Right Y Force	Denton W50-7101051	LC-DM4976 Fy	15054	0.000142900	mV/V/N
Femur Right Z Force	Denton W50-7101051	LC-DM4976 Fz	15024	0.000072200	mV/V/N
Femur Right X Moment	Denton W50-7101051	LC-DM4976 Mx	351	0.006505700	mV/V/Nm
Femur Right Y Moment	Denton W50-7101051	LC-DM4976 My	352	0.006488900	mV/V/Nm
Knee Right X Displacement	Space Age 150-0121VL	DS-021033	20	23.250799626	mV/V/mm
Upper Tibia Right Z Force	Denton 4353J	LC-75 Fz	11158	0.000095200	mV/V/N
Upper Tibia Right X Moment	Denton 4353J	LC-75 Mx	397	0.007490000	mV/V/Nm
Upper Tibia Right Y Moment	Denton 4353J	LC-75 My	398	0.007475800	mV/V/Nm
Lower Tibia Right X Force	Denton 4929J	LC-166 Fx	11129	0.000175600	mV/V/N
Lower Tibia Right Y Force	Denton 4929J	LC-166 Fy	11153	0.000171300	mV/V/N
Lower Tibia Right Z Force	Denton 4929J	LC-166 Fz	11138	0.000099500	mV/V/N
Lower Tibia Right X Moment	Denton 4929J	LC-166 Mx	396	0.007424800	mV/V/Nm
Lower Tibia Right Y Moment	Denton 4929J	LC-166 My	399	0.007372600	mV/V/Nm
Right Tibia X Acceleration	Endevco 7264C	AC-P82744	2002	0.018270001	mV/V/G's
Right Tibia Y Acceleration	Endevco 7264C	AC-P82322	2004	0.017259999	mV/V/G's

Foot Right X Acceleration	Endevco 7264C	AC-P74976	2021	0.017840001	mV/V/G's
Foot Right Z Acceleration	Endevco 7264C	AC-P83339	2010	0.019900001	mV/V/G's
Ankle Right X Rotation	Contelec PD210-4B	DS-0528	144	3.202199936	mV/V/deg
Ankle Right Y Rotation	Contelec PD210-4B	DS-0526	146	3.155299928	mV/V/deg
Ankle Right Z Rotation	Contelec PD210-4B	DS-0527-1	157	3.160600085	mV/V/deg

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 DO9798

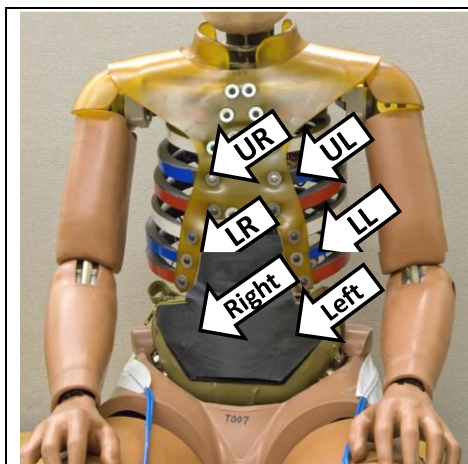


Figure 1. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

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 DL9207

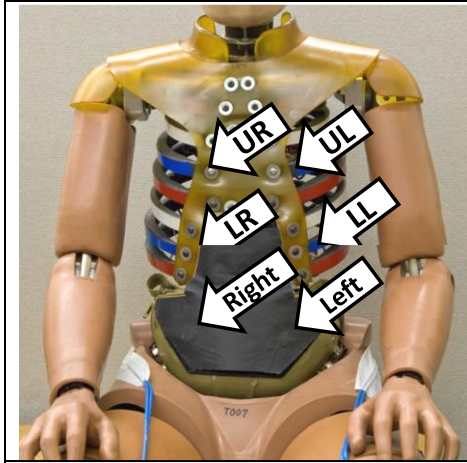


Figure 2. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

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: 10/27/2015		
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 50th Male		
Date of last Certification: Certification performed from 7/2014 through 8/2015		
<u>Tests conducted:</u> <u>Since last inspection:</u> None <u>Since last certification:</u> None		
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> None		
<u>Physical evidence of damage:</u> Abdomen Bag tear		
<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: 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: 8/28/2015		
NHTSA Representative: Timothy Keon		
Inspection Reporter: Matt Goehle		
Inspection type (check one): ☒ Pre-Test ☐ Post-Test		
Dummy S/N: DL9207		Legs S/N: LX0045/LX0046
Dummy Description: THOR-M 50th Male		
Date of last Certification: Certification performed from 7/2014 through 4/2015		
<u>Tests conducted:</u> <u>Since last inspection:</u> R20155376-2015 Honda Fit <u>Since last certification:</u> S0309 (at UVA) S0310 (at UVA)	S0311 (at UVA) S0312 (at UVA) LX Leg certification performed R20150186 - 2015 Malibu R20150187 - 2015 Malibu R20155144 - 2015 Highlander	LX Leg certification performed R20150228 - 2015 F-150 R20155404 - 2015 Mazda R20155376-2015 Honda Fit
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 11FEMRL00THFOXP, Femur Left X Force, Questionable magnitude from 90ms to 125ms, SN:LC-DM4975 Fx - 11TIBILLXTHFOZP, Lower Tibia Left Z Force, Questionable data from 57.8ms to 83.4ms, SN:LC-121 Fz - 11FOOTRILXTHANZP, Ankle Right Z Rotation, Questionable spikes from 35.5ms to 125ms, SN:DS-0527-1		
<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: 11/11/2015		
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	

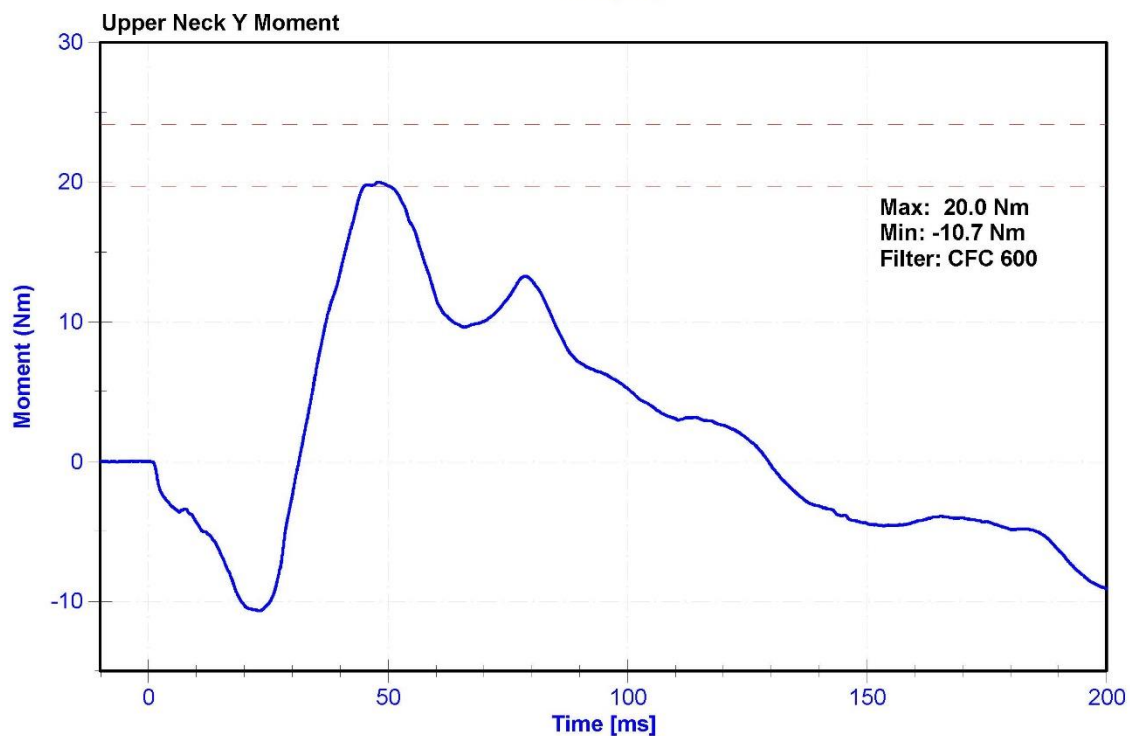
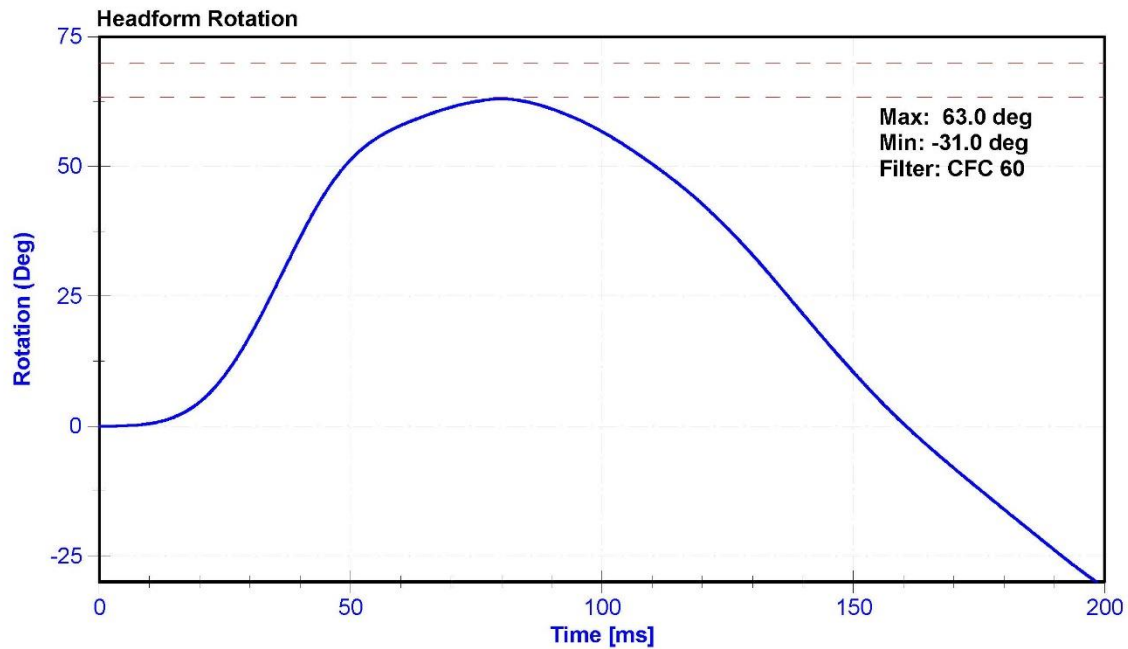
DUMMY CALIBRATIONS

50% ADULT MALE THOR DO9798 DUMMY CALIBRATIONS

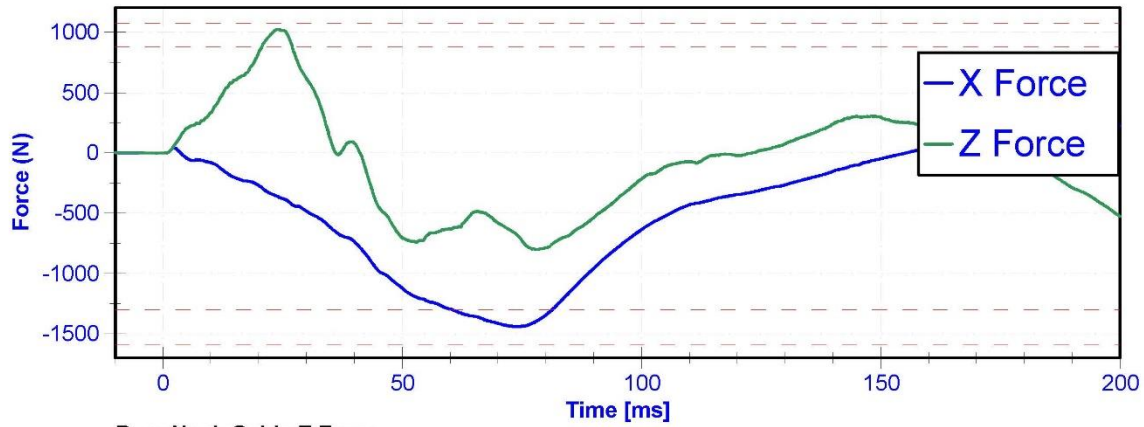


Certification Report
THOR-M 50th Male Neck Flexion Frontal - NHTSA Draft 2015-10-16

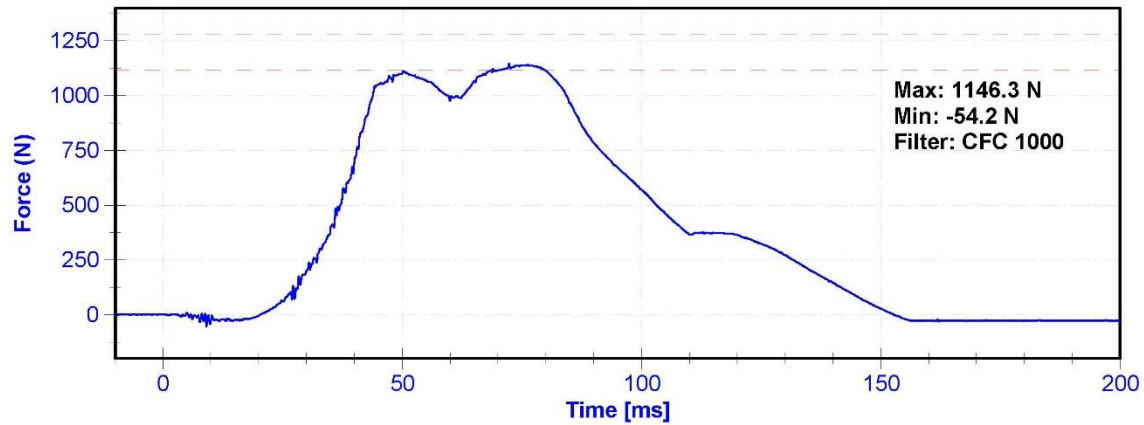
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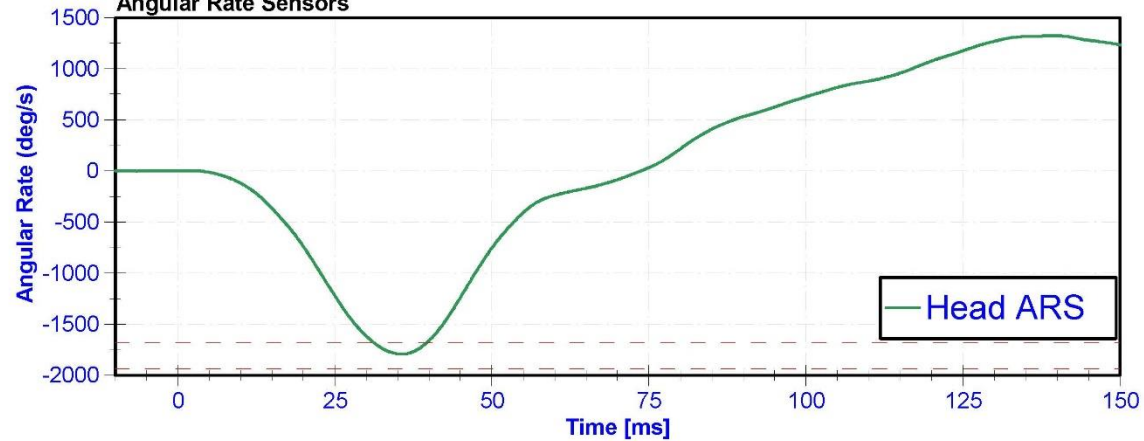
Upper Neck Force



Rear Neck Cable Z Force



Angular Rate Sensors



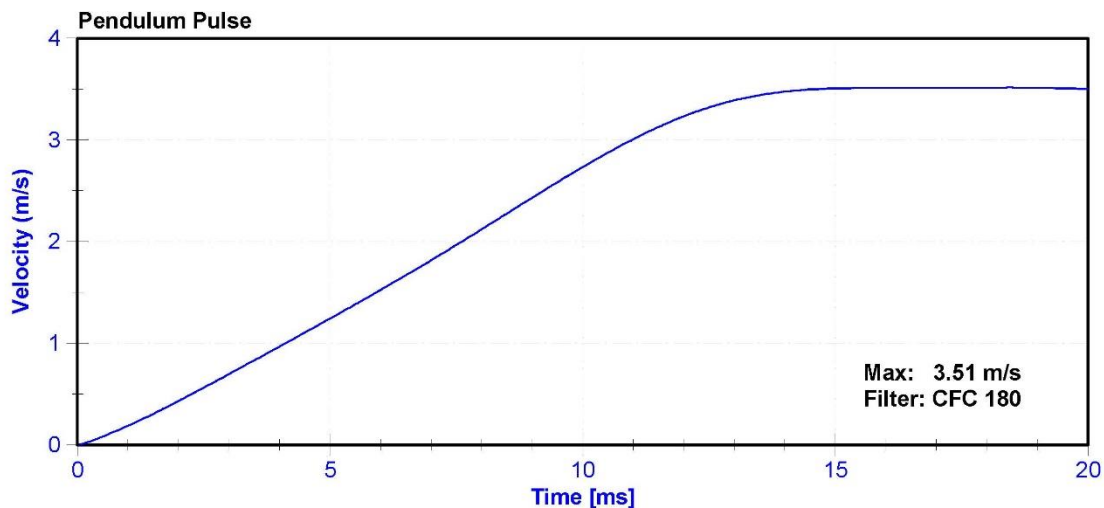
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

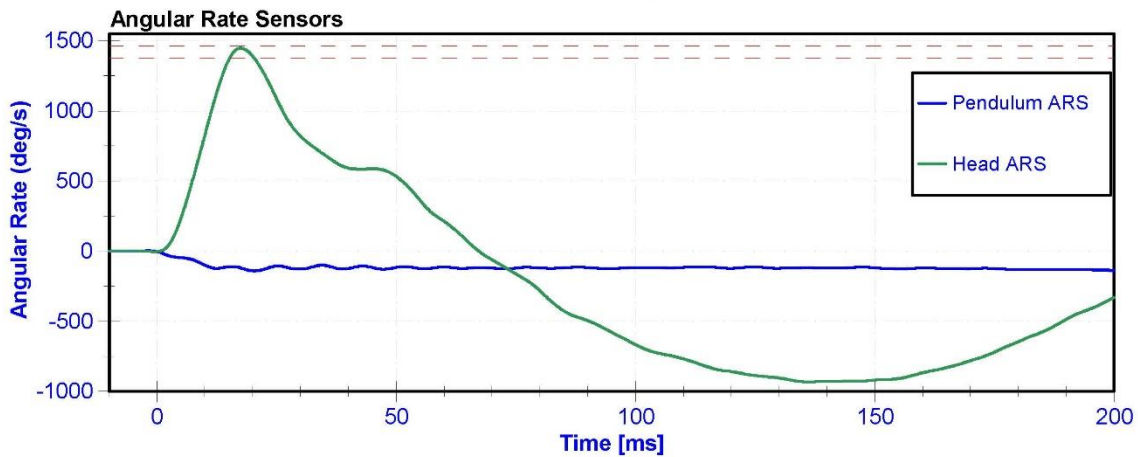
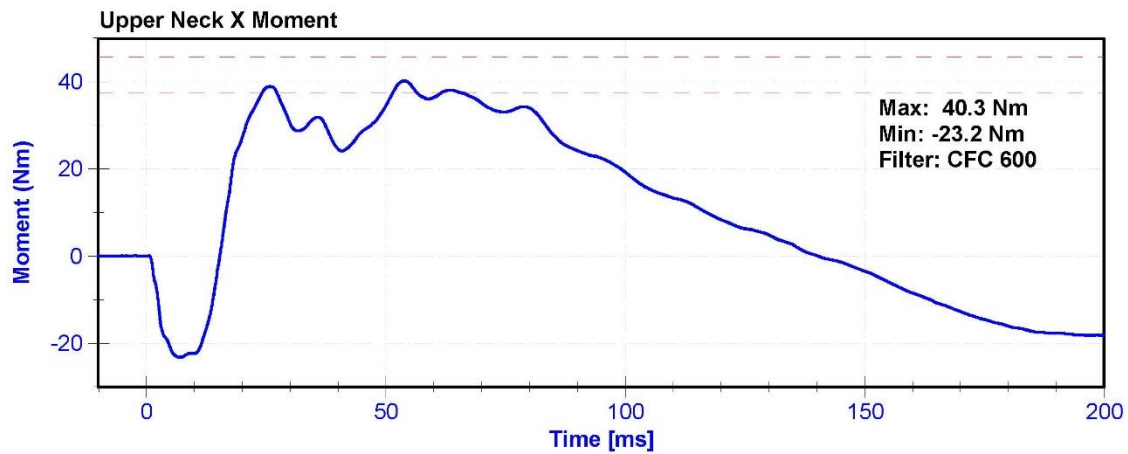
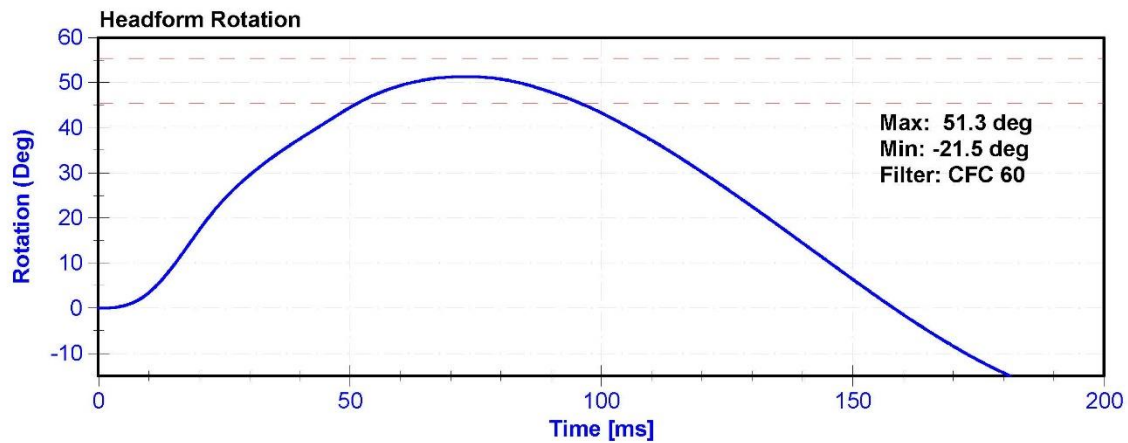
Results

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 10380J14	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





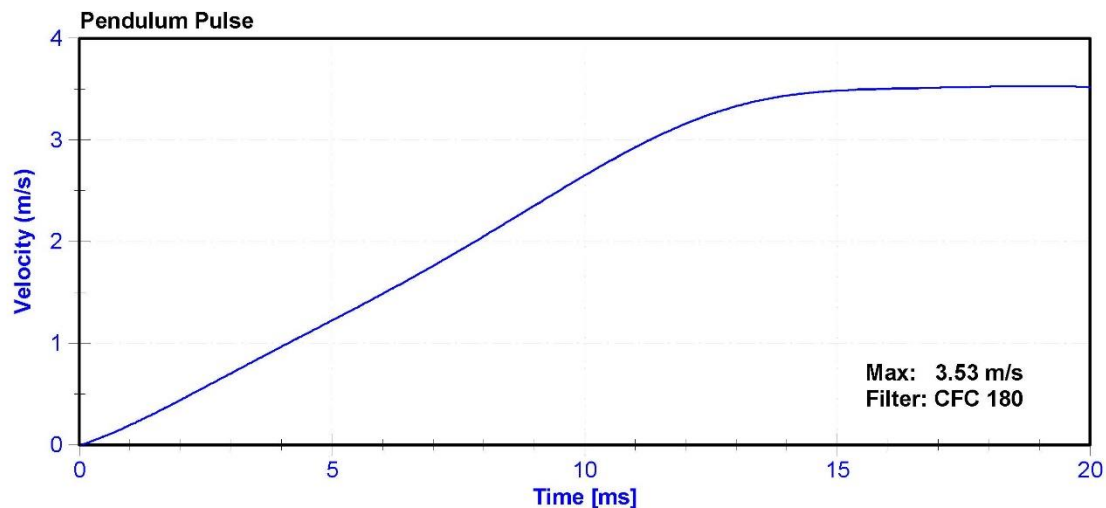
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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 10380J14	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



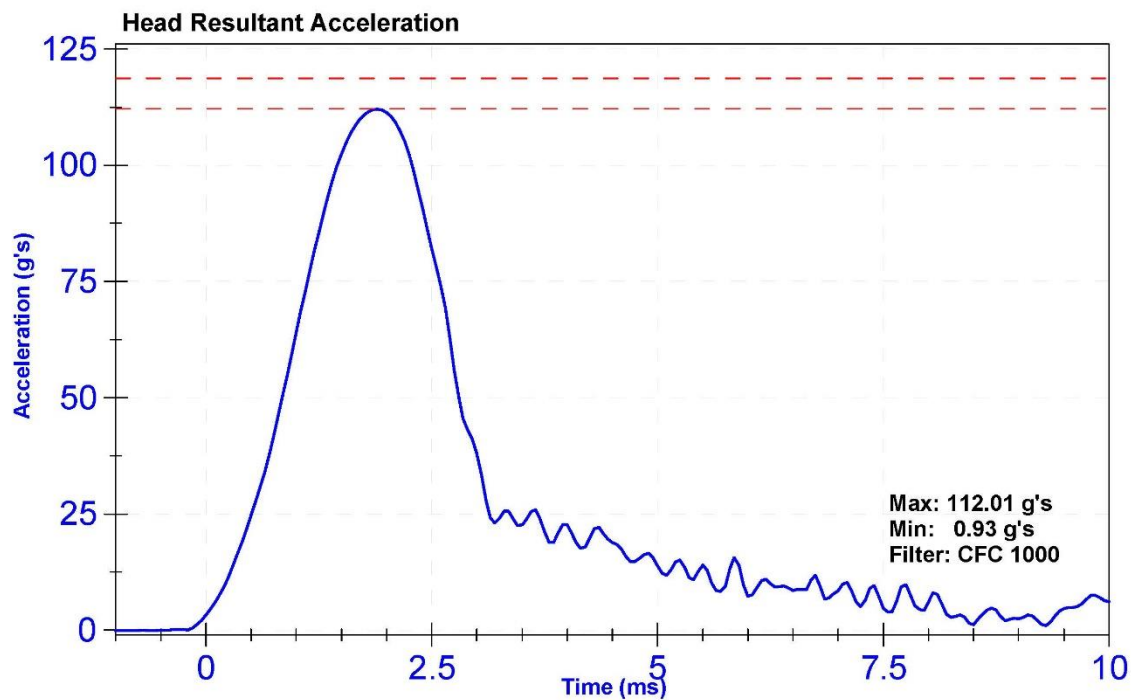
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

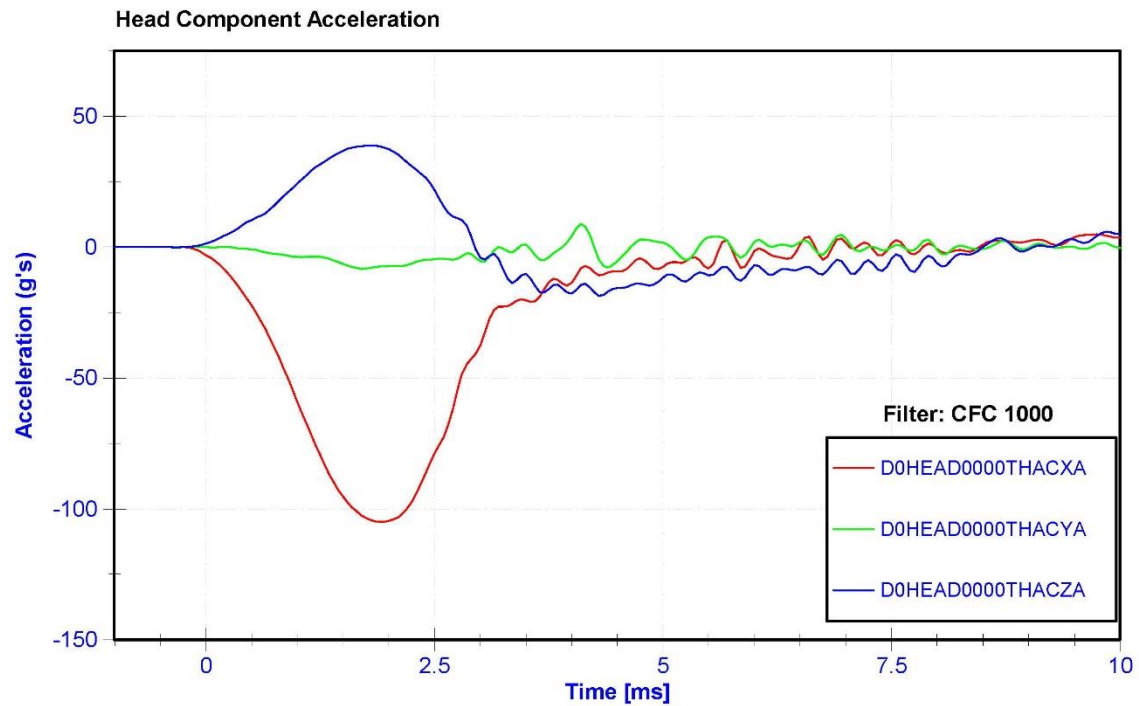
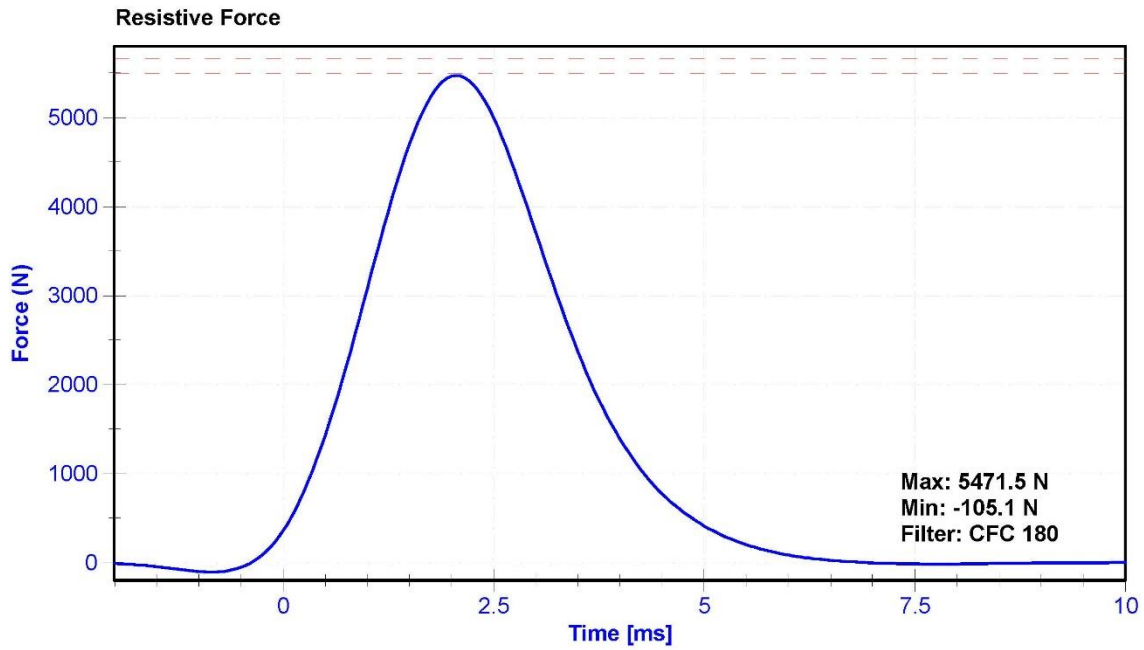
Results

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





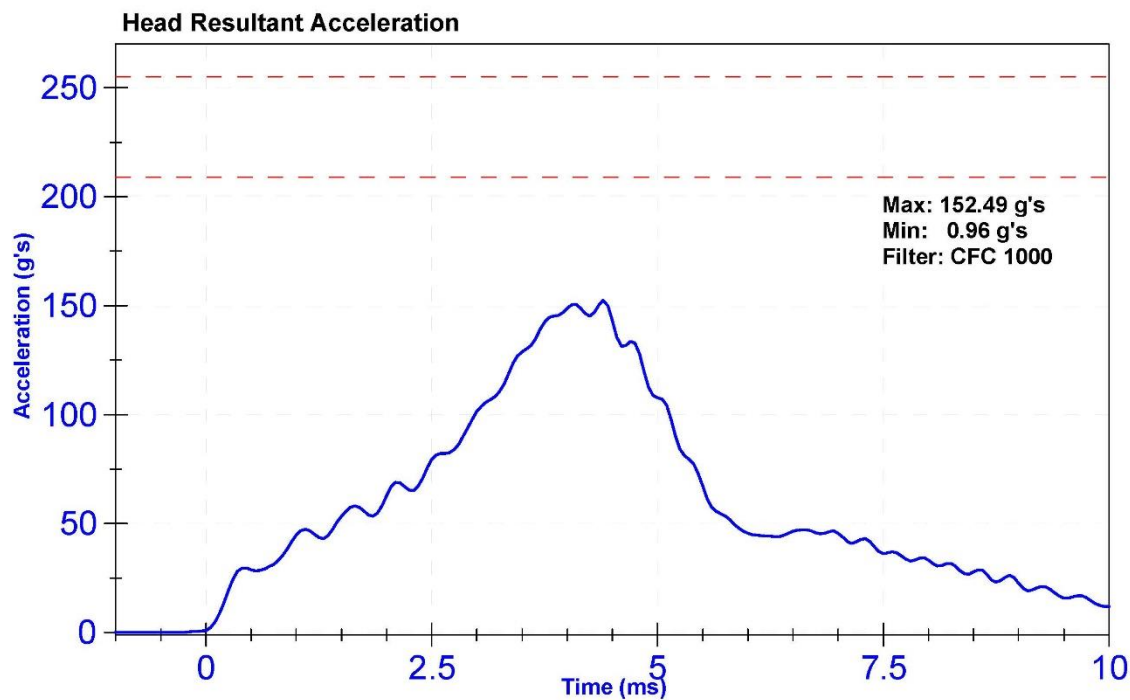
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

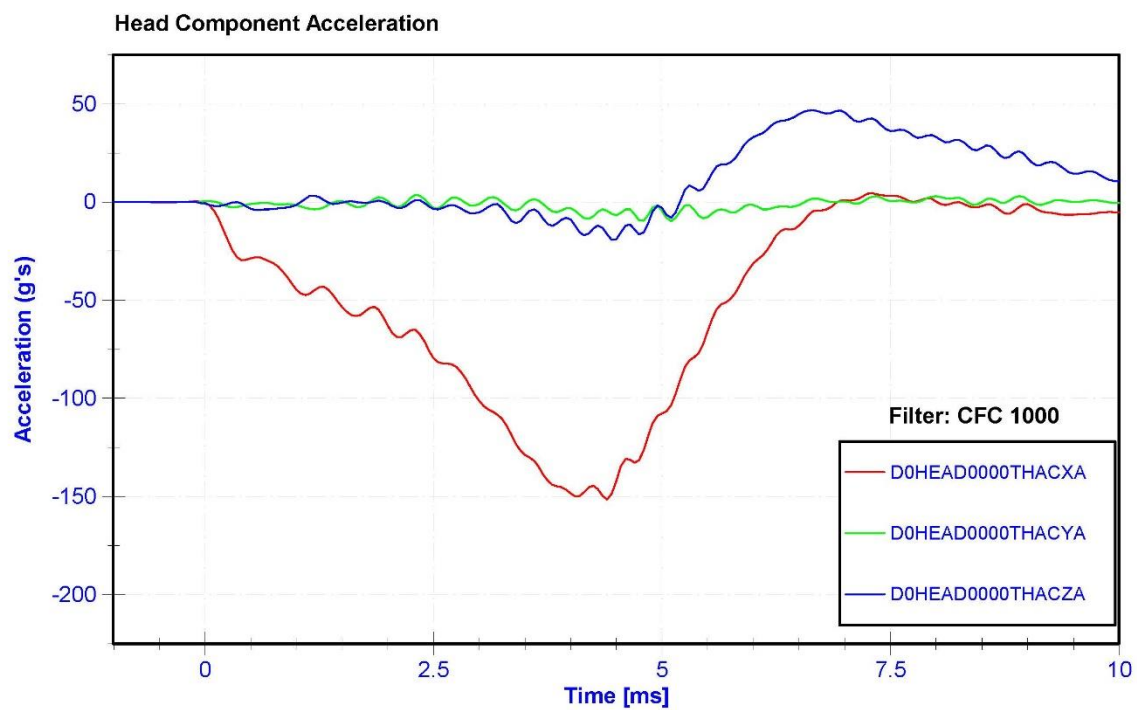
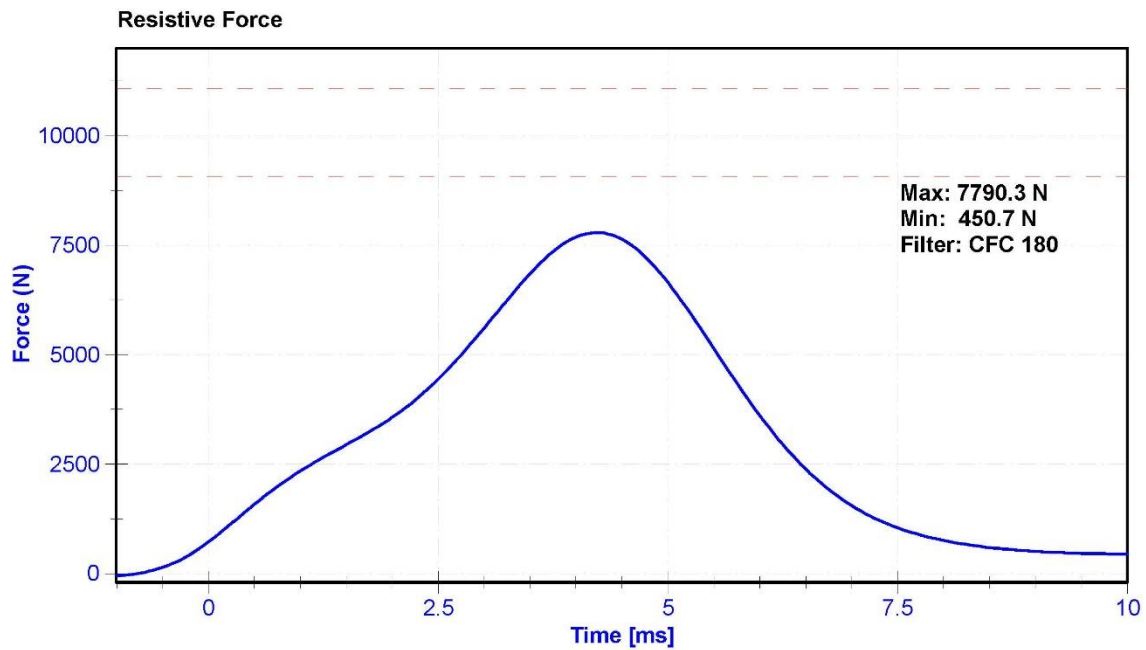
Results

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





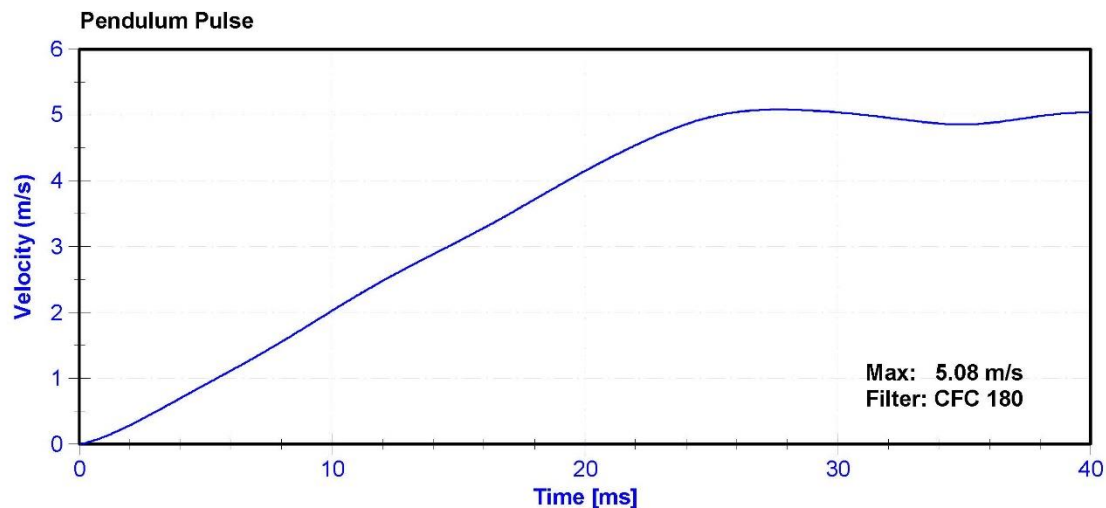
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

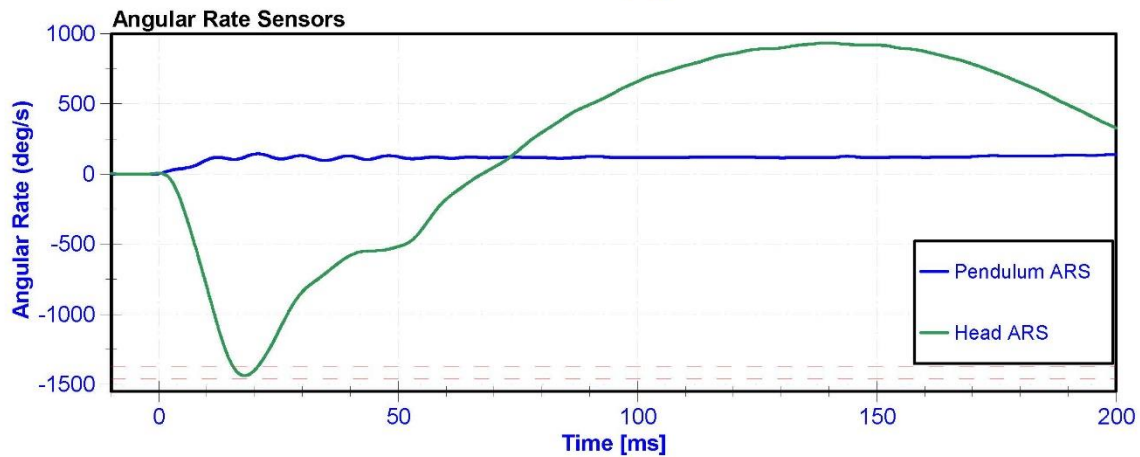
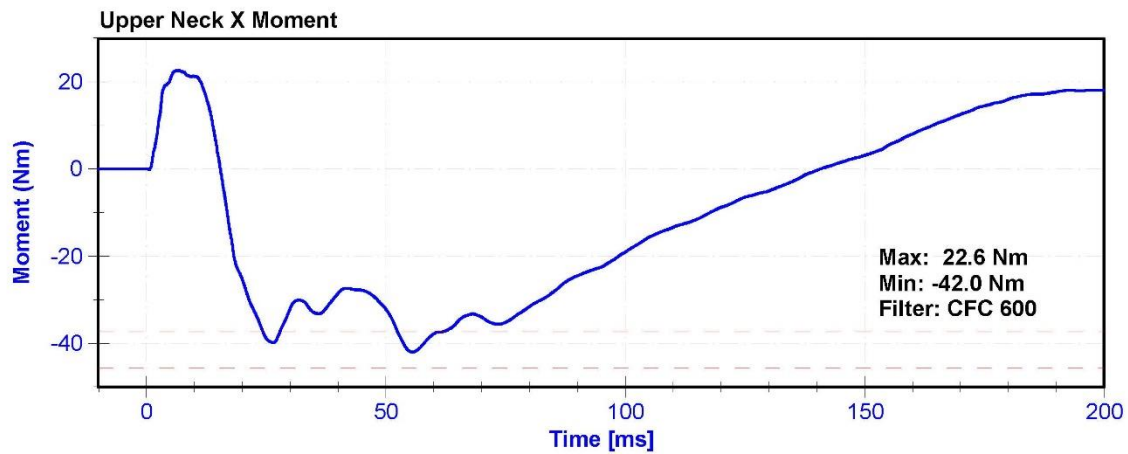
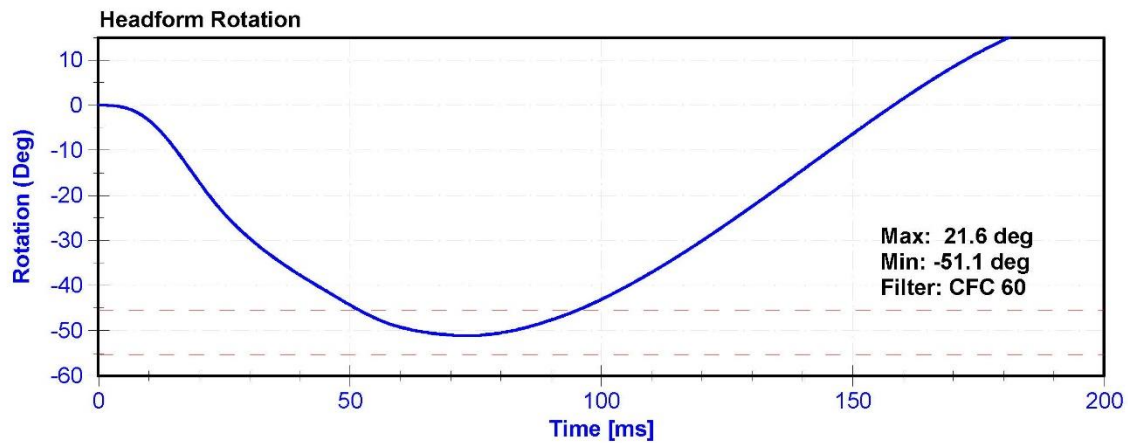
Results

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





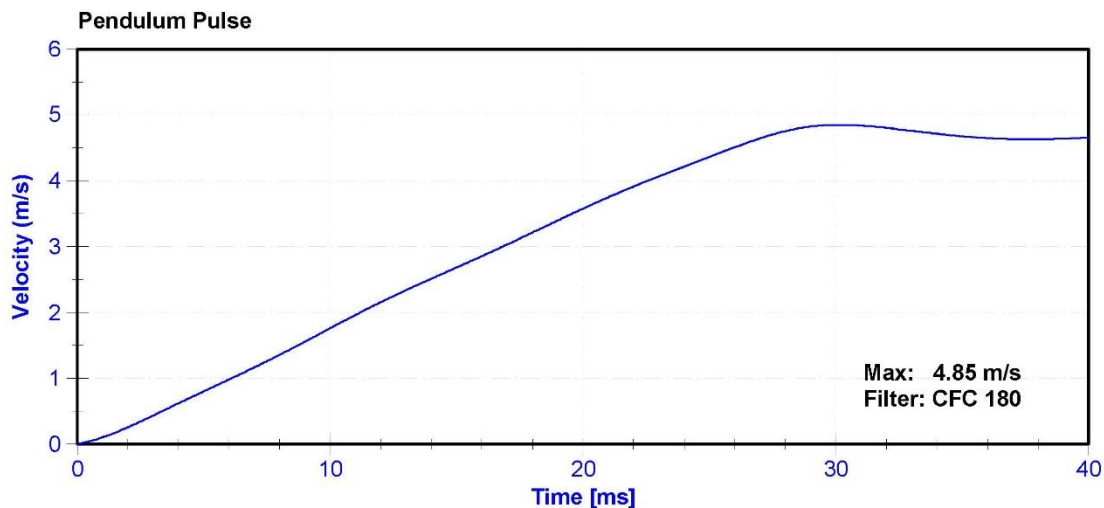
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

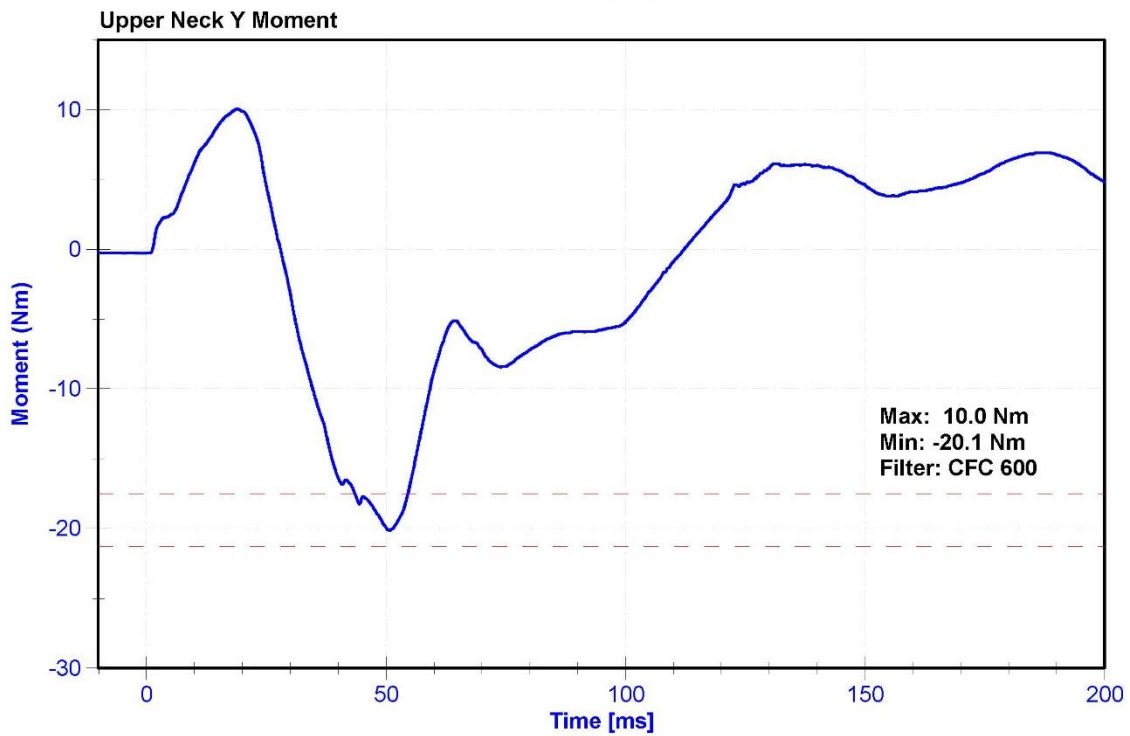
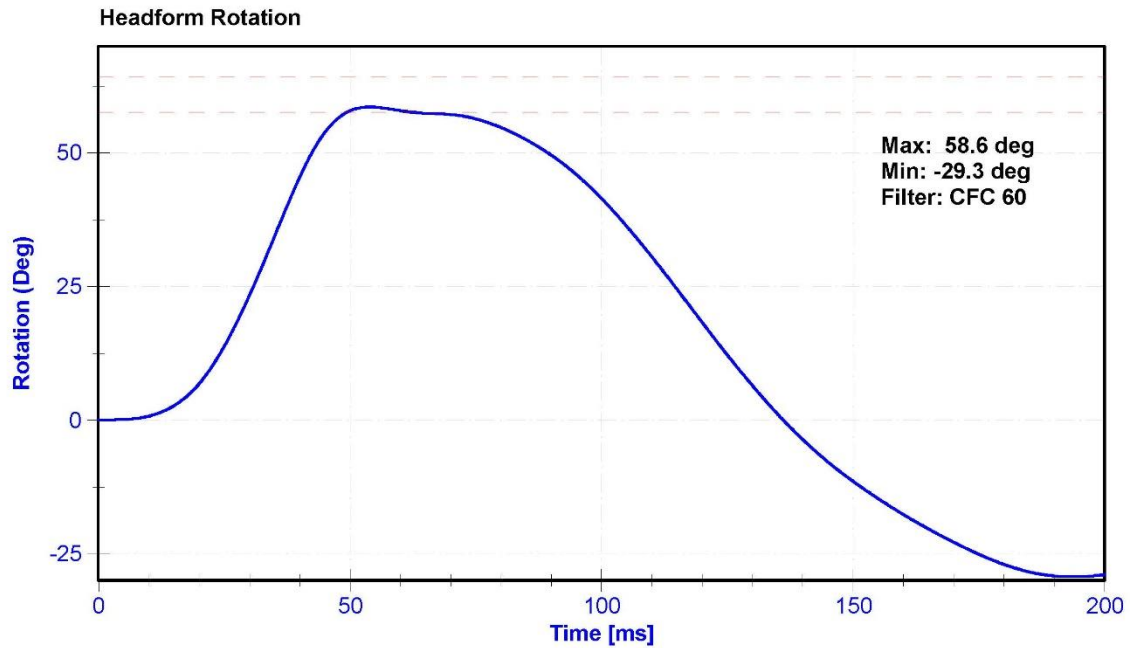
Results

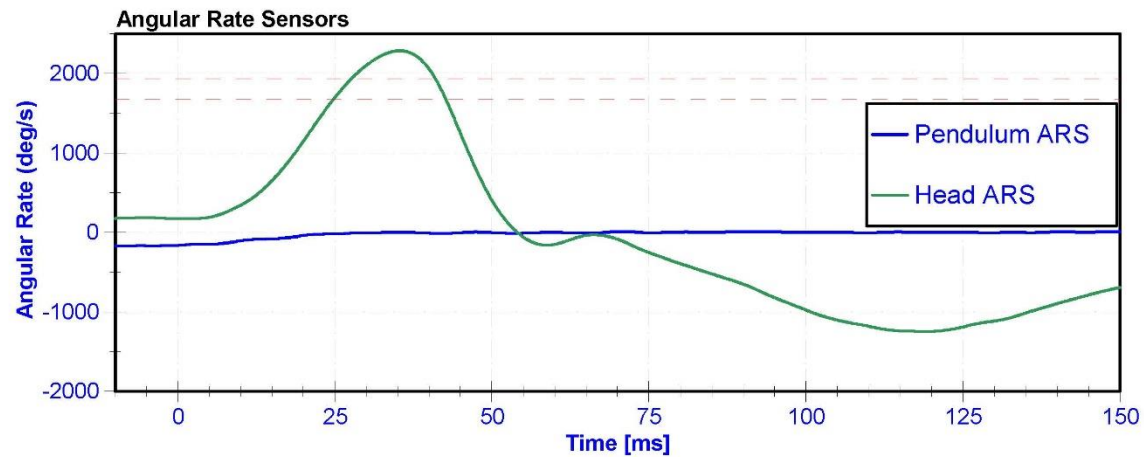
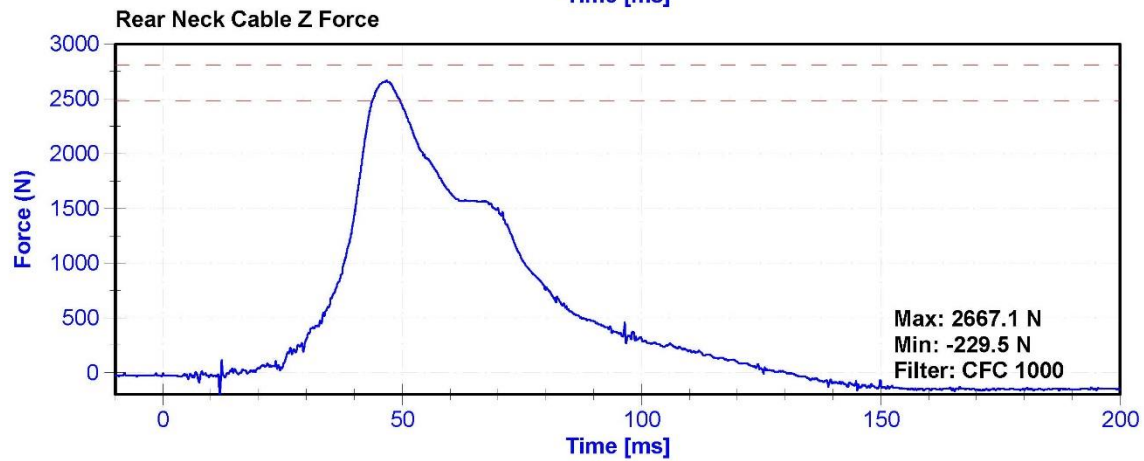
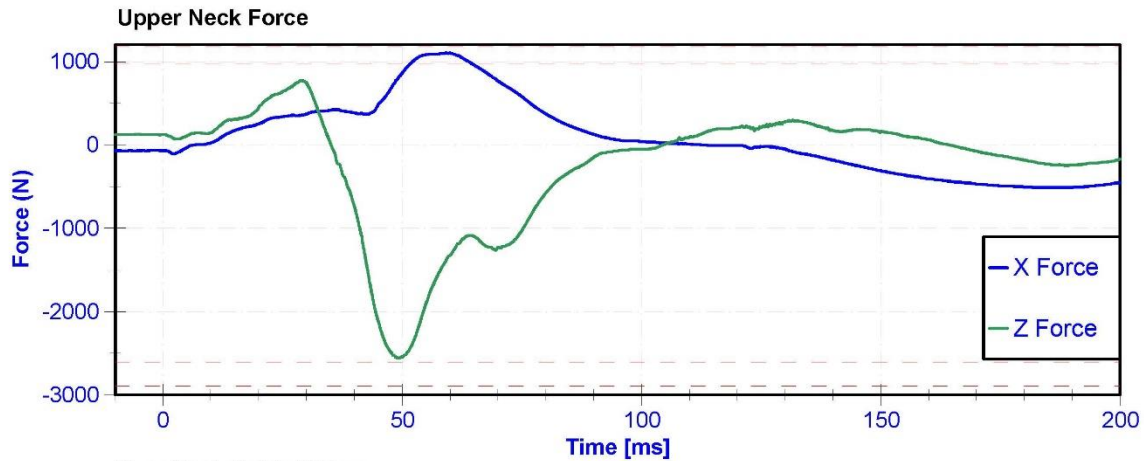
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	45.0	Pass
Velocity	4.95	5.05	m/s	4.98	Pass
Pendulum Impulse at 10ms	1.76	1.91	m/s	1.762	Pass
Pendulum Impulse at 20ms	3.50	3.75	m/s	3.577	Pass
Pendulum Impulse at 30ms	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







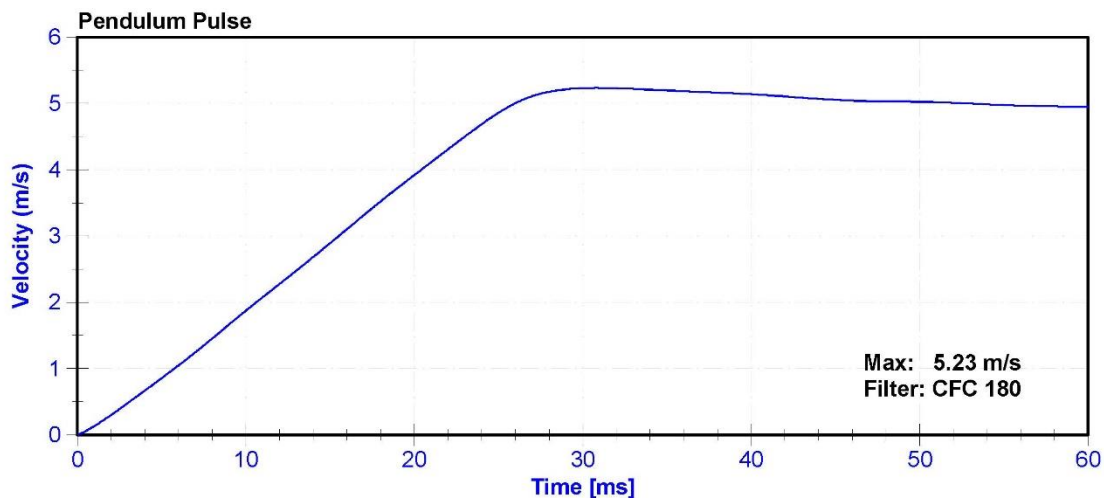
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

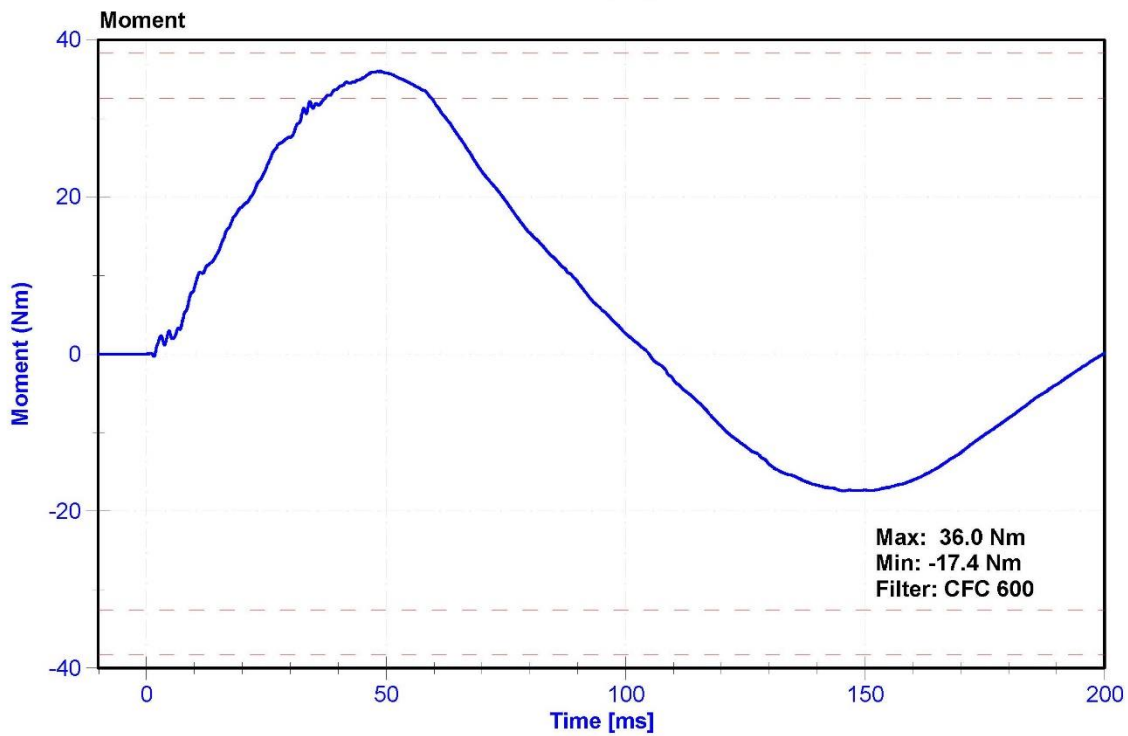
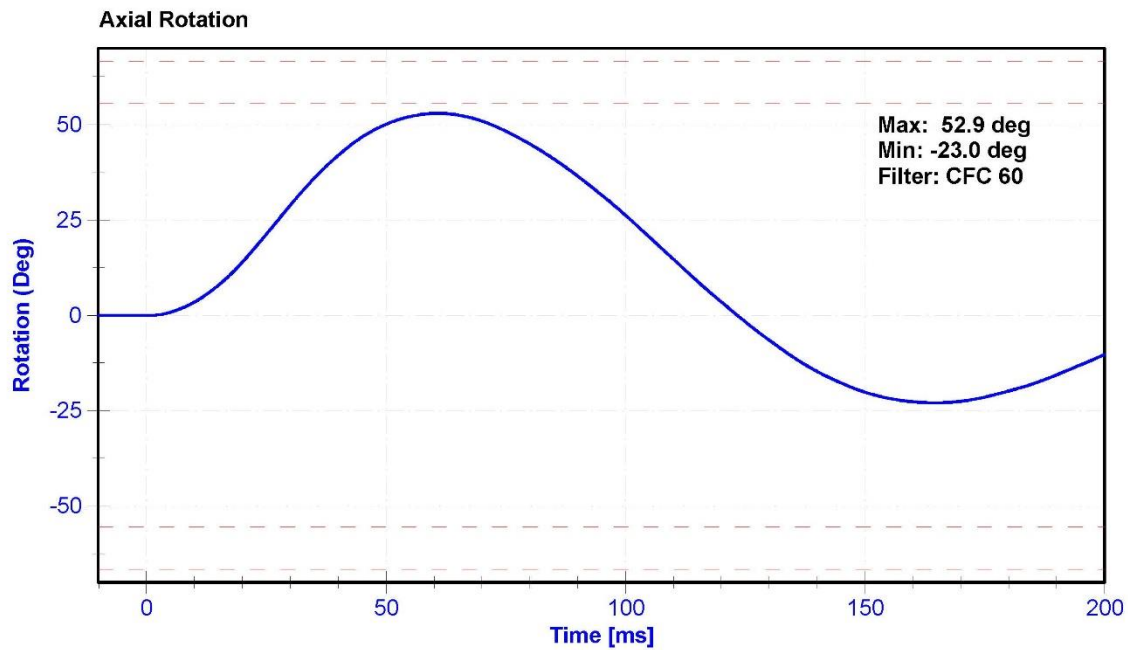
Results

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





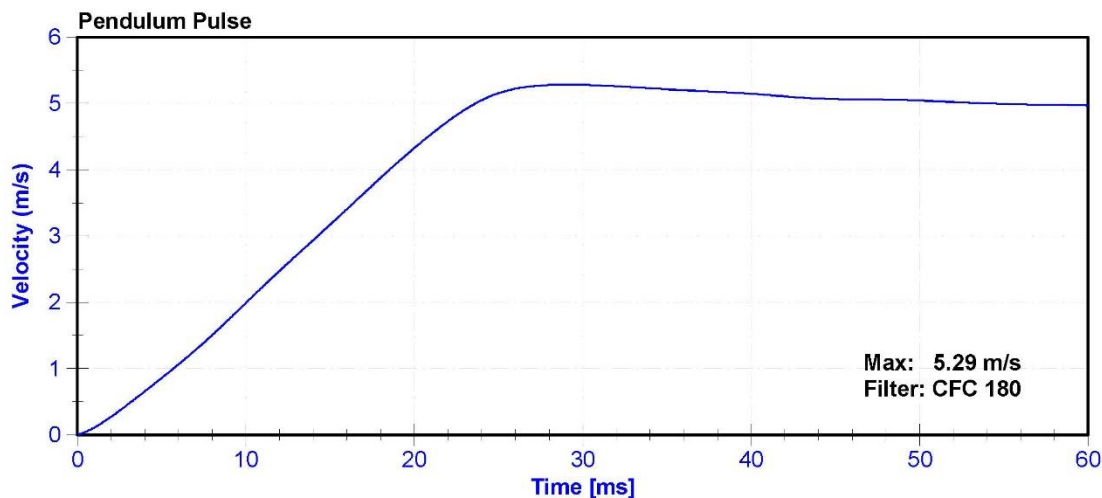
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

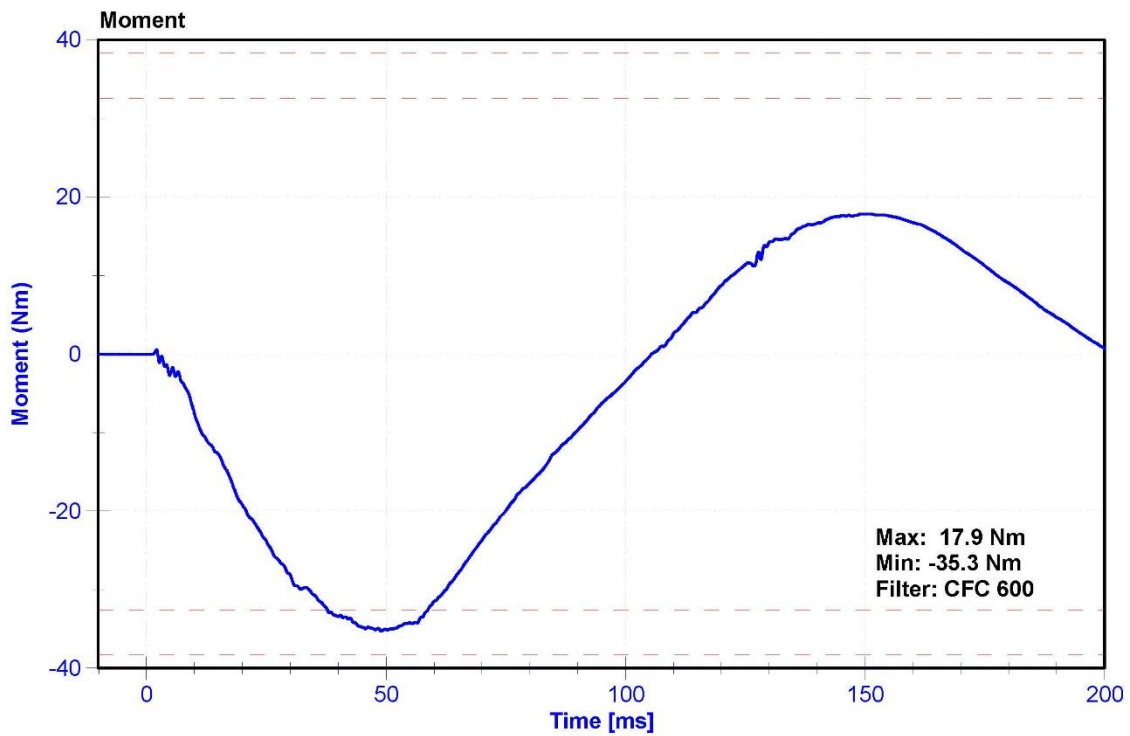
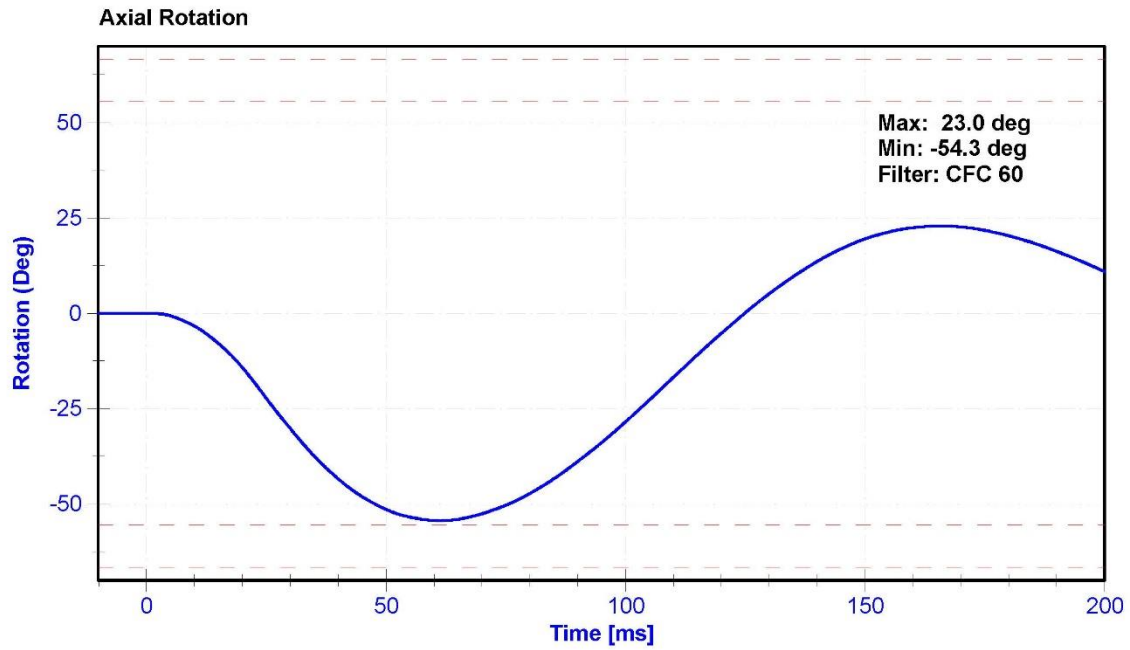
Results

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





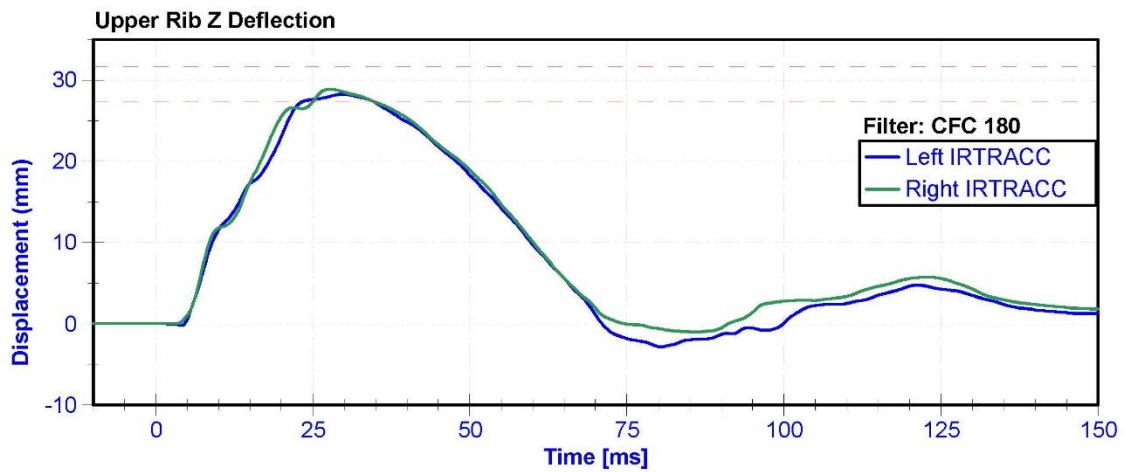
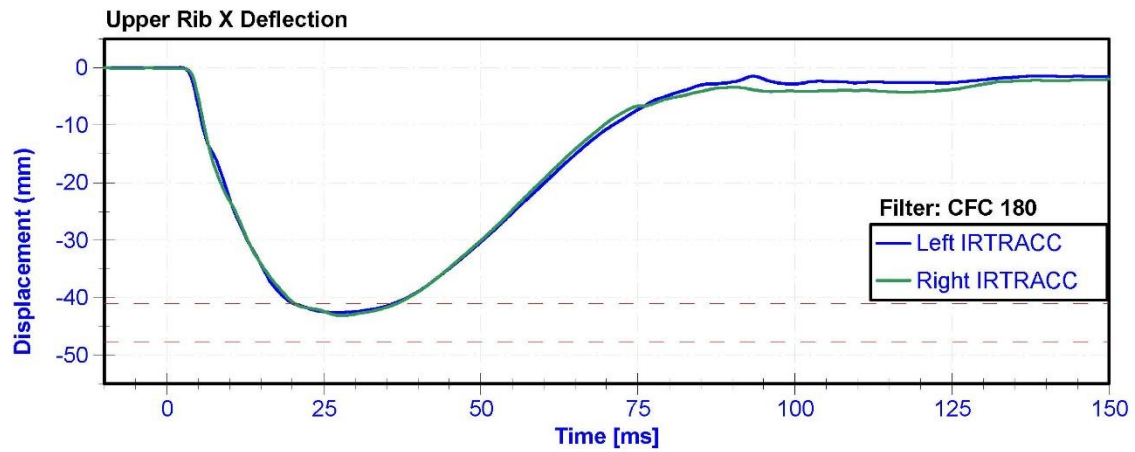
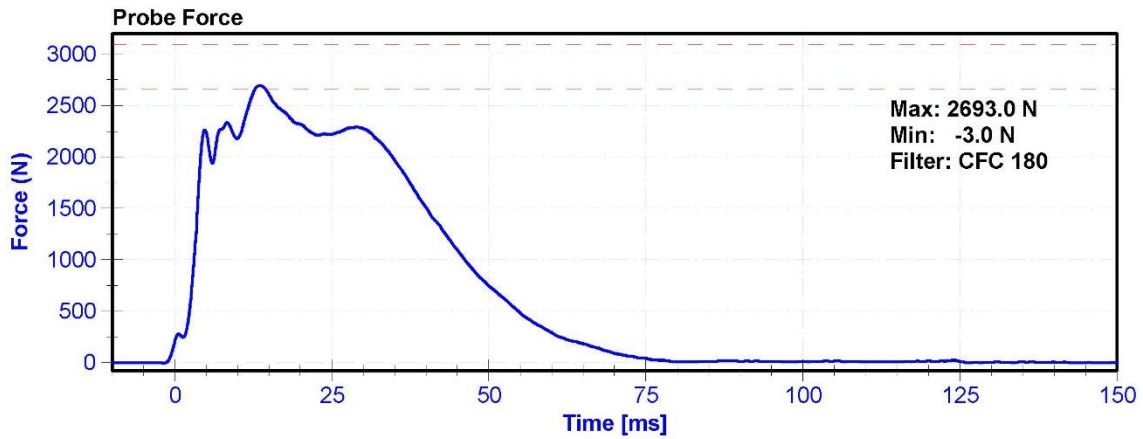
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	D09798	Laboratory Supervisor	M. Goehle

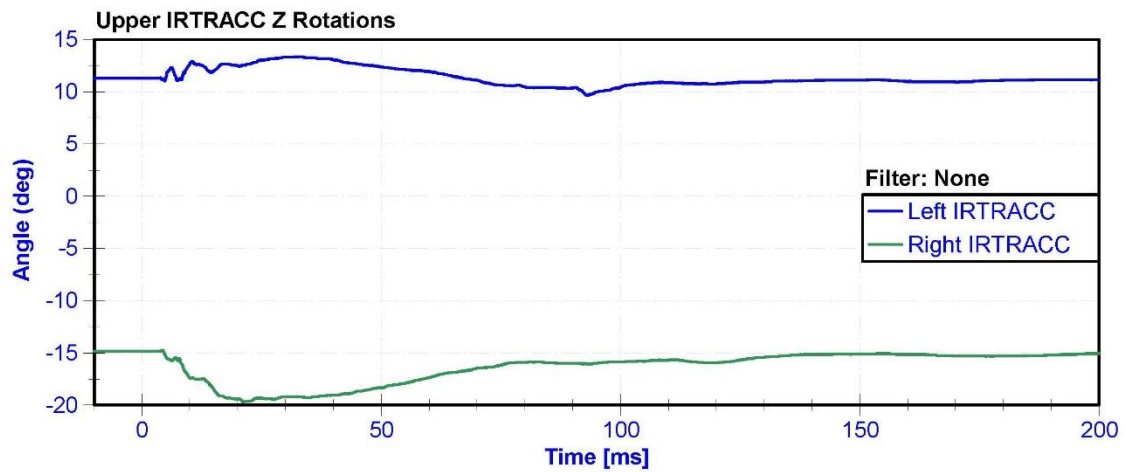
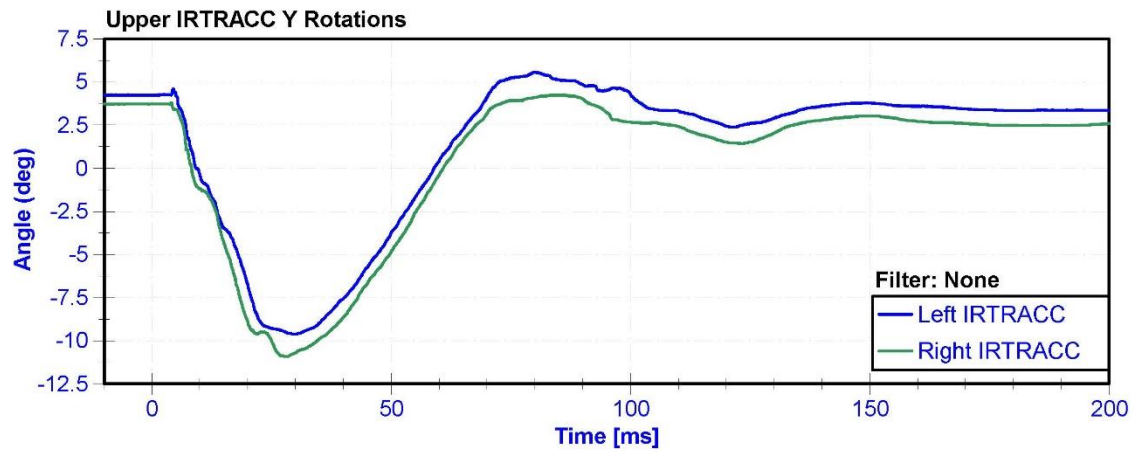
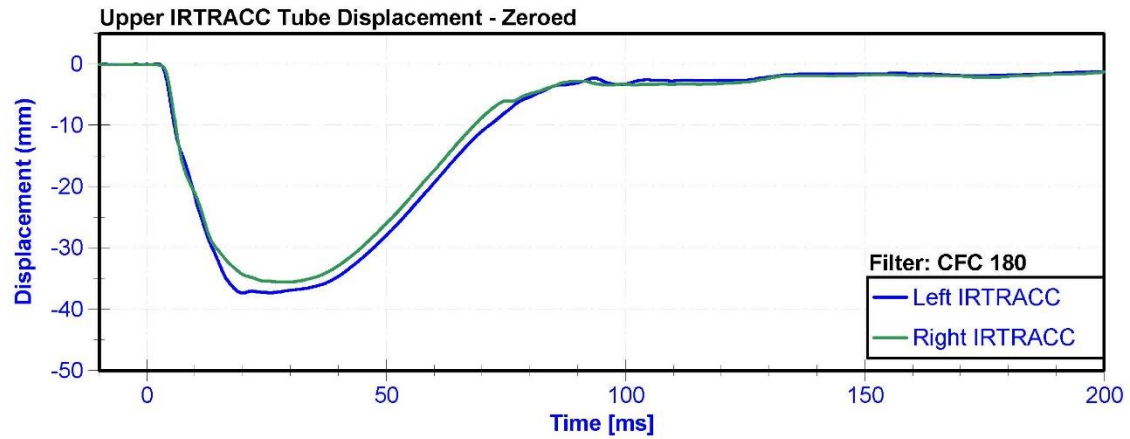
Results

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





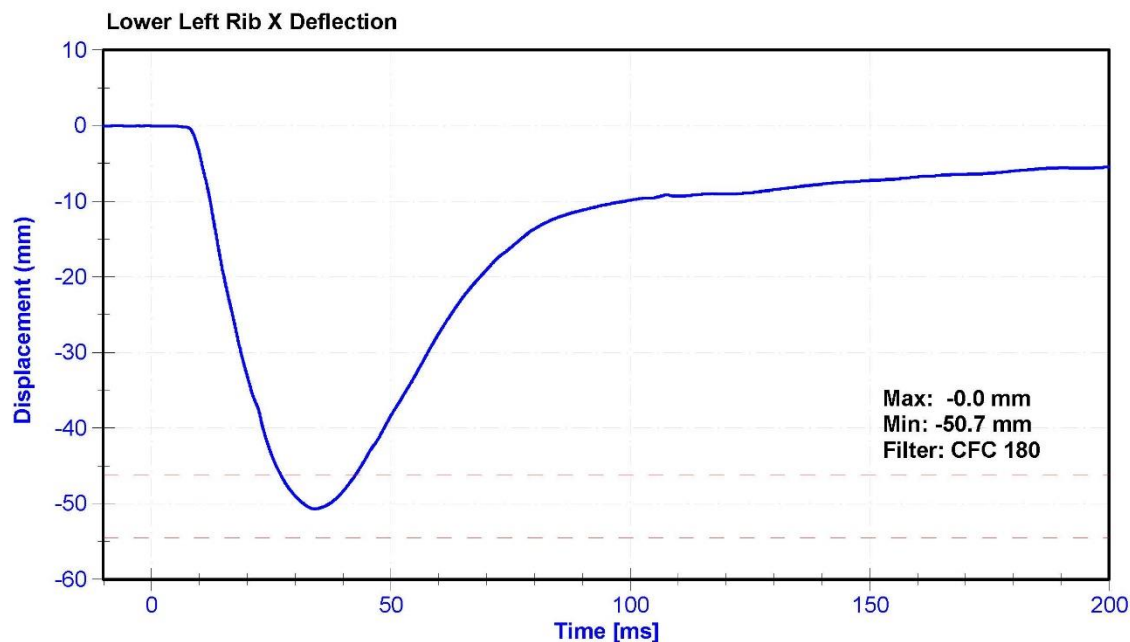
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

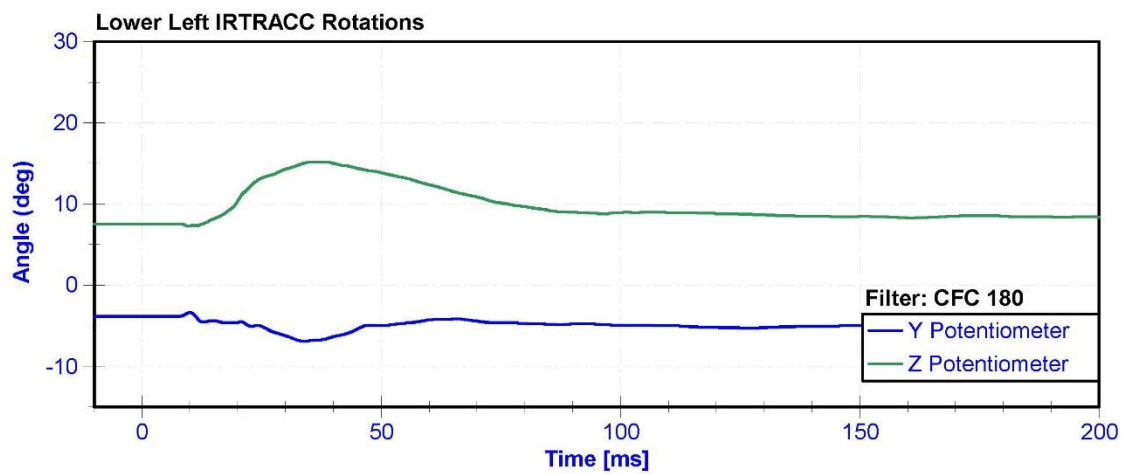
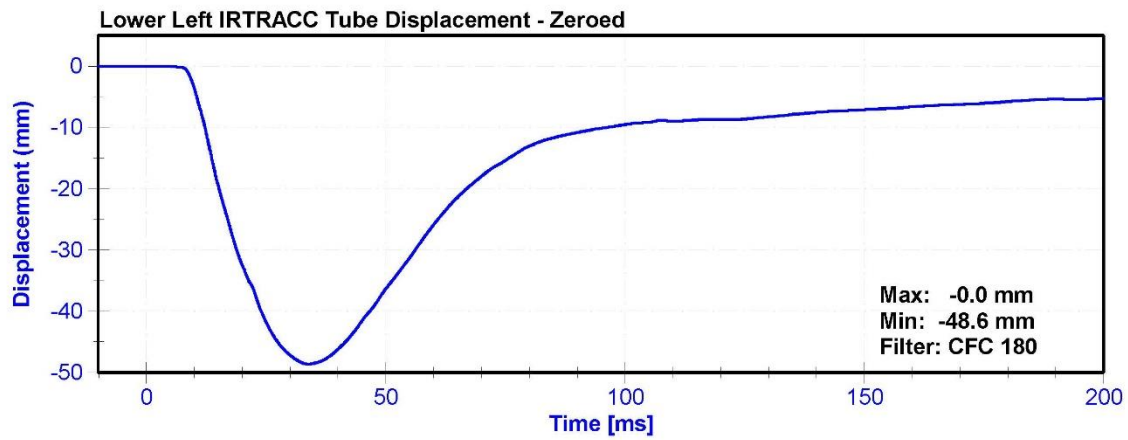
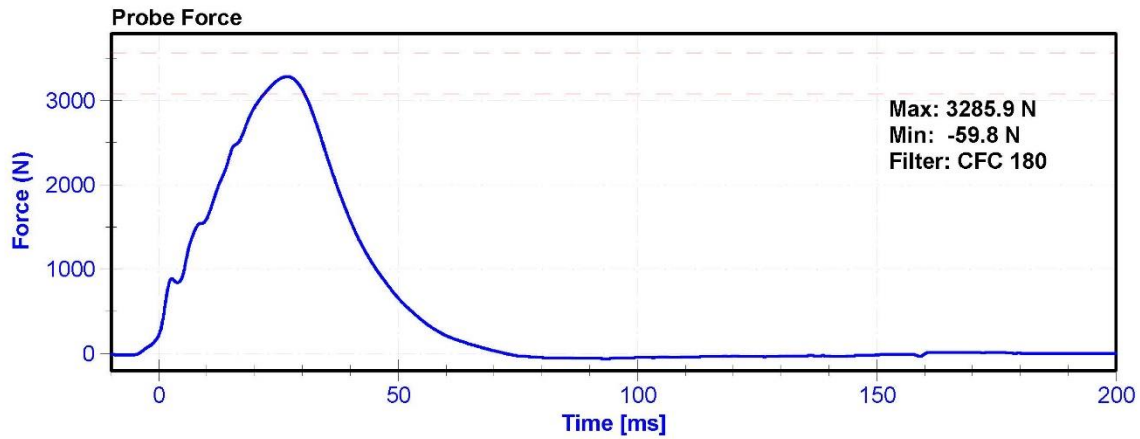
Results

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





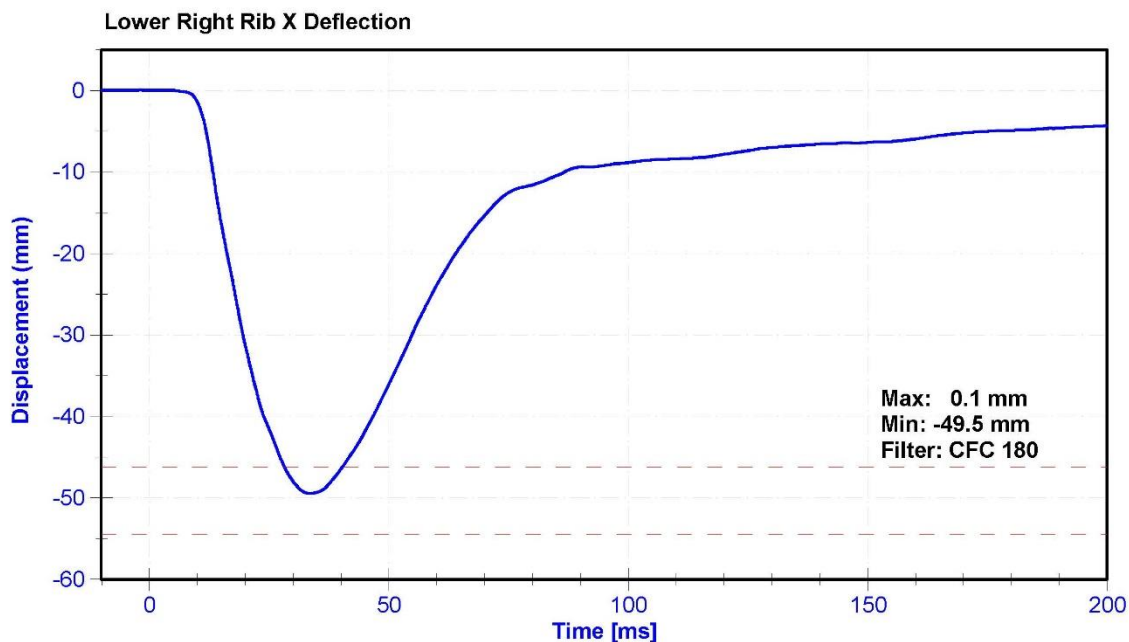
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

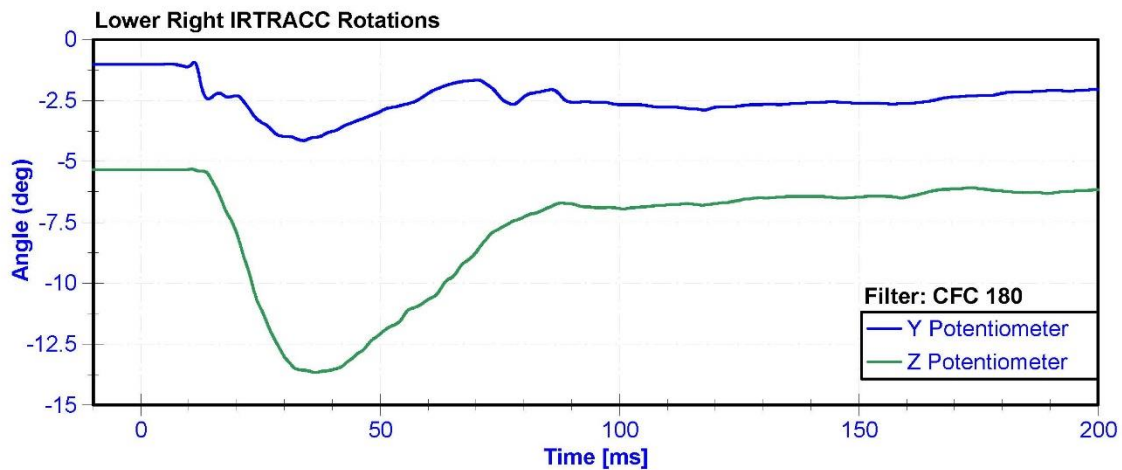
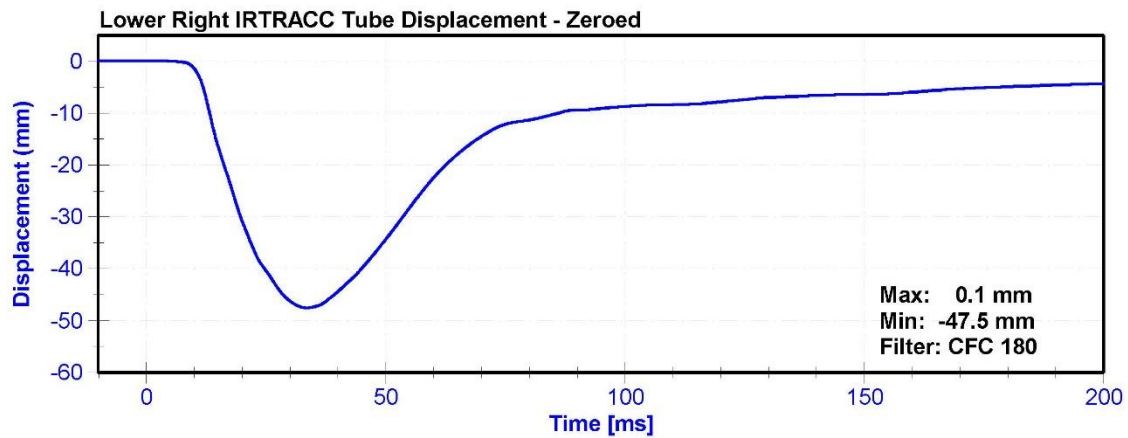
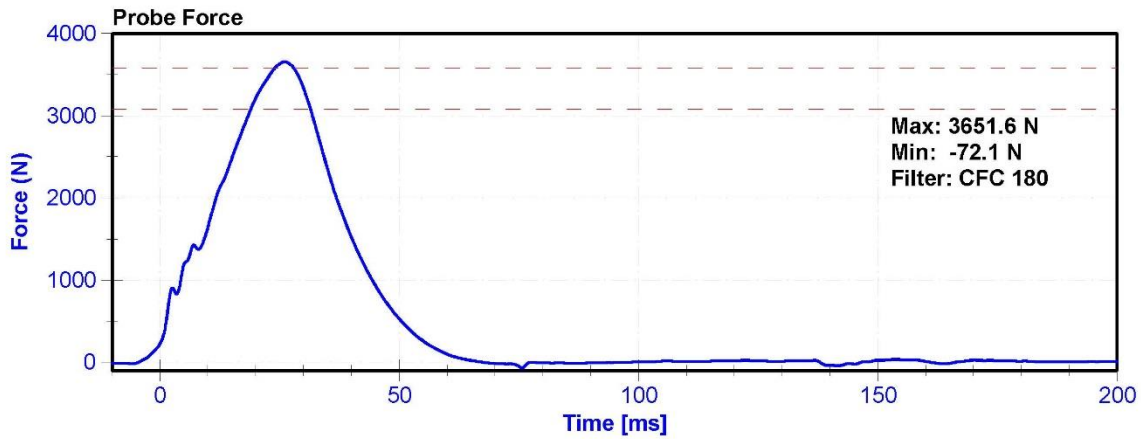
Results

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 IRTRACC	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







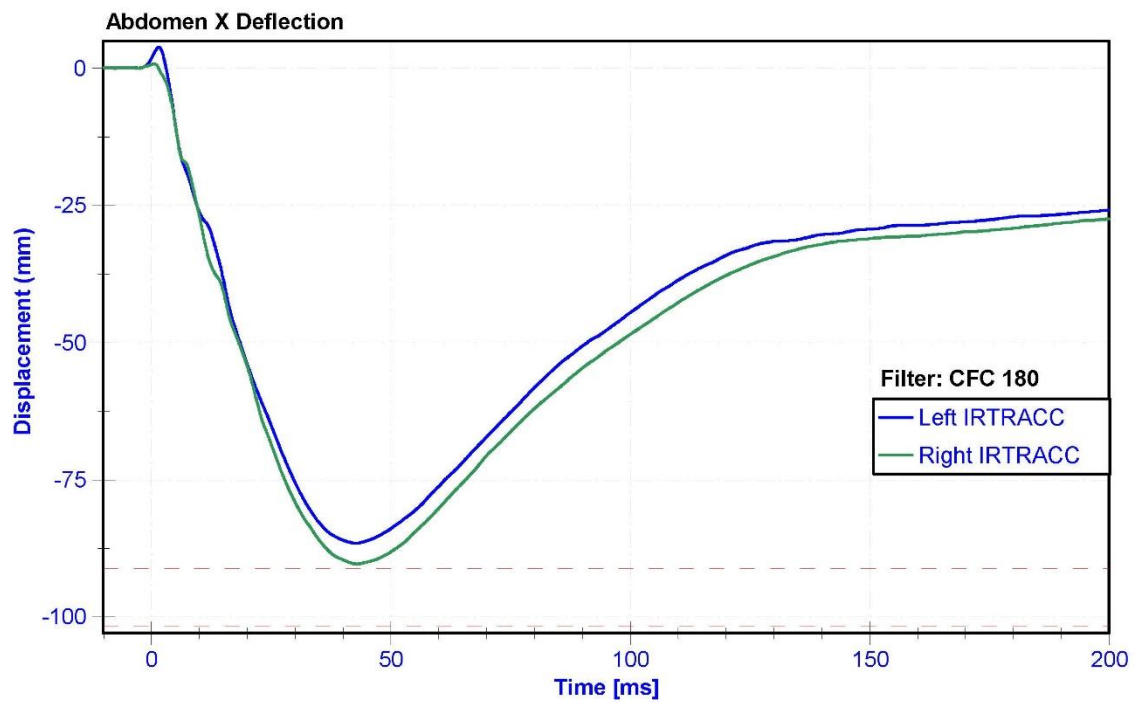
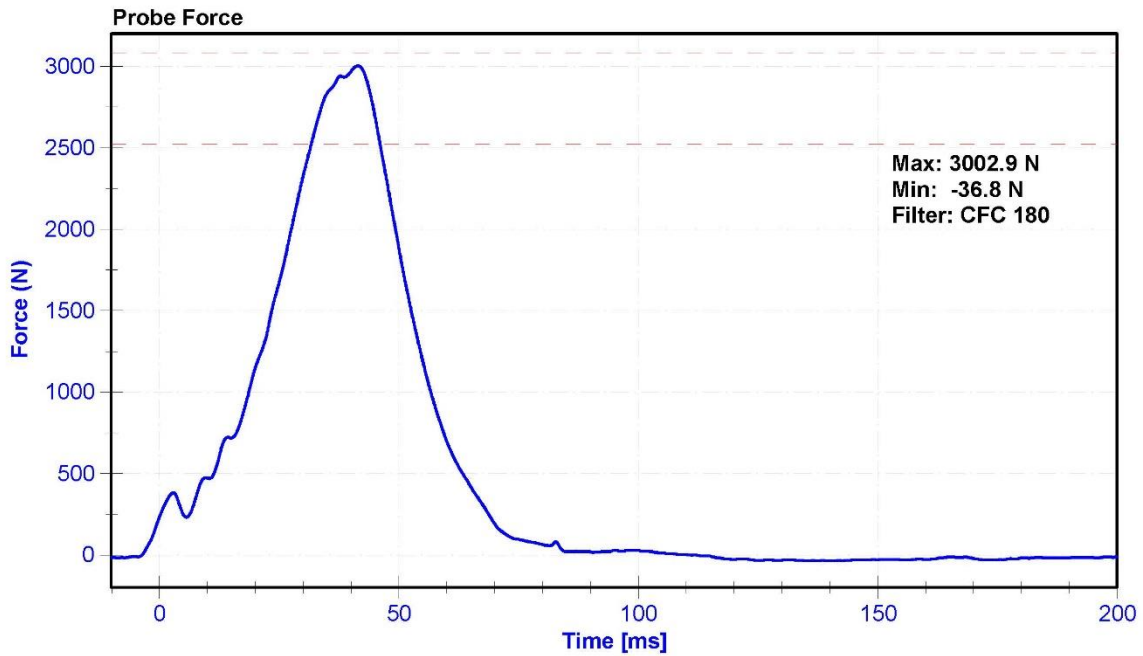
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

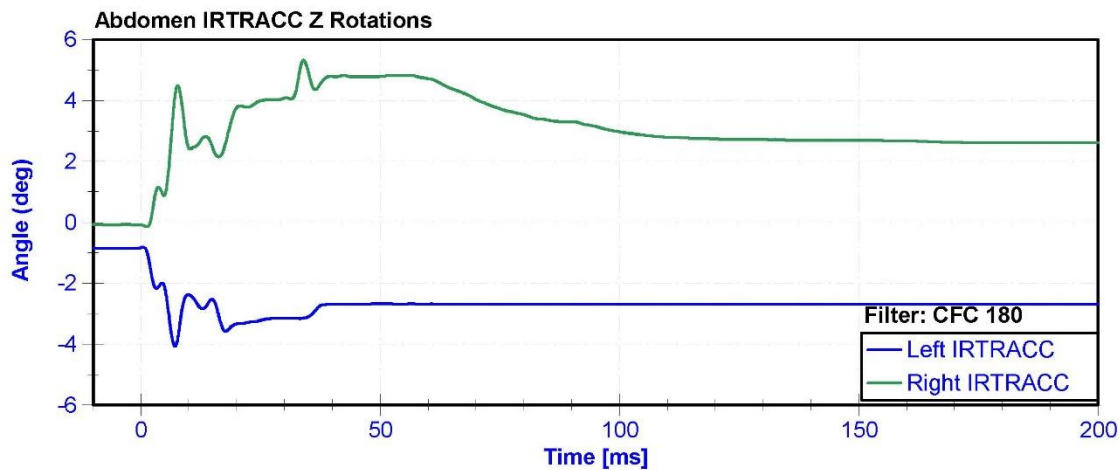
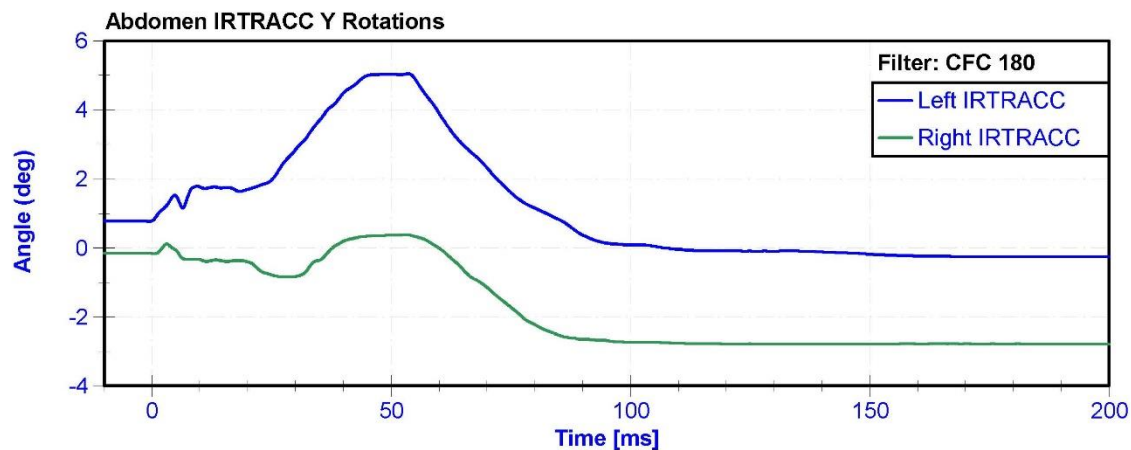
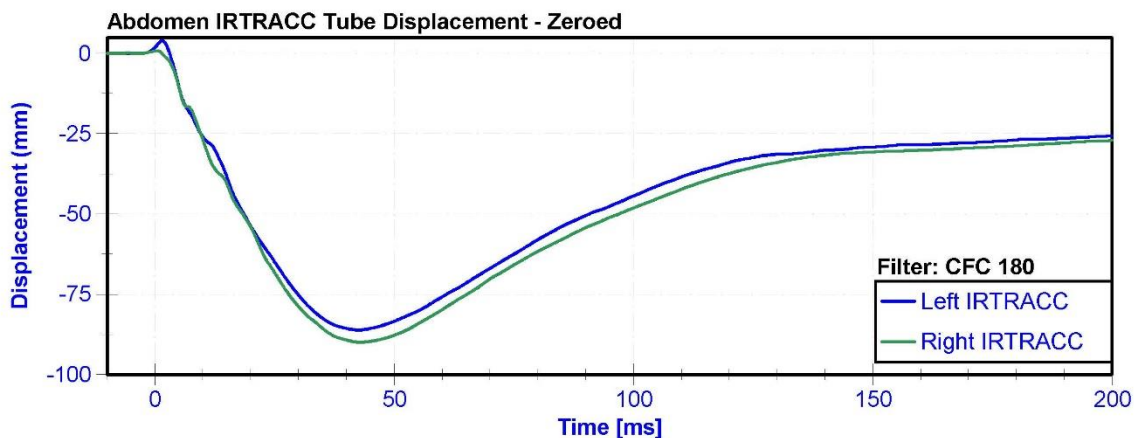
Results

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





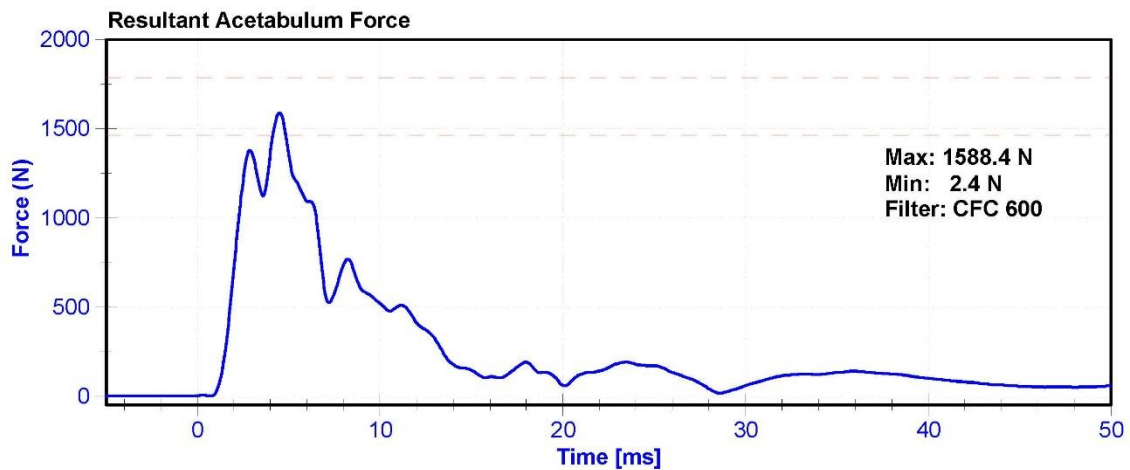
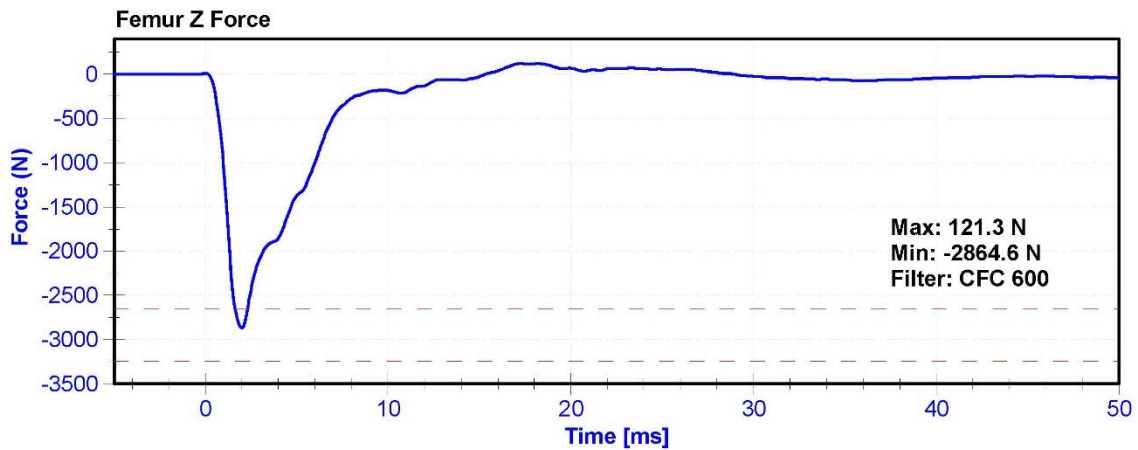
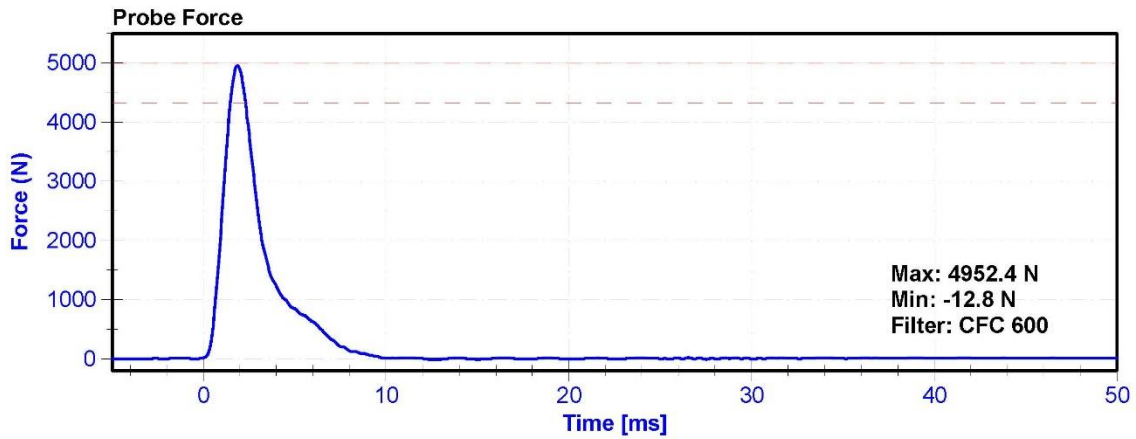
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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 10530JL4	LC-DM1945 Fx	3/7/2015	3/6/2016



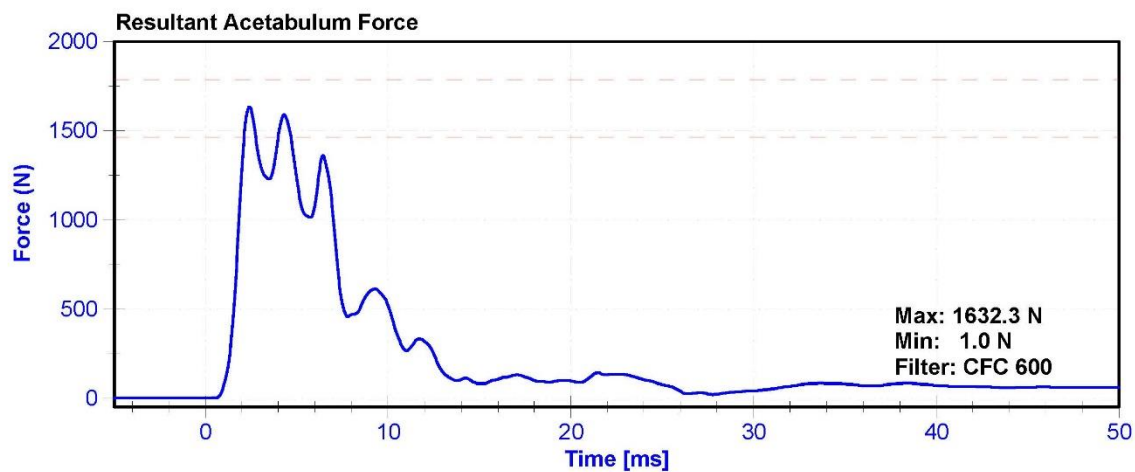
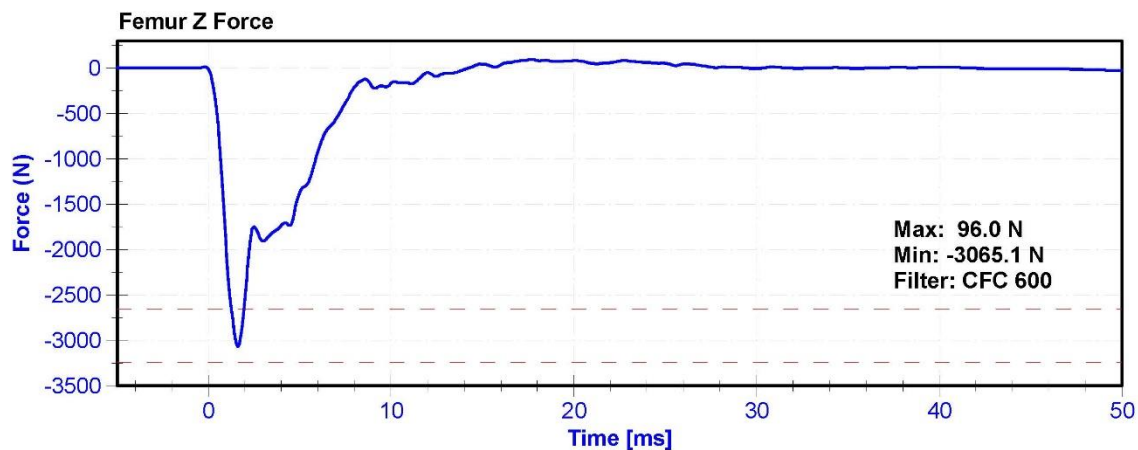
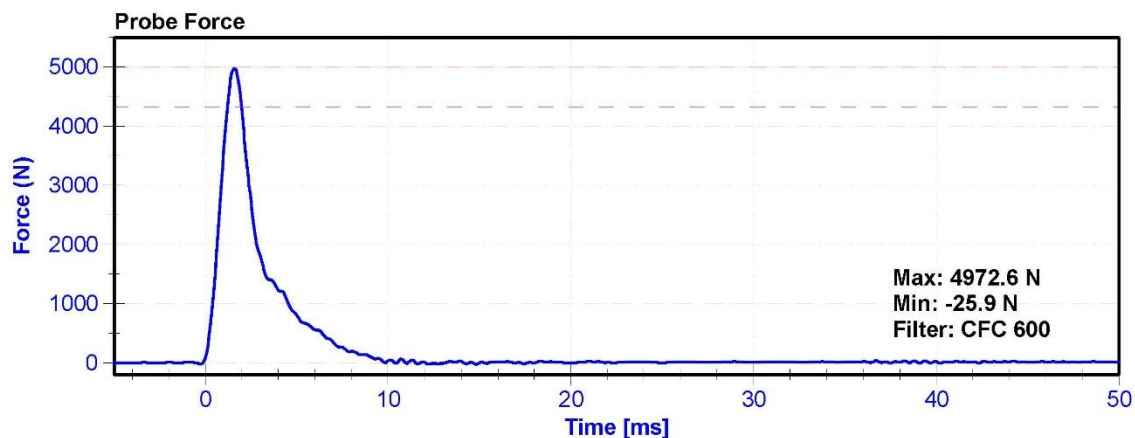
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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 10670JI4	LC-DL9552 Fx	3/7/2015	3/6/2016





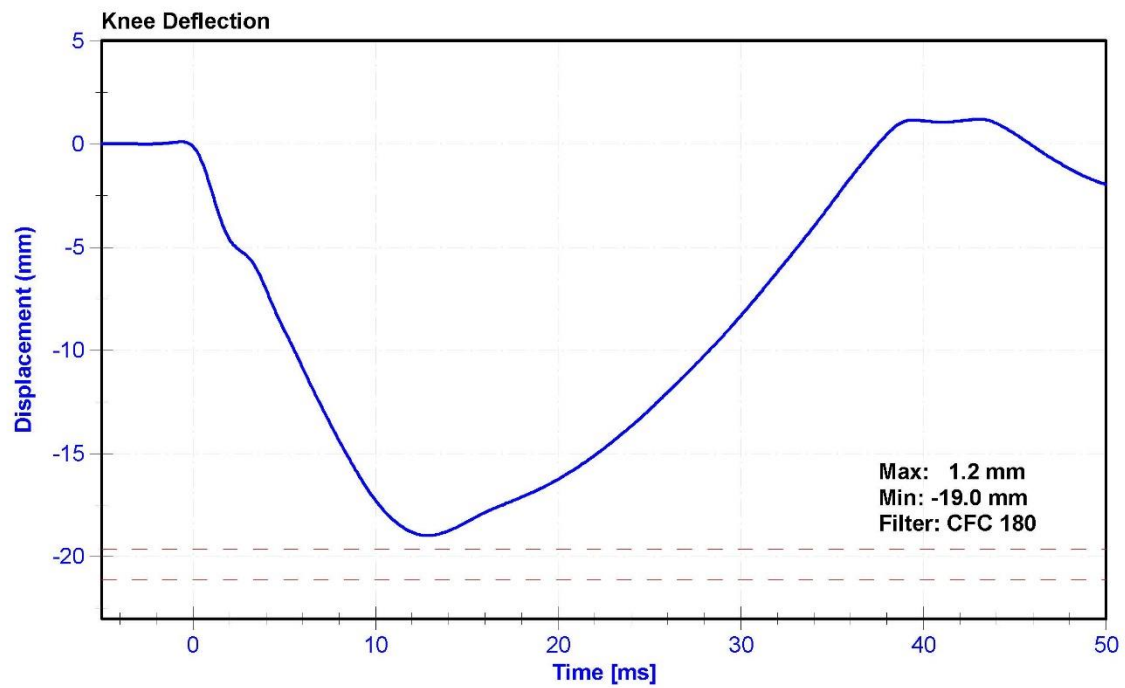
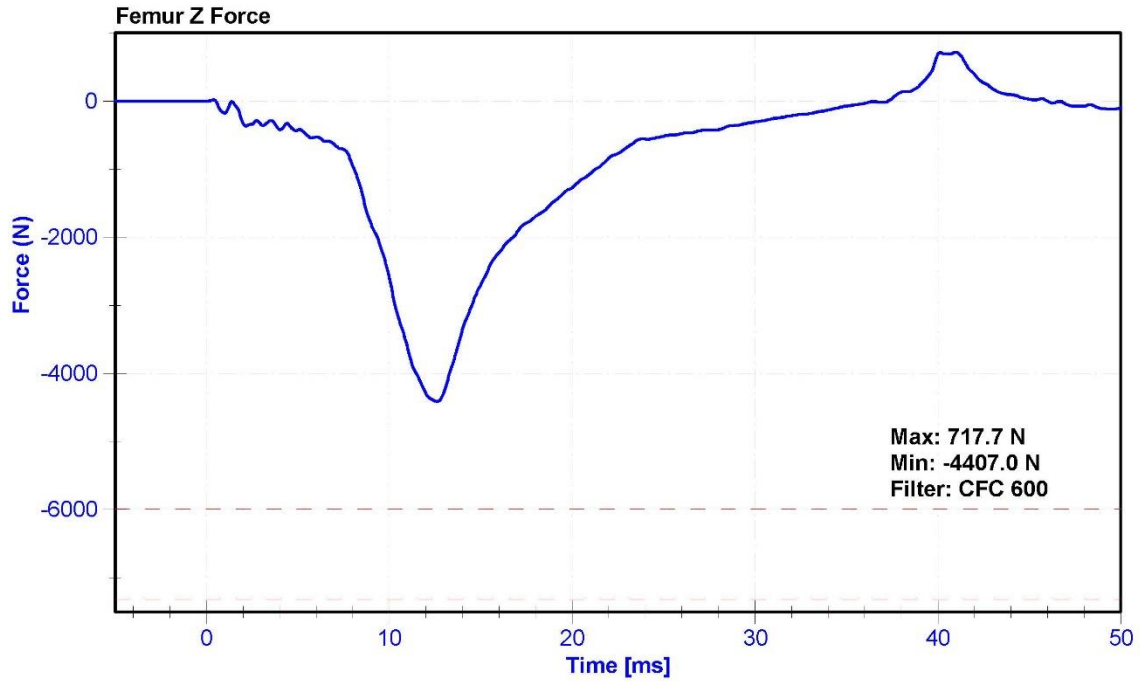
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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





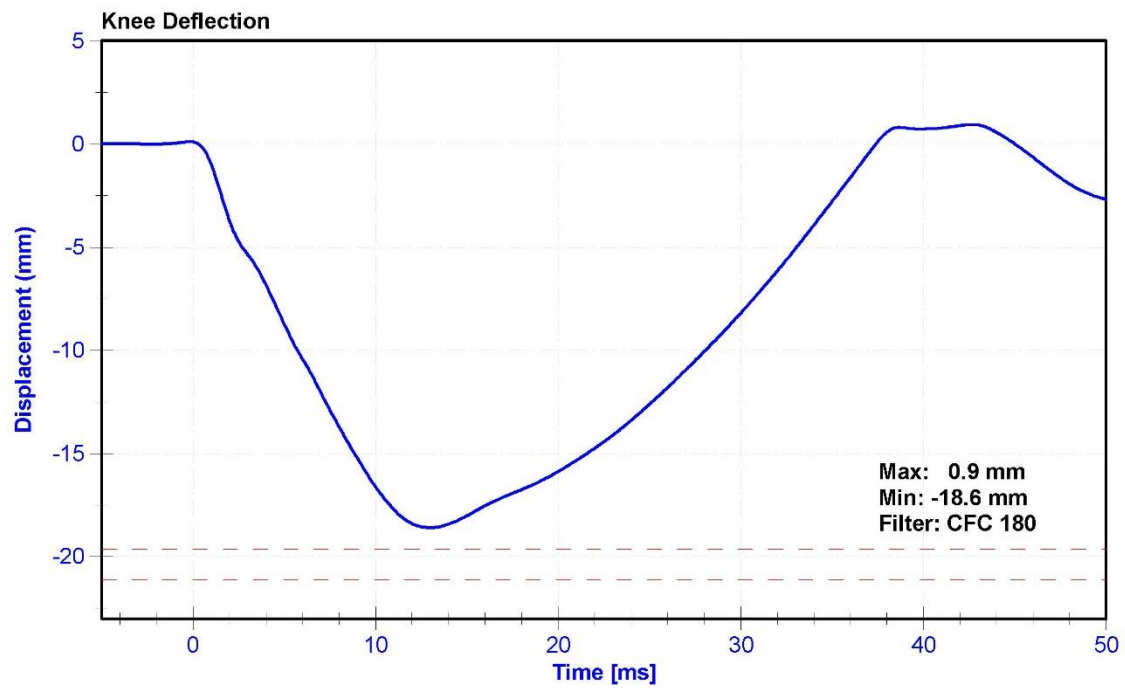
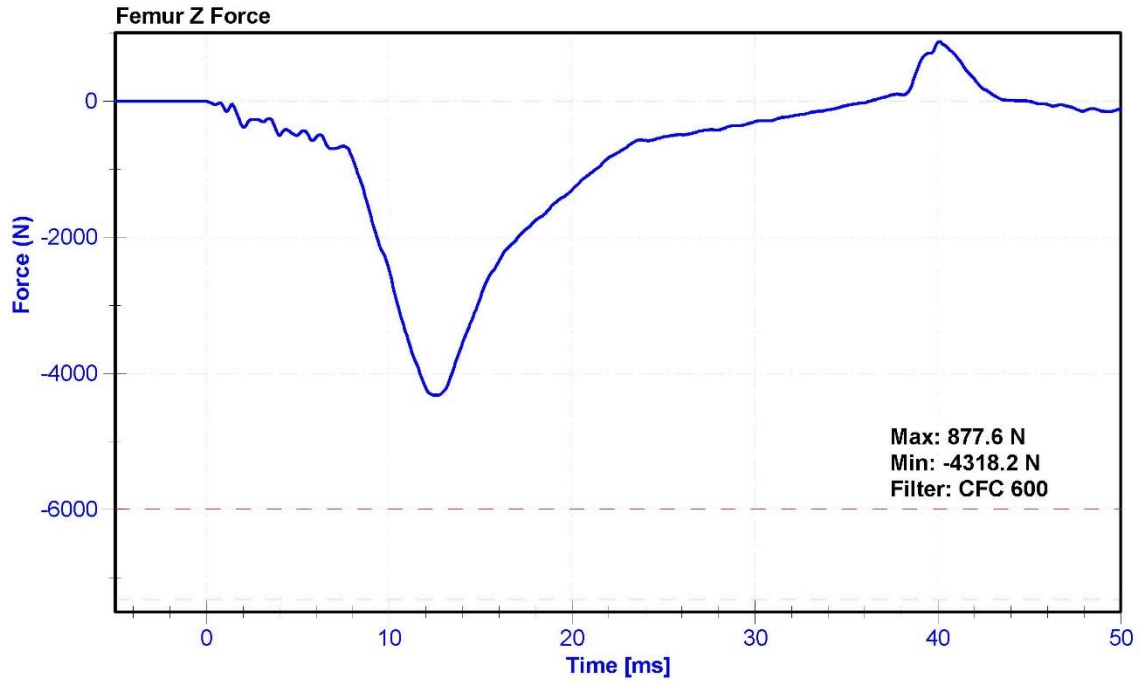
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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





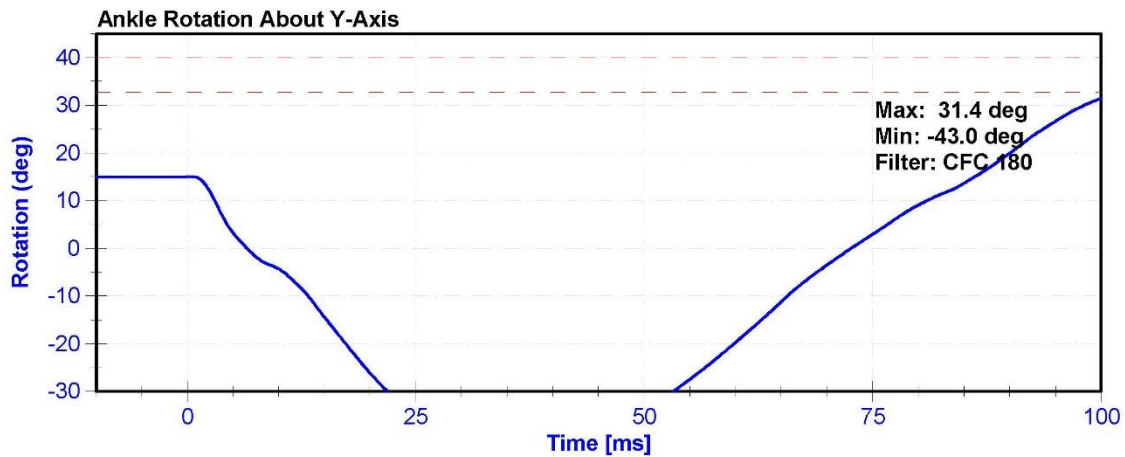
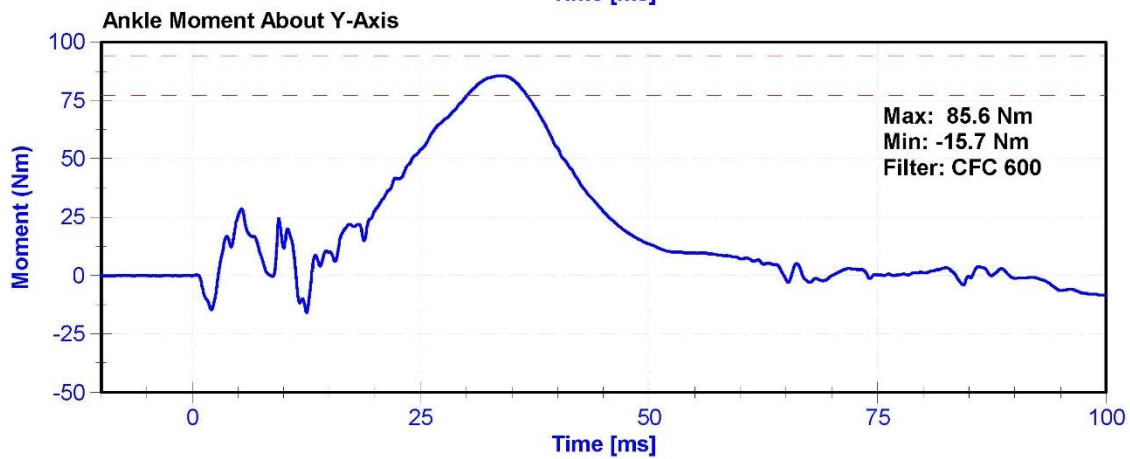
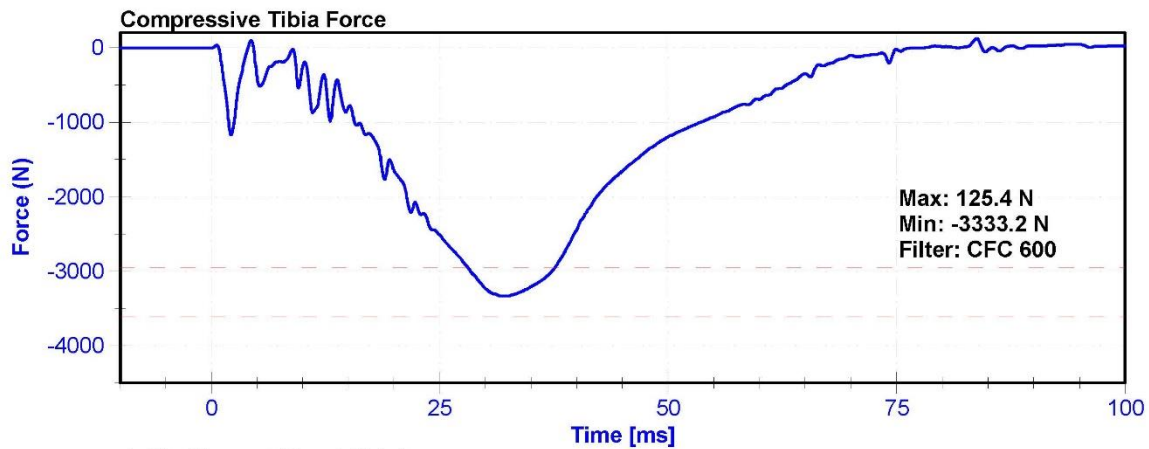
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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



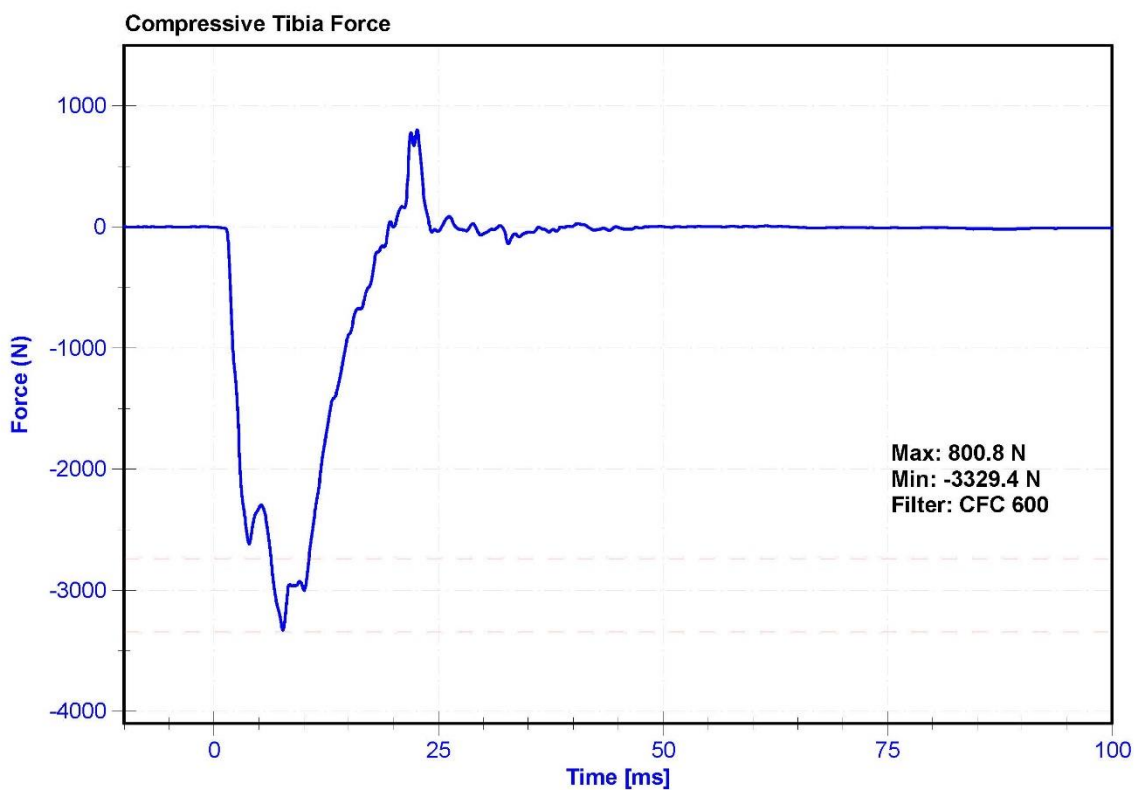
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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





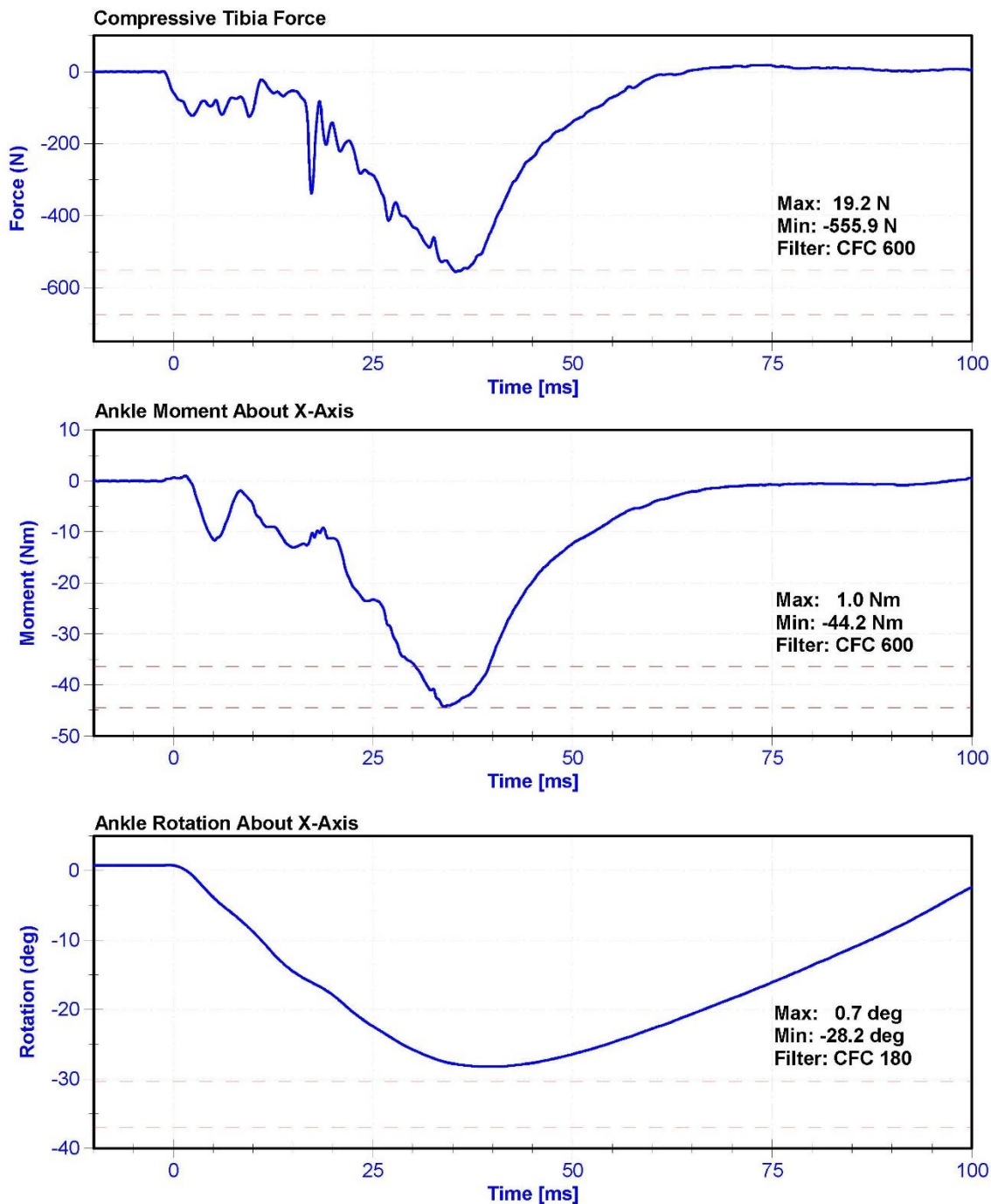
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	D09798	Laboratory Supervisor	M. Goehle

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





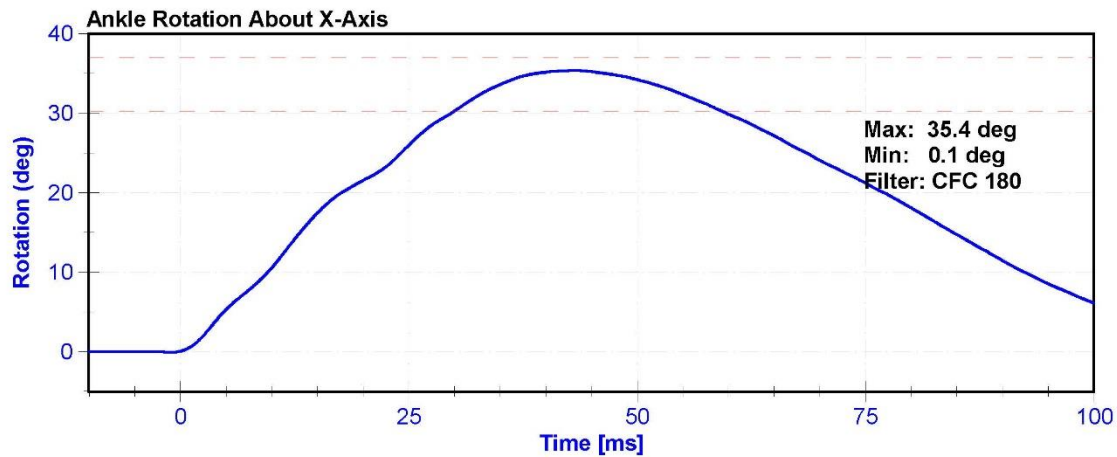
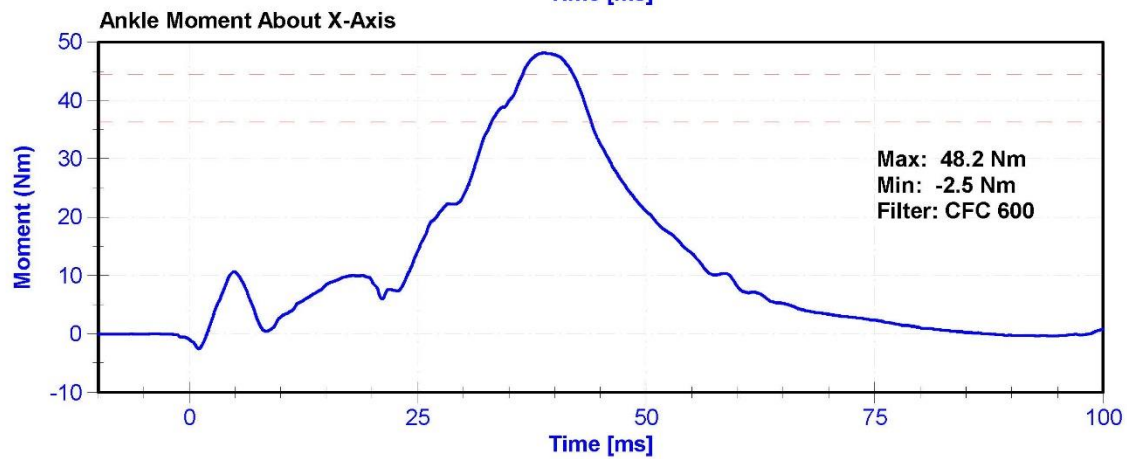
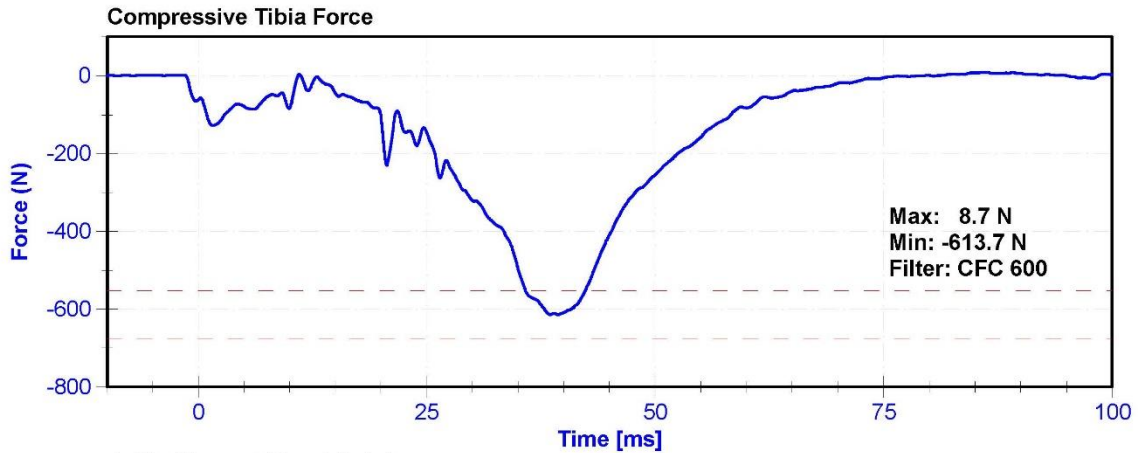
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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





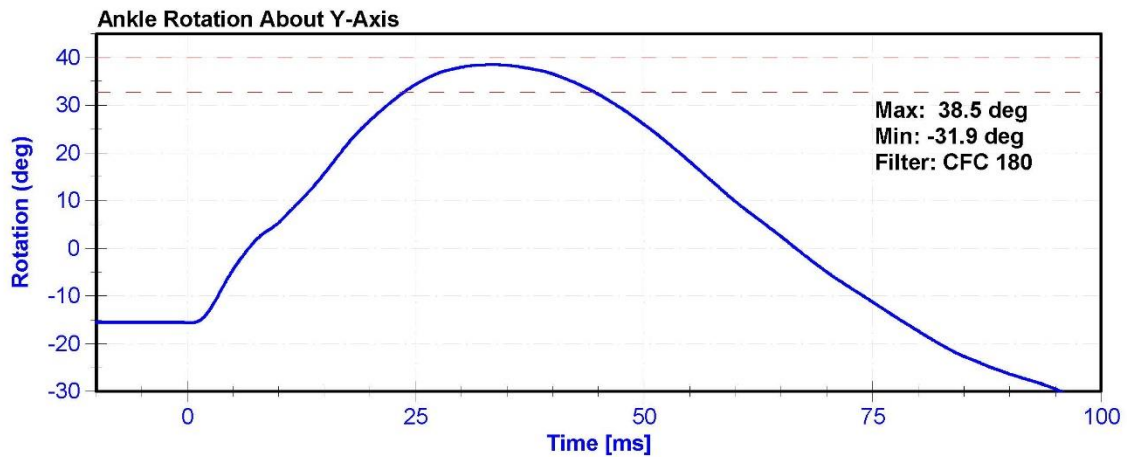
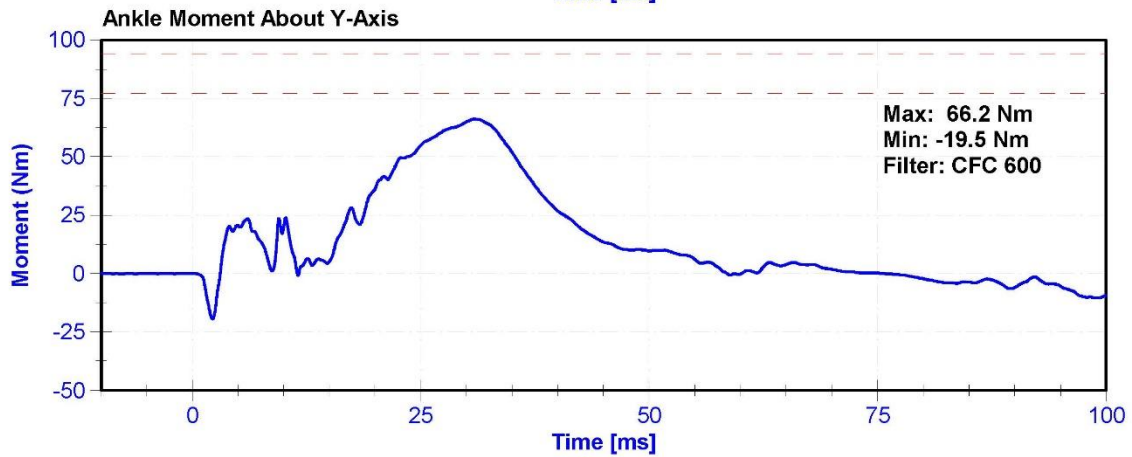
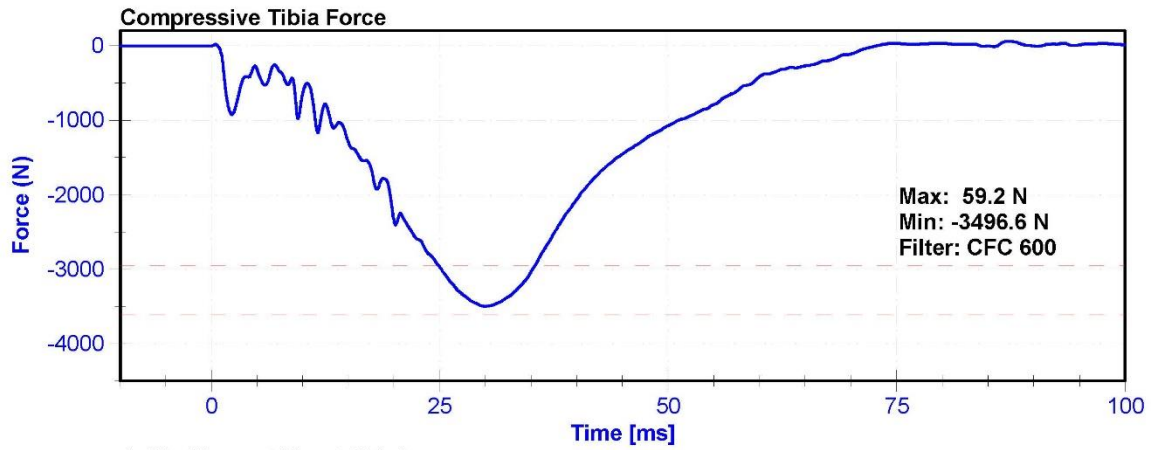
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	D09798	Laboratory Supervisor	M. Goehle

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



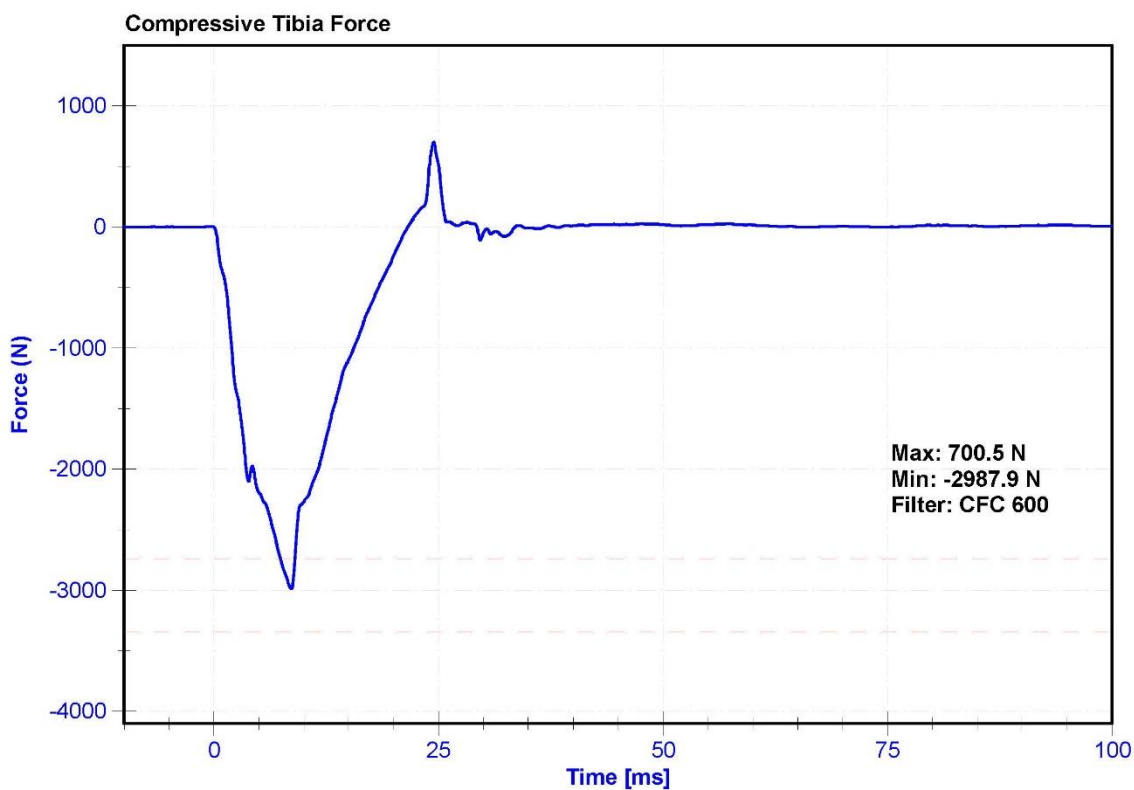
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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



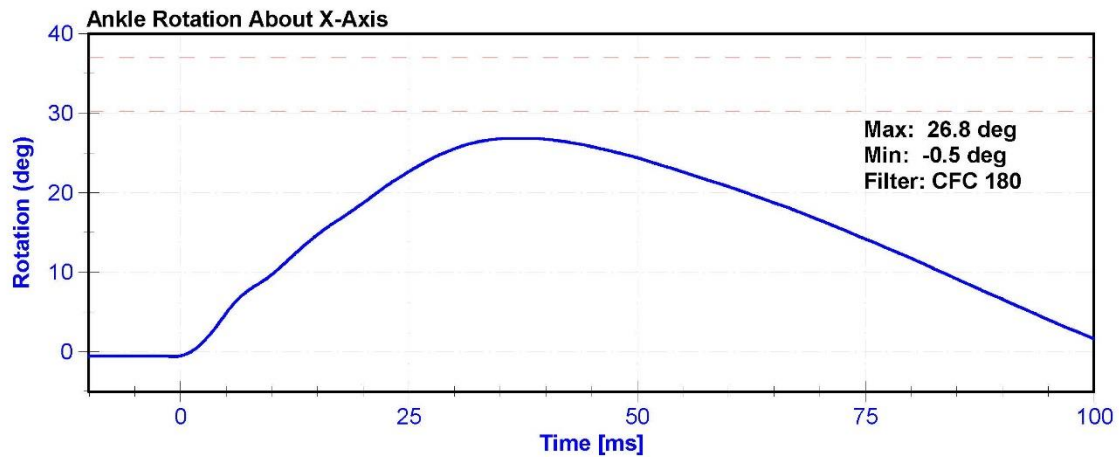
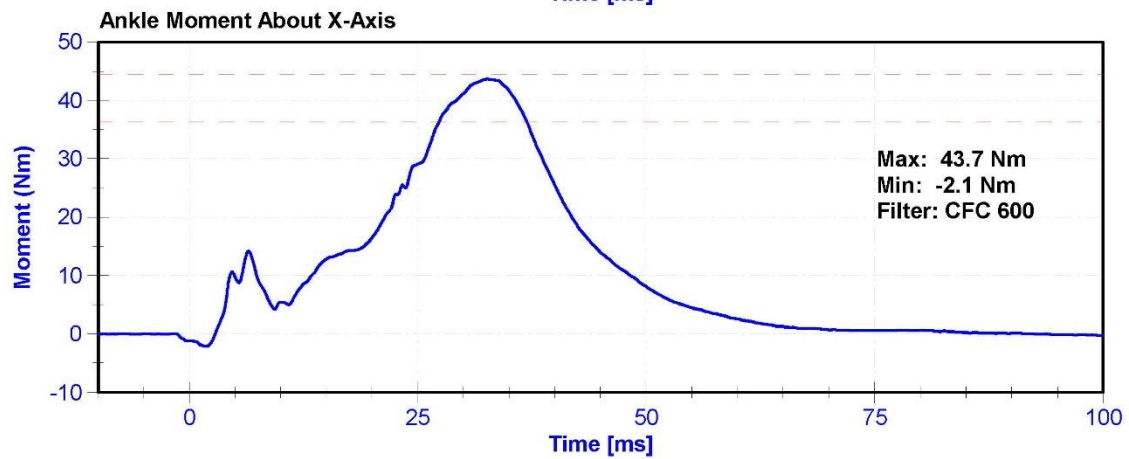
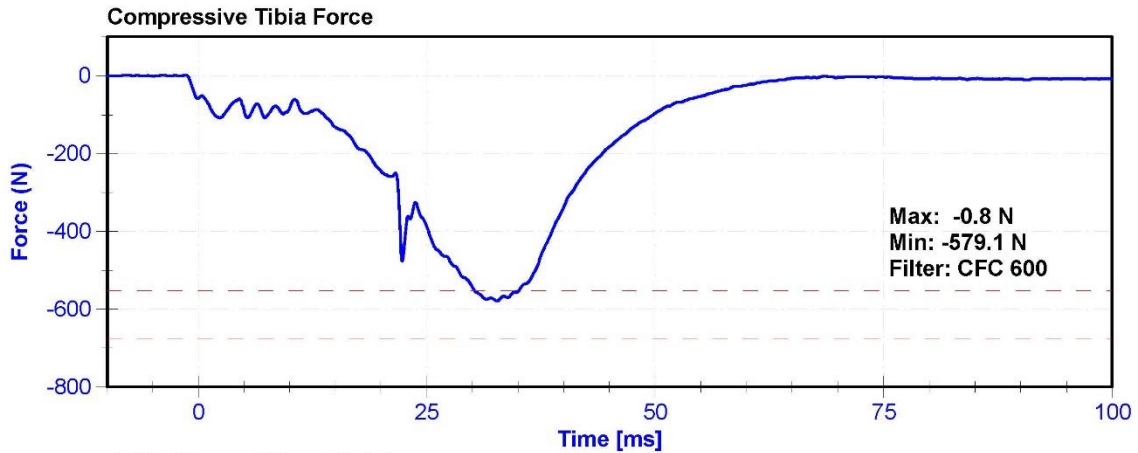
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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



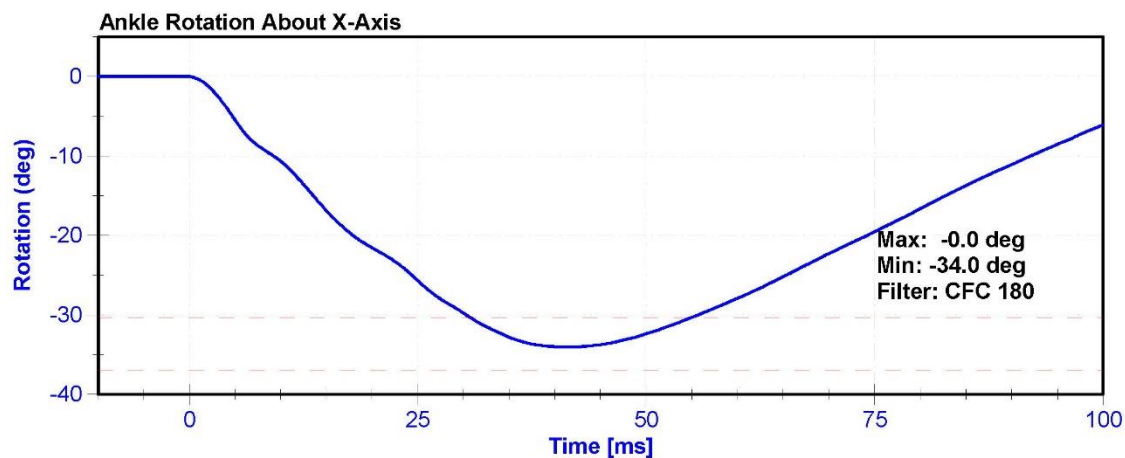
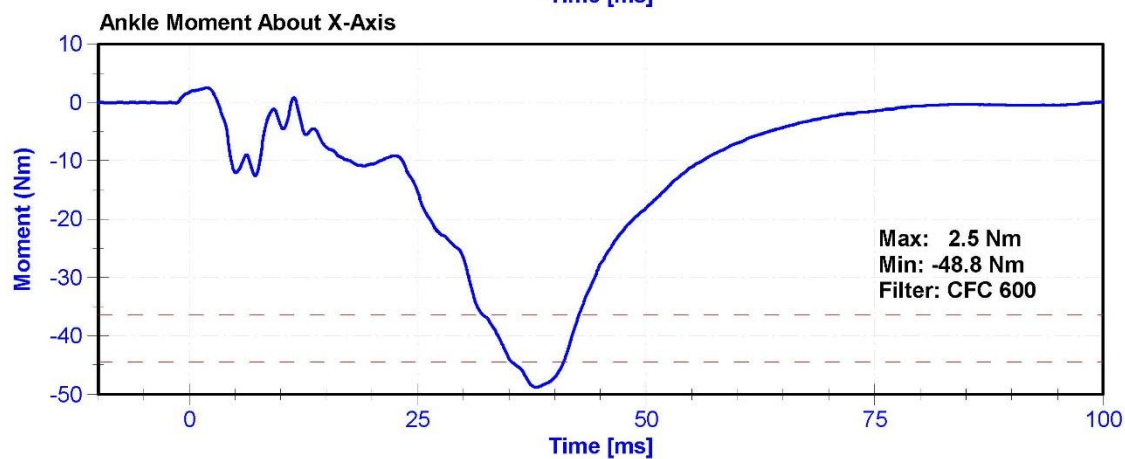
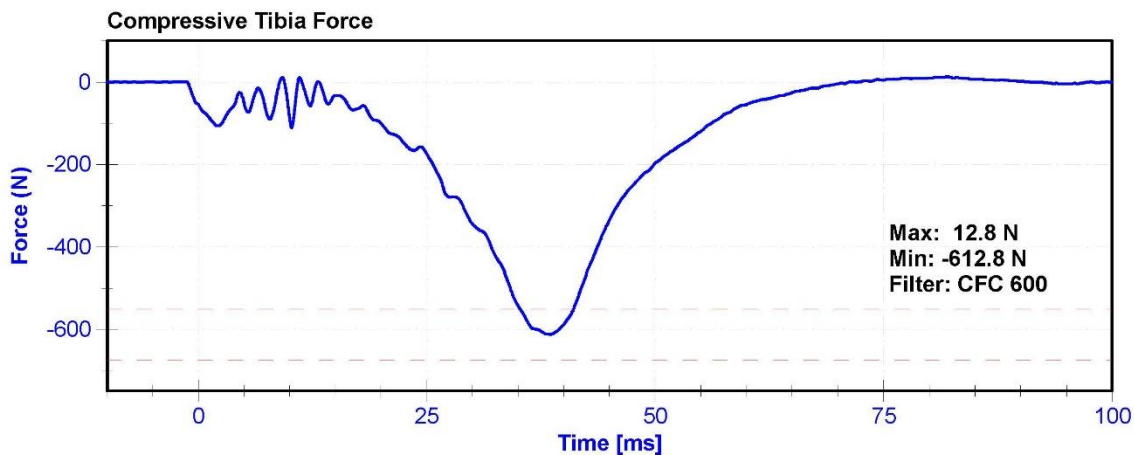
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	DO9798	Laboratory Supervisor	M. Goehle

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

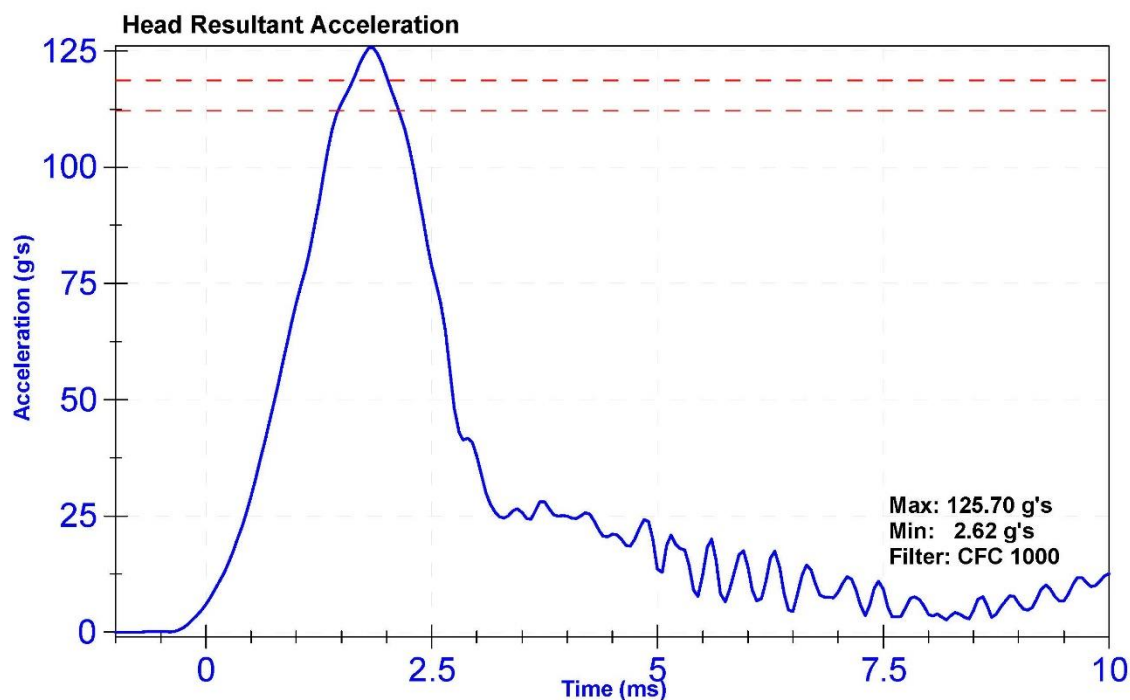
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

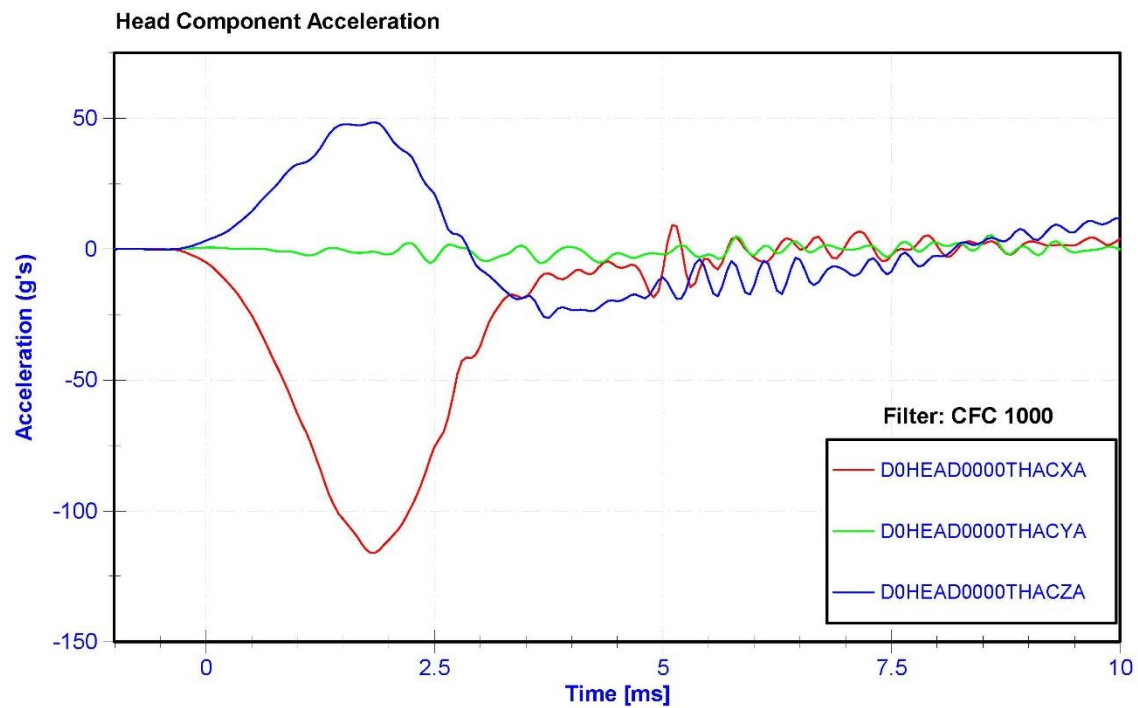
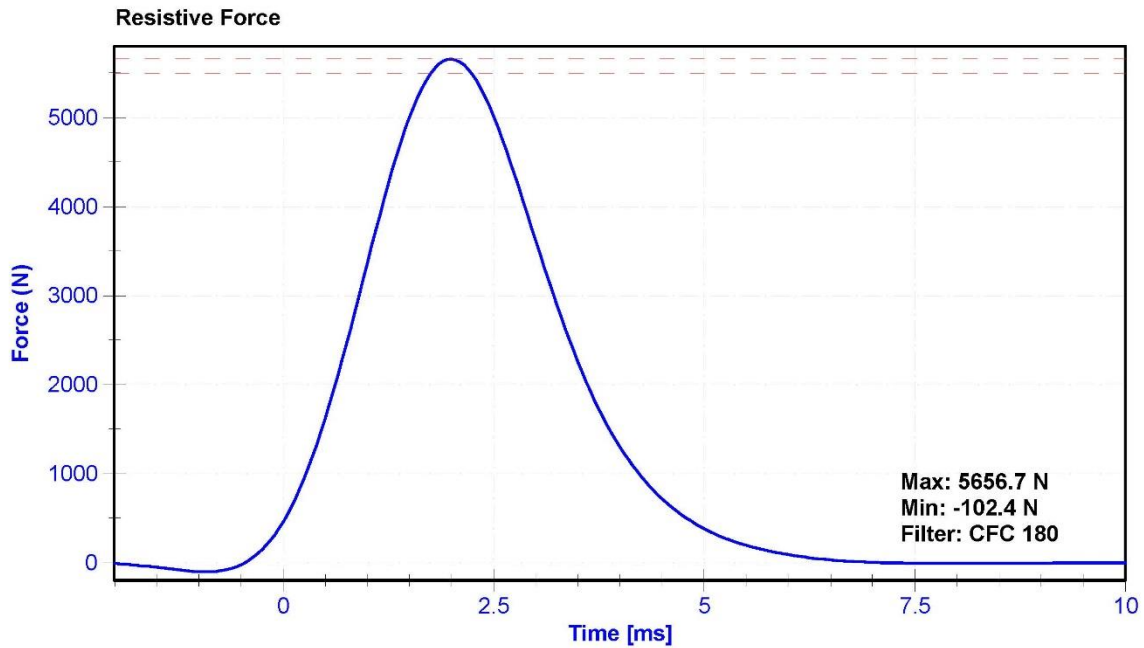
Results

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





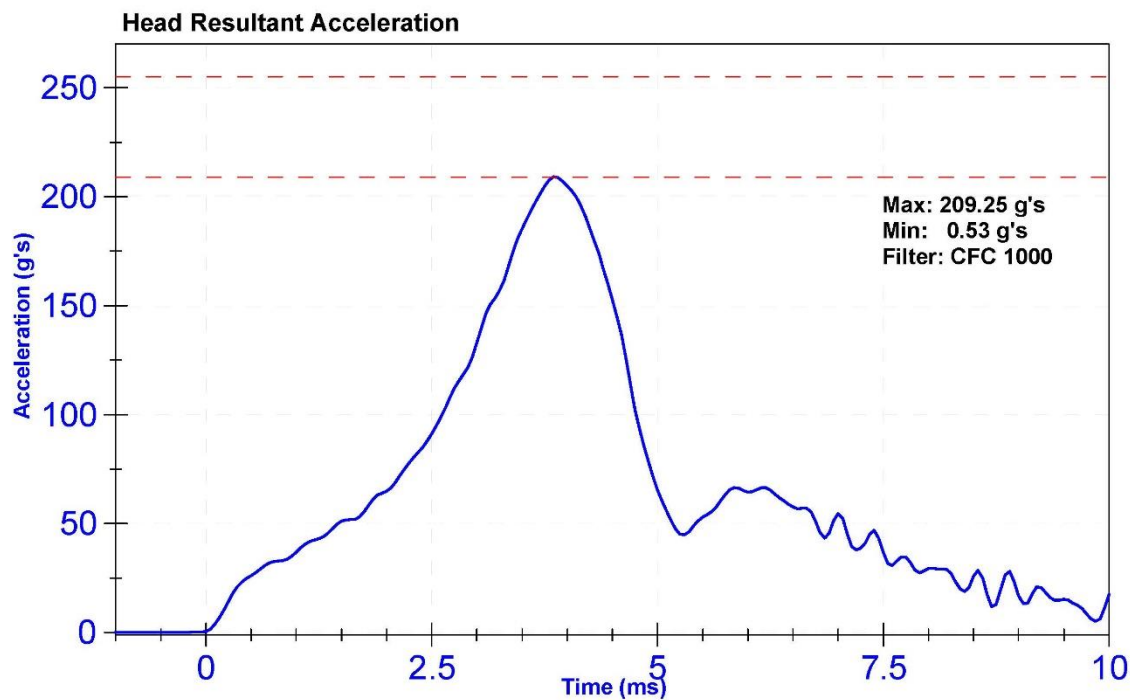
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

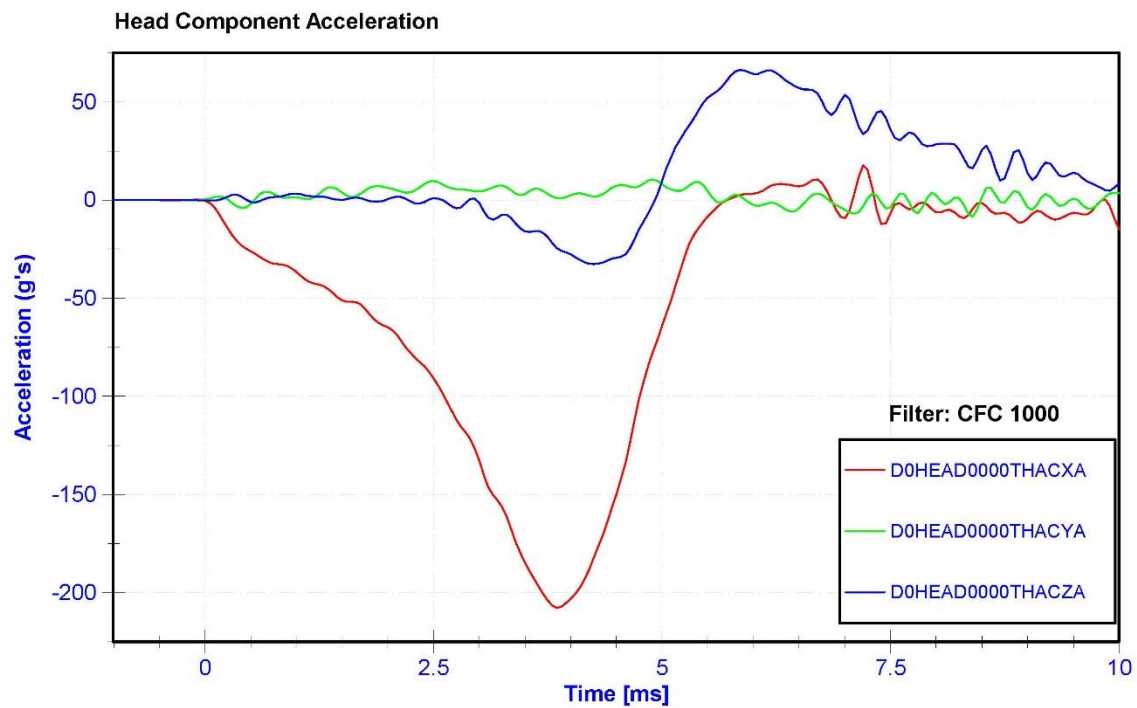
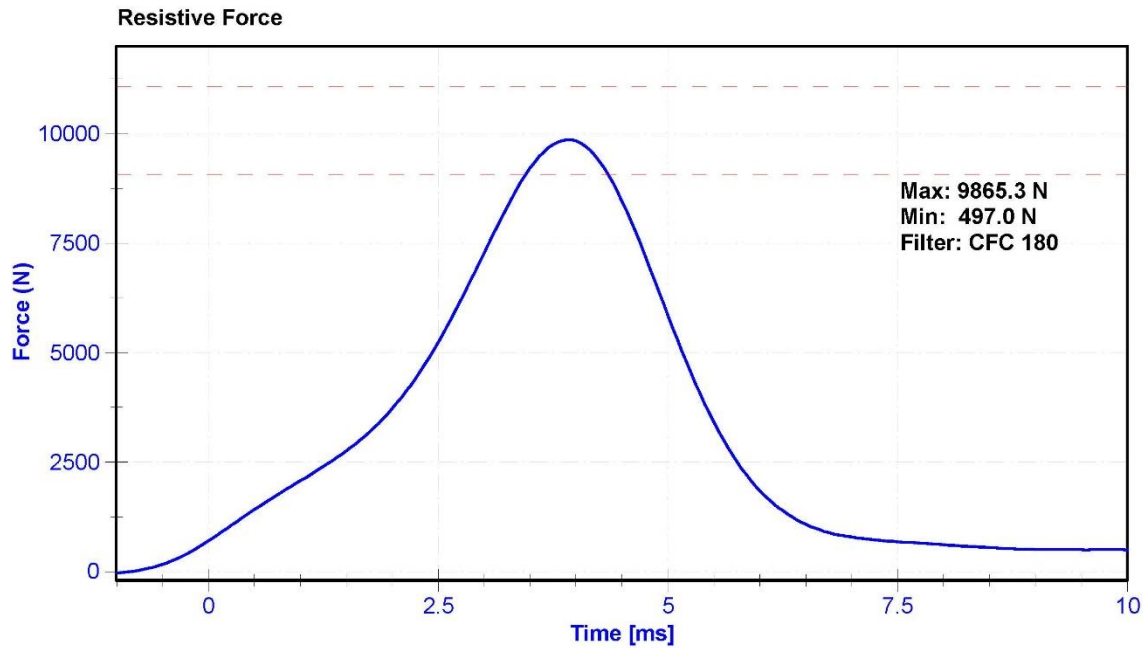
Results

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





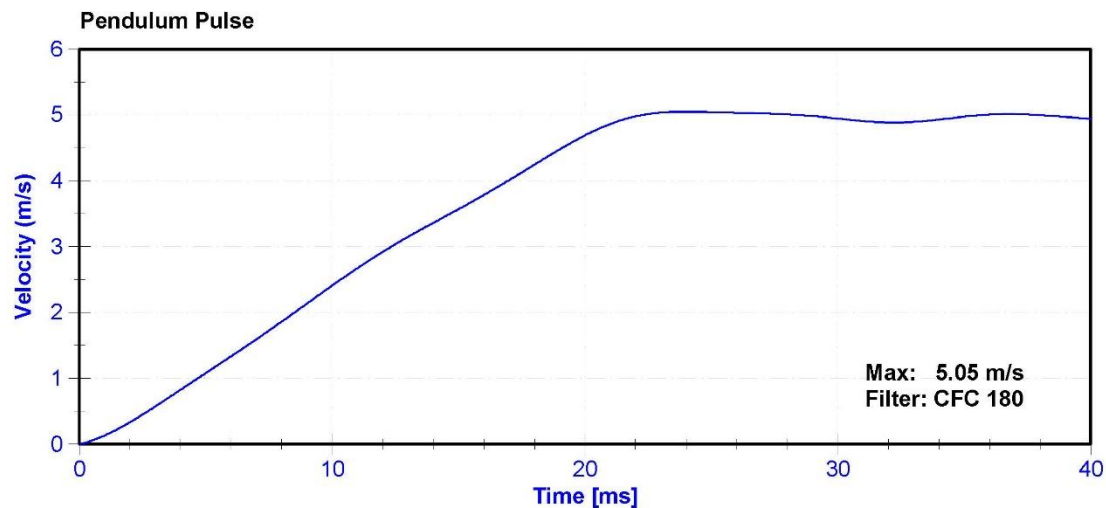
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

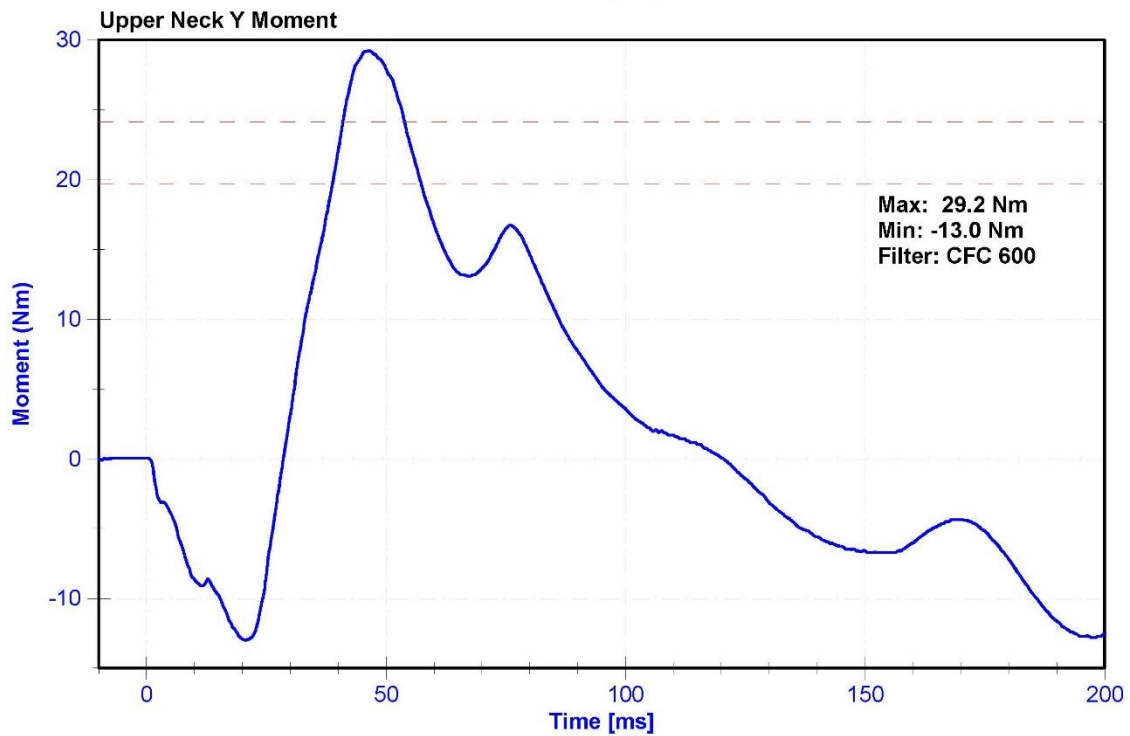
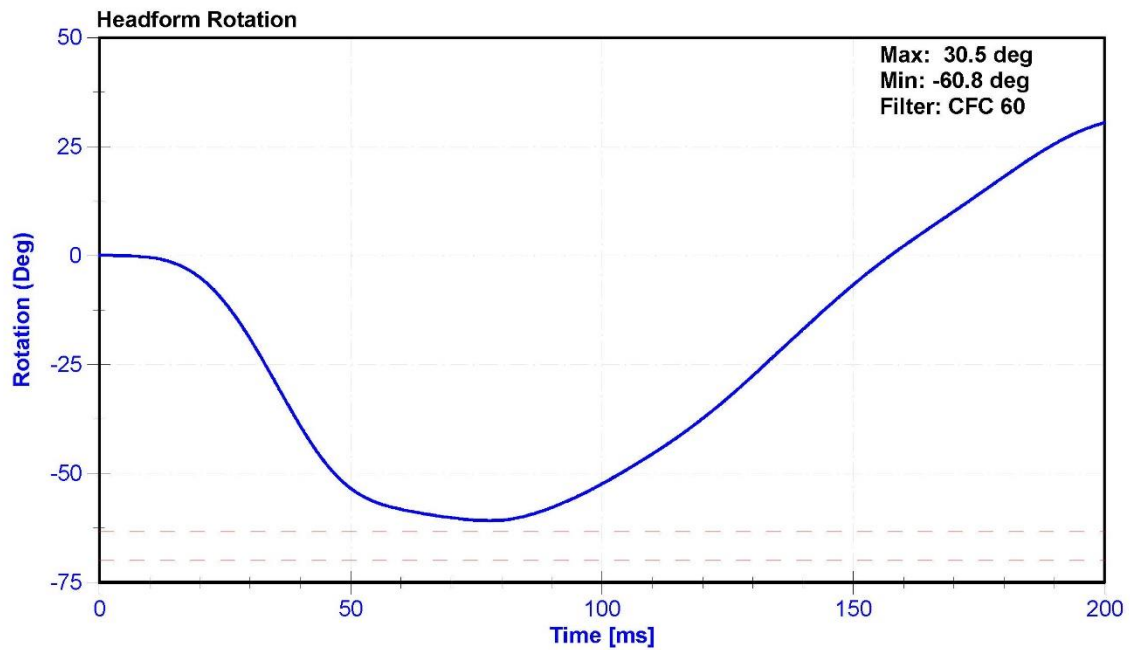
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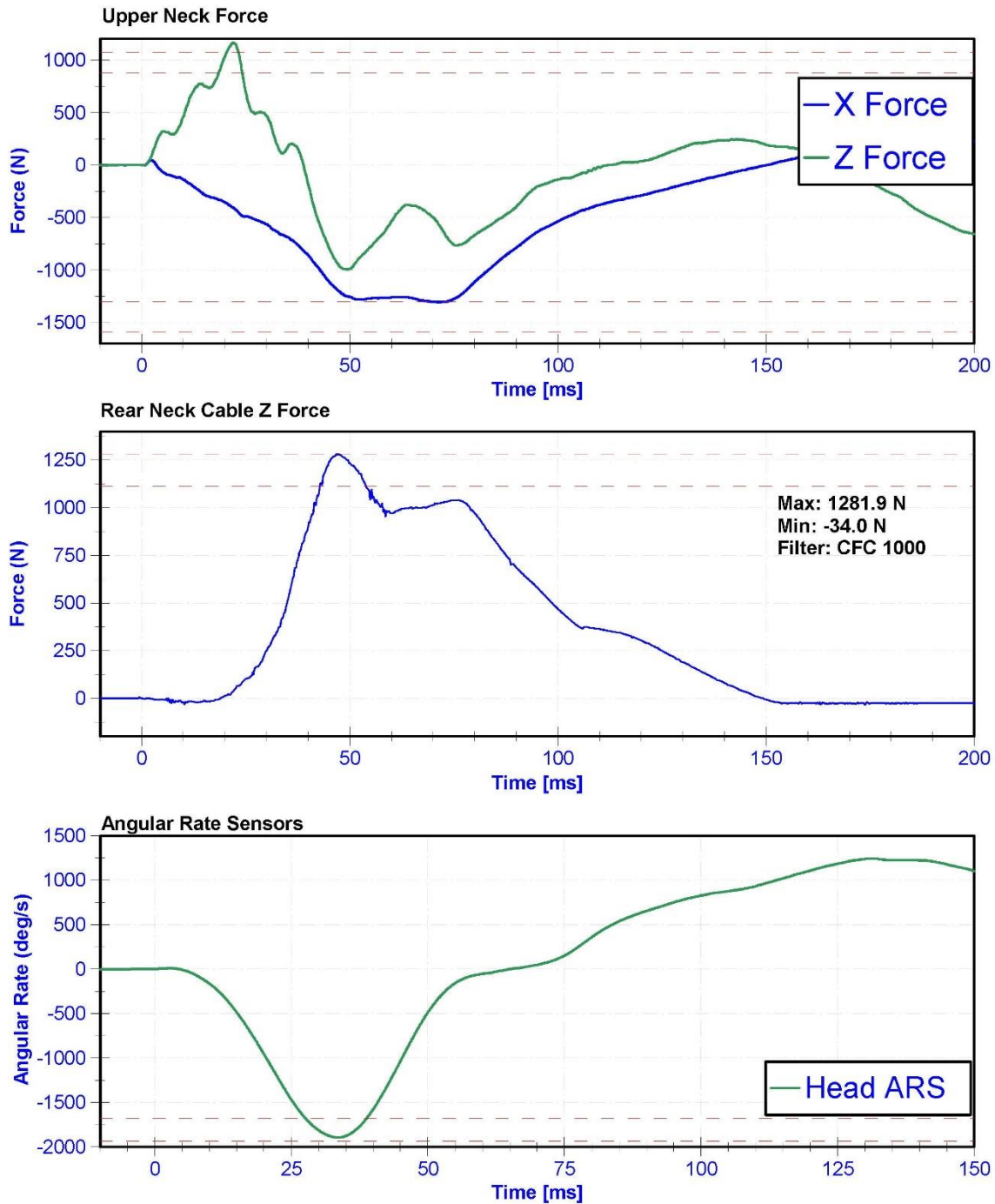
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	46.7	Pass
Velocity	4.95	5.05	m/s	4.96	Pass
Pendulum Impulse at 8ms	1.49	1.85	m/s	1.861	Fail
Pendulum Impulse at 16ms	3.08	3.86	m/s	3.784	Pass
Pendulum Impulse at 24ms	4.48	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







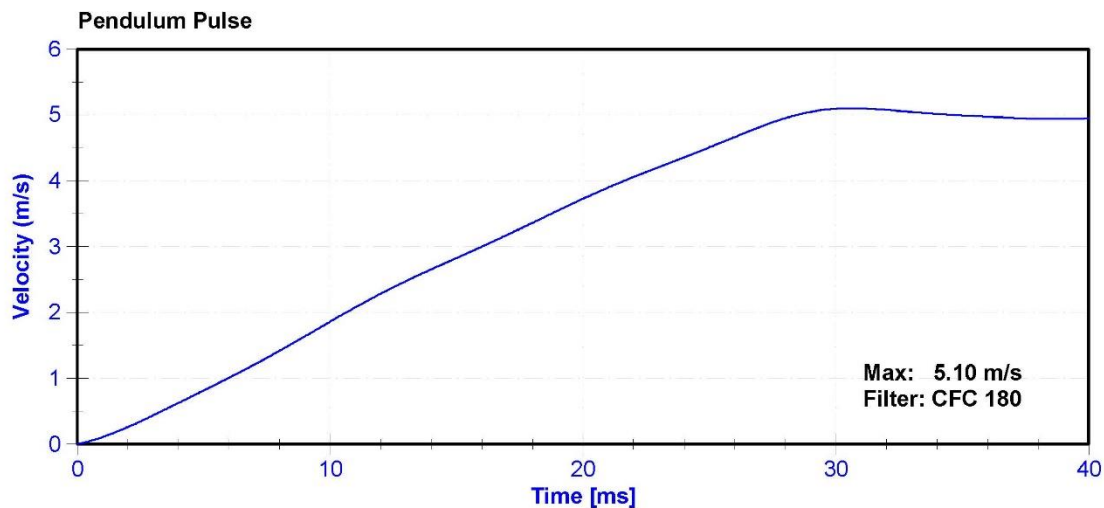
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

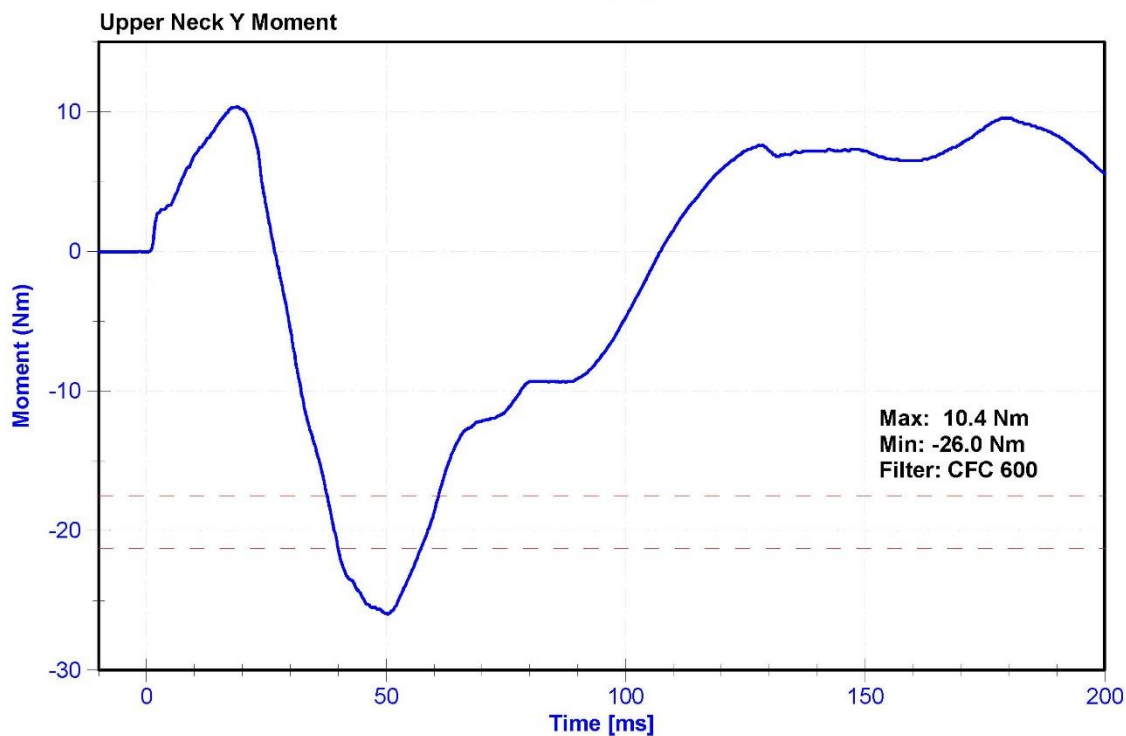
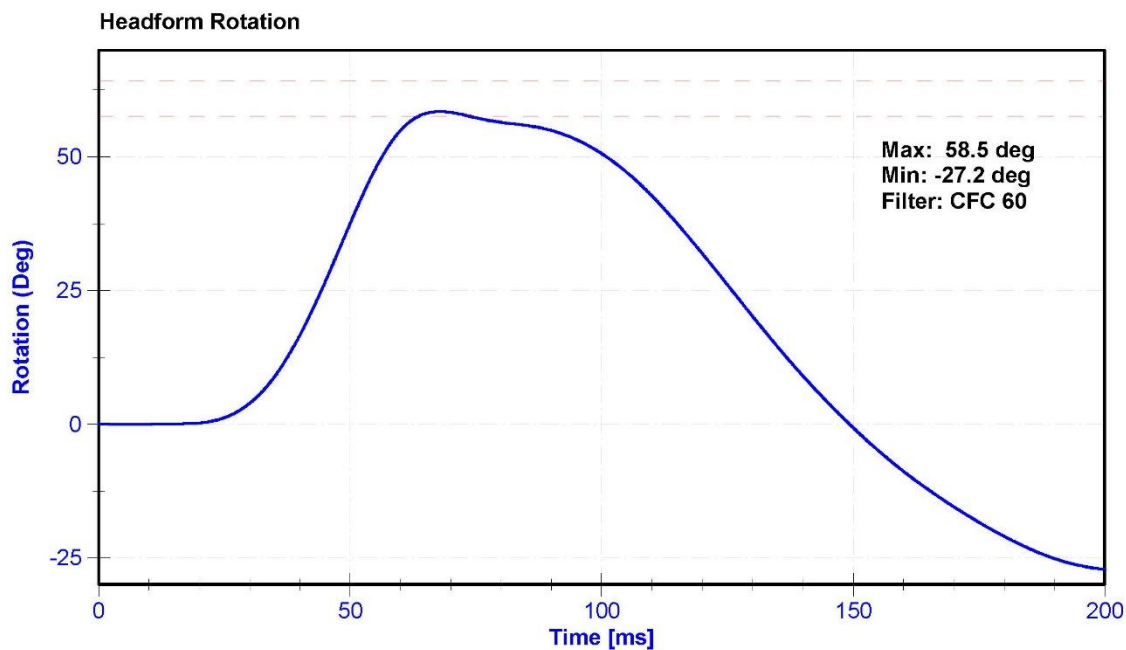
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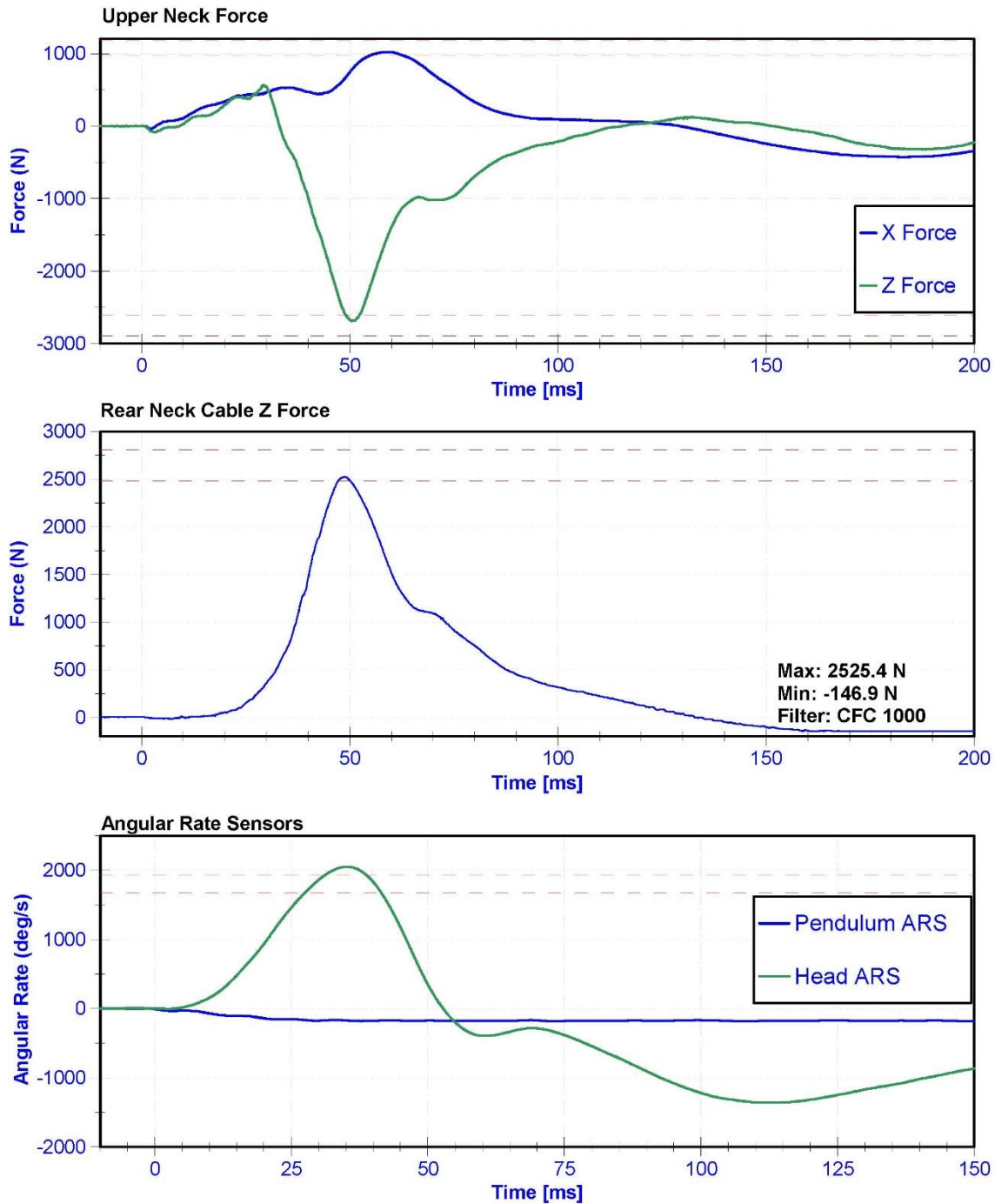
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	44.3	Pass
Velocity	4.95	5.05	m/s	4.96	Pass
Pendulum Impulse at 10ms	1.76	1.91	m/s	1.861	Pass
Pendulum Impulse at 20ms	3.50	3.75	m/s	3.728	Pass
Pendulum Impulse at 30ms	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







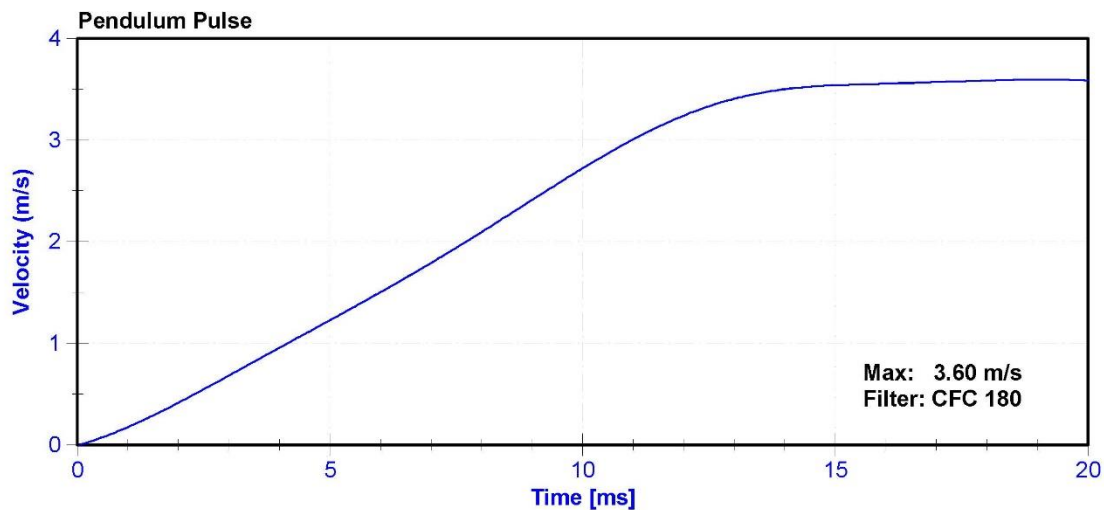
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

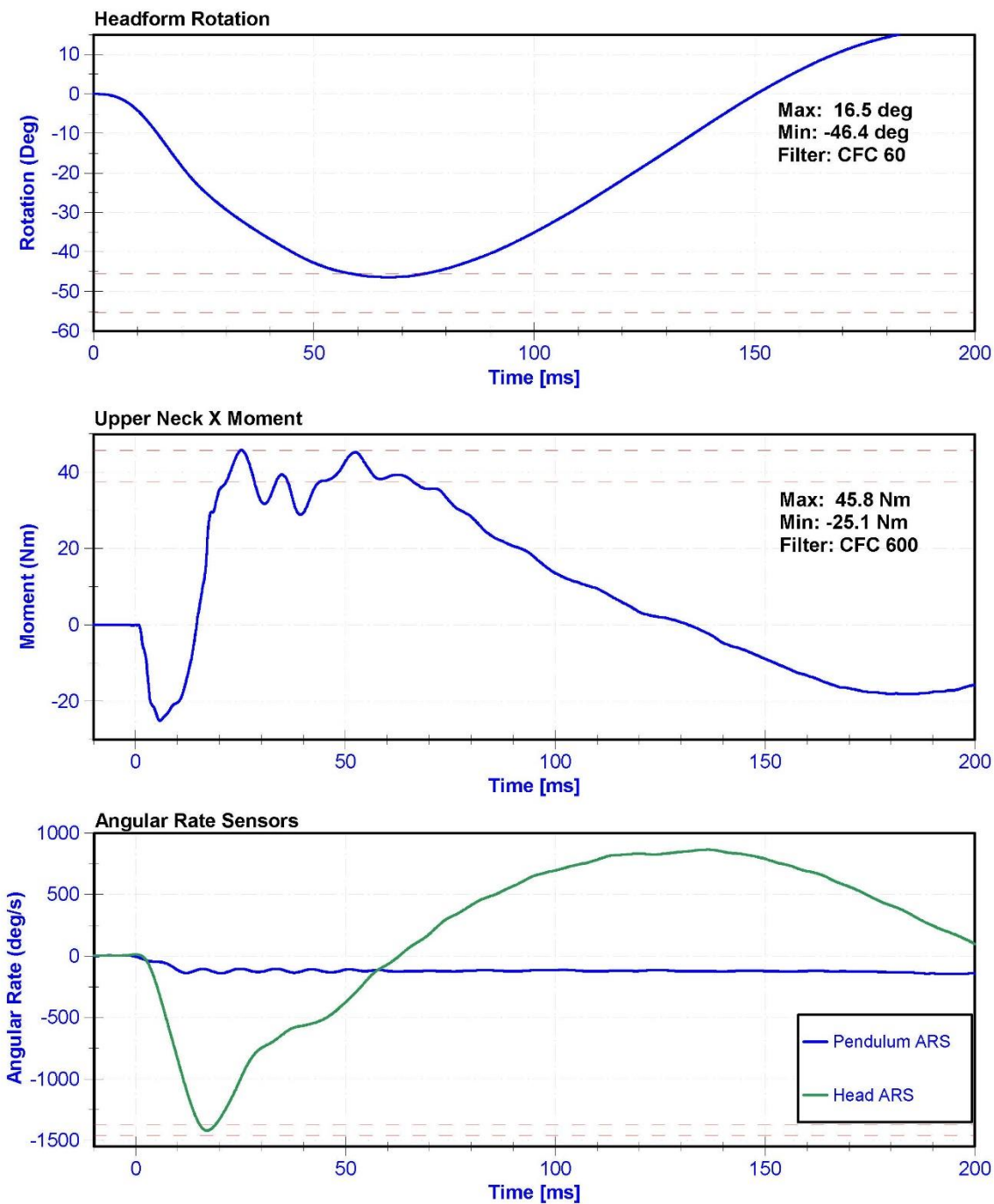
Results

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





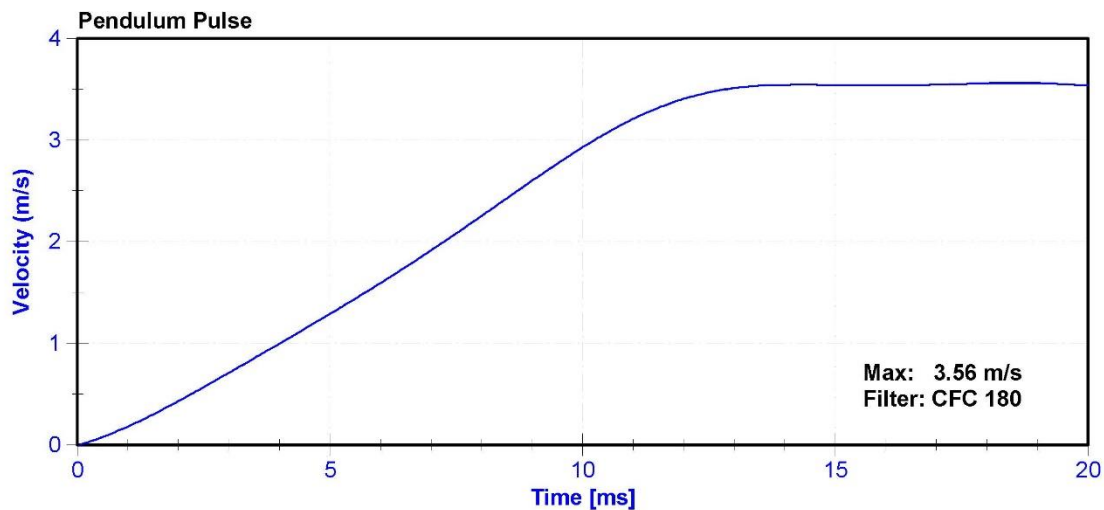
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

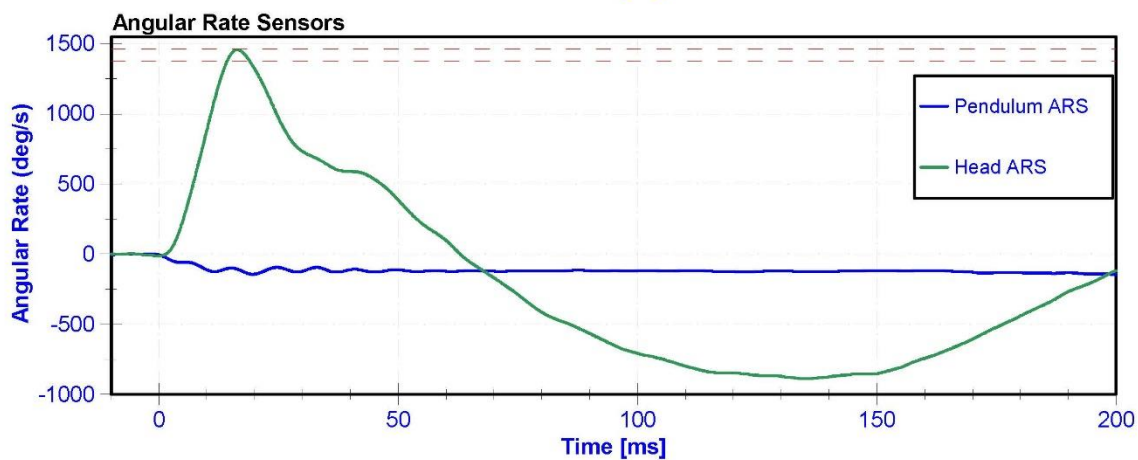
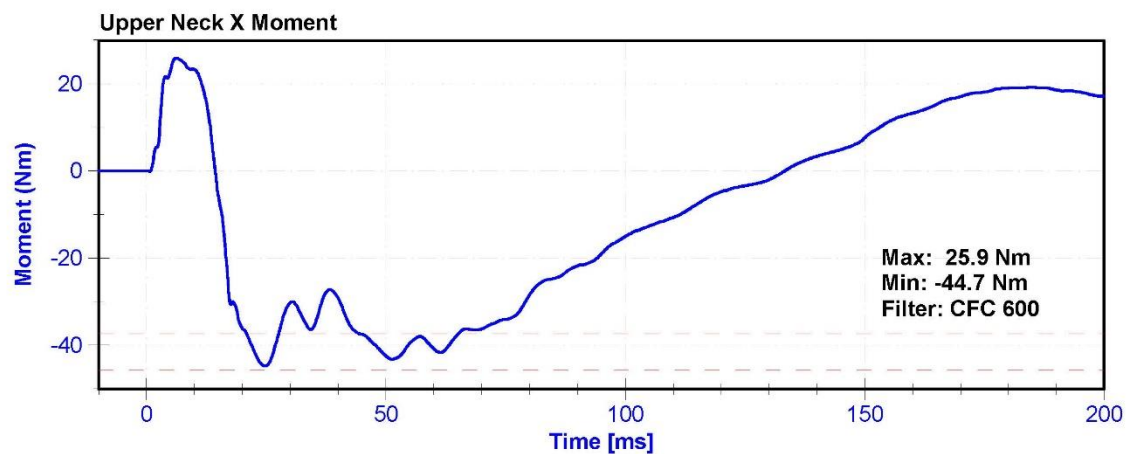
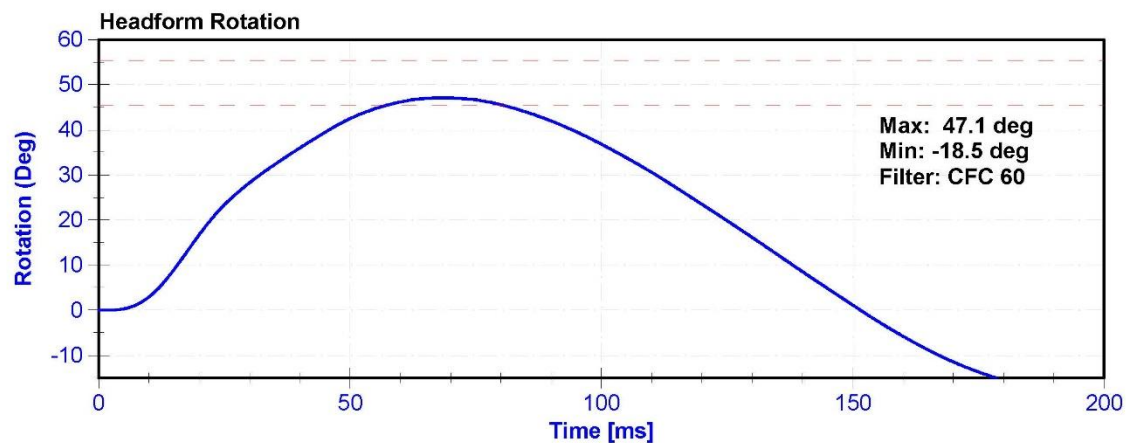
Results

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





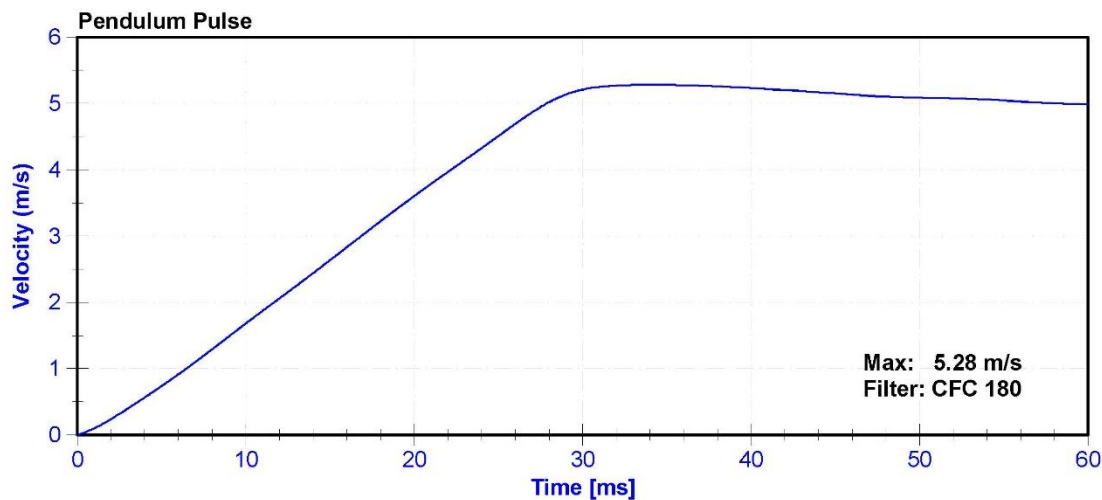
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

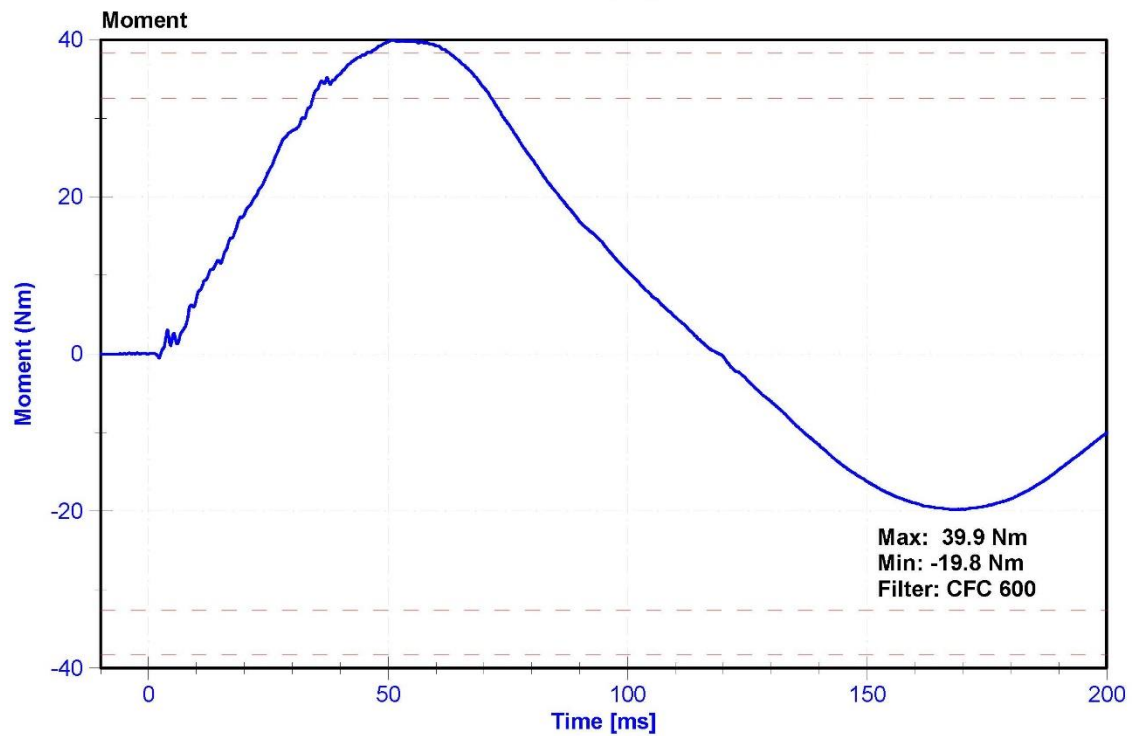
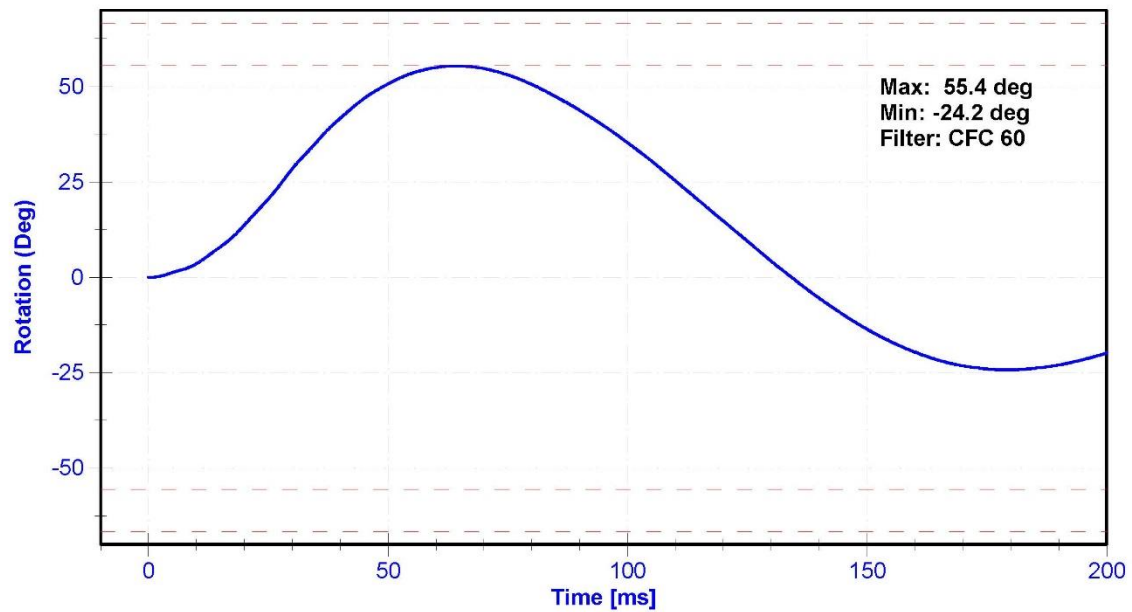
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	44.2	Pass
Velocity	4.95	5.05	m/s	5.04	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.681	Fail
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.636	Fail
Pendulum Impulse at 20ms	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 10380J14	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



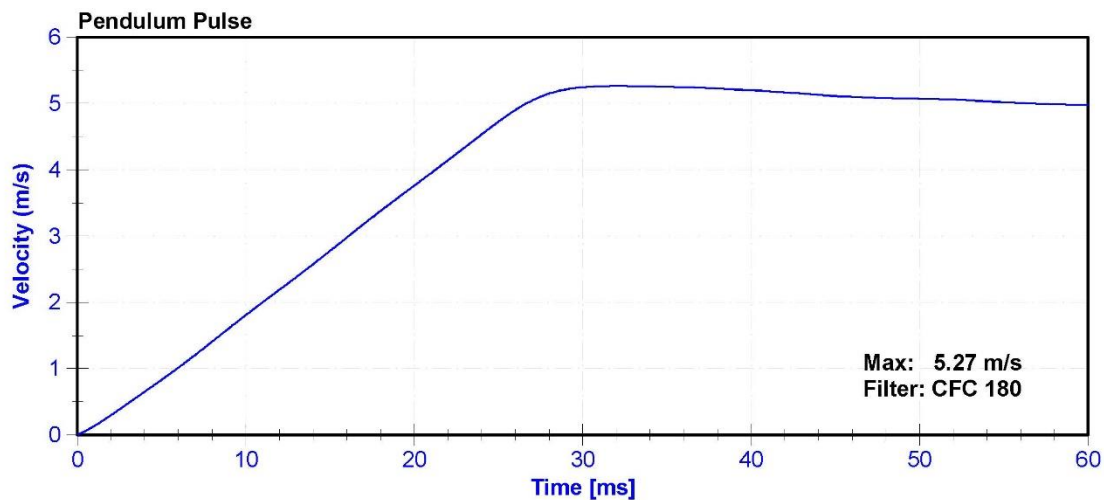
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

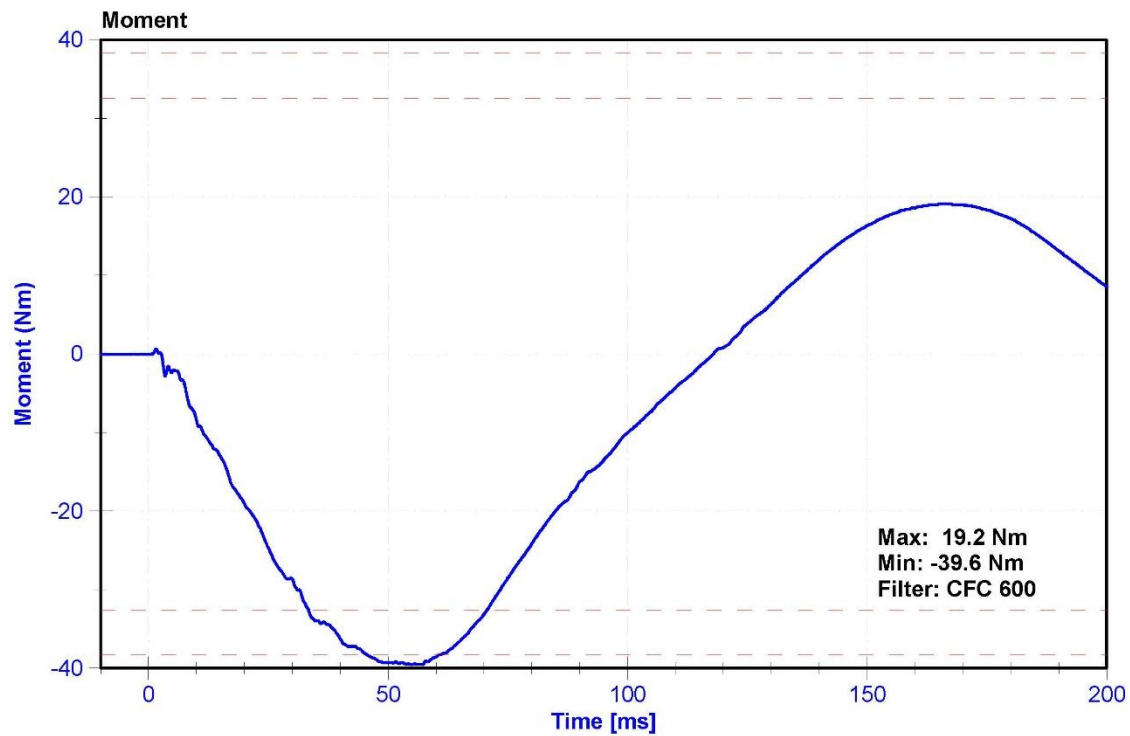
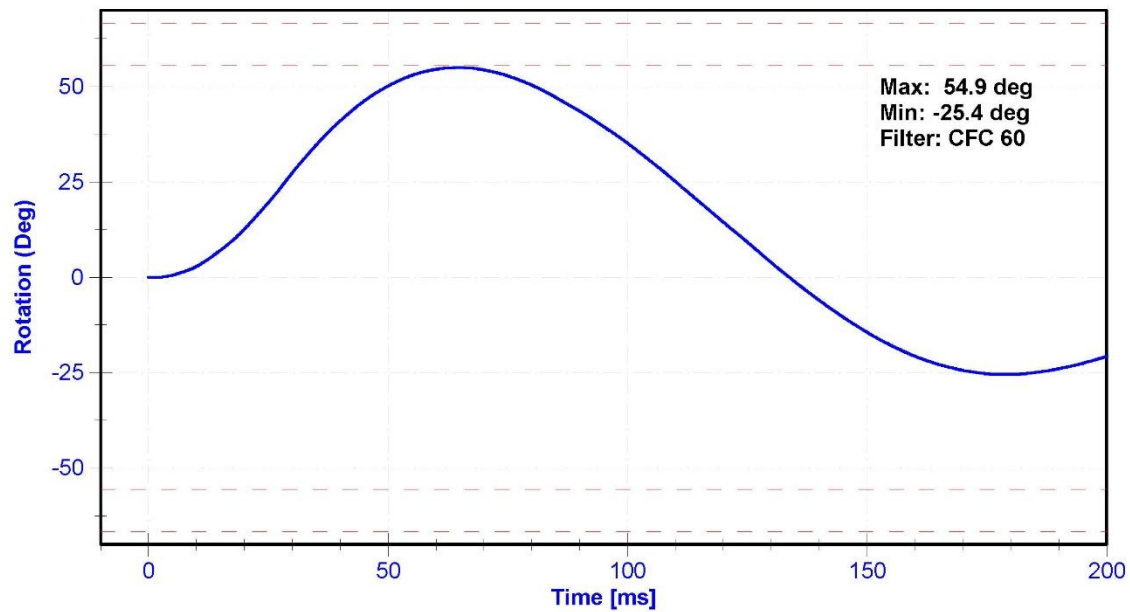
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	45.4	Pass
Velocity	4.95	5.05	m/s	5.01	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.807	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.777	Pass
Pendulum Impulse at 20ms	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 10380J14	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



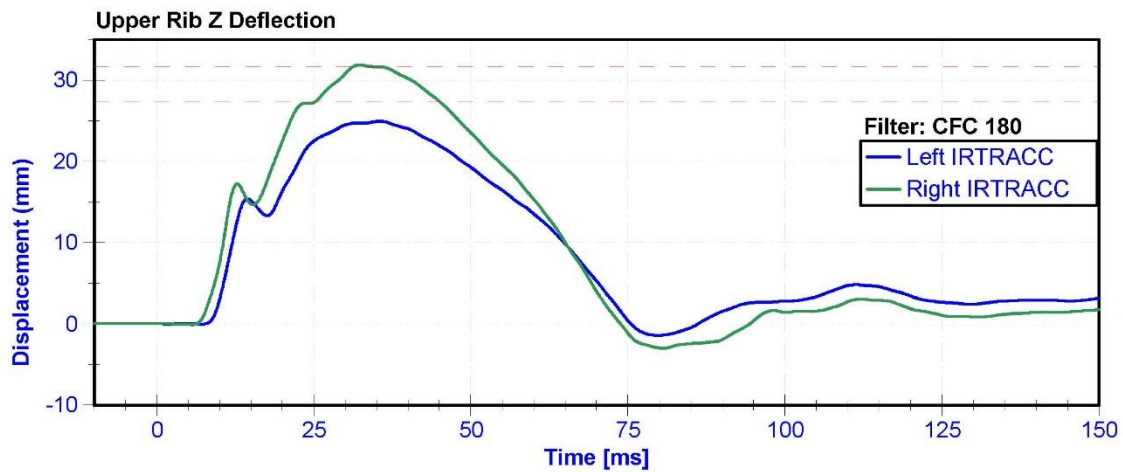
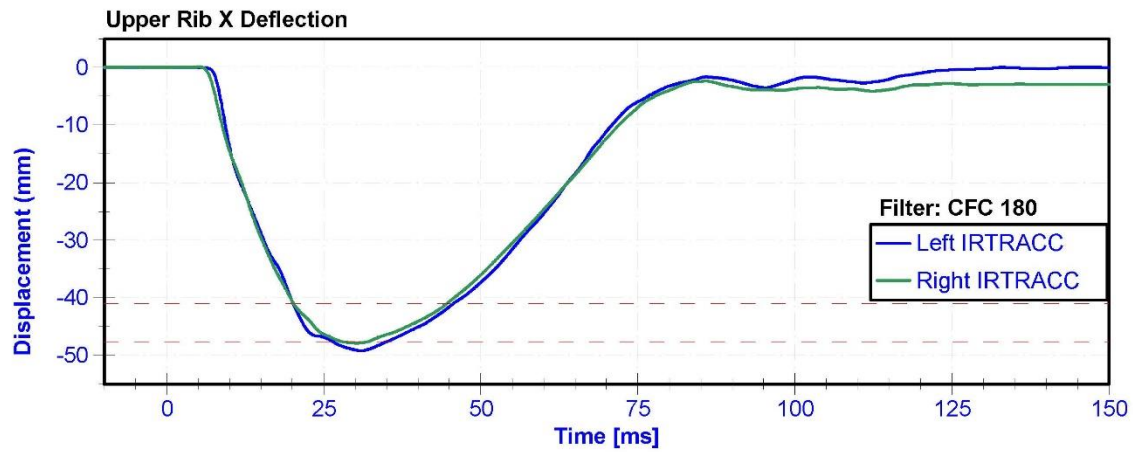
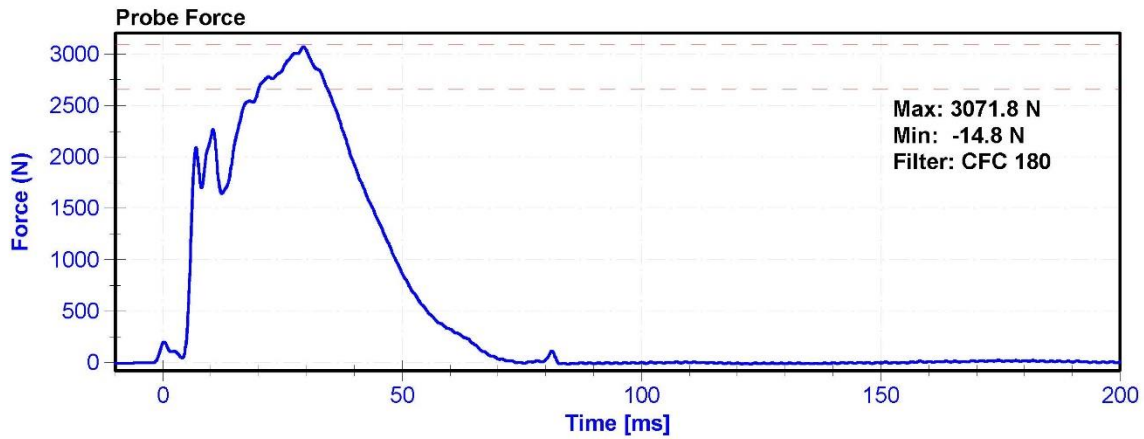
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

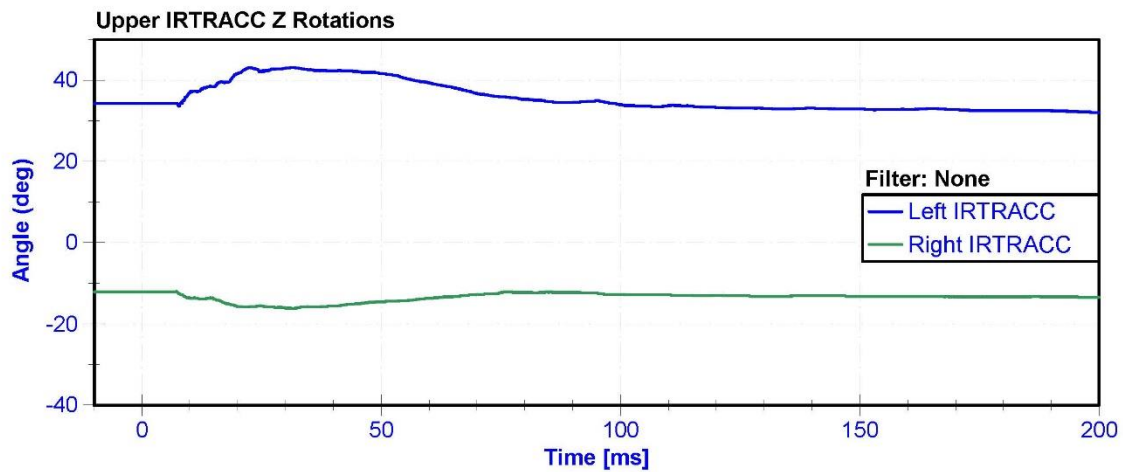
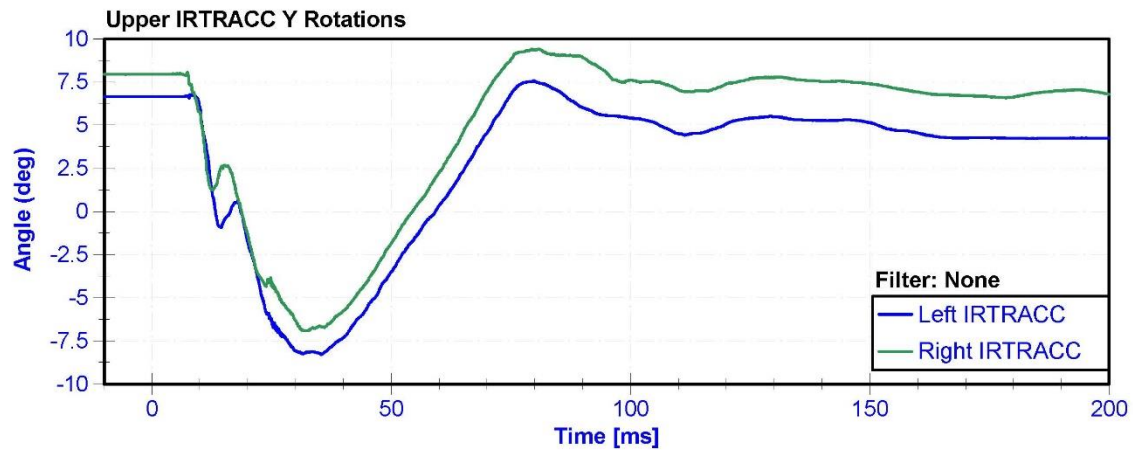
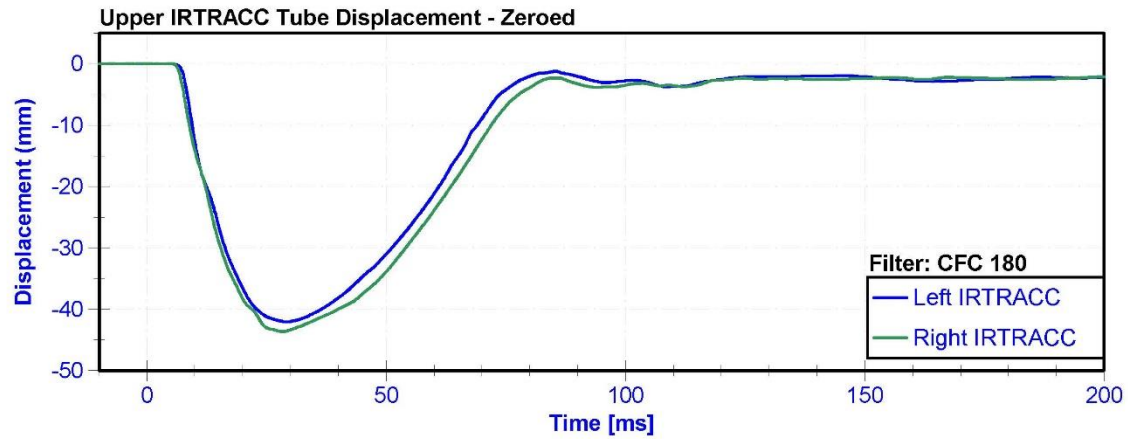
Results

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





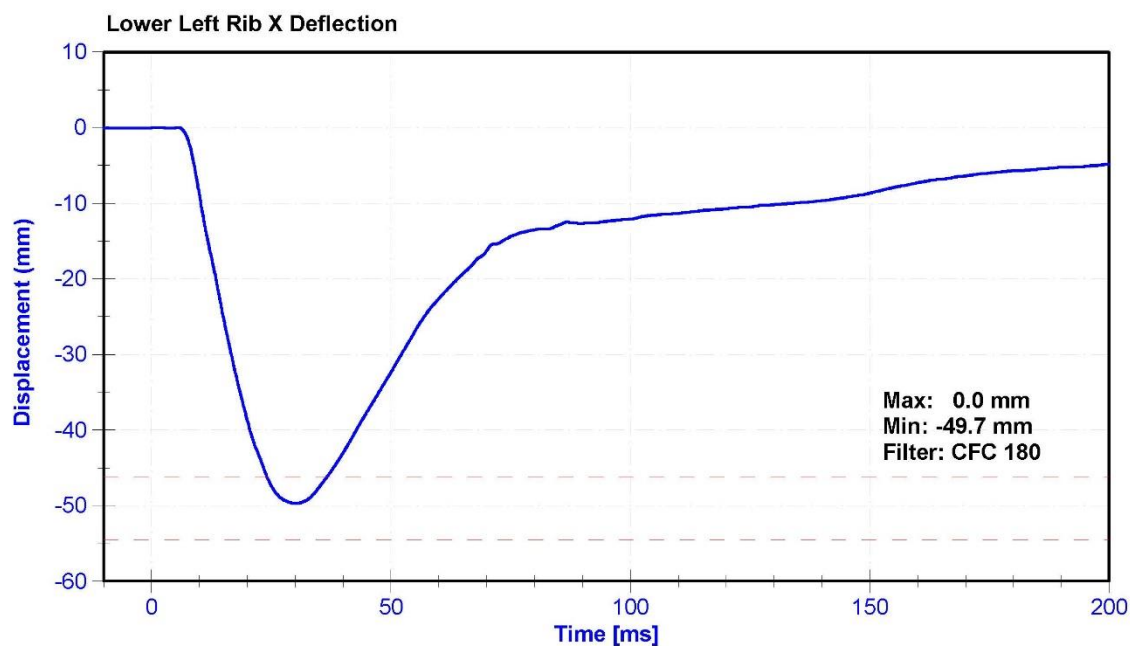
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

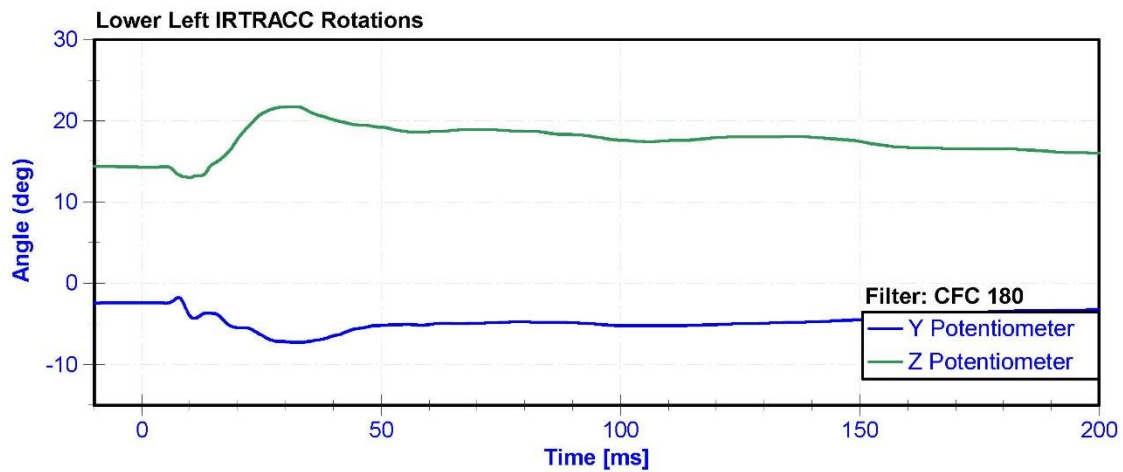
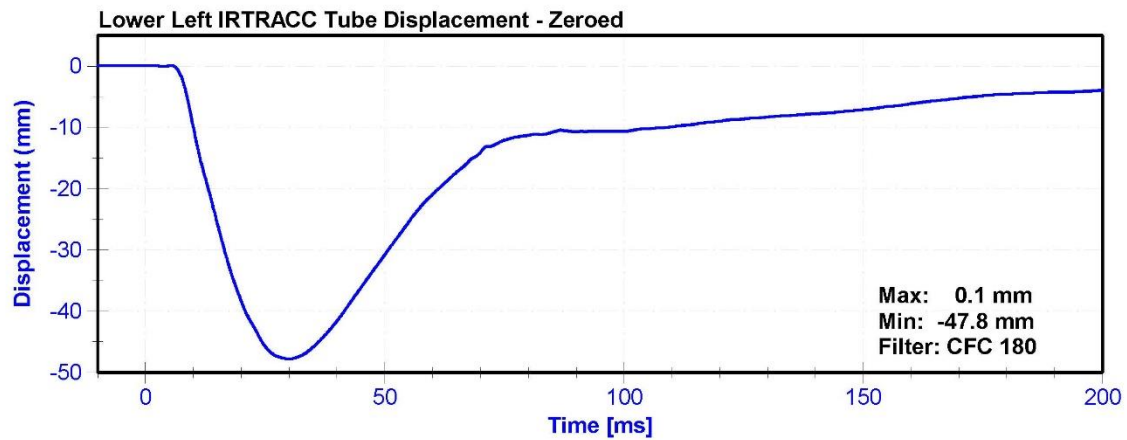
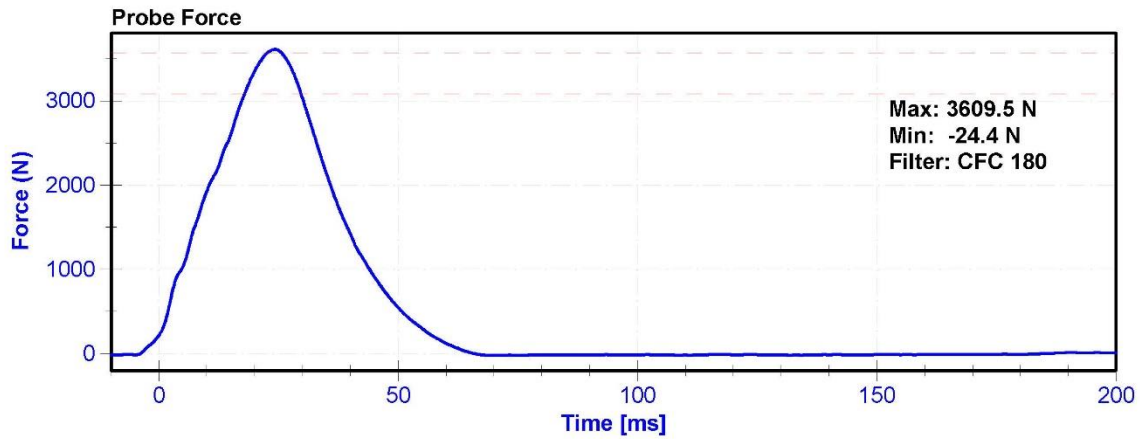
Results

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 IRTRACC	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





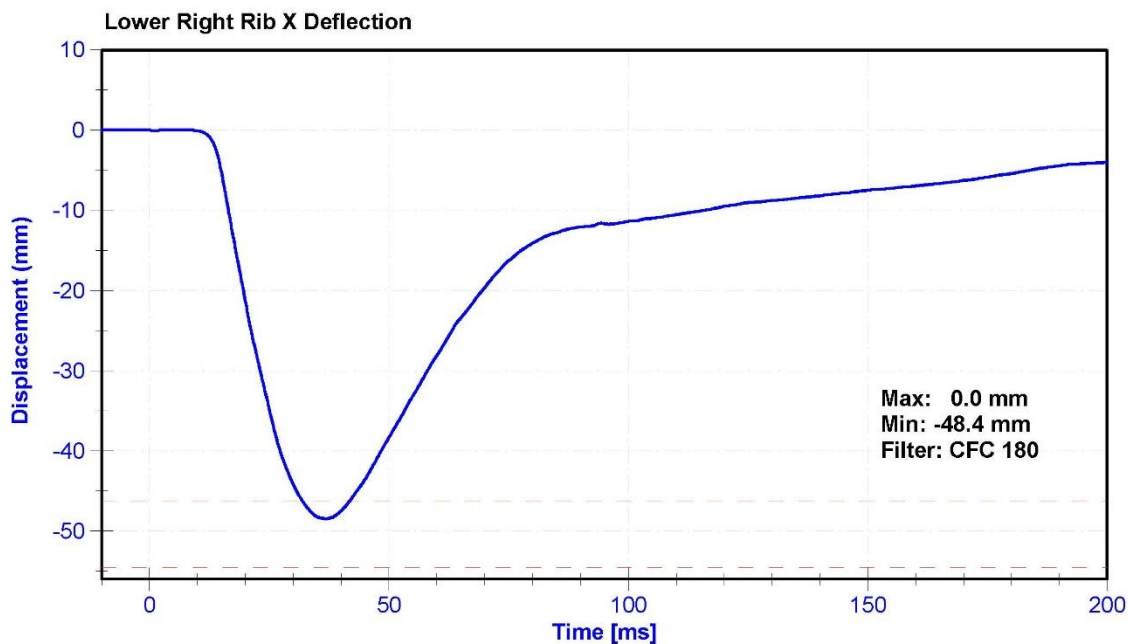
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

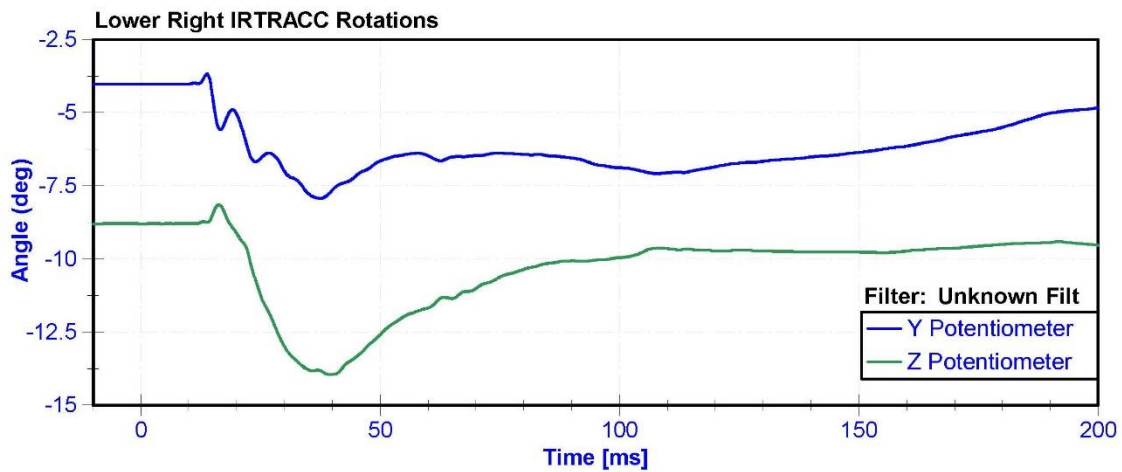
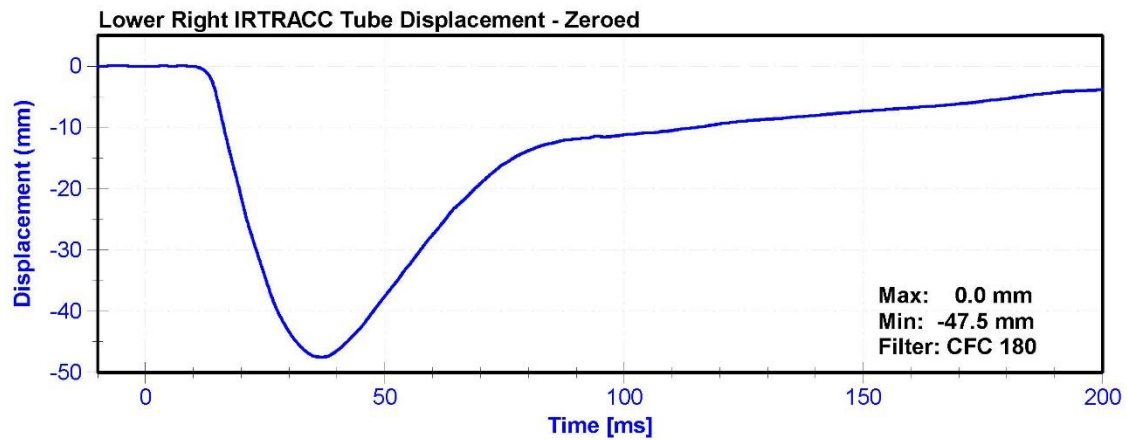
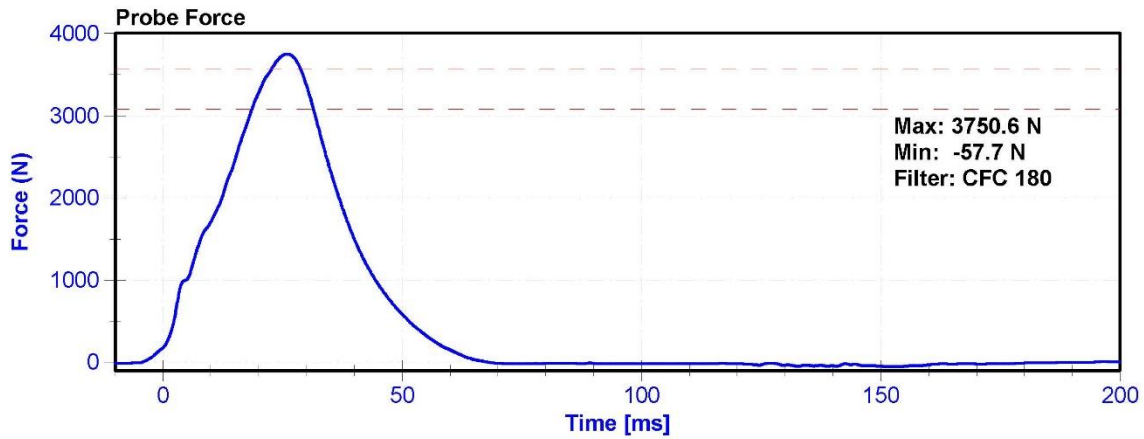
Results

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







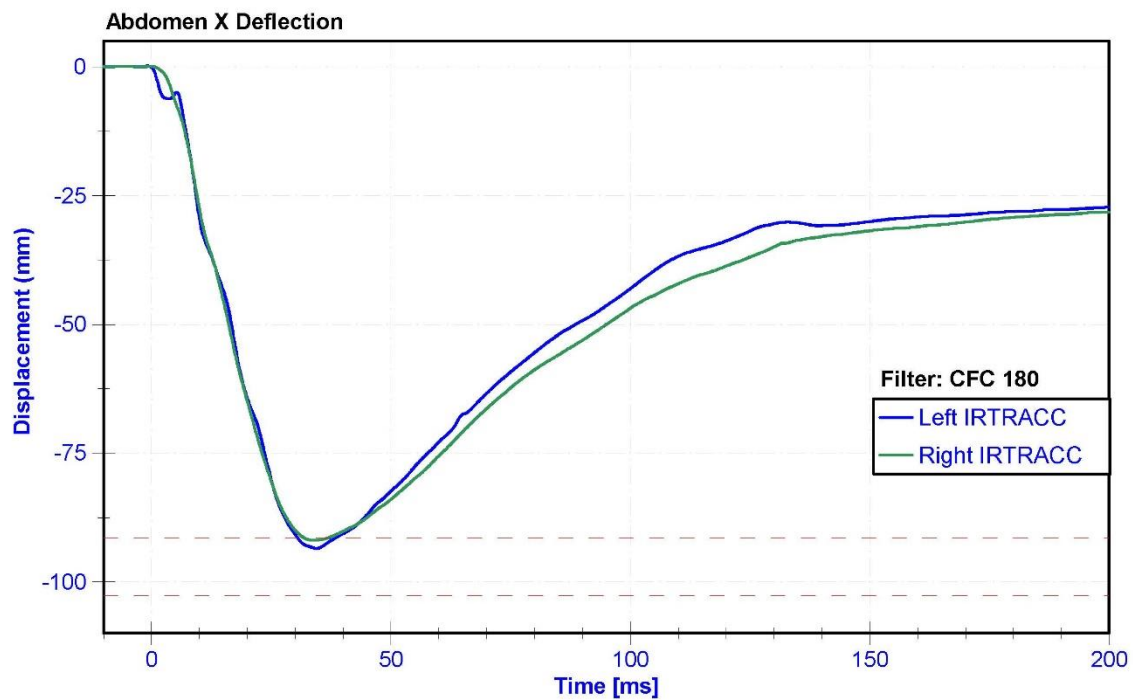
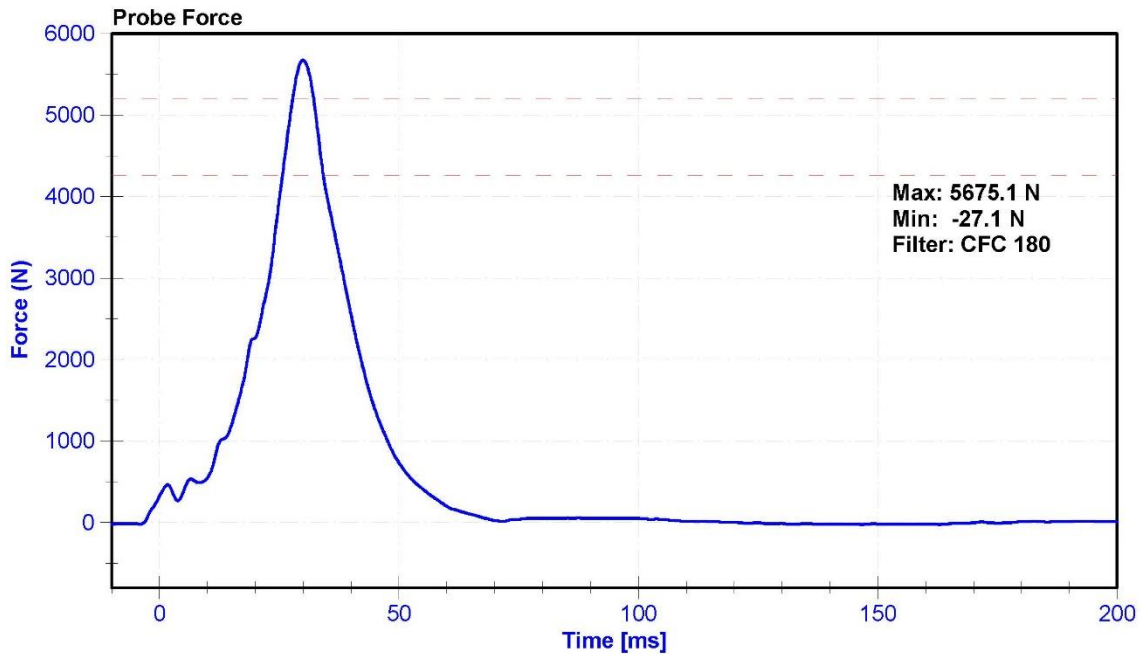
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

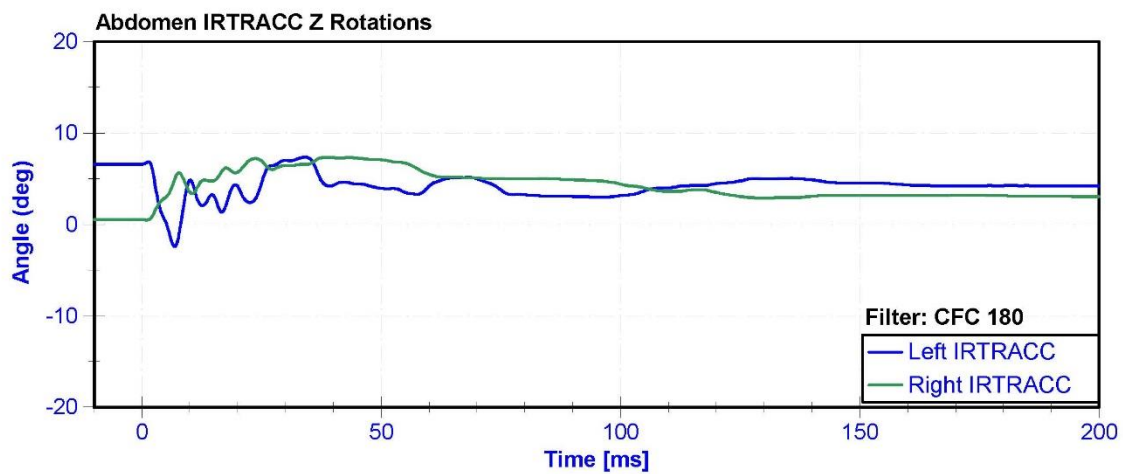
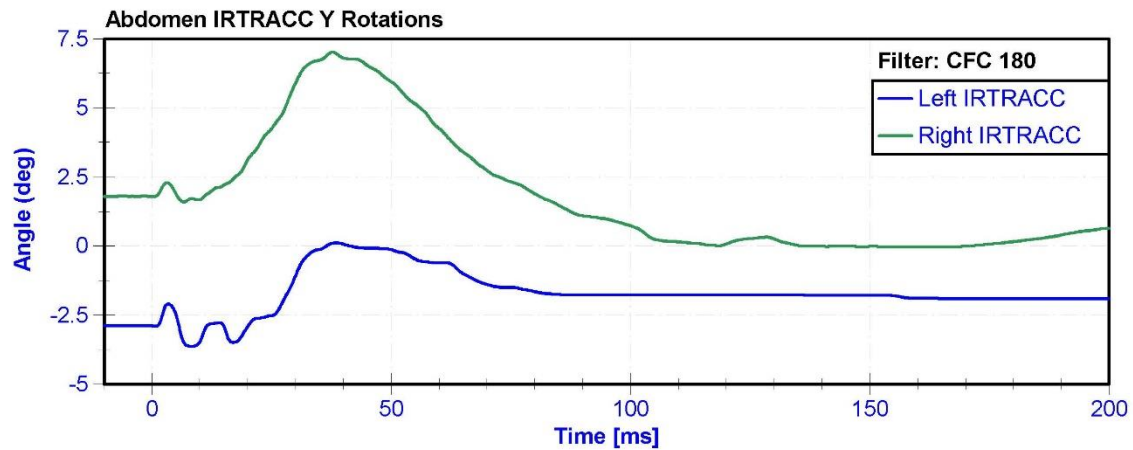
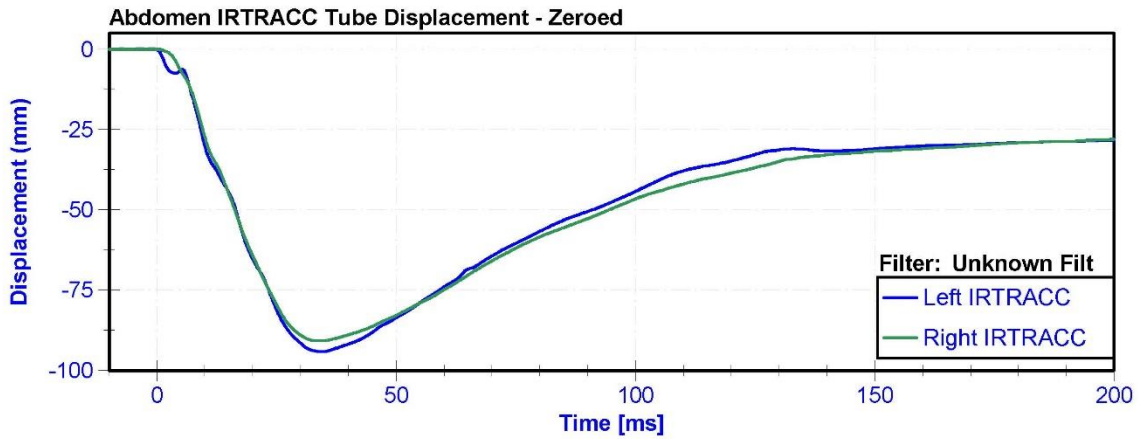
Results

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







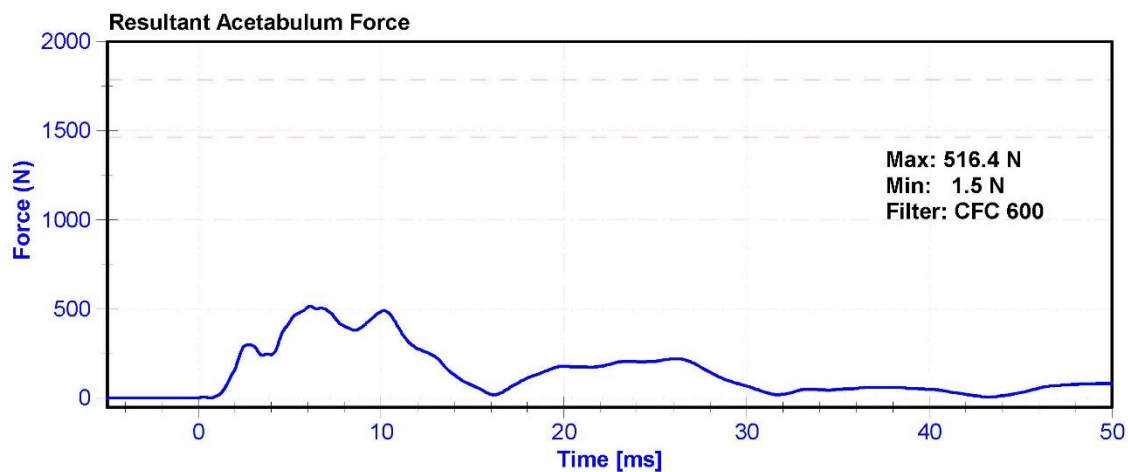
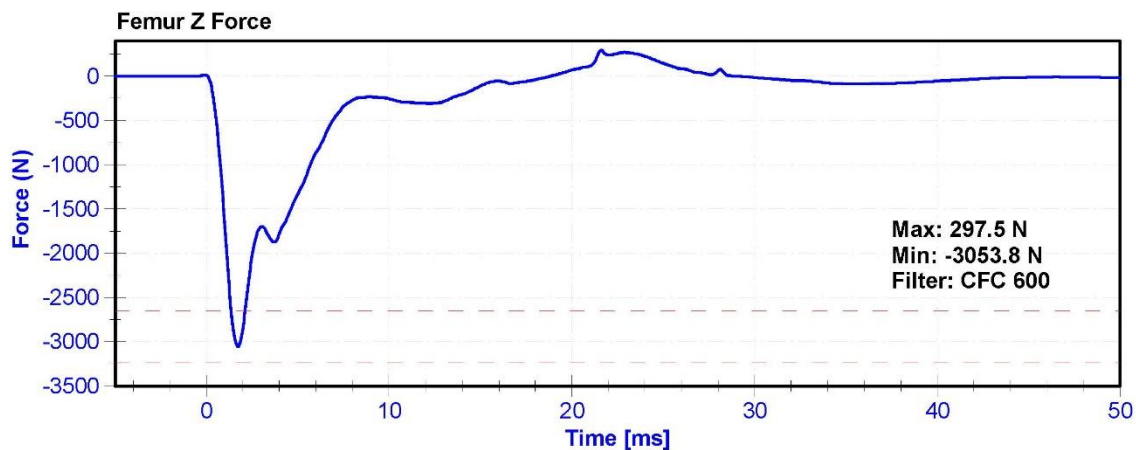
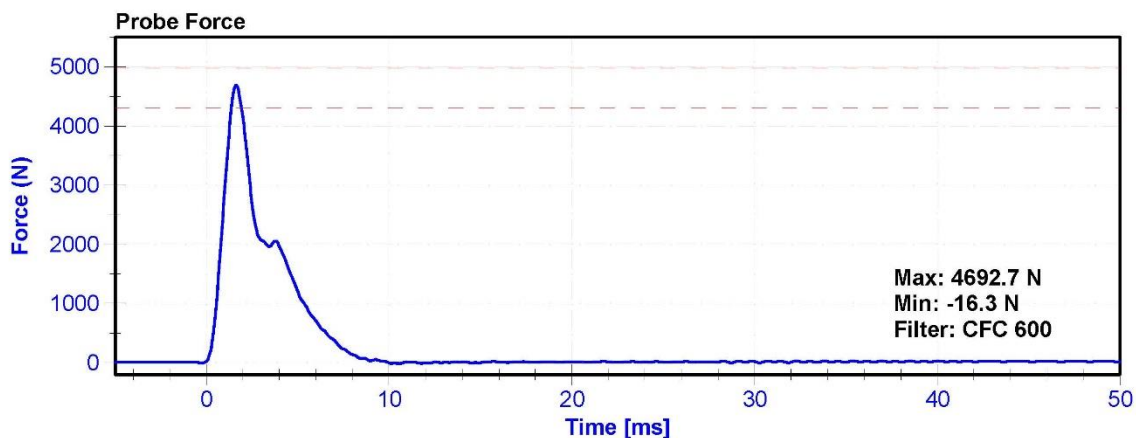
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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 10670J14	LC-DP3835 Fx	3/7/2015	3/6/2016





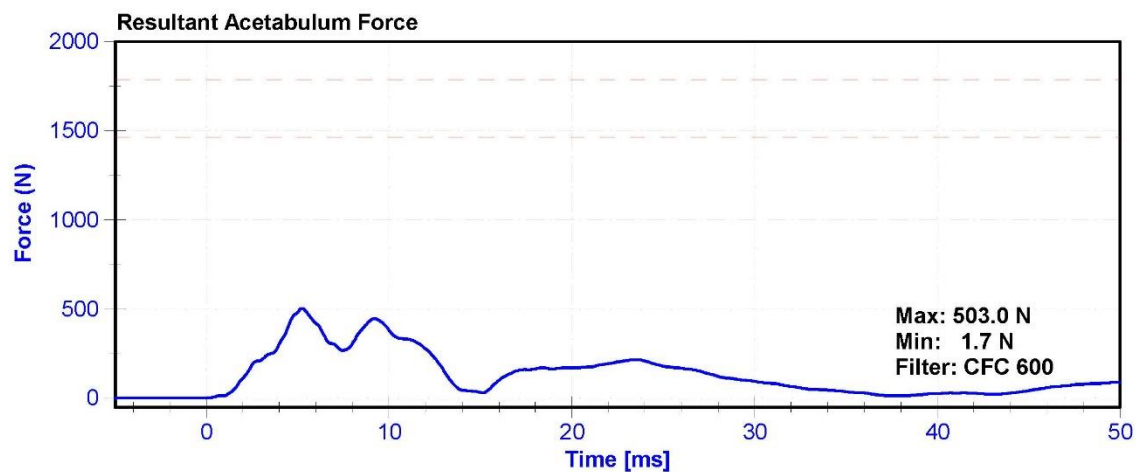
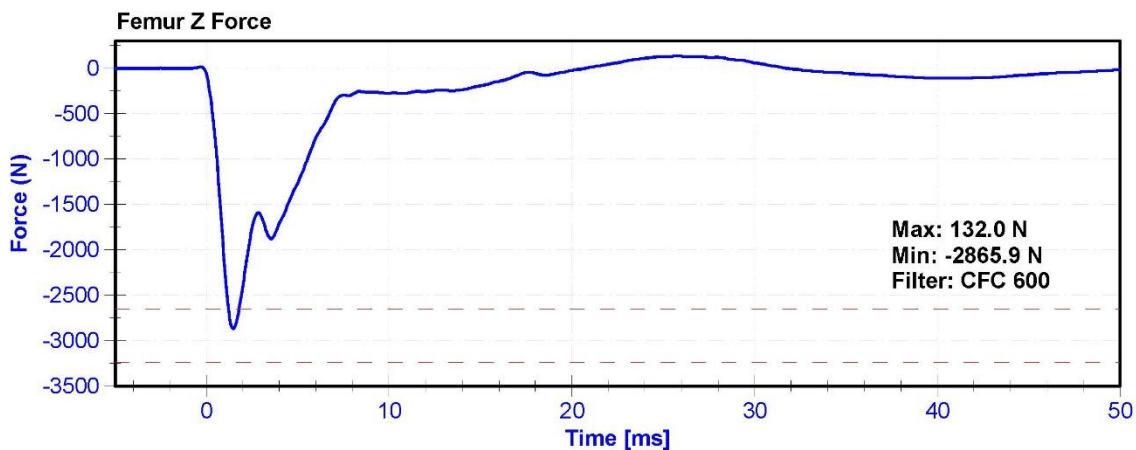
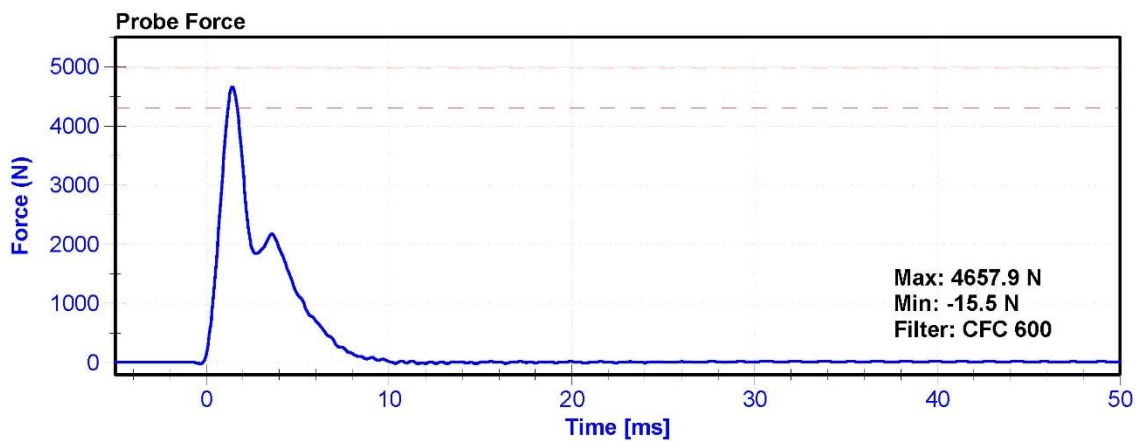
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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





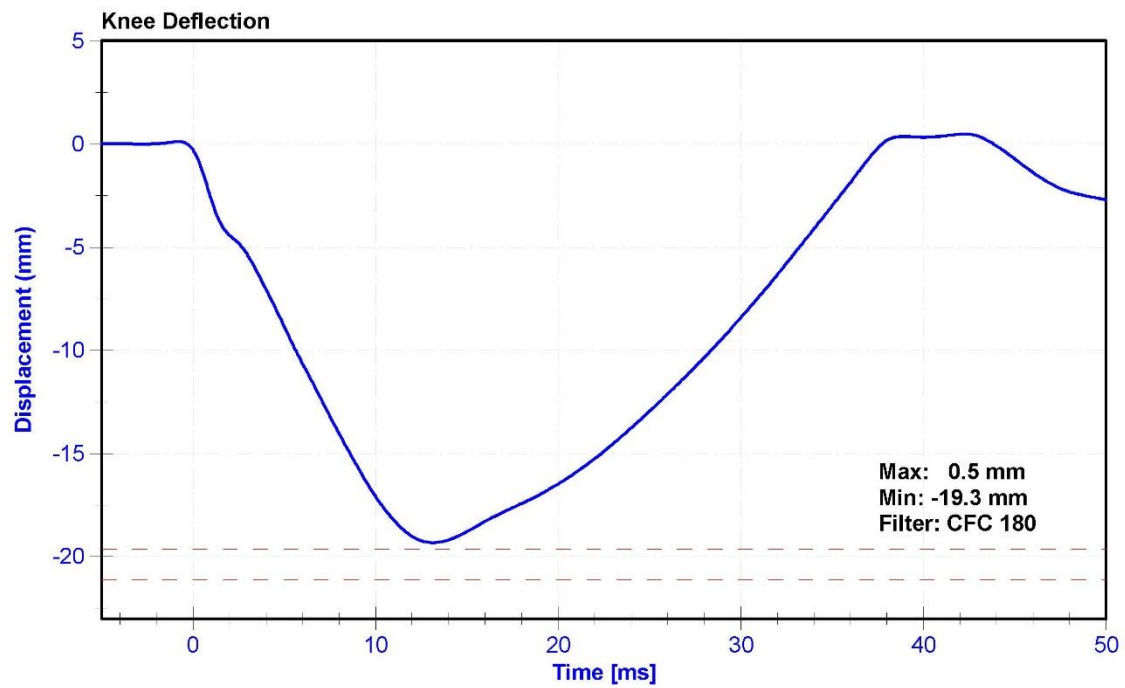
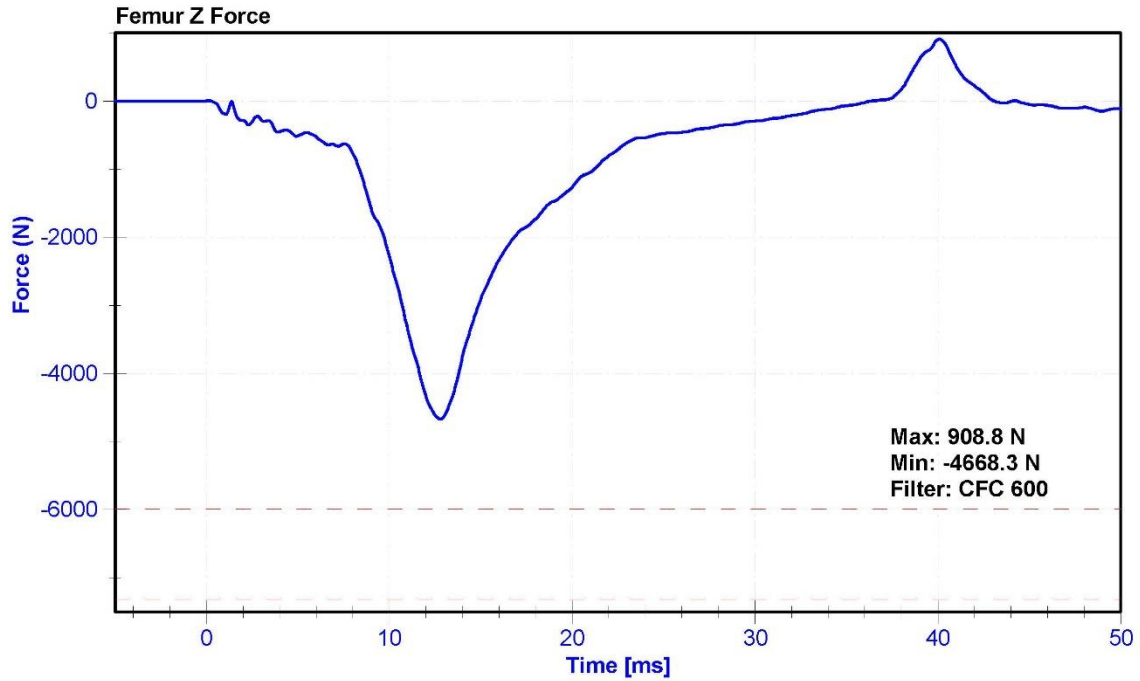
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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





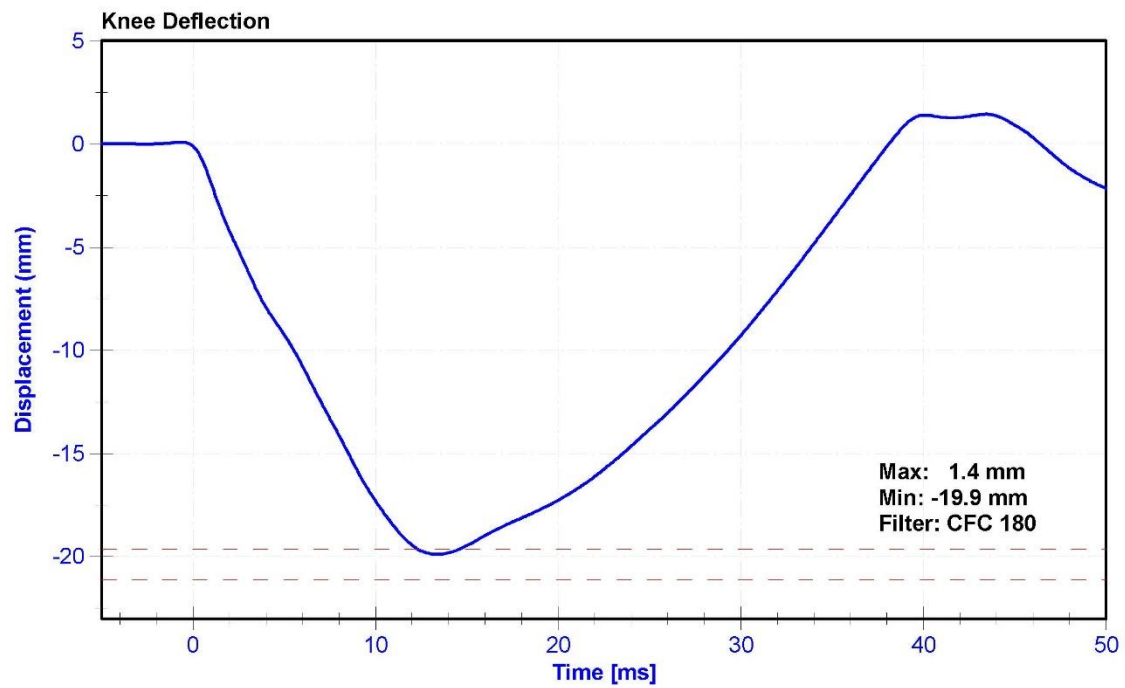
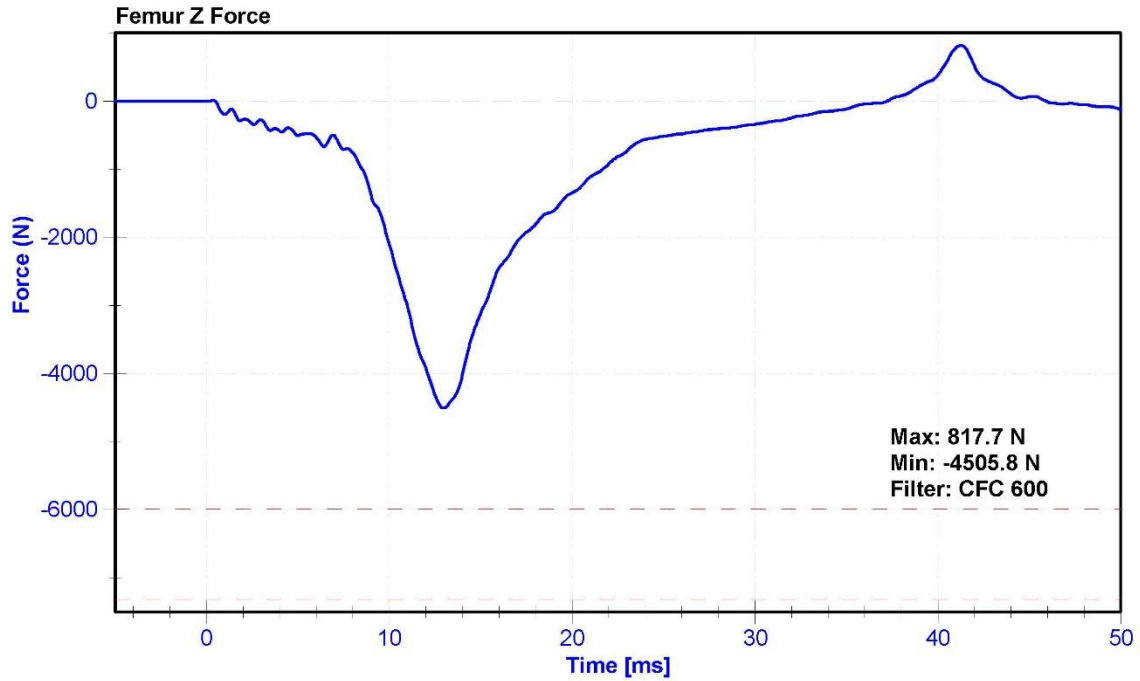
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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



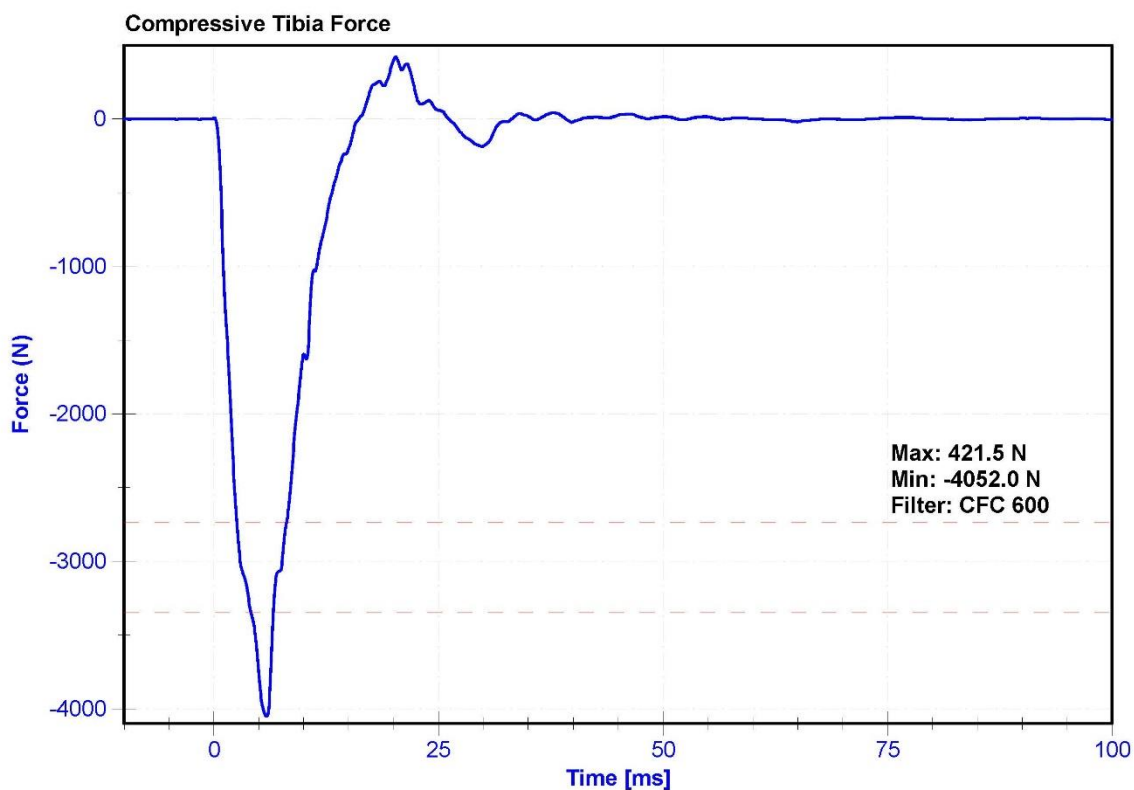
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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



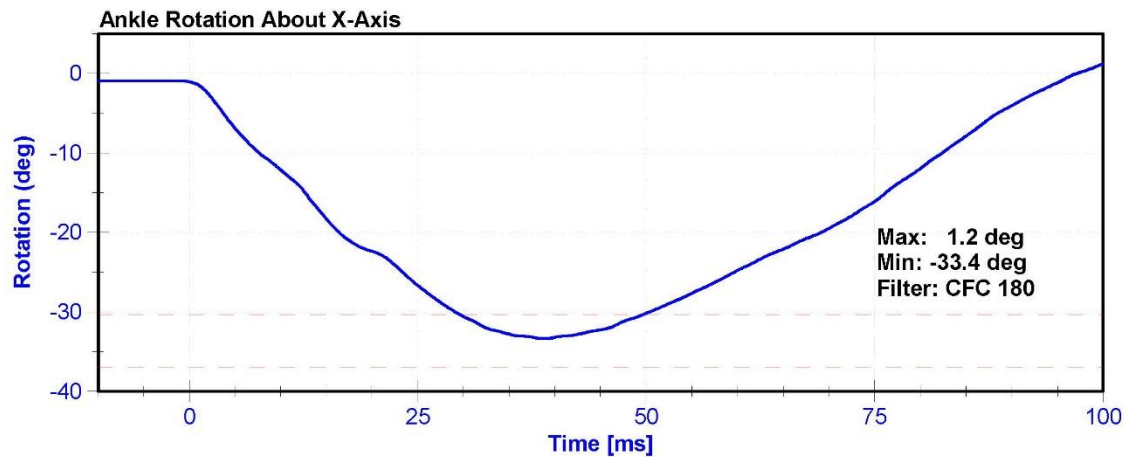
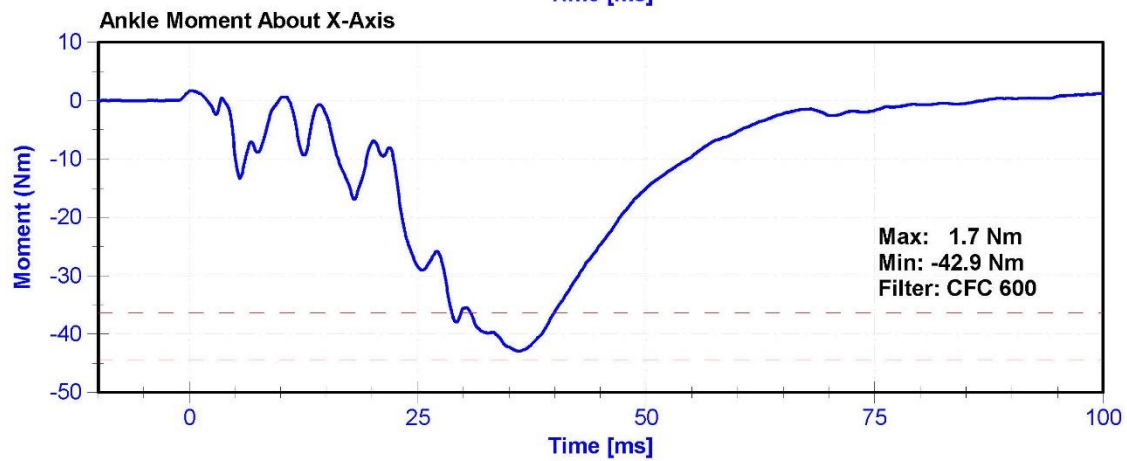
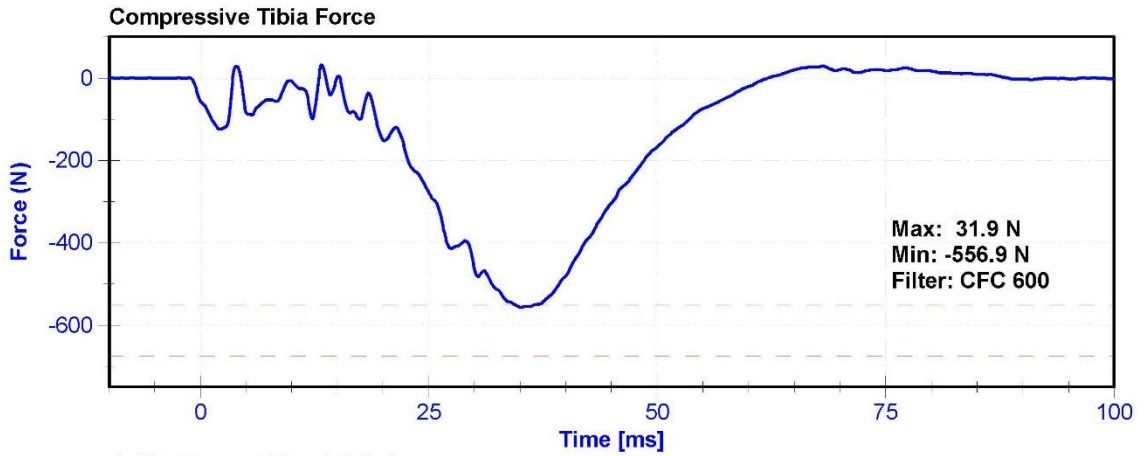
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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





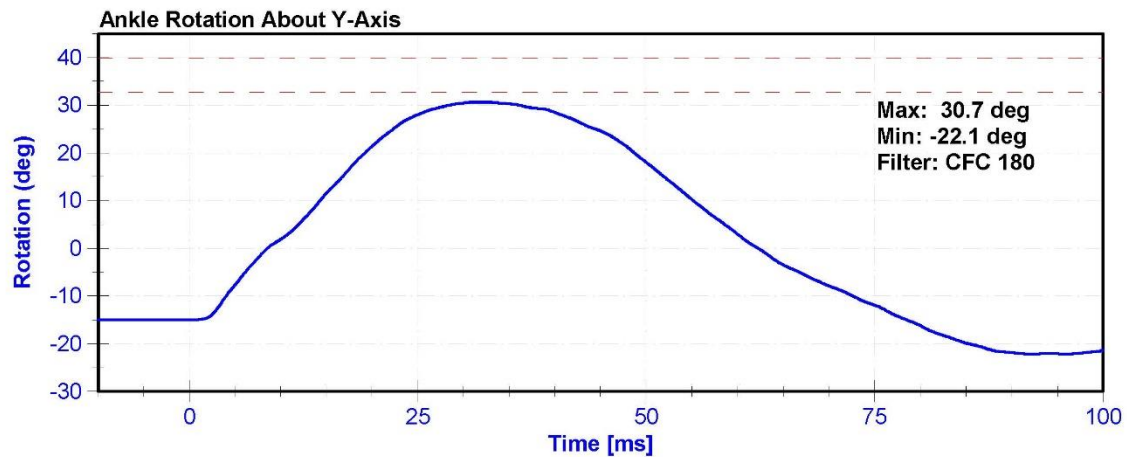
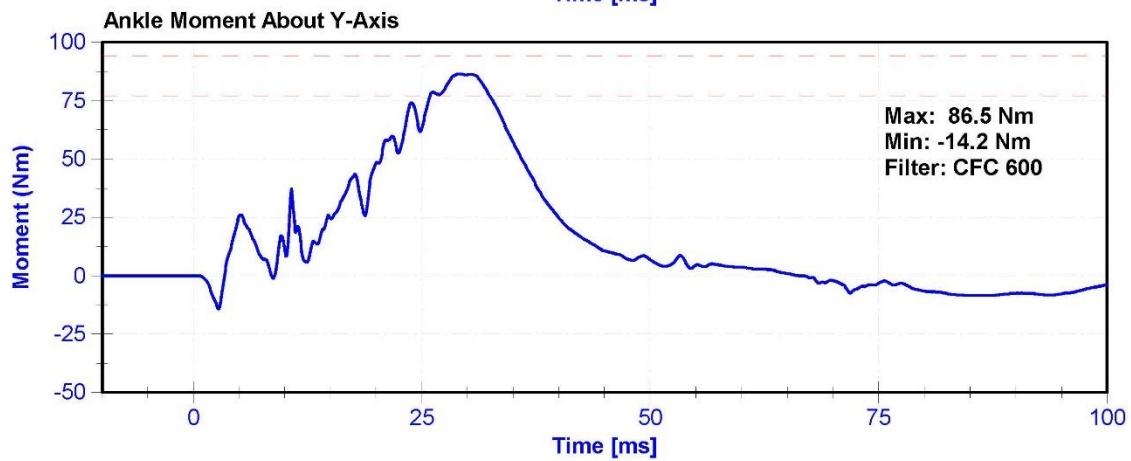
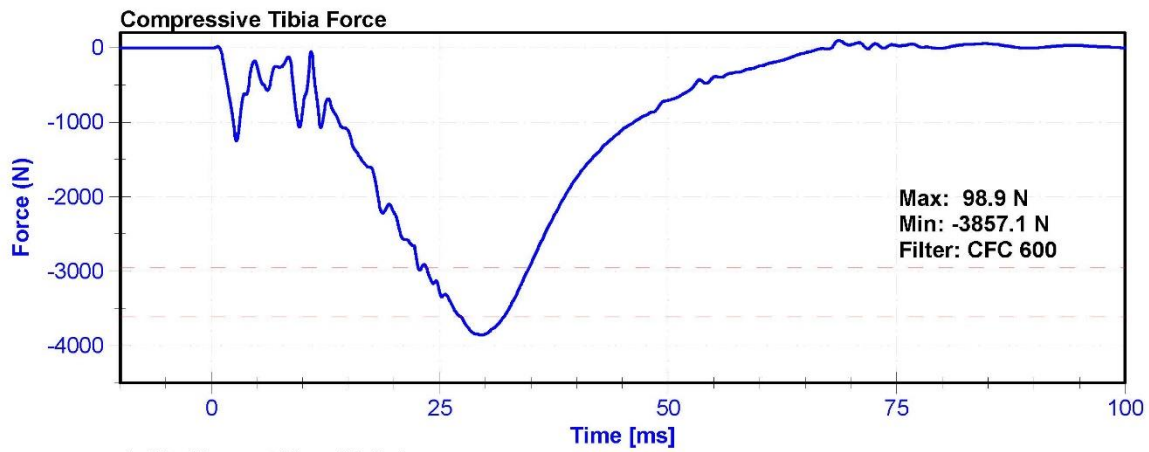
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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





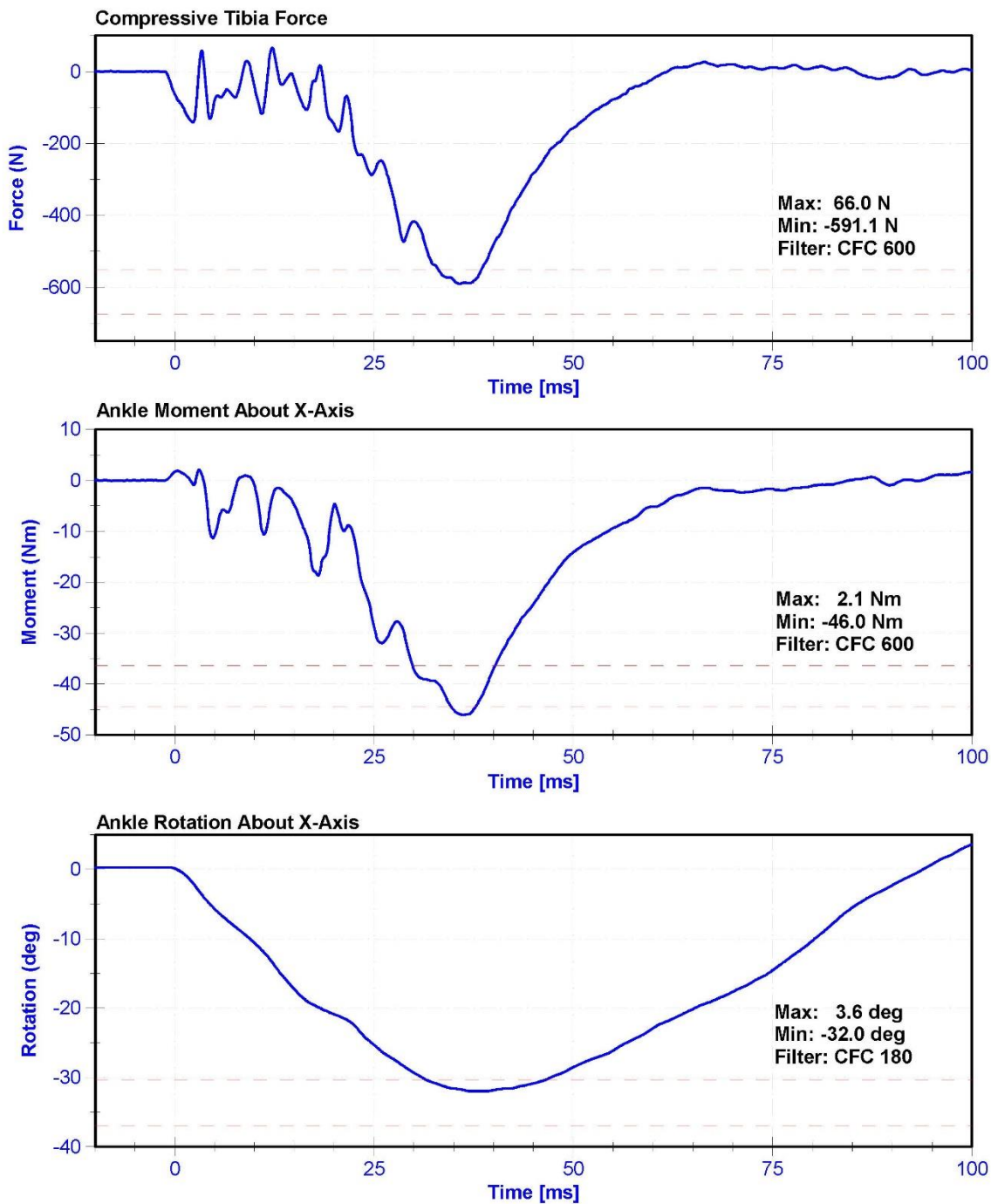
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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



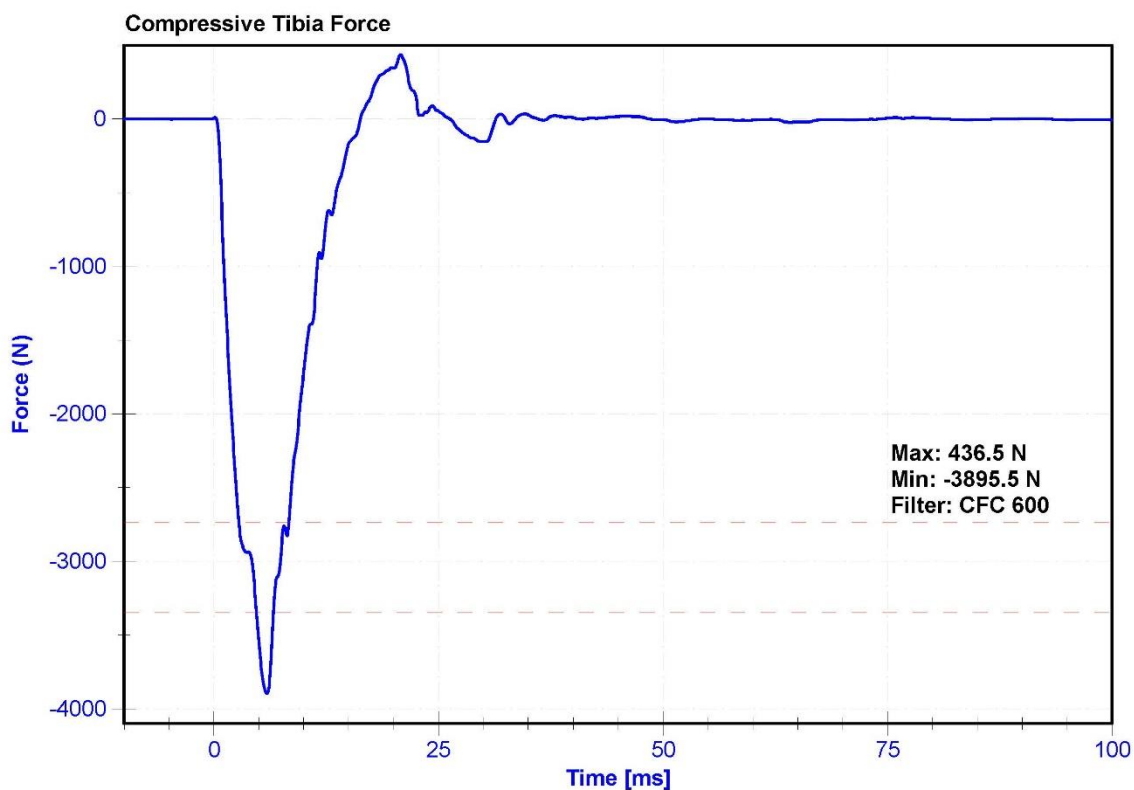
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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





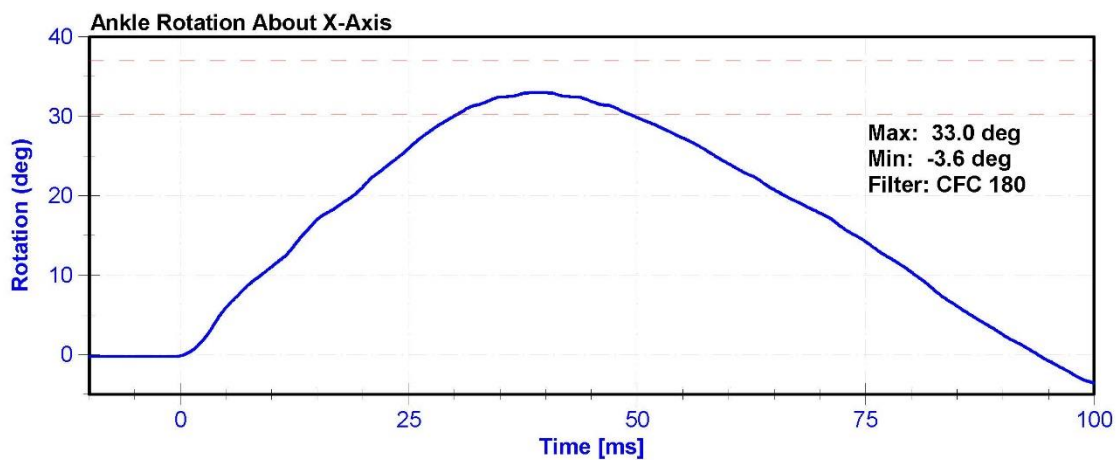
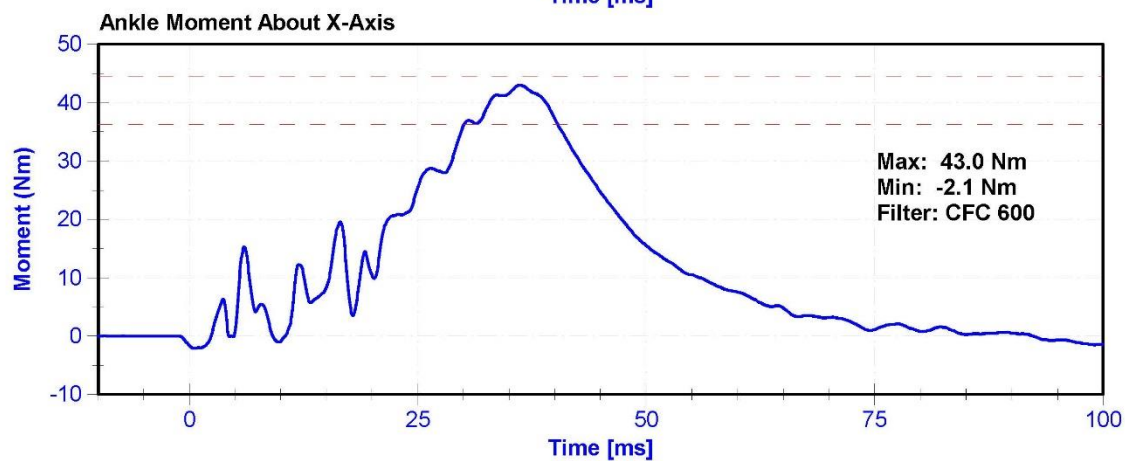
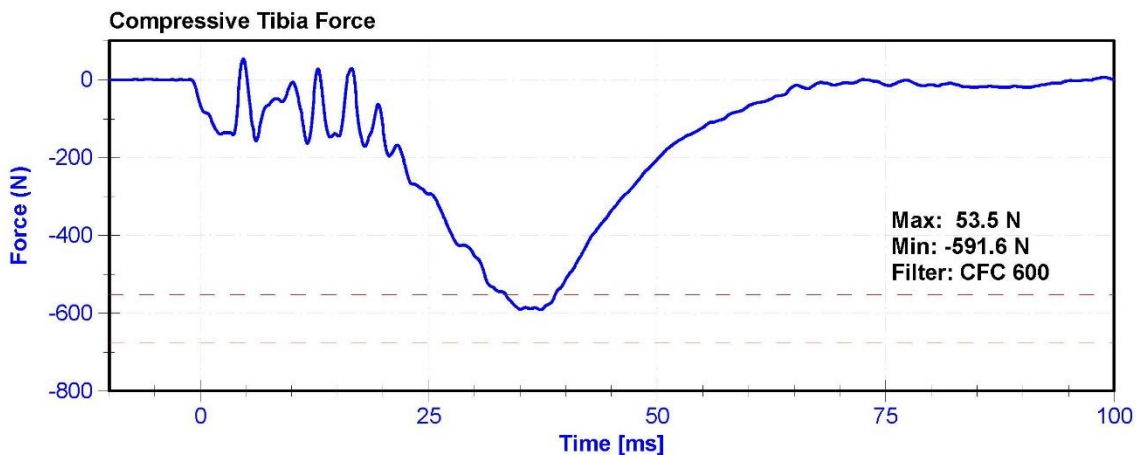
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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





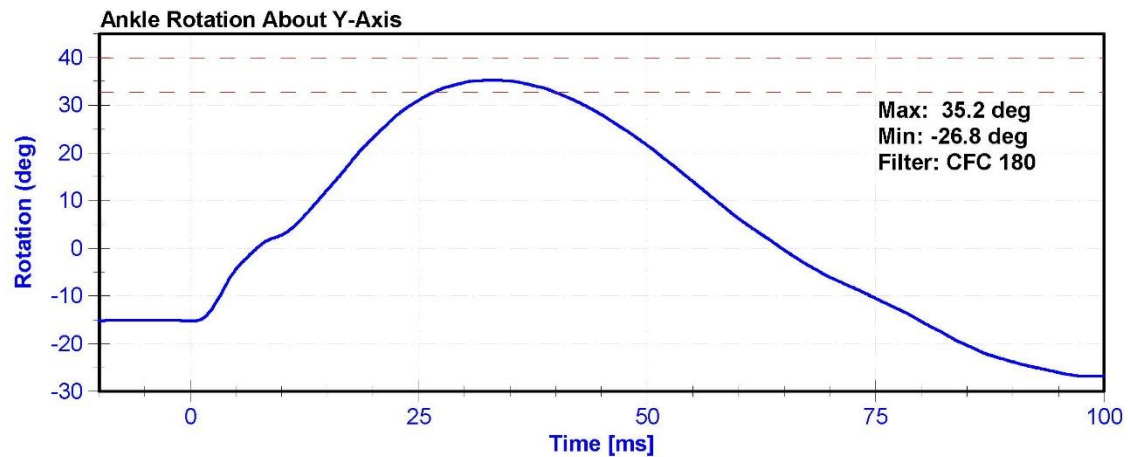
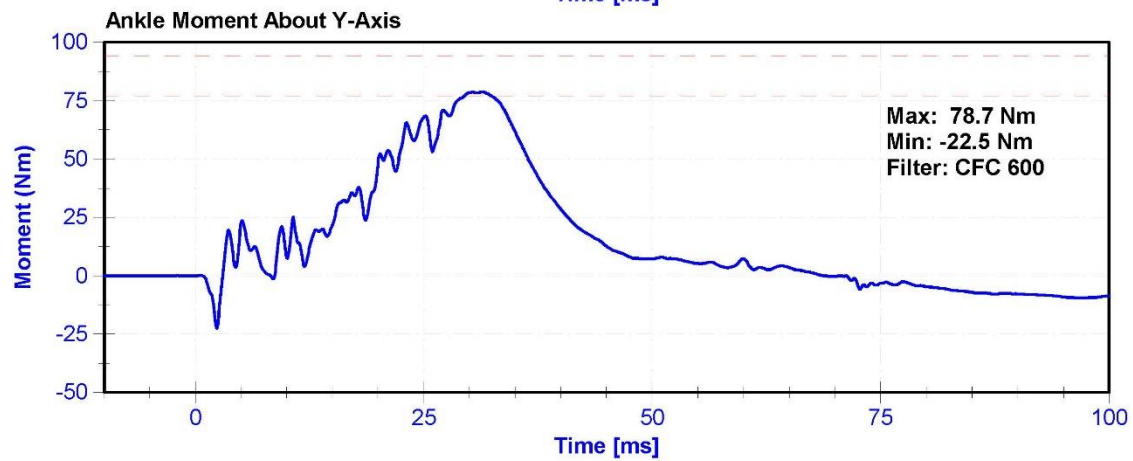
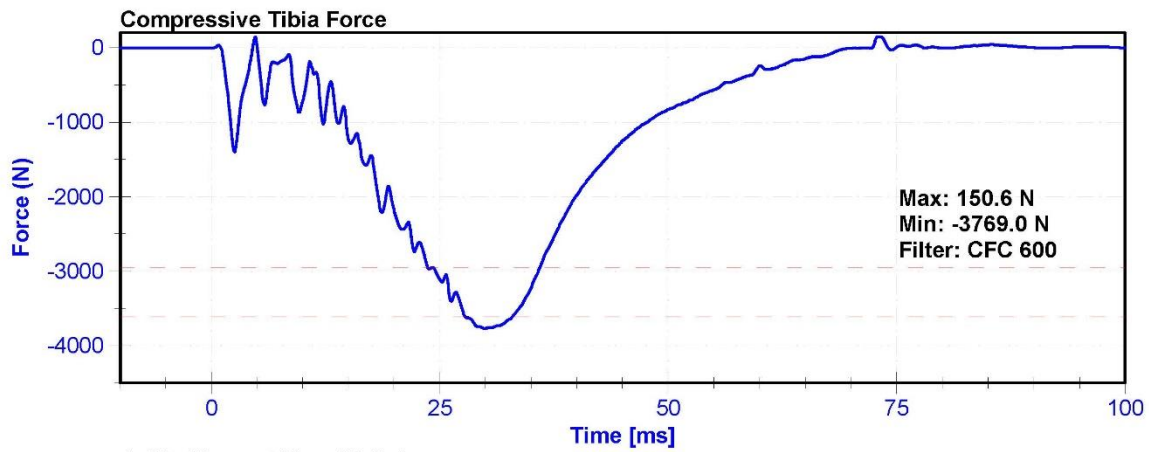
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

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

